State of California
AIR RESOURCES BOARD

# Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Response

## Public Hearing to Consider Proposed Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear

Public Hearing Date: September 24, 2020
Agenda Item No.: 20-9-2

## I. General

The Staff Report: Initial Statement of Reasons for Rulemaking (Staff Report), entitled Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear (Regulation), released July 21, 2020, is incorporated by reference herein. The Staff Report contained a description of the rationale for the proposed amendments. On July 21, 2020, all references relied upon and identified in the Staff Report were made available to the public. The July 21, 2020 Notice of Public Hearing to Consider Proposed Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear initiated a 45-day public comment period,[1] which began on July 24, 2020 and ended September 22, 2020 (45-day Public Notice).

At its September 24, 2020 public hearing, the California Air Resources Board (CARB or Board) approved for adoption the proposed amendments to sections 95350 to 95359 and proposed new sections 95354.1, 95357.1 and 95359.1, Title 17 California Code of Regulations, which comprise the Regulation for Reducing Greenhouse Gas Emissions from Gas-Insulated Equipment. On May 5, 2021, staff released a Notice of Public Availability of Modified Text that added new section 95357.2 to the Regulation.

The Board directed the Executive Officer to determine if additional conforming modifications to the Regulation were appropriate and to make any proposed modified regulatory language available for public comment, with any additional supporting documents and information, for a period of at least 15 days as required by Government Code section 11346.8. The Board further directed the Executive Officer to consider

[1] This term derives from the Administrative Procedure Act, which specifies that originally-released regulatory text must be made available to the public for at least 45 days of review. (Cal. Gov. Code § 11346.4.) The actual duration of the comment period was 60 days.

written comments submitted during the public review period and make any further modifications that are appropriate available for public comment for at least 15 days, and present the Regulation to the Board for further consideration if warranted, or take final action to adopt the proposed amendments after addressing all appropriate modifications. Furthermore, the Board directed the Executive Officer to finalize the Final Statement of Reasons (FSOR) for the Regulation and submit the final rulemaking package to the Office of Administrative Law for review.

On May 5, 2021, staff released the First Notice of Public Availability of Modified Text (first 15-day Public Notice).[2] Comments that were received during the first formal 15-day public comment period for the modified text, as well as further staff analysis, were reflected in the modifications made in the Second Notice of Public Availability of Modified Text (second 15-day Public Notice) that was released on June 17, 2021 for a second 15-day public comment period. This FSOR provides written responses to all comments received on the proposed Regulation in response to the 45-day Public Notice, first 15-day Public Notice, and second 15-day Public Notice.

### A. Mandates and Fiscal Impacts to Local Governments and School Districts

The Board has determined that this regulatory action will not result in a mandate to any local agency or school district the costs of which are reimbursable by the state pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code.

### B. Consideration of Alternatives

As noted in the Economic Analysis found in the Staff Report, the Regulation is not anticipated to have adverse economic impacts on small businesses. Therefore, staff has not identified any reasonable alternatives that would lessen any adverse impact on small business.

For the reasons set forth in the Staff Report, in staff's comments and responses at the hearing, and in this FSOR, the Board determined that no alternative considered by the agency would be more effective in carrying out the purpose for which the regulatory action was proposed, or would be as effective and less burdensome to affected private persons, or would be more cost-effective to affected private persons and equally effective in implementing the statutory policy or other provisions of law than the action taken by the Board.

[2] This term derives from the Administrative Procedure Act, which specifies that proposed changes from the originally-released regulatory text must be made available to the public for at least 15 days of review. (Cal. Gov. Code § 11346.8(c).) The actual duration of the comment period was 21 days.

## II. Modifications Made to the Original Proposal

### A. Modifications Approved at the Board Hearing and Provided for in the First 15-Day Comment Period

As directed by the Board at the September 24, 2020, Board Hearing, staff made conforming modifications to the Regulation and made the proposed modified regulatory language available for public comment. CARB released the first 15-Day Public Notice on May 5, 2021. CARB released the second 15-Day Public Notice on June 17, 2021. The conforming modifications introduced in each package are summarized below.

As directed by the Board at the September 24, 2020 Board Hearing, staff revised the proposed amendments to convert the requirement to request permission to acquire $SF_6$ equipment after the phase-out to a notification in the event of a catastrophic failure, make other changes to the phase-out exemption process, engage with stakeholders to develop technically sound and consistently applied methodologies to measure equipment capacity, revise procedures, clarify terminology, revise the enforcement provisions, modify the effective dates, and incorporate other needed changes. All changes are described in the first 15-day Public Notice released on May 5, 2021.

Staff originally proposed GIE owners follow an expedited phase-out exemption application process to acquire $SF_6$ GIE after the phase-out in response to a catastrophic failure. In the first 15-day Public Notice, staff replaced the expedited phase-out exemption application process with a notification process, which allows GIE owners to acquire a replacement $SF_6$ GIE device upon failure without seeking CARB approval in advance. Staff's original proposal did not address with sufficient detail the requirements for acquisition of spare GIE through either the expedited or standard phase-out exemption process. In the first 15-day Public Notice, unique requirements for spares were added to both processes. Staff also made other clarifying and technical changes to the phase-out exemption process in response to stakeholder comments.

Staff's original proposal did not include a mechanism through which GIE owners could determine a revised nameplate capacity for existing GIE. In the first 15-day Public Notice, such a process was added.

Staff also made other needed technical revisions and clarifications throughout the Regulation to revise procedures, clarify terminology, revise the enforcement provisions, modify the effective dates, and incorporate other needed changes. In total, the changes were responsive to Board direction and stakeholder comments.

Based on comments received in response to the first 15-day Public Notice, CARB staff made additional changes to the Regulation. All changes are described in the second 15-day Notice, released on June 17, 2021. In the second 15-day Public Notice, CARB

staff clarified the required elements of an $SF_6$ phase-out exemption request, incorporated modifications that specify the Executive Officer will approve a phase-out exemption request once it is deemed complete, and shortened the review time for phase-out exemption requests. CARB staff added technical clarifications to the nameplate capacity adjustment process and made additional changes to the enforcement provisions.

### B. Non-Substantial Modifications

Subsequent to the second 15-day comment period mentioned above, staff identified the following additional non-substantive changes to the Regulation:

Section 95351(a), definition of "Acquire:" deleted inadvertent inclusion of "Wal" that was present at the end of the word "transport."
Section 95353(d), Table 3: Changed the header of the right hand column from "$C_{e,k}$ ($MTCO_2e$)" to "$C_{e,k}$ or $C_{er,l}$ ($MTCO_2e$)."
Section 95353(g)(1): moved the word "and" from the end of the description of the term "$AEF_i$" to the end of the description of the term "$Average\ CO_2e\ capacity_i$" and changed the period at the end of the description of this term to a semicolon.
Section 95354(j)(1): Added a comma between "95354(j)(2)(A)" and "the."
Sections 95354(j)(2)(A) and (B): Moved the word "or" from the end of section 95354(j)(2)(A) to the end of section 95354(j)(2)(B).
Section 95354(j)(4)(B): Deleted an extraneous comma that was present after "or."
Section 95354(k): Deleted an extraneous comma that was present between "95354(e)-(j)" and "are."

The above described modifications constitute non-substantial changes to the regulatory text. Section 95353(d) includes an equation involving the terms $C_{e,k}$, and $C_{er,l}$. The definition of both of these terms clearly states they represent the GHG capacity of an equivalent $SF_6$ GIE device in units of $MTCO_2e$, which the regulated entity is to identify in Table 3. The previous header in Table 3 only listed one of these two terms, when it clearly should have listed both, per the definitions of these terms provided in this section. The second change is a punctuation correction that does not change the meaning of the regulation. The third change corrects a grammatical error in what was to be a list of three items that should have been differentiated by "or" before the last item, but "or" was in the wrong location. These changes do not materially alter the requirements or conditions of the proposed rulemaking action.

## III. Documents Incorporated by Reference

The Regulation adopted by the Executive Officer incorporates by reference the following documents:

United States Environmental Protection Agency (U.S. EPA). 2014. Mandatory Reporting of Greenhouse Gases; Final Rule. Title 40 CFR, Part 98, Subpart A, Table A-1. December 11,

2014. https://www.govinfo.gov/content/pkg/FR-2014-12-11/pdf/2014-28444.pdf, Section 95351(a).

These documents were incorporated by reference because it would be cumbersome, unduly expensive, and otherwise impractical to publish them in the California Code of Regulations. In addition, some of the documents are copyrighted, and cannot be reprinted or distributed without violating the licensing agreements. The documents are lengthy and highly technical test methods and engineering documents that would add unnecessary additional volume to the Regulation. Distribution to all recipients of the California Code of Regulations is not needed because the interested audience for these documents is limited to the technical staff at a portion of reporting facilities, most of whom are already familiar with these methods and documents. Also, the incorporated documents were made available by CARB upon request during the rulemaking action and will continue to be available in the future. The documents are also available from college and public libraries, or may be purchased directly from the publishers.

## IV. Summary of Comments Made During the 45-Day Comment Period and September 24, 2020 Board Hearing and Agency Response

Written comments were received during the 45-day comment period in response to the September 24, 2020 public hearing notice, and written and oral comments were presented at the Board Hearing. Listed below are the organizations and individuals that provided comments during the 45-day comment period, the date and form of their comments, and the abbreviation assigned to each. The dates in the table below are the dates that feedback was received, which for written testimony is the date it was "Added to Database" in the rulemaking comment log.

Note that some comments which follow were scanned or otherwise electronically transferred, so they may include minor typographical errors or formatting that is not consistent with the originally submitted comments. However, all content reflects the submitted comments. All originally submitted comments are available here: https://www.arb.ca.gov/lispub/comm/bccommlog.php?listname=sf62020

| Abbreviation | Commenter |
|---|---|
| 3M | Erik Olson, 3M<br>Written Testimony: 9/22/2020 |
| CCA | Julia Randolph, Coalition for Clean Air<br>Written Testimony: 9/21/2020 |
| CCA2 | Julia Randolph, Coalition for Clean Air<br>Oral Testimony: 9/24/2020 |
| CCEEB | William J. Quinn, California Council for Environmental and Economic Balance<br>Written Testimony: 9/22/2020 |
| CCEEB2 | Mikhael Skvarla, California Council for Environmental and Economic Balance |

| Abbreviation | Commenter |
|---|---|
| | Oral Testimony: 9/24/2020 |
| CMUA | Frank Harris, California Municipal Utilities Association<br>Oral Testimony: 9/24/2020 |
| DILO | Billy Lao, DILO Company, Inc.<br>Written Testimony: 9/21/2020 |
| GE | Heiner Markhoff, GE Grid Solutions<br>Written Testimony: 9/16/2020 |
| GE2 | JC Sandberg, G.E. Renewable Energy<br>Oral Testimony: 9/24/2020 |
| JUG | Linus Farias, Joint Utilities Group<br>Written Testimony: 9/22/2020 |
| JUG2 | Linus Farias, Joint Utilities Group<br>Oral Testimony: 9/24/2020 |
| LADWP | Katherine Rubin, Los Angeles Department of Water and Power<br>Written Testimony: 9/22/2020 |
| LADWP2 | Katherine Rubin, Los Angeles Department of Water and Power<br>Written Testimony: 9/24/2020 |
| MWDSC | Daniel Guillory, Metropolitan Water District of Southern California<br>Written Testimony: 9/22/2020 |
| NCPA | Susie Berlin, Northern California Power Agency<br>Oral Testimony: 9/24/2020 |
| NEER | Michael W. Sole, NextEra Energy Resources<br>Written Testimony: 9/22/2020 |
| NRG | Sean P. Beatty, NRG Energy Inc.<br>Written Testimony: 9/22/2020 |
| NRG2 | George Piantka, NRG Energy Inc.<br>Oral Testimony: 9/24/2020 |
| NRG3 | Tim Sisk, NRG Energy Inc.<br>Oral Testimony: 9/24/2020 |
| Ortega | Estela Ortega<br>Oral Testimony: 9/24/2020 |
| PG&E | Dean Kato, Pacific Gas and Electric Company<br>Written Testimony: 9/17/2020 |
| PG&E2 | Linus Farias, Pacific Gas and Electric Company<br>Written Testimony: 9/22/2020 |
| PG&E3 | Fariya Ali, Pacific Gas and Electric Company<br>Oral Testimony: 9/24/2020 |
| PSPC | Harvey, Eder, Public Solar Power Coalition<br>Oral Testimony: 9/24/2020 |
| SCE | Tammy Yamasaki, Southern California Edison<br>Written Testimony: 9/22/2020 |
| SCE2 | Tammy Yamasaki, Southern California Edison |

| Abbreviation | Commenter |
|---|---|
| | Oral Testimony: 9/24/2020 |
| SCPPA | Jon Costantino, Southern California Public Power Authority<br>Oral Testimony: 9/24/2020 |
| SDG&E | Brian Yim, San Diego Gas and Electric Company<br>Written Testimony: 9/22/2020 |
| SDG&E2 | Brian Yim, San Diego Gas and Electric Company<br>Oral Testimony: 9/24/2020 |
| SF6&AltCoal | Jonathan Stewart, SF6 and Alternatives Coalition<br>Written Testimony: 9/2/2020 |
| Siemens | Hassan Syed Mohammad, Siemens USA<br>Murtaza Khan, Siemens USA<br>Written Testimony: 9/16/2020 |
| SiemensEng | Paul Roskilly, Siemens Energy Inc.<br>Written Testimony: 9/3/2020 |
| SMUD | Martha Helak, Sacramento Municipal Utility District<br>Oral Testimony: 9/24/2020 |
| TID | Ken Nold, Turlock Irrigation District<br>Written Testimony: 9/22/2020 |
| TID2 | Ken Nold, Turlock Irrigation District<br>Oral Testimony: 9/24/2020 |
| WPTF | Scott Miller, Western Power Trading Forum<br>Written Testimony: 9/22/2020 |
| WPTF2 | Brian Biering, Western Power Trading Forum<br>Oral Testimony: 9/24/2020 |
| WSPA | Tiffany Roberts, Western States Petroleum Association<br>Written Testimony: 9/22/2020 |

## A. SUPPORT FOR PROPOSED REGULATION

### A-1. General Support for the Proposed Amendments

**Comment:**
The Utilities Group represents the majority of electricity transmission and distribution system owners and operators in California.

The Utilities Group supports the direction of this rulemaking to further reduce potential emissions of high global warming potential (GWP) gases in the state and phase out the use of sulfur hexafluoride ($SF_6$) in gas insulated equipment (GIE). The Proposed Amendments are intended to allow the state to meet these objectives without compromising the electric grid, and allowing the continued use of existing GIE. Over the past three years, the Utilities Group worked constructively with CARB staff and industry stakeholders through informal meetings and workshops as the Proposed Amendments were being developed….

The Utilities Group commends staff's responsiveness and willingness to address these critical issues through this process. The comments that follow support the goal for timely adoption of $SF_6$ alternatives while assuring the needs for safety and reliability…. (JUG)

**Comment:**
Although this regulation is relatively small, its impact is important for us, because we truly believe that the substation is the key to the grid of the future. I want to thank the CARB SF6 team for working collaboratively with the joint utilities for the past three years. Your team has changed with transfers and retirements and the engagement of the utility subject matter experts has been unprecedented.

These results really have -- speak for themselves. Firstly, we've supported the systematic phase-out proposal. We've supported the phase-out exemption process for planned replacements without SF6 alternatives. We have supported the early action credit. And that sends a clear technol -- a clear message to both manufacturers and utilities to move forward with their alternative solutions.

We also look forward to working with staff to address our comments that we have provided in written form and resolve the outstanding topics we have through the 15-day process.

Just a quick background. Back in 2010, we started off with a ten percent leak rate. And now, we are regulated to a one percent leak rate starting in 2020. The important greenhouse gas that has been used by the industry for decades is effective and will continue to be used to protect high voltage equipment in electric substations and power plants and other applications.

Since the adoption of the regulation, we have successfully maintained our emissions to all these limits. And we're going to have to redouble our efforts to keep it under one percent with the mass emission limit.

We're committed to reducing these emissions and eliminating SF6 emissions altogether. We still have additional items to address, which some of my colleagues will speak to, and we look forward, like I said, to the 15-day process.

I do want to reiterate that with technology advancements, the primary purpose of this regulation has shifted from leak management to enabling the transition away from SF6 to less polluting alternatives.

Collectively, we're partners. We'll only succeed if this -- win this ambitious endeavor, if we enable the development of technological solutions. (JUG2)

**Comment:**
NCPA is a member of the Joint Utilities Group that has worked with CARB staff on the proposed amendments, and we appreciate all of staff's efforts in this regard. NCPA is a joint power agency whose 16 members include municipalities, publicly-owned

utilities, and electric cooperatives, a lot of smaller utilities involved here. And our members are committed to doing their part to ensure that the state meets its clean energy goals and reduce GHG and other emissions, while continuing to provide reliable and affordable electricity.

We support the State's objectives to transition away from the use of the high global warming potential gases. But given the critical role of SF6 equipment in the provision of reliable electricity, we are very pleased to see the recognition in the draft resolution that the modification should support our efforts to ensure a safe and reliable system.

This will be even more significant as the State exponentially increases its reliance on electrification to support the climate goals…. (NCPA)

**Comment:**
I want to echo the great appreciation for CARB staff over the last few years. It's really clear that they have spent so much time truly learning and understanding the deeply technical aspects and details that go into the operation of a safe and reliable grid.

Since we've been able to share our technical challenges involved with transforming the grid to adapt to non-SF6 alternatives, the regulation has made great progress towards being feasible to implement, while still phasing out this high GWP greenhouse gas.

SCE is committed to a clean energy future and supports the approval of this regulation to reduce SF6, so long as staff can continue to work with the utilities in the 15-day change process to understand the implications of some of the newer concepts presented in the July amendments on reliability…. (SCE2)

**Comment:**
As a member of the Joint Utilities Group, SDG&E supports all the comments stated by my fellow JUG colleagues as it highlights many of the joint challenges amongst the California utilities.

SDG&E fully supports CARB's goal to reduce greenhouse gas with the high global warming potential through this specific regulation. And we appreciate CARB staff providing the opportunity to further refine this regulation through another public comment period.

We believe this ability to work with CARB staff will allow our company and other utilities to collaboratively work towards a common goal in reducing SF6 emissions, while also balancing the importance of providing safe, reliable, and cost-effective electricity, both presently and for the future…. (SDG&E2)

**Comment:**
SMUD is a member of the Joint Utilities Group and we support the comments of our peer utilities speaking today.

SMUD would like to say a special thank you to staff for their collaborative approach to this rulemaking and their cooperation throughout this process. It has been a long road and we are gratified to see this regulation come before the Board today.…

We concur that it is important for staff to continue to work with stakeholders to get this regulation where it needs to be. We really want to get this right. That said, we support this regulation, provided the needed amendments are addressed…. (SMUD)

**Comment:**
Siemens Energy Transmission fully supports the Californian grid operators and CARB in the reduction of GHG emissions of power grids. We are fully committed to provide SF6 free, GHG-free and thus CO2 neutral equipment as early as possible. We welcome the extension of scope to gas-insulated equipment and other GHG, the proposed phase out and the phase out dates and the early credit system to stop the increasing amount of SF6 emissions and drive the development to complete SF6 free, GHG free grids. First deliveries for gas-insulted equipment, both GIS and Circuit-breakers, between 72,5 kV and 145kV are planned for 2021, giving Californian utilities the chance to benefit from the early credit system and start the transition towards a CO2 neutral power grid by exchanging all SF6 gas-insulated equipment by CO2 neutral products…. (SiemensEng)

**Comment:**
- $SF_6$ is an extremely potent and long-lived GHG (22,800 100-yr GWP)
- $SF_6$ is used as an insulating gas in transmission & distribution substation switchgear equipment
- PG&E uses $SF_6$ in electrical transmission equipment (circuit breakers, transformers, gas insulated switchgear)

<u>Current Amendments</u>
- Adds phase-out of $SF_6$ in new equipment starting in 2025
- Preserves the aggressive 1% $SF_6$ leak limit
- Offers early action emissions credit adjustment, case-by-case technical phase-out exemption
- Clarifies other regulatory requirements for $SF_6$ compliance

<u>Support</u>
- PG&E supports the phase-out of $SF_6$ GIE and the overall amendments
- We appreciate the work CARB staff has put in to structure the phase-out; this allows utilities to ensure the safety, reliability and resilience of our systems while planning carbon-free options
- Some outstanding issues remain but we believe they can be addressed with staff through one or more15-day changes. (PG&E)

**Comment:**
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….

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. (PG&E2)

**Comment:**
This is Fariya Ali speaking on behalf of PG&E, which is a member of the joint utility group that has been working closely with staff for the past three years on this regulation. Today, I'd like to state our overall support of the SF6 regulation amendments, including the phase-out of SF6 over time as alternative technologies become increasingly available…. (PG&E3)

**Comment:**
California must continue to take all feasible measures to address the climate crisis. We are currently experiencing the worst wildfires in recent history, and scientists know that global warming is fueling the fires. Given climate change is main impact of GHG emissions, the expansion of the regulation to include other GHGs, as staff recommended, is key in driving emission reductions. In addition, continuing to regulate SF6 is critical as it is the most potent and long lasting of the six main GHGs. Given the extremely high global warming potential (GWP) of SF6, our climate depends on us to phase it out and provide safe alternatives.

California's leading climate programs have spurred innovation for decades, and we must continue to seek new pathways to reducing emissions. Updating the SF6 emissions regulation to include a continuing gradual phase-out is critical to this goal. These smart regulatory standards will help develop a market for safe alternatives that would not have developed otherwise….

We appreciate that CARB staff members are working to bring forward new strategies to reduce the impacts of sulfur hexafluoride on our atmosphere. Acting quickly to address this sector will help buy time to stave off the worst climate catastrophe. (CCA)

**Comment:**
We really appreciate the continued work being done on reducing the significant climate pollutant by the CARB staff.

This past month, California has experienced the worst wildfires in our recent history, and scientists know that global warming is fueling these fires. Given climate change is the main impact of greenhouse gas emissions, the expansion of this regulation to include other GHGs, as staff has recommended, is key in driving emission reductions. In addition, continuing to regulate SF6 is critical as it is the most potent and long-lasting of the six main GHGs…. (CCA2)

**Comment:**
Siemens being a pioneer and driver of sustainability, fully supports the California Air Resource Board (CARB) for sustainable development, focused on climate change and clean energy via the amendments to the regulation for reducing sulfur Hexafluoride gas and finding alternative substances for electrical insulation with lower GWP…. (Siemens)

**Comment:**
NextEra Energy Resources (NEER), and its affiliate entities operating in California, support the efforts by the California Air Resources Board (CARB) to reduce greenhouse gas (GHG) emissions associated with the state's power grid. We value the thoughtful approach that CARB staff has taken in balancing the need to expeditiously reduce GHG emissions with the mandate to ensure safe and reliability electric service while supporting the advancement and commercial availability of environmentally-friendly technology…. (NEER)

**Comment:**
We thank staff for the continued conversations over the course of this rule development. As the Chair indicated upon the opening of the agenda item, this is a very technical regulation. We've been in dialogue for some time. The proposed amendments made public roughly 60 days ago are reflective of substantial changes from the previous preliminary drafts…. (CCEEB2)

**Comment:**
SCE is committed to a clean energy future and has an obligation to the 15 million people in the communities we serve to deliver safe, reliable, clean, and affordable energy.

SCE appreciates the dedication of the CARB Staff over the past several years to learn and understand the unique challenges of the individual utilities and the manufacturers producing gas insulated equipment (GIE). We recognize the substantial effort CARB Staff has taken to work with stakeholders to develop a regulation that will reduce GHG emissions and be achievable and cost-effective while preserving safety and reliability in the electric grid. The Proposed Amendments continue to build a more feasible regulation…. (SCE)

**Comment:**
LADWP appreciates the constructive dialog between stakeholders and CARB staff during the informal rulemaking phase, and the changes made to the rule language in response to feedback. LADWP acknowledges the work CARB staff has done on this

regulation, which has evolved to include detailed calculations, recordkeeping and reporting requirements…. (LADWP)

**Comment:**
WSPA appreciates CARB's effort to work with industry stakeholders to incorporate recommendations that have been submitted during the regulatory process over the last couple of years, and we submit the following comments and suggestions for CARB's consideration to clarify and improve 45-day language…. (WSPA)

**Agency Response:**
CARB staff appreciates the commenters' support.

**A-2. Support for Specific Provisions in the Proposed Amendments**

**Comment:**
CCEEB understands and supports the reasoning to systematically phase-out the use of $SF_6$ in gas-insulated equipment (GIE), thereby reducing the long-term impact of a greenhouse gas with a GWP of 23,500 relative to CO2 and an environmental persistence of 3,200 years.

CCEEB appreciates ARB staff's recognition of the technical nature of regulation and amendments to address several stakeholder comments from the last draft, including:

- Amending Definitions to match practices
- Developing a phase-out schedule that provides:
    - A clear signal to OEMs/Suppliers to develop equipment using alternative technologies (ongoing need incentives & state support to drive the transition).
    - Sufficient time provisions for regulated parties.
- $SF_6$ phase-out exemption when needed.
- Forward-looking nameplate accuracy mechanism.
- Recognizing entities with smaller inventories….

<u>Conclusion</u>
This is a very technical and important regulation. While CCEEB supports the phase-out of $SF_6$ GIE, we believe the are some critical open items that need additional work. ARB staff and compliance stakeholders have been working well together, and we encourage this to continue. CCEEB supports the need for subsequent 15-day notices to continue this work to achieve the ultimate goal of phasing out $SF_6$ GIE. (CCEEB)

**Comment:**
CCEEB understands and supports the reasoning to system -- systematically phase-out the use of SF6 in gas-insulated equipment. I want to emphasize that we support the phase-out.

We agree with staff that this rule is necessary to drive manufacturers to create alternatives. And for that, we are thankful…. (CCEEB2)

**Comment:**
SCE understands the importance of reducing greenhouse gas (GHG) emissions, specifically from high global warming potential gases, and supports the phase-out of sulfur hexafluoride ($SF_6$) from gas insulated switchgear…. (SCE)

**Comment:**
As an environmental steward, Metropolitan supports the ultimate phase-out of $SF_6$ GIE used in electrical transmission systems, as $SF_6$ gas has an extremely high global warming potential.…

Metropolitan supports the provisions for obtaining a $SF_6$ phase-out exemption as presented in §95357(b)….

Metropolitan thanks ARB for considering industry concerns by including "at least two $SF_6$ suppliers" in Section §95357 (b)(1). The addition of at least two suppliers will provide stakeholders with a variety of viable non-$SF_6$ alternatives and manufacturers to choose from during the bidding process. This will not only set a fair bidding process with competitive pricing among various manufacturers, but also provide stakeholders with the option to find the best available equipment to fit the demands of diverse electrical infrastructure.…

*§ 95351. Definitions and Acronyms*
*"Active Gas-Insulated Equipment," "Catastrophic Failure," and "Replacement Parts"*
Metropolitan appreciates that ARB updated the definitions of "Active Gas-Insulated Equipment," "Catastrophic Failure," and "Replacement Parts" within the Proposed Regulation. The addition of "spare" GIE in the definition of "Active Gas-Insulated Equipment," or "Active GIE," removes confusion by clarifying that GIE that is fully charged and prepared for connection to an electrical power system is considered "active."

Metropolitan also supports the inclusion of "failure of a GIE device that impacts human safety" into the definition of "Catastrophic Failure." In doing so, the regulation would allow Metropolitan to apply for an expedited $SF_6$ phase-out exemption, per §95357 (h), in the event of a "Catastrophic Failure." This exemption provision will help Metropolitan return its critical electrical infrastructure back to service, thereby ensuring the safe and reliable delivery of Colorado River water to Southern California.

Lastly, ARB's decision to include a broad definition for "Replacements Parts," which includes "ancillary components that support or enable, but cannot perform, the primary activities or operation of an integrated GIE," will allow GIE owners to properly maintain their existing $SF_6$ GIE by replacing key parts over time. (MWDSC)

**Comment:**

LADWP appreciates inclusion of the phase-out exemption in the Proposed Amendments, which appropriately recognizes there are situations where non-SF6 alternatives cannot be used due to unavailability or technical infeasibility.…

For new GIE, LADWP agrees with establishing the "covered insulating gas at activation (CIGAA)" gas capacity value based on the amount of insulating gas used to fill the GIE at the time of commissioning. Experience shows that the actual amount of gas used to fill the GIE to proper operating pressure may differ from the manufacturers' theoretical gas capacity based on assumptions (nameplate value). This difference may be due to component manufacturing tolerances, bushing type, and the actual pressure and temperature conditions at the facility where the GIE is installed and filled. Therefore, CIGAA is a more accurate representation of the actual gas capacity value and should be used in calculations instead of the theoretical gas capacity (nameplate value).…

§ 95357. SF6 Phase-Out Exemption

LADWP supports inclusion of the phase-out exemption in the Proposed Amendments. The purpose of this exemption is to allow for the purchase of SF6 insulated GIE in cases where non-SF6 alternative equipment is not available or not suitable for the application. While moving away from SF6 towards more environmentally friendly alternatives is a worthy endeavor, the new technology needs to be performance tested to ensure the device will operate reliably prior to widespread use in the power system. The phase-out exemption is a very important contingency measure for the transition from SF6 GIE to the non-SF6 alternatives that will work hand-in-hand with the phase-out to protect reliability of the power system.… (LADWP)

**Comment:**
The language CARB has included to allow for exceptions is very helpful towards allowing for GIE manufacturers and users alike to align with the new proposed regulation. DILO supports this language and appreciates the work CARB has put behind the exception regulations.… (DILO)

**Comment:**
Catastrophic Failure and Emergency Events--§ 95351(a); § 95357(h); and § 95357.1
WSPA had previously advocated for and CARB has proposed an exemption that could be granted in the case of a "Catastrophic Failure" that includes shutdown of the regulated facility's operations due to the sudden and unexpected failure of a GIE device, for which the facility has no other GIE in its possession to resolve the catastrophic failure and which needs to be replaced faster than on the phase-out timescale (§95357(h)). This exemption would allow an entity, after going through the proper approval process, to replace existing SF6 equipment with new SF6 equipment even during the phase-out period. Therefore, **WSPA approves the term "Catastrophic Failure" and the proposed associated exemption** and suggests keeping intact the definition proposed in § 95351(a):

> **"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)….

SF6 Phase-Out Exemption—§ 95357

WSPA commends CARB for giving much consideration to exemption language for the phase-out of SF6 equipment. Sections 95357(b)(1)-(4) and 95357(d)(8)(D) allow for exemptions due to available non-SF6 equipment not able to be obtained from more than one manufacturer; not meeting size requirements; being incompatible with existing equipment, wiring, or connectors; not being suitable based on safety or reliability requirements; or not able to be used in accordance with company policy or procedure. While the exemption process is rightfully rigorous, requiring full justification and demonstrating attempts to find non-SF6 solutions, WSPA supports all these exemptions. (WSPA also supports the "catastrophic failure" exemption as described in § 95357(h).) Specifically, in relation to the (d)(8)(D) exemption for safety or reliability issues due to failure to comply with **"company-specific policy or procedure,"** WSPA feels this language adequately addresses its concerns expressed in February 2020 that a GIE owner should be able to "submit for a technical infeasibility exemption to allow for the acquisition of SF6 GIE after the phase-out date…if the available non-SF6 GIE has not been demonstrated to meet recognized industrial standards, procedures, practices, or equivalent internal practices (including risk-based criteria)." **WSPA supports CARB's proposed exemption language.**

Annual Emissions Limits—§ 95353

Stakeholders with low SF6 capacity had requested a change to mass emission limits instead of percentage-based limits due to very low calculated mass numbers needed for compliance under the percentage-based approach. **For setting the baseline capacity, WSPA supports CARB's proposed method** in § 95353(b)-(c) of using the sum of the average CO2e capacity for all active GIE devices at the facility, yielding an average system capacity that is then used to calculate a facility-wide emissions limit.

We also agree with allowing facilities to purchase SF6 GIE through 2024 that would be added to the baseline calculation for the phase-out beginning in 2025. After that, the baseline would not decrease when SF6 GIE is replaced with non-SF6 GIE and would not include any SF6 GIE purchased with exemptions. CARB provides an incentive to invest in non-SF6 equipment by allowing a baseline to remain static in relation to a reduction in the potential to emit due to purchase of non-SF6 equipment. As CARB describes in its Notice of Public Hearing, page 8:

> An emissions limit with a fixed baseline would incentivize a GIE owner to replace SF6 GIE with non-SF6 GIE after the baseline is set because the implementation of non-SF6 GIE would decrease the actual amount of SF6 in their system, which would reduce the risk of SF6 emissions, without any corresponding decrease in average system capacity used to evaluate regulatory compliance.

WSPA supports this section's proposed methodology for incenting the transition to non-SF6 GIE. (WSPA)

**Comment:**
III. §95353 - Annual Emissions Limit.
In setting the emission rate limit, CARB has proposed a threshold of 10,000 MTCO2e, below which the emissions limit would be set at 2%, and above which the emission limit would be set at 1%. The Utilities Group supports this proposal. As the Initial Statement of Reasons (ISOR) notes, GIE owners with average system capacities below 10,000 MTCO2e would have a difficult time complying with a 1% emission limit due to the fact that a single event could release enough gas to exceed the annual emission limit before the GIE owner was even aware that a leak had occurred. Additionally, the total number of GIE owners that fall below this threshold are a relatively small source of $SF_6$ emissions, comprising less than 2% of the total statewide $SF_6$ capacity (ISOR, pp. 33-34).

The Utilities Group also notes that the 10,000 MT CO2e threshold is consistent with the applicability threshold in the Mandatory Reporting Regulation.… (JUG)

**Comment:**
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.…

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 $SF_6$ GIE.… (PG&E2)

**Comment:**
We're a signatory to the Joint Utilities' comments. We support the proposed modifications in those comments and appreciate the recognition of the need to resolve outstanding issues in 15-day changes.

And with that said, I'd like to highlight a few points. The first is it is important to recognize the technical nature of GIE and SF6 equipment. It's been mentioned a couple of times. The transition to non-SF6 equipment may not be feasible or possible in all instances for all systems at the same time. And NCPA supports the provisions that allow for a phase-out exemption.…

Second, NCPA supports the regulatory -- the regulations properly maintaining a two percent limit for small GIE owners if a non-de minimis limit cannot be established for smaller ones. And we support the proposed regulation's recognition of the use of existing SF6 purchases, even if the equipment has not been installed prior to the phase-out date.… (NCPA)

**Comment:**

$SF_6$ Phase-Out
Pursuant to SB 32 and Board Resolution 17-46 requirements to reduce GHG emissions, SF6 has been regulated for the past 10 years. But in the absence of an updated regulation, the allowable emission rate would remain at one percent instead of continuing to decrease as it has the past 10 years. Statewide SF6 capacity is growing one to five percent per year, so as capacity grows, so too would expected emissions. We support the phase-out of SF6 in GIE technologies by July 2025. The rule needs to be strengthened in order to phase it out.

This is critical in eliminating GHG emissions because of its extremely high GWP, small reductions in SF6 emissions can have a large impact on reducing GHG emissions, which are the main drivers of climate change. This will enable industry to accelerate the transition to technologies that don't use SF6....

We oppose the exemptions that some industries are asking for, and further urge the board to only give exemptions as staff has recommended in their proposal. It is vital to hold everyone who emits this gas accountable in order to maintain a decrease in emissions in California's electricity sector…. (CCA)

**Comment:**
Updating this regulation to include a phase-out of SF6 will create smart regulatory standards that will help develop a market for safe alternatives that would not have developed otherwise.

We support this phase-out of SF6 and GIE technologies by July 2025....

We oppose the exemptions that some industries are asking for and further urge the Board to only give exemptions as staff has recommended in their proposal. It is vital to hold everyone who emits the gas accountable in order to maintain a decrease in emissions in California's electricity sector. (CCA2)

**Comment:**
In support of the proposed amendments we highlight the following items which are deemed to be key in ensuring the successful reduction of a potential release of SF6 from gas insulated equipment (GIE) and ability of the industry to maintain a stable, safe and reliable power grid. These are (i) the applicability of the phase-outs to only new equipment procured after the identified phase-out dates, (ii) availability of clear guidelines under which exemptions can be procured, and (iii) applicability of the phase-outs to qualifying GIE.

Applicability to New Equipment
NEER has reviewed the CARB Staff Report: Initial Statement of Reasons (ISOR) and Appendix A, Proposed Regulation Order. Based on this review, we understand that the goal of the amendments are to replace SF6 GIE that is nearing or have reached end-of-life with non-SF6 GIE as those products become technically achievable and commercially available. The proposal for phase-outs is geared toward replacement of

SF6 GIE that have reached or are approaching end of useful life rather than requiring fully functioning equipment to be removed from service by the effective date (e.g. See discussion in ISOR at pg. 37 and pg. 123). Furthermore, to ensure reliability of the grid, the proposed regulation allows for procurement of SF6 GIE up to the date the applicable phase-out restriction becomes effective to ensure that adequate spares are on-hand. The early adoption credit, as we understand it, incentivizes GIE owners who need to replace SF6 GIE to do so in advance of an applicable phase-out date without experiencing the drawback of a lower emissions baseline at December 31, 2024, resulting from a reduction in inventory of active SF6 GIE. [NextEra] supports the overall phase-out plan, and the proposed exemptions of replacement parts from the phase-outs as outlined in §95357, as it appropriately balances the goal of significant reduction in GHG while recognizing the essential need for flexibility in operations to ensure a safe and reliable power grid….

Availability of Clear Exemption Guidelines
As CARB Staff noted in its Initial Statement of Reasons Section 11.B.3., there may be cases where GIE owners need to install SF6 GIE after applicable phase-out dates. It is vital that the proposed language for §95357 SF6 Phase-Out Exemption remain in the final version of the regulation as it provides an option for GIE owners to procure needed equipment to maintain operational reliability in the event that non-SF6 containing GIE is commercially unavailable, operationally untested, or technologically infeasible…. (NEER)

**Agency Response:**
CARB staff appreciates the commenters' support.

Two commenters implied the phase-out of $SF_6$ in GIE technologies would be completed by July 2025. CARB staff notes that the phase-out would begin January 1, 2025, and be completed by January 1, 2033. Additionally, CARB staff notes use of $SF_6$ will be allowed beyond these dates, the dates represent deadlines by which $SF_6$ GIE can no longer be acquired, unless certain conditions are met.

## B. OPPOSITION TO THE PROPOSED REGULATION

### B-1. Revise GWP Basis for Defining "Covered Insulating Gas"

**Comment:**
In regard to the proposed reporting requirements for a "Covered Insulting Gas" in Gas-Insulated Equipment (GIE), specifically insulating gas mixtures using 3M™ Novec™ 4710 Insulating Gas, we urge CARB to base its reporting criteria on $CO_2$ equivalents ($CO_2e$) and not Global Warming Potential (GWP).

As background on Novec 4710 gas compared to sulfur hexafluoride ($SF_6$), please refer to the following table:

| Property | 3M™ Novec™ 4710 Insulating Gas | $SF_6$ |
|---|---|---|

| | | |
|---|---|---|
| Atmospheric lifetime (years) | 30 | 3,200 |
| Global Warming Potential * | 2,100 | 23,500 |
| Dielectric strength (kV, relative to $SF_6$) | 1.9 | 1.0 |
| Ozone depletion potential | 0 | 0 |

** 100-yr ITH, IPCC 2013 method.*

Comparing technologies by focusing on any single property does not provide a complete metric reflecting the environmental advantages of a technology to reduce greenhouse gas (GHG) emissions, which is the intention of the CARB project to amend regulations for gas insulated switchgear[3] per AB32, "AB 32 directs CARB to develop and track GHG emissions and progress toward the 2020 statewide GHG target[4]."

When considering only the GWP of a single component of the technology (i.e. the pure gas), one does not gain an appreciation that technologies using alternative gases can provide significant environmental advantages. The full environmental advantage can be better observed when considering the emissions reductions as measured in $CO_2e$. $CO_2e$ reductions more accurately describe the environmental advantages of alternative gas technologies and is a more useful metric for comparison of technologies. Focusing only on GWP could potentially limit a new technology's adoption rate. CARB is already using the $CO_2e$ metric in other areas (such as in its Annual Emissions Limit and Threshold calculations[5]).

To demonstrate how different gas mixtures can reduce the GHG emissions, the following table shows the $CO_2e$ reductions for a piece of gas insulated switchgear filled with different gases:

| Gas formulation | 3.5% 3M™ Novec™ 4710 Insulating Gas in $CO_2$ | 100% $SF_6$ |
|---|---|---|
| Gas pressure (bar) | 6 | 4 |
| Gas density at 25°C ($kg/m^3$) | 11.9 | 23.6 |

[3] https://ww2.arb.ca.gov/sites/default/files/2020-06/sf6_workshop_presentation_11-28-17.pdf
[4] https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf
[5] https://ww2.arb.ca.gov/sites/default/files/2020-07/sf6-gis-reg-slides-07132020.pdf

| | | |
|---|---|---|
| Composite GWP* of gas mixture | 292 | 23,500 |
| GWP reduction compared to $SF_6$ | 98.8% | - |
| GHG emissions (MT $CO_2e/m^3$) | 3.5 | 554 |
| GHG emissions reductions (i.e. $CO_2e$ reduction) | 99.4%** | - |

** $GWP_{mixture} = \sum_i x_i GWP_i$*

*** Since GHG emissions reduction in $CO_2e$ uses the commonly accepted GWP calculated over a 100-year integration time horizon, it discounts the longer-term effects of $SF_6$, which continue far beyond 100 years. As a result, the $CO_2e$ emissions reductions calculated over longer time frames are > 99.9%.*

CARB's current proposal, which requires reporting of alternative gas mixtures based solely upon GWP, would likely result in a significant disadvantage to alternative gas adoption rates due to the imposed reporting requirements. Such reporting requirements impose a burden on the end customers and may effectively limit the number of options available to them. As such, equipment manufactures may be deterred from developing equipment using alternative gas technologies, thereby further limiting the number of available solutions to end customers.

Based on commercially available systems, solutions using 3M™ Novec™ 4710 Insulating Gas are the only technologies with the demonstrated capability of directly replacing $SF_6$ in non-switching compartments of existing equipment. This could drastically accelerate an $SF_6$ phase out. One such project working to retro-fill existing systems is the UK National Grid's "Alternatives to $SF_6$ for retro-filling existing equipment[6]." Despite these advantages, without changes to the proposed amendments, these systems would be subject to the same reporting requirements and systems using $SF_6$.

In future updates to these amendments, CARB should consider adopting the Life Cycle Assessment (LCA) approach. The LCA approach allows a complete view of the technology, including the dielectric medium, size and weight of the equipment and so on. The LCA also shows technologies using Novec 4710 gas may be the strongest means to enable the broad transition away from using $SF_6$. To our knowledge, systems using Novec 4710 gas are the only known systems that can support designs without any increased physical space requirements. A comprehensive LCA demonstrated that technologies using Novec 4710 gas offer the most benefit to the environment compared to competing technologies[7].

[6] https://www.gegridsolutions.com/products/reference/ge_g3_roadmap_2025-en.pdf
[7] https://www.smarternetworks.org/project/nia_nget0199

We urge CARB to take this opportunity to demonstrate that $CO_2e$ emissions reductions are a more valuable metric for determining the benefits and environmental impact of each technology. This will allow for the selection of $SF_6$ alternative technologies to be driven by performance and their ability to reduce GHG emissions.

Recommendations: To meet CARB's goals for GHG reductions and to support a meaningful transition away from $SF_6$ filled switchgear, we recommend the following:

- Define reporting requirement thresholds based upon $CO_2e$.
- Eliminate reporting requirements for all alternative gas mixtures based solely on GWP.
- Establish a reporting threshold for gas mixtures measured in $CO_2e$ and only when the $CO_2e$ emissions reduction is <95%, as compared to $SF_6$. (3M)

**Comment:**
We respectfully request your consideration of our comments and feel these changes will enhance the proposed regulation as the global regulatory environment has facilitated GIE with GWP up to 500 to be widely accepted by multiple European utilities as well as the EU's Life program (https://think-grid.org/eu-contributes-development-sf6-free-420-kvswitchgear). Many OEMs including GE already have developed a range of $SF_6$-free products for international 50 Hz markets. Our recommended improvements to the proposed regulation will further encourage open-market technological advancement in the 60 Hz $SF_6$-free high voltage switchgear domain with benefit for all stakeholders within and outside the State of California.

We believe the proposed regulation does not fully acknowledge the significant GHG reductions realized with the use of gas blends, through the definition of "Covered Insulating Gas" as well as the impact when such gases are used in "gas blends". As stated on page 129 of the Initial Statement of Reasons, "*….under the proposed Regulation, equipment that uses an insulating medium with a GWP less than or equal to one are exempt from reporting, which further lowers GIE owners' staff time and cost.*". The current proposed regulation places existing proven $SF_6$-Free technology at a competitive disadvantage and could further discourage California stakeholders to broadly adopt viable $SF_6$-Free solutions.

The reporting exemption threshold of GWP ≤ 1 presents an additional reporting burden on users who use gas blends, providing a competitive advantage to other technologies even though gas blends present a 99% or better improvement compared to $SF_6$. Defining this threshold for gas blends at GWP ≤500 will encourage development and adoption of $SF_6$-free solutions for a broad range of applications which will still represent substantial GHG reduction compared to $SF_6$, as much as 99% or more. A reasonable threshold will also provide further incentive to drive OEM development meeting the proposed phase-out schedule, particularly for higher short-circuit and voltage ratings.

For example, a typical 145kV/63kA $SF_6$ dead tank circuit breaker contains approximately 96 lbs of $SF_6$ gas, which has a $CO_2e$ of 993 metric tons. A gas blend dead tank circuit breaker with $CO_2/O_2/C_4F_7N$ (Novec4710) will use a gas blend total of only 37.5 lbs to achieve equivalent performance. The gas blend dead tank in this example will have a partial pressure mixture ratio of 83.5/13/3.5% ($CO_2/O_2/C_4F_7N$) meaning that allowing for molar weight (195g/mol) there is only 5.4 lbs of NOVEC 4710 contained within the mixture. Using GWP defined in § 95351 (a) for Novec 4710, the net GWP of the blend is 287, thus $CO_2e$ for the example gas blend is 5.05metric tons.

The use of Novec 4710 in this example is only 5.4 lbs while an equivalent $SF_6$ circuit breaker could use 96 lbs or more of $SF_6$. Following the example presented in the Initial Statement of Reasons (page 22), if all the $SF_6$ in non-hermetically sealed GIE were replaced with this gas blend and assuming 1% leak rate, annual $CO_2e$ emissions would be roughly equivalent to driving less than 600 passenger vehicles for one year. Annual $CO_2e$ emissions for $SF_6$ GIE are comparable to driving over 45,000 passenger vehicles per year. Furthermore, modern GIE has a demonstrably lower emission rate compared to the installed base over the past several decades, meaning to actual emission rate will be less than 0.5%.

The following actions and revisions are requested to further incentivize users and OEMs of alternative gas blend GIE to pursue new product with higher ratings performance for the 60 Hz market (vs 50Hz in Europe) and without the reporting burden associated with $SF_6$ and other very high GWP GHGs:

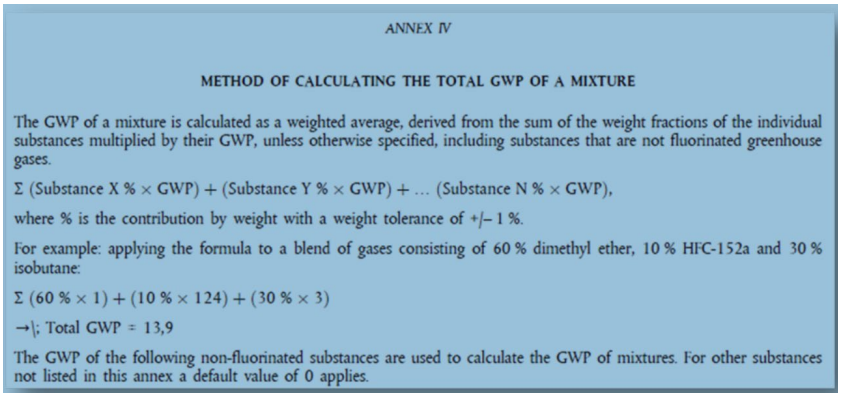
1. Change the definition of "Covered Insulating Gas" to include gas blends and Raise GWP exclusion for gas blends to 500.
2. Consider GWP of the gas blend, rather than the individual components.

- Page 3
  § 95351 (a)
  - "Covered Insulating Gas" means an insulating gas with a GWP greater than one or gas blend with NET GWP greater than five hundred (500). When the ~~amount~~ net GWP of covered insulating gas must be calculated for gas blends, it must be calculated pursuant to section 95354(l).

- Page 5
  § 95351 (a)
  - "Global Warming Potential" or "GWP" means the ratio of the time-integrated radiative forcing from the instantaneous release of one unit of a trace substance relative to that of one unit of a reference gas, in this case, carbon dioxide. The GWP values for this subarticle are as specified in Table A-1 to Subpart A of Title 40 CFR Part 98 as published to the Federal Register on December 11, 2014, which is hereby incorporated by reference. The GWP of Novec-4710 shall be the default GWP for "other fluorinated GHGs" (2,000) as listed in Table A-1 of Subpart A of Title 40 CFR Part 98 as

published to the Federal Register on December 11, 2014. Reporting of Novec 5110 is not required because the default GWP in Table A-1 (Subpart A of Title 40 CFR Part 98 as published to the Federal Register on December 11, 2014) for a compound of its type is 1. Reporting of Novec-4710 is not required when used in a gas blend with net GWP less than 500 calculated pursuant to section 95354(l).

- Page 23
  § 95354 (l)
  - Gas Blends. Whenever GWP of a covered insulating ~~gas that is a constituent of a~~ gas blend must be quantified, use the following equation to calculate the gas blend GWP ~~amount of covered insulating gas to be reported (pounds) and record the values of the inputs used~~: (Reference "*Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006*" https://www.eea.europa.eu/policy-documents/regulation-eu-no-517-2014 )



ANNEX IV

METHOD OF CALCULATING THE TOTAL GWP OF A MIXTURE

The GWP of a mixture is calculated as a weighted average, derived from the sum of the weight fractions of the individual substances multiplied by their GWP, unless otherwise specified, including substances that are not fluorinated greenhouse gases.

Σ (Substance X % × GWP) + (Substance Y % × GWP) + … (Substance N % × GWP),

where % is the contribution by weight with a weight tolerance of +/– 1 %.

For example: applying the formula to a blend of gases consisting of 60 % dimethyl ether, 10 % HFC-152a and 30 % isobutane:

Σ (60 % × 1) + (10 % × 124) + (30 % × 3)

→|: Total GWP = 13,9

The GWP of the following non-fluorinated substances are used to calculate the GWP of mixtures. For other substances not listed in this annex a default value of 0 applies.

Please also consider the overall Life Cycle Assessment (LCA) for any $SF_6$-free solutions. An LCA analysis considers the environmental impact of the equipment beyond insulating gases and can include evaluation of material content, energy usage, emissions, depletion of natural resources and end of life disposal. Reference Hermosillo, Laruelle, Darles, Gregoire, Kieffel, "Environmental Performance of Dead-Tank Circuit Breakers with $SF_6$ and Alternative Gases" CIGRE Session, paper A3-102, Paris, 2020.

We thank you for your consideration and are happy to support the development of a regulation yielding a reduction in GHG emissions while at the same time ensuring a competitive environment in which high performance GIE will be developed in a timely and cost efficient manner. We are convinced these changes are needed to facilitate the adoption of all $SF_6$-free technologies and thus a successful timely reduction of installation of $SF_6$ GIE at all kV and kA ratings in California. (GE)

**Comment:**

CARB's currently contemplated reporting requirement for SF6-free gas-insulated switchgear will lead to a significant disadvantage in the California market for alternative gas blend solutions. As some previous commenters mentioned, the gas blend technologies yield significant carbon reduction benefits and are an important component to the SF6 phase-out timeline, especially for upper -- upper voltage and current ratings as well as special purpose applications.

Numerous stakeholders, including some California utilities, have commented on this, and recognize this obstacle, and support increasing the reporting threshold for gas blends in insulated gas -- insulating gases.

We respectfully request CARB revise the proposed regulation to include a reporting exemption for all SF6-free gas blend technologies with a GWP of less than or equal to 500. Again, alternative gas blend solutions with a GWP less than or equal to 500 are a critical component to the complete SF6 phase-out roadmap.

The requested reporting requirement modification puts gas blend solutions on a level playing field in the California market with other carbon-reducing market-ready solutions and provides California utilities with another highly impactful and effective tool, as they reduce and eliminate the use of SF6.

European markets have facilitated the adoption of all SF-free technologies and many are starting to realize the significant environmental benefits from this inclusive approach. We are convinced the change we propose today - again GWP less than or equal to 500 for gas blends - is necessary to give California utilities a complete menu of SF6-free options and to operationalize a successful and timely reduction of the installation of non-SF6 gas-insulated equipment at all kV and kA ratings.

We thank you again for your consideration and for the opportunity to contribute to this critical regulation that will have far-reaching implications and influence the evolution of SF6-free North American -- in the North American market.

And we look forward to working with staff as this process moves forward. (GE2)

**Comment:**
After reading the comment letter that GE Grid Solutions submitted into the rulemaking docket, LADWP recognizes that GE brings up a good point – that development of SF6-free gas-insulated equipment (GIE) using alternative gases may be discouraged if alternative gases are less desirable because they are subject to the regulation recordkeeping and reporting burden. This may be an unintentional impact of the proposed amendments.

The proposed amended regulation will apply to owners of GIE that uses a “covered insulating gas”, which is defined as an insulating gas with a Global Warming Potential (GWP) greater than one (GWP > 1). This includes gas mixtures with GWP > 1, that appear to be a suitable substitute for SF6 for higher voltage and higher short-circuit current applications.

As a buyer of GIE, LADWP desires to have a broad range of SF6-free product options to choose from. LADWP supports the open-market condition for development of SF6-free GIE technology is critical, especially since the current evidence indicates that GIE technologies with GWP less than or equal to one (GWP ≤ 1) will have enormous challenges to meet the requirements of particular applications such as high voltage shunt capacitor and reactor switching and protection. In addition, it appears that SF6-free GIE technologies with GWP ≤ 1 will have difficulty meeting high short-circuit current ratings as well as high voltage ratings. Based on the evidence available today, it appears vacuum technology will not be able to meet the needs for these particular applications.

LADWP encourages CARB to consider raising the applicability threshold for covered insulating gases to a GWP of 500. A higher threshold will avoid putting technologies that use a gas mixture at a disadvantage, and allow development of SF6-free GIE in an open-market condition.

More SF6-free GIE choices will facilitate CARB's goal to phase out the use of SF6, and reduce the likelihood of needing SF6 phase out exemptions for the higher voltage and higher short-circuit current applications. (LADWP2).

**Comment:**

II. **"Covered Insulating Gas"** *means an insulating gas with a GWP greater than one. When the amount of covered insulating gas must be calculated for gas blends, it must be calculated pursuant to section 95354(l).*

1. We encourage CARB to consider raising the reporting exemption threshold from GWP ≤ 1 to GWP ≤500 for gas mixtures. The reporting exemption threshold of GWP ≤ 1 presents an additional reporting burden on reporters who may use gas blends, even though gas blends (with a GWP <500 compared to SF6's GWP of 23,000) present a tremendous improvement in GHG emissions. Defining a threshold for gas blends at GWP ≤500 will encourage development and adoption of SF6-free alternative GIE, particularly in the high-voltage category, where no alternatives to SF6 currently exist. A reasonable threshold will also provide further incentive to drive OEMs to develop alternative, low GWP gases help utilities meet CARB's proposed phase-out schedule…. (TID)

**Comment:**

Section 95351 of the Proposed Amendments defines a "Covered Insulating Gas" as an insulating gas with a global warming potential (GWP) greater than one. SDG&E requests that "Covered Insulating Gas" GWP should be increased to greater than 500. This increase will encourage technology advancement in the higher voltage levels 230 kV and greater…. (SDG&E)

**Comment:**

SDG&E would like to comment on a few subsections within the proposed amendments. Within Section 95351, a covered insulating gas is defined as an insulating gas with a

global warming potential greater than one. SDG&E proposes that covered insulating gas GWP be increased to greater than 500. We believe this increase will encourage technology advancement into higher voltage levels, 230 kV and greater…. (SDG&E2)

**Comment:**
My second comment is on behalf of SMUD as an individual entity. We also request that CARB consider raising the reporting threshold for exemption from a global warming potential of less than or equal to 1 to -- to less than or equal to 500.

The reporting exemption threshold of 1 GWP for alternative gas mixtures presents an additional reporting burden on reporters who may use gas blends, even though gas blends present a tremendous improvement in GHG emissions.

Defining a threshold for gas blends of less than or equal to 500 will encourage development and adoption of SF6 alternative equipment, particularly in the high voltage category, where no alternatives to SF6 currently exist and are very, very much needed.

A reasonable threshold will also provide further incentive to drive manufacturers to develop alternative low GWP gases to help utilities meet the phase-out schedule. (SMUD)

**Comment:**
3- Clause 95351-a (Page 5): **Global Warming or GWP:** We request to have a copy of table A-1 to further comment on its constituent…. (Siemens)

**Agency Response:**
Several commenters are requesting CARB change the definition of "covered insulating gas" so it means an insulating gas, or gas blend, with a GWP greater than 500 rather than an insulating gas with a GWP greater than one. CARB staff disagrees with the requested change for the reasons discussed in the paragraphs below.

As stated in the ISOR, CARB staff seeks to accelerate adoption, and track the use of, non-$SF_6$ insulating gases that will replace $SF_6$ in GIE over the coming years. Prior to proposing the Amendments, CARB staff met with over ten manufacturers to determine when key non-$SF_6$ equipment types will be available and what would replace $SF_6$ in these GIE. Based on those conversations, CARB staff learned that several non-$SF_6$ technologies will contain no greenhouse gases (GHG) at all, others will contain a gas, or gas blend, with a GWP of less than or equal to one, and some will contain a gas, or gas blend, with a GWP between one and 500. For example, commenters identified one technology that will use a Novec 4710 based gas blend with a GWP of about 280-300.

Staff defined "covered insulating gases" to exclude gases with a GWP less than or equal to one; thus, the Regulation does not cover these insulating gases and does not include reporting requirements for these gases. Staff proposes only to

require the reporting and regulatory coverage of insulating gases with a GWP greater than one because the amount of GHGs with GWPs less than or equal to one that would be used in GIE would have a relatively small potential impact to global warming (in $MTCO_2e$). Emissions of GHGs with a GWP of one have a climate warming impact commensurate with $CO_2$. Whereas $CO_2$ is released in large volumes from industrial processes, power generation, and transportation (among other sources), the volume of $CO_2$ and other gases with a GWP less than or equal to one contained in GIE throughout the State is anticipated to be very low. As discussed in the ISOR, if all $SF_6$ in active, non-hermetically sealed GIE in California at present were converted to $CO_2$, the amount of $CO_2$ in GIE statewide would only be about 1,000 $MTCO_2e$, and annual emissions would be roughly ten metric tons of $CO_2e$, which is relatively insignificant.[8]

CARB staff has determined that it is essential that the Regulation cover insulating gases with a GWP greater than one in order to ensure appropriate tracking of emissions and reductions of GHGs from GIE. Tracking GHG emissions within the State is critical to assure California is making substantial progress towards achieving its mission to combat climate change. Although emissions of a GHG with a GWP of 500 may seem insignificant relative to the extremely high 22,800 GWP of $SF_6$, a GWP of 500 is still very high. For example, CARB has established numerous regulations and programs, including a detailed inventory of emissions, that address another highly potent GHG, methane, which has a GWP of 25.[9] Because emissions of GHGs with GWPs of 500 are 20 times more potent than methane, failure to track GHG emissions with GWPs up to 500 would be inconsistent with CARB's existing programs and statutory obligations to track and reduce GHG emissions. Because it is important under this Regulation to track and regulate emissions of GHGs with GWPs greater than one, CARB staff has determined that the regulation should apply to these GHGs rather limiting its application to insulating gases with GWPs greater than 500 as requested by several commenters.

One commenter expressed concern that, if CARB does not raise the GWP reporting threshold to 500, California utilities would not be able to install non-$SF_6$ GIE in a timely manner across all voltage and short-circuit current ratings. CARB staff disagrees and wishes to clarify that the amendments do not prohibit the use of alternative gases with a GWP above one, they simply require that GIE that utilize these gases comply with the Regulation's requirements.

Several commenters recommend that CARB define the limit in terms of $CO_2e$ instead of GWP. They assert that the Novec 4710 gas mixture would have a substantially lower impact on climate change because it is expected to be used in lower volumes in GIE than $SF_6$. One commenter's data showed the amount of alternative gas used in a GIE device (in pounds) would be only 39% of the

[8] U.S. EPA Greenhouse Gas Equivalencies Calculator: https://www.epa.gov/energy/greenhouse-gasequivalencies-calculator . Last accessed November 20, 2019.
[9] https://ww2.arb.ca.gov/ghg-gwps

amount of $SF_6$. CARB staff appreciates this information and hopes the development of this alternative will reduce overall emissions. However, this does not mean that CARB should raise the GWP reporting threshold or define the limit in terms of $CO_2e$ instead of GWP. As discussed above, it is important to regulate and track emissions of GHGs, particularly those with high GWPs, in order to ensure California's progress towards its climate goals. Failure to regulate and track emissions of Novec 4710 would be inconsistent with other CARB programs and regulations, which track emissions of GHGs with significantly lower GWPs than Novec 4710.

One commenter stated that the leak rate of modern GIE will be less than 0.5% as part of the justification for raising the GWP threshold to 500. CARB staff appreciates this information and hopes that modern developments in technology will reduce leak rates; however, CARB staff has seen no data to justify this claim. Further, CARB staff recognizes that leaks will still occur and is committed to holding GIE owners accountable to the applicable emission rate limits as well as the tracking and recordkeeping requirements.

In addition to raising the GWP reporting threshold to 500, several comments request changing the definition of "covered insulating gas" to include gas blends, which are a mixture of multiple individual gases. "Covered insulating gas" is defined in the proposed amendments as "an insulating gas with a GWP greater than one. When the amount of covered insulating gas must be calculated for gas blends, it must be calculated pursuant to section 95354(m)." The implication of the requested change is that a unit of a hypothetical gas with a GWP of 2,000 when used in isolation would be required to be reported, but, when that same unit of gas is used in a blend that has a GWP below the threshold, it would not be required to be reported, even though the impact on climate change when that unit of gas was emitted would be identical. As stated above, failure to track high-GWP gases is in conflict with other CARB programs, regardless of whether the high-GWP gas is used in a blend with other less potent gases, and so tracking at the level of the individual gas is most appropriate. This is accomplished in the Regulation through the definition of "covered insulating gas" which is specific to "an insulating gas," not a blend. CARB therefore retained the original definition of covered insulating gas.

Several commenters asserted that CARB staff's requirement to track and report emissions of insulating gases with a GWP greater than one will put these solutions at a competitive disadvantage relative to lower GWP alternatives, which could hinder technological development. Several comments also assert that Novec 4710-based gas blends appear most ready to replace $SF_6$ in high-voltage applications and obstacles that hinder development of technology that utilizes this gas blend could delay the transition away from $SF_6$. CARB staff disagrees. Throughout the informal public process prior to the start of the regulatory amendment process, GIE owners listed a number of factors they use when deciding which GIE to purchase for a given application. These factors

include cost, reliability, technical capabilities, and size. While the requirement to report emissions from one alternative technology, and not another, may be an additional factor GIE owners consider, it is not likely to be among the most significant factors, especially if the technology is cost-effective, reliable, fits in the footprint of the facility, and meets technical specifications. If, as commenters assert, Novec 4710-based gas blends truly are the best alternative technology in high-voltage applications, this technology would be at a competitive advantage over other alternatives due to the amount of weight GIE owners would place on the other factors listed above. In addition, CARB staff notes that reporting requirements for gases with a GWP greater than one are commensurate with the reporting that all regulated entities currently have to do, and as such the reporting of these gases would not represent a new burden or cost to $SF_6$ GIE owners who have been reporting to the Regulation for years.

One commenter also requested CARB staff consider a Lifecycle Assessment (LCA) approach for non-$SF_6$ technologies, which would consider the environmental impact of materials used in GIE, energy usage, and end of life disposal in addition to direct emissions of the covered insulating gas. This Regulation covers direct emissions of covered insulating gas from GIE, and is one of multiple regulations that will work in combination to help California reach its GHG reduction targets. Emissions from energy usage within California are captured under other regulations.

Finally, one commenter requested a copy of table A-1 from U.S. EPA's Mandatory Reporting of Greenhouse Gases Rule, as of December 11, 2014. This document is available here: https://www.ecfr.gov/cgi-bin/text-idx?SID=5292436e6a74492248c4a1f0fc834048&mc=true&node=ap40.23.98_19.1&rgn=div9 .

**B-2. Revise the Phase-Out Schedule and Exemption Process**

**Comment:**
SCE has some remaining concerns about the practicability of some of the additional regulatory requirements which impact safety, reliability, and affordability.

One of the largest challenges SCE will face is the timeline of anticipated commercial availability of non- $SF_6$ GIE. Based on our ongoing discussions with non-$SF_6$ GIE manufacturers, we remain very concerned that non-$SF_6$ GIE that meets SCE's specific engineering standards and system needs will not be available before the proposed phase-out dates listed in the regulation. The Proposed Amendments take this into account by utilizing a tiered approach, with phase out that would take effect in stages between 2025 and 2033. We support the tiered approach, however, a GIE owners' ability to comply with the regulation will be heavily dependent upon manufacturers' development of new technologies in line with their anticipated timelines over the next 10 years. Therefore, the $SF_6$ phase-out exemption process is an incredibly critical

component of the regulation, and SCE supports an infeasibility exception process that will allow SCE to maintain safety, reliability and affordability of the grid....

*I.* *Modify $SF_6$ Phase-out table dates to be consistent with commercial availability and minimum testing requirements of GIE.*

SCE supports CARB's tiered phase-out schedule for new GIE purchases that is dependent upon the commercial availability of non-$SF_6$ equipment for each voltage class of equipment that is economically feasible and is linked to a robust $SF_6$ Phase-Out Exemption process to ensure $SF_6$ GIE phase-out does not compromise the safety, reliability, and integrity of the electrical system. The additional granularity that CARB has built into the phase-out schedules for kA rating and configuration in Table 1 and 2 in the Proposed Amendments is a helpful addition.

It is critical that phase-out dates consider not only commercial availability, but also allow necessary time for SCE to appropriately evaluate, test, install, and pilot new equipment for safe and reliable operation. CARB has proposed three years on top of commercial availability, which is helpful, but may not be sufficient, especially to pilot new technologies in real-world conditions at higher voltage levels. When executing a major technology change on the electrical system, time for careful testing is needed to understand how real-world application influences the new technology in terms of public and worker safety. For distribution GIE, the primary safety concerns include manhole explosion events and Arc Flash events. The additional time is necessary for each utility to gain operational experience to transition to new technology options which collectively have minimal proven operational performance as compared to the $SF_6$ GIE counterpart.

Once non-$SF_6$ equipment is considered commercially available by a manufacturer, SCE must follow a strict process before installing new equipment on SCE's electric system:

i. **Project design and specification writing (8 to 18 months lead time)**: Substation Apparatus must create a specification with project-specific details for a vendor to begin to develop and manufacture compatible equipment for SCE's electrical system.

ii. **Competitive bid, bid evaluation, and award (3 to 6 months lead time)**: Once the specification is approved, it is then shared externally with other vendors through either a Request for Information or Request for Proposal.

iii. **Manufacture of equipment (8 to 14 months lead time):** Time necessary to manufacture and deliver equipment.

iv. **Utility pilot testing and evaluation (60 months lead time):** Substation Apparatus must then perform a full technical evaluation in parallel with Supply Chain Management's commercial evaluation.

| | Voltage Levels | Commercial Availability Date of Non-$SF_6$ Equipment (Year)[2] | Lead Time for Project Design & Apparatus Spec Writing (# of months) | Competitive Bidding & Selection Process (# of months) | Manufacture of non-$SF_6$ Equipment (# of months) | Project Timing, Utility Pilot Testing & Evaluation of non-$SF_6$ Equipment (# of months) | Phase Out Date = (Commercial Availability Date) + (Project Design & Spec Writing) + (Competitive Bidding) + (Manufacture of Equipment) + (Utility Pilot Testing & Evaluation) |
|---|---|---|---|---|---|---|---|
| Substation | 72.5 kV | 1/1/2022 | 8 | 8 | 8 | 60 | 1/1/2029 |
| | 145 kV | 1/1/2022 | 8 | 8 | 8 | 60 | 1/1/2029 |
| | 245 kV | 1/1/2026 | 9 | 6 | 9 | 60 | 1/1/2033 |
| | 550 kV | 1/1/2028 | 16 | 6 | 14 | 60 | 1/1/2036 |

SCE's proposed edits to §95352, Sulfur Hexafluoride Phase Out, Table 1 and Table 2, are indicated below in underlined and ~~strikethrough~~ text:

**§95352. Table 1, Phase-out Dates for $SF_6$ GIE with Voltage Capacity ≤38 kV:**

| Configuration | Voltage Capacity (kV) | Short-Circuit Current Rating (kA) | Phase-Out Date |
|---|---|---|---|
| Aboveground | <38 | All | January 1, 2025 |
| | 38 | All | January 1, ~~2028~~ 2031 |
| Belowground | ≤38 | <25 | January 1, ~~2025~~ 2031 |
| | | ≥25 | January 1, 2031 |

**§95352. Table 2, Phase-out Dates for $SF_6$ GIE with Voltage Capacity >38 kV:**

| Voltage Capacity (kV) | Short-Circuit Current Rating (kA) | Phase-Out Date |
|---|---|---|
| 38 < kV ≤ 145 | < 63 | January 1, 2025 |

| | | |
|---|---|---|
| | ≥ 63 | January 1, ~~2028~~ 2029 |
| 145 < kV ≤ 245 | < 63 | January 1, ~~2027~~ 2033 |
| | ≥ 63 | January 1, ~~2031~~ 2033 |
| > 245 | All | January 1, ~~2033~~ 2036 |

… (SCE)

**Comment:**
SCE's written comments, as well as the JUG letter, get into all the technical details, but I do want to highlight two very important issues to us. The first challenge SCE will face is the timeline of anticipated commercial availability of non-SF6 GIE. From an engineering standpoint, we remain concerned that non-SF6 GIE, that means our specific engineering standards and system needs, may not be available before the proposed phase-out dates currently listed in the regulation.

CARB did point out in the presentation, they are allowing three years for utilities to pilot and procure, which we absolutely appreciate, but we also anticipate that we may need more time to thoroughly evaluate, test, install, and pilot new equipment for safe and reliable operation in real-world conditions to our standards, especially at higher voltage levels.

So as we heard from staff, CARB's solution to this concern is the phase-out exemption process. And we are all hoping that tech -- the technologies will be available within the phase-out dates, and the exemption process is a last resort. But we still want to emphasize that a clear and robust phase-out exemption process for those very specific circumstances where we may still need SF6 to support reliability is very critical…. (SCE2)

**Comment:**
While TID is supportive of the ARB's efforts to achieve carbon neutrality and reduce all GHG emissions, including SF6, the ARB must also carefully evaluate this Regulation in light of the Regulation's direct effect on the ability of utilities to manage their critical facilities and maintain grid reliability. TID appreciates the ARB's efforts to work with stakeholders, but remains concerned that the Draft Regulation would not allow sufficient flexibility to ensure that transmission and distribution operators can continue to meet <u>reliability</u> and <u>safety</u> standards, particularly at the higher voltage levels.…

We remain concerned that the technology pathway to alternatives is unclear and in the absence of a clear technology pathway, these terms will lead to unmanageable compliance risks for the utilities. Utilities do not have confidence in the market for high voltage GIE, TID would highlight the following issues....

<u>Discussion Section 95352</u>

*Table 2. Phase-Out Dates for SF6 GIE with Voltage Capacity > 38 kV* under **Section § 95352 Sulfur Hexafluoride Phase-Out** epitomizes TID's concerns reflected throughout our comments in this letter. While we appreciate the ARB's efforts to respond to comments on the pre-rulemaking drafts, we believe the phase out schedule is still problematic. From TID's perspective this table presents immediate compliance obstacles and will cause an over reliance on the technical infeasibility exemption during early years.

*Table 2. Phase-Out Dates for $SF_6$ GIE with Voltage Capacity > 38 kV*

| Voltage Capacity (kV) | Short-Circuit Current Rating (kA) | Phase-Out Date |
|---|---|---|
| 38 < kV ≤ 145 | < 63 | January 1, 2025 |
| | ≥ 63 | January 1, 2028 |
| 145 < kV ≤ 245 | < 63 | January 1, 2027 |
| | ≥ 63 | January 1, 2031 |
| > 245 | All | January 1, 2033 |

The *Table 2. Phase-Out Dates for SF6 GIE with Voltage Capacity > 38 kV* indicate that the ARB has only considered the assurances of manufacturers and a single California utility as its basis for developing the timeline. These projections, based on feedback from the industry, have been explained as unrealistic by many utilities in previous meetings, workshops, and formal letters submitted to the ARB. We feel this phase-out schedule is too aggressive given the current state-of-the-market combined with the necessary time utilities will require to thoroughly evaluate the new technology and train staff.

Even were non-SF6 technology market-ready today, in order to ensure a competitive bid process, the GIE meeting system requirements must be available from multiple manufacturers. Since there are essentially two types of technologies being developed at voltage levels greater than 69 kV, vacuum and non-SF6 gas alternatives, this requires that multiple vendors have market-ready equipment for each technology.

Subsequent to availability, there is significant time and cost that must be invested in order to ensure the utility is meeting strict standards for operating critical facilities in a reliable and predictable fashion. When grid reliability and public health is on the line, a utility must carefully evaluate and test new technologies prior to qualifying a manufacturer's product for use on a utility's system. TID is not positioned, neither from a budget perspective nor an engineering resource perspective, to conduct multiple pilots simultaneously. Optimistically, TID can conduct a pilot every two years, but three years is preferred. Assuming the market availability of the GIE and a start date in 2021, TID hopes to establish two vendors per technology by the end of 2029.

As it stands, piloting non-SF6 GIE projects places a disproportionate financial burden on smaller- and medium-sized utilities in comparison to the larger utilities in California.

This is especially true for utilities like TID whose customer base is primarily comprised of disadvantaged communities who cannot bear significant rate increases in a relatively short time horizon.

In a typical budget year, funds are adequate to replace two (2) failing or end-of-life breakers at voltages 69 kV and above. Conducting pilots at the 115 kV level will require phasing out equipment not slated for replacement, thereby reducing TID's capacity to address its aging 69 kV breaker fleet. Requiring a more aggressive evaluation cycle will further negatively impact the safe and reliable operation of TID's interconnected system by forcing continued operation of equipment that is in need of replacing.

The second problem with relying on over-optimistic assumptions corresponds to an over-reliance on exemptions. As described above, TID will not have two vendors qualified on its system for each technology by the beginning of 2025. Therefore, only SF6 GIE will allow for a competitive bid process and a phase-out exemption will be required due to the inability to evaluate alternatives over this timeframe. For a nominal voltage of 115 kV, this will be the case, at least until the end of 2027 and may extend past 2029. For the 230 kV voltage level, it is unlikely TID will ever qualify more than one vendor, if it does decide to run a pilot project. There are very few 230 kV breakers on the TID system. The critical nature of breakers at this voltage class cause the feasibility of conducting a pilot impractical. Please see the discussion below in **Section 95357(b)(1)(2)(3)(4)** for further discussion of this concern. To address these concerns and provide small and medium size utilities with more opportunity to test and evaluate alternatives, CARB should amend the Phase-out dates, as set forth in the following table:

*Table 1: Utility Proposed SF6 GIE Phase-Out Dates*

| **Voltage (kV)** | **Short-circuit Current (kA)** | **Utility Proposed Phase-Out Date** |
|---|---|---|
| ≤ 72.5 | < 63 | January 1, 2025 |
| ≤ 72.5 | ≥ 63 | January 1, 2028 |
| 72.5 < kV ≤ 145 | All | January 1, 2029 |
| 145 < kV ≤ 245 | All | January 1, 2033 |
| > 245 | All | January 1, 2036 |

…

Section 95357(a)

*(a) Pursuant to section 95352(a)(1), a GIE owner who wishes to acquire SF6 GIE after the applicable phase-out date indicated in Table 1 or Table 2 must electronically submit an SF6 phase-out exemption request to the Executive Officer that, if approved, would allow the GIE owner to acquire the requested SF6 GIE.*

Discussion

For TID the language being "if approved" is a major problem. Utilities need time to ensure the GIE they are installing is tested, proven, affordable, and compatible with their existing infrastructure. Making the determination for acquiring SF6 GIE after the phase-out date should lie with the utilities' engineering staff, not ARB personnel.

A solution to this problem is to change the "*if approved*" to "*when approved*".

Section 95357(b)(1)(2)(3)(4)

*(b) Beginning September 1, 2024, a GIE owner may submit an SF6 phase-out exemption request if either:*

*(1) Non-SF6 GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two suppliers; or*

*(2) Available non-SF6 GIE cannot meet the size requirements for the particular project(s) or application(s), taking into consideration the physical size of the GIE, the physical constraints of the project location(s), including required clearance; or*

*(3) Available non-SF6 GIE cannot be used for the specific project(s) or application(s) due to incompatibility with existing equipment, wiring, or connectors; or*

*(4) Available non-SF6 GIE is not suitable based on safety or reliability requirements*

Discussion

TID is extremely concerned that these provisions contemplate a scenario where the ARB would supplement its judgment for the expert determinations of professional engineers charged with managing critical facilities consistent with prudent utility practice. The decisions of the utilities' own professional engineers who are experts on the operations of their own transmission and distribution systems should be afforded deference in the following processes:

- SF6 phase-out exemption or
- Expedited SF6 phase-out exemption request.

A utility's engineering staff knows the complex interactions within the system and understands the attributes, restrictions, and risks of potential replacement GIE. Utility personnel, by necessity, act as the primary source of information tasked with identifying and resolving any issues associated with the GIE on their systems. If a utility's engineering personnel are responsible for resolving any incident, procuring GIE, testing and evaluating equipment, then it would follow that the utility personnel should be afforded deference in questions of whether an exemption is necessary.

To address this concern, TID recommends that the regulations provide that SF6 phase-out exemption and expedited SF6 phase-out exemption requests be subject to the following:

- the request would be submitted to the ARB with an attestation from the utility's [head engineer or responsible person] that the exemption is necessary and complies with all of the provisions set forth in the regulation, and
- The ARB's approval of the request will not be denied if such a valid attestation is provided.

A second and related problem is when GIE owners need to seek a phase-out exemption if equivalent non-SF6 GIE is not available from at least "two suppliers";

The proposed regulation essentially provide that a phase-out exemption request can be denied if the ARB determines that equipment is available from "at least two suppliers", however, the regulation does not include a definition or description of a "supplier";

The GIE owners are best suited to determine whether a "supplier" is a responsible provider of reliable equipment, able to meet the owner's requirements for things such as warranties and service;

To address this concern, TID recommends that the regulations provide that a SF6 phase-out exemption and expedited SF6 phase-out exemption request based on section 95357(b)(1) (Non-SF6 GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two suppliers) be subject to the following:

- The request for exemption would be submitted to the ARB with an attestation, from the utility's Lead Engineer or other responsible party, that there are not at least two qualified suppliers of the necessary equipment that would be able to fulfill the GIE owner's minimum requirements, and
- The ARB's approval of the request will not be denied if such a valid attestation is provided.

Finally, this section does not make it clear whose definition for "safety or reliability" will be used when determining whether non-SF6 GIE is suitable. Again, TID believes utilities and their professional engineering staff should be afforded deference in determining which GIE is safe and reliable through a comprehensive qualification process. At a minimum, TID would ask the ARB to rewrite this section either granting utilities the authority to determine what is safe, reliable, and compatible with their existing infrastructure or include a detailed process for working with utility personnel to qualify manufacturers of high voltage GIE.

Section 95357(d)(5)

*(5) The names of manufacturers contacted about the availability of non-SF6 GIE that might be appropriate for use in the project(s) described in section 95357(d)(3), and the dates contact was initiated;*

Discussion

This is another aspect of the Regulation that the ARB should afford deference to professional engineers of the utility in determining whether the equipment is available by at least two suppliers. For its own system, only suppliers that have been qualified by TID should be allowed to provide equipment for use on its system. For determinations related to TID's own system, TID should be able to rely on the use of its qualified vendor list to identify suppliers of the various technology equipment with distinct system characteristics. As vendor qualifications are completed utilities shall update their qualified vendor list. As such, this section should be revised to require submission of the utility's qualified vendor list so as to make ARB aware of the number of available suppliers available for a particular utility's system.

Section 95357(d)(8)(C)

*(C) For exemptions submitted under section 95357(b)(3), this includes a list of available non-SF6 GIE that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers and a justification that clearly explains why each of the available non-SF6 GIE identified are incompatible and how the SF6 GIE described in section 95357(d)(4) are compatible.*

Discussion…

Depending on the application, there are many performance requirements that a breaker must meet or exceed that are not identified in the phase-out tables. In general, the utility will develop a specification that describes the minimum capabilities of the GIE for the application. If a non-SF6 GIE that has been qualified for use by the utility cannot meet these requirements, this is likely borne out by a thorough review of the breaker design and comparison of the GIE ratings and utility specifications. TID submits that attestation by a utility's engineering staff that minimum specifications are not met by a non-SF6 GIE, should meet this submission requirement and that further supporting documentation justifying the determination shall not be required. TID would ask the ARB to approve all utility requests for exemptions under section 95357(b)(3) as the utility personnel are the individuals with the most expertise in determining which GIE is compatible with the existing infrastructure.

Section 95357 (d)(8)(D)

*(D) For exemptions submitted under section 95357(b)(4), this includes a list of available non-SF6 GIE that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers and a justification that clearly explains why each of the available non-SF6 GIE identified fail the safety or reliability requirements and how the*

*SF6 GIE described in section 95357(d)(4) do meet the requirements. If failure rates or other indicators of reliability are used, specific details must be provided. If the GIE owner's justification cites a company-specific policy or procedure that available non-SF6 GIE do not currently meet and that is within the control of the GIE owner (for example, the company requires three years of testing for new equipment), the justification must also provide an explanation as to how the GIE owner will address the situation to enable the transition to non-SF6 alternatives in a timely manner.*

Discussion

A utility cannot be expected to assess whether GIE is safe or reliable without first-hand experience. TID intends to pilot non-SF6 technology to ensure safety and reliability of a proposed GIE. If after the evaluation period a specific manufacturer has demonstrated failures, further business with the manufacturer will be subject to penalties applied in the procurement process. If mitigation measures do not result in improved performance, the vendor may be removed from a vendor list. Aside from its internal processes, a utility is not necessarily staffed to keep exhaustive tabs on the safe and reliable performance of every breaker available in the market. Unless a supplier has willingly disclosed design flaws, it is doubtful there is access to this type of information.

The last phrase of this section is one that should be considered and guide the phase-out exemption process: "…*the justification must also provide an explanation as to how the GIE owner will address the situation to enable the transition to non-SF6 alternatives in a timely manner…"* As stated in the opening of this letter, TID supports the transition away from SF6 as equally capable technology is developed, but the process should be measured and appropriate based on current levels of available resources and the need to operate the grid safely and reliably. Implementing the phase-out as it is presently described, requires a utility to be exposed to risk by not considering its preferred level of conservatism; requires the utility to commit to an overly aggressive evaluation ramp-up; or requires it to take on the additional engineering burden of attempting to ward off inferior equipment and suppliers by undertaking the goal of studying and researching each piece of GIE that becomes available by every possible supplier.

When a utility, as a good steward of the environment, prioritizes this transition, it is only appropriate to do so by relying on the expertise of knowledgeable staff and hired consultants. No two utilities are exactly alike, and some may be accepting of greater risk than others. If a utility is unable to keep pace with other utilities in this transition based on available resources, it should not be penalized for making informed decisions about the safe and reliable operation of its own system. Each utility will transition away from SF6 in a way that is unique to its own determinations of safety, reliability, and system management…. (TID)

**Comment:**

We recognize an excellent work that CARB has done in establishing a reasonable regulation, however, in addition to the above comments, on the $SF_6$ phase-out dates, we would like to direct CARB's attention towards $SF_6$ alternatives which must fulfil specific requirements: Long-term stability must preserve operator's CAPEX and OPEX and the $CO_2$ equivalent reduction must be assured over lifetime to be real environmentally friendly. Alternatives must also respond to the following questions:
- Shall sustainable $SF_6$ alternatives contain F-gases?
- Which technical performance restrictions are acceptable?
- Which EHS drawbacks offset GWP reduction?
- Are handling and process modifications riskless?
- Which socio economic impact must be considered?
- Are alternatives mirrored in upgrading of Standards – gas handling, GIE standards

Some of these questions are currently addressed by international activities at Study Committees of the International Council on Large Electric Systems (CIGRE). At IEC an ad hoc working group has identified the set of international Standards that will have to be adapted to cover alternative gases or gas mixtures to $SF_6$ in electrical equipment. Today an IEC Maintenance Team only addresses IEC 62271-4 "High-voltage switchgear and control gear - Handling procedures for $SF_6$ and its mixtures" with a targeted publication of the revised Standard by September 2022.

A range of alternative gases and gas mixtures for medium-voltage applications are promoted on the market in hopes of meeting demand for a full SF6 substitute. Those include natural origin gases ($N_2$, $O_2$, $CO_2$) and its mixtures and gas mixtures based on partially new developed other F-gases (e.g. Fluoronitrile, Fluoroketone) targeting to meet, or at least coming close to $SF_6$'s unique technical performance, i.e. among others dielectric behavior, switching and short-circuit capabilities, heat transfer, chemical stability incl. recombination ability. All of those while keeping today's $SF_6$ physical switchgear footprint.

Beside the technical performance of alternative gases and gas mixtures specific attention must be turned to environmental, health and safety (EHS) topics. An indication is given by the alternative substances manufacturer's Safety Data Sheets where the latest findings of applied pure substance research is recorded in revolving document issues. Although data might be available for amount of substance used today, data are missing for amount of substance to fully cover a wide application in industry.

In addition, end-of-life treatment of those substances and its mixtures applied in electrical equipment must be observed just as its alteration during the switchgear equipment's operation by electrical and chemical effects. Those relate e.g. to switching, ordinary or abnormal partial discharge and may produce by-products with anomalous EHS effects or influence the alternative gases' and gas mixtures' overall performance.

CARB's discussion draft of "Potential Changes to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear", include fixed phase-out dates when owners of medium-voltage $SF_6$ gas-insulated equipment may no longer acquire this kind of equipment.

Considering the fact that significant product development and gaining long-term experience in operation is still required, along with cost-intensive, complex, time-consuming overall industrialization of a comprehensive $SF_6$-free portfolio in order to cover the full range of today's $SF_6$ gas-insulated medium-voltage products and systems, a fixed phase-out date seems not to be appropriate.

It bears the risk that non-sustainable alternatives are forced into operation while important and essential EHS topics are still not exclusively answered.

CARB should allow frequent review of technological development in the area of medium-voltage electrical T&D equipment via piloting rather than providing fixed $SF_6$ equipment phase-out dates and making alignment with other international initiatives via best practice sharing....

Conclusion

Effective and economic support for the development and market readiness should be the goal for applications of new medium-voltage $SF_6$-free technologies from 2030 onwards. Economic concerns for manufacturers and operators must be considered, particularly since clear market signals are currently missing for a complete, cost-intensive, complex, time-consuming overall industrialization of a portfolio and for a further portfolio development application by application.

Clear distinction shall be made between medium-voltage sealed pressure system equipment versus high-voltage closed pressure system equipment. The International Electrotechnical Commission supplies a clear definition of those pressure systems which shall be applicable worldwide to avoid any disarray.

Special attention shall be turned to EHS topics and the socio-economic impact of promoted alternatives. Newly developed F-gases and its by-products leave questions open concerning its toxicity and remaining risks concerning carcinogenetic and mutagenic impact.

CARB should allow frequent review of technological development in the area of medium-voltage electrical T&D equipment via piloting rather than fixed $SF_6$ equipment phase-out dates.

Chronological adjustment with standardization activities which describe application, design and performance criteria and handling of alternative gases or gas mixtures in electrical equipment shall be considered. Other regional and international initiatives e.g. European F-Gas regulation, European Manufacturers and grid operator's self-

commitment, CIGRE Study Committees and IEC Standardization shall be reviewed for best practice sharing. (Siemens)

**Comment:**
Sulfur Hexafluoride Phase-Out—§ 95352(a)(4)
*Date Extension*
WSPA appreciates that CARB has taken previous comments from industries into consideration and provided tiered phase-out dates with extended windows, based on voltage capacity, amperage, and accessibility. WSPA agrees with CARB's reasoning on pages 6 and 8 of the Notice of Public Hearing on the proposed rule to extend the phase-out dates so that non-SF6 GIE is available from at least two manufacturers, to ensure that GIE owners have three years for testing new technology before employing it at their sites, and to accommodate capital planning cycles (indirectly benefiting refinery turnaround schedules). WSPA previously commented that larger equipment should be phased out first, so that the power industry with its experience, expertise, and technical capacity would be the lead adopters before smaller sources of GHG emissions from GIE were phased out. **WSPA still believes and suggests that smaller sources should be phased out later than larger sources**…. (WSPA)

**Comment:**
Section 95357 of the Proposed Amendments implements a phase-out schedule for SF6 circuit breakers and other GIE beginning with the year 2025. As stated in previous SDG&E letters, it is imperative that the Proposed Amendments are aligned with the availability of commercially manufactured and utility tested SF6 alternative GIE, to ensure SDG&E's electric grid can be operated in a safe, reliable, and cost-effective manner.

Until new (tested and certified) SF6 alternative GIEs are made available, it is critical that existing SF6 GIE and spare SF6 GIE be preserved for use to safely and reliably operate the electric grid. The incorporation of new SF6 alternative GIE into existing facilities may require significant changes (i.e., footprint and configuration within a substation), which will subsequently require adequate time to permit and construct. Lastly, the costs associated with the transition to non-SF6 GIE will be paid by SDG&E's customers, so it is vitally important that the Proposed Regulations strike a realistic balance between the phase-out schedule and multilayered requirements to implement such SF6 alternative GIE…. (SDG&E)

**Comment:**
It is paramount, notwithstanding the aggressive limits on emissions from existing $SF_6$ GIE and the phase-out schedule of $SF_6$ in GIE, that the Proposed Amendments are implemented without compromising grid safety and reliability, and in recognition that the costs of the transition away from $SF_6$ GIE will be borne by the state's electricity customers. This transition needs to adopt alternative technologies that meet industry standards, are cost-effective, and consider the need for utilities to maintain the necessary parts and equipment to support existing equipment through its useful life....

VIII. § 95357 - $SF_6$ Phase-Out Exemption.

A. The Utilities Group proposes the following amendment to specify that GIE purchased prior to, but entering California after the phase-out date will qualify for a phase-out exemption:

**AMEND** § 95357 (a). Pursuant to section 95352(a)(1), a GIE owner who wishes to acquire SF6 GIE after the applicable phase-out date indicated in Table 1 or Table 2 or as allowed in 95352 (a)(3) must electronically submit an SF6 phase-out exemption request to the Executive Officer that, if approved, would allow the GIE owner to acquire the requested SF6 GIE.

B. The Proposed Amendments properly include a provision for GIE owners to seek a phase-out exemption under certain conditions. The Utilities Group supports the objective of the phaseout but need the ability to maintain their existing SF6 GIE equipment that is critical for a safe and reliable electricity supply. For this reason, it is important that the regulation acknowledge that all decisions related to the replacement of $SF_6$ equipment, under both ordinary operations and in the event of equipment failure, are appropriately made by the utilities' own experts. The GIE owners' employees and engineers have intimate knowledge of their respective systems and make these decisions. As drafted, the proposed regulations would grant a third-party the authority to second-guess the decisions of the utilities' own experts in determining whether to approve either an $SF_6$ phase-out exemption or expedited $SF_6$ phase-out exemption request. The Utilities Group proposes that the regulation be amended to address this concern and recommends that the Proposed Amendments provide that $SF_6$ phase-out exemption and expedited $SF_6$ phase-out exemption requests be subject to the following: (1) the request would be submitted to CARB with an attestation from the GIE owner's lead engineer that the exemption is necessary and complies with all of the provisions set forth in the regulation, and (2) CARB's approval of the request will not be denied if such a valid attestation is provided.

C. The Utilities Group acknowledges that a justification for acquiring SF6 GIE after phase-out dates must be submitted to CARB to be considered for an exemption. The exemption application requires the manufacturer and maker information of the SF6 GIE. However, it should be recognized that the bidding process for municipalities are based on a "lowest (cost) responsive bidder." That is, in most cases, the GIE owner will not have the specific SF6 GIE information at the time the exemption application is submitted. Conversely, if the GIE owner were to wait after bids for the SF6 GIE are evaluated and then, send the application to CARB, this will require that SF6 GIE suppliers extend their quote validation period to observe both municipalities' board approvals and CARB review periods. It is not guaranteed that the suppliers may want to do that. The Utilities Group proposes the following amendment:

AMEND § 95357(d)(4). Description and quantity of SF6 GIE to be exempted, including but not limited to the GIE characteristics (per Tables 1 and 2) and equipment type, seal type, proposed manufacturer and model, and nameplate capacity;

D. GIE owners may seek a phase-out exemption if equivalent non-$SF_6$ GIE is not available from at least "two suppliers." The proposed regulation essentially provides that a phase-out exemption request can be denied if CARB determines that equipment is available from "at least two suppliers." However, the regulation does not include a definition or description of a "supplier." The GIE owner must be able to procure equipment from a qualified supplier; it is the GIE owners that are best suited to determine whether a "supplier" is a bonafide provider of the necessary equipment, able to meet the owner's requirements for things such as warranties and service. The Utilities Group does not believe that CARB should define the metrics for determining whether a supplier is qualified. Because utilities (and their governing bodies) are best suited to make the determination of whether a supplier is qualified to provide the services, the regulation should not actually define a supplier that would be universally acceptable. Rather than include such a definition, the Utilities Group proposes that the regulations acknowledge that the GIE owner must attest that the equipment is not available from at least two qualified suppliers, as the GIE owner has determined the suppliers' qualifications. The Utilities Group proposes the following **amendment**:

**AMEND** § 95357(b)(1). Non-SF6 GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two suppliers; or be subject to the following: (1) the request for exemption would be submitted to CARB with an attestation from the GIE owner's lead engineer that there are not at least two suppliers of the necessary equipment that would be able to fulfil the GIE owner's minimum requirements for vendors, and (2) CARB's approval of the request will not be denied if such a valid attestation is provided.

**AMEND** § 95357(d)(8)(A). For exemptions submitted under section 95357(b)(1), this includes the specific GIE characteristics (per Tables 1 and 2) that cannot be met by at least two suppliers or be subject to the following: (1) the request for exemption would be submitted to CARB with an attestation from the GIE owner's lead engineer that there are not at least two suppliers of the necessary equipment that would be able to fulfil the GIE owner's minimum requirements for vendors, and (2) CARB's approval of the request will not be denied if such a valid attestation is provided….

H. Amend $SF_6$ Phase-Out Exemption Request Procedure. The Utilities Group recognizes CARB's flexibility in allowing for multiple GIEs of the same type to be exempted under one application. However, limiting the validity of the

application to 24 months could create a non-technical burden for utilities to either:

a. Install/replace all equipment of the same type within a 24-month period, or
b. Resubmit/restart a new procurement process to acquire non-$SF_6$ GIE after 24 months, where most likely, equipment would still be unavailable.

The Utilities Group recommends the following **amendments**:

**AMEND § 95357(j).** A GIE owner with an approved SF6 phase-out exemption may ~~acquire~~ identify and order the specific SF6 GIE described in the SF6 phase-out exemption within 24 months of CARB's approval of the request, or within three months of CARB's approval of an expedited SF6 phase-out exemption request. If the SF6 GIE are not acquired within the specified timeframe, the GIE owner must submit another SF6 phase-out exemption request. The SF6 GIE acquired shall only be used in the specified project(s) identified in section 95357(d)(3). There is no date by which SF6 GIE acquired utilizing an SF6 phase-out exemption must be placed into active service, or removed from active service…. (JUG)

**Comment:**
Phase out of $SF_6$ GIE

DILO is prepared to support the industry as new solutions are launched to replace $SF_6$ GIE with alternative solutions. However, as stated in earlier correspondence, it is unclear if the process and time frame to reach 100% compatibility of alternative solutions will meet the same level of performance of $SF_6$ gas across all voltages and current ratings per the proposed phase out dates…. (Dilo)

**Comment:**
[Availability of Clear Exemption Guidelines]…
[NextEra] supports the current proposed §95357, but urges Staff to consider a prescriptive or self-certification exemption framework under which §95357 would outline the requirements which are needed to substantiate exemptions from the phase-out and the requirement that CARB staff verifies the requirements have been met. This process has the benefit of streamlining the exemption process and creating administrative efficiency which may lead to the reduction in the currently proposed 75-day exemption review timeline.

Applicability of Phase-Outs to Qualifying GIE
NEER seeks to clarify that the Phase-Outs should not apply to certain GIE. GIE that is spare equipment in inventory, acquired prior to an applicable Phase-Out date, should be exempt from categorization as new equipment if such spare is not placed into

service until after an applicable Phase-Out date. Phase-Outs should only apply to new equipment.... (NEER)

**Comment:**
LADWP's roles as a multi-utility Balancing Authority, and as an open-access transmission provider with 26 percent of the state's transmission capacity, necessitate that, at any given moment, electrical energy destined for numerous users throughout California travels through LADWP's power system, much of which depends on SF6-insulated equipment. Reliability of the electric power system is essential for public health and safety. LADWP encourages CARB to keep reliability of the power system in mind as it considers the Proposed Amendments to the SF6 Regulation.…

LADWP offers the following comments on the phase out exemption.…

b. Procurement of GIE for use in the electric power system must go through an engineering and specification process. The utility engineer(s) that perform the evaluation are the subject matter experts who have intimate knowledge of the electric system and type of GIE needed for each application. In addition, utilities procure GIE from qualified suppliers of reliable equipment that can meet the utility's specifications and requirements. The utility lead engineer's determination that the procurement of a GIE is necessary and meets the requirements for an exemption should be sufficient to warrant an approval. In the Proposed Amendments, the potential for CARB to deny the exemption creates regulatory uncertainty. It seems reasonable that if the request for exemption meets all the criteria laid out in the regulation to obtain an exemption, then the exemption should be approved. To address this uncertainty, LADWP supports the Utilities' Group proposal that SF6 phase-out exemption requests would be submitted with an attestation from the lead engineer that the exemption is necessary and complies with all the criteria to receive an exemption set forth in the regulation, and CARB's approval of the exemption will not be denied if such an attestation is provided.… (LADWP)

**Comment:**
But just like instances that involve equipment failure and emergencies, decisions regarding the feasibility of replacing existent GI -- existing GIE are going to be technical and utility specific. And we recommend that the proposed amendments be modified (inaudible) the need for deference the utility engineers when submitting the applications for non-emergency phase-out exemptions consistent with the specific parameters set forth in the proposed regulation and subject to an attestation.…

In closing, we note that the transition to non-SF6 equipment is important, but there are also cost and technical implications that need to be considered. And therefore, this transition must be carried out in a way that does not unduly burden electricity ratepayers or compromise grid reliability at the same time that the State will be relying even more heavily on electricity. (NCPA)

**Comment:**

4. *Phase Out Exemption (95357)*: The ARB should revise this request process to specifically acknowledge determinations by Professional Engineers responsible for operating critical facilities.…

*IV. The ARB Should Revise Section 95357 to Explicitly to Acknowledge the Expert Determinations of Professional Engineers Responsible for the Operation of Critical Facilities.*

WPTF appreciates the ARB's recognition in the Proposed Regulation of the need to account for situations where SF6 GIE may be needed after the phase out. There are a number of justifications a GIE owner may offer. Enabling flexibility in the exemption review process is critical because there may be many different situations and circumstances where operators of critical facilities. Within the list of situations, WPTF specifically supports the inclusion of "specific project or application(s) due to incompatibility with existing equipment, wiring or connectors." While the ARB does not include a specific cost justification, we understand the phase out exemption request process would allow for the acquisition of SF6 after the phase out in situations where reconfiguring existing systems would be overly burdensome or costly. In making these determinations, it is important to recognize that operating engineers at critical facilities are in the best position to evaluate the feasibility of SF6 alternatives. The ARB should recognize this expertise by explicitly relying and deferring to attestation provided by professional engineers under Section 95357…. (WPTF)

**Comment:**
**§ 95357(j) $SF_6$ Phase-Out Exemption.**

We support new language to allow for multiple GIEs of the same type to be exempted under one application. However, limiting the validity of the application to 24 months may be challenging and will create additional burden for utilities to either:

a. Install/replace all equipment of the same type within a 24-month period, or
b. Resubmit/restart a new procurement process to acquire non-$SF_6$ GIE after 24 months, where most likely, equipment would still be unavailable.

Alternatively, we recommend revising the 45-day Language as follows:

> *"A GIE owner with an approved $SF_6$ phase-out exemption may ~~acquire~~ identify and order the specific $SF_6$ GIE described in the $SF_6$ phase-out exemption within 24 months of CARB's approval request…."*… (SF6&AltCoal)

**Comment:**
Metropolitan strongly emphasizes that the industry needs fully vetted, reliable, and robust non-$SF_6$ GIE alternatives in order to continue to safely and reliably deliver water to its customers in an environmentally responsible way…. (MWDSC)

**Comment:**
**Exemptions**
Any exemptions that are given pursuant to this rule should be reviewed every year in order to have an exemption renewed. A time limit is critical in incentivizing towards a complete phase-out of SF6…. (CCA)

**Comment:**
Any exemptions that are given pursuant to this rule should be reviewed every year, in order to have an exemption renewed…. (CCA2)

**Agency Response:**
Some commenters expressed concern that the phase-out schedule is too aggressive. Rationale for this position included that necessary technology would not be available in time, that there is not high confidence in the market for certain GIE, and/or that they need more than the proposed three years to test non-$SF_6$ GIE. Two commenters requested alternative phase-out dates for certain categories of GIE, claiming that three years was insufficient to conduct the necessary testing. One commenter suggested CARB staff not assign a fixed phase-out schedule for medium-voltage GIE at all.

As discussed in the ISOR, to develop the phase-out schedule, CARB staff followed a rigorous process that reflects feedback from manufacturers and regulated entities. This process considered technical availability of non-$SF_6$ GIE alternatives, cost and supplier considerations, and the need for testing by GIE owners. CARB staff consulted with more than ten manufacturers currently developing non-$SF_6$ GIE to learn when their products are expected be commercially available. During this more-than-year-long process, manufacturers shared their product development schedule with CARB staff, and the portions of that information CARB staff was able to make public are included on pages 23-26 of the ISOR or on manufacturer websites. In some cases, for example belowground GIE with a voltage capacity less than or equal to 38 kV and short-circuit current rating greater than or equal to 25 kA, manufacturer-provided dates aggregated equipment types in a way that did not address specific product concerns raised by stakeholders, and CARB staff instead used date information provided by GIE owners about the expected availability of non-$SF_6$ GIE that would work on their specific systems. CARB staff structured the categories of GIE characteristics based on stakeholder comments during the informal public process that preceded the formal rulemaking, as well as data collected from the manufacturers, resulting in specific dates that varied by voltage level, short circuit current ratings, and whether the device would be used above- or below-ground.

To ensure that there would be a competitive marketplace for non-$SF_6$ GIE that would facilitate reasonable price-setting for these non-$SF_6$ GIE, and in response to stakeholder comments, CARB staff based all the phase-out dates proposed in the Regulation on the dates when two or more manufacturers stated that each specific type of non-$SF_6$ GIE will be available, plus three years for GIE owners to test the

GIE in their operations. This three-year testing window is based on stakeholder feedback, received during the informal rulemaking process, that three years is the most typical amount of time organizations require to ensure that new products are safe, reliable, and deployable. Regulated entities also informed CARB that their capital planning cycle is typically three to five years. As such, given timing of the regulatory process, the final Regulation sets the first phase-out date to be no sooner than January 1, 2025 to accommodate this timeline, even though there are numerous types of GIE commercially available today from multiple manufacturers. As described in more detail in the ISOR, the following types of non-$SF_6$ GIE are available from multiple manufacturers today, unless otherwise specified:

- Belowground, ≤ 38 kV, short-circuit current ratings < 25 (kA)
- Belowground, ≤ 38 kV, short-circuit current ratings ≥ 25 (kA)
- Aboveground, < 38 kV, all short-circuit current ratings (kA)
- Aboveground, 38 kV, all short-circuit current ratings (kA) (one manufacturer)
- 38 < kV ≤ 145, short-circuit current ratings < 63 (kA)

Finally, while phase-out dates reflect careful planning and it is anticipated that non-$SF_6$ GIE will be available in advance of the phase-out dates, CARB staff recognizes that in some specific cases GIE owners may still need to install $SF_6$ GIE after the corresponding phase-out dates. As such, because ensuring the reliability of the grid and operation of critical facilities is paramount, the Regulation includes a phase-out exemption process by which GIE owners can apply for approval to acquire GIE after the phase-out dates if:

- Non-$SF_6$ GIE of the equipment type and GIE characteristics necessary for the particular project(s) or applications(s) are unavailable from at least two suppliers;
- Available non-$SF_6$ GIE cannot meet the size requirements for the particular project or application(s), taking into consideration the physical size of the GIE, the physical constraints of the project location(s), including required clearance;
- Available non-$SF_6$ GIE cannot be used for the specific project(s) or application(s) due to incompatibility with existing equipment, wiring, or connectors; or
- Available non-$SF_6$ GIE cannot meet required technical specifications and/or are not suitable based on the GIE owner's documented safety or reliability requirements.

Additionally, the final Regulation includes a notification process whereby GIE owners can install $SF_6$ GIE after the corresponding phase-out date to resolve a failure, as defined in the Regulation.

The commenters requesting date changes, elimination of fixed phase-out dates for medium-voltage GIE, or other revisions to the phase-out schedule due to concern over the market readiness or availability of certain equipment types did not provide

any information or data that demonstrated that non-$SF_6$ GIE would not be commercially available from two or more manufacturers three-years in advance of CARB's proposed phase-out dates. While CARB agrees with stakeholders that insufficient demand has been the limiting factor for broader deployment of non-$SF_6$ GIE at certain voltage levels, the final Regulation and mandated $SF_6$ phase-out would generate a more certain market for non-$SF_6$ GIE in California, spurring manufacturers to complete planned product development. This is evidenced by the extent to which manufacturers publicly shared future development schedules. The Regulation and accompanying information on non-$SF_6$ GIE availability can also serve as a model for other jurisdictions or other GIE owners to adopt similar policies to phase out of $SF_6$. Further, GIE owners have the phase-out and notification processes available to them when certain conditions are met. The phase-out exemption and notification processes allow for limited use of $SF_6$ GIE, which is necessary to facilitate the transition to non-$SF_6$ GIE and ensure the reliability of electrical operations in California. Based on this and the rigor and transparency of the process that staff followed to develop the phase-out schedule, CARB staff did not incorporate any requested changes to the schedule.

One commenter requested later phase-out dates for smaller sources so the "power industry" would be subject to the phase-out first. CARB staff interprets "smaller sources" to mean those with lower system-wide $SF_6$ capacity; however, it is not clear if the commenter is requesting later phase-out dates for non-power sector GIE owners, or for those with an $SF_6$ capacity below a certain value. This commenter did not propose any revised dates, nor provide a technical explanation why non-$SF_6$ GIE could not be installed in their systems. CARB staff's understanding is that operation and functioning of GIE is undifferentiated by the sector in which it is used (e.g., refineries, utilities) or the system-wide capacity of the GIE owner. Further, none of the manufacturers with whom CARB staff discussed non-$SF_6$ product availability indicated that their products would only be compatible with certain industry types. For these reasons, the phase-out schedule remains unchanged.

Some commenters stated that the phase-out should only apply to new GIE, and should not apply to in-use or spare GIE. One commenter requested section 95357(a) be modified to specify that GIE purchased prior to, but entering California after, the phase-out date, qualify for an exemption. CARB staff agrees: the phase-out dates specified in the final Regulation apply only to acquisition of new equipment. This means that GIE already acquired by the GIE owner prior to those dates, including spares, may be activated after the phase-out dates, and may be operated through the end of their lifetime regardless of whether they are initially activated before or after their respective phase-out date. However, the commenter's suggested change to 95357(a) is unnecessary, because section 95352(a)(3) already allows for acquisition of $SF_6$ GIE purchased prior to the phase-out without the need to file an exemption at all.

Several commenters expressed concerns related to the phase-out exemption provision that would allow an exemption if non-$SF_6$ GIE are "unavailable from at least two suppliers." Concerns included how a "supplier" would be defined, that the "universe" of suppliers they must consider is undefined in the Regulation, and that there would be an expectation that GIE owners must keep exhaustive tabs on every supplier's products to track and prove "unavailability." One commenter noted that GIE owners keep lists of suppliers that are "qualified" for their operations, and recommended that the two-supplier provision apply only to that list of qualified suppliers who are able to respond to their bid solicitations.

CARB staff has revised the Regulation to address these concerns. The 45-day Public Notice specified that a GIE owner may apply for an exemption when non-$SF_6$ GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two suppliers, but did not define the term "supplier" or otherwise specify the universe of suppliers that must be considered. To address the commenters' concerns, the final Regulation specifies in sections 95357(b) and 95357(l) that only those suppliers that submitted bids for the specific project(s) must be considered. This means that if non-$SF_6$ GIE meeting the GIE characteristics defined in Tables 1 or 2 are not available from at least two suppliers that submitted bids, the GIE owner could request an exemption. The specification that only those suppliers that submitted bids for the specific project(s) must be considered defines the universe of suppliers that must be considered. Further, limiting this provision to apply only to bids received addresses concerns related to those suppliers being "qualified" by the GIE owner, since a GIE owners qualified supplier list will specify those suppliers that are able to bid.

Relatedly, commenters indicated GIE owners may be unable to qualify more than one vendor at certain voltage levels and that multiple vendors for each type of technology must be qualified to ensure a competitive bid process. The revision noted above allows for use of a phase-out exemption if the GIE owner does not receive bids for non-$SF_6$ GIE from more than one supplier. CARB staff made this revision in response to stakeholder feedback that each GIE owner may have a different process for gathering bids, ranging from open solicitations that allow bids from any manufacturer to more limited solicitations that only go out to a list of qualified suppliers. CARB staff used the term "universe" of suppliers to refer to those suppliers eligible to bid based on the bidding process used by the GIE owner.

There is a concern, however, that GIE owners could use this justification in perpetuity should they not perform the research necessary to add other non-$SF_6$ suppliers to their qualified supplier list. To address this concern, the final Regulation includes requirements that the GIE owner submit the names of manufacturers that submitted bids, a description of the universe of entities that were eligible to bid (e.g. public solicitation, qualified vendor list), and an explanation of the efforts the GIE owner will undertake to identify applicable non-

$SF_6$ GIE to enable the transition to non-$SF_6$ alternatives in a timely manner. Collectively, these revisions grant near-term flexibility to GIE owners while ensuring that the GIE owner ultimately works to transition to non-$SF_6$ GIE devices in the longer term. Also, CARB staff wishes to clarify that GIE owners can still acquire non-$SF_6$ GIE when only one supplier has been qualified. Qualification of two suppliers is not a pre-requisite for the acquisition of non-$SF_6$ GIE. In fact, the GIE owner is encouraged to purchase non-$SF_6$ GIE wherever possible.

Commenters expressed concerns over the costs associated with the transition to non-$SF_6$ GIE, including the costs of incorporating non-$SF_6$ GIE into existing facilities. They noted in some cases that these costs will be paid by customers, and stated the phase-out should be carried out such that it does not unduly burden electricity ratepayers. Regarding incorporation of non-$SF_6$ GIE into existing facilities, as discussed in the ISOR, CARB staff is aware that in some cases non-$SF_6$ GIE may not meet the size specifications required by the GIE owner, and therefore a phase-out exemption may be requested when available non-$SF_6$ GIE cannot meet size requirements. Therefore, the Regulation does not impose significant retrofit costs beyond what may be necessary for any typical equipment replacement process.

With regard to the costs of the transition associated with procurement of non-$SF_6$ GIE, the inclusion of the "two suppliers" exemption provision discussed above is intended to ensure a competitive marketplace such that costs of non-$SF_6$ GIE can remain reasonable. Additionally, despite the capital cost, which is anticipated to be higher, some non-$SF_6$ GIE have lower maintenance costs and/or do not need to be reported to CARB, thus providing cost savings over the long term. As shown in Tables 10 and 13 of the ISOR, by 2036, the last year in which costs and cost savings were estimated, cost savings associated with the proposed amendments will have grown to nearly match costs, and annual savings will continue on throughout the life of the GIE. Thus, while there may be some near-term costs associated with the transition to non-$SF_6$ GIE, in the long-run the transition should help lower overall costs.

Commenters expressed concern with the exemption category that is available when available non-$SF_6$ GIE "are not suitable based on safety or reliability requirements." Commenters noted concern over whose definition for "safety or reliability" would be used to judge the validity of exemption requests; stated that GIE owners should have the authority to determine what is safe and reliable with their existing infrastructure; and said that if CARB staff did not grant them that authority, the Regulation should include a detailed process for working with GIE owner personnel to qualify manufacturers. One commenter also suggested that the phase-out schedule might "force" the GIE owner to use a new technology before the GIE owner has explored needed environmental, health, and safety (EHS) issues.

In response to these concerns, the final Regulation specifies that the safety/reliability exemption category is specific to the GIE owner's requirements for safety and reliability. This gives GIE owners authority to define what "safety

and reliability" means to their own system, and the Regulation in no way "forces" GIE owners to use a technology that they don't deem safe and reliable. This provision is also offered in addition to the "two suppliers" exemption category, providing GIE owners with multiple valid options to justify the need to use $SF_6$ GIE after the phase-out. As a result of this revision, the requested provision for CARB staff to work with the GIE owner to qualify manufacturers is not necessary.

Commenters stated the process to qualify a manufacturer's product for use involves multiple steps, indicating they may not be possible to complete the qualification process before the phase-out begins or financial constraints at small- and medium- sized GIE owners will make it challenging to qualify multiple vendors by the start of the phase-out. It is important to note the final Regulation does not apply to $SF_6$ GIE that GIE owners already own and keep as spares or operate, and thus the onset of phase-out date does not require immediate replacement of $SF_6$ GIE with non-$SF_6$ alternatives. Instead, it will apply when GIE owners want to install new equipment for new projects or to replace other GIE that have reached the end of their life. As such, GIE owners will not necessarily need to begin using non-$SF_6$ GIE on the specified phase-out dates, but rather will need to plan for GIE installations that will need to occur after that date. Further, if there are concerns about specific applications, GIE owners can use their spares or otherwise plan for purchases prior to the phase-out dates. Also, the "safety and reliability" exemption category was included in the proposed amendments in part due to these concerns. Because GIE owners already have sufficient lead time for planning, and have flexible options for compliance, no changes were made to the Regulation in response to these comments.

A commenter stated that the GIE characteristics listed in Tables 1 and 2 do not sufficiently address the technical and performance requirements they may have for a GIE device, and it is unclear which exemption category should be used for such technical constraints. To address this concern, in the final Regulation, CARB staff modified the "safety and reliability" exemption request in the first 15-day Public Notice by adding "cannot meet required technical specifications," consistent with CARB staff's original intent. This commenter also raised the "qualified supplier" concern expressed earlier. The manner in which a "qualified supplier" is defined varies by GIE owner, but generally means a supplier that can meet the GIE owner's standards for things like reliability, warranties, and service. Therefore, revisions made to the "two supplier" provision described above can also serve to alleviate this concern.

A number of commenters expressed concern that the phase-out exemption process, as initially proposed, would grant a third-party (CARB staff) the authority to second-guess the decisions of the utilities' own experts in determining whether to approve a $SF_6$ phase-out exemption. Commenters requested the Regulation acknowledge that the decision to acquire GIE should

lie exclusively with the GIE owner's experts, that CARB should not deny a phase-out exemption whose need is attested to by the GIE owners' technical experts, and that language referring to approval of an exemption request should be changed from "if approved" to "when approved." Another commenter urged CARB staff to consider a prescriptive or self-certification exemption framework which would outline the requirements needed to substantiate exemptions, and that, as part of the approval process, CARB staff verifies these requirements have been met.

CARB staff agrees that the Regulation should outline the requirements for the information that must be submitted in exemption request, and that CARB staff should verify that all required information has been submitted. Sections 95357(d)(8)(A-D) of the Regulation list the specific materials that GIE owners must provide to CARB; each section references the section number of the corresponding phase-out exemption category and lists specific materials that must be provided that pertain to that specific category. CARB staff would need this information to verify that the exemption request is complete and includes the information required in the Regulation. This information must be submitted along with a signed attestation statement that the statements and information provided are true, accurate, and complete pursuant to section 95357(d)(6). There are no changes to the final Regulation as a result of this comment.

Regarding the concern that CARB staff would second guess decisions reached by GIE owner experts, the provisions in the Regulation specify the circumstances under which a GIE owner may utilize a phase-out exemption and specify the materials that must be provided to CARB to support the exemption. To emphasize and clarify this perspective, the second 15-day Public Notice includes revisions, consistent with stakeholder comments, to clarify that CARB staff will review each exemption request to ensure the requirements of section 95357 have been met, and that if the exemption request is deemed complete per the Regulation's requirements, it will be approved. Sections 95357(d)(8)(E) and 95357(f) which related to CARB staff's determination that an exemption request is "complete" were modified to specify that once the completeness determination is made, the exemption request is also approved. Additionally, section 95357(g), which originally granted CARB staff 30 days to notify the submitter of the approval or denial of a request was modified to eliminate the 30-day review period, as requested by commenters, to further clarify CARB staff's review will be limited to the completeness of the request.

One commenter requested any exemptions given be reviewed every year. Conversely, two other commenters requested CARB staff change the time period in which GIE can be acquired after approval of an exemption request from 24 months to an indefinite time period so long as the GIE were "ordered" within 24 months after CARB's approval. CARB staff's interpretation of the comment that requested exemptions be "reviewed every year" is that once an exemption is granted, the GIE owner may only acquire associated GIE for one

year and after that a new exemption request would need to be submitted, and approved, for the GIE owner to acquire additional GIE. The 45-day Public Notice required acquisition of requested GIE within 24 months of CARB's approval of the exemption request. As discussed in the ISOR, this deadline was informed by stakeholder feedback and intended to strike a balance between two competing factors. On one hand, manufacturer lead time to develop and deliver an $SF_6$ GIE product can be over one year, meaning it would not be appropriate to limit acquisition of $SF_6$ GIE to one year from the date the exemption was approved. On the other hand, the non-$SF_6$ GIE market is anticipated to be continually evolving, and so a time limit was imposed on phase-out exemptions to facilitate reasonably-spaced checks of non-$SF_6$ GIE availability, and to disincentivize overreliance on long-duration exemptions that could hinder transition to non-$SF_6$ GIE. Further, once the GIE are acquired, there is no specified timeframe in which the GIE must be activated or retired, providing the GIE owner the flexibility to use the GIE as needed once acquired. As such, the final Regulation's deadline to acquire exempted GIE within 24 months of approval of the exemption request is appropriate and this provision has not changed.

One commenter stated that in most cases the GIE owner will not have the specific $SF_6$ GIE information required by section 95357(d)(4) available at the time the exemption request is submitted. More specifically, commenters requested CARB modify this section to require a "proposed manufacturer" be identified in the exemption request. CARB staff disagrees with the request to allow the GIE owner to provide a "proposed manufacturer." GIE owners should be able to receive bids from both $SF_6$ and non-$SF_6$ manufacturers at the onset of their process, then, if none of the GIE proposed by non-$SF_6$ manufacturers are workable, identify the $SF_6$ manufacturer from whom the device will be purchased prior to submittal of the exemption request.

One commenter advocating for a delay to the phase-out for medium voltage GIE stated that newly developed F-gases and by-products leave questions open concerning toxicity and risks concerning carcinogenetic and mutagenic impact. Evidence was not provided to back up the commenter's claim that use of alternative gases would cause any sort of negative health impacts. The alternative gases known to CARB staff have been used in Europe for several years,[10] and CARB staff is unaware of any reported health and safety issues. Use of both the emerging alternative gases and $SF_6$ can lead to byproducts that require special handling by personnel with the appropriate safety training. Alternative gas manufacturers have indicated the handling procedures for alternative gases and $SF_6$ are comparable.

[10] https://www.gegridsolutions.com/products/brochures/sf6-free_g3-flyer-en.pdf

## B-3. Revise Other Phase-Out Exemption Process Details

**Comment:**

F. The timing set forth in proposed section 95357(e) does not reflect the real-world circumstances under which the GIE owners operate. The Utilities Group recommends that the GIE owners receive conditional approval with a phased approach to requests. Once a project goes through the bidding process (twice, due to non-availability of equipment), the project would be far behind schedule, which could impact the energization of the equipment and could have financial and/or reliability consequences if utilities must wait until the end of the procurement process to submit for approval. Further, in order to ensure that the process is timely, CARB should confirm receipt of the request within two days of submittal, as waiting a full week to even know whether the request has been received will unduly delay the process…. (JUG)

**Comment:**

a. Most steps in the process state the number of days to complete the action. "Day" is defined as one calendar day. The exception is section 95357(i)(1) which specifies "within two State of California business days". Please clarify that, unless otherwise specified, the number of days in each step of the process are calendar days not business days…. (LADWP)

**Comment:**

The concern with this section is whether it is appropriate for a utility to provide any GIE manufacturer's equipment detail to ARB that may, or may not, be proprietary…. (TID)

**Agency Response:**

One commenter requested CARB staff confirm receipt of a phase-out exemption request within two days instead of one week. To confirm receipt of a phase-out exemption request, CARB staff would need to first receive the request and process it to issue a receipt. This involves logging the request, assigning it a number, and sending the receipt. Given competing workload priorities, weekends, and holidays, this process could take up to one week in some cases and therefore CARB staff has retained the one week deadline.

One commenter requested conditional approval for exemption requests, citing CARB's review process as a factor that could lead to project delays. CARB staff assumes the commenter desires the ability to proceed with acquisition of the requested GIE while CARB staff reviews the exemption request. The regulatory requirements stipulate the process that must be followed to acquire $SF_6$ GIE after the phase-out dates, and CARB staff has a duty to ensure all justifications for exemptions submitted are true, accurate, and complete. Conditional approval, which could result in a large capital expenditure and compliance issues if the exemption request is not approved, is not appropriate. In terms of the cited potential project delays, the commenter cited no specific data to support the concern. CARB staff's review

schedule was informed by stakeholder feedback and therefore, during the course of normal business operations, GIE owners should be able to budget accordingly to ensure projects are not delayed. However, the second 15-day Public Notice reduced CARB staff's review time from a process that could have taken up to 75 days to complete, or longer if the initial request did not include all required information, to 45 days. This reduced review time should address the commenter's concern to some degree.

One commenter requested CARB staff clarify that unless otherwise specified, the number of days in each step of the process are calendar days not business days. CARB staff agrees, however, no changes were made in response to this comment because this is consistent with the definition of a "day" in section 95351(a) of the 45-day Public Notice which specified a "day" means a calendar day.

One commenter expressed concern that the information required to be submitted pursuant to section 95357(d)(8)(C) may be proprietary but did not request any specific changes to the proposed amendments. CARB staff notes section 95358 of the Regulation states "Information submitted pursuant to this subarticle may be claimed as confidential. Such information shall be handled in accordance with the procedures specified in title 17, California Code of Regulation, sections 91000 through 91022." This section of the Regulation applies to phase-out exemption requests in addition to information included in annual reports. Therefore, no changes to this section are needed.

**B-4. Allow Acquisition of Multiple $SF_6$ GIE of the Same Type through a Single Exemption Request**

**Comment:**

*IV. The mechanism to acquire multiple $SF_6$ GIE of the same equipment type and GIE characteristics should be streamlined.*

SCE supports the newly added Section 95357(c), which allows the GIE owner to submit a single request to cover all associated $SF_6$ GIE. However, the process as described by reference under §95357(d)(8) still requires the identification of a specific location at the time of submittal, including a picture showing the location where the $SF_6$ GIE would be installed. SCE has a population of 43,000+ belowground distribution structures which can generally be categorized into 19 distinct sizes that SCE has standardized over the years. The need to provide individual information and pictures on a location-by-location basis with the exemption request would require an excessive number of crew hours and disruptive traffic control because so many structures are located in belowground vaults under in lanes of traffic. The pictures would provide little to no tangible benefit because all requests for the same structure size would look nearly identical and have the same information supplied.

Grouping similar exemptions by structure size/type as proposed will streamline the exemption process and significantly reduce labor costs for both CARB and SCE

associated with procurement processes (i.e. going to bid for each exemption), application, review, and approval.

Proposed edits to §95357(c) and (d) are indicated below in underlined and ~~strikethrough~~ text:

§95357*(c)* Whenever a GIE owner wishes to acquire multiple $SF_6$ GIE of the same equipment type and GIE characteristics, for which the justification provided under section 95357(d)(8) is identical, the GIE owner may submit a single request to cover all associated $SF_6$ GIE. In this case, the GIE owner must specify the number of $SF_6$ GIE it is requesting to acquire under the exemption and list the locations or dimensions of each structure type where the $SF_6$ GIE ~~would~~ could be installed, but does not need to identify which specific $SF_6$ GIE device would be installed at each location or structure type.

§95357(d)(3) For aboveground GIE exemptions only, a ~~A~~ description of the specific project(s) to which the $SF_6$ phase-out exemption would apply, including location(s); whether it is an existing or new facility, or if it has been subject to a process that significantly changes the in-place infrastructure (e.g., overhaul, re-powering); and the number of each type of GIE device described in section 95357(d)(4) that would be installed there;… (SCE)

**Agency Response:**
The commenter supports the Regulation's provision allowing a single exemption request to cover multiple $SF_6$ GIE for which the same rationale apply, but states that section 95357(d)(8)(B)'s requirement to provide a photo of every location where a GIE could be installed is too cumbersome. They instead request grouping by structure size or type in section 95357(c) and revising 95357(d)(3) to cover only certain exemptions. It is unclear if the requestor is talking about acquiring spares or not, but the modifications to section 95357(d)(3) in the first 15-day Public Notice were meant to clarify CARB's original intent that a spare GIE can be acquired through the regular exemption process and provide GIE owners a pathway to do so that did not involve listing every location where the GIE device could be installed. Additionally, the first 15-day Public Notice revised the specific mention of "location" to be "space" in section 95357(d)(8)(B), which specifies that photos need to be provided with the exemption request. Whereas location is a specific place, the word "space" more commonly defines physical dimensions, and so multiple locations can have the same space or dimensions and "each space" that has the same dimensions could apply to multiple locations. Therefore, a single photo could be submitted that is representative of each type of space where the GIE could be installed instead of an individual photo of an identical space in each location.

### B-5. Reintroduce the Non-$SF_6$ Electrical Power Equipment Clearinghouse

**Comment:**
*§ 95357. $SF_6$ Phase-Out Exemption*

*Non-$SF_6$ Electrical Power Equipment Clearinghouse…*
However, Metropolitan recommends that ARB amend §95357(b) to re-introduce the concept of a robust "Non-$SF_6$ Electrical Power Equipment Clearinghouse" or "Clearinghouse." ARB originally proposed the creation of this Clearinghouse in the 2019 draft regulation, but did not include it in the Proposed Regulation. The purpose of the Clearinghouse was to list all known non-$SF_6$ GIE available for sale, whether for pilot testing or full commercial use, by equipment type, voltage, short-circuit current, and other design characteristics. In developing the Clearinghouse, ARB should incorporate a rigorous qualification process for non-$SF_6$ GIE manufacturers to complete prior to selling non-$SF_6$ GIE in the State. In addition, the Clearinghouse would help stakeholders demonstrate the absence of viable non-$SF_6$ alternatives; thereby, enabling them to streamline the application process for obtaining a $SF_6$ phase-out exemption. As such, Metropolitan recommends ARB amend §95357 (b)(1) as follows:

"Non-$SF_6$ GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two ARB Clearinghouse qualified $SF_6$ suppliers; or"… (MWDSC)

**Agency Response:**
The commenter recommends CARB staff re-introduce the "Non-$SF_6$ Electrical Power Equipment Clearinghouse" in the proposed amendments. The clearinghouse concept was introduced by CARB staff during the informal public process, but was not included in the proposed amendments, and so this comment is out of scope. The clearinghouse was envisioned to be a website in which CARB staff would identify non-$SF_6$ products that are available for sale to facilitate determination of the "two supplier" provision of the phase-out exemption process, but was not intended to be captured in the Regulation itself.

**B-6. Include GIE acquired with an $SF_6$ Phase-out Exemption in Average System Capacity**

**Comment:**
§ 95353. Annual Emissions Limit

A. Average System Capacity and Annual Emissions Limit should include GIE acquired with a SF6 phase-out exemption....

In cases where a SF6 phase-out exemption is granted, the gas capacity of GIE acquired with that exemption should be reflected in the average system capacity and the annual emissions limit. Therefore, LADWP recommends deleting the following provision that would exclude GIE acquired with a SF6 phase-out exemption from the average system capacity and annual emissions limit.

**DELETE** § 95353(b)(3)(C) ~~The GIE device was not acquired with an SF6 phase-out exemption, either by the GIE owner or by a previous owner of the GIE device~~…. (LADWP)

**Comment:**

A. GIE acquired with a $SF_6$ Phase-out Exemption should be included in the Average System Capacity. The Annual Emission Limit is calculated as 1% of the annual average GIE capacity. However, the Proposed Amendments would exclude GIE acquired with a phase-out exemption from the 'average system capacity' for each covered insulating gas ($C_{avg,j,i}$). We recommend that the capacity of all GIE be included when calculating the annual emission limit, regardless of whether the GIE was acquired pre or post phase out date. This is appropriate since the exemption applies when alternatives are unavailable for technical reasons. Therefore, the Utilities Group proposes deleting the sentence that would exclude GIE acquired with a phase-out exemption from the annual average system capacity.

**DELETE § 95353(b)(3)(C)** ~~The GIE device was not acquired with an SF6 phase-out exemption, either by the GIE owner or by a previous owner of the GIE device~~…. (JUG)

**Comment:**

*VIII. Include GIE acquired with an $SF_6$ phase-out exemption in average system capacity*

GIE acquired with an $SF_6$ Phase-out Exemption should be included in the Average System Capacity. The Annual Emission Limit is calculated as 1% of the annual average GIE capacity. However, the Proposed Amendments would exclude GIE acquired with a $SF_6$ phase-out exemption from the "average system capacity" for each covered insulating gas ($C_{avg,j,i}$). We recommend that the capacity of all GIE be included when calculating the annual emission limit, regardless of whether the GIE was acquired before or after the phase-out date. This is appropriate since the exemption applies when alternatives are unavailable for technical reasons and the GIE owner has no other alternatives.

Proposed edits to §95353(b)(3)(C), Annual Emissions Limit, are indicated below in ~~strikethrough~~ text:

§95353(b)(3)(C) ~~The GIE device was not acquired with an SF6 phase-out exemption, either by the GIE owner or by a previous owner of the GIE device~~…. (SCE)

**Comment:**

However, there are a number of open items that need to be dressed in subsequent 15-day comment periods, specifically CCEEB supports a number of the items addressed by the joint utilities, specifically…the accounting of SF6 gas in GIE mentioned…. (CCEEB2)

**Agency Response:**
Commenters stated that the gas capacity of $SF_6$ GIE acquired with a phase-out exemption should be reflected in the annual emission limit. CARB staff disagrees. The amendments offer GIE owners significant flexibility to use $SF_6$ GIE after the phase-out, via the regular exemption process and the new notification process, introduced in the first 15-day Public Notice, to allow expedited acquisition of $SF_6$ GIE after a failure. That flexibility is needed to facilitate the technology transition from $SF_6$ to non-$SF_6$ GIE over time. However, these amendments are intended to put California on the path to phasing out the use of $SF_6$, and there is concern that the flexibility offered could result in excessive reliance on the exemption and notification processes. Therefore, as discussed in the ISOR, excluding $SF_6$ GIE acquired after the phase-out from the annual emissions limit is needed to further incentivize transition to non-$SF_6$ GIE, and dis-incentivize over-reliance on $SF_6$ phase-out exemption and notification processes.

This exclusion is reasonable given that the proposed amendments give GIE owners a number of options to do the reverse and increase their emissions limit without actually adding any $SF_6$ to their system in order to balance their effective emission rate. First, the early action credit allows GIE owners to increase their emissions limit by a relatively large amount (up to 10 percent of total capacity) when non-$SF_6$ GIE are installed prior to the corresponding phase-out dates. This provision allows GIE owners to increase their emissions limit without a corresponding risk of $SF_6$ emissions. In addition, after the phase-out begins in 2025, GIE owners can replace existing $SF_6$ GIE with non-$SF_6$ GIE without any corresponding drop to their emissions limit. Given this added flexibility, and the need to disincentivize over-reliance on $SF_6$ GIE after the phase-out, no changes were made to the Regulation in response to these comments.

**B-7. Change Catastrophic Failure Exemption Request to a Notification and Revise the Definition of Catastrophic Failure**

**Comment:**
Because this rulemaking addresses equipment that is fundamental to the safe and reliable operation of electric distribution and transmission infrastructure, California's electric utilities, as many have already said, including rural and electric cooperatives, publicly-owned utilities, and investor-owned utilities, have worked collaborative -- collaboratively as a Joint Utility Group throughout this rulemaking process. The joint utilities appreciate the opportunity to work collaboratively with staff at CARB and leadership there also to help develop this regulation.

Because of the complicated technical elements being addressed here, the Joint Utilities Group includes many technical staff at various utilities and people who work closely with the design, procurement, installation or operation of gas-insulated equipment. Input from these technical experts has helped to address needs to maintain the safe and reliable operation of these systems.

California clearly sees the growth in our electric system is fundamental to the state's continued efforts to reduce GHG emissions. As a result, a safe and reliable electric

system is ever more important. We are pleased to note that this need for continued safe and reliable operation is reflected in the proposed Board resolution, particularly in the proposal to recognize the need to immediately be able to repair and/or replace equipment in the event of failure. (CMUA)

**Comment:**
This is an important regulation. And it is crucial to get it right. As the Board has just heard, there are a few remaining issues with the proposed regulation that remain to be ironed out. How the utilities respond to emergency events is one of these concerns.

A utility's ability to swiftly respond when system failures occur is vital to maintaining grid reliability. So we are thankful to staff that this topic will be addressed in the next round of revisions to the proposed amendments.

Amending the emergency event exemption so that during catastrophic failure notification to staff to replace SF6 equipment will suffice, as opposed to an approval process, is much appreciated. We would also ask that notification versus approval be applied to all failures, not just catastrophic ones.

We propose notifying CARB within 15 days of a failure and following up with supporting documentation 180 days after the event…. (SMUD)

**Comment:**
II. Add a method that allows regulated parties to replace $SF_6$ GIE following equipment failure with a notification, rather than seeking prior CARB approval with a $SF_6$ Phase-out Exemption….

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)….

IV. Replacing $SF_6$ GIE following equipment failure. The Proposed Regulation requires the regulated party to seek an accelerated $SF_6$ 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 $SF_6$ gas. However, an unplanned replacement with another $SF_6$-containing or non-$SF_6$-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…. (PG&E2)

**Comment:**
To further support reliability of the grid, SCE must have the ability to immediately replace like-for-like equipment during unforeseen equipment failure through a notification process, as opposed to an approval process....

*II.* *Allow a notification process in order to expedite like-for-like GIE replacement during unplanned failure, to support system reliability.*

Situations may arise during failures or catastrophic/life-threatening incidents where equipment *must* be replaced immediately in order to protect system reliability and customer safety. Other essential public services rely upon the reliability of the electrical system, such as hospitals, water-treatment facilities, first responders, critical communication facilities, financial institutions, critical air-navigation systems, and medically sensitive residential customers. SCE must be able to act immediately to restore the grid after unplanned failures.

The Proposed Regulation requires the regulated party to seek an accelerated $SF_6$ phase-out exemption following a "Catastrophic Failure," as defined. The term "catastrophe" implies the occurrence of an extreme, severe event, which is not necessarily the case when a given device (such as a circuit breaker) fails. Upon such a failure, the utility must act quickly to ensure system safety, reliability and integrity/resilience. A GIE may fail under different unplanned conditions, including extreme heat, cold, or lightning strike, and may not result in a release of $SF_6$ gas. An electricity surge or 'flashover' can cause the failure of a circuit breaker. If the breaker is a critical asset within the SCE substation or the larger network of substations, the failure creates an abnormal condition that directly affects system reliability in various forms (e.g. power flow). It will require expedited replacement of equipment where a non- $SF_6$ alternative may not be readily available. The replacement breaker may be secured through internal emergency inventory, a mutual aid agreement with a utility in California or another state, or directly from the supplier.

To assure that SCE can immediately 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 customers, SCE recommends the following amendments:

Proposed edits to §95351, Definitions, and §95357, $SF_6$ Phase-Out Exemption are indicated below in underlined and ~~strikethrough~~ text:

§95351, Definitions
"~~Catastrophic~~ Failure"

§95357(h), $SF_6$ Phase-Out Exemption
(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 $SF_6$ 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:

~~§ 95357(i)~~ (Delete section (i), which would no longer be applicable)… (SCE)

**Comment:**
A large majority of electric transmission and distribution substations use $SF_6$ GIE in switchgear, including circuit switchers and circuit breakers, which serve a critical role to protect the electric grid as electric current is transferred at various voltages from generating sources to end-users. As such, end-users could be significantly impacted if a substation is disabled due to failed GIE. [It is paramount, notwithstanding the aggressive limits on emissions from existing $SF_6$ GIE and the phase-out schedule of $SF_6$ in GIE, that the Proposed Amendments are implemented without compromising grid

safety and reliability, and in recognition that the costs of the transition away from $SF_6$ GIE will be borne by the state's electricity customers.]...

General Comments

The Utilities Group comments and recommended amendments provide clarity and compliance certainty as the state transitions away from the long-term use of SF6 as an insulating medium in GIE. The proposed amendments include:

1. Allowing direct procurement of replacement SF6 GIE following a failure event.…

2. **AMEND** the definition of "Catastrophic Failure" to "Failure" as proposed, 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~~ the reliability of a system (e.g., the electrical grid, facility operations, a power producer's availability for dispatch to the electrical grid).…

G. Replacing $SF_6$ GIE following equipment failure. The Proposed Regulation requires the regulated party to seek an accelerated $SF_6$ phase-out exemption following a "Catastrophic Failure," as defined. 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. An unplanned replacement with another $SF_6$-containing or non-$SF_6$-containing GIE that meets operational requirements would be required in an expedited manner. A GIE may fail under different unplanned conditions, including extreme heat, cold, or lightning strike; not all GIE failures result in a release of $SF_6$ gas. 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-$SF_6$ 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), as well as its customers, the Utilities Group recommends the following **amendments**:

a. **AMEND** § 95351, Definitions, by changing the term "Catastrophic Failure" with "Failure," as proposed earlier in this letter.

b. **AMEND** § 95357(h) $SF_6$ Phase-out Exemption following GIE Failure 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:*

*c.* **DELETE** § 95357(i) since this would no longer be applicable…. (JUG)

**Comment:**
[The definition of a ...] "Catastrophic Failure," [in **Section § 95351** should be revised to clarify how the ARB intends to work with utilities as we collectively wait and rely upon manufacturers to develop GIE necessary for large scale deployment of non-SF6 equipment, particularly at the high voltage classifications.]...

l. **"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, and a power producer's availability for dispatch to the electrical grid).*

1. Please see the discussion below in **Section 95357(b)(1)(2)(3)(4)** for how the determination and responsibility of a Catastrophic Failure should be addressed….

Section (d)(8)(E)

*(E) Within the timeframe specified in section 95357(f), if the Executive Officer determines that the information provided as part of the exemption request is insufficient to serve as the basis for an exemption under this section, s/he may request additional information and/or clarification related to sections 95357(c) and 95357(d) prior to the application being deemed complete pursuant to section 95357(f).*

Discussion

It is not clear who would be liable in the event of a system reliability failure if during the time the Executive Officer takes to make the determination that the information

provided by the utility as part of the exemption request is insufficient. Customer safety should be assured throughout the determination period.

Section 95357(H)

*(H) Whenever a catastrophic failure occurs that, in the estimation of the GIE owner may only be resolved through the acquisition of SF6 GIE on a faster timescale than possible under the schedule described in section 95357(e)-(g), the GIE owner may submit an expedited SF6 phaseout exemption request. This request must be submitted within 14 days of the beginning of the catastrophic event. The GIE owner shall follow the process described in section 95357(a)-(g), with the following exceptions:*

Discussion

TID has several concerns with this section. In the event of any failure it is crucial utilities' follow the fastest path possible to restore their failed system equipment, ensuring reliability….

After a failure, it will typically require between 3 to 10 weeks, and beyond, to restore the element to service. Because a failure is likely unanticipated, these timelines must be kept as short as possible so as not to encroach upon scheduled maintenance availabilities of generation and transmission facilities or peak load seasons. During these situations, it is imperative the transmission system be intact to the fullest extent possible to maintain reliable operation. Requiring an additional 14-days prior to initiating a repair can result in a utility incurring undue costs by delaying maintenance or, in the case of high loads, scrambling to ensure power is sufficient for the load.

Having a 14 day timeframe for the ARB to approve a utility's request for an expedited SF6 breaker is again, a huge issue. This is clearly a situation where the ARB should minimize that timeframe by affording the utility deference in making these determinations.

To address this concern and the concern related to adding time to an outage, TID recommends the following language:

*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….* (TID)

**Comment:**
First, I want to thank staff for their hard work on this regulation. I will be representing both the JUG and TID while discussing our issue -- issues with the emergency phase-out exemption. There has been quite a bit of back and forth between the JUG, staff, and some of the Board members over the last few days in a commendable attempt to solve some of our issues.

In this light, my comments have been revised. Nonetheless, the wording in slide 7, "phase-out exemption possible", still has the utility -- utilities extremely concerned that the phase-out provisions contemplate a scenario where the ARB would supplement its judgment in place of the expert determinations of the utility's own professional engineers.

When dealing with reliability and security of the grid, I can't stress enough that during an emergency or any type of failure, a utility's engineering staff knows the complex interactions within the system and understands the attributes, restrictions, and potential risks over placement of GIE.

Utility personnel, by necessity, act as the primary source of information, tasked with identifying and resolving any issues associated with the GIE on their systems.

If a utility's engineering personnel are responsible for resolving any incident, procuring the GIE, testing, and evaluating the equipment, then it would follow that the utility personnel should be afforded deference in questions of whether an exemption is necessary or not. As in slide 7, phase-out exemption has a possibility.

The JUG and TID requests the Board to follow up this issue during the further development of the regulation to assure that safety and a reliable grid won't be in jeopardy due to our -- the current faulty regulation language. (TID2)

**Comment:**
In this letter, we will express some outstanding concerns with specific provisions of the proposed amendments that we believe still need to be addressed to successfully implement this regulation, while providing for reliability, safety, and cost-effectiveness for compliance entities and ratepayers.

Change $SF_6$ Phase-out Exemptions Following GIE Failure
CCEEB suggests changing the request for exemption after equipment failure to a notification. This is important to assure that the GIE and associated systems (e.g. power generation sources, substations, transmission and distribution lines) are not adversely impacted due to administrative delays in repair. The request timeline in the proposed regulatory amendment could significantly delay needed work following a product failure. In some instances, (e.g. distribution of GIE), customers may experience loss of power from time of equipment failure until the equipment is replaced. Additionally, engineered installations require significant work to replace equipment failure and maintain system reliability.

Under the request process, no work can begin for as long as 75 days, imposing significant risk to system reliability. The time to replace equipment upon failure varies based on equipment status and line characteristics for that specific installation. If spare replacement equipment is available, it is reasonable to expect a 3 to 10-week turnaround from failure to being re-energized for substation equipment and 8 to 48-hour turnaround for distribution equipment.

The exemption request process could increase this timeline three to five-fold. If equipment must be ordered, expect a 24 to 30-week turnaround from failure to being re-energized.

*Recommendations*

- *Change* Definition *of Catastrophic Failure to FAILURE (§95351)*
    - Transmission and Distribution systems are designed with redundancy.
        - Recognize the need to maintain a reliable system.
    - Equipment failure removes this redundancy.
- *Add* Reporting: Professional Engineer submit notification to ARB replacement with statement of $SF_6$ GIE necessity *(§95355)*.
- *Delete* $SF_6$ Phase-out Exemption - Catastrophic Failure *§95351(h)*…. (CCEEB)

**Agency Response:**
Commenters raised several concerns related to the 45-day Public Notice's expedited phase-out exemption process, which was to be used in response to catastrophic failures. Commenters requested the process be changed to a notification process. The rationale for the request included that, once a failure has occurred, system reliability could be negatively impacted if the GIE owner were required to wait for CARB approval to acquire a replacement device. One commenter stated it was not clear who would be liable in the event of a system reliability failure during the Executive Officer's review of the exemption request.

To address the concerns raised by commenters, the final Regulation replaces the expedited phase-out exemption process with a notification process. Unlike the expedited phase-out exemption process, which would have required CARB approval to install $SF_6$ GIE, the notification process would allow the GIE owner to acquire a replacement $SF_6$ device without prior approval from CARB, upon failure of any GIE device. Under the new process, the GIE owner must notify CARB of the failure and provide information on the $SF_6$ GIE acquired in response to the failure. In addition to commenter requests, this change is consistent with Board Resolution 20-28 and CARB staff's consultations with the California Independent System Operator (CAISO). The new notification process should address commenter concerns over liability since this process allows for immediate acquisition of a replacement $SF_6$ GIE device. Additionally, the first 15-day Public Notice includes "imminent failures" in the definition of "failure," so if the GIE owner has indications that the device will fail, they may acquire the replacement device through the notification process, reducing the risks described by the commenters. Based on information provided by stakeholders, failures are anticipated to be relatively uncommon events, with even the largest GIE owners experiencing no more than a few per year. Each of these events will likely have their own special circumstances, with differing levels of probability that a GIE device will fail over various time horizons. Therefore, CARB staff chose not to define "imminent" and to instead provide GIE owners the flexibility to make the determination on a case-by-case basis. Section

95357(i)(2)(F) was revised to require the GIE owner provide, in cases of imminent failure, an explanation of the circumstances that indicated to the GIE owner that the device failure was imminent, and the timeframe within which the GIE owner expected the GIE device to fail. This information, which must be submitted along with an attestation statement, requires the GIE owner to provide CARB with the information necessary to substantiate their use of the failure notification process and to justify their acquisition of $SF_6$ GIE after the applicable phase-out date due to an anticipated "imminent" failure.

One commenter suggested amending the emergency event exemption so all failures, not just catastrophic ones, could be addressed through a notification as opposed to an approval process. The commenter also suggested the GIE owner notify CARB within 15 days, and follow up with supporting documentation within 180 days. It is not clear if the commenter meant for requested changes to apply to the expedited $SF_6$ phase-out exemption process, which in the 45-day Public Notice applied to catastrophic failures as defined in the Regulation, or to emergency event exemptions. CARB staff's interpretation is that the commenter was referring to the expedited phase-out exemption request process, which has been converted to a notification process. With the notification process, GIE owners would notify CARB staff of the failure with fifteen days, consistent with the commenter's suggestion. Subsequently, GIE owners would provide additional documentation within 45 days of the GIE owner's acquisition of the replacement device. This timeline was selected given the variation that owners may see in the amount of time it takes to acquire the replacement device, and to allow time for needed installation, testing, and activation.

Commenters requested that the term "catastrophic failure" be changed to "failure" and one commenter requested the definition of "failure" be revised. In consultation with the CAISO as directed by the Board, in the first 15-day Public Notice CARB staff changed the term "Catastrophic Failure" to "Failure." In the 45-day Public Notice, the definition was "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)." The commenter proposed replacing "human safety and/or substantially impairs, damages, or shuts down part or all" with "the reliability." In response to these comments, in the first 15-day Public Notice, CARB staff changed the definition to "the sudden and unexpected, or imminent, failure of a GIE device that requires replacement of the device." The changes to the term itself, and the definition, are intended to ensure GIE owners are granted sufficient flexibility to immediately respond to issues impacting electricity system reliability.

**B-8. Add Special Considerations for Spare $SF_6$ GIE in the Exemption Process and after Failure**

**Comment:**
SDG&E should be able to purchase spare SF6 GIE for emergency replacement. SDG&E keeps spare SF6 gas circuit breakers for equipment failures and should be able to replace the spares when these are used for GIE failure replacement. SDG&E has had three such replacements in the last five years. These spares could be designated for failed equipment replacements, and not new installations…. (SDG&E)

**Comment:**
Section 95357 implements a phase-out schedule for SF6 circuit breakers and other GIE beginning with the year 2025. Until tested and certified SF6 alternative GIE are made available, it is critical that existing SF6 GIE and spare SF6 GIE be preserved to use -- to safely and reliably operate the electric grid. Entities should be able to purchase SF6 GIE for emergency replacement.

SDG&E keeps SF6, gas circuit breakers for equipment failures and should be able to replace the spares when they are used for GIE failure replacement. These spares should be designated for failed equipment replacement and not new installations. (SDG&E2)

**Comment:**
In some instances when a utility experiences a failure and the utility does not have a spare, they can call upon a neighboring utility, asking for "mutual aid", to provide an SF6 breaker, decreasing the duration of an outage. This system of "mutual aid" between utilities where in an emergency an affected utility can call upon a sister utility to obtain a replacement device. Due to a combination of this section and section 95345(b) an offer of assistance will end up penalizing the aiding party, in that the replacement gas will count against a supplying utility's baseline inventory. This is antithetical to the safety and reliability that these "mutual aid" networks have been set-up to promote…. (TID)

**Comment:**
c. If a spare GIE is used to replace an in-service GIE that failed catastrophically (cannot be repaired), CARB's Initial Statement of Reasons recognizes the need to replace the spare GIE. Having a spare on hand allows the utility to replace a GIE as quickly as possible to ensure system reliability. This is especially important during times of high demand on the electric system. However, the criteria to obtain a phase-out-exemption do not include replacement of a spare SF6 GIE. LADWP recommends adding a new category to the exemption criteria to enable replacement of spare SF6 GIE after the phase-out date.

95357(b)(5) To replenish inactive spare SF6 GIE.

d. An SF6 phase-out exemption request to replace spare SF6 GIE is a special case that is not project specific. For example, a particular make and model of circuit

breakers may be installed at multiple facilities, so the spare GIE(s) of that make and model could be used at any of those facilities. LADWP recommends amending section 95357(d)(3) as follows:

> 95357(d)(3) A description of the specific project(s) to which the SF6 phase-out exemption would apply, including location(s); whether it is an existing or new facility, or if it has been subject to a process that significantly changes the in-place infrastructure (e.g., overhaul, re-powering); and the number of each type of GIE device described in section 95357(d)(4) that would be installed there; this provision does not apply if the exemption is for replacement of spare SF6 GIE;… (LADWP)

**Comment:**
3. Allowing direct procurement of replacement spare SF6 GIE under certain conditions.…

E. Add mechanism to replace spare inventory. The Utilities Group recognizes that the ISOR supports the concept of an $SF_6$ Phase-Out Exemption to acquire a new spare GIE device. However, the purchase of GIE to be placed back into spare inventory does not appear to fall clearly into any of the 4 identified exemption categories within the standard protocol (§95357(b)(1), (2), (3) or (4)). Immediate access to spare GIE for like-for-like repairs is critical to minimize outage times and to provide reliability and redundancy. Occasionally, through a mutual aid network, utilities may call upon GIE inventory from another utility. In this instance the replacement GIE shouldn't be subject to the regulation as this would disincentivize providing aid. The ability to acquire or replace a spare is fundamental to maintaining reliability of the grid. The Utilities Group proposes adding a new category, Section 95357(5) to provide additional clarity:

> **ADD** §95357(b)(5). Available non-SF6 GIE cannot be used to replenish inactive spare GIE inventory…. (JUG)

**Comment:**
Management of Spare GIE

The ARB Staff Report supports the concept of an $SF_6$ Phase-Out Exemption to acquire new spare GIE. While CCEEB supports this change, we note that the acquisition of a spare does not appear to fall clearly into the four identified categories where $SF_6$ GIE is allowed:

1. Available from at least two suppliers
2. Cannot meet size requirements
3. Incompatibility with existing equipment, wiring, or connectors
4. Not suitable due to safety or reliability

Immediate access to spare GIE for repairs is critical to minimize outage times. Occasionally, through a mutual aid network, utilities may call upon GIE inventory from a fellow utility's inventory. In this instance the replacement GIE should not be subject to the regulation as this would disincentivize providing aid. The ability to acquire or replace a spare is fundamental to maintaining reliability of the grid.

*Recommendation*

- Add fifth exemption category:
  ***§**95357 (b)(5) Available non-$SF_6$ GIE cannot be used to replenish inactive spare inventory*…. (CCEEB)

**Comment:**
[However, there are a number of open items that need to be dressed in subsequent 15-day comment periods, specifically CCEEB supports a number of the items addressed by the joint utilities,]… Third, the acquisition of spare GIE for system reliability…. (CCEEB2)

**Comment:**
It is also critical that SCE retains the ability to replenish spare SF6 GIE inventory for unforeseen replacements....

*III. There should be a clear process to maintain spare $SF_6$ inventory for reliability purposes, including after phase-out.*

Maintaining 12,635 miles of transmission lines and 91,375 miles of distribution lines across 50,000 square miles of SCE service area[11] requires a robust and flexible inventory of spare equipment for like-for-like replacements to facilitate quick repair of unanticipated equipment failures in order to maintain grid reliability and redundancy.

SCE recognizes and appreciates that the Staff Report: Initial Statement of Reasons supports the concept of an $SF_6$ Phase-Out Exemption to acquire a new spare GIE device:

> *"New section 95357(h)(5) requires the GIE owner include a statement certifying that they have no GIE in their possession ($SF_6$ or otherwise) that is not already in use that could be installed to resolve the catastrophic failure, which is necessary to ensure the expedited process is utilized only for true emergencies that cannot be resolved through any means other than the expedited acquisition of $SF_6$ GIE. A catastrophic failure that can be resolved by installing a spare part should be resolved as such, and* ***if the GIE owner subsequently needs to submit a separate exemption request to acquire a new spare $SF_6$ GIE device, they can do so following the standard protocol."***[12]

[11] https://www.sce.com/about-us/who-we-are
[12] https://ww3.arb.ca.gov/regact/2020/sf6/isor.pdf, page 100.

However, the purchase of GIE to be placed back into spare inventory does not appear to fall clearly into any of the four identified exemption categories within the standard protocol (§95357(b)(1), (2), (3) or (4)).

Due to the unpredictable nature of equipment failures, it is critical that the spare GIE be allowed to be placed at any location across SCE service territory, and not tied to a specific project location, especially pertaining to distribution-level GIE. Requiring that spare inventory be tied to a specific project location would be impracticable, as it would essentially require that a spare unit be maintained for each location in order to retain the ability to quickly restore the system in the case of failed GIE. Conversely, allowing replenishment of spare GIE inventory that is available to be deployed to any failure location across SCE territory would allow SCE to maintain an acceptable level of reliability without the need for a massive spare fleet.

For clarity, SCE proposes adding a new category, Section 95357(5). Proposed edits to §95357(b), $SF_6$ Phase-Out Exemption, are indicated below in underlined and ~~strikethrough~~ text:

§95357(b), $SF_6$ Phase-Out Exemption
(b) Beginning September 1, 2024, a GIE owner may submit an SF6 phase-out exemption request if either:

(1) Non-$SF_6$ GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two suppliers; or

(2) Available non-$SF_6$ GIE cannot meet the size requirements for the particular project(s) or application(s), taking into consideration the physical size of the GIE, the physical constraints of the project location(s), including required clearance; or

(3) Available non-$SF_6$ GIE cannot be used for the specific project(s) or application(s) due to incompatibility with existing equipment, wiring, or connectors; or

(4) Available non-$SF_6$ GIE is not suitable based on safety or reliability requirements; or

(5) Available non-$SF_6$ GIE cannot be used to replenish inactive spare GIE inventory…. (SCE)

**Comment:**
The second challenge is the ability to acquire spare SF6 equipment after phase-out. Not including the rest of the California grid, SCE alone is responsible for maintaining over 91,000 miles of distribution lines and 12,000 miles of transmission lines. In support of all our customers who rely on electricity in nearly every aspect of their lives, including the future of transportation in California, we need crews ready to respond immediately to unanticipate -- unanticipated failures.

And then after a failure, we need to replace our spare equipment that has been in inventory. And the rule doesn't seem to account for that very clearly, so we'd

appreciate the opportunity to continue to work with staff to…develop a feasible process. (SCE2)

**Agency Response:**
Commenters provided feedback that activation of a spare GIE device to resolve a failure depletes the GIE owner's inventory of spare GIE, which could hinder their ability to respond to additional failures. Several commenters explained that the practice of "mutual aid" allows GIE owners to loan each other replacement GIE in case of a failure, and one commenter expressed concern that if the GIE owner loaning the replacement device cannot replace it, they may be discouraged from providing assistance.

The 45-day Public Notice did not specify a process for acquisition of $SF_6$ GIE to replenish a GIE owner's inventory of spares through the expedited phase-out exemption process. In response to these comments, the first 15-day Public Notice specifies in section 95357(j) that GIE owners can acquire a new $SF_6$ GIE device of the same characteristics as the spare device that was activated to resolve the failure. This would be done through the notification process, without prior approval from CARB. Because this provision would apply regardless of whether the GIE owner activated one of their own spares to resolve the failure, or borrowed a spare from another GIE owner, this provision should address commenter concerns that the proposed Regulation could discourage "mutual aid."

Commenters also identified the need to acquire spare $SF_6$ GIE through the standard exemption process in situations where a failure did not occur, and stated that the exemption process did not allow for this possibility. Commenters stated that a phase-out exemption request to replace spare GIE is a special case that is not project specific and that it is critical that spare GIE acquired with an exemption be allowed to be placed at any location across their service territory.

CARB staff's intention in the 45-day Public Notice was to allow for acquisition of spares through the standard exemption process, and agrees that the exemption process, as originally proposed, did not make that clear. To clarify CARB's original intent, the first 15-day Public Notice specifies in sections 95357(d)(3) and 95357(d)(3)(A) that a spare GIE device can be acquired through the regular exemption process using the four original categories. This clarification makes the addition of a fifth exemption category, as suggested by commenters, unnecessary. In regard to the comment that GIE should be able to use a spare acquired via a phase-out exemption "at any location," CARB staff disagrees. The 45-day Public Notice limited the locations where the acquired $SF_6$ GIE could be used to specific projects listed in the phase-out exemption request. It is possible that the lack of specific language about spares, and the project-specific nature of the 45-day Public Notice exemption process, prompted this comment. If this is the case, the inclusion of spares in the phase-out exemption

process should address this comment. The final Regulation requires the GIE owner identify whether the requested GIE would be spare(s), and if so, provide a description of the "type of locations" to which the phase-out exemption would apply. This change would allow the acquired spare(s) to be installed in any location throughout the GIE owner's service territory for which the justification provided in the exemption request is valid.

**B-9. Allow Greater Flexibility for Replacement of $SF_6$ GIE Under Warranty**

**Comment:**
*Replacement Exemption*
The phase-out language precludes any person from acquiring SF6 GIE after specified dates except under certain conditions, one being the replacement of "a defective SF6 GIE device at no cost to the GIE owner under the terms of the manufacturer's warranty." **WSPA appreciates the exemption, but given that warranty replacements may incur a cost**, such as restocking, shipping, or deductible fees, WSPA recommends that the exemption language be revised to read, "The SF6 GIE manufacturer replaces a defective SF6 GIE device ~~at no cost to the GIE owner~~ under the terms of the manufacturer's warranty."… (WSPA)

**Comment:**
II. §95352 - Sulfur Hexafluoride Phase-Out.
A. The phase-out language includes a provision that exempts replacement of defective GIE under warranty. Since GIE warranty replacements may incur unforeseen costs, including restocking or shipping fees, we recommend this language be **amended** as follows:

(a)(4) The SF6 GIE manufacturer replaces a defective SF6 GIE device ~~at no cost to the GIE owner~~ under the terms of the manufacturer's warranty…. (JUG)

**Comment:**
§ 95352(a)(4) $SF_6$ Phase-Out.

The phase-out language includes a provision that exemptions would apply if replacing "*…a defective $SF_6$ GIE device at no cost to the GIE owner under the terms of the manufacturer's warranty.*"

Because GIE warranty replacements may incur costs such as restocking or shipping fees, we recommend revising this language to "*…a defective $SF_6$ GIE device ~~at no cost to the GIE owner~~ under the terms of the manufacturer's warranty.*"… (SF6&AltCoal)

**Agency Response:**
The commenters requested the flexibility to replace defective GIE that are still under manufacturer's warranty if the terms of the warranty required the GIE owner to pay a fee. CARB staff agrees with these comments and have removed "at no cost to the GIE owner" from section 95352(a)(4).

## B-10. Certain GIE Owners Should Not be Subject to the Emission Rate Limit

**Comment:**
WPTF appreciates the ARB's efforts throughout this proceeding to consider many different perspectives and careful analysis of regulations that affect critical facilities. Further amendments are necessary to ensure the regulatory design achieves the California Air Resources Board's ("ARB") stated goal of setting "stringent, but reasonable limits on emissions." Further amendments are necessary because under the Proposed Amendments, IPPs [Independent Power Producers] would not be able to ensure their own compliance with the emissions threshold. The risk of Gas Insulated Equipment ("GIE") failures is a reality of operating generating facilities at high voltages. Even with the exercise of reasonable diligence, prudence and care, there will still be risks of releases. The Initial Statement of Reasons ("ISOR") recognizes the challenges faced by approximately 2% of the total emissions inventory, but does not fully address this concern. WPTF therefore recommends the following amendments:

1. *Inclusion and Reporting Threshold (95353)*: WPTF recommends amendments to require all SF6 inventory holders to track their inventories, report to the ARB and be subject to the phase out deadlines. For the group of entities the ARB identifies as comprising 2% of the total emissions inventory, the ARB should only require reporting, consistent with other ARB program designs adopted pursuant to Health and Safety Code Sec. 38500 *et seq.* (i.e., SB 32)….

5. *Sulfur Hexafluoride Phase-Out and Annual Emissions Limit (95352 and 95353)*: Before instituting enforcement actions due to releases of SF6, the ARB should provide a clear process for achieving compliance, such as the acquisition and retirement of emissions allowances or offsets….

*I.* *The ARB Should Amend Section 95353 to Establish a Reporting-only Threshold of 10,000 MTCO2(e).*

*a.* *The 2.0% / 50 MTCO2(e) Standard is not a Reasonable Limit for Small Inventories of High Voltage GIE.*

WPTF supports the ARB's goal to set "stringent but reasonable limits on emissions."[13] WPTF appreciates the ARB's efforts to evaluate the ability of small GIE inventory holders to meet a "reasonable limit." The ISOR includes detailed figures demonstrating that California's SF6 inventory is concentrated in a relatively small group of entities.[14] The ISOR goes on to conclude that a 2% or 50 MMTCO2(e) standard can be reasonably achieved by small inventory owners despite the challenges associated with meeting a strict emissions standard as applied to a small inventory. WPTF appreciates the ARB's acknowledgment of this issue, but respectfully disagrees

[13] ISOR at p. 34.
[14] Id.

with the conclusion that a 2% or 50 MMTCO2(e) standard resolves the concerns of small inventory holders.

According to the ISOR, entities above 10,000 MTCO2(e) comprise approximately 98% of the total SF6 inventory.[15] This is because SF6 is used in the greatest abundance by the State's largest transmission and distribution utilities. Independent generators also rely on SF6 for GIE in high voltage classifications but comprise a very small percentage of the overall SF6 inventory. IPPs including combined cycle gas turbines, peaker power plants, solar PV, solar thermal, geothermal, wind, biomass and battery storage all use SF6 in their GIE. These IPPs play a co-equal role to utilities in ensuring the State meets its Resource Adequacy targets. Virtually all of the electrons produced at utility scale in California rely in some form on SF6 for switchgear. WPTF appreciates the ARB's attention to the nature of these services in determining how to regulate approximately 2% of the total SF6 emissions inventory. Based on historic emissions levels, we believe that this segment of the overall emissions inventory presents limited risk of releases and the relative occurrence of releases would be within the State's broader emission reduction targets (i.e., 40% below 1990 levels by 2030).

The proposed 2% or 50 MMTCO2(e) emissions limit threshold in the Proposed Regulations would not resolve the concerns associated with the ability of small GIE inventory holders to reasonably comply with the emissions limits. We appreciate the ARB's recognition that a 1% emission standard is difficult to comply with and respectfully assert that a 2% emissions threshold is as difficult for most GIE owners to comply with. This is because most releases are due to unforeseen equipment failures.

Independent generators' GIEs are typically at higher voltage classifications and each GIE typically holds more than 50 MTCO2(e). Consequently, a single release due to an unforeseen equipment failure will still put the IPP over the 2.0% emissions limit or 50 MTCO2(e). The existing Regulation set a 2.0% standard (in 2019). Emissions in a single year are not a proper benchmark for whether small inventory holders can meet this standard over the longer term. At a 2% standard, small inventory holders face ongoing risks of non-compliance in the event of a single release of high voltage GIE or retirement where measured SF6 is considerably less than nameplate capacity due to losses in SF6 capacity over time.

Over the past seven years the current SF6 Regulation has been in place, WPTF believes most, if not all, IPPs have taken steps to ensure they are prudently handling and maintaining their SF6 inventories to minimize risks of releases. The ARB's statutory authority to enforce violations is well understood, and yet the pathway to compliance is not. Once IPPs undertake reasonably prudent maintenance and handling procedures for SF6 GIE the only remaining option to ensure compliance is a complete system redesign. The technology pathway and retrofit costs of system redesigns at high voltage remains unclear. Some IPPs have estimated that the costs of retrofitting high-voltage SF6 alternatives could necessitate significant (i.e., seven-figure or more)

[15] Id.

retrofit costs for a single facility. Such costs cannot be recovered or passed through by IPPs due to the lack of a captive rate base. Utilities will have the ability to recover any associated costs with replacement. Put simply, once all reasonably prudent maintenance measures have been undertaken by the IPP, there is little if anything the IPP can do to protect against unforeseen equipment failures that may lead to inadvertent releases. Unlike other GHG regulations adopted by the ARB, this Regulation would not permit the purchase of allowances or offsets. Under a plain reading of the Draft Regulations, an IPP may be subject to enforcement, irrespective of whether the release could have been prevented by reasonably prudent maintenance and equipment management standards. For entities that pride themselves on operating their critical facilities safely and in full compliance with all environmental laws to maintain a reliability grid, such a situation where compliance cannot be reasonably assured is untenable. As discussed in Section 5 below, the ARB should consider reasonable compliance measure that would enable entities to ensure their own compliance in the event of inadvertent releases.

*b. The Proposed Regulation Would Result in Disparate Treatment of IPPs and Large Utilities.*

Currently (and as amended), the Regulations enable the State's largest electric utilities to combine all of their GIE for reporting and compliance. This means that those with higher inventories are at a lesser risk of non-compliance compared to small inventory holders when there is a single piece of GIE equipment unexpectedly fails. WPTF encourages the ARB to review the largest utilities' reported SF6 data and confirm that multiple large (i.e., >50 MTCO2(e)) releases can occur in a year and the largest utilities will still be within the applicable emissions limits for that reporting year. By comparison, a single release at a high voltage GIE device at a small inventory holder (i.e., the typical IPP) will exceed the annual emissions limit by double digit orders of magnitude over a 2% emissions limit. Most IPPs operate a single or hand full of facilities subject to the regulation. The Proposed Regulation would perpetuate a regulatory design that creates risks of regulatory compliance for IPPs that are not shared with their competitors. Under the Proposed Regulation, IPPs will continue to bear a disproportionate compliance risk due to the relative size of their inventories compared to large transmission and distribution utilities. This disparate impact is compounded by the fact that IPPs compete with utility owned generation, and IPPs do not have captive rate bases over which they can impose the costs of switching to non-SF6 alternatives. We are deeply concerned that the integration of alternative technologies will require massive capital outlays that exceed the ARB's projection of the potential costs associated with compliance with the new regulatory design. Even if alternative technologies are technically feasible at higher voltage levels, the cost of retrofitting existing facilities to accommodate new technologies will jeopardize the economic sustainability of these facilities. It is unlikely that IPPs will be able to pass these costs on in the competitive power markets or to their bilateral counterparties. Put simply, WPTF remains concerned that disparate treatment under the Proposed Regulation could affect the IPPs' competiveness in the wholesale power markets and remain available to serve grid reliability needs.

*c. The ARB Should Revisit its Proposal to Address the Small GIE Inventory Concern in the August 2019 Draft Pre-Rulemaking Amendments.*

WPTF supports the ARB's goal to set "stringent but reasonable limits on emissions."[16] In an early draft of the potential amendments released during the informal public process, CARB staff proposed a "threshold value of 5,500 MTCO2e (~ 500 pounds of SF6) average system capacity, below which level entities would be required to report emissions to CARB but would not be held to an emissions limit." This was a simple approach that would have reduced administrative burden for ARB staff and GIE owners alike. Under this simple proposal, data would still be available to ensure projections of relative emissions are consistent with expectations. This proposal also had appeal because it had been tested in other contexts. A simple reporting/compliance threshold is consistent in its design with other regulatory determinations of the ARB under the same statutory framework (i.e., the Cap-and-Trade and Mandatory Reporting Regulation adopted pursuant to Section 38500 of the California Health and Safety Code). If adopted, the Proposed Regulations would have the ARB act under those very same statutory provisions. The ARB should propose further amendments develop a regulatory design that minimizes administrative burden without sacrificing environmental stringency. By the ARB's own analysis sources less than 10,000 MTCO2(e) comprise 2% of the overall SF6 inventory and the ARB has used this same threshold for compliance in the MRR and Cap-and-Trade. Since small inventories comprise less than 2% of the total SF6 emissions inventory and the potential cost of these regulations may jeopardize the ability of firm capacity generation to operate in an economically sustainable way and meet grid reliability needs, the ARB should not impose the emissions limit and phase out requirement.

For the reasons explained is subsections (a) – (c), WPTF recommends the ARB revise the Draft Regulations to require reporting by all sources below 10,000 MTCO2(e), but not set a specific emissions limit or threshold. This way the ARB could monitor these sources (and the future build out of new capacity) and ensure that ARB's own projections that emissions only account for about 2% of the overall inventory are consistent with expectations. If there is clear evidence that inventories below 10,000 MTOC2(e) are not being prudently managed, the ARB could always revise its Regulation to impose an emissions limit. In light of the fact that IPP's comprise less than 2% of the total SF6 inventory, we believe a simple emissions limit threshold of 10,000 MTCO2(e) can achieve the ARB's environmental objectives while avoiding the creation of an emissions limit that cannot be reasonably complied with by small GIE inventory holders.…

*V. The ARB Should Clarify the Application of Emissions Limit and Provide an Opportunity to Achieve Compliance through the Voluntary Purchase of Cap-and-Trade Allowances in the Event of an Exceedance.*

[16] Id.

WPTF recommends that the Emissions limits be clarified to include rounding to the nearest whole number. For example, an entity that emits 2.3% emissions in a year should be rounded to 2%. Further, as discussed in Section I above, the Proposed Regulation may lead to non-compliance despite a regulated entity undertaking reasonably prudent maintenance and operating measure to protect against inadvertent releases. To address these concerns, the ARB should create a voluntary compliance mechanism that would avoid an enforcement action. In the event that the emergency event exemption does not apply, the ARB should allow the regulated entity to purchase cap-and-trade allowances or emissions offsets to provide a clear and predictable mechanism that entities can rely on to ensure their own compliance. (WPTF)

**Comment:**
And, first off, we'd like to very much echo the other commenters you've heard who have expressed appreciation for the staff. They have been very open and made themselves accessible on numerous occasions and really appreciate their openness and all their efforts on this regulation.

Despite that, we -- we do still have some -- two fundamental concerns with the regulation and that is how it affects the small inventory holders. Most of the power plants in California will fall into this category. As you saw in Mr. Cook's presentation, these sources generally represent about two percent of the total statewide inventory of SF6. Those power plants are also obviously critical to reliability on the grid.

And they use SF6 typically at high voltage. And SF6 is literally what stands between the generation of their power and the delivery of their power to the grid during all system conditions, including those that we saw in August and September recently with the extreme heat events and the need for reliable capacity on the grid.

So we really appreciate you taking a close look at this regulation. It is technical, but it relates directly to reliability. The concern is is that when a small inventory holder has a release, that release will likely put them well over the threshold. And while we appreciate staff's efforts to refine that threshold to a two percent or 50-pound level, we just don't feel that that -- that will address the concern.

And after all of the prudent maintenance measures have been undertaken, we're concerned that there will still be risks that just can't be mitigated under this regulation. It could jeopardize those plants being available to the grid.

So our ask is that you amend the reporting threshold. And as we've heard before, the 10,000 metric ton threshold is consistent with other regulations. You'll have access to information to ensure that expectations about the level of these emissions remain within those expectations, and yet ensure that the overall environmental goals of the regulation are met…. (WPTF2)

**Comment:**

We have proposed SF6 Regulation amendments that (1) provide an appropriate de minimis threshold for reporting and enforcement – an example of such language is provided below;...and (4) include maintenance provisions that will ensure safe and environmentally compliant operations of GIE ….

*Appropriate De Minimis Threshold*

NRG disagrees with ARB's revised approach to address facilities with "small facility inventories" in the latest Proposed Amendments. ARB's approach to remove the <5,500 MTCO2e emissions limit applicability (i.e., "de minimis") that was presented in the 2019 Discussion Draft, and replace it with a 2% Annual Emission Factor (AEF) for average CO2e capacities <10,000 MTCO2e (Table 5 of Proposed Amendments) does little to prevent facilities/owners with small capacity inventories from being subject to continued enforcement with substantial fines for small or even zero emission events attributed to phantom emissions; many of the potentially small emission events that could result in substantial fines may result from prudent, Original Equipment Manufacturer (OEM) recommended preventative maintenance inspections.

ARB had previously stated that the proposed de minimis threshold was established as the mid-point for all reporting entities, with half of the reporters having inventories >5,500 MTCO2e and half of the reporters having inventories <5,500 MTCO2e. Recently, in the latest SF6 workshop, ARB further highlighted that facilities/owners with capacities <10,000 MTCO2e account for <2% of the total statewide SF6 capacity inventory. This information reinforces that ARB has not established a realistic de minimis threshold that fairly considers the number of small facility inventories and the corresponding inventories held by these facilities. We believe that the de minimis inventory threshold should be established at no less than 10,000 MTCO2e – a point to which we elaborate further below.

If the actual potential of emissions from small facility inventories is <2% of the total statewide SF6 capacity inventory, then why is ARB proposing a disproportionate and inequitable regulation for emissions from small facility inventories? We understand that ARB believes that facilities with small inventories (<10,000 MTCO2e) can comply with the proposed 2% AEF because these types of small inventory facilities largely complied with the 2% AEF in 2019. However, basing the proposed amendments for small facility inventories on a single high-performing year is shortsighted and inappropriate when you consider the historical maintenance requirements of GIE. As ana example, a small facility inventory in California could have six (6) identical 15-lb breakers that have had historical maintenance events, which typically result in 2-lbs of SF6 gas needing to be added due to a maintenance event. Compliance under the new proposed amendment would only allow a 1.8-lb emission limit for the year, which means that this facility would have an AEF exceedance and be in violation of the proposed amendments for this small maintenance event. This example illustrates that the proposed 2% AEF is likely to continue to disproportionately penalize small emitters, while entities with larger inventories will likely continue to have "compliant" actual emissions based on the percentage of losses as compared to the significantly

greater inventories held by these entities. The 2% AEF does not support or promote compliance for small facility inventories, as it provides little relief for unavoidable emissions that could occur during regularly scheduled preventative maintenance, unscheduled repair maintenance activities, and voluntary early retirement of GIE equipment with phantom emissions.…

*Inclusion of Maintenance Provisions*

Lastly, the Proposed Amendments should encourage and promote the proper maintenance of SF6 GIE. The Proposed Amendments do not currently require, encourage, or allow for preventative maintenance. NRG recommends that ARB include language that exempts minor losses (i.e., 2% or less) associated with maintenance events, if, and only if, the SF6 GIE owner has demonstrated and can document that precautions and best-management-practices were implemented during the maintenance event. (NRG)

**Comment:**
I want to thank CARB and staff for their accessibility and, you know, an ear to all of our comments. We've been very involved in this regulation and through the amendments for numerous years. So again, I want to thank that -- thank staff.

First, a little more background at NRG. We are -- we currently own and operate more than 4,000 megawatts of generation in California ranging from peaking, combined cycle, renewables. During the effective period of this regulation, our portfolio was as much as 11,000 megawatts and included 50, 60-year old once-through cool generation and modern solar, wind, and gas fired.

So we have a very in-depth perspective on this regulation. It comes from extensive experience with management of active and retired large capacity GIEs that are 50 and 60 years old, as well as smaller and more modern GIE inventories.

So each of these assets are individual LLCs with small breaker inventories, capacities that are individually subject to the stringent compliance limits from potential losses, whether measured while conducting routine maintenance or from discrepancies in nameplate capacities while proactively retiring this aged infrastructure…. (NRG2)

**Comment:**
As NRG, you know, we have several electric generating facilities with small inventories. And one of our biggest concerns with the current and really proposed amendments is the lack of -- lack of equitability that we see between small and large SF6 capacity inventories. In particular, staff has proposed a two percent annual emission factor for facilities with SF6 inventories that are less than 10,000 metric tons or about 950 pounds of SF6.

And in talking with staff, their reasoning is that in 2019, it was a large-scale compliance for these facilities with this two percent rule.

We're really concerned about this. From the vantage point of using a single year of data to look at future compliance, it can really be problematic. For example, we have a 90-pound facility that will have a 1.8 pound emission factor going forward. Every couple years, we need to do maintenance, periodic OEM-required maintenance on these breakers. And to our best efforts, we end up with about two pounds of losses associated with this. So this means going forward that we're looking at a violation potentially every few years for doing periodic required maintenance.

And that just doesn't seem right, when compared with larger facilities that can perform this maintenance, which is required, and prevents larger releases from taking place. And so with this in mind, we think this demonstrates that inequities of the regulation when compared to these companies with large inventories. And because of this disparity, we ask that you encourage staff to create a de minimis exemption from enforcement for SF6 inventories that are less than 10,000 metric tons of CO2e.

And we would thoroughly support that this exemption continue to require reporting to ensure the documentation of potential inventory losses while facilities like ours continue to exercise the best management practices in their management of SF6…. (NRG3)

**Agency Response:**
Several commenters requested that the Regulation exempt GIE owners with a system capacity of less than 10,000 $MTCO_2e$ from the emissions limit completely. One commenter justified this request by noting that CARB staff released a draft of potential amendments during the informal public process that proposed a 5,500 $MTCO_2e$ capacity threshold below which GIE owners would be required to report emissions, but not be held to an emissions limit.

In the proposed amendments, CARB staff established a two percent emissions limit for GIE owners with a system capacity less than 10,000 $MTCO_2e$, doubling the emissions limit that they are subject to in the current Regulation. This higher emissions limit was set in response to extensive feedback received during the informal public process that GIE owners of this size would be challenged to meet the one percent emission limit. CARB staff agreed with that perspective and raised the emissions limit. This revision initially increases expected emissions from regulated entities by approximately 5,000 $MTCO_2e$ per year. While this is counter to the goal of the Regulation to reduce emissions, it is an important change to address real challenges that GIE owners with smaller capacities face, as detailed in the ISOR. The data reported under the Regulation show that the vast majority of entities, of all sizes, have been able to keep their emission rate below 2% over the last several years. As such, the two percent limit remains unchanged in the final Regulation.

The commenter that mentioned the 5,500 $MTCO_2e$ capacity threshold is correct that CARB staff released a draft of potential amendments during the informal public process that included a proposal that GIE owners with capacities below this

amount would not be subject to an emissions limit. However, as described above, further analysis by CARB staff demonstrates that the vast majority of GIE owners of all sizes have been able to comply with a two percent emissions limit. Also, CARB staff had received feedback in response to that 5,500 $MTCO_2e$ proposal to raise the threshold to 10,000 $MTCO_2e$. In considering that change, CARB staff analyzed emissions impacts, in conjunction with compliance rates, and found that a limit should in fact be imposed. Therefore, it is appropriate to limit emissions from these GIE owners to two percent of their system capacity, or 50 $MTCO_2e$, to prevent emissions from these sources from increasing more than the 5,000 $MTCO_2e$ mentioned above.

One commenter stated the capacity of their system is so small that 1.8 pounds of $SF_6$ emissions would put them over the annual limit. This is not correct, as the proposed Regulation sets a minimum emissions limit of 50 $MTCO_2e$ (~5 pounds of $SF_6$) for all GIE owners.

Commenters requested other changes to the emissions limit provisions, including exempting losses associated with maintenance events or allowing GIE owners to round down so that, for example, an entity that emits at a 2.3% rate in a year would be rounded to 2%. As mentioned above, CARB staff's emissions and compliance analyses justify the two percent emissions limit, and allowing emissions levels higher than that is unnecessary and counter to CARB's goal of minimizing emissions from this sector. Further, exempting emissions associated with maintenance events would send the wrong signal to GIE owners, effectively disincentivizing careful gas handling during maintenance activities. This would again have the impact of increasing $SF_6$ emissions in California, which is counter to the point of this Regulation.

One commenter stated the two-percent limit does little to prevent GIE owners with small capacity inventories from being subject to continued enforcement in the case of phantom emissions. The term "phantom emissions" has been used by stakeholders to describe situations where GIE have inaccurate nameplate capacities, resulting in the calculation of emissions that did not actually occur. CARB acknowledges that the $SF_6$ capacity of a device, as listed on the nameplate, may be incorrect. To address this concern, and in response to stakeholder requests, CARB staff added in the first 15-day Public Notice an optional process that allows GIE owners to determine a revised nameplate capacity for existing GIE. This new process is in addition to the option that exists in the current Regulation whereby GIE owners may revise the nameplate capacity of a GIE device if they receive a revised nameplate or product specifications from the manufacturer. As such, the Regulation allows GIE owners two options to pursue should they wish to revise inaccurate nameplate capacities to avoid "phantom emissions."

One commenter stated the Regulation enables the State's largest electric utilities to combine their GIE for reporting and compliance. This means that

those with higher inventories are at a lesser risk of non-compliance compared to small inventory holders when a single GIE device unexpectedly fails, an issue of equity, which was echoed by another commenter. An example was provided of a company that owns several electric generating facilities with small $SF_6$ capacity that are independently subject to the Regulation for whom the two-percent limit is problematic, and a commenter mentioned having "individual LLCs with small breaker inventories, capacities that are individually subject to the stringent compliance limits from potential losses." The commenters provide no evidence or data to support claims that smaller entities have a higher rate of compliance issues, and CARB staff analysis shows that over the past three years GIE owners with a system capacity less than 10,000 $MTCO_2e$ maintained an emission rate of two-percent or less more frequently than their larger counterparts. As such CARB staff has no evidence to support the commenters' claim of disparate impacts for larger and smaller entities under the final Regulation.

Regarding the comment related to individual electric generating facilities and LLCs, the current Regulation defines the GIE owner as "the person who owns gas insulated switchgear." CARB understands the commenter's concern that individual facilities or LLCs with smaller capacities than their parent organizations have challenges complying with the Regulation when it applies to them independently rather than to their parent organization, which arises in circumstances where the parent organization has a significantly larger capacity because their subsidiaries include multiple facilities or LLCs who each own their own GIE. As such, CARB staff revised the definition of GIE owner to accommodate additional ownership structures that could be considered a GIE owner. As such, in the first 15-day Public Notice, the definition of "GIE Owner" now includes various options, such as a limited liability company, subsidiary, parent company, or other entity at the GIE owner's discretion.

One commenter requested that, before instituting enforcement actions due to releases of $SF_6$, CARB should provide a clear process for achieving compliance, such as the acquisition and retirement of emissions allowances or offsets. Because the changes discussed above give all GIE owners an opportunity to comply with the Regulation, and penalties for emission exceedances will be appropriate for GIE owners of all sizes, CARB staff did not make the requested change.

One commenter stated that, beyond instituting reasonably prudent maintenance and handling procedures for $SF_6$ GIE, the only way to ensure compliance is to perform a complete system redesign, and that the costs of such a redesign could jeopardize the economic sustainability of these facilities. CARB staff disagrees that regulatory compliance requires significant retrofit costs for GIE owners. First, the emissions limit for smaller-capacity GIE owners has been doubled relative to the current Regulation and data reported to the Regulation shows no compliance differential between entities with larger or smaller capacities. The final Regulation also includes several planning tools and

levers that GIE owners can use to manage their emissions limit, improving their ability to comply. One such provision is the early action credit which allows GIE owners to increase their emissions limit when non-$SF_6$ GIE are installed prior to the corresponding phase-out dates. In addition, after the phase-out begins in 2025, GIE owners can replace existing $SF_6$ GIE with non-$SF_6$ GIE without any corresponding drop to their emissions limit. Also, GIE owners wishing to replace $SF_6$ GIE with non-$SF_6$ GIE can apply for an exemption if the available non-$SF_6$ GIE does not fit in the space available, negating any need for a costly redesign. As such, GIE owners with smaller capacities have sufficient and flexible options to achieve compliance with the Regulation's emissions limit.

Finally, one commenter stated CARB should not impose the emissions limit and phase out requirement. It is not clear if the requested change would apply universally, or just to small-capacity GIE owners. It is also unclear if the commenter means these two provisions should not be imposed in combination, or, if neither of the provisions should be imposed. CARB staff has interpreted the comment to mean these provisions should not be imposed in combination, otherwise, the comment would contradict the commenter's statement from earlier in the letter: "WPTF recommends amendments to require all $SF_6$ inventory holders to track their inventories, report to the ARB and be subject to the phase out deadlines." Regardless, the phase-out is necessary to generate a more certain market for non-$SF_6$ GIE, spurring manufacturers to complete product development. Meanwhile, the emissions limit encourages GIE owners to reduce $SF_6$ emissions from existing GIE as much as possible. These provisions are essential to achieve the goal of the Regulation to transition away from the use of $SF_6$ and to reduce GHG emissions from GIE in California. Therefore, both measures have been retained.

**B-11. Revise GIE Owner Definition to Match Mandatory Reporting Regulation**

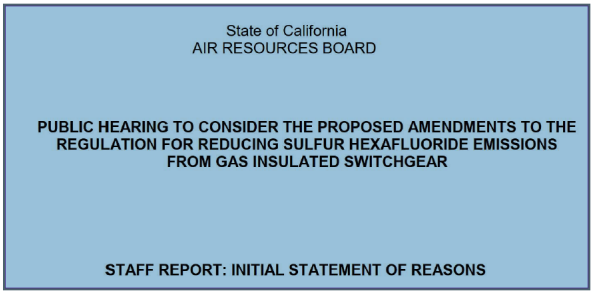
**Comment:**
Recordkeeping Requirements—§ 95355
The proposed language in § 95355(a) requires that a single annual emissions report be "submitted by each GIE owner regardless of whether the GIE owner's GIE are located in a single physical location or multiple contiguous locations within California." For greenhouse gas reporting purposes in CARB's Mandatory Reporting Rule, a single facility location, such as a refinery, must report its emissions separately from another refinery location in the state that may have the same owner. It would make sense to have the reporting under this proposed rule to have facilities report separately to match the reporting that they conduct under the MRR. Perhaps this proposed requirement is meant to address power companies with many substations under single ownership, but for other industries, this may not be appropriate. **WSPS** [sic] **suggests that facilities report separately or combined under this SF6 rule in the same manner as they do under the CARB MRR**…. (WSPA)

**Agency Response:**

The commenter requests the manner in which a single regulated entity is defined under the $SF_6$ Regulation be consistent with CARB's Mandatory Reporting Regulation (MRR). The explanation provided states that owners of multiple refineries are required to report emissions from those refineries separately under MRR. CARB staff disagrees with the requested change. Under the $SF_6$ Regulation, the GIE Owner must submit a single report for all their GIE regardless of the number of individual facilities where the GIE reside. Further, the $SF_6$ Regulation does not have facility definitions, there is no regulatory value in making the change, and the change would be very cumbersome and disruptive to split approximately 300 covered entities into separate facilities. Also, throughout the rulemaking process several stakeholders have noted that compliance with the emissions limit is more challenging for smaller-capacity GIE owners. The impact of the requested change would divide a single larger-capacity GIE owner into multiple smaller-capacity GIE owners, exacerbating the issue.

**B-12. Expand the Early Action Credit**

**Comment:**
Further to the webinar on July 13th 2020 relating to the 'Proposed Amendments to the Regulation for Reducing Sulfur Hexafluoride (SF6) Emissions from Gas Insulated Switchgear', Siemens Energy Transmission would like to discuss further the 'Early Action Credit'. We understand from your analysis circuit breakers amount for around 64% of total capacity, reference page 27 of report below.


State of California
AIR RESOURCES BOARD

PUBLIC HEARING TO CONSIDER THE PROPOSED AMENDMENTS TO THE REGULATION FOR REDUCING SULFUR HEXAFLUORIDE EMISSIONS FROM GAS INSULATED SWITCHGEAR

STAFF REPORT: INITIAL STATEMENT OF REASONS

That leaves around 36% of total capacity illegible for this credit. Siemens Energy has analyzed their SF6 Gas Insulated Switchgear (GIS) products in typical arrangements sold and installed in the USA and calculates the following per bay:

| | |
|---|---|
| 72,5 kV up to 145kV | 3,466 $MTCO_2e$ |
| >145kV to ≤245kV | 3,625 $MTCO_2e$ |
| >245kV | 7,159 $MTCO_2e$ |

Based on current Siemens Energy projects in California, USA the average number of bays per substation is over 15 on projects up to 245kV. Hence, per SF6 filled substation being installed the total increase in MTCO2e is approximately:

| | |
|---|---|
| 72,5 up to 145kV | 51,990 $MTCO_2e$ |
| >145kV to ≤245kV | 54,375 $MTCO_2e$ |

Siemens Energy does not have full data on all planned GIS projects in California, but is currently aware of over 11 GIS projects being considered or being built in the state. Siemens Energy believes these numbers are significant and consequently should be considered in the 'Early Action Credit' section of the new regulation

To accelerate the reduction of GHG emissions in California we welcome the Early Action Credit system. However , Siemens Energy suggesting to increase the credit per device of GIS and Circuit Breakers by 1.5 to 2 times ($MTCO_2e$) to further encourage utilities to make early decisions to accelerate the decrease of GHG emissions. (SiemensEng)

**Comment:**
Early Action Credit
CCEEB appreciates the recognition in the proposed regulation for early action to phase-out $SF_6$. This helps build momentum for development of alternatives in a time of significant uncertainty. We believe some additional incentives could overcome the indications that OEM solutions are being delayed due to COVID-19, international tariffs, industry consolidations (ABB-Hitachi), spinoffs (Siemens Energy), and reprioritization of R&D in response to new economic circumstances.

*Recommendation*
Advance Early-action credit from 2021 to 2017 (§95353(d)) will recognize the work done to advance the phase-out and send a strong signal to OEMs and compliance entities to continue development of alternative technologies…. (CCEEB)

**Comment:**
[However, there are a number of open items that need to be dressed in subsequent 15-day comment periods, specifically CCEEB supports a number of the items addressed by the joint utilities, specifically]…early action credits starting earlier as previously mentioned…. (CCEEB2)

**Comment:**
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.…

However, in order to recognize regulated parties that have already proactively replaced or installed non-$SF_6$ alternative GIE and encourage others to accelerate the transition away from $SF_6$ 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 $SF_6$ 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*:

$$Average\ CO_2e\ capacity_i = EAC_i + \sum_{n=j}^{m} \frac{GWP_j * C_{avg,j,i}}{2204.62}$$

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:

$$Emissions\ Limit_i = EAC_i + \frac{AEF_i}{100} * Average\ CO_2e\ capacity_i$$

…(PG&E2)

**Comment:**
The second topic I wanted to mention is the early action credit. We are very pleased with the inclusion of an early action credit in the regulation and believe it will be a very important incentive and signal to utilities and manufacturers to accelerate the transition. To that end, we think the credit will be more effective if the start date is moved up and the ability to use credits begins in 2021 instead of 2025. (PG&E3)

**Comment:**
B. Early Action Credit. The Utilities Group supports CARB staff's inclusion of the EAC provision in section §95353 of the Propose Amendments. In order to recognize early action by entities that pro-actively installed non-$SF_6$ GIE prior to adoption of the Proposed Amendments, we recommend: a) changing the starting year for the EAC from 2021 to 2017 when the phase-out regulatory

concepts were first introduced by CARB, and b) provide the EAC starting in the year when the early action was taken.…

The Utilities Group proposes the following **amendments** to implement the EAC and Conversion Factor recommendations:

1. **AMEND** §95353 (c) as follows to recognize the EAC in the year the early action was taken and use the more accurate conversion factor:

   §95353 (c) GIE owners must calculate their average $CO_2e$ capacity on an annual basis as follows for each covered insulating gas j:

$$Average\ CO_2e\ capacity_i = EAC_i + \sum_{n=j}^{m} \frac{GWP_j * C_{avg,j,i}}{2204.62}$$

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 EAC 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:

$$Emissions\ Limit(i) = EAC(i) + [\frac{AEF}{100} * Average\ CO2e\ capacity]$$

…. (JUG)

**Comment:**
*§ 95353. Annual Emissions Limit*
*Early Action Credit*
Metropolitan encourages further expansion of the "Early Action Credit" (EAC) program. As currently proposed, the EAC will only reward GIE owners with the higher voltage equipment (i.e., ≥ 72.5 kV) who install non-$SF_6$ circuit breakers between January 1, 2021 and the corresponding $SF_6$ GIE phase-out date.

Metropolitan recommends that ARB extend the EAC program to include all voltage ranges for GIE equipment. By extending the EAC system to all GIE equipment, smaller GIE owners such as Metropolitan would be similarly incentivized to replace $SF_6$ GIE early; thereby, helping to reduce potential $SF_6$ emissions…. (MWDSC)

**Comment:**

7- Clause 95353-d (Page 11): **Annual Emission Limits:** As per this clause, we understand that the early credit applies to Circuit Breaker only. Is there an early credit program for the GIE too?... (Siemens)

**Comment:**

Early Action Credits—§ 95353(d)

CARB proposes an early action program that would give credit to facilities that purchase non-SF6 between January 1, 2021, and the applicable phase-out date, with roughly two-thirds credit being given based on capacity, with the credit being included in the baseline up to 10% max of 2021 capacity. WSPA agrees with the overall approach but would like to suggest three changes. With CARB's goal being the reduction of emissions from SF6, it would seem that there should be a much **higher limit of early action credit rather than just 10% of the 2021 capacity**. Facilities would be more incented to replace SF6 if greater credit were given toward the baseline and if greater credit were given per piece of GIE replaced; that is, **giving credit up to 100% of the voltage capacity**. Another suggestion is to decrease the lowest capacity that is eligible for credit from the proposed 72.5 kV. Even some large industrial facilities may only have a few smaller pieces of equipment with less than 72.5 kV capacity and therefore would not qualify under this proposed early action credit program. **The credit should be available for all types of GIE listed for phase-out in Table 1**. With these three changes, facilities would be more likely to look aggressively to replace SF6 GIE with non-SF6 equipment as soon as technically feasible, assuming adequate market availability and proven reliability…. (WSPA)

**Agency Response:**

Several commenters requested additional types of gas-insulated switchgear be eligible for the early action credit. The broadest request was for all gas-insulated switchgear to be eligible, including gas-insulated substations and all voltage levels. Rationale included that, based on the ISOR, around 36% of California's active, non-hermetically sealed $SF_6$ capacity are not eligible. One commenter provided data on the amount of $SF_6$ in GIS they have built. Commenters also requested the amount of credit GIE owners receive for activating individual GIE devices be increased, with some stating that the early action credit covers only two-thirds of capacity or that the credits should be increased 1.5 to two times. Commenters requested that the total amount of early action credit they are allowed to accrue be increased as well.

The proposed Regulation limits early action credit eligibility to circuit breakers and GIE with a voltage capacity of 72.5 kV or greater. The excluded less-than-72.5 kV GIE account for about 24 percent of California's active, non-hermetically sealed $SF_6$ capacity. As explained in the ISOR, non-$SF_6$ low- and medium-voltage equipment (38 kV and below) have been widely produced by a number of manufacturers and used by utilities for more than a decade, so these devices do not require any additional incentives for installation. Additionally, very few $SF_6$ GIE exist in California at voltage capacity levels between 38 and 72.5 kV, and so early action credit for equipment at this kV level was not included. The commenters provided no new information that

substantiated their request, and the original rationale for the exclusion is still valid, so there was no change made to expand early action credit to these GIE.

GIE with a voltage capacity of 72.5 kV or greater that are not circuit breakers, including gas-insulated substations or GIS, make up the remaining 12 percent of capacity excluded from early action credit eligibility. CARB staff have interpreted the commenter's use of the term "substation" to be synonymous with "GIS." Because the data provided were for a single manufacturer, and the $SF_6$ Regulation reported data for GIS is limited and varied, CARB staff asked California utilities to provide additional data about their GIS. Only a few utilities notified CARB that they own GIS, and the number of GIS identified was low, especially when divided across the four voltage classes for which early action credit is assigned for non-$SF_6$ circuit breakers. One utility indicated they would be unlikely to replace one of their $SF_6$ GIS with a non-$SF_6$ version in time to claim early action credit. Reliable and representative data about the volume of $SF_6$ in GIS therefore remains unavailable, and demand for this addition is low. For these reasons, CARB staff has not added an early action credit for GIS.

Regarding the commenter's request to increase the amount of early action credit granted to GIE owners that activate qualifying GIE, as discussed in the ISOR, GIE owners that place qualifying non-$SF_6$ circuit breakers into active service between January 1, 2021 and the phase-out date for an equivalent $SF_6$ circuit breaker will receive a credit toward their baseline emissions limit. The credit, as noted in Table 3 of the Proposed Regulation Order, would be roughly equivalent to the amount of $SF_6$ in a modern circuit breaker, derived from reported data by averaging the $SF_6$ capacity of non-hermetically sealed circuit breakers manufactured on January 1, 2016 or later. Because each unit of early action credit granted to a GIE owner allows them to emit additional $SF_6$, a balance is needed to provide enough incentive to GIE owners to acquire non-$SF_6$ GIE without allowing excessive emissions. CARB did not change the early action credit amounts in the final Regulation because staff set these amounts based on a rigorous review of comprehensive data, and because the commenters did not provide new data upon which to base recalculation of the credit.

Regarding the commenter's request for a higher limit on the total amount of early action credit a GIE owner can receive than initially proposed, CARB staff disagrees with the requested change. The final Regulation allows GIE owners to accrue early action credit up to 10 percent of their 2021 capacity. Ten percent is a significant increase to the capacity on which the GIE owner's emissions limit is based, especially when considering that average $SF_6$ capacity growth statewide has averaged three percent per year. The commenter provided no data to substantiate their request, and so CARB staff has made no corresponding changes to the Regulation.

Several commenters asked to be able to start accruing early action credit in 2017 instead of 2021. Similar to the rationale for excluding distribution-level GIE from early action credit program, any non-$SF_6$ GIE already acquired did not require any sort of CARB-issued incentive to install. Because each unit of early action credit granted could allow additional $SF_6$ emissions elsewhere on a GIE owner's system, and the purpose of

the credit is to incentivize early action, not reward past action, CARB staff made no changes in response to these comments.

Several commenters requested early action credit be incorporated in their emissions limit in the year when the non-$SF_6$ circuit breaker was activated. In the 45-day Public Notice the early action credit would not have impacted the GIE owner's emissions limit until 2025. CARB staff agrees that the Regulation should allow early action credits to increase emission limits beginning in 2021, and the first 15-day Public Notice contains this revision. However, for the reasons described above, CARB staff does not consider it appropriate to provide credit for non-$SF_6$ circuit breakers activated prior to 2021.

**B-13. Revise Measurement Procedures**

**Comment:**

3. Revise Requirement for Gas Received Inside Equipment. GIE suppliers have not established a standard to supply reporters with an accurate mass of covered gas added to GIE prior to shipping from the factory. The Utilities Group recommends the following **amendment** to address the lack of consistency:

   **AMEND** § 95354(a)(10)(A)(2). For GIE acquired after December 31, 2020, record the amount of covered insulating gas in the device at the time the device was acquired (pounds)~~, per information provided by the manufacturer~~. If no covered insulating gas was in the device when it was acquired, record this value as zero;… (JUG)

**Comment:**

Finally, for reasons explained below, we recommend including a definition of 'mass flow meter:' "*a device which measures the instantaneous and cumulative mass of a gas flow.*"…

§ 95354(b)(1) and (d)(1)

The referenced subsections require reporting entities to measure the covered insulating gas transferred to and from GIE meeting certain requirements. The proposed language prescribes the process for these measurements, which involves weighing the gas container before and after the transfer and subtracting the second value from the first, in cases where covered insulating gas is transferred from the container to a GIE, and vice versa in cases where the covered insulating gas is transferred from a GIE to a container.

While this is a viable process to measure the weight of the covered insulating gas, we recommend that CARB add language in both subsections to allow reporting entities to use a mass flow meter to measure the gas. Historically used to measure $SF_6$, a mass flow meter can be calibrated to measure any covered insulating gas. Mass is not affected by changing temperature and pressure. Thus, a flow meter provides a very accurate account of the gas which is measured as it enters and exits the device.

In order to use a mass flow meter properly, the user simply connects the device via a connection hose between the GIE and the gas cart being used. In this manner, all gas flowing to or from the GIE passes through the mass flow meter. Once the gas cart reaches the required pressure, the mass flow meter yields a mass reading that the user can record.

Allowing reporting entities the option of using a mass flow meter provides several benefits. These benefits include the following:

- The relative ease of process associated with simply taking a reading off of a device as opposed to performing two different weighing functions.
- Use of mass flow meters allows the user to easily account for any gas that remains trapped in the connecting hose between the GIE and the gas cart – use of the described container method does not account for this and relies on the user to remember this important step.
- Many reporting entities have invested in gas transfer processes that involve mass flow meters; not allowing use of these devices would largely turn those investments into a sunk cost.
- Most reporting entities rely on third party contractors for at least some gas handling and maintenance functions. These contractors regularly use mass flow meters to perform these services and, accordingly, not allowing reporting entities to rely on their measurements would be inefficient and unnecessarily time-consuming.

We recommend the following language:

> *(b) Beginning January 1, 2021, for any GIE device that has never been in the GIE owner's inventory as active GIE or that was accounted for in section 95354(c)(1) in a prior data year, and to which covered insulating gas must be added for it to become active GIE, GIE owners shall not add covered insulating gas to a GIE device prior to the data year in which it first becomes active GIE or becomes active GIE after being accounted for in section 95354(c)(1). The amount of covered insulating gas transferred to the GIE device (pounds) must be recorded. <u>To determine the amount of covered insulating gas transferred to the GIE device, a GIE owner may choose either of the following processes:</u>*
>
> > *(1) weigh the gas container being used to fill the device prior to, and after, the addition of the covered insulating gas to the GIE device following the requirements of section 95354(e), and subtract the second value (aftertransfer gas container weight) from the first value (prior-to-transfer gas container weight), or*
> >
> > *<u>(2) connect a mass flow meter between the cart and the GIE and transfer the gas into the GIE. Once the GIE is filled to the temperature corrected pressure or expected weight of gas, close the connection to the GIE from the mass flow meter hose and perform a recovery of the gas trapped in the</u>*

*filling hose through the mass flow meter. Read and record the mass reading on the mass flow meter.*

And;

*(d) For any GIE device meeting the specifications in sections 95354(c)(1)(A) and 95354(c)(1)(B), covered insulating gas must be removed and evacuated into a covered gas container or containers, and accounted for following the requirements of section 95354(d)(1) in the same year that the GIE device is counted as "removed from regular use." The amount of covered insulating gas transferred out of the GIE device (pounds) must be recorded. To determine the amount of covered insulating gas transferred to the GIE device, a GIE owner may choose either of the following processes:*

*(1) weigh the gas container being used to receive the covered insulating gas being evacuated from the device prior to, and after, the evacuation of the covered insulating gas from the GIE device following the requirements of section 95354(e), and subtract the first value (prior-to transfer gas container weight) from the second value (after-transfer gas container weight); or*

*(2) connect a mass flow meter between the GIE and the gas cart and evacuate the gas. Once the cart reaches the required pressure, read and record the measurement on the mass flow meter.*

§ 95354(e) and (f) Container Weight.

While many industrial scales are accurate to within 1%, all scales require proper maintenance and calibration; the accuracy can only be as good as the calibration. Scales designed specifically to weigh cylinders and storage racks require much less frequent calibration than other industrial scales so are more likely to render an accurate reading.

Additionally, in order to ensure accurate measurements of gas inside containers, it is important for owners to record and use the tare weight in addition to the gross weight. We recommend the following revisions:

*(e) Whenever a gas container is required to be weighed, weigh the container on a scale that is certified by the manufacturer to be accurate to within one percent of the true weight and is specifically designed for weighing cylinders, cylinder storage racks and/or storage tanks. In order to calculate the container weight, GIE owners must record the gross weight and tare weight stamped on the container, then subtract the tare weight from the gross weight.*

*(f) GIE owners must weigh covered gas containers at the points in time set forth in sections 95354(f)(1)(A)-(B) and 95354(f)(2). Each time a container is*

*weighed, record the date, the amount of covered insulating gas in the container (pounds), and the reason why the container was weighed (end of calendar year weighing, added to inventory, removed from inventory), and document the tare weight stamped on the container.*

§ 95354(i) Gas Carts.

Most utilities that own and operate $SF_6$ GIE would opt to purchase a gas cart that can handle $SF_6$ filling and recovery across different $SF_6$ GIE sizes and types. Larger volume of $SF_6$ GIEs will require gas carts with increased size and weight capability. Due to the size and capability requirements, most utilities have gas carts that are permanently mounted on a trailer. Trailer-mounted gas carts would make the Scale Method impractical to implement, since the trailer would have to be weighed for each $SF_6$ transaction and this would require a vehicle scale that is not readily available in the field.

This would leave utilities with only the Container Method. The Container Method would require the gas cart to be brought up to a pre-determined pressure, then to transfer the gas between the gas cart and the container. We recommend deleting the language in the Container Method that requires reporters to use a pre-determined pressure for transfer between gas cart and container and allow entities to simply recover all gas in the gas cart to a container(s), then to weigh the container(s).

Requiring reporting entities to consistently use the same pre-determined pressure will lead to inaccurate measurements. In order to determine the proper pressure for accurate gas measurements, the GIE owner must first determine the gas temperature, which will be impacted by the ambient temperature. Naturally, ambient temperature is highly variable depending on application (indoor, outdoor, underground), location and season.

Even if GIE owners were allowed to calculate the appropriate pressure for each scenario, this step does not lead to increased accuracy and introduces unnecessary complexities.

Finally, and similar to our recommendation in the preceding section, we recommend that CARB include language allowing reporting entities to measure covered insulating gas in gas carts using a mass flow meter. In this case, the mass flow meter would be connected between the gas cart and the cylinder to measure all gas being recovered into the cylinder.

Accordingly, § 95354(i)(1) and (2) should be amended to read:

*(1) By January 1, 2021, the GIE owner must determine whether they will account for covered insulating gas in each gas cart using the "container method" following the requirements of sections 95354(i)(2)(A) and 95354(i)(3)(A), or the "scale method" following the requirements of sections 95354(i)(2)(B) and 95354(i)(3)(B) and must, for each gas cart, use the method*

*selected for all subsequent measurements of the amount of covered insulating gas in that gas cart pursuant to section 95354(i)(2-3), or the "mass flow meter method" following the requirements of 95354(i)(2)(C). ~~Whenever a GIE owner elects to use the "container method" for a specific gas cart, the GIE owner shall, by January 1, 2021, select a pressure that they will bring the gas in that cart to prior to each measurement required pursuant to section 95354(i)(2-3). The gas cart must be brought to that pressure prior to making the measurements in section 95354(i)(2-3). GIE owners that elect to use the "container method" for multiple gas carts are not required to select the same pressure for each individual gas cart.~~ Whenever a GIE owner acquires a gas cart after December 31, 2020, they must determine whether they will use the "container method" or the "scale method" at the time the gas cart is acquired.*

*(2) For each gas cart owned by or stored on the property of the GIE owner on December 31 of the data year, either:*

*A. Container method. ~~Bring the gas cart to the pressure specified in section 95354(i)(1) by transferring insulating gas between the gas cart and a covered gas container. Perform this process prior to determining the weight of the covered gas container and recording that weight pursuant to sections 95354(f) and (g); or~~, weigh the gas container being used to receive the covered insulating gas being ~~evacuated~~ <u>recovered</u> from the gas cart prior to, and after, the ~~evacuation~~ <u>recovery</u> of the covered insulating gas from the gas cart following the requirements of section 95354(e), and subtract the first value (prior-to-transfer gas container weight) from the second value (after-transfer gas container weight).; or…*

*B. [no change]; or*

*C. Mass flow meter method. Connect a mass flow meter between the gas cart and the container and evacuate the gas. Once the cart reaches the required pressure, read and record the measurement on the mass flow meter.*

As noted, we also recommend replacing "evacuate" with "recover." 'Evacuation' is an industry term that refers to the removal of air and moisture. 'Recover' refers to the transfer of gas, which we believe to be the intended meaning of this language…. (SF6&AltCoal)

**Comment:**

C. <u>Add option to use mass flow meter to measure gas transferred into / out of GIE</u>

The Proposed Amendments require weighing the gas container(s) before and after transfer of gas into or out of a GIE. LADWP encourages CARB add the option to use a mass flow meter to measure the amount of gas transferred, in lieu of weighing the gas container before and after the transfer. A mass flow meter is connected between the GIE and the gas container, and can measure the flow of gas with an accuracy of 0.5%. Use of a mass flow meter is beneficial in situations where the gas container cannot be weighed (such as a gas cart).

**ADD 95354(b)(2):** A mass flow meter may be used to measure the amount of covered insulating gas transferred in to the GIE.

**ADD 95354(d)(2):** A mass flow meter may be used to measure the amount of covered insulating gas transferred out of the GIE…. (LADWP)

**Comment:**
Inventory and Insulating Gas Procedures—§ 95354
The procedures laid out in the rulemaking for quantifying the amount of insulating gas transferred into or out of GIE rely on weighing gas containers in various storage configurations, which can be unwieldly and very time-consuming, given that cylinder contents also have to be brought to the temperature and pressure required by procedure. **WSPA proposes that CARB allow the use of mass flow meters**, which have been commonly used for decades and yield accurate mass calculations for inventory purposes. CARB should develop another subsection that would allow and describe the appropriate use of mass flow meters for facilities to conduct their annual inventories…. (WSPA)

**Comment:**
Weigh of Gas Carts (Section 95354 (g) & (i)(2)(B): DILO proposes that the language which includes weighing of gas cart be removed.

Due to the different sizes, applications, and design, including carts permanently installed in trailers, it is not operationally effective and, in most cases, not possible to weigh a gas cart and calculate empty weight and "full weight." Further a gas cart does not have a set "full weight" and can be misleading.

DILO does agree that the "scale method" is accurate under specific requirements. Thus, requiring users of gas carts to empty gas cart systems into on-board cylinders which can be removed and weighed individually and emptying the cart system per the manufacturer's recommendations be a requirement. Note methods to safely empty gas carts into cylinders is possible and is part of most SF6 gas cart short term storage, long term storage and maintenance processes.

**Scales:** DILO proposes that the language regarding scales be further clarified to include the language "Cylinder Scales and/or scales designed to weigh cylinders and cylinder rack systems." In addition, include language for a definition that specifies a scale which is

specifically designed to weigh cylinders (this may include a pallet scale or similar that is designed to weigh large objects such as cylinder rack systems).

Proposed language for a definition: Cylinder Scale: A Beam balance (or Beam scale) device specifically designed to measure weight or mass of a cylinder or cylinder rack system.

DILO is has witnessed situations where 3rd party contractors have used non-industrial scales to weigh cylinders. These scales are not capable of maintaining accuracy and may create false weighing events. Specifically clarifying scales which are designed to weigh cylinders and cylinder rack systems will eliminate the opportunity for inaccurate reporting.

**Mass Flow Meter***:* DILO proposes that language regarding the use a Mass Flow Meter.

Mass Flow Meter accuracy has been proven to be more accurate than balances scales. Many stakeholders have made investments towards Mass Flow Meters. Not including their use as part of determining gas used during a transfer of gas will render these investments useless as well as lower the accuracy capabilities of Mass Flow Meter users.

A mass flow meter is used by simply connecting the device via hoses designed for the application. The Mass Flow meter is temporarily installed between the GIE and the gas cart. The Mass Flow Meter by it's design will account for all gas flowing to or from the GIE. Once the user notes that the transfer of gas is complete, the user will record the reading from the Mass Flow Meter.

**95354(e) and (f) Container Weight.:** DILO proposes that the regulation language include the instruction that cylinder Tare Weight is required as part of the documentation to ensure that the net weight can be properly and accurately calculated. This will eliminate the potential for inaccurate data due to the net weight of containers not being recorded…. (DILO)

**Comment:**

Section 95354 (i)(1)

*Gas Carts. GIE owners must do the following for all gas carts that contain covered insulating gas:*

*(1) By January 1, 2021, the GIE owner must determine whether they will account for covered insulating gas in each gas cart using the "container method" following the requirements of sections 95354(i)(2)(A) and 95354(i)(3)(A), or the "scale method" following the requirements of sections 95354(i)(2)(B) and 95354(i)(3)(B) and must, for each gas cart, use the method selected for all subsequent measurements of the amount of covered insulating gas in that gas cart pursuant to section 95354(i)(2-3). Whenever a GIE owner elects to use the "container method" for a specific gas cart, the GIE owner shall, by January 1, 2021, select a pressure that they will bring the*

*gas in that cart to prior to each measurement required pursuant to section 95354(i)(2-3). The gas cart must be brought to that pressure prior to making the measurements in section 95354(i)(2-3). GIE owners that elect to use the "container method" for multiple gas carts are not required to select the same pressure for each individual gas cart. Whenever a GIE owner acquires a gas cart after December 31, 2020, they must determine whether they will use the "container method" or the "scale method" at the time the gas cart is acquired.*

Discussion

The ARB should allow the use of a thermal mass flow meter to measure the amount of gas transferred to and from a breaker to a cylinder. For effective flow energy management applications such as SF6, thermal mass flow meters provide entities the highest degree of precision 0.5% ± 0.1kg/h reading of actual capacity. TID staff already have experience using a mass flow meter and based on its in-the-field observations, we believe these meters are the most accurate measure of capturing the gas that enters a vessel because there is no erroneous accounting of any gas that is left in hoses and nozzles that would occur by weighing a container. Adding language in this section allowing the use of a mass flow meter in addition to the use of a scale would provide flexibility while still allowing a full accounting of gas transfers. For these reasons, the ARB should allow the use of a mass flow meter.

Section 95354(j)

*(j) GIE owners must establish and adhere to written procedures to track all covered gas containers included in the inventory compiled pursuant to section 95354(g). The GIE owner must review the procedures annually and revise them as needed to ensure the information is current and the requirements of section 95354(e)-(h), are met. The procedures must contain a mechanism to record the following information when any gas container is moved from one location to another, at a minimum:*

*(1) The date(s) of the gas container's movement from one location to another;*

*(2) The gas container's identification number;*

*(3) The location to which the gas container has been moved, and the name and address (if applicable) of the location; and*

*(4) The name of the person receiving the gas container at the location*

Discussion

TID recommends the ARB delete this entire section from the regulation because it is overly burdensome and would not further the environmental objectives of the Proposed Regulation…. (TID)

**Agency Response:**
One commenter requested CARB staff eliminate the requirement that the amount of covered insulating gas in a GIE device at acquisition be provided by the manufacturer, effectively expanding the types of entities that may determine this value. CARB staff agrees, and section 95354(a)(10)(A)(2.) of the final Regulation has been modified to allow the value to be determined by transferring covered insulating gas from the GIE device to a gas container, and determining the amount of gas initially present within the GIE device using prescribed methods. The ability for GIE owners to use a value provided by the manufacturer has also been retained.

Several commenters requested CARB staff allow use of flow meters to measure the amount of gas transferred into GIE, recovered from GIE, and present within a gas cart. One commenter requested a definition of "mass flow meter" be added to the Regulation. CARB staff agrees with the requested changes and the final Regulation specifies that mass flow meters can be used to measure the amount of gas initially present within a GIE device at acquisition, transferred into GIE, recovered from GIE, present within a gas cart, and during nameplate capacity adjustments. The final Regulation also includes calibration, re-calibration, and accuracy requirements for flow meters.

One commenter noted the use of the "Scale Method" to determine the amount of covered insulating gas within gas carts would be impractical for many gas carts, while another commenter requested the method be removed in the final Regulation. CARB staff has retained the use of the "Scale Method" in the final Regulation because stakeholders requested its inclusion during the informal rulemaking process, and CARB staff wishes to provide as many viable options to determine the amount of covered insulating gas in a gas cart as possible. Of note, the retention of this method does not mandate its use, as the final Regulation allows for the use of two other methods.

One commenter requested the "Container Method," used to determine the amount of covered insulating gas within gas carts, be modified to allow the GIE owner to empty the cart, instead of transferring gas into or out of the cart until a specified pressure is reached. CARB staff specified in the 45-day Public Notice that GIE owners remove gas down to a fixed pressure to grant GIE owners flexibility to "empty" the cart to whatever degree they were able to, given that equipment available to the GIE owner may vary in terms of the lowest pressure it can bring the gas carts to. The fact that a constant pressure is used for each measurement means the change in the amount of gas in the cart from year to year, which the mass-balance equation treats as emissions, would still be accurate. The intent of the provision was to maximize flexibility for GIE owners, but CARB staff recognizes through stakeholder feedback that this specification was confusing. As such, the final Regulation has been modified to specify that GIE owners using the container method or mass flow method must record the pressure at which the gas cart is "empty" according to manufacturer specifications, and bring the cart to that pressure every time they account for covered insulating gas in that gas cart.

Two commenters stated the Regulation should require the tare weight of each container be recorded so GIE owners may accurately determine the amount of covered insulating gas in each container, and CARB staff agrees. The first 15-day public Notice includes this change, as well as a definition of "tare weight," and a methodology in section 95354(g)(3) that explains how to use the tare weight in conjunction with the measured weight of the container to determine the amount of covered insulating gas it contains.

Two commenters requested that any scales used to weigh containers be specifically designed for weighing cylinders, cylinder storage racks and/or storage tanks. Rationale included that other types of scales require more frequent calibration and are therefore less accurate. CARB staff disagrees. The current Regulation requires all scales used to weigh gas containers or gas carts be certified by the manufacturer to be accurate to within one percent of the true weight, and be re-calibrated every three years or at the minimum frequency specified by the manufacturer. Because commenters did not explain why use of scales, in the manner specified by the Regulation, is problematic, the proposed change was not incorporated.

One commenter requested CARB staff remove sections 95354(j)(1-4) (now 95354(k)(1-4)) from the Regulation because they are overly burdensome. CARB staff originally proposed these sections, which required that GIE owners' procedures for tracking gas containers include recording the date of a gas container's movement, the location it was moved to, the name of the person that received it and its identification number. At the time this provision was initially included in an informal draft of the proposed amendments, data reported by GIE owners demonstrated that they were not tracking their gas containers carefully enough. Since then, the quality of data reported under the Regulation has improved, and CARB staff now finds these sections to be unnecessary. These sections were removed in the first 15-day Public Notice.

One commenter stated the term "recover" should be used in place of "evacuate" to improve alignment with terminology used in the industry. CARB staff agrees. This change has been made in the first 15-day Public Notice.

**B-14. Revise Procedures for Adding and Removing Gas from GIE**

**Comment:**
4. Allowing the accounting of SF6 gas for leak calculation in the year gas is evacuated….

B. The Utilities Group recognizes CARB's intention to account for movement of covered insulating gas between containers and GIE in the mass balance calculation within the data year. However, it is sometimes not possible to remove gas from a GIE by December 31 when a GIE is removed from service late in the data year. To remedy the challenge of rushing to remove gas solely to meet an administrative deadline, while also meeting the objective to avoid creating 'phantom emissions', a GIE device should be considered "removed

from regular use" on the date when the gas is extracted. In addition, GIE returned to the manufacturer for repair should not be considered removed from inventory because ownership of the GIE does not change hands. The Utilities Group proposes the following **amendment** to remedy this regulatory conflict:

**AMEND** §95354(c)(1)(B). When the GIE device is taken out of active service ~~for the purpose of removing the device from a GIE owner's inventory (e.g., to be disposed of, sold, transferred to a new GIE owner, sent to the manufacturer for repair)~~ and the covered insulating gas has been extracted.

C. § 95354(c)(1) Removed from Regular Use and (d) Remove Covered Insulating Gas. These sections would declare a GIE that has not been active for five consecutive years as "removed from regular use" and require the gas be removed from the GIE. It is not clear whether a GIE that was "removed from regular use" can be put back in service, and whether this requirement would apply to spare GIE. This proposed requirement is problematic for several reasons: 1) it adds unnecessary gas removal work, diverting operations and maintenance staff away from their regular duties; 2) removing the gas could ruin distribution switches and hermetically sealed equipment that were intended to remain fully charged; 3) the GIE owner may not have the special equipment necessary to extract the gas; and 4) it adds more recordkeeping to track how long a GIE has been in storage. The Utilities Group recommends deleting these proposed requirements, as the requirements create more work and don't improve emissions reporting accuracy.

D. Gas from GIE (excluding fully charged switches and hermetically sealed GIE) is typically removed within 1 year of the GIE being removed from active use. Additionally, distribution switches and hermetically sealed GIE that come fully charged from the factory should be exempt from the requirement to remove the gas. The Utilities Group proposes the following **amendment** to address this conflict:

**AMEND** §95354(d). For any GIE device meeting the specifications in sections 95354(c)(1)(A) and 95354(c)(1)(B), covered insulating gas must be removed and evacuated into a covered gas container or containers, and accounted for following the requirements of section 95354(d)(1) ~~in the same year that the GIE device is counted as "removed from regular use."~~ within one year from the date that the GIE device has been removed from active use. The amount of covered insulating gas transferred out of the GIE device (pounds) must be recorded. GIE devices that are sold or transferred to a new GIE owner or returned to the manufacturer for repair do not require the covered gas to be extracted unless necessary to comply with Department of Transportation requirements…. (JUG)

**Comment:**
Accounting of $SF_6$ Gas in GIE

CCEEB recognizes the objective to maintain accuracy in the mass balance per data year. However, GIE taken out of service later in the year will not meet the deadline to remove the gas ("in the same year that the GIE is counted as removed from regular use"). We believe it is reasonable to extract the gas from GIE (excluding fully charged switches and hermetically sealed GIE) within one year of the GIE being removed from active use.…

*Recommendation*

- To avoid phantom emissions, we propose that a GIE device be considered "removed from regular use" on the date when the gas is extracted:
    - 95453(c)(B) "*When the GIE device is taken out of active service and the covered insulating gas has been extracted ~~for the purpose of removing the device from a GIE owner's inventory (e.g., to be disposed of, sold, transferred to a new GIE owner, sent to the manufacturer for repair).~~*"
- Some GIE (e.g. fully charged switches, hermetically sealed GIE) can be sent to the manufacturer for repair or transferred to a new GIE owner without extracting the $SF_6$. The GIE owner may not have the special equipment necessary to extract the gas from certain types of GIE. One cannot remove gas from hermetically sealed GIE that is being transferred to another entity (as this would render GIE useless).
- ***95354(d)*** *For any GIE device meeting the specifications in sections 95354(c)(1)(A) and 95354(c)(1)(B), covered insulating gas must be removed and evacuated into a covered gas container or containers, and accounted for following the requirements of section 95354(d)(1) in the same year that the GIE device is counted as "removed from regular use." Within one year from the date that the GIE device has been removed from active use. The amount of covered insulating gas transferred out of the GIE device (pounds) must be recorded. GIE devices that are sold or transferred to a new GIE owner or returned to the manufacturer for repair do not require the covered gas to be extracted unless necessary to comply with Department of Transportation requirements….* (CCEEB)

**Comment:**

*IX. GIE device should be considered "removed from regular use" on the date when the gas is extracted.*

SCE recognizes CARB's objective to account for movement of covered insulating gas between containers and GIE in the mass balance calculation per data year. However, GIE taken out of service later in the year will not meet the deadline to remove gas. When distribution-level equipment is removed from active service in the field, it is taken to the nearest SCE Service Center until it can be collected for flat-bed shipment to SCE's central processing facility. This is the only location throughout SCE's 50,000-square-mile service territory where gas can be removed from distribution equipment, so it can take days or weeks to reach the facility. At this location, the equipment goes through an evaluation process and the GIE is either: (1) put in storage (without gas removal); or (2) gas is removed in order to send the equipment to be salvaged; or (3)

the equipment is returned to the manufacturer. Units returned to the manufacturer are typically returned fully charged with gas. When GIE is returned to the manufacturer for repair, SCE still considers that GIE to be part of our inventory because we retain ownership of the GIE during the repair process. The manufacturer will almost always remove gas from the equipment, either for repair or before salvaging. If GIE is repaired and sent back, the GIE comes back with an "R", which stands for "refurbished" at the end of the serial number. If these units are included in the "removed from regular" use definition, there could be phantom emissions associated with these returned to manufacturer (RTM) units if they are removed and/or added back to the inventory in different calendar years. We recommend that CARB provides guidance in the regulation for how to account for RTM units.

To address the logistical challenges and added expenses associated with expedited end-of-year transport and removal of gas while also avoiding phantom emissions, we propose that a GIE device be considered "removed from regular use" on the date when the gas is extracted before unit is salvaged. Also, it is reasonable for the GIE owner to extract the gas from GIE within one year of the GIE being removed from active use.

Proposed edits to §95354(c)(1)(B) and §95354(d), Inventory and Insulating Gas Procedures, are indicated below in ~~strikethrough~~ text:

**§95354(c)(1)(B)** When the GIE device is taken out of active service for the purpose of removing the device from a GIE owner's inventory ~~(e.g., to be disposed of, sold, transferred to a new GIE owner, sent to the manufacturer for repair)~~ and the covered insulating gas has been extracted.

**§95354(d)** For any GIE device meeting the specifications in sections 95354(c)(1)(A) and 95354(c)(1)(B), covered insulating gas must be removed and evacuated into a covered gas container or containers, and accounted for following the requirements of section 95354(d)(1) ~~in the same year that the GIE device is counted as "removed from regular use."~~ within one year from the date that the GIE device has been removed from active use. The amount of covered insulating gas transferred out of the GIE device (pounds) must be recorded. GIE devices that are sold or transferred to a new GIE owner or returned to the manufacturer for repair do not require the covered gas to be extracted unless necessary to comply with Department of Transportation requirements…. (SCE)

**Comment:**
D. Fully-charged switches and hermetically sealed GIE should be excluded from the requirements to add or remove gas from the GIE

Sections 95354 (b) and (d) of the Proposed Amendments would require the owner to 1) add gas to the GIE in the year it becomes active GIE, and 2) remove gas from the GIE in the year it is "removed from regular use".

These requirements should not apply to any GIE that is designed to be shipped, stored and installed fully charged. Examples of fully-charged GIE include distribution switches and hermetically sealed switches and interrupters. Since these GIE are designed to remain fully charged, they can be sent to the manufacturer for repair or transferred to a different facility while fully charged. Removing the gas from this type of GIE could render the GIE useless.

For GIE that are designed for the user to add and remove gas, the timing of gas filling or removal does not necessarily coincide with the calendar year. For example, a GIE may be filled in November of one year and placed in active service in February of the next year. A GIE removed from service in November may have the gas removed in January.

LADWP recommends revising the proposed rule language as follows:

**AMEND 95354(b)** Beginning January 1, 2021, for any GIE device that has never been in the GIE owner's inventory as active GIE or that was accounted for in section 95354(c)(1) in a prior data year, and to which covered insulating gas must be added for it to become active GIE, GIE owners shall ~~not~~ add covered insulating gas to a GIE device ~~prior to the~~ ~~data~~ within one year of the date ~~in which~~ it first becomes active GIE or becomes active GIE after being accounted for in section 95354(c)(1). The amount of covered insulating gas transferred to the GIE device (pounds) must be recorded. This requirement does not apply to GIE including hermetically sealed GIE that are designed to be shipped, stored and installed fully charged.

**AMEND 95354(d)** For any GIE device meeting the specifications in sections 95354(c)(1)(A) and 95354(c)(1)(B), covered insulating gas must be removed and evacuated into a covered gas container or containers, and accounted for following the requirements of section 95354(d)(1) ~~in the same~~ within one year of the date that the GIE device is counted as "removed from regular use." The amount of covered insulating gas transferred out of the GIE device (pounds) must be recorded. This requirement does not apply to GIE including hermetically sealed GIE that are designed to be shipped, stored and installed fully charged…. (LADWP)

**Agency Response:**
Four commenters stated it is sometimes not possible to recover gas from a GIE device by December 31 when the device is removed from service late in the year, and recommended GIE owners be granted one year from the date the device was removed from active use to recover the gas. Further, they recommended the GIE device be considered "removed from regular use" on the date the gas is extracted. CARB staff agrees. The originally proposed requirements were intended to ensure all gas disbursed from the GIE device was reported in the same year the device was considered "removed from regular use," so the mass-balance equation by which emissions are calculated balances properly. The changes requested by the commenters achieve this goal, while providing additional flexibility to GIE owners. The first 15-day Public Notice contains these revisions.

Commenters recommended that GIE returned to the manufacturer for repair should not be considered removed from inventory, and the GIE owner should not be required to extract gas from the GIE device prior to shipment, because these GIE would be subsequently returned to the GIE owner and there would be no change in ownership. Clarification of the manner in which these GIE are to be accounted for in the emissions equation was also requested. CARB staff agrees with the requested changes and revised section 95354(c)(1)(B) of the first 15-day Public Notice by deleting "sent to the manufacturer for repair" so these GIE would no longer be considered "removed from regular use." As a result, gas would not be required to be extracted from these GIE prior to shipment. To respond to the commenter's question regarding the manner in which these GIE are to be accounted for in the emissions equation, section 95354.1 lays out the process. For example, if the original GIE device were sent to the manufacturer for repair, the GIE owner could consider the old device "removed from regular use," and the gas within the device "disbursed" in the year in which the gas was extracted. In this example, they would consider the device that returns a new device and consider the gas within that device "acquired" in the year the device was activated. Alternatively, if the GIE device is not considered "removed from regular use" the GIE owner could consider any net addition of gas to the GIE device made by the manufacturer an acquisition, and any net removal of gas a disbursement. Either approach would be acceptable and may differ depending on the specific situation and information available from the manufacturer.

One commenter stated gas should not be required to be extracted from GIE sold or transferred to a new GIE owner. CARB staff agrees in most, but not all cases. Per section 95354(c)(2) of the 45-day Public Notice, active GIE sold or transferred are considered "transferred while in use" and there is no requirement to extract gas from these GIE prior to transfer or sale. Further, the 45-day Public Notice did not require GIE owners to extract gas from inactive GIE that were never activated, because these GIE are not considered "removed from regular use." No changes were needed for these sections of the Regulation. However, if the GIE device is inactive, and was previously active, gas should be recovered when the GIE device is removed from the GIE owner's inventory. Otherwise, any emissions that have occurred from that device would be unaccounted for. In the first 15-day Public Notice CARB staff added this requirement at section 95354(c)(1)(C) of the Regulation.

One commenter stated it is not clear whether a GIE device that was "removed from regular use" can be re-activated, and whether the requirement to recover gas after five years of inactivity applies to spare GIE. The proposed Regulation allows GIE "removed from regular use" to be put back into service. The requirement to recover gas would not apply to spare GIE that have never been activated. Pursuant to section 95354(c) from the 45-day Public Notice, the only GIE that could be considered "removed from regular use" are those "that has been active GIE at some point during ownership by the GIE owner."

Commenters indicated the requirement to recover gas after five years of inactivity is problematic because, for example, it adds unnecessary gas removal work, could ruin

distribution switches and hermetically sealed equipment that were intended to remain fully charged, the GIE owner may not have the special equipment necessary to extract the gas, and it adds more recordkeeping to track how long a GIE has been in storage. CARB staff believes the reference to "distribution switches and hermetically sealed GIE that come fully charged" encompasses (all) hermetically sealed GIE and the subset of non-hermetically sealed GIE that come, and are intended to remain, fully charged. CARB staff agrees this requirement should not apply to hermetically sealed GIE, and this requirement did not apply to hermetically sealed in the 45-day Public Notice. Per section 95354(c), the requirement only applies to GIE that have been "active," which by definition excludes hermetically sealed GIE. It could prove difficult for the GIE owner to remove the gas from non-hermetically sealed GIE intended to remain fully charged, and the modifications made to section 95354(d), which allow recovery to be performed by the GIE owner, a manufacturer, contractor, or vendor, should address this concern. In terms of the argument regarding recordkeeping, CARB staff maintains that a deadline is needed by which the GIE owner must recover gas from GIE that have been active at some point, but inactive for a prolonged time period. The current Regulation requires the capacity of a GIE device be accounted for in the emissions calculation when the device was "retired," but did not provide a definition of this term. The requirement that the device be considered "removed from regular use," once one of the circumstances described in new sections 95354(c)(1) occur, is necessary to close a loophole in the emissions calculation that allowed GIE owners to exclude GIE devices that were no longer in active service from their emissions calculations for an indefinite amount of time. This means not only are emissions not accurately accounted for, but also increases the risk that gas that has not been removed from discarded or otherwise unused GIE could leak to the atmosphere. During the informal public process, CARB staff proposed gas be recovered from these GIE after three years of inactivity, and in response to comments, increased the time frame to five years.

Finally, one commenter stated Section 95354(b) of the Proposed Amendments would require the owner to add gas to the GIE in the year it becomes active GIE, and CARB staff disagrees. The requirement states "GIE owners shall not add covered insulating gas to a GIE device prior to the data year in which it first becomes active GIE." There is no requirement to add gas to GIE being activated. Rather, this requirement prohibits the addition of gas to a GIE device in years prior to activation, which is necessary for the annual emissions calculation to balance properly.

**B-15. Revise the Reporting Requirements**

**Comment:**
6. Technical amendments to improve the implementation of the regulation....

IV. §95354 – Inventory and Insulating Gas Procedures.

A. The requirements to inventory GIE in the Proposed Amendments are either administratively burdensome or unspecific for reporters, may not

be available for the individual GIE, and are not used to calculate emissions. Therefore, the Utilities Group proposes the following amendments to ease the regulatory burden associated with GIE inventories:

1. Record the Year when equipment was manufactured. Manufacturers do not provide a specific date when a GIE was manufactured and often provide only the year of manufacture on the nameplate. The year of manufacture can be used to determine the age of the GIE with an appropriate level of accuracy and prevent the likelihood of multiple violations due to missing or incomplete data. Therefore, the Utilities Group recommends changing the GIE inventory requirement from "Date" to "Year" equipment was manufactured as follows:

   **AMEND** § 95354(a)(2): ~~Date~~ Year equipment was manufactured.… (JUG)

**Comment:**
§ 95354. Inventory and Insulating Gas Procedures.

A. Year of manufacture rather than date of manufacture

Manufacturers do not provide a specific date when a GIE was manufactured, and often provide only the year of manufacture on the data plate. The year of manufacture is sufficient to determine the age of the GIE, and will avoid guesswork to estimate the month and day of manufacture. Given the stricter enforcement language, LADWP is concerned that an estimated date of manufacture could be considered inaccurate information, resulting in multiple daily violations. Therefore, LADWP recommends changing the GIE inventory requirement from "Date" to "Year" equipment was manufactured as follows:

**AMEND** § 95354(a)(2): ~~Date~~ Year equipment was manufactured.… (LADWP)

**Comment:**

- Amend §95354(a)(2) to require only the year of manufacture in GIE equipment inventory because GIE manufacturers do not provide specific days and months of manufacture on their nameplates.… (CCEEB)

**Comment:**
[However, there are a number of open items that need to be dressed in subsequent 15-day comment periods, specifically CCEEB supports a number of the items addressed by the joint utilities, specifically]…the reporting…provisions. (CCEEB2)

**Agency Response:**
Several commenters requested CARB staff change the requirement to report the "date" GIE were manufactured to the "year," and CARB staff agrees. This change is included in the first 15-day Public Notice.

**B-16. Revise the Recordkeeping Requirements**

**Comment:**

VII. §95356 Recordkeeping. The Proposed Amendments lists specific records that must be retained by a reporter. Subsection (a)(4) prescribes retention of extensive records to demonstrate purchase and acquisition of GIE by an owner. The extent of the records specified do not support the need to accurately inventory GIE and is unnecessary. Utilities normally utilize electronic recordkeeping systems to record GIE properties and procurement and can be used to demonstrate purchase and acquisition. The Utilities Group proposes the following **amendment**:

**AMEND** §95356(a)(4). Documentation regarding the purchase and acquisition of any covered insulating gas and/or GIE ~~(including but not limited to, contracts, material invoices, and receipts)~~, including any information used to justify the acquisition of SF6 GIE after the phase-out date pursuant to section 95352(a)(2)-(4);… (JUG)

**Comment:**

Section 95356 of the Proposed Amendments, particularly subsection (a)(4), requires onerous procurement recordkeeping which does not provide added value to the overall achievement of reducing SF6 emissions. We propose the following language change:

**AMEND** §95356(a)(4). Documentation regarding the purchase and acquisition of any covered insulating gas and/or gas insulated equipment (GIE) ~~(including but not limited to, contracts, material invoices, and receipts)~~, including any information used to justify the acquisition of SF6 GIE after the phase-out date pursuant to section 95352(a)(2)-(4);… (SDG&E)

**Comment:**

Additionally, we propose amending Section (a)(4) as noted below to remove the prescriptive documentation that needs to be retained by a reporter. This is unnecessary since electronic recordkeeping systems commonly record GIE properties and procurement and can be used to demonstrate purchase and acquisition....

*§95356(a)(4)* Documentation regarding the purchase and acquisition of any covered insulating gas and/or GIE (including but not limited to, contracts, material invoices, and receipts), including any information used to justify the acquisition of $SF_6$ GIE after the phase-out date pursuant to section 95352(a)(2)-(4);… (CCEEB)

**Comment:**

§ 95356. Recordkeeping

A. The physical address of GIE should not be collected.

CARB is proposing to include the physical address of GIE in the recordkeeping requirements. The records may need to be provided to CARB staff upon request.

(a) GIE owners must retain the following records for the time period specified by section 95356(b) and, upon request by CARB, provide these records to CARB staff within 30 days of the request:

(3) The location, either expressed as a physical address or a latitude and longitude, of each device included in the GIE inventory and each covered gas container and gas cart included in the inventory of containers reported pursuant to section 95354(a) and (g);

LADWP has security concerns with disclosing sensitive information such as the physical location of critical infrastructure. GIE subject to this regulation may be located in areas governed under critical infrastructure protection policies. Divulging the location of critical assets that are potential targets for terrorist activity could compromise the integrity of the electric grid.

The physical location of electrical equipment was purposely omitted from the original CARB SF6 GIS regulation for security reasons. Before adopting this particular proposed amendment, LADWP recommends deleting the physical location of GIE devices from the recordkeeping requirement in order to safeguard this sensitive information from disclosure to the public.

95356 (3) The location, either expressed as a physical address or a latitude and longitude, of ~~each device included in the GIE inventory and~~ each covered gas container and gas cart included in the inventory of containers reported pursuant to section 95354(a) and (g);… (LADWP)

**Comment:**
[However, there are a number of open items that need to be dressed in subsequent 15-day comment periods, specifically CCEEB supports a number of the items addressed by the joint utilities, specifically]…the…recordkeeping provisions.

We believe -- we urge you to include a number of these items in the resolution to fully assure compliance entities of staff and work will continue closely moving forward. We believe that the trajectory of this rule to date has been positive and will continue to have those dialogues in order to make sure that this continues.

With more robust resolution language, we believe that we can assure that this rule will work both for ARB and the compliance events, as well as for the compliance entities moving forward. (CCEEB2)

**Agency Response:**
Several commenters requested CARB staff eliminate the text "(including but not limited to, contracts, material invoices, and receipts)" in section 95356(a)(4). A similar requirement is included in section 95355(c) of the current Regulation, where GIE owners must "Retain $SF_6$ gas and equipment purchase documentation (such as contracts, material invoices, receipts, etc.)." This requirement, which has been in the Regulation since its inception, is even more critical in light of the proposed

amendments because acquisition of $SF_6$ GIE will eventually be prohibited by the implementation of new $SF_6$ phase-out dates, unless specific conditions apply. Retention of these materials by the GIE owner is necessary so that CARB staff will have the ability to verify, if needed, that GIE owners are complying with the provisions associated with the phase-out of $SF_6$ GIE. As such, the suggested changes were not incorporated into the final Regulation.

One commenter requested CARB staff not require recordkeeping related to the physical address of each GIE device due to security concerns with disclosure of the information. This requirement has been in the Regulation since its inception and, as noted by the commenter, this information is not required to be reported. However, the GIE owner must retain this information should a need arise to locate a specific device, such as to collect information from its nameplate or during a CARB inspection. Should CARB staff acquire this information, and should a request for the information be submitted under the California Public Records Act, in conjunction with section 95358 of the Regulation, CARB staff would follow established protocols to determine if the information should be released. Because CARB has established protocols to protect sensitive information, and access to the information could be needed to ensure compliance with the Regulation, this recordkeeping requirement has been retained.

**B-17. Revise the Emissions and Emissions Limits Calculations**

**Comment:**
B. Conversion Factor from pounds to metric tons should not be rounded

When calculating the baseline gas capacity, annual emission limit and annual emissions, LADWP recommends using the more accurate conversion factor of 2204.62 pounds per metric ton. This conversion factor is consistent with the unit of measure conversions in 40CFR 98 Subpart A Table A-2, which is also used for calculating CO2e emissions under the EPA mandatory reporting rule. In the Proposed Amendments, the rounded conversion factor of 2205 should be replaced with 2204.62 in the formulas in section §95353 (c) and (e) and the formulas in section § 95354.1 (b) and (c).

**AMEND** § 95353 (c) and (e) "~~2205~~2204.62" is the number of pounds in a metric ton.
**AMEND** § 95354.1 (b) and (c) "~~2205~~2204.62" is the number of pounds in a metric ton.…

§ 95354.1. Calculating Annual Emissions: equation needs to account for additional gas acquisitions and disbursements, and exclude GIE where gas is neither added nor removed.

The following changes are needed to accurately account for gas in the mass-balance emission calculation equation:

1) The Acquisitions category does not account for all the possible means of adding gas to the inventory. For example, the "gas obtained in bulk" term

also needs to include gas cylinders found (hidden) within the entity's facilities that previously were not accounted for in the container inventory, as well as gas cylinders coming into California from an out-of-state facility owned by the same entity. For example, LADWP owns several facilities located in Nevada that have SF6 cylinders. If cylinders from LADWP's out-of-state facilities are moved to LADWP's facilities within California, that amount of gas in the cylinders needs to be counted as an acquisition in the mass balance. On the flip side, cylinders from LADWP's facilities within California may be moved to LADWP's out-of-state facilities, so would need to be counted as a disbursement.

2) The Disbursements category does not account for all the possible means of removing gas from the inventory.

    a. The disbursements term needs to account for gas inside inactive GIE that is sold to another entity. For example, if an existing GIE within California is sold to another entity as allowed under section 95352 (a)(2) of the proposed amendments, the gas inside the GIE needs to be counted as a disbursement. This would not count as "transferred while in active use" because the GIE is being moved to the other entity's facility.

    b. Gas cylinders can be moved from a facility within California to a facility outside of California under the same ownership. Since data reported to CARB is limited to the geographic boundaries of California, moving a gas cylinder from California to outside of California would be considered a disbursement in the mass-balance equation.

3) Fully charged switches and hermetically sealed GIE that are placed in active service or removed from active service should be excluded from the mass-balance equation, since gas is neither added to or removed from the GIE.

To properly account for net changes in gas and GIE capacity in the mass-balance equation, LADWP recommends revising the terms of the mass-balance equation as follows:

> *Acquisitions of covered insulating gas j* = (covered insulating gas *j* obtained in bulk during the data year (e.g., in gas containers or gas carts) ~~from chemical producers, distributors, or other entities~~) + (covered insulating gas *j* inside GIE when acquired by the GIE owner, for any GIE that became active GIE for the first time during the data year) + (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)) + (covered insulating gas *j* returned to site during the data year (e.g., in gas containers or gas carts) after off-site recycling);

*Disbursements of covered insulating gas j* = (covered insulating gas contained in GIE sold to another entity) + (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* returned to suppliers or sent to another facility outside of California (e.g., in gas containers or gas carts) during the data year) + (covered insulating gas *j* sent off site for recycling in gas containers or gas carts during the data year) + (covered insulating gas *j* sent to destruction facilities in gas containers or gas carts during the data year); and

*Net increase in total capacity of active GIE owned and filled with covered insulating gas j (excluding hermetically sealed and GIE received fully charged from the manufacturer)* = (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 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))…. (LADWP)

**Comment:**

6- Clause 95353-b (Page 10): **Annual Emission Limits:** In the formula for calculating average system capacity, "n" has been referred to the active GIE, i.e only non-hermetically sealed equipment (as per the stipulated definition). Is there any reason why hermetically sealed GIE shall not be part of the calculation?... (Siemens)

**Comment:**

NRG also continues to highlight the need for language which allows an entity to permanently retire a GIE device at any date within the year, and that the annual inventory not be required to be time-weighted averaged in such instances of retired GIE devices. The current regulation could potentially and inadvertently force a GIE device owner to delay the retirement of a GIE device, thus creating the potential for real emissions, because an early retirement requires the annual inventory to be recalculated based on a time-weighted average. The GIE owner/operator should be able to permanently retire a GIE device at any point within the year, and avoid potential noncompliance due to a calculated reduced emissions rate…. (NRG)

**Comment:**

C. Conversion Factor. With the mass emission limit set at 1% of the baseline value from 2020-2034 for most entities, it is crucial to calculate and record the baseline value as accurately as possible. When calculating the baseline $CO_2e$, the Utilities Group recommends using a conversion factor of 2204.62 instead of 2205 to convert from pounds to metric tons. This conversion factor is consistent

with the unit of measure conversions in 40CFR 98 Subpart A Table A-2, which is also used for calculating $CO_2e$ emissions under the EPA mandatory reporting rule. Using a conversion factor of 2204.62 instead of 2205 pounds to a metric ton ensures consistency and compliance with other reporting rules and accuracy of baseline values and emission limits.…

2. **AMEND** the conversion factor in the formulas in § 95353 (c) and (e) and the formulas in § 95354.1 (b) and (c).

"~~2205~~2204.62" is the number of pounds in a metric ton…. (JUG)

**Agency Response:**
Two commenters requested the conversion factor for the number of pounds in a metric ton be revised from 2,205 to 2,204.62 to achieve more precision, and CARB staff agrees. This change is included in the first 15-day Public Notice.

One commenter asked why the proposed Regulation does not include hermetically sealed GIE in the GIE owner's "average system capacity," a value upon which the emissions limit is based. Hermetically sealed GIE are pre-charged and sealed at the factory, with the expectation that they will not leak and are designed by the manufacturer to not be fillable. Because emissions from active GIE are determined based on the amount of gas added, and these GIE are not fillable, there would be no way for the GIE owner to determine the emissions from the device while in use. Therefore, the presence or lack of hermetically sealed GIE within a GIE owner's possession should have no bearing on their allowed emissions under the Regulation. For this reason, the capacity of these GIE are not included in the GIE owner's "average system capacity." This has been the case since the inception of the Regulation.

One commenter requested GIE owners be able to permanently retire GIE at any point within the year and avoid potential noncompliance due to a calculated reduced emissions rate. CARB staff assumes that this commenter is requesting this because, under the Regulation, GIE owners are subject to an emission rate limit where the denominator is based on the capacity of their active GIE and the number of days each GIE device is active. Thus, assuming reported emissions are the same, the later in the year a GIE owner retires a GIE device, the larger the denominator, and the lower the emission rate. There should not be leaks from GIE that are not in active service, so the impact of this change would be increasing the GIE owner's emissions limit when no additional emissions should be expected. The suggested change would be counter to the purpose of the Regulation and has not been made.

One commenter suggested several changes to the mass-balance emission calculation equation. First, they stated the "gas obtained in bulk" term needs to include gas cylinders found within the GIE owners' facilities that previously were not accounted for in the container inventory. CARB staff disagrees. The proper solution to this issue is to revise prior year(s) reports to accurately reflect the amount of covered insulating gas the container held at required points in time, and

capture any emissions from the container in the "Decrease in covered insulating gas j inventory" term.

Second, the comments stated that if gas containers are transported into/out of California from/to their out-of-state facilities, the gas in the containers should be counted as an acquisition/disbursement. CARB staff agrees. No changes were needed to the acquisition term as a result of this comment because it covers gas obtained in bulk from "other entities." The circumstance described qualifies as acquisition from an "other entity" because the "GIE owner" subject to this Regulation includes only the portion of operations in California, so their out-of-state operations would be considered the "other entity." However, the disbursements term did not capture "other entities" in the 45-day Public Notice. The disbursements term was modified to add "covered insulating gas sent to other entities" in the first 15-day Public Notice.

Third, the commenter stated the disbursements term needs to account for gas inside inactive GIE sold to another entity. The first 15-day Public Notice contains some changes in response to this comment, where needed. If the inactive GIE device was never activated, it will have never entered the mass-balance equation at all, and therefore this gas should not be accounted for as a disbursement. If the device had been active at some point, and has been inactive for at least five years, the gas should have already been extracted and accounted for pursuant to section 95354(c)(1)(A). No changes are therefore needed for these circumstances. However, if the GIE device was previously active and has been inactive for less than five years, gas should be recovered to determine emissions from the device in the same way as if it had been retired. Section 95354(c)(1)(C) was added in the first 15-day Public Notice to require gas recovery in this scenario.

Finally, the commenter stated fully charged switches and hermetically sealed GIE should be excluded from the mass-balance equation. CARB staff agrees regarding hermetically sealed GIE. The mass-balance equation specifically applies to "active GIE," which, by definition, are non-hermetically sealed. In the first 15-day Public Notice CARB staff has added the word "active" to the mass-balance emissions equation, where appropriate, for clarity. CARB staff disagrees regarding fully-charged switches that do not meet the definition of "hermetically sealed." If these GIE have a port and are fillable, their emissions can be accounted for. Such GIE meet the definition of "non-hermetically sealed" and their emissions are therefore captured by the proposed Regulation.

**B-18. Add Additional Processes to Determine Revised Nameplate Capacity**

**Comment:**
Also, we'd like to address phantom emissions. And we understand that staff believes that OEM engineered analysis can be done to correct or rename a nameplate capacity. But from your experience, this doesn't work. For example, we retired four identical 760-pound breakers over the course of a few years. And when we did that --

and let me just say, they were all working exactly how they should be at the time they went in alarm.

When we did that, we removed six hundred and --663, 656, 640, and 636 pounds. And we did that OEM analysis and that didn't help either. At a cost of $15,000, we -- the new nameplate was 720 pounds. So with that, we ask that CARB help us to encourage staff to come up with a transparent way in order to answer that phantom emission question. (NRG3)

**Comment:**
[We have proposed SF6 Regulation amendments that]…(2) acknowledge phantom emissions during retirement of sulfur hexafluoride (SF6) gas insulated equipment (GIE); (3) promote and encourage early and/or timely retirement of GIE ;…

*Acknowledgement of Phantom Emissions*

NRG also continues to reinforce the need for ARB to recognize and treat phantom emissions of SF6 distinctly from actual emissions of SF6 that should not be penalized. The issue with respect to phantom emissions came to light during NRG's recent retirement of older (1970s and older) SF6 GIE. NRG recognizes as well as many within the industry that we could not have foreseen or appreciated the systemic discrepancies experienced when utilizing GIE nameplate capacities as a means for determining emissions when the current SF6 Regulation was drafted, commented upon, and approved. However, the reality is that the majority of older SF6 GIE does not contain the volume/weight of SF6 as indicated by their respective OEM nameplate capacity. The issues with nameplate discrepancies have also been continually highlighted by industry and agency representatives as demonstrated in EPA's SF6 Conference in San Francisco January 24-25, 2017. Mr. Dave Mehl of the ARB briefly touched on the issue of discrepancies of Nameplate Capacity vs. Actual Capacity (Attachment A – see slide 8 of attached Mehl Presentation), and John Stewart of National Electrical Manufacturers Association (NEMA) addressed the prevalence of discrepancies of nameplate capacities demonstrated through actual maintenance events (Attachment B - see slide 11 of attached Stewart Presentation). NRG appreciates that ARB staff believes that the current SF6 regulation addresses this issue of phantom emissions by allowing the OEM to rename GIE nameplate capacities through an engineering evaluation. However, ARB staff should be aware that this methodology does not apply in every instance, and this nameplate capacity engineering evaluation should not be considered as the mechanism by which phantom emissions are addressed.

For example, NRG presents the following two real-world case studies which demonstrate the inaccuracies associated with older GIE nameplate capacities, and the issue that phantom emissions create for both ARB and the GIE owner. The first example relates to the retirement of four (4) identical 1965 Westinghouse circuit breakers with SF6 OEM nameplate capacity(ies) of 760-lbs each. NRG retired these four circuit breakers over the course of three years in an attempt to retire them in a

manner that would prevent an exceedance of the AER. All four circuit breakers were operating within the OEM standard pressures and temperatures at the time of retirement indicating that there had not been measurable losses. Additionally, these circuit breakers have a 10% volume loss alarm by design, and none of these circuit breakers were in alarm at retirement or had been in alarm for several years prior to their retirement. At retirement, 663-lb, 656-lbs, 640-lbs, and 636-lbs of SF6, respectively, were removed from the breaker, which equates to a 4% difference between the four circuit breakers. To add to our point about the difficult parameters under which to comply with the regulation, the SF6 recovery from these four breakers demonstrated accuracy and precision of the actual amounts recovered from fully and appropriately operating breakers, yet the differences among the SF6 recoveries from these breakers was still more than 2% - more than the allowed losses by the proposed amendments. Due to the significant difference in the original nameplates vs. the actual recoveries of SF6 for these four circuit breakers, NRG contracted with the OEM to perform an evaluation to assess the nameplate capacity of this model circuit breaker at a cost of $15,000. The result of the engineering evaluation was a renaming of the nameplate capacity to 721-lbs (Attachment C - *ABB Report of Findings on the SF6 Gas Amounts in Westinghouse Type 2300SF Circuit Breaker*). This engineering analysis did not substantially change the original nameplate capacity and further illustrated that these efforts will not in every instance remove or address the issue of phantom emissions. The differences between either the original nameplate capacity (760-lbs) or revised nameplate capacity (721-lbs) and the actual volume removed from each of these four identical, properly operating circuit breakers provide strong evidence that there were substantially less actual capacity in these identical breakers, indicating that it is more probable that there were not reportable emissions above the limit at the time of the retirement of these breakers. Regardless the current SF6 regulation resulted in the described multi-year retirement effort to avoid exceedances simply due to phantom emissions.

The second example relates to the retirement of another NRG subsidiary-owned 1975 ITE dual pressure circuit breaker with a nameplate capacity of 935-lbs. The ITE circuit breaker was fully operational at the time of retirement. 837-lbs of SF6 were removed from the circuit breaker upon its retirement. While acknowledging that there is not as much detail regarding this ITE circuit breaker as only one of these circuit breakers was retired, NRG nonetheless asserts the same nameplate capacity discrepancies observed and demonstrated with the four identical Westinghouse circuit breakers are consistent with the retirement of this circuit breaker as well. In addition, the large capacity of the ITE circuit breaker example can mathematically drive the facility inventory and emissions rate for small facility inventories, making a non-compliance event unavoidable when nameplate capacity discrepancies exist.

*Promote and Encourage Retirement of SF6 GIE*

ARB's Proposed Amendments' failure to address the retirement of SF6 GIE and potential phantom emissions will create substantial non-compliance and enforcement issues across both large and small capacity inventory owners/facilities in the future as

the phase-out of SF6 GIE occurs. NRG strongly believes that language must be included which promotes, encourages and incentivizes the early and/or timely retirement of SF6 GIE to achieve the complete phase-out of SF6 GIE, and specifically to provide a transparent process to retire SF6 GIE with phantom emissions.

To that end, NRG recommends that ARB provide a voluntary variance or preapproved retirement verification process. The Proposed Amendments already outline and provide a template for such a construct with the Emergency Event Exemption process in Section 35357.1, and a similar voluntary retirement exemption process could be included with additional operational and maintenance considerations that would be part of the evidence necessary to receive an approved verification for a permanent retirement exemption from ARB. The process could be similar to the Third Party Verification process which is required for verifying annual GHG emissions under the Mandatory Reporting Rule. Authorizing a voluntary retirement variance framework would create a cost-effective mechanism when compared to enforcement penalties to facilitate the timely retirement of SF6 GIE, remove potential SF6 liability for SF6 GIE awaiting retirement or being delayed in an attempt to achieve the AEF, and lastly promote and encourage the phase-out of SF6 GIE which is a primary focus of this Proposed Amendments. This process would be in-line with ARB's goals to reduce potential losses from equipment employing SF6, if not the complete and permanent removal of the use of SF6…. (NRG)

**Comment:**

B. <u>Adjust gas capacity for existing GIE with inaccurate name plate values…</u>

For existing in-use GIE, the proposed rule language does not offer insight into how to address adjustments to the original nameplate gas capacity value. Experience shows there can be significant discrepancies between the original nameplate gas capacity value for in-use equipment and the amount of gas recovered from the equipment. For example, the amount of SF6 recovered from eight large (500 kV) circuit breakers during decommissioning was 200-240 pounds lower than the nameplate gas capacity value. In this case, if the original nameplate gas capacity value is used in the emission mass-balance calculation, the result would be "phantom emissions" (emissions that did not actually occur) due to the gas capacity value on the nameplate not reflecting the actual gas capacity of the GIE. Since the gas capacity of decommissioned equipment factors into the emissions mass-balance calculation, it is important to determine the actual gas capacity value for in-use equipment in order to accurately calculate emissions.

Determining the actual gas capacity value for in-use equipment can be done in several ways:

1) Full recovery of the insulating gas from the GIE, starting from proper operating pressure and ending at vacuum.

2) The manufacturer reviews the GIE components, calculates the gas capacity and issues a revised nameplate.

LADWP recommends adding the following provision to adjust the gas capacity value for in-use equipment:

> **ADD § 95354 (a)(10)(A)7.** For in-use GIE, the "covered insulating gas at activation" gas capacity value may be revised based on 1) full recovery of the insulating gas starting from proper operating pressure and ending at vacuum, 2) manufacturer review and revision to the GIE name plate gas capacity value, or 3) other method approved by the manufacturer…. (LADWP)

**Comment:**
Nameplate Capacity Recordkeeping for Existing GIE
For existing GIE, the regulation does not address how to reconcile differences between the nominal nameplate capacity and the real gas capacity of individual GIE. Nameplates assigned by OEMs are nominal; the real nameplate capacity can only be determined at the time of initial installation. It is important to determine the actual gas capacity value and have that value be recorded to accurately account for the covered gas in a GIE.

*Recommendation*

- Prior to evacuation of $SF_6$ gas from a GIE, a *qualified* technician validates that the GIE pressure gauge reads the correct operating pressure to meet utility accuracy standards.
- A *qualified* technician certifies the accuracy of the mass of gas removed at the time of decommissioning for a reported GIE.
- The reporter uses the certified mass of gas removed as the corrected nameplate capacity value for that specific reporting year.
- The Nameplate capacity would be certified by the Designated Representative with the Annual Report (§95355)…. (CCEEB)

**Comment:**
However, there are a number of open items that need to be dressed in subsequent 15-day comment periods, specifically CCEEB supports a number of the items addressed by the joint utilities, specifically…nameplate capacity corrections for existing GIE to be able to reconcile differences between nominal plate capacity and real gas capacity to avoid phantom emissions…(CCEEB2)

**Comment:**
III. Add the proposed method to accurately account for the mass of $SF_6$ gas in GIE installed prior to the adoption of the amendments. This method will allow utilities to accurately account for $SF_6$ 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.…

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 $SF_6$-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….

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 $SF_6$ 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))…. (PG&E2)

**Comment:**
As Linus just mentioned, there are still some areas of the regulation that need to be worked on, in order to ensure we manage the transition away from SF6 while still maintaining a safe and reliable electric grid.

I'd like to touch on just a couple of those topics. I am pleased to see that the Board resolution directs staff to continue working with us on accurately measuring equipment capacity. We look forward to discussing PG&E's proposal to adjust SF6 gas equipment nameplate capacity in a manner that will improve emissions reporting accuracy and resolve a long-standing challenge of reporting, what I'll refer to as, phantom emissions from equipment.

As we reduce the inventory of SF6 gas-containing equipment and manage to a leak limit instead of a leak rate, accurate data will be even more important. Again, happy to see the acknowledgement to continue working on this in the resolution…. (PG&E3)

**Comment:**
2. Methodologies to certify a revised nameplate for existing GIE.…

I. § 95351 – Definitions. The following changes to certain definitions will 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, to support the recommendation to resolve the uncertainty in gas weights from existing $SF_6$ - 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….

4. Add options to determine mass of gas in in-use GIE. For in-use GIE, the Proposed Amendments do not prescribe how to address adjustments to the original gas nameplate capacity. Differences between the 'nominal' and 'real' covered insulating gas capacities can be significant and introduce reporting errors if the nominal nameplate capacity does not match the real mass of gas in a GIE. Since this difference is typically identified when a GIE is decommissioned, it is important to determine the actual gas capacity value and have that value be recorded to accurately account for the covered gas in a GIE. Therefore, the Utilities Group

recommends that the following section be added to permit GIE owners to adjust the gas capacity value for in-use GIE:

**ADD** § 95354 (a)(10)(A) 7. For in-use GIE, the "covered insulating gas at activation" gas capacity value may be revised based on: 1) full recovery of the insulating gas by a qualified technician, starting with the optimal GIE pressure gauge reading that meets utility standards, or 2) a revised GIE nameplate provided by the manufacturer….

V. § 95354.1. Calculating Annual Emissions.

A. GIE gas capacities assigned by the original equipment manufacturer (OEM) on nameplates are nominal; the real gas capacity of the GIE 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. The Utilities Group proposes the following method to resolve the concern of phantom emissions:

i. Prior to evacuation of $SF_6$ gas from a GIE, a qualified technician validates that the GIE pressure gauge meets utility accuracy standards for in-service operational use, and the GIE is at proper operating pressure based on the manufacturer's gas temperature pressure curve.
ii. 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.
iii. The reporter uses the certified mass of gas removed as the corrected gas capacity value for that specific reporting year.
iv. The corrected gas capacity would be certified by the Designated Representative with the Annual Report.

To ensure that these procedures are followed, the regulation can specify 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.

B. **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))…. (JUG)

**Comment:**
Nameplate capacity and correction

DILO requests that CARB staff further consider as part of the regulation the clarification that nameplate capacity corrections be the responsibility of the GIE owner and at their discretion.

The nameplate capacity should be confirmed as follows:

a. Via the process for filling from vacuum (i.e. fully recovering shipping gas or installed gas during maintenance or de-commissioning to final blank-off pressure) or
b. by following the proposed nameplate capacity calculation method as proposed by NEMA $SF_6$ Coalition for nameplate adjustment.

The regulation should enforce that a calibrated scale or a mass flow meter be used in either application to fill, recover and account for gas handled.

At this time the process presented by NEMA has been the most effective and accurate method available to $SF_6$ gas users and has been used in support of calculating not only correct nameplate values, but to also verify the recovery of 100% of the installed $SF_6$ in GIE.

Further, it is clear that the concern regarding nameplate inaccuracies can be found at all levels of GIE. However, as the impact may be greater with high voltage than with medium voltage, we wish to recommend that the process be applied to GIE which has a voltage rating of 38kV and above.

DILO does recommend that once any of the proposed processes are used, an $SF_6$ gas nameplate value is permanently installed on the GIE and no changes are allowed unless the GIE is altered due to a repair or maintenance which replaces parts and materials that effect the actual gas weight in the equipment at the temperature corrected pressure. In this case the processes as summarized above must be followed…. (DILO)

**Comment:**

2. *Emissions Accounting (95354)*: The Proposed Amendments would establish GIE inventories based on nameplate capacity. There is considerable evidence in this record demonstrating that a nameplate capacity-based accounting system will lead to "phantom emissions", which would disincentive retirement of older GIE. The ARB should address these concerns by amending the rulemaking package to include a pre-approval process for retirements.…

*II. The ARB Should Adopt a Preapproved Retirement Process.*

The Proposed Amendments would establish GIE inventories based on nameplate capacity or as measured at activation. In explaining these amendments, the ISOR acknowledges stakeholder concerns with "Phantom Emissions":

> CARB has heard from a number of GIE owners that an individual GIE device's nameplate capacity value may not accurately reflect the amount of covered insulating gas that a device actually contains, and can be off by as much as 20 percent. Thus, under the current Regulation, the possible inaccuracy of nameplate capacity values has led GIE owners to call into question whether emissions that are calculated at retirement are the result of inaccuracies in the nameplate capacity rather than actual emissions. The proposed amendments solve this issue by revising the emission equation to have GIE owners use the calculated covered insulating gas at activation value, rather than the nameplate value, when possible.

WPTF appreciates the ARB's acknowledgement of these concerns, but does not believe the proposal to adjust inventories at activation values will resolve the phantom emissions concern. Older GIE are what are at risk of being assessed phantom emissions. Some of these systems have been in place for decades and will not be "activated" when the new Regulations take effect. Removing SF6 from active GIE and replacing the SF6 in an older system for the sole purpose of establishing the GIE baseline inventory will in-and-of itself create risks of releases. In the absence of being able to measure SF6 quantity at activation the Regulation defers to the nameplate capacity, which as the ARB acknowledges may overstate the actual SF6 quantity in many cases.

WPTF acknowledges that the existing Regulation provides a process for working with a GIE manufacturer to update nameplate capacity demarcations. However, in the absence of actually evacuating GIE (thereby creating a risk of release), there is no way to definitively determine the actual capacity of older equipment. This is because a GIE may lose capacity over an extended period of time and there is no way to determine when and by how much those releases may be when they occur over a multi-decade timeframe. Small releases that occur over time may have occurred well before the original start of the Regulation, and there is no way that even a manufacturer of GIE can accurately measure this phenomenon.

To avoid creating a disincentive to retirement of older GIE, the ARB should address these concerns by amending the rulemaking package to include a pre-approval process for retirements. The pre-approval process should create an exception to the enforcement of the annual emissions limits under Section 95353 when a GIE owner is: (1) in compliance with the reported emissions limits for all periods leading up to the retirement; (2) prior to the retirement, the GIE owner discloses its retirement plan demonstrating handling procedures to protect against emissions releases during the decommissioning of the GIE; and (3) the ARB approves the retirement plan prior to

the decommissioning event. This addition would ensure that ARB's goals of replacing older GIE, which may be at the greatest risk of failures, occur in an orderly and predictable manner. In addition to a pre-approved retirement process, the ARB should also create a specific mass-based retirement amount that would ensure that a voluntary retirement of SF6 GIE does not result in non-compliance with the emissions limits…. (WPTF)

**Comment:**
We'd also ask that you take a close look at the request for retirement planning and ensure that those signals are correct to ensure that older systems can be effectively retired quickly without creating undue risk of enforcement. (WPTF2)

**Agency Response:**
Commenters stated the importance of using the actual gas capacity value for in-use equipment when calculating emissions to ensure accuracy and noted that the nameplate capacity of a GIE device is not sufficiently accurate. Examples were provided of GIE with inaccurate nameplate capacities that had been retired for which the GIE owners claim the emissions equation calculated "phantom emissions." Commenters stated the 45-day Public Notice's method for determining a revised nameplate capacity for in-use GIE based on an engineering evaluation conducted by the manufacturer, and calculation of "covered insulating gas at activation" for new GIE were insufficient to address the issue alone, but they supported their inclusion in the final Regulation. Several commenters requested additional methodologies be added to the Regulation to determine the true capacity of a GIE device.

CARB staff agrees with commenters that it is important to determine the actual gas capacity value for in-use GIE and acknowledges inaccurate nameplate capacities can lead to "phantom emissions," as stated in the ISOR. However, data reported under the Regulation have also shown some retired $SF_6$ GIE have more $SF_6$ than their nameplate capacity indicates, meaning the error can go both ways, sometimes resulting in "phantom reductions." Nonetheless, CARB staff agrees that GIE owners need additional methodologies through which a revised nameplate capacity can be determined. As such, the first 15-day Public Notice contained a new process through which GIE owners could revise the nameplate capacity of existing GIE. The new process was heavily informed by stakeholder proposals.

Commenters suggested several methodologies to determine the true capacity of an in-use GIE device. These methodologies included a method proposed by NEMA's $SF_6$ Coalition involving measurement of the amount of gas recovered from a GIE device starting at the proper operating pressure and ending at vacuum during maintenance or decommissioning, a method utilizing the amount of gas added to a GIE device being filled, and other methods approved by the manufacturer.

At a high level, CARB staff agrees with commenters who suggested the revised nameplate capacity be based on the amount of gas recovered from a GIE device starting at the proper operating pressure and ending at vacuum. The gas capacity value of a GIE device is a critical input in determining emissions compliance for GIE owners under the Regulation. As such, any changes to a GIE device's gas capacity value must follow a clear, transparent, and rigorous method. The final Regulation contains such a methodology, discussed in more detail below. The determination of a revised nameplate capacity based on the amount of gas added to a GIE device being filled is akin to the "covered insulating gas at activation" methodology CARB staff included in the 45-day Public Notice, which applies to GIE acquired after December 31, 2021 and has been retained in the final Regulation.

Several commenters that proposed a methodology involving recovery of insulating gas from a GIE device suggested the process involve validation by a qualified technician that the GIE pressure gauge "meets utility accuracy standards for in-service operational use," evacuation of the gas, certification of the amount of gas recovered, and use of the amount of gas recovered as the nameplate capacity beginning in the year the measurement was performed. CARB staff agrees with most of these points, including that the process must entail evacuation of the gas, measurement (and certification, as part of the annual report) of the amount of gas recovered, and that the amount recovered should be used as the nameplate capacity beginning in the year the measurement was performed. The first 15-day Public Notice contains these elements. CARB staff disagreed with the portion of commenter's proposal regarding the pressure to which the GIE device should be brought before recovery begins. "Utility accuracy standards for in-service operational use" could vary among GIE owners, leading to inconsistent measurements, and would not be established by an independent third-party. To ensure nameplate capacity adjustments are performed consistently, and with the highest level of accuracy, the first 15-day Public Notice instead specifies that the initial pressure of the GIE device must meet the design operating pressure specified by the manufacturer.

While some commenters made recommendations about the types of GIE that should undergo the process and how measurements should be made, most of the processes suggested by commenters lacked these necessary details. Therefore, CARB staff held several meetings with stakeholders in the months following the Board Hearing to clarify these points in order to finalize the methodology included in the first 15-day Public Notice. The nameplate capacity adjustment process in the first 15-day Public Notice is voluntary; it applies only to GIE owners that wish to perform nameplate capacity adjustments. If the GIE owner elects to perform nameplate capacity adjustments, the first 15-day Public Notice requires adding or removing gas from the GIE device until the manufacturer-specified design operating pressure is reached based on the manufacturer-specified temperature/pressure curve or other manufacturer-

provided materials, then recovering gas until five minutes after blank-off pressure is reached. Once completed, the GIE owner would measure the amount of gas recovered and use this value as the revised nameplate capacity starting in the year the process was completed.

One commenter suggested the Regulation require use of a calibrated scale or a mass flow meter to account for the gas handled. CARB staff agrees that calibrated scales and mass flow meters must be used to determine the amount of gas handled; the first 15-day Public Notice contains these requirements. Additionally, consistent with stakeholder feedback, GIE owners would be required to determine that the GIE device is at the manufacturer-specified design operating pressure using pressure and temperature gauges that meet the minimum accuracy requirements of section 95354(f)(2) and (3). Also, gas carts used in the process must be capable of recovering gas from the GIE device to the maximum achievable blank-off pressure specified by the GIE manufacturer.

One commenter suggested only GIE with a voltage capacity ≥ 38 kV should be eligible for the process and that the capacity of a GIE device not be re-evaluated, once determined, unless its capacity has been altered. CARB staff agrees with these comments, as reflected in the final Regulation. Additionally, based on stakeholder feedback, hermetically sealed GIE and fully-charged GIE to which the GIE owner does not add or remove gas are exempted from the process, as are GIE with compromised integrity. GIE acquired after December 31, 2021 are also excluded. This is because GIE owners must calculate "covered insulating gas at activation" for these GIE, and this value is used as the nameplate capacity instead of the manufacturer-specified nameplate capacity.

One commenter suggested that once the process has been completed, a revised nameplate value should be permanently installed on the GIE device. CARB staff agrees a revised nameplate capacity label should be affixed to the GIE device once the process is completed, but only if the revised value differs from the initial value and the GIE device will remain in active service. This requirement has been included in the final Regulation.

Some commenters suggested requirements for data collection, reporting, and recordkeeping be added to the Regulation to ensure the procedures are followed accurately, and CARB staff agrees. Final reporting requirements include the date the process was completed, details related to the final pressure of the GIE device at the end of the process, and the serial numbers of GIE removed from regular use that never underwent the process due to compromised integrity. GIE owners that undertake the process are required to record all data, measurements, materials used, and correspondence with CARB in addition to supporting document that demonstrates certain GIE had compromised integrity (where applicable). GIE owners must also reflect the

revised nameplate capacity in their annual report and calculations of emissions and emissions limits starting in the year the process was completed.

Two commenters requested a definition of "Covered Insulating Gas at Removal from Regular Use" be added to the Regulation, and associated changes be made to allow this value to represent the revised nameplate capacity of a GIE device in the emissions equation. CARB staff does not consider these changes to be necessary because in the first 15-day Public Notice the revised nameplate capacity would be represented by the term "Covered Insulating Gas at Activation." As specified in section 95351(a) of the Regulation, this term would represent the revised nameplate capacity value for those GIE that undergo the nameplate capacity adjustment process.

Finally, two commenters requested CARB staff add a pre-approval process for retirements to help address the issue of "phantom emissions." Because the nameplate capacity adjustment process will allow all GIE owners to determine the actual capacity of their GIE, concerns over "phantom emissions" should be addressed. As such, the requested process has not been added to the Regulation. Although this process was not added to the Regulation, CARB staff encourages GIE owners concerned with the implications of retiring their GIE to notify CARB staff of their concerns in advance of retirement.

**B-19. Revise the Enforcement Provisions and Definition of "Substantive Error"**

**Comment:**
Section 95359 of the Proposed Amendments introduces enforcement actions which are unnecessary and overly punitive, as even a minor error could result in multiple violations and exorbitant fines. The new proposal within this section separates out similar errors into multiple violation categories. This has a multiplier effect that could create excessive penalty amounts. These changes are counterproductive and will not serve CARB, or the regulated community, in implementation. For example, utilities within the Joint Utilities Group have experienced several situations where a serial number or voltage was recorded incorrectly. These types of corrections do not have a significant, if any, impact on the emissions and should not result in a violation. The existing rule provisions provide clear authority for CARB to enforce any violations of the rule—be they emissions, reporting, or recordkeeping. (SDG&E)

**Comment:**
5. Amendments to enforcement provisions that are overly burdensome and punitive.…

**AMEND** the definition of "Substantive Error" as proposed, to better align with other GHG 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%....

X. Provide Fair and Reasonable Enforcement Provisions. The proposed amendments to the Enforcement Section are unnecessary and overly punitive, as even a minor error could result in multiple violations and exorbitant fines. The existing rule provisions provide clear authority for CARB to enforce any violation of the rule—be they emissions, unauthorized replacement of GIE, reporting, and/or recordkeeping.

The new proposal separates out similar errors into multiple violation categories, or otherwise serves to become multipliers for maximum penalty amounts. These changes are counterproductive, and will not serve the regulated community, or CARB, in implementation. As an example, utilities have experienced several situations where a serial number or voltage was recorded incorrectly. These types of corrections do not have a significant, if any, impact on the emissions and should not result in a violation.

The Utilities Group does not believe the legislature intended for CARB to issue a mandatory penalty provision deeming an annual emission violation to automatically constitute 365 days of violation. An exceedance of the annual emission limit should therefore not automatically constitute 365 separate violations, especially when an event or date of exceedance can be found. The JUG urges CARB to exercise its discretion and to develop a method to calculate the number of days in violation for entities that exceed the annual emission rate or mass emission limit. If such a determination into what caused the exceedance, and the duration of the exceedance and the extent of the exceedance can be found, the number of days should be reduced. Real world examples can be seen where a release of gas occurred on a definitive date and therefore would not constitute a full year of violations.

The Utilities Group proposes the following **amendments**:

**§95359. Enforcement.**
(a) *Penalties*. Penalties may be assessed for any violation of this subarticle pursuant to Health and Safety Code section 38580. Each day during any portion of which a violation occurs is a separate offense. In seeking any penalty amount, CARB shall consider all relevant circumstances, including any pattern of violation, the size and complexity of the reporting entity's operations, and the other criteria in Health and Safety Code section 42403(b).

(b) Each day or portion thereof that any report required by this subarticle remains unsubmitted~~,~~ or is submitted late, or ~~, shall constitute a single, separate violation of this subarticle. or contains~~ ~~Additionally, each~~ contains an incomplete data field that exists after the reporting deadline (either in a submitted report or an unsubmitted report) ~~shall constitute a single, separate violation of this~~

~~subarticle. Finally~~, or contains a ~~each~~ data field that ~~contains~~ ~~or inaccurate information after the reporting deadline~~, includes a Substantive Error that is not corrected by the GIE owner within the time period set forth in section 95355(c) shall constitute a single, separate violation of this subarticle. The Executive Officer shall take into consideration the materiality, with respect to emission compliance, of any incomplete or inaccurate information when penalties are assessed.

(c) ~~Any Each MTCO2e~~ An exceedance of the ~~maximum allowable SF6~~ emission rate limit for a ~~calendar year~~ data year prior to 2020 or to the emissions limit for data year 2020 and beyond shall constitute a single, separate violation of this subarticle for each day of the calendar year, except where a defined event triggered such an exceedance.

(d) Any acquisition, for use in California, of a SF6 GIE device after the dates provided in Table 1 and Table 2 shall constitute a single, separate violation of this subarticle for each day ~~the GIE owner is in possession of the device and for each MTCO2e of covered insulating gas at activation, in that device, or that the device is designed to contain~~, unless it was acquired pursuant to one of the exceptions noted in section 95352(a)(1-4).

~~(d)~~(e) *Injunctions.* Any violation of this subarticle may be enjoined pursuant to Health and Safety Code section 41513. (JUG)

**Comment:**
Happy to be here to speak on behalf of the Southern California Public Power Authority member utilities. And we have been working with the JUG on this rulemaking and certainly support the JUG letter.

I have two items to bring up. I think I'm the last JUG member, so I have one more item technically and some closing thoughts. Staff made changes to the enforcement provisions of this rule. We don't believe those -- those --those changes are necessary. The ability to enforce and contend with anything that happens within this rule was already there. What staff made changes to do was raise -- basically, raise the upper bound of a penalty. And we don't think that -- that's very useful. It doesn't really help implementation, and given all the non-emissions pieces of the puzzle that have to be reported, can be counterproductive.

We've spoke to staff on this and we just didn't want it to be forgotten since it was not put in the slide show or the resolution. So -- so that's the ask that the Board ensure that this is one of the topics that we can talk to staff about and that changes can be made.

So in conclusion, it's been a long journey. We've made a lot of progress and we certainly appreciation staff's help. The JUG utilities are committed to spending the resources and designing the future systems in accordance with this rule. That's a --

that's a big deal, but I can't underestimate the need to keep the dialogue going with staff in a productive way.

Utility substations are key infrastructure that will enable the state to meet its climate goals. We have to get this right. The JUG members have been clear that we are supportive of the direction of this effort, that we will put the work forward, and that we will get it right ourselves. But that support is predicated on making these last set of changes that we think are necessary and have been spoken previously.

But we are looking forward to working with staff, we are looking forward to the ongoing dialogue, and we forward -- and look forward to getting these important details that makes sense for both sides of the phone here. (SCPPA)

**Comment:**
Enforcement Provisions
CCEEB believes the proposed enforcement provisions for non-emission related violations are unnecessary, overly punitive, and inflate the maximum penalty. The existing provisions provide clear authority for ARB to enforce any violation of the rule—emissions or reporting/recordkeeping. There is already a per-day clause and the ability to adequately enforce under the ARB's Enforcement Policy.

The new proposal separates similar errors into multiple violation categories, or otherwise serves to multiply maximum penalty amounts. These changes are counterproductive and will not serve the regulated community, or ARB, in implementation. As an example, utilities have experienced several situations where a serial number or voltage was recorded incorrectly. These paperwork errors do not have a significant, if any, impact on the emissions and should not result in a violation.

CCEEB does not believe the legislature intended for ARB to issue a mandatory penalty provision deeming an annual emission violation automatically constitutes 365 days of violation. An exceedance of the annual emission limit should, therefore, not automatically constitute 365 separate violations, especially when an event or date of exceedance can be found. CCEEB requests ARB exercise its discretion and develop a method to calculate the number of days in violation for entities that exceed the annual emission rate or mass emission limit. If ARB makes a determination into what caused the exceedance, the duration of the exceedance, and the extent of the exceedance, the number of days should be reduced. Real-world examples exist where a release of gas occurred on a definitive date and, therefore, would not constitute a full year of violations.

*Recommendation*

- **§95359** (a) *Penalties.* Penalties may be assessed for any violation of this subarticle pursuant to Health and Safety Code section 38580. Each day during any portion of which a violation occurs is a separate offense. ***In seeking any penalty amount, ARB shall consider all relevant circumstances, including any pattern of violation, the size and complexity of the reporting entity's***

***operations, and the other criteria in Health and Safety Code section 42403(b).***

(b) Each day or portion thereof that any report required by this subarticle remains unsubmitted~~,~~ or is submitted late***, or*** ~~shall constitute a single, separate violation of this subarticle. or contains Additionally,~~ each incomplete data field that exists after the reporting deadline (either in a submitted report or an unsubmitted report)***, or*** ~~shall constitute a single, separate violation of this subarticle. Finally,~~ each data field that contains ~~or~~ inaccurate information after the reporting deadline~~,~~ shall constitute a single, separate violation of this subarticle. The Executive Officer shall take into consideration the materiality***, with respect to emission compliance,*** of any incomplete or inaccurate information when penalties are assessed.

(c) ~~Any Each MTCO2e~~ **An** exceedance of the ~~maximum allowable SF6~~ emission rate limit for a ~~calendar year~~ data year prior to 2020 or to the emissions limit for data year 2020 and beyond shall constitute a single, separate violation of this subarticle for each day of the calendar year***, except where a defined event triggered such an exceedance***.

(d) Any acquisition***, for use in California,*** of a SF6 GIE device after the dates provided in Table 1 and Table 2 shall constitute a single, separate violation of this subarticle for each day ~~the GIE owner is in possession of the device and for each MTCO2e of covered insulating gas at~~ **is active** ~~activation, in that device, or that the device is designed to contain,~~ unless it was acquired pursuant to one of the exceptions noted in section 95352(a)(1-4).

~~(d)~~(e) *Injunctions.* Any violation of this subarticle may be enjoined pursuant to Health and Safety Code section 41513…. (CCEEB)

**Comment:**

[However, there are a number of open items that need to be dressed in subsequent 15-day comment periods, specifically CCEEB supports a number of the items addressed by the joint utilities, specifically]…enforcement provisions such as those for small entities and non-emissions associated violations, as well as a simplified violation accounting, and also addressing the defined event enforcement. (CCEEB2)

**Comment:**

Discussion

Section 95351 Definitions and Acronyms

The definition of a "Substantive Error,"…in **Section § 95351** should be revised to clarify how the ARB intends to work with utilities as we collectively wait and rely upon manufacturers to develop GIE necessary for large scale deployment of non-SF6 equipment, particularly at the high voltage classifications.…

IV. **"Substantive Error"** *means an error that affects calculated emissions, data used to calculate emissions, data used to calculate the emissions*

*limit or compliance with the emissions limit, and data needed by CARB staff to verify reported data and compliance with this Regulation.*

1. This definition does not explain how granular CARB staff is going to look when verifying an entity's reported data and compliance with this regulation. "*An error*" implies a zero tolerance and therefore, a violation, no matter how *de minimis* theerror.

2. TID requests the ARB explain the difference between an Error and a Substantive Error….

Section 95359(a)(b)

*(a) Penalties. Penalties may be assessed for any violation of this subarticle pursuant to Health and Safety Code section 38580. Each day during any portion of which a violation occurs is a separate offense.*

*(b) Each day or portion thereof that any report required by this sub article remains uncommitted, or is submitted late, shall constitute a single, separate violation of this sub article. Additionally, each incomplete data field that exists after the reporting deadline (either in a submitted report or an unsubmitted report) shall constitute a single, separate violation of this sub article. Finally, each data field that contains or inaccurate information after the reporting deadline, shall constitute a single, separate violation of this subarticle. The Executive Officer shall take into consideration the materiality of any incomplete or inaccurate information when penalties are assessed.*

Discussion

Notwithstanding the Substantive Error language, discussed earlier, the changes to the Enforcement Section are unnecessary and overly punitive. While TID appreciates the need to ensure that Regulations are enforceable, the multiple ways that penalties can be assessed may lead to draconian penalties.

The existing regulatory provisions provide clear authority for CARB to enforce any violation of the rule—emissions or reporting/recordkeeping.

There is already a per day clause and the ability to adequately enforce financially under the agency's Enforcement Policy.

This new proposal separates out similar errors into multiple violation categories that serve to become multipliers for maximum penalty amounts.

These changes are counterproductive, and will not serve the regulated community, or CARB, in implementation.

TID's recommended modifications follow:

§95359. Enforcement.

(a) *Penalties.* Penalties may be assessed for any violation of this sub article pursuant to Health and Safety Code section 38580. Each day during any portion of which a violation occurs is a separate offense. In seeking any penalty amount, CARB shall consider all relevant circumstances, including any pattern of violation, the size and complexity of the reporting entity's operations, and the other criteria in Health and Safety Code section 42403(b).
(b) Each day or portion thereof that any report required by this subarticle remains unsubmitted~~, or~~ is submitted late**, or** ~~shall constitute a single, separate violation of this subarticle. or contains Additionally,~~ each incomplete data field that exists after the reporting deadline (either in a submitted report or an unsubmitted report)**, or** ~~shall constitute a single, separate violation of this subarticle. Finally,~~ each data field that contains~~or~~ inaccurate information after the reporting deadline~~,~~ shall constitute a single, separate violation of this subarticle. The Executive Officer shall take into consideration the materiality**, with respect to emission compliance,** of any incomplete or inaccurate information when penalties are assessed.
(c) ~~Any Each MTCO2e~~ **An** exceedance of the ~~maximum allowable SF6~~ emission rate limit for a ~~calendar year~~ data year prior to 2020 or to the emissions limit for data year 2020 and beyond shall constitute a single, separate violation of this subarticle for each day of the calendar year**, except where a defined event triggered such an exceedance**.
(d) Any acquisition**, for use in California,** of a SF6 GIE device after the dates provided in Table 1 and Table 2 shall constitute a single, separate violation of this subarticle for each day ~~the GIE owner is in possession of the~~ device ~~and for each MTCO2e of covered insulating gas at~~ **is active** ~~activation, in that device, or that the device is designed to contain,~~ unless it was acquired pursuant to one of the exceptions noted in section 95352(a)(1-4).

~~(d)~~(e) *Injunctions.* Any violation of this sub article may be enjoined pursuant to Health and Safety Code section 41513. (TID)

**Comment:**
§ 95351. Definition of Substantive Error needs to include a materiality threshold.

CARB is proposing the following definition:

**"Substantive Error"** means an error that affects calculated emissions, data used to calculate emissions, data used to calculate the emissions limit or compliance with the emissions limit, and data needed by CARB staff to verify reported data and compliance with this Regulation.

As written, this definition implies zero tolerance for errors that affect calculated emissions in any way, or errors in data used to calculate emissions or the annual

emissions limit, regardless of whether the effect of the error is material or immaterial. This is concerning given the proposed enforcement language which would assign daily violations for any data field that contains inaccurate information.

LADWP believes that the definition of substantive error needs to include a reasonable materiality threshold for errors to be considered substantive. For example, CARB's *Regulation for the Mandatory Reporting of Greenhouse Gas Emissions* (MRR) uses a materiality threshold of five percent (5%) (see below).

> *"Material misstatement" means any discrepancy, omission, or misreporting, or aggregation of the three, identified in the course of verification services that leads a verification team to believe that the total reported covered emissions (metric tons of $CO_2e$) or reported covered product data contains errors greater than 5%, as applicable, in an emissions data report. Material misstatement is calculated separately for covered emissions and covered product data, as specified in section 95131(b)(12)(A).*

The term "substantive" implies the error has a material impact on the end result. LADWP recommends incorporating the 5% materiality threshold and percent error calculation from the MRR into this regulation. Copied below for reference is the percent error equation.

$$Percent\ error\ (emissions) = \sum \frac{[Discrepancies + Omissions + Misreporting\ ]x\ 100\%}{Total\ reported\ covered\ emissions}$$

The stated purpose of this regulation is "to achieve greenhouse gas (GHG) emission reductions from the operation of electrical equipment that uses a GHG as an insulating medium." The focus of this regulation is on the emissions, not on the accuracy of the data in the equipment inventory. It does not seem suitable to apply the substantive error definition to "data needed by CARB staff to verify reported data and compliance with this Regulation".

LADWP recommends simplifying the definition of Substantive Error to focus on the regulated emissions and the emission limit, and apply a 5% materiality threshold similar to the MRR.

> **AMEND "Substantive Error"** means an error that materially affects calculated emissions or, ~~data used to calculate emissions, data used to calculate~~ the emissions limit ~~or compliance with the emissions limit, and data needed by CARB staff to verify reported data and compliance with this Regulation~~, resulting in a change in total reported emissions or the emission limit greater that 5%....

§ 95359. Enforcement: the proposed changes appear to be punitive and could result in excessive violations.

LADWP recognizes the following significant changes made to the enforcement section of the regulation.

- The original enforcement language would impose daily violations for late submittals of the annual report, incomplete or inaccurate information in the report, and for exceeding the annual emission limit.

- The revised enforcement language would impose daily violations for incomplete or inaccurate information in each separate data field in the report, each metric ton of emissions (MTCO2e) over the emission limit, and acquisition of a SF6 GIE after the phase out date without an exemption as well as each MTCO2e of gas in that SF6 GIE.

Proposed such strict enforcement standards while at the same time significantly expanding the complexity of this regulation appears unfair to the utility. The expanded data collection requirements create significant opportunity to have incomplete or inaccurate data. The purpose of this regulation is to achieve GHG emission reductions; therefore, enforcement should be limited to emission exceedances.

LADWP requests that CARB reconsider the proposed changes to the enforcement section and incorporate by reference the Utilities Group comments on the enforcement language. (LADWP)

**Comment:**

*XI.* *Revise the definition of "substantive error" to exclude minor administrative errors that do not impact emissions.*

SCE recommends a change to the definition of 'Substantive Error' to be consistent with other CARB GHG regulations such as the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (MRR) and the Low Carbon Fuel Standard. This change adds a materiality threshold for the imposition of liability.

Proposed edits to §95351, Definitions and Acronyms, are indicated below in underlined and ~~strikethrough~~ text:

*§95351, Definitions and Acronyms.*
*"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 ~~from a nonconformance of this regulation.~~ in a change in emissions greater than 5%.* (SCE)

**Comment:**

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%.... (PG&E2)

**Agency Response:**
Several commenters stated the revisions to the enforcement provisions in section 95359 were unnecessary and overly punitive and suggested changes. Changes requested by commenters included revising some provisions to match the current Regulation, that certain issues should not automatically constitute a separate violation for each day of the calendar year and/or per $MTCO_2e$, and that CARB should consider all relevant circumstances when seeking penalties. While CARB staff does not agree with all the changes proposed by commenters, CARB staff does agree with a number of the specific changes requested, and these changes are reflected in the final Regulation. The next few paragraphs summarize specific comments received on each section 95359(a)-(d) and CARB staff's response.

Several commenters requested section 95359(a) be modified by adding "in seeking any penalty amount, CARB shall consider all relevant circumstances, including any pattern of violation, the size and complexity of the reporting entity's operations, and the other criteria in Health and Safety Code section 42403(b)" to the end of the section. This change has not been incorporated because CARB staff does not consider it necessary. CARB's enforcement policy is available online (https://ww2.arb.ca.gov/resources/documents/enforcement-policy) and describes the factors used to determine appropriate penalties, some of which commenters requested be added to the Regulation.

Several commenters requested section 95359(b) be modified, essentially, to revert back to the text of the current Regulation. Requested changes would assign a single violation for each day a report contains incomplete or inaccurate data. Commenters also requested the concluding sentence be changed to "The Executive Officer shall take into consideration the materiality, with respect to emission compliance, of any incomplete or inaccurate information when penalties are assessed." CARB staff agrees with the commenters that requested to revert this section back to the language in the current Regulation and have made that change. CARB staff does not agree with the addition of "with respect to emission compliance." All annual $SF_6$ reports are required to be certified as "true, accurate, and complete" and CARB staff expects this to be the case regardless of whether the reporting error impacts the GIE owner's compliance with the emission limit. No change has been made in response to this request.

One commenter also linked the new term "Substantive Error," proposed in section 95355(c), to enforcement parameters by suggesting that term be brought into enforcement section 95359(b), suggesting that a separate violation be assigned for each day a report contains a substantive error not corrected within the time period set forth in 95355(c). Commenters also requested changes and clarifications to the definition of "Substantive Error." The new term "Substantive Error" and new

sections 95355(c) and 95355(c)(1) were added to the 45-day Public Notice to define the specific types of errors contained in annual reports that a GIE owner must rectify within 45 days upon their discovery or notification of such an error. Analysis of the comments received showed that the term "Substantive Error" was causing confusion. Further, commenters were interpreting the 45-day window as a time during which GIE owners would not be subject to penalties, which was not the intention of the provision. As a result, CARB staff re-assessed these additions, and found them to be unnecessary because the enforcement provisions already set expectations and consequences for reports that are late or contain incomplete, untrue, or inaccurate information. As such, the definition of "Substantive Error" and sections 95355(c) and 95355(c)(1) were removed in the first 15-day Public Notice. Therefore, none of the changes requested by commenters have been made.

Several commenters requested section 95359(c) be modified so that each exceedance of the annual emission limit would not automatically constitute a separate violation for each day of the calendar year and/or per $MTCO_2e$ emitted above allowed levels. The 45-day Public Notice assigned a separate emission exceedance violation for each $MTCO_2e$ of the exceedance for each day of the calendar year. CARB staff agrees with commenters who requested each exceedance not automatically constitute a separate violation for each day of the calendar year. Exceedances may be the result of a discrete event that did not last for the full 365 (or 366)-day data year. Accordingly, the final Regulation reflects this change. The assignment of a separate violation per $MTCO_2e$ emitted above allowed levels has been retained. This provision is consistent with other CARB GHG regulations and is necessary so that the Executive Officer may scale any penalties appropriately based on the magnitude of the exceedance, ensuring penalties are assessed in a more equitable and consistent manner among GIE owners that violate the Regulation.

Commenters requested section 95359(d) be revised such that acquisition of an $SF_6$ GIE device after the dates provided in Table 1 and Table 2 no longer constitute a single violation for each $MTCO_2e$ of capacity and each day the GIE owner is in possession of the device, instead recommending a single violation for each day only. One commenter went further and specified the number of days should only be the number of days in which the acquired device was active, not the number of days in which the device was possessed. Commenters also requested CARB staff modify this section to clarify that violations would not be assessed for use of $SF_6$ GIE outside California. No changes have been made in response to these comments. The final Regulation prohibits the acquisition of $SF_6$ GIE for use in California after prescribed phase-out dates and offers GIE owners flexibility to acquire $SF_6$ GIE after the phase-out under certain conditions via the $SF_6$ phase-out exemption and notification provisions. Because the phase-out prohibits the acquisition of $SF_6$ GIE following the applicable phase-out date, it follows that violations will be enforced on a "per $MTCO_2e$" basis in order to capture the magnitude of the harm that could be caused by this equipment if a release occurs. Further, a per-day violation is necessary because the risk of $SF_6$ emissions from $SF_6$ GIE acquired in violation of the Regulation increases the longer a

device is in California. In summary, CARB staff considers it appropriate to assign penalties for violation of the phase-out requirement based on the number of days the $SF_6$ GIE device remains in the GIE owner's possession after the date it was acquired in violation of the Regulation, as well as the amount of covered insulating gas. Therefore, it is appropriate to assign a separate violation per day and per $MTCO_2e$ of covered insulating gas at activation in that device or that the device is designed to contain. It is not necessary to specify that violations will not be assessed for use of $SF_6$ GIE outside California because the Regulation does not apply to $SF_6$ GIE used outside of California, as specified in section 95352(a) which provides that the phase out only applies to the acquisition of $SF_6$ GIE for use in California. Additionally, section 95359(d) assigns violations for "acquisition" of prohibited $SF_6$ GIE, and the definition of "Acquire" in section 95351(a) specifies "equipment transported through California that will never be used in California are not considered to have been 'acquired.'"

Finally, one commenter stated the enforcement provisions should be limited to emission exceedances only. CARB staff disagrees. CARB staff requires reported data be true, accurate, and complete, because CARB staff must use that data verify calculated emissions and check compliance with the emission rate limit. In order to motivate GIE owners to submit true, accurate, and complete reports on time, and to make timely corrections when submitted data contains errors or is missing, CARB staff needs the ability to take enforcement action against GIE owners that report late, or whose report contains errors. Further, since acquisition of $SF_6$ GIE is prohibited after the phase-out unless certain conditions apply, CARB staff requires the ability to take enforcement action against violators of this provision, even when there are no associated emissions, in order to ensure compliance with the phase-out and spur the transition to non-$SF_6$ alternatives.

**B-20. Revise the Emergency Event Exemption Process**

**Comment:**

3. *Definitions Emergency Events (95351)*: The ARB should broaden the definition of emergency events to include unforeseen events that cannot be prevented by reasonable diligence.…

III. *WPTF Recommends Amending the Definition of Emergency Event to Ensure that Small Inventory Holders Can Reasonably Achieve Compliance with the Amended Regulation in the Event of Unforeseen Releases that Cannot Be Prevented by Reasonable Diligence and Care.*

As discussed in Section I above, IPPs will face considerable challenges and cannot reasonably meet the proposed emissions limits. WPTF believes that many IPPs have undertaken reasonable diligence efforts to avoid unforeseen equipment failures. Despite these efforts, IPPs will still be at risk of equipment failures and could be subject to significant penalties despite the exercise of reasonable diligence and care. We believe that as with the current regulatory design, many of these events may not qualify because the ARB also requires that emergency events be a "sudden and

unforeseen event, including but not limited to, an earthquake, flood or fire."[17] WPTF is aware of situations where the ARB has rejected emergency event requests that were unforeseen, but nevertheless did not precipitate from an unforeseen event such as an earthquake, flood, or fire. In recognition of the disparate impact of small GIE owners, WPTF encourages the ARB broaden the Emergency Event Definition to include all events that are unforeseen and could not have been prevented by the exercise of reasonable care and diligence. This change will provide incentives to continue to operate and maintain their systems, while at the same time providing a clearer pathway for IPPs to ensure they will be in compliance with the emissions limits…. (WPTF)

**Comment:**

III. **"Emergency Event"** *means a situation arising from a sudden and unforeseen event including, but not limited to, an earthquake, flood, or fire.*

1. Once a utility has undertaken all reasonably prudent maintenance and operating measures to minimize the risk of an SF6 release, there is little a utility can do to ensure they will be in compliance. In the event of an unforeseen release that occurs due to unexpected equipment failure, the utility has only the definition of "Emergency Event" to point to in demonstrating that they should be deemed in compliance in light of their exercise of reasonable diligence and care. However, the Emergency Event exemption only applies if there is an unforeseen event like an earthquake. The ARB should amend this definition to exclude the list of unforeseen events and simply ask whether in light of the exercise of reasonable diligence and care, was the event unforeseen…. (TID)

**Comment:**

WSPA believes that not only should its members be allowed to replace GIE equipment on an expedited basis when it experiences a catastrophic failure for which cause may be onsite or at a power producer's facility but that the **emissions from such a catastrophic failure, which is also an emergency event, should be excluded from the calculating of annual emissions**, as provided for in §95357.1 (Emergency Event Exemption). The current definition of "Emergency Events," however, does not explicitly include power outages that are not the fault of the GIE owner. Section 95357(1)-(2) allows the exemption from reporting such emissions when the release of SF6 "could not have been prevented by exercise of prudence, diligence, and care" and "was beyond the control of the GIE owner." There are emergency events, including catastrophic equipment failures, that may be due to the power grid beyond the control of the GIE owner. In fact, there may be some overlap in which an event could be categorized as both a "catastrophic failure" and an "emergency event." WSPA suggests, therefore, that §95357.1also cover "Catastrophic Events" or include language in the two definitions that would acknowledge partial overlap…. (WSPA)

**Comment:**

[17] 17 Cal. Code Reg. Sec. 95351.

IX. Amend the Emergency Event Exemption. The Utilities Group 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 a detailed root cause analysis that may take several months following the emergency event. However, if an emergency event occurs, as defined, 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:

**AMEND** § 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… (JUG)

**Comment:**

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.…

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… (PG&E2)

**Agency Response:**

Several commenters requested CARB staff broaden the definition of "emergency event" to include any unforeseen events that could not have been prevented by reasonable diligence and care. CARB staff disagrees with this suggestion and did not incorporate the proposed changes to the definition of "emergency event." CARB staff is opposed to the proposed broadening of the definition of "emergency event" because the proposed definition could capture a wide range of leaks or emissions that are not the result of "emergency events" as defined in the Regulation, thereby rendering the Regulation's emissions limit meaningless. Because this change would

undermine the Regulation's goals by exempting a wide-range of emissions from inclusion in the emissions limit, this change has not been incorporated. Further, the commenters' proposal is outside of the scope of this proceeding because the only changes proposed to this section of the Regulation are harmonizing in nature (e.g., "GIS" to "GIE," "emission rate" to "emissions," "$SF_6$" to "covered insulating gas," and updates to other terminology).

Two commenters requested GIE owners be allowed to submit supporting documentation that demonstrates a release occurred as a result of an emergency event to CARB staff within 180 calendar days of the event. CARB staff disagrees. The requirement to provide this information within 30 days is necessary to ensure timely processing of the request. Further, this time limit has been in place since the original Regulation, and the commenters provided no new data to substantiate the need for an expanded timeline. Because all the changes proposed to this section of the Regulation are harmonizing in nature and did not relate to the time limit for submission of supporting documentation, the requested change is outside of the scope of this rulemaking.

Several commenters noted some "catastrophic failures" should also qualify as "emergency events" and requested the ability to treat such events as both a "failure," and an "emergency event." The term "catastrophic failure" was defined in the 45-day Public Notice to establish the circumstances under which the GIE owner could file an expedited phase-out exemption request. The first 15-day Public Notice contained revisions that remove "catastrophic" and define "failure" as "the sudden and unexpected, or imminent, failure of a GIE device that requires replacement of the device." The Regulation allows for acquisition of $SF_6$ GIE after the phase-out date in response to a failure, which is completely different from the emergency event exemption. The emergency event exemption excludes emissions from an event deemed to satisfy the definition of an "emergency event" from the GIE owner's annual emissions. Expanding the definition of "emergency events" to include the relatively broad definition of "failure" would undermine the Regulation's goals by exempting a wide-range of emissions from inclusion in the emissions limit, even if they are not the result of a true "emergency event" as defined. Should an event that meets the definition of "failure" also meet the definition of "emergency event," there is nothing in the Regulation that prohibits the GIE owner from utilizing both provisions. No changes have been made in response to these comments.

**B-21. Revise the Definitions of GIE, Active GIE, and Hermetically Sealed GIE**

**Comment:**

5. **AMEND** the definition of "Gas-Insulated ~~switchgear~~ Equipment" or ~~GIS~~ "GIE" as proposed, 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~~ GI~~E~~S 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.

The proposed definition provides a more precise description of GIE. While we understand that CARB may need to include vacuum and solid dielectric in the regulation for purposes of calculating Early Action Credit (EAC), the definition of "Gas-Insulated Equipment" or "GIE" should not include equipment that does not contain greenhouse gases (GHGs). GIE that does not contain GHGs should not be reported under this regulation. We recommend revising the definition of GIE to only include equipment containing GHGs.

Additionally, the definition of GIE in the 45-day language refers to "…*transmission of electric current in electrical power systems.*" This phrase may cause some confusion because it contradicts the example of coupling capacitor potential devices. We recommend simplifying the language to "*operation of electrical power system.*"

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….

VI. §95355.1(a) Reporting Requirements. It is not clear from the proposed text that vacuum and dielectric GIE are exempt from this provision. Since vacuum and dielectric GIE contain noncovered insulating gases with a GWP less than 1, these should be excluded from reporting requirements, except where required to demonstrate EAC eligibility, and the proposed amendments should reflect this clarification…. (JUG)

**Comment:**

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~~ GIE~~S~~ 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…. (PG&E2)

**Comment:**
§ 95351(a) Definitions and Acronyms.

We understand that CARB may need to include vacuum and solid dielectric in the regulation for purposes of the Early Action Credit. However, the definition of "Gas-Insulated Equipment" or "GIE" should not include equipment that does not contain GHGs. GIE that does not contain GHGs should not be reported under this regulation. We recommend revising the definition of GIE to only include equipment containing GHGs.

Additionally, the definition of GIE in the 45-day language refers to *"…transmission of electric current in electrical power systems."* This phrase may cause some confusion because "transmission" is a term used to describe the movement of electricity at voltages greater than or equal to 72.5kV, and we do not believe it is CARB's intent to limit the definition in this manner.

We also do not see the merit in including hermetically sealed equipment within the definition of "GIE," thereby making all recordkeeping and reporting requirements for GIE applicable. Since hermetically sealed equipment does not impact emissions, we recommend removing it from the definition.

Taking into account the above three comments, we propose the following definition for "GIE":

*"Gas-Insulated Equipment" or "GIE" means all electrical power equipment, ~~regardless of location and insulating medium (e.g. solid dielectric, vacuum, SF6, alternative gas)~~ that utilizes a covered insulating gas to provide insulating and/or interrupting (arc quenching) functions related to the transmission or distribution of electric current in electrical power systems. GIE includes, but are not limited to, switchgear, switches, circuit switches, coupling capacitors potential devices, gas insulated substations, and/or circuit breakers. ~~This definition includes hermetically sealed GIE and non-hermetically sealed GIE.~~"*… (SF6&AltCoal)

**Comment:**
Lastly, as the regulations are designed to reduce GHG emissions, we recommend the removal of the reference to hermetically sealed equipment in the definition of "GIE" contained in §95351(a). As non-hermetically sealed equipment impacts emissions through potential failure leakage, and hermetically sealed equipment does not leak upon failure, the inclusion of latter does not advance the goal of GHG emissions reduction. (NEER)

**Comment:**
However, we would like to submit our comments on few clauses related to **Medium Voltage GIE (≤38kV)** as stipulated in the released draft of Proposed Amendments to the Regulation for Reducing Sulphur Hexafluoride Emission from Gas Insulated Switchgear dated July 21st, 2020 as follows.

1- Clause 95351-a (Page 2): **Active GIE**: Active GIE has been defined as only non-hermetically sealed. Is there a valid reason why hermetically sealed GIE is excluded?
2- Clause 95351-a (Page 4): **Gas Insulated Equipment**: Vacuum is not an insulating medium neither in MV nor in HV switchgear. Vacuum technology is used for switching / arc quenching purpose only. Since the clause refer to "insulating and/or interrupting functions", it would be appropriate to eliminate the word "insulating" in the sentence "insulating media"….

5- Clause 95351-a (Page 5): **Hermetically Sealed GIE:** The definition stipulated is in contradiction to the international standard IEC 62271…. (Siemens)

**Agency Response:**
Several commenters requested changes to different parts of the definition of "GIE," including that the definition not include hermetically sealed GIE, solid dielectric equipment, and GIE that do not contain GHGs. Commenters also requested clarification on whether vacuum and dielectric GIE that contain insulating gases with a GWP less than one are required to be reported in GIE owners' GIE inventories. The 45-day Public Notice defined "GIE" as "all electrical power equipment, regardless of…insulating medium (e.g., solid dielectric, vacuum, $SF_6$, alternative gas)…related to the transmission of electrical current in electrical power systems…. This definition includes hermetically sealed GIE and non-hermetically sealed GIE." CARB staff has retained the language of the definition as originally proposed with one exception (discussed in the next paragraph) because there is a need in the Regulation to have an

all-encompassing term to describe this type of electrical power equipment. For example, all "GIE that uses covered insulating gas" must be reported to CARB pursuant to the need to track regulated entities' use of gases with a GWP greater than one in their GIE, including in hermetically sealed GIE. Conversely, CARB also tracks the use of "non-$SF_6$" GIE by regulated entities for the early action credit. Because only GIE that uses covered insulating gas are required to be reported, CARB staff clarifies for the commenter that "vacuum and dielectric GIE that contain insulating gases with a GWP less than one" are not covered insulating gases, and these GIE are therefore not required to be reported in GIE owners' GIE inventories.

Several commenters requested the replacement of "transmission of electric current in" in the definition with "operation of." Rationale for the change included that this terminology may cause confusion because "transmission" is a term used to describe the movement of electricity at voltages greater than or equal to 72.5 kV. The proposed change would not affect which devices are considered "GIE," and CARB staff agrees the requested change could reduce confusion. This change has been made in the first 15-day Public Notice.

Two commenters requested CARB staff add "station service voltage transformers" to the examples of GIE provided in the definition. Because the types of GIE listed are examples, and not all types of GIE are listed, adding this equipment type to the definition would not add value to the Regulation.

One commenter requested deletion of the first instance of the word "insulating" from the definition of GIE because vacuum technology, which is mentioned in the definition to clarify that equipment which utilize vacuum technology are considered "GIE," is used for arc quenching only. Because the types of technologies listed are meant to be examples only, and the term "insulating medium" applies to the majority of the examples, such a change was not made.

Commenters also asked why "Active GIE" as defined do not include hermetically sealed GIE. The 45-day Public Notice defined "Active GIE" as "GIE that is non-hermetically sealed and is connected through busbars or cables to an electrical power system." The capacity of active GIE serves as the basis for the calculations of emissions limits and emissions. The reasoning is that GIE that is in active use is the GIE expected to be filled with insulating gas and is most likely to leak. This term excludes hermetically sealed GIE because hermetically sealed GIE are pre-charged and sealed at the factory, with the expectation that they will not leak and are designed by the manufacturer to not be fillable. Because emissions from active GIE are determined based on the amount of gas added, and these GIE are not fillable, there would be no way for the GIE owner to determine the emissions from the device while in use and, as such, they are excluded from calculation of emissions and emissions limits.

Commenters asked that the definition of non-hermetically sealed GIE be changed to "GIE that is not hermetically sealed." The definition of non-hermetically sealed GIE is carefully worded to describe the characteristics that would make a GIE

device meet this definition, and was carefully considered in the context of regulatory requirements for non-hermetically sealed GIE. The commenters' proposed definition would simply be the converse of the definition of "hermetically sealed GIE," which would change the meaning of the term and cause confusion. The definition of hermetically sealed GIE includes specification that they "are precharged…at the factory, and designed…to not be fillable…." Some non-hermetically sealed GIE are pre-charged at the factory and are fillable, so the requested change could result in confusion over whether pre-charged GIE that are fillable qualify as hermetically sealed, or non-hermetically sealed. No changes have been made in response to these comments.

Commenters stated the definition of hermetically sealed is in contradiction to international standard IEC 62271, but did not propose an alternative definition, or express any specific concerns with the 45-day Public Notice's proposed changes to this definition. The only changes to this definition in the 45-day Public Notice are conforming changes such as replacing "switchgear" with "equipment" and "$SF_6$" with "covered insulating gas," minor re-organization of existing content, clarification of the word "user," and removal of unnecessary words that did not change the meaning of the definition. Therefore, no changes have been made in response to this comment.

**B-22. Revise the Definitions of Gas Cart and Gas Container**

**Comment:**

3. **AMEND** the definition of "Gas Cart' as proposed, 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.~~ 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, 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…. (JUG)

**Comment:**

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.~~ 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~~…. (PG&E2)

**Agency Response:**
Two commenters requested CARB staff amend the definitions of "gas cart" and "gas container." While comments did not provide a justification for either requested change, subsequent stakeholder feedback indicated that the proposed definition of "gas cart" could be interpreted to include gas containers, and that the definition of "gas container" did not clearly distinguish a single gas container, required to be weighed annually pursuant to section 95354(g), from other types of vessels inside GIE or gas carts which are not. CARB staff agrees it is important to distinguish between these types of equipment. Accordingly, in the first 15-day Public Notice, the definition of "Gas Cart" is modified to add "A gas cart may utilize gas containers, but gas containers do not fall within the definition of gas cart" to clarify that gas containers are not gas carts. The definition of "Gas Container" was modified to add the word "single" consistent with stakeholder feedback that this change would address the concerns discussed above.

**B-23. Revise the Definition of Voltage Capacity**

**Comment:**
**Use of "Voltage Capacity" (Multiple Sections)**

Several times throughout the 45-day Language, CARB uses the term "voltage capacity." "Voltage" and "Capacity" are two different terms with different meanings; their usage together here is not technically accurate. "Voltage" is the electric potential between two points (i.e. on a conductor) while "capacity" generally refers to the maximum electric output an electricity generator can produce. We recommend that CARB replace "voltage capacity" with "voltage ratings" in each instance throughout the proposed language. (SF6&AltCoal)

**Comment:**
8. **ADD** a definition for equipment voltage capacity. There are several different ways voltage capacity can be interpreted (e.g., nominal system voltage or nameplate maximum voltage). We recommend using the IEEE standard

terminology (reflected on the GIE nameplate as "Rated Voltage") in order to maintain consistency with industry standards:

"**Equipment Voltage Capacity**" which is reflected on the GIE nameplate as "Rated Voltage" consisted with IEEE standard terminology….

2. Align GIE Voltage Characteristics with Industry Standards. The Utilities Group recommends that GIE voltage capacity use the Institute of Electrical and Electronics Engineers (IEEE) convention to describe the characteristics of a particular GIE in an owner's inventory and **amend** the section as follows:

**AMEND** § 95354(a)(5). Equipment rated voltage capacity using IEEE convention (in kilovolts)…. (JUG)

**Agency Response:**
One commenter requested CARB staff change the term "voltage capacity" to "voltage ratings" while another requested a definition for "voltage capacity" be added to the Regulation. In the first 15-day Public Notice, a definition of "Voltage Capacity" has been added to specify that this term reflects the maximum voltage that the manufacturer specifies for a GIE device to operate within, the so called "rated voltage," (IEEE standard terminology mentioned by one commenter) as opposed to "nominal voltage." Since the term has now been defined to clarify its meaning in response to the comments, CARB staff elected to retain the term "voltage capacity" instead of "voltage rating" for consistency with the current Regulation.

### B-24. Revise the Definition of Replacement Parts

**Comment:**
Additionally, the definition of "Replacement Parts" is too narrow and will preclude certain components (i.e., the interrupter) from being replaced within the spirit of the regulation. We recommend the following: ""*Replacement Parts" are interchangeable components used to repair a GIE."*… (SF6&AltCoal)

**Comment:**
Per the proposed §95352(c) "[r]eplacement parts are not subject to the phase-out. However, we find that the definition of "Replacement Parts" in §95351(a) too narrowly worded which may inadvertently lead to the inability of a GIE owner to repair SF6-containing GIE which still has useable service life. We recommend expanding the definition to include any interchangeable or similar component used to repair a GIE…. (NEER)

**Comment:**
Replacement Parts—§ 95351(a) and § 95352(c)
WSPA appreciates the intent of the regulation to allow the continued use of SF6 GIE for the rest of their useful lives, in that the phase-out dates are to apply only to replacement units. In addition, §95352(c) states that "Replacement parts are not subject to the phase-

out." In accordance with that intent, WSPA believes the definition of "replacement parts" should not be limited to just those parts that are defined as "ancillary components that support or enable, but cannot perform, the primary activities or operation of an integrated GIE device." Needing to replace a part that may be primary in function should not deem the GIE as being at the end of life and/or needing to have the whole GIE device replaced with another technology. **Just as the spirit of the regulation allows replacement of the SF6 gas in a GIE device even during the phase-out period, so long as the GIE device has not reached the end of life, the rule should also allow replacement of any part of the GIE.** The delineation for when the whole SF6 GIE device must be replaced is when it has reached the end of its useful life; the regulation requires that the replacement then be a non-SF6 technology. This is also in keeping with CARB's acknowledgement in this proposed rule's Notice of Public Hearing, page 5, that "[b]ecause GIE lasts approximately 40 years, though, emissions reductions from non-SF6 GIE acquired between 2025 and 2036 will continue through 2075…." For these reasons, WSPA proposes that the definition in § 95351(a) should be revised to read:

> "Replacement Parts" are ~~ancillary~~ components that support or enable~~, but cannot perform,~~ the ~~primary~~ activities or operation of an integrated GIE device."… (WSPA)

**Agency Response:**
Several commenters requested CARB staff expand the definition of "Replacement Parts" to cover interrupters and other interchangeable or similar components used to repair GIE, whose replacement, according to commenters, would not have been allowed in the 45-day Public Notice. One commenter requested elimination of the specification that Replacement Parts are "ancillary" and "cannot perform the primary activities" of an integrated GIE device. In the first 15-day Public Notice, the definition of "Replacement Parts" is modified based on the suggested revisions to state these are "interchangeable components used to repair a GIE device" and the terms "ancillary" and "that support or enable, but cannot perform, the primary activities or operation of an integrated" have been removed from the definition, as suggested by commenters.

### B-25. Revise Other Definitions

**Comment:**
4- Clause 95351-a (Page 5): **Global Warming Potential or GWP:** We have noticed that no reporting requirement for the not "covered insulation gases" is stated, meaning insulation gases with GWP less or equal than one (clause 95351-a, page 3). Is there any valid reason why the substance NOVEC 5110 (C5-PFK) is additionally explicitly mentioned not falling under the reporting requirement?... (Siemens)

**Agency Response:**
The commenter states gases that are not "covered insulating gases" are not required to be reported and asks why one such gas (Novec 5110) is explicitly stated to be exempt from the reporting requirements. The commenter is correct that covered

insulating gases with a GWP less than or equal to one, including Novec 5110, are not required to be reported. The definition of GWP specifies the GWP for known alternative gases (Novec 5110 and Novec 4710) because it may have been challenging for GIE owners to identify the appropriate GWP for these compounds in Table A-1 to Subpart A of Title 40 CFR Part 98 as published to the Federal Register on December 11, 2014. It is important to clarify the GWP of these alternative gases so that GIE owners know whether their use is subject to the provisions of the Regulation.

**B-26. Streamline VOC Permitting Requirements for non-$SF_6$ GIE**

**Comment:**

*X. Add $SF_6$ alternative gases with low maximum incremental reactivity VOC-exempt compounds lists*

SCE anticipates significant implementation and annual operating costs for GIE owners associated with local air district permitting for equipment containing $SF_6$ alternative gases (NOVEC, etc.) that CARB may not have considered in the economic analysis.

A Permit to Construct/Operate is required prior to building, erecting, installing, altering, or replacing any equipment that has a potential to emit air contaminants. $SF_6$ alternative gases contain volatile organic compounds (VOC). South Coast Air Quality Management District Rule 102 defines VOC as any volatile compound of carbon, excluding exempt compounds and a list of excluded compounds[18]. For example, NOVEC 4710 is volatile, contains carbon, and its main component (2,3,3,3-tetrafluoro-2-(trifluoromethyl)-Propanenitrile [CAS 42532-60-5; C4F7N] is not specified as an exempt compound. The relevant federal regulation (40 CFR 51.100) clarifies the definition of VOC to specify such compounds must participate in atmospheric photochemical reactions. As a heptafluoro-iso-butyronitrile, it is likely that the main component of NOVEC 4710 has negligible photochemical reactivity; however, since it has not been listed as an exempt compound by CARB[19], the U.S. Environmental Protection Agency or local air districts, it would be considered a VOC and would therefore be subject to local air district permitting requirements.

The costs associated with permitting each GIE unit can vary widely among local air districts. Depending on how each air district decides to categorize the unit, the fees to obtain a Permit to Construct could be between $1,850 to $4,700 per unit, plus staff or consultant labor hours to prepare and submit the permit to construct. After that, there are annual fees associated with the Permit to Operate.

These local permitting costs could add to the mounting costs associated with switching to new, technologies versus the existing, proven $SF_6$ technologies on the electric grid (such as the costs of pilot programs, labor for retrofit, premium costs over existing

[18] https://www.aqmd.gov/docs/default-source/rule-book/reg-i/rule-102-definition-of-terms.pdf?sfvrsn=4
[19] https://ww3.arb.ca.gov/ei/speciate/voc_rog_dfn_1_09.pdf

technologies, training employees on new technologies, etc.). The cost burden will fall on the shoulders of customers.

To minimize barriers to adoption of alternative $SF_6$ technologies and to minimize cost impacts to customers, we request that CARB, in close collaboration with GIE owners and manufacturers, work with U.S. EPA and the air districts to add $SF_6$ alternative gases to their VOC-exempt compounds lists…. (SCE)

**Agency Response:**
The commenter states the alternative gas Novec 4710 will likely be considered a VOC, meaning that installation of a GIE device using this gas would require the owner to obtain costly construction and operation permits. The commenter states that the main component of Novec 4710 likely has negligible photochemical reactivity, meaning it may qualify as an exempt compound; however, jurisdictions that maintain lists of VOC-exempt compounds have not classified it as such. The commenter requests CARB staff collaborate with GIE owners, manufacturers, and these jurisdictions to add $SF_6$ alternative gases to their VOC-exempt compounds lists. CARB staff discussed this issue with South Coast Air Quality Management District (SCAQMD) staff to inform them of this potential new use of a VOC. It is CARB staff's understanding that U.S. EPA takes the first step in these matters by adding a compound to their VOC-exempt compounds list, performing their own analysis to determine if it should be added to their list. This comment is out of scope in that it is not under the purview of this Regulation to address VOC permitting issues or to advocate to EPA regarding their VOC-exempt compounds list.

If, as the commenter asserts, NOVEC 4710 has negligible photochemical reactivity, it is possible that this compound will be exempted from VOC-permitting requirements by the start of the $SF_6$ phase-out (2025), meaning the permitting costs would be zero. Additionally, CARB staff anticipates most GIE insulated with NOVEC 4710 installed in California will be in high-voltage equipment, which have later phase-out dates, giving even more time for these regulatory agencies to determine the appropriateness of adding NOVEC 4710 to their VOC-exempt compounds list before large quantities of these equipment are installed. Finally, the total cost to purchase a high-voltage NOVEC 4710 insulated GIE device remains uncertain but, based on the ISOR's economic analysis (Table 9), is expected to be at least an order of magnitude higher than the VOC-permitting costs. The costs quoted by the commenter for a permit ($1,850-$4,700) represent a relatively small fraction of the total cost of purchasing one of these pieces of equipment.

**B-27. Revise Incorrect Section References**

**Comment:**
B. <u>Incorrect reference to sections containing information to be reported</u>
There appears to be an incorrect reference in 95355(a)(5) to the information to be included in the annual report. 95355(a)(5) refers to the information in section 95354 (a), (d), (g), (h) and (l). However, the information that is traditionally

included in the annual report is found in section 95354 (a) GIE inventory, (g) gas container inventory, (h) gas transfers, and (i) gas carts…. (LADWP)

**Agency Response:**
The commenter says that the section references in section 95355(a)(5) that point to section 95354(d) and 95354(l) are incorrect because they don't correspond to information that is reported in the current Regulation, specifically the GIE inventory, gas container inventory, and gas transfers. Further, the commenter implies that a reference to section 95354(i), which requires reporting of information related to gas carts, should be added for consistency with the current Regulation. The originally proposed section references are correct and no changes have been made in response to this comment. Section 95354(d) of the final Regulation requires reporting of certain transfers, a subset of those required to be reported under the current Regulation, therefore its inclusion is consistent with the current Regulation. Section 95355(a)(5) does not specify data recorded pursuant to section 95354(i) need to be reported because gas cart data is required to be reported pursuant to section 95355(a)(5)'s reference to section 95354(h). While the content has been re-organized, this requirement is again consistent with the current Regulation. Finally, data recorded pursuant to section 95354(l) which requires calculation of the amount of covered insulating gas to be reported from a gas blend (which was changed to 95354(m) in the first 15-day Public Notice) must be reported because, unlike the current Regulation, some GIE will be insulated with gas blends.

### B-28. Change the Reporting Deadline

**Comment:**
§ 95355. Annual Reporting

A. Change the annual report deadline from June 1 to June 30.
LADWP recommends clarifying the annual report submittal due date to reflect CARB's practice of moving the due date to the following business day if the due date falls on a weekend. In addition, LADWP would like to reiterate the Utilities Group's April 2019 request to move the annual SF6 report due date from June 1 to June 30 (or the following business day). Many of the utilities subject to this regulation are also required to submit an Electric Power Entity report under CARB's *Regulation for the Mandatory Reporting of Greenhouse Gas Emissions*, which is also due on June 1. Moving the annual SF6 report due date to June 30 would be much appreciated. This would allow utilities to better manage their deadlines and achieve compliance.

> 95355 (a) By June ~~1~~ 30 of each year, or the following business day if June 30 falls on a weekend, any person who was a GIE owner at any point during the previous calendar year must submit an annual GHG emissions data report to the Executive Officer for the previous ~~data~~ calendar year…. (LADWP)

**Agency Response:**

The commenter requested changes to the annual reporting deadline. This request is out of scope for the current rulemaking as no changes to the deadline were proposed in these amendments. CARB staff agrees that whenever the June 1 deadline falls on a weekend, the reporting deadline becomes the next business day. This fact is codified in Government Code section 6707, which states that "When the last day for filing any instrument or other document with a state agency falls upon a Saturday or holiday, such act may be performed upon the next business day with the same effect as if it had been performed upon the day appointed." Therefore, this does not need to be specified in this Regulation.

### B-29. Other Mechanisms to Reduce GHG Emissions Should be Added to the Regulation

**Comment:**
Disposal of $SF_6$ Gas post de-commissioning and replacement with Alternative gas

DILO wishes to also request that the CARB staff review further the environmental and financial impact of $SF_6$ gas disposal as the phase out moves forward.

A consideration of allowing users to use reconditioned $SF_6$ gas as an alternative to new ("virgin") $SF_6$ gas will have a positive impact on the environment, reducing maintenance and/or capital expenditure costs to users for disposal, and allowing the reconditioned gas to be part of the solution for global reduced emissions.

As an additional consideration, we recommend that the regulation should include language specific to the training and certification of gas handling personnel. This is a requirement in the E.U. regulation and has resulted in better gas handling practices which have contributed to emissions reductions across the E.U. and within the stakeholder organizations. (DILO)

**Agency Response:**
The commenter requested additional measures to reduce $SF_6$ emissions be added to the Regulation, including allowing GIE owners to use reconditioned $SF_6$ as an alternative to "virgin" $SF_6$ and mandating personnel that handle gas be trained and certified. This request is out of scope because neither the current nor proposed Regulation specify whether GIE owners must use reconditioned versus "virgin" $SF_6$, and neither specify any training or certification requirements for gas handling.

### B-30. Board Should Delay Adopting Amendments

**Comment:**
So in my role, I've participated in numerous rulemaking processes, Board decisions. You know, they typically follow a series of workshops that line up right before the Board meeting. And, you know, I certainly understand, you know, with COVID, you know, we've all had to adapt, and I appreciate all CARB has presented this workshop today -- or this Board decision today. But normally you get, you know, a series of workshops, and comments, and response to comments the line up right before the

Board meeting. And we've missed that opportunity. There's been some 18 months since the last workshop.

So, you know, today, I'd like, you know, Board to consider a delay of adopting the amendments. You know taking addressed methodically these comments perhaps in another workshop or two and then bringing it back to the Board. (NRG2)

**Agency Response:**
This comment is out of scope of the proposed changes to the Regulation. However, CARB staff wishes to clarify that a number of public meetings were held over several years leading up to the Board Hearing. At each of these, CARB staff provided a working draft of the proposed amendments, or a summary of changes, and gave stakeholders the opportunity to comment and/or ask clarifying questions. The public meetings concluded with the draft CARB staff released approximately 60 days before the Board Hearing. These meetings included:

- November 28, 2017: Public workshop.
- May 3, 2018: Public working group meeting.
- February 25, 2019: Public workshop.
- August 15, 2019: Public workshop.
- July 13, 2020: Public webinar.

At its September 24, 2020 public hearing, the Board approved for adoption the proposed amendments. The Board directed the Executive Officer to determine if additional conforming modifications to the Regulation were appropriate and to make any proposed modified regulatory language available for public comment, with any additional supporting documents and information, for a period of at least 15 days as required by Government Code section 11346.8. The Board further directed the Executive Officer to consider written comments submitted during the public review period and make any further modifications that are appropriate available for public comment for at least 15 days, and present the Regulation to the Board for further consideration if warranted, or take final action to adopt the Regulation after addressing all appropriate modifications. This Final Statement of Reasons contains those comments and a summary of the changes CARB staff has made to the amendments since the Board Hearing.

### B-31. CARB should do more to Address Air Pollution

**Comment:**
We are very concerned about the community. It's very affected by the pollution. Many people have to leave due to the air quality. The air pollution is very bad, many are sick due to respiratory illnesses. And also in addition to that, the smoke, because of the wildfires, many have had to leave and live in another state. It's time for CARB to take action now to make the change now. It's urgent. We are getting very sick with respiratory illnesses. It's time to make the change now. Also, we want to focus on the schools, so that the air pollution can be decreased.…

It's important that the change be made now, that more regulations be put into place now. I'm not seeing any change that more regulations be made in regards to industries, in regards to cars. In Fresno, the air pollution is very bad. I'm not seeing any change being made.

As a resident of Fresno, I've been living in Fresno and my son has asthma, and it's very important that action be taken to protect these -- these people, such as children, and older ones that are sick with respiratory illnesses. It's important that action be taken now. (Ortega)

**Agency Response:**
CARB staff appreciates this comment but it falls outside of the scope of the proposed changes to the Regulation which specifically address GHG emissions from gas-insulated switchgear. While $SF_6$ is a very potent GHG, it has not been shown to cause respiratory illnesses. CARB staff believes this comment was intended to be in response to the Board item "Public Meeting to Hear an Informational Update on AB 617 Community Emissions Reduction Program Implementation" which was heard later in the day. CARB is taking measures to improve local air quality through other measures including the Community Air Protection Program, established in response to AB 617.

### B-32. Accelerate Research Efforts for Alternative Technologies

**Comment:**
I think it's great that we're working on this, but we can't wait till these far-off dates. We've got to compact this down and do research in the alternatives and look at public production, like the Production Act under World War II to facilitate this and phase this stuff out. These numbers are too outrageous to be contended with.

And they need to be changed, as well as the control, and equity issues of developing new technologies that goes back to the consulting we did in the 70s and 80s with the Public Utilities Commission and the Energy Commission. The low-income solar equity program about dealing with the issues of environmental justice and equity and the transition.

The first earmark for ten percent of the financing of solar transition was $180 million. Anyway, it continued at ten percent. And your now -- we've got 35 percent earmarks. This has to be done in everything that's going on that's passing through the state related to energy and equity.

And we gave the example of housing back then. We have refundable tax credits, which you need for low income now and related health and housing, and the deaths in asthma and whatnot. We need a fund -- local funds to help address costs that people suffer from these diseases financed directly from the externalities of the oil company.

We saw the market price go down more than $40 minus -- the real numbers are orders of magnitude higher than that, destroyed our nest, our ecosystem, our watershed, et cetera, are $400, $4,000, $40,000 a barrel is the real cost. And these folks and entities have to be paying and into funds now with Vanguard, and BlackRock, and everything else. (PSPC)

**Agency Response:**
This comment does not appear to address any specific issues related to the $SF_6$ Regulation, and is therefore out of scope of the proposed changes to the Regulation.

## V. Summary of Comments Made During the First 15-Day Comment Period and Agency Response

Chapter V of this FSOR contains all comments submitted during the first 15-day comment period[20] that were directed at the first set of proposed 15-day changes together with CARB's responses. The 15-day comment period commenced on May 5, 2021 and ended on May 26, 2021. Written comments were received in response to the May 5, 2021 Notice of Public Availability of Modified Text. Listed below are the organizations and individuals that provided comments during the first 15-day comment period, the date and form of their comments, and the abbreviation assigned to each. The dates in the table below are the dates that feedback was received, which for written testimony is the date it was "Added to Database" in the rulemaking comment log.

Note that some comments which follow were scanned or otherwise electronically transferred, so they may include minor typographical errors or formatting that is not consistent with the originally submitted comments. However, all content reflects the submitted comments. All originally submitted comments are available here: https://www.arb.ca.gov/lispub/comm/bccommlog.php?listname=sf62020.

| Abbreviation | Commenter |
|---|---|
| 3MGEHitachiABB | Lionel Chailleux, GE Renewable Energy<br>Written Testimony: 5/26/2021 |
| Anaheim | Jonathan Sanks, City of Anaheim<br>Written Testimony: 5/26/2021 |
| GE3 | Bertrand Portal, GE Grid Solutions<br>Written Testimony: 5/26/2021 |
| HitachiABB | Michael Lane, Hitachi ABB Power Grids<br>Written Testimony: 5/26/2021 |
| HitachiABB2[21] | Michael Lane, Hitachi ABB Power Grids<br>Written Testimony: 5/26/2021 |
| JUG3 | Fariya Ali, Joint Utilities Group<br>Written Testimony: 5/26/2021 |
| Rak | Tom Rak<br>Written Testimony: 5/23/2021 |
| SCE3 | Tammy Yamasaki, Southern California Edison<br>Written Testimony: 5/26/2021 |

[20] This term derives from the Administrative Procedure Act, which specifies that proposed changes from the originally-released regulatory text must be made available to the public for at least 15 days of review. (Cal. Gov. Code § 11346.8(c).) The actual duration of the comment period was twenty-one days.
[21] This comment letter was identical to HitachiABB. To avoid duplication, this comment letter has not been included in this FSOR.

| Abbreviation | Commenter |
|---|---|
| SF6&AltCoal2 | Jonathan Stewart, SF6 and Alternatives Coalition<br>Written Testimony: 5/25/2021 |
| TID3 | Austin Avery, Turlock Irrigation District<br>Written Testimony: 5/26/2021 |

## A. OPPOSITION TO THE PROPOSED REGULATION

### A-1. Revise "GWP ≤ 1" Basis for Defining Covered Insulating Gas

**Comment:**
GE Grid Solutions applauds California Air Resources Board's (CARB) ongoing efforts to reduce usage of greenhouse gases and appreciate CARB staff solicitation of industry input through the process.

We respectfully submit that the current "*PROPOSED AMENDMENTS TO THE REGULATION FOR REDUCING SULFUR HEXAFLUORIDE EMISSIONS FROM GAS INSULATED SWITCHGEAR*" do not effectively support implementation of viable $SF_6$-free solutions and place an undue burden on users to report emissions from gas insulated equipment (GIE) having substantial global warming potential (GWP) improvement.

GE strongly recommends to CARB to reconsider the reporting requirement of alternative gas solutions with a maximum GWP reporting threshold of at least 500. Please consider the following:

- Our position is supported by multiple California end users
- End users stated that reporting burden will impede decision to use gas blends:
    - Slowing early adopters and integration into the California grid, especially special applications and ratings ≥145kV and ≥50kA
    - Slow adoption could impede product development, challenging the phase-out schedule
    - When solutions don't exist to meet the phase-out schedule, users will apply for $SF_6$ exemptions resulting in further increases in California's $SF_6$ inventory
- Multiple OEMs are working on alternative gases. GE Renewable Energy's Grid Solutions and Hitachi ABB Power Grids Ltd. recently announced a non-exclusive, cross-licensing agreement related to the use of an alternative gas to sulfur hexafluoride ($SF_6$) used in high voltage equipment.
  https://www.ge.com/news/press-releases/ge-and-hitachi-abb-power-grids-sign-landmark-agreement-to-reduce-environmental-impact-electrical-transmission-industry
- Proposed amendment does not consider the minimal usage of NOVEC™ fluids in alternative gas blends nor the very low risk of emissions due to the fact that the permeation of NOVEC™ 4710 molecule through GIE gaskets is much lower than $CO_2$ and $O_2$ leading to very low risk of emissions of GHG with GWP>1. Under

normal operating conditions emissions will consist mostly of $CO_2$ with equivalent GWP emissions lower than methane.

- Methane does not appear to be a fair comparison to gas blends
    - Methane is the second most important GHG in California, accounting for 9% of 2017 GHG emissions in $CO_2$ equivalent unit Source: https://ww3.arb.ca.gov/cc/inventory/background/ch4.html
    - For example, NOVEC™ 4710 gas blend in a high volate circuit breaker with a partial pressure mixture ratio of 83.5/13/3.5% ($CO_2/O_2/C_4F_7N$) approximately represents only 0.0036% of methane emissions.
- Proposed amendment influences other regulations in the US and North America and could affect development cycles of alternative gas solutions which may be the best technology especially for higher ratings and special applications.
- Inconsistent with EU progress where gas blends are easily usable and accepted as a critical viable technology for replacing $SF_6$.
    - European Commission "REPORT FROM THE COMMISSION assessing the availability of alternatives to fluorinated greenhouse gases in switchgear and related equipment, including medium-voltage secondary switchgear recognizes the benefit of fluoronitrile gas blends.
    - https://ec.europa.eu/clima/sites/clima/files/news/docs/c 2020 6635 en.pdf
- Proposed amendments does not consider Life Cycle Assessment of the replacement solution and the environmental impact of $SF_6$-free technology through consumption of raw materials, transportation, manufacturing, land usage, operating, and end of life. We believe it favors technology such as vacuum and $CO_2$ that can have a higher overall environmental impact using Life Cycle Assessment methodology (reference CIGRE 2020 A3-102, CIGRE 2018 C3-302)….

Supporting Information

From "Initial Statement of Reasons"
"Absent the proposed amendments, staff estimates that $SF_6$ emissions in 2036 would be 364,000 $MTCO_2e$, a significant increase relative to estimated emissions of 286,000 $MTCO_2e$ in 2024,"

"If all $SF_6$ in active, non-hermetically sealed GIE in California at present were converted to $CO_2$, the amount of $CO_2$ in GIE statewide would only be about 1,000 $MTCO_2e$. Annual $CO_2$ emissions in this case would be roughly ten metric tons (assuming a one-percent leak rate as required by the Regulation),"

- $SF_6$ GWP = 22,800
- Proposed GWP limit = 500
- $CO_2/O_2$/FN GWP = 300 (example for HVCB)
- Methane GWP = 25 (Source: https://ww3.arb.ca.gov/cc/inventory/background/ch4.htm)

- $CO_2e$ all $SF_6$ circuit breakers
- $CO_2e$ replacing all $SF_6$ with $CO_2$

- $CO_2e$ replacing all $SF_6$ with $CO_2/O_2/FN$

- $CO_2e$ $CO_2$ cb emissions = 10 $MTCO_2e$ (Source STAFF REPORT: INITIAL STATEMENT OF REASONS, DATE OF RELEASE: July 21, 2020)
- $CO_2e$ $SF_6$ emissions = 228,000 $MTCO_2E$ (10 x 22,800)
- $CO_2e$ $CO_2/O_2/FN$ cb emissions = 1,500 $MTCO_2e$ [ (10*300)/2, assuming $CO_2/O_2/FN$ is ½ weight of $SF_6$]

Methane ($CH_4$)
Source: https://ww3.arb.ca.gov/cc/inventory/background/ch4.htm
$CO_2e$ 2017 Methane emissions = 39,900,000 $MTCO_2e$

Assuming 100% adoption, $CO_2/O_2/FN$ emissions represent 0.0036% of methane emissions

Proposed Revisions

The following actions and revisions are requested to further incentivize users and OEMs of alternative gas blend GIE to pursue new product with higher ratings performance for the 60 Hz market (vs 50 Hz in Europe) and without the reporting burden associated with $SF_6$ and other very high GWP GHGs:

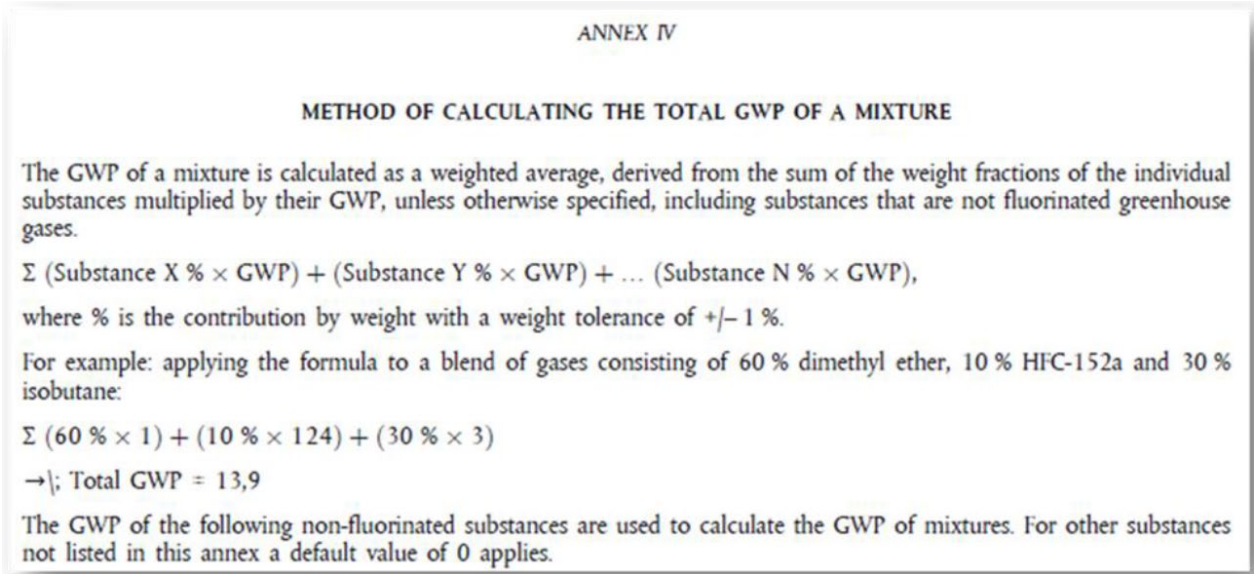
1. Change the definition of "Covered Insulating Gas" to include gas blends and Raise GWP exclusion for gas blends to 500.
2. Consider GWP of the gas blend, rather than the individual components. Alternative gas GIE using NOVEC™ 4710 will only use gas blends. The individual molecule will never be used independently.

- Page 3
  § 95351 (a)
  - "Covered Insulating Gas" means an insulating gas with a GWP greater than one or gas blend with NET GWP greater than five hundred (500). When the ~~amount~~ net GWP of covered insulating gas must be calculated for gas blends, it must be calculated pursuant to section 95354(l).

- Page 5
  § 95351 (a)
  - "Global Warming Potential" or "GWP" means the ratio of the time-integrated radiative forcing from the instantaneous release of one unit of a trace substance relative to that of one unit of a reference gas, in this case, carbon dioxide. The GWP values for this subarticle are as specified in Table A-1 to Subaprt A of Title 40 CFR Part 98 as published to the Federal Register on December 11, 2014, which is herby incorporated by reference. The GWP of NOVEC™ – 4710 shall be the default GWP for "other fluorinated GHGs" (2,000) as listed in Table A-1 of Subpart A of Title 40 CFR Part 98 as published to the Federal Register on December 11, 2014.

Reporting of NOVEC™ 5110 is not required because the default GWP in Table A-1 (Subpart A of Title 40 CFR Part 98 as published to the Federal Register on December 11,2014) for a compound of its type is 1. Reporting of NOVEC™ – 4710 is not required when used in a gas blend with net GWP less than 500 calculated pursuant to section 95354(l).

- Page 23
  § 95354 (l)
  - "Gas Blends. Whenever GWP of a covered insulating ~~gas that is a constituent of a~~ gas blend must be quantified, use the following equation to calculate the gas blend GWP ~~amount of covered insulating gas to be reported (pounds) and record the values of the inputs used~~: (Reference "*Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006*" https://www.eea.europa.eu/policy-documents/regulation-eu-no-517-2014 )



ANNEX IV

METHOD OF CALCULATING THE TOTAL GWP OF A MIXTURE

The GWP of a mixture is calculated as a weighted average, derived from the sum of the weight fractions of the individual substances multiplied by their GWP, unless otherwise specified, including substances that are not fluorinated greenhouse gases.

Σ (Substance X % × GWP) + (Substance Y % × GWP) + … (Substance N % × GWP),

where % is the contribution by weight with a weight tolerance of +/– 1 %.

For example: applying the formula to a blend of gases consisting of 60 % dimethyl ether, 10 % HFC-152a and 30 % isobutane:

Σ (60 % × 1) + (10 % × 124) + (30 % × 3)

→|; Total GWP = 13,9

The GWP of the following non-fluorinated substances are used to calculate the GWP of mixtures. For other substances not listed in this annex a default value of 0 applies.

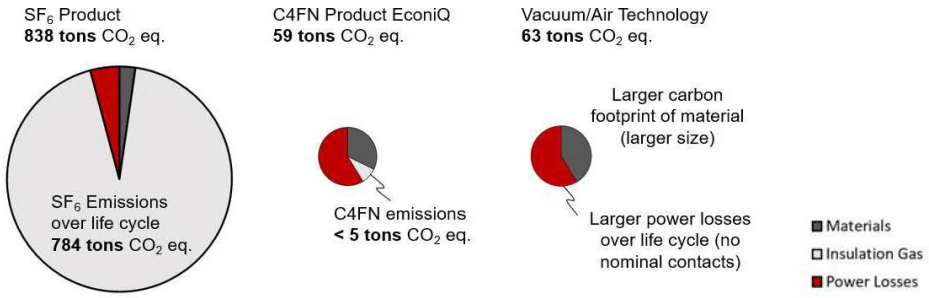
(GE3)

**Comment:**
EconiQ™ High Voltage Products do not contain $SF_6$ and the metal enclosed products use an alternative gas blend containing C4-FN (fluoronitrile), 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™ delviers 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:




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 $SF_6$ 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 phase out $SF_6$ 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 $SF_6$ 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 $CO_2$ or $N_2$, however, the fluoronitrile molar content, and thus the climate impact, would be identical…. (HitachiABB)

**Comment:**
We believe CARB's currently contemplated reporting requirement for $SF_6$-free GIE will lead to a significant disadvantage for alternative gas-blend solutions in California. These gas-blend technologies yield significant carbon reduction benefits and are an important component to the $SF_6$ phaseout timeline, especially for upper voltage and current ratings as well as special purpose applications.

Numerous stakeholders, including many Californian utilities, recognize this obstacle and support increasing the reporting threshold for gas blends and insulating gases.

Alternative gas-blend solutions are a critical component to the complete $SF_6$ phase-out roadmap. Increasing the reporting requirement threshold to include all $SF_6$-free solutions with GWP>1 would put gas-blend solutions on a level-playing field in California with other carbon-reducing market-ready solutions. We believe that excluding the reporting requirement for all $SF_6$-free solutions will provide California utilities with another highly impactful and effective tool as they reduce and eliminate the use of $SF_6$.

It is also important to note that gas-blend solutions include a dielectric gas that represents the smallest percent component of the gas mixture compared to the other molecules such as $CO_2$ and $O_2$, therefore representing a minor emission risk relative to the blend. We therefore recommend considering the GWP of the gas mixture instead of the GWP of the individual components.

Europe has already facilitated the adoption of all $SF_6$-free technologies and many European countries are starting to realize the significant environmental benefits from this inclusive approach. We are convinced the change is necessary to give Californian utilities a complete menu of $SF_6$-free options and to operationalize a successful timely reduction of installation of non-$SF_6$ GIE at all kV and kA ratings. (3MGEHitachiABB)

**Comment:**

2. Require use of ZERO GWP alternatives in a phase-in approach that aligns with the 2030 phase-out of all GWP gases. (There are currently three vendors that offer zero GWP alternatives.)… (Rak)

**Agency Response:**

Commenters requested changes to the type of gases covered by the Regulation, and several comments requested changing the definition of "covered insulating gas" to include gas blends, which are a mixture of multiple individual gases. Other requested changes included amending the definition of "covered insulating gas" so it means a gas blend with a GWP greater than 500, raising the GWP threshold (to an unspecified value) to exempt all gases with a significantly lower impact than $SF_6$, and exempting all insulating gases that do not contain $SF_6$. Two commenters noted that raising the "threshold" value is a position supported by multiple GIE owners in California.

As stated in the ISOR, CARB staff seeks to accelerate adoption, and track the use of, non-$SF_6$ insulating gases that will replace $SF_6$ in GIE over the coming years. Prior to proposing the Amendments, CARB staff met with over ten manufacturers to determine not only when key non-$SF_6$ equipment types will be available, but also what would take the place of $SF_6$ in these GIE. Based on those conversations, CARB staff learned several non-$SF_6$ technologies will contain no greenhouse gases (GHG) at all; others will contain a gas, or gas mixture, with a GWP of less than or equal to one; and as commenters have stated, one technology will contain a Novec 4710 based gas mixture.

"Covered insulating gas" is defined in the proposed amendments as "an insulating gas with a GWP greater than one." Staff set the definition of a covered insulating gases to exclude those gases with a GWP less than or equal to one, thus the Regulation does not cover these insulating gases and does not include reporting requirements for these gases. Staff proposes only to require the reporting and regulatory coverage of insulating gases with a GWP greater than one because the amount of GHGs with GWPs less than or equal to one that would be used in GIE would have a small potential impact to global warming (in $MTCO_2e$). Emissions of GHGs with a GWP of one have a climate warming impact commensurate with $CO_2$. Whereas $CO_2$ is released in large volumes from industrial processes, power generation, and transportation (among other sources), the volume of $CO_2$ and other gases with a GWP less than or equal to one contained in GIE through the State is anticipated to be very low. As discussed in the ISOR, if all $SF_6$ in active, non-hermetically sealed GIE in California at present were converted to $CO_2$, the

amount of $CO_2$ in GIE statewide would only be about 1,000 $MTCO_2e$, and annual emissions would be roughly ten metric tons of $CO_2e$.[1]

As an agency, CARB is charged with developing programs and actions to fight climate change and with tracking California's progress in reducing GHG emissions. Fundamental to these efforts is the tracking of GHG emissions within the State. CARB has established numerous regulations and programs that address other potent GHGs, including methane, which is currently assigned by CARB a GWP of 25, and nitrous oxide, which has a GWP of 298.[22] As such, failure to track emissions of GHGs with even higher GWPs, including into the hundreds, would be inconsistent with other CARB regulations and with CARB's overall goal to track and regulate these gases.

The requested change to include gas blends in the definition of covered insulating gas would result in gases with a GWP greater than one, including those with high GWPs, being used in the state and not being reported to CARB if the gas is used in a blend that has a GWP less than one. Because failure to track high-GWP gases is in conflict with other CARB programs, tracking at the level of the individual gas is most appropriate. The final Regulation therefore did not incorporate this requested change.

One commenter stated that methane is not a fair comparison for gas blends because it is the second most important GHG in California. CARB staff acknowledges that $SF_6$-alternative gases are anticipated to be emitted in much lower quantities than methane. Methane is emitted in much lower quantities than carbon dioxide, but because it is much more potent, CARB has enacted regulations to control it. The same can be said of rulemakings currently underway to reduce emissions of hydrofluorocarbons from refrigeration and air conditioning. Due to the potency of alternative gas solutions relative to other regulated compounds, the final Regulation retains the reporting requirement for insulating gases with a GWP greater than one.

One commenter requested CARB staff prohibit the acquisition of GIE that use an insulating gas with a non-zero GWP after phase-out. CARB staff disagrees that the Regulation should prohibit acquisition of GIE that use an insulating gas with a non-zero GWP after the phase-out. Non-$SF_6$ technologies for certain applications are still under development, especially in high-voltage and high-short circuit current applications, and commenters have stated that alternative gas technologies may be the best solution for these applications. Also, while some alternatives still utilize high-GWP gases and must therefore still be tracked and controlled under the Regulation, they may still achieve a significant reduction in $CO_2e$ emissions compared to $SF_6$. To transition from $SF_6$ as soon as

[22] https://ww2.arb.ca.gov/ghg-gwps

possible, use of any options capable of achieving dramatic emission reductions are allowed under the Regulation.

Other commenters expressed concern that CARB's proposed GWP reporting threshold could hinder product development. Their rationale is that the definition of covered insulating gases in the Regulation will put technologies that use gases with a GWP greater than one at a competitive disadvantage, will prevent a complete menu of $SF_6$-free options across all voltage and short-circuit current ratings from being developed, and that this lack of non-$SF_6$ solutions will force GIE owners to rely on $SF_6$ phase-out exemptions. CARB staff disagrees that the requirement to report emissions of insulating gases with a GWP greater than one could hinder product development. Throughout the informal public process prior to the start of the regulatory amendment process, GIE owners listed a number of factors they use when deciding which GIE to purchase for a given application. These factors include cost, reliability, technical capabilities, and size. While the requirement to report emissions from one alternative technology, and not another, may be an additional factor GIE owners consider, it is not likely to be among the most significant factors, especially if the technology is cost-effective, reliable, fits in the footprint of the facility, and meets technical specifications. If, as commenters assert, gas blends truly are the best alternative technology in high-voltage applications, this technology would be at a competitive advantage over other alternatives due to the amount of weight GIE owners would place on the other factors listed above. In addition, CARB staff notes that reporting requirements for gases with a GWP greater than one are commensurate with the reporting that all regulated entities currently have to do, and as such the reporting of these gases would not represent a new burden or cost to $SF_6$ GIE owners who have been reporting to the Regulation for years.

Commenters stated the requirement to report alternative gas emissions would be inconsistent with progress made in the European Union where gas blends are easily usable and accepted as a critical technology for replacing $SF_6$. It is unclear if the commenter believes reporting of alternative gas blends is not required in the European Union. Regardless, while CARB staff seeks to align policies with other jurisdictions where possible, each jurisdiction has a unique emissions footprint and GHG reduction policies appropriate for one jurisdiction may not be for another. Therefore, the decisions made in Europe may not necessarily be adopted by CARB. However, CARB staff researched the European F-Gas Regulation, which is currently under review, to learn of any inconsistencies in the reporting requirements for these gases. CARB staff discovered one revision being considered would prohibit the sale of medium and high-voltage GIE with a GWP greater than 500[23] but did not discover any documents that stated emissions of GHGs with a GWP of 500 or less may be exempt from reporting under the revised Regulation. As such, CARB staff does

[23] https://ec.europa.eu/clima/sites/default/files/f-gas/legislation/docs/20210506_briefing_en.pdf

not find the requirement to report alternative gas emissions to be inconsistent with the European Union.

One commenter stated research is being conducted to see if $SF_6$ GIE can be retrofitted to use an alternative gas with a GWP between 500 and 1,000, but did not suggest a specific change to the Regulation. CARB staff is encouraged by this research, but it does not warrant a change to the proposed Regulation.

Commenters stated the impact on global warming from the use of a Novec 4710 gas mixture is even lower than the GWP indicates (relative to $SF_6$) because it is expected to be used in lower volumes in GIE than $SF_6$, and is the smallest component of alternative gas mixtures. One commenter stated the permeation of Novec 4710 molecules through GIE gaskets is much lower than $CO_2$ and $O_2$, leading to very low risk of emissions of GHGs with a GWP greater than one. However, no data were provided to justify the claim that Novec 4710 escapes from GIE at a lower rate than the other constituent members of the gas blend. CARB staff appreciates this information, and sees it as a benefit to reducing emissions overall. However, this does not mean that CARB should raise the GWP reporting threshold, since, as mentioned above, failure to track emissions of Novec 4710 would be inconsistent with other CARB programs and regulations.

Commenters proposed the equation in section 95354(m) be modified so it determines the GWP of a gas blend. To clarify, the purpose of section 95354(m) is not to determine the GWP of a blend, but instead, to determine the emissions (pounds) of a specific covered insulating gas that is a component of a blend, likely to be Novec 4710. Under the proposed Regulation, the emissions of the specific covered insulating gas within the blend that has a GWP greater than one would need to be reported, not the entire blend.

Two commenters requested CARB staff consider a LCA approach for non-$SF_6$ technologies, which would consider the environmental impact of materials used in GIE, energy usage, transportation, and end of life disposal in addition to direct emissions of the covered insulating gas. This Regulation covers direct emissions of covered insulating gas from GIE, and is one of multiple regulations that will work in combination to help California reach its GHG reduction targets. Emissions from energy usage within California are captured under other regulations.

**A-2. Revise the Phase-Out Schedule and Exemption Process**

**Comment:**
I offer the following comments on the subject regulation under review.

President Biden has returned the USA to the Paris Climate Accord and in doing so adopted its guidance to reach a "peak inventory" of Global Warming Potential (GWP)

gases by 2030 and then to reduce that inventory and emissions of the GWP gases into the atmosphere.

The CA regulation could support this federal mandate by not only "Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear" but by capping our GWP gases in 2030 while working to reduce our GWP gases emissions. In the past CA has measured our GWP gases emissions as a percent of inventory. While we allowed GWP gases users to recklessly increase their GWP gases inventory. For the last 20 years there have been zero GWP alternatives that could have substituted for GWP gases, reducing our inventory.

Because in the past we have not used available zero GWP alternative gases we have grown our GWP gases inventory, increased our GWP gases emissions while decreasing our annual percentage of inventory emissions. Percentage of inventory emissions is an incorrect indicator until the "Peak inventory" is established.

President Biden and the Paris Climate Agreement has moved our thinking away from "efficient use" of GWP gases to the "elimination of use "of GWP gases.

Example: The new Ford F150 (that Biden drove the other day) does not have improved efficiency to reduce the GWP gases emissions. Instead, the truck "eliminates the use" of GWP producing fuels. Its electric motor eliminated its gasoline motor. We need to take our regulation on SF6 to that level.

We can do this by taking the following steps:

1. Phase out the procurement of new SF6 gases in CA by the end of 2030 (with the limited exceptions for technically justified cases).… (Rak)

**Comment:**
The JUG supports the overall direction of this rulemaking to further reduce potential emissions of high global warming potential (GWP) gases in the state and phase out the use of sulfur hexafluoride ($SF_6$) in gas insulated equipment (GIE). However, the JUG has significant concerns with two elements of the proposed amendments, which have not been adequately addressed in the Proposed Changes. Throughout this rulemaking, the JUG has actively supported CARB's decision to phase out the use of $SF_6$, provided that a *workable* phase-out exemption is available in the event of equipment failure or when the utility's subject matter expert determines that a non-$SF_6$ alternative cannot meet the technical specifications for the project. While the Proposed Changes include some modifications to the phase-out exemption…the JUG remains deeply concerned that…the phase-out exemption process… [is] burdensome, unclear, and could infringe on a utility's responsibility to manage its electric grid and comply with reliability requirements[24]. It is paramount, notwithstanding the aggressive

[24] The North American Electric Reliability Corporation (NERC) develops and enforces reliability standards for the bulk electric power system in the United States. The Western Electricity Coordinating Council

limits on emissions from existing $SF_6$ GIE and the phase-out schedule of $SF_6$ in GIE, that the Proposed Amendments are implemented without compromising grid safety and reliability, and in recognition that the costs of the transition away from $SF_6$ GIE will be borne by the state's electricity customers….

The JUG appreciates staff's responsiveness and willingness to discuss these critical issues throughout this process. In addition to the significant concerns noted above, the comments that follow highlight those areas where additional changes are necessary through a second 15-day change process for clarification or in order to ensure the proposed amendments can be successfully implemented while maintaining grid reliability and safety.

Topics addressed in this comment letter are as follows (the links below take you to each section):

I. Phase-out Exemption and Failure Notification Process
II. Nameplate Capacity Adjustment Procedure
III. Enforcement Provisions
IV. Calculating Annual Emissions
V. Inventory and Insulating Gas Procedures
VI. Reporting Requirements
VII. Spare GIE
VIII. Annual Emissions Limit

The convention used to present the JUG comments is bold blue text (e.g. **addition**) to note recommended additions to the regulatory language and red text with strikeout (e.g. deletion) to note recommended deletions. Ellipses (…) indicate additional text in the regulation that the JUG is not making recommendations on.

## I. Phase-out Exemption…Process

***The JUG believe that Section 95357 would not provide sufficient discretion to GIE owners. CARB should modify Section 95357 to clarify the requirement to obtain an exemption and create a process that provides deference to utility operators in maintaining reliability and managing their systems, including an appeals process.***

In prior comments on the rulemaking, the JUG expressed their collective concerns that "as drafted, the proposed regulations would grant a third-party the authority to second-guess the decisions of the utilities' own experts in determining whether to approve…an $SF_6$ phase-out exemption…." These concerns have not been resolved in the Proposed Changes.

(WECC) is a regional entity responsible for compliance monitoring and enforcement of the bulk electric system reliability standards in the Western Interconnection (including California). The California Public Utilities Commission oversees reliability of the electricity distribution infrastructure.

The management and use of transmission and distribution infrastructure is complex and can vary greatly by utility. Utility subject matter experts (SMEs) are best equipped to understand the intricacies of planning, procurement, and management of transmission and distribution infrastructure and the complex decisions that go into maintaining the grid reliability of their unique systems. The Proposed Changes to the Amendments make considerable modifications to Section 95357 that add additional processes on top of existing reporting requirements and emission limits in other sections of the regulation, that are already robust and extremely prescriptive. As discussed below, the Proposed Changes should be further refined to remove unnecessary processes and clarify the application of the phase-out exemption…process.

The current $SF_6$ Regulation already includes robust provisions that require accurate reporting and accounting. CARB has closely monitored $SF_6$ inventories while protecting against potential releases and continues to do so. The utilities' track record in meeting rigorous reporting requirements under the existing $SF_6$ Regulation, as well as their efforts to comply with greenhouse gas (GHG) reduction measures like the Cap-and-Trade Program, Renewables Portfolio Standard, and other measures, have facilitated the greatest amount of emission reductions in California. The utilities have truly been partners to CARB in implementing AB 32 and SB 32. The JUG hopes that this track record demonstrates the utilities' commitment to GHG reduction and reinforces CARB's confidence and trust that GIE Owners will continue to do the right thing. Utilities will continue to meet their obligations to account for and mitigate $SF_6$ releases, and meet the phase-out requirements when feasible….

This approach does not allow utilities to responsibly plan for operational or equipment changes necessitated by prudent utility practices and creates significant risks for maintaining reliability in the event that an exemption request is denied.

As stated in Resolution 20-28[25] "the modifications [to the proposed regulation] should support California's efforts to ensure a safe and reliable electricity system." Utility SMEs should be permitted to continue to be accountable for ensuring the safety and reliability of their systems by using their professional judgement in implementing exemptions when necessary. Former Chair Nichols' comments on the 45-Day Text made clear the need for deference.

> "You need to be open to the suggestion that the companies that are subject to this requirement actually know their business and are not going to be gaming the system, and that we have adequate means to test, and see if that, in fact, is what's happening. I really feel that the balance here is between literally keeping the lights on in certain locations

[25] Public Hearing to Consider Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear, September 24, 2020 (https://ww3.arb.ca.gov/board/res/2020/res20-28.pdf)

and phasing out this very damaging chemical. And we have to find a way to do both."[26]

The Proposed Changes do not streamline the regular phase-out exemption request process as requested previously by the JUG. The regulation would still require the compilation of a virtually limitless body of material and data to justify an exemption, irrespective of whether that information is relevant to the exemption request. Many of the exemption process requirements seem unreasonable and unduly burdensome, and will tax utility staff resources to compile a package of material that includes things like "all applicable justifications for the exemption," a "description of the universe of entities eligible to bid", the complete dimensions of each space, each available non-$SF_6$ GIE, or identifying the universe of non-$SF_6$ GIE that meet the GIE characteristics.[27] Other justification requirements are not broad enough – for example, "the specific GIE characteristics (per Tables 1 and 2) that cannot be met by at least two suppliers" is a subset of all the possible GIE characteristics that need to be considered, so should not be the sole basis for making a decision. Rather than a prescriptive list of documentation that must be provided, the JUG recommends that CARB allow the applicant some discretion regarding how to justify the exemption, and to identify the list in 95357(d)(8) as examples but not requirements….

In sum, the JUG is concerned that the numerous requirements in the phase-out exemption structure lead to ambiguity and there are potentially any number of reasons that CARB could deny a phase-out exemption request. The utilities need a clear pathway to procuring critical equipment in a reasonable timeframe. A denial could pose serious challenges to utility planning and operations. In the extreme, a utility that has been denied a request to replace an $SF_6$ breaker could be put in the position of redesigning its system, which could include the construction of a new substation. This could expose utility operators to costs that are many orders of magnitude higher than replacing a single breaker. In addition to cost concerns, a denial would undoubtedly lengthen the timeframe over which the utility must manage system constraints and could impact the utility's ability to respond to other climate initiatives driven by electrification and the existing demands on system planners. Designing and constructing a new substation can take several years and managing constraints over this lengthy period of time would put an undue burden on utility operators. Simply put, the implications of denying a phase out exemption request could be profound, and in extreme cases could prevent GIE Owners from maintaining system reliability. To mitigate these concerns and provide the requisite degree of clarity required by the Administrative Procedures Act, the JUG recommends the following amendments to Section 95357, as set forth below:…

C. <u>JUG recommends amending Section 95357(b) to provide more responsibility to the GIE owner in determining that a phase-out exemption is necessary.</u>

[26] CARB Hearing Transcript for Agenda Item 20-9-2, October 19, 2020 Board Hearing at p. 75.
[27] 15 Day Text at 17 Cal. Code Reg. Sec. 95357(d).

(b) Beginning September 1, 2024, a GIE owner may submit an $SF_6$ phase-out exemption request if **the GIE owner determines**, based on bids received pursuant to section 95357 (l), either: …

D. JUG Recommends Amending Section 95357(d), (f), (g) and (i) to streamline the informational requirements for Phase-Out Exemptions so that only information germane to the specific request must be collected, while allowing the Executive Officer to request additional, *relevant* information if needed.

(d) The SF6 phase-out exemption request must contain the following:

(1)-(4) …

(5) The names of manufacturer(s):

(A) Contacted about the availability of non-$SF_6$ GIE that might be appropriate for use in the type of project(s) described in section 95357(d)(3)(A) and/or 95357(d)(3)(B), and the dates contact was initiated; **or**

(B) That submitted bids pursuant to section 95357(l);

~~(C) A description of the universe of entities eligible to bid based on the bidding process used by the GIE owner (e.g., public solicitation, qualified vendor list);~~

(6)-(7) …

(8) ~~All~~ **The** applicable justifications for the exemption **and any relevant supporting documentation. Examples of supporting documentation may include, but are not limited to**:

(A) For exemptions submitted under section 95357(b)(1), ~~this includes~~ the specific GIE characteristics (per Tables 1 and 2) that cannot be met by at least two suppliers **based on the bids received**.

(B) For exemptions submitted under section 95357(b)(2), ~~this includes~~ **justification may include** the complete dimensions of each space within which requested $SF_6$ GIE would reside; the complete dimensions of each available non-$SF_6$ GIE that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers **and based on bids received**; the complete dimensions of the $SF_6$ GIE specified in section 95357(d)(4); and a picture showing the space where the SF6 GIE would be installed. If the dimensions of the non-$SF_6$ GIE are smaller than the dimensions of the space available, but the device

cannot be placed into the space for another reason (e.g., the space lacks the necessary clearance, another obstacle prevents transport of the device to the space), the justification **may** also include a description of the constraint that clearly demonstrates why the device cannot be placed in the available space.

(C) For exemptions submitted under section 95357(b)(3), ~~this includes~~ a list of available non-$SF_6$ GIE that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers **and for which bids were received,** and a justification that clearly explains why each of the available non-SF6 GIE identified are incompatible and how the $SF_6$ GIE described in section 95357(d)(4) are compatible.

(D) For exemptions submitted under section 95357(b)(4), ~~this includes~~ **justification may include** a list of available non-$SF_6$ GIE that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers **and for which bids were received,** and a justification that clearly explains why each of the available non-$SF_6$ GIE identified fail to meet the technical specifications and/or the GIE owner's documented safety or reliability requirements, such as failure rates or other indicators of reliability, and how the $SF_6$ GIE described in section 95357(d)(4) do meet the requirements. ~~If failure rates or other indicators of reliability are used, specific details must be provided. If the GIE owner's justification cites a company specific policy or procedure that available non-SF6 GIE do not currently meet and that is within the control of the GIE owner (for example, the company requires three years of testing for new equipment), the justification must also provide an explanation as to how the GIE owner will address the situation to enable the transition to non-SF6 alternatives in a timely manner.~~

…

(f) Within 45 days of submittal, the Executive Officer shall notify the submitter that **their application is approved** ~~their application is complete~~ or that additional information and/or clarification is necessary ~~to complete the application and/or~~ to ensure the Executive Officer has sufficient information to issue a decision. Upon receipt of additional information and/or clarification pursuant to section 95357(d)(8)(E) from the submitter, the Executive Officer will ~~perform the actions specified in this subsection~~ **notify the submitter of the approval or denial of their application request** within 45 days. **In the event that the request is denied, the Executive Officer shall specify the reasons for denial.**

(g)~~Within 30 days of the acknowledgment that the request is complete pursuant to section 95357(f), the Executive Officer shall notify the submitter of the approval or denial of the SF6 phase-out exemption request~~. In the event that the Executive Officer has not responded to the submitter within ~~30~~ **45** days of the ~~notification that the~~ application ~~is complete,~~ the $SF_6$ phase-out exemption request is approved….

E. The JUG recommends the inclusion of a phase-out exemption appeal process to provide an option for recourse if CARB denies an exemption.

As expressed in previous comments, the JUG remains concerned that the phase-out exemption process would grant CARB the authority the second-guess the decisions of the utilities' own experts in determining whether to approve or deny an exemption request. While the JUG continues to believe that GIE owners' subject matter experts are the best positioned to determine whether an exemption is necessary, the JUG recommends that if the regulation amendments allow the Executive Officer to reject an exemption request, they must also include a process by which the utility may appeal this decision…. (JUG3)

**Comment:**

Overview Section 95357 (Phase-Out Exemption…

TID appreciates the cooperative effort that the ARB has demonstrated in much of the regulatory amendment process and looks forward to engaging with the modifications needed in this very challenging regulation. We also are supportive of the overall direction of this rulemaking to further reduce potential emissions of high global warming potential ("GWP") gases in the state and phase out the use of sulfur hexafluoride $SF_6$ in gas insulated equipment ("GIE").

TID is concerned that the current structure the ARB has applied to Section 95357 lacks clarity and could result in the ARB identifying an arbitrary number of reasons to deny a phase-out exemption request.

For all utilities, a single denial could pose a serious challenge for future capital projects and operations on our system. In the extreme, TID is concerned that if the ARB were to deny our exemption request to replace an SF6 breaker, the alternative solution would, at a minimum, require substantial modification within existing facilities up to and including demolition and reconstruction of entire substations. This will necessitate more complex, costly, and extended outages with multiple elements removed from service. For reference, a typical breaker replacement can range between $100,000 and $250,000; a new substation can easily exceed $10 million. As a POU this entire burden is borne by our owners/customers. From a system reliability standpoint, more elements out of service means a more vulnerable system which requires imposing stricter limits. In many cases, these limits cannot be supported, especially as outages are extended in duration. TID would ask the ARB to consider both cost and system

reliability constraints that would occur for utilities in the event of a single exemption denial.

In the event a utility submits an exemption request based on technical ratings, utilities would have no viable path to implement a non-SF6 piece of equipment. In this scenario, given the limitations of non-SF6 GIE, utilities would be faced with the reality of having to implement a system redesign, with the goal of relocating the constraint, for the purpose of avoiding the use of a *proven* technology. This would likely result in multi-year capital construction projects that could possibly require new high voltage transmission lines or substation facilities. An undertaking such as this will elongate the timeframe over which the utility must manage system constraints.

Furthermore, TID anticipates in the coming years a large shift in electrical loading due to utilities rising demand as a result of transportation and building electrification. Because of the rise in this electrical demand, TID will need to increase the ratings of currently installed breakers. Clearly, if the ARB were to ever deny a phase-out exemption request, TID's ability to be as responsive to other climate initiatives would be compromised.

The illustrated scenarios conveyed thus far reflect an overarching concern for TID with this regulation; any denial would force the utility to either expand the scope of work (cost/outage/ resources) in order to create a viable solution, or run the equipment in question to failure. Simply put, the implications of denying a phase-out exemption request could severely impact TID and, in the most extreme cases, compromise system reliability.

Rather than issuing a denial, TID would ask the ARB to modify Section 95357 in such a way that would invite the ARB staff to work alongside the utility engineer with the common goal of supporting system reliability while incorporating low global warming potential ("GWP") equipment where it is feasible to do so.

While TID continues to believe that utility engineers are the best positioned to determine whether an exemption should be granted, if the, as proposed, regulations allow the Executive Officer to reject an exemption request, they must also include a process by which the utility may appeal this decision. Should the ARB decline to adopt a full notification process in which the utilities phase-out exemption request is not approved, TID strongly supports the Joint Utilities Group recommendation that a **phase-out exemption appeals process** be added to Section 95357(g), enabling the GIE Owner to appeal an ARB staff denial determination to an administrative hearings board.

The following sections reflect TID's comments on proposed changes to Section 95357 we would encourage ARB staff to apply to the regulation.

Section 95357(a)

*(a) Pursuant to section 95352(a)(1), a GIE owner who wishes to acquire SF6 GIE after the applicable phase-out date indicated in Table 1 or Table 2 must electronically submit an SF6 phase-out exemption request to the Executive Officer that, if approved, would allow the GIE owner to acquire the requested SF6 GIE unless there is a failure as defined in section 95351(a). In the event of a failure, the GIE owner may acquire SF6 GIE pursuant to section 95357(i) or (j).*

Discussion

As stated in a past comment letter, TID would implore the ARB to recognize that the language being "if approved" is a major problem; as discussed in the overview. Making the determination for acquiring SF6 GIE after the phase-out date should lie with the utilities' engineering staff who will communicate transparently with ARB personnel to fully understand why the utility submitted a phase-out exemption notification.

Further Section 95357 Discussion

TID supports the entirety of the JUG recommendations made on May 26, 2021 and reiterates JUG recommendations on Section 95357 below….

TID supports the JUG recommendation for amending Section 95357(b) to provide more responsibility to the GIE owner in determining that a phase-out exemption is necessary.

Recommended changes are as follows;

(b) Beginning September 1, 2024, a GIE owner may submit an SF6 phase-out exemption request if **the GIE owner determines**, based on bids received pursuant to section 95357 (l), either:

TID supports JUG recommendations Amending Section(s) 95357(d), (f), (g) and (i) that would streamline the informational requirements for a utility phase-out exemption. In addition, TID recommends adjusting the language of Section 95357(d)(8)(A-D) to better align with the recent revision of Section 95357(b)(1-4)

(d) The SF6 phase-out exemption request must contain the following:

(1) GIE owner's name and ARB identification number (if assigned);

(2) Designated representative's name, official title, mailing address, phone number and email address;

(3) Whether or not the requested GIE would initially be spare GIE;

(A) For GIE that would initially be spare GIE, a description of the type of locations to which the SF6 phase-out exemption would apply (e.g.,

underground vaults with diameter less than X feet, all substations with a certain configuration);

(B) For all other GIE, a description of the specific project(s) to which the SF6 phase-out exemption would apply, including location(s); whether it is an existing or new facility, or if it has been subject to a process that significantly changes the in-place infrastructure (e.g., overhaul, re-powering); and the number of each type of GIE device described in section 95357(d)(4) that would be installed there;

(4) Description and quantity of SF6 GIE to be exempted, including but not limited to the GIE characteristics (per Tables 1 and 2) and equipment type, seal type, manufacturer and model, and nameplate capacity;

(5) The names of **manufacturer(s)**:

(A) Contacted about the availability of non-SF6 GIE that might be appropriate for use in the type of project(s) described in section 95357(d)(3)(A) and/or 95357(d)(3)(B), and the dates contact was initiated; **or**

(B) That submitted bids **or otherwise consulted** pursuant to section 95357(l);

~~(C) A description of the universe of entities eligible to bid based on the bidding process used by the GIE owner (e.g., public solicitation, qualified vendor list);~~

(6) The appropriate attestation statement from section 95355(c);

(7) The section number under which the exemption is being submitted (section 95357(b)(1), (2), (3), or (4)); and

(8) ~~All~~ **The** applicable justifications for the exemption **and any relevant supporting documentation. Examples of supporting documentation may include, but are not limited to**:

(A) For exemptions submitted under section 95357(b)(1), ~~this includes the specific GIE characteristics (per Tables 1 and 2) that cannot be met by at least two suppliers~~ **demonstrate non-SF6 GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two suppliers based on the bids received**.

(B) For exemptions submitted under section 95357(b)(2), ~~this includes~~ the complete dimensions of each ~~location~~ **space** within which requested SF6 GIE would reside; the complete dimensions of ~~each~~ available non-SF6 GIE **considered** ~~that meet the GIE characteristics (per Tables 1 and 2)~~

~~identified by the equipment manufacturers and~~ **,based on bids received**; the complete dimensions of the SF6 GIE specified in section 95357(d)(4); and a picture showing the space where the SF6 GIE would be installed. If the dimensions of the non-SF6 GIE are smaller than the dimensions of the space available, but the device cannot be placed into the space for another reason (e.g., the space lacks the necessary clearance, another obstacle prevents transport of the device to the space), the justification should also include a description of the constraint that clearly demonstrates why the device cannot be placed in the available space.

(C) For exemptions submitted under section 95357(b)(3), ~~this includes~~ a list of available non-SF6 GIE **considered,** ~~that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers~~ **for which bids were received,** and a justification that clearly explains why each of the available non-SF6 GIE identified are incompatible and how the SF6 GIE described in section 95357(d)(4) are compatible.

(D) For exemptions submitted under section 95357(b)(4), ~~this includes~~ a list of available non-SF6 GIE ~~that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers~~ **for which bids were received** and a justification that clearly explains why each of the available non-SF6 GIE identified fail to meet the technical specifications and/or the GIE owner's documented safety or reliability requirements, such as failure rates or other indicators of reliability, and how the SF6 GIE described in section 95357(d)(4) do meet the requirements. ~~If failure rates or other indicators of reliability are used, specific details must be provided.~~ If the GIE owner's justification cites a company-specific policy or procedure that available non-SF6 GIE do not currently meet and that is within the control of the GIE owner (for example, the company requires three years of testing for new equipment), the justification ~~must~~ **should** also provide an explanation as to how the GIE owner will address the situation to enable the transition to non-SF6 alternatives in a timely manner.

(E) Within the timeframe specified in section 95357(f), if the Executive Officer determines that the information provided as part of the exemption request is insufficient to serve as the basis for an exemption under this section, s/he may request additional information and/or clarification related to sections 95357(c) and 95357(d) prior to the application being deemed complete pursuant to section 95357(f).

(9) Information submitted pursuant to section 95357(d)(8) that relies on documentation provided by an equipment manufacturer must be dated less than 180 days prior to the submission of the SF6 phase-out exemption request.

(f) Within 45 days of submittal, the Executive Officer shall notify the submitter that **their application is approved** ~~their application is complete~~ or that additional information and/or clarification is necessary ~~to complete the application and/or~~ to ensure the Executive Officer has sufficient information to issue a decision. Upon receipt of additional information and/or clarification pursuant to section 95357(d)(8)(E) from the submitter, the Executive Officer will ~~perform the actions specified in this subsection~~ **notify the submitter of the approval or denial of their application request** within 45 days. **In the event that the request is denied, the Executive Officer shall specify the reasons for denial.**

(g)~~Within 30 days of the acknowledgment that the request is complete pursuant to section 95357(f), the Executive Officer shall notify the submitter of the approval or denial of the SF6 phase-out exemption request~~. In the event that the Executive Officer has not responded to the submitter within ~~30~~ **45** days of the ~~notification that the~~ application ~~is complete~~, the SF6 phase-out exemption request is approved….

*E. The JUG recommends the inclusion of a phase-out exemption appeal process*

As expressed in previous comments, the JUG remains concerned that the phase-out exemption process would grant CARB the authority to second-guess the decisions of the utilities' own experts in determining whether to approve or deny an exemption request. While the JUG continues to believe that GIE owners' lead engineers are the best positioned to determine whether an exemption should be granted, the JUG recommends that if the regulation amendments allow the Executive Officer to reject an exemption request, they must also include a process by which the utility may appeal this decision.…

Conclusion

TID supports the transition away from SF6 as equally capable technology is developed, but believes the process should be measured and appropriate based on current levels of available resources and the need to operate the grid safely and reliably. When a utility, as a good steward of the environment, prioritizes this transition, it is only appropriate to do so by relying on the expertise of knowledgeable staff and hired consultants. No two utilities are exactly alike, and some may be accepting of greater risk than others. If a utility is unable to keep pace with other utilities in this transition based on available resources, it should not be penalized and instead have the freedom to make informed decisions about the safe and reliable operation of its own system. Each utility will transition away from SF6 in a way that is unique to its own determinations of safety, reliability, and system management. (TID3)

**Agency Response:**
One commenter suggested an accelerated phase-out schedule to prohibit acquisition of $SF_6$ GIE in California by the end of 2030, with limited exceptions for technically justified cases. As discussed in the ISOR, to develop the phase-out schedule, CARB staff followed a rigorous process that reflects feedback from

manufacturers and regulated entities. This process considered technical availability of non-$SF_6$ GIE alternatives, cost and supplier considerations, and the need for testing by GIE owners. CARB staff consulted with more than ten manufacturers currently developing non-$SF_6$ GIE to learn when their products are expected to be commercially available. During this more-than-year-long process, manufacturers shared their product development schedules with CARB staff, and the portions of that information CARB staff was able to make public are included on pages 23-26 of the ISOR or on manufacturer websites. In some cases, for example belowground GIE with a voltage capacity less than or equal to 38 kV and short-circuit current rating greater than or equal to 25 kA, the manufacturer-provided dates aggregated equipment types in a way that did not address specific product concerns raised by stakeholders. CARB staff instead used date information provided by GIE owners about the expected availability of non-$SF_6$ GIE that would work on their specific systems.

To ensure that there would be a competitive marketplace for non-$SF_6$ GIE that would facilitate reasonable price-setting for these non-$SF_6$ GIE, and in response to stakeholder comments, CARB staff based all the phase-out dates proposed in the Regulation on the dates when two or more manufacturers stated that each specific type of non-$SF_6$ GIE will be available, plus three years for GIE owners to test the GIE in their operations. This three-year testing window is based on stakeholder feedback, received during the informal rulemaking process, that three years is the most typical amount of time organizations require to ensure that new products are safe, reliable, and deployable. The resulting phase-out schedule does phase out acquisition of the majority of $SF_6$ GIE in California by the end of 2030. However, based on the information collected by CARB staff, acquisition of $SF_6$ GIE with a voltage capacity greater than 245 kV would not be phased-out until January 1, 2033. Regarding the "technically justified cases," the Regulation includes a phase-out exemption process by which GIE owners can apply for approval to acquire $SF_6$ GIE after the phase-out dates if certain conditions apply, and a notification process whereby GIE owners can install $SF_6$ GIE after the corresponding phase-out date to resolve a failure. Based on this information, CARB staff set the dates in the phase-out schedule to spur the transition to alternative technologies in a way that would not compromise the reliability of the electrical grid. Therefore, no changes have been made to the phase-out schedule in response to this comment.

Two commenters expressed concern that the phase-out exemption process, as proposed in the first 15-day Public Notice, would grant a third-party (CARB staff) the authority to second-guess the decisions of the GIE owner's own experts in determining whether to approve an $SF_6$ phase-out exemption. The commenters proposed addition of "the GIE owner determines" to section 95357(b), revisions to section 95357(f) and (g), and asked that language referring to approval of an exemption request should be changed from "if approved" to "when approved." Rationale included that utility experts are best equipped to understand the intricacies of their unique systems.

Regarding the concern that CARB staff would second guess decisions reached by GIE owner experts, the provisions in the Regulation specify the circumstances under which a GIE owner may utilize a phase-out exemption and specify the materials that must be provided to CARB to support the exemption. To emphasize and clarify this perspective, the second 15-day Public Notice includes revisions, consistent with stakeholder comments, to clarify that CARB staff will review each exemption request to ensure the requirements of section 95357 have been met, and that if the exemption request is deemed complete per the Regulation's requirements, it will be approved. Sections 95357(d)(8)(E) and 95357(f), which related to CARB staff's determination that an exemption request is "complete," were modified to specify that once the completeness determination is made, the exemption request is also approved. Additionally, section 95357(g), which originally granted CARB staff 30 days to notify the submitter of the approval or denial of a request was modified to eliminate the 30-day review period, as requested by commenters, to further clarify CARB staff's review will be limited to the completeness of the request. The proposed addition of "the GIE owner determines" to section 95357(b) was not incorporated because the section is solely applicable if the GIE owner determines a phase-out exemption is needed. As such, the proposed addition is not necessary.

Commenters expressed concern that the requirements in the phase-out exemption process could lead to ambiguity and cited a number of potential reasons why CARB could deny a request, creating significant risks for GIE owners, and requested a clear pathway to procure $SF_6$ GIE in a reasonable timeframe. Commenters requested discretion to justify exemptions rather than having to follow prescriptive documentation and asked that the items listed in 95357(d)(8) be considered examples, not requirements. To address concerns over denial of exemptions, commenters requested the addition of "In the event that the request is denied, the Executive Officer shall specify the reasons for the denial" to section 95357(f), and the inclusion of a phase-out exemption appeal process to give GIE owners recourse if CARB denies an exemption.

CARB staff shares the goal of allowing $SF_6$ GIE to be acquired through a clearly-defined phase-out exemption process in a reasonable time frame when the need is justified. CARB staff disagrees with the proposed changes because they would be contrary to these goals. The Regulation lists specific materials that GIE owners must provide to CARB for each exemption category in response to stakeholder feedback that without such specification the process could be administered arbitrarily. As such, the Regulation specifies the information that is needed to support each exemption type and specifies where that information would come from (bids received by the GIE owner plus information on the GIE owner's own operations). There are four types of exemption requests, and each must be supported through submittal of information specified in the appropriate section from 95357(d)(8)(A-D). The final Regulation specifies that these sections list the specific materials that GIE owners must provide to CARB, and each section

references the section number of the corresponding phase-out exemption category. The information in each subsection must be provided in full for exemption requests to be deemed complete. GIE owners are only required to complete the information from whichever one of these four subsections is germane to the specific type of exemption request sought. The final Regulation also converted the process into a "completeness check," whereby provision of the required information will result in approval of the request, significantly shortening the time period needed for the process. As such, GIE owners have clear and advance information regarding the materials and process needed for a phase-out exemption.

Regarding requested changes to phase-out exemption processes in case of CARB staff's denial of an exemption request, section 95357(f) of the 45-day Public Notice specified the actions the Executive Officer will perform upon receipt of an exemption request. These actions include notifying the submitter that the application has been approved, or, requesting additional information and/or clarification to complete the application. The requested phase-out exemption appeal process is unnecessary because the Executive Officer will request additional information and/or clarification if needed, so the GIE owner will understand what is needed to complete the request and receive approval.

One commenter stated the changes to the proposed amendments included in the first 15-day Public Notice add additional processes on top of existing requirements that are already robust and extremely prescriptive. Commenters stated many of the exemption process requirements seem unreasonable and unduly burdensome, and requested removal of section 95357(d)(5)(C) which required submittal of "a description of the universe of entities eligible to bid based on the bidding process used by the GIE owner (e.g., public solicitation, qualified vendor list)," the word "all" from the requirement to provide "all applicable justifications for the exemption" in section 95357(d)(8), and "this includes" from sections 95357(d)(8)(A-D), which specify the information needed to justify each exemption type. Two commenters recommended adding specification that the information provided pursuant to sections 95357(d)(8)(A-D) be based on bids received. One commenter suggested section 95357(d)(5)(B), which requires GIE owners provide the names of manufacturers that submitted bids, be modified to also require GIE owners provide the names of manufacturers "otherwise consulted."

Regarding the proposed amendments in the first 15-day Public Notice, CARB staff disagrees with the commenter's assertion that the proposed amendments add additional processes or that the requirements are unreasonable and unduly burdensome. The changes included in the first 15-day Public Notice were made in direct response to comments received in response to the 45-day Public Notice, and clarify processes rather than adding new requirements. Sections 95357(d)(3) and 95357(d)(3)(A-B) were modified to clarify requirements when a phase-out exemption is submitted for spares. Revisions to sections 95357(b) and 95357(l) reduce uncertainty and burden by specifying that information used to justify a phase-out exemption

request be based on bids received. Other revisions include changing the term "location" to be "space" in section 95357(d)(8)(B), and clarifying changes to section 95357(b)(4), among others.

The 45-day Public Notice specified that a GIE owner may apply for an exemption when non-$SF_6$ GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two suppliers, but did not define the term "supplier" or otherwise specify the universe of suppliers that must be considered. To address commenters' concerns, the first 15-day Public Notice specified in sections 95357(b) and 95357(l) that only those suppliers that submitted bids for the specific project(s) must be considered. CARB staff added a provision requiring GIE owners to submit a "description of the universe of entities that were eligible to bid based on the bidding process used by the GIE owner (e.g. public solicitation, qualified vendor list)." This information is a simple description of the entities eligible to bid in the GIE owner's process, as outlined in the examples provided, and is necessary for CARB staff to have needed context for the "two suppliers" justification. CARB staff does not consider this requirement to be unreasonable or unduly burdensome; all GIE owners should be able to easily comply with this requirement.

The commenter's suggestion to add "or otherwise consulted" to section 95357(d)(5)(B) is unnecessary because, under section 95357(d)(5)(A), GIE owners must already provide information on manufacturers "Contacted about the availability of non-$SF_6$ GIE that might be appropriate for use in the type of project(s) described in section 95357(d)(3)(A) and/or 95357(d)(3)(B), and the dates contact was initiated."

CARB staff does not find any of the other information that the commenter pointed out to be "unduly burdensome" in the context of the type of exemption request being submitted. For example, if the GIE owner files an exemption due to space limitations, the complete dimensions of the space should be readily available, as it would be needed to determine if available non-$SF_6$ options would fit. Additionally, listing available non-$SF_6$ GIE should not be overly burdensome because this information would be available in the bids received.

Regarding the request for specification that the information provided pursuant to sections 95357(d)(8)(A-D) be based on bids received, CARB staff agrees. The first 15-day Public Notice revised section 95357(b) to add "based on bids received" and revised section 95357(l) to state "a GIE owner who wishes to use a phase-out exemption…shall base the information required in section…95357(d)(8)…on bids received." While CARB staff agrees with the commenter, their specific changes have not been incorporated because the existing revisions included in the first 15-day Public Notice are sufficiently clear. CARB staff also agrees with the requested removal of the word "all" from the requirement to provide "all applicable justifications for the exemption" in section 95357(d)(8), and "this includes" from

sections 95357(d)(8)(A-D), which specify the information needed to justify each exemption type. The second 15-day Public Notice includes these changes.

One commenter stated that "other justification requirements," which CARB staff interprets to mean "phase-out exemption categories," are not broad enough. The commenter specifically mentions the exemption request described in section 95357(b)(1), which applies when non-$SF_6$ GIE with the specific GIE characteristics listed in Tables 1 and 2 that are necessary for a particular project are unavailable from at least two suppliers. Another commenter proposed broadening the applicability of this phase-out exemption beyond the GIE characteristics listed in Tables 1 and 2. Rationale included that the characteristics listed in these tables are but a subset of all the possible technical criterion that need to be considered when GIE owners procure GIE. Harmonizing changes that would remove "that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers" from sections 95357(d)(8)(B-D) were also proposed.

These comments are related to comments received in response to the 45-day Public Notice that the GIE characteristics listed in Tables 1 and 2 do not sufficiently address the technical and performance requirements that GIE owners may have for a GIE device, and it is unclear which exemption category should be used for such technical constraints. To address this concern, CARB staff modified the "safety and reliability" exemption request in the first 15-day Public Notice by adding "cannot meet required technical specifications," consistent with CARB staff's original intent. Therefore, the commenters who expressed concern about technical requirements beyond those listed in Tables 1 and 2 have the option to utilize another exemption category. Further, CARB staff does not agree that the specified GIE characteristics in Tables 1 and 2 should be discarded. CARB staff structured the categories of GIE characteristics based on stakeholder comments during the informal public process that preceded the formal rulemaking, as well as data collected from the manufacturers, resulting in specific dates that varied by voltage level, short circuit current rating, and whether the device would be used above- or below-ground. Because of the rigor and transparency of this process, the clarity that the chosen GIE characteristics add to the phase-out schedule, and the ability to use the exemption in section 95357(b)(4), the requested changes to remove consideration of Tables 1 and 2 from the exemption categories have not been incorporated.

Commenters requested deletion of "if failure rates or other indicators of reliability are used, specific details must be provided" and "if the GIE owner's justification cites a company specific policy or procedure that available non-$SF_6$ GIE do not currently meet and that is within the control of the GIE owner (for example, the company requires three years of testing for new equipment), the justification must also provide an explanation as to how the GIE owner will address the situation to enable the transition to non-$SF_6$ alternatives in a timely manner" from section 95357(d)(8). Commenters did not provide a justification for these changes. Information about failure rates or other indicators of reliability must be provided so that CARB staff can verify the veracity of the claim and inform future policies.

Regarding company-specific safety and reliability requirements, CARB staff recognizes that such policies may be grounds to submit an exemption of this type. However, CARB staff is concerned that GIE owners could use this justification in perpetuity should they elect not to perform the testing required under their company-specific policy or procedure. As such, the requirement to provide an explanation as to how the GIE owner will address the situation to enable eventual transition to non-$SF_6$ alternatives has been retained.

**A-3. Ensure Confidentiality of Phase-Out Exemption Requests**

**Comment:**

*III.* *Ensure utility supplier/bid lists provided as part of an SF6 phase-out exemption request remain confidential.*

Section 95357(d)(5) requires that an SF6 phase-out exemption request must contain:

(5) the names of manufacturers:

(A) Contacted about the availability of non-SF6 GIE that might be appropriate for use in the type of project(s) described in section 95357(d)(3)(A) and/or 95357(d)3(B), and the dates contact was initiated;
(B) That submitted bids pursuant to section 95357(I); and
(C) A description of the universe of entities eligible to bid based on the bidding process used by the GIE owner (e.g., public solicitation, qualified vendor list);

SCE's bid process, including qualified vendor lists and submitted bids are considered business confidential information. Section 95358, Treatment of Confidential Information, does not specify how to claim confidentiality. SCE would like to ensure that vendor's proprietary technologies and pricing information remains confidential and would appreciate additional guidance and clarity to confirm that this type of information would remain confidential.

*IV.* *Clarify rule language to specify that non-SF6 alternatives must be available from at least two suppliers to require purchase.*

SCE understands the intent of the regulation is to require the purchase of non-SF6 GIE when it is available for a specific application after the phase-out date from at least two suppliers. However, we believe the rule language in Section 95357(b)(1) could potentially be interpreted incorrectly. An example of incorrect interpretation would be if a stakeholder receives ten bids and two suppliers are unable to provide non-SF6 GIE, but eight suppliers can provide non-SF6 GIE. Since non-SF6 GIE is "unavailable from at least two suppliers", a phase-out exemption may be submitted.

Proposed edits to §95357(b), $SF_6$ Phase-Out Exemption and Failure Notification, are indicated below in underlined and ~~strikethrough~~ text:

(b) Beginning September 1, 2024, a GIE owner may submit an SF6 phase-out exemption request if, based on bids received pursuant to section 95357(l) either:

(1) Non-SF6 GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are ~~unavailable~~ available from ~~at least~~ less than two suppliers; or… (SCE3)

**Agency Response:**
One commenter stated their qualified vendor lists and submitted bids are considered confidential business information and requested additional guidance and clarity on whether it would remain confidential. As stated in section 95358, "Information submitted pursuant to this subarticle may be claimed as confidential. Such information shall be handled in accordance with the procedures specified in title 17, California Code of Regulation, sections 91000 through 91022." This provision applies to $SF_6$ phase-out exemption requests, in addition to other information submitted pursuant to the Regulation. When submitting confidential information to CARB, GIE owners should follow the procedures specified in title 17, California Code of Regulation, section 91011 "Submissions of Confidential Data."

The commenter requested revising section 95357(b)(1) to change "unavailable from at least two suppliers" to "available from less than two suppliers" in order to improve clarity. The ISOR and this FSOR clearly explain that this language means that GIE owners may request a phase-out exemption if they do not receive bids from at least two suppliers of non-$SF_6$ GIE. As such, the requested changes are not necessary to clarify the section's intent, and no modifications have been made in response to this comment.

**A-4. Revise the Failure Notification Process**

**Comment:**
[While the Proposed Changes include some modifications…] including a somewhat streamlined process for equipment failures… [The JUG remains deeply concerned that] …the failure notification process [is] [burdensome, unclear, and could infringe on a utility's responsibility to manage its electric grid and comply with reliability requirements[28]. It is paramount, notwithstanding the aggressive limits on emissions from existing $SF_6$ GIE and the phase-out schedule of $SF_6$ in GIE, that the Proposed Amendments are implemented without compromising grid safety and reliability, and in recognition that the costs of the transition away from $SF_6$ GIE will be borne by the state's electricity customers.…]

[28] The North American Electric Reliability Corporation (NERC) develops and enforces reliability standards for the bulk electric power system in the United States. The Western Electricity Coordinating Council (WECC) is a regional entity responsible for compliance monitoring and enforcement of the bulk electric system reliability standards in the Western Interconnection (including California). The California Public Utilities Commission oversees reliability of the electricity distribution infrastructure.

I. Failure Notification [Process]

[In prior comments on the rulemaking, the JUG expressed their collective concerns that "as drafted, the proposed regulations would grant a third-party the authority to second-guess the decisions of the utilities' own experts in determining whether to approve]…an…expedited $SF_6$ phase-out exemption request." [These concerns have not been resolved in the Proposed Changes]….

[Utility subject matter experts (SMEs) are best equipped to understand the intricacies of planning, procurement, and management of transmission and distribution infrastructure and the complex decisions that go into maintaining the grid reliability of their unique systems. The Proposed Changes to the Amendments make considerable modifications to Section 95357 that add additional processes on top of existing reporting requirements and emission limits in other sections of the regulation, that are already robust and extremely prescriptive. As discussed below, the Proposed Changes should be further refined to remove unnecessary processes and clarify the application of the]… notification [process]….

The Proposed Changes to Section 95357 would not only increase CARB's oversight of utility decision making for which equipment to use in their electric system, it does not clearly set forth when GIE Owners may rely on a failure notification versus the regular phase-out exemption process….

Even when a failure notification is allowed under Section 95357, the Proposed Changes go on to establish a process for evaluating the failure notification, including the rationale for the failure notification and discovery of "additional information," suggesting that the notification and accompanying attestation are subject to CARB's discretionary review.

In addition, the 45-day timeframe after a GIE failure occurs to submit information about the new GIE device acquired to replace the failed GIE is not feasible. It can take months to purchase, manufacture, ship, do the construction work to remove the old GIE and install the new GIE, and connect and test the new GIE, not to mention perform a root cause analysis on what caused the old GIE to fail. The timeframe for submitting this information to CARB should be based on receipt of all the required information….

A. JUG Recommends Removing Section 95357(k) in its entirety because it contains unnecessary process and undermines the efficacy of the failure notification process.

~~(k) Upon receipt of a notification pursuant to sections 95357(i)(1), (i)(2), (j) (1), or (j)(2):~~

~~(1) Within seven days, the GIE owner will receive an acknowledgement of the receipt of the notification, which will include a failure identification number. If the GIE owner does not~~

~~receive a receipt within seven days of submittal, the GIE owner must contact CARB to inquire whether CARB has received the notification.~~

~~(2) Within 21 days of submittal, the Executive Officer shall notify the submitter if additional information is necessary to complete the notification;~~

~~(A) Within 21 days of being notified by the Executive Officer that additional information is necessary to complete the notification, the GIE owner must provide the requested information.~~

~~(B) Upon receipt of additional information from the submitter pursuant to Section 95357(k)(2)(A), the Executive Officer will notify the submitter if additional information is necessary to complete the notification within 21 days.~~

B. JUG Recommends adding a definition for the term "imminent" and amending Section 95357(i) to include failures that reflect compromised system reliability:

ADD to Section 95351 (Definitions): **"Imminent" means a timeframe in which a GIE Owner expects a failure is reasonably likely to occur, either due to end of useful life or the detrimental condition of a GIE device, and during which there is insufficient time for replacement equipment to be properly planned, procured, and installed prior to the anticipated failure.**

95357 (i) In the event of **compromised system reliability or** a failure of a GIE device in active service that, in the estimation of the GIE owner may only be resolved through the acquisition of $SF_6$ GIE that would otherwise require an $SF_6$ exemption, the GIE owner may acquire an $SF_6$ GIE device with the same GIE characteristics as the failed GIE **or compatible GIE characteristics to restore system reliability** without prior approval from the Executive Officer, and must:…

(i) In the event of **compromised system reliability or** a failure of a GIE device in active service that, in the estimation of the GIE owner may only be resolved through the acquisition of $SF_6$ GIE that would otherwise require an $SF_6$ exemption, the GIE owner may acquire an $SF_6$ GIE device with the same GIE characteristics as the failed GIE **or an $SF_6$ GIE with compatible characteristics, in order to restore system reliability** without prior approval from the Executive Officer, and must:

(1) Within 15 days of the failure, electronically submit a notification to the Executive Officer that includes:

…

(C) The following information regarding the failure:

1. The date and time ~~of~~ the failure **was identified**;

2. The location of the failure; and

3. The manufacturer's serial numbers, pursuant to section 95354(a)(3), of all GIE that were affected by the failure.

(2) Within 45 days of ~~the failure~~ **obtaining all of the information specified below,** electronically submit the following information to the Executive Officer for each GIE device acquired.

(A) Date acquired;

(B) Date activated;

(C) GIE characteristics;

(D) Equipment type;

(E) Manufacturer's serial number;

(F) An explanation of the cause of the failure; and

(G) The appropriate attestation statement from section 95355(c)….

(JUG3)

**Comment:**

[Overview Section 95357]…Failure Notification)…

TID also supports the JUG recommendations adding a definition for the term "imminent" and amending Section 95357(i) to include failures that reflect compromised system reliability.

**"Imminent" means a timeframe in which a GIE Owner expects a failure is reasonably likely to occur, either due to end of useful life or the detrimental condition of a GIE device, and during which there is insufficient time for replacement equipment to be properly planned, procured, and installed prior to the anticipated failure.**

95357 (i) In the event of **compromised system reliability or** a failure of a GIE device in active service that, in the estimation of the GIE owner may only be resolved through the acquisition of SF6 GIE that would otherwise require an SF6 exemption, the GIE owner may acquire an SF6 GIE device with the same GIE characteristics as the failed

GIE or a compatible GIE characteristics to restore system reliability without prior approval from the Executive Officer, and must:…

(i) In the event of a failure of a GIE device in active service that, in the estimation of the GIE owner may only be resolved through the acquisition of SF6 GIE that would otherwise require an SF6 exemption, the GIE owner may acquire an SF6 GIE device with the same GIE characteristics as the failed GIE without prior approval from the Executive Officer, and must:

(1) Within 15 days of the failure, electronically submit a notification to the Executive Officer that includes:

(A) GIE owner's name and ARB identification number (if assigned);

(B) Designated representative's name, official title, mailing address, phone number and email address;

(C) The following information regarding the failure:

1. The date and time ~~of~~ the failure was identified;

2. The location of the failure; and

3. The manufacturer's serial numbers, pursuant to section 95354(a)(3), of all GIE that were affected by the failure…. (TID3)

**Agency Response:**
One commenter expressed concern that the failure notification process, as proposed in the first 15-day Public Notice, would grant a third-party (CARB staff) increased oversight of, and the authority to second-guess, decisions made by the GIE owner's own experts in determining whether the need for $SF_6$ GIE was valid, and add additional processes on top of existing robust and prescriptive requirements. The commenters proposed removal of section 95357(k).

CARB staff disagrees that the first 15-day Public Notice adds additional processes. Changes made in the first 15-day Public Notice streamline processes by converting the expedited exemption request process to a notification process in the case of failure, removing some previously proposed requirements, specifying the circumstances when a GIE owner may use the new process, and specifying the materials that must be provided to CARB to support the notification. This requirement does not constitute CARB staff "second guessing" engineering decisions. In fact, the key structure of the new notification process is that GIE owners do not need CARB authorization to acquire $SF_6$ GIE after the corresponding phase-out date to resolve a failure, as defined in the Regulation. Section 95357(k) has been retained to ensure that CARB staff is able to obtain the information required in this provision, and to

have a process for communicating with the GIE owner if the GIE owner's notification is incomplete or is missing information required in section 95357(i)(1), (i)(2), (j)(1), or (j)(2). This section also establishes reasonable timeframes for CARB staff and the submitter to review information and respond. As such, no revisions have been made in response to this comment.

Commenters stated the proposed amendments do not clearly distinguish when GIE owners may use the failure notification process versus the phase-out exemption process and requested a definition for the term "imminent" be added. Commenters also requested section 95357(i) be expanded to let GIE owners use the notification process in case of "compromised system reliability," and requested that acquisition of GIE with compatible characteristics to the GIE device that failed be allowed.

CARB staff does not agree that the first 15-day Public Notice did not sufficiently clarify when a GIE owner may use the failure notification process instead of the exemption process. Section 95357(i) states "in the event of a failure…the GIE owner may acquire an $SF_6$ GIE device…without prior approval from the Executive Officer," meaning the notification process can be used after a failure. Additionally, "Failure" was defined as "the sudden and unexpected, or imminent, failure of a GIE device that requires replacement of the device." This definition was revised in the first 15-day Public Notice as requested by commenters, and in consultation with the CAISO as directed by the Board, and no further changes have been made.

Regarding the request for a definition of the term "imminent," this term was added to the definition of "Failure" in the first 15-day Public Notice due to stakeholder feedback which requested inclusion of "imminent failure." CARB staff agreed and incorporated this change. The revisions to the definition of "Failure," including the addition of "imminent," were intended to ensure GIE owners are granted sufficient flexibility to immediately respond to issues impacting electricity system reliability. Based on information provided by stakeholders, failures are anticipated to be relatively uncommon events, with even the largest GIE owners experiencing no more than a few per year. Each of these events will likely have their own special circumstances, with differing levels of probability that a GIE device will fail over various time horizons. Therefore, CARB staff chose not to define "imminent" and to instead provide GIE owners the flexibility to make the determination on a case-by-case basis. Section 95357(i)(2)(F) was revised to require the GIE owner provide, in cases of imminent failure, an explanation of the circumstances that indicate to the GIE owner that the device failure is imminent, and the timeframe within which the GIE owner expects the GIE device to fail. This information, which must be submitted along with an attestation statement, requires the GIE owner to provide CARB with the information necessary to substantiate their use of the failure notification process and to justify their acquisition of $SF_6$ GIE after the applicable phase-out date due to an anticipated "imminent" failure.

Regarding the request for the notification process to be used in cases of "compromised system reliability," the 45-day Public Notice included similar language in the definition of "failure," which was removed in the first 15-day Public Notice. The previously proposed language would have allowed use of the notification process after a failure that "impairs, damages, or shuts down part or all of a system (e.g., the electrical grid)." CARB staff finds inserting language related to "system reliability," for which a definition was not proposed, would make this definition more subjective, which could result in inconsistent interpretations. Therefore, the requested change was not made.

Regarding the request that the Regulation allow acquisition of GIE with "compatible characteristics" to the GIE device that failed, CARB staff disagrees that such a change is necessary. In the first 15-day Public Notice, section 95357(i) specified that after failure of a GIE device in active service, the GIE owner may acquire an $SF_6$ GIE device with the same GIE characteristics as the failed GIE without prior approval. GIE characteristics have been defined since the 45-day Public Notice as the combination of attributes listed in Tables 1 or 2. Specifically, these include: configuration (meaning aboveground or belowground), voltage capacity, and short-circuit current rating. Voltage capacity and short-circuit current rating are presented as ranges. The first 15-day Public Notice clearly states a GIE device with the same GIE characteristics as the device that failed can be acquired, and the ranges in Tables 1 and 2 provide some flexibility. A new device would meet regulatory requirements as long as the configuration of the replacement device is the same, and its voltage capacity and short-circuit current rating fall within the same range as the device that failed.

One commenter stated section 95357(i)(2)'s requirement to submit information about the device acquired within 45 days of failure is not feasible because it can take months to purchase, manufacturer, ship, connect, and test the new device. The commenter also implied a root cause analysis of what caused the old GIE device to fail would also be required within this timeframe. The commenter requested the deadline be 45 days from receipt of all required information instead of 45 days from the failure.

The commenter did not provide any data to show average timeframes for resolving failures and otherwise did not quantitatively substantiate why providing the requested information within 45 days of failure is "not feasible." However, as part of evaluating this comment, CARB staff revisited stakeholder feedback received during the informal public process regarding some of the longer timeframes that can be involved when acquiring certain types of new GIE, particularly larger, high-voltage GIE. As such, CARB staff opted to specify the provision of required information within 45 days of acquiring the replacement GIE. The information that must be provided at that time includes: the date the replacement GIE device was acquired and activated; the replacement GIE characteristics (as defined in the Regulation), equipment type,

and serial number; an explanation of the cause of the failure; and the appropriate attestation statement from section 95355(c). In situations where a GIE owner is unable to activate the GIE device within 45 days of acquisition, the GIE owner could provide an estimated date of activation to comply with section 95357(i)(2)(B). Regarding the root cause analysis, GIE owners are simply required to provide an "explanation of the cause of the failure." While the GIE owner may wish to undertake a root cause analysis, such a detailed explanation is not required to be included in the notification.

Finally, two commenters requested section 95357(i)(1)(C)(1.) be amended to require the GIE owner to provide the date and time the failure was identified, instead of the date and time the failure occurred. This provision is to be used in case of failure, where commenters have made the case that time is of the essence to resolve any potential reliability issues. Commenters did not provide a justification for the change to indicate why they would not be able to identify the date and time of the failure (as defined in the Regulation), so no change has been made to this section.

**A-5. Clarify Usage of Spare $SF_6$ GIE after Failure**

**Comment:**
VII. Spare GIE

*The JUG requests that CARB revise Section 95352(b) ($SF_6$ Phase-Out) to clarify the usage of spare GIE*

In the event of GIE failure, it is essential that GIE owners be able to replace the device with available spares to minimize any disruptions. It is the JUG's understanding that intent of the Proposed Changes would allow spare $SF_6$ GIE to replace any GIE that fails, but the JUG requests CARB modify the provisions of section 95352 (b) to make this explicit:

> (b) Starting on the applicable dates provided in Table 1 and Table 2, no GIE owner may ~~convert~~ **replace existing** non-$SF_6$ GIE ~~to~~ **with** $SF_6$, **except as provided in 95352(a)**…. (JUG3)

**Agency Response:**
The commenter requested the regulatory language clarify that GIE owners may activate spare $SF_6$ GIE in place of GIE that failed at any time, and requests a change to a section of the Regulation that is not relevant to spares. It has been the case since the 45-day Public Notice that spare $SF_6$ GIE, acquired prior to the phase-out, can be activated at any time, including to replace a GIE device that failed after the phase-out. Regarding acquisition of spare $SF_6$ GIE in response to failure, commenters provided feedback in response to the 45-day Public Notice that activation of a spare GIE device to resolve a failure depletes the GIE owner's inventory of spare GIE, which could hinder their ability to respond to

additional failures. In response, the first 15-day Public Notice specified in section 95357(j) that GIE owners can acquire a new $SF_6$ GIE device of the same GIE characteristics as the spare device that was activated to resolve the failure. This would be done through the notification process, without prior approval from CARB. Section 95352(b), mentioned in the comment, prohibits GIE owners from modifying a non-$SF_6$ GIE device to allow it to use $SF_6$, after the phase-out. This provision is not related to activation of spares and no changes have been made.

**A-6. Clarify Equations Used to Calculate Early Action Credit**

**Comment:**
VIII. Annual Emissions Limit

*The JUG recommends the following modifications to Section 95353 for greater clarity.*

A. Section 95353(d)

Beginning with data year 2021, GIE owners who elect to apply an early action credit must calculate their early action credit (EAC) on an annual basis using Equation 3. For consistency, the JUG recommends editing the title of Table 3 so that the header also includes the term "Cer"… (JUG3)

**Agency Response:**
The commenter requested the column header in Table 3 which read $C_{e,k}$ ($MTCO_2e$) in the first 15-day Public Notice be changed to "$C_{e,k}$ and $C_{er,l}$ ($MTCO_2e$)." The commenter is correct that the values specified in this column in Table 3 will be used for both the term "$C_{e,k}$" and "$C_{er,l}$" in the equation in section 95353(d), as demonstrated by the provided description of these terms. CARB staff has incorporated this change in the final Regulation.

**A-7. Revise Measurement Procedures**

**Comment:**
Inventory and Insulating Gas Procedures

§ 95355(f) contains accuracy and capability requirements for certain equipment that will be used by regulated entities to measure SF6 quantities and/or perform nameplate adjustments. We support CARB in prescribing requirements to ensure the accuracy of field readings, but propose one change from the 15-day Text below. We also note for CARB consideration, several instances where the requirements in the 15-day Text could result in a capital cost for regulated entities.

The word "Precision" should be removed from lines (2) and (3), and elsewhere in the 15-day Text where used in conjunction with "pressure gauge" and "temperature gauge." Use of this word to modify "pressure gauge" and "temperature gauge," respectively, adds no particular industry meaning or import, and could lead to different

interpretations among regulated entities[29]. The certification requirements contained in the descriptive language provide ample clarity of the accuracy requirements and will ensure the accuracy of the values.

We note that § 95355(l) contains a requirement for regulated entities to recalibrate equipment. While we strongly support a requirement for equipment to be calibrated prior to initial use, it is important to point out that only some, but not all, brands/models of this equipment currently in use by regulated entities can be recalibrated by the users. Accordingly, if CARB intent is not to impose a potential capital cost on regulated entities vis-à-vis procurement of new equipment, we recommend adding throughout this subsection language clarifying that the requirement to recalibrate this equipment only applies where it is possible for the GIE owner to do so.

Similarly, we also note that the requirement in § 95355(f)(4) for gas carts used to perform nameplate adjustment procedures be "capable of recovering gas from the GIE device to a blank-off pressure of 3.5 Torr or less" could entail an additional capital cost for regulated entities. While most, if not all, regulated entities currently own gas carts, not all gas carts are capable of reaching the threshold of 3.5 Torr. Accordingly, under this requirement regulated entities would be forced to either procure new gas carts or invest in upgrading current gas carts. If CARB intent is to not impose an additional cost on regulated entities, we recommend removing that requirement…. (SF6&AltCoal2)

**Comment:**
The nameplate capacity adjustment procedure should be practical and feasible for utility maintenance crews to perform when in the field with their existing gas carts and measurement tools, in order to avoid incurring unnecessary capital costs to purchase additional equipment. The utilities are concerned about the prescriptive requirement that the gas cart must be capable of recovering gas from the GIE device to a blank-off pressure of 3.5 Torr or less (§ 95354(f)(4)). While the JUG appreciates the desire for accuracy, imposing prescriptive equipment requirements in the name of accuracy may prevent some utilities from utilizing the procedure if their gas cart is incapable of attaining a blank-off pressure of 3.5 Torr or less due to gas cart specification range limitations. Since the purpose of the nameplate capacity adjustment procedure is to improve the accuracy of reported emissions, the ability to utilize the procedure is vital to ensuring the accuracy of the $SF_6$ inventory. It is more important that the procedure be feasible for all utilities to implement, if utilities opt to do so, rather than overly prescribing which equipment can and cannot be used, in order to realize the full benefit of the nameplate capacity adjustment procedure.

[29] The $SF_6$ & Alternatives Coalition notes use of the terms, "precision pressure gauge" and "precision temperature gauge" in its white paper entitled, *Recommended Processes to Support Accurate Reporting of $SF_6$ Emissions*. Use of the word precision was only intended to clarify for readers that the equipment should be accurate.

Since one size does not fit all, the JUG recommends that the nameplate adjustment procedure be used in combination with the GIE manufacturer and gas cart instructions for recovery of the insulating gas. The blank-off pressure is GIE-specific, so rather than specify a capability for the gas cart and a five-minute hold time, the procedure should direct the user to follow the GIE manufacturer and gas cart instructions for recovery of the gas. For example, the blank-off pressure for a small GIE is different than for a large GIE, and a gas cart that is suitable to recover gas from a smaller GIE may not be suitable to recover gas from a large GIE.

The JUG also recommends relying on the GIE manufacturer-provided temperature-compensated pressure gauge attached to the GIE (if available) to measure the GIE gas pressure prior to recovery of the insulating gas. If the GIE does not have an integrated temperature-compensated pressure gauge, then an external temperature-compensated pressure gauge or separate external pressure gauge and external temperature gauge may be used to measure the GIE gas pressure. The GIE integrated temperature-compensated pressure gauge is typically used when initially filling the GIE with gas (fill to pressure not weight); it is also used to monitor the GIE pressure over the service life of the GIE. For consistency, the JUG recommends using the same gauge to measure pressure prior to recovering the gas.

As such, the JUG recommends modifying the nameplate adjustment procedure and associated accuracy requirements as follows:

A. JUG recommends modifying Section 95357.2 (c) to remove overly prescriptive requirements and defer to GIE manufacturer instructions:

(c): If a GIE owner elects to adjust the nameplate capacity of any GIE, the owner must:

(1) **Measure and record the ambient temperature.** ~~Record the initial system pressure and vessel temperature prior to removing any insulating gas using a precision pressure gauge meeting the minimum accuracy requirements of section 95354(f)(2) and a precision temperature gauge meeting the minimum accuracy requirements of section 95354(f)(3).~~

(2) **Using the GIE temperature/pressure curve or other manufacturer specified method, ensure that the GIE's pressure is within the manufacturer specified limits using the GIE's integrated gauges. If the GIE does not have an integrated pressure gauge, an external temperature-compensated pressure gauge or separate external pressure gauge and external temperature gauge may be used to measure the GIE gas pressure.** ~~Convert the initial system pressure to a temperature compensated initial system pressure by using the manufacturer-specified temperature/pressure curve.~~

(3) …
(4) …

(5) **Follow the GIE manufacturer and gas cart instructions to recover insulating gas from the GIE until the GIE reaches the maximum achievable blank-off pressure, then hold for the appropriate amount of time as specified in the manufacturer instructions.** ~~Recover insulating gas from the GIE device until five minutes after the pressure in the GIE device reaches the blank-off pressure.~~

B. JUG recommends modifying Section 95354 (Inventory and Insulating Gas Procedures) parts (f) and (l) to remove overly prescriptive accuracy and calibration requirements and defer to GIE manufacturer instructions:

Section 95354(f) Accuracy Requirements

(f) The following accuracy requirements apply to equipment used to determine values required to be recorded under this subarticle:

(1) …
(2) ~~*Precision*~~ ***External*** *pressure gauges* must be certified by the manufacturer to be accurate within 0.5% of the largest value that the gauge can, according to the manufacturer's specifications, accurately record.
(3) ~~*Precision*~~ ***External*** *temperature gauges* must be certified by the manufacturer to be accurate within +/-1.0° F.
(4) *Gas carts* used to perform nameplate capacity adjustments must be **suitable to recover $SF_6$ from the GIE to the maximum achievable blank-off pressure as specified by the GIE manufacturer.** ~~capable of recovering gas from the GIE device to a blank-off pressure of 3.5 Torr or less.~~

Section 95354(l)(4) Calibration Requirements

(4) Recalibrate mass flow meters~~, precision pressure gauges, and precision temperature gauges~~ used to measure quantities reported under this subarticle at the minimum frequency specified by the manufacturer…. (JUG3)

**Agency Response:**
Commenters requested deleting the requirement to record the initial system pressure from the nameplate capacity adjustment process. CARB staff has retained the requirement to record the initial system pressure. This value is necessary to derive the temperature-compensated initial system pressure, which is used to determine the GIE device is full, prior to gas recovery. It would not be possible to ensure nameplate capacity adjustments are

performed accurately without measuring this value, and "recording" it is necessary for CARB staff to verify that nameplate capacity adjustments followed regulatory requirements.

Commenters suggested modifying section 95357.2(c)(2) such that the GIE owner may use the temperature/pressure curve, or another manufacturer specified method, to ensure the GIE device's pressure is within the manufacturer specified limits. Commenters also requested the ability to use the GIE device's integrated gauges, and asked that sections 95354(f)(2) and (3) be modified to specify that accuracy requirements only apply to external gauges.

Regarding use of other manufacturer specified methods when the manufacturer's temperature/pressure curve is unavailable, CARB staff agrees, and the second 15-day Public Notice reflects this change. Regarding use of the GIE device's integrated gauges, the first 15-day Public Notice requires that temperature and pressure gauges meet accuracy requirements; it does not prohibit the use of integrated gauges as suggested by the comments. The commenter's requested changes to sections 95354(f)(2) and (3) would mean that no accuracy requirements would be imposed on internal gauges. CARB staff disagrees with the requested change because the values calculated through this process will be used when determining emissions levels and compliance with the emissions limit; therefore, these values need to be accurate. Should the GIE device's internal gauges not meet the requirements of these sections, external gauges could be used.

Commenters requested GIE owners be required to measure the ambient temperature instead of the "vessel temperature using a…temperature gauge meeting the minimum accuracy requirements of section 95354(f)(3)." The nameplate capacity adjustment process requires the GIE owner ensure the initial pressure in the GIE device matches the temperature-compensated design operating pressure specified by the manufacturer to ensure an accurate result. During the months following the Board Hearing, and in comments received during the second 15-day comment period, stakeholder feedback recommended the "vessel temperature" be measured using a temperature gauge meeting the above requirements to ensure accurate results. A justification for the change to "ambient temperature" was not provided, nor was this change recommended in comments received during the second 15-day comment period. Because use of the initially proposed methodology will ensure accurate results, and the commenter provided no data or a justification to demonstrate use of the "ambient temperature" would yield accurate results, no changes were made in response to this comment.

Commenters requested removal of the word "precision" from "precision pressure gauge" and "precision temperature gauge." The rationale for this

change was that this term added no particular meaning to industry and could lead to different interpretations among regulated entities. CARB staff agrees with the commenter; the word "precision" was removed in the second 15-day Public Notice.

One commenter recommended that, during nameplate capacity adjustments, rather than specify a five-minute hold time after blank-off pressure has been reached, the GIE owner be required to hold pressure for the appropriate amount of time specified in the manufacturer instructions. A rationale was not provided for this request. The final Regulation specifies that gas be recovered until five minutes after the pressure in the GIE device reaches the blank-off pressure. This is based on the recommended methodology provided by the $SF_6$ and Alternatives Coalition, which represents 17 members who are producers and distributors of $SF_6$ and $SF_6$ alternatives, manufacturers of gas-insulated equipment, a California utility, and other $SF_6$ stakeholders. The commenter did not explain why holding the pressure for five minutes was problematic, and CARB staff is not aware that manufacturers commonly provide these instructions, and so no changes were made to the Regulation.

One commenter requested modification of section 95354(f)(4) to require that gas carts used to perform nameplate capacity adjustments be suitable to recover $SF_6$ from the GIE device to the maximum achievable blank-off pressure specified by the GIE manufacturer. The first 15-day Public Notice required that gas carts be capable of recovering gas from a GIE device to a blank-off pressure of 3.5 Torr. The commenter's justification included that the prescriptive equipment requirement may prevent some GIE owners from utilizing the procedure, yielding a less accurate $SF_6$ inventory overall. One commenter also noted the first 15-day Public Notice's gas cart capability requirement could require GIE owners to procure or upgrade their carts. The second 15-day Public Notice includes this change because it achieves the desired accuracy and adds flexibility to the nameplate capacity adjustment process. This change will also address the other commenters' concern regarding procurement of new equipment.

One commenter recommended deletion of the requirement to recalibrate pressure and temperature gauges; however, a justification was not provided. Another commenter recommended adding throughout section 95355(l) that the requirement to recalibrate equipment only applies where it is possible for the GIE owner to do so. Rationale included that some brands/models cannot be recalibrated by the users. For scales, section 95355(l)(2) requires recalibration using NIST-traceable standards and a published calibration method if the manufacturer has not specified calibration procedures. These methods should be readily available to all GIE owners, and the requirement is consistent with the current Regulation. For all other types of equipment listed, section 95355(l)(4) requires recalibration at the minimum frequency specified by the manufacturer. Therefore, if the manufacturer does not specify

recalibration is necessary, the GIE owner would not be required to do so. CARB staff finds the first 15-day Public Notice to be sufficiently clear and no changes were made in response to this comment.

**A-8. Revise GIE Gas Handling Procedures**

**Comment:**
C. Section 95354(c)(1)(A)(B)(C)

Pertaining to Section 95354(c)(1) on classification of GIE considered to be "removed from regular use", it is unclear whether spare GIE is subject to this section of the regulation. Spare GIEs can be in a GIE owner's possession for greater than 5 consecutive years without being connected to the system. If CARB considers spare GIEs as inactive equipment after the 5 consecutive year period, this would create unnecessary amounts of surplus $SF_6$ GIE that would be rendered unsuitable for service, which could potentially end up in scrap yards, creating more environmental challenge to address down the road.

> (c) Beginning January 1, 2022, any GIE device that has been active GIE at some point during ownership by the GIE owner:
>
> > (1) Shall be considered "removed from regular use" in section 95354.1(a) when covered insulating gas has been extracted pursuant to section 95354(d) after in any of the following circumstances:
> >
> > > (A) When the GIE device has not been active GIE for five consecutive years, or
> > >
> > > (B) When the GIE device is taken out of active service for the purpose of removing the device from a GIE owner's inventory (e.g., to be disposed of, sold, transferred to a new GIE owner).
> > >
> > > (C) When the GIE device has been inactive GIE for less than five consecutive years and is being removed from the GIE owner's inventory (e.g., to be disposed of, sold, transferred to a new GIE owner).

D. Section 95354(d)

There are instances where GIE was active but taken out of service at its original location and placed into spare status since it had not reached end of life. Scenarios where this could occur include temporary construction, substation relocation, fault duty increase, etc.

> (d) Within one year of a GIE device meeting the specifications in sections 95354(c)(1)(A) through 95354(c)(1)(C), covered insulating gas must be removed and accounted for…

Per Section 95354(d), GIEs that are taken out of service will need to have gas completely recovered and accounted for as part of the gas inventory. This includes the minimum 5 psi that is typically recommended by manufacturers to be kept inside the breaker to prevent moisture intrusion inside the equipment. To inquire whether other gases, such as nitrogen or dry air, can be used to maintain the 5 psi, there was some hesitancy by the manufacturer with this approach since the breakers are designed to be filled with $SF_6$. JUG asks CARB for further clarification on whether this requirement would be applicable to GIE that become spare.

The JUG also requests that CARB does not limit this activity to just the GIE owner or the original manufacturer. There are many instances where the original manufacturer was purchased by another manufacturer or company. There are also circumstances among the JUG where a vendor performs this activity. The JUG recommends the following modification and requests that CARB clarify that these two cases can be accommodated by the requirement in the second half of part (d) as follows:

(d) …The amount of covered insulating gas transferred out of the GIE device (pounds) must be recorded by the GIE owner or by the ~~original manufacturer of the GIE device if the~~ manufacturer**, contractor or vendor that** recovers the gas. The GIE owner is responsible for ensuring the gas is accounted for consistent with the methodologies specified in section 95354(d)(1) or (2)…. (JUG3)

**Comment:**
§ 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. (HitachiABB)

**Agency Response:**
Commenters interpreted section 95354(d) to require complete gas recovery from GIE taken out of service, including recovery of the minimum 5 psi manufacturers typically recommend be retained. They also requested the section be modified to allow non-original manufacturers, contractors, or vendors to transfer gas out of GIE being removed from regular use. Regarding the type of entities that may transfer gas out of GIE, CARB staff agrees all the entities listed by the commenter are capable of performing the task, and the second 15-day Public Notice includes this change. In regard to the other comment, section 95354(d) does not require or mention "recovery of the minimum 5 psi manufacturers typically recommend be retained." Rather, the nameplate capacity adjustment process requires recovery of

"insulating gas from the GIE device until five minutes after the pressure in the GIE device reaches the blank-off pressure." Further, blank-off pressure is defined as "the lowest achievable pressure of a GIE device or gas cart, as recommended by the manufacturer." As such, the methodology directs GIE owners to recover $SF_6$ as appropriate to GIE manufacturer specifications. CARB specified these processes based on commenter feedback and the need to accommodate a variety of GIE and manufacturer specifications.

One commenter requested clarification whether spare GIE are subject to the requirements of section 95354(c)(1). The requirement would not apply to spare GIE that have never been activated. Pursuant to section 95354(c), the only GIE that could be considered "removed from regular use" are GIE "that has been active GIE at some point during ownership by the GIE owner."

One commenter recommended allowing the use of density sensors in lieu of pressure gauges and temperature gauges in the nameplate capacity adjustment process. CARB staff's proposed method was developed through a number of conversations with stakeholders between the Board Hearing and the release of the first 15-day Public Notice, none of which proposed the use of density sensors. As such, CARB staff has no information on these devices beyond the brief mention in the comment. As such, this methodology was not added to the second 15-day Public Notice.

**A-9. Revise the Reporting Requirements**

**Comment:**
V. Inventory and Insulating Gas Procedures

*The JUG seeks clarification from CARB on the following subarticles within Section 95354*

A. Section 95354(a)

The JUG asks CARB to clarify that this is only required for GIE equipment that have covered insulating gas with a GWP:

> (a) GIE owners must establish and maintain a current and complete GIE inventory for each data year, which includes the following information for each GIE device that uses covered insulating gas:…

B. Section 95354(a)(12)

Pertaining to Section 95354(a)(12), the JUG would like to point out that $SF_6$ capacity of parts will not always be available by manufacturers. There is an array of replacement parts for GIE. On the lower end of the spectrum, there are interrupters for air switches holding miniscule amounts of $SF_6$, where the $SF_6$ capacity data may or may not be published by the OEM. On the higher end of

the spectrum, there are interrupter tanks on dead tank breakers where the amount of $SF_6$ capacity would be the capacity of the dead tank breaker. The JUG asks for clarification on what types of replacement parts are required for reporting and possibly consider making this part of the regulation optional since it is for informational use only. If this section of the regulation becomes a requirement, this will need to be brought up to the attention of the National Electrical Manufacturers Association (NEMA) and manufacturers.

(12) For $SF_6$-containing replacement parts installed during the data year on active SF6 GIE for which the phase-out date has already passed (required beginning January 1, 2025):

(A) Name or description of the part;

(B) SF6 capacity of the part**, if available**; and

(C) Manufacturer's serial number of the SF6 GIE device…. (JUG3)

**Comment:**
$SF_6$ Capacity of Replacement Parts

§95354 Inventory and Insulating Gas Procedures contains a range of information regulated entities must record. Subsection (a)(12)(B) would require regulated entities to record, for $SF_6$-containing replacement parts meeting certain criteria, the $SF_6$ capacity of the part. $SF_6$ Gas Insulated Equipment (GIE) manufacturers and other component suppliers do not measure capacity of specific parts and components, only of the final assembly which may have multiple components such as tanks and bushing that contain $SF_6$. Under current designs and test practices, most manufacturers do not measure the $SF_6$ capacity of each of these components independently, so this information is typically not available to regulated entities.

Though manufacturing tolerances may cause the new part to vary in the volume of $SF_6$ it contains as compared to its predecessor, this difference in isolation is highly unlikely to affect the nameplate value of the whole GIE to any material degree. Accordingly, there is no value in terms of accurate reporting for regulated entities to perform this exercise and we recommend deleting §95354(a)(12) in its entirety…. (SF6&AltCoal2)

**Agency Response:**
One commenter requested clarification whether section 95354(a) is only required for GIE that have a covered insulating gas with a GWP. This section states "GIE owners must establish and maintain a current and complete GIE inventory for each data year, which includes…each GIE device that uses covered insulating gas." Additionally, "Covered insulating gas" is defined in the proposed amendments as "an insulating gas with a GWP greater than one." Therefore, information specified in section 95354(a) must only be recorded for GIE that use an insulating gas with a GWP greater than one.

One commenter requested clarification on the types of replacements parts required to be reported. Commenters stated GIE manufacturers and other component suppliers do not measure the capacity of specific parts, meaning this value will not always be available to GIE owners. These commenters requested the requirement to record and report information on replacement parts be removed from the Regulation entirely, or that the requirement to report the replacement parts' $SF_6$ capacity only be required "if available." Regarding the request for clarification, per section 95354(a)(12), via section 95355(a)(5), beginning January 1, 2025, all replacement parts that contain $SF_6$ installed during the data year on active $SF_6$ GIE for which the phase-out date has already passed are required to be reported. CARB staff thanks commenters for providing the information that the $SF_6$ capacity of replacement parts may be unavailable and agrees with the commenter who requested this information only be required to be reported "if available." The second 15-day Public Notice includes this change. CARB staff elected to retain the requirement to report these replacement parts because, pursuant to section 95352(c), "replacement parts" are allowed to be acquired after the phase-out deadline, but "GIE" are not. CARB staff requires these data elements be reported to ensure each piece of equipment acquired under section 95352(c) meets the definition of a "replacement part." This goal can be achieved by retaining the requirement to report replacement parts, even if the $SF_6$ capacity of the part is not always available to be reported.

**A-10. Revise the Emissions and Emissions Limits Calculations**

**Comment:**

*II. Clarify proper mass-balance accounting for $SF_6$ gas transfers into or out of GIE that is either jointly owned or GIE in which utility does not have any ownership but has some cost responsibility.*

Section 95354.1 states, 'When accounting for emissions associated with GIE that are jointly owned by multiple GIE owners, each joint owner must apply its equity share of the relevant GIE when calculating annual emissions, pursuant to section 95354(a)(7)(b).

SCE would like to bring to CARB staff's attention that different contractual arrangements exist between SCE and other 3rd party entities. These contracts are based not only on the ownership of GIE but also on maintenance related cost responsibility. A few of the common contractual arrangements are listed below.

1. GIE is 100% owned by SCE; SCE and 3rd party split 50% of the maintenance costs each.
2. GIE is 100% owned by 3rd party; SCE and 3rd party split 50% of the maintenance costs each.
3. GIE is 100% owned and maintained by 3rd party.
4. GIE is 100% owned by SCE; 3rd party has 100% cost responsibility.
5. Jointly owned GIE between 2 or more parties with varying cost responsibility.

As can be seen above, equity share alone is not sufficient guidance to allocate emissions. As an example, for scenario described in #2; per current guidance, SCE would NOT have to account for emissions because of 0% ownership. However, there might be a scenario where gas from SCE's cylinder inventory is used to top off this GIE during leak repair. While all the gas is reduced from SCE's cylinder inventory (affecting the term *Decrease in covered insulating gas inventory*), because the 3rd party is responsible for only 50% of maintenance costs, SCE would only sell them 50% of the gas (affecting the term *Disbursement of covered insulating gas*). The remaining 50% of the gas shows up as SCE emissions. This is not consistent with the current guidance.

While some of these scenarios are covered under the current guidance listed in Section 95354.1, SCE would appreciate specific guidance from CARB on how to account for emissions associated with unique contractual situations to not generate non-existent emissions. Further, additional guidance on accounting for these GIE during commissioning and decommissioning where gas added or removed is not owned by GIE owner will be helpful to ensure consistent and accurate emissions reporting across all utilities…. (SCE3)

**Comment:**
IV. Calculating Annual Emissions

> *The JUG recommends revising Section 95354.1 to include additional ways that covered insulating gas can be acquired or disbursed, and utilize adjusted gas capacity values determined in accordance with section 95357.2.*

The JUG recommends revising the description of the terms in the equation for calculating annual emissions to 1) include additional ways that covered insulating gas can be acquired or disbursed, and 2) utilize adjusted GIE gas capacity values determined using the nameplate capacity adjustment procedure in section 95357.2.

As written, the Acquisitions and Disbursements terms of the equation account for gas inside of active GIE transferred from/to another entity, but do not account for gas inside of inactive GIE transferred from/to another entity. An example of this is a GIE that comes fully charged from the factory to which the user does not add or remove gas. These GIE are received fully charged, and can be shipped back to the manufacturer for repairs or to an outside vendor for salvage with the gas still inside.

In addition, gas inside cylinders belonging to the same entity may be transferred from a facility inside California to a facility outside California and vice versa. As written, the Acquisitions and Disbursements terms of the equation account for acquisitions of gas obtained in bulk from chemical producers, distributors or other entities, and disbursement of gas returned to suppliers or sent to other entities, but not cylinders belonging to the same entity that come into California or leave California.

The last term of the equation, which accounts for the net increase in nameplate capacity of active GIE, needs to include any revised nameplate capacity values determined using the nameplate adjustment procedure in section 95357.2.

A. To ensure accurate accounting of covered insulating gas, the JUG recommends revising the terms of the emission calculation equation as follows:

*Acquisitions of covered insulating gas j* = (covered insulating gas *j* obtained in bulk during the data year (e.g., in gas containers or gas carts) ~~from chemical producers, distributors, or other entities~~) + (covered insulating gas *j* inside GIE when acquired by the GIE owner, for any GIE that became active GIE for the first time during the data year) + (covered insulating gas *j* ~~at activation for~~ **inside of** active **or inactive** GIE transferred ~~while in use~~ from another entity during the data year ~~pursuant to section 95354(c)(2)~~) + (covered insulating gas *j* returned to site during the data year (e.g., in gas containers or gas carts) after off-site recycling);

*Disbursements of covered insulating gas j* = (covered insulating gas *j* ~~at activation for~~ **inside of** active **or inactive** GIE transferred ~~while in use~~ to another entity during the data year ~~pursuant to section 95354(c)(2)~~) + (covered insulating gas *j* returned to suppliers **or sent to a facility outside of California belonging to the same entity** (e.g., in gas containers or gas carts) during the data year) + (covered insulating gas *j* sent off site for recycling in gas containers or gas carts during the data year) + (covered insulating gas *j* sent to destruction facilities in gas containers or gas carts during the data year) **+** (covered insulating gas *j* sent to other entities); and

*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 **reactivated** after being considered removed from regular use ~~during the data year pursuant to section 95354(c)(1)~~) - (covered insulating gas *j* ~~at activation~~ **at removal** for GIE removed from regular use during the data year pursuant to section 95354(c)(1)) – (covered insulating gas *j* at activation for **active or inactive** 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 active **or inactive** GIE transferred ~~while in use~~ from another entity during the data year ~~pursuant to section 95354(c)(2)~~).

B. The JUG also recommends adding a definition for "Covered Insulating Gas at Removal" to account for adjusted nameplate capacities determined using the procedure in section 95357.2:

ADD to Section 95351 (Definitions): **"Covered Insulating Gas at Removal" means the nameplate capacity value determined using the nameplate adjustment procedure in section 95357.2; or the design capacity of the GIE device specified by the manufacturer**….

B. Section 95353(e)(1)

In this section, for data years 2025 and beyond, GIE owners must calculate the value of the baseline for year i using equation 5. The JUG suggests modifying the description of term "Ckrj" to say, "**during the data year and was either not replaced by any GIE device or was replaced with a $SF_6$ GIE device;**" (JUG3)

**Agency Response:**
One commenter requested CARB provide guidance on how to calculate emissions from GIE subject to contractual arrangements between distinct entities regarding percentage of ownership and percentage of responsibility for maintenance costs in a manner that would not generate non-existent emissions for any of those entities; examples were provided. Regarding shared ownership, the Regulation specifies the manner in which emissions are to be accounted for in this scenario in section 95354(a)(7)(B). Regarding shared responsibility for maintenance costs, CARB staff recognizes that the examples provided by the commenter reflect only a subset of the unique arrangements between certain GIE owners and other entities, and addressing all of them in the Regulation would add so much complexity that the Regulation could become more challenging to interpret. Additionally, it is the responsibility of the GIE owner to ensure compliance with the Regulation. Nonetheless, CARB staff will endeavor to engage with the commenter, as needed, to address their specific questions.

One commenter stated if gas containers are transported into/out of California from/to their out-of-state facilities, the gas in the containers should be counted as an acquisition/disbursement. CARB staff agrees. No changes were needed to the acquisition term as a result of this comment because it covers gas obtained in bulk from "other entities." The circumstance described qualifies as acquisition from an "other entity" because the "GIE owner" subject to this Regulation includes only the portion of operations in California, so their out-of-state operations would be considered the "other entity." In the 45-day Public Notice, the disbursements term did not capture "other entities." Accordingly, "covered insulating gas sent to other entities" was added in the first 15-day Public Notice; no other changes are needed in response to this comment.

One commenter stated the equation for calculating annual emissions does not account for gas inside inactive GIE transferred to or received from another entity. The commenter proposed revising the equation's terms related to active GIE "transferred while in use" to address this issue. Pursuant to section 95354(c)(2), which has not been modified since the 45-day Public Notice, a GIE device removed from a GIE owner's inventory without being taken out of active service shall be considered "transferred while in use." The equation for calculating annual emissions covers these situations through terms involving "covered insulating gas *j* at activation for active GIE transferred while in use…."

As such, the suggestion to convert these terms to cover inactive GIE is not appropriate and has not been incorporated.

CARB staff also disagrees that any other additional modifications beyond those included in the first 15-day Public Notice are needed. Regarding inactive GIE received from another entity, these GIE will not enter the mass-balance emissions equation until they are activated by the GIE owner. At the time of activation, the amount of gas inside the device would be accounted for as an "acquisition," and the capacity of the device would be accounted for in the term "net increase in total capacity." This is the same manner in which emissions are accounted for when an inactive GIE device is purchased from the manufacturer. Regarding inactive GIE transferred to another entity, if the inactive GIE device was never activated, it will have never entered the mass-balance equation at all, and therefore this gas should not be accounted for as a disbursement. If the device had been active at some point, and has been inactive for at least five years, the gas should have already been extracted and accounted for pursuant to section 95354(c)(1)(A). If the GIE device was previously active and has been inactive for less than five years, gas should be recovered to determine emissions from the device in the same way as if it had been retired. Section 95354(c)(1)(C) was added in the first 15-day Public Notice to require gas recovery in this scenario.

One commenter requested the equation term for the net increase in nameplate capacity of active GIE be revised to include revised capacity values determined using the nameplate adjustment procedure. CARB staff does not consider this change to be necessary because in the first 15-day Public Notice the revised nameplate capacity would be represented by the term "Covered Insulating Gas at Activation." As specified in section 95351(a) of the Regulation, this term would represent the revised nameplate capacity value for those GIE that undergo the nameplate capacity adjustment process.

One commenter suggested revising the description of the term "Ckr,j," in section 95353(e)(1) from "during the data year and was not replaced or was replaced with a $SF_6$ GIE device" to "during the data year and was either not replaced by any GIE device or was replaced with a $SF_6$ GIE device." The rationale provided was that the proposed change would improve clarity. CARB staff finds the originally proposed language to be sufficiently clear without the addition of "either" and "by any GIE device." Therefore, the requested change was not incorporated in the second 15-day Public Notice.

**A-11. Revise the Nameplate Capacity Adjustment Process**

**Comment:**
Nameplate Capacity Accuracy Verification and Adjustment

The Coalition is pleased to see that the 15-day Text has new provisions in §95357.2 Nameplate Capacity Adjustments to allow regulated entities to adjust nameplates on existing $SF_6$ GIE to address nameplate inaccuracies. We fully support this concept as a regulatory tool to increase accuracy of the data collected by CARB.

Our support for this concept notwithstanding, we have concerns about the requirements outlined in this Section inasmuch as they would require a reporting entity to notify CARB of the intent to adjust a nameplate prior to performing the very process that is outlined in §95357.2(c). Note that this process is intended to be used to verify whether the nameplate capacity value is accurate and, if not, identify what the accurate value is. It is not clear why CARB thinks a utility will know whether there is a nameplate inaccuracy prior to verifying this vis-à-vis the outlined process.

Not only does the notification requirement presuppose the utility will know whether the rated nameplate is accurate without first verifying, but it will also lead to a multitude of notifications to CARB (under the provisions in §95357.2(a)(1)) of the intent to adjust accurate nameplates. In other words, we forsee scenarios where a regulated entity, suspecting an inaccurate nameplate but having no other way to verify, notifies CARB "…of the intention to perform the nameplate capacity adjustments" (§95357.2(a)) on a GIE but then, upon performing the process to verify nameplate accuracy, determines that the nameplate is accurate and therefore, is not in need of adjustment.

Overall, we understand CARB desire to receive notification when nameplates are adjusted. We also recognize the importance of CARB being apprised when regulated entities intend to perform a "system-wide" nameplate verification as per §95357.2(b). But we do not believe there is any added value in CARB knowing about potential adjustments on specific GIE before they occur.

Accordingly, we recommend that the language be revised in §95357.2 as follows to address the above concerns while preserving CARBs ability to serve in its oversight role. Changes below to the 15-day Text are reflected in legislative format but, for the sake of clarity, when a subarticle or subsection has been re-ordered and re-numbered with no other changes to the 15-day Text, legislative formatting was not applied.

§ 95357.2. Nameplate Capacity Verification and Adjustments.

(a) GIE owners who elect to adjust the nameplate capacity value specified by the manufacturer on the nameplate attached to the GIE device, or within the manufacturer's official product specifications, may do so by undertaking the following process.

(1) Record the initial system pressure and vessel temperature prior to removing any insulating gas using a ~~precision~~ pressure gauge meeting

the minimum accuracy requirements of section 95354(f)(2) and a ~~precision~~ temperature gauge meeting the minimum accuracy requirements of section 95354(f)(3).

(2) Convert the initial system pressure to a temperature-compensated initial system pressure by using the manufacturer-specified temperature/pressure curve.

(3) If the temperature-compensated initial system pressure of the GIE device does not match the temperature-compensated design operating pressure specified by the manufacturer, add or remove insulating gas to/from the GIE device until the manufacturer-specified value is reached.

(4) Follow one of the following process, depending on the methodology being used to measure the amount of gas recovered:

(A) Connect a mass flow meter between the GIE device and a gas cart; or

(B) Weigh the gas container being used to receive the gas and record this value.

(5) Recover insulating gas from the GIE device until five minutes after the pressure in the GIE device reaches the blank-off pressure.

(6) Record the amount of insulating gas recovered (pounds), either based on the reading from the mass flow meter, or by weighing the gas container that received the gas and subtracting the weight recorded pursuant to section 95357.2(c)(4)(B) from this value. The amount of gas recovered shall be the revised nameplate capacity for the GIE device.

(7) Record the final system pressure.

(b) GIE owners who elect to perform the process outlined in § 95357.2(a) <u>on any $SF_6$</u> GIE must do so on all non-hermetically sealed $SF_6$ GIE the first time each device is removed from regular use pursuant to section 95354(c)(1) or during maintenance activities that require opening the gas compartment.

(c) <u>GIE owners who perform the process outlined in § 95357.2(a) in accordance § 95357.2(b) must provide a one-time notification to CARB prior to performing the process on the first $SF_6$ GIE.</u>

(d) GIE that fall into <u>one or more of</u> the categories listed in the subsections below are exempted from <u>the</u> requirement <u>in § 95357.2(b)</u>:

(1) GIE with a voltage capacity less than or equal to 38 kV;

(2) GIE that are fully-charged GIE to which the GIE owner does not add or remove gas;

(3) GIE whose integrity have been compromised (e.g., due to damage to the gas containment vessel); or

(4) GIE that were acquired after December 31, 2021.

(e) GIE owners who perform the process outlined in § 95357.2(a) in accordance § 95357.2(b) must notify CARB of any resulting nameplate adjustments for each data year in which a nameplate is revised. The notification shall include:

(1) GIE owner name and ARB identification number (if assigned);

(2) Designated representative's name, official title, mailing address, phone number and email address; ~~and~~

(3) A list of the manufacturer serial numbers of the non-hermetically sealed $SF_6$ GIE subject to the nameplate capacity adjustment process per section 95357.2(a);

(4) The nameplate capacity value specified by the manufacturer on the nameplate attached to the GIE device, or within the manufacturer's official product specifications; and

(5) The revised nameplate capacity value.

(f) If the GIE device will remain in active service, and the revised nameplate capacity value differs from the nameplate capacity assigned to the device prior to the adjustment, the GIE owner must affix a revised nameplate capacity label, showing the revised nameplate value and the year the nameplate capacity adjustment process was performed, to the device by the end of the calendar year in which the process was completed. The manufacturer's previous nameplate capacity label must remain visible after the revised nameplate capacity label is affixed to the device.

(g) For each GIE device whose nameplate capacity was adjusted during the data year, the revised nameplate capacity value must be used in all provisions wherein the nameplate capacity is required to be recorded, reported, or used in a calculation in this subarticle unless otherwise specified herein. (SF6&AltCoal2)

**Comment:**
II. Nameplate Capacity Adjustments

*Section 95357.2 is overly prescriptive and will limit the ability of some utilities to utilize the procedure. CARB should modify Section 95357.2 and related terms in*

*Section 95354 to ensure the procedure is feasible for all utilities and compliance entities. The JUG also requests additional clarification in relation to certain sections of the procedure.*

The JUG appreciates inclusion of the optional nameplate capacity adjustment procedure in the Proposed Changes. The purpose behind the nameplate capacity adjustment procedure is to determine the true gas capacity of non-hermetically sealed GIE to which the user adds and removes gas, in order to more accurately report $SF_6$ emissions and avoid reporting "phantom emissions" due to discrepancies between the nominal gas capacity value stated on the original equipment manufacturer (OEM) nameplate (data plate) and the true gas capacity of the GIE at design operating pressure. Since the gas capacity value is used in the equation to calculate emissions, utilizing the procedure to verify or adjust the GIE gas capacity value will improve the accuracy of reported emissions….

C. The JUG recommends adding the following clarifications to Section 95357.2(a)(1)(C) to confirm the notification would be a one-time, upfront notification of the intent to perform nameplate capacity adjustments with a list of serial numbers for the non-hermetically sealed GIE the procedure is intended to be performed on over time:

(a) **Provide a one-time opt-in notification to** ~~Notify~~ CARB of the intention to perform nameplate capacity adjustments. The provisions of sections 95357.2(b)-(e) will only apply to GIE owners that elect to perform adjustments and that have notified CARB of their intent to do so going forward.

(1) The notification must include:
(A) …
(B) …
(C) ~~The~~ **A list of** manufacturer serial numbers of the **non-hermetically sealed** GIE subject to the nameplate capacity adjustment process per section 95357.2(b).

D. The JUG requests that CARB clarify 95357.2(e) to specify that the revised nameplate capacity value should be utilized beginning in the year the procedure was performed.

(e) For each GIE device whose nameplate capacity was adjusted during the data year, the revised nameplate capacity value must be used **beginning** in **the year the procedure is performed for** all provisions wherein the nameplate capacity is required to be recorded, reported, or used in a calculation in this subarticle unless otherwise specified herein.

E. The JUG requests clarification on the recordkeeping requirements in Section 95356(a)(14) as they relate to the nameplate capacity adjustments procedure:

Given the JUG's recommended edits in part II.A. above to remove the requirement to use the manufacturer temperature/pressure curve, the JUG requests modifying the record keeping requirement in Section 95356(a)(14)(C) to reflect the fact that the manufacturer temperature/pressure curve may not be available:

> (C) Manufacturer temperature/pressure curves for each GIE device subject to nameplate capacity adjustments pursuant to section 95357.2, **if available and used for the nameplate capacity adjustment**.

The JUG also requests clarification on what type of supporting documentation will be acceptable to demonstrate a GIE had compromised integrity, as required in Section 95356(a)(14)(D)….

E. Section 95354(a)(10)(A)(6)

Establishing a "covered insulating gas at activation" (CIGAA) value in 95354 (a)(10)(A)(6) is currently limited to only GIE acquired after 12/31/21 and made active for the first time after December 31, 2021. The JUG recommends broadening this to establish a CIGAA value for GIE already in the inventory that are re-filled with covered insulating gas after performing maintenance, as well as inactive GIE that were installed, filled with gas, and placed into service.

> 6. For GIE acquired after December 31, 2021 and **inactive GIE already in the GIE owner's equipment inventory that are** made active for the first time after December 31, 2021, covered insulating gas at activation shall be calculated as the sum of the values recorded in sections 95354(a)(10)(A)2. and 95354(a)(10)(A)3.b. (pounds). If no covered insulating gas was added to the GIE device per section 95354(a)(10)(A)3., covered insulating gas at activation shall be equal to the value recorded in section 95354(a)(10)(A)2. **For inactive GIE to which covered insulating gas is added to make the GIE active; GIE removed from regular use that is put back into active service; or GIE refilled with covered insulating gas after maintenance that involves replacement of parts; covered insulating gas at activation shall equal the total amount of covered insulating gas added to the GIE starting from strong vacuum and ending at the manufacturer specified operating pressure, calculated per one of the methods in section 95354(b)(1) or 95354(b)(2)**….

(JUG3)

**Comment:**
APU appreciates that CARB has included the ability to improve the accuracy of GIE inventories through the use of nameplate capacity adjustments in Section 95357.2 of the Proposed Rule. Generally, this would allow inaccurate nameplates to be

corrected by charging the piece of equipment to its design capacity, extracting the insulating gas, and measuring the amount of gas recovered. In addition to this method, APU recommends that CARB consider adding an additional method where the nameplate could be adjusted while adding insulating gas back into the GIE. We recommend that the nameplate capacity adjustment be split into two alternatives in Section 95357.2:

(1) Nameplate Capacity Adjustment While Removing Gas
Insert 95357.2(c)(1)-(7)

(2) Nameplate Capacity Adjustment While Filling Gas
(A) Remove all insulating gas from the GIE in accordance with manufacturer requirements.

(B) Weigh the gas container being used to supply the gas, record this value, and add insulating gas to the GIE until reaching the temperature-compensated design operating pressure specified by the manufacturer using the procedures in section 95354(b)(1) or 95354(b)(2).

(C) Record the amount of insulating gas added (pounds), either based on the reading from the mass flow meter, or by weighing the gas container that supplied the gas. The amount of gas added shall be the revised nameplatecapacity for the GIE device.

This would simplify the nameplate adjustment process by eliminating the need to adjust the level of insulating gas in the GIE before beginning the gas extraction process if the GIE would be refilled and returned to service. (Anaheim)

**Comment:**

Discussion

TID supports in its entirety the JUG recommendations on part 2 of the May 26, 2021 comment letter, Nameplate Capacity Adjustments Section 95357.2. TID this is a section that ARB staff and utility personnel should be able address discrepancies in the regulatory language…. (TID3)

**Comment:**

*V. Provide clarity in rule language to indicate that nameplate values adjusted via Nameplate Capacity Adjustment Procedure are not retroactive.*

SCE appreciates the ability and option to adjust nameplate values in Section 95357.2, Nameplate Capacity Adjustments. It is our understanding that the intent of the section is to allow GIE owners to adjust nameplates on GIE acquired prior to December 31, 2021 and that those adjustments would not change or affect historical CARB annual reports. It would be helpful for the rule language to clearly state that the nameplate

capacity adjustment is not retroactive and historical CARB reports are not subject to changes based on the new or updated nameplate capacity.

SCE suggests adding language to Section 95357.2 to clearly state this intent so that there is no confusion in the future.

*Suggested Language – Nameplate capacity adjustments pursuant to Section 95357.2 would take effect in the data year of the adjustment. A GIE owner's prior annual reports would not be adjusted….* (SCE3)

**Agency Response:**
One commenter requested an additional nameplate capacity adjustment methodology that would allow GIE owners to determine a revised capacity based on the amount of insulating gas added to a GIE device to fill it after the gas has been removed. This is slightly different than the methodology CARB staff proposed in the first 15-day Public Notice. That methodology states that GIE owners that elect to undertake the process to add $SF_6$ to the GIE device are required to fill it to manufacturer pressure-temperature specifications, then recover gas from GIE to determine their true capacity. CARB staff's proposed method was based on recommended methodologies provided by the $SF_6$ and Alternatives Coalition, which represents 17 members who are producers and distributors of $SF_6$ and $SF_6$ alternatives, manufacturers of gas-insulated equipment, and a California utility. While the proposed methodology may work, adding one nameplate capacity adjustment methodology as included in the first 15-day Public Notice, in addition to the existing opportunity to work with the manufacturer to adjust the nameplate, was sufficient. For this reason, CARB staff has not added this methodology to the second 15-day Public Notice.

One commenter recommended broadening the requirement to calculate "covered insulating gas at activation" to cover inactive GIE already in the GIE owner's possession that are made active for the first time after December 31, 2021, and to cover active GIE already in the GIE owner's possession that are re-filled after maintenance. CARB staff set this specification so that this provision will apply on a prospective basis based on the anticipated effective date of the amendments. Further, the new nameplate capacity adjustment process could be applied to these "existing" GIE, making such a change unnecessary. As such, CARB staff did not implement the suggested revision.

One commenter raised several concerns with GIE owners providing CARB "one-time" notifications regarding intent to perform nameplate capacity adjustments instead of a "system-wide" notification. Commenters suggested revisions in several locations throughout section 95357.2 to clarify that the notification is "system-wide." CARB staff does not intend for GIE owners to provide a notification each time capacity of a GIE device is to be revised. Section 95357.2(a) of the first 15-day Public Notice specifies that GIE owners must notify CARB of the intention to perform nameplate capacity adjustments, and section 95357.2(a)(1)(C) specifies the notification must include the serial numbers of the GIE that will undergo the nameplate capacity adjustment process, which are limited according to the criteria in sections 95357.2(b) and 95357.2(b)(1)-(4). Per section 95357.2(b), GIE owners that elect to perform the process must do so on all subject GIE the first time each device is removed from regular use or undergoes maintenance activities that require opening the gas compartment. Sections 95357.2(a) and 95357.2(a)(1)(C) are sufficiently clear that the Regulation requires a single notification to cover all applicable GIE that fit the criteria, and so the proposed revisions throughout section 95357.2 to clarify that this is the case have not been incorporated.

One commenter stated that GIE owners will have no way of knowing if a GIE device's nameplate capacity is accurate or not prior to undertaking the process, and noted in some cases the manufacturer's capacity will prove to be accurate. CARB staff agrees, but nonetheless elected to require the GIE owner use the revised value for reporting purposes regardless of how close it is to the manufacturer's nameplate capacity. This is because the GIE owner would have already performed the adjustment process, and use of the revised value will ensure the capacities used under the Regulation are as accurate as possible. The first 15-day Public Notice specified that, if the GIE owner opts to do nameplate adjustments, they have to do it for all applicable GIE per the exemptions specified in sections 95357.2(b) and 95357.2(b)(1)-(4). Nameplate capacities can be overstated, resulting in "phantom emissions," and can also be understated, resulting in "phantom reductions." Therefore, the Regulation requires objective criteria that every GIE owner who opts to do nameplate capacity adjustments must apply. If GIE owners were allowed to pick and choose which GIE to apply this to, there is the risk of inconsistent results across

regulated entities, or GIE owners only performing nameplate capacity adjustments when they anticipate it will benefit them.

Commenters requested changes to the reporting requirements including that the nameplate capacity section be revised to require the GIE owner notify CARB of any capacity adjustments made during the data year, including both the original and revised value, and that the nameplate capacity adjustment process not be retroactive. Regarding the annual notification of capacity adjustments and associated reporting requirements, CARB staff does not find the changes to be necessary because the Regulation already requires this information be reported. The revised capacity is required to be reported as part of the annual report pursuant to section 95354(a)(8) of the first 15-day Public Notice (via section 95355(a)(5)), while the original capacity would have been reported the prior data year. Regarding retroactivity, CARB staff agrees nameplate capacity adjustment values should not be applied retroactively, requiring re-submittal of prior year reports. Section 95354(a)(8)(A) states the reported nameplate capacity must reflect the latest value specified during the data year. As such, no changes were made in response to this request.

Commenters requested elimination of the requirement to retain the manufacturer temperature/pressure curve if other manufacturer specifications were used to perform the nameplate capacity adjustment, and requested clarification on the type of supporting documentation CARB staff would accept to demonstrate compromised integrity. CARB staff agrees the manufacturer temperature/pressure curve need not be retained if it was not used to perform nameplate capacity adjustments, with the caveat that whatever materials were used to perform the adjustment should be retained. This requirement has been clarified in the second 15-day Public Notice. Regarding the request for clarification on the type of supporting documentation CARB staff would accept to demonstrate compromised integrity, the final Regulation requires GIE owners that elect to perform nameplate capacity adjustments, but find that the GIE device has compromised integrity, to provide "Supporting documentation to demonstrate that the GIE device had compromised integrity." CARB staff anticipates that there could be any number of reasons for compromised integrity, and refrained from specifying the type of documentation required in order to allow sufficient flexibility for GIE owners to provide the types of supporting documentation that are relevant to their particular analysis. The commenter did not suggest what type of supporting documentation to specify. For these reasons, no changes have been made to the Regulation in response to this comment.

Commenters proposed removal of the word "precision" to describe pressure and temperature gauges in section 95357.2(c)(1). Commenters also requested the first 15-day Public Notice's stipulation that "GIE that fall into the categories listed…are exempted from this requirement" be changed to "GIE that fall into one or more of the categories listed." Finally, commenters requested the first

15-day Public Notice's stipulation that the notification include "The manufacturer serial numbers of the GIE subject to the…process" be changed to "A list of the manufacturer serial numbers of the non-hermetically sealed GIE…." The rationale for removal of "precision" was that this term added no particular meaning to industry and could lead to different interpretations among regulated entities. In the second 15-day Public Notice, the word "precision" has been removed. CARB staff determined the other revisions requested are unnecessary because the provisions are sufficiently clear as written. The Regulation does not need to specify that the serial numbers be provided in list form, and it is clear from section 95357.2(b) that only non-hermetically sealed GIE are eligible for the process.

**A-12. Revise the Enforcement Provisions**

**Comment:**
The second major issue is that the modified enforcement provisions in the Proposed Changes do not sufficiently address the JUG's concern about excessively punitive enforcement….

III. Enforcement Provisions

*The JUG recommends amending Section 95359 to provide consistent, fair, and reasonable enforcement provisions.*

The JUG appreciates CARB's Proposed Changes to the Enforcement Section §95359(b). These changes revert back to the previous rule language which provided clear authority, and adequate deterrence, for CARB to enforce any violation of the rule—be they emissions, reporting, or recordkeeping.

The JUG believes that our originally requested changes to paragraphs (c) and (d) are still necessary. As currently proposed, sections (c) and (d) are unnecessarily punitive, as even a minor error has the potential to result in exorbitant fines due to the "per MTCO2e" language and the multiplier of the $SF_6$ GWP, as explained below.

The focus of section (c) is the annual emission limit, and the focus of section (d) is the unauthorized acquisition of a $SF_6$ GIE. CARB has adequate enforcement penalty authority without needing the per tonne equivalent multiplier. The JUG understands that CARB wants the penalty structure to be consistent with the Cap-and-Trade Program and the Mandatory Reporting Regulation (MRR), but is deeply concerned that factoring in the multiplier of $SF_6$ GWP could lead to excessively punitive results, rendering even small infractions subject to very large potential penalties. Such a regulatory structure would be counterproductive, and would not serve the regulated community, or CARB, in implementation.

If it were determined that a single 'small' GIE containing 30 lbs. of $SF_6$ were to be acquired without an approved Phase-Out Exemption or proper failure notification, the

potential penalty calculation, based on the value of $SF_6$ GWP referenced in the ISOR[30], could be as follows:

30 lbs of $SF_6$ x 22,800 GWP x (mt/2,205 lbs) = ~310 violations/day/mtC02e

Depending on the assumed per day penalty, which could be up to $5,150 per violation per day[31], and if the determination was made six months after acquisition, the maximum potential penalty based on this understanding would be approximately ***$287,000,000***. If the timing, quantity of GIEs, or size were increased, this number would be even more ridiculous. The JUG believes this is excessive, unnecessary and should be changed. If the annual limit were violated, then there could be a 365-day multiplier leading to similarly unrealistic potential penalties.

The unique nature of $SF_6$ is why these regulations are being promulgated, but there should also be recognition that such a GWP multiplier doesn't work on the enforcement side. The JUG urges CARB to exercise its discretion here to ensure the regulation is clear and does not result in unreasonable outcomes.

As such, the JUG proposes the following limited, yet important, additional modifications:

> (c) ~~Each MTCO2e~~ **An** exceedance of the emission rate limit for a data year prior to 2020 or to the emissions limit for data year 2021 and beyond shall constitute a single, separate violation of this subarticle for each day of the calendar year.
>
> (d) Any acquisition of an $SF_6$ GIE device after the dates provided in Table 1 and Table 2 shall constitute a single, separate violation of this subarticle for each day the GIE owner is in possession of the device ~~and for each MTCO2e of covered insulating gas at activation, in that device, or that the device is designed to contain,~~ unless it was acquired pursuant to one of the exceptions noted in section 95352(a)(1-4)….

VI. <u>Reporting Requirements</u>

> *The JUG requests that CARB modify Section 95355 to include a period of time in which errors can be corrected after submission of the annual report without enforcement action, similar to the Mandatory Reporting Regulation (MRR).*

Based upon the statement by CARB (via a teleconference with JUG) on May 19, 2021, it is the JUG's understanding that although sections 95355(c) and 95355(c)(1) have been removed from the Proposed Changes, reporting entities may still submit revised SF6 reports to CARB upon determination of correctable errors on previously submitted reports. The JUG requests conformity of this regulation to that of CARB's

[30] https://ww3.arb.ca.gov/regact/2020/sf6/isor.pdf
[31] https://ww2.arb.ca.gov/sites/default/files/2020-06/2019_Annual_Enforcement_Report.pdf

MRR which explicitly recognizes the ability to amend a report's correctable errors within a specific timeframe without penalty of enforcement.

The JUG acknowledges that the $SF_6$ regulation does not have a verification period as the MRR program does, but believes that a similar approach would be appropriate. Below are the relevant sections of the MRR as an example:

> Section 95131 (b)(9): Emissions Data Report Modifications. As a result of data checks by the verification team and prior to completion of a verification statement(s), the reporting entity must fix all correctable errors that affect covered emissions or covered product data in the submitted emissions data report, and submit a revised emissions data report to ARB.
>
> Section 95107(c): ARB will not initiate enforcement action under this subparagraph until after any applicable verification deadline for the pertinent report…. (JUG3)
>
> **Agency Response:**
> The commenter requested CARB staff include a period of time in which errors could be corrected after submission of the annual report without enforcement action. The commenter acknowledged the $SF_6$ Regulation does not have a verification period as the MRR does, but requested a similar approach be added. Under the MRR, covered entities have the opportunity to address errors in the report after the reporting deadline but prior to the passage of the verification deadline. Unlike the MRR, the $SF_6$ Regulation does not require third party verification, or have a similar "verification deadline," and CARB staff is not a third-party verifier. All annual $SF_6$ reports are required to be certified as "true, accurate, and complete" by the time the report is submitted to CARB and CARB staff expects this to be the case. As such, any errors not addressed by the reporting deadline could result in enforcement action. No change has been made in response to this request.
>
> The commenter stated sections 95359(c) and (d) of CARB staff's first 15-day Public Notice were unnecessarily punitive and suggested changes to remove the stipulation that a separate violation be assigned per $MTCO_2e$. For section 95359(c), the use of $MTCO_2e$ is consistent with other CARB Regulations and is appropriate so that penalties may be scaled based on the magnitude of the impact of those emissions. CARB's MRR also covers multiple GHGs, and similar language exists in section 95107(c): "Each metric ton of $CO_2e$ emitted but not reported as required by this article is separate violation." As such, the "Each $MTCO_2e$ exceedance" language is retained in the final Regulation. However, the second 15-day Public Notice did remove the "each day" provision that was included in section 95359(c) of the 45-day Public Notice because exceedances may be the result of a discrete event that did not last for the full 365 (or 366)-day data year.

The commenter requested section 95359(d) be revised such that acquisition of an $SF_6$ GIE device after the dates provided in Table 1 and Table 2 no longer constitute a single violation for each $MTCO_2e$ of capacity and each day the GIE owner is in possession of the device, instead recommending a single violation for each day the GIE owner is in possession of the device only. An example was provided demonstrating the maximum fine for unauthorized acquisition of an $SF_6$ GIE device. No changes have been made in response to this comment. The final Regulation prohibits the acquisition of $SF_6$ GIE for use in California after prescribed phase-out dates and offers GIE owners flexibility to acquire $SF_6$ GIE after the phase-out under certain conditions via the $SF_6$ phase-out exemption and notification provisions. Because the phase-out prohibits the acquisition of $SF_6$ GIE following the applicable phase-out date, it follows that violations will be enforced on a "per $MTCO_2e$" basis in order to capture the magnitude of the harm that could be caused by this equipment if a release occurs. Further, a per-day penalty for violations of the phase out requirement is necessary because the risk of $SF_6$ emissions from $SF_6$ GIE acquired in violation of the Regulation increases the longer a device is in California. In summary, CARB staff considers it appropriate to assign penalties for violation of the phase-out requirement based on the number of days the $SF_6$ GIE device remains in the GIE owner's possession after the date it was acquired in violation of the Regulation, as well as the amount of covered insulating gas. Therefore, it is appropriate to assign a separate violation per day and per $MTCO_2e$ of covered insulating gas at activation in that device or that the device is designed to contain.

**A-13. Revise the Definition of Tare Weight**

**Comment:**
Tare Weight

We recommend revising the definition of Tare Weight to be more accurate, as follows:

"Tare weight" means the weight of an empty gas container ~~that when subtracted from the gross weightyields the amount of gas in the gas container~~, not including the container cap…. (SF6&AltCoal2)

**Agency Response:**
The commenter requested changes to the definition of "Tare Weight" but did not provide a justification for the change. CARB staff has not incorporated this change because a justification was not provided and the original definition is clear with respect to how the term is to be defined and used in the Regulation.

**A-14. Streamline VOC Permitting Requirements for Non-$SF_6$ GIE**

**Comment:**
*VI. Add $SF_6$ alternative gases with low maximum incremental reactivity VOC-exempt compounds lists.*

SCE anticipates significant implementation and annual operating costs for GIE owners associated with local air district permitting for equipment containing $SF_6$ alternative gases (NOVEC, etc.) that CARB may not have considered in the economic analysis.

A Permit to Construct/Operate is required prior to building, erecting, installing, altering, or replacing any equipment that has a potential to emit air contaminants. $SF_6$ alternative gases contain volatile organic compounds (VOC). South Coast Air Quality Management District Rule 102 defines VOC as any volatile compound of carbon, excluding exempt compounds and a list of excluded compounds[32]. For example, NOVEC 4710 is volatile, contains carbon, and its main component (2,3,3,3-tetrafluoro-2-(trifluoromethyl)-Propanenitrile [CAS 42532-60-5; C4F7N]) is not specified as an exempt compound. The relevant federal regulation (40 CFR 51.100) clarifies the definition of VOC to specify such compounds must participate in atmospheric photochemical reactions. As a heptafluoro-iso-butyronitrile, it is likely that the main component of NOVEC 4710 has negligible photochemical reactivity; however, since it has not been listed as an exempt compound by CARB[33], the U.S. Environmental Protection Agency or local air districts, it would be considered a VOC and would therefore be subject to local air district permitting requirements.

The costs associated with permitting each GIE unit can vary widely among local air districts. Depending on how each air district decides to categorize the unit, the fees to obtain a Permit to Construct could be between $1,850 to $4,700 per unit, plus staff or consultant labor hours to prepare and submit the permit to construct. After that, there are annual fees associated with the Permit to Operate.

These local permitting costs could add to the mounting costs associated with switching to new, technologies versus the existing, proven $SF_6$ technologies on the electric grid (such as the costs of pilot programs, labor for retrofit, premium costs over existing technologies, training employees on new technologies, etc.). The cost burden will fall on the shoulders of customers.

To minimize barriers to adoption of alternative $SF_6$ technologies and to minimize cost impacts to customers, we request that CARB, in close collaboration with GIE owners and manufacturers, work with U.S. EPA and the air districts to add $SF_6$ alternative gases to their VOC-exempt compounds lists. (SCE3)

**Agency Response:**
The commenter states the alternative gas Novec 4710 will likely be considered a VOC, meaning that installation of a GIE device using this gas would require the owner to obtain costly construction and operation permits. The commenter states that the main component of Novec 4710 likely has negligible photochemical reactivity, meaning it may qualify as an exempt compound; however, jurisdictions that maintain lists of VOC-exempt compounds have not classified it as such. The commenter requests CARB staff collaborate with GIE owners, manufacturers, and these jurisdictions to add $SF_6$

[32] https://www.aqmd.gov/docs/default-source/rule-book/reg-i/rule-102-definition-of-terms.pdf?sfvrsn=4
[33] https://ww3.arb.ca.gov/ei/speciate/voc_rog_dfn_1_09.pdf

alternative gases to their VOC-exempt compounds lists. CARB staff discussed this issue with South Coast Air Quality Management District (SCAQMD) staff to inform them of this potential new use of a VOC. It is CARB staff's understanding that U.S. EPA takes the first step in these matters by performing their own analysis to determine if a specific compound should be added to their VOC-exempt compounds list. This comment is out of scope in that it is not under the purview of this Regulation to address VOC permitting issues or to advocate to U.S. EPA regarding their VOC-exempt compounds list.

If, as the commenter asserts, NOVEC 4710 has negligible photochemical reactivity, it is possible that this compound will be exempted from VOC-permitting requirements by the start of the $SF_6$ phase-out (2025), meaning the permitting costs would be zero. Additionally, CARB staff anticipates most GIE insulated with NOVEC 4710 installed in California will be in high-voltage equipment, which have later phase-out dates, giving even more time for these regulatory agencies to determine the appropriateness of adding NOVEC 4710 to their VOC-exempt compounds list before large quantities of these equipment are installed. Finally, the total cost to purchase a high-voltage NOVEC 4710 insulated GIE device remains uncertain but, based on the ISOR's economic analysis (Table 9), is expected to be at least an order of magnitude higher than the VOC-permitting costs. The costs quoted by the commenter for a permit ($1,850-$4,700) represent a relatively small fraction of the total cost of purchasing one of these pieces of equipment.

**A-15. Provide Implementation Guidance Documents**

**Comment:**

*I. Provide implementation guidance documents, a calculation template and an SF6 phase-out exemption form to facilitate consistency and minimize errors.*

SCE would find significant value in any additional guidance from rulemaking staff during rule implementation, such as a guidance document, which could describe example scenarios and address frequently asked questions. CARB staff has spent a great deal of time describing and clarifying the intent of the rule for stakeholders in meetings and workshops and it would be helpful for this level of understanding to be memorialized for future reference. The regulation is very technical, and we would like to prevent any misinterpretations.

A calculation template or tool to be used for the annual reporting would drive consistency in annual reports among stakeholders while minimizing reporting errors. Lastly, a form, template, or tool to be used when requesting an SF6 phase-out exemption would also help standardize and streamline the process…. (SCE3)

**Agency Response:**

The commenter requested CARB staff provide a calculation template and phase-out exemption request form to help minimize reporting errors and standardize and streamline processes. CARB staff appreciates this input and will

endeavor to make such materials available as part of the implementation steps for the amended Regulation.

**A-16. Enhance Existing Mechanisms to Reduce GHG Emissions and Add New Mechanisms to the Regulation**

**Comment:**

1. …Starting at the end of 2021, require all Gas insulated Switchgear to have a design leak-rate of less than 0.3%. This design leak-rate should be typed tested by a certified independent third party and validated thru post installation field testing.

(Presently there are at least three suppliers that have switchgear that have equipment that has a leak-rate as low as 0.1% and offer a 30 year warranty on the 0.1% leak-rate. Utilities in CA are presently purchasing equipment with leak-rates that exceed 2%)…

3. Require 100% recycle of GWP gases (such as SF6) starting at the end of 2021. (presently all major equipment manufacturers allow for the use of recycled SF6 in their equipment.

4. Each major user of a GWP gas (like SF6) should have a road map to reach a peak inventory prior to 2030 and then have a working plan to reduce their inventory to their 2000 level by 2050.

5. The maximum allowable inventory leak-rate should be 0.5%. The same level that IEEE has recommended for the last 10 years. (The current 1.0% leak-rate is too high when major equipment manufacturers are warranting equipment for 30 years at a 0.1% leakage rate.)

Thank you for your time and interest in this change. We are no longer working to make our use of the GWP gases more "efficient" we are working to "eliminate" the use of all human-made GWP gases. SF6 is the for-ever-GWP gas, it is not a gas that exists in nature, it is only made by humans and lasts in our earth's atmosphere for 3,200 years. (Rak)

**Agency Response:**

The commenter requested each GIE owner's annual emissions limit be reduced to the equivalent of 0.5% of their capacity. Rationale included that modern GIE achieve a leak rate lower than 1.0% per year, citing IEEE recommendations and manufacturer warranty information but without providing links or other public information sources. CARB staff's goal for the proposed Regulation is to set emissions limits such that GIE owners of all sizes would be held to stringent but reasonable limits on emissions. While it is beneficial to hear that manufacturers are providing such warranties, CARB staff cannot assume that such lower leak rates apply to the bulk of the $SF_6$ GIE in operation, meaning a reduction from the current Regulation's 1.0% leak rate would not be appropriate. Further, the commenter did not provide any information regarding whether the actual rate

of leaks in the real world would align with the 0.1% leakage rate in the specified manufacturer warranties. In fact, based on data collected under the Regulation, and feedback from smaller-capacity GIE owners, the 45-day Public Notice raised the emissions limit to 2.0% for GIE owners with a system capacity less than 10,000 $MTCO_2e$ because of their demonstrated challenges in complying with a lower emission limit. Because available information demonstrates that a one percent emissions rate is the lowest feasible rate in the current environment, the requested change has not been made.

The commenter requested that additional measures to reduce GHG emissions be added to the Regulation, including 100% recycling of covered insulating gases, and establishing a road map to reach peak GHG capacity by 2030 and/or reduce capacity to the 2000 level by 2050. CARB staff appreciates these innovative suggestions and could explore these as part of a future rulemaking. However, such significant changes are not appropriate for the second 15-day Public Notice given the level of revision they would entail, and the lack of time and data to adequately explore them. Also, the 45-day Public Notice does not specify whether GIE owners must recycle covered insulating gas, or mandate a fixed date by which GIE owners must reach peak inventory. Therefore, this portion of the request is out of scope.

## VI. Summary of Comments Made During the Second 15-Day Comment Period and Agency Response

Chapter VI of this FSOR contains all comments submitted during the second 15-day comment period that were directed at the second set of proposed 15-day changes together with CARB's responses. The 15-day comment period commenced on June 18, 2021 and ended on July 2, 2021. Written comments were received during the second 15-day comment period in response to the June 19, 2021 Second Notice of Public Availability of Modified Text. Listed below are the organizations and individuals that provided comments during the second 15-day comment period, the date and form of their comments, and the abbreviation assigned to each. The dates in the table below are the dates that feedback was received, which for written testimony is the date it was "Added to Database" in the rulemaking comment log.

Note that some comments which follow were scanned or otherwise electronically transferred, so they may include minor typographical errors or formatting that is not consistent with the originally submitted comments. However, all content reflects the submitted comments. All originally submitted comments are available here: https://www.arb.ca.gov/lispub/comm/bccommlog.php?listname=sf62020.

| Abbreviation | Commenter |
|---|---|
| CFMV | Robert Mayo, Carbon Free Mountain View<br>Written Testimony: 6/29/2021 |
| JUG4 | Fariya Ali, Joint Utilities Group<br>Written Testimony: 7/02/2021 |

| Abbreviation | Commenter |
|---|---|
| LADWP3 | Katherine Rubin, Los Angeles Department of Water and Power<br>Written Testimony: 7/02/2021 |
| SCE4 | Tammy Yamasaki, Southern California Edison<br>Written Testimony: 7/02/2021 |
| sPower | David A. Tong, Peacock, Piper, Tong + Vos LLP<br>Written Testimony: 7/02/2021 |

## A. SUPPORT FOR PROPOSED REGULATION

### A-1. General Support for the Proposed Amendments

**Comment:**
The public has an interest in seeing the phase-out of SF6 GIE proceed as rapidly and smoothly as possible, and for California to serve as a role model in this regard…. (CFMV)

**Comment:**
While sPower is concerned with the phaseout of SF6 and the development of feasible alternative insulators in electricity transmission and distribution equipment, we generally support the proposed amendments, as specified in the Second Notice…. (sPower)

**Comment:**
Conclusion

The JUG reiterates its support of the objective of this rulemaking to transition California away from the use of high GWP gases. We appreciate the modifications that were included in the Second 15-Day Changes, and we recognize staff's efforts to work with stakeholders throughout this lengthy process…. (JUG4)

**Agency Response:**
CARB staff appreciates the commenters' support.

### A-2. Support for Specific Provisions in the Proposed Amendments

**Comment:**
There are two specific provisions we would like to address, the ability to aggregate emission limits and reporting obligations among related entities…

sPower appreciates and supports CARB's amendments to the SF6 Regulations which would allow the aggregation of Gas-Insulated Equipment (***"GIE"***) into a single GIE

owner for the purpose of calculating total nameplate capacity, and thus annual emissions limits.[34]

These amendments result in more equitable treatment of those enterprises which operate several smaller facilities that are subject to the SF6 Regulations through separate and distinct legal entities, each of which is considered a stand-alone GIE (or GIS) owner. These enterprises' current inability to aggregate their subsidiaries' facilities' smaller nameplate capacity and total annual emissions limit has resulted in those enterprises being treated disparately under the current SF6 Regulations when compared to those businesses which operate larger facilities. Without these amendments, a small leak at a facility with a relatively small nameplate capacity would be treated as a violation, yet a much larger leak at a facility with a larger nameplate capacity would not be a violation.

sPower offers its further support for this amendment as it streamlines and facilitates the reporting obligation for companies which have complex agreement in place among multiple entities for shared GIE. This in turn, will result in the reduction of potential reporting errors.

sPower commends CARB for including these commonsense amendments to the SF6 Regulations and respectfully requests that the board include them in the final version of the amended regulations without any further amendments…. (sPower)

**Comment:**
LADWP appreciates the information provided by CARB staff that approval of the exemption will be based on a "completeness check" of the application package, and that the justifications should be based on bids received instead of searching for what may be available on the market. These clarifications are important to make sure that utilities can successfully apply for and receive an exemption, so that the SF6 Regulation does not undermine the utilities' ability to maintain the reliability of the electric grid….

LADWP appreciates that CARB included the Nameplate Capacity Adjustment procedure in the rule. Use of this procedure will be necessary to correctly report emissions, especially for higher voltage GIE where discrepancies ranging from 40 to 360 pounds between the actual gas fill amount and the manufacturer estimated gas capacity have been encountered. Such discrepancies will result in false emissions, and could cause an exceedance of the one percent (1%) annual emission limit…. (LADWP3)

**Comment:**
The rulemaking to modify the Sulfur Hexafluoride ($SF_6$) regulation has been a lengthy and complex process, and the JUG recognizes staff's efforts to work constructively with stakeholders to develop amendments that phase out the use of $SF_6$ in a manner

[34] The relevant, proposed amendments can be found at page 5 (*amended definition of "Gas-Insulated Equipment Owner" or "GIE Owner"*) and page 17 (*amended Section 95353(i), "Combining GIE Owners."*) of the Second Notice, respectively.

that is technically and practically feasible. These Second 15-Day Changes incorporate modest but critical changes that properly recognize the gas insulated equipment (GIE) owners' expertise in decisions concerning the safe and reliable operations of their equipment by converting the phaseout exemption process into an administrative completeness review. The JUG would like to express our appreciation for CARB making this important change and believes it is the direct result of our ongoing collaboration with staff….

The JUG supports the modification to section 95357(i)(2)(F) for the GIE owner to provide an explanation for the cause of the failure and/or the circumstances that led the GIE owner to believe a GIE failure is imminent and needs to be replaced for reliability reasons. For example, an imminent failure may be based on classification of a GIE device as "failed" due to compromised reliability as demonstrated by the device's failure of one or more critical operational or diagnostic tests, or manifestation of symptoms indicating the device is ready to fail….

The JUG appreciates and supports the changes made to the gas cart requirements in section 95354(f), and the option to use either the temperature/pressure curve or other GIE manufacturer-provided materials to verify the GIE is at the proper operating pressure at the beginning of the Nameplate Capacity Adjustment procedure…. (JUG4)

**Agency Response:**
CARB staff appreciates the commenters' support.

## B. OPPOSITION TO THE PROPOSED REGULATION

### B-1. Revise the Phase-Out Schedule and Exemption Process

**Comment:**
However, the JUG remains deeply concerned that several aspects of the proposed regulation are unclear or technically impractical, which could jeopardize the regulation's successful implementation. The JUG recognizes that at this stage in the rulemaking, CARB may not have the ability to make further revisions to the proposed regulation text. Nevertheless, the JUG believes it is essential that these additional issues be addressed in order to have a workable regulation. If CARB determines it is infeasible to modify the proposed regulation text, the JUG urges CARB to provide express clarification in the Final Statement of Reasons (FSOR) and/or commit to an enforcement stay until the regulation can be reopened, as may be needed. The JUG also recommends convening a working group to work through implementation issues for technical aspects of the regulation and identify additional regulatory guidance that may be needed.

Topics addressed in this comment letter are as follows:

I. Phase-Out Exemption Process and Failure Notification
II. Nameplate Capacity Adjustment Procedure

II. Enforcement Provisions
IV. Other Clarifications
    A. Calculating Annual Emissions
    B. Covered Insulating Gas at Activation
    C. Corrections to Annual Reports

The convention used to present the JUG comments is bold blue text (e.g. **addition**) to note recommended additions to the regulatory language and red text with strikeout (e.g. ~~deletion~~) to note recommended deletions. Italic font (e.g. *addition* or ~~*deletion*~~) notes modifications made by CARB in the Second 15-Day Changes. Ellipses (…) indicate additional text in the regulation that the JUG is not making recommendations on.

I. Phase-out Exemption Process and Failure Notification

*The JUG believes that Section 95357 should be revised to clarify the requirements to obtain an exemption and to meet CARB's stated intent to create a process that acknowledges utility operators' role in maintaining grid reliability and managing their systems.*

A. Aligning the Intent of Revisions to Section 95357 with the Regulatory Language

The JUG appreciates CARB's recognition of the importance of ensuring that utility personnel have the appropriate discretion to exercise their expertise regarding the safe and reliable operation of GIE. The provisions of section 95357 ($SF_6$ Phase-Out Exemption and Failure Notification) were designed to provide GIE owners with the ability to continue to use GIE equipment that utilizes $SF_6$ in instances where it is not feasible to replace or repair $SF_6$ equipment that is either failing or nearing the end of its useful life, with a non-$SF_6$ alternative. In the Notice,[35] Staff clarifies that "Section 95357(f) is modified so that the Executive Officer will approve a phase-out exemption request once it is deemed complete."

However, based on JUG's reading of the released regulation language, the corresponding revisions to section 95357(f) do not provide the necessary clarity to accurately reflect this stated intent and ensure that the purpose set forth in the Summary of Proposed Modifications can be carried out unambiguously. For that reason, the JUG suggests that section 95357(f), as proposed in the Attachment A to the Notice, be revised to reflect the stated intent as shown below, or that the FSOR specify these express clarifications:

> (f) Within 45 days of submittal, the Executive Officer shall notify the submitter that their application is **either** complete, **in which case the submitter's phase-out exemption request shall be deemed approved,** ~~*and has been approved*~~,

[35] Second Notice of Public Availability of Modified Text, Proposed Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear, dated June 17, 2021, p. 3.

or that additional information and/or clarification is necessary to complete the application. Upon receipt of additional information and/or clarification pursuant to section 95357(d)(8)(E) from the submitter, the Executive Officer will perform the actions specified in this subsection within 45 days.

…

The corresponding change to section 95357(d)(8)(E) should also be added as follows:

(E): Within the timeframe specified in section 95357(f), if the Executive Officer determines that the information provided as part of the exemption request is insufficient to serve as the basis for an exemption under this section, s/he may request additional information and/or clarification related to sections 95357(c) and 95357(d) prior to the application being deemed complete *and approved* pursuant to section 95357(f)**; if no additional information is needed to complete the request, the submitter's phase-out exemption request shall be deemed approved.**

…

B. Removing Ambiguous and Unclear Provisions in Section 95357 (d)(5)(C)

The JUG remains concerned that the provisions in section 95357 (d)(5)(C) which would require a GIE owner to include in the phase-out exemption request a "description of the universe of entities eligible to bid," are ambiguous and unclear. Section 95357 (d)(5)(C) includes examples and identifies a public solicitation or qualified vendor list; we believe these examples provide the level of detail and certainty necessary for the GIE owner to comply. However, requiring the submission of the "universe of entities" lacks the necessary level of clarity needed to ensure that the GIE owner can comply. As such, the "universe of entities" reference is vague and ambiguous and would not comply with the clarity standard for regulations set forth in 1 CCR 16. To remedy this issue, the JUG requests that CARB correct this section, as shown below. If these changes are not possible within CARB's rulemaking timeframe, then the FSOR must clearly state that a copy of the GIE owner's public solicitation criteria or qualified vendor list is sufficient to describe the "universe" of entities eligible to bid.:

(C): A **copy of the GIE owner's public solicitation criteria or qualified vendor list from which the GIE owner is authorized to purchase GIE** ~~description of the universe of entities eligible to bid based on the bidding process used by the GIE owner (e.g., public solicitation, qualified vendor list)~~;

…

C. Removing Information Not Germane to Reason for Phase-Out Exemption Request from Section 95357(d)(8)

The JUG believes that some of the informational requirements in section 95357(d)(8), as set forth below, are redundant, unnecessary, confusing, and burdensome. For example, 95357(d)(8)(D) states "… the justification must also provide an explanation as to how the GIE owner will address the situation to enable the transition to non-$SF_6$ alternatives in a timely manner" which is the same information required in 95357(l)(1). As such this requirement is redundant and should be removed. To streamline the informational requirements for Phase-Out Exemptions, remove requests for information that are not germane to the specific request or redundant, and ensure that all relevant information is provided, the JUG recommends the following revisions. At a minimum, the FSOR should clarify that only relevant information to the circumstances must be submitted, and the exemption justification should be based on the bids received by the GIE owner in relation to the specific projects, locations and/or structure types as noted in 95357(l). These clarifications do not alter the Executive Officer's ability to request additional information if needed.

(d) The $SF_6$ phase-out exemption request must contain the following:

(8) ~~*All*~~ *The* applicable justifications for the exemption, *as follows* **and any relevant supporting documentation. Examples of supporting documentation may include, but are not limited to**:

(A) For exemptions submitted under section 95357(b)(1), ~~*this includes*~~ the specific GIE characteristics (per Tables 1 and 2) that cannot be met by at least two suppliers.

(B) For exemptions submitted under section 95357(b)(2), ~~*this includes*~~ **justification may include** the complete dimensions of each space within which requested $SF_6$ GIE would reside; the complete dimensions of each available non-$SF_6$ GIE that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers; the complete dimensions of the $SF_6$ GIE specified in section 95357(d)(4); and a picture showing the space where the $SF_6$ GIE would be installed. If the dimensions of the non-$SF_6$ GIE are smaller than the dimensions of the space available, but the device cannot be placed into the *space* for another reason (e.g., the space lacks the necessary clearance, another obstacle prevents transport of the device to the space), the justification **may** also include a description of the constraint that clearly demonstrates why the device cannot be placed in the available space.

(C) For exemptions submitted under section 95357(b)(3), ~~*this includes*~~ a list of available non-$SF_6$ GIE that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers and a justification that clearly explains why each of the available non-$SF_6$ GIE identified are incompatible and how the $SF_6$ GIE described in section 95357(d)(4) are compatible.

(D) For exemptions submitted under section 95357(b)(4), ~~*this includes*~~ **justification may include** a list of available non-$SF_6$ GIE that meet the GIE characteristics (per Tables 1 and 2) identified by the equipment manufacturers and a justification that clearly explains why each of the available non-$SF_6$ GIE identified fail to meet the technical specifications and/or the GIE owner's documented safety or reliability requirements, such as failure rates or other indicators of reliability, and how the $SF_6$ GIE described in section 95357(d)(4) do meet the requirements. ~~If failure rates or other indicators of reliability are used, specific details must be provided. If the GIE owner's justification cites a company-specific policy or procedure that available non-$SF_6$ GIE do not currently meet and that is within the control of the GIE owner (for example, the company requires three years of testing for new equipment), the justification must also provide an explanation as to how the GIE owner will address the situation to enable the transition to non-$SF_6$ alternatives in a timely manner~~.

The JUG appreciates that CARB staff has recognized the importance of the exemption process and has committed to address the JUG concerns. In the interest of ensuring that the regulatory text in fact reflects staff's intent to provide a workable exemption process, the JUG urges CARB to refine the rule language as set forth above…. (JUG4)

**Comment:**
LADWP recognizes the complexities involved in developing the very technical SF6 Regulation and appreciates the many discussions with CARB staff and the changes made to the rule language to address the electric utilities' concerns. Below for your consideration are comments on specific sections in the rule language where additional revisions and clarification in the Final Statement of Reasons would be beneficial.

1) <u>Section 95357: SF6 Phase-out Exemption – need assurance that electric utilities can successfully apply for and receive an exemption to maintain reliability of the electric grid.</u>

With the SF6 phase-out beginning in 2025, LADWP is taking proactive steps to prepare for the phase-out. Reliability of the electric grid is essential to public health and safety, so any new circuit breaker technology needs to be thoroughly tested to ensure it will operate reliably prior to installing it in the electric grid. LADWP is partnering with the Electric Power Research Institute (EPRI) to conduct testing on non-SF6 technology circuit breakers from at least two manufacturers, after the non-SF6 circuit breakers become commercially available (which is expected a few years from now).

Until such time as the non-SF6 technology can meet LADWP's needs, we have to depend on the exemption and failure notification process to maintain LADWP's transmission and distribution substations which currently rely on SF6 gas-insulated equipment (GIE).

The exemption goes hand-in-hand with the SF6 phase out and therefore should be workable and not place an unreasonable burden on utility staff to obtain an exemption. Reliability of the electric system will hinge on the exemption process to satisfy the electric system needs. LADWP owns & operates 25% of the transmission lines in California. Operation of LADWP's electric grid currently depends on more than 2,000 pieces of SF6 gas-insulated electrical equipment to manage the flow of electricity through the system. LADWP needs assurance that if we apply for an exemption to replace a piece of SF6 GIE, the exemption will be granted.

To provide this assurance, LADWP supports the Joint Utility Group (JUG) comments to clarify the exemption rule language…. (LADWP3)

**Comment:**
Furthermore, given the urgent nature of the climate crisis and the special role California has in accelerating the deployment of technologies, we encourage you to aggressively push this phase-out as fast as possible and consider shortening the phase-out periods. (CFMV)

**Agency Response:**
One commenter encouraged CARB staff to consider shortening the phase-out periods. However, alternative dates or any information or data that demonstrated what those dates should be were not provided. As discussed in the ISOR, to develop the phase-out schedule, CARB staff followed a rigorous process that reflects feedback from manufacturers and regulated entities. This process considered technical availability of non-$SF_6$ GIE alternatives, cost and supplier considerations, and the need for testing by GIE owners. CARB staff consulted with more than ten manufacturers currently developing non-$SF_6$ GIE to learn when their products are expected to be commercially available. During this more-than-year-long process, manufacturers shared their product development schedules with CARB staff, and the portions of that information CARB staff was able to make public are included on pages 23-26 of the ISOR or on manufacturer websites. In some cases, for example belowground GIE with a voltage capacity less than or equal to 38 kV and short-circuit current rating greater than or equal to 25 kA, manufacturer-provided dates aggregated equipment types in a way that did not address specific product concerns raised by stakeholders, and CARB staff instead used date information provided by GIE owners about the expected availability of non-$SF_6$ GIE that would work on their specific systems. CARB staff structured the categories of GIE characteristics based on stakeholder comments during the informal public process that preceded the formal rulemaking, as well as data collected from the manufacturers, resulting in specific dates that varied by voltage level, short circuit current ratings, and whether the device would be used above- or below-ground.

To ensure that there would be a competitive marketplace for non-$SF_6$ GIE that would facilitate reasonable price-setting for these non-$SF_6$ GIE, and in response

to stakeholder comments, CARB staff based all the phase-out dates proposed in the Regulation on the dates when two or more manufacturers stated that each specific type of non-$SF_6$ GIE will be available, plus three years for GIE owners to test the GIE in their operations. This three-year testing window is based on stakeholder feedback, received during the informal rulemaking process, that three years is the most typical amount of time organizations require to ensure that new products are safe, reliable, and deployable. Regulated entities also informed CARB that their capital planning cycle is typically three to five years. As such, given timing of the regulatory process, the final Regulation sets the first phase-out date to be no sooner than January 1, 2025 to accommodate this timeline. Based on this and the rigor and transparency of the process staff followed to develop the phase-out schedule, CARB staff did not incorporate any requested changes to the schedule.

One commenter stated they need assurance that exemption requests submitted to replace $SF_6$ GIE will be granted. Another stated CARB staff's revisions to section 95357(f) in the second 15-day Public Notice do not provide the necessary clarity to accurately reflect CARB staff's stated intentions therein that a phase-out exemption request will be approved once deemed complete. The commenter suggested replacing "…the Executive Officer shall notify the submitter that their application is complete and has been approved" with "…the Executive Officer shall notify the submitter that their application is either complete, in which case the submitter's phase-out exemption request shall be deemed approved, or…" in section 95357(f) and addition of "if no additional information is needed to complete the request, the submitter's phase-out exemption request shall be deemed approved" to section 95357(d)(8)(E).

In response to comments received on the first 15-day Public Notice that CARB staff may second guess decisions reached by GIE owner experts, sections 95357(f) and 95357(d)(8)(E) were modified in the second 15-day Public Notice. These changes were consistent with stakeholder comments to clarify that CARB staff will review each exemption request to ensure the requirements of section 95357 have been met, and that if the exemption request is deemed complete per the Regulation's requirements, it will be approved.

One commenter stated that the examples in section 95357(d)(5)(C) provide "the level of detail and certainty necessary for the GIE owner to comply," but finds the provision that a GIE owner provide a "description of the universe of entities eligible to bid" in their exemption request lacks the necessary level of clarity needed to ensure that the GIE owner can comply. The commenter suggested changing this section such that the GIE owner be required to provide "a copy of [their] public solicitation criteria or qualified vendor list from which [they are] authorized to purchased GIE." The commenter requested CARB staff clearly state in the FSOR that a copy of the GIE owner's public solicitation criteria or qualified vendor list is sufficient to describe the "universe" of entities eligible to bid if CARB staff did not incorporate the requested change.

Regarding the "universe of entities eligible to bid," the 45-day Public Notice specified that a GIE owner may apply for an exemption when non-$SF_6$ GIE of the equipment type and GIE characteristics necessary for the particular project(s) or application(s) are unavailable from at least two suppliers, but did not specify the universe of suppliers that must be considered. To address commenter concerns, the first 15-day Public Notice specified in sections 95357(b) and 95357(l) that only those suppliers that submitted bids for the specific project(s) must be considered. CARB staff added a provision requiring GIE owners to submit a "description of the universe of entities that were eligible to bid based on the bidding process used by the GIE owner (e.g. public solicitation, qualified vendor list)." Regarding the requested clarification, a simple description of the entities eligible to bid in the GIE owner's process will satisfy this requirement. In regard to the commenter that suggested that CARB staff "clearly state in the FSOR that a copy of the GIE owner's public solicitation criteria or qualified vendor list is sufficient to describe the 'universe' of entities eligible to bid," the suggested documents (copy of the GIE owner's public solicitation criteria or qualified vendor list), are not consistent with the Regulation's requirements of a *description* of the universe of entities that can bid. These examples were included when this provision was added in the first 15-day Public Notice, which is sufficiently clear, and no additional changes are needed.

One commenter requested changes to section 95357(d)(8)(A-D), including that the items listed be considered examples instead of requirements, and the deletion of the last two sentences from section 95357(d)(8)(D). The commenter also requested only information relevant to the circumstances be submitted, and the justification be based on the bids received.

Regarding the request that the items listed in sections 95357(d)(8)(A-D) be considered examples, the Regulation specifies the information that is needed to support each exemption type and specifies where that information would come from (bids received by the GIE owner plus information on the GIE owner's own operations). There are four types of exemption requests, and each must be supported through submittal of information specified in the appropriate section from 95357(d)(8)(A-D). The final Regulation specifies that these sections list the specific materials that GIE owners must provide to CARB, and each section references the section number of the corresponding phase-out exemption category. The information in each subsection must be provided in full for exemption requests to be deemed complete. GIE owners are only required to complete the information from whichever one of these four subsections is germane to the specific type of exemption request sought.

Regarding the request that the last two sentences of section 95357(d)(8)(D) be deleted, information about failure rates or other indicators of reliability must be provided so that CARB staff can verify the veracity of the claim with other data and inform future policies. CARB staff also recognizes that company-specific

safety and reliability requirements may be grounds to submit an exemption of this type. However, CARB staff is concerned that GIE owners could use this justification in perpetuity should they elect not to perform the testing required under their company-specific policy or procedure. As such, the requirement to provide an explanation as to how the GIE owner will address the situation to enable eventual transition to non-$SF_6$ alternatives has been retained.

Regarding the request that the justification for an exemption be based on bids received, CARB staff agrees. While this is CARB's intent, changes have not been made, because CARB staff finds sections 95357(b) and 95357(l), which state "based on bids received" and "a GIE owner who wishes to use a phase-out exemption…shall base the information required in section…95357(d)(8)…on bids received," respectively, to be sufficiently clear.

One commenter stated, "The provisions of section 95357…were designed to provide GIE owners with the ability to continue to use GIE equipment that utilizes $SF_6$ in instances where it is not feasible to replace or repair $SF_6$ equipment that is either failing or nearing the end of its useful life, with a non-$SF_6$ alternative." CARB staff notes the failure notification process specified in sections 95357(i-k) can only be used in the case of a "Failure" as defined in section 95351(a). This provision does not apply to GIE "nearing the end of its useful life" more broadly, as CARB staff would expect that GIE owners will continue to plan for retirement of equipment as they do now for safety and reliability reasons.

One commenter suggested that if the second 15-day Public Notice cannot be modified, CARB staff provide clarification in this FSOR and/or commit to an enforcement stay until the regulation can be reopened. The commenter also recommended CARB staff convene a working group to discuss implementation issues and publish additional regulatory guidance as needed. CARB staff has addressed all the points raised by commenters above and does not consider an enforcement stay to be necessary. The changes incorporated throughout the rulemaking process, consistent with stakeholder comments, grant all GIE owners an opportunity to comply. CARB staff appreciates the commenter's offer to provide feedback on the Regulation through a working group and will engage with stakeholders, as needed, to develop Regulatory guidance.

**B-2. Extend Failure Notification's Deadline to Provide Date Activated**

**Comment:**
D. Section 95357(i)(2) Failure Notification needs flexibility to accommodate situations where partial but not all, information can be submitted to CARB within 45 days….

The JUG appreciates the recognition that "within 45 days of the failure" is not enough time to purchase, manufacture and ship the replacement GIE device. The revised deadline of "within 45 days of the acquisition of the GIE device used to resolve the

failure" is a more feasible timeframe to report information about the replacement GIE to CARB in most cases. However, in cases where installation is more complex, it may take longer than 45 days to install, test and activate the replacement GIE, as explained below. Some flexibility in the failure notification process is needed to accommodate situations where more time is needed.

The following information will be available to report to CARB once the GIE owner receives the replacement GIE: Date acquired, GIE characteristics, Equipment type, and Manufacturer's serial number. However, it may take longer than 45 days to know the "Date activated", especially for high-voltage GIE that are more complex to install and activate. Many non-hermetically sealed GIE are not "plug and play". Construction work is necessary to remove the old GIE and install the new GIE, which requires scheduling an outage for the affected portion of the substation. If the new GIE does not have the same footprint and configuration as the old GIE, repairs and/or modifications to the foundation and wiring may be needed. After the GIE is installed, it needs to be filled with insulating gas and tested prior to activation. If testing reveals a problem, the GIE cannot be placed into service until the problem is resolved.

The rule needs to accommodate outliers that don't fit within the 45-day timeframe. The JUG believes that 60 days is a reasonable across-the-board deadline to report "Date activated" and urges CARB to revise the deadline to 60 days after the GIE is acquired. Alternatively, CARB could expressly clarify in the FSOR that GIE owners may report available information to CARB within 45 days and provide the remaining information during the notification completeness review process in 95357(k). The JUG recommends revising Section 95357(i)(2) as follows:

> …
>
> (2) Within ~~45~~ **60** days *of* the *acquisition of the GIE device used to resolve the* failure, electronically submit the following information to the Executive Officer for each GIE device acquired…. (JUG4)

**Comment:**

2) Section 95357(i)(2): Failure Notification – may need additional time to report "Date activated" of the replacement GIE to CARB

When an in-service GIE fails and must be replaced for grid reliability, the rule allows for procurement of a replacement SF6 GIE without prior approval from CARB, followed by submittal of information about the replacement GIE to CARB. LADWP appreciates this Failure Notification process because it enables the GIE owner to address the failure and order the replacement GIE as quickly as possible, which may take months to be manufactured and delivered. LADWP appreciates CARB recognizing this and revising the date to submit the list of specific information about the replacement GIE to CARB from "within 45 days of the failure" to "within 45 days of the acquisition of the GIE device used to resolve the failure".

The list of information to be reported to CARB includes the date the replacement GIE was activated or placed in service. In some cases, it may take longer than 45 days to install, test, and activate the replacement GIE, especially in high voltage stations. Installing the replacement GIE requires scheduling an outage to remove the failed GIE and install the replacement GIE, and may require repairs to the foundation or modifications to the wiring. The outage is especially important for safety of the electrical station construction and maintenance crews while working in a high voltage station. It is difficult to schedule an outage during periods of heavy demand on the electric system, which may delay installation of the replacement GIE.

Once the replacement GIE is delivered, the 45-day clock starts to submit the list of specific information about the replacement GIE, including "Date activated", to CARB. If the replacement GIE is still in the construction and testing process, most of the information on the list can be submitted to CARB within 45 days but "Date activated" will not be known. LADWP requests clarification whether it is acceptable to submit the available information within 45 days, and if any items are unavailable, identify the information as unavailable and will be submitted later when it becomes available. If the rule language does not provide this flexibility, LADWP suggests revising the timeframe for submitting the information from 45 days to 60 days as a "non-substantive" change that CARB staff could make before finalizing the rule…. (LADWP3)

**Agency Response:**
Commenters expressed concern with the second 15-day Public Notice's requirement that GIE owners provide certain information to CARB staff within 45 days of acquiring $SF_6$ GIE used to resolve a failure. Commenters requested the Regulation either grant GIE owners 60 days to provide the information, or that CARB staff clarify that GIE owners may report available information within 45 days and the remaining information at a later time, for example, during the completeness review process in section 95357(k). Rationale included that it may take longer than 45 days to install, test, and activate the replacement device, meaning that, for these outliers, the GIE owner would be unable to provide CARB the "date activated," one of the required components of the notification, within 45 days.

In the first 15-day Public Notice, CARB staff replaced the expedited phase-out exemption process with a failure notification process, which included a new requirement that the GIE owner provide CARB staff certain information within 45 days of the failure to allow the GIE owner to substantiate and justify their use of the notification process, and to give CARB staff needed visibility regarding that justification. The information included the date the replacement GIE device was acquired and activated; the replacement GIE characteristics (as defined in the Regulation), equipment type, and serial number; an explanation of the cause of the failure; and the appropriate attestation statement from section 95355(c). In response to comments received during the first 15-day comment period, CARB staff changed the deadline to 45 days from "acquisition of the GIE device used to resolve the failure" in the second 15-day Public Notice.

CARB staff appreciates the specific recommendation to change the 45 days in this provision to be 60 days. CARB staff was not able to make a substantive change like this after the second 15-day Public Notice, and has not changed the deadline in the final Regulation. However, as requested, CARB staff clarifies that, in the atypical situation where a GIE owner is unable to activate the GIE device within 45 days of acquisition, the GIE owner could provide an estimated date of acquisition to comply with section 95357(i)(2)(B).

**B-3. Revise GIE Gas Handling Procedures**

**Comment:**
SCE appreciates the dedication of the CARB Staff over the past several years to learn and understand the unique challenges of the individual utilities and the manufacturers producing gas insulated equipment (GIE). We recognize the substantial effort CARB Staff have taken to work with stakeholders to address specific concerns and develop a regulation that will reduce GHG emissions and be achievable and cost-effective while preserving safety and reliability in the electricity grid. The Proposed Amendments in the 15-Day text continue to build a more feasible regulation. SCE requests clarifications or guidance on certain regulation sections mentioned in this letter, either through the FSOR process or published FAQs.

*I. Provide clarification around timelines related to 'Removed from Regular Use."*

Section 95354(d) specifies that covered insulating gas must be removed from a GIE within one year of the GIE device being classified as "removed from regular use". SCE would find it useful if CARB staff can provide additional guidance regarding the timeline when the one-year clock begins.

In most instances, when SCE's distribution assets (<38 kV) are removed in the field, the field operators removing the switches are unable to determine if the switch will require disposal, or if the switch is in a condition to be reused (perhaps after repairs). This determination is made by a separate organization within SCE, once they receive the switch from the field. Thus, the determination of whether to recondition a switch and keep it in storage or to dispose of it is made at a later date, not at the moment when a GIE device is removed in the field. Based on operational data, this might take anywhere from a few weeks to six months depending on the scope of the job.

Based on our reading of 95354(C)(1), we understand that the one-year clock would start at the moment when the determination is made to dispose of the switch, which can occur after its removal. Until that determination, the GIE device would be considered to be in storage. We believe this interpretation complies with section 95354, as long as unit does not stay in storage longer than five consecutive years and gas is removed within one year after the determination has been made to remove the GIE from SCE's inventory.

A confirmation of our understanding in the FSOR or any guidance would be appreciated.

II. *Confirm understanding around procedures for measuring covered insulating gas being removed from GIE.*

Section 95354(d)(1) states: "Weigh the gas container being used to receive the covered insulating gas from the device prior to, and after, recovery of the covered insulating gas from the GIE device following the requirements of section 95354(e), and subtract the first value (prior-to-transfer gas container weight) from the second value (after-transfer gas container weight)."

SCE would like to bring to CARB staff's attention the existence of gas carts with manifolds that allow the removal of gas from multiple GIEs at the same time. All GIE devices connected to the gas cart would simultaneously empty the gas into one common cylinder/ container. Under the proposed language, it is unclear whether the amount of gas must be weighed and recorded separately for each GIE, or whether it is acceptable to transfer gas from multiple GIEs to one common cylinder simultaneously. The cylinder would still be weighed before and afterward, and the GIE devices will each be weighed before and afterward to determine the gas removed from each GIE device.

A clarification provided in the FSOR or subsequent guidance documents will be helpful to ensure acceptable procedures are used consistently across all utilities. (SCE4)

**Agency Response:**
The commenter requested clarification or guidance on certain regulatory requirements, and stated CARB staff could provide this guidance either in the FSOR or through published FAQs, presumably at a later date. First, the commenter inquired as to when the one year period quoted in section 95354(d) begins. Section 95354(d) references sections 95354(c)(1)(A) through 95354(c)(1)(C), which section 95354(c)(1) of the first 15-day Public Notice specifies would trigger a GIE device being considered "removed from regular use," and consist of any of the following circumstances:

- When the GIE device has not been active GIE for five consecutive years
- When the GIE device is taken out of active service for the purpose of removing the device from the GIE owner's inventory
- When the GIE device has been inactive GIE for less than five consecutive years and is being removed from the GIE owner's inventory.

In the situation described by the commenter, the gas would need to be removed either (1) within one year of the fifth anniversary of the date it was last active GIE or (2) when it is being removed from the GIE owner's inventory, whichever comes first. CARB staff is always available to answer specific

questions such as this from regulated entities and can issue future guidance if there is a need.

The commenter also mentioned that some gas carts can remove covered insulating gas from multiple GIE simultaneously and asked whether under 95354(d)(1) the amount of gas must be weighed and recorded separately for each GIE, or whether it is acceptable to transfer gas from multiple GIEs to one common cylinder simultaneously. CARB staff thanks the commenter for identifying the existence of gas carts that can remove gas from multiple GIE at the same time. In the second 15-day Public Notice, section 95357(d)(1) requires the GIE owner to "weigh the gas container being used to receive the covered insulating gas from the device prior to, and after, recovery of the covered insulating gas from the GIE device…." The referenced language, and the related sections 95354(c) and (d) more broadly, use the singular "GIE device" because these sections are intended specify processes for a single GIE device.

**B-4. Revise the Emissions Calculation**

**Comment:**
IV. Other Clarifications

*The JUG requests that the FSOR include a detailed explanation from CARB on why the JUG's recommended changes to the following sections were not included in Second 15-Day Changes.*

A. Section 95354.1(a) Calculating Annual Emissions:

The JUG comments on the 21-day changes identified shortcomings with the description of the terms of the emission calculation equation, but that comment was not addressed in the Second 15-Day Changes. The JUG believes that changes to the terms of the equation are necessary to correctly calculate the annual emissions. As currently written, the gas acquisition and disbursement terms do not account for movement of gas cylinders within the same entity from a facility inside California to a facility outside of California, and vice versa. The scope of the annual emissions report to CARB is limited to the boundaries of California, so cylinders relocated to another state need to be accounted for as "Removed from Inventory." While the disbursements term does account for gas in cylinders returned to suppliers or sent to other entities, it does not account for gas in cylinders moved to an out-of-state facility belonging to the same entity. The JUG asks CARB to explain how the emission calculation equation accounts for the movement of cylinders belonging to the same entity to another state. The JUG also asks CARB to explain how gas contained within inactive GIE that is sold to another entity should be accounted for. Lastly, for GIE on which the Nameplate Capacity Adjustment procedure was performed, the JUG asks CARB to confirm in the FSOR how the adjusted nameplate capacity value is used in the annual emission calculation…. (JUG4)

**Comment:**

5) Section 95354.1 Calculating Annual Emissions – the terms of the equation need to be refined to capture all gas acquisitions and disbursements, and clarify the net increase in nameplate capacity term

LADWP believes that refinements to the terms of the emission calculation equation are necessary in order to correctly calculate emissions. As currently written, the acquisitions and disbursements terms do not capture all the ways that gas can be acquired or disbursed, and it is unclear how adjusted nameplate capacity values determined using the Nameplate Capacity Adjustment procedure in section 95357.2 fit into the net increase in nameplate capacity term.

The JUG's comments on the 21-day changes spelled out specific revisions that would have resolved these concerns. However, these requested refinements were not addressed in the second 15-day changes version of the rule language.

Regarding the acquisitions and disbursements terms, CARB staff advised that movement of gas cylinders belonging to the same entity from a facility inside California to a facility outside of California and vice versa, should be treated as gas sent to other entities or gas acquired from other entities. LADWP disagrees with this interpretation and does not believe it is consistent with the current rule language. LADWP has facilities in California and Nevada, and gas cylinders that move between these facilities should be treated as an acquisition or disbursement for purposes of the CARB report, which is limited to the geographic boundaries of California. Movement of gas cylinders between LADWP's facilities in California and Nevada are not sent to an "other entity".

Regarding the net increase in nameplate capacity term, CARB staff advised that the adjusted nameplate capacity values determined using the Nameplate Capacity Adjustment procedure fall into the "covered insulating gas j at activation for GIE removed from regular use during the data year pursuant to section 95354(c)(1)" category. "Covered insulating gas at activation" represents filling the GIE with gas before placing it into service, so it is confusing to use the same term to mean the amount of gas extracted from a GIE that is taken out of service. This rule language is not self-explanatory and requires the user to refer to two different definitions to figure it out. The JUG recommended substituting the language "Covered Insulating Gas at Removal" defined as "the nameplate capacity value determined using the nameplate adjustment procedure in section 95357.2; or the design capacity of the GIE device specified by the manufacturer". The JUG's suggested language would make the rule language easier to understand and implement, and therefore, LADWP recommends that this change be made.

Also, in the net increase in nameplate capacity term, for GIE reactivated after being removed from regular use, both "removal from regular use" and "status change to active" refer to "during the data year", so it appears that both have to occur within

the same data year. LADWP requests clarification of this language and the intent…. (LADWP3)

**Agency Response:**
Commenters stated that if gas containers are transported into/out of California from/to their out-of-state facilities, the gas in the containers should be counted as an acquisition/disbursement, but the emissions equation in the Regulation does not allow for that. One commenter disagreed with CARB staff's advisement (via teleconference) that movement of gas cylinders belonging to the same entity from/to their out-of-state facilities should be treated as gas sent to other entities or gas acquired from other entities. CARB staff agrees the movement of containers described by the commenters should be accounted for as acquisitions and disbursements of covered insulating gas, respectively, when calculating annual emissions. The second 15-day Public Notice's emissions equation is broad enough to capture these acquisitions and disbursements as written. The acquisition term covers gas obtained in bulk from "other entities." The circumstance described qualifies as acquisition from an "other entity" because the "GIE owner" subject to this Regulation includes only the portion of operations in California, so their out-of-state operations would be considered the "other entity." In the 45-day Public Notice, the disbursements term did not capture "other entities." Accordingly, "covered insulating gas sent to other entities" was added in the first 15-day Public Notice. No other changes are needed in response to these comments.

One commenter asked CARB staff to explain how gas inside inactive GIE transferred to another entity should be accounted for. If the inactive GIE device was never activated, it will have never entered the mass-balance equation at all, and therefore this gas should not be accounted for as a disbursement. If the device has been active at some point, and has been inactive for at least five years, the gas should have already been extracted and accounted for pursuant to section 95354(c)(1)(A). If the GIE device was previously active and has been inactive for less than five years, gas should be recovered to determine emissions from the device in the same way as if it had been retired. Section 95354(c)(1)(C) was added in the first 15-day Public Notice to require gas recovery in this scenario.

One commenter asked CARB staff to explain how adjusted nameplate capacity values are to be used in the annual emission calculation. Another commenter stated CARB staff's explanation (via teleconference) that the adjusted nameplate capacity value be "Covered Insulating Gas at Activation" would be confusing. The commenter recommended replacing this language with "Covered Insulating Gas at Removal" defined as "the nameplate capacity value determined using the nameplate adjustment procedure in section 95357.2; or the design capacity of the GIE device specified by the manufacturer." In the first 15-day Public Notice, the definition of "Nameplate Capacity" was revised to add "or may be the value calculated by the GIE owner pursuant to section

95357.2, if applicable." With this addition, the full definition reads as follows "'Nameplate Capacity' means the design capacity of the insulating gas specified by the manufacturer for optimal performance of a GIE device. Nameplate capacity may be found on the nameplate attached to the GIE device, may be stated within the manufacturer's official product specifications, or may be the value calculated by the GIE owner pursuant to section 95357.2, if applicable." This definition fully captures revised nameplate capacity values that are derived from undertaking the nameplate capacity adjustment process in section 95357.2. Further, beginning with the 45-day Public Notice, the definition of "Covered Insulating Gas at Activation," the term used in the emissions equation, has read as follows "'Covered Insulating Gas at Activation' means the value calculated in section 95354(a)(10)(A)6.; if this value is not calculated, this term means the nameplate capacity of the GIE device." Section 95354(a)(10)(A)(6) prescribes a method for calculating covered insulating gas at activation only for GIE acquired after December 31, 2021 and made active for the first time after December 31, 2021, so any other GIE device would use their nameplate capacity, as defined. Finally, proper use of the revised nameplate capacity is further supported by section 95357.2(e), which states, "For each GIE device whose nameplate capacity was adjusted during the data year, the revised nameplate capacity value must be used in all provisions wherein the nameplate capacity is required to be recorded, reported, or used in a calculation in this subarticle unless otherwise specified herein."

The emissions equation specifies the GIE owner should account for "covered insulating gas *j* at activation" of GIE removed from regular use, or active GIE transferred while in use. The provisions cited above ensure that the adjusted nameplate capacity value will be used when annual emissions are calculated. As such, the change requested by the commenter is not necessary.

One commenter stated the following term from the emissions equation is unclear: "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)," which is a component of the broader term "*Net increase in total capacity of active GIE owned and filled with covered insulating gas j*." While no specific changes were proposed, the commenter stated that it appears a re-activated GIE device must be both "removed from regular use" and have its "status changed to active" in the same year for the capacity to be captured by this term. The commenter requested CARB staff clarify this language and the intent.

This term captures the covered insulating gas at activation of several types of GIE. First, it includes any GIE whose "status changed to active GIE for the first time during the data year." This would apply to new GIE in the year they are activated for the first time. Additionally, and more relevant to the comment, this term would apply to GIE previously designated as "removed from regular use"

whose status changed to active GIE during the data year. This would apply to GIE that were active at one time, that have undergone a period of inactivity such that they were "removed from regular use" pursuant to section 95354(c)(1), and that were subsequently re-activated. This term applies to all re-activated GIE previously designated as "removed from regular use," not just the subset of those GIE that happened to be "removed from regular use" and then re-activated in the same data year. Further, section 95354(a)(10)(A)(7)(a.) requires that, for non-hermetically sealed GIE, GIE owners report operational changes to the device during the data year, including "The GIE device became active for the first time or after it was previously considered removed from regular use pursuant to section 95354(c)(1)." CARB staff finds specified provisions sufficiently clear, and no changes have been made in response to this comment.

**B-5. Revise the Nameplate Capacity Adjustment Process**

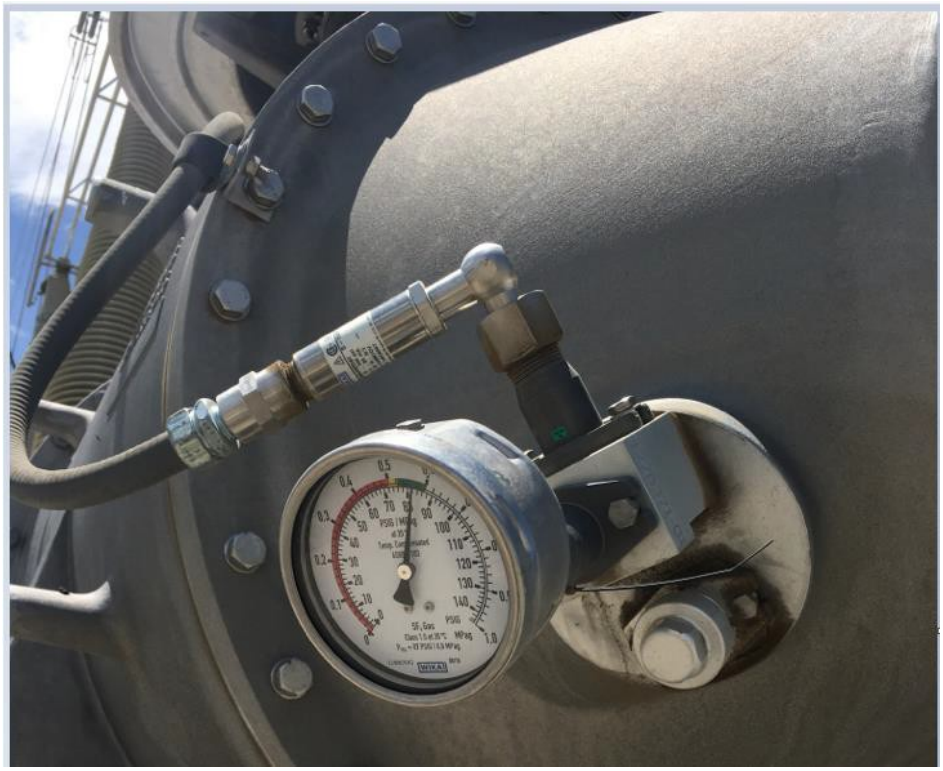
**Comment:**
II. Nameplate Capacity Adjustments Procedure

> *Section 95357.2 should be revised so that the integrated temperature-compensated pressure gauge provided by the GIE manufacturer for monitoring gas pressure inside the GIE may be used to measure the initial GIE gas pressure at the beginning of this procedure….*

In addition, the JUG supports the overall Nameplate Capacity Adjustment procedure with one exception, which is the approach to measuring the GIE gas pressure at the beginning of the procedure.

This procedure applies to non-hermetically sealed GIE. Many non-hermetically sealed GIE have an integrated temperature-compensated pressure gauge that is connected directly to the GIE gas vessel (see Figure 1 below).

*Figure 1: Integrated temperature-compensated pressure gauge*



The integrated gauge is typically used to fill the GIE with gas (fill to pressure not weight), and to monitor the gas pressure over the service life of the GIE. If this integrated gauge was used for the initial gas fill, for consistency it makes sense to use the same gauge to measure the GIE gas vessel pressure prior to removal of the gas using the Nameplate Capacity Adjustment procedure. With this approach, the user would simply take a reading from the GIE integrated temperature-compensated pressure gauge and compare that value with the temperature/pressure curve or other manufacturer materials to determine whether the GIE is at the proper operating pressure.

In the absence of this type of gauge, the user would need to attach an external pressure gauge at the GIE fill port to measure the absolute pressure of gas inside the GIE, then convert that pressure to temperature-compensated pressure. There are several sources of error with this approach. First, if the pressure gauge is connected to the GIE fill port via tubing, the gauge will measure pressure of the gas inside the tubing which may be slightly different than the pressure inside the GIE gas vessel. Second, you cannot accurately measure temperature of the gas inside the vessel from outside the vessel. For GIE in an outdoor environment with the sun warming the gas vessel, the temperature on the outside of the gas vessel will be warmer than the temperature on the inside of the gas vessel. The sun will not warm the gas inside the vessel uniformly -- if a temperature gradient exists within the gas vessel, attaching a temperature gauge at the fill port would be a spot measurement that may not

represent the average temperature within the vessel. Therefore, measuring temperature outside of the gas vessel will not accurately represent the temperature of the gas inside the gas vessel. This would be a source of error when converting the pressure reading to temperature-compensated pressure, thereby offsetting the accuracy gained by using highly accurate gauges to separately measure the pressure and temperature.

The JUG asked several GIE manufacturers whether the integrated temperature-compensated pressure gauge provided for use with their GIE can meet the 0.5% accuracy standard specified by CARB and were advised that the accuracy of these gauges ranges from +/- 1% to 3%. These "utility grade" gauges have a rugged design suitable for general use in many different environments. A 0.5% accurate pressure gauge would be a "process or laboratory grade" gauge -- these are delicate high precision measurement instruments that cannot survive the shock coming from operating the breaker, nor can they be left outdoors without loss of function. They also require controlled atmospheric conditions to return accurate results.

Given these practical considerations, the JUG sees little benefit to be gained from separately measuring pressure and temperature and converting to temperature-compensated pressure, when the GIE has an integrated temperature-compensated pressure gauge with an accuracy of 1% - 3%. The JUG urges CARB to revise section 95357.2 (c) (1) and (2) to expressly allow the option to use either the GIE manufacturer provided integrated temperature-compensated pressure gauge that is connected directly to the GIE gas vessel, or CARB's approach using separate pressure and temperature gauges. Neither approach is perfect, and both approaches will provide temperature-compensated pressure for comparison with the GIE pressure/temperature curve. At a minimum, CARB should clarify in the FSOR that neither the requirements of section 95257.2, nor the accuracy requirements in 95354 (c), preclude GIE owners from using the GIE manufacturer provided integrated temperature-compensated pressure gauge for the nameplate adjustment procedure.

The JUG's proposed changes to the rule language are provided below:

§ 95357.2. Nameplate Capacity Adjustments.

…

(c) If a GIE owner elects to adjust the nameplate capacity of any GIE, the owner must:

(1) Record the initial system **temperature-compensated** pressure **of the gas inside the GIE** ~~and vessel temperature~~ prior to removing any insulating gas **using one of the following methods**:

**a. If the GIE device has an integrated temperature-compensated pressure gauge from which a numerical reading can be taken, that was provided by the GIE manufacturer for monitoring the gas**

**pressure inside the GIE, record the temperature-compensated pressure value from this gauge; or**

b. **U**sing a ~~*precision*~~ pressure gauge meeting the minimum accuracy requirements of section 95354(f)(2) and a ~~*precision*~~ temperature gauge meeting the minimum accuracy requirements of section 95354(f)(3), **separately measure the initial system pressure of the GIE and the temperature.** ~~(2)~~ Convert the initial system pressure to a temperature compensated initial system pressure by using the manufacturer-specified temperature/pressure curve *or other manufacturer-provided materials that can be used to convert the initial system pressure to a temperature compensated initial system pressure.*

…….

B. Section 95354(a)(10)(A)(6) Covered Insulating Gas At Activation (CIGAA)

In the JUG comments on the 21-day changes, we recommended expanding CIGAA to include all GIE filled with insulating gas prior to activation within the data year, regardless of whether the GIE were acquired prior to or after 12/31/21. Use of the actual gas fill value for GIE activated during the data year in the annual emission calculation would be more accurate than using the estimated gas capacity provided by the manufacturer. JUG members have a fair number of GIE acquired prior to 12/31/21 that have not been activated; there is no reason to use a less accurate nameplate capacity value for these GIE simply because they were acquired prior to 12/31/2021. In the interest of accuracy, CIGAA should apply to all GIE filled with insulating gas prior to activation within the data year, regardless of the date the GIE was acquired…. (JUG4)

**Comment:**

3) Section 95357.2 (c)(1) Nameplate Capacity Adjustment Procedure - add option to use either GIE manufacturer-provided pressure gauge or external gauges to measure GIE initial gas pressure prior to removal of gas…

LADWP supports the overall procedure, but recommends including two options for measuring the GIE initial gas pressure to determine whether the GIE is at the proper operating pressure prior to extracting the gas. As written, the rule language specifies the use of pressure and temperature gauges meeting certain accuracy requirements, then convert the pressure to temperature-compensated pressure. Most non-hermetically sealed GIE have an integrated temperature-compensated gas pressure gauge attached directly to the GIE gas vessel. Since this integrated gauge is used to monitor and maintain the GIE at the proper operating pressure over its service life, it would make sense to use this same gauge to determine whether the GIE is at the proper operating pressure at the beginning of the nameplate adjustment procedure.

The JUG's comments in the first 21-day changes to the SF6 regulation recommended having the option to determine the initial GIE temperature-compensated pressure using either the integrated temperature-compensated pressure gauge provided by the GIE manufacturer, or external pressure and temperature gauges. However, this requested change was not incorporated into the rule language. LADWP urges CARB to reconsider these two options, and supports the JUG comments on the second 15-day changes, which includes a detailed explanation for why both options should be allowed.

4) Section 95354(a)(10((A)(6) Covered Insulating Gas at Activation (CIGAA) should apply to all GIE filled with gas during the data year to improve accuracy of the emission calculation, regardless of when the GIE was acquired.

For many years, LADWP has noticed discrepancies between the manufacturer estimated nameplate gas capacity value and the amount of gas needed to fill the GIE to proper operating pressure, for both older and brand new GIE. Since the nameplate gas capacity is used to calculate emissions, discrepancies between the actual gas fill amount and the nameplate gas capacity value will skew the calculated emissions.

LADWP supports the concept of establishing a more accurate nameplate capacity value based on the actual gas fill or "covered insulating gas at activation" (CIGAA). Use of the CIGAA value as the nameplate gas capacity value in the emission calculation, instead of the estimated gas capacity provided by the GIE manufacturer, will improve accuracy of the calculated emissions. However, the rule language limits applicability of CIGAA to only GIE acquired after 12/31/21 and made active for the first time after 12/31/21. This limitation means that brand new GIE acquired in a previous year, will have to use the less-accurate manufacturer estimated nameplate gas capacity in the emission calculation, instead of the measured amount of gas used to fill the GIE. This unequal treatment of new GIE based solely on the date the GIE was acquired does not utilize the best and most accurate data available, and could result in the calculation of inaccurate emissions

The addition of both CIGAA and the Nameplate Capacity Adjustment procedure to the SF6 regulation can make a significant improvement in the accuracy of nameplate capacity data used in the emission calculation. Since the annual emission limit is now at one percent (1%), the accuracy of data used in the emission calculation is important.

The JUG's comments on the 21-day changes recommended expanding the use of CIGAA to apply to any GIE filled with gas and activated for the first time, as well as GIE refilled with gas after maintenance work, regardless of when the GIE was acquired. However, this requested change was not included in the second 15-day changes version of the rule language. LADWP requests that CARB consider including this recommended change that would improve accuracy of the calculated emissions…. (LADWP3)

**Agency Response:**

Commenters requested revisions to sections 95357.2(c)(1) and (2) to allow the use of an integrated temperature-compensated pressure gauge to determine the temperature-compensated initial pressure prior to performing the nameplate capacity adjustment process. Rationale included that use of these gauges would result in similar levels of accuracy to CARB staff's proposed methodology. One commenter requested CARB staff clarify in the FSOR that the final Regulation does not preclude GIE owners from using these gauges for nameplate capacity adjustments.

To ensure nameplate capacity adjustments are performed consistently, and with the highest level of accuracy, the initial pressure of the GIE device must meet the design operating pressure specified by the manufacturer. Nothing in the final Regulation precludes a GIE owner from using a GIE device's integrated gauges so long as they meet the requirements of sections 95354(f)(2) and (3). The commenters' requested changes would mean that no accuracy requirements would be imposed on integrated gauges. CARB staff disagrees with the requested change because the values calculated through this process will be used when determining emissions levels and compliance with the emissions limit; therefore, these values need to be accurate. Should the GIE device's internal gauges not meet the requirements of sections 95354(f)(2) and (3), external gauges could be used. The requirements of sections 95354(f)(2) and (3) are based on the recommended methodology provided by the $SF_6$ and Alternatives Coalition, which represents 17 members who are producers and distributors of $SF_6$ and $SF_6$ alternatives, manufacturers of gas-insulated equipment, a California utility, and other $SF_6$ stakeholders.

Commenters recommend broadening the requirement to calculate "covered insulating gas at activation" to cover all GIE filled with insulating gas prior to activation within the data year, regardless of whether the GIE were acquired prior to or after December 31, 2021. Throughout the rulemaking process, commenters have noted inaccurate nameplate capacities become problematic when GIE are retired, because this is the point in time where any discrepancies between the nameplate capacity and the amount of gas within the device is considered to have been emitted. CARB staff did not elect to allow calculation of "covered insulating gas at activation" for the GIE requested by the commenter because the nameplate capacity adjustment process could be applied to these GIE.

**B-6. Revise the Enforcement Provisions**

**Comment:**
III. Enforcement Provisions

*Section 95359 still do not provide consistent, fair, and reasonable enforcement provisions.*

In prior comments on the 45-day language[36] and the 21-day language[37], the JUG highlighted the need for limited revisions to the enforcement provisions in section 95359 (c) and (d), pertaining to an exceedance of the annual emissions rate and an unauthorized acquisition of $SF_6$ GIE, respectively, to ensure outcomes are consistent, fair, and reasonable.

The JUG is disappointed that CARB did not make any modifications to section 95359 (d) in the Second 15-Day Changes to promote reasonable and constructive enforcement outcomes. As detailed in the JUG's 21-day comments, the inclusion of the "per MTCO2e" language could result in multiple violations and exorbitant fines based on the $SF_6$ GWP referenced in the ISOR, even if it were a single small GIE containing $SF_6$ that was acquired without a proper phaseout exemption or failure notification. Depending on the assumed per day penalty, which could now be up to $5,235[38] per violation per day, the penalty could be as high as **$1.6 million per day**, an absurd result.

The JUG understands that CARB wants the penalty structure to be consistent with the Mandatory Reporting Regulation and Cap-and-Trade, but the sheer increase in magnitude when converting from $SF_6$ to CO2e could lead to penalties that are incomparable with other regulations. With CARB's Second 15- Day Changes that convert the phase-out exemption process to an administrative review similar to the failure notification process, the JUG hopes that the risk of inadvertently acquiring unauthorized $SF_6$ GIE will be lower, but maintaining an enforcement structure in which a single error could result in astronomical penalties is counterproductive.

The JUG appreciates CARB's removal of the "per-day" multiplier in section 95359 (c), as it is reasonable to consider the magnitude of an annual emissions rate violation rather than applying a daily penalty. The JUG believes this change represents an improvement but remains concerned that continuing to include the "per MTCO2e" multiplier could lead to disproportionately higher penalties, given the magnitude of the $SF_6$ GWP referenced in the ISOR. Pound for pound, an $SF_6$ exceedance could result in a tenfold increase in violations, and thus penalties, relative to CO2, as shown below:

1 lb of $SF_6$ x 22,800 GWP x mt/2,205 lbs = 10.3 violations

Assuming the maximum penalty of $5,235 per violation, the cost *per pound* exceedance is approximately $54,000.

[36] JUG 45-day comment letter: https://www.arb.ca.gov/lists/com-attach/14-sf62020-USJSMgYxWFQGagVw.pdf
[37] JUG 21-day comment letter: https://www.arb.ca.gov/lists/com-attach/31-sf62020-B3RUNAYxAw9VOQB1.pdf
[38] https://ww2.arb.ca.gov/sites/default/files/2021-06/2020_Annual_Enforcement_Report.pdf?utm_medium=email&utm_source=govdelivery

If CARB retains the enforcement provisions as currently proposed, the FSOR must explain why the JUG's common-sense modifications were rejected and how CARB will ensure reasonable and comparable implementation of the $SF_6$ enforcement program relative to other regulations….

C. Section 95355 Reporting Requirements should include the ability for corrections to annual reports

The JUG reiterates its previous comments on the 21-day changes on the need for explicit recognition of the ability to provide corrections to annual reports, which was not included in the Second 15-Day Changes. Based upon the statement by CARB (via a teleconference with JUG) on May 19, 2021, it is the JUG's understanding that although sections 95355(c) and 95355(c)(1) have been removed from the Proposed Changes, reporting entities may still submit revised $SF_6$ reports to CARB upon determination of correctable errors on previously submitted reports. The JUG had requested conformity of this regulation to that of CARB's MRR which explicitly recognizes the ability to amend a report's correctable errors within a specific timeframe without penalty of enforcement, which we still believe to be appropriate. The JUG urges CARB to clarify in the FSOR that this process will be allowed….

To ensure the resiliency and accuracy of this regulation, the JUG believes that the additional corrections and clarifications we have identified above are necessary to align with the intent of the regulation and allow for a practical and feasible implementation process. (JUG4)

**Comment:**

6) Section 95355 Reporting Requirements should address revisions to previously submitted reports

Over the past four years, CARB staff has implemented a quality assurance check of the annual SF6 reports, where CARB asks the reporting entity to explain any differences in GIE and cylinder inventory data between the current and previous annual reports, and correct any errors. This practice is beneficial to ensure the annual reports are correct and the most up-to-date best available information is utilized as is required per the certification statement.

This practice is similar in nature to verification of emission reports under CARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (MRR). Under the MRR, emission data reports undergo verification by an independent third-party that is accredited by CARB, where the verifier acts on behalf of CARB to review the emission reports, identify questions, ask the reporting entity to address the questions and correct any "correctable errors". The MRR enforcement language stipulates that CARB will not initiate enforcement action until after the verification timeframe has ended.

LADWP believes it would be beneficial to have a similar defined process for the quality assurance check of the annual SF6 reports, with the ability to fix correctable errors and submit a revised SF6 report to CARB within a given timeframe without enforcement penalty. (LADWP3)

**Comment:**
[There are two specific provisions we would like to address,]…and the SF6 Regulations' enforcement provision which treats the failure to submit an annual report as a continuing violation on a daily basis….

sPower has concerns with respect to the proposed amendments to Section 95358, "Enforcement."[39] After the May 5, 2021 First Notice of Public Availability of Modified Text, CARB now proposes amending Section 95358(c) so that $MTCO_2e$ emission rate limits will not be considered continuing violations "…for each day of the calendar year." While sPower supports this proposed amendment, we urge CARB to consider incorporating similar changes to Section 95358(b), the SF6 Regulations' enforcement provision relating to reporting violations.

As currently drafted, "**[e]ach day or portion** thereof that any report required by this subarticle remains unsubmitted, [or] is submitted late …, shall constitute a single, separate violation of this subarticle." [Second Notice, p. 53 (emphasis added).] sPower contends the emphasized language is inconsistent with reporting violations, especially in relation to the *annual* reporting obligations of GIE/GIS owners under the SF6 Regulations. Given that the rule only contains one reporting deadline and that a GIE/GIS owner can only miss an annual reporting deadline once, sPower urges CARB to not treat these as continuing violations past June 1st of the applicable year for the report. (sPower)

> **Agency Response:**
> One commenter requested the enforcement provisions be modified such that, if an annual report is submitted late, the GIE owner be assigned only a single violation instead of a separate violation per day until the report is submitted. Section 95358(b) of the current Regulation states "Each day or portion thereof that any report required by this subarticle remains unsubmitted, is submitted late, or…shall constitute a single, separate violation of this subarticle" and that has been retained in the final Regulation. This provision is important to motivate GIE owners who miss the reporting deadline to submit their annual reports as soon as possible. Further, this provision is consistent with other CARB regulations, for example, section 95107(b) of the MRR states "Each day or portion thereof that any report required by this article remains unsubmitted, is submitted late, or…is a single, separate violation." No changes have been made in response to this comment.

[39] If amended as proposed in the Second Notice, Section 95358 will be renumbered Section 95359. [Second Notice, p. 53.]

Commenters requested CARB staff include a period of time in which errors could be corrected after submission of the annual report without enforcement action. Commenters stated this approach would be similar to CARB's MRR. One commenter requested CARB staff recognizes that GIE owners be able to revise their annual reports to correct errors. Under the MRR, covered entities have the opportunity to address errors in the report, after the reporting deadline, but prior to the passage of the verification deadline. Unlike the MRR, the $SF_6$ Regulation does not require third party verification, or have a similar "verification deadline," and CARB staff is not a third-party verifier. All annual $SF_6$ reports are required to be certified as "true, accurate, and complete" by the time the report is submitted to CARB, and CARB staff expects this to be the case. As such, any errors not addressed by the reporting deadline could result in enforcement action. CARB staff also confirms that GIE owners may revise their annual reports upon discovery of a reporting error. In fact, GIE owners should be motivated to do so because, since the first 15-day Public Notice, section 95359(b) specifies that "Each day or portion thereof that any report required by this subarticle…contains an incomplete, untrue or inaccurate data field after the reporting deadline shall constitute a single, separate violation of this subarticle." No change has been made in response to these requests.

One commenter expressed concern that factoring the high GWP of $SF_6$ into the penalty structure in sections 95359(c) and 95359(d) could lead to very large potential penalties. The use of $MTCO_2e$ is consistent with other CARB Regulations and is appropriate so that penalties may be scaled based on the magnitude of the impact of those emissions. CARB's MRR also covers multiple GHGs, and similar language exists in section 95107(c): "Each metric ton of $CO_2e$ emitted but not reported as required by this article is separate violation." As such, the "Each $MTCO_2e$ exceedance" language is retained in the final Regulation.

One commenter requested that, if the enforcement provisions were not revised for the final Regulation, CARB staff explain how it will ensure enforcement of the $SF_6$ Regulation will be handled in a comparable manner with other regulations. CARB's enforcement policy is available online (https://ww2.arb.ca.gov/resources/documents/enforcement-policy) and describes the factors used to determine appropriate penalties.

**B-7. Ensure Transparency**

**Comment:**
We encourage the continuation of transparency and also suggest that it would be helpful for CARB and/or GIE owners to issue periodic public progress reports. For example, it would be helpful to report which types of equipment are found to be readily available, which types are not available, and which types are currently deployed or being tested. It would also be helpful to periodically report what exemptions have been granted and the reasons for those exemptions. The public sharing of such information will give the public confidence in the progress of the phase-out, highlight

potential problems, and might also provide useful information to GIE owners and suppliers…. (CFMV)

**Agency Response:**
The commenter recommends CARB staff periodically publish reports describing non-$SF_6$ GIE currently available (including those being tested) and identify gaps. Publication of a list of exemptions that have been granted, and the supporting rationale, was also requested. The Regulation does not specify CARB staff would produce any such reports, and so this comment is out of scope. However, CARB staff appreciates these suggestions, and agrees that it would be beneficial to share information in the future regarding availability of non-$SF_6$ GIE. CARB staff will consider these suggestions when implementing the Regulation, and in particular the $SF_6$ phase-out, in the coming years.

## VII. Peer Review

Health and Safety Code section 57004 sets forth requirements for peer review of identified portions of rulemakings proposed by entities within the California Environmental Protection Agency, including CARB. Specifically, the scientific basis or scientific portion of a proposed rule may be subject to this peer review process. Here, CARB determined that the rulemaking at issue does not contain a scientific basis or a scientific portion subject to peer review, and thus no peer review as set forth in section 57004 was or is needed to be performed.