

Review of Proposed Revisions to the GHGRP for Electrical Equipment

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Overview

- Review of proposed updates
 - Inclusion of all fluorinated GHGs
 - Threshold calculation
 - Procedure for (optional) measurement of nameplate capacities
 - Proposed definitions

GHGRP Proposed Revisions

- EPA proposed to update the GHGRP through rulemaking to address changes in industry and emission trends, to adopt improved methodologies, and to fill important data gaps
- EPA conducted a comprehensive program review, including a decade of data verification and analysis, new studies, industry and technology advancements, stakeholder feedback, and EPA data needs, and identified proposed revisions in the following areas:
 - Addressing Data Gaps: Potentially significant emission sources that are not currently accounted for
 - Updating Emission Factors: New data support updating emission factors that will result in more accurate emission calculations
 - Improving Calculation Methods: Updating methods to reflect more complete understanding of emission sources or more recently developed methods
 - Adding or Modifying Data Elements: Collecting new data to eliminate data gaps, improve verification, support national estimates, and inform other EPA programs
 - Technical Clarifications: Clarifying requirements to better reflect EPA's intent or respond to common questions
 - Streamlining Program Implementation: Providing flexibility in calculation requirements or monitoring methods, removing redundant data elements
- EPA also requested comment on potential future revisions that would expand the GHGRP to several new source categories
- In addition, this action proposes confidentiality determinations that establish whether data would be entitled to confidential treatment
- Comment period closed on October 6, 2022

Proposing to Update Source Category Definitions for DD and SS to include all F-GHGs

- Proposed revisions to source category for DD: “The electrical transmission and distribution equipment use source category consists of all electric transmission and distribution equipment and servicing inventory **insulated with or containing fluorinated GHGs, including but not limited to** sulfur hexafluoride (SF₆) and perfluorocarbons (PFCs)...”
- This proposed change impacts both applicability and the emissions calculations.

Proposed Threshold Calculation (Subpart DD)

- Proposed to base applicability on the total nameplate of insulating-gas-containing equipment for each GHG, the weight fraction of each fluorinated GHG, the GWP, and an assumed emission factor of 10%.
- $E = \sum_j \sum_i NC_{EPS,j} * GHG_{i,w} * GWP_i * EF * 0.000453592$

E = Annual emissions for threshold applicability purposes (metric tons CO₂e).

$NC_{EPS,j}$ = For a facility other than an electric power system, the total nameplate capacity of insulating gas j containing equipment (excluding hermetically sealed-pressure equipment) located within the facility

$GHG_{i,w}$ = The weight fraction of fluorinated GHG i in insulating gas j in the gas insulated equipment included in the total nameplate capacity

$NC_{other,j}$, expressed as a decimal fraction. If fluorinated GHG i is not part of a gas mixture, use a value of 1.0.

GWP_i = Gas-appropriate GWP as provided in Table A-1 to subpart A of this part.

EF = Emission factor for electrical transmission and distribution equipment (lbs emitted/lbs nameplate capacity). For all gases, use an emission factor or 0.1.

Proposed Emissions Calculation (Subpart DD)

- Proposed that emissions calculations would include emissions of all F-GHGs
 - User Emissions_i = $\text{GHGi}_{,w} * [(\text{Decrease in Insulating gas } j \text{ Inventory}) + (\text{Acquisitions of Insulating gas } j) - (\text{Disbursements of Insulating gas } j) - (\text{Net Increase in Total Nameplate Capacity of Equipment Operated Containing Insulating gas } j)]$
- Proposal would require that reporters track their inventories, acquisitions, disbursements and changes to total installed nameplate capacity by F-GHG and composition.

Proposed Requirements for (Optional) Facility-Measured Nameplate Capacities

- Proposed revision would apply to closed-pressure electrical equipment with a voltage capacity greater than 38 kV.
- Proposed that measurement be voluntary, but if facility measured the nameplate capacity (NC) of any equipment, it would have to measure NC of all eligible equipment that was installed or retired in that year or subsequent years.
- Proposed that if facility-measured NC was more than two percent different from manufacturer-specified NC, facility would have to adopt measured value. If facility-measured NC was within two percent of manufacturer-specified NC, facility would not be required to adopt measured value, but if facility elected to adopt, it would be required to adopt all facility-measured NCs within two percent of manufacturer-specified value.

Facility-Measured Nameplate Capacities (cont.)

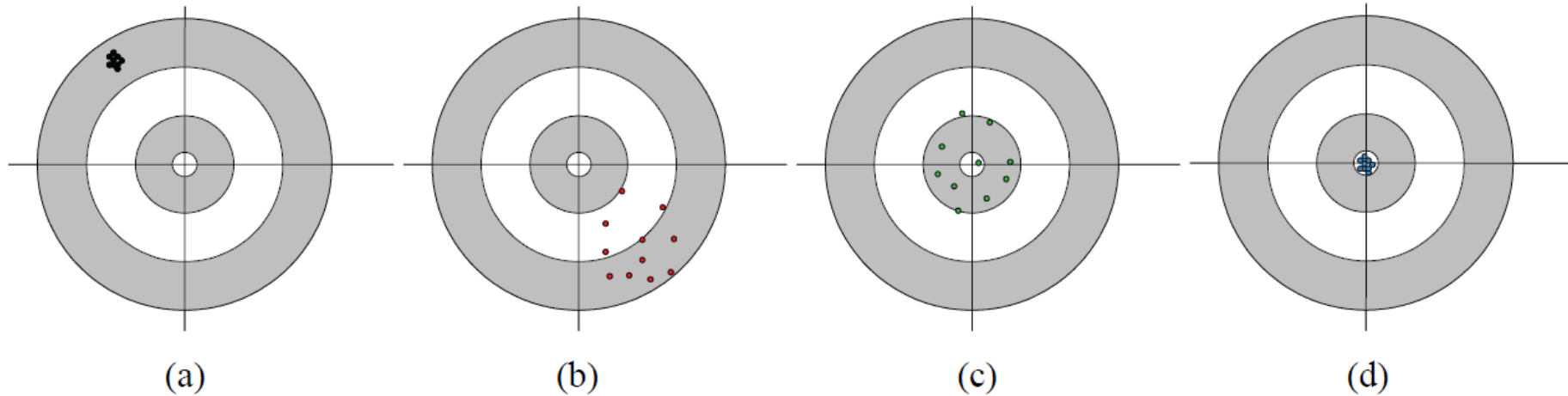
- Proposed procedure for measuring nameplate capacity would be similar to CARB's, except draft proposed rule would allow facilities to recover part of charge (e.g., if retiring equipment had leaked) and to calculate full charge (NC) based on ratio of pressures:

$$NC_C = \frac{P_{NC}}{(P_i - P_f)} \times M_R$$

- Requested comment on including compressibility factors in the equation, which would make it more accurate but also more complicated.
- Proposed that measuring devices be “precise” as well as “accurate” to within same limits as CARB. (These limits may need to be tightened for facilities using calculation approach above.)
- Requested comment on specifying a minimum temperature equilibration time.

Both Precision and Accuracy Affect Data Quality

(a) inaccurate but precise; (b) inaccurate and imprecise; (c) accurate but imprecise; and (d) precise and accurate



Source: *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1, General Guidance and Reporting*, Chapter 3, “Uncertainties,” page 3.8.

Proposed Definitions to Clarify Terms

- *Energized*, for the purposes of this subpart, means connected through busbars or cables to an electrical power system or fully-charged, ready for service, and being prepared for connection to the electrical power system. Energized equipment does not include spare gas insulated equipment (including hermetically-sealed pressure switchgear) in storage that has been acquired by the facility, and is intended for use by the facility, but that is not being used or prepared for connection to the electrical power system.
- *Insulating gas*, for the purposes of this subpart, means any fluorinated GHG or fluorinated GHG mixture, including but not limited to SF6 and PFCs, that is used as an insulating and/or arc quenching gas in electrical equipment.
- *New equipment*, for the purposes of this subpart, means any gas insulated equipment, including hermetically sealed pressure switchgear, that is not energized at the beginning of the reporting year, but is energized at the end of the reporting year. This includes equipment that has been transferred while in use, meaning it has been added to the facility's inventory without being taken out of active service (*e.g.*, when the equipment is sold to or acquired by the facility while remaining in place and continuing operation).
- *Retired equipment*, for the purposes of this subpart, means any gas insulated equipment, including hermetically sealed pressure switchgear, that is energized at the beginning of the reporting year, but is not energized at the end of the reporting year. This includes equipment that has been transferred while in use, meaning it has been removed from the facility's inventory without being taken out of active service (*e.g.*, when the equipment is acquired by a new facility while remaining in place and continuing operation).

For Additional Information

- For information on the GHGRP: <https://www.epa.gov/ghgreporting>
 - Information and resources for reporting facilities
 - <https://www.ccdsupport.com/confluence/display/faq/FAQs>
 - View and/or download the latest GHGRP Data
 - [Envirofacts](#)
 - [Facility Level Information on GHGs Tool \(FLIGHT\)](#)
 - [2017 Data Highlights](#)
 - [Industrial Profiles](#)
- For more information on proposed revisions to the GHGRP:
<https://www.regulations.gov/docket/EPA-HQ-OAR-2019-0424>
- For Information on the Inventory of US Greenhouse Gas Emissions and Sinks:
<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>
- Contact: Debbie Ottinger (Ottinger.Deborah@epa.gov)

Thank you for your attention!

Nameplate Equation with Z Factors

Including Z factors in the calculation results in the following equation:

$$NC_C = \frac{\frac{P_{NC}}{Z_{PNC}}}{\left(\frac{P_i}{Z_{Pi}} - \frac{P_f}{Z_{Pf}}\right)} \times M_R$$

where the previously defined terms retain those definitions and:

Z_{PNC} = Compressibility factor for insulating gas at the rated fill temperature and at the temperature-compensated design operating pressure specified by the equipment manuf.

Z_{Pi} = Compressibility factor for insulating gas at the rated fill temperature and at the initial temperature-compensated pressure of the equipment.

Z_{Pf} = Compressibility factor for insulating gas at the rated fill temperature and at the final temperature-compensated pressure of the equipment.

Current Reporting Threshold

§ 98.301 Reporting threshold.

(a) You must report GHG emissions from an electric power system if the total nameplate capacity of SF₆ and PFC containing equipment (excluding hermetically sealed-pressure equipment) located within the facility, when added to the total nameplate capacity of SF₆ and PFC containing equipment (excluding hermetically sealed-pressure equipment) that is not located within the facility but is under common ownership or control, exceeds **17,820 pounds** and the facility meets the requirements of [§ 98.2\(a\)\(1\)](#).