



# Update on the Greenhouse Gas Reporting Program: *Electrical Transmission and Distribution Equipment*

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U.S. Environmental Protection Agency

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# Overview

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- Background
  - SF<sub>6</sub> and PFCs: potent and long-lived GHGs
  - Global and US SF<sub>6</sub> emission trends
- Greenhouse Gas Reporting Program
  - Requirements (including new data elements)
  - 2016 Data
  - Reported trends



# F-GHG Characteristics

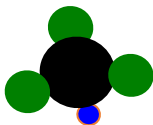
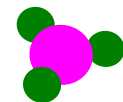
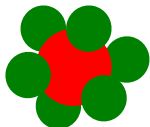
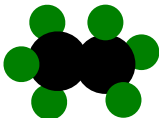
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Chemical Type	GWPs	Lifetimes (years)	Sources
HFCs 	100-15,000	1-240	Air-conditioning/refrig. and other ODS substitute uses F-GHG production Electronics
NF <sub>3</sub> 	17,200	500	Electronics production F-GHG production
SF <sub>6</sub> 	22,800	3,200	Electrical T&D equipment Electronics Magnesium production F-GHG production
PFCs 	7,000-17,000	2,500-50,000	Electronics production Aluminum production F-GHG production
Other Fluorinated GHGs	~ 0.1-10,000		Electronics production F-GHG production

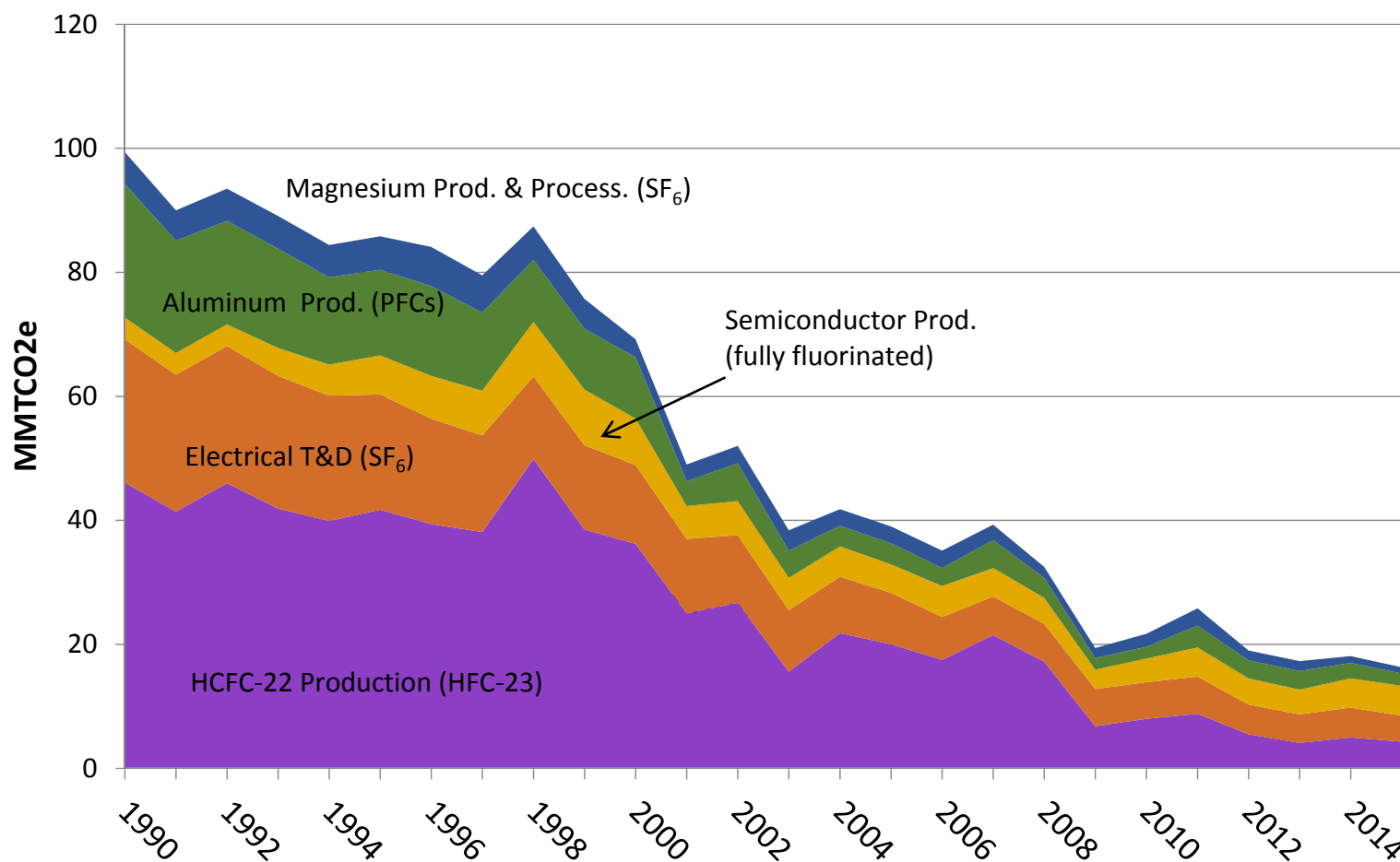


# US Emissions: Sources of SF<sub>6</sub> and other F-GHGs

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Source: U.S. Inventory of GHG Emissions and Sinks: 1990-2015.



# The Greenhouse Gas Reporting Program (GHGRP)

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- Annual Reporting Program
  - For reporting year (RY) 2016, over 8,100 facilities and suppliers reported to the greenhouse gas reporting program.
  - Reported direct emissions in RY16 totaled 2.99 billion metric tons carbon dioxide equivalent (CO<sub>2</sub>e), about half of total U.S. greenhouse gas emissions.
- Reporting threshold of 25,000 metric tons CO<sub>2</sub> equivalent (CO<sub>2</sub>e) or more per year for most sources
- Reports are submitted to EPA electronically via the electronic greenhouse gas reporting tool (e-GGRT)
- Reports go through EPA verification



# GHGRP: Electrical Transmission & Distribution Equipment

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- **Subpart DD: Electrical Transmission and Distribution Equipment Use**
  - Report emissions and related quantities if system nameplate capacity (excluding hermetically sealed-pressure equipment) exceeds 17,820 pounds.
- **Subpart SS: Electrical Equipment Manufacture or Refurbishment**
  - Report emissions and related quantities if total annual purchases of SF<sub>6</sub> and PFCs exceed 23,000 pounds.



# Calculating GHG Emissions

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## Subpart DD – Eq. DD-1

- *User Emissions = (Decrease in Storage Inventory) + (Acquisitions) – (Disbursements) – (Net increase in Total Nameplate Capacity of Equipment Operated)*

## Subpart SS – Eq. SS-1

- *User Emissions = (Decrease in Storage Inventory) + (Acquisitions) – (Disbursements)*

## Subpart SS – Eq. SS-6

- *Emissions from Equipment Installation = (Total Mass used to Fill Equipment) + (Total Mass used to charge Equipment Prior to Leaving the Manufacturer Facility) – (Total Nameplate Capacity Installed at Electric T&D Facility)*



# Nameplate Capacity Considerations

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- Accurate nameplate capacities of *new* and *retiring* equipment are key to accurate calculation of emissions using mass-balance approach.
  - Nameplate capacity of other equipment doesn't affect mass-balance calculation, although it does affect calculated emission rates.
- Stated nameplate capacity of new equipment generally expected to be accurate.
- Stated nameplate capacity of retiring equipment may need to be corrected.
  - Trained technicians, appropriate SF<sub>6</sub> recovery practices, and properly calibrated weigh scales, flowmeters, and/or gauges are critical to obtaining an accurate revised nameplate capacity estimate.





# Recent Revisions to Subpart DD

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- Starting with RY 2017 reports (due by April 2, 2018):
  - Report state(s) or territory in which electric power system lies.
  - For new and retired equipment reported each year:
    - You must distinguish between hermetically sealed equipment and other equipment, and
    - Report the numbers of pieces as well as nameplate capacities of each type of equipment.

*Published in [81 FR 89264](#) (December 9, 2016)*

- Use the new reporting form for RY 2017
- Continue to use the previous reporting form for RY11-RY16 submissions



# New Reporting Form for Subpart DD in RY17

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Subpart DD Reporting Form RY17 FINAL.xls [Read-Only] [Compatibility Mode] - Excel

File Home Insert Page Layout Formulas Data Review View Developer Tell me what you want to do

Clipboard Font Alignment Number Styles

H35

A	B	C	D	E	F
20		<b>GHGRP ID:</b>			
21		<b>Reporting Period:</b>			
22		<b>Comments: (optional)</b>			
23					
24		<b>1b.) Fill out the following table with information about this facility's operations.</b>			
25		<b>Length of transmission lines carrying voltages above 35 kilovolts (miles) [98.306(b)]</b>	<b>Were missing data methods used for the length of transmission lines carrying voltages above 35 kilovolts [98.3(c)(8)]</b>	<b>If yes, report the reason the data were missing [98.3(c)(8)]</b>	<b>If yes, report the method used for estimating missing data [98.3(c)(8)]</b>
26					
27					
28		<b>1c.) Fill out the following table with all the state(s) or territory that the facility lies.</b>			
29		<b>State(s) or territory in which the facility lies [98.306(m)]</b>			
30	1				
31	2				
32	3				
33	4				
34	5				
35	6				
36	7				
37	8				
38	9				
39	10				
40					
41		<b>1c.) Proceed to worksheet "<a href="#">2. GHG-Specific Information</a>" and enter the required information for your facility.</b>			
42					

- Enter states and territories on the Facility Details tab.



*Draft RY17 DD Reporting form*



# New Reporting Form for Subpart DD in RY17



Subpart DD Reporting Form RY17 FINAL.xls [Read-Only] [Compatibility Mode] - Excel

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2e.) Enter the required equation inputs in the table to calculate the Net Increase in Total Nameplate Capacity of Equipment Operated according to the equation below for each applicable gas. Note that Nameplate Capacity refers to the full and proper charge of equipment rather than to the actual charge, which may reflect leakage. To override a calculated result and report an alternative value, use columns E5 & E6 in the table.

$$\text{Net Increase in Total Nameplate Capacity of Equipment Operated} = (\text{The Nameplate Capacity of new equipment in pounds, including hermetically sealed-pressure switchgear} - (\text{The Nameplate Capacity of retiring equipment in pounds, including hermetically sealed-pressure switchgear}))$$

E1	E2	E3	E4	E5	E6	
SF6 or PFC	Nameplate Capacity of new hermetically sealed-pressure switchgear (pounds) [98.306(a)(2)]	Nameplate Capacity of new equipment other than hermetically sealed-pressure switchgear (pounds) [98.306(a)(3)]	Nameplate Capacity of retired hermetically sealed-pressure switchgear (pounds) [98.306(a)(4)]	Nameplate Capacity of retired equipment other than hermetically sealed-pressure switchgear (pounds) [98.306(a)(5)]	Net Increase in Total Nameplate Capacity of Equipment Operated (pounds, unrounded) [98.303(a)(b)]	What result do you want to report? (Calculated result or override value)
					Calculated Result [E6=(E2+E3)-(E4+E5)]	
1 Sulfur hexafluoride					0	Use the calculated result
2 PFC-14 (Perfluoromethane)					0	Use the calculated result
3 PFC-116 (Perfluoroethane)					0	Use the calculated result
4 PFC-218 (Perfluoropropane)					0	Use the calculated result
5 Perfluorocyclopropane					0	Use the calculated result
6 PFC-3-1-10 (Perfluorobutane)					0	Use the calculated result
7 Perfluorocyclobutane					0	Use the calculated result
8 PFC-4-1-12 (Perfluoropentane)					0	Use the calculated result
9 PFC-5-1-14 (Perfluorohexane)					0	Use the calculated result
10 PFC-9-1-18					0	Use the calculated result

2ee.) Enter the required number of SF-6 or PFC-containing pieces of equipment in each of the categories below during the year.

EE1	EE2	EE3	EE4	EE5
SF6 or PFC	New hermetically sealed-pressure switchgear [98.306(n)(1)]	New equipment other than hermetically sealed-pressure switchgear [98.306(n)(2)]	Retired hermetically sealed-pressure switchgear [98.306(n)(3)]	Retired equipment other than hermetically sealed-pressure switchgear [98.306(n)(4)]
1 Sulfur hexafluoride				
2 PFC-14 (Perfluoromethane)				
3 PFC-116 (Perfluoroethane)				
4 PFC-218 (Perfluoropropane)				

- Now there are separate columns for hermetically sealed and other than hermetically sealed new and retired equipment

- There is a new table for counts of each type of equipment



# Latest GHGRP data

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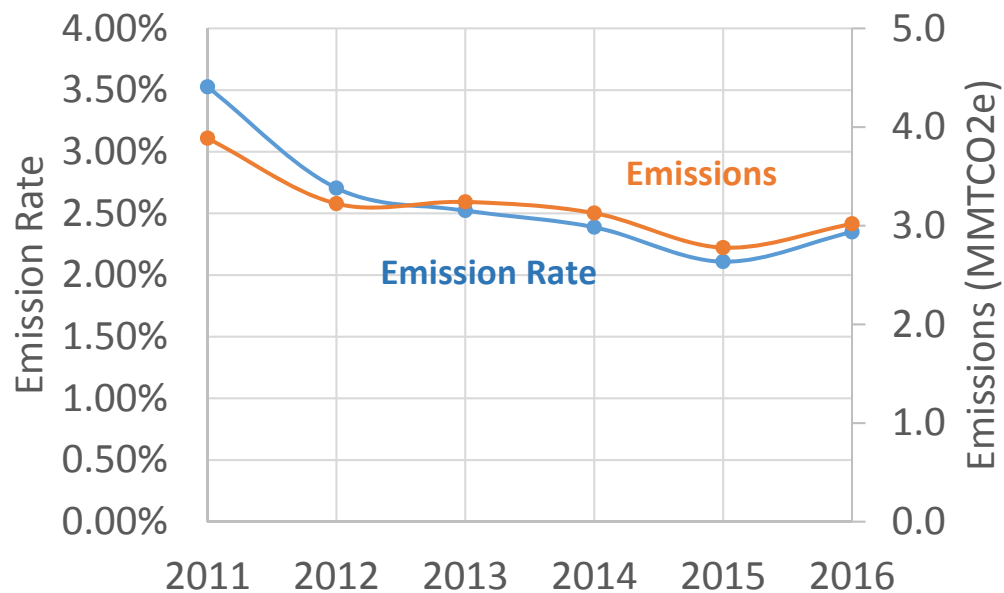
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## • Subpart DD: Electrical Equipment Users

	2011	2012	2013	2014	2015	2016
Number of Reporters	121	122	121	118	105	88
Emissions (MMTCO <sub>2</sub> e)	3.89	3.22	3.24	3.13	2.78	3.02
Annual Emission Changes		-17.0%	0.5%	-3.5%	-11.2%	8.7%
Total Emission Changes		-17.0%	-16.6%	-19.5%	-28.5%	-22.3%
Avg. Emission Rate*	3.5%	2.7%	2.5%	2.4%	2.1%	2.4%

\*based on Beginning of Year Nameplate Capacity



- Over the six years of the reporting program, there has been a 22.3 percent reduction in emissions
- 14 facilities left the program after 2014; they accounted for 2.1% of 2014 emissions.
- 19 additional facilities left the program after 2015; they accounted for 4.7% of 2015 emissions.



# Latest GHGRP data

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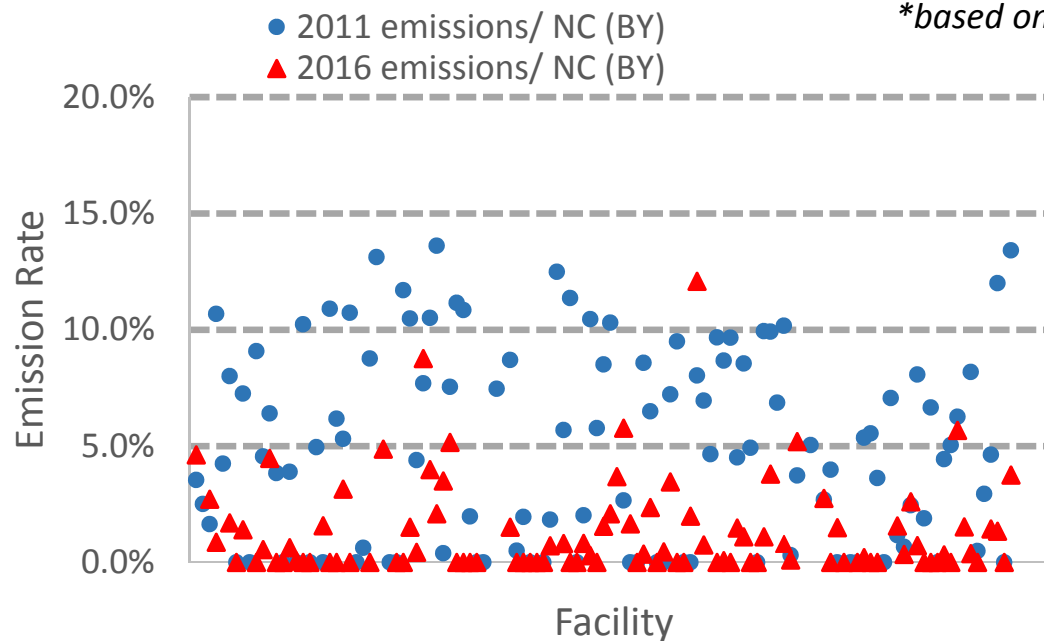
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Total Emission Changes		-17.0%	-16.6%	-19.5%	-28.5%	-22.3%
Avg. Emission Rate*	3.53%	2.71%	2.52%	2.39%	2.11%	2.35%

\*based on Beginning of Year Nameplate Capacity



- Most facilities now have an emission rate of 5% or lower.
- Facilities that left the program after 2015 had an average emission rate of 1.3% (2015)



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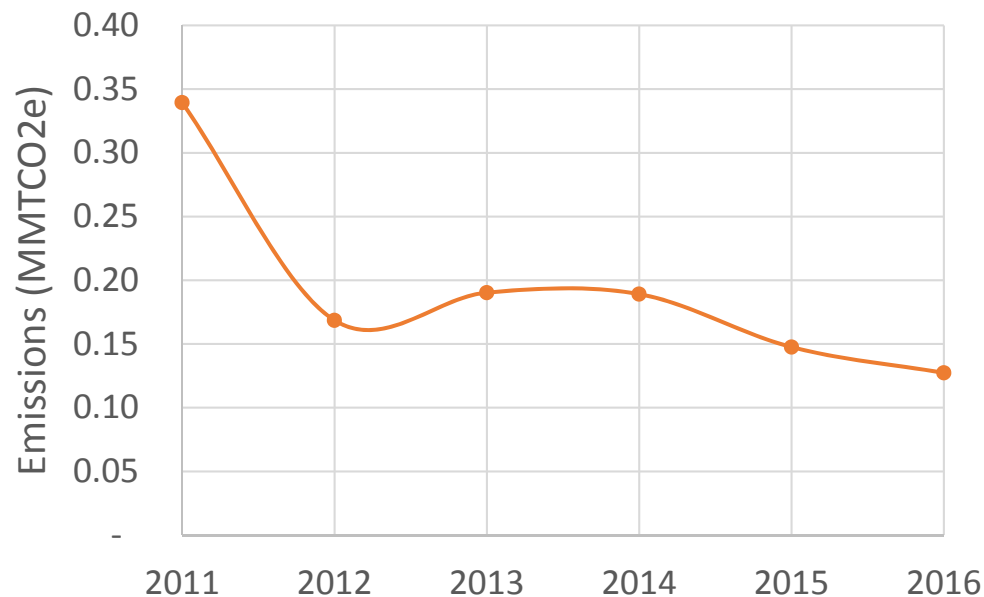


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## • Subpart SS: Electrical Equipment Manufacturers

	2011	2012	2013	2014	2015	2016
Number of Reporters	6	6	6	7	7	7
Emissions (MMTCO <sub>2</sub> e)	0.34	0.17	0.19	0.19	0.15	0.13
Annual Emission Changes		-50.3%	+12.9%	-0.6%	-22.0%	-13.7%
Total Emission Changes		-50.3%	-43.9%	-44.3%	-56.5%	-62.5%



- Over the six years of the reporting program, there has been a 62.5 percent reduction in emissions
- Almost all of the emission reductions came from one company between the first and second year of reporting



# For Additional Information

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- Visit: <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 \(FLIGHT\)](#)
    - [2016 Data Highlights](#)
    - [Industrial Profiles](#)

