2015 GHGRP Data Highlights

Table of Contents

GHGRP 2015: Reported Data 5
Greenhouse Gas Reporting Program Background 5
Who reports? 8
Reported Emissions 9
Emissions Trends 10
Emissions by GHG 12
Geographic Distribution of Emissions 14
Emissions Range 17
GHGRP Calculation Methods Used 19
Report Verification 19
For More Information 19

GHGRP 2015: Power Plants 20
Power Plants Sector — Greenhouse Gas Emissions Reported to the GHGRP 20
Trend of Annual Reported GHG Emissions in the Power Plant Sector (as of 8/13/16) 21
Location and emissions range for each reporting facility in the power plant sector (as of 8/13/16) 21
Other EPA Resources 23

GHGRP 2015: Petroleum & Natural Gas Systems 24
Petroleum and Natural Gas Systems Sector — Greenhouse Gas Emissions Reported to the GHGRP 24
Total Reported Direct Emissions from Petroleum and Natural Gas Systems, by Subsector (as of 8/13/16) 25
Trend of Annual Reported GHG Emissions for Petroleum and Natural Gas Systems (as of 8/13/16) 26
Facility locations and reported emissions (CO_2e) for offshore production 26
Reported emissions (CO_2e) and well count by geologic basin for onshore production facilities 27
Reported emissions (CO_2e) by facility for industry types: natural gas processing, natural gas transmission/compression, underground natural gas storage, LNG storage, LNG import/export 28
Facility locations for industry types: natural gas processing, natural gas transmission, underground natural gas storage, LNG storage, LNG import/export 29
Reported emissions (CO_2e) by natural gas utility service territory for natural gas distribution facilities 29
Reported methane emissions (CO_2e) for gas well completions and workovers with hydraulic fracturing 30
Other EPA Resources 30

GHGRP 2015: Refineries 31
Refineries Sector — Greenhouse Gas Emissions Reported to the GHGRP 31
Trend of Annual Reported GHG Emissions in the Refinery Sector (as of 8/13/16) 31
Location and emissions range for each reporting facility in the refinery sector (as of 8/13/16) 32
Other EPA Resources 33

GHGRP 2015: CHEMICALS 35
Chemicals Sector — Greenhouse Gas Emissions Reported to the GHGRP 35
Total Reported Direct Emissions from Chemicals (All Subsectors), by Subsector (as of 8/13/16). 36
Trend of Annual Reported GHG Emissions for Chemicals (All Subsectors) (as of 8/13/16) 37
Location and emissions range for each reporting facility for Chemicals (All Subsectors) (as of 8/13/16) 37
Chemicals (Non-fluorinated) 38
Chemicals (Non-Fluorinated) Subsectors — Greenhouse Gas Emissions Reported to the GHGRP 38
Total Reported Direct Emissions from Chemicals (Non-fluorinated), by Subsector, (as of 8/13/16). 39
Trend of Annual Reported GHG Emissions for Chemicals (Non-fluorinated), by Subsector (as of 8/13/16). 40
Location and emissions range for each reporting facility for Chemicals (Non-fluorinated) (as of 8/13/16). 40
Fluorinated Chemicals 42
Fluorinated Chemicals Subsector — Greenhouse Gas Emissions Reported to the GHGRP 42
Total Reported Direct Emissions from Fluorinated Chemicals, by Subsector (as of 8/13/16). 43
Trend of Annual Reported GHG Emissions from Fluorinated Chemicals, by Subsector (as of 8/13/16). 44
Location and emissions range for each reporting facility in Fluorinated Chemicals (as of 8/13/16). 44
Other EPA Resources 45

GHGRP 2015: WASTE 46
Waste Sector — Greenhouse Gas Emissions Reported to the GHGRP 46
Total Reported Direct Emissions from Waste, by Subsector (as of 8/13/16) 47
Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16). 47
Location and emissions range for each reporting facility in the waste sector (as of 8/13/16). 48
Other EPA Resources 49

GHGRP 2015: METALS 50
Metals Sector — Greenhouse Gas Emissions Reported to the GHGRP 50
Total Reported Direct Emissions from Metals, by Subsector (as of 8/13/16). 51
Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16). 51
Location and emissions range for each reporting facility in the metals sector in 2015 (as of 8/13/16). 52
Other EPA Resources 52

GHGRP 2015: MINERALS 53
Minerals Sector — Greenhouse Gas Emissions Reported to the GHGRP 53
Total Reported Direct Emissions from Minerals, by Subsector (as of 8/13/16). 54
Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16). 54
Location and emissions range for each reporting facility in the minerals sector (as of 8/13/16). 55
Other EPA Resources 56

GHGRP 2015: PULP AND PAPER 57
Pulp and Paper Sector — Greenhouse Gas Emissions Reported to the GHGRP 57
Total Reported Direct Emissions from Pulp and Paper, by Subsector (as of 8/13/16). 58
Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16) 58

Location and emissions range for each reporting facility in the pulp and paper sector (as of 8/13/16). 59
Other EPA Resources 59

GHGRP 2015: Other Sectors 60
Other Sector — Greenhouse Gas Emissions Reported to the GHGRP 60
Total Reported Direct Emissions from Ot her, by Subsector (as of 8/13/16). 61
Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16). 62
Location and emissions range for each reporting facility in the Other Sector (as of 8/13/16). 62

GHGRP 2015: Miscellaneous Combustion 65
Miscellaneous Combustion — Greenhouse Gas Emissions Reported to the GHGRP 65
2015 Total Reported Direct Emissions from Miscellaneous Combustion, by Subsector (as of 8/13/16). 66
Trend of Annual Reported GHG Emissions from Miscellaneous Combustion, by Subsector (as of 8/13/16) 67
Location and emissions range for each reporting facility in the Miscellaneous Combustion sector (as of 8/13/16). 67

GHGRP 2015: Underground Coal Mines 70
Underground Coal Mines — Greenhouse Gas Emissions Reported to the GHGRP 70
Trend of Annual Reported Direct Emissions from the Underground Coal Mines Sector (as of 8/13/16). 70
Location and emissions range for each reporting facility in the underground coal mines sector (as of 8/13/16). 71
Other EPA Resources 71

GHGRP 2015: Electronics Manufacturing 72
Electronics Manufacturing — Greenhouse Gas Emissions Reported to the GHGRP 72
Location and emissions range for each reporting facility in the Electronics Manufacturing sector (as of 8/13/16). 72

GHGRP 2015: Electrical Equipment Production and Use 74
Production and Use of Electrical Equipment — Greenhouse Gas Emissions Reported to the GHGRP 74
Total Reported Direct Emissions from Production and Use of Electrical Equipment Sector, by Subsector (as of 8/13/16). 75

GHGRP 2015: Supplier Highlights 76

GHGRP 2015: Suppliers of Natural Gas and Natural Gas Liquids 77
Natural Gas and Natural Gas Liquids Suppliers Sector — Carbon Dioxide Quantity Reported to the GHGRP 77
Graphic of the natural gas and NGL supply chain 78
Trend of Annual Reported CO_2 Quantity Associated with Natural Gas and NGL Supply. 78

GHGRP 2015: Suppliers of Petroleum Products 79
Petroleum Product Suppliers Sector – Number of Reporters 79
Graphic of the natural gas and NGL supply chain 80
Trend of annual reported CO_2 quantity associated with natural gas and NGL supply 80

GHGRP 2015: Suppliers of Industrial GHGs and Products Containing GHGs 81

Number of Reporters Subject to Subparts OO and QQ....81
Quantity (Net Supply) of GHGs Reported....81

GHGRP 2015 : CAPTURE, SUPPLY, AND UNDERGROUND INJECTION OF CARBON DIOXIDE....83
Capture and Supply of CO_2....83
Underground Injection of CO_2....85

GHGRP 2015: Reported Data

For reporting year (RY) 2015, over 8,000 facilities and suppliers reported to the greenhouse gas reporting program. Among these reporters,

- 8,003 facilities in nine industry sectors reported direct emissions.
- Reported direct emissions totaled 3.05 billion metric tons carbon dioxide equivalent (CO_2e), about half of total U.S. greenhouse gas emissions.
- 961 suppliers reported.
- 101 facilities reported injecting CO_2 underground.

Summary GHGRP data has been broken into several sections below.

All greenhouse gas data presented here reflect the information reported to EPA as of 08/13/2016. The reported emissions **exclude biogenic** CO_2. GHG data displayed here in units of carbon dioxide equivalent (CO_2e) reflect the global warming potential (GWP) values from Table A-1, which is generally based on the IPCC's Fourth Assessment Report (AR4), with the addition of GWPs from the IPCC's Fifth Assessment Report for fluorinated GHGs that did not have GWPs in the AR4.

Greenhouse Gas Reporting Program Background

As directed by Congress, EPA's Greenhouse Gas Reporting Program (GHGRP) collects annual greenhouse gas information from the top emitting sectors of the U.S. economy (Table 1). The GHGRP is the only dataset containing facility-level greenhouse gas (GHG) emissions data from large industrial sources across the United States. With five years of reporting for most sectors, GHGRP data are providing important new information on industrial emissions—showing variation in emissions across facilities within an industry, variation in industrial emissions across geographic areas, and changes in emissions over time at the sector and facility level. EPA is using this facility-level data to improve estimates of national greenhouse gas emissions, including using it to improve the U.S. Greenhouse Gas Inventory. The data are also being used to inform regulatory actions and voluntary emission reduction efforts.

This document summarizes national industrial sector emissions and trends.

Table 1: GHGRP Sector Classifications

Industry Sector	Number of Reporters	Emissions (million metric tons CO_2e)
Power Plants	1,480	1,969.3
Petroleum and Natural Gas Systems	2,413	231.4
Onshore Petroleum & Nat. Gas Prod.	534	97.3
Offshore Petroleum & Nat. Gas Prod.	133	7.3
Natural Gas Processing	467	58.5
Natural Gas Trans./Compression	521	22.9
Underground Natural Gas Storage	53	1.5 [1]

[1] The Southern California Gas Company - Aliso Canyon facility's actual 2015 emissions were higher than those reported to the GHGRP. The GHGRP provides well-vetted average emission factors to calculate emissions. The facility followed these GHGRP calculation methods for 2015 reporting. Actual emissions differ from those

Industry Sector	Number of Reporters	Emissions (million metric tons CO_2e)
Natural Gas Local Distribution Co.	177	14.3
Liquefied Natural Gas Imp./Exp. Eq.	7	0.6
Liquefied Natural Gas Storage	7	**
Other Petroleum & Nat. Gas Systems	541	29.1
Refineries	144	175.6
Chemicals	462	173.9
Non-Fluorinated Chemicals		
Adipic Acid Production	3	6.1
Ammonia Manufacturing	23	22.8
Hydrogen Production	110	44.1
Nitric Acid Production	34	11.8
Petrochemical Production	68	54.9
Phosphoric Acid Production	12	1.6
Silicon Carbide Production	1	0.1
Titanium Dioxide Production	7	2.3
Other Chemicals Production	213	20.3
Fluorinated Chemicals		
Fluorinated GHG Production	14	5.6
HCFC-22 Prod./HFC-23 Dest.	4	4.3
Waste	1,540	111.7
Industrial Waste Landfills	174	8.6
Municipal Landfills	1,161	91.0
Solid Waste Combustion	64	10.1
Wastewater Treatment	148	2.1
Metals	297	90.2
Aluminum Production	9	5.3
Ferroalloy Production	10	2.1
Iron and Steel Production	127	70.3
Lead Production	12	1.0
Magnesium Production	11	1.2
Zinc Production	5	0.6
Other Metals Production	123	9.7
Minerals	379	115.5
Cement Production	95	68.8
Glass Production	106	8.0
Lime Manufacturing	74	28.8
Soda Ash Manufacturing	4	5.2

reported due to an exceptional leak event. See California Air Resource Board's Aliso Canyon Natural Gas Leak webpage for more information.

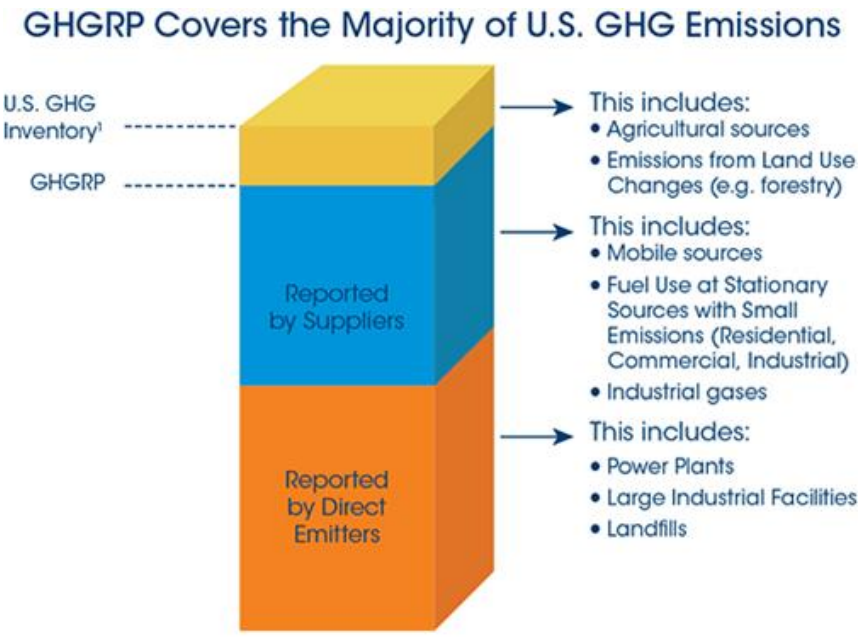
Industry Sector	Number of Reporters	Emissions (million metric tons CO_2e)
Other Minerals	102	4.6
Pulp and Paper	232	38.4
Pulp and Paper Manufacturing	108	26.9
Other Paper Producers	124	11.6
Other	1,433	139.5
Food Processing	341	30.9
Ethanol Production	176	18.5
Manufacturing	287	15.5
Universities	115	8.9
Military	41	2.4
Other	180	11.3
Underground Coal Mines	123	42.9
Electronics Manufacturing	58	6.3
Electrical Equipment Manufacturers	7	0.2
Electrical Equipment Use	105	2.7

** Total reported emissions are less than 0.05 million metric tons CO_2e.

The GHGRP does not represent total U.S. GHG emissions, but provides facility level data for large sources of direct emissions, thus representing the majority of U.S. GHG emissions. The GHGRP data collected from direct emitters representing about half of all U.S. emissions. When including greenhouse gas information reported to the GHGRP by suppliers, emissions coverage reaches approximately 85–90% (See Figure 1). The *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014* contains information on all GHG emissions sources and sinks in the United States.

Learn more about the differences between the Inventory and the GHGRP.

Figure 1: U.S. Greenhouse Gas Inventory and the Greenhouse Gas Reporting Program



[1] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2014. April 2016.

Suppliers report the quantity of GHGs that would be emitted if the fuels and industrial GHGs that they place into the economy each year are used/released. Reporting by suppliers helps account for the greenhouse gas emissions by the numerous low-emitting sources that are not required to report emissions under the GHGRP (e.g., mobile sources, residential sources). Learn more about suppliers and their 2015 reported data

Table 2: Overview of GHG Data Reported (2015)

Direct emitters	
Number of facilities reported	8,003
Reported direct emissions (billion metric tons CO_2e)	3.05
Suppliers of fuel and industrial gases	
Number of suppliers	961
Underground injection of carbon dioxide	
Number of carbon dioxide injection facilities	101

Who reports?

For 2015, 8,003 direct emitters submitted a GHG report. The Petroleum and Natural Gas Systems sector had the largest number of reporting facilities, followed by the Waste Sector and the Power Plants Sector. Among suppliers, Suppliers of Natural Gas and Natural Gas Liquids had the largest number of reporting facilities.

Table 3: Number of Direct Emitters that Reported (2015)

Industry Sector	**Number of Reporters[2]**
Power Plants	1,480

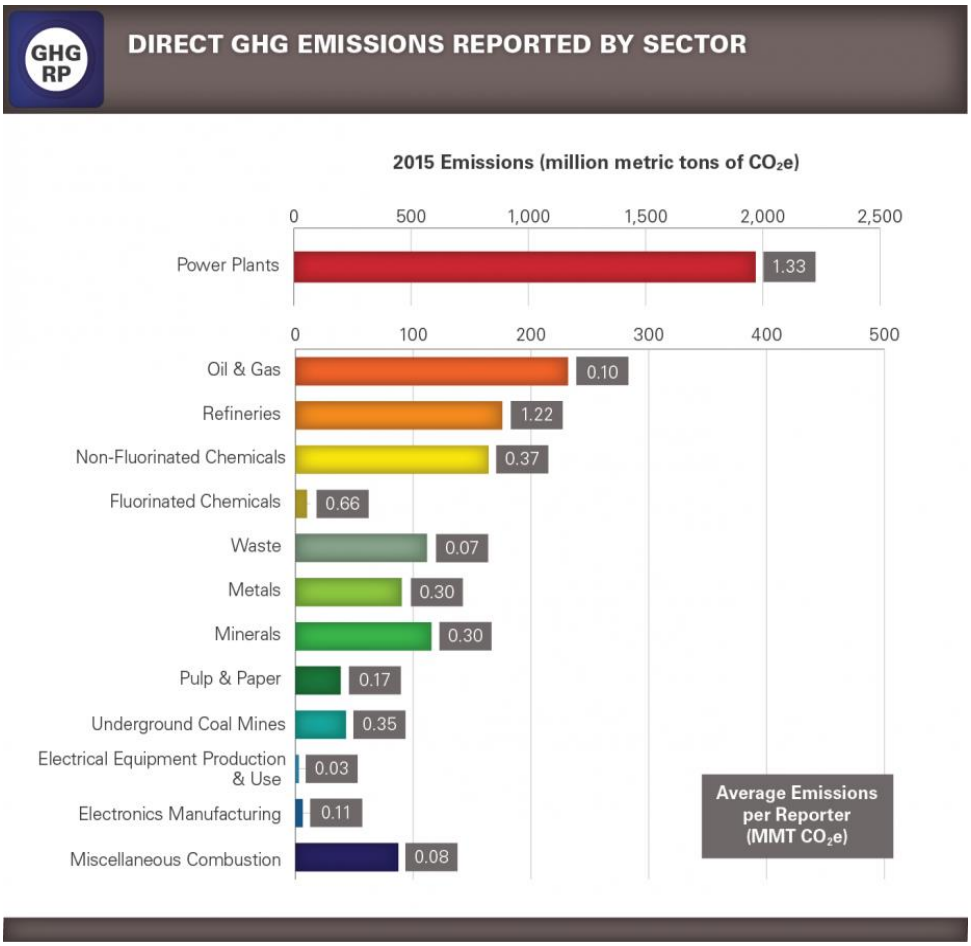
[2] Totals sum to more than 8,003 because facilities whose activities fall within more than one sector are counted multiple times.

Industry Sector	Number of Reporters[2]
Petroleum and Natural Gas Systems	2,413
Refineries	144
Chemicals	462
• *Fluorinated Chemicals*	15
• *Non-fluorinated Chemicals*	447
Waste	1,540
Metals	297
Minerals	379
Pulp and Paper	232
Other	1,433
• *Underground Coal Mines*	123
• *Electrical Equipment Production & Use*	112
• *Electronics Manufacturing*	58
• *Other Combustion*	1,140

Reported Emissions

In 2015, 3.05 billion metric tons CO_2e were reported by direct emitters. The largest emitting sector was the Power Plant Sector with 2.0 billion metric tons CO_2e, followed by the Petroleum and Natural Gas Systems Sector with 231 million metric tons (MMT) CO_2e and the Refineries Sector with 176 MMT CO_2e. This information, as well as average emissions per reporter, is shown in the following chart.

Figure 2: Direct GHG Emissions Reported by Sector (2015)



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Emissions Trends

National level trends in greenhouse gas emissions are available through the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014*. The Greenhouse Gas Reporting Program is different from the U.S. GHG Inventory in that it collects information from the largest stationary sources in the U.S. and provides nearly complete emissions coverage for many of the largest emitting industries. Trends in emissions reported for individual industries are discussed in the industry-specific reports.

Total U.S. emissions increased by 1.0% from 2013 to 2014, based on the U.S. GHG Inventory. Between 2013 and 2014, emissions reported to the GHGRP increased by 0.5% (Table 4).

The U.S. GHG Inventory is not yet available for 2015. For sources reporting to the GHGRP, emissions increased by 0.5% from 2013 to 2014. Over the past five reporting years (2011-2015), GHGRP reported emissions have declined by 8.2%. This decline is caused primarily by an 11.3% decline in reported emissions by power plants since 2011.

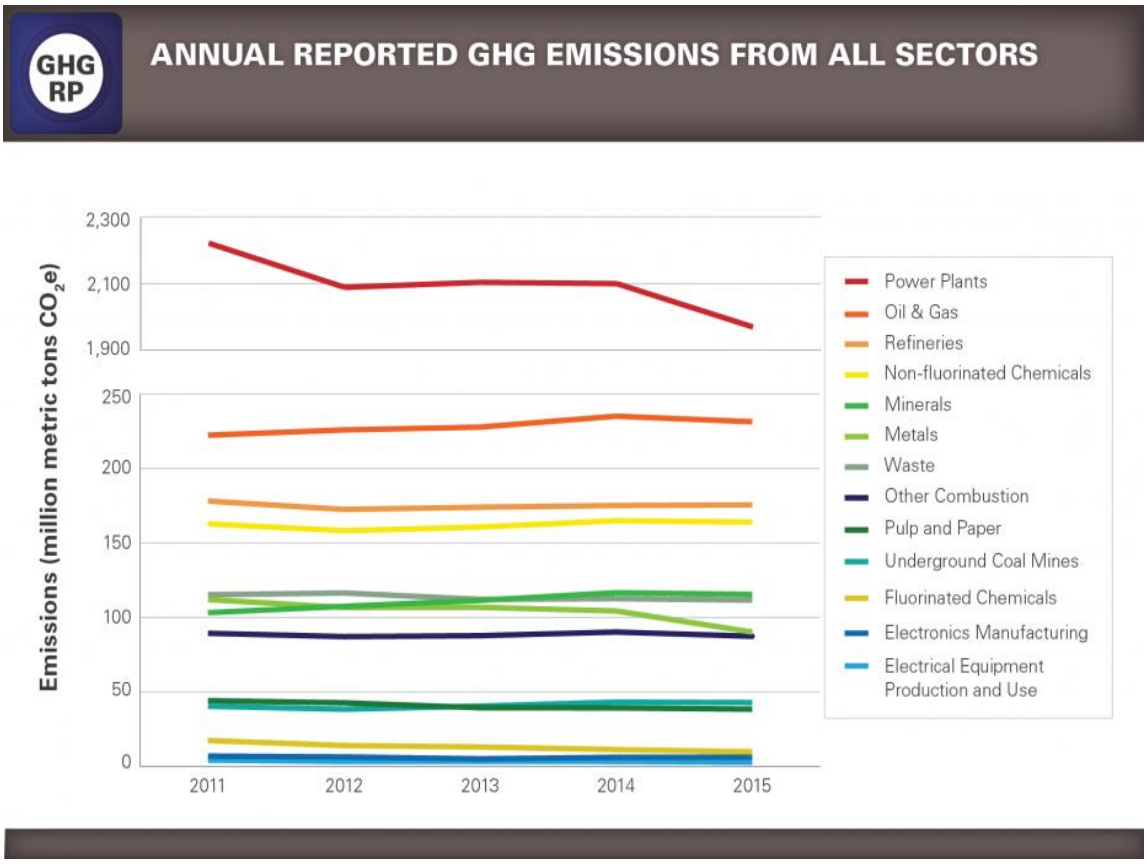
Table 4: Emissions Trends for U.S. GHG Inventory and GHGRP (2011-2015)

Industry Sector	2011	2012	2013	2014	2015
U.S. GHG Inventory					
Total emissions (million metric tons CO_2e)	6,865.4	6,643.0	6,800.0	6,870.5	Not available
Percent change in emissions from previous year	-1.7%	-3.2%	2.4%	1.0%	Not available
GHGRP					
Number of direct emitting facilities	7,641	7,885	7,962	8,183	8,003
Direct emissions (million metric tons CO_2e)	3,317.8	3,168.0	3,186.0	3,202.1	3,045.6
Percent change in emissions from previous year	—	-4.5%	0.6%	0.5%	-4.9%

Table 5: Emission Trends by Sector (2011-2015)

Sector	2011 Emissions (MMT CO_2e)	2012 Emissions (MMT CO_2e)[3]	2013 Emissions (MMT CO_2e)	2014 Emissions (MMT CO_2e)	2015 Emissions (MMT CO_2e)
Power Plants	2,221.3	2,088.4	2,103.6	2,099.6	1,969.3
Petroleum and Natural Gas Systems	222.3	226.0	227.8	235.1	231.4
Refineries	178.2	172.5	174.0	175.2	175.6
Chemicals	180.3	172.3	173.8	176.3	173.9
• *Fluorinated Chemicals*	17.4	14.1	13.1	11.4	9.9
• *Non-fluorinated Chemicals*	162.9	158.3	160.7	165.0	164.1
Waste	115.3	116.5	112.2	112.6	111.7
Metals	112.0	106.8	106.8	104.4	90.2
Minerals	103.2	107.5	111.5	116.6	115.5
Pulp and Paper	44.2	42.7	39.4	39.3	38.4
Other	141.0	135.4	136.9	143.0	139.5
• *Underground Coal Mines*	40.4	38.4	40.5	43.2	42.9
• *Electrical Equipment Production & Use*	4.3	3.4	3.5	3.4	2.9
• *Electronics Manufacturing*	7.0	6.4	5.1	6.2	6.3
• *Other Combustion*	89.4	87.2	87.8	90.2	87.5

Figure 3: Trends in Direct GHG Emissions (2011-2015) [3,4]



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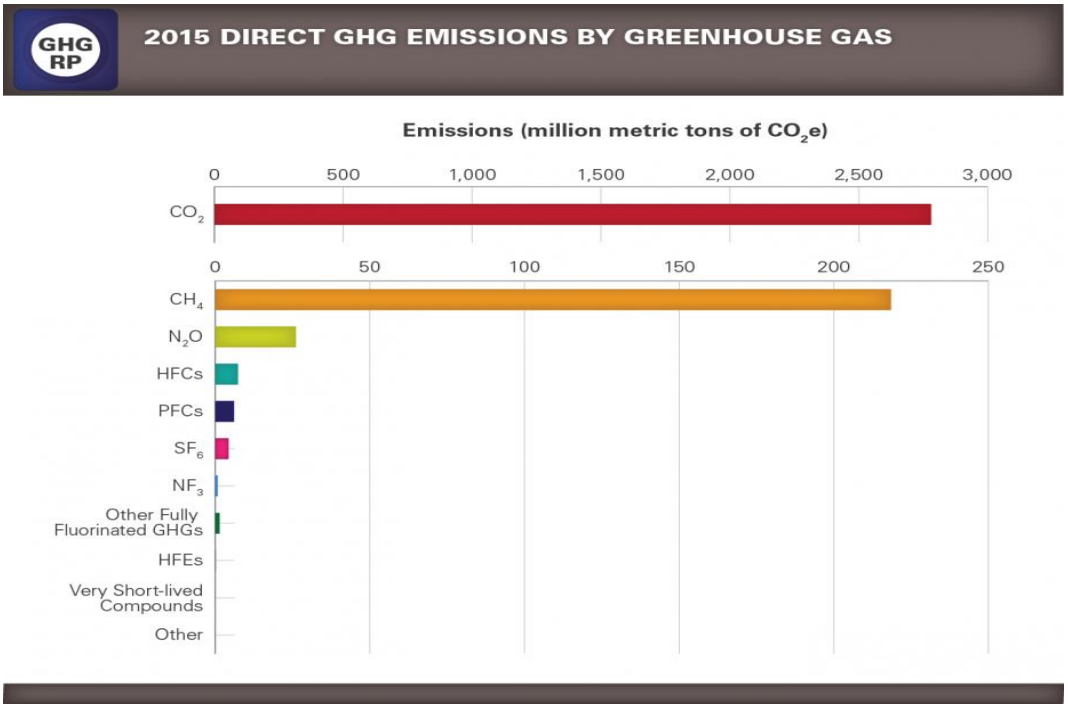
Emissions by GHG

Carbon dioxide is the GHG emitted in the largest quantities. The 2.8 billion metric tons of CO_2 reported for 2015 represent 91.3% of the GHGs reported in 2015[5] Methane emissions represent 7.2% of reported 2015 GHG emissions, N_2O represents 0.9%, and fluorinated gases (HFCs, PFCs, SF_6) represent 0.7% (Figure 4).

[3] Non-fluorinated Chemicals and Fluorinated Chemicals are components of "Chemicals" in FLIGHT.
[4] Other Combustion, Underground Coal Mines, Electronics Manufacturing and Electrical Equipment Production & Use comprise "Other" in FLIGHT.
[5] The Inventory of U.S. Greenhouse Gas Emissions And Sinks for 2015 is not yet available. In 2014, CO_2 represented 81% of total U.S. GHG emissions.

Figure 4: Direct Emissions by GHG (2015)



The table below lists the primary sectors emitting each GHG.

Table 6: Largest Sources of GHG Emissions

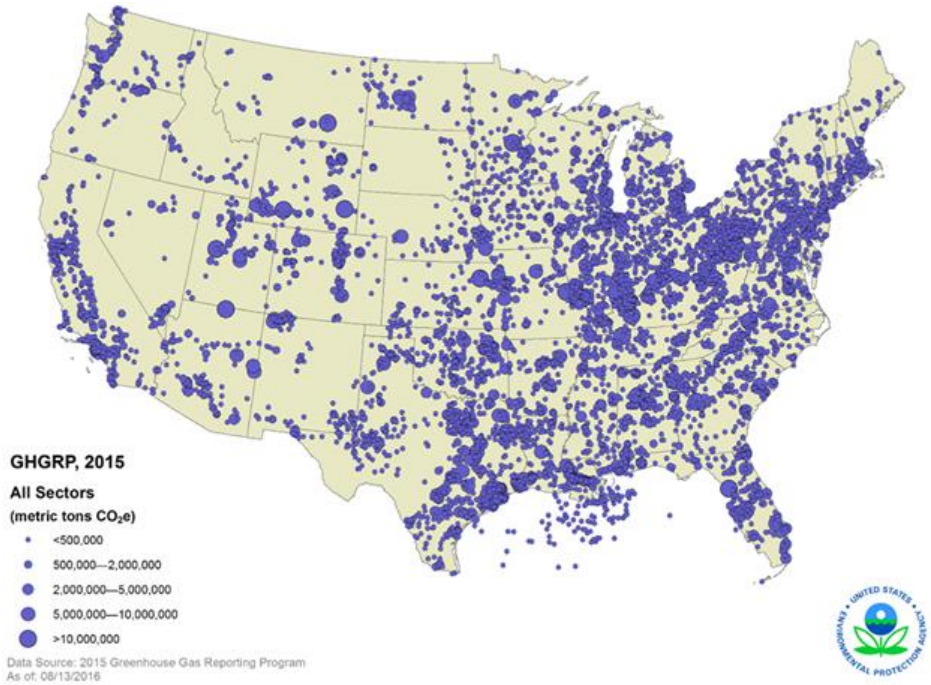
Greenhouse Gas	Source Categories Contributing Most to Emissions[6]	Sectors Contributing Most to Emissions
CO_2	Electricity Generation (D), Stationary Combustion (C)	Power Plants
CH_4	Municipal Landfills (HH), Petroleum & Natural Gas Systems (W)	Waste, Petroleum & Natural Gas Systems
N_2O	Nitric Acid Production (V), Electricity Generation (D), Adipic Acid Production (E)	Chemicals, Power Plants
SF_6	SF_6 from Electrical Equipment (DD), Electronics Manufacturing (I), Magnesium Production (T)	Other, Metals
NF_3	Electronics Manufacturers (I), Fluorinated Gas Production (L)	Other
HFCs	HCFC–22 Production and HFC–23 Destruction (O), Fluorinated Gas Production (L)	Chemicals
PFCs	Electronics Manufacturers (I), Aluminum Production (F)	Metals, Other

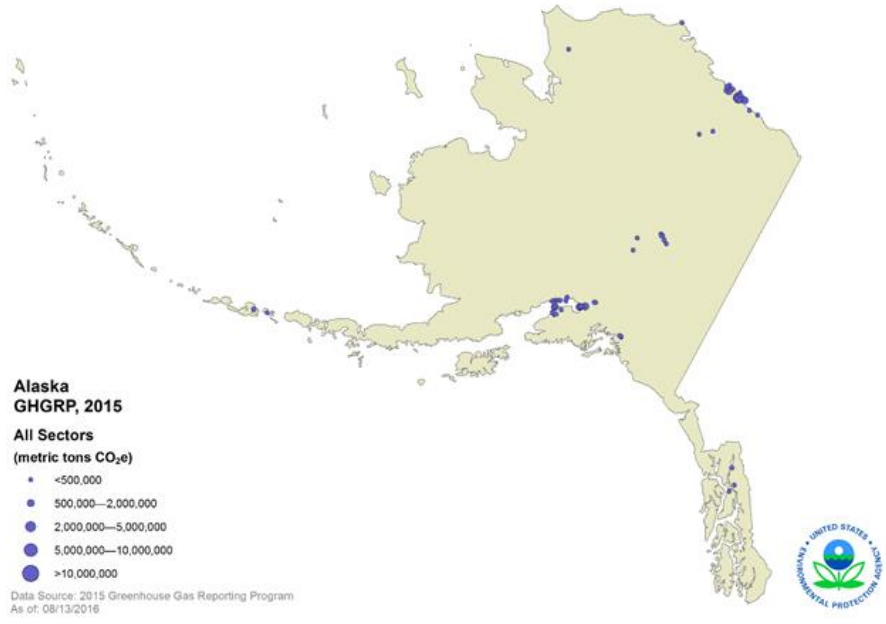
[6] These source categories account for 75 percent or more of the reported emissions of the corresponding GHG. The subpart under which the emissions were reported is shown in parentheses.

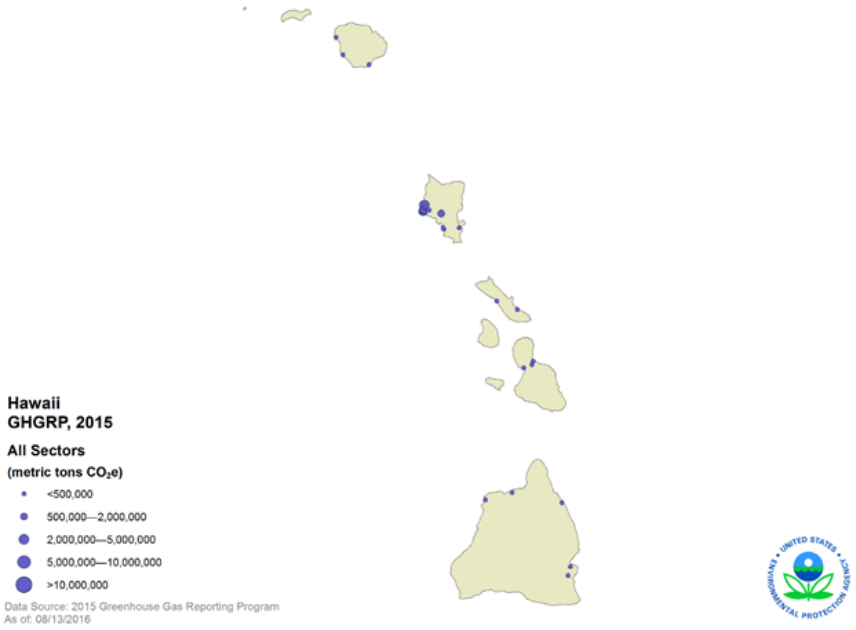
Geographic Distribution of Emissions

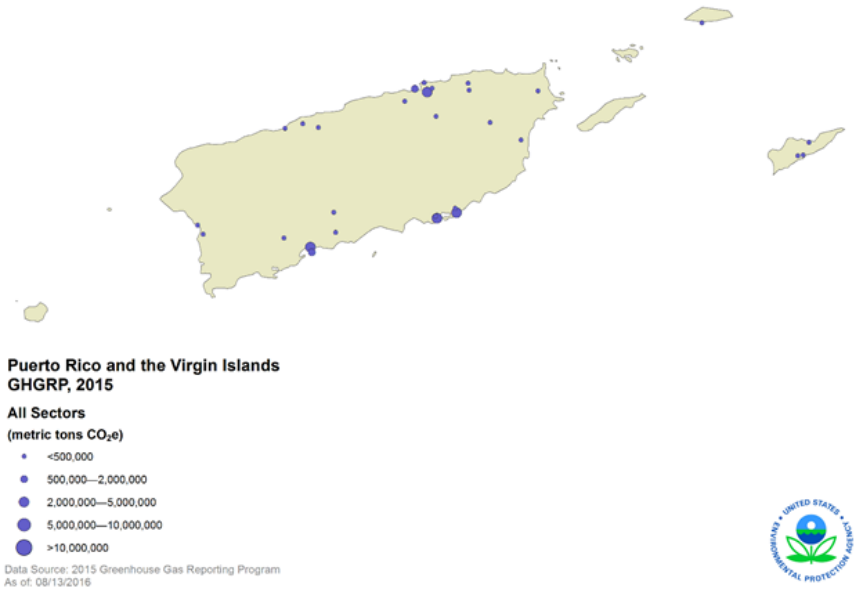
This map shows the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility. There are also facilities located in Alaska, Hawaii, Puerto Rico, the U.S. Virgin Islands, and Guam.

Figure 5: Location and Total Reported Emissions from GHGRP Facilities (2015)





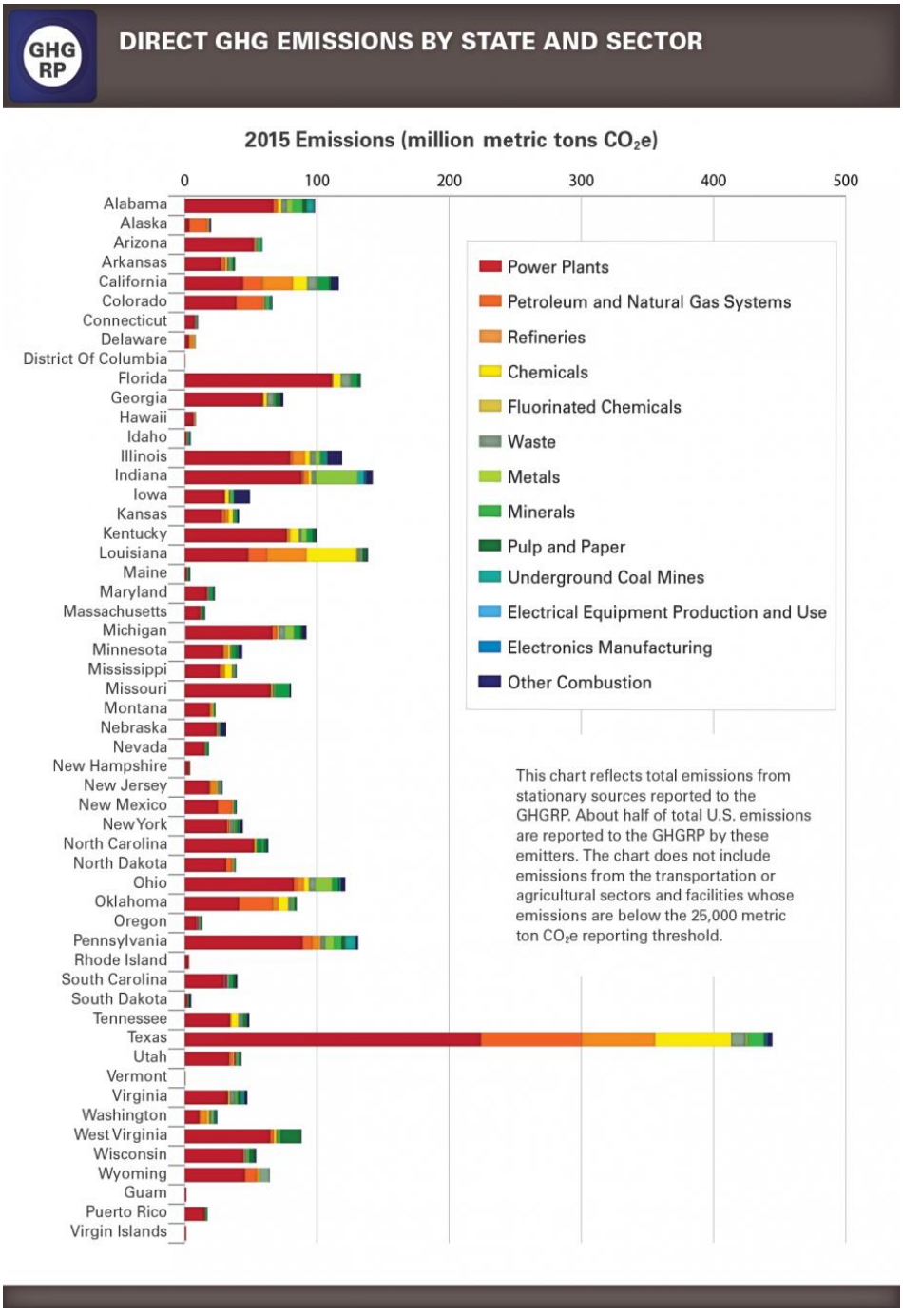

Hawaii
GHGRP, 2015
All Sectors
(metric tons CO_2e)
<500,000
500,000—2,000,000
2,000,000—5,000,000
5,000,000—10,000,000
>10,000,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016


Puerto Rico and the Virgin Islands
GHGRP, 2015
All Sectors
(metric tons CO_2e)
<500,000
500,000—2,000,000
2,000,000—5,000,000
5,000,000—10,000,000
>10,000,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016

Readers can identify facilities in their state, territory, county, or city by visiting FLIGHT.

Because it generally applies to facilities that emit greater than 25,000 metric tons CO_2e per year, the GHGRP provides total reported emissions from large stationary sources in each state. Figure 6 shows the reported emissions in each state broken out by industrial sector.

Figure 6: Direct GHG Emissions by State and Sector (2015)

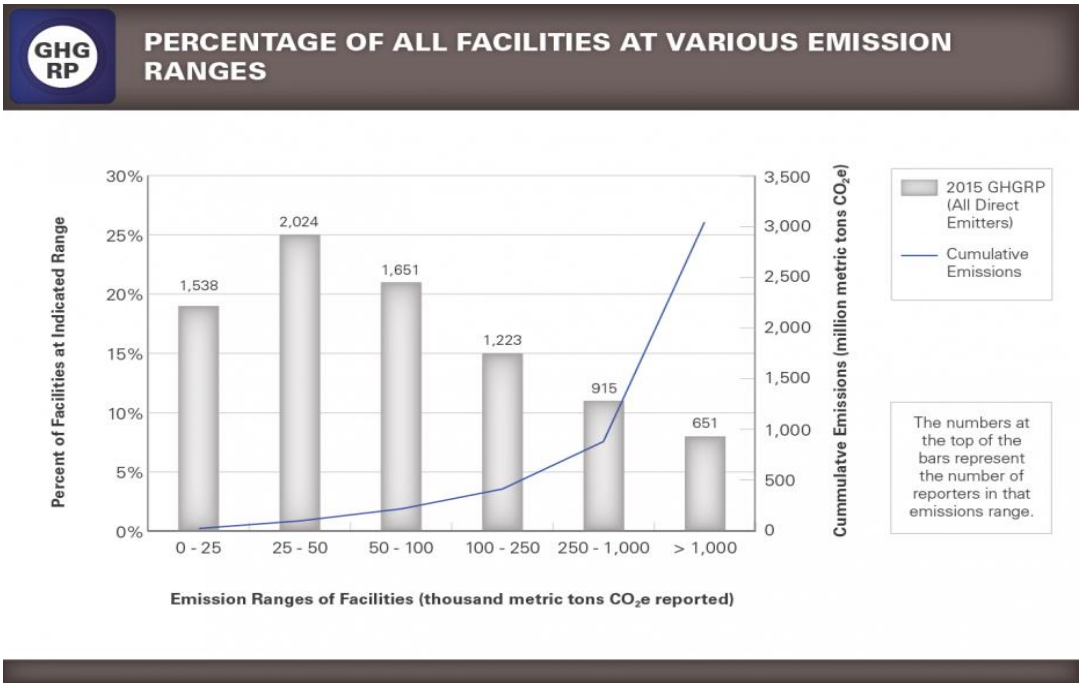


View this information in FLIGHT.

Emissions Range

The GHGRP provides a comprehensive dataset that can be used to determine the number of facilities at various emissions levels in many industry sectors. The GHGRP can also be used to determine the total GHG emissions from individual facilities, including emissions from fossil fuel combustion and other processes. This information is valuable for planning future policies. GHGRP data provide policy makers with a better understanding of the number of facilities and total emissions that would be covered by potential GHG reduction policies for various industries.

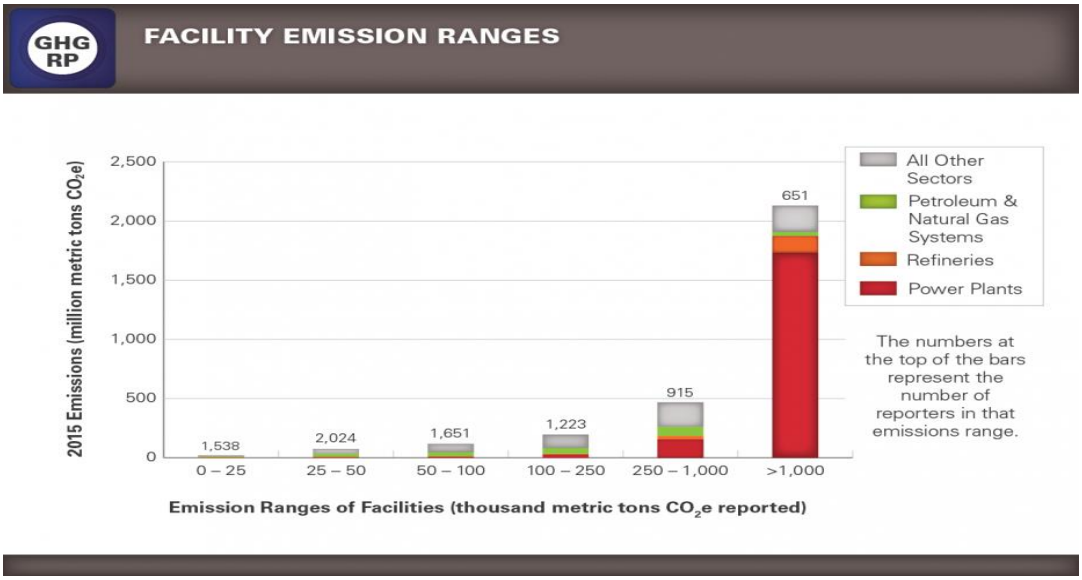
Figure 7: Percentage of All Reporting Facilities at Various Emission Ranges (2015)



Eighty percent of reporting facilities had emissions less than 250,000 metric tons CO_2e. In 2015, the 651 largest-emitting facilities—those emitting more than one million metric tons CO_2e—accounted for almost 2.2 billion metric tons CO_2e. These emissions represent 71.7% of the total 3.05 billion metric tons CO_2e reported. These high-emitting facilities are mainly power plants, but also include petroleum refineries and facilities in the Chemicals and Metals sectors.

You can use FLIGHT to list and sort facilities based on total reported emissions and find the largest emitting facilities in the country or a specific state or county. This tool also allows you to sort facilities by specific industry types.

Figure 8: Facility Emission Ranges (2015)



GHGRP Calculation Methods Used

The GHGRP prescribes methodologies that must be used to determine GHG emissions from each source category. Reporters generally have the flexibility to choose among several methods to compute GHG emissions. The decision of which method to use may be influenced by the existing environmental monitoring systems in place and other factors. Reporters can change emission calculation methods from year to year and within the same year, as long as they meet the requirements for use of the method selected.

Additional information on the methodologies that reporters use to determine GHG emissions.

Report Verification

All reports submitted to EPA are evaluated by electronic validation and verification checks. If potential errors are identified, EPA will notify the reporter, who can resolve the issue either by providing an acceptable response describing why the flagged issue is not an error or by correcting the flagged issue and resubmitting their annual GHG report.

Additional information describing EPA's verification process in more details.

For More Information

For more detailed information from each industrial sector, view the industry sections below.

Use FLIGHT to view maps of facility locations, obtain summary data for individual facilities, create customized searches, and display search results graphically.

Downloadable spreadsheets containing summary data reported to the GHGRP from each reporter are available on the Data Downloads page.

All other publicly available data submitted to the GHGRP are available for download through Envirofacts.

The U.S. Greenhouse Gas Inventory contains information on all sources of GHG emissions and sinks in the United States from 1990 to 2014.

All GHG emissions data reflect the global warming potential (GWP) values from the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (*Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K. and Reisinger, A. (eds)]. IPCC, Geneva, Switzerland, 2007*). The AR4 values also can be found in the current version of Table A-1 in subpart A of 40 CFR part 98.

GHGRP 2015: Power Plants

The power plant sector consists of facilities that produce electricity by combusting fossil fuels and/or biomass. The sector includes units that are subject to the Acid Rain Program and any other electricity generators that are otherwise required to report to the EPA CO_2 mass emissions year-round according to 40 CFR part 75. This sector also includes combustion units serving electricity generators that are located at facilities with primary NAICS codes of 221330 (Steam and Air-Conditioning Supply[7]) or 2211xx (Electric Power Generation, Transmission and Distribution), which includes some part 75 reporters that report heat input to the EPA on a year-round basis. The emissions from this sector are solely from stationary fuel combustion sources.

Power Plants Sector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e unless otherwise noted)

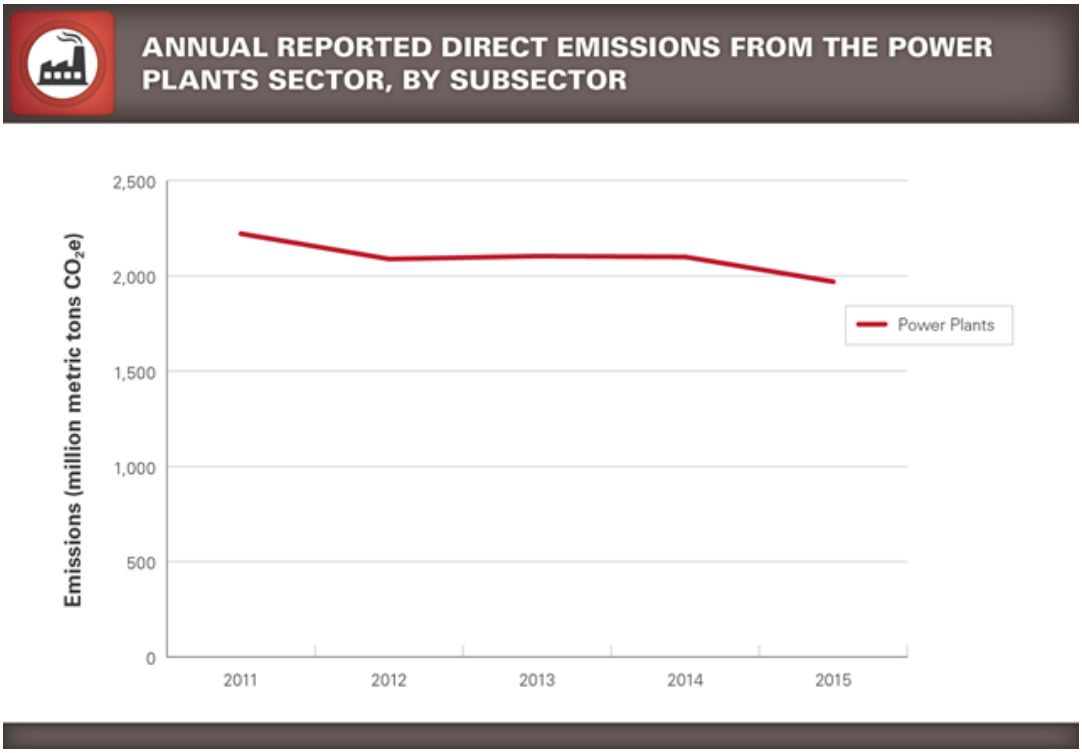
	2011	2012	2013	2014	2015
Number of facilities:	1,593	1,609	1,577	1,547	1,480
Total emissions (CO_2e):	2,221.3	2,088.4	2,103.6	2,099.6	1,969.3
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	2,207.9	2,076.5	2,091.4	2,087.2	1,958.3
• Methane (CH_4):	4.2	3.7	3.7	4.0	3.6
• Nitrous oxide (N_2O):	9.2	8.2	8.4	8.4	7.4

Totals may not equal sum of individual GHGs due to independent rounding.

CO_2 emissions from the combustion of biomass are NOT included in emissions totals provided above.

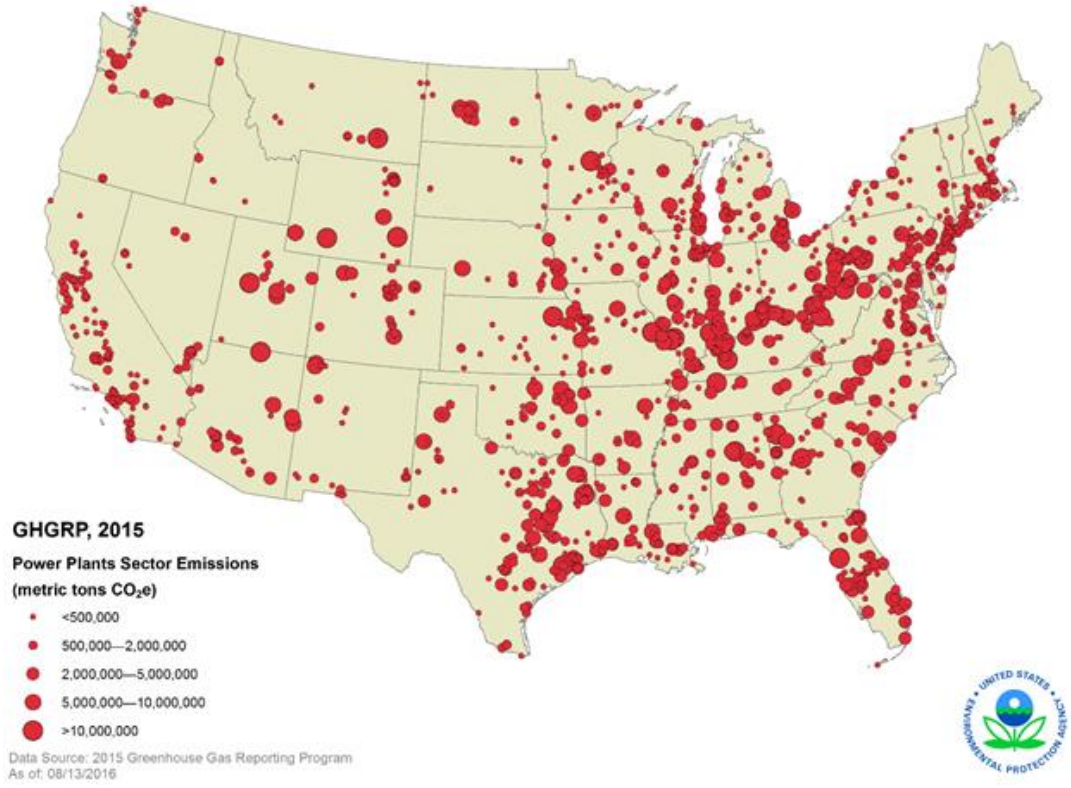
[7] Establishments primarily engaged in providing steam, heated air, or cooled air. The steam distribution may be through mains.

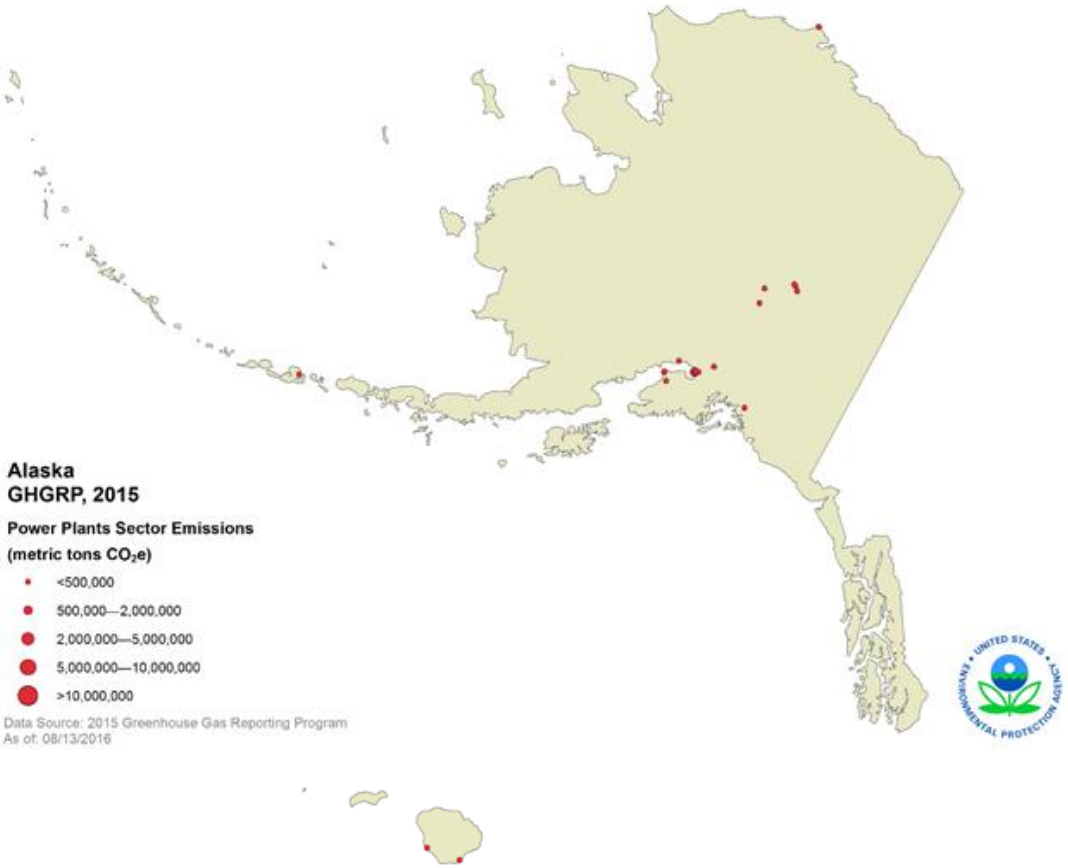
Trend of Annual Reported GHG Emissions in the Power Plant Sector (as of 8/13/16)



Location and emissions range for each reporting facility in the power plant sector (as of 8/13/16)

These maps show the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.




Alaska
GHGRP, 2015
Power Plants Sector Emissions
(metric tons CO_2e)
<500,000
500,000—2,000,000
2,000,000—5,000,000
5,000,000—10,000,000
>10,000,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016

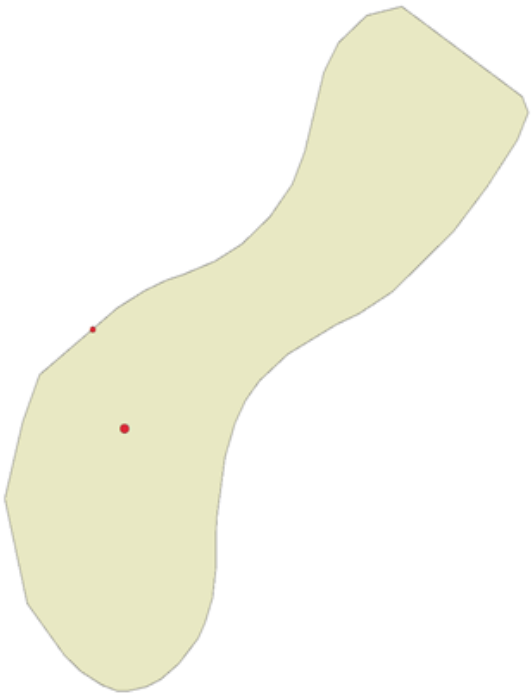

Hawaii
GHGRP, 2015
Power Plants Sector Emissions
(metric tons CO_2e)
<500,000
500,000—2,000,000
2,000,000—5,000,000
5,000,000—10,000,000
>10,000,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016

Puerto Rico and the Virgin Islands
GHGRP, 2015

Power Plants Sector Emissions
(metric tons CO_2e)

- <500,000
- 500,000—2,000,000
- 2,000,000—5,000,000
- 5,000,000—10,000,000
- >10,000,000

Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016



Guam
GHGRP, 2015

Power Plants Sector Emissions
(metric tons CO_2e)

- <500,000
- 500,000—2,000,000
- 2,000,000—5,000,000
- 5,000,000—10,000,000
- >10,000,000

Data Source: 2014 Greenhouse Gas Reporting Program
As of: 08/16/2015

Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Petroleum & Natural Gas Systems

This sector consists of the following industry segments of the petroleum and natural gas industry.

- **Onshore Production.** Production of petroleum and natural gas associated with onshore production wells and related equipment.
- **Offshore Production.** Production of petroleum and natural gas from offshore production platforms.
- **Natural Gas Processing.** Processing of field quality gas to produce pipeline quality natural gas.
- **Natural Gas Transmission.** Compressor stations used to transfer natural gas through transmission pipelines.
- **Underground Natural Gas Storage.** Facilities that store natural gas in underground formations.
- **Natural Gas Distribution.** Distribution systems that deliver natural gas to customers.
- **Liquefied Natural Gas (LNG) Import/Export.** Liquefied Natural Gas import and export terminals.
- **LNG Storage.** Liquefied Natural Gas storage equipment.
- **Other Petroleum and Natural Gas Systems.** Stationary fuel combustion emissions from petroleum and natural gas source categories that are not otherwise listed.

Petroleum and Natural Gas Systems Sector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	1,922	2,094	2,186	2,416	2,413
Total emissions (CO_2e):	222.3	226.0	227.8	235.1	231.4
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	138.4	145.4	150.6	161.9	160.5
• Methane (CH_4):	83.8	80.1	77.1	73.1	70.3
• Nitrous oxide (N_2O):	0.1	0.4	0.1	0.1	0.6

Totals may not equal sum of individual GHGs due to independent rounding.

CO_2 emissions from the combustion of biomass are NOT included in emissions totals provided above.

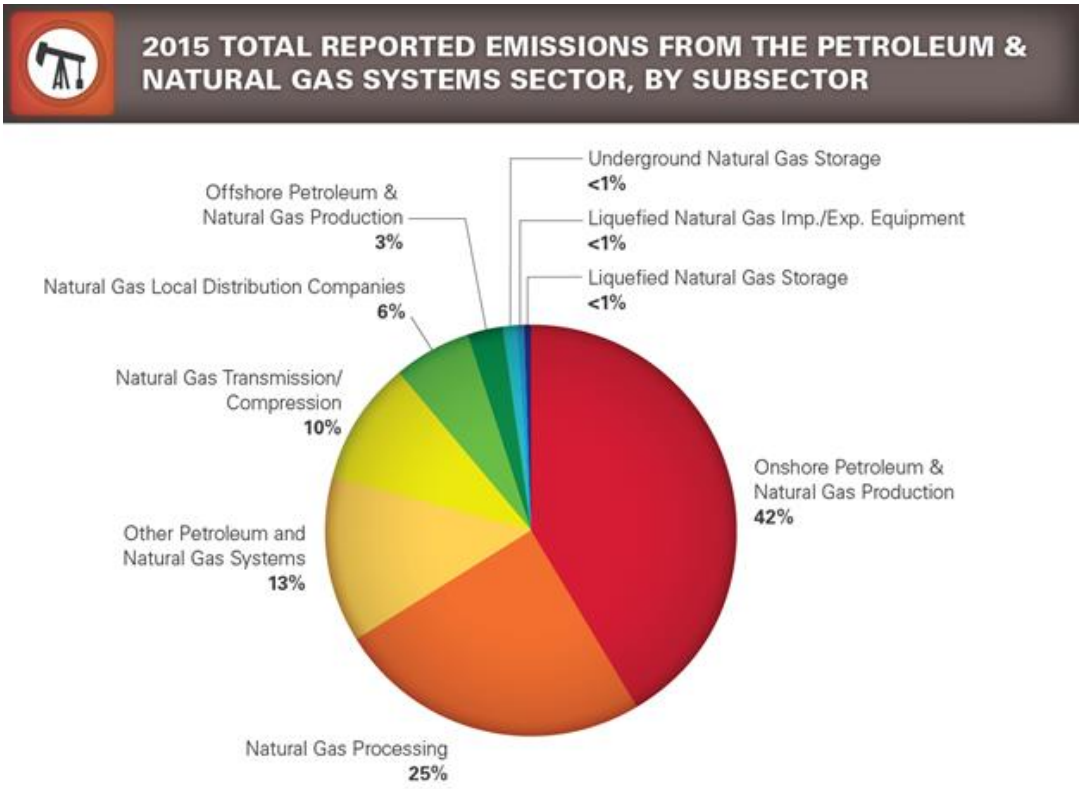
Industry Sector	2015 Number of Reporters	2015 Emissions (million metric tons CO_2e)
Onshore Production	534	97.3
Offshore Production	133	7.3
Natural Gas Processing	467	58.5

Industry Sector	2015 Number of Reporters	2015 Emissions (million metric tons CO_2e)
Natural Gas Transmission/Compression	521	22.9
Underground Natural Gas Storage	53	1.5[1]
Natural Gas Local Distribution Companies	177	14.3
Liquefied Natural Gas (LNG) Import/Export	7	0.6
LNG Storage	7	**
Other Petroleum and Natural Gas Systems	541	29.1

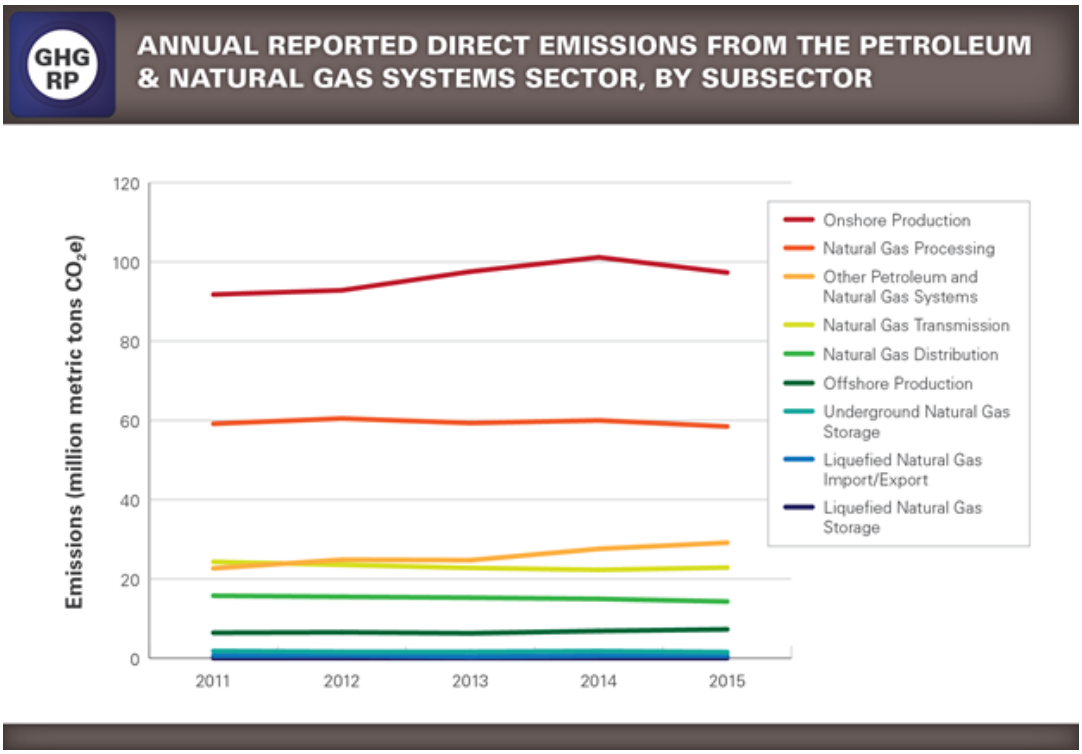
Totals may not equal sum of individual GHGs due to independent rounding.

** Total reported emissions are less than 0.05 million metric tons CO_2e

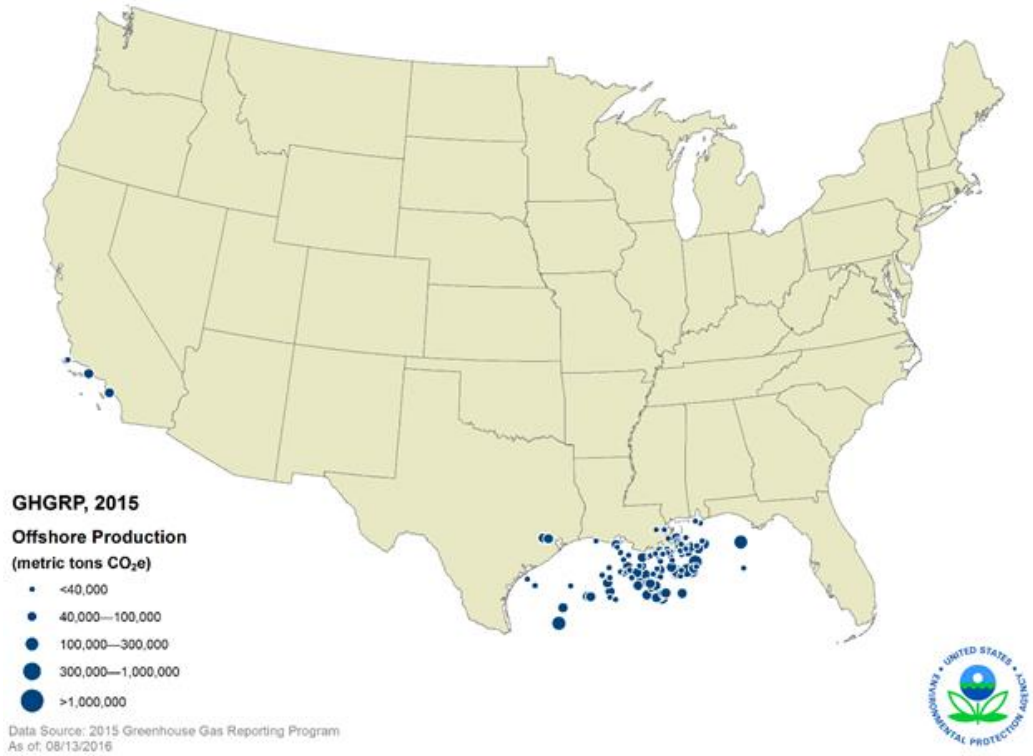
Total Reported Direct Emissions from Petroleum and Natural Gas Systems, by Subsector (as of 8/13/16).



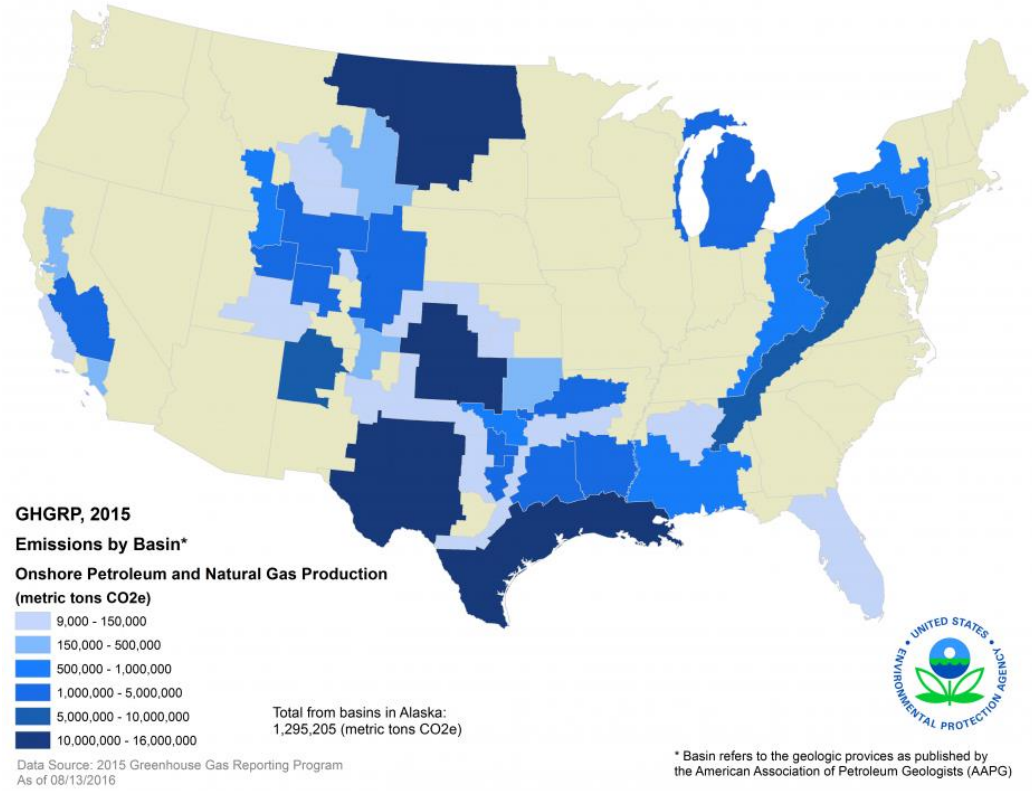
Trend of Annual Reported GHG Emissions for Petroleum and Natural Gas Systems (as of 8/13/16)

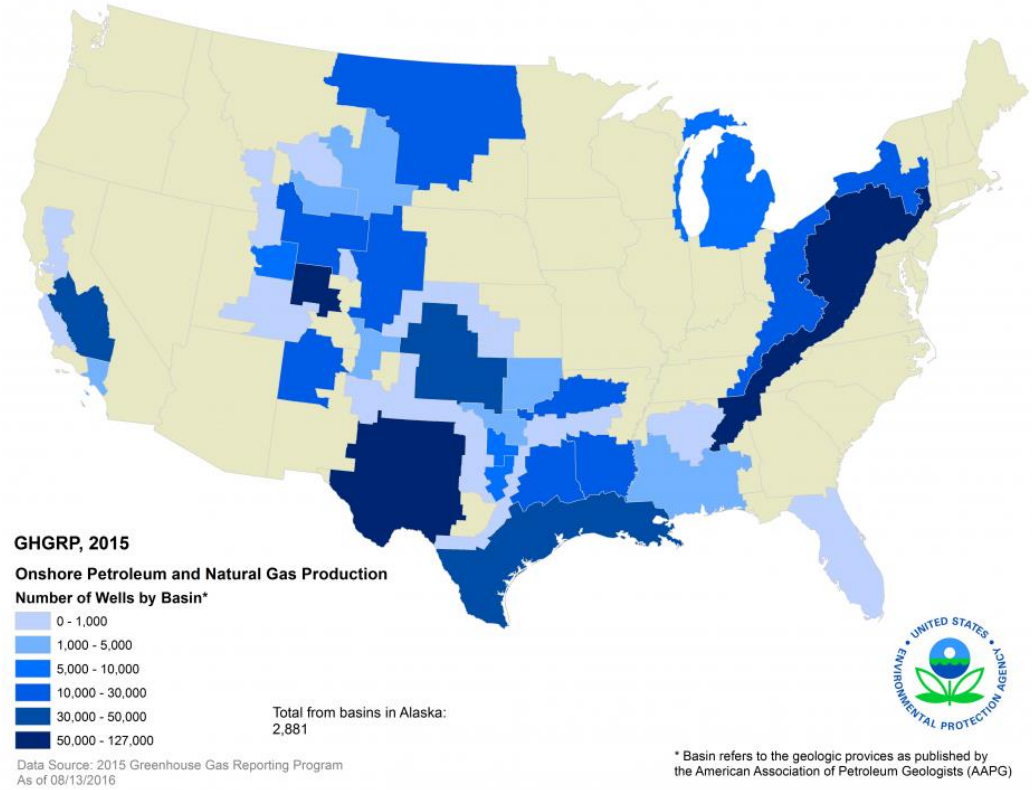


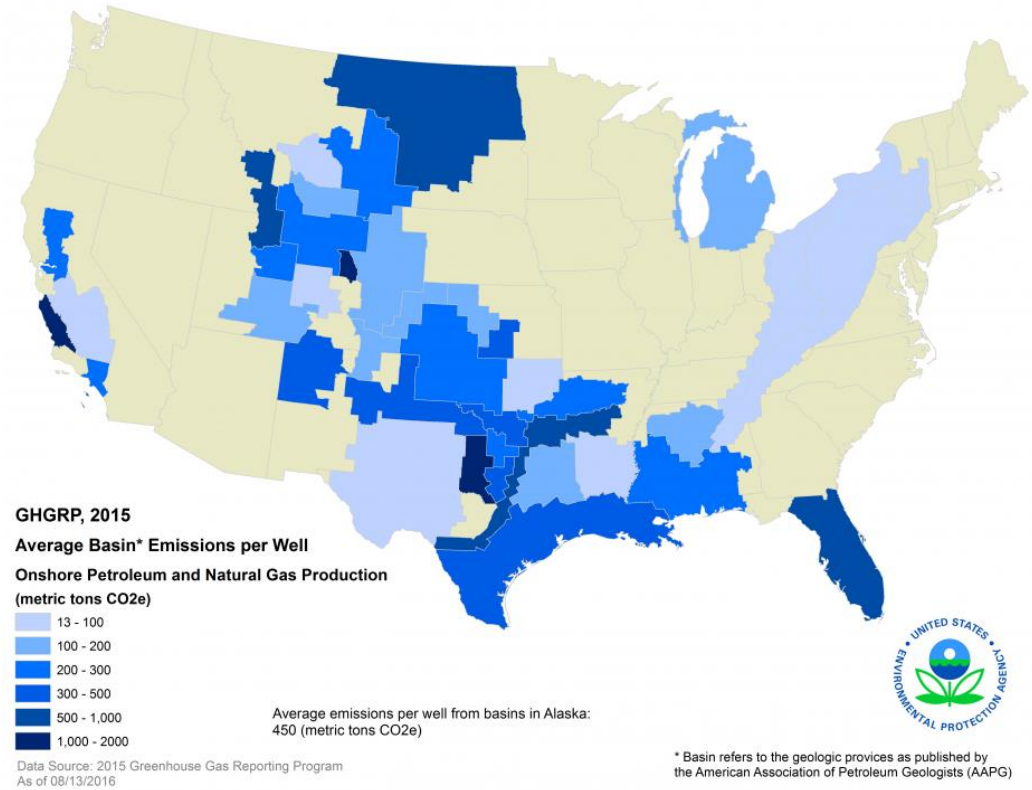
Facility locations and reported emissions (CO_2e) for offshore production



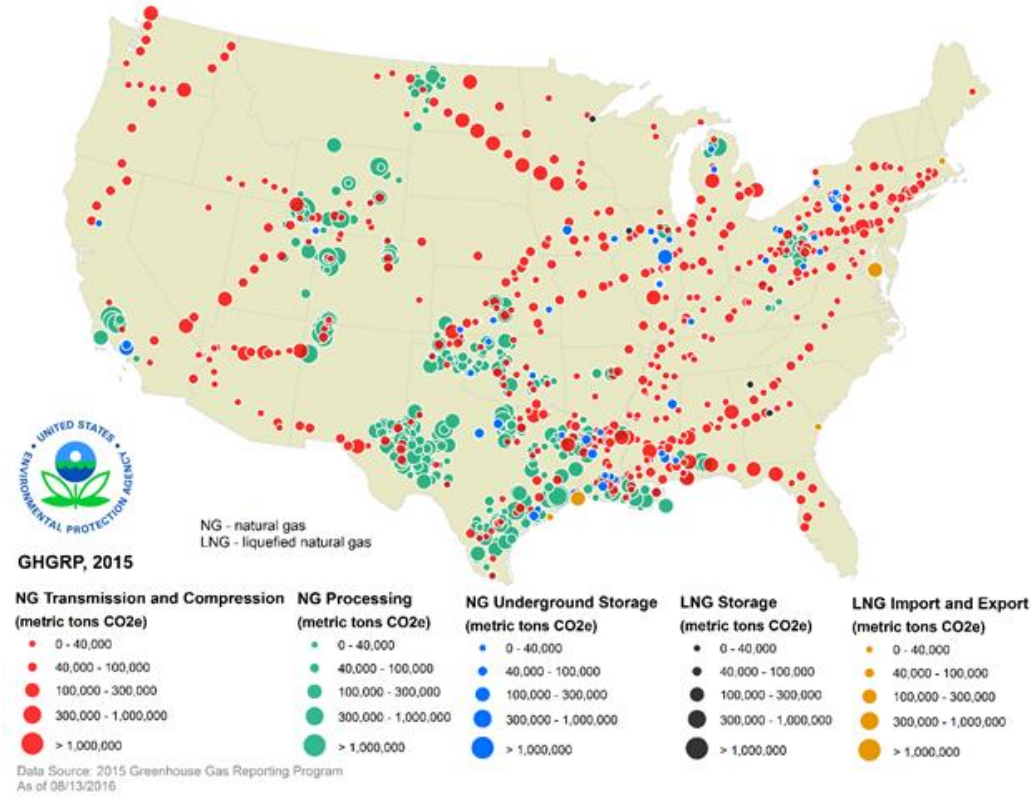
Reported emissions (CO_2e) and well count by geologic basin for onshore production facilities



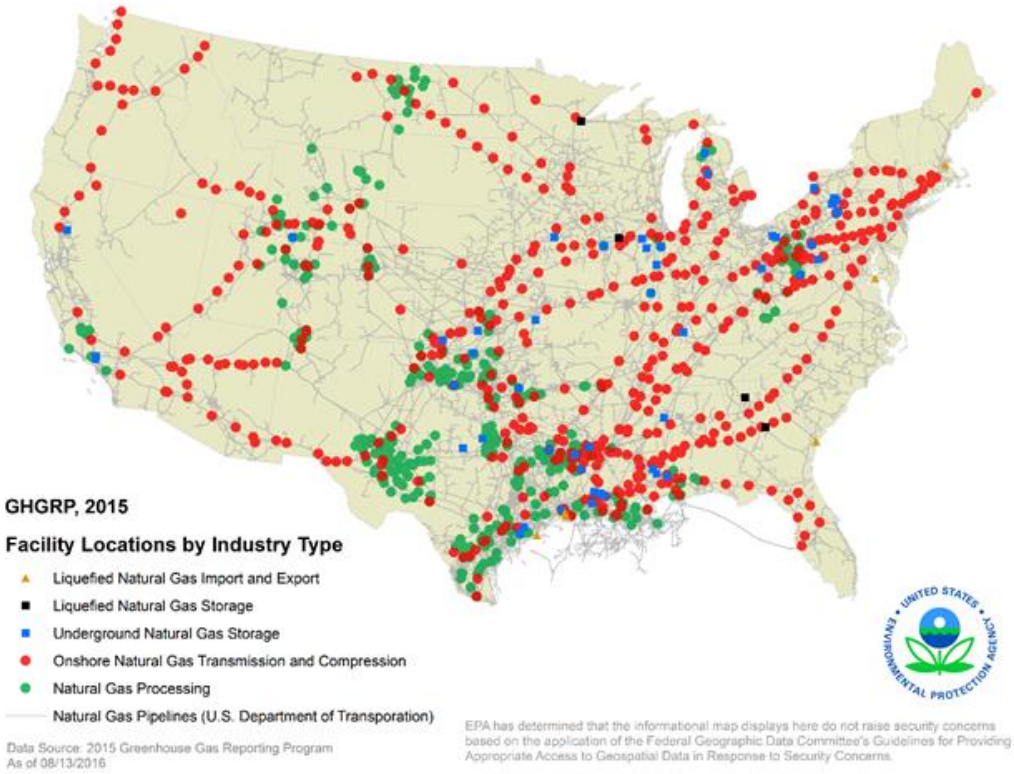




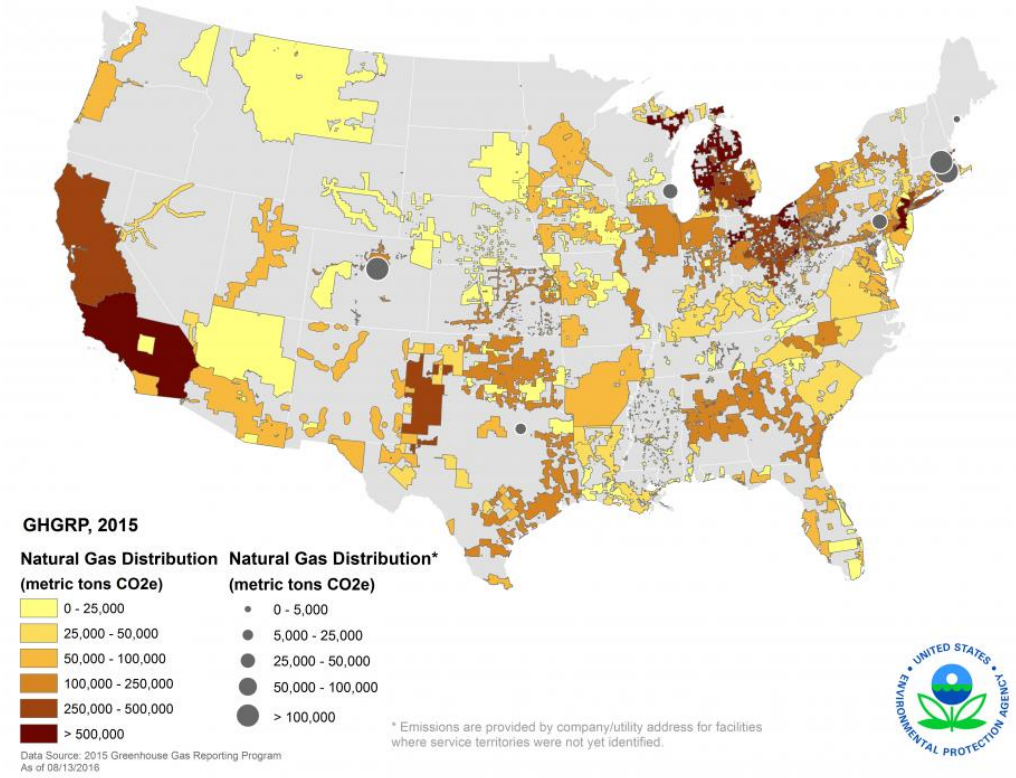
Reported emissions (CO_2e) by facility for industry types: natural gas processing, natural gas transmission/compression, underground natural gas storage, LNG storage, LNG import/export



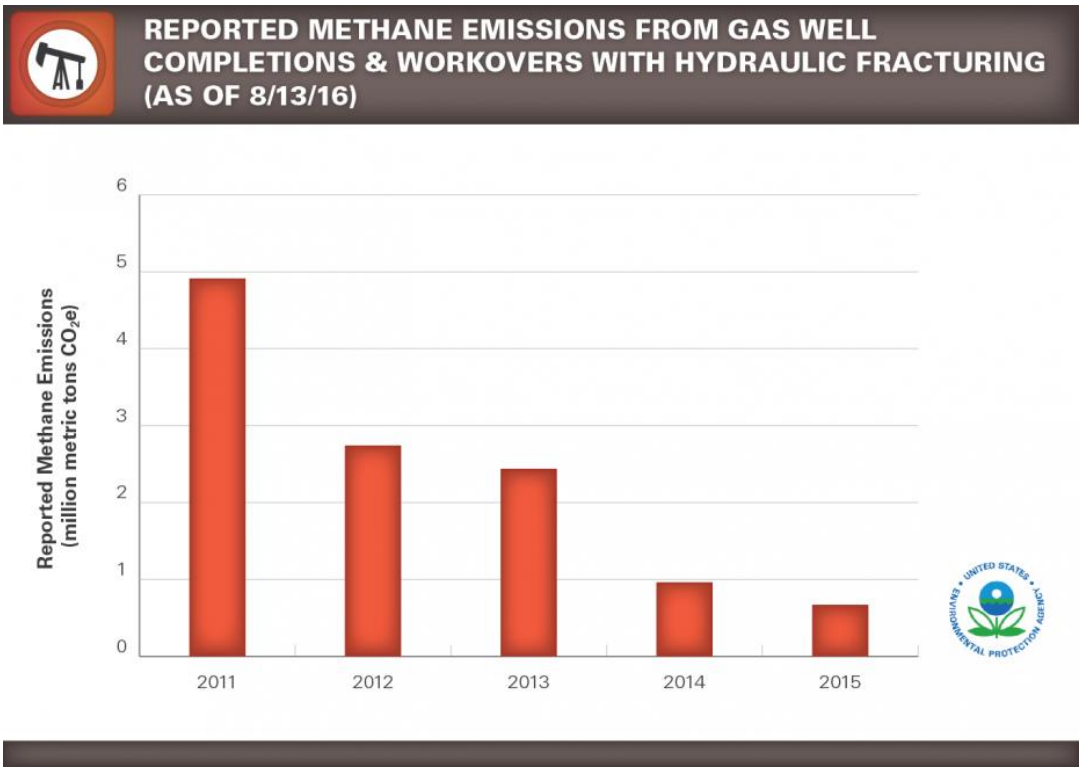
Facility locations for industry types: natural gas processing, natural gas transmission, underground natural gas storage, LNG storage, LNG import/export



Reported emissions (CO_2e) by natural gas utility service territory for natural gas distribution facilities



Reported methane emissions (CO_2e) for gas well completions and workovers with hydraulic fracturing



Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Refineries

The refinery sector consists of facilities that produce gasoline, gasoline blending stocks, naphtha, kerosene, distillate fuel oils, residual fuel oils, lubricants, or asphalt (bitumen) by the distillation of petroleum or the re-distillation, cracking, or reforming of unfinished petroleum derivatives. GHG process emissions from this sector include emissions from venting, flares, and fugitive leaks from equipment (e.g., valves, flanges, pumps). In addition to emissions from petroleum refining processes, the sector includes combustion emissions from stationary combustion units located at these facilities. Process emissions from hydrogen production plants and petrochemical manufacturing facilities located at refineries are included in the chemical manufacturing sector. Emissions from industrial waste landfills and industrial wastewater treatment at these facilities are included in the waste sector.

Refineries Sector — Greenhouse Gas Emissions Reported to the GHGRP

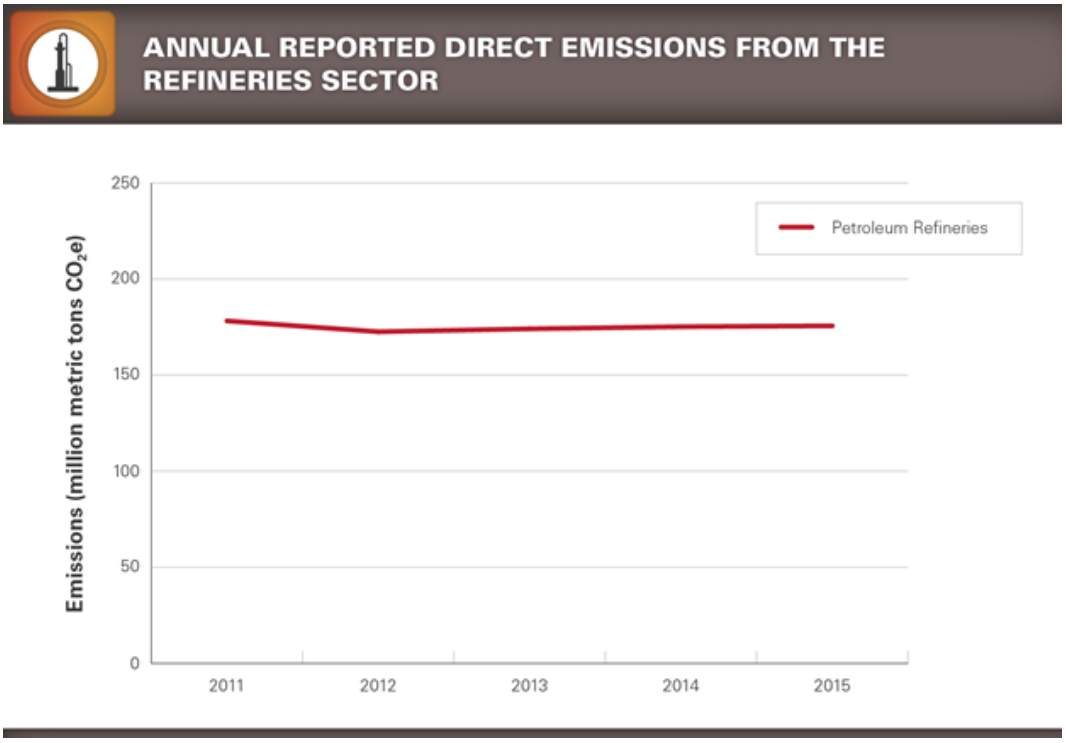
(all emissions values represented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	150	147	146	142	144
Total emissions (CO_2e):	178.2	172.5	174.0	175.2	175.6
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	176.8	171.2	172.7	173.9	174.3
• Methane (CH_4):	0.9	0.8	0.8	0.8	0.8
• Nitrous oxide (N_2O):	0.5	0.5	0.5	0.5	0.5

Totals may not equal sum of individual GHGs due to independent rounding.

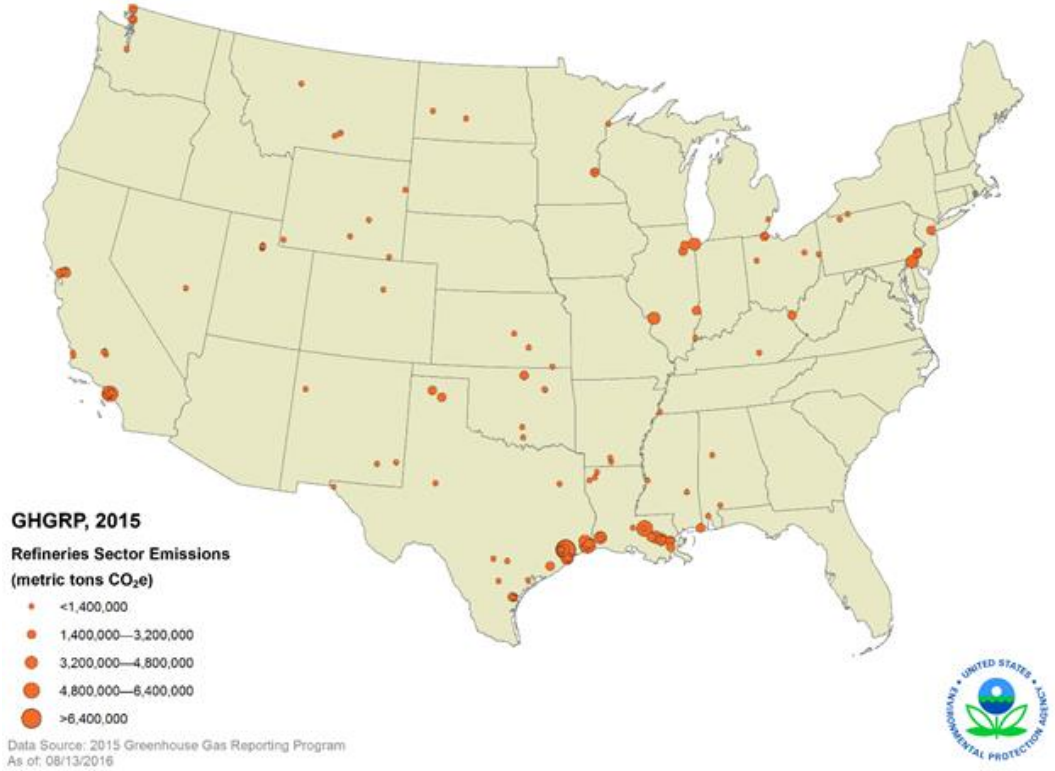
CO_2 emissions from the combustion of biomass are NOT included in emissions totals provided above.

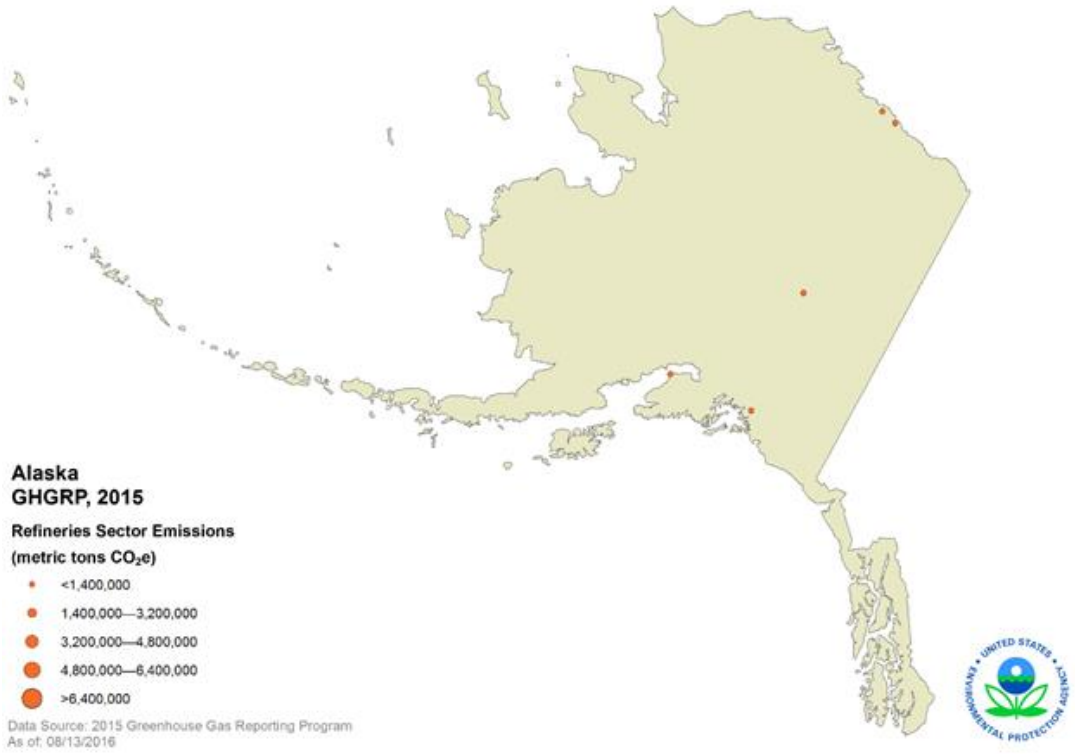
Trend of Annual Reported GHG Emissions in the Refinery Sector (as of 8/13/16)

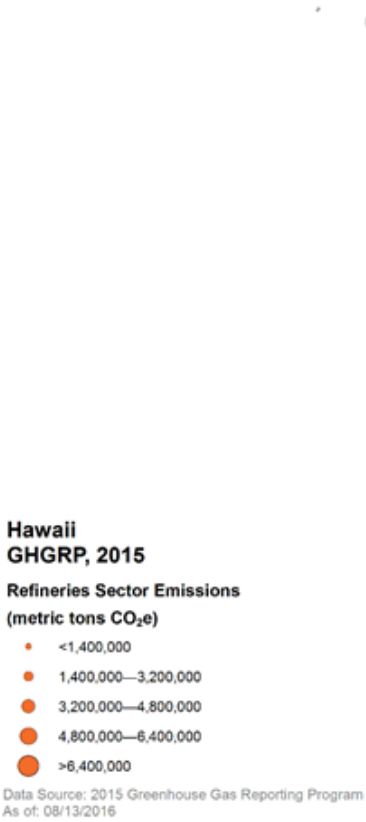


Location and emissions range for each reporting facility in the refinery sector (as of 8/13/16)

These maps show the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.







Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Chemicals

The chemical manufacturing sector consists of facilities that manufacture organic or inorganic chemicals. For this summary, the sector is broken down into facilities that produce fluorinated chemicals and non-fluorinated chemicals. The non-fluorinated chemicals subsector comprises facilities that produce adipic acid, ammonia, hydrogen (both merchant and non-merchant plants), nitric acid, petrochemicals, phosphoric acid, silicon carbide, and titanium dioxide. The fluorinated chemicals subsector comprises facilities that produce HCFC-22 (or destroy HFC-23) and other fluorinated chemicals. A more detailed description of these subsectors is provided below. A total of 463 chemicals facilities reported in 2015.

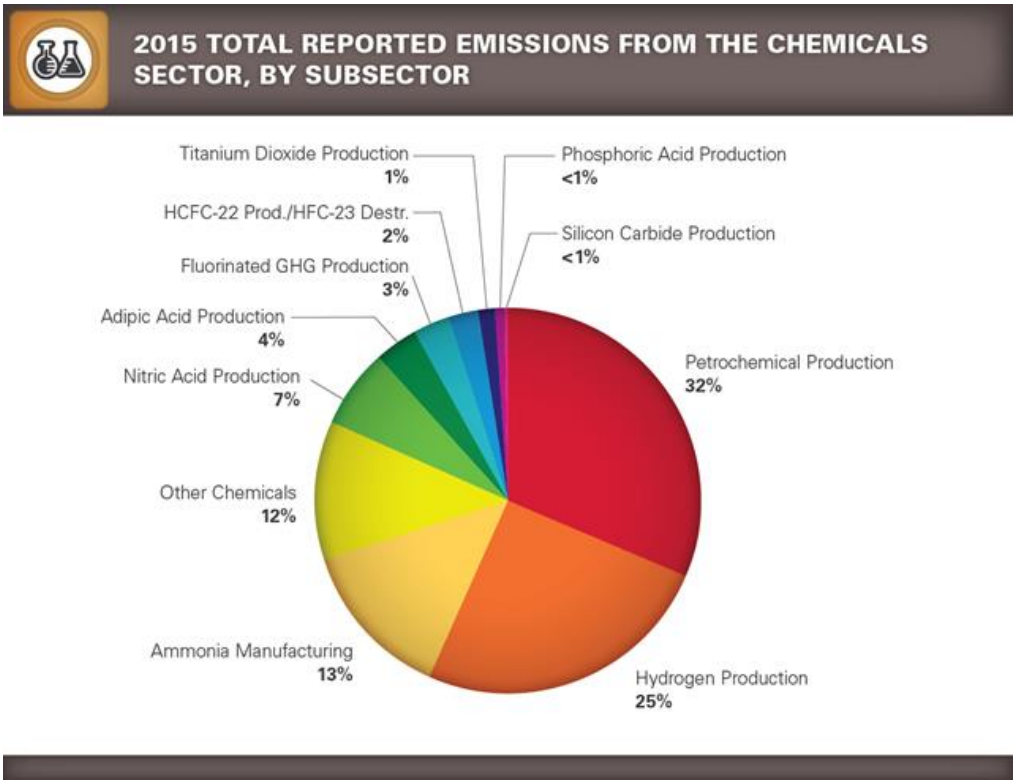
Chemicals Sector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	457	467	472	462	462
Total emissions (CO_2e):	180.3	172.3	173.8	176.3	173.9
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	142.3	142.8	146.5	148.9	148.6
• Methane (CH_4):	0.2	0.2	0.2	0.3	0.2
• Nitrous oxide (N_2O):	21.3	16.0	14.8	16.6	16.0
• Fluorinated GHGs:	16.6	13.3	12.3	10.5	9.1
Emissions by subsector					
• Non-fluorinated chemicals	162.9	158.3	160.7	165.0	164.1
• Fluorinated chemicals	17.4	14.1	13.1	11.4	9.9

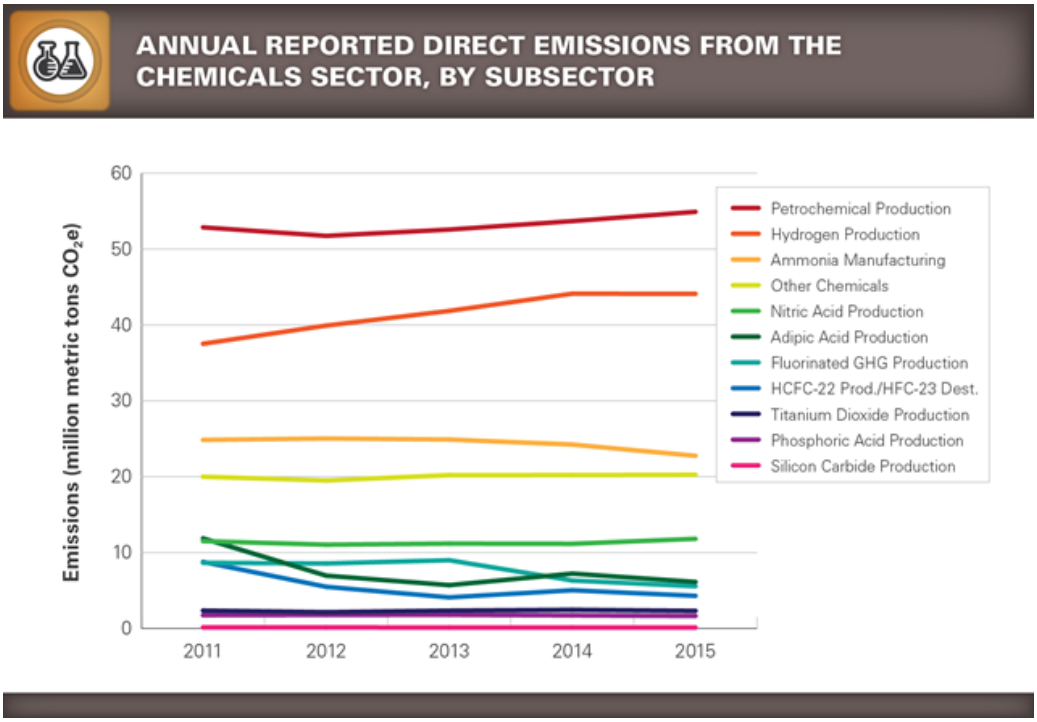
Totals may not equal sum of individual GHGs due to independent rounding.

Total Reported Direct Emissions from Chemicals (All Subsectors), by Subsector (as of 8/13/16).



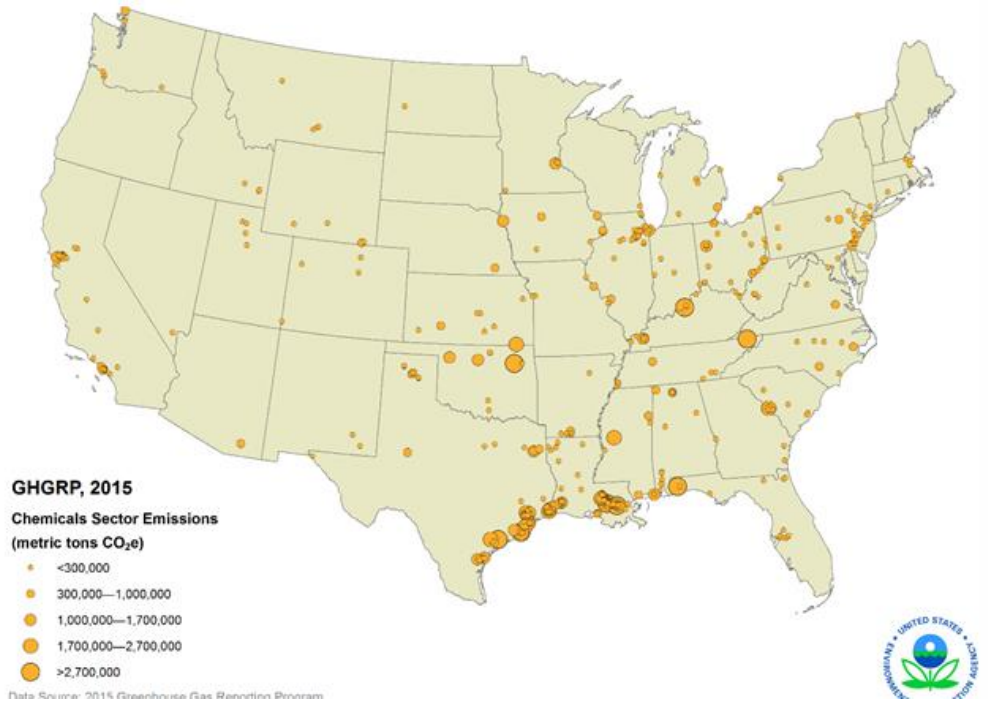
Sum of percentages may not equal 100% due to independent rounding.

Trend of Annual Reported GHG Emissions for Chemicals (All Subsectors) (as of 8/13/16).



Location and emissions range for each reporting facility for Chemicals (All Subsectors) (as of 8/13/16)

This map shows the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.



Chemicals (Non-fluorinated)

The non-fluorinated chemical manufacturing subsector consists of facilities that produce adipic acid, ammonia, hydrogen (both merchant and non-merchant plants), nitric acid, petrochemicals (acrylonitrile, carbon black, ethylene, ethylene dichloride, ethylene oxide, methanol), phosphoric acid, silicon carbide, soda ash, and titanium dioxide. In addition to emissions from these chemical production processes, the subsector includes combustion emissions from facilities that produce pesticides, fertilizer, pharmaceuticals, and other organic and inorganic chemicals. A total of 445 facilities reported 2014 emissions under the non-fluorinated chemicals subsector. A small number of facilities in this subsector collect CO_2 either for use in their other production processes, to transfer to other users, or to sequester or otherwise inject underground; this subsector includes the CO_2 from those process emissions. For example, some of the process emissions reported for ammonia manufacturing plants includes CO_2 that is later consumed on site for urea production. This CO_2 is not released to the ambient air from the ammonia manufacturing process unit(s).

Chemicals (Non-Fluorinated) Subsectors — Greenhouse Gas Emissions Reported to the GHGRP

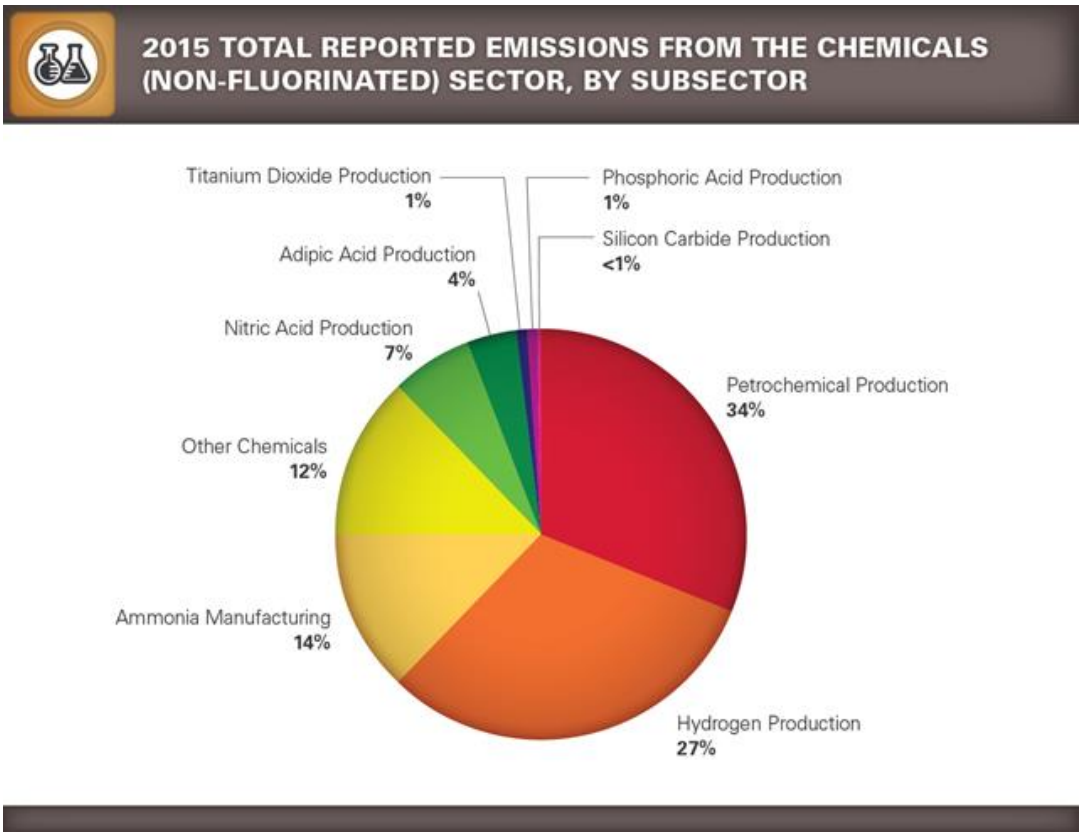
(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	441	451	456	447	447
Total emissions (CO_2e):	162.9	158.3	160.7	165.0	164.1
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	141.5	142.1	145.7	148.1	147.8
• Methane (CH_4):	0.2	0.2	0.2	0.3	0.2
• Nitrous oxide (N_2O):	21.3	16.0	14.8	16.6	16.0

Number of reporters and 2015 emissions (CO_2e) for the Non-Fluorinated Chemicals industry subsector

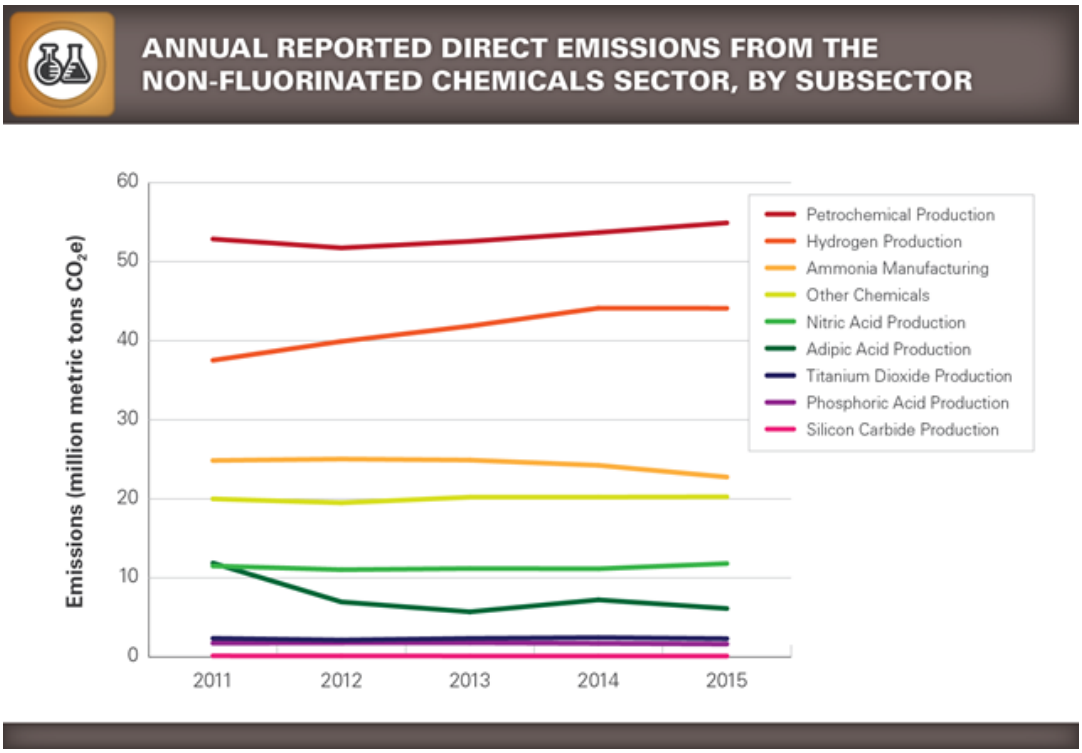
Industry Sector	2015 Number of Reporters	2015 Emissions (million metric tons CO_2e)
Adipic Acid Production	3	6.1
Ammonia Manufacturing	22	22.8
Hydrogen Production	110	44.1
Nitric Acid Production	34	11.8
Petrochemical Production	68	54.9
Phosphoric Acid Production	12	1.6
Silicon Carbide Production	1	0.1
Titanium Dioxide Production	7	2.3
Other Chemicals	213	20.3

Total Reported Direct Emissions from Chemicals (Non-fluorinated), by Subsector, (as of 8/13/16).



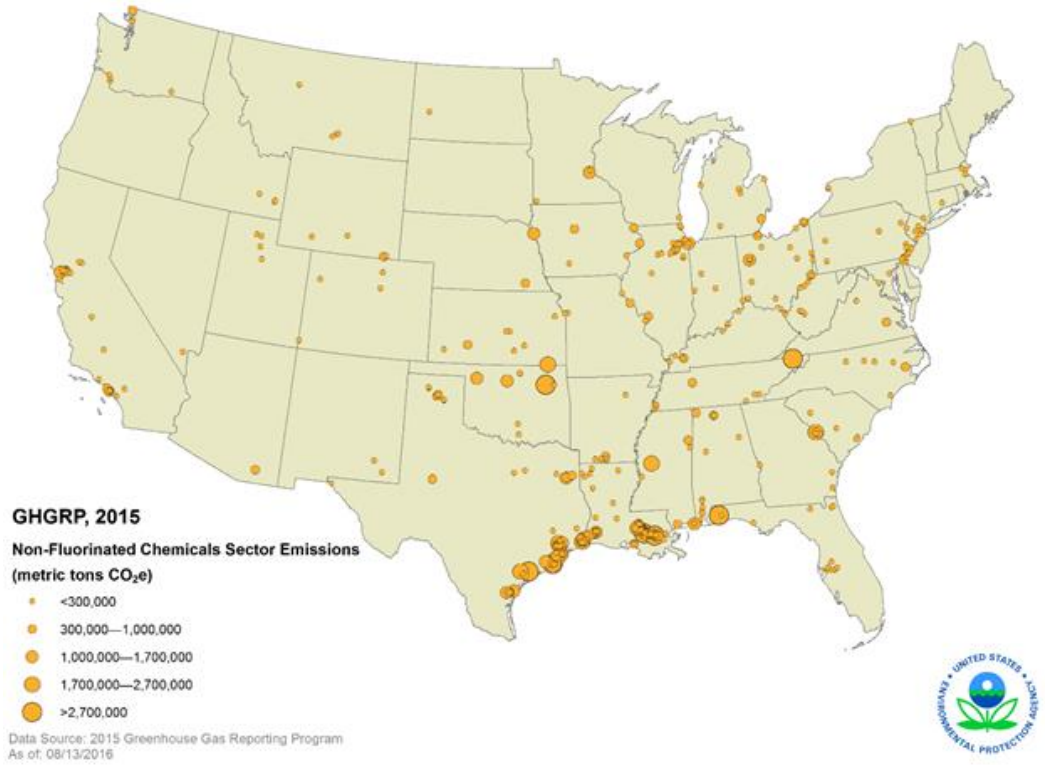
Sum of percentages may not equal 100% due to independent rounding.

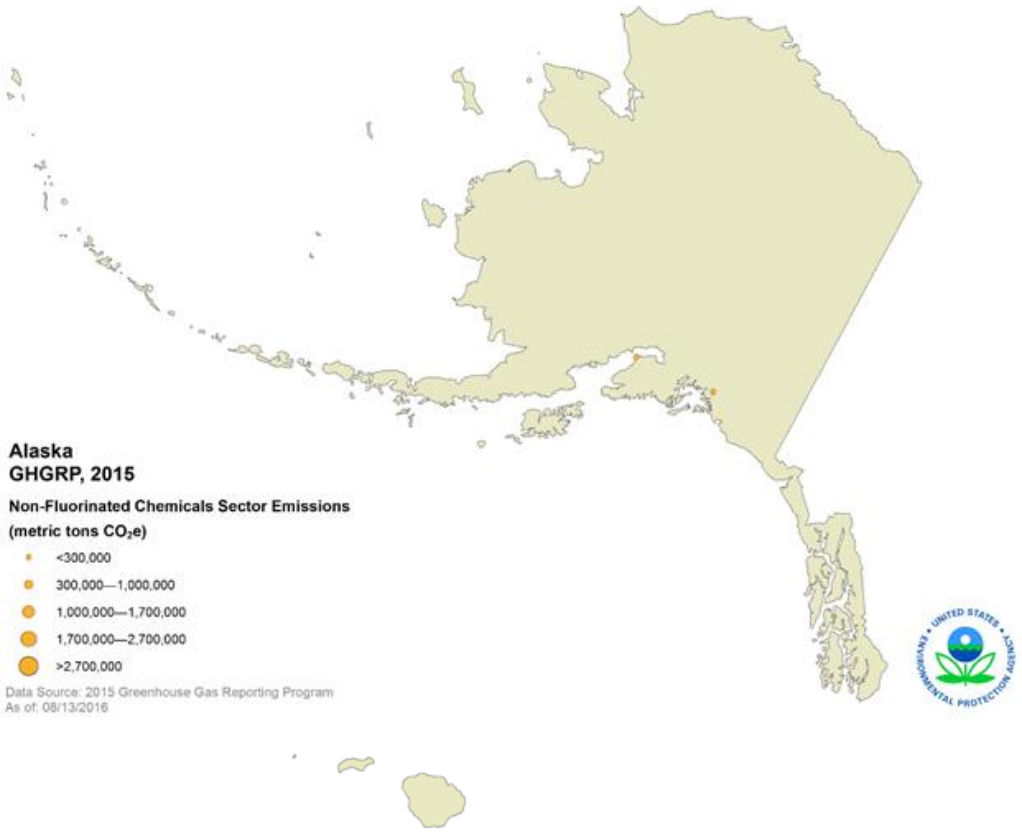
Trend of Annual Reported GHG Emissions for Chemicals (Non-fluorinated), by Subsector (as of 8/13/16).



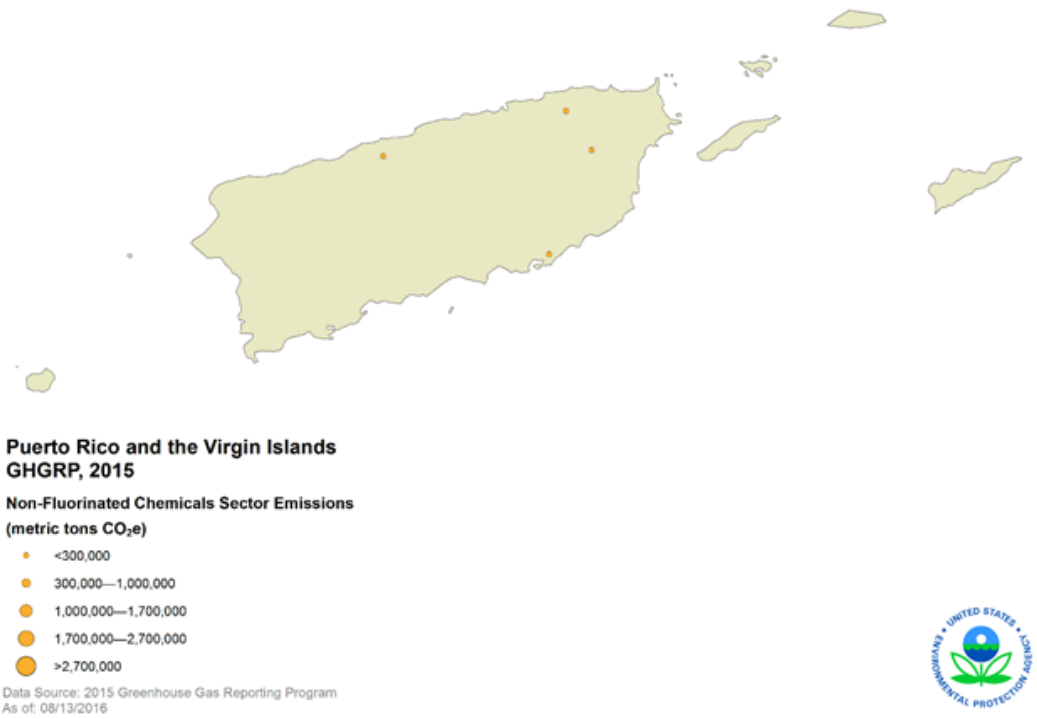
Location and emissions range for each reporting facility for Chemicals (Non-fluorinated) (as of 8/13/16).

These maps show the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.




Alaska
GHGRP, 2015
Non-Fluorinated Chemicals Sector Emissions
(metric tons CO_2e)
<300,000
300,000—1,000,000
1,000,000—1,700,000
1,700,000—2,700,000
>2,700,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016


Hawaii
GHGRP, 2015
Non-Fluorinated Chemicals Sector Emissions
(metric tons CO_2e)
<300,000
300,000—1,000,000
1,000,000—1,700,000
1,700,000—2,700,000
>2,700,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016



Fluorinated Chemicals

The fluorinated chemical subsector includes facilities that produce hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6), nitrogen trifluoride (NF3), other fluorinated GHGs such as fluorinated ethers, and chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), including chlorodifluoromethane (HCFC-22). The subsector also includes facilities that destroy HFC-23, which is a by-product of HCFC-22 production and which may be emitted from the destruction process. This subsector does not include industries that use these fluorinated GHGs (i.e. semiconductors).

Fluorinated Chemicals Subsector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

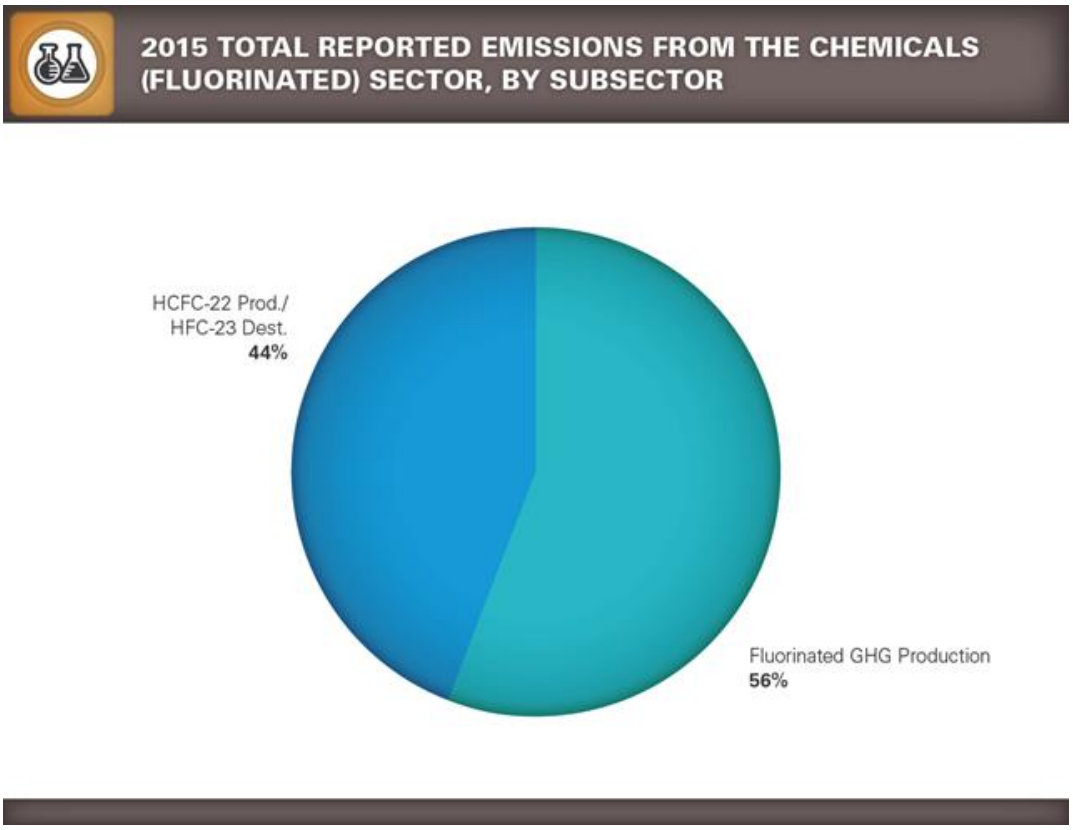
	2011	2012	2013	2014	2015
Number of facilities:	16	16	16	15	15
Total emissions (CO_2e):	17.4	14.1	13.1	11.4	9.9
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	0.8	0.8	0.8	0.8	0.8
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	**	**	**	**	**
• Fluorinated GHGs:	16.6	13.3	12.3	10.5	9.1

Totals may not equal sum of individual GHGs due to independent rounding.
** Total reported emissions are less than 0.05 million metric tons CO_2e.

Number of reporters and 2015 emissions (CO2e) for the Fluorinated Chemicals industry subsector

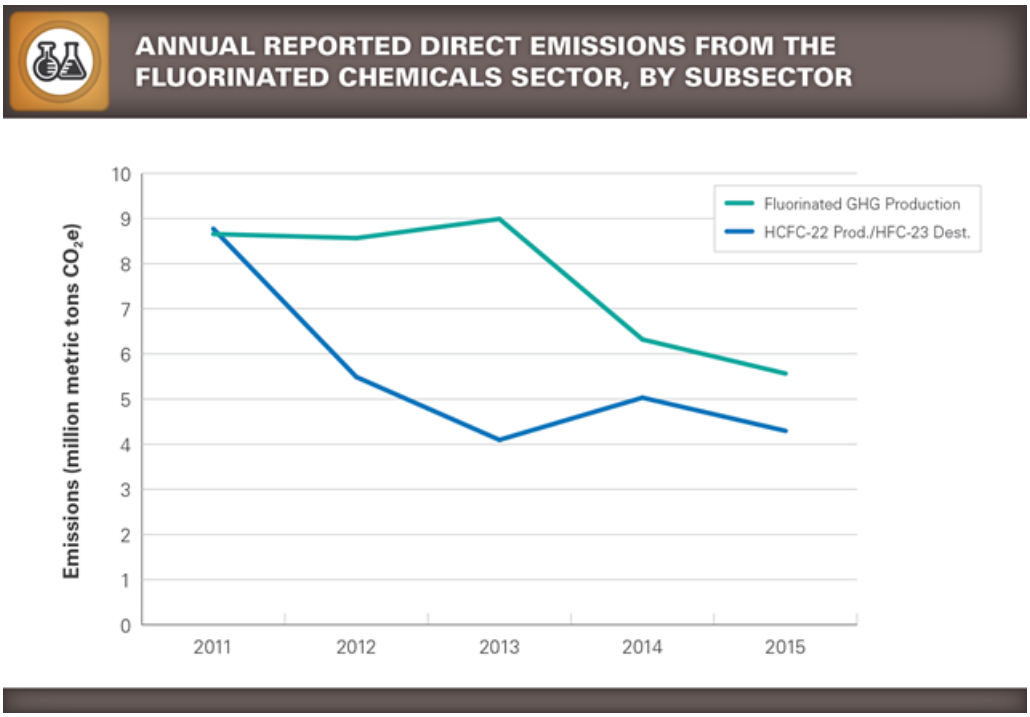
Industry Sector	2015 Number of Reporters	2015 Emissions (million metric tons CO_2e)
Fluorinated GHG Production	14	5.6
HCFC-22 Production/HFC-23 Destruction	4	4.3

Total Reported Direct Emissions from Fluorinated Chemicals, by Subsector (as of 8/13/16).



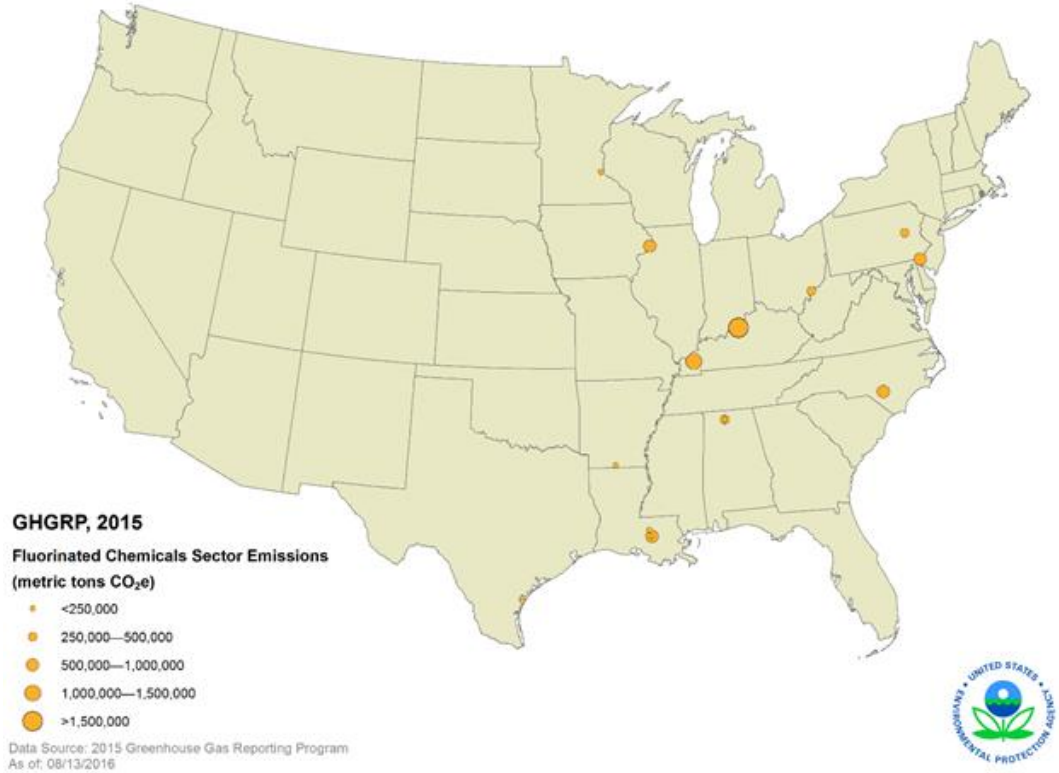
Sum of percentages may not equal 100% due to independent rounding.

Trend of Annual Reported GHG Emissions from Fluorinated Chemicals, by Subsector (as of 8/13/16).



Location and emissions range for each reporting facility in Fluorinated Chemicals (as of 8/13/16).

This map shows the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.



Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Waste

The waste sector consists of municipal solid waste (MSW) landfills, industrial waste landfills, industrial wastewater treatment systems, and facilities that operate combustors or incinerators for the disposal of nonhazardous solid waste. Emissions from fossil fuel combustion at facilities with industrial waste landfills, and industrial wastewater treatment systems are included in other sectors.

MSW landfills. This category consists of landfills that accepted MSW on or after January 1, 1980 and generate methane in amounts equivalent to 25,000 metric tons of CO_2e or more per year. This category includes emissions from the landfill, landfill gas collection systems, and destruction devices for landfill gases (including boilers, engines, and flares).

Industrial Waste Landfills. This category consists of industrial waste landfills that accepted industrial waste on or after January 1, 1980 and that have a total landfill design capacity of 300,000 metric tons or more. The category excludes landfills for hazardous waste and those that receive only construction and demolition or inert wastes. This category includes emissions from the landfill, landfill gas collection systems, and destruction devices for landfill gases (including flares).

Industrial Wastewater Treatment. This category consists of anaerobic processes used to treat nonhazardous industrial wastewater and industrial wastewater treatment sludge at facilities that perform pulp and paper manufacturing, food processing, ethanol production, or petroleum refining.

Solid Waste Combustion. This category consists of combustors and incinerators for the disposal of nonhazardous solid waste.

Waste Sector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	1,643	1,648	1,631	1,625	1,540
Total emissions (CO_2e):	115.3	116.5	112.2	112.6	111.7
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	10.1	10.3	10.5	10.6	10.8
• Methane (CH_4):	104.8	105.8	101.3	101.7	100.5
• Nitrous oxide (N_2O):	0.4	0.4	0.4	0.4	0.4

Totals may not equal sum of individual GHGs due to independent rounding.

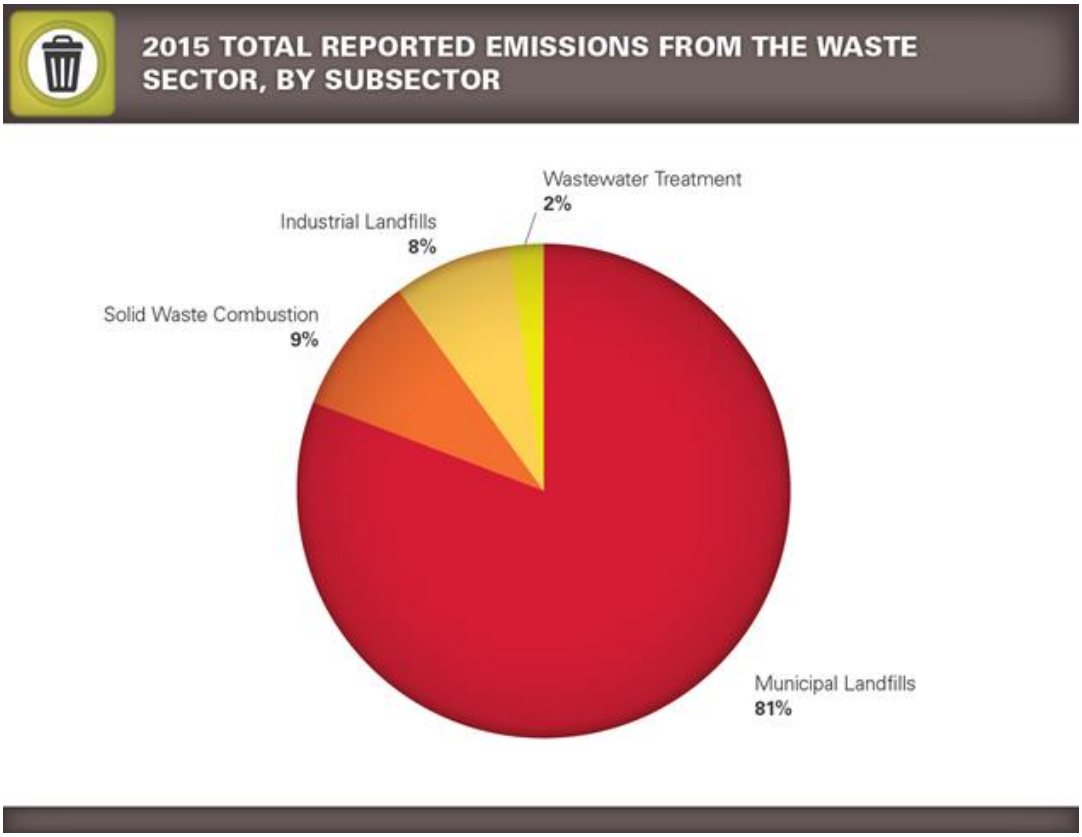
** Total reported emissions are less than 0.05 million metric tons CO_2e.

CO_2 emissions from the combustion of biomass are NOT included in emissions total provided above.

Number of reporters and 2015 emissions (CO_2e) per waste industry subsector

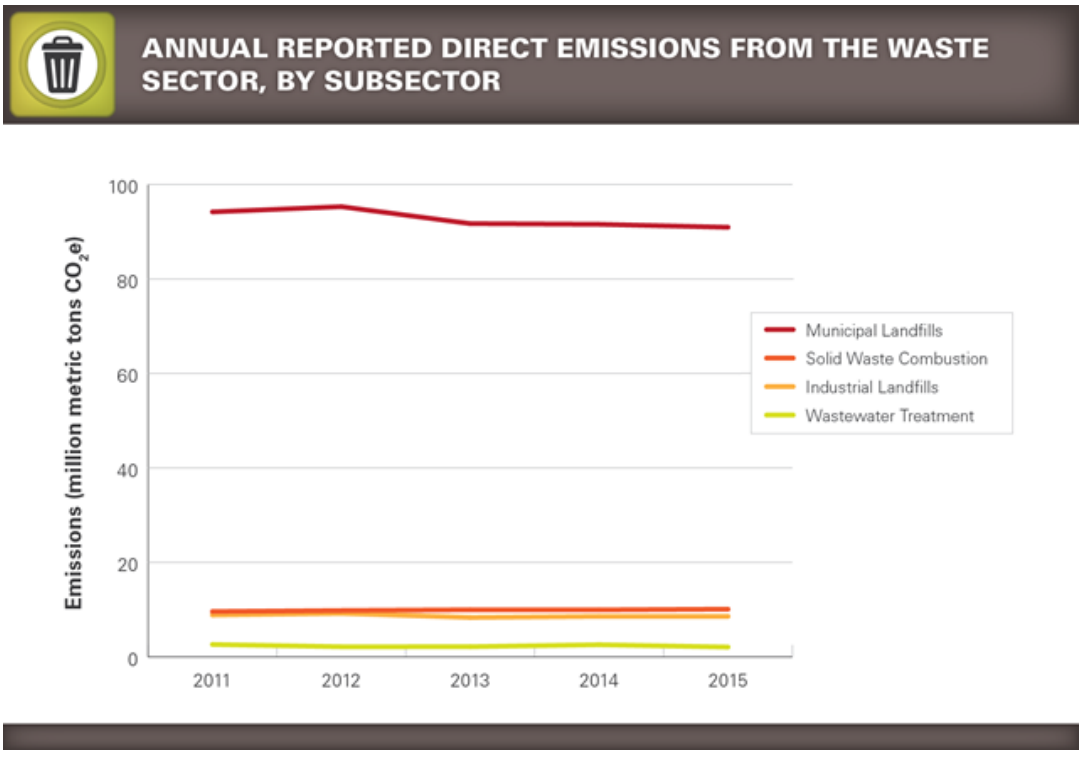
Industry Sector	2015 Number of Reporters	2015 Emissions (million metric tons CO_2e per year)
MSW Landfills	1,161	91.0
Industrial Wastewater Treatment	148	2.1
Industrial Waste Landfills	174	8.6
Solid Waste Combustion	64	10.1

Total Reported Direct Emissions from Waste, by Subsector (as of 8/13/16)



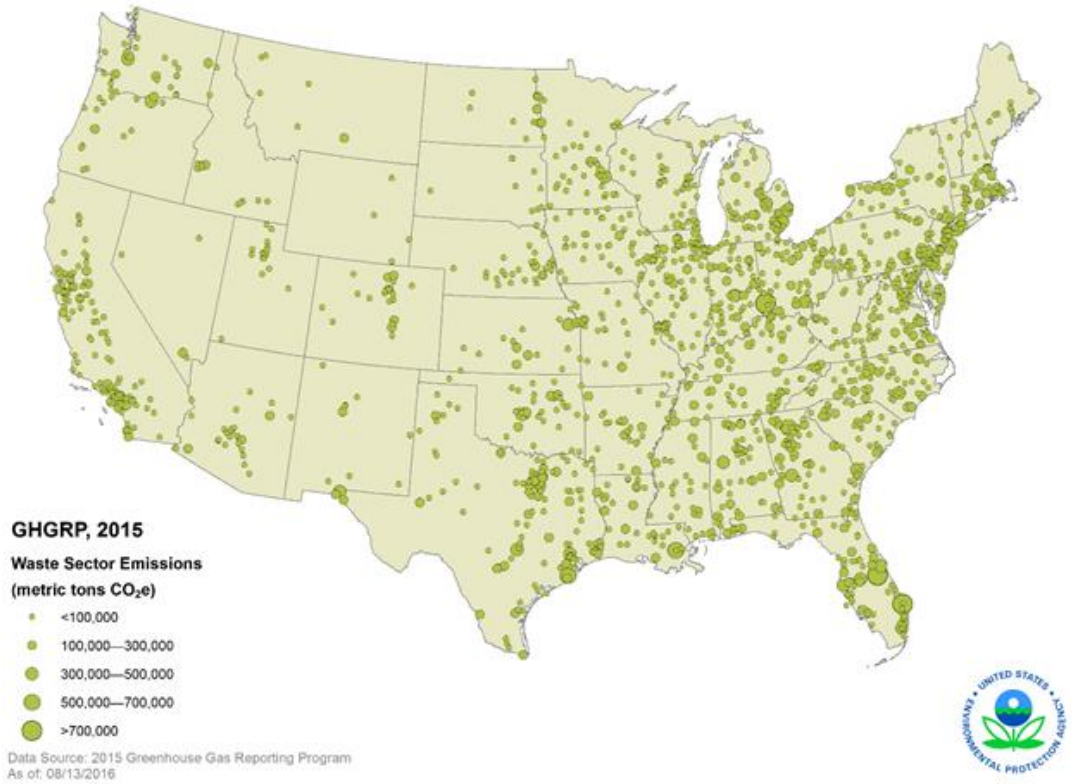
Sum of percentages may not equal 100% due to independent rounding.

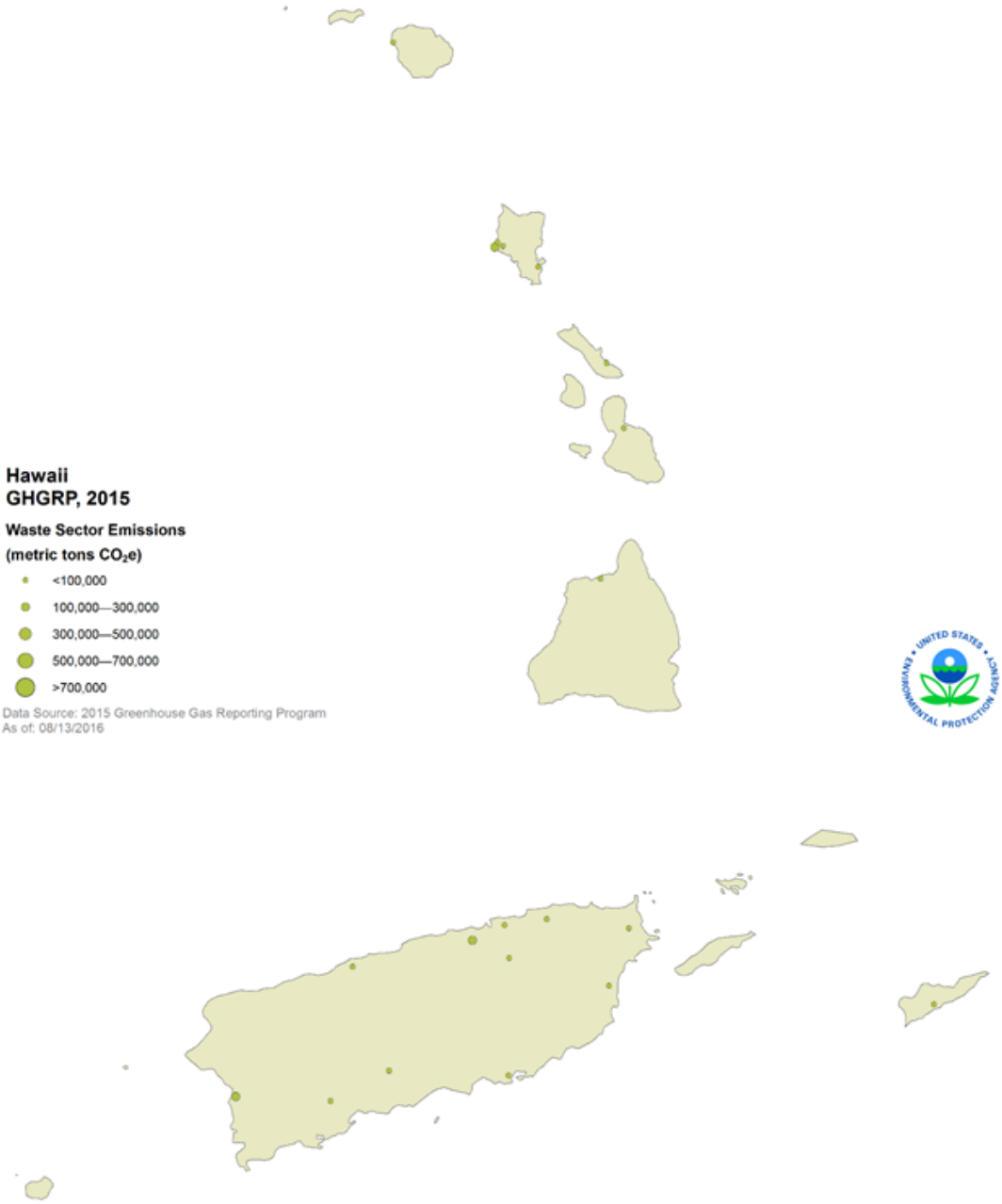
Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16).



Location and emissions range for each reporting facility in the waste sector (as of 8/13/16).

These maps show the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.





Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Metals

The metals sector consists of metal production facilities that smelt, refine, and/or cast ferrous and nonferrous metals, including primary aluminum, ferroalloy, iron and steel, lead, magnesium, and zinc, from ore, pig, or scrap using electrometallurgical and other methods. The sector also includes foundries and any other metal production facility operating under NAICS codes beginning with 331 (Primary Metal Manufacturing). Primary aluminum, ferroalloy, iron and steel, lead, magnesium, and zinc production facilities report GHG emissions from metal smelting, refining, and/or casting activities, as well as from stationary fuel combustion sources. All other metal production facilities report only the GHG emissions from stationary fuel combustion sources.

Metals Sector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	299	300	300	302	297
Total emissions (CO_2e):	112.0	106.8	106.8	104.4	90.2
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	107.0	102.5	102.7	101.0	87.4
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	**	**	**	**	**
• Hydrofluorocarbons (HFCs):	**	**	0.1	0.1	0.1
• Perfluorocarbons (PFCs):	3.5	2.9	3.0	2.5	2.0
• Sulfur hexafluoride (SF_6):	1.5	1.3	1.0	0.7	0.7

Totals may not equal sum of individual GHGs due to independent rounding.

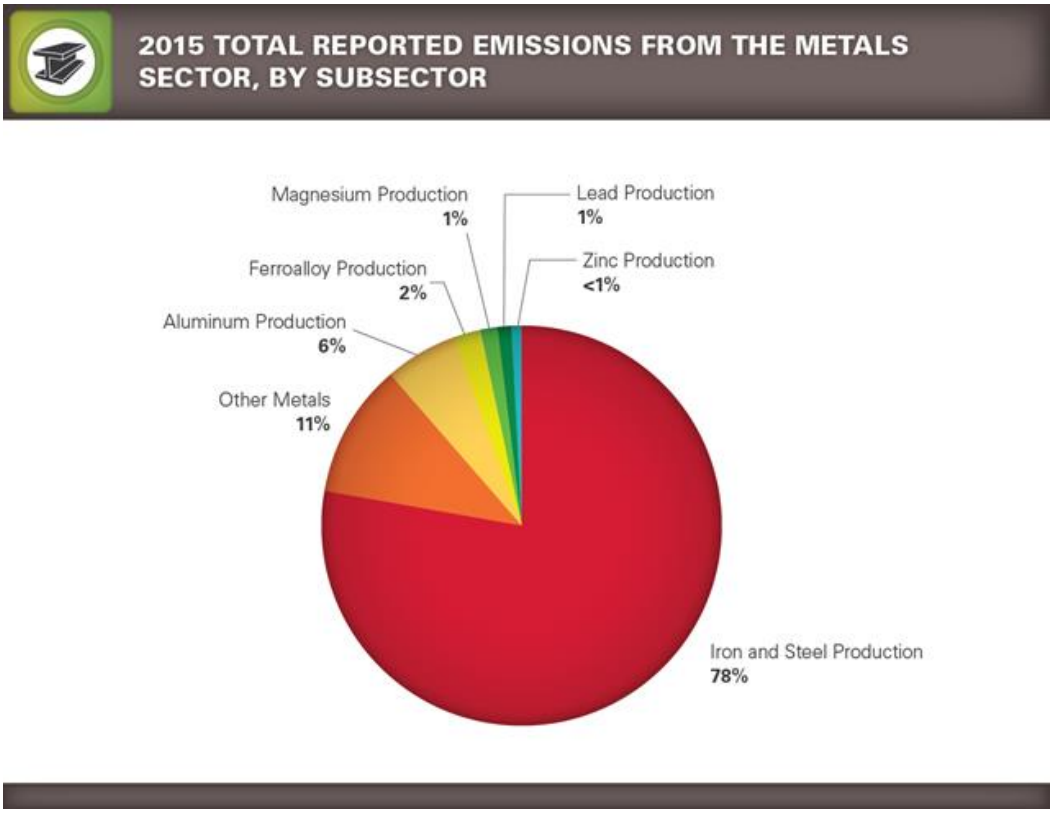
** Total reported emissions are less than 0.05 million metric tons CO_2e.

CO_2 emissions from the combustion of biomass are NOT included in emissions totals provided above.

Number of reporters and 2015 emissions (CO_2e) per metal industry subsector

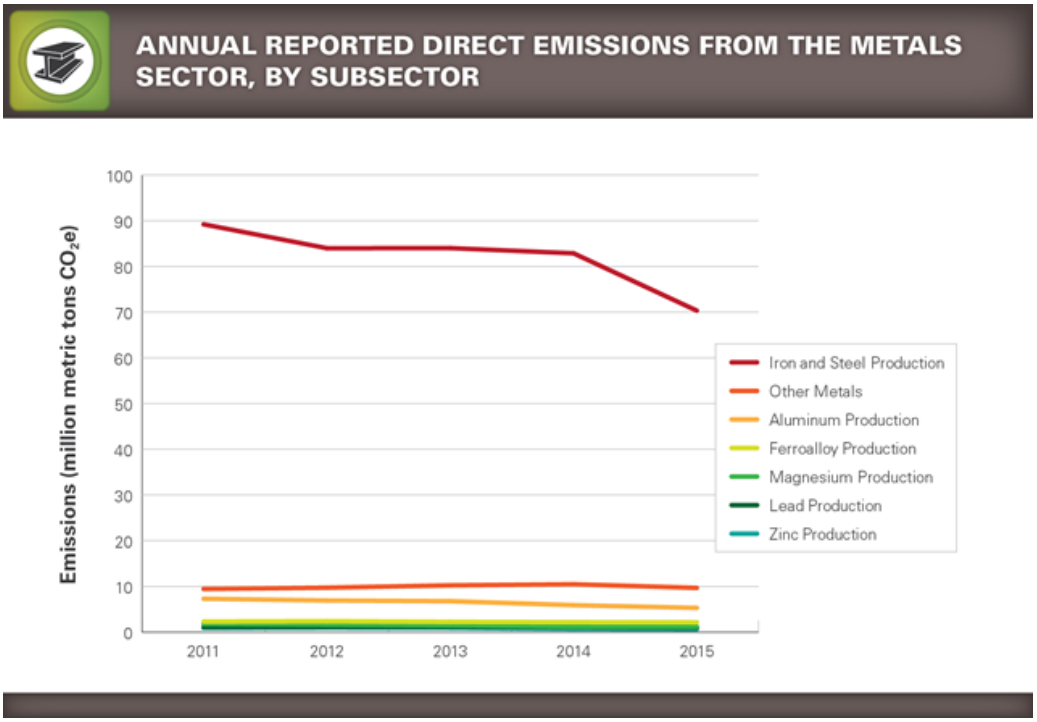
Industry Sector	2015 Number of Reporters	2015 Emissions (million metric tons CO_2e per year)
Aluminum Production	9	5.3
Ferroalloy Production	10	2.1
Iron and Steel Production	127	70.3
Lead Production	12	1.0
Magnesium Production	11	1.2
Zinc Production	5	0.6
Other Metals	123	9.7

Total Reported Direct Emissions from Metals, by Subsector (as of 8/13/16).



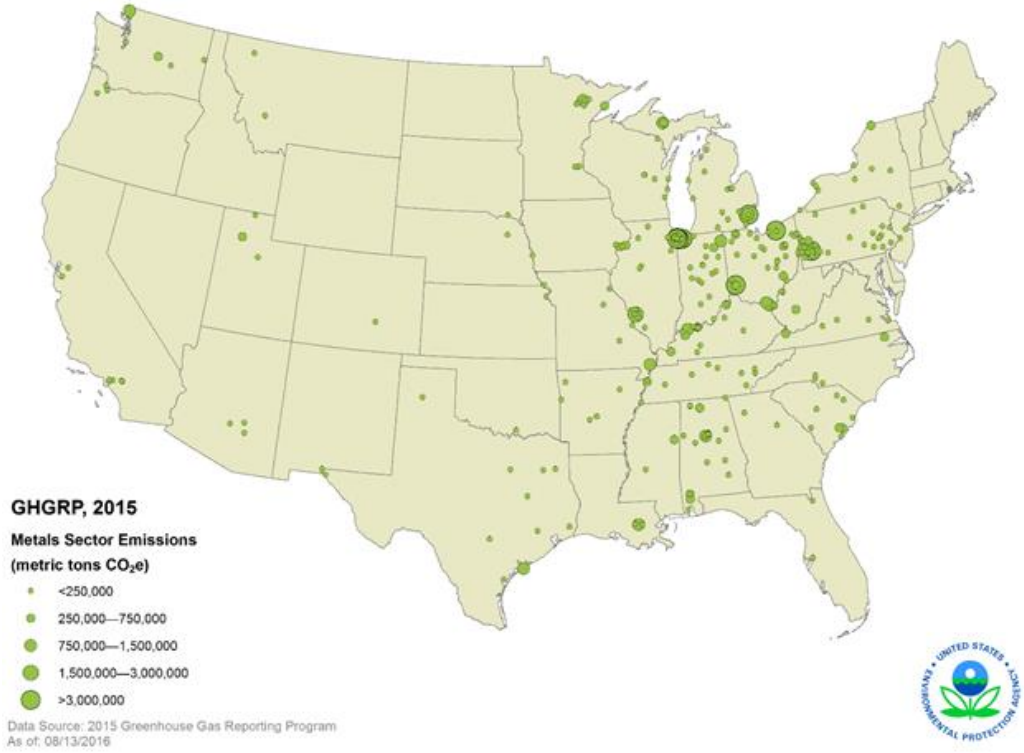
Sum of percentages may not equal 100% due to independent rounding.

Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16).



Location and emissions range for each reporting facility in the metals sector in 2015 (as of 8/13/16).

This map shows the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.



Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Minerals

The minerals sector consists of cement production, glass manufacturing, lime production, soda ash production, and any other mineral production facility operating under NAICS codes beginning with 327 (Non-metallic Mineral Product Manufacturing). Facilities under this sector transform mined or quarried non-metallic minerals — such as sand, gravel, stone, clay, and refractory materials — into products for intermediate or final consumption. Glass, cement, soda ash and lime facilities report both process emissions from the calcination of carbonate-based raw materials and GHG emissions from stationary fuel combustion sources. All other mineral production facilities report only GHG emissions from stationary fuel combustion sources. A small number of facilities in this sector collect CO_2 either for use in their other production processes (e.g., sugar refining), to transfer to other users, or to sequester or otherwise inject underground. This sector includes the CO_2 emissions reported for those processes.

Minerals Sector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

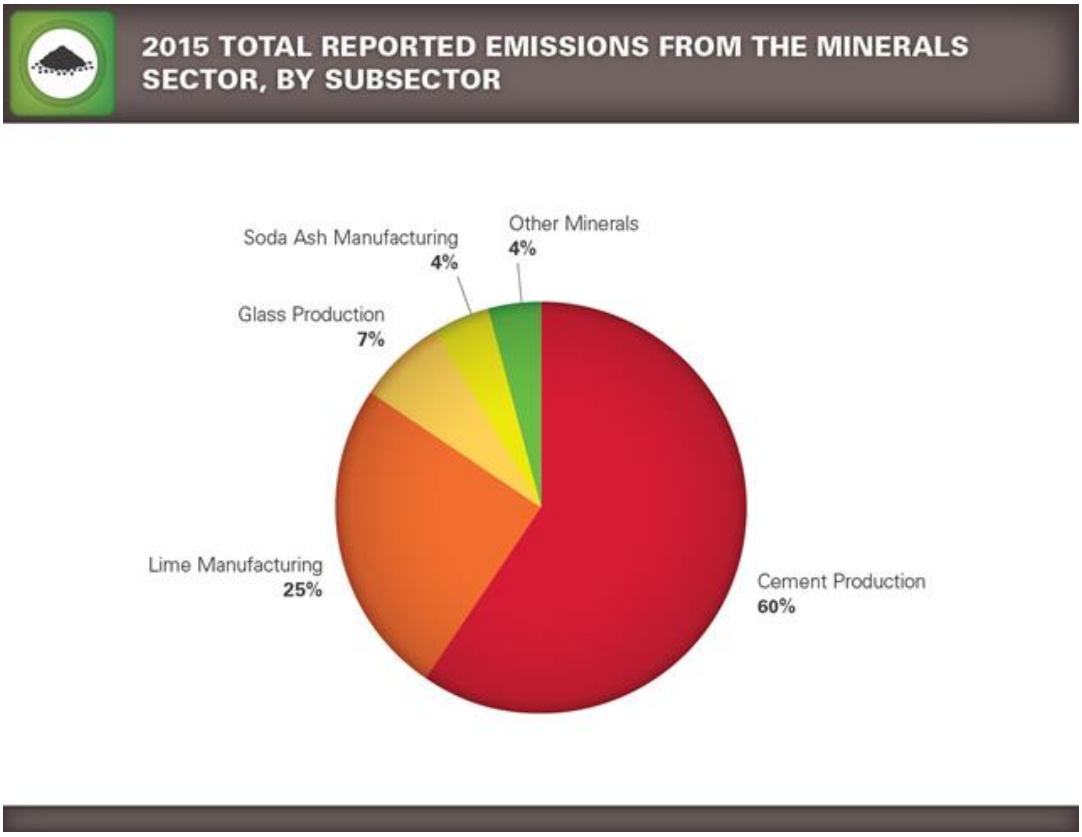
	2011	2012	2013	2014	2015
Number of facilities:	367	369	378	381	379
Total emissions (CO_2e):	103.2	107.5	111.5	116.6	115.5
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	102.9	107.2	111.2	116.2	115.1
• Methane (CH_4):	0.1	0.1	0.1	0.1	0.1
• Nitrous oxide (N_2O):	0.2	0.2	0.2	0.3	0.2

CO_2 emissions from the combustion of biomass are NOT included in emissions totals provided above.

Number of reporters and 2015 emissions (CO_2e) per minerals industry subsector

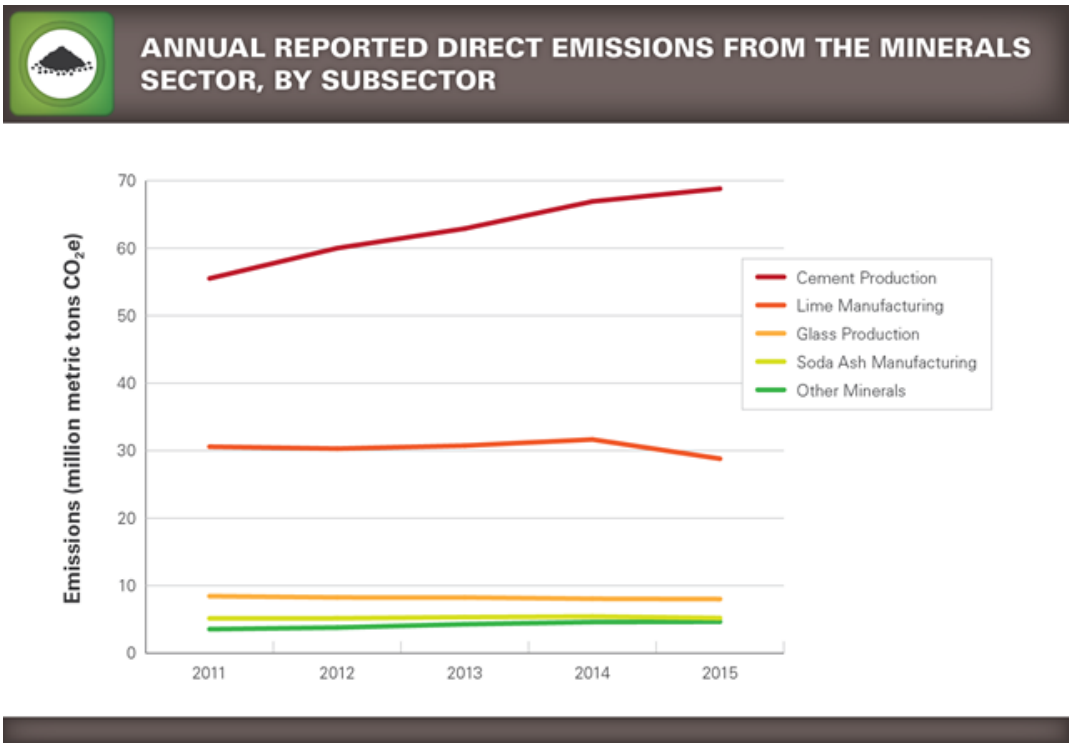
Industry Sector	2015 Number of Reporters	2015 Emissions (million metric tons CO_2e per year)
Cement Production	95	68.8
Lime Production	74	28.8
Glass Production	106	8.0
Soda Ash Manufacturing	4	5.2
Other Minerals	102	4.6

Total Reported Direct Emissions from Minerals, by Subsector (as of 8/13/16).



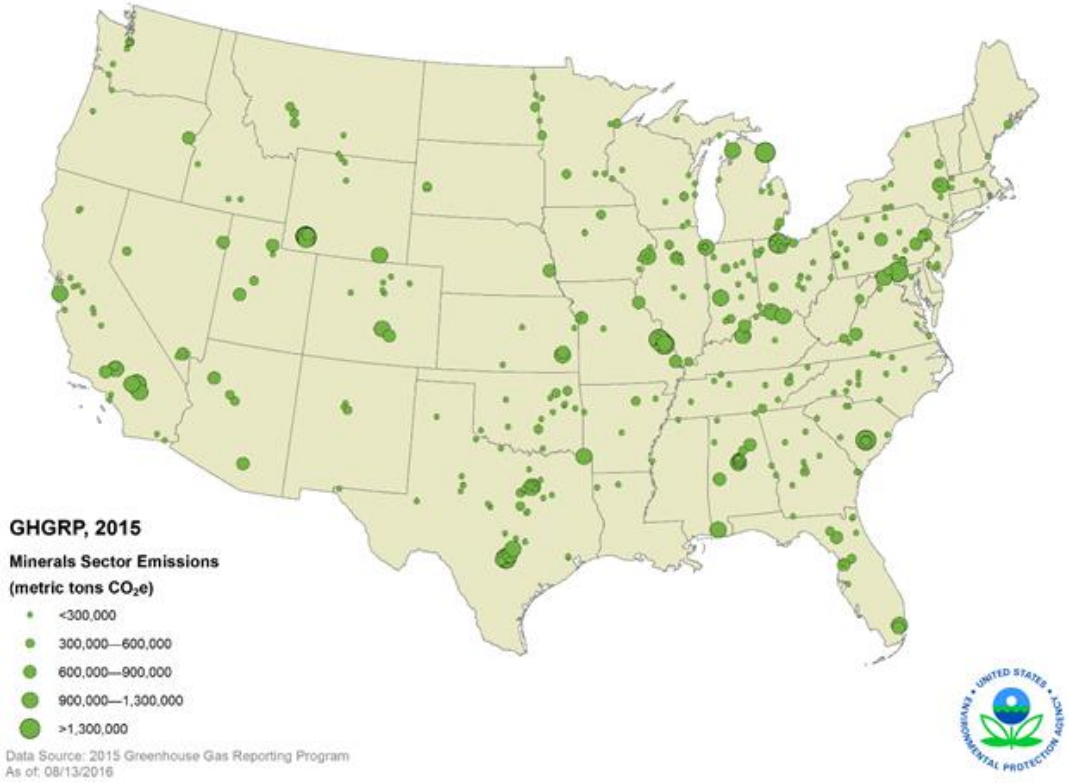
Sum of percentages may not equal 100% due to independent rounding.

Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16).



Location and emissions range for each reporting facility in the minerals sector (as of 8/13/16).

These maps show the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.



Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Pulp and Paper

The pulp and paper sector consists of facilities that produce market pulp or that manufacture pulp and paper. Facilities that have pulping processes report the GHG emissions from chemical recovery units, lime kilns, and stationary fuel combustion units. In addition to emissions from pulp production processes, the sector includes combustion emissions from facilities that produce paper products from purchased pulp, produce secondary fiber from recycled paper, convert paper into paperboard products, operate coating and laminating processes, print products (such as books, labels, business cards, stationery, and business forms), and perform support activities (such as data imaging, plate-making services, and bookbinding). Emissions from industrial landfills and industrial wastewater treatment at facilities in the pulp and paper sector are included in the waste sector

Pulp and Paper Sector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	233	232	233	234	232
Total emissions (CO_2e):	44.2	42.7	39.4	39.3	38.4
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	41.2	39.8	38.6	38.5	37.7
• Methane (CH_4):	1.1	1.1	0.2	0.2	0.2
• Nitrous oxide (N_2O):	1.9	1.9	0.6	0.6	0.6

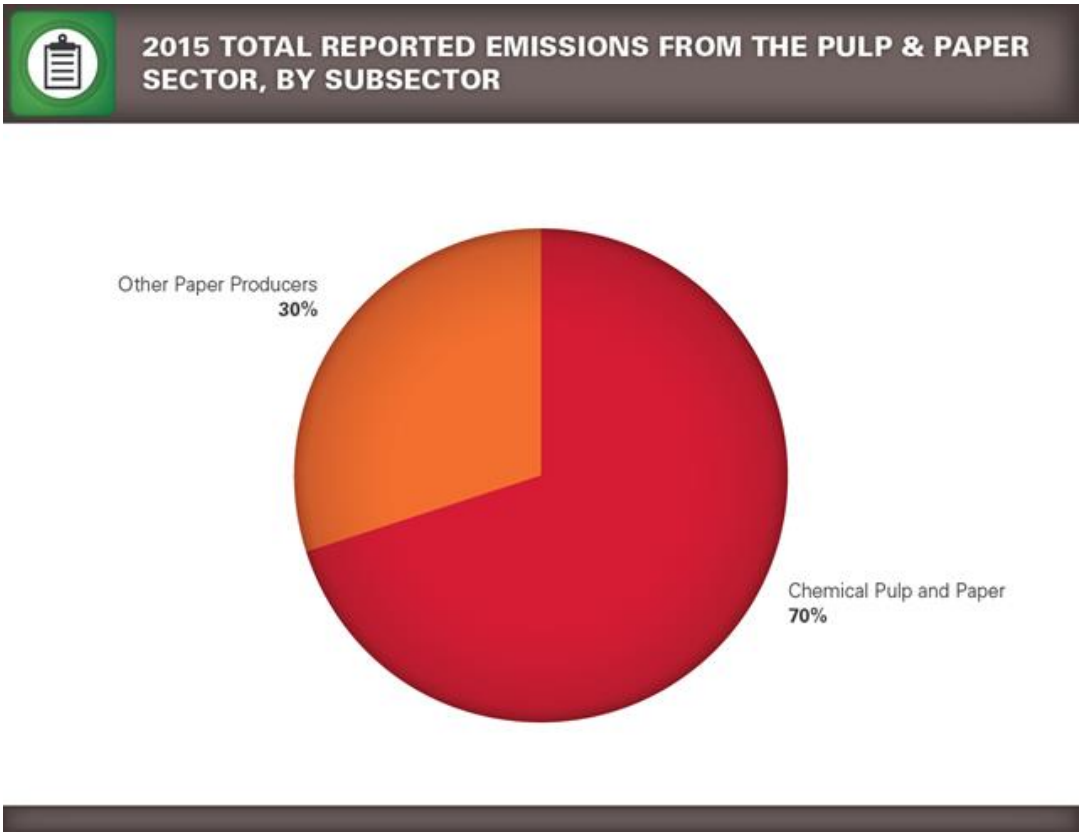
Totals may not equal sum of individual GHGs due to independent rounding.

CO_2 emissions from the combustion of biomass are NOT included in emissions totals provided above.

Number of reporters and 2015 emissions (CO_2e) per pulp and paper industry subsector

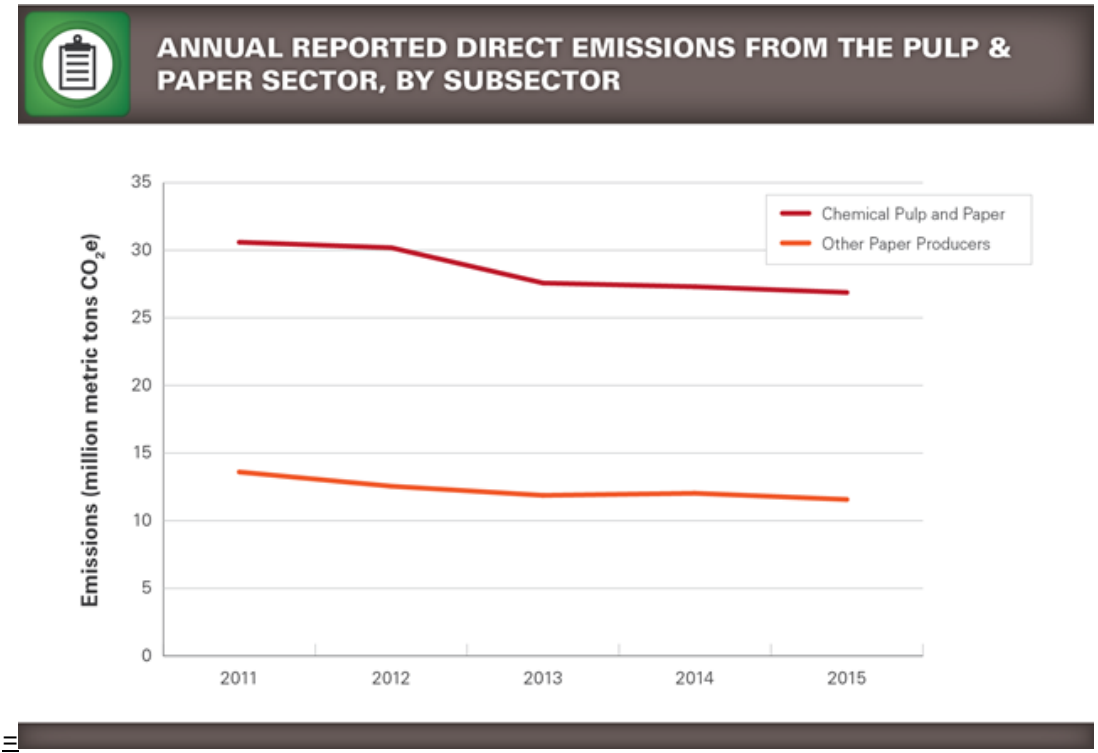
Industry Sector	2015 Number of Reporters	2015 Emissions (million metric tons CO_2e)
• Chemical Pulp and Paper Production	108	26.9
• Other Paper Producers	124	11.6

Total Reported Direct Emissions from Pulp and Paper, by Subsector (as of 8/13/16).



Sum of percentages may not equal 100% due to independent rounding.

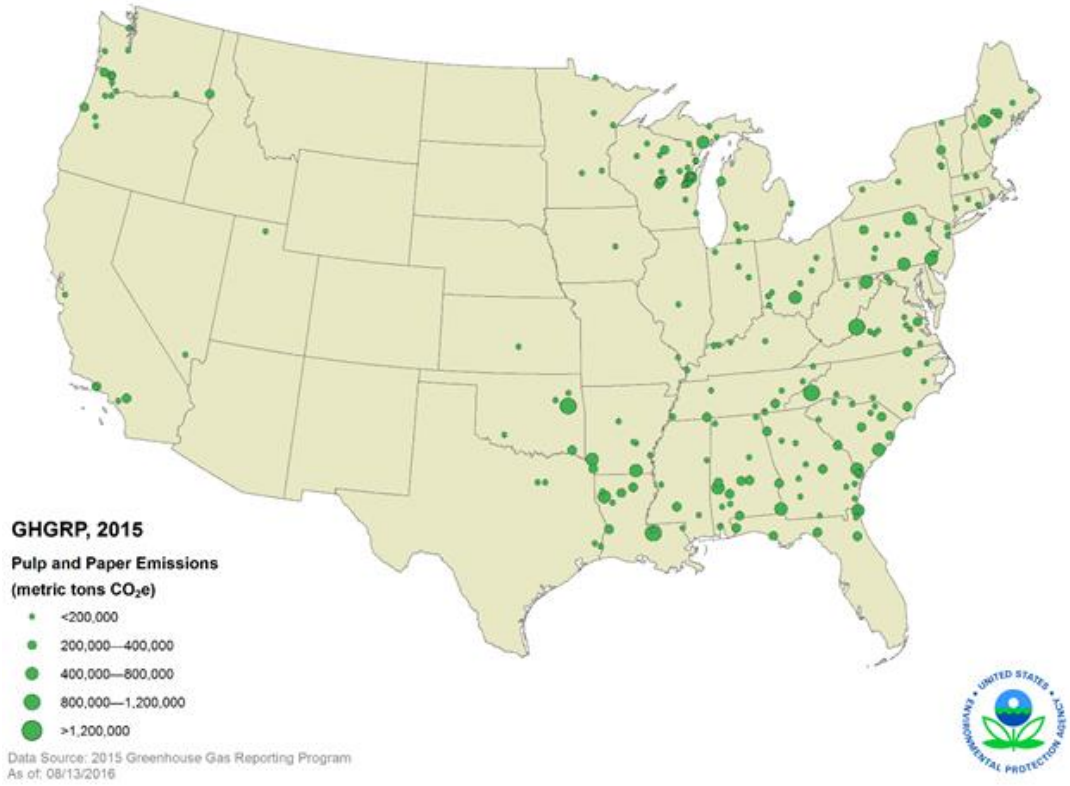
Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16)



Emissions from the pulp and paper sector declined from 2012 to 2013 in part due to a change in the emission factors used to estimate GHG emissions from the combustion of spent pulping liquor and wood residuals.

Location and emissions range for each reporting facility in the pulp and paper sector (as of 8/13/16).

This map shows the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.



Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Other Sectors

This sector consists of underground coal mines, electronics manufacturing, electrical equipment manufacturing and electrical transmission and distribution systems. The sector also includes stationary fuel combustion from miscellaneous commercial, institutional, and industrial facilities not covered under other sectors (e.g., ethanol production, food processing, and other manufacturing processes). Emissions from industrial waste landfills and industrial wastewater treatment at these facilities are included in the waste sector.

Other Sector — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	1,381	1,413	1,428	1,455	1,433
Total emissions (CO_2e):	141.0	135.4	137.0	143.0	139.5
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	90.8	88.4	88.3	91.1	88.2
• Methane (CH_4):	40.4	38.3	40.4	42.9	42.8
• Nitrous oxide (N_2O):	0.5	0.6	0.4	0.4	0.4
• Hydrofluorocarbons (HFCs):	0.2	0.2	0.2	0.3	0.3
• Hydrofluoroethers (HFEs):	**	**	**	**	**
• Perfluorocarbons (PFCs):	3.2	2.8	2.6	3.0	3.0
• Sulfur hexafluoride (SF_6):	4.6	3.7	3.8	4.1	3.6
• Nitrogen trifluoride (NF_3):	0.6	0.6	0.5	0.5	0.5
• Other fully fluorinated GHGs:	0.7	0.7	0.6	0.8	0.7
• Very short-lived compounds:	**	**	**	**	**

Totals may not equal sum of individual GHGs due to independent rounding.

** Total reported emissions are less than 0.05 million metric tons CO_2e.

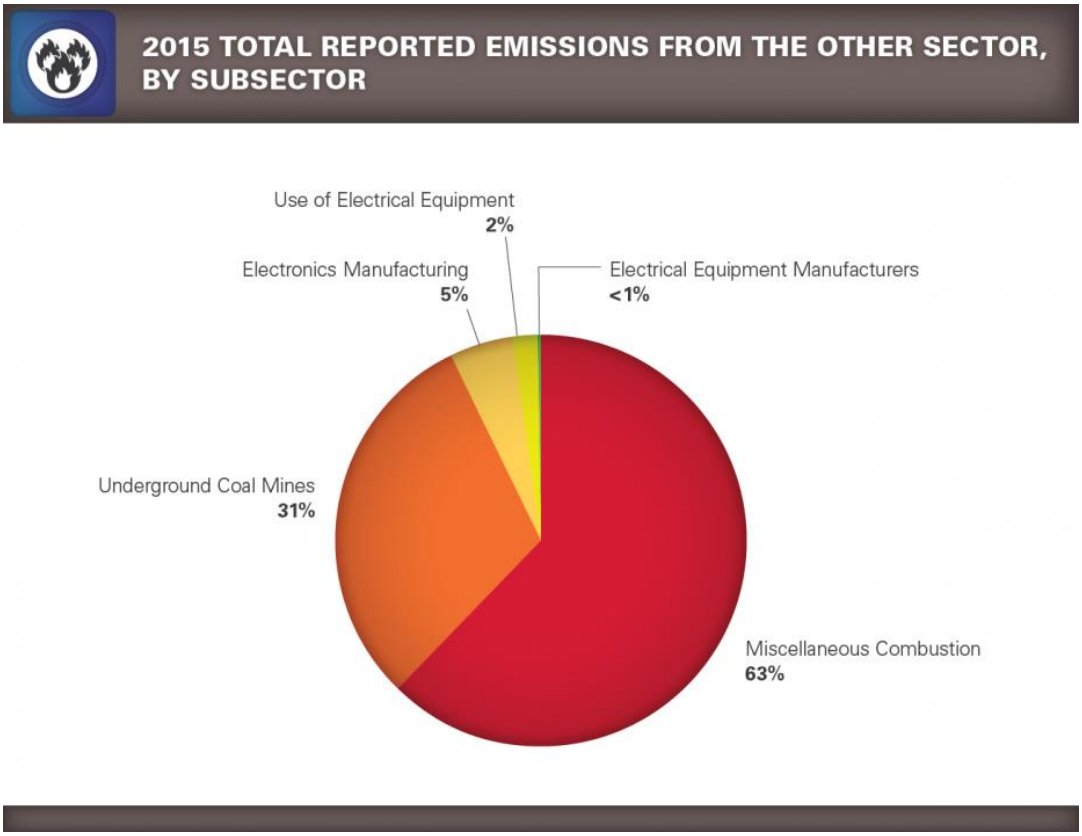
CO_2e emissions from the combustion of biomass are NOT included in emissions totals provided above.

Number of reporters and 2015 emissions (CO_2e) per other industry subsector

Industry Subsector	2015 Number of Reporters	2015 Emissions (million metric tons)
Miscellaneous Combustion		
• Food Processing	341	30.9
• Ethanol Production	176	18.5
• Other Manufacturing	287	15.5
• Universities	115	8.9
• Military	41	2.4
• Other Combustion	180	11.3
Underground Coal Mines	123	42.9

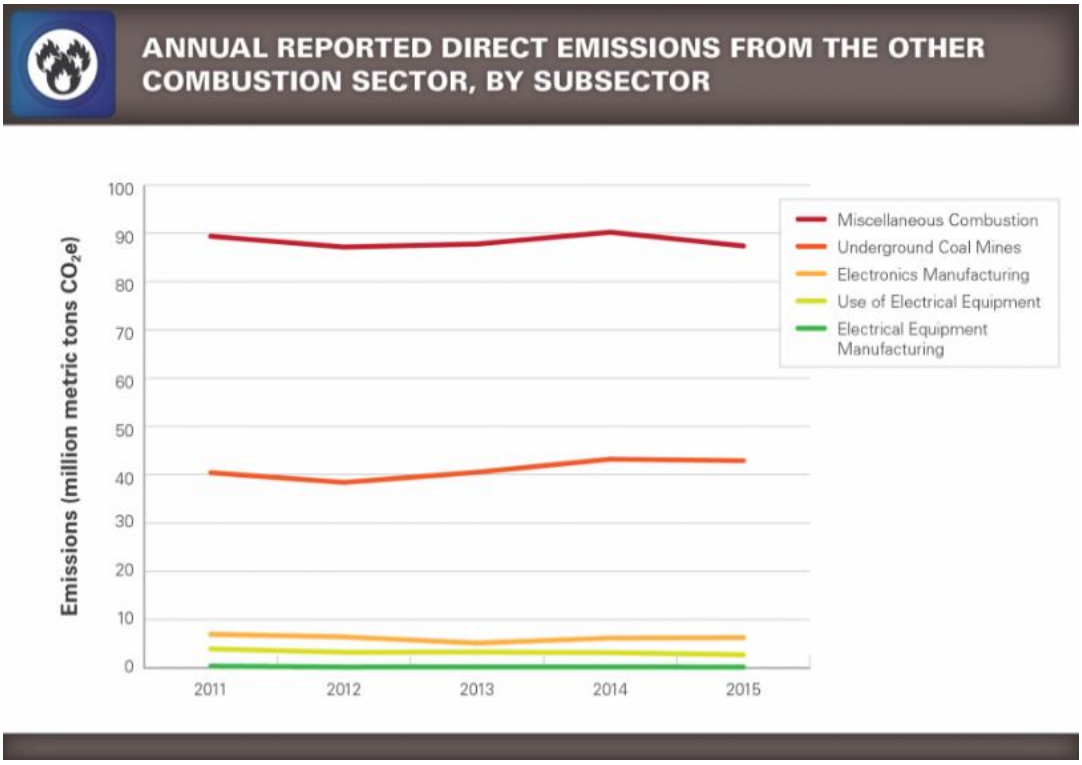
Industry Subsector	2015 Number of Reporters	2015 Emissions (million metric tons)
Electronics Manufacturing	58	6.3
Production and Use of Electrical Equipment		
• Electrical Equipment Manufacturers	7	0.2
• Use of Electrical Equipment	105	2.7

Total Reported Direct Emissions from Ot her, by Subsector (as of 8/13/16).



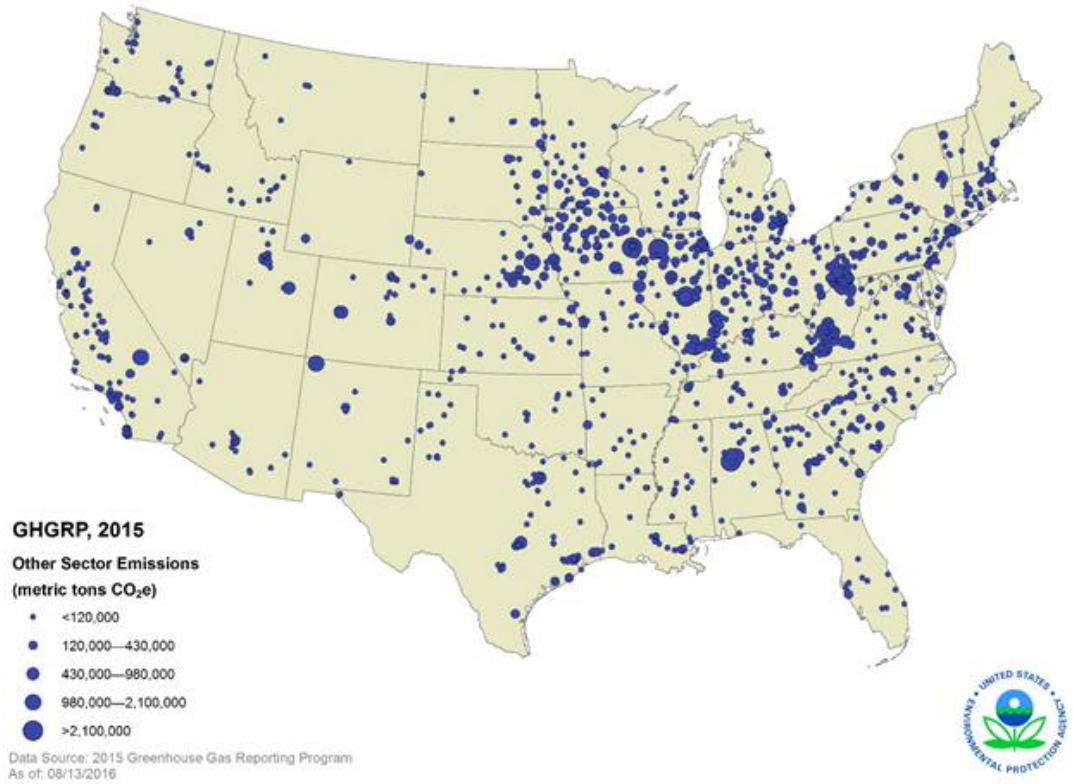
Sum of percentages may not equal 100% due to independent rounding.

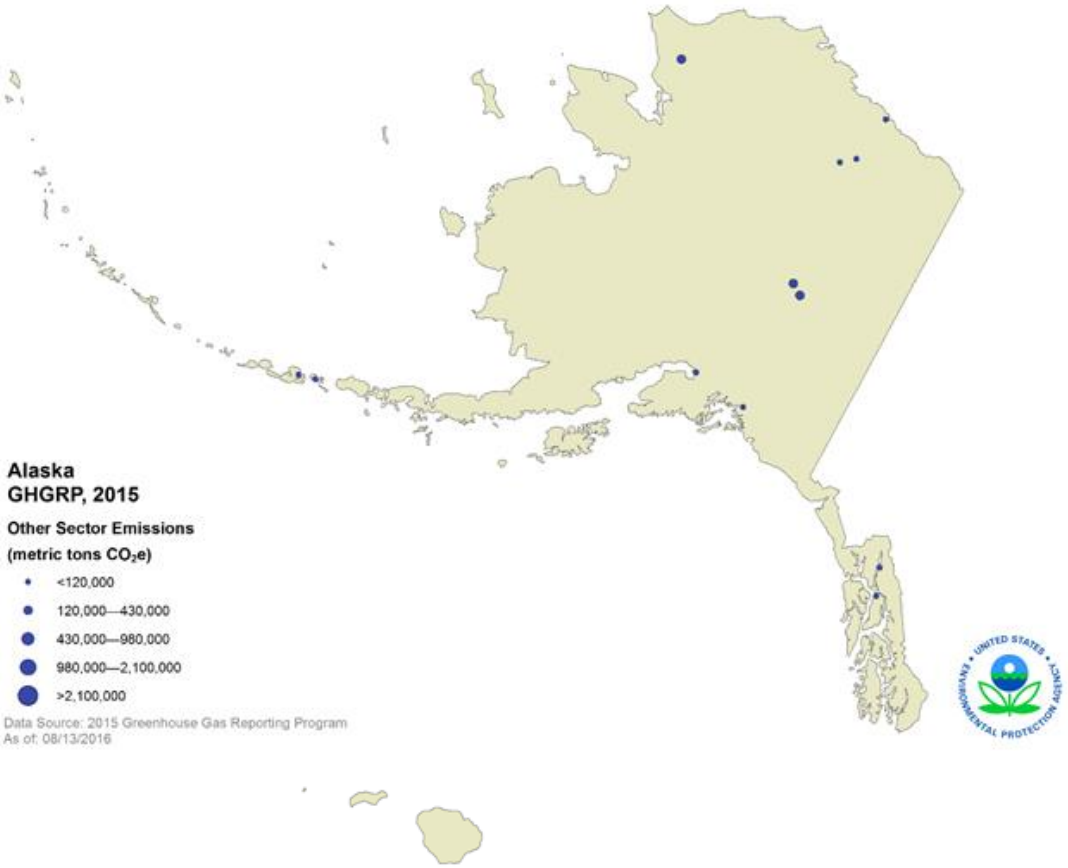
Trend of Annual Reported GHG Emissions by Subsector (as of 8/13/16).

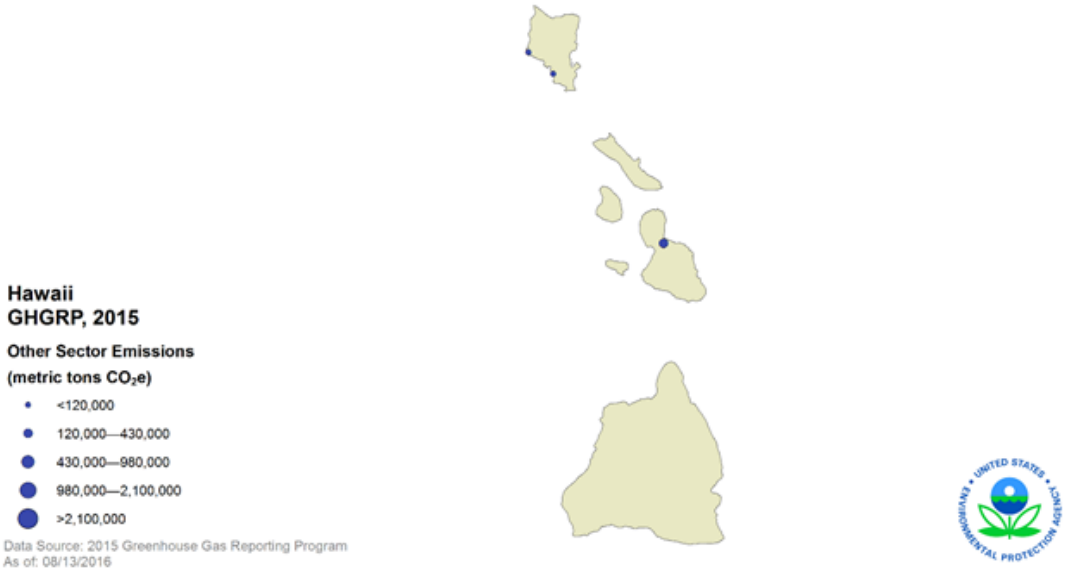


Location and emissions range for each reporting facility in the Other Sector (as of 8/13/16).

These maps show the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.




Alaska
GHGRP, 2015
Other Sector Emissions
(metric tons CO_2e)
<120,000
120,000—430,000
430,000—980,000
980,000—2,100,000
>2,100,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016


Hawaii
GHGRP, 2015
Other Sector Emissions
(metric tons CO_2e)
<120,000
120,000—430,000
430,000—980,000
980,000—2,100,000
>2,100,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016

Puerto Rico and the Virgin Islands GHGRP, 2015

Other Sector Emissions
(metric tons CO_2e)

- <120,000
- 120,000—430,000
- 430,000—980,000
- 980,000—2,100,000
- >2,100,000

Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016

GHGRP 2015: Miscellaneous Combustion

Miscellaneous Combustion comprises facilities that reported GHG emissions from stationary fuel combustion sources only and that are not part of any other sector. This category includes food processing, ethanol production, manufacturing operations, universities, military installations, and any combustion sources not included elsewhere, such as mining operations and hospitals.

Miscellaneous Combustion — Greenhouse Gas Emissions Reported to the GHGRP

(all emissions values presented in million metric tons CO_2e)

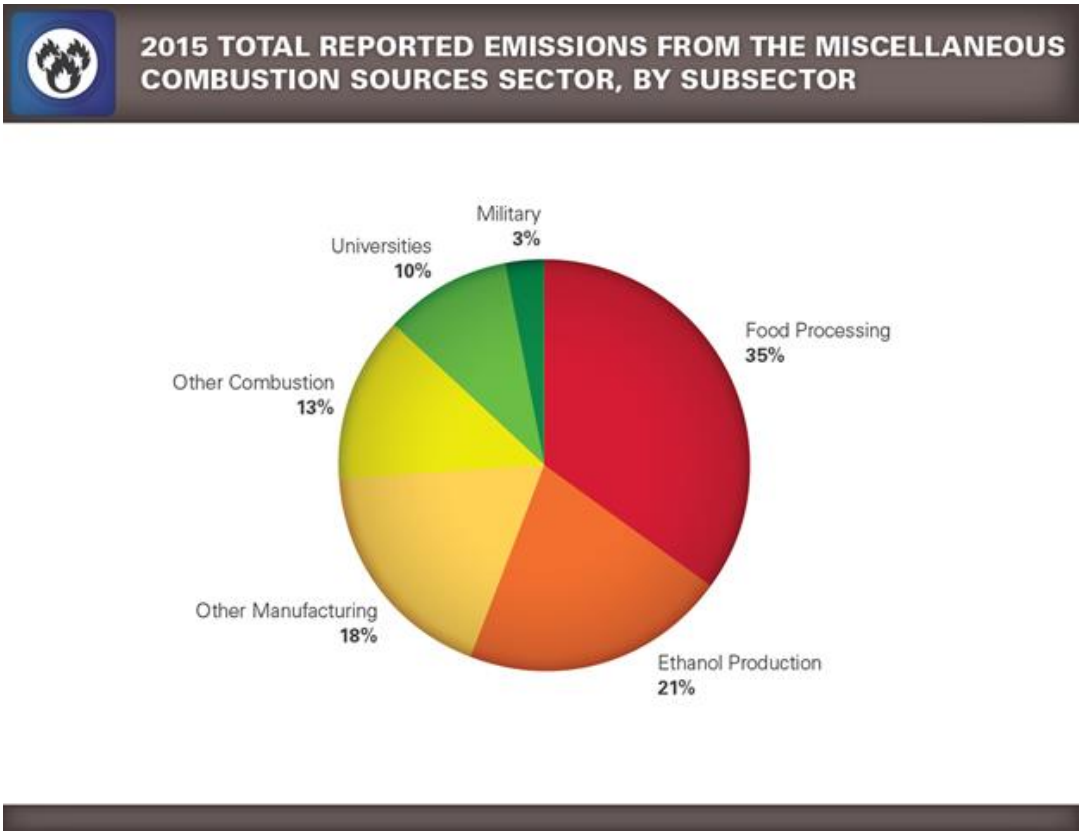
	2011	2012	2013	2014	2015
Number of facilities:					
• Food Processing	315	325	329	336	341
• Ethanol Production	163	166	164	172	176
• Other Manufacturing	286	290	292	296	287
• Universities	112	115	114	115	115
• Military	43	44	43	43	41
• Other Combustion	160	170	173	181	180
Total emissions (CO_2e):					
• Food Processing	31.2	31.0	31.2	31.9	30.9
• Ethanol Production	18.2	17.3	17.1	18.3	18.5
• Other Manufacturing	16.9	16.0	16.5	16.8	15.5
• Universities	9.5	9.0	9.2	9.3	8.9
• Military	2.7	2.6	2.5	2.5	2.4
• Other Combustion	10.9	11.2	11.2	11.3	11.3
Emissions by greenhouse gas (CO_2e)					
Food Processing					
• Carbon dioxide (CO_2):	31.0	30.9	31.0	31.8	30.7
• Methane (CH_4):	0.1	0.1	0.1	0.1	0.1
• Nitrous oxide (N_2O):	0.1	0.1	0.1	0.1	0.1
Ethanol Production					
• Carbon dioxide (CO_2):	18.2	17.2	17.1	18.3	18.5
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	**	0.2	**	**	**
Other Manufacturing					
• Carbon dioxide (CO_2):	16.8	15.9	16.4	16.8	15.5
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	0.1	0.1	0.1	0.1	**
Universities					
• Carbon dioxide (CO_2):	9.4	9.0	9.2	9.3	8.8
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	**	**	**	**	**
Military					

	2011	2012	2013	2014	2015
• Carbon dioxide (CO_2):	2.7	2.6	2.5	2.5	2.4
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	**	**	**	**	**
Other Combustion					
• Carbon dioxide (CO_2):	10.9	11.2	11.2	11.3	11.2
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	**	**	**	**	**

Totals may not equal sum of individual GHGs due to independent rounding.

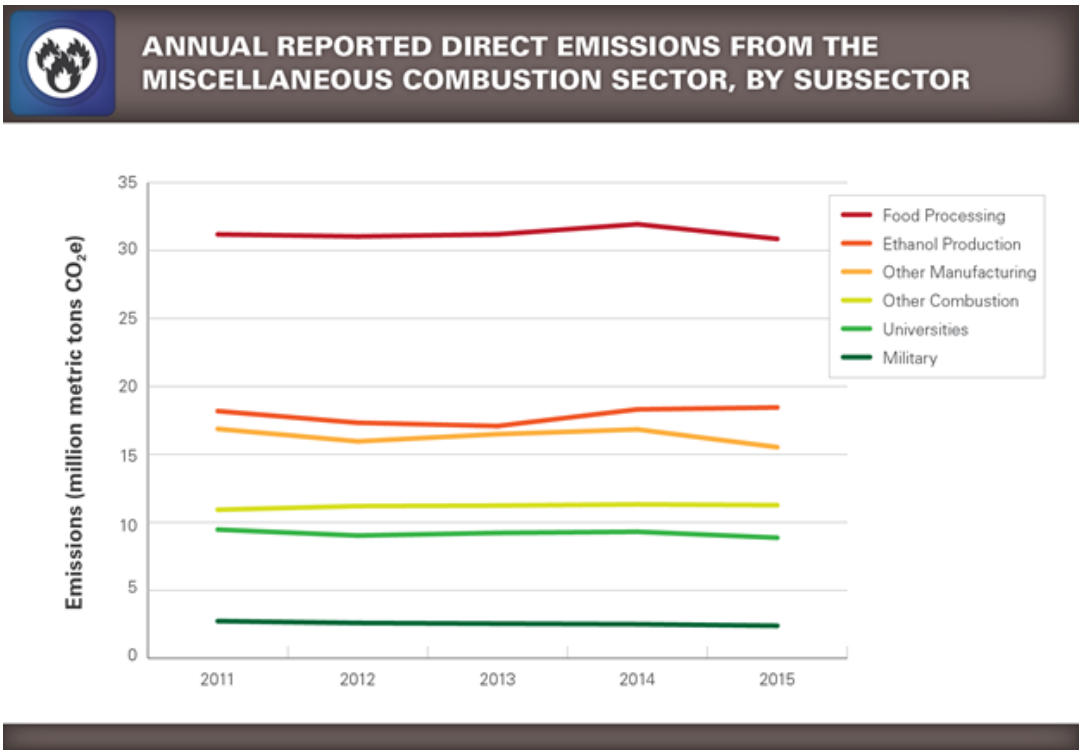
** Total reported emissions are less than 0.05 million metric tons CO_2e.

2015 Total Reported Direct Emissions from Miscellaneous Combustion, by Subsector (as of 8/13/16).



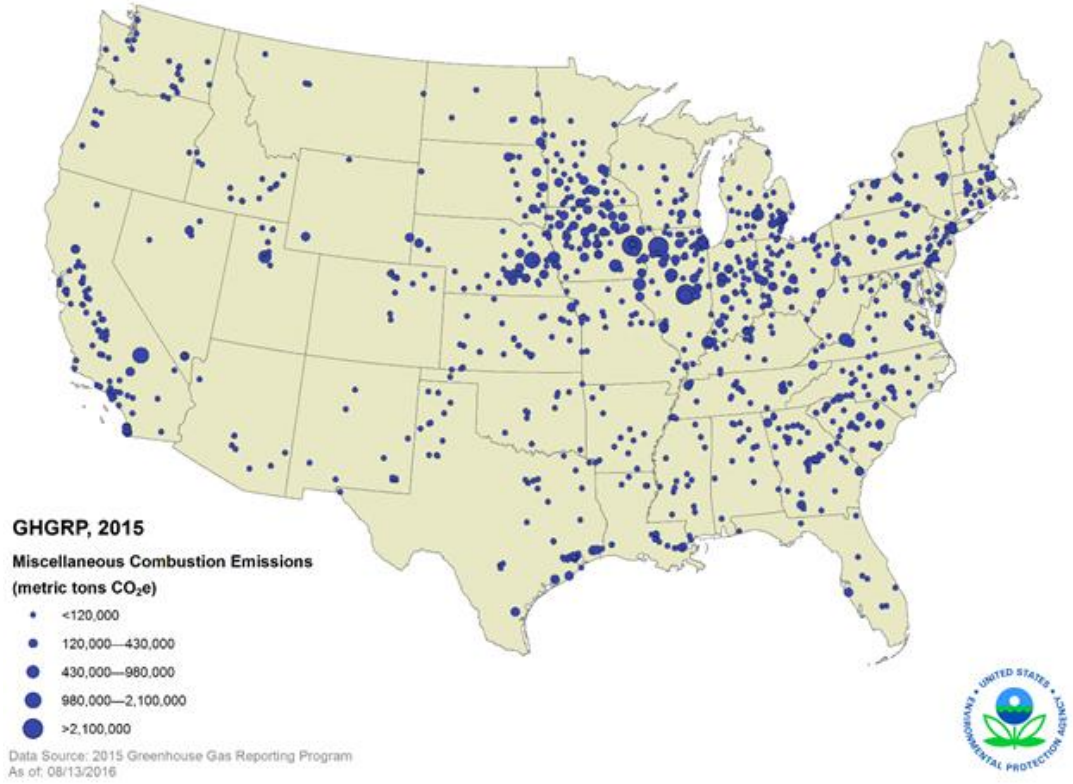
Sum of percentages may not equal 100% due to independent rounding.

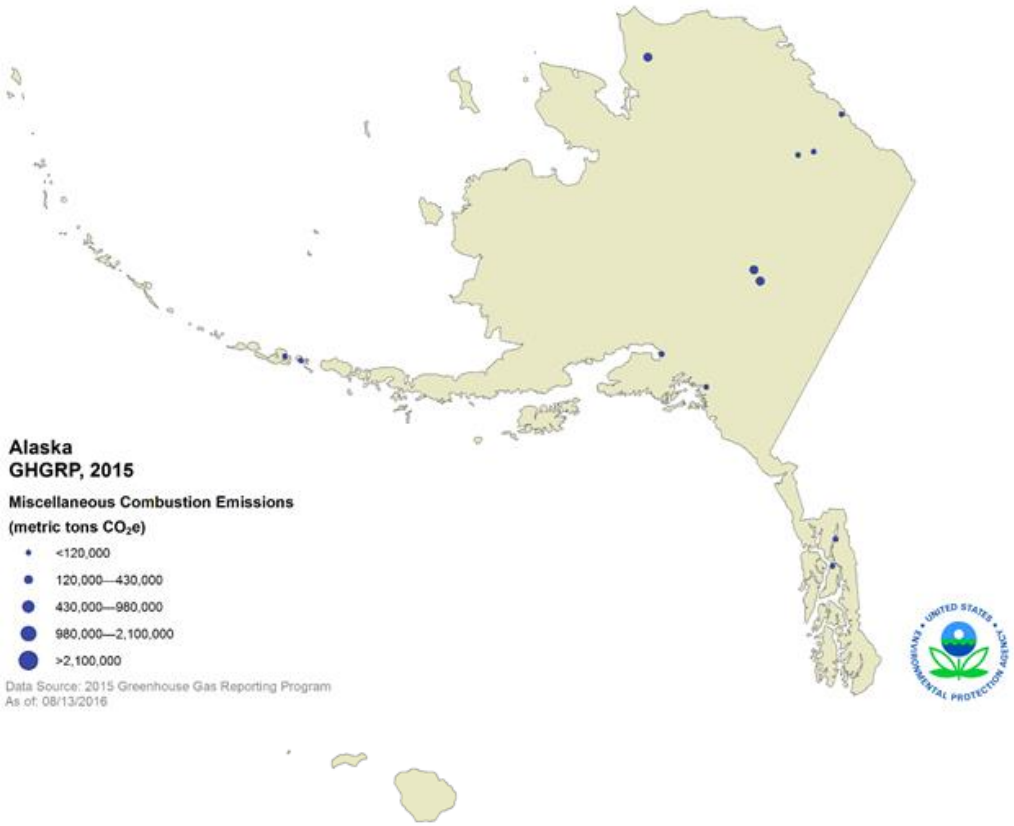
Trend of Annual Reported GHG Emissions from Miscellaneous Combustion, by Subsector (as of 8/13/16).



Location and emissions range for each reporting facility in the Miscellaneous Combustion sector (as of 8/13/16).

These maps show the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.




Alaska
GHGRP, 2015
Miscellaneous Combustion Emissions
(metric tons CO_2e)
<120,000
120,000—430,000
430,000—980,000
980,000—2,100,000
>2,100,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016


Hawaii
GHGRP, 2015
Miscellaneous Combustion Emissions
(metric tons CO_2e)
<120,000
120,000—430,000
430,000—980,000
980,000—2,100,000
>2,100,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016

Puerto Rico and the Virgin Islands GHGRP, 2015

Miscellaneous Combustion Emissions (metric tons CO_2e)

- <120,000
- 120,000—430,000
- 430,000—980,000
- 980,000—2,100,000
- >2,100,000

Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016

GHGRP 2015: Underground Coal Mines

The Underground Coal Mines sector consists of all underground coal mines that liberate 36,500,000 actual cubic feet of methane (equivalent to approximately 17,579 metric tons CO_2e) or more per year. Facilities in this sector include both underground coal mines under development and those categorized by the Mine Safety and Health Administration as active mines. Surface mines and abandoned mines are excluded from this category. Facility owners or operators must report the total annual methane liberated from ventilation and degasification systems as well as GHG emissions from any other source categories at the facility, such as stationary combustion devices.

Underground Coal Mines — Greenhouse Gas Emissions Reported to the GHGRP

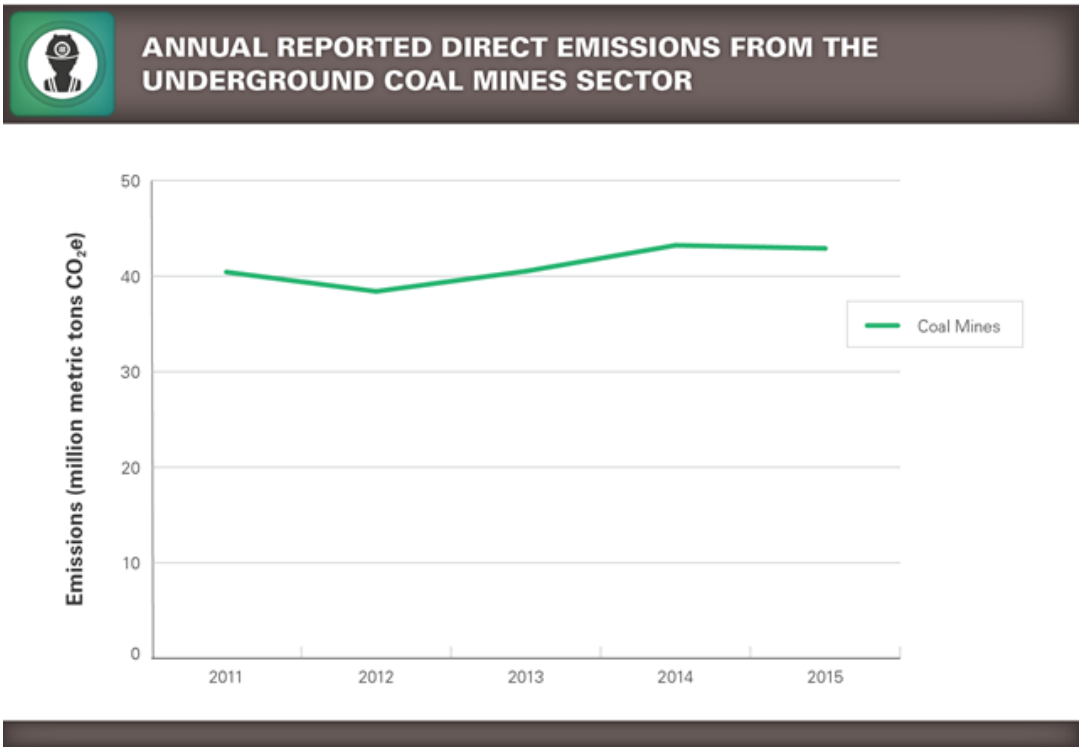
(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	117	118	129	128	123
Total emissions (CO_2e):	40.4	38.4	40.5	43.2	42.9
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	0.2	0.2	0.2	0.5	0.3
• Methane (CH_4):	40.2	38.2	40.3	42.7	42.6
• Nitrous oxide (N_2O):	**	**	**	**	**

** Total reported emissions are less than 0.05 million metric tons CO_2e.

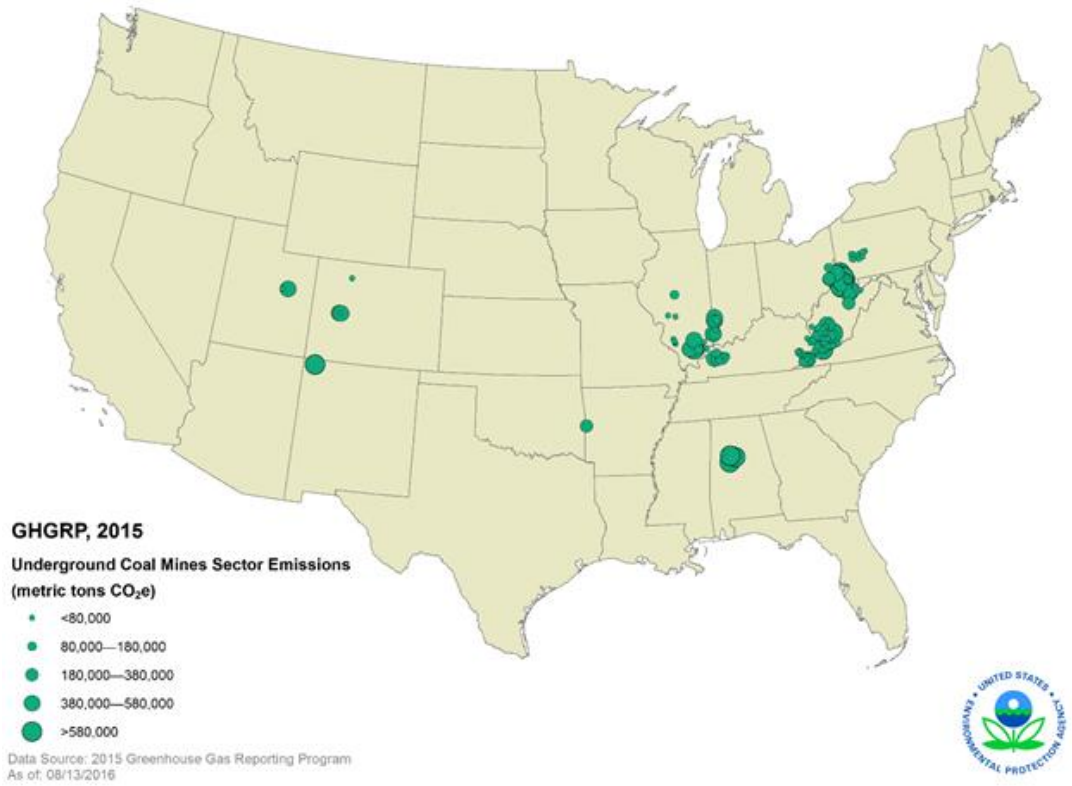
CO_2 emissions from the combustion of biomass are NOT included in the emissions totals provided above.

Trend of Annual Reported Direct Emissions from the Underground Coal Mines Sector (as of 8/13/16).



Location and emissions range for each reporting facility in the underground coal mines sector (as of 8/13/16).

This map shows the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.



Other EPA Resources

- U.S. Greenhouse Gas Inventory Report

GHGRP 2015: Electronics Manufacturing

This source category includes, but is not limited to, facilities that manufacture semiconductors (including light-emitting diodes), micro-electromechanical systems (MEMS), liquid crystal displays (LCDs), and photovoltaic cells (PV). Specifically, this subsector consists of electronics manufacturing facilities with production processes that use plasma-generated fluorine atoms and other reactive fluorine-containing fragments to etch thin films, clean chambers for depositing thin films, clean wafers, or remove residual material. The source category also includes electronics manufacturing facilities with chemical vapor deposition processes or other production processes that use N_2O, and with processes that use fluorinated GHGs as heat transfer fluids (HTF) to control temperature or clean surfaces.

Electronics Manufacturing — Greenhouse Gas Emissions Reported to the GHGRP

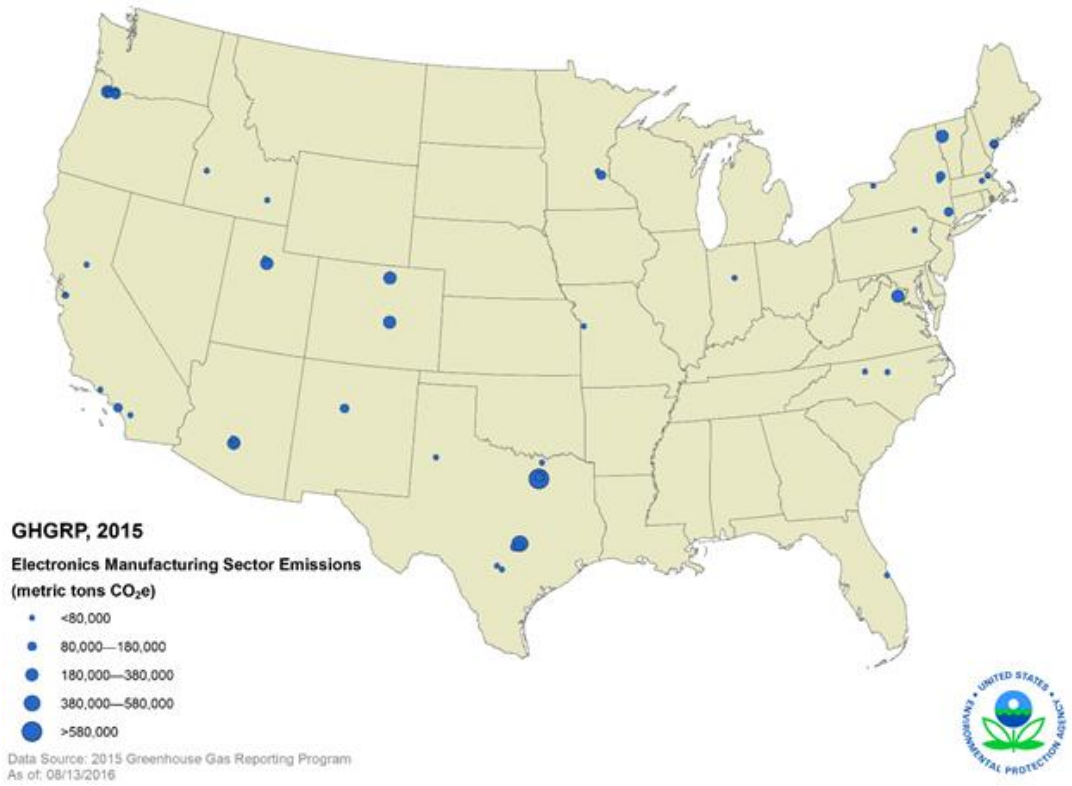
(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:	56	56	57	59	58
Total emissions (CO_2e):	7.0	6.4	5.1	6.2	6.3
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	1.6	1.5	0.7	0.7	0.8
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	0.2	0.2	0.2	0.2	0.2
• Hydrofluorocarbons (HFCs):	0.2	0.2	0.2	0.3	0.3
• Hydrofluoroethers (HFEs):	**	**	**	**	**
• Perfluorocarbons (PFCs):	3.2	2.8	2.6	3.0	3.0
• Sulfur hexafluoride (SF_6):	0.3	0.3	0.3	0.7	0.7
• Nitrogen trifluoride (NF_3):	0.6	0.6	0.5	0.5	0.5
• Other Fully Fluorinated GHGs:	0.7	0.7	0.6	0.8	0.7
• Very short-lived compounds:	**	**	**	**	**

Emissions of CO_2 and CH_4 are from stationary fuel combustion sources

Location and emissions range for each reporting facility in the Electronics Manufacturing sector (as of 8/13/16).

This map shows the locations of direct-emitting facilities. The size of a circle corresponds to the quantity of emissions reported by that facility.


GHGRP, 2015
Electronics Manufacturing Sector Emissions
(metric tons CO_2e)
<80,000
80,000—180,000
180,000—380,000
380,000—580,000
>580,000
Data Source: 2015 Greenhouse Gas Reporting Program
As of: 08/13/2016

GHGRP 2015: Electrical Equipment Production and Use

This source category includes electrical transmission and distribution systems and facilities that manufacture or refurbish electrical equipment.

The electrical transmission and distribution subsector consists of all electric transmission and distribution equipment insulated with or containing sulfur hexafluoride (SF6) or perfluorocarbons (PFCs) within an electric power system. This equipment includes but is not limited to gas-insulated substations; circuit breakers; switchgear, including closed-pressure and hermetically sealed-pressure switchgear; gas-insulated lines containing SF6 or PFCs; and gas containers such as pressurized cylinders, gas carts, electric power transformers, and other containers of SF6 or PFCs. Emissions occur during installation, use, servicing, and decommissioning of the equipment.

The electrical equipment manufacturing subsector includes facilities that manufacture or refurbish electrical equipment. At these facilities, emissions occur during equipment testing and filling.

Production and Use of Electrical Equipment — Greenhouse Gas Emissions Reported to the GHGRP

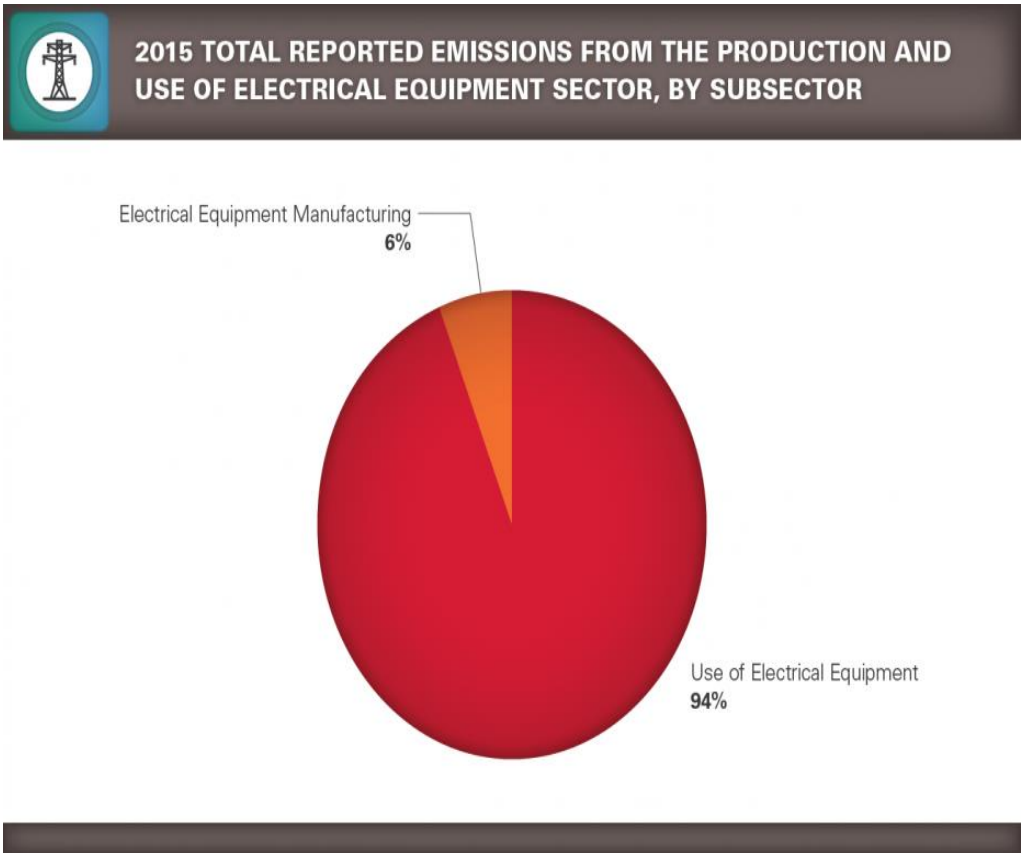
(all emissions values presented in million metric tons CO_2e)

	2011	2012	2013	2014	2015
Number of facilities:					
• Use of Electrical Equipment	123	123	121	118	105
• Electrical Equipment Manufacturers	6	6	6	7	7
Total emissions (CO_2e):					
• Use of Electrical Equipment	3.9	3.2	3.3	3.2	2.7
• Electrical Equipment Manufacturers	0.3	0.2	0.2	0.2	0.2
Emissions by greenhouse gas (CO_2e)					
• Carbon dioxide (CO_2):	**	**	**	**	**
• Methane (CH_4):	**	**	**	**	**
• Nitrous oxide (N_2O):	**	**	**	**	**
• Perfluorocarbons (PFCs):	**	**	**	**	**
• Sulfur hexafluoride (SF_6):	4.3	3.4	3.5	3.3	2.9

Totals may not equal sum of individual GHGs due to independent rounding.

** Total reported emissions are less than 0.05 million metric tons CO_2e.

Total Reported Direct Emissions from Production and Use of Electrical Equipment Sector, by Subsector (as of 8/13/16).



Sum of percentages may not equal 100% due to independent rounding.

GHGRP 2015: Supplier Highlights

For reporting year (RY) 2015, over 900 suppliers of fuels and industrial gases reported to EPA's Greenhouse Gas Reporting Program (GHGRP).

Suppliers do not report direct emissions, but instead report the quantity of GHGs that would be emitted if the fuels and industrial GHGs that they produce, import, or export each year were combusted, released, or oxidized. Emissions associated with these fuels and industrial gases do not occur at the supplier's facility but instead occur throughout the country, wherever they are used. An example of this is gasoline, which is supplied into the U.S. economy by a relatively small number of entities and consumed by many individual vehicles throughout the country.

The GHG quantity reported by suppliers might not always result in GHG emissions, and the emissions might not take place during that particular reporting year. However, the data from suppliers provide important information on the structure and flow of products through the economy and these products may ultimately result in greenhouse gas emissions. In addition, data reported by fossil fuel and industrial gas suppliers can account for greenhouse gases emitted by the numerous sources that use these products but do not report under the GHGRP due to their low individual emissions (passenger vehicles, for example). Emissions reported by suppliers can be accessed through the suppliers section of FLIGHT.

For 2015, 961 suppliers submitted a GHG report. The majority of GHG emissions associated with the transportation, residential, and commercial sectors are accounted for by these suppliers.

Table 1: Number of Suppliers that Reported (2015)

Industry Sector	Number of Reporters[8]
Suppliers of Coal-Based Liquid Fuels	0
Suppliers of Petroleum Products	231
Suppliers of Natural Gas and Natural Gas Liquids *Natural Gas Local Distribution Companies* *Natural Gas Liquids Fractionators*	 377 124
Suppliers of Industrial GHGs and Products Containing GHGs *Industrial GHGs* *Imports and Exports of Equipment Pre–charged with Fluorinated GHGs or Containing Fluorinated GHGs in Closed–cell Foams*	 66 43
Suppliers of Carbon Dioxide	139

[8] Totals sum to more than 961, because suppliers that fall into more than one sector are counted multiple times

GHGRP 2015: Suppliers of Natural Gas and Natural Gas Liquids

This sector consists of entities that supply natural gas and natural gas liquids. Natural gas supply is reported by Local Distribution Companies (LDCs) and natural gas liquids (NGL) fractionators.

NGL Fractionators are installations that receive natural gas or natural gas liquids from producers and fractionate these raw inputs into individual products (ethane, propane, normal butane, isobutane, or pentanes plus) and supply those products into the economy.

Local Distribution Companies receive natural gas from a transmission pipeline company and physically deliver the gas to end users.

These Suppliers do not report direct emissions, but instead report the quantity of CO_2 that would be emitted if the fuels they supply each year were combusted. Emissions associated with these fuels do not occur at the supplier's facility but instead occur throughout the country, wherever they are used. The full GHG quantity reported by suppliers might not always result in GHG emissions, and the emissions might not take place during that particular reporting year. An example is ethane supplied by NGL fractionators, which is often used to produce plastics.

The GHG quantities reported by suppliers can be accessed through the suppliers section of FLIGHT. Some natural gas and natural gas liquids suppliers also report direct emissions from petroleum and natural gas operations.

Natural Gas and Natural Gas Liquids Suppliers Sector — Carbon Dioxide Quantity Reported to the GHGRP

(million metric tons CO_2)

	2011	2012	2013	2014	2015
Local Distribution Companies					
Number of reporters:	379	385	383	380	377
CO_2 Quantity	715.2	708.9	770.2	789.7	764.4
Natural Gas Liquids Fractionators					
Number of reporters:	116	120	125	128	124
CO_2 Quantity:[9]	211.4	234.2	222.7	261.7	289.5

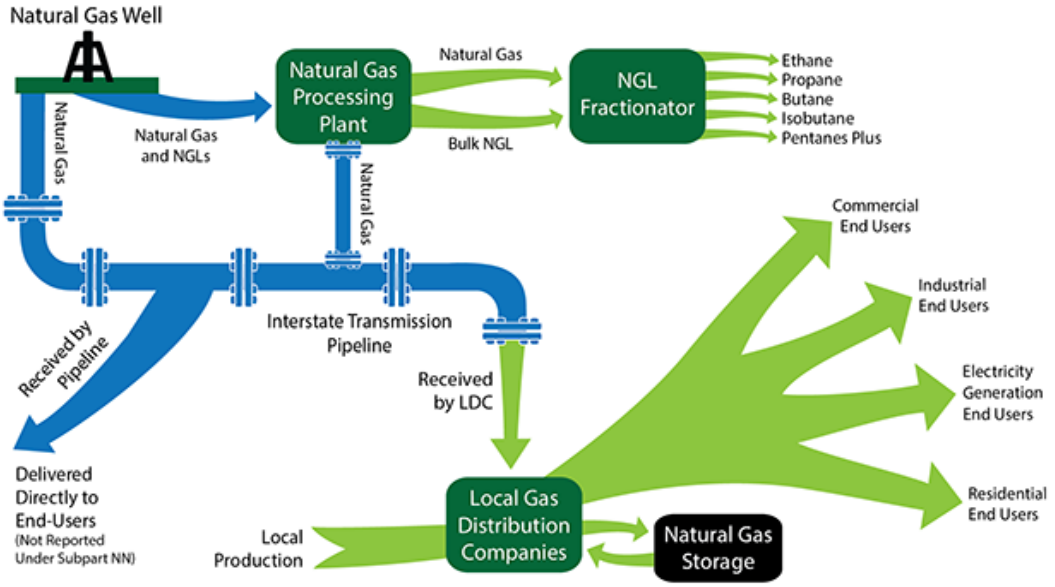
Natural Gas Deliveries Reported by LDCs (Mscf)

End-User	2011	2012	2013	2014	2015
Total Reported Deliveries	12,821,502,091	12,803,741,763	13,947,832,842	14,383,113,977	13,862,200,370
Residential Customers	4,638,529,919	4,085,574,944	4,848,194,760	5,005,735,887	4,540,946,672
Commercial Customers	3,039,953,088	2,806,910,521	3,195,406,736	3,371,629,183	3,099,028,202
Industrial Customers	3,284,163,103	3,508,132,232	3,662,750,062	3,767,913,926	3,727,521,915
Electricity Generating Facilities	1,858,855,981	2,403,124,066	2,241,481,284	2,237,834,980	2,494,703,581

[9] Excludes CO_2 reported by NGL Fractionators whose reported quantities are classified as confidential business information (CBI).

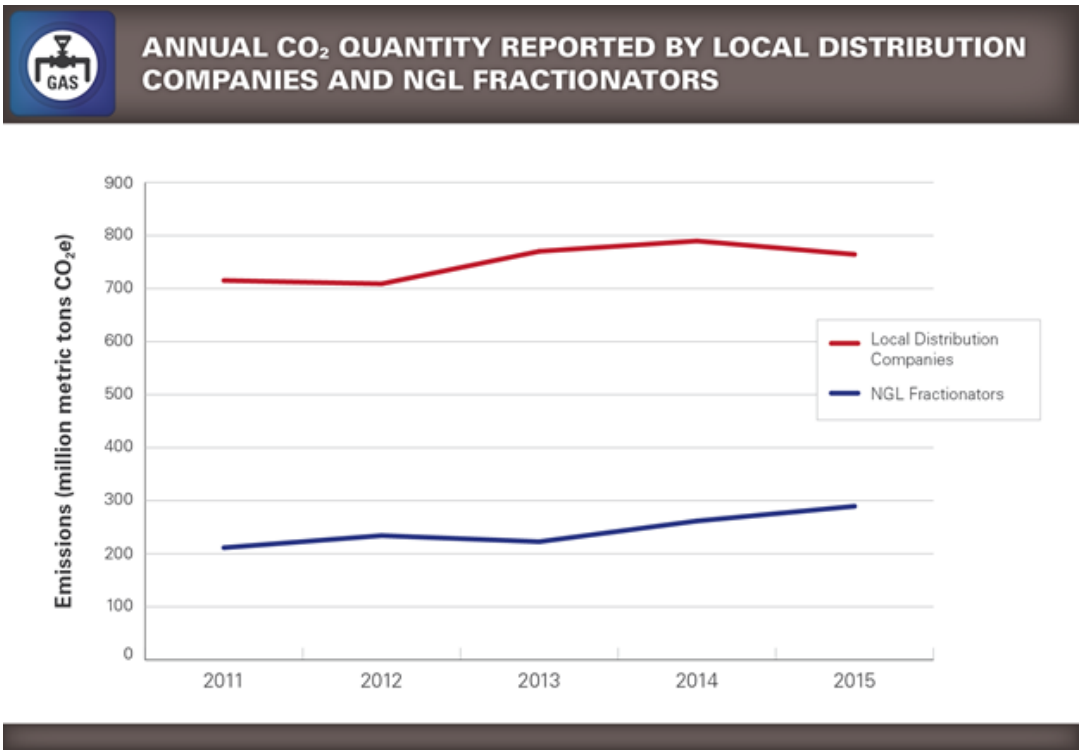
Mscf means thousand standard cubic feet of gas.

Graphic of the natural gas and NGL supply chain



Quantities marked with green arrows are reported to EPA by NGL Fractionators or Local Distribution Companies under Subpart NN.

Trend of Annual Reported CO_2 Quantity Associated with Natural Gas and NGL Supply.



GHGRP 2015: Suppliers of Petroleum Products

This sector consists of entities that supply natural gas and natural gas liquids. Natural gas supply is reported by Local Distribution Companies (LDCs) and natural gas liquids (NGL) supply is reported by fractionators.

NGL Fractionators are installations that receive natural gas or bulk natural gas liquids from producers, fractionate these raw inputs into individual products (ethane, propane, normal butane, isobutane, or pentanes plus), and then supply those products into the economy.

Local Distribution Companies receive natural gas from a transmission pipeline company and physically deliver the gas to end users.

These Suppliers report the quantity of CO_2 that would be emitted if the fuels they supply each year were combusted. Emissions associated with these fuels do not occur at the supplier's facility but instead occur throughout the country, wherever they are used. The full GHG quantity reported by suppliers might not always result in GHG emissions, and the emissions might not take place during the year in which they are reported. An example is ethane supplied by NGL fractionators, which is often used to produce plastics.

The GHG quantities reported by suppliers can be accessed through the suppliers section of FLIGHT. Some natural gas and natural gas liquids suppliers also report direct emissions from petroleum and natural gas operations.

Petroleum Product Suppliers Sector – Number of Reporters

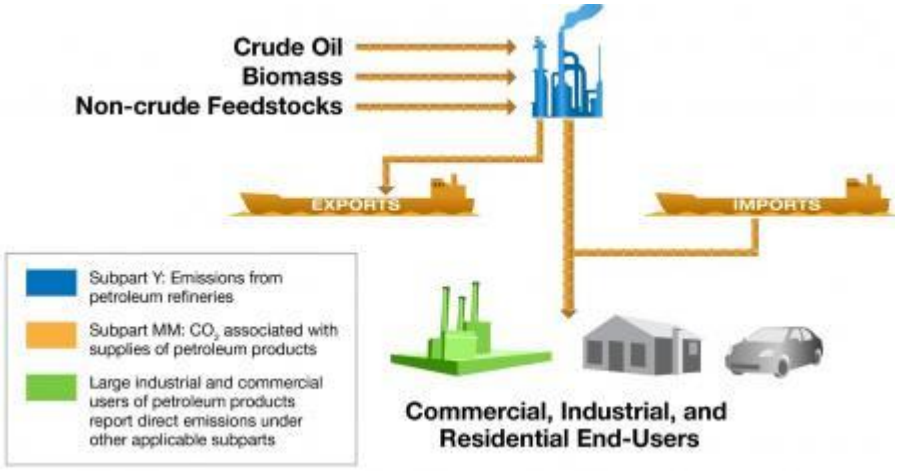
	2012	2013	2014	2015
Importers	84	84	85	85
Exporters	58	58	60	58
Petroleum Refineries	137	136	136	137

Petroleum Refineries – CO_2 Quantity Associated with Supplied Products[10]

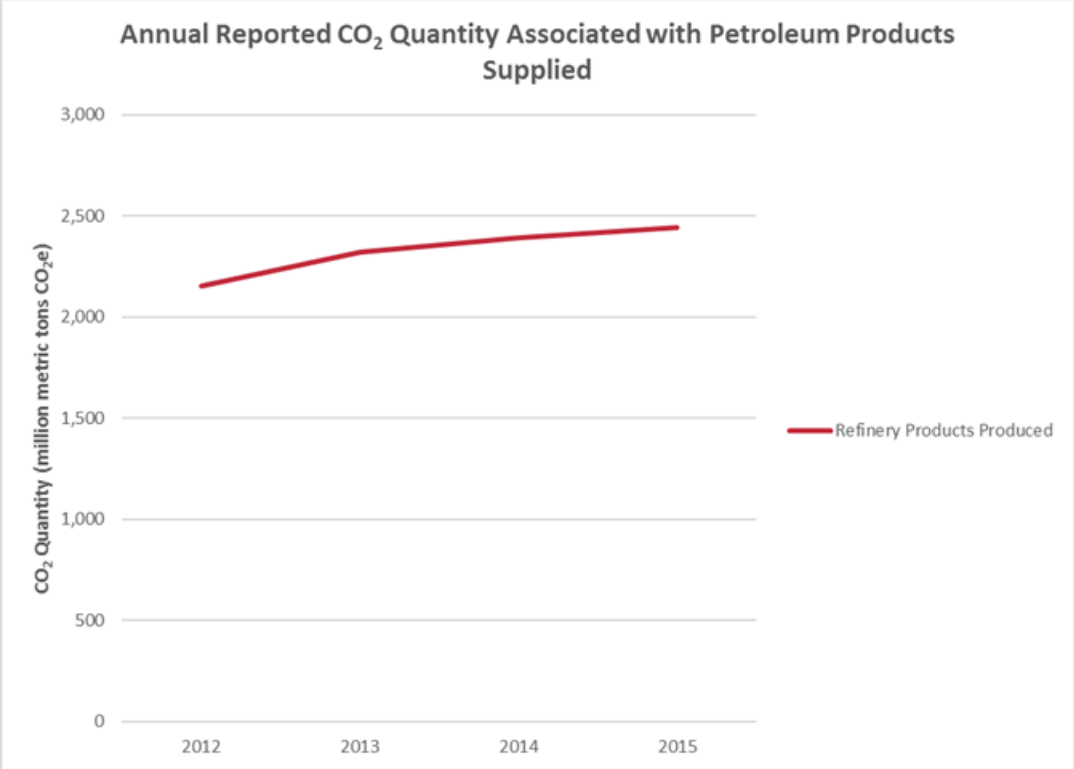
	2012	2013	2014	2015
Importers	84	84	85	85
Exporters	58	58	60	58
Petroleum Refineries	137	136	136	137

[10] Carbon dioxide quantities shown in this table exclude petroleum refineries whose carbon dioxide quantities are considered confidential business information.

Graphic of the natural gas and NGL supply chain



Trend of annual reported CO_2 quantity associated with natural gas and NGL supply



GHGRP 2015: Suppliers of Industrial GHGs and Products Containing GHGs

This sector comprises industrial greenhouse gas (GHG) suppliers and entities that import or export certain products that contain fluorinated greenhouse gases. These suppliers do not report direct emissions, but instead report the equivalent quantity of CO_2 that would be emitted if the gases that they produce, import, or export each year were released to the atmosphere.

Industrial GHG Suppliers. Entities that manufacture, import, or export fluorinated greenhouse gases or nitrous oxide in bulk report as suppliers of industrial GHGs under Subpart OO of the GHGRP. The number of reporters displayed in the table below includes all reporters subject to Subpart OO, not just those reporting supply of the specific compounds listed in the table titled Quantity (Net Supply) of GHGs Reported.

Importers and Exporters of (1) equipment that is pre-charged with fluorinated greenhouse gases (e.g., electrical equipment and air conditioners) and (2) closed cell foams containing fluorinated greenhouse gases (e.g., insulation contained inside refrigerators; insulation boardstock) report under Subpart QQ.

Number of Reporters Subject to Subparts OO and QQ

Industry Sector	2010	2011	2012	2013	2014	2015
Industrial GHG Suppliers (OO)	47	59	66	64	64	66
Producers (Facilities)	21	24	25	24	22	21
Importers	26	34	37	37	38	38
Exporters	16	24	26	24	26	26
Importers and Exporters of Fluorinated Gases in Products (QQ)	N/A[a]	36	41	43	43	43
Importers	N/A[a]	29	35	35	37	37
Exporters	N/A[a]	26	30	32	32	31

[a] Importers and Exporters of Fluorinated Gases in Products were not required to report 2010 data.

The total number of suppliers reporting under OO (and QQ) is less than the sum of the producers, importers, and exporters reporting under OO (and QQ) because some reporters qualify as multiple types of suppliers.

Quantity (Net Supply) of GHGs Reported
(Quantities are presented in million metric tons per year of net CO_2e[a]***)***

Industry Sector	2010	2011	2012	2013	2014	2015
Industrial GHG Suppliers						
Saturated HFCs, excluding HFC-23[b]	235	241	227	278	254	264
Sulfur hexafluoride (SF_6)	[c]	[c]	35[d]	[c]	[c]	[c]
Other GHGs	[c]	[c]	[c]	[c]	[c]	[c]
Importers and Exporters of Fluorinated Gases in Products	N/A[e]	[c]	[c]	[c]	[c]	[c]

[a] Net supply or net CO_2e means CO_2e quantities of bulk gas produced + imported – exported – transformed – destroyed.
[b] As of 8/13/16 for 2015 and 9/25/15 for the other years in this row.

[c] To avoid revealing sensitive business information, these quantities have not been published. EPA is investigating which reported quantities may be aggregated and released to the general public.
[d] As of 8/16/15.
[e] Importers and Exporters of Fluorinated Gases in Products were not required to report 2010 data.

GHGRP 2015 : Capture, Supply, and Underground Injection of Carbon Dioxide

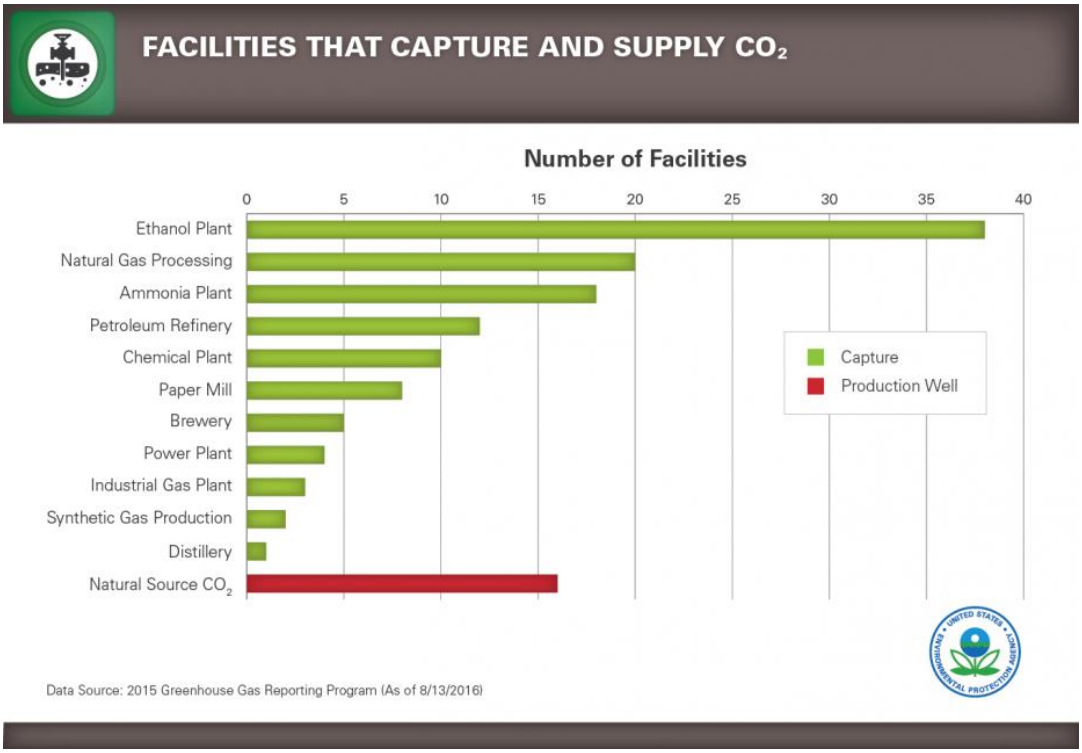
EPA's Greenhouse Gas Reporting Program (GHGRP) collects key information regarding the capture, supply, and underground injection of carbon dioxide (CO2) in the United States. Greenhouse gas (GHG) data from these activities are reported under the following GHGRP subparts:

- Suppliers of CO2 (subpart PP) covers facilities that capture CO2 from industrial sources and processes or extract it from natural CO2-bearing formations for supply into the economy.
- Underground injection of CO_2 (subpart UU) covers facilities that inject CO_2 underground for enhanced oil and gas recovery (ER), acid gas injection/disposal, carbon storage research and development (R&D), or for any other purpose other than geologic sequestration.
- Geologic sequestration of CO_2 (subpart RR) provides a mechanism for facilities to monitor and report to EPA amounts of CO_2 sequestered. Facilities submit a plan for monitoring, reporting and verifying CO_2 sequestered underground. Once the plan is approved, facilities report basic information on CO_2 received for injection, data related to the amounts of CO_2 sequestered, and annual monitoring activities. EPA approved the first "monitoring, reporting, and verification" plan in December 2015 and data were reported beginning with the 2016 reporting year.

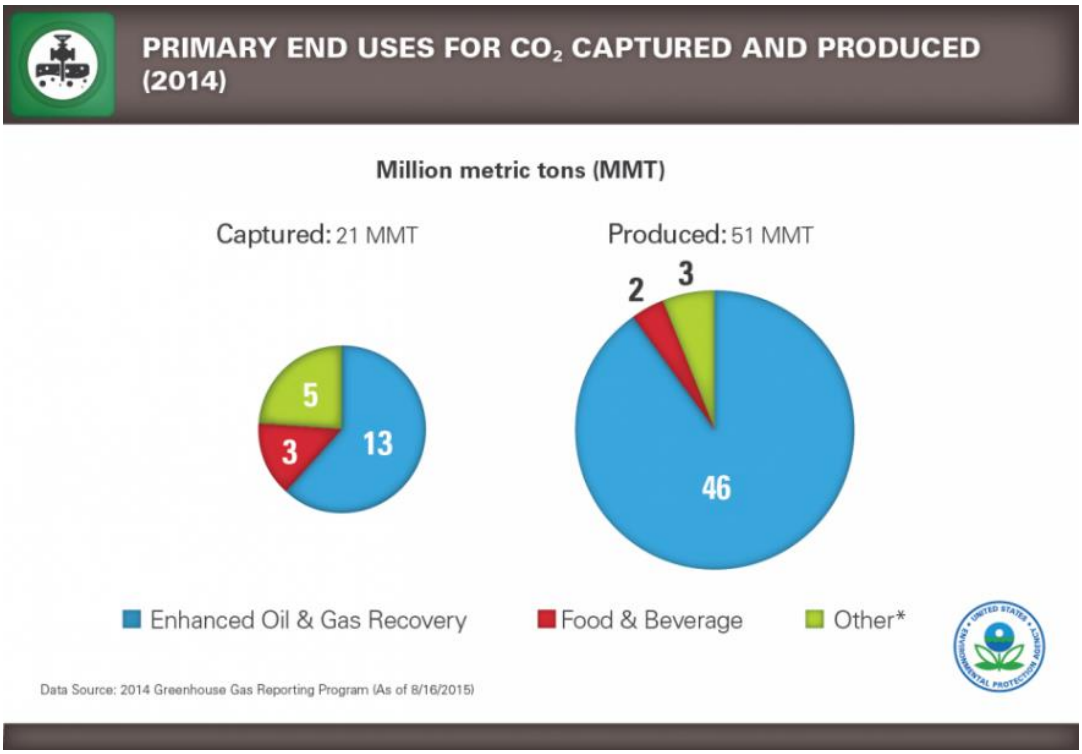
GHGRP, 2014*		
Capture and Supply of CO_2*	**Amount (MMT***)**	**Reporting Facilities**
Total CO_2 captured and produced	*72*	*139*
CO_2 captured (industrial sources)	21	123
CO_2 produced (natural sources)	51	16
Underground Injection of CO_2	**Amount (MMT***)**	**Reporting Facilities**
Total CO_2 received for underground injection	*64*	*96*
CO_2 received for ER	63	86
CO_2 received for acid gas injection/disposal, carbon storage R&D, and other purposes	1	10
* As of 8/16/15 ** The GHGRP also collects data from importers and exporters of carbon dioxide. These data are not provided in the table but these reporters can be identified through FLIGHT. *** Million Metric Tons		

Capture and Supply of CO_2

Ethanol, natural gas, and ammonia production are among the top three industrial facility types that capture CO_2 for supply into the economy.



In 2014,[11] most of the CO_2 captured from industrial processes (64 percent) and nearly all of the CO_2 produced from natural sources (91 percent) was used for ER. Food and beverage manufacturing is the second most common end use, followed by other end uses such as pulp and paper manufacturing, fire-fighting equipment, and metal fabrication.



* Includes cleaning and solvent use, fumigants and herbicides, transportation and storage of

[11] As of 8/16/15.

explosives, fire-fighting equipment, industrial and municipal water/wastewater treatment, pulp and paper, metal fabrication, greenhouse plant growth and unknown (which may include ER).

** Note that some CO_2 suppliers reported the primary end use for captured or produced CO_2 as "unknown." It is believed that the quantities reported by CO_2 suppliers as "unknown" account for the difference between CO_2 received for ER and CO_2 supplied for ER.

Underground Injection of CO_2

After CO_2 is captured or produced, it can be compressed and transported to a site where it is injected underground. Some facilities both capture or produce CO_2 and inject it underground onsite.

The primary use of carbon dioxide is for ER. ER helps to mobilize oil and gas in underground hydrocarbon reservoirs, thereby increasing production. While most CO_2 captured or produced is supplied to facilities that conduct ER, a smaller portion is injected underground for other purposes.