



2019

OVERVIEW OF 2017 REPORTED EMISSIONS

MARCH 2019

FACILITY GREENHOUSE GAS REPORTING PROGRAM



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HIGHLIGHTS

- 1,622 facilities reported their greenhouse gas (GHG) emissions in 2017 to Environment and Climate Change Canada, totalling 292 megatonnes (Mt)¹ of carbon dioxide equivalent (CO₂ eq.).
- The 2017 reporting cycle marks the first year of the expansion to the federal GHG reporting program (GHGRP)—the reporting threshold was lowered to 10 kilotonnes (kt) CO₂ eq and certain facilities in targeted sectors were also required to provide additional data².
- The change in the threshold resulted in an additional 953 facilities reporting to the program for the first time.
- Facilities in the 10 to 50 kt range accounted for 8% (22 Mt) of the total facility-reported emissions for 2017—largely from the oil and gas sector.
- The reported emissions are largely distributed across three sectors: (i) Mining, Quarrying, and Oil and Gas Extraction (36%), (ii) Utilities (30%), and (iii) Manufacturing (29%)—amongst all facilities, those engaged in oil/gas extraction and electricity generation account for 62% of the total.
- 520 facilities reported emitting 50 kt of CO₂ eq. or more in 2017 for a total of 269 Mt, 3% higher than the 2016 total.
- Since 2005, total emissions from facilities emitting 50 kt or more decreased by 3% (9 Mt). The Utilities and Manufacturing sectors experienced the largest declines (43 Mt and 14 Mt, respectively), while reported emissions increased by 48 Mt from facilities in the Mining, Quarrying, and Oil and Gas Extraction sector, largely in Alberta (43 Mt).
- The GHG emissions data reported by facilities represent 41% of Canada's total GHG emissions (716 Mt in 2017) and 64% of Canada's industrial GHG emissions as reported in Canada's National GHG Inventory.³
- Sectoral trends in the emissions reported by facilities mirror those in Canada's National GHG Inventory.
- Environment and Climate Change Canada is continuing the expansion of the reporting requirements under the GHGRP with phase 2 changes taking effect for the 2018 data year—this will facilitate the direct use of the expanded data in the National GHG Inventory, thus better reflecting emission changes occurring at individual facilities and improving the granularity, consistency and comparability of GHG data across Canada.

¹ 1 Mt = 1 million tonnes or 1 000 kilotonnes (kt).

² The reporting threshold was reduced from 50kt to 10kt in 2017. The 2017 GHGRP Gazette notice spells out the complete reporting requirements for 2017. It can be accessed on the *Canada Gazette*: <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting/reporting.html>

³ In this overview report, Canada's industrial GHG emissions include those from the following GHG categories from the *National Inventory Report: Greenhouse Gas Sources and Sinks in Canada 1990–2017: Stationary Combustion Sources* (except Residential), Other Transportation, Fugitive Sources, Industrial Processes and Product Use, and Waste. The national inventory report is available on the United Nations Climate Change-National Inventory Submissions: <https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2018>.

GREENHOUSE GAS REPORTING PROGRAM



Environment and Climate Change Canada's Greenhouse Gas Reporting Program (GHGRP) has completed the collection of GHG emissions information from Canadian facilities for the 2017 calendar year. Any facility with annual GHG emissions of 10 kilotonnes (kt) of carbon dioxide equivalent (CO₂ eq.) or higher is required to report to the program.

The Government of Canada established the GHGRP in March 2004 under the authority of section 46 of the *Canadian Environmental Protection Act, 1999* (CEPA) to collect GHG emissions information annually from the largest emitting Canadian facilities. To date, facility-reported GHG information has been collected and published through Environment and Climate Change Canada's GHGRP for the period 2004 to 2017. This program is part of Canada's ongoing effort to develop, in collaboration with Canadian provinces and territories, a harmonized and efficient mandatory GHG reporting system that minimizes duplication and reporting burden for industry and governments.

Key objectives of the program are to provide Canadians with consistent information on GHG emissions, inform the development of the National Greenhouse Gas Inventory and support regulatory initiatives. The data collected are also shared with provinces and territories. The data used in this overview report are current as of October 22, 2018. Subsequent company updates or new reports received will be included in future data releases.

In December 2016, the Government of Canada published a Notice of Intent to inform stakeholders of its intent to expand the GHGRP using a phased approach. It is pursuing this expansion in order to: enable the direct use of the reported data in Canada's National GHG Inventory, increase the consistency and comparability of GHG data across jurisdictions, and obtain a more comprehensive picture of Canadian facility emissions. The 2017 data reporting cycle represented Phase 1 of the GHGRP expansion. In this phase, the reporting threshold was lowered to require all facilities emitting 10 kt or more of GHGs (in CO₂ eq. units) to report. Facilities in targeted industry sectors were also required to use prescribed methods to quantify their emissions and to report additional information on their calculations. These sectors were cement, lime, aluminium, iron and steel producers as well as facilities engaged in CO₂ capture, transport, and geological storage activities. The *Notice with respect to reporting of greenhouse gases (GHGs) for 2017*⁴ reflects the above changes.

The *Notice with respect to reporting of greenhouse gases (GHGs) for 2018* represents the second year of the phased expansion to the GHGRP. It contains the following key changes:

1. Requirements to apply specific quantification methods to determine emissions, and provide additional data for selected sectors.
2. These requirements are specific to facilities engaged in mining, ethanol production, electricity and heat generation, ammonia

production, nitric acid production, hydrogen production, petroleum refineries, pulp and paper production, and base metal production.

3. Modifications to certain requirements under Schedules 7 and 10 that were issued in phase 1 through the Notice with respect to reporting of greenhouse gases (GHGs) for 2017.

The 2018 Notice, published in the *Canada Gazette* on January 19, 2019, sets out the federal reporting requirements for 2018 data, scheduled to be submitted by facilities to Environment and Climate Change Canada by June 1, 2019.

REPORTED 2017 GREENHOUSE GAS EMISSIONS 2

For the purposes of the GHGRP, a facility is defined as an integrated facility, pipeline transportation system, or offshore installation⁵. An integrated facility is defined as all buildings, equipment, structures, on-site transportation machinery, and stationary items that are located on a single site, on multiple sites or between multiple sites that are owned or operated by the same person or persons and that function as a single integrated site, excluding public roads.

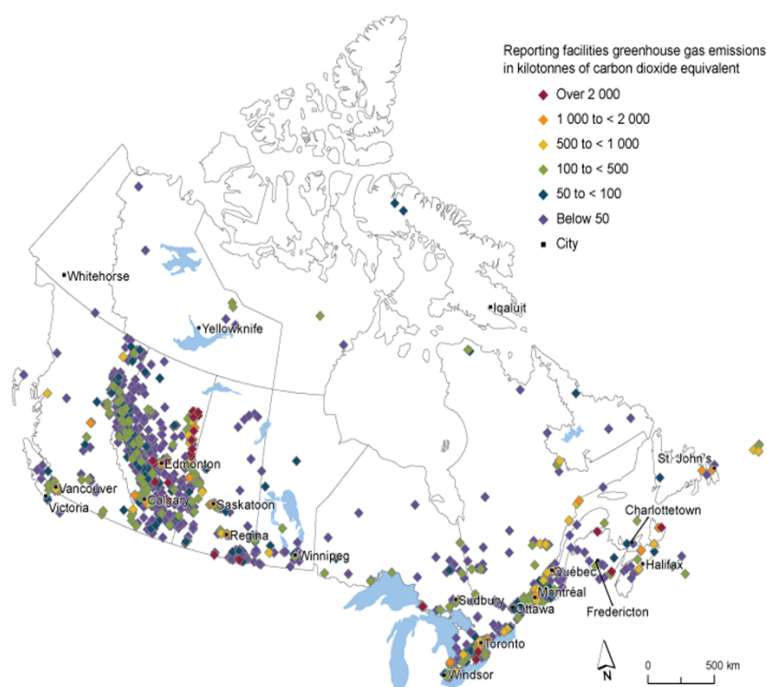
A total of 1 622 facilities reported their GHG emissions to Environment and Climate Change Canada for the 2017 calendar year, collectively emitting a total of 292 Mt of GHGs (Figure 1)⁶. Of these facilities, 320 reported GHG emission levels greater than 100 kt, accounting for 87% (255 Mt)

⁴ The Notice with respect to reporting of greenhouse gases (GHGs) for 2017 can be accessed at the *Canada Gazette*.

⁵ The term "facility" was updated in the 2017 notice as part of the GHGRP expansion to provide clarification that equipment used for on-site transportation is included and to reflect new requirements for reporting on carbon capture, transport and storage.

⁶ Unless explicitly stated otherwise, all emissions data presented in this report are expressed in CO₂ eq. units.

Figure 1: 2017 Facility GHG Emissions Reported to Environment and Climate Change Canada^{a,b}



a. Map excludes pipeline transportation systems.

b. Map provided by the Canadian Environmental Sustainability Indicators program available online at <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions/large-facilities.html>.

of the total reported emissions, and 56 emitted more than 1 Mt, accounting for 58% (169 Mt) of the total reported emissions (Figure 2). Those with emissions over 1 Mt fall within several industrial sectors such as electric power generation, oil sands extraction, petroleum refineries and natural gas transportation pipelines. Facilities with emissions falling below the reporting threshold of 10 kt per year can voluntarily report their GHG emissions; 61 facilities did so this year, representing 0.1% (0.2 Mt). All voluntarily reported emissions are included in this report and in the data set published by Environment and Climate Change Canada.

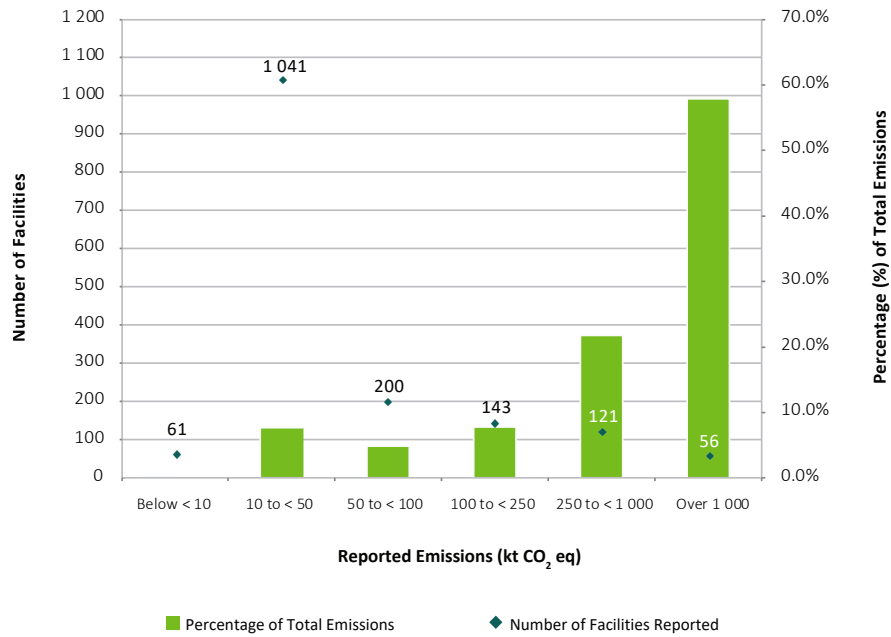
953 facilities reported their GHG emissions for the first time: they belong to a number of sectors, such as oil and gas extraction (533 facilities), food manufacturing (54 facilities), and waste treatment and disposal (45 facilities). The combined emissions from these new reporters are 22 Mt, contributing

about 8% to the total reported emissions. These new reporters mostly include facilities in the 10 to 50 kt range now required to report their emissions because of the lower threshold of 10 kt CO₂ eq.

2.1 Emission Calculation Methods

A facility may choose among a number of available methods to calculate its GHG emissions. The methods selected by reporting facilities must be consistent with the methodological guidelines developed by the Intergovernmental Panel on Climate Change (IPCC) and adopted by the United Nations Framework Convention on Climate Change (UNFCCC) for the preparation of national GHG inventories. Reporting facilities must indicate the types of methods used to determine the quantities of emissions reported. Such methods may include monitoring or direct measurement, mass balance, emission factors, and/or engineering estimates.

Figure 2: Contribution of Facilities in Various Emission Ranges to Total Reported Emissions (2017)



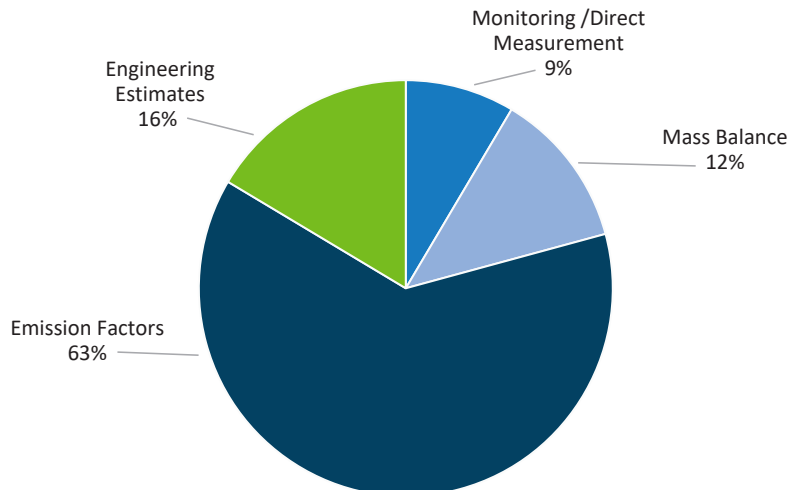
Facilities in the 0-10 kt range voluntarily reported their emissions. Totals may not add up due to rounding.

Facilities covered under phase 1 of the GHGRP expansion (i.e. producers of aluminium, lime, cement, iron and steel, as well as facilities engaged in CO₂ capture, transport and geological storage activities) were required to use specific quantification

methods, as described in *Canada's Greenhouse Gas Quantification Requirements*⁷, along with the requirements to provide additional information. These are not discussed in the present section.

⁷ *Canada's Greenhouse Gas Quantification Requirements*: <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting/reporting/quantification-requirements.html>

Figure 3: Types of Methods Used by Facilities



Overall, methods incorporating the use of emission factors were the approach preferred by most facilities (Figure 3). An emission factor is a measure that indicates the rate at which a GHG is released into the atmosphere due to a given activity, such as burning a specific fuel type or producing a specific industrial product. The emission factors used may be general or technology-specific. Many facilities used more than one calculation method to determine their emissions.

Table 1: **Global Warming Potential Values for the Main Greenhouse Gases**

Greenhouse Gas	100-year GWPs ^a
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	25
Nitrous oxide (N ₂ O)	298
Sulphur hexafluoride (SF ₆)	22 800
Hydrofluorocarbons (HFCs), 13 species	Ranges from 92 to 14 800
Perfluorocarbons (PFCs), 7 species	Ranges from 7 390 to 12 200

a. GWPs were updated in 2013 and applied to all years in the data published by the GHGRP.

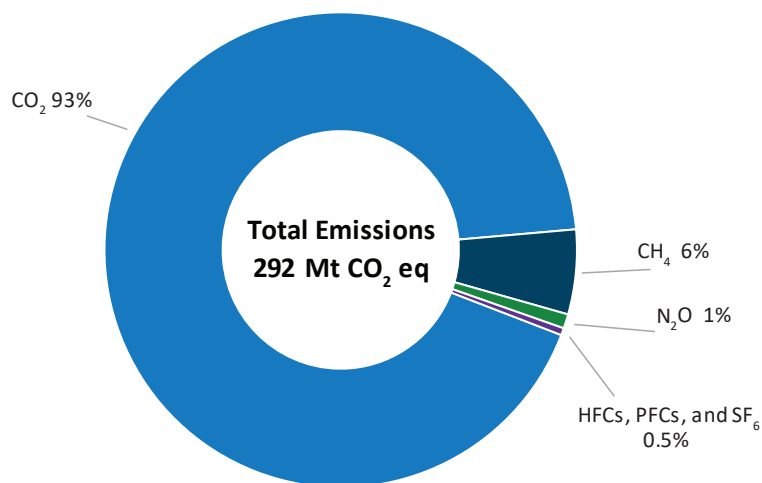
2.2 Greenhouse Gases and Global Warming Potentials

GHGs are not equal in their effect on the atmosphere. Each GHG has its own average atmospheric lifetime and heat-trapping potential. GHG emissions are often calculated and reported in terms of how much CO₂ would be required to produce a similar warming effect over a given time horizon. This is called the CO₂ eq. value and is calculated by multiplying the amount of the gas by its associated global warming potential (GWP) (Table 1). Environment and Climate Change Canada uses the GWP values from the IPCC Fourth Assessment Report adopted by the UNFCCC, a complete list of which can be found in the *Notice with respect to reporting of greenhouse gases (GHGs) for 2017*. The GWP values used by the GHGRP are consistent with those used in Canada's National Greenhouse Gas Inventory.

2.3 Reported GHG Emissions by Gas and by Source

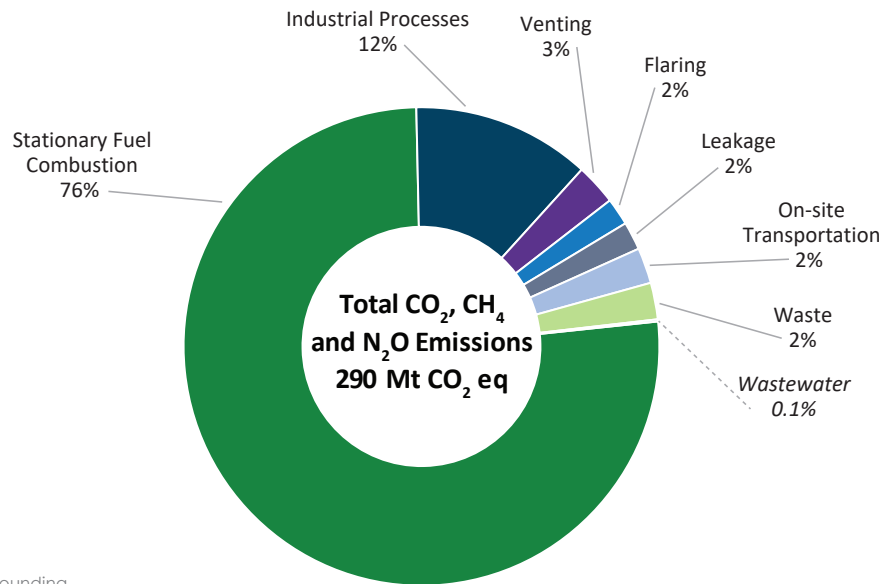
CO₂ represented the majority (93%) of the total reported emissions in 2017, while methane (CH₄) and nitrous oxide (N₂O) emissions contributed 6% and 1%, respectively (Figure 4). Facilities are also

Figure 4: **Reported 2017 GHG Emissions by Gas (292 Mt CO₂ eq.)**



Totals may not add up due to rounding.

Figure 5: **Reported 2017 GHG Emissions by Source (CO₂, CH₄ and N₂O Included)**



Totals may not add up due to rounding.

required to report emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) stemming from industrial processes or industrial product use. The combined emissions of these gases accounted for the remaining 0.5% (1 Mt).

When reporting to the GHGRP, facilities are required to report emissions of CO₂, CH₄ and N₂O under the following source categories:⁸ stationary fuel combustion, industrial processes, fugitive sources including venting, flaring and leakage, on-site transportation, waste and wastewater⁹. Stationary fuel combustion is the largest source of reported emissions, representing 76% of the total (Figure 5). This source includes emissions resulting from the burning of fuels for the purpose of producing energy (e.g., to generate electricity, heat or steam), but does not include emissions from

combustion engines in vehicles or mobile equipment which are grouped under On-site Transportation. Any waste material burned or incinerated at a facility to produce energy is also included in stationary combustion. Industrial process emissions, the second-largest source of reported emissions at 12%, refer to emissions stemming from specific industrial processes involving chemical or physical reactions other than combustion. Such reactions occur, for example, in the processes of mineral production (e.g., lime, cement), metal production (e.g., iron, steel, aluminium) and chemical production (e.g., nitric acid and ammonia production).

2.4 Reported GHG Emissions by Province/Territory

Facilities in the province of Alberta accounted for the largest share of reported emissions, with approximately 54% of the total, followed by facilities in Ontario (15%), Saskatchewan (10%) and

⁸ Additional information on these emission source categories can be found in the Technical Guidance on Reporting Greenhouse Gas Emissions, available online at <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting/reporting/technical-guidance-2017.html>.

⁹ Some source categories have been modified and updated. These alterations reflect the GHGRP expansion and are applicable to the 2017 reporting year.

Table 2: **Reported 2017 GHG Emissions by Province/ Territory**

Province / Territory	Number of Facilities	Total Emissions (kt CO ₂ eq)	Percentage of Total Emissions
Newfoundland and Labrador	16	5 807	2%
Prince Edward Island	3	100	0.03%
Nova Scotia	22	7 509	3%
New Brunswick	18	6 949	2%
Quebec	185	22 574	8%
Ontario	323	42 550	15%
Manitoba	39	2 391	1%
Saskatchewan	185	28 892	10%
Alberta	627	157 741	54%
British Columbia	191	16 428	6%
Yukon	2	30	0.01%
Northwest Territories	6	473	0.2%
Nunavut	5	383	0.1%
Total^a	1 622	291 828	100%

a. Totals may not add up due to rounding.

Quebec (8%) (Table 2). The number of facilities, the quantity and type of fuel consumed, and the predominant industry largely explain this ranking.

2.5 Reported GHG Emissions by Sector

When completing a report for the GHGRP, a reporter is required to identify the main activities occurring at its facility using the North American Industry Classification System (NAICS).¹⁰ In 2017, three NAICS-defined industry sectors accounted for the majority of GHG emissions: the Mining, Quarrying, and Oil and Gas Extraction sector, representing 37% (109 Mt); the Manufacturing sector, accounting for 29% (84 Mt); and the Utilities sector, primarily facilities generating electricity from fossil fuels, accounting for 28% (81 Mt) (Figure 6). The remaining 6% (19 Mt) of emissions captured under “Other”

were reported by various types of facilities, mainly natural gas transportation pipelines (9 Mt) and waste management (7 Mt).

Activities of reporting facilities in the Mining, Quarrying, and Oil and Gas Extraction sector can be further broken down into three main categories (Figure 7):

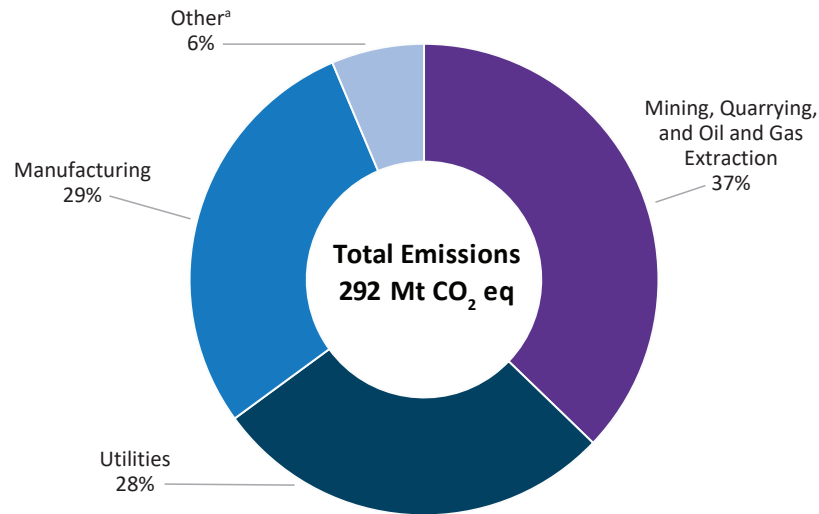
1. Oil sands extraction, the dominant sub-category which includes oil sands mining, in-situ bitumen production and upgrading (64%);
2. Oil and gas extraction (27%); and
3. mining of metal ore (e.g., iron) (4%), coal (3%), and non-metallic minerals (e.g., potash and diamonds) (2%).

The Manufacturing sector includes a wide range of industrial activities, with important contributors to the reported 2017 emissions being (Figure 8):

1. petroleum and coal product manufacturing (22%);
2. iron, steel and ferro-alloy manufacturing (17%);
3. basic chemical manufacturing (e.g., ethylene, polyethylene, hydrogen gas) (14%); and
4. cement and concrete product manufacturing (13%).

10 The NAICS is an industry classification system that was developed by the statistics agencies of Canada, the United States and Mexico to enable them to collect comparable statistical data. It is a comprehensive system that encompasses all economic activities using six-digit codes. In Canada, the NAICS 2017 version consists of 20 sectors, 102 subsectors, 322 industry groups, 708 industries and 923 national industries. NAICS 2017 can be accessed on Statistics Canada: <https://www.statcan.gc.ca/eng/subjects/standard/naics/2017/v3/index>

Figure 6: **Reported 2017 GHG Emissions by Industry Sector (292 Mt CO₂ eq.)**



a. "Other" includes various types of facilities such as natural gas transportation pipelines, solid waste landfills, airports, universities, hospitals and public administration buildings.

Figure 7: **Reported 2017 GHG Emissions by Subsectors of Mining, Quarrying, and Oil and Gas Extraction (109 Mt CO₂ eq.)**

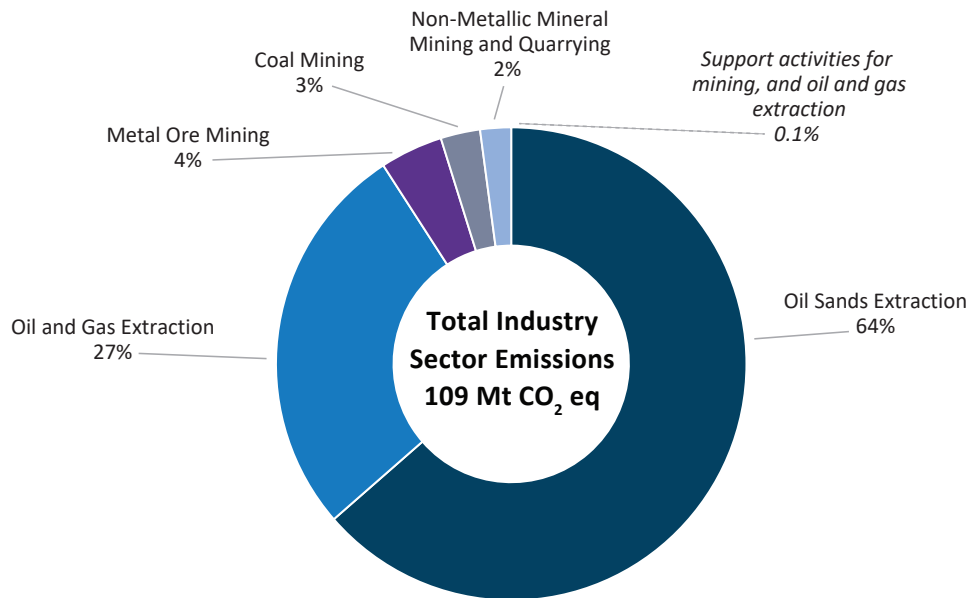
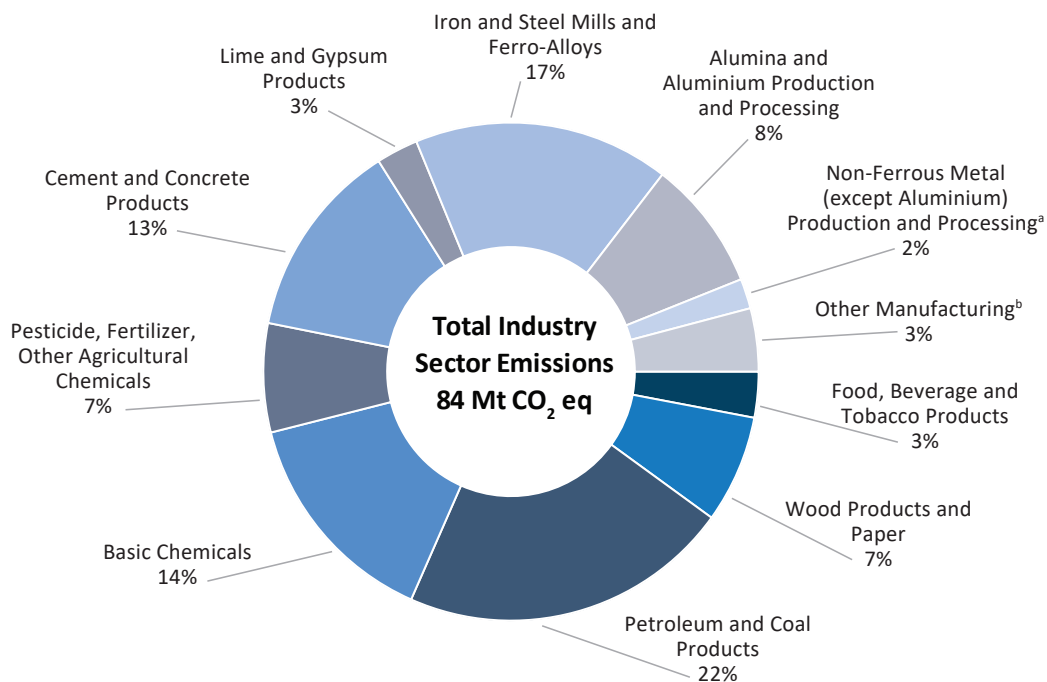


Figure 8: **Reported 2017 GHG Emissions by Subsectors of Manufacturing (84 Mt CO₂ eq.)**



a. Non-Ferrous Metal (except Aluminium) Production and Processing includes the production of base metals (e.g., copper, nickel, zinc).

b. "Other Manufacturing" represents other types of manufacturing, including electrical equipment, transportation equipment and furniture manufacturing.

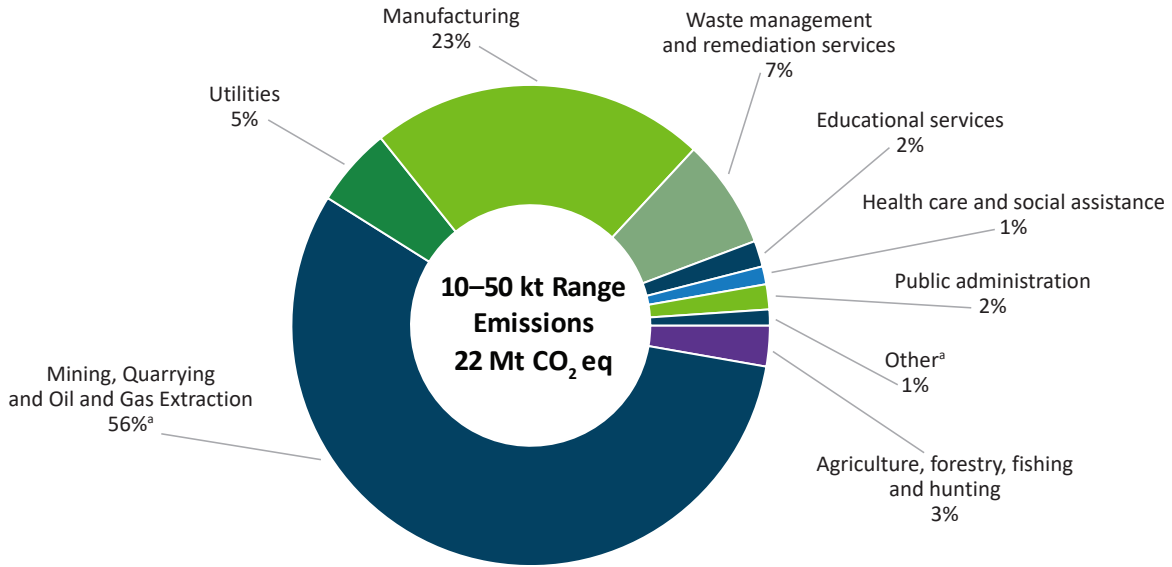
2.6 Effect of Threshold Change

Starting with the 2017 data collection, the mandatory reporting threshold was lowered from 50 kt CO₂ eq. to 10 kt CO₂ eq. This means any facility emitting 10 kt or more of GHGs in the calendar year must report to the program. The threshold change resulted in a 165% increase in the number of facilities reporting between 2016 and 2017 (1622 for the year 2017, up from 611 for 2016). The emissions from the new facilities accounted for 22 Mt of the 2017 total reported emissions. Over half (56%) of the 22 Mt of GHGs emitted by facilities in the 10 to 50 kt range, come from the Mining, Quarrying and Oil and Gas Extraction sector where an additional 618 facilities are now reporting (Figure 9). The Manufacturing sector is the second largest contributor (224 facilities newly reporting), accounting for 23% of the emissions in this range. Many landfills, universities and hospitals

were required to report for the first time because of the 10 kt threshold. Moreover, new reporting sectors included greenhouse operations and defence services facilities.

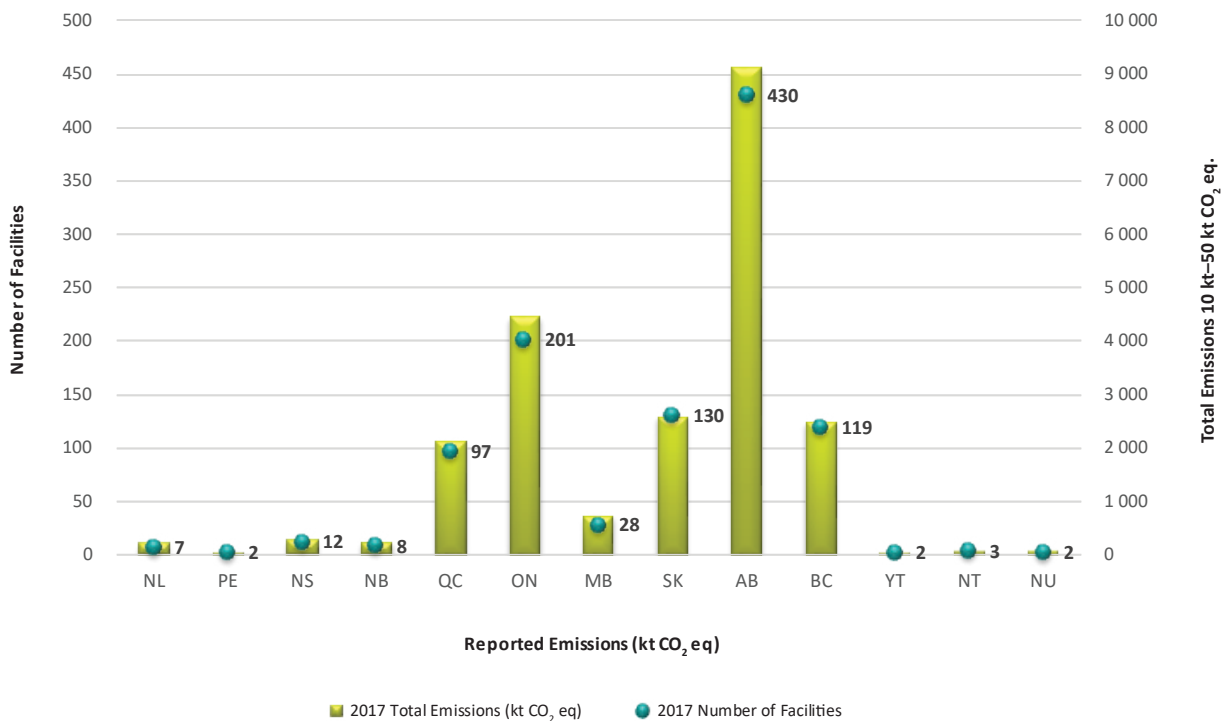
The lowering of the reporting threshold from 50 kt CO₂ eq. to 10 kt CO₂ eq. resulted in a number of new facilities reporting in this range across Canada (Figure 10). Alberta experienced the highest gain of new reporters in this range with 430 new reporters (41% of the total number of new reporting facilities), followed by 201 in Ontario (19%), 130 in Saskatchewan (13%) and 119 in British Columbia (11%). Facilities in this range accounted for 22 Mt of total reported facility emissions for 2017, with the highest share being in Alberta (9 Mt), followed by Ontario (4 Mt), Saskatchewan (2.6 Mt) and British Columbia (2.5 Mt).

Figure 9: **Reported 2017 GHG Emissions from Facilities in the 10 to 50 kt Range by Sector (22 Mt CO₂ eq)**



a. "Other" includes various types of facilities such as wholesale trade and transportation and warehousing.

Figure 10: **Reported 2017 GHG Emissions for facilities between 10 kt to 50 kt CO₂ eq.**



TRENDS IN REPORTED GHG EMISSIONS 3

The number of facilities reporting GHG emissions to Environment and Climate Change Canada can change from year to year. The lowering of the mandatory reporting threshold resulted in an increase in the number of facilities reporting. Changes in production levels, processes and technologies, the types of fuels used at a facility, facility start-ups/closures and unplanned events can all result in a change in the annual emissions, so that a facility may fall below or attain the reporting threshold from one year to the next. The number of voluntary reporters may also change, affecting the number of reporting facilities.

Since the reporting threshold was recently lowered from 50 kt to 10 kt in 2017, facilities with emissions below 50 kt were excluded from the trend analysis presented in this section. This exclusion is necessary to remove the impact of lowering the reporting threshold on observed changes in emission levels. Over the 2005–2017 period, the number of reporting facilities emitting 50 kt CO₂ eq. or more increased from 337 to 520 (Table 3), while emissions from these facilities decreased by 3% (9 Mt) since 2005.

3.1 National-Level Trends

Total reported GHG emissions for facilities emitting 50 kt of CO₂ eq. or more were 269 Mt in 2017, compared to 262 Mt for 2016 (Table 3).¹¹ Over the 2005–2017 period, the number of reporting facilities in this range increased from 337 to 520, while emissions from these facilities decreased by 3% (9 Mt). In contrast with this trend, total emissions since 2011 increased by 6% (15 Mt), with some levelling out between 2012 and 2016.

While the number of facilities reporting their emissions has steadily increased over the last several years, overall GHG emissions did not increase accordingly: their variations are mainly driven by the evolution of important industry sectors and the influence of the largest emitters (i.e. emissions above 100 kt) (Figure 2).

3.2 Industry Sector and Provincial/Territorial Trends

The summary of facility-reported emissions by NAICS industry sector provides a picture of the types of facilities (mostly industrial operations) that report to the GHGRP in response to the annual GHG reporting requirements (Figure 11 and Table 4). The provincial breakdown of each main industry sector highlights the regional presence of key industries accounting

¹¹ A number of facilities submitted new reports or updates to GHG reports for previous years. Environment and Climate Change Canada includes these updates in its annual data release, resulting in some revisions to previously published data.

Table 3: **Total Facility-Reported GHG Emissions, Selected Years***

	2005	2009 ^a	2011	2012	2013	2014	2015	2016	2017 ^a
Number of facilities	337	464	475	489	500	501	491	503	520
GHG emissions (kt CO ₂ eq)	277 997	252 158	254 352	257 862	259 582	262 549	262 723	262 016	269 471
Annual change (%)	N/A ^b	-4.13%	-3.02%	1.38%	0.67%	1.14%	0.07%	-0.27%	2.85%
Change since 2005 (%)	N/A	-9%	-9%	-7%	-7%	-6%	-5%	-6%	-3%

For the complete data set (i.e. yearly data since 2004), visit the website <https://www.canada.ca/en/environment-climate-change/services/climate-change/green-house-gas-emissions/facility-reporting/data.html>.

a. The reporting threshold changed in 2009 from 100 kt to 50 kt and, from 50 kt to 10 kt in 2017. For 2017, emissions data for facilities between 10 kt to 50 kt CO₂ eq. are not included.

b. N/A = not applicable.

*Only facilities with emissions above 50 kt were included in the analysis for 2009–2017.

Table 4: Reported GHG Emissions by NAICS Industry Sector, Selected Years

NAICS ^a Industry Sector (Units: Mt CO ₂ eq)	2005	2009 ^b	2011	2012	2013	2014	2015	2016	2017 ^b
Total^c	278	252	254	258	260	263	263	262	269
21—Mining, Quarrying, and Oil and Gas Extraction^c	48	62	71	77	82	83	87	86	96
Oil and gas extraction	14	15	15	14	15	15	14	15	19
Oil sands extraction ^d	28	42	49	55	59	61	65	64	69
Coal mining	1.68	2.21	2.72	2.98	2.64	2.43	2.06	2.14	2.77
Metal ore mining	2.83	2.48	3.35	3.16	3.54	3.34	3.42	3.55	3.78
Non-metallic mineral mining and quarrying	1	1	1.54	1.65	1.75	1.81	1.93	1.79	1.99
Support activities for mining, and oil and gas extraction	N/A ^h	N/A	N/A	N/A	N/A	N/A	N/A	0.06	N/A
22—Utilities^c	123	103	94	90	88	88	85	84	80
Electric power generation	122	101	91	88	86	86	84	83	78
Natural gas distribution	1.24	1.90	1.86	1.67	1.80	1.54	1.30	1.25	1.16
Water, sewage and other systems ^e	0	0.49	0.38	0.36	0.43	0.43	0.42	0.41	0.37
31–33—Manufacturing^c	92	74	77	79	76	76	76	77	78
Food, beverages, and tobacco products	0.34	0.65	0.72	0.69	0.91	1.00	1.00	1.02	1.05
Wood products and paper	5	4	4	5	5	5	5	5	5
Petroleum and coal products	20	19	17	18	17	17	17	17	18
Basic chemicals	14	11	11	11	11	11	11	11	11
Pesticide, fertilizer, other agricultural chemicals	6	5	6	6	6	6	6	6	6
Cement and concrete products	13	9	10	11	10	10	11	10	11
Lime and gypsum products	3	2	2	2	2	2	2	2	2
Iron and steel mills and ferro-alloys	17	11	14	15	13	14	13	14	14
Primary production of alumina and aluminium	10	8	8	8	7	7	7	7	7
Non-ferrous metal (except alum.) smelting and refining	3	2	1	2	2	2	2	2	1
Other manufacturing ^f	0	1	2	2	2	2	2	2	2
Other^{c,g}	15	13	12	12	14	15	15	15	15
Pipeline transportation of natural gas	12	7	7	6	8	9	9	9	9
Waste management and remediation services	2.81	5.29	4.94	0.54	0.48	0.53	0.52	0.40	0.53
Institutional facilities	N/A	0.34	0.53	5.28	5.21	5.31	5.41	5.48	5.53
Miscellaneous	N/A	0.10	0.07	0.06	0.00	0.06	0.09	0.07	0.20

a. Facilities required to report to the GHGRP provide a primary NAICS code that describes the main activities occurring at the facility.

b. The reporting threshold changed in 2009 from 100 kt to 50 kt and in 2017 from 50 kt to 10 kt. The analysis for 2019 to 2017 only includes emissions information \geq 50 kt CO₂ eq.

c. Totals may not add up due to rounding.

d. Includes facilities engaged in oils sands mining, in-situ bitumen production and upgrading.

e. Includes sewage treatment facilities, heating and steam generation plants.

f. Not a NAICS sector but a grouping of various NAICS codes reported by facilities engaged in other types of manufacturing such as Electrical Equipment, Transportation Equipment and Furniture Manufacturing.

g. Not a NAICS sector but a grouping of various NAICS codes reported by the following types of facilities: natural gas transportation pipelines, solid waste landfills

h. N/A = not available

for the reported emissions (e.g., large component of emissions from the Manufacturing sector in Ontario, Quebec and Alberta) (Table 5).

GHG emissions reported by the Mining, Quarrying, Oil and Gas Extraction sector have increased over the last decade, surpassing those reported by Utilities in 2015 (Figure 11). On the other hand, the Utilities and Manufacturing sectors have reported reduced emissions since 2005. Trends observed from facility-reported sector emissions are similar to trends observed in the National GHG Inventory. Various factors have led to these trends and are further discussed in this section.

3.2.1 Short-Term Changes

The 3.2% (8 Mt) increase in total reported emissions over the last five years is mostly due to the 17% increase in emissions from the Mining, Quarrying, and Oil and Gas Extraction sector (14 Mt from 2013 to 2017) (Table 4), largely in Alberta (Table 5). Oil sands extraction experienced a 10-Mt increase in emissions, consistent with observed increases in synthetic crude oil production (10%) and in non-

upgraded bitumen production (53%) during this period.¹² Saskatchewan facilities also contributed to the increase, with several new facilities (potash mines, oil and gas extraction) reporting to the program for the first time in the last few years (Table 5).¹³

The sustained increase in the above sector is offset by emission reductions in the Utilities sector (Figure 11). Electric power generation experienced an 8 Mt decrease in emissions since 2013 (Table 4), attributed to the closure of coal-fired plants in Ontario and to lower fuel consumption due to energy efficiency improvements.¹⁴

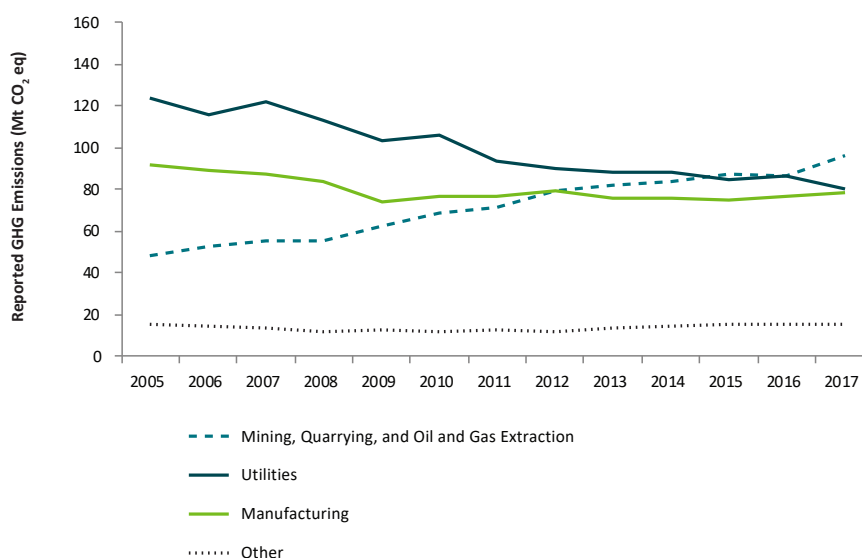
Excluding the impact of the threshold change, overall emissions from the Manufacturing sector have remained largely stable during the last 5 years, with only minor variations in emission levels in certain subsectors (e.g., petroleum and coal products, iron and steel, cement manufacturing) (Table 4).

12 [AER] Alberta Energy Regulator. 2017. Alberta's Energy Reserves 2017 and Supply/Demand Outlook 2018–2027: ST98-2018: <https://www.aer.ca/providing-information/data-and-reports/statistical-reports/st98>

13 Based on GHG emission data reported by facilities to the GHGRP.

14 Based on GHG emission data reported by facilities to the GHGRP.

Figure 11: Long-Term Sectoral Trend, 2005-2017a



a. Other - not a NAICS sector but a grouping of various NAICS codes reported by the following types of facilities: natural gas transportation pipelines, solid waste landfills, airports and institutional facilities (universities, hospitals and public administration buildings).

Table 5: **Reported Greenhouse Gas Emissions by Industry Sector and by Province/ Territory, Selected Years**

Industry Sector Province/Territory (Units: Mt CO ₂ eq)	2005	2009 ^a	2011	2012	2013	2014	2015	2016	2017 ^a
Total^b	278	252	254	258	260	263	263	262	269
21—Mining, Quarrying, and Oil and Gas Extraction^b	48	62	71	77	82	83	87	86	96
Newfoundland and Labrador	3	3	3	3	3	3	3	3	3
Nova Scotia	N/A ^c	0.3	0.2	0.2	0.4	0.5	0.4	0.4	0.3
New Brunswick	N/A	N/A	0.06	0.06	0.02	N/A	0.06	N/A	N/A
Quebec	2	1	2	2	2	2	2	2	2
Ontario	0.2	0.2	0.1	0.1	0.3	0.3	0.3	0.4	0.6
Manitoba	N/A	0.06	0.1	0.2	0.2	0.08	0.1	0.07	0.06
Saskatchewan	3	3	3	4	4	4	4	5	6
Alberta	35	50	56	61	65	67	71	70	78
British Columbia	5	5	6	7	7	7	6	5	6
Northwest Territories	0.4	0.5	0.6	0.9	0.6	0.6	0.6	0.6	0.4
Nunavut	N/A	N/A	0.2	0.2	0.2	0.2	0.2	0.2	0.3
22—Utilities^b	123	103	94	90	88	88	85	84	80
Newfoundland and Labrador	1	0.8	0.7	0.7	0.8	1	1	1	1
Nova Scotia	11	9	9	8	8	7	7	7	7
New Brunswick	9	6	4	4	4	4	4	4	3
Quebec	0.5	1	0.6	0.5	0.4	0.3	0.3	0.3	0.3
Ontario	36	20	17	18	15	10	10	9	6
Manitoba	0.6	0.2	0.08	0.07	0.09	0.07	0.1	N/A	N/A
Saskatchewan	15	16	15	16	15	15	16	15	16
Alberta	50	48	46	44	44	49	47	47	46
British Columbia	2	2	0.9	0.8	1	1	0.8	0.8	0.7
31-33 Manufacturing^b	92	74	77	79	76	76	76	77	78
Newfoundland and Labrador	1	1	0.9	1	0.9	1.0	1	1	1
Prince Edward Island	0.10	0.07	0.07	N/A	0.06	0.06	0.05	0.06	0.06
Nova Scotia	1	1	1.0	1	0.9	0.3	0.3	0.3	0.2
New Brunswick	4	4	4	4	4	3	4	4	4
Quebec	20	18	17	18	17	17	17	16	17
Ontario	38	26	28	29	27	28	27	28	28
Manitoba	1	1	1	0.9	1	1.0	1	1.0	0.9
Saskatchewan	2	2	2	2	3	3	3	3	3
Alberta	18	17	18	18	18	18	19	19	19
British Columbia	6	5	5	5	5	5	5	5	5
Other^{b,d}	15	13	12	12	14	15	15	15	15
Quebec	0.3	0.8	0.8	0.9	1	1	1	1	1
Ontario	5	4	4	3	3	4	5	4	4
Manitoba	1	0.7	0.7	0.6	0.7	0.8	0.9	0.8	0.7
Saskatchewan	3	2	2	2	2	2	2	2	2
Alberta	4	3	3	4	4	4	4	5	5
British Columbia	1	2	2	2	2	2	2	2	2

a. The reporting threshold changed in 2009 from 100 kt to 50 kt and in 2017 from 50 kt to 10 kt. The analysis for 2009–2017 only includes emissions information for facilities that emit ≥ 50 kt of CO₂ eq.

b. Totals may not add up due to rounding

c. N/A = not available

d. "Other" includes various types of facilities such as natural gas transportation pipelines, solid waste landfills, airports, universities, hospitals and public administration buildings.

Note: For the complete data set (i.e. yearly data since 2004), visit the website <https://climate-change.canada.ca/facility-emissions/>

3.2.2 Long-Term Trends

Over the 2005–2017 period, total reported emissions decreased by 3% (9 Mt). The major long-term trends are similar to the short-term trends in that, since 2005, emissions from facilities in the Utilities and Manufacturing sectors have declined overall, while emissions from the Mining, Quarrying, and Oil and Gas Extraction sector have steadily increased (Figure 11).

Up to and including the year 2014, the Utilities sector consistently accounted for the largest portion of reported emissions (Figure 11), with electric power generation being the main contributor. However, emissions from fossil-fuel electric power generation fell significantly (44 Mt) (Table 4), largely from the discontinuation of coal-fired electricity production in Ontario as well as emission reductions in New Brunswick, Nova Scotia and Alberta (Table 5). Fuel switching (i.e., from coal to natural gas, a lower carbon fuel) and increased reliance on hydro, nuclear and renewable sources of generation are also contributors to the decrease in utility emissions.¹⁵

Emissions from the Manufacturing sector remain well below (15% or 14 Mt) their 2005 levels (Figure 11).

Between 2005 and 2017, Ontario and Quebec showed the largest decreases in GHG emissions from the Manufacturing sector. Ontario saw a net decrease of 10 Mt (Table 5), largely observed in iron/steel, cement, and chemical manufacturing (e.g., halted adipic acid production in 2009) (Table 4). Quebec showed an overall decrease in emissions of 3 Mt from 2005 to 2017 (Table 5), with aluminium production and petroleum refining facilities contributing the most to this provincial change (Table 4). Emission decreases resulted from technological change in aluminum production,^{16,17,18} the closure of aluminium smelters in Quebec, and the conversion of a petroleum refinery to a storage terminal.

The Mining, Quarrying, and Oil and Gas extraction sector has shown an increasing trend over the last

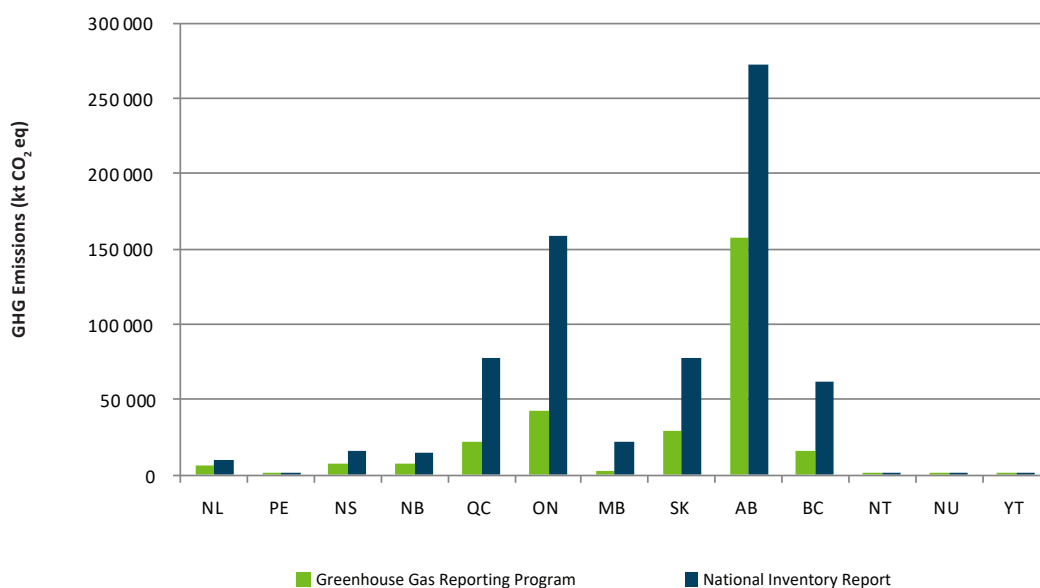
15 Statistics Canada CANSIM 2008-2015, Table 127-0002: Electric power generation, by class of electricity producer (annual).

16 Based on GHG emission data reported by facilities to the GHGRP.

17 Environment Canada. 2008. Environmental Performance Agreement Concerning Atmospheric Emissions of Polycyclic Aromatic Hydrocarbons between EC and Alcoa: <http://www.ec.gc.ca/epe-epa/default.asp?lang=En&n=3C7FB073-1>

18 Environment Canada. 2008. Environmental Performance Agreement Concerning Atmospheric Emissions of Polycyclic Aromatic Hydrocarbons between EC and Rio Tinto Alcan: <http://www.ec.gc.ca/epe-epa/default.asp?lang=En&n=5BE979CD-1>

Figure 12: Provincial/Territorial Contribution to 2017 Facility-Reported (GHGRP) Total and the National Inventory Total



decade (Figure 11). Most of the increase (48 Mt between 2005 and 2017) was driven by oil sands extraction facilities in Alberta (43 Mt growth since 2005), and Saskatchewan, reflecting this sector's steady growth trend.

FACILITY-REPORTED EMISSIONS AND THE NATIONAL GHG INVENTORY 4

The total facility-reported GHG emissions for 2017 collected under the GHGRP represents 41% of Canada's total GHG emissions in 2017 (716 Mt) and 64% of Canada's industrial GHG emissions¹⁹. The GHGRP applies to large GHG-emitting facilities (mostly industrial) and does not cover other sources of GHG emissions (e.g., road transportation, agricultural sources), whereas the National GHG Inventory is a complete accounting of all GHG sources and sinks in Canada.

When comparing the provincial and territorial contribution to the facility-reported total from the GHGRP with the national total from the NIR, the distribution of emissions by province shows a similar pattern (Figure 12). Alberta has the highest emissions, followed by Ontario, Quebec and Saskatchewan. This pattern of industrial emissions reflects the regional concentration of large industrial facilities and trends in the use of fossil fuels for energy production.

Although the facility-reported emissions may capture 64% of industrial GHG emissions nationally, the degree of coverage at the provincial level varies significantly from province to province

(Figure 13), due to the size and number of industrial facilities in each province that have emissions above the 10 kt CO₂ eq. reporting threshold.

Where appropriate, the facility-reported emissions data are used by Environment and Climate Change Canada to confirm estimates in the national GHG inventory developed largely from national and provincial statistics and internationally-recognised emission estimation methodologies. The extent to which the facility-reported GHG emissions data could be fully integrated into the GHG Inventory is dependent on the level of detail and type of data available (the integration of facility data into the NIR is a key objective for the recent expansion to reporting under the GHGRP).

ADDITIONAL INFORMATION ABOUT THE GHGRP 5

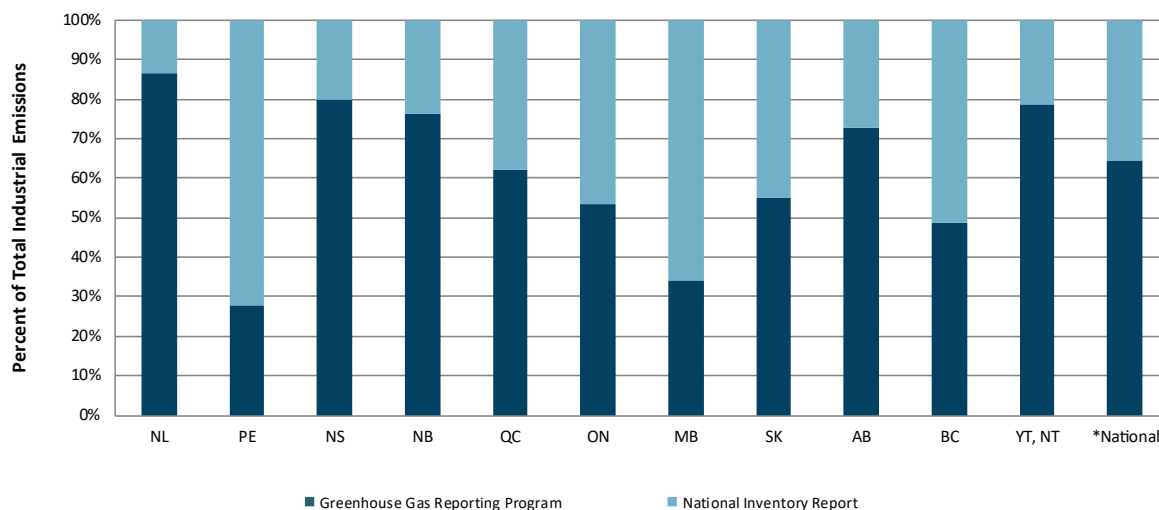
5.1 Data Quality

Facilities that meet the GHG reporting requirements under the GHGRP must ensure that the reported data are reliable. Facilities are required by law to submit information that is true, accurate and complete to the best of their knowledge. CEPA sets out penalties for companies that fail to report or that knowingly submit false or misleading information. Reporters have a legal obligation to keep copies of the information submitted, along with any calculations, measurements and other data on which the information is based. All information must be kept for a period of three years from the date on which it was required to be reported to Environment and Climate Change Canada.

The data provided in this report are for information purposes only. Environment and Climate Change Canada conducted a number of data quality checks of the submitted data for compliance

¹⁹ In this overview report, Canada's industrial GHG emissions include emissions from the following GHG categories from the *National Inventory Report 1990–2017: Greenhouse Gas Sources and Sinks in Canada: Stationary Combustion Sources (except Residential), Other Transportation, Fugitive Sources, Industrial Processes and Product Use, and Waste*. Based on preliminary data from the latest National Inventory.

Figure 13: **2017 Facility-Reported Emissions as a Percentage of National and Provincial/Territorial Industrial GHG Emissions^a from the National Inventory***



a. In this overview report, Canada's industrial GHG emissions include the following GHG categories from the *National Inventory Report, Greenhouse Gas Sources and Sinks in Canada 1990–2017*: Stationary Combustion Sources (except Residential), Other Transportation, Fugitive Sources, Industrial Processes and Product Use, and Waste.

*Nunavut is not included due to the lack of data

purposes and for completeness, and it will continue to analyze the data, which may result in periodic updates.

5.2 Public Access

The GHGRP provides public access to information from all facilities that reported GHG emissions to the program through an annual online publication. In addition to this summary report, the facility-level data are presented in the form of tables, a searchable database and a downloadable format. Users can search by emissions of a specific gas or emissions of all gases, by facility name or National Pollutant Release Inventory (NPRI) identification number, by reporting company, by province/territory or city, or by industry sector, using the NAICS²⁰ code. Users can also access a web-based mapping tool on

the Canadian Environmental Sustainability Indicators website, which shows where reporting facilities are located in Canada.

To access the data or obtain further information on the GHGRP or National Greenhouse Gas Inventory program, consult the following websites:

Reported Facility GHG Data

<https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting/data.html>

Reporting to the GHGRP

<https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting/reporting.html>

Canada's National GHG Inventory

<https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html>

Canadian Environmental Sustainability Indicators

<https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/climate.html>

²⁰ The NAICS is an industry classification system that was developed by the statistics agencies of Canada, the United States and Mexico to enable them to collect comparable statistical data. It is a comprehensive system that encompasses all economic activities using six-digit codes. In Canada, the NAICS 2017 consists of 20 sectors, 102 subsectors, 322 industry groups, 708 industries and 923 national industries.

5.3 Links to Other Programs

The GHGRP is similar to, yet distinct from, the NPRI. Although both programs are delivered by Environment and Climate Change Canada under the authority of section 46 of CEPA, the NPRI collects data from facilities on pollutant releases (to air, water and land), disposals and transfers for recycling, whereas the GHGRP collects data from facilities on GHG emissions. Facilities reporting to the GHGRP are asked to report their NPRI identification number to facilitate searching and comparison of emissions from facilities that report to both programs.

A number of provincial jurisdictions also require facilities to report GHG emissions information annually under specific provincial regulations. Efforts have been undertaken to streamline the reporting process between the national and various provincial jurisdictions, resulting in the launch of a single-window reporting system to help reduce the reporting burden on industry and the overall cost to government. This single-window system allows one-time entry for information commonly required at both levels, while accommodating requirements that are jurisdiction-specific. Provinces currently using this reporting system include Alberta, British Columbia, Ontario and New Brunswick. Nova Scotia and Saskatchewan will start using the system for 2018 reporting.

CONTACT US



If you have questions about this report or for more information about its content, please contact the GHGRP:

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Website: <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting.html>

Additional information can be obtained at:

Environment and Climate Change Canada

Public Inquiries Centre

7th Floor, Fontaine Building

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