Environment Canada Environnement Canada

# Facility Greenhouse Gas Emissions Reporting Program

## Overview of the Reported 2007 Greehouse Gas Emissions


- Facility Greenhouse Gas Emissions Reporting Program
- Analysis of greenhouse gas emissions from reporting facilities — 2007 emissions
- Comparison of greenhouse gas emissions from reporting facilities — 2004 to 2007
- Regional contribution to reported greenhouse gas emissions — 2004 to 2007
- Sectoral contribution to reported greenhouse gas emissions – 2004 to 2007
- What do I need to know before using the reported facility-level greenhouse gas information?
- For more information
- Contact us
- Disclaimer


## 1 Facility Greenhouse Gas Emissions Reporting Program

In March 2004, the Government of Canada established the Greenhouse Gas Emissions Reporting Program, thus initiating a phased approach to the collection of greenhouse gas (GHG) emissions and related information. The Program was part of Canada's effort to develop, through a collaborative process with provinces and territories, a harmonized and efficient mandatory GHG reporting system which minimizes duplication and the reporting burden for industry and governments alike. Focusing on a limited number of emitters and basic reporting requirements, this system will serve to lay the foundation for a fully developed system. The Program's three main objectives are to provide Canadians with timely information on GHG emissions, to enhance the level of detail in the National Greenhouse Gas Inventory, and to meet provincial and territorial requirements for GHG emissions information.

## 2 Analysis of greenhouse gas emissions from reporting facilities – 2007 emissions

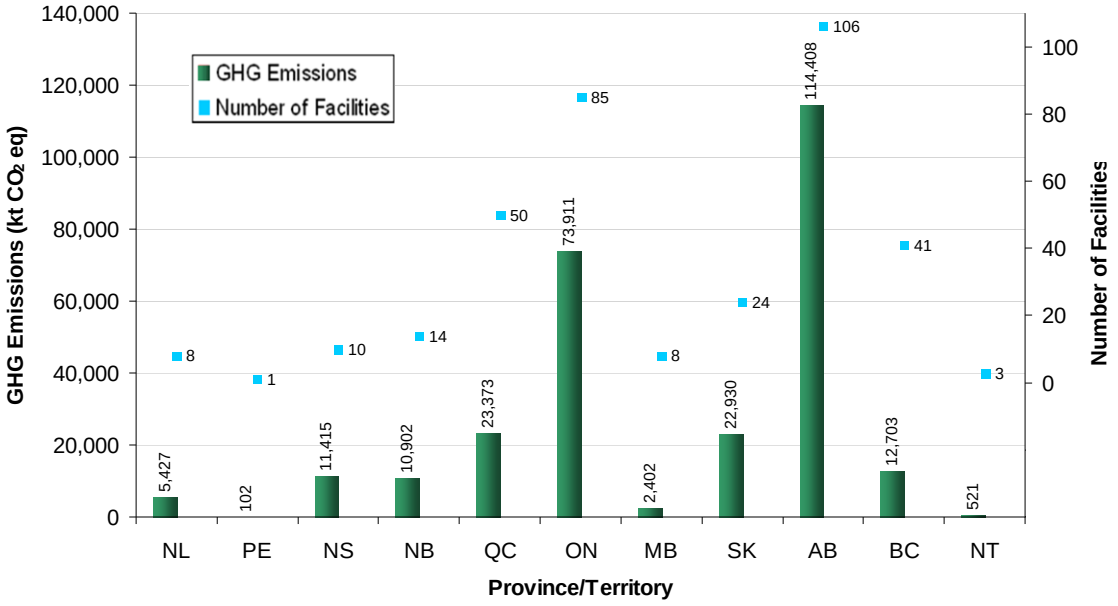
A total of 350 facilities reported GHG emissions for the 2007 calendar year, collectively emitting a total of 278 megatonnes (Mt) of $CO_2$ eq of GHGs. Facilities can voluntarily report their GHG emissions if their emissions are below the reporting threshold; 43 facilities did so for 2007. Total facility GHG emissions in 2007 represent just over one third (39%) of Canada's total GHG emissions in 2006, as published in the *National Inventory Report, 1990-2006: Greenhouse Gas Sources and Sinks in Canada*. The data used in this overview report are current as of September 3, 2008.

Canada

Carbon dioxide ($CO_2$) represented the majority of total reported emissions—around 94%. Methane ($CH_4$) accounted for just 3%, while nitrous oxide ($N_2O$) represented approximately 2%. The remaining gases, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride ($SF_6$), accounted for the remaining 1% and originated primarily from the Manufacturing sector.

Facilities in Alberta accounted for the largest share of reported emissions, with approximately 41% of the total, followed by those in Ontario, which accounted for about 27%. Saskatchewan and Quebec were the next largest contributors, each with about 8% of reported emissions (see Figure 1 for provincial emissions and number of facilities reporting).

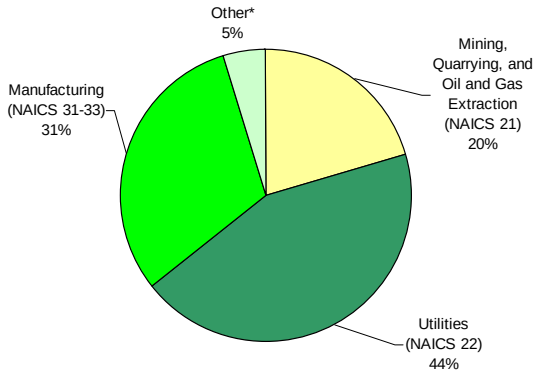
**Figure 1: Reported 2007 GHG emissions by province/territory**




When completing the GHG report, the reporter is required to identify the North American Industry Classification System (NAICS)[1] code that corresponds to the main activities occurring at the facility. Three industrial sectors accounted for the majority of GHG emissions. Utilities, primarily those generating electricity, accounted for 44%, while Manufacturing accounted for 31% and Mining, Quarrying, and Oil and Gas Extraction for 20%, as shown in Figure 2. Within the Utilities sector, approximately 99% of the emissions were produced by the Electric Power Generation, Transmission and Distribution subsectors. Facilities reporting in the Utilities sector include fossil-fuel electric power generation and natural gas distribution. A breakdown of the emissions from the Mining, Quarrying, and Oil and Gas Extraction sector is provided in Figure 3. Activities of reported Mining, Quarrying, and Oil and Gas Extraction facilities include petroleum, natural gas, and bitumen production, coal, metal ore, potash, and diamond mining. Examples of reporting Manufacturing facilities include frozen food, paper, petroleum and coal, chemical, and cement manufacturing.

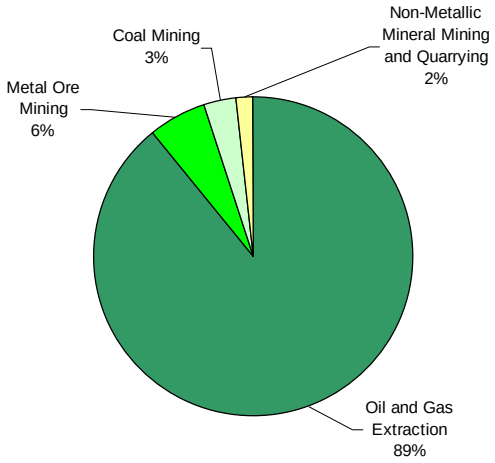
[1] The NAICS code is a six-digit code that was developed by Statistics Canada, the U.S. Office of Management and Budget and Mexico's Instituto Nacional de Estadistica Geografia e Informatica, to enable the respective national agencies to collect comparable statistical data. The NAICS code in Canada consists of 20 sectors, 102 subsectors, 324 industry groups, 718 industries and 928 national industries.

**Figure 2: Sectoral contribution to 2007 reported GHG emissions**




*"Other" includes Transportation and Warehousing, as well as Administrative and Support, Waste Management and Remediation Services.

**Figure 3: Reported 2007 GHG emissions for subsectors of Mining, Quarrying, and Oil and Gas Extraction (NAICS 21)**




**This pie chart represents 57 Mt $CO_2$ eq, which accounts for 20% of the reported emissions.**

In 2007, just under 83% (289) of facilities reported GHG emission levels of less than 1 Mt. The remaining 17% (61) of facilities emitted GHGs in quantities greater than 1 Mt, and accounted for approximately 71% of the total reported emissions. The majority of the facilities reporting more than 1 Mt of GHG emissions fall within subsectors such as Fossil Fuel Electric Power Generation, Non-conventional Oil Extraction, Chemical Manufacturing, Cement Manufacturing, and Petroleum Refining.

## 3 Comparison of greenhouse gas emissions from reporting facilities — 2004 to 2007

The Greenhouse Gas Emissions Reporting Program has collected GHG data for four calendar years, covering the period from 2004 to 2007. Some data reported in previous years were revised by facilities, which may have resulted in changes in the number of facilities reporting, as well as in reported emissions. Data changes stemmed from errors in reported data/calculations, or from improved data sources or methodologies.

The total number of reporting facilities increased slightly from 326 in 2004 to 350 in 2007. The increase is mostly due to voluntary reporters. Voluntary reporters are facilities that did not meet the 100 kt threshold but chose to report their emissions. There were 19 new facilities which had not previously reported under the Program. There were 16 facilities which had reported 2006 emissions but did not report 2007 emissions. Thirteen of these were voluntary reporters in 2006 and chose not to report in 2007. The 3 remaining facilities indicated that they no longer met the reporting thresholds or have closed permanently.

Table 1 below presents a comparison of GHG emissions from all facilities that reported over the 2004–2007 period. Table 2 provides a comparison of GHG emissions for those facilities that reported GHG emissions in all four years. There were 291 facilities that reported GHG emissions in all four years; these are considered to be "comparable facilities." Note that comparable facilities may have undergone a change in ownership or operator.

In looking at emissions from all facilities, there was, according to reported data, a slight decrease in overall emissions of 0.4% (1 Mt) from 2004 to 2007. On the basis of comparable facilities, there was an overall decrease of about 1.2% (3 Mt) in emissions over the 2004–2007 period. This reveals that the emission decreases demonstrated by the comparable facilities exceed the overall decrease in emissions from all facilities over the 2004–2007 period. Among the specific gases, $SF_6$ had the largest percentage change, an 83% reduction, largely due to the decrease in magnesium production.

**Table 1: Comparison of all reporting facilities — reported GHG emissions, 2004 to 2007**

| All reporting facilities | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|
| Total facility count | 326 | 337 | 343 | 350 |
| Facilities above 100 kt threshold | 305 | 307 | 299 | 307 |
| Emissions (kt $CO_2$ eq) | | | | |
| $CO_2$ | 260,734 | 260,164 | 255,424 | 262,733 |
| $CH_4$ | 7,156 | 8,287 | 8,283 | 8,356 |
| $N_2O$ | 6,254 | 5,891 | 4,286 | 4,338 |
| HFCs | 25 | 53 | 41 | 21 |
| PFCs | 3,028 | 3,065 | 2,626 | 2,302 |
| $SF_6$ | 2,057 | 1,132 | 1,246 | 344 |
| Total | 279,254 | 278,593 | 271,905 | 278,094 |
| Annual change | NA | -0.2% | -2.4% | 2.3% |
| Change since 2004 | NA | -0.2% | -2.6% | -0.4% |

NA = Not applicable

**Table 2: Comparison of comparable reporting facilities — reported GHG emissions, 2004–2007**

| Comparable reporting facilities | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|
| Total facility count | 326 | 337 | 343 | 350 |
| Facilities above 100 kt threshold | 305 | 307 | 299 | 307 |
| Emissions (kt $CO_2$ eq) | | | | |
| $CO_2$ | 252,943 | 255,559 | 250,899 | 254,939 |
| $CH_4$ | 7,096 | 6,797 | 6,415 | 6,409 |
| $N_2O$ | 6,161 | 5,787 | 4,142 | 4,142 |
| HFCs | 24 | 53 | 41 | 21 |
| PFCs | 3,028 | 3,065 | 2,626 | 2,302 |
| $SF_6$ | 2,057 | 1,132 | 1,246 | 344 |
| Total | 271,309 | 272,394 | 265,368 | 268,157 |
| Annual change | NA | 0.4% | -2.6% | 1.1% |
| Change since 2004 | NA | 0.4% | -2.2% | -1.2% |

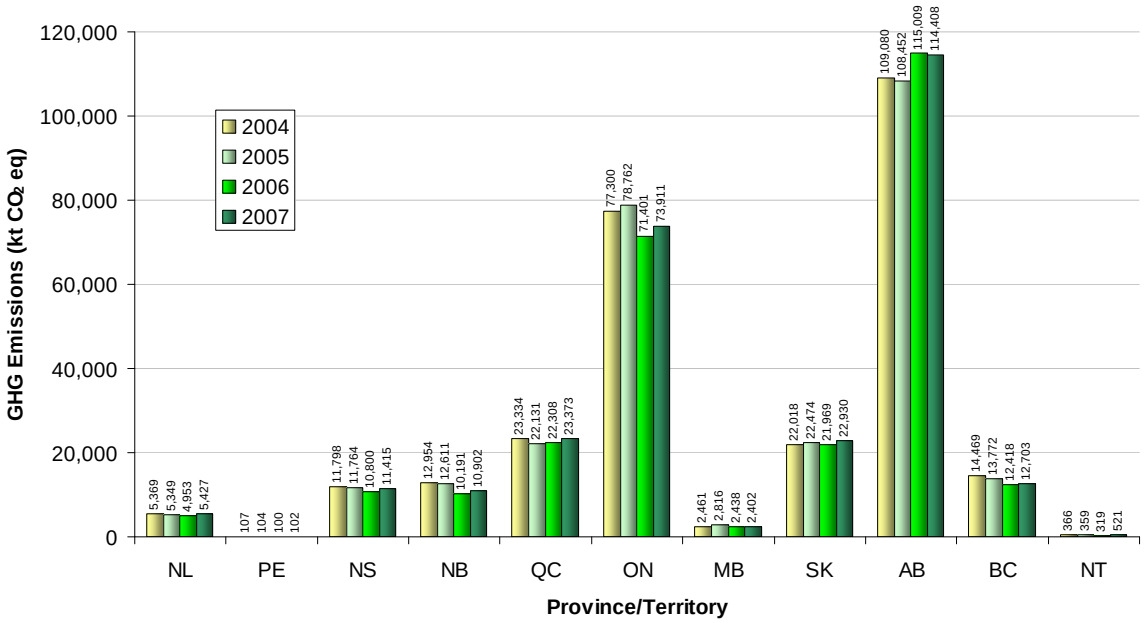
NA = Not applicable

## 4 Regional contribution to reported GHG emissions — 2004 to 2007

Over the period from 2004 to 2007, the majority of provinces and territories saw no change or an overall increase in the number of reporting facilities, with Alberta showing the biggest increase, 8 additional facilities, followed by Saskatchewan with 5 additional facilities. Quebec was the only province that had a decrease of three reporting facilities over the 2004 to 2007 period. When comparing facilities that are above threshold, Saskatchewan has the largest increase, 4 facilities, followed by Nova Scotia, New Brunswick, and Ontario with 2 facilities each. Both Alberta and Quebec had decreases of 5 facilities when comparing the number of facilities above threshold over the 2004 to 2007 period.

In terms of the trend in total reported GHG emissions by province/territory from 2004 to 2007, Alberta displayed the largest overall change in reported emissions, with an increase of 5 Mt, followed by Ontario with a decrease of 3 Mt (on the basis of all facilities). Emissions from Alberta and Saskatchewan had an overall increase, 5% and 4% respectively, of total reported emissions over the same period—see Figure 4. The percentage contribution to the total reported GHG emissions for most provinces has largely remained consistent (change <1%) from 2004 to 2007. Alberta's contribution to total emissions increased by 2%, while Ontario's contribution decreased by 1%.

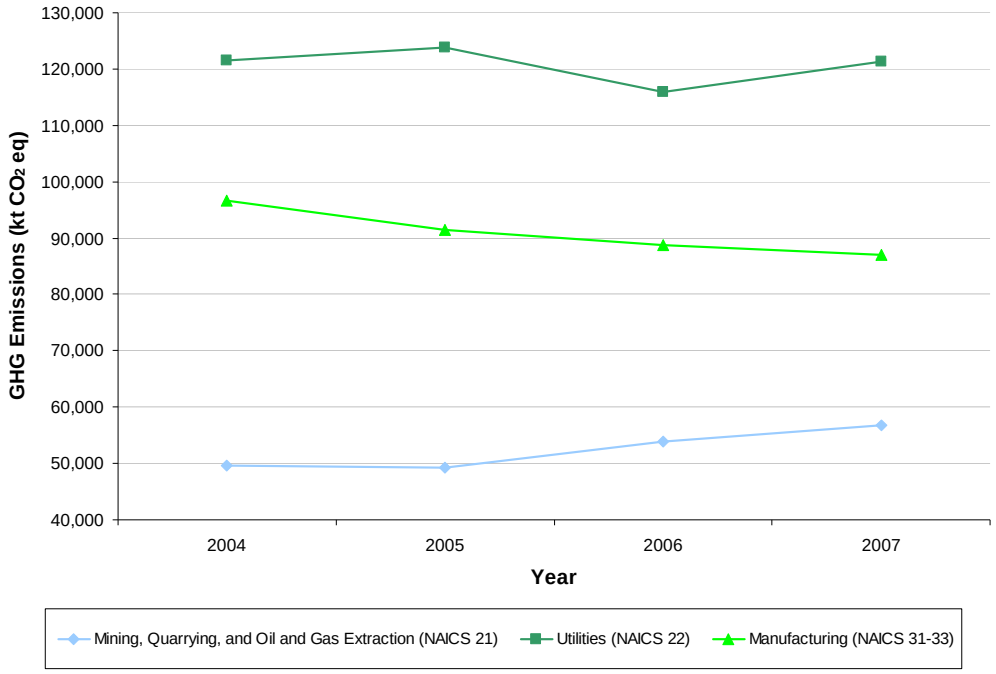
**Figure 4: Comparison of GHG emissions from all reporting facilities by province/territory – 2004 to 2007**




## 5 Sectoral contribution to reported GHG emissions — 2004 to 2007

The change in reported GHG emissions by sector, NAICS 21, 22, and 31–33, from 2004 to 2007 is shown in Figure 5. The Mining, Quarrying, and Oil and Gas Extraction sector has shown a steady increase in emissions since 2005, the Utilities sector emissions have fluctuated from year to year, and the Manufacturing sector has shown a steady decrease, while the emissions from the sectors grouped under "Other" have remained relatively flat.

**Figure 5: Sectoral change in reported GHG emissions — 2004 to 2007**




When comparing the Utilities sector and sectors grouped under “Other” and their contribution to the total GHG emissions, they remain largely unchanged over the 2004-2007 period; however, the Mining, Quarrying, and Oil and Gas Extraction sector has seen an increase of about 3%, while the Manufacturing sector has seen a decrease of about 3%, as shown in Table 3. All sector groupings except Manufacturing saw an overall increase in the number of facilities reporting. The Manufacturing sector showed a decrease of 1 facility from 2004 to 2007. Since 2004, both the Mining, Quarrying, and Oil and Gas Extraction sector and the sectors grouped under “Other” show an overall increase in emissions of 15% and 10% respectively. The data show an emission decrease of 10% for the Manufacturing sector, while the Utilities sector remains relatively unchanged from 2004 to 2007.

These changes in emissions could be due to changes in the number of facilities reporting, variability in production volumes or operations (e.g., closures, shut-down periods), warmer winters and cooler summers, decrease in demand for manufactured products, increases in oil and natural gas production, or emission reduction efforts.

| Table 3: Sectoral contribution to reported GHG emissions, 2004 to 2007 | | | | | | |
|---|---|---|---|---|---|---|
| **NAICS** | **Sector** | **Parameter** | **2004** | **2005** | **2006** | **2007** |
| 21 | Mining, Quarrying, and Oil and Gas Extraction | Number of facilities | 68 | 72 | 76 | 81 |
| | | Emissions (kt $CO_2$ eq) | 49,591 | 49,178 | 53,878 | 56,823 |
| | | Percentage of yearly total | 18% | 18% | 20% | 20% |
| | | Annual change | NA | -1% | 10% | 5% |
| | | Change since 2004 | NA | -1% | 9% | 15% |
| 22 | Utilities | Number of facilities | 75 | 75 | 76 | 77 |
| | | Emissions (kt $CO_2$ eq) | 121,459 | 123,787 | 115,868 | 121,401 |
| | | Percentage of yearly total | 43% | 44% | 43% | 44% |
| | | Annual change | NA | 2% | -6% | 5% |
| | | Change since 2004 | NA | 2% | -5% | 0% |
| 31–33 | Manufacturing | Number of facilities | 162 | 162 | 158 | 161 |
| | | Emissions (kt $CO_2$ eq) | 96,615 | 91,480 | 88,676 | 87,114 |
| | | Percentage of yearly total | 35% | 33% | 33% | 31% |
| | | Annual change | NA | -5% | -3% | -2% |
| | | Change since 2004 | NA | -5% | -8% | -10% |
| Other* | Other | Number of facilities | 21 | 28 | 33 | 31 |
| | | Emissions (kt $CO_2$ eq) | 11,589 | 14,148 | 13,483 | 12,755 |
| | | Percentage of yearly total | 4% | 5% | 5% | 5% |
| | | Annual change | NA | 22% | -5% | -5% |
| | | Change since 2004 | NA | 22% | 16% | 10% |

*"Other" includes Transportation and Warehousing; Administrative and Support, Waste Management and Remediation Services; and Health Care and Social Assistance.
NA = Not applicable

## 6 What do I need to know before using the reported facility-level greenhouse gas information?

**Greenhouse gas emissions are reported in $CO_2$eq units.** Greenhouse gases are not equal. In fact, each GHG has a unique average atmospheric lifetime and heat-trapping potential. Greenhouse gas emissions are often calculated in terms of how much $CO_2$ would be required to produce a similar warming effect. This is called the carbon dioxide equivalent ($CO_2$eq) value and is calculated by multiplying the amount of the gas by an associated global warming potential (GWP). For example, the GWP for methane ($CH_4$) is 21, which means that each tonne of $CH_4$ emitted is considered to have a cumulative warming effect over the next 100 years equivalent to emitting 21 tonnes of $CO_2$. The scientific community has established a GWP for each of the GHGs subject to reporting under the Greenhouse Gas Emissions Reporting Program. A complete list can be found in Environment Canada's *National Inventory Report 1990-2006: Greenhouse Gas Sources and Sinks in Canada*.

**Greenhouse gas emissions data are only required from facilities that meet the reporting requirements.** Not all industrial facilities in Canada are required to report their annual GHG emissions to Environment Canada. The Greenhouse Gas Emissions Reporting Program only requires facilities that emit the equivalent of 100 kt or more of $CO_2$eq to report. If desired, facilities not meeting the reporting threshold can still participate in the Greenhouse Gas Emissions Reporting Program and report their emissions annually.

**The number of reporting facilities may change from year to year.** Fluctuation in the number of reporting facilities is not unexpected from year to year. A change in production levels, process and technology and/or type of fuel used at a facility could all result in either an increase or a decrease in the annual emissions reported by a facility. As a result, a facility may go below or attain the reporting threshold of 100 kt $CO_2$eq.

**The Greenhouse Gas Emissions Reporting Program is not the National Pollutant Release Inventory (NPRI).** Although both programs are delivered by Environment Canada under the authority of the *Canadian Environmental Protection Act, 1999*, they are two distinct programs. The NPRI currently collects pollution data on a range of emissions of concern, including criteria air contaminants, whereas the Greenhouse Gas Emissions Reporting Program collects GHG information from facilities. Facilities reporting to the Greenhouse Gas Emissions Reporting Program are asked to report their NPRI identification number to facilitate searching and comparison of emissions from facilities that report to both programs.

**Selection of the GHG estimation methodology is up to the facility.** There are several methodologies for estimating GHG emissions at a facility. These include monitoring and direct measurement, mass balance, emissions factors, and engineering estimates. Specific estimation methods are not prescribed, and reporters are advised to choose the quantification methodologies most appropriate for their own particular industry or application. Reporting facilities must use methods for estimating emissions that are consistent with the guidelines adopted by the United Nations Framework Convention on Climate Change and developed by the Intergovernmental Panel on Climate Change.

**The facility must ensure that the reported data are of good quality.** 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 the reporting requirement came into force. Reporters are also required to submit a Statement of Certification, signed by an authorized official, stating that the information contained in the attached emission report is accurate and complete, to the best of their knowledge. Environment Canada conducts a number of checks on the reported GHG data for compliance purposes and for completeness prior to publication; however, any interpretation of the reported data must consider the possible presence of estimation, calculation or input errors made by facilities.

## 7 For more information

The GHG Division website (www.ec.gc.ca/pdb/ghg/facility_e.cfm) provides public access to information from all facilities that reported GHG emissions. Data is provided in tables, a searchable database and in a downloadable format. Users can search by emissions of a specific gas or emissions of all gases, by facility name or NPRI identification number, by province/territory or city, or by industrial sector using the NAICS code.

Please visit the following websites for additional information on:

- Climate change science: www.msc-smc.ec.gc.ca/education/scienceofclimatechange
- Reporting of greenhouse gases: www.ghgreporting.gc.ca
- Canada's National Greenhouse Gas Inventory: www.ec.gc.ca/ghg
- Clean-air-related issues: www.ec.gc.ca/cleanair-airpur

## 8 Contact us

Do you have questions about this report or need more information about its contents? If so, please contact us:

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## 9 Disclaimer

Data presented here is current as of September 3, 2008. Environment Canada conducted a number of data checks for compliance purposes and for completeness. Environment Canada will continue to analyze the data which may result in periodic updates to the data. The data provided within this website are for information purposes only. Any interpretation of the data must consider the possible presence of estimation, calculation or input errors made by facilities.