



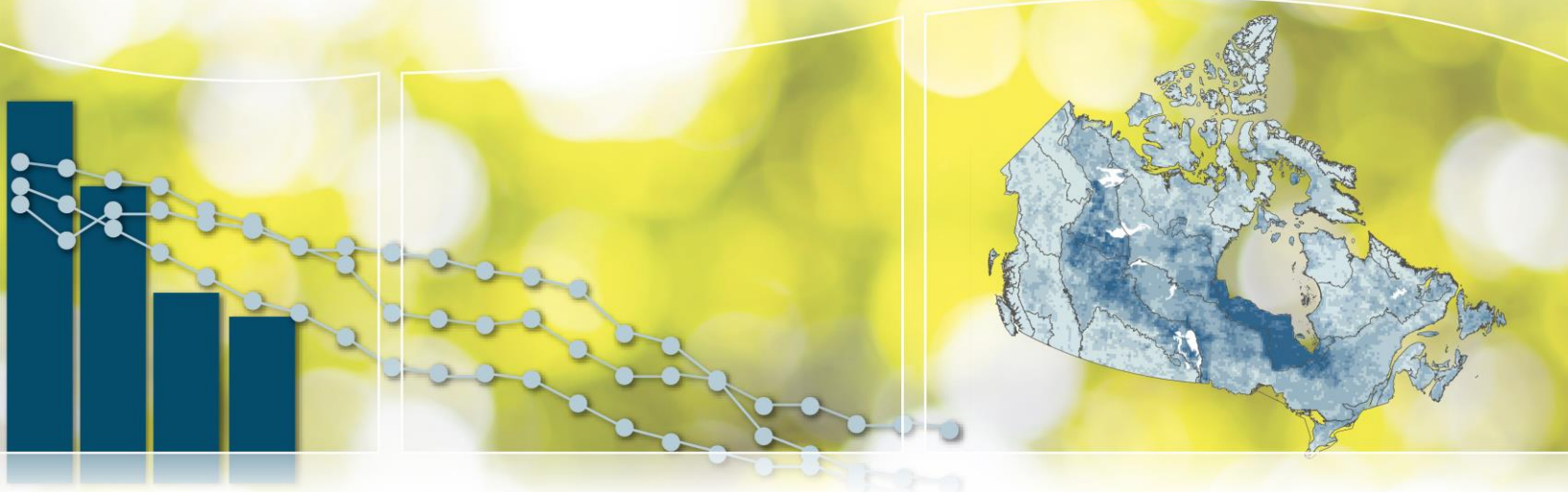
Environment and  
Climate Change Canada

Environnement et  
Changement climatique Canada



# Canadian Environmental Sustainability Indicators

## Releases of Harmful Substances to the Environment



**Suggested citation for this document:** Environment and Climate Change Canada (2016) Canadian Environmental Sustainability Indicators: Releases of Harmful Substances to the Environment. Consulted on *Month day, year*.  
Available at: [www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=3C4C1124-1](http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=3C4C1124-1).

Cat. No.: En4-283/2016E-PDF  
ISBN: 978-0-660-05394-3

Unless otherwise specified, you may not reproduce materials in this publication, in whole or in part, for the purposes of commercial redistribution without prior written permission from Environment and Climate Change Canada's copyright administrator. To obtain permission to reproduce Government of Canada materials for commercial purposes, apply for Crown Copyright Clearance by contacting:

Environment and Climate Change Canada  
Public Inquiries Centre  
7th floor, Fontaine Building  
200 Sacré-Coeur boul.  
Gatineau, QC K1A 0H3  
Telephone: 819-938-3860  
Toll Free: 1-800-668-6767 (in Canada only)  
Fax: 819-994-1412  
TTY: 819-994-0736  
Email: [ec.enviroinfo.ec@canada.ca](mailto:ec.enviroinfo.ec@canada.ca)

Photos: © Thinkstockphotos.ca; © Environment and Climate Change Canada

© Her Majesty the Queen in Right of Canada, represented by the Minister of Environment and Climate Change, 2016

Aussi disponible en français

# Canadian Environmental Sustainability Indicators

## Releases of Harmful Substances to the Environment

August 2016

### Table of Contents

<b>Part 1. Releases of Harmful Substances to the Environment Indicator.....</b>	<b>6</b>
Releases to air .....	6
Releases to water .....	7
Releases of Mercury to the Environment .....	8
Releases of Lead to the Environment.....	15
Releases of Cadmium to the Environment .....	20
<b>Part 2. Data Sources and Methods for the Releases of Harmful Substances to the Environment Indicator .....</b>	<b>25</b>
Introduction.....	25
Description and rationale of the Releases of Harmful Substances to the Environment indicator.....	25
Data .....	26
Methods .....	27
Caveats and limitations .....	31

<b>Part 3. Annexes .....</b>	<b>32</b>
Annex A. Data tables for the figures presented in this document .....	32
Annex B. References and additional information .....	45

### List of Figures

Figure 1. Mercury, lead and cadmium emissions to air, Canada, 1990 to 2014 .....	6
Figure 2. Releases of mercury, lead and cadmium to water, Canada, 2003 to 2014 .....	7
Figure 3. Releases of mercury to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water) .....	8
Figure 4. Mercury emissions to air by source, Canada, 1990 to 2014 .....	10
Figure 5. Releases of mercury to water by source, Canada, 2003 to 2014 .....	11
Figure 6. Mercury emissions to air by province and territory, Canada, 2014 <sup>[A]</sup> .....	12
Figure 7. Releases of mercury to water by province and territory, Canada, 2013 and 2014 <sup>[A]</sup> .....	13
Figure 8. Global mercury emissions to air, 2010 .....	14
Figure 9. Releases of lead to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water) .....	15
Figure 10. Lead emissions to air by source, Canada, 1990 to 2014 .....	16
Figure 11. Releases of lead to water by source, Canada, 2003 to 2014 .....	17
Figure 12. Lead emissions to air by province and territory, Canada, 2014 <sup>[A]</sup> .....	18
Figure 13. Releases of lead to water by province and territory, Canada, 2013 and 2014 <sup>[A]</sup> .....	19
Figure 14. Releases of cadmium to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water) .....	20
Figure 15. Cadmium emissions to air by source, Canada, 1990 to 2014 .....	21
Figure 16. Releases of cadmium to water by source, Canada, 2003 to 2014 .....	22
Figure 17. Cadmium emissions to air by province and territory, Canada, 2014 <sup>[A]</sup> .....	23
Figure 18. Releases of cadmium to water by province and territory, Canada, 2013 and 2014 <sup>[A]</sup> .....	24

### List of Tables

Table 1. Comparison of sources used in CESI and APEI for the emissions to air .....	28
Table 2. Comparison of sources used in CESI and NPRI (NAICS) for releases to water ...	30
Table A.1. Data for Figure 1. Mercury, lead and cadmium emissions to air, Canada, 1990 to 2014 .....	32
Table A.2. Data for Figure 2. Releases of mercury, lead and cadmium to water, Canada, 2003 to 2014 .....	33
Table A.3. Data for Figure 3. Releases of mercury to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water) .....	33
Table A.4. Data for Figure 4. Mercury emissions to air by source, Canada, 1990 to 2014	34
Table A.5. Data for Figure 5. Releases of mercury to water by source, Canada, 2003 to 2014 .....	35

Table A.6. Data for Figure 6. Mercury emissions to air by province and territory, Canada, 2014.....	35
Table A.7. Data for Figure 7. Releases of mercury to water by province and territory, Canada, 2013 and 2014.....	36
Table A.8. Data for Figure 8. Global mercury emissions to air, 2010 .....	37
Table A.9. Data for Figure 9. Releases of lead to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water) .....	37
Table A.10. Data for Figure 10. Lead emissions to air by source, Canada, 1990 to 2014 .	38
Table A.11. Data for Figure 11. Releases of lead to water by source, Canada, 2003 to 2014.....	39
Table A.12. Data for Figure 12. Lead emissions to air by province and territory, Canada, 2014.....	40
Table A.13. Data for Figure 13. Releases of lead to water by province and territory, Canada, 2013 and 2014.....	40
Table A.14. Data for Figure 14. Releases of cadmium to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water) .....	41
Table A.15. Data for Figure 15. Cadmium emissions to air by source, Canada, 1990 to 2014.....	41
Table A.16. Data for Figure 16. Releases of cadmium to water by source, Canada, 2003 to 2014.....	42
Table A.17. Data for Figure 17. Cadmium emissions to air by province and territory, Canada, 2014 .....	43
Table A.18. Data for Figure 18. Releases of cadmium to water by province and territory, Canada, 2013 and 2014.....	44

## Part 1. Releases of Harmful Substances to the Environment Indicator

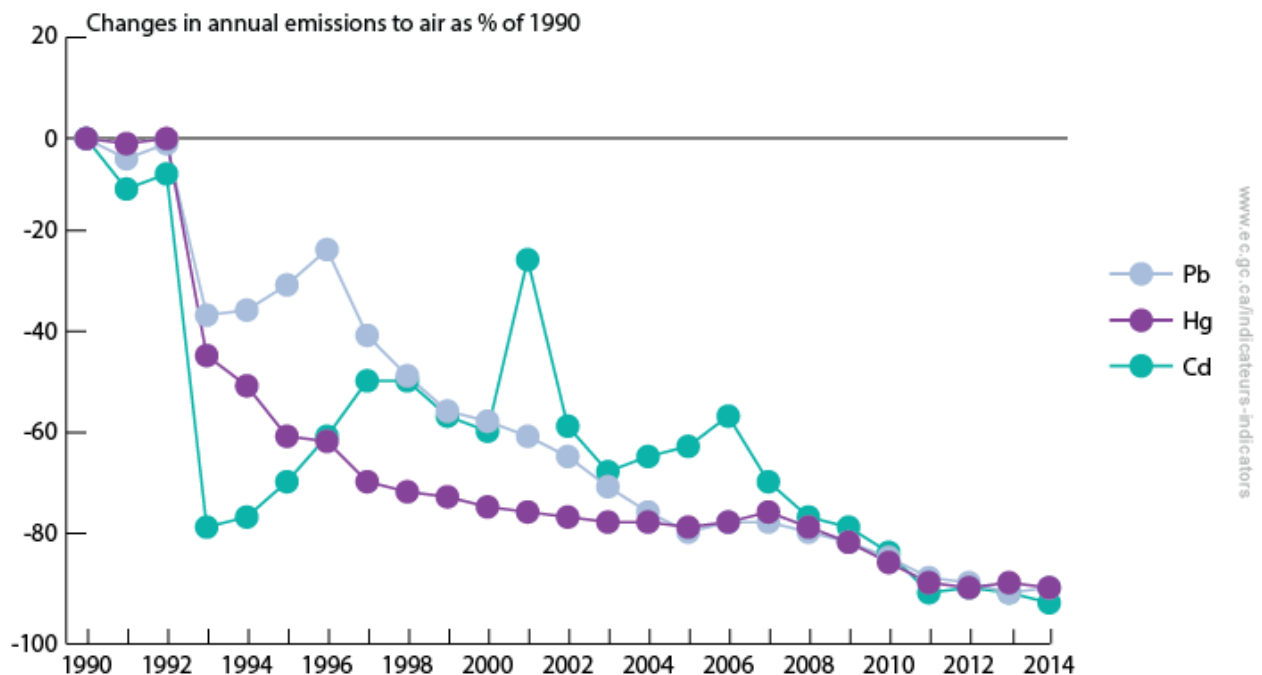
Toxic substances released to the environment can harm human health, wildlife and biological diversity. For instance, toxic metals can be inhaled or deposited onto soil and into water, where they can enter the food chain and accumulate in the tissues of living organisms. Some of these substances can also travel great distances by air.

The Releases of Harmful Substances to the Environment indicators track releases of mercury (Hg), lead (Pb) and cadmium (Cd) and their compounds to air and water. These substances are listed as toxic<sup>1</sup> under the *Canadian Environmental Protection Act, 1999* (CEPA 1999), so their release to the environment is closely monitored. The latest available data from the [Air Pollutant Emissions Inventory](#) (APEI) and reported facility releases from the [National Pollutant Release Inventory](#) (NPRI) are used to calculate these indicators.

### Releases to air

In 2014, Hg, Pb and Cd emissions to air have been reduced to about 10% of their 1990 levels (emissions reductions of 89%, 89% and 92% respectively). These reductions are mainly due to reduced emissions from industrial sources.

**Figure 1. Mercury, lead and cadmium emissions to air, Canada, 1990 to 2014**



[Data for Figure 1](#)

<sup>1</sup> Section 64 of CEPA 1999 defines a substance as toxic if it is "entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health."

**Note:** The indicator only reports releases from human-related sources.

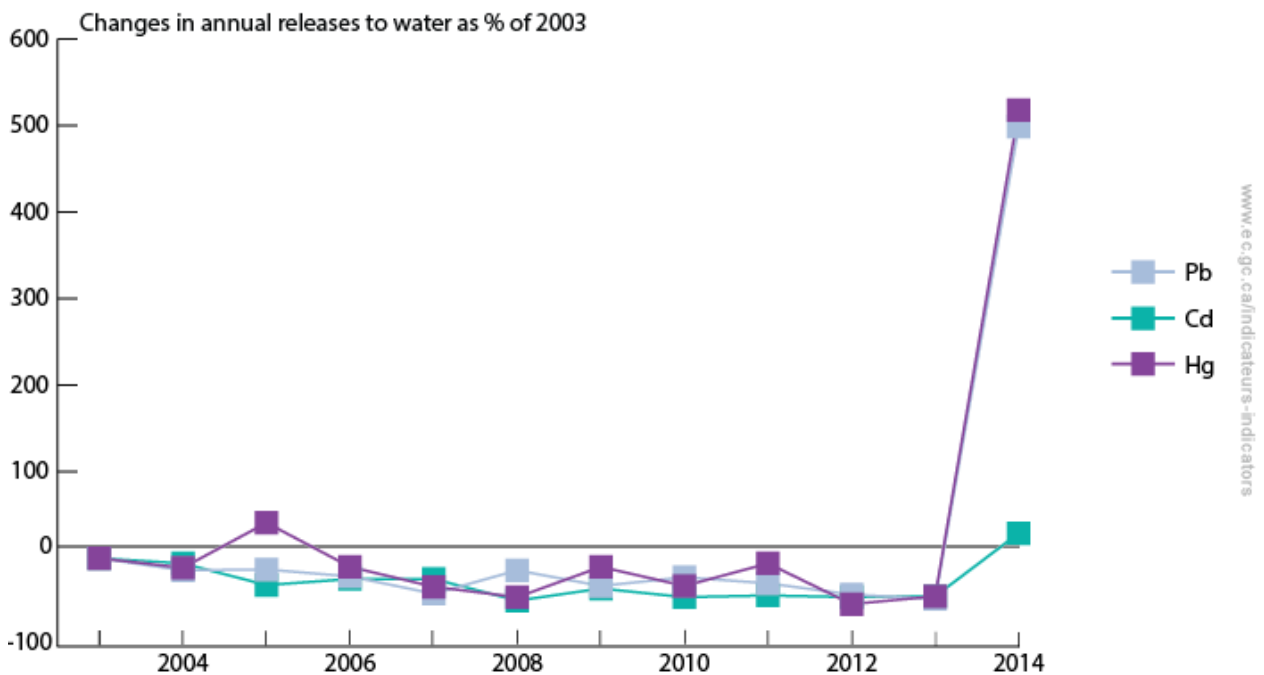
**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

## Releases to water

In 2014, an important spill accounted for increases in releases of Hg and Pb to water of 518% and 499% respectively and of 29% for Cd between 2003 and 2014. On August 4, 2014, a dam securing a tailings pond from the Mount Polley mine in central British Columbia breached, spilling mining waste into Polley Lake and surrounding waters.

In 2014, the Mount Polley mine reported releases of Pb, Cd and Hg to water for the first time. Releases to water from the Mount Polley mine in 2014 amounted to 134.1 tonnes (t) of Pb, 2.8 t of Cd and 2.1 t of Hg.

**Figure 2. Releases of mercury, lead and cadmium to water, Canada, 2003 to 2014**



[Data for Figure 2](#)

**Note:** The indicator only reports releases from human-related sources. This chart accounts only for the releases to water reported in the NPRI based on the NPRI reporting criteria for releases of Hg, Pb and Cd and their compounds. These amounts should not be interpreted as comprehensive totals of releases to water of these pollutants in Canada.

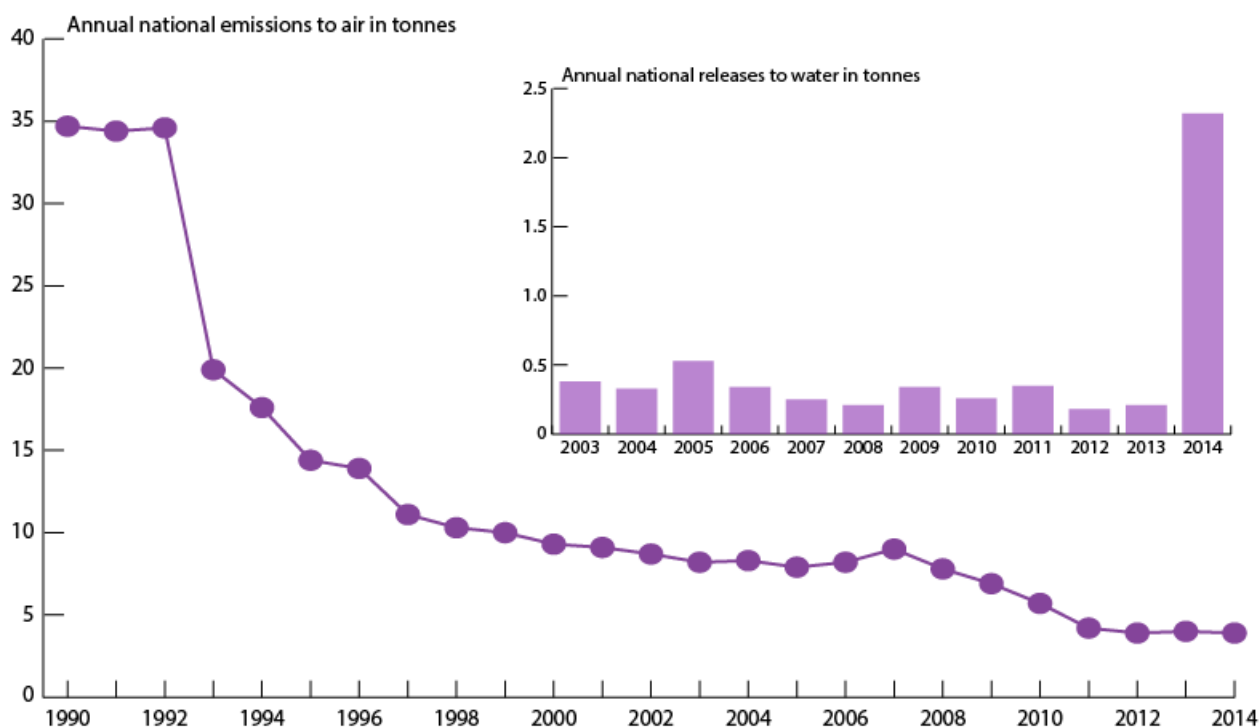
**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

## Releases of Mercury to the Environment

In 2014, national mercury (Hg) emissions to air from human-related activities totalled 3.9 tonnes (t), which is a 3% (about 0.1 t) decrease from the 2013 level, and a 89% decrease (30.8 t) from 1990, the baseline year of this time series.

On August 4, 2014, a dam securing a tailings pond from the Mount Polley mine in central British Columbia breached, spilling mining waste, including 2.1 t of Hg, into Polley Lake and surrounding waters. As a result, the amount of Hg released to water in 2014 was 2.32 t, about 10 times higher than the 2013 reported level of 0.21 t and a 518% increase (1.95 t) from 2003, the baseline year of this time series.

**Figure 3. Releases of mercury to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water)**



[Data for Figure 3](#)

**Note:** The indicator only reports releases from human-related sources. The Hg releases in water indicator includes the amount of elemental Hg in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Hg releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#). Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

Mercury is a naturally occurring metal that is used to manufacture products like thermometers, batteries and dental amalgam. Mercury can be emitted to the air by natural processes such as volcanic activity, soil and rock erosion, and by human activities such as metal smelting, iron and steel production, coal-fired electricity generation, industrial boilers, cement kilns, waste incineration, and from the improper disposal of products such as electrical switches and fluorescent lights. Mercury can also be released directly to water by



human activities such as pulp and paper production, metals processing and from wastewater treatment.<sup>2</sup>

Mercury can be transported through the air and deposited into water or onto land. It can be transformed by microorganisms into methylmercury, a toxic form of Hg that is harmful to both humans and wildlife. Methylmercury can bioaccumulate in the food chain and enter our bodies through the ingestion of food containing high levels of mercury, such as predatory fish like freshwater trout or arctic char. Mercury accumulated in vegetation can also be re-emitted to the air during forest fires. Mercury and its compounds are listed as toxic<sup>3</sup> under the *Canadian Environmental Protection Act, 1999* (CEPA 1999).

The large decline in Hg emissions to air since the 1990s is due primarily to changes in facility processes and the adoption of emission-reduction technologies in the non-ferrous smelting and refining sector, the closing of facilities, and compliance with federal and provincial legislation and guidelines introduced over this period. Improvements in fossil fuel-fired electricity generation and incineration also contributed to the decline.

Since 2003 the amount of Hg released to water has been relatively stable, with an increase in 2005, attributed to large release from a single wastewater treatment plant. The increase in 2014 was attributed to the Mount Polley incident in British Columbia.

---

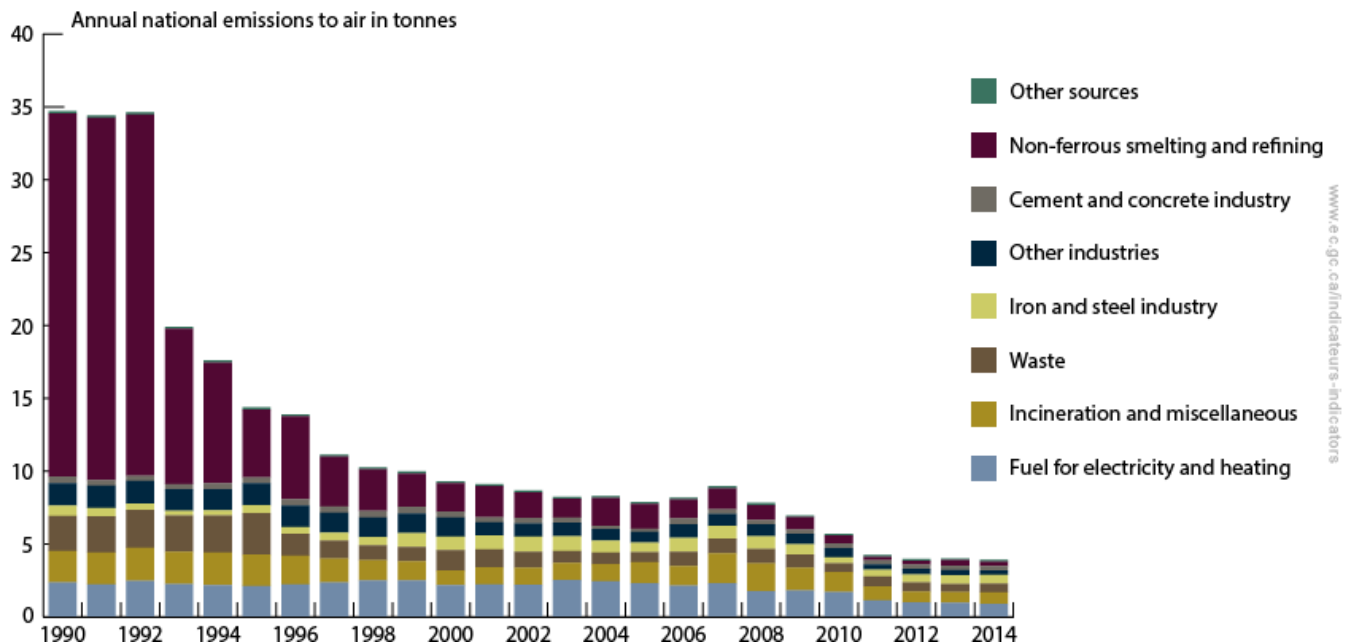
<sup>2</sup> Wastewater treatment plants do not generate Hg. The source of Hg in wastewater treatment plant effluent is typically dental offices (Hg in dental amalgam discharged to the sewer) and industrial discharges to the sewer from metal finishing, steel manufacturing and refineries.

<sup>3</sup> Section 64 of CEPA 1999 defines a substance as toxic if it is "entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health."

### Mercury emissions to air by source

In 2014, the highest proportion of Hg emissions to air in Canada came from fuel for electricity and heating (mainly from coal combustion), representing about 23% (0.89 t) of the national emissions. Incineration and miscellaneous sources had the second-highest proportion of Hg emissions, with 20% (0.78 t) of national emissions. Releases from waste were the third-largest source representing 16% (0.61 t) of national emissions. The largest reduction in Hg emissions between the years 1990 and 2014 was from non-ferrous smelting and refining with an emission reduction of 99% (24.6 t).

**Figure 4. Mercury emissions to air by source, Canada, 1990 to 2014**



[Data for Figure 4](#)

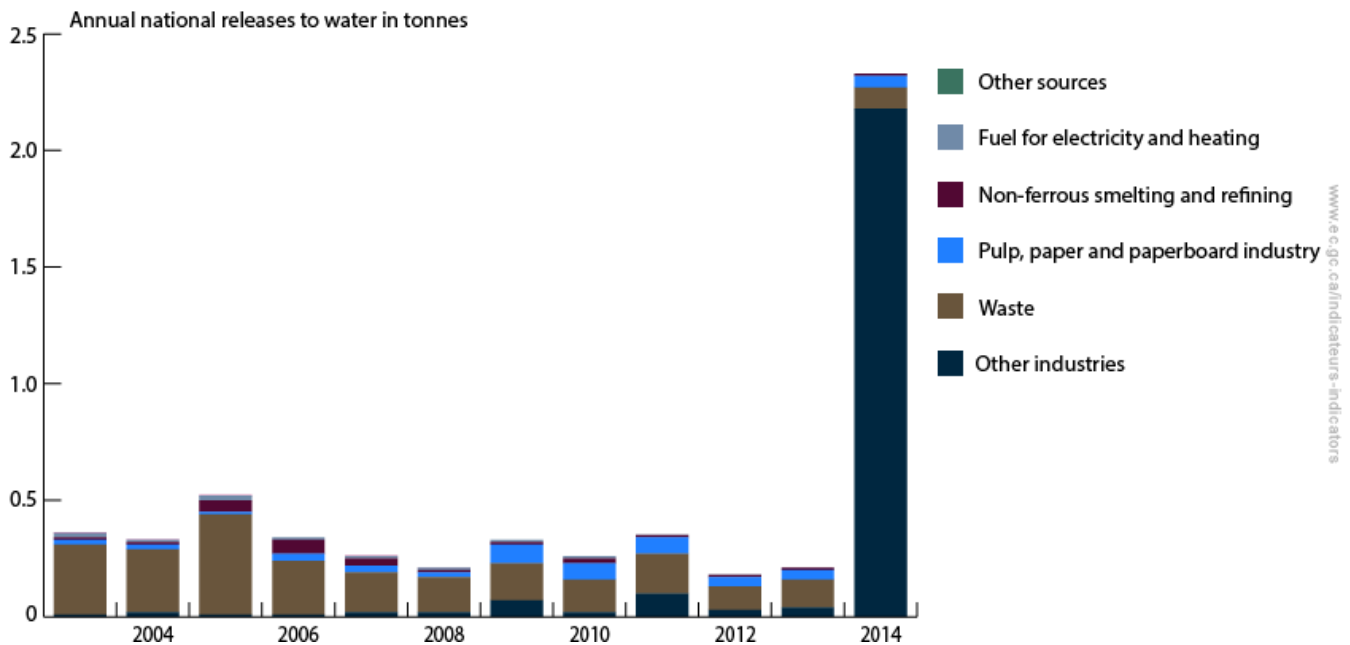
**Note:** The indicator only reports releases from human-related sources. Other sources include transportation, off-road vehicles and home firewood burning. For more details on the sources please consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

### Releases of mercury to water by source

Of the 2.32 t of mercury released to water in 2014, 2.14 t was from the Mount Polley incident. Because of this exceptional event, the other industries category contributed 94% (2.18 t) of the total Hg released to water in 2014. The second greatest contribution was from waste, which include wastewater treatment plants.<sup>4</sup> It was also the source having experienced the largest reduction (0.22 t) between 2003 and 2014.

**Figure 5. Releases of mercury to water by source, Canada, 2003 to 2014**



[Data for Figure 5](#)

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental Hg in any compound, alloy or mixture reported in the NPRI based on the NPRI reporting criteria. As a result, the reported Hg releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Other sources include transportation (road, rail, air, marine). Other industries also include oil and gas industry, iron and steel industry, and cement and concrete industry. For more details on the sources, consult the [Data Source and Methods](#).

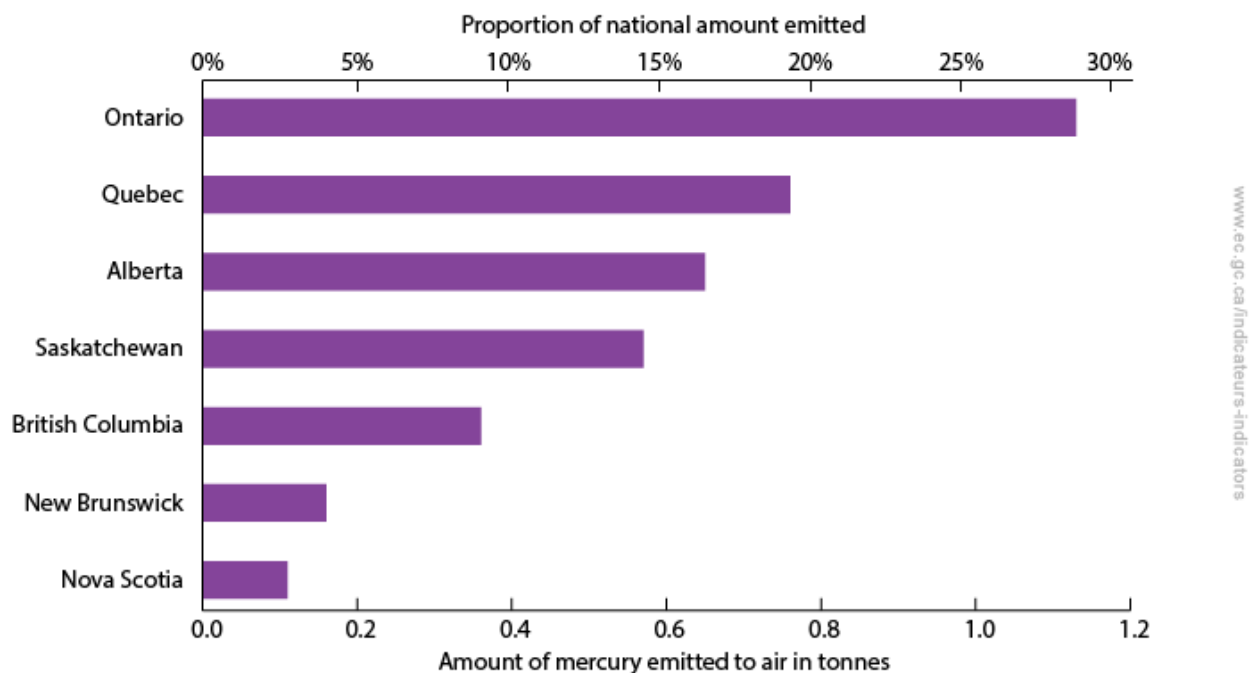
**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

<sup>4</sup> Wastewater treatment plants do not generate Hg. The source of Hg in wastewater treatment plant effluent is typically dental offices (Hg in dental amalgam discharged to the sewer) and industrial discharges to the sewer from metal finishing, steel manufacturing and refineries.

### Mercury emissions to air by province and territory

Ontario had the highest Hg emissions level in 2014, representing 29% (1.13 t) of total national emissions (3.9 t). Mercury emissions in Ontario came mainly from the iron and steel industry, waste sources and the cement and concrete industry. Quebec, with the second-highest emission level, accounts for 20% (0.76 t) of national emissions, mainly from waste sources, incineration, and the non-ferrous smelting and refining industry. Alberta ranked third, with emissions of 0.65 t of Hg; electric power-generating plants were the most important source of emissions in that province.

**Figure 6. Mercury emissions to air by province and territory, Canada, 2014<sup>[A]</sup>**



[Data for Figure 6](#)

**Note:** The indicator only reports releases from human-related sources.

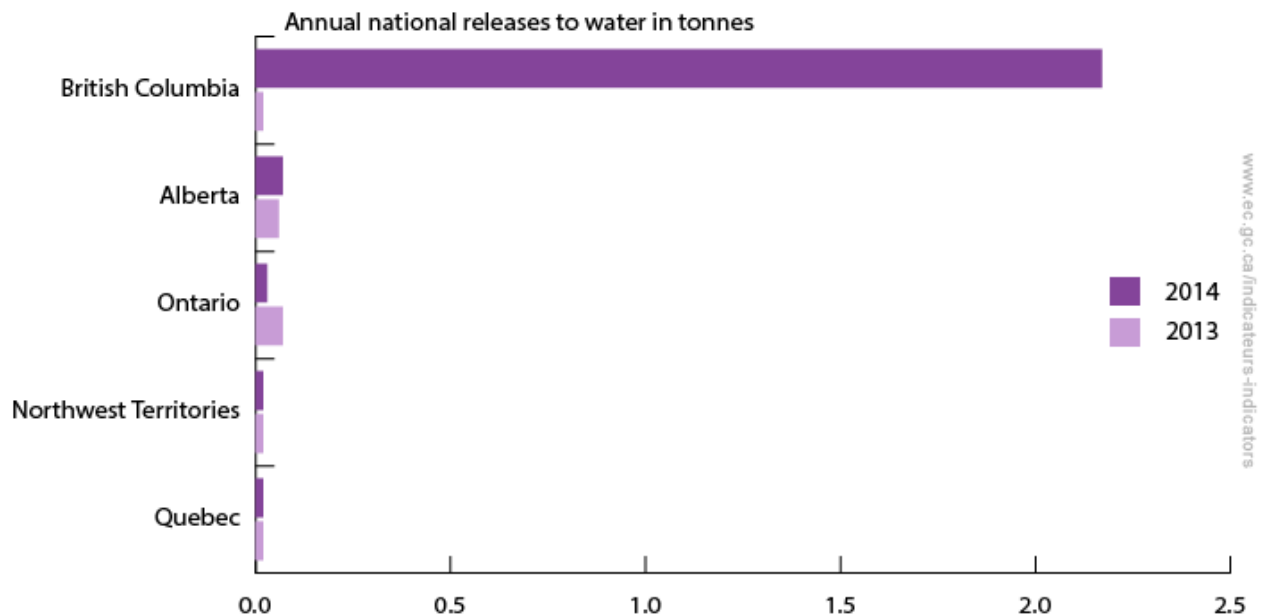
<sup>[A]</sup> Manitoba, Newfoundland and Labrador, Prince Edward Island, the Northwest Territories, Yukon, and Nunavut are not shown in the chart due to their low emissions ( $\leq 0.1$  t).

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

### Releases of mercury to water by province and territory

In 2014, because of the Mount Polley mine incident, British Columbia had the largest release of Hg to water with 94% (2.17 t) of the total Hg release. Facilities in Alberta and Ontario were the second and third largest contributors to total Hg release. This is very different from 2013, when nearly 60% of the releases were accounted for by Ontario and Alberta.

**Figure 7. Releases of mercury to water by province and territory, Canada, 2013 and 2014<sup>[A]</sup>**



[Data for Figure 7](#)

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental Hg in any compound, alloy or mixture reported in the NPRI based on the NPRI reporting criteria. As a result, the Hg releases represent only a portion of the releases of this toxic pollutant to water in Canada.

<sup>[A]</sup> Prince Edward Island, Yukon and Nunavut did not report releases of Hg to the NPRI in 2014. New Brunswick, Manitoba, Nova Scotia, Newfoundland and Labrador, and Saskatchewan are not shown in the chart due to their low releases ( $\leq 0.01$  t).

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

### Releases of mercury from facilities

Environment and Climate Change Canada's NPRI provides detailed information on emissions and releases from industrial and commercial facilities that meet NPRI reporting criteria. The Canadian Environmental Sustainability Indicators (CESI) program provides access to this information through an online interactive map.

With the CESI interactive map, you can zoom in to local areas and obtain details on [Hg emissions to air](#) and [releases of Hg to water](#) from individual facilities.

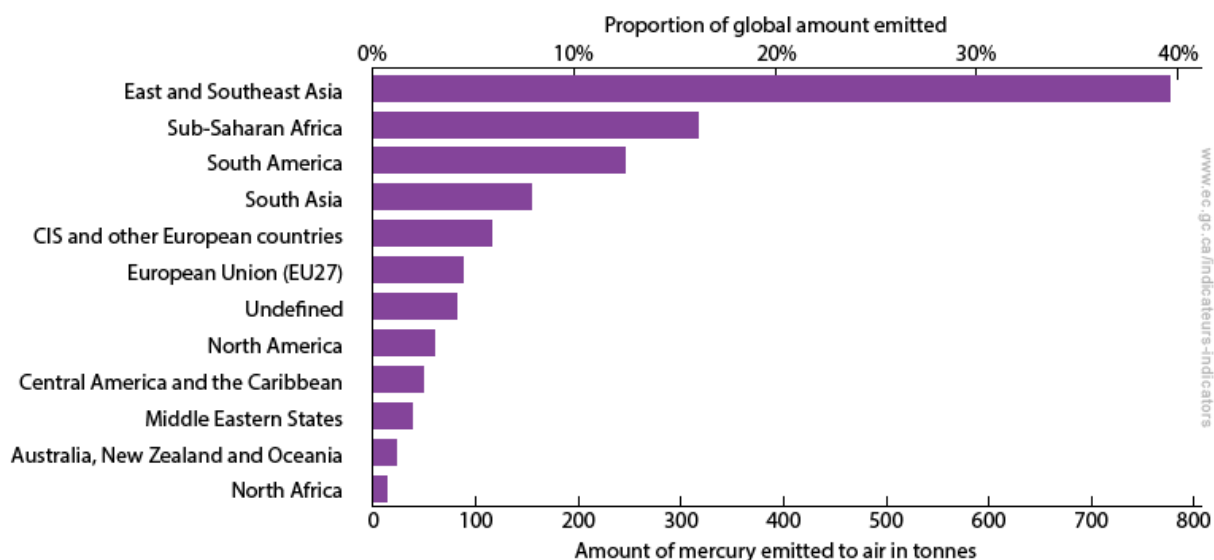
**Source:** Environment and Climate Change Canada (2016) [National Pollutant Release Inventory Online Data Search – Facility Reported Data](#).

## Global mercury emissions to air

In 2010, the global emissions<sup>5</sup> of Hg to air from human activity were estimated to be 1960 t.

East and Southeast Asia accounted for 39.7% (777 t) of the global total, with China contributing about three quarters of the region's emissions, or approximately one third of the global total. Sub-Saharan Africa ranked second, with 16.1% (316 t), followed by South America, with 12.5% (245 t). South Asia ranked fourth, with 7.9% (154 t), and the Commonwealth of Independent States (CIS)<sup>6</sup> and other European countries (excluding members of the European Union) ranked fifth, with 5.9% (115 t). Canada emitted less than 5 t in 2010,<sup>7</sup> about 0.3% of the global Hg emissions to air.

**Figure 8. Global mercury emissions to air, 2010**



[Data for Figure 8](#)

**Note:** The CIS includes Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Ukraine. The Undefined region includes emissions from contaminated sites.

**Source:** United Nations Environmental Program (UNEP) Chemicals Branch (2013) [Global Mercury Assessment 2013: Sources, emissions, releases, and environmental transport](#).

Mercury emissions can travel hundreds to thousands of kilometres via air masses before being deposited.<sup>8</sup> For example, transboundary flows of Hg emissions from foreign sources accounted for over 95% of the anthropogenic Hg deposited in Canada in 2006.<sup>9</sup>

<sup>5</sup> United Nations Environment Programme (UNEP) Chemicals Branch (2013) [Global Mercury Assessment 2013: Sources, emissions, releases, and environmental transport](#). Retrieved in April, 2016. The global emissions were calculated by the UNEP and are independent of Canada's Hg emission estimates.

<sup>6</sup> The CIS includes Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Ukraine.

<sup>7</sup> The use of different calculation estimations and different source classifications account for the differences in Canada's mercury emissions as reported in the global comparison indicator and in the national mercury indicator for 2010.

<sup>8</sup> Durnford D *et al.* (2010) [Long-range transport of mercury to the Arctic and across Canada. Atmospheric Chemistry and Physics](#) 10(2):4673–4717. Retrieved in March, 2016.

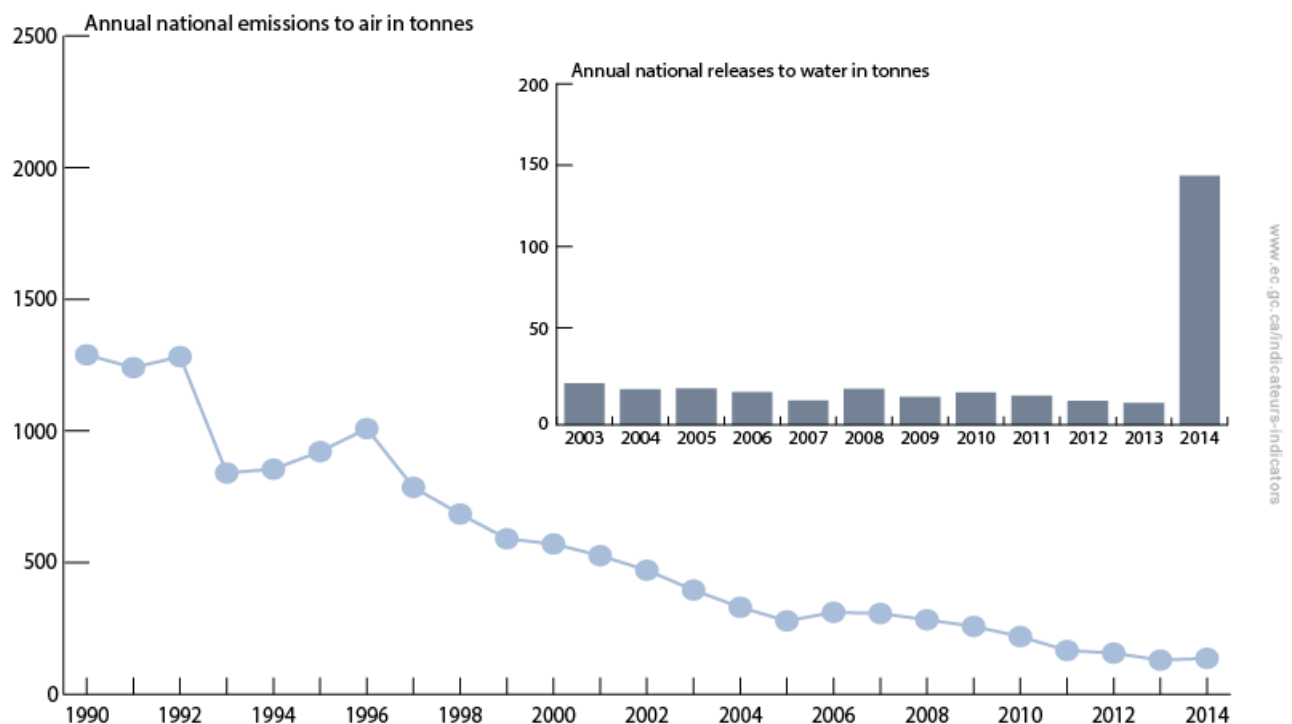
## Releases of Lead to the Environment

In 2014, national lead (Pb) emissions to air from human-related activities totalled 136 tonnes (t), which represents an increase of 5% (about 7 t) from the 2013 level, and is 89% (1153 t) lower than in 1990.

In 2014, national Pb releases to water were 146 t of Pb, more than 10 times the total releases reported in 2013 and about 500% higher than the releases reported in 2003, the baseline year of the time series.

In central British Columbia, a dam securing a tailings pond from the Mount Polley mine breached on August 4, 2014, spilling mining waste into Polley Lake and surrounding waters. That breach alone released 134 t of Pb to water, or 92% of the total reported for Canada in 2014.

**Figure 9. Releases of lead to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water)**



[Data for Figure 9](#)

**Note:** The indicator only reports Pb releases from human-related sources. The releases in water indicator includes the amount of elemental Pb in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Pb releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#). Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

Lead is a metal that occurs naturally in the earth's crust. Lead is emitted mainly as a result of industrial activities such as metal smelting and refining and various combustion processes. It

<sup>9</sup> Environment Canada and Health Canada (2010) [Risk Management Strategy for Mercury](#). Retrieved in March, 2016.

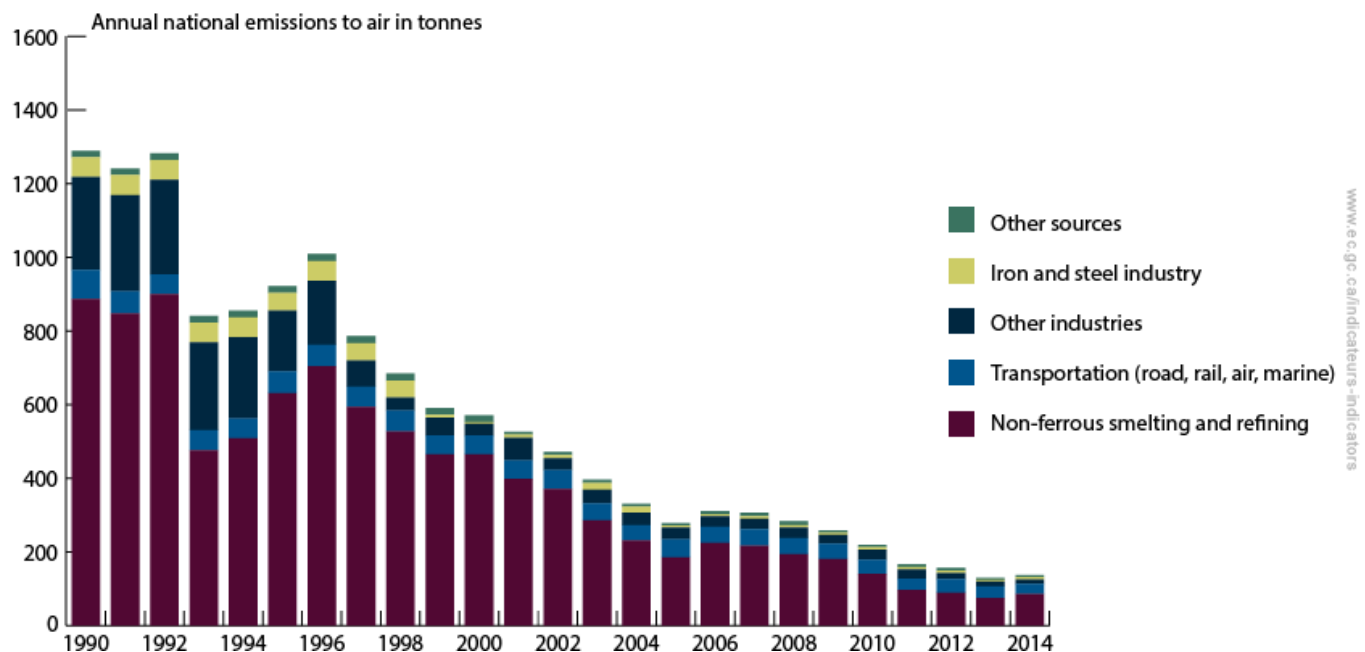
is also released from natural processes such as rock and soil erosion. Lead can be deposited on terrestrial or water surfaces and subsequently builds up in soils or sediments. It can be released directly to water from human activities such as pulp and paper production, processing of metal, and from wastewater treatment.<sup>10</sup> Exposure to lead, even in small amounts, can be hazardous to both humans and wildlife. Lead is listed as toxic<sup>11</sup> under the *Canadian Environmental Protection Act, 1999* (CEPA 1999).

Emissions to air decreased between 1990 and 2014 as a result of reduced emissions from many industrial sectors, most notably the non-ferrous smelting and refining industry and the mining industry, the declining use of leaded aviation fuel, the closing of some facilities, and compliance with the federal and provincial legislation and guidelines introduced over this period.

### Lead emissions to air by source

In 2014, the highest proportion of Pb emissions to air in Canada came from non-ferrous smelting and refining, representing 63% (86 t) of national emissions. Transportation (road, rail, air and marine), mostly air transportation, accounted for the second-highest proportion of Pb emissions, with 20% (28 t) of national emissions. The largest reduction in emissions between the years 1990 and 2014 was from non-ferrous smelting and refining with an emission reduction of 801 t or 90%. In 2014, other industries (mainly mining) emitted 8% (12 t) of national Pb emissions, making them the third-largest source while having the second largest reduction in emissions between 1990 and 2014 (240 t).

**Figure 10. Lead emissions to air by source, Canada, 1990 to 2014**



<sup>10</sup> Wastewater treatment plants do not generate lead. The source of Pb in wastewater treatment plant effluent is typically caused by industrial discharges to the sewer.

<sup>11</sup> Section 64 of CEPA 1999 defines a substance as toxic if it is "entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health."



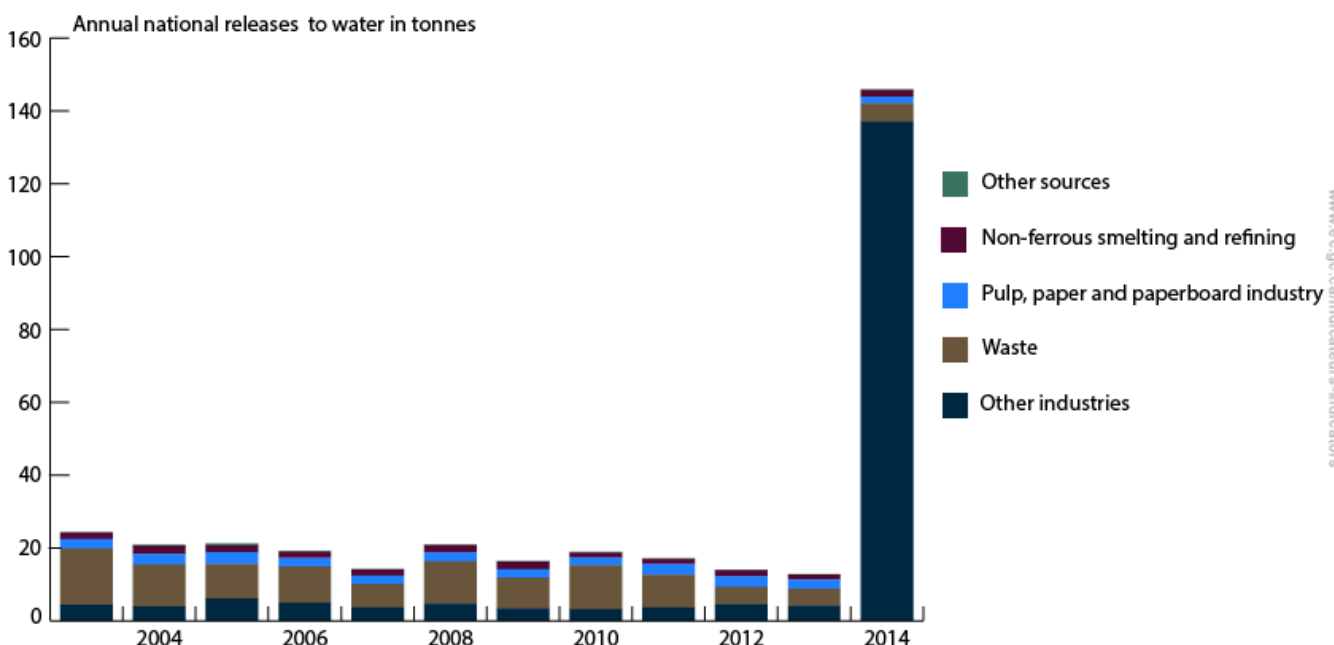
**Note:** The indicator only reports releases from human-related sources. The category other sources includes fuel for electricity and heating, home firewood burning, waste, and incineration and miscellaneous. For more details on the sources, consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

### Releases of lead to water by source

In 2014, the source category other industries contributed 136.9 t of the total Pb released to water of 145.8 t. This included 134.1 t released from the Mount Polley mine dam failure. The next categories contributing the most to releases of Pb to water were waste, accounting for approximately 5.1 t followed by the pulp, paper and paperboard industry, representing 1.9 t of the national total. Between 2003 and 2014 the source category waste showed the largest reduction in releases (10.4 t or 67%).

**Figure 11. Releases of lead to water by source, Canada, 2003 to 2014**



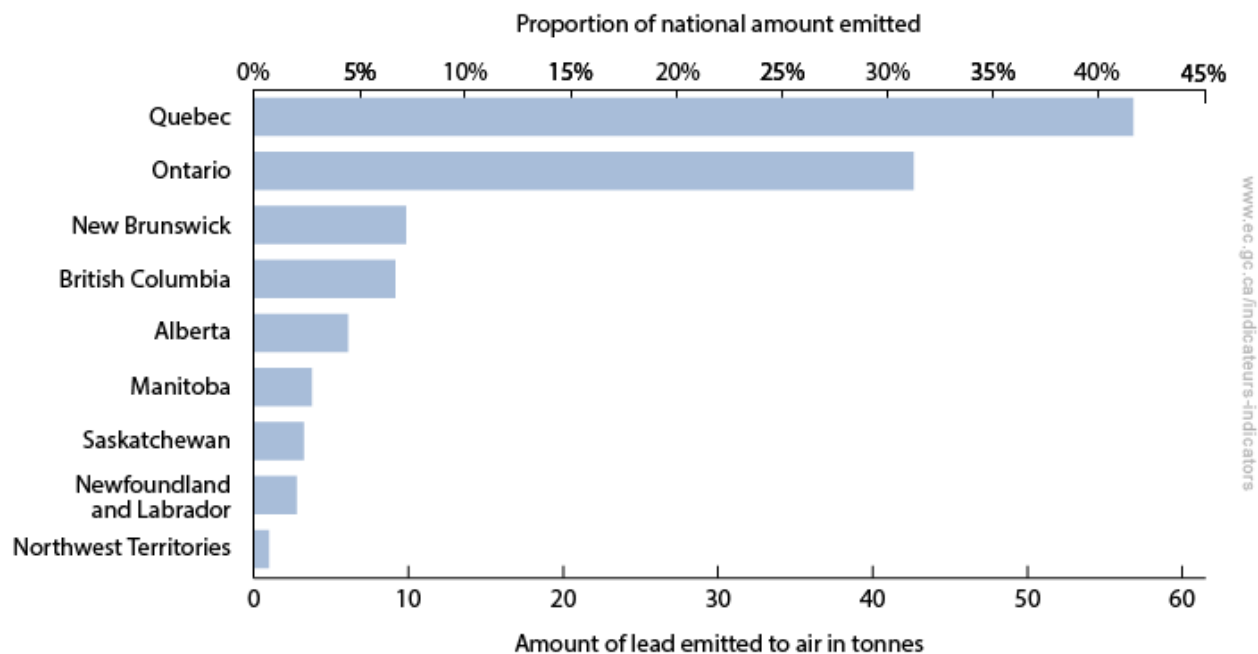
**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental Pb in any compound, alloy or mixture reported in the NPRI based on the NPRI reporting criteria. As a result, the reported Pb releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Other sources include, transportation (road, rail, air, marine), and fuel for electricity and heating. Other industries include iron and steel industry, oil and gas industry and cement and concrete industry. For more details on the sources, consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

### Lead emissions to air by province and territory

Quebec had the highest Pb emissions level in 2014, representing 42% (56.8 t) of national emissions (136.4 t). Ontario, had the second-highest emission level, with 31% (42.7 t) of national emissions, followed by New Brunswick with 7% (9.8 t). Lead emissions in these three provinces mainly came from the non-ferrous smelting and refining industry in 2014.

**Figure 12. Lead emissions to air by province and territory, Canada, 2014<sup>[A]</sup>**



[Data for Figure 12](#)

**Note:** The indicator only reports releases from human-related sources.

<sup>[A]</sup> Nova Scotia, Yukon, Nunavut and Prince Edward Island are not shown in the chart due to their low emissions (< 1 t).

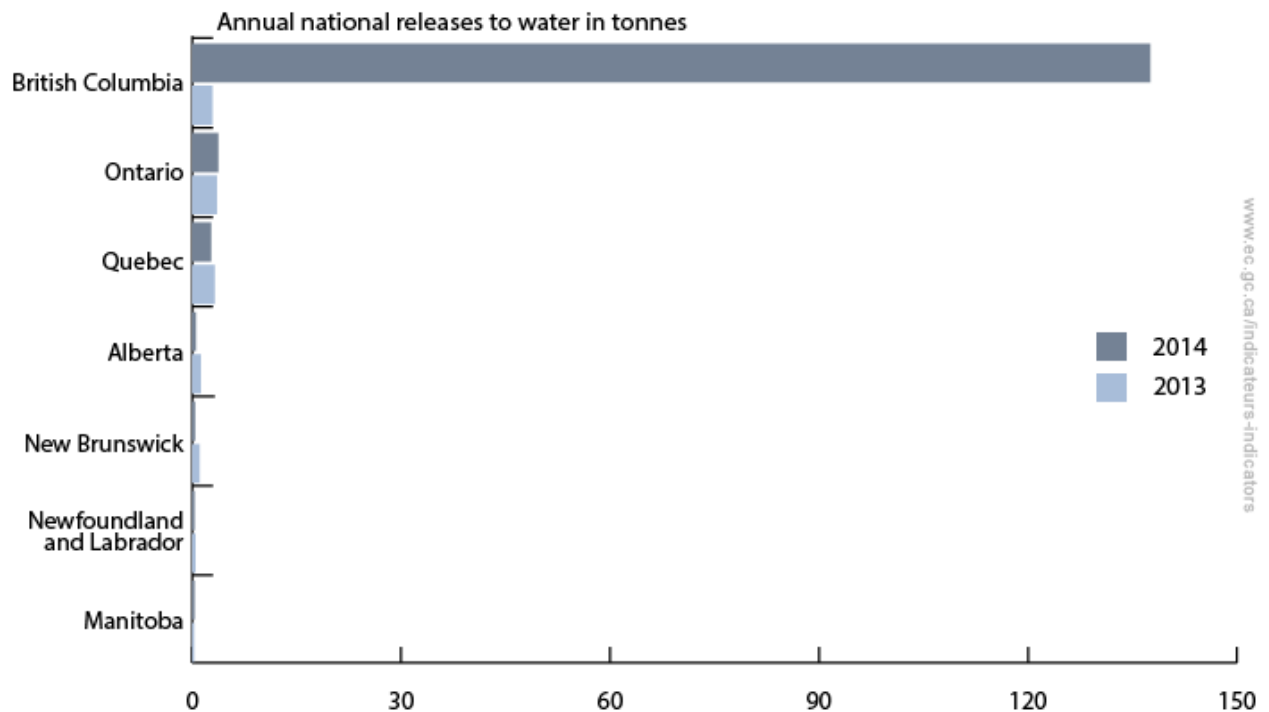
**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

### Releases of lead to water by province and territory

Because of the Mount Polley mine incident, British Columbia facilities accounted for more than 94% of the total Pb releases to water in Canada in 2014. Ontario and Quebec released 3.8 t and 2.7 t respectively of the total lead released to water in Canada. The releases from these two provinces came mostly from wastewater treatment plants.<sup>12</sup> In 2013, facilities in Ontario and Quebec contributed more than 50% of total releases of Pb to water.

<sup>12</sup> Wastewater treatment plants do not generate lead. The source of Pb in wastewater treatment plant effluent is typically caused by industrial discharges to the sewer.

**Figure 13. Releases of lead to water by province and territory, Canada, 2013 and 2014<sup>[A]</sup>**



[Data for Figure 13](#)

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental Pb in any compound, alloy or mixture reported in the NPRI based on the NPRI reporting criteria. As a result, the Pb releases represent only a portion of the releases of this toxic pollutant to water in Canada.

<sup>[A]</sup> Yukon did not report releases of Pb to the NPRI in 2013 and 2014. Nova Scotia, Nunavut, Prince Edward Island, Saskatchewan and the Northwest Territories are not shown in the chart due to their low releases (< 0.3 t).

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

### Releases of lead from facilities

Environment and Climate Change Canada's NPRI provides detailed information on emissions and releases from industrial and commercial facilities that meet NPRI reporting criteria. The Canadian Environmental Sustainability Indicators (CESI) program provides access to this information through an online interactive map.

With the CESI interactive map, you can zoom in to local areas and obtain details on [releases of lead to water](#) from individual facilities.

**Source:** Environment and Climate Change Canada (2016) [National Pollutant Release Inventory Online Data Search – Facility Reported Data](#)

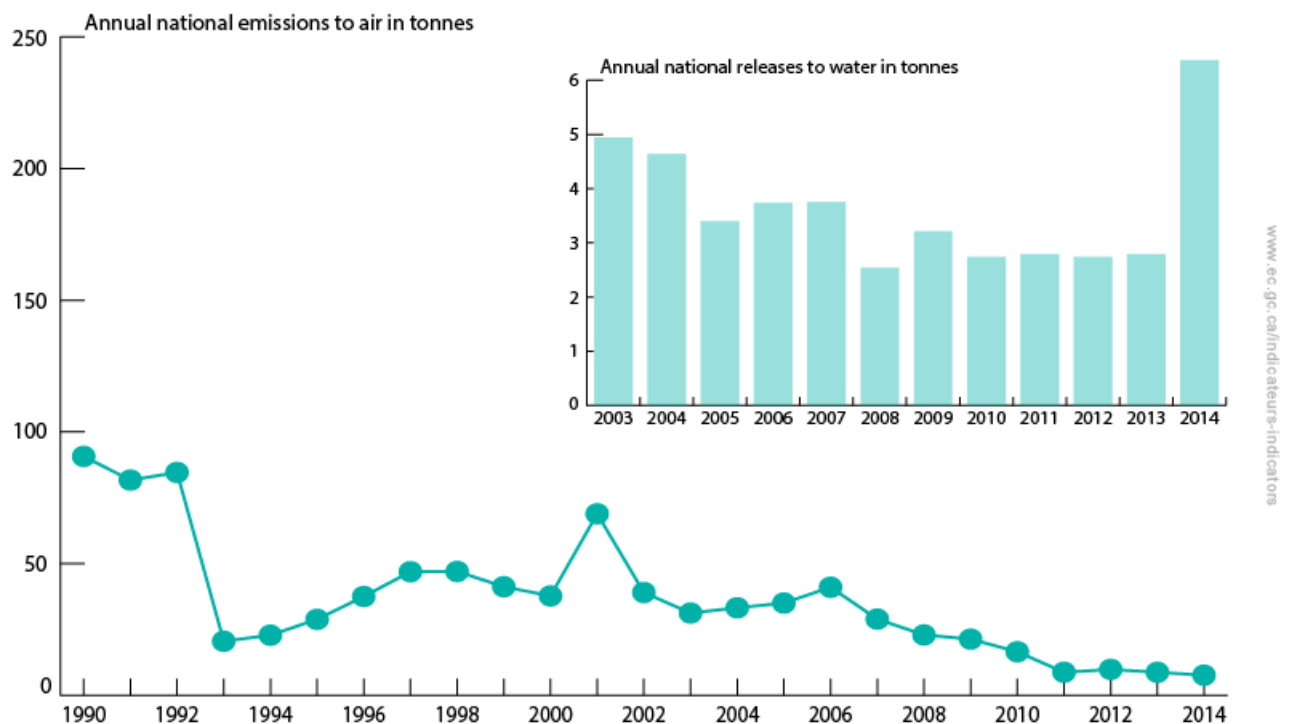
## Releases of Cadmium to the Environment

In 2014, national cadmium (Cd) emissions to air from human-related activities totalled 7.6 tonnes (t), a decrease of 12% (about 1.0 t) from the 2013 level, and is 92% lower (83 t) than in 1990.

In 2014, a peak in releases of Cd to water was observed, where about 6.4 t of Cd were released to water, an increase of 128% (3.6 t) from the 2013 level and an increase of 29% (1.4 t) from 2003.

In central British Columbia, a dam securing a tailings pond from the Mount Polley mine breached on August 4, 2014, spilling mining waste into Polley Lake and surrounding waters. The 2014 spill released 3.8 t of Cd to water.

**Figure 14. Releases of cadmium to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water)**



[Data for Figure 14](#)

**Note:** The indicator only reports releases from human-related sources. The Cd releases in water indicator includes the amount of elemental Cd in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Cd releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#). Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

Cadmium is a naturally occurring metal used in batteries and in electroplating to protect other metals from corrosion. It can also be emitted directly to air from human activities such as non-ferrous smelting and refining and fuel consumption for electricity or heating. Cadmium can be released directly to water from human activities such as pulp and paper

production, metals processing and from wastewater treatment.<sup>13</sup> Exposure to Cd can be hazardous to both humans and wildlife. Inorganic Cd compounds are listed as toxic<sup>14</sup> according to the *Canadian Environmental Protection Act, 1999* (CEPA 1999).

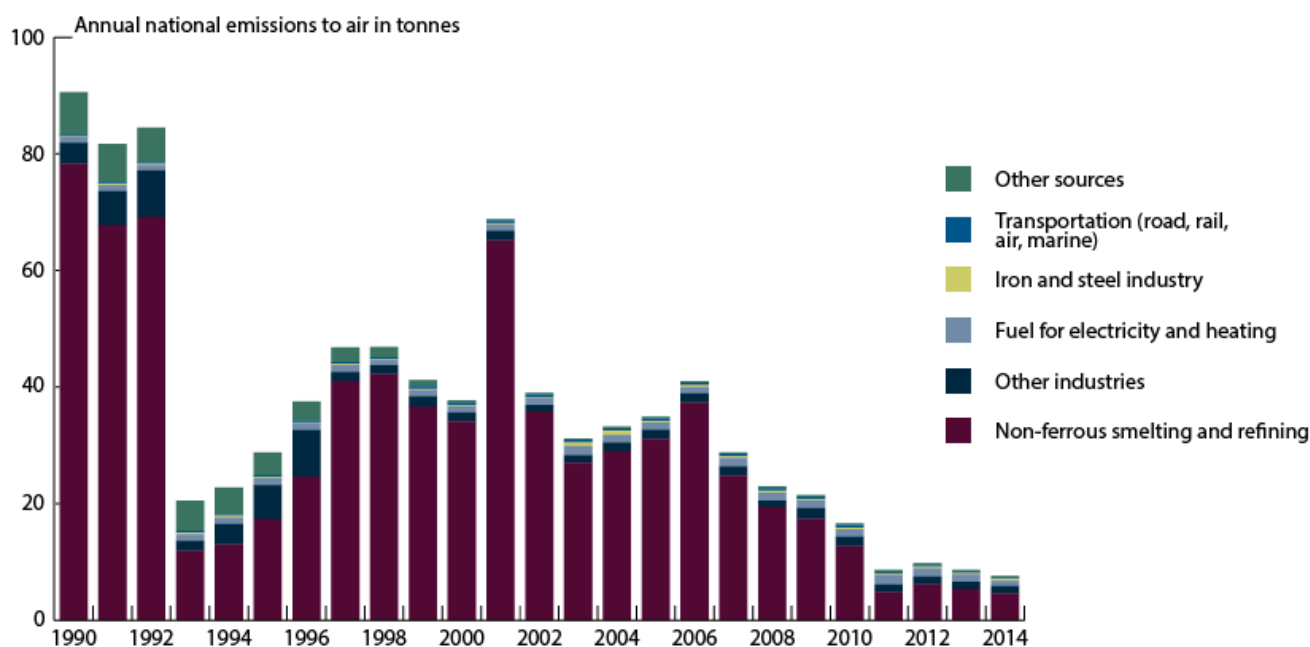
Reductions in Cd emissions to air between 1990 and 2014 are mainly due to a reduction of emissions from industrial sources, including the non-ferrous smelting and refining sector, the closing of facilities, and compliance with federal and provincial legislation and guidelines introduced over this period.

The decrease of Cd release to water is attributed to decreases in releases observed between 2003 and 2013 from wastewater treatment plants, while the peak in 2014 is due to the Mount Polley incident.

### Cadmium emissions to air by source

In 2014, the highest proportion of Cd emissions to air in Canada came from non-ferrous smelting and refining, representing 60% (4.6 t) of national emissions. The source other industries had the second-highest proportion of Cd emissions, with 16% (1.2 t) of national emissions, closely followed by fuel for electricity and heating with a 14% (1.0 t) share of the national Cd emissions. The largest reduction between 1990 and 2014 was from non-ferrous smelting and refining with an emissions reduction of 74 t.

**Figure 15. Cadmium emissions to air by source, Canada, 1990 to 2014**



[Data for Figure 15](#)

<sup>13</sup> Wastewater treatment plants do not generate Cd. The source of Cd in wastewater treatment plant effluent is typically caused by industrial discharges to the sewer.

<sup>14</sup> Section 64 of the CEPA 1999 defines a substance as toxic if it is "entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health."

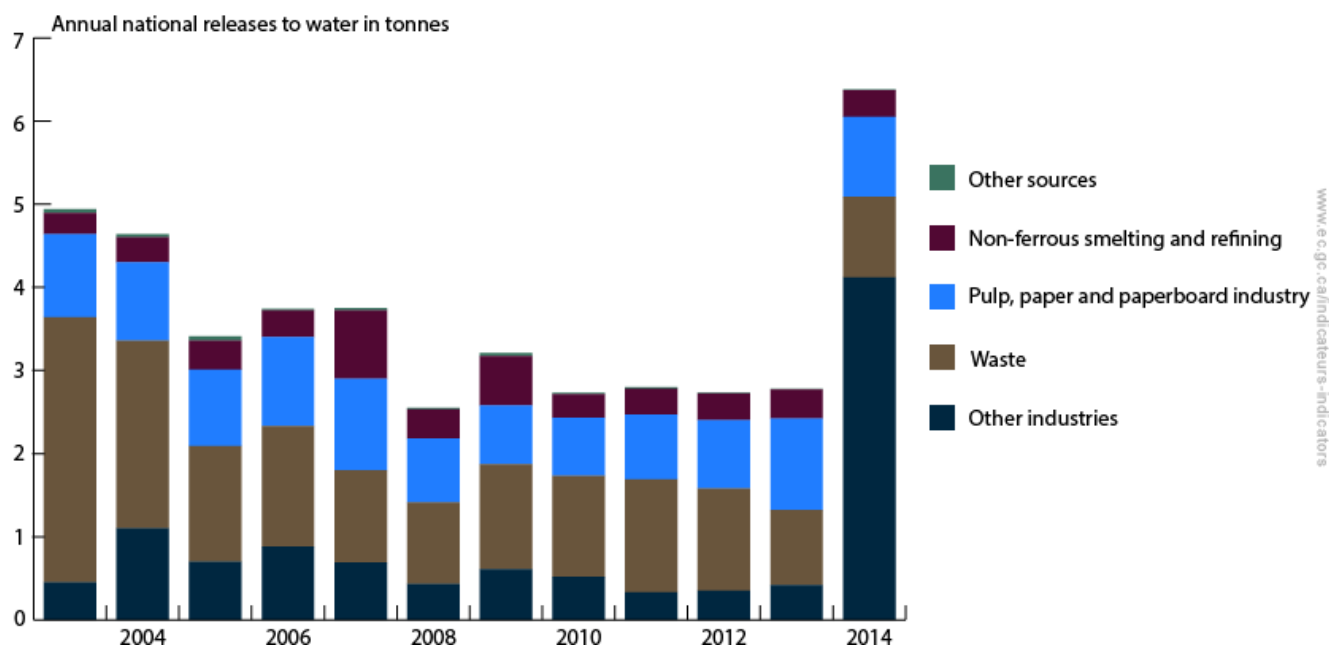
**Note:** The indicator only reports releases from human-related sources. The category other sources includes home firewood burning, incineration and miscellaneous, and waste. For more details on the sources, consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

### Releases of cadmium to water by source

In 2014, 4.1 t of Cd was released by the source category other industries, which includes the Mount Polley mine spill. This is 10 times higher than the amount reported in 2013 (0.41 t). Other industries contributed 65% of the total Cd (6.4 t) released to water in 2014. Second and third were the waste source (wastewater treatment plants<sup>15</sup> mostly) and pulp, paper and paperboard industry with 15% each (0.97 t and 0.96 t respectively) of the total Cd. The largest reduction in releases between the years 2003 and 2014 was from waste with a release reduction of 2.2 t.

**Figure 16. Releases of cadmium to water by source, Canada, 2003 to 2014**



[Data for Figure 16](#)

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental Cd in any compound, alloy or mixture reported in the NPRI based on the NPRI reporting criteria. As a result, the reported Cd releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Other sources include fuel for electricity and heating and transportation (road, rail, air, marine). Other industries also include iron and steel industry, oil and gas industry, and cement and concrete industry. For more details on the sources, consult the [Data Source and Methods](#).

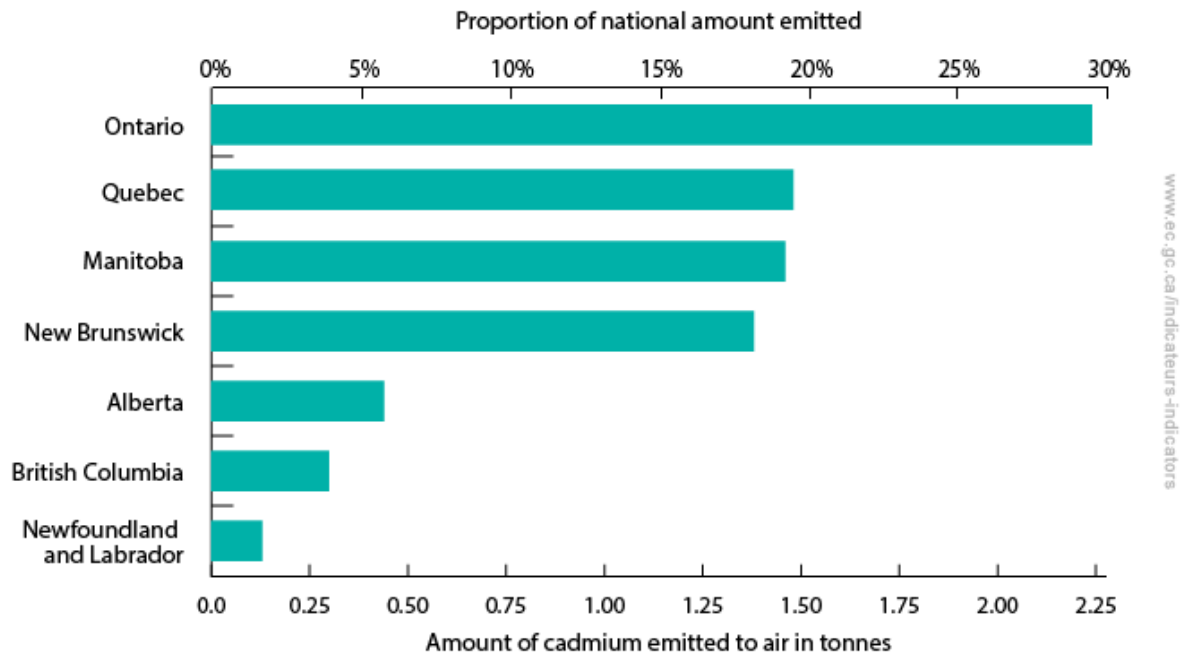
**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

<sup>15</sup> Wastewater treatment plants do not generate Cd. The source of Cd in wastewater treatment plant effluent is typically caused by industrial discharges to the sewer.

### Cadmium emissions to air by province and territory

Ontario had the highest Cd emissions level in 2014, representing 29% (2.2 t) of national emissions (7.6 t). Ontario's emissions mainly came from the non-ferrous smelting and refining, and mining industry. Quebec and Manitoba, with the second- and third-highest emission levels, accounted for 19% (1.5 t) of total national emissions. Non-ferrous smelting and refining was the most important source in both provinces. In Quebec, metal fabrication industry and the iron and steel industry were also important sources.

**Figure 17. Cadmium emissions to air by province and territory, Canada, 2014<sup>[A]</sup>**



[Data for Figure 17](#)

**Note:** The indicator only reports releases from human-related sources.

<sup>[A]</sup> Saskatchewan, Nova Scotia, Prince Edward Island, the Northwest Territories, Nunavut and Yukon are not shown in the chart due to their low emissions ( $\leq 0.1$  t).

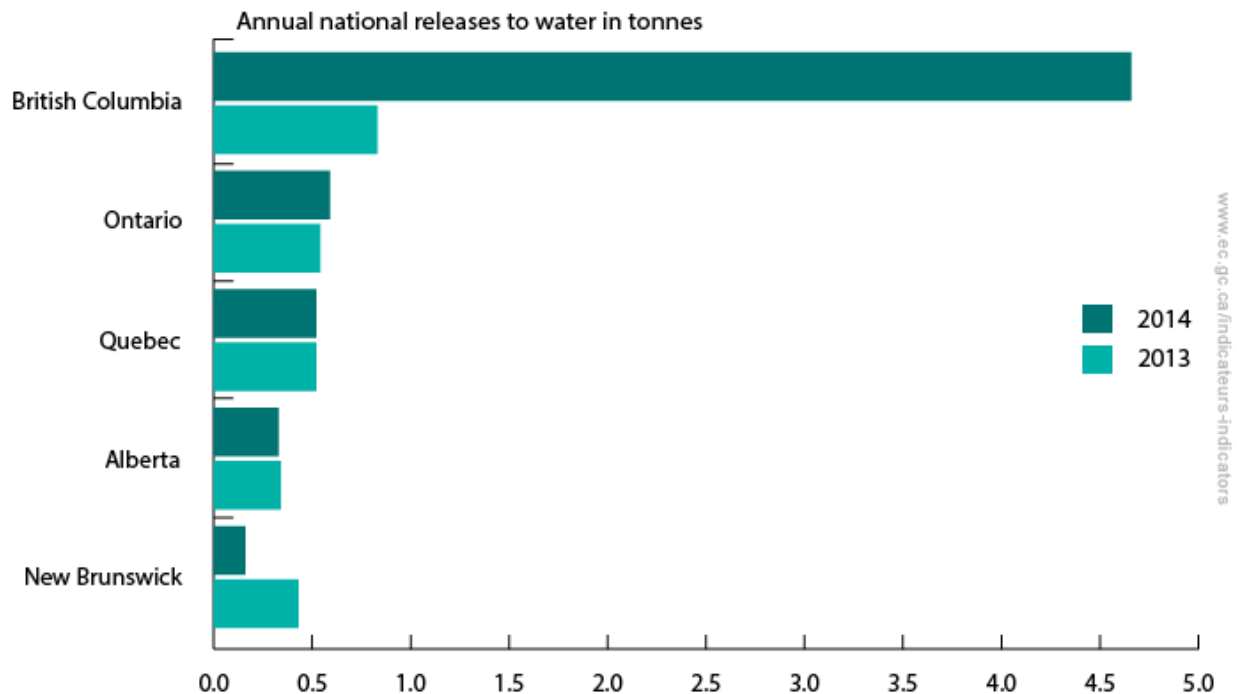
**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

### Releases of cadmium to water by province and territory

In 2014, British Columbia facilities accounted for about 73% of the total Cd releases to water in Canada. This high share is explained by the Mount Polley mine incident. Ontario and Quebec facilities contributed 0.6 t and 0.5 t respectively of the total Cd releases to water, mainly from wastewater treatment plants<sup>16</sup> and pulp, paper and paperboard industry. In 2013, British Columbia contributed less than 30% of total releases with Ontario accounting for more than 19%.

<sup>16</sup> Wastewater treatment plants do not generate Cd. The source of Cd in wastewater treatment plant effluent is typically caused by industrial discharges to the sewer.

**Figure 18. Releases of cadmium to water by province and territory, Canada, 2013 and 2014<sup>[A]</sup>**



[Data for Figure 18](#)

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental Cd in any compound, alloy or mixture reported in the NPRI based on the NPRI reporting criteria. As a result, the Cd releases represent only a portion of the releases of this toxic pollutant to water in Canada.

<sup>[A]</sup> Yukon did not report releases of Cd to the NPRI in 2013 and 2014. Manitoba, Prince Edward Island, Saskatchewan, Newfoundland and Labrador, Nova Scotia, the Northwest Territories and Nunavut are not shown in the chart due to their low releases ( $\leq 0.05$  t).

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

### Releases of cadmium from facilities

Environment and Climate Change Canada's NPRI provides detailed information on emissions and releases from industrial and commercial facilities that meet NPRI reporting criteria. The Canadian Environmental Sustainability Indicators (CESI) program provides access to this information through an online interactive map.

With the CESI interactive map, you can zoom in to local areas and obtain details on [Cd releases to water](#) from individual facilities.

**Source:** Environment and Climate Change Canada (2016) [National Pollutant Release Inventory Online Data Search – Facility Reported Data](#).



These indicators are used to measure progress towards [Target 4.8: Chemicals Management – Reduce risks to Canadians and impacts on the environment and human health posed by releases of harmful substances](#) of the [Federal Sustainable Development Strategy 2013–2016](#).



## Part 2. Data Sources and Methods for the Releases of Harmful Substances to the Environment Indicator

### Introduction

The [Releases of Harmful Substances to the Environment](#) indicators are part of the [Canadian Environmental Sustainability Indicators](#) (CESI) program, which provides data and information to track Canada's performance on key environmental sustainability issues. These indicators are also used to measure progress towards the goals and targets of the [Federal Sustainable Development Strategy 2013–2016](#).

### Description and rationale of the Releases of Harmful Substances to the Environment indicator

#### Description

The Releases of Harmful Substances to the Environment indicators track anthropogenic releases to air and water of three toxic substances: mercury, lead and cadmium and their compounds.

For each toxic substance, emissions to air are provided at the national and regional (provincial and territorial) level and by source. Facility and global emissions to air are also provided for mercury.

Releases to water for each toxic substance are provided at the national, regional (provincial and territorial) and facility level, and by source.

#### Rationale

Mercury and its compounds, lead and inorganic cadmium compounds are on the [Toxic Substances List](#) under Schedule 1 of the *Canadian Environmental Protection Act, 1999* (CEPA 1999). This means that these substances are "entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health."

The indicators inform Canadians about emissions to air and releases to water of these toxic substances from human activity in Canada. These indicators also help the government to identify priorities and develop or revise strategies to inform further risk management and to track progress on policies put in place to reduce or control air and water pollution.

#### Recent changes to the indicator

The Releases of Harmful Substances to the Environment indicators report air emission estimates that have been recalculated or updated for many different sources using improved emission estimation methods or refinements resulting in some changes to historical estimates. For more information about the recent changes consult the annex A2.3 of the [Air Pollutant Emission Inventory Report](#). Emissions to air at the provincial and territorial level were also included in this update.

# Data

## Data source

Air indicators reported in the Canadian Environmental Sustainability Indicators (CESI) program for mercury (Hg), lead (Pb) and cadmium (Cd) are based on emission estimates reported in the Air Pollutant Emission Inventory (APEI) compiled by Environment and Climate Change Canada. The [APEI Report](#) includes emissions reported by facilities to the National Pollutant Release Inventory (NPRI), as well as emissions estimated by Environment and Climate Change Canada using the latest estimation methods, published statistics or other sources of information such as surveys and reports. The APEI summaries and trends are compiled in collaboration with provincial, territorial and regional environmental agencies.

The releases of toxic substances to water indicators reported in CESI are taken from the [NPRI database](#), which is compiled by Environment and Climate Change Canada. The NPRI includes releases reported by industrial, commercial and institutional facilities. The indicators include the amounts of elemental Hg, Pb and Cd in any compound, alloy or mixture reported in the NPRI based on the [NPRI reporting criteria](#).

Mercury emissions for international comparison are from the [Global Mercury Assessment 2013: Sources, emissions, releases and environmental transport](#) report of the United Nations Environment Programme (UNEP).

Emissions and releases reported on the interactive map were retrieved from the [NPRI Downloadable Facility Datasets](#).

## Spatial coverage

The indicators provide national coverage and are also presented by province and territory. Mercury emissions to air and releases of Hg, Pb and Cd to water are displayed by facility on the [CESI interactive map](#). International data are presented only for Hg emissions to air.

## Temporal coverage

Historical data are provided at the national and source level for emissions to air (1990 to 2014) and for releases to water (2003 to 2014). The latest year available, 2014, is used for regional emissions to air and releases to water. The year 1990 was selected as the first year for heavy metals emissions to air because it is the base year for Canada's international commitment for reporting on heavy metals under the Convention on Long-Range Transboundary Air Pollution (CLRTAP). The year 2003 was selected as the first year for releases to water because this is the year the NPRI updated its reporting criteria for Hg, Pb, and Cd. International comparison of Hg emissions to air is provided for the latest year where data is available, 2010.

## Data completeness

The APEI Report is compiled to provide the best information available on all significant sources of key air pollutants. As such, improvements to data completeness are made periodically as new emission estimation methodologies are adopted and additional information is made available. The historical emissions are also updated to reflect these improvements.

Because the releases to water indicators are derived solely from the NPRI database, they only reflect releases from facilities that met [NPRI reporting criteria](#). As a result, the indicators do not include all releases in Canada, they are limited to the main point sources for each selected toxic substance.

### Data timeliness

The data are current up to 2014 (except as described in the Temporal coverage section above) for both emissions to air and releases to water. For air, the data are from the APEI's December 1, 2015 version of the dataset for the years 1990–2014. For water, the NPRI data used are from the September 8, 2015 version of the dataset. The indicators are reported approximately a year after data collection because of the time required for data validation, analysis and interpretation.

## Methods

The emissions to air of the Releases of Harmful Substances to the Environment indicators were obtained from the Air Pollutant Emission Inventory (APEI) data. The emissions to air indicators were summed for each source and for each province and territory for the years reported. The releases to water were calculated by summing the releases from the [National Pollutant Releases Inventory \(NPRI\) database](#). The releases to water indicators were summed for Canada, for each source, and for each province and territory for the years reported.

Emissions and releases are estimated or measured through one of the following methods:

- Continuous emission monitoring systems (CEMS)
- Predictive emission monitoring (PEM)
- Source testing
- Mass balance
- Site-specific emission factors
- Published emission factors
- Engineering estimates
- Special studies

These measurement methods and estimation techniques are used by the facilities to report their releases (point sources) to the NPRI. The source testing technique was the most common release estimation method used in the NPRI for the year 2014. Please consult the [Reporting to the National Pollutant Release Inventory](#) web page for more details on these calculation methods.

### Air emissions estimation methods

The methodologies used to estimate emissions are reviewed, updated and improved on a periodic basis. Collaborative work with sector experts from within and outside Environment and Climate Change Canada is undertaken to incorporate available expertise and the latest advancements in scientific knowledge. Further information on these methods is available through Environment and Climate Change Canada's [Air Pollutant Emission Inventory](#) website on air pollutant emissions, as well as through the document entitled [Air Pollutant Emission Inventory Report](#).

The APEI comprehensive emissions tables include four sources type: area, open, mobile, and point (stationary) sources. Emissions are compiled using top-down and bottom-up approaches, which are described below.

Area and open source emissions are sources too small or too numerous to be reported individually as point sources (e.g., dry cleaning, saw mills). They are usually compiled through a top-down approach using activity-level statistics and emission factors that are specific to the source. Activity data are multiplied by emission factors to estimate the emissions for the specific source.

Mobile source (transportation) emissions are compiled using a combination of bottom-up and top-down approaches. Emissions are estimated using models (e.g., Canadian version of United States Environmental Protection Agency [MOVES](#) and [NONROAD](#) models) that consider the number of vehicles, fuel consumed, distance travelled, technology used and many other parameters.

Point source emissions are compiled through a bottom-up approach starting with emissions from facilities. The facility information reported to the NPRI is used in combination with provincial information to compile the emissions from point sources.

Care is taken to avoid double counting of emissions for the same source. A reconciliation of the emissions is conducted when point source emissions are already accounted for in the area source estimates. In these cases, the area source estimates are modified (reduced or removed) to avoid double counting. A data quality control process is also in place to avoid discrepancies in the database, both in data compilation and in the production of summary tables.

### Source classification

The Canadian Environmental Sustainability Indicators (CESI) classifies emissions by summarizing emissions from multiple sources as defined in the APEI sectors. Table 1 shows the allocation of air pollutant emission sources reported by CESI with those reported by APEI.

**Table 1. Comparison of sources used in CESI and APEI for the emissions to air**

<b>CESI sources</b>	<b>APEI sectors</b>
Fuel for electricity and heating	Electric power generation (utilities)
	Commercial fuel combustion
	Residential fuel combustion
Home firewood burning	Residential fuel wood combustion
Incineration and miscellaneous	Agriculture
	Crematorium
	Construction operations
	Dust from paved roads
	Dust from unpaved roads
	Dust from coal mining
	Industrial and commercial incineration
	Mine tailings
	Municipal incineration
	Other incineration and utilities
	Cigarette smoking
	Dry cleaning
	General solvent use
	Marine cargo handling industry
	Meat cooking
	Prescribed burning
	Refined petroleum products retail
	Surface coatings
	Printing
	Structural fires
	Human
	Other miscellaneous sources

<b>CESI sources</b>	<b>APEI sectors</b>
Off-road vehicles	Off-road use of diesel
	Off-road use of gasoline / liquefied petroleum gas (LPG) / compressed natural gas (CNG)
Oil and gas industry	Upstream petroleum industry
	Downstream petroleum industry
Other industries	Aluminum industry
	Asphalt paving industry
	Cement and concrete industry <sup>[A]</sup>
	Chemicals industry
	Mineral products industry
	Foundries
	Grain industries
	Iron and steel industries <sup>[A]</sup>
	Iron ore mining industry
	Mining and rock quarrying
	Non-ferrous smelting and refining industry <sup>[A]</sup>
	Pulp and paper industry
	Wood industry
	Petroleum product transportation and distribution
	Other industries
	Abrasives manufacture
	Bakeries
	Metal fabrication
	Glass manufacture
	Vehicle manufacture (engines, parts, assembly, painting)
	Electronics
	Plastics manufacture
	Food preparation
	Paint and varnish formulation
	Textiles
	Miscellaneous industrial sectors
	Biofuel production
Transportation (road, rail, air, marine)	Air transportation
	Heavy-duty diesel vehicles
	Heavy-duty gasoline trucks
	Light-duty diesel trucks
	Light-duty diesel vehicles
	Light-duty gasoline trucks
	Light-duty gasoline vehicles
	Marine transportation
	Motorcycles
	Rail transportation
Waste	Tire wear and brake linings
	Waste

<sup>[A]</sup> These APEI sectors are sometimes shown as individual sources.

For display purposes, smaller emitting sources are sometimes grouped together under the title "Other sources" in the charts of air emissions by source. The names of the sources used are listed in the notes of each chart.

Source descriptions for the releases to water indicators were taken from the [North American Industry Classification System](#) (NAICS) used by Statistics Canada. The four-digit NAICS code, as reported by the facilities, was used for source classification.

**Table 2. Comparison of sources used in CESI and NPRI (NAICS) for releases to water**

<b>CESI Sources</b>	<b>NPRI Sources (NAICS)</b>
Non-ferrous smelting and refining	Non-ferrous metal (except aluminum) production and processing
Oil and gas industry	Oil and gas extraction
Other industries	Alumina and aluminum production and processing
	Basic chemical manufacturing
	Coal mining
	Coating, engraving, heat treating and allied activities
	Electrical equipment manufacturing
	Engine, turbine and power transmission equipment manufacturing
	Foundries
	Metal ore mining
	Motor vehicle parts manufacturing
	Non-metallic mineral mining and quarrying
	Other chemical product manufacturing
	Other electrical equipment and component manufacturing
	Other miscellaneous manufacturing
	Pesticide, fertilizer and other agricultural chemical manufacturing
	Petroleum and coal product manufacturing
	Pharmaceutical and medicine manufacturing
	Plastic product manufacturing
	Steel product manufacturing from purchased steel
	Veneer, plywood and engineered wood product manufacturing
Fuel for electricity and heating	Electric power generation, transmission and distribution
Other sources	Support activities for water transportation
	Other professional, scientific and technical services
Iron and steel industry	Iron and steel mills and ferro-alloy manufacturing
Cement and concrete industry	Cement and concrete product manufacturing
Pulp, paper and paperboard industry	Pulp, paper and paperboard mills
Waste	Water, sewage and other systems
	Remediation and other waste management services

For display purposes, smaller releasing sources are sometimes grouped together under the title "Other sources" in the charts of releases by source. The names of the sources used are listed in the notes of each chart.

## **Caveats and limitations**

### **Emissions to air**

Total emissions of mercury, lead and cadmium to air reported in the Releases of Harmful Substances to the Environment indicators exclude natural sources.

The methods used to estimate air pollutant emissions continue to evolve. Improvements are made every year to methodologies for estimating and compiling emissions summaries and analyzing trends. As a result of these improvements, emissions for a given year may be different from those previously published by Environment and Climate Change Canada, other governmental agencies and international organizations. Caution is advised when comparing different reports and different sources.

Some area source emissions were not updated for 2014 due to activity level statistics not available at the time of the compilation. In these cases, the emission estimates from the most recent year available (2013) were used.

Canada's Air Pollutant Emission Inventory (APEI) uses point source information from the National Pollutant Release Inventory (NPRI) and other sources. The version of the data published by the NPRI may not be identical to that used in the APEI. Some additions and corrections are done to the point source data in the APEI.

### **Releases to water**

The number and composition of facilities that report releases to water to the NPRI varies each year. This variation is due to the fact that only facilities that meet or exceed the reporting threshold should report to the NPRI. An analysis of how this might affect the apparent trends has not been undertaken.

Data reported to the NPRI by facilities may be updated from time to time by the reporter as new and more up-to-date information is received and reviewed. Facilities reporting to the NPRI may use different methods to calculate emissions. These methods vary depending on the substance and/or facility, and may also change from year to year.

The releases to water indicators only reflect the releases reported by facilities to the NPRI. They do not estimate or include potential releases from other sources in Canada.

### **International mercury emissions to air**

The Canadian mercury (Hg) emissions to air used for the international comparison were estimated with different estimation techniques and different source classifications than the Hg emissions to air used for the national indicators (Environment and Climate Change Canada). In addition, some air emissions sources were not quantified in the international Hg emissions; these include biofuel production and combustion, vinyl-chloride monomer production, secondary metals production and ferro-alloys, oil and gas extraction, transport and processing other than refinery emissions, industrial/hazardous waste incineration and disposal sewage sludge incineration, preparation of dental amalgam fillings and disposal of removed fillings containing Hg.

Even though the Canadian Hg emissions to air used for the comparison follows the same reporting structure as the [Global Mercury Assessment](#) report and uses the best data, measurements and methods available, users must be cautious when comparing the data, as emissions estimation methodologies differ among countries.

## Part 3. Annexes

### Annex A. Data tables for the figures presented in this document

**Table A.1. Data for Figure 1. Mercury, lead and cadmium emissions to air, Canada, 1990 to 2014**

Year	Mercury (change in annual emissions to air as a percentage of 1990 levels)	Lead (change in annual emissions to air as a percentage of 1990 levels)	Cadmium (change in annual emissions to air as a percentage of 1990 levels)
1990	0	0	0
1991	-1	-4	-10
1992	0	-1	-7
1993	-43	-35	-77
1994	-49	-34	-75
1995	-59	-29	-68
1996	-60	-22	-59
1997	-68	-39	-48
1998	-70	-47	-48
1999	-71	-54	-55
2000	-73	-56	-58
2001	-74	-59	-24
2002	-75	-63	-57
2003	-76	-69	-66
2004	-76	-74	-63
2005	-77	-78	-61
2006	-76	-76	-55
2007	-74	-76	-68
2008	-77	-78	-75
2009	-80	-80	-77
2010	-84	-83	-82
2011	-88	-87	-90
2012	-89	-88	-89
2013	-88	-90	-90
2014	-89	-89	-92

**Note:** The indicator only reports releases from human-related sources.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).



**Table A.2. Data for Figure 2. Releases of mercury, lead and cadmium to water, Canada, 2003 to 2014**

Year	Mercury (change in annual releases to water as a percentage of 2003 levels)	Lead (change in annual releases to water as a percentage of 2003 levels)	Cadmium (change in annual releases to water as a percentage of 2003 levels)
2003	0	0	0
2004	-11	-14	-6
2005	41	-13	-31
2006	-10	-21	-24
2007	-33	-41	-24
2008	-45	-14	-49
2009	-10	-32	-35
2010	-32	-22	-45
2011	-6	-29	-43
2012	-53	-42	-45
2013	-44	-47	-44
2014	518	499	29

**Note:** The indicator only reports releases from human-related sources. This table accounts only for the releases to water reported in the NPRI based on the NPRI reporting criteria for releases of mercury, lead and cadmium and their compounds. These amounts should not be interpreted as comprehensive totals of releases to water of these pollutants in Canada.

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

**Table A.3. Data for Figure 3. Releases of mercury to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water)**

Year	Mercury (annual national emissions to air in tonnes)	Mercury (annual national releases to water in tonnes)
1990	34.7	no data
1991	34.4	no data
1992	34.6	no data
1993	19.9	no data
1994	17.6	no data
1995	14.4	no data
1996	13.9	no data
1997	11.1	no data
1998	10.3	no data
1999	10.0	no data
2000	9.3	no data
2001	9.1	no data
2002	8.7	no data
2003	8.2	0.38
2004	8.3	0.33
2005	7.9	0.53
2006	8.2	0.34
2007	9.0	0.25

Year	Mercury (annual national emissions to air in tonnes)	Mercury (annual national releases to water in tonnes)
2008	7.8	0.21
2009	6.9	0.34
2010	5.7	0.26
2011	4.2	0.35
2012	3.9	0.18
2013	4.0	0.21
2014	3.9	2.32

**Note:** The indicator only reports releases from human-related sources. The mercury (Hg) releases in water indicator includes the amount of elemental Hg in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Hg releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#). Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

**Table A.4. Data for Figure 4. Mercury emissions to air by source, Canada, 1990 to 2014**

Year	Fuel for electricity and heating (tonnes)	Incineration and miscellaneous (tonnes)	Waste (tonnes)	Iron and steel industry (tonnes)	Other industries (tonnes)	Cement and concrete industry (tonnes)	Non- ferrous smelting and refining (tonnes)	Other sources (tonnes)
1990	2.36	2.15	2.40	0.71	1.55	0.46	24.90	0.16
1991	2.23	2.18	2.48	0.58	1.53	0.38	24.87	0.15
1992	2.47	2.26	2.61	0.44	1.54	0.36	24.78	0.16
1993	2.26	2.21	2.49	0.32	1.47	0.37	10.63	0.16
1994	2.18	2.24	2.54	0.35	1.45	0.41	8.26	0.16
1995	2.11	2.17	2.82	0.55	1.51	0.41	4.65	0.15
1996	2.23	1.97	1.48	0.48	1.46	0.44	5.68	0.15
1997	2.37	1.63	1.22	0.56	1.36	0.45	3.39	0.15
1998	2.49	1.40	1.01	0.56	1.36	0.45	2.84	0.15
1999	2.49	1.31	0.99	0.97	1.32	0.47	2.28	0.15
2000	2.18	0.99	1.40	0.94	1.31	0.39	1.94	0.15
2001	2.22	1.19	1.22	0.96	0.89	0.37	2.12	0.15
2002	2.20	1.17	1.10	1.04	0.90	0.37	1.75	0.14
2003	2.51	1.19	0.82	1.01	0.92	0.35	1.29	0.14
2004	2.45	1.17	0.78	0.82	0.81	0.22	1.90	0.14
2005	2.30	1.44	0.70	0.66	0.74	0.21	1.70	0.14
2006	2.13	1.35	0.98	0.96	0.92	0.43	1.28	0.14
2007	2.31	2.04	1.01	0.88	0.82	0.33	1.42	0.15
2008	1.76	1.92	0.98	0.87	0.83	0.30	1.01	0.15
2009	1.80	1.57	0.90	0.71	0.71	0.30	0.84	0.11
2010	1.70	1.37	0.59	0.42	0.63	0.32	0.54	0.12
2011	1.14	0.95	0.68	0.46	0.37	0.30	0.21	0.13

Year	Fuel for electricity and heating (tonnes)	Incineration and miscellaneous (tonnes)	Waste (tonnes)	Iron and steel industry (tonnes)	Other industries (tonnes)	Cement and concrete industry (tonnes)	Non-ferrous smelting and refining (tonnes)	Other sources (tonnes)
2012	0.98	0.75	0.63	0.55	0.37	0.30	0.25	0.13
2013	0.97	0.73	0.55	0.59	0.37	0.31	0.36	0.13
2014	0.89	0.78	0.61	0.59	0.32	0.30	0.29	0.13

**Note:** The indicator only reports releases from human-related sources. Other sources include transportation, off-road vehicles and home firewood burning. For more details on the sources please consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

**Table A.5. Data for Figure 5. Releases of mercury to water by source, Canada, 2003 to 2014**

Year	Other industries (tonnes)	Waste (tonnes)	Pulp, paper and paperboard industry (tonnes)	Non-ferrous smelting and refining (tonnes)	Fuel for electricity and heating (tonnes)	Other sources (tonnes)
2003	0.01	0.30	0.02	0.01	0.02	< 0.01
2004	0.02	0.27	0.02	0.01	0.01	< 0.01
2005	0.01	0.43	0.01	0.05	0.02	< 0.01
2006	0.01	0.23	0.03	0.06	0.01	no data
2007	0.02	0.17	0.03	0.03	0.01	< 0.01
2008	0.02	0.15	0.02	0.01	0.01	< 0.01
2009	0.07	0.16	0.08	0.01	0.01	no data
2010	0.02	0.14	0.07	0.02	0.01	no data
2011	0.10	0.17	0.07	0.01	< 0.01	no data
2012	0.03	0.10	0.04	0.01	< 0.01	no data
2013	0.04	0.12	0.04	0.01	< 0.01	no data
2014	2.18	0.09	0.05	0.01	< 0.01	no data

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental mercury (Hg) in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Hg releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Other sources include transportation (road, rail, air, marine). Other industries also include oil and gas industry, iron and steel industry, and cement and concrete industry. For more details on the sources, consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

**Table A.6. Data for Figure 6. Mercury emissions to air by province and territory, Canada, 2014<sup>[A]</sup>**

Province or territory	Mercury emissions (tonnes)	Percentage of national emissions
-----------------------	----------------------------	----------------------------------

Province or territory	Mercury emissions (tonnes)	Percentage of national emissions
Ontario	1.13	29.0
Quebec	0.76	19.6
Alberta	0.65	16.8
Saskatchewan	0.57	14.6
British Columbia	0.36	9.4
New Brunswick	0.16	4.1
Nova Scotia	0.11	2.8
Manitoba	0.07	1.9
Newfoundland and Labrador	0.06	1.4
Prince Edward Island	0.01	0.3
Northwest Territories	< 0.01	0.1
Yukon	< 0.01	< 0.1
Nunavut	< 0.01	< 0.1
Canada	3.88	100

**Note:** The indicator only reports releases from human-related sources.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

**Table A.7. Data for Figure 7. Releases of mercury to water by province and territory, Canada, 2013 and 2014<sup>[A]</sup>**

Province or territory	2013 mercury releases (tonnes)	2013 percentage of national releases	2014 mercury releases (tonnes)	2014 percentage of national releases
British Columbia	0.02	10.9	2.17	93.5
Alberta	0.06	26.5	0.07	3.0
Ontario	0.07	33.4	0.03	1.3
Northwest Territories	0.02	11.7	0.02	0.9
Quebec	0.02	11.3	0.02	0.9
New Brunswick	0.01	5.6	0.01	0.3
Manitoba	< 0.01	0.3	< 0.01	< 0.1
Nova Scotia	< 0.01	0.3	< 0.01	< 0.1
Newfoundland and Labrador	< 0.01	<0.1	< 0.01	< 0.1
Saskatchewan	< 0.01	<0.1	< 0.01	< 0.1
Canada	0.21	100	2.32	100

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental mercury (Hg) in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the Hg releases represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

**Table A.8. Data for Figure 8. Global mercury emissions to air, 2010**

Regions	Mercury emissions (tonnes)	Percentage of global emissions
East and Southeast Asia	777.0	39.7
Sub-Saharan Africa	316.0	16.1
South America	245.0	12.5
South Asia	154.0	7.9
Commonwealth of Independent States (CIS) and other European countries	115.0	5.9
European Union (EU27)	87.5	4.5
North America	60.7	3.1
Central America and the Caribbean	47.2	2.4
Middle Eastern States	37.0	1.9
Australia, New Zealand & Oceania	22.3	1.1
North Africa	13.6	0.7
Undefined	82.0	4.2

**Note:** The CIS includes Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Ukraine. The Undefined region includes emissions from contaminated sites.

**Source:** United Nations Environmental Program (UNEP) Chemicals Branch (2013) [Global Mercury Assessment 2013: Sources, emissions, releases, and environmental transport](#).

**Table A.9. Data for Figure 9. Releases of lead to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water)**

Year	Lead (annual national emissions to air in tonnes)	Lead (annual national releases to water in tonnes)
1990	1289.1	no data
1991	1240.5	no data
1992	1282.3	no data
1993	840.4	no data
1994	854.9	no data
1995	921.4	no data
1996	1008.9	no data
1997	785.7	no data
1998	684.5	no data
1999	590.4	no data
2000	570.7	no data
2001	526.1	no data
2002	470.9	no data
2003	395.6	24.3
2004	330.1	20.8
2005	278.3	21.3
2006	311.0	19.1

Year	Lead (annual national emissions to air in tonnes)	Lead (annual national releases to water in tonnes)
2007	306.5	14.3
2008	282.8	21.0
2009	257.7	16.5
2010	219.0	18.9
2011	166.0	17.2
2012	156.2	14.0
2013	129.5	12.9
2014	136.4	145.8

**Note:** The indicator only reports lead (Pb) releases from human-related sources. The releases in water indicator includes the amount of elemental Pb in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Pb releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#). Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

**Table A.10. Data for Figure 10. Lead emissions to air by source, Canada, 1990 to 2014**

Year	Non-ferrous smelting and refining (tonnes)	Transportation (road, rail, air, marine) (tonnes)	Other industries (tonnes)	Iron and steel industry (tonnes)	Other sources (tonnes)
1990	886.2	79.0	252.2	53.9	17.8
1991	847.5	60.1	261.1	53.9	18.0
1992	899.2	54.2	256.5	53.9	18.5
1993	476.1	54.0	238.4	53.9	18.0
1994	508.2	53.4	220.8	53.9	18.5
1995	630.7	59.6	164.3	48.5	18.3
1996	704.0	58.0	173.3	53.9	19.8
1997	593.7	54.7	71.5	46.8	19.0
1998	527.4	56.4	35.4	45.5	19.8
1999	464.7	51.8	47.5	7.6	18.7
2000	464.5	52.1	31.6	3.5	19.0
2001	397.7	51.2	60.7	8.8	7.7
2002	371.3	50.5	32.6	8.5	8.0
2003	285.6	45.6	37.0	18.7	8.7
2004	230.8	41.7	33.5	16.6	7.5
2005	185.6	48.2	32.1	5.7	6.7
2006	224.4	43.2	28.9	5.9	8.7
2007	216.3	44.9	29.2	6.6	9.6
2008	193.6	43.5	29.2	6.0	10.6

Year	Non-ferrous smelting and refining (tonnes)	Transportation (road, rail, air, marine) (tonnes)	Other industries (tonnes)	Iron and steel industry (tonnes)	Other sources (tonnes)
2009	181.1	41.4	24.3	4.5	6.5
2010	140.8	37.4	27.4	6.3	7.2
2011	96.2	30.7	25.8	6.1	7.3
2012	88.4	37.5	16.5	6.6	7.2
2013	74.9	31.8	12.3	5.1	5.3
2014	85.5	27.5	12.2	6.1	5.2

**Note:** The indicator only reports releases from human-related sources. The category Other sources includes fuel for electricity and heating, home firewood burning, waste, and incineration and miscellaneous. For more details on the sources, consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

**Table A.11. Data for Figure 11. Releases of lead to water by source, Canada, 2003 to 2014**

Year	Other industries (tonnes)	Waste (tonnes)	Pulp, paper and paperboard industry (tonnes)	Non-ferrous smelting and refining (tonnes)	Other sources (tonnes)
2003	4.38	15.49	2.55	1.74	0.18
2004	3.97	11.53	2.84	2.26	0.26
2005	6.11	9.47	3.29	1.82	0.58
2006	5.00	9.90	2.35	1.65	0.24
2007	3.63	6.42	2.37	1.64	0.19
2008	4.76	11.58	2.42	2.04	0.16
2009	3.39	8.49	2.25	2.13	0.19
2010	3.21	11.97	2.12	1.45	0.14
2011	3.65	8.97	2.91	1.50	0.16
2012	4.66	4.69	2.80	1.75	0.12
2013	4.17	4.66	2.42	1.48	0.13
2014	136.92	5.11	1.85	1.77	0.13

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental lead (Pb) in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Pb releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Other sources include, transportation (road, rail, air, marine), and fuel for electricity and heating. Other industries include iron and steel industry, oil and gas industry and cement and concrete industry. For more details on the sources, consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

**Table A.12. Data for Figure 12. Lead emissions to air by province and territory, Canada, 2014<sup>[A]</sup>**

Province or territory	Lead emissions (tonnes)	Percentage of national emissions
Quebec	56.84	41.7
Ontario	42.65	31.3
New Brunswick	9.83	7.2
British Columbia	9.15	6.7
Alberta	6.10	4.5
Manitoba	3.75	2.8
Saskatchewan	3.23	2.4
Newfoundland and Labrador	2.78	2.0
Northwest Territories	1.00	0.7
Nova Scotia	0.58	0.4
Yukon	0.25	0.2
Nunavut	0.13	0.1
Prince Edward Island	0.12	0.1
Canada	136.42	100

**Note:** The indicator only reports releases from human-related sources.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

**Table A.13. Data for Figure 13. Releases of lead to water by province and territory, Canada, 2013 and 2014<sup>[A]</sup>**

Province or territory	2013 lead releases (tonnes)	2013 percentage of national releases	2014 lead releases (tonnes)	2014 percentage of national releases
British Columbia	2.92	22.7	137.54	94.3
Ontario	3.56	27.7	3.76	2.6
Quebec	3.23	25.1	2.70	1.9
Alberta	1.27	9.9	0.53	0.4
New Brunswick	1.03	8.0	0.40	0.3
Newfoundland and Labrador	0.46	3.5	0.33	0.2
Manitoba	0.27	2.1	0.31	0.2
Saskatchewan	0.10	0.8	0.13	0.1
Nova Scotia	0.01	0.1	0.07	< 0.1
Prince Edward Island	<0.01	<0.1	0.02	<0.1
Nunavut	0.01	0.1	<0.01	<0.1
Northwest Territories	<0.01	<0.1	<0.01	<0.1
Canada	12.87	100	145.78	100

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental lead (Pb) in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the Pb releases represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).



**Table A.14. Data for Figure 14. Releases of cadmium to air and water, Canada, 1990 to 2014 (air) and 2003 to 2014 (water)**

Year	Cadmium (annual national emissions to air in tonnes)	Cadmium (annual national releases to water in tonnes)
1990	90.7	no data
1991	81.7	no data
1992	84.6	no data
1993	20.5	no data
1994	22.8	no data
1995	28.8	no data
1996	37.5	no data
1997	46.9	no data
1998	47.0	no data
1999	41.2	no data
2000	37.7	no data
2001	68.9	no data
2002	39.0	no data
2003	31.2	4.94
2004	33.2	4.64
2005	35.0	3.40
2006	41.0	3.74
2007	28.9	3.75
2008	22.9	2.54
2009	21.3	3.21
2010	16.5	2.74
2011	8.7	2.79
2012	9.8	2.74
2013	8.7	2.79
2014	7.6	6.37

**Note:** The indicator only reports releases from human-related sources. The cadmium (Cd) releases in water indicator includes the amount of elemental Cd in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Cd releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#). Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

**Table A.15. Data for Figure 15. Cadmium emissions to air by source, Canada, 1990 to 2014**

Year	Non-ferrous smelting and refining (tonnes)	Other industries (tonnes)	Fuel for electricity and heating (tonnes)	Iron and steel industry (tonnes)	Transportation (road, rail, air, marine) (tonnes)	Other sources (tonnes)
1990	78.3	3.6	1.0	0.1	0.3	7.3
1991	67.8	5.8	1.0	0.2	0.3	6.6
1992	69.2	7.9	1.0	0.2	0.3	5.9

Year	Non-ferrous smelting and refining (tonnes)	Other industries (tonnes)	Fuel for electricity and heating (tonnes)	Iron and steel industry (tonnes)	Transportation (road, rail, air, marine) (tonnes)	Other sources (tonnes)
1993	11.9	1.7	1.1	0.3	0.3	5.2
1994	13.0	3.5	1.1	0.3	0.3	4.6
1995	17.3	5.9	1.2	0.2	0.3	3.9
1996	24.6	8.0	1.2	0.2	0.3	3.2
1997	41.0	1.6	1.2	0.2	0.3	2.5
1998	42.2	1.5	1.0	0.1	0.3	1.8
1999	36.6	1.8	1.1	0.2	0.4	1.1
2000	34.1	1.5	1.1	0.2	0.4	0.4
2001	65.2	1.6	1.1	0.2	0.4	0.3
2002	35.8	1.1	1.2	0.2	0.4	0.3
2003	27.0	1.3	1.6	0.6	0.4	0.3
2004	29.0	1.5	1.3	0.7	0.4	0.3
2005	31.1	1.6	1.2	0.3	0.4	0.3
2006	37.3	1.6	1.1	0.3	0.4	0.3
2007	24.8	1.6	1.4	0.3	0.4	0.3
2008	19.4	1.1	1.4	0.3	0.4	0.4
2009	17.4	1.8	1.3	0.2	0.4	0.4
2010	12.7	1.6	1.3	0.3	0.4	0.3
2011	4.8	1.3	1.7	0.2	0.3	0.3
2012	6.2	1.3	1.4	0.3	0.3	0.3
2013	5.3	1.3	1.3	0.2	0.2	0.3
2014	4.6	1.2	1.0	0.3	0.2	0.3

**Note:** The indicator only reports releases from human-related sources. The category other sources includes home firewood burning, incineration and miscellaneous, and waste. For more details on the sources, consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

**Table A.16. Data for Figure 16. Releases of cadmium to water by source, Canada, 2003 to 2014**

Year	Other industries (tonnes)	Waste (tonnes)	Pulp, paper and paperboard industry (tonnes)	Non-ferrous smelting and refining (tonnes)	Other sources (tonnes)
2003	0.45	3.19	1.00	0.25	0.05
2004	1.10	2.26	0.94	0.30	0.04
2005	0.70	1.39	0.92	0.35	0.05
2006	0.88	1.45	1.07	0.32	0.02
2007	0.69	1.11	1.10	0.82	0.03
2008	0.43	0.98	0.77	0.35	0.02

Year	Other industries (tonnes)	Waste (tonnes)	Pulp, paper and paperboard industry (tonnes)	Non-ferrous smelting and refining (tonnes)	Other sources (tonnes)
2009	0.61	1.26	0.71	0.59	0.04
2010	0.52	1.21	0.70	0.28	0.02
2011	0.33	1.36	0.78	0.31	0.02
2012	0.35	1.23	0.82	0.32	0.01
2013	0.42	0.90	1.10	0.35	0.01
2014	4.12	0.97	0.96	0.32	0.01

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental cadmium (Cd) in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the reported Cd releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Other sources include fuel for electricity and heating and transportation (road, rail, air, marine). Other industries also include iron and steel industry, oil and gas industry, and cement and concrete industry. For more details on the sources, consult the [Data Source and Methods](#).

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

**Table A.17. Data for Figure 17. Cadmium emissions to air by province and territory, Canada, 2014<sup>[A]</sup>**

Province or territory	Cadmium emissions (tonnes)	Percentage of national emissions
Ontario	2.24	29.4
Quebec	1.48	19.5
Manitoba	1.46	19.2
New Brunswick	1.38	18.1
Alberta	0.44	5.8
British Columbia	0.30	3.9
Newfoundland and Labrador	0.13	1.7
Saskatchewan	0.09	1.2
Nova Scotia	0.07	1.0
Prince Edward Island	0.01	0.1
Northwest Territories	< 0.01	0.1
Nunavut	< 0.01	< 0.1
Yukon	< 0.01	< 0.1
Canada	7.62	100

**Note:** The indicator only reports releases from human-related sources.

**Source:** Environment and Climate Change Canada (2016) [Air Pollutant Emission Inventory](#).

**Table A.18. Data for Figure 18. Releases of cadmium to water by province and territory, Canada, 2013 and 2014<sup>[A]</sup>**

Province or territory	2013 cadmium releases (tonnes)	2013 percentage of national releases	2014 cadmium releases (tonnes)	2014 percentage of national releases
British Columbia	0.83	29.7	4.66	73.2
Ontario	0.54	19.2	0.59	9.2
Quebec	0.52	18.5	0.52	8.2
Alberta	0.34	12.2	0.33	5.2
New Brunswick	0.43	15.4	0.16	2.5
Manitoba	0.03	1.2	0.05	0.7
Prince Edward Island	0.01	0.5	0.04	0.7
Saskatchewan	0.02	0.7	0.01	0.1
Newfoundland and Labrador	0.07	2.4	0.01	0.1
Nova Scotia	<0.01	0.1	0.01	0.1
Northwest Territories	< 0.01	<0.1	< 0.01	< 0.1
Nunavut	< 0.01	<0.1	< 0.01	< 0.1
Canada	2.79	100	6.37	100

**Note:** The indicator only reports releases from human-related sources. The indicator includes the amount of elemental cadmium (Cd) in any compound, alloy or mixture reported in the National Pollutant Release Inventory (NPRI) based on the NPRI reporting criteria. As a result, the Cd releases represent only a portion of the releases of this toxic pollutant to water in Canada.

**Source:** Environment and Climate Change Canada (2016) [Overview of Reviewed Facility-Reported Data of the National Pollutant Release Inventory \(NPRI\) 2014](#).

## Annex B. References and additional information

### References and further reading

Environment and Climate Change Canada (2015) [Air Pollutant Emission Inventory Database](#). Retrieved on February 15, 2016.

Environment and Climate Change Canada (2015) [Air Pollutant Emission Inventory \(APEI\) Report](#). Retrieved on February 15, 2016.

Environment and Climate Change Canada (2015) [Guide for Using and Interpreting National Pollutant Release Inventory \(NPRI\) Data](#). Retrieved in March, 2015.

Environment and Climate Change Canada (2015) [National Pollutant Release Inventory – Pollution Data and Reports](#). Retrieved in March, 2016.

Environment and Climate Change Canada (2014) [National Pollutant Release Inventory Datasets](#). September 2015 version. Retrieved in March, 2016.

United Nations (2013) [Global Mercury Assessment 2013: Sources, emissions, releases and environmental transport](#). Retrieved in April, 2013.

### Related information

[Canadian Mercury Science Assessment](#)

[Chemical Substances – Lead](#)

[Chemical Substances – Mercury and its Compounds](#)

[Federal Actions on Mercury](#)

[List of Toxic Substances Managed under CEPA, 1999 \(Schedule 1\) – Cadmium](#)

[List of Toxic Substances Managed under CEPA, 1999 \(Schedule 1\) – Lead](#)

[Mercury and the Environment](#)

[Risk Management Strategy for Lead](#)

**[www.ec.gc.ca](http://www.ec.gc.ca)**

Additional information can be obtained at:

Environment and Climate Change Canada  
Public Inquiries Centre  
7th Floor, Fontaine Building  
200 Sacré-Coeur boul.  
Gatineau, QC K1A 0H3  
Telephone: 1-800-668-6767 (in Canada only) or 819-938-3860  
Fax: 819-994-1412  
TTY: 819-994-0736  
Email: [ec.enviroinfo.ec@canada.ca](mailto:ec.enviroinfo.ec@canada.ca)