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# Environmental Protection Expenditures in the Business Sector



2004



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Statistics Canada  
Environment Accounts and Statistics Division

# Environmental Protection Expenditures in the Business Sector

2004

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## Symbols

The following standard symbols are used in Statistics Canada publications:

- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0<sup>s</sup> value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- p preliminary
- r revised
- x suppressed to meet the confidentiality requirements of the *Statistics Act*
- E use with caution
- F too unreliable to be published

## Acknowledgements

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This report was prepared by the Environment Accounts and Statistics Division under the direction of **Rob Smith**, Director and **Bruce Mitchell**, Chief, Environmental Protection Accounts and Surveys. Data collection for this survey was conducted by the Operations and Integration Division (**Catherine Bois**, Director) and the Environment Accounts and Statistics Division.

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## Preface

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This publication presents estimates from the Survey of Environmental Protection Expenditures, 2004. The survey covers capital and operating expenditures made in 2004 by businesses in order to anticipate or to respond to environmental regulations, environmental conventions or voluntary agreements.

Environmental regulations, current and anticipated, play a major role in the evolution of industry spending on environmental protection. Governments in Canada impose various environmental regulations regarding the prevention or reduction of air emissions, effluents, solid waste, as well as the protection of wildlife and habitat. However, industry spending on environmental protection may also be affected by environmental conventions and voluntary agreements between governments and industry representatives. These are increasingly important and include specific actions on pollution prevention or abatement.

The Survey of Environmental Protection Expenditures (SEPE) tries to fill gaps in the data regarding the cost to industry of environmental protection and the demand for associated environmental products and services. In addition to covering business expenditures on environmental protection, SEPE, since 1997, has been broadened to cover the adoption of environmental management practices, pollution prevention practices and environmental technologies. Beginning reference year 1998, SEPE has been changed from an annual to a biennial survey, partly in an effort to reduce respondent burden.

In 2002, SEPE introduced new material with the purpose of collecting data on industry's initiatives with respect to greenhouse gas emission reductions. The material was developed as part of a multi-departmental working group funded through the federal government's Action Plan 2000.

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## Highlights

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- Canadian industry reported \$6.8 billion in expenditures to protect the environment in 2004, virtually unchanged from 2002. These results follow substantial increases in expenditures from 2000 to 2002. Although total expenditures did not change, businesses spent more on pollution prevention and site reclamation and decommissioning projects but less on end-of-pipe pollution abatement and control projects. Energy-related industries were responsible for much of the increase in investments from 2000 to 2002. Although the petroleum and coal products industry continued to increase investments in environmental protection, the mining, primary metals and non-metallic mineral products industries were the other industries to report increased investments over 2002.



# Analysis

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## Environmental protection expenditure tables

Canadian companies spent \$6.8 billion to protect the environment in 2004, virtually unchanged from 2002 figures.

Overall, there was little change in total capital expenditures (\$2.9 billion, -1.0%) and operating expenses (\$3.8 billion, +0.1%) for environmental protection between 2002 and 2004.

Pollution prevention accounted for more than half (53%) of environmental capital expenditures in 2004, up from 50% in 2002. On the other hand, pollution abatement and control (end-of-pipe processes) accounted for 25% of capital expenditures on environmental protection, down from 32% in 2002.

While capital expenditures on pollution prevention increased \$80.8 million to \$1.5 billion, capital expenditures on end-of-pipe processes declined by \$251.6 million to \$0.71 billion. Industry reported \$1.5 billion for pollution abatement and control operating expenses, a decline of \$197.7 million compared to 2002.<sup>1</sup>

Environmental protection expenditures showed more variability at the industry level, where in some industries expenditures increased by over 20% while in others expenditures fell by more than 20%.

The Petroleum and Coal industry continued to upgrade their refineries to meet new sulphur regulations, increasing their capital investments from \$811 million in 2002 (a 35% increase from 2000) to \$933 million in 2004 (+15%). The largest investments were for pollution prevention equipment (\$779.5 million), followed by pollution abatement and control equipment (\$93.1 million).

The Mining industry reported significant increases in investments in pollution abatement and control equipment in 2004 compared with 2002, up \$49.6 million to \$85.9 million, while pollution prevention investments reached \$51.8 million, an increase of \$20.6 million. Expenditures were made for projects such as site decommissioning and water treatment.

The Electric Power Generation, Transmission and Distribution industry experienced a significant decline in environmental protection expenditures in 2004 compared to 2002 (from \$837.7 million to \$507.8 million). With the exception of capital investments in environmental assessments and audits, where expenditures increased \$69.4 million to \$96.3 million, most other expenditures declined. The largest decline occurred in capital investments, which shrunk from \$511.9 million in 2002 to \$282.5 million in 2004 (-44.8%). Much of the decline was due to smaller investments in end-of-pipe and pollution prevention capital projects.

Businesses spent \$955 million in 2004 on technologies that reduced greenhouse gas emissions (GHG), down from \$1.1 billion in 2002. The distribution of expenditures also changed between 2002 and 2004. Although operating expenditures increased from \$523.0 million to \$575.8 million, this increase was more than offset by a 35% decline in capital investments made to reduce greenhouse gas emissions from \$583.3 million in 2002 to \$379.3 million in 2004.

Oil and gas extraction companies invested \$124.8 million to reduce GHG emissions in 2004. Although this was the largest amount spent compared to the 15 other industry groups surveyed, it also represented a decrease of 46% compared to 2002. The Wood Products industry was the second largest investor at \$45.9 million, up from \$19.3 million in 2002. The Electric Power Generation, Transmission and Distribution industry accounted for \$21.2 million in GHG emission reduction investments, down from \$98.8 million in 2002.

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1. Proportions do not include the 'other manufacturing' industry category.

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## Environmental management and technology tables

Approximately one-third of businesses reported they used an energy management or monitoring system in 2004 while slightly fewer (29%) indicated they had performed an energy audit in the last three years. A similar proportion of businesses (33%) indicated that they realized cost savings as a result of adopting environmental management practices or technologies in 2004.

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Table 17, Pollution prevention methods by industry, 2004.

Table 18, Pollution prevention methods by province or territory, 2004.

Table 19, Distribution of pollution prevention methods by establishment size, 2004.

Table 20, Distribution of environmental technology use, 2004.

Table 21, Distribution of companies that reported cost savings as a result of adopting environmental management practices by establishment size, 2004.

## Greenhouse gas emission reduction technology tables

One quarter of companies (26%) in the 16 industry groups surveyed indicated they adopted new or significantly improved systems or equipment to reduce greenhouse gas emissions in 2004. Companies in the Oil and Gas

Extraction industry were most likely (63%) to have adopted new or significantly improved systems or equipment followed by the Natural Gas Distribution industry (53%). Overall, almost half of companies indicated the impact on GHG emissions was low.

Across most industries, sufficient return on investment was cited as the most compelling reason to adopt innovative technologies to reduce greenhouse gas emissions, followed by corporate policy. The greatest obstacle cited was the high cost of equipment.

As in 2002, the majority of capital expenditures on pollution abatement and control (PAC) and pollution prevention in 2004 were directed towards the treatment of emissions to air. Directing the majority of investments to reduce air pollution is a continuation of the trend seen in previous survey cycles.

There was little change in the use of technologies to improve energy efficiency and reduce greenhouse gas emissions in 2004 compared to 2002. For example, the use of cogeneration, wind energy systems, solar energy systems and fuel substitution stayed virtually the same while the use of alternative fuel systems or equipment increased slightly, from 5% to 8%.

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Table 22, Proportion of establishments in fossil-fuel related industries that reported greenhouse gas emissions reductions, 2004.

Table 23, Adoption and impact of new or significantly improved systems or equipment to reduce greenhouse gas emissions by industry, 2004.

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Table 31, Energy conservation processes and technologies by industry, 2004.

Table 32, Energy conservation processes and technologies by province or territory, 2004.

Table 33, Distribution of energy conservation processes and technologies by establishment size, 2004.

## Related products

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### Selected publications from Statistics Canada

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16F0006P	Environmental Protection Expenditures in the Business Sector, Preliminary Data
16F0024X	Environmental Management and Technologies in the Business Sector

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### Selected surveys from Statistics Canada

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1903	Survey of Environmental Protection Expenditures
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### Selected summary tables from Statistics Canada

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- *Expenditures on environmental protection by industry and activity*

# Statistical tables

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**Table 1**  
**Capital expenditures on environmental protection by industry, 2004**

	Pollution prevention, abatement and control expenditures (PPAC) <sup>1</sup>	Other environmental protection expenditures <sup>2</sup>	Total	Share of total
	millions of dollars			percent
Logging	0.8	1.5	2.3	0.1
Oil and gas extraction	292.7	268.7	561.4	19.2
Mining	139.4	31.1	170.6	5.8
Electric power generation, transmission and distribution	158.1	124.3	282.5	9.7
Natural gas distribution	10.3	4.0	14.3	0.5
Food	76.8	4.4	81.1	2.8
Beverage and tobacco products	10.6	0.0 <sup>s</sup>	10.6	0.4
Wood products	79.1	1.4	80.4	2.8
Pulp, paper and paperboard mills	155.5	7.6	163.1	5.6
Petroleum and coal products	888.5	45.1	933.6	32.0
Chemicals	75.7	9.0	84.7	2.9
Non-metallic mineral products	84.1	19.6	103.6	3.6
Primary metals	159.1	9.9	169.0	5.8
Fabricated metal products	33.6	0.2	33.8	1.2
Transportation equipment	86.5	1.0	87.5	3.0
Pipeline transportation	42.6	11.8	54.4	1.9
<b>Capital expenditures, excluding 'other manufacturing'</b>	<b>2,293.3</b>	<b>539.6</b>	<b>2,832.9</b>	<b>97.1</b>
Other manufacturing	81.5	3.3	84.8	2.9
<b>Total</b>	<b>2,374.8</b>	<b>542.9</b>	<b>2,917.6</b>	<b>100.0</b>

1. Capital expenditures on pollution prevention, abatement and control (PPAC) include capital expenditures on pollution abatement and control (PAC) processes (also referred to as end-of-pipe processes), pollution prevention processes and environmental monitoring.

2. Capital expenditures on other environmental protection include capital expenditures on environmental assessments and audits, site reclamation and decommissioning, and wildlife and habitat protection.

**Note(s):** Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 2**  
**Capital expenditures on environmental protection by type of activity and industry, 2004**

	Environmental monitoring	Environmental assessments and audits	Reclamation and decom- missioning	Wildlife and habitat protection	Pollution abatement and control processes (end-of-pipe)	Pollution prevention processes	Total	Share of total
	millions of dollars							percent
Logging	0.2	0.0 <sup>s</sup>	x	x	0.5	0.1	2.3	0.1
Oil and gas extraction	19.8	23.6	232.5	12.6	65.5	207.3	561.4	19.2
Mining	1.8	6.4	18.6	6.2	85.9	51.8	170.6	5.8
Electric power generation, transmission and distribution	6.3	96.3	16.4	11.6	80.1	71.8	282.5	9.7
Natural gas distribution	0.1	0.4	x	x	2.2	8.0	14.3	0.5
Food	6.0	0.2	x	x	34.7	36.0	81.1	2.8
Beverage and tobacco products	0.0 <sup>s</sup>	0.0	0.0 <sup>s</sup>	0.0	6.0	4.5	10.6	0.4
Wood products	2.0	0.4	0.2	0.7	30.7	46.4	80.4	2.8
Pulp, paper and paperboard mills	2.6	0.3	7.1	0.2	99.7	53.3	163.1	5.6
Petroleum and coal products	15.9	4.0	37.5	3.7	93.1	779.5	933.6	32.0
Chemicals	4.9	2.5	6.4	0.1	32.5	38.3	84.7	2.9
Non-metallic mineral products	3.7	1.3	6.0	12.2	25.7	54.6	103.6	3.6
Primary metals	9.2	0.7	9.3	0.0 <sup>s</sup>	103.2	46.7	169.0	5.8
Fabricated metal products	1.0	0.1	0.0 <sup>s</sup>	0.1	12.3	20.3	33.8	1.2
Transportation equipment	1.4	0.9	0.0 <sup>s</sup>	0.0 <sup>s</sup>	33.1	52.0	87.5	3.0
Pipeline transportation	0.5	4.4	6.5	0.9	4.7	37.3	54.4	1.9
<b>Capital expenditures, excluding 'other manufacturing'</b>	<b>75.4</b>	<b>141.5</b>	<b>345.5</b>	<b>52.6</b>	<b>710.0</b>	<b>1,507.9</b>	<b>2,832.9</b>	<b>97.1</b>
Other manufacturing <sup>1</sup>	..	..	..	..	..	..	84.8	2.9
<b>Total</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>2,917.6</b>	<b>100.0</b>

1. Details of the expenditure breakdown by type of environmental protection activity is only available for the listed industries.

**Note(s):** Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 3**  
**Capital expenditures on environmental protection by type of activity and province or territory, 2004**

	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	Pollution abatement and control processes (end-of-pipe)	Pollution prevention processes	Total	Share of total
	millions of dollars						percent	
Newfoundland and Labrador	3.6	0.4	3.8	0.5	8.6	14.6	<b>31.5</b>	1.1
Prince Edward Island	0.1	0.0 <sup>s</sup>	0.0 <sup>s</sup>	0.1	1.5	2.6	<b>4.3</b>	0.2
Nova Scotia	2.1	2.7	5.2	2.5	14.3	21.5	<b>48.2</b>	1.7
New Brunswick	0.7	0.2	1.8	0.4	10.6	65.3	<b>79.0</b>	2.8
Quebec	14.9	x	x	7.9	140.5	140.0	<b>369.4</b>	13.0
Ontario	15.1	6.0	17.1	10.0	220.6	374.2	<b>642.9</b>	22.7
Manitoba	1.9	x	x	4.6	20.2	52.0	<b>137.9</b>	4.9
Saskatchewan	2.7	3.2	21.8	2.1	34.4	68.3	<b>132.5</b>	4.7
Alberta	26.5	28.6	234.3	20.4	168.3	675.2	<b>1,153.3</b>	40.7
British Columbia	7.6	7.8	26.8	3.8	87.2	87.7	<b>220.9</b>	7.8
Yukon Territory, Northwest Territories and Nunavut	0.2	1.1	1.1	0.4	3.8	6.5	<b>13.0</b>	0.5
<b>Canada</b>	<b>75.4</b>	<b>141.5</b>	<b>345.5</b>	<b>52.6</b>	<b>710.0</b>	<b>1,507.9</b>	<b>2,832.9</b>	<b>100.0</b>

**Note(s):** Figures may not add up to totals due to rounding. This table excludes the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 4**  
**Operating expenditures on environmental protection by industry, 2004**

	Pollution prevention, abatement and control expenditures (PPAC) <sup>1</sup>	Other environmental protection expenditures <sup>2</sup>	Total	Share of total
	millions of dollars			percent
Logging	29.0	171.0	<b>200.0</b>	5.2
Oil and gas extraction	267.0	332.9	<b>599.9</b>	15.6
Mining	179.7	112.9	<b>292.6</b>	7.6
Electric power generation, transmission and distribution	84.5	140.9	<b>225.3</b>	5.9
Natural gas distribution	17.8	8.9	<b>26.6</b>	0.7
Food	142.3	25.2	<b>167.4</b>	4.4
Beverage and tobacco products	10.8	3.5	<b>14.2</b>	0.4
Wood products	101.5	46.0	<b>147.5</b>	3.8
Pulp, paper and paperboard mills	369.6	39.6	<b>409.2</b>	10.7
Petroleum and coal products	109.9	137.1	<b>246.9</b>	6.4
Chemicals	268.0	64.8	<b>332.8</b>	8.7
Non-metallic mineral products	51.0	22.5	<b>73.6</b>	1.9
Primary metals	527.0	45.6	<b>572.6</b>	14.9
Fabricated metal products	40.9	9.7	<b>50.6</b>	1.3
Transportation equipment	115.5	23.5	<b>138.9</b>	3.6
Pipeline transportation	37.4	35.6	<b>73.0</b>	1.9
<b>Operating expenditures, excluding 'other manufacturing'</b>	<b>2,351.8</b>	<b>1,219.7</b>	<b>3,571.5</b>	<b>93.1</b>
Other manufacturing	241.7	23.0	<b>264.7</b>	6.9
<b>Total</b>	<b>2,593.5</b>	<b>1,242.7</b>	<b>3,836.1</b>	<b>100.0</b>

1. Operating expenditures on pollution prevention, abatement and control (PPAC) include operating expenditures on pollution abatement and control (PAC) processes (also referred to as end-of-pipe processes), pollution prevention processes, environmental monitoring, and purchase of waste management and sewerage services.

2. Operating expenditures on other environmental protection include operating expenditures on environmental assessments and audits, site reclamation and decommissioning, wildlife and habitat protection, fees, fines and licenses, and other environmental activities.

**Note(s):** Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 5**  
**Operating expenditures on environmental protection by province or territory, 2004**

	Pollution prevention, abatement and control expenditures (PPAC) <sup>1</sup>	Other environmental protection expenditures <sup>2</sup>	Total	Share of total
	millions of dollars			percent
Newfoundland and Labrador	41.2	15.7	56.9	1.5
Prince Edward Island	9.2	5.6	14.7	0.4
Nova Scotia	44.4	31.3	75.7	2.0
New Brunswick	93.1	24.8	117.9	3.1
Quebec	560.4	139.1	699.5	18.2
Ontario	930.3	307.3	1,237.6	32.3
Manitoba	96.4	32.2	128.7	3.4
Saskatchewan	95.1	42.3	137.3	3.6
Alberta	425.3	441.4	866.7	22.6
British Columbia	274.0	168.2	442.3	11.5
Yukon Territory, Northwest Territories and Nunavut	24.1	34.7	58.8	1.5
<b>Canada</b>	<b>2,593.5</b>	<b>1,242.7</b>	<b>3,836.1</b>	<b>100.0</b>

1. Operating expenditures on pollution prevention, abatement and control (PPAC) include operating expenditures on pollution abatement and control (PAC) processes (also referred to as end-of-pipe processes), pollution prevention processes, environmental monitoring, and purchase of waste management and sewerage services.

2. Operating expenditures on other environmental protection include operating expenditures on environmental assessments and audits, site reclamation and decommissioning, wildlife and habitat protection, fees, fines and licenses, and other environmental activities.

**Note(s):** Figures may not add up to totals due to rounding. This table includes the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 6**  
**Operating expenditures on environmental protection by type of activity and industry, 2004**

	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	Pollution abatement and control processes (end-of-pipe) <sup>1</sup>	Pollution prevention processes	Fees, fines and licenses	Other	Total	Share of total
	million dollars								percent	
Logging	5.2	13.9	35.1	113.7	19.6	4.2	2.0	6.4	200.0	5.2
Oil and gas extraction	39.0	26.9	196.7	6.2	187.0	40.9	25.2	77.9	599.9	15.6
Mining	38.8	11.3	80.0	2.3	101.9	38.9	7.4	11.9	292.6	7.6
Electric power generation, transmission and distribution	16.0	26.0	30.4	18.6	49.0	19.5	5.8	60.0	225.3	5.9
Natural gas distribution	0.4	0.9	0.7	0.3	1.3	16.1	0.7	6.3	26.6	0.7
Food	33.6	2.9	4.8	0.2	88.5	20.2	11.7	5.6	167.4	4.4
Beverage and tobacco products	0.9	0.5	0.2	0.0 <sup>s</sup>	9.3	0.6	2.0	0.7	14.2	0.4
Wood products	25.9	3.3	9.2	21.1	49.5	26.1	5.0	7.4	147.5	3.8
Pulp, paper and paperboard mills	38.3	5.4	4.5	5.5	243.4	87.9	10.8	13.4	409.2	10.7
Petroleum and coal products	12.0	2.3	123.5	0.2	56.2	41.8	3.2	7.8	246.9	6.4
Chemicals	39.0	6.7	26.4	10.7	162.9	66.2	2.9	18.0	332.8	8.7
Non-metallic mineral products	7.8	3.5	9.8	0.7	36.4	6.9	3.9	4.7	73.6	1.9
Primary metals	35.4	9.2	14.9	0.6	391.5	100.0	4.9	15.9	572.6	14.9
Fabricated metal products	2.8	2.3	2.4	0.0 <sup>s</sup>	35.0	3.1	0.3	4.6	50.6	1.3
Transportation equipment	6.9	4.1	1.1	0.0 <sup>s</sup>	97.0	11.6	0.6	17.5	138.9	3.6
Pipeline transportation	2.5	2.1	18.8	3.7	5.6	29.3	1.1	9.9	73.0	1.9
<b>Operating expenditures, excluding 'other manufacturing'</b>	<b>304.4</b>	<b>121.3</b>	<b>558.6</b>	<b>183.8</b>	<b>1,534.1</b>	<b>513.3</b>	<b>87.7</b>	<b>268.3</b>	<b>3 571.5</b>	<b>93.1</b>
Other manufacturing <sup>2</sup>	..	..	..	..	..	..	..	..	264.7	6.9
<b>Total</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>3 836.1</b>	<b>100.0</b>

1. Includes waste management and sewerage services.

2. Details of the expenditure breakdown by type of environmental protection activity is only available for the listed industries.

**Note(s):** Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.



**Table 7**  
**Operating expenditures on environmental protection by type of activity and province or territory, 2004**

	Environ- mental monitoring	Environ- mental assess- ments and audits	Recla- mation and decom- missioning	Wildlife and habitat protection	Pollution abatement and control processes (end-of-pipe) <sup>1</sup>	Pollution prevention processes	Fees, fines and licenses	Other	Total	Share of total
	millions of dollars									percent
Newfoundland and Labrador	5.6	2.0	3.0	4.9	16.9	18.4	2.4	3.4	<b>56.6</b>	1.6
Prince Edward Island	0.8	0.5	x	x	4.7	3.4	0.2	x	<b>14.5</b>	0.4
Nova Scotia	4.9	1.2	x	x	30.5	4.2	2.5	x	<b>70.4</b>	2.0
New Brunswick	9.7	2.6	5.6	8.3	58.9	22.1	2.5	5.6	<b>115.3</b>	3.2
Quebec	64.2	25.7	35.3	12.7	300.7	107.1	13.8	44.1	<b>603.7</b>	16.9
Ontario	87.3	32.0	121.7	49.8	559.0	174.5	20.2	71.7	<b>1,116.2</b>	31.3
Manitoba	12.1	2.6	10.0	2.2	48.9	25.7	1.7	15.3	<b>118.5</b>	3.3
Saskatchewan	10.9	3.7	21.5	2.9	52.6	29.7	4.9	9.2	<b>135.3</b>	3.8
Alberta	64.8	30.1	271.1	25.6	266.3	83.8	24.3	89.2	<b>855.1</b>	23.9
British Columbia	29.2	17.5	45.2	68.5	188.7	42.1	14.7	21.3	<b>427.3</b>	12.0
Yukon Territory, Northwest Territories and Nunavut	14.9	3.4	27.0	1.3	7.0	2.2	0.5	2.5	<b>58.8</b>	1.6
<b>Canada</b>	<b>304.4</b>	<b>121.3</b>	<b>558.6</b>	<b>183.8</b>	<b>1,534.1</b>	<b>513.3</b>	<b>87.7</b>	<b>268.3</b>	<b>3,571.5</b>	<b>100.0</b>

1. Includes waste management and sewerage services.

**Note(s):** Figures may not add up to totals due to rounding. This table excludes the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 8**  
**Total expenditures on pollution abatement and control and pollution prevention by region and industry, 2004**

	Atlantic provinces <sup>1</sup>		Quebec		Ontario		Western provinces and territories <sup>2</sup>		British Columbia		Canada
	Pollution abatement and control	Pollution prevention	Pollution abatement and control	Pollution prevention	Pollution abatement and control	Pollution prevention	Pollution abatement and control	Pollution prevention	Pollution abatement and control	Pollution prevention	Total
	millions of dollars										
Logging	x	1.0	1.8	0.3	x	0.4	1.0	0.2	7.3	2.5	<b>24.5</b>
Oil and gas extraction	13.6	x	0.0	0.0	x	x	216.3	232.6	x	5.6	<b>500.8</b>
Mining	4.1	15.4	19.6	9.3	59.9	17.3	71.7	33.0	32.7	15.7	<b>278.5</b>
Electric power generation, transmission and distribution	x	x	x	x	24.4	14.9	69.5	29.6	1.3	x	<b>220.4</b>
Natural gas distribution	0.0	0.0	x	x	x	x	2.6	12.2	x	x	<b>27.6</b>
Food	17.5	9.9	22.5	10.8	44.6	20.3	29.4	11.3	9.2	4.0	<b>179.4</b>
Beverage and tobacco products	0.9	0.3	4.0	2.3	8.5	1.8	0.8	0.3	1.1	0.4	<b>20.4</b>
Wood products	7.5	3.1	17.3	9.8	18.5	16.2	16.3	24.6	20.6	18.7	<b>152.7</b>
Pulp, paper and paperboard mills	46.6	24.4	87.6	45.8	75.9	31.9	24.6	18.1	108.3	21.0	<b>484.2</b>
Petroleum and coal products	x	x	33.2	47.9	30.8	213.4	61.8	472.1	x	x	<b>970.5</b>
Chemicals	1.3	0.7	32.1	20.6	99.2	50.7	58.3	30.4	4.4	2.1	<b>299.8</b>
Non-metallic mineral products	2.2	1.8	21.0	21.3	19.3	19.8	11.4	11.9	8.2	6.7	<b>123.6</b>
Primary metals	x	x	165.1	58.1	256.9	74.1	19.8	8.7	x	x	<b>641.5</b>
Fabricated metal products	1.5	0.2	7.4	1.2	30.7	20.6	6.0	1.1	1.8	0.3	<b>70.7</b>
Transportation equipment	1.2	0.9	14.3	5.7	107.0	53.5	5.6	2.4	2.1	1.1	<b>193.7</b>
Pipeline transportation	0.0 <sup>s</sup>	0.0	x	x	x	x	6.5	54.7	2.7	3.5	<b>76.9</b>
<b>Total</b>	<b>146.0</b>	<b>152.2</b>	<b>441.2</b>	<b>247.2</b>	<b>779.6</b>	<b>548.7</b>	<b>601.5</b>	<b>943.4</b>	<b>275.9</b>	<b>129.9</b>	<b>4,265.4</b>

1. Includes Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick.

2. Includes Manitoba, Saskatchewan, Alberta, Yukon Territory, Northwest Territories and Nunavut.

**Note(s):** Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 9**  
**Distribution of capital expenditures on pollution abatement and control (end-of-pipe) by medium and industry, 2004**

	Air	Surface water	On-site contained solid and liquid waste	Noise, radiation and vibration	Total
millions of dollars					
Logging	0.1	0.0	0.4	0.0	<b>0.5</b>
Oil and gas extraction	31.9	13.9	17.0	2.7	<b>65.5</b>
Mining	x	53.1	2.9	x	<b>85.9</b>
Electric power generation, transmission and distribution	x	20.8	9.7	x	<b>80.1</b>
Natural gas distribution	0.4	0.0	1.8	0.0	<b>2.2</b>
Food	12.1	11.4	11.0	0.2	<b>34.7</b>
Beverage and tobacco products	0.5	4.8	0.2	0.6	<b>6.0</b>
Wood products	24.7	4.1	1.7	0.1	<b>30.7</b>
Pulp, paper and paperboard Mills	58.9	29.5	10.6	0.7	<b>99.7</b>
Petroleum and coal products	41.1	22.5	22.5	7.1	<b>93.1</b>
Chemicals	16.8	10.2	4.6	0.9	<b>32.5</b>
Non-metallic mineral products	24.3	0.4	0.4	0.6	<b>25.7</b>
Primary metals	82.1	9.9	10.5	0.8	<b>103.2</b>
Fabricated metal products	10.6	1.2	0.3	0.1	<b>12.3</b>
Transportation equipment	x	0.5	0.0 <sup>s</sup>	x	<b>33.1</b>
Pipeline transportation	1.1	0.9	2.7	0.0	<b>4.7</b>
<b>Total</b>	<b>409.4</b>	<b>183.0</b>	<b>96.4</b>	<b>21.2</b>	<b>710.0</b>

**Note(s):** Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 10**  
**Distribution of capital expenditures on pollution abatement and control (end-of-pipe) by medium and province or territory, 2004**

	Air	Surface water	On-site contained solid and liquid waste	Noise, radiation and vibration	Total
millions of dollars					
Newfoundland and Labrador	2.8	2.7	x	x	<b>8.6</b>
Prince Edward Island	0.5	0.5	0.5	0.0 <sup>s</sup>	<b>1.5</b>
Nova Scotia	3.4	8.5	2.4	0.0 <sup>s</sup>	<b>14.3</b>
New Brunswick	4.5	2.4	3.7	0.0 <sup>s</sup>	<b>10.6</b>
Quebec	82.0	37.0	17.8	3.7	<b>140.5</b>
Ontario	150.8	49.1	17.2	3.5	<b>220.6</b>
Manitoba	6.7	10.1	x	x	<b>20.2</b>
Saskatchewan	6.5	21.3	6.6	0.1	<b>34.4</b>
Alberta	95.3	29.4	31.4	12.2	<b>168.3</b>
British Columbia	55.6	20.0	10.7	0.9	<b>87.2</b>
Yukon Territory, Northwest Territories and Nunavut	1.4	2.0	0.3	0.1	<b>3.8</b>
<b>Canada</b>	<b>409.4</b>	<b>183.0</b>	<b>96.4</b>	<b>21.2</b>	<b>710.0</b>

**Note(s):** Figures may not add up to totals due to rounding. The distribution of capital expenditures on 'pollution abatement and control (end-of-pipe)' is not available for the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 11**  
**Distribution of capital expenditures on pollution prevention by medium and industry, 2004**

	Air	Surface water	On-site contained solid and liquid waste	Noise, radiation and vibration	Other	Total
millions of dollars						
Logging	0.0	0.0 <sup>s</sup>	0.0 <sup>s</sup>	0.0	0.1	0.1
Oil and gas extraction	131.1	18.9	42.8	3.6	11.0	207.3
Mining	6.2	24.3	21.2	0.0	0.1	51.8
Electric power generation, transmission and distribution	36.7	19.4	x	x	x	71.8
Natural gas distribution	2.1	0.2	5.7	0.0	0.0	8.0
Food	11.6	12.3	6.9	0.1	5.2	36.0
Beverage and tobacco products	2.8	0.9	0.1	0.0	0.7	4.5
Wood products	26.7	15.4	x	x	x	46.4
Pulp, paper and paperboard mills	27.7	14.3	4.2	1.3	5.7	53.3
Petroleum and coal products	446.3	170.1	123.5	x	x	779.5
Chemicals	14.3	7.3	10.2	0.4	6.0	38.3
Non-metallic mineral products	31.8	3.7	7.0	0.1	12.1	54.6
Primary metals	17.5	3.4	23.4	0.1	2.3	46.7
Fabricated metal products	19.6	0.1	0.1	0.0	0.5	20.3
Transportation equipment	46.6	1.1	1.8	0.2	2.3	52.0
Pipeline transportation	5.1	15.3	13.4	1.2	2.3	37.3
<b>Total</b>	<b>826.0</b>	<b>306.9</b>	<b>276.9</b>	<b>45.9</b>	<b>52.2</b>	<b>1,507.9</b>

**Note(s):** Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 12**  
**Distribution of capital expenditures on pollution prevention by medium and province or territory, 2004**

	Air	Surface water	On-site contained solid and liquid waste	Noise, radiation and vibration	Other	Total
millions of dollars						
Newfoundland and Labrador	3.5	4.9	5.6	x	x	14.6
Prince Edward Island	0.6	1.5	0.5	0.0	0.1	2.6
Nova Scotia	16.1	3.3	1.3	x	x	21.5
New Brunswick	44.4	11.6	6.2	0.0 <sup>s</sup>	3.2	65.3
Quebec	68.1	26.9	34.2	2.4	8.5	140.0
Ontario	236.8	79.2	36.8	3.3	18.1	374.2
Manitoba	24.2	18.0	8.3	0.2	1.2	52.0
Saskatchewan	42.1	11.5	11.7	0.8	2.2	68.3
Alberta	332.0	132.7	158.7	x	x	675.2
British Columbia	56.3	15.0	11.9	1.6	3.0	87.7
Yukon Territory, Northwest Territories and Nunavut	2.1	2.5	1.7	x	x	6.5
<b>Canada</b>	<b>826.0</b>	<b>306.9</b>	<b>276.9</b>	<b>45.9</b>	<b>52.2</b>	<b>1,507.9</b>

**Note(s):** Figures may not add up to totals due to rounding. The distribution of capital expenditures on 'pollution prevention' is not available for the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 13**  
**Use of environmental management practices by business, 2004**

	Proportion of establishments using the practice <sup>1</sup>	Employment share of establishments using the practice
	percent	
Environmental management system	58	74
Life cycle analysis	14	23
ISO 14000 certification	25	36
Implementation of a pollution prevention plan	42	54
Environmental voluntary agreements	23	42
Green procurement policy	12	19
Eco-labelling of products	5	8
Annual environmental performance report	41	59
Other	7	11
<b>Total</b>	<b>73</b> <sup>2</sup>	<b>85</b>

1. Number of establishments indicating they used the practice as a percentage of all establishments that provided a response.

2. Number of establishments indicating they used at least one environmental practice as a percentage of the total number of establishments that provided a response.

**Note(s):** This table includes reported data only. This table includes the 'other manufacturing' industry category but does not include the 'pipeline transportation' industry as employment numbers were not available for this industry.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 14**  
**Distribution of environmental management practices by industry, 2004**

	Environmental management system	Life cycle analysis	ISO 14000 certification	Implementation of a pollution prevention plan	Environmental voluntary agreements	Green procurement policy	Eco-labelling of products	Annual environmental performance report	Other	Total <sup>1</sup>
	percent <sup>2</sup>									
Logging	82	13	74	56	29	15	21	54	7	<b>88</b>
Oil and gas extraction	83	33	11	45	58	9	3	68	17	<b>92</b>
Mining	78	11	19	52	31	13	3	71	13	<b>92</b>
Electric power generation, transmission and distribution	61	31	26	47	43	25	15	55	11	<b>72</b>
Natural gas distribution	80	33	13	64	67	27	13	53	0	<b>87</b>
Food	43	9	1	28	10	10	1	27	9	<b>69</b>
Beverage and tobacco products	62	5	19	33	10	5	0	19	0	<b>71</b>
Wood products	46	6	22	33	15	13	12	35	6	<b>59</b>
Pulp, paper and paperboard mills	75	7	55	63	34	13	13	70	10	<b>92</b>
Petroleum and coal products	83	41	31	72	38	3	7	59	11	<b>83</b>
Chemicals	67	21	18	55	26	10	5	45	6	<b>81</b>
Non-metallic mineral products	45	5	9	33	16	15	6	37	4	<b>66</b>
Primary metals	56	9	30	35	25	5	1	35	10	<b>69</b>
Fabricated metal products	39	7	24	28	11	7	1	15	7	<b>52</b>
Transportation equipment	76	24	61	56	19	19	4	41	10	<b>81</b>
Pipeline transportation	93	19	10	51	69	19	0	76	2	<b>97</b>
<b>Total, excluding 'other manufacturing'</b>	<b>63</b>	<b>14</b>	<b>26</b>	<b>45</b>	<b>27</b>	<b>12</b>	<b>6</b>	<b>46</b>	<b>8</b>	<b>76</b>
Other manufacturing	40	11	23	31	9	13	2	24	5	<b>63</b>
<b>Total</b>	<b>58</b>	<b>14</b>	<b>25</b>	<b>42</b>	<b>23</b>	<b>12</b>	<b>5</b>	<b>41</b>	<b>7</b>	<b>73</b>

1. Number of establishments indicating they used at least one environmental practice as a percentage of the total number of establishments that provided a response.

2. Number of establishments indicating they used the practice as a percentage of all establishments that provided a response.

**Note(s):** This table includes reported data only.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 15**  
**Distribution of environmental management practices by province or territory, 2004**

	Environmental management system	Life cycle analysis	ISO 14000 certification	Implementation of a pollution prevention plan	Environmental voluntary agreements	Green procurement policy	Eco-labelling of products	Annual environmental performance report	Other	Total <sup>1</sup>
	percent <sup>2</sup>									
Newfoundland and Labrador	48	17	29	52	22	13	4	54	6	76
Prince Edward Island	63	13	0	50	38	0	0	33	0	63
Nova Scotia	60	15	33	44	26	2	8	47	25	84
New Brunswick	58	14	28	41	22	20	14	47	3	84
Quebec	50	12	24	41	19	8	3	28	5	64
Ontario	55	12	28	41	17	14	4	38	7	72
Manitoba	40	11	11	21	24	13	3	33	13	58
Saskatchewan	80	12	14	42	39	6	3	69	0	86
Alberta	69	22	14	43	41	12	4	52	8	82
British Columbia	71	15	38	50	28	16	15	58	11	86
Yukon Territory, Northwest Territories and Nunavut	64	18	9	36	36	9	0	64	13	73
<b>Total</b>	<b>58</b>	<b>14</b>	<b>25</b>	<b>42</b>	<b>23</b>	<b>12</b>	<b>5</b>	<b>41</b>	<b>7</b>	<b>73</b>

1. Number of establishments indicating they used at least one environmental practice as a percentage of the total number of establishments that provided a response.

2. Number of establishments indicating they used the practice as a percentage of all establishments that provided a response.

**Note(s):** This table includes reported data only. This table includes the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 16**  
**Distribution of environmental management practices by establishment size, 2004**

	Number of employees per establishment			
	Fewer than 100	100 to 499	500 to 999	More than 999
	percent <sup>1</sup>			
Environmental management system	49	63	76	85
Life cycle analysis	14	11	21	27
ISO 14000 certification	18	27	39	43
Implementation of a pollution prevention plan	37	44	55	60
Environmental voluntary agreements	20	22	37	58
Green procurement policy	9	11	16	23
Eco-labelling of products	6	6	6	14
Annual environmental performance report	33	45	57	74
Other	6	9	12	14
<b>Total<sup>2</sup></b>	<b>64</b>	<b>77</b>	<b>89</b>	<b>93</b>
<b>Percentage of total employees<sup>3</sup></b>	<b>68</b>	<b>79</b>	<b>89</b>	<b>96</b>

1. Number of establishments indicating they used the practice as a percentage of all establishments that provided a response.

2. Number of establishments that indicated they used at least one energy conservation process or technology as a percentage of the total number of establishments that provided a response.

3. Employment of establishments indicating they used at least one environmental practice, as a percentage of total employment of establishments that provided a response.

**Note(s):** This table includes reported data only. This table excludes the 'other manufacturing' and 'pipeline transportation' industry categories.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 17**  
**Pollution prevention methods by industry, 2004**

	Product design or reformulation	Equipment or process modifications	Recirculation, recovery, reuse or recycling	Materials, feedstock or solvent substitution	Improved management or purchasing techniques	Prevention of leaks and spills	Good operating practices or training	Other	Total <sup>1</sup>
	percent <sup>2</sup>								
Logging	5	28	54	10	30	74	81	12	<b>82</b>
Oil and gas extraction	23	71	71	25	39	88	86	32	<b>97</b>
Mining	13	43	70	26	43	84	75	25	<b>93</b>
Electric power generation, transmission and distribution	16	37	59	38	48	73	70	25	<b>82</b>
Natural gas distribution	13	53	40	20	27	67	67	11	<b>80</b>
Food	14	45	51	18	31	58	68	12	<b>83</b>
Beverage and tobacco products	5	42	52	5	47	79	70	36	<b>81</b>
Wood products	15	41	60	18	30	52	64	13	<b>77</b>
Pulp, paper and paperboard mills	11	56	71	26	26	74	76	28	<b>95</b>
Petroleum and coal products	48	69	79	36	52	93	89	0	<b>93</b>
Chemicals	30	55	66	27	38	78	78	10	<b>91</b>
Non-metallic mineral products	16	32	61	22	15	57	59	8	<b>83</b>
Primary metals	10	47	68	25	35	72	67	23	<b>89</b>
Fabricated metal products	17	45	60	28	43	54	63	10	<b>84</b>
Transportation equipment	22	57	71	49	38	72	77	27	<b>98</b>
Pipeline transportation	25	56	44	21	35	75	86	23	<b>94</b>
<b>Total, excluding 'other manufacturing'</b>	<b>18</b>	<b>48</b>	<b>63</b>	<b>25</b>	<b>35</b>	<b>70</b>	<b>73</b>	<b>18</b>	<b>88</b>
Other manufacturing	26	45	59	37	38	56	59	25	<b>91</b>
<b>Total</b>	<b>20</b>	<b>47</b>	<b>62</b>	<b>28</b>	<b>36</b>	<b>67</b>	<b>69</b>	<b>19</b>	<b>89</b>

1. Number of establishments indicating they used at least one pollution prevention method as a percentage of the total number of establishments that provided a response.

2. Number of establishments indicating they used the pollution prevention method as a percentage of all establishments that provided a response.

**Note(s):** This table includes reported data only.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 18**  
**Pollution prevention methods by province or territory, 2004**

	Product design or reformulation	Equipment or process modifications	Recirculation, recovery, reuse or recycling	Materials, feedstock or solvent substitution	Improved management or purchasing techniques	Prevention of leaks and spills	Good operating practices or training	Other	Total <sup>1</sup>
	percent <sup>2</sup>								
Newfoundland and Labrador	21	33	58	13	44	68	84	21	<b>88</b>
Prince Edward Island	38	50	63	0	17	63	50	17	<b>63</b>
Nova Scotia	16	58	64	28	42	56	63	37	<b>81</b>
New Brunswick	9	29	66	23	38	65	65	34	<b>88</b>
Quebec	13	40	63	28	32	59	64	17	<b>87</b>
Ontario	23	50	62	31	39	67	69	19	<b>88</b>
Manitoba	28	55	48	41	38	71	66	23	<b>86</b>
Saskatchewan	33	66	68	32	36	81	87	20	<b>97</b>
Alberta	21	53	59	20	34	73	75	16	<b>91</b>
British Columbia	17	45	62	16	28	74	75	20	<b>93</b>
Yukon Territory, Northwest Territories and Nunavut	9	9	36	27	18	55	36	10	<b>73</b>
<b>Total</b>	<b>20</b>	<b>47</b>	<b>62</b>	<b>28</b>	<b>36</b>	<b>67</b>	<b>69</b>	<b>19</b>	<b>89</b>

1. Number of establishments indicating they used at least one pollution prevention method as a percentage of the total number of establishments that provided a response.

2. Number of establishments indicating they used the pollution prevention method as a percentage of all establishments that provided a response.

**Note(s):** This table includes reported data only. This table includes the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 19**  
**Distribution of pollution prevention methods by establishment size, 2004**

	Number of employees per establishment			
	Fewer than 100	100 to 499	500 to 999	More than 999
	percent <sup>1</sup>			
Product design or reformulation	16	16	25	18
Equipment or process modifications	39	49	60	67
Recirculation, recovery, reuse or recycling	53	66	70	83
Materials, feedstock or solvent substitution	17	24	37	50
Improved management or purchasing techniques	30	35	42	46
Prevention of leaks and spills	63	70	81	88
Good operating practices or training	64	72	82	89
Other	17	17	16	28
<b>Total <sup>2</sup></b>	<b>79</b>	<b>90</b>	<b>95</b>	<b>98</b>
<b>Percentage of total employees <sup>3</sup></b>	<b>81</b>	<b>91</b>	<b>96</b>	<b>98</b>

1. Number of establishments indicating they used the pollution prevention method as a percentage of all establishments that provided a response.
2. Number of establishments that indicated they used at least one energy conservation process or technology as a percentage of the total number of establishments that provided a response.
3. Employment of establishments indicating they used at least one pollution prevention method as a percentage of the total employment of establishments that provided a response.

**Note(s):** This table includes reported data only. This table excludes the 'other manufacturing' and 'pipeline transportation' industry categories.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 20**  
**Distribution of environmental technology use, 2004**

	Proportion of establishments that reported each technology	
	Yes	No
	percent <sup>1</sup>	
Cogeneration	8	92
Alternative fuel systems or equipment	8	92
Fuel substitution	8	92
Waste energy recovery/reuse (for example, heat recovery)	29	71
Use of energy management or monitoring system(s)	33	67
Performed energy audit in the last three years	29	71
Other systems, equipment or employee training that improved energy efficiency	25	75
<b>Renewable energy technologies</b>		
Small, mini, or micro-hydroelectric facility	3	97
Solar energy systems or equipment	7	93
Wind energy systems or equipment	1	99
Biomass energy <sup>2</sup>	9	91
Geothermal	0 <sup>s</sup>	100
Other renewable energy systems or equipment	2	98
<b>Total <sup>3</sup></b>	<b>59</b>	<b>41</b>

1. Number of establishments indicating they used a technology as a percentage of all establishments that provided a response.
2. Examples include energy crops and waste-to-energy.
3. Number of establishments indicating they used at least one technology as a percentage of all establishments that provided a response.

**Note(s):** This table includes reported data only. This table excludes the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 21**  
**Distribution of companies that reported cost savings as a result of adopting environmental management practices by establishment size, 2004**

	Establishments reporting cost savings
	percent <sup>1</sup>
<b>Number of employees per establishment</b>	
Fewer than 100	21
100 to 499	33
500 to 999	48
More than 999	62
<b>Total <sup>2</sup></b>	<b>33</b>

1. Number of establishments indicating they experienced cost savings as a percentage of all establishments that provided a response.
2. Number of establishments that indicated they used at least one energy conservation process or technology as a percentage of the total number of establishments that provided a response.

**Note(s):** This table includes reported data only. This table excludes the 'other manufacturing' and 'pipeline transportation' industry categories.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 22**  
**Proportion of establishments in fossil-fuel related industries that reported greenhouse gas emissions reductions, 2004**

	Reduced fugitive or vented greenhouse gas emissions	Reduced other sources of greenhouse gas emissions
	percent <sup>1</sup>	
Oil and gas extraction	94	75
Natural gas distribution	92	77
Pipeline transportation	85	44
Petroleum and coal products	89	74
<b>Total <sup>2</sup></b>	<b>90</b>	<b>62</b>

1. Number of establishments that reported the use of systems or equipment to reduce greenhouse gas emissions as a percentage of establishments that reported extracting, refining, transporting or distributing fossil fuels in 2004.
2. Number of establishments that indicated they used at least one energy conservation process or technology as a percentage of the total number of establishments that provided a response.

**Note(s):** This table includes reported data only.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.



**Table 23**  
**Adoption and impact of new or significantly improved systems or equipment to reduce greenhouse gas emissions by industry, 2004<sup>1</sup>**

	Introduced new or significantly improved systems or equipment		Impact on emissions <sup>2</sup>		
	Yes	No	Low	Moderate	High
	percent				
Logging	15	85	64	18	18
Oil and gas extraction	63	37	39	41	20
Mining	24	76	69	31	0
Electric power generation, transmission and distribution	27	73	44	33	22
Natural gas distribution	53	47	25	50	25
Food	24	76	53	35	18
Beverage and tobacco products	33	67	57	29	14
Wood products	19	81	45	36	18
Pulp, paper and paperboard mills	38	63	34	49	17
Petroleum and coal products	43	57	83	17	0
Chemicals	19	81	52	31	17
Non-metallic mineral products	18	82	53	40	7
Primary metals	26	74	41	43	15
Fabricated metal products	16	84	47	35	18
Transportation equipment	31	69	68	20	12
Pipeline transportation	35	65	58	42	0
<b>Total</b>	<b>26</b>	<b>74</b>	<b>49</b>	<b>36</b>	<b>14</b>

1. Adoption of new or significantly improved systems or equipment within a three-year period, 2002 to 2004.
2. Respondents who answered Yes to the adoption of new or significantly improved systems or equipment were asked to rank the impact on greenhouse gas reductions as being low, moderate or high.

**Note(s):** This table includes reported data only. Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 24**  
**Adoption and impact of new or significantly improved systems or equipment to reduce greenhouse gas emissions by province or territory, 2004<sup>1</sup>**

	Introduced new or significantly improved systems or equipment		Impact on emissions <sup>2</sup>		
	Yes	No	Low	Moderate	High
	percent				
Newfoundland and Labrador	13	88	100	0	0
Prince Edward Island	25	75	100	0	0
Nova Scotia	21	79	29	71	0
New Brunswick	27	73	67	33	0
Quebec	29	71	52	30	19
Ontario	20	80	53	37	11
Manitoba	30	70	47	29	24
Saskatchewan	41	59	54	42	4
Alberta	35	65	39	34	27
British Columbia	28	72	45	49	6
Yukon Territory, Northwest Territories and Nunavut	44	56	50	50	0
<b>Total</b>	<b>26</b>	<b>74</b>	<b>49</b>	<b>36</b>	<b>14</b>

1. Adoption of new or significantly improved systems or equipment within a three-year period, 2002 to 2004.
2. Respondents who answered Yes to the adoption of new or significantly improved systems or equipment were asked to rank the impact on greenhouse gas reductions as being low, moderate or high.

**Note(s):** This table includes reported data only. Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 25**  
**Total operating and capital expenditures on environmental processes and technologies to reduce greenhouse gas emissions by industry, 2004**

	Operating expenditures	Capital expenditures	Total
millions of dollars			
Logging	52.0	8.5	60.5
Oil and gas extraction	23.0	124.8	147.8
Mining	38.0	10.1	48.1
Electric power generation, transmission and distribution	75.7	21.2	96.9
Natural gas distribution	3.5	5.2	8.7
Food	8.8	23.7	32.5
Beverage and tobacco products	1.7	3.7	5.4
Wood products	106.5	45.9	152.3
Pulp, paper and paperboard mills	129.8	37.2	167.1
Petroleum and coal products	1.2	37.1	38.3
Chemicals	57.9	25.7	83.6
Non-metallic mineral products	11.0	8.1	19.1
Primary metals	34.9	5.4	40.3
Fabricated metal products	22.4	8.7	31.1
Transportation equipment	6.5	10.8	17.3
Pipeline transportation	3.1	3.1	6.2
<b>Total</b>	<b>575.8</b>	<b>379.3</b>	<b>955.1</b>

**Note(s):** Figures may not add up to totals due to rounding.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 26**  
**Total operating and capital expenditures on environmental processes and technologies to reduce greenhouse gas emissions by province or territory, 2004**

	Operating expenditures	Capital expenditures	Total
millions of dollars			
Newfoundland and Labrador	8.7	5.8	14.5
Prince Edward Island	1.7	0.6	2.4
Nova Scotia	23.6	2.9	26.5
New Brunswick	35.3	11.1	46.3
Quebec	74.8	71.0	145.9
Ontario	88.0	54.4	142.4
Manitoba	23.0	28.9	51.8
Saskatchewan	13.5	7.6	21.2
Alberta	62.5	155.1	217.6
British Columbia	229.5	40.8	270.3
Yukon Territory, Northwest Territories and Nunavut	15.1	1.1	16.2
<b>Total</b>	<b>575.8</b>	<b>379.3</b>	<b>955.1</b>

**Note(s):** Figures may not add up to totals due to rounding. This table excludes the 'other manufacturing' industries category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 27**  
**Obstacles to the adoption of technologies to reduce greenhouse gas emissions by industry, 2004<sup>1</sup>**

	Lack of information or knowledge	Lack of available new and improved technology	Lack of skilled personnel	High cost of equipment	Lack of financing	Regulatory and policy barriers	Other	Companies that reported one or more obstacles	Industry share of reported obstacles <sup>2</sup>
	percent <sup>3</sup>								
Logging	28	49	13	64	41	13	10	57	3
Oil and gas extraction	32	48	22	67	40	29	21	88	6
Mining	40	38	14	58	33	15	22	83	8
Electric power generation, transmission and distribution	31	44	3	56	38	31	10	59	3
Natural gas distribution	33	50	17	75	42	58	17	80	1
Food	43	24	26	58	52	13	11	74	9
Beverage and tobacco products	31	25	19	63	38	0	25	80	1
Wood products	33	23	9	69	43	20	11	61	9
Pulp, paper and paperboard mills	13	13	10	83	69	15	9	90	10
Petroleum and coal products	65	30	22	83	39	39	22	79	2
Chemicals	38	30	13	65	47	12	13	71	14
Non-metallic mineral products	33	42	7	60	30	15	3	74	5
Primary metals	31	28	17	70	54	7	14	76	11
Fabricated metal products	31	29	33	64	47	12	5	62	5
Transportation equipment	40	17	15	82	51	8	12	83	6
Pipeline transportation	35	52	8	60	15	38	8	87	5
<b>Total</b>	<b>25</b>	<b>23</b>	<b>11</b>	<b>50</b>	<b>34</b>	<b>12</b>	<b>9</b>	<b>74</b>	<b>100</b>

1. Adoption of new or significantly improved systems or equipment within a three year period, 2002 to 2004.

2. Number of establishments in the industry that indicated encountering at least one obstacle as a percentage of all establishments that indicated encountering at least one obstacle.

3. Number of establishments that indicated encountering the obstacle as a percentage of all establishments that provided a response.

**Note(s):** This table includes reported data only.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 28**  
**Obstacles to the adoption of technologies to reduce greenhouse gas emissions by industry – Innovators versus non-innovators, 2004<sup>1</sup>**

	Lack of information or knowledge		Lack of available technology		Lack of skilled personnel		High cost of equipment	
	Innovator	Non-innovator	Innovator	Non-innovator	Innovator	Non-innovator	Innovator	Non-innovator
	percent <sup>2</sup>							
Logging	27	13	27	27	9	7	64	30
Oil and gas extraction	33	15	43	30	30	0	78	15
Mining	27	33	35	29	4	12	69	40
Electric power generation, transmission and distribution	39	10	33	20	6	0	50	27
Natural gas distribution	50	0	63	14	0	29	75	43
Food	38	27	26	12	29	15	62	34
Beverage and tobacco products	29	21	14	21	29	7	86	29
Wood products	33	15	9	14	15	3	61	35
Pulp, paper and paperboard mills	8	13	13	10	19	3	83	66
Petroleum and coal products	67	44	0	38	17	19	100	38
Chemicals	23	27	12	22	5	10	51	43
Non-metallic mineral products	40	20	20	32	7	4	53	41
Primary metals	20	24	26	17	15	11	57	48
Fabricated metal products	25	16	13	18	25	16	44	35
Transportation equipment	36	30	24	9	8	14	72	63
Pipeline transportation	63	7	58	39	4	2	79	36
<b>Total</b>	<b>31</b>	<b>21</b>	<b>25</b>	<b>20</b>	<b>15</b>	<b>9</b>	<b>67</b>	<b>41</b>

	Lack of financing		Regulation and policy barriers		Other		None	
	Innovator	Non-innovator	Innovator	Non-innovator	Innovator	Non-innovator	Innovator	Non-innovator
	percent <sup>2</sup>							
Logging	27	22	9	7	9	5	18	40
Oil and gas extraction	43	11	30	11	22	11	0	37
Mining	15	30	15	11	15	18	8	20
Electric power generation, transmission and distribution	39	16	28	14	0	8	28	43
Natural gas distribution	50	14	75	14	25	0	0	43
Food	35	37	9	9	6	8	18	29
Beverage and tobacco products	57	14	0	0	0	29	14	21
Wood products	42	21	27	7	12	5	15	44
Pulp, paper and paperboard mills	77	50	4	19	4	10	2	15
Petroleum and coal products	50	19	67	6	42	0	0	38
Chemicals	37	31	9	8	7	10	26	30
Non-metallic mineral products	27	20	27	7	7	1	13	28
Primary metals	48	35	7	5	11	10	15	27
Fabricated metal products	31	26	0	7	0	4	13	38
Transportation equipment	36	43	4	7	8	11	0	23
Pipeline transportation	17	11	46	25	0	11	8	16
<b>Total</b>	<b>42</b>	<b>29</b>	<b>18</b>	<b>9</b>	<b>10</b>	<b>9</b>	<b>11</b>	<b>30</b>

- Establishments who answered 'yes' to adopting new or significantly improved systems or equipment to reduce greenhouse gases during the period 2002 to 2004 are considered 'innovators.' Establishments who answered 'no' to adopting new or significantly improved systems or equipment to reduce greenhouse gases during the period 2002 to 2004 are considered 'non-innovators.'
  - Number of establishments that indicated encountering the obstacle as a percentage of all establishments that provided a response.
- Note(s):** This table includes reported data only. Due to changes in the methodology used to calculate this table, comparisons to 2002 results are no longer possible.  
**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 29**  
**Drivers to the adoption of technologies to reduce greenhouse gas emissions by industry, 2004<sup>1</sup>**

	Sufficient return on investment	Regulations	Voluntary agreement	Public relations	Corporate policy, culture and awareness	Other	Share of companies in industry that reported encountering one or more drivers	Industry share of reported drivers <sup>2</sup>
	percent <sup>3</sup>							
Logging	73	48	24	24	52	0	52	3
Oil and gas extraction	82	74	43	65	78	5	92	6
Mining	69	54	35	42	65	7	71	7
Electric power generation, transmission and distribution	59	56	46	64	64	8	65	4
Natural gas distribution	78	78	56	44	89	0	69	1
Food	80	57	19	24	52	10	72	9
Beverage and tobacco products	71	50	21	7	64	7	70	1
Wood products	69	52	18	35	63	7	55	9
Pulp, paper and paperboard mills	80	59	21	31	56	4	85	10
Petroleum and coal products	84	72	56	48	64	0	93	2
Chemicals	77	58	27	23	60	3	73	15
Non-metallic mineral products	67	55	20	33	62	5	69	5
Primary metals	78	48	26	31	49	11	75	11
Fabricated metal products	75	49	22	29	56	7	62	5
Transportation equipment	70	55	25	40	68	11	76	5
Pipeline transportation	76	71	55	71	98	0	83	5
<b>Total</b>	<b>54</b>	<b>41</b>	<b>21</b>	<b>26</b>	<b>44</b>	<b>4</b>	<b>72</b>	<b>100</b>

1. Adoption of new or significantly improved systems or equipment within a three year period, 2002 to 2004.

2. Number of establishments in the industry that indicated encountering at least one driver as a percentage of all establishments that indicated encountering at least one driver.

3. Number of establishments that indicated encountering the driver as a percentage of all establishments that provided a response.

**Note(s):** This table includes reported data only.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 30**
**Drivers to the adoption of technologies to reduce greenhouse gas emissions by industry – Innovators versus non-innovators, 2004<sup>1</sup>**

	Sufficient return on investment		Regulations		Voluntary agreement		Public relations	
	Innovator	Non-innovator	Innovator	Non-innovator	Innovator	Non-innovator	Innovator	Non-innovator
	percent <sup>2</sup>							
Logging	55	30	45	18	27	8	18	10
Oil and gas extraction	85	52	78	44	52	15	65	44
Mining	65	40	35	36	31	20	46	22
Electric power generation, transmission and distribution	67	22	56	24	56	16	78	22
Natural gas distribution	75	14	88	0	63	0	50	0
Food	79	42	53	31	35	5	26	12
Beverage and tobacco products	71	36	57	21	29	7	14	0
Wood products	67	28	48	22	18	7	33	14
Pulp, paper and paperboard mills	77	55	52	44	21	14	42	14
Petroleum and coal products	83	69	75	56	50	50	58	31
Chemicals	51	51	47	36	30	15	26	13
Non-metallic mineral products	67	39	47	33	27	10	27	20
Primary metals	74	45	48	27	41	9	30	17
Fabricated metal products	63	36	31	26	19	11	13	16
Transportation equipment	64	38	48	30	28	11	36	21
Pipeline transportation	83	50	88	41	63	34	88	41
<b>Total</b>	<b>71</b>	<b>41</b>	<b>55</b>	<b>31</b>	<b>36</b>	<b>13</b>	<b>42</b>	<b>17</b>

	Corporate policy, culture, awareness		Other		None	
	Innovator	Non-innovator	Innovator	Non-innovator	Innovator	Non-innovator
	percent <sup>2</sup>					
Logging	18	25	0	0	27	47
Oil and gas extraction	80	52	4	4	0	22
Mining	65	36	8	4	8	34
Electric power generation, transmission and distribution	56	31	11	2	11	41
Natural gas distribution	100	0	0	0	0	57
Food	53	26	12	5	12	30
Beverage and tobacco products	71	29	14	0	0	43
Wood products	64	24	0	4	12	49
Pulp, paper and paperboard mills	56	38	2	4	4	20
Petroleum and coal products	75	44	0	0	0	13
Chemicals	58	35	5	2	14	28
Non-metallic mineral products	87	30	7	3	0	36
Primary metals	59	23	11	6	7	27
Fabricated metal products	38	29	13	2	0	40
Transportation equipment	72	32	16	4	0	30
Pipeline transportation	96	70	0	0	0	25
<b>Total</b>	<b>65</b>	<b>32</b>	<b>6</b>	<b>3</b>	<b>6</b>	<b>33</b>

1. Establishments who answered 'yes' to adopting new or significantly improved systems or equipment to reduce greenhouse gases during the period 2002 to 2004 are considered 'innovators.' Establishments who answered 'no' to adopting new or significantly improved systems or equipment to reduce greenhouse gases during the period 2002 to 2004 are considered 'non-innovators.'

2. Number of establishments that indicated the driver as a percentage of all establishments that provided a response.

**Note(s):** This table includes reported data only. Due to changes in the methodology used to calculate this table, comparisons to 2002 results are no longer possible.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 31**  
**Energy conservation processes and technologies by industry, 2004**

	Cogeneration	Alternative fuel systems or equipment	Fuel substitution	Waste energy recovery and reuse	Use of energy management or monitoring systems	Performed energy audit past three years 2002 to 2004	Other systems, equipment or employee training
	percent <sup>1</sup>						
Logging	5	8	3	18	11	9	9
Oil and gas extraction	20	22	16	38	50	39	38
Mining	3	5	2	24	39	33	24
Electric power generation, transmission and distribution	14	14	9	25	43	26	32
Natural gas distribution	0	13	20	7	27	33	20
Food	1	4	3	35	31	29	24
Beverage and tobacco products	10	14	14	38	29	29	29
Wood products	10	9	12	28	24	19	15
Pulp, paper and paperboard mills	33	17	27	74	58	58	30
Petroleum and coal products	7	0	14	72	52	52	48
Chemicals	9	2	6	22	29	25	19
Non-metallic mineral products	0	11	11	18	13	11	18
Primary metals	2	5	5	19	29	26	23
Fabricated metal products	1	0	3	12	21	20	19
Transportation equipment	0	1	1	25	38	36	36
Pipeline transportation	10	26	7	13	51	40	38
<b>Total</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>29</b>	<b>33</b>	<b>29</b>	<b>25</b>
	Renewable energy technologies						Total <sup>3</sup>
	Small, mini- or micro-hydroelectric facility	Solar energy systems or equipment	Wind energy systems or equipment	Biomass energy <sup>2</sup>	Geothermal	Other renewable energy systems or equipment	
	percent <sup>1</sup>						
Logging	3	11	0	14	0	1	<b>41</b>
Oil and gas extraction	3	49	3	0	0	1	<b>82</b>
Mining	2	13	0	0	0	2	<b>60</b>
Electric power generation, transmission and distribution	20	7	12	6	4	10	<b>64</b>
Natural gas distribution	0	40	0	0	0	7	<b>60</b>
Food	0	1	0	3	0	2	<b>57</b>
Beverage and tobacco products	0	0	0	0	0	0	<b>48</b>
Wood products	0	1	0	30	1	3	<b>57</b>
Pulp, paper and paperboard mills	11	1	1	54	0	2	<b>88</b>
Petroleum and coal products	0	7	0	3	0	0	<b>86</b>
Chemicals	0	0	0	0	0	0	<b>53</b>
Non-metallic mineral products	0	0	0	5	0	0	<b>41</b>
Primary metals	2	0	0	1	1	1	<b>50</b>
Fabricated metal products	0	0	0	1	0	0	<b>40</b>
Transportation equipment	0	4	0	0	0	1	<b>64</b>
Pipeline transportation	3	35	1	3	0	1	<b>71</b>
<b>Total</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>9</b>	<b>0<sup>s</sup></b>	<b>2</b>	<b>59</b>

1. Number of establishments indicating they used the process or technology as a percentage of all establishments that provided a response.

2. Examples include energy crops and waste-to-energy.

3. Number of establishments that indicated they used at least one energy conservation process or technology as a percentage of the total number of establishments that provided a response.

**Note(s):** This table includes reported data only.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

**Table 32**  
**Energy conservation processes and technologies by province or territory, 2004**

	Cogeneration	Alternative fuel systems or equipment	Fuel substitution	Waste energy recovery and reuse	Use of energy management or monitoring systems	Performed energy audit past three years 2002 to 2004	Other systems, equipment or employee training
	percent <sup>1</sup>						
Newfoundland and Labrador	4	12	12	16	36	12	28
Prince Edward Island	0	25	13	50	13	13	38
Nova Scotia	11	11	17	37	40	37	3
New Brunswick	13	15	28	37	41	37	26
Quebec	5	5	8	33	30	30	19
Ontario	6	4	4	22	29	26	25
Manitoba	2	11	8	21	43	34	40
Saskatchewan	6	15	10	27	36	34	22
Alberta	15	14	10	31	39	29	31
British Columbia	14	16	15	36	34	32	18
Yukon Territory, Northwest Territories and Nunavut	22	22	0	44	67	22	44
<b>Total</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>29</b>	<b>33</b>	<b>29</b>	<b>25</b>
	Renewable energy technologies						Total <sup>3</sup>
	Small, mini- or micro-hydroelectric facility	Solar energy systems or equipment	Wind energy systems or equipment	Biomass energy <sup>2</sup>	Geothermal	Other renewable energy systems or equipment	
	percent <sup>1</sup>						
Newfoundland and Labrador	12	0	0	8	0	0	<b>48</b>
Prince Edward Island	0	0	0	25	0	0	<b>63</b>
Nova Scotia	6	11	6	14	0	3	<b>57</b>
New Brunswick	7	2	0	28	0	4	<b>78</b>
Quebec	1	2	0	14	0	2	<b>55</b>
Ontario	2	2	1	4	1	1	<b>54</b>
Manitoba	0	6	2	6	2	8	<b>64</b>
Saskatchewan	0	19	1	7	0	0	<b>66</b>
Alberta	1	19	1	5	0	1	<b>66</b>
British Columbia	6	11	0	21	1	3	<b>66</b>
Yukon Territory, Northwest Territories and Nunavut	11	33	0	0	0	0	<b>60</b>
<b>Total</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>9</b>	<b>0<sup>s</sup></b>	<b>2</b>	<b>59</b>

1. Number of establishments indicating they used the process or technology as a percentage of all establishments that provided a response.

2. Examples include energy crops and waste-to-energy.

3. Number of establishments that indicated they used at least one energy conservation process or technology as a percentage of the total number of establishments that provided a response.

**Note(s):** This table includes reported data only. This table excludes the 'other manufacturing' industry category.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.



**Table 33**  
**Distribution of energy conservation processes and technologies by establishment size, 2004**

	Number of employees per establishment			
	Fewer than 100	100 to 499	500 to 999	More than 999
	percent <sup>1</sup>			
Cogeneration	5	9	11	11
Alternative fuel systems or equipment	5	8	9	16
Fuel substitution	4	10	9	17
Waste energy recovery and reuse	18	31	41	52
Use of energy management or monitoring systems	20	32	48	65
Performed energy audit past three years 2002 to 2004	17	29	45	54
Other systems, equipment or employee training	14	23	34	49
<b>Renewable energy technologies</b>				
Small, mini- or micro-hydroelectric facility	0	3	5	10
Solar energy systems or equipment	5	4	7	16
Wind energy systems or equipment	0	0	1	10
Biomass energy <sup>2</sup>	4	13	12	10
Geothermal	0	0	0	1
Other renewable energy systems or equipment	1	1	3	10
<b>Total <sup>3</sup></b>	<b>42</b>	<b>60</b>	<b>77</b>	<b>88</b>
<b>Percentage of total employees <sup>4</sup></b>	<b>44</b>	<b>61</b>	<b>77</b>	<b>90</b>

1. Number of establishments that indicated they used at least one energy conservation process or technology as a percentage of the total number of establishments that provided a response.
2. Examples include energy crops and waste-to-energy.
3. Number of establishments that indicated they used at least one energy conservation process or technology as a percentage of the total number of establishments that provided a response.
4. Employment of establishments indicating they used at least one energy conservation process or technology, as a percentage of the total employment of the establishments that provided a response.

**Note(s):** This table includes reported data only. This table excludes the 'other manufacturing' and 'pipeline transportation' industry categories.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.

## Introduction

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The following information should be used to ensure a clear understanding of the basic concepts that define the data provided in this product, of the underlying methodology of the survey, and of key aspects of the data quality. This information will provide the user with a better understanding of the strengths and limitations of the data, and of how they can be effectively used and analysed. The information may be of particular importance when making comparisons with data from other surveys or sources of information, and in drawing conclusions regarding change over time.

Data presented in this report are derived from the Survey of Environmental Protection Expenditures (SEPE). The SEPE provides a measure of the cost to Canadian industry to comply with present or anticipated environmental regulations, conventions and voluntary agreements. The SEPE also collects information on environmental management practices and environmental technologies used by industry for the purpose of preventing, abating or controlling pollution.

The SEPE has been conducted on an annual basis since 1994. However, as of reference year 1998 this survey is conducted every two years.

## Data sources and methodology

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The SEPE does not cover the entire economy (agriculture, construction, distributive trades, service industries and the government sector are not surveyed). Rather, the survey targets industries in the primary and manufacturing sectors.

The data reported in this study are based upon a survey of 2 790 establishments in primary industries (resource extraction industries), manufacturing industries, the Electric Power Generation, Transmission, and Distribution Industry, the Pipeline Transportation Industry, the Oil and Gas Extraction Industry and the Natural Gas Distribution Industry. In order to be selected for inclusion in the survey, an establishment had to have more than 49 employees.<sup>1</sup>

### Reference period

Respondents were given the option of reporting for a **12-month** period ending between April 1, 2004 to March 31, 2005. The results in this report, however, are simply presented as environmental protection expenditures made during 2004. No adjustment to the data is made for companies that do not report a fiscal year ending on December 31<sup>st</sup>.

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1. In some provinces and territories, in order to obtain minimum coverage, the employment thresholds were reduced.

# General methodology

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## Survey frame

A list of establishments to be surveyed was produced using the frame from Statistics Canada's Annual Survey of Manufactures, the Business Register and other frames that contain establishments or businesses active in the following industries: Oil and Gas Extraction; Pipeline Transportation; Petroleum and Coal Products; Electric Power Generation, Transmission and Distribution; and Natural Gas Distribution. Metal and non-metal mining establishments were added based on Natural Resource Canada's Census of Mines.

## Sample selection

### Industry classification

In previous years, establishments were selected based on the 1980 Standard Industrial Classification System (SIC). However, beginning with reference year 1998, industry selection was based on the North American Industry Classification System (NAICS).

This new classification system was developed as a cooperative effort between the statistical agencies of Canada, Mexico and the United States. Created against the background of the North American Free Trade Agreement, it is designed to provide common definitions of the industrial structure of the three countries and a common statistical framework to facilitate the analysis of the three economies.<sup>1</sup>

The establishments that were surveyed in both 1997 and 1998 were compared to examine any differences in industry classification resulting from the switch to NAICS. It was found that an insignificant number of establishments were reclassified into different industry groups, thus allowing for comparisons with previous survey years.<sup>2</sup>

## Coverage and sample selection

The non-manufacturing (primary) and manufacturing sample was a stratified sample based on employment, from which a take-all portion and a take-some portion was identified.<sup>3</sup> The take-all strata included the following industries: Oil and Gas Extraction; Mining (excluding quarrying); Electric Power Generation, Transmission and Distribution; Natural Gas Distribution; Beverage and Tobacco Products; Pulp, Paper and Paperboard Mills; Petroleum and Coal Products; Primary Metals; and Pipeline Transportation. All establishments with over 49 employees in these primary and manufacturing industries received a more detailed (long) questionnaire.

The take-some industries included Logging (excluding contract logging), Food, Wood Products, Chemicals, Non-Metallic Mineral Products, Fabricated Metal Products, and Transportation Equipment. Establishments in these industries also received a long questionnaire. The take-all and take-some portions of the sample are determined based on a number of factors found in each industry, such as the average level of environmental protection expenditures per employee greater than \$1 000 (at the 4, 5 or 6-digit NAICS level, depending on the industry) and the number of small and medium-sized establishments within the industry group.

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1. Statistics Canada, 2002, North American Industry Classification System, Catalogue no. 12-501-X, Ottawa.

2. For additional information on the impact of the conversion to a NAICS-based classification system from SIC80, please see: Statistics Canada, September 1999, Private and Public Investment in Canada, Revised Intentions, 1999, pp. 11-14, Catalogue no. 61-206-X.

3. The term "take-all" refers to the selection of all establishments within that NAICS industry that have more than 49 employees while "take-some" refers to the selection of a portion of the establishments that have more than 49 employees within the NAICS industry.

**List of selected targeted industries**

- Logging (NAICS 113311, 113312);
- Oil and Gas Extraction (NAICS 211);
- Mining (NAICS 2121, 2122, 21239);
- Electric Power Generation, Transmission and Distribution (NAICS 2211);
- Natural Gas Distribution (NAICS 2212);
- Food (NAICS 311);
- Beverage and Tobacco Products (NAICS 312);
- Wood Products (NAICS 321);
- Pulp, Paper, and Paperboard Mills (NAICS 3221);
- Petroleum and Coal Products (NAICS 324);
- Chemicals (NAICS 325);
- Non-Metallic Mineral Products (NAICS 327);
- Primary Metals (NAICS 331);
- Fabricated Metal Products (NAICS 332);
- Transportation Equipment (NAICS 336);
- Pipeline Transportation (NAICS 4861, 4862, 4869).

A total of 16 industry groups were targeted for increased survey coverage and received the more detailed long questionnaire in 2004 based on 4, 5 and 6-digit NAICS industries (see text box "**List of selected targeted industries**").

The remaining industries in the manufacturing sector were sampled at the 4-digit NAICS level and grouped into an 'other manufacturing' category. To minimize response burden, establishments (with more than 49 employees) in these industries received a less detailed (short) questionnaire. The industries comprising the 'other manufacturing' category are those with an average level of environmental protection expenditure per employee below \$1 000.

Additional information, obtained from the annual reports of establishments where available, and Statistics Canada's annual Capital and Repair Expenditure Survey<sup>4</sup> was also used in the sample selection.

The take-some sample was stratified by ranking establishments within each 4, 5 or 6-digit NAICS (again depending on the industry group) by total employment. If there were 50 or more establishments in the NAICS category, the top 15% of establishments were selected to be surveyed. If there were between 15 and 49 establishments, the top 20% were selected. Where the total number of establishments fell below 15 in the 4, 5 or 6-digit NAICS group, all establishments were selected. In some provinces and territories, the employment threshold was reduced to improve coverage.<sup>5</sup> The sample selected the largest establishments in order to maximize the employment covered while minimizing the number of establishments surveyed.

4. The Capital and Repair Expenditure Survey provided information on industries that had relatively high capital expenditures on assets associated with pollution abatement and control (PAC). In the past, information from surveys in other countries was also used to help determine target industries.

5. The employment threshold was reduced in the Territories and Prince Edward Island to increase their representative sample.

Analysis has shown that there is no correlation between environmental expenditures per employee and establishment size. Therefore, it was assumed that no bias was introduced by sampling the largest establishments in an industry group.

## Concepts and variables measured

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The survey questionnaire was designed in consultation with key public and private sector groups and by referencing the experiences from other countries who have conducted similar surveys. Environmental protection expenditures for the purposes of the survey are defined as those made to meet environmental regulations, conventions or voluntary agreements (see Text Box "**Environmental protection expenditures**" and the questionnaire (see IMDB 1903) for further explanation).

Sampled establishments in the 'other manufacturing' industries received a short version of the questionnaire. The short version of the questionnaire requests the breakdown of expenditures into capital (investment) expenditures and operating expenses for:

- pollution prevention, abatement and control;
- other environmental protection activities;
- purchase of environmental services;
- pollution prevention methods;
- environmental management practices.

The long questionnaire was sent to establishments in target industries and required a more detailed breakdown of expenditures. In addition to the information asked on the short form, the long form asked respondents to report their capital (investment) expenditures and operating expenses for:

- pollution prevention;
- pollution abatement and control (end-of-pipe);
- environmental monitoring;
- environmental assessments and audits;
- site reclamation and decommissioning;
- protection and restoration of wildlife and habitat;
- environmental charges;
- environmental processes and technologies.

Also included on both the short and long questionnaires were two qualitative questions related to pollution prevention and environmental management practices. Respondents could indicate which pollution prevention methods and environmental management practices were used at their establishment.

A new feature on the 2002 and continued on the 2004 SEPE long questionnaire was the revision and addition of questions related to environmental processes and technologies with a focus on greenhouse gas emissions. The questions were designed to measure whether businesses have reduced their greenhouse gas emissions, what processes and technologies were used, the impact on greenhouse gas emissions (low, moderate or high) and what kinds of drivers and obstacles businesses encountered in adopting these technologies.

Both the long and short questionnaires included a question allowing respondents to indicate how long it took to complete the questionnaire (including the time required to gather necessary information). This information is used to help Statistics Canada track response burden. Other revisions were made to the 2004 questionnaire where thought necessary to improve wording, coverage and clarity.

### **Environmental protection expenditures**

Environmental protection expenditures are defined as all capital (investment) and operating (current) expenditures<sup>1</sup> incurred by businesses in order to comply with or to anticipate Canadian and international environmental regulations, conventions<sup>2</sup> or voluntary agreements. The challenge in measuring expenditures made on environmental initiatives (for example, projects to reduce energy consumption or waste generation) is to isolate them from expenditures made in order to reduce production costs. For this reason, the 1997 survey expanded the criterion of environmental protection to include any expenditure that ensures or anticipates compliance to environmental regulation or official voluntary agreement.<sup>3</sup> Environmental protection expenditures are classified as follows:

**Environmental monitoring:** Expenditures for purchase of equipment, supplies, labour and services required to monitor pollutant emissions that would affect air, water or soil quality;

**Environmental assessments and audits:** Expenditures made to review current operations' compliance with regulations and to evaluate the environmental impact of proposed projects;

**Site reclamation and decommissioning:** Expenditures for clean-up of environmental damage and for closing a site;

**Wildlife and habitat protection:** Expenditures made to protect wildlife and habitat from the effects of economic activity and to restore stocks that have been adversely affected by such activity;

**Pollution abatement and control (end-of-pipe processes):** Expenditures related to funding of separately identifiable processes whose sole purpose is to abate or control undesirable substances emitted during normal production activities, without any incidence on the production process itself; expenditures on waste and sewage management and treatment;

**Pollution prevention<sup>4</sup>:** Expenditures made to develop a new or significantly modified production process (integrated processes) in order to prevent or reduce pollutants and waste before they are generated; expenditures on leak and spill prevention; expenditures on energy and water conservation; expenditures on on-site recirculation, recovery, reuse and recycling of materials and substances;

**Environmental fees, fines and licences:** Permits, fees, levies, fines, penalties or damage awards paid to government agencies or to individuals, or any other charges paid to regulating bodies, and;

**Other environmental protection:** Expenditures for administration of environmental projects, for training, and for other initiatives not elsewhere specified. Expenditures on environmental research and development are excluded, in principle, from the data on business expenditures. These data are collected through the Research and Development in Canadian Industry Survey<sup>5</sup>.

1. Capital expenditures refer to all costs in 2004 (reporting year) for machinery and equipment and their installation and repair, as well as for the construction of non-residential facilities (by contractors or own employees). Operating expenditures refer to all cash expenses, rather than accruals, incurred during the 2004 reporting year for maintenance and repair (of existing environmental equipment), labour, fuel and electricity, materials and supplies, and purchased services.

2. Environmental conventions include any formal multiparty commitment to meet specific targets relating to habitat protection and waste and pollution abatement, such as the Canada–U.S. Air Quality Agreement, and the Responsible Care Program adopted by the Canadian Chemical Producers' Association.

3. Any voluntary agreement implemented by an establishment or the participation in any voluntary environmental program such as ARET (Accelerated Reduction/Elimination of Toxics).

4. Please note that previous Environmental Protection Expenditures in the Business Sector reports refer to pollution prevention as "PAC integrated processes". Integrated processes are a subset of pollution prevention.

5. Statistics Canada, 2000, Research and Development in Canadian Industry Survey, Catalogue no 88-001-X, Ottawa.



## Data accuracy

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The mailout of the 2004 reference year Survey of Environmental Protection Expenditures took place in June 2005. Data collection took place from July 2005 to the end of January 2006. Survey questionnaires were mailed to specific establishments identified by the sample and the responses were returned by mail. The surveys were addressed to a contact person who was either responsible for, or had knowledge of, the environmental operations of the company. In the case of some multi-establishment firms, the survey was mailed to the head office which either forwarded the questionnaire to the appropriate establishment or provided a combined report for all targeted establishments.

Follow-ups via fax and/or telephone were carried out after the due date to remind respondents to return their surveys.

Questionnaires were edited in two steps. First, validity edits were applied to ensure that responses to particular questions fell within a limited range of possible values. Second, consistency edits were applied. Cases where responses in one section of the questionnaire were inconsistent with those given in other sections were identified and edited. These edits were done on an ongoing basis throughout the data collection phase.

Additional follow-ups were carried out to collect missing data and to resolve inconsistencies.

## Response rates

Table 1 "Response rates by industry and by province, 2004", shows the response rate for each industry and province and territory, according to both the number of reporting establishments and employment, as a percentage of the total number of survey establishments in scope.

For the 2004 reference year, there were 2,118 reports received for 2,790 surveyed establishments. The response rate for the 2004 survey was 76%, based on the number of reporting establishments, and 80% based on employment covered.<sup>1</sup>

Response rates by industry ranged from a high of 93% in the Pipeline Transportation Industry to a low of 63% in the Non-Metallic Mineral Products Industry. Response rates by province and territory ranged from a low of 57% in Prince Edward Island to a high of 87% in Saskatchewan.

## Qualitative data

The Survey of Environmental Protection Expenditures has a number of qualitative questions (7c, 12 and 13 on the long questionnaire and questions 7 and 8 on the short questionnaire). Currently, this information is collected, verified for data quality and released as reported values only. No estimation is done for non-response or for the non-surveyed portion of the sample.<sup>2</sup> Since the larger establishments (based on employment) are more likely to be sampled, they have the greatest impact on the qualitative results. Analysis indicates that the larger establishments are generally more likely to use pollution prevention methods (Question 7c (long questionnaire) and 7 (short questionnaire)), environmental processes and technologies (Question 12) and environmental management practices (Question 13 (long questionnaire) and Question 8 (short questionnaire)). Users should note that the results likely over-estimate the use of these environmental methods, technologies and practices for industries comprising predominantly larger establishments.

1. This figure does not include employment from the Pipeline Transportation Industry.

2. Estimation for non-response and for the non-surveyed sample was done for questions 12f) and 12g) only.

**Text table 1**  
**Response rates by industry and by province or territory, 2004**

Industry	According to number of reporting units			According to employment <sup>1</sup>		
	Responses	Total <sup>2</sup>	Response as a percentage of total <sup>2</sup>	Number of employees	Total <sup>2</sup>	Response as a percentage of total <sup>2</sup>
	number		percent	number		percent
<b>Industry</b>						
Logging	75	109	69	7,863	11,817	67
Oil and gas extraction	81	99	82	29,864	37,314	80
Mining	110	134	82	33,500	38,101	88
Electric power generation, transmission and distribution	71	79	90	77,173	80,204	96
Natural gas distribution	16	19	84	13,025	14,872	88
Food	142	180	79	68,419	85,384	80
Beverage and tobacco products	22	24	92	9,502	10,701	89
Wood products	182	248	73	34,956	47,596	73
Pulp, paper and paperboard mills	130	149	87	46,499	51,249	91
Petroleum and coal products	33	42	79	7,953	9,288	86
Chemicals	237	286	83	42,929	48,718	88
Non-metallic mineral products	92	147	63	11,013	19,013	58
Primary metals	183	237	77	60,355	70,791	85
Fabricated metal products	106	156	68	27,930	41,079	68
Transportation equipment	83	114	73	76,559	106,182	72
Pipeline transportation	78	84	93	..	..	..
Other manufacturing	477	683	70	187,633	248,668	75
<b>Total</b>	<b>2,118</b>	<b>2,790</b>	<b>76</b>	<b>735,173</b>	<b>920,977</b>	<b>80</b>
<b>Province and territory</b>						
Newfoundland and Labrador	25	31	81	8,940	10,685	84
Prince Edward Island	8	14	57	1,430	2,196	65
Nova Scotia	45	59	76	15,004	18,646	80
New Brunswick	51	73	70	17,722	22,788	78
Quebec	500	686	73	185,004	238,799	77
Ontario	871	1,136	77	328,906	411,650	80
Manitoba	81	99	82	33,220	37,642	88
Saskatchewan	74	85	87	16,721	18,252	92
Alberta	250	321	78	72,084	90,566	80
British Columbia	201	266	76	54,337	66,464	82
Yukon Territory, Northwest Territories and Nunavut	12	20	60	1,805	3,289	55
<b>Canada</b>	<b>2,118</b>	<b>2,790</b>	<b>76</b>	<b>735,173</b>	<b>920,977</b>	<b>80</b>

1. Employment is not available for the Pipeline Transportation industry. It has not been included in the provincial/territorial employment totals.

2. The total excludes out of scope establishments, mergers, closed and/or sold establishments.

Source(s): Statistics Canada, Environment Accounts and Statistics Division.

## Verification, imputation and estimation

After data capture was complete, further validation of the data was performed to ensure that totals were correct and to verify that there were no outliers. The latter validation was performed by comparing figures with those from the previous year.

Imputation for non-response was performed in four stages.

First, all possible related information was assembled (e.g., information from the Capital and Repair Expenditure Survey, Business Register, and from company annual reports) and some establishments were re-contacted to help provide further indicators that would allocate expenditures by province or industry where this information was missing.

Second, when possible, the previous year's operating expenditure data were used to impute for 2004 operating expenditure data. An industry growth factor was calculated for establishments within the industry that responded for both years (2002 and 2004). The appropriate industry growth factor was then applied to impute operating expenditure data for records that were a non-response in the current cycle but responded in the previous cycle.<sup>3</sup>

3. Regression analysis has shown that using the previous year's operating expenditures is a reasonable predictor of future operating expenditures.

Third, total environmental protection expenditures were estimated on a per-employee basis. The mean of environmental expenditures per employee by industry (4-digit NAICS for 'other manufacturing' records) and province or region<sup>4</sup> was used to estimate for non-responding establishments. If there were not enough donors at the industry and province/region level, then imputation was based on the mean of the environmental expenditure per employee ratio for a more aggregated group of donors:

1. industry and Canada;
2. pooled (similar) industries and province/region;
3. pooled industry and Canada; or
4. total for Canada.

Finally, the missing components of environmental protection expenditures were estimated as a proportion of total expenditures using donors from the same industry.

Table 2 "Imputation for non-response as a share of total environmental protection expenditures by industry and by province or territory, 2004", shows the proportion of imputed value over the total value of environmental protection expenditures (value for complete and partial responses + imputed value for non-response), by industry and by province and territory. Imputation rates by industry ranged from 47.9% in the Natural Gas Distribution Industry to 1.3% in the Pipeline Transport Industry. Table 3 "Imputation for non-response as a share of total environmental protection expenditures by category, 2004" provides the same information by expenditure category. Imputation rates by expenditure category ranged from a high of 30.4% to a low of 8.6%.

Estimation was done for establishments that had more than 49 employees but were not surveyed. The mean of the environmental protection expenditures to employment ratio was used for estimation in a manner similar to that for imputation. No estimation or imputation was done for the qualitative information collected in questions 7c, 12 or 13.

## Sampling and non-sampling errors

There are two general categories of error in surveys. The first, sampling error, arises from the fact that a sample or subset of the target population is used to represent the population. The size of sampling error is quantifiable. The second category is referred to as non-sampling error and is not as easily quantified. Non-sampling error refers to all the other kinds of error that arise in surveys. For example, incomplete or inaccurate lists of the general population, respondent misinterpretation of questions, provision of erroneous information, failure to respond, information processing errors and so on.

Typically the sampling error is measured by the expected variability of the estimate from the true value, expressed as a percentage of the estimate. This measure is referred to as the coefficient of variation or the standard deviation. However, in the case of the Survey of Environmental Protection Expenditures, the sample is not randomly chosen. Rather, a minimal sample number was calculated, and the establishments with the largest number of employees were sampled. This methodology was used in order to survey the largest proportion of employment in each target industry while keeping response burden to a minimum. Given the nature of the sampling process, no coefficient of variation was produced.

Every attempt was made to eliminate the non-sampling error. For example, establishments brought into the survey for the first time were researched and contact information was verified. Instructions and definitions were further refined to be more clear and straightforward. The returned questionnaires were verified and validated before data capture. The data was edited and tabulated automatically. Extensive follow-up was carried out for incomplete responses and for non-response. For the 2000 reference year, the Survey of Environmental Protection Expenditures was converted to a new capture and editing system that is being adopted across all Statistics Canada business

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4. The mean of environmental protection expenditures to employment ratio by region was used when there were not enough donors at the provincial level.

surveys. The capture and edit system continues to introduce new tools and efficiencies that improve the quality of the data. Each survey iteration has benefited from ongoing improvements to the system.

**Text table 2**

**Imputation for non-response as a share of total environmental protection expenditures by industry and by province or territory, 2004**

	Imputed value as a percentage of total value <sup>1</sup>
	percent
<b>Industry</b>	
Logging	28.2
Oil and Gas Extraction	19.3
Mining	12.7
Electric Power Generation, Transmission and Distribution	4.2
Natural Gas Distribution	47.9
Food	17.8
Beverage and Tobacco Products	10.4
Wood Products	18.8
Pulp, Paper and Paperboard Mills	7.2
Petroleum and Coal Products	6.9
Chemicals	9.0
Non-Metallic Mineral Products	43.8
Primary Metals	13.3
Fabricated Metal Products	22.2
Transportation Equipment	24.1
Pipeline Transportation	1.3
Other manufacturing	25.3
<b>Total</b>	<b>13.3</b>
<b>Province or territory</b>	
Newfoundland and Labrador	13.7
Prince Edward Island	9.5
Nova Scotia	3.6
New Brunswick	13.1
Quebec	16.3
Ontario	12.9
Manitoba	8.4
Saskatchewan	5.8
Alberta	14.3
British Columbia	10.0
Yukon Territory, Northwest Territories and Nunavut	40.6
<b>Canada</b>	<b>13.3</b>

1. This table does not include the estimated portion of the total environmental expenditures.

Source(s): Statistics Canada, Environment Accounts and Statistics Division.

Given that Survey of Environmental Protection Expenditures has been conducted since the early 1990s, many establishments have received it in the past and are now familiar with the concepts, and as a result their responses are quite accurate. In fact, in some cases, establishments have modified their accounting practices in order to provide, as accurately as possible, the information required by the survey.

The most common difficulty reported by respondents was the inability of their record-keeping systems to isolate the environmental protection component of their expenditures. Expenditures made either for capital investment or for current operations often provide a combination of benefits, such as increased efficiency and reduced waste. In these circumstances, it is difficult to determine what proportion of the expenditure to credit towards environmental protection. Consequently, respondents may over-estimate or under-estimate that proportion. Another example of such bias is the inclusion of health protection expenditures in the reported environmental protection expenditures, because of the respondent's inability to distinguish between the two sets of costs.

An additional difficulty encountered by respondents is the separation of expenditures on environmental protection made in response to environmental regulation, convention or voluntary agreement from those that benefit the environment beyond compliance. In some cases, respondents may have included expenditures on the environment that were beyond the context of the survey.

**Text table 3**  
**Imputation for non-response as a share of total environmental protection expenditures by category, 2004**

	Imputed value as a percentage of total value <sup>1</sup>
	percent
<b>Expenditure category excluding other manufacturing industries</b>	
Environmental monitoring	
Operating	13.6
Capital	16.1
<b>Total</b>	<b>14.2</b>
Environmental assessments and audits	
Operating	12.5
Capital	8.7
<b>Total</b>	<b>10.4</b>
Site reclamation and decommissioning	
Operating	8.6
Capital	20.1
<b>Total</b>	<b>13.1</b>
Protection and restoration of wildlife and habitat	
Operating	19.1
Capital	17.6
<b>Total</b>	<b>18.7</b>
Pollution abatement and control (end-of-pipe processes)	
Operating	14.4
Capital	12.1
<b>Total</b>	<b>13.7</b>
Pollution prevention	
Operating	12.2
Capital	11.7
<b>Total</b>	<b>11.9</b>
Environmental fees, fines and licences - Operating	13.8
Other environmental protection expenditures - Operating	12.2
<b>Total expenditures on environmental protection</b>	
<b>Operating</b>	<b>13.0</b>
<b>Capital</b>	<b>13.0</b>
<b>Total</b>	<b>13.0</b>
Systems and equipment to reduce greenhouse gas emissions	
Operating	30.4
Capital	27.2
<b>Total</b>	<b>29.1</b>
<b>Other manufacturing</b>	
Pollution prevention, abatement and control expenditures	
Operating	25.2
Capital	27.0
<b>Total</b>	<b>25.6</b>
Other environmental protection expenditures	
Operating	21.0
Capital	26.6
<b>Total</b>	<b>21.8</b>
<b>Total expenditures on environmental protection</b>	
<b>Operating</b>	<b>24.8</b>
<b>Capital</b>	<b>27.0</b>
<b>Total</b>	<b>25.3</b>

1. This table does not include the estimated portion of the total environmental expenditures.

**Source(s):** Statistics Canada, Environment Accounts and Statistics Division.



# Survey of Environmental Protection Expenditures, 2004

Confidential when completed

Collected under the authority of the *Statistics Act*, Revised Statutes of Canada, 1985, Chapter S19.

Si vous préférez ce questionnaire en français, veuillez cocher

### Correct as required

Company name

Establishment name

C/O

Address

City

Province/Territory

Postal code



## Please read before completing

### PURPOSE OF THE SURVEY

This survey provides a measure of the expenditures made by industry for environmental protection in Canada in response to Canadian and international environmental regulations, conventions and voluntary agreements. The survey also aims at identifying environmental management practices and technologies used in Canadian industry for the purpose of preventing or abating pollution. These data will be aggregated with information from other sources to produce official estimates of environmental protection expenditures.

The results of this survey will be published in the Statistics Canada publication *Environmental Protection Expenditures in the Business Sector, 2004*, Catalogue No. 16F0006XIE.

### CONFIDENTIALITY

Statistics Canada is **prohibited by law** from publishing any statistics which would divulge information obtained from this survey that relates to any identifiable respondent, without the previous written consent of that respondent. The data reported will be treated in strict confidence, used for statistical purposes and published in aggregate form only. The confidentiality provisions of the *Statistics Act* are not affected by either the *Access to Information Act* or any other legislation.

### AUTHORITY

This survey is conducted under the authority of the *Statistics Act*, Revised Statutes of Canada, 1985, Chapter S19. **COMPLETION OF THIS QUESTIONNAIRE IS A LEGAL REQUIREMENT UNDER THE STATISTICS ACT.**

### INQUIRIES

If you require assistance in completing this questionnaire or if you have any questions or comments regarding this survey, please refer to the *Guide to Definitions and Classification Details* found at the end of this questionnaire or contact:

**Operations and Integration Division  
Statistics Canada  
Ottawa, ON, Canada, K1A 0T6**

Telephone (toll-free): **1-800-255-7726**

Fax: **1-800-755-5514**

Email: **enviro.oid.exp@statcan.ca**

The questionnaire is available in an electronic spreadsheet format. Please contact the Operations and Integration Division if you prefer to use this reporting option.

In all correspondence concerning this questionnaire, please quote the identification number that appears on the address label.

**Important:** Please read the *Guide to Definitions and Classification Details* included at the end of this form before answering. If your response for an item is zero, please write "0" in the corresponding box rather than leaving the cell blank.

**Please return this questionnaire within 30 days of receipt.**

If you are unable to do so, kindly inform the Operations and Integration Division of the expected completion date.

For Statistics Canada use only

Rec.			
Y	M	D	

Ed.			
Y	M	D	

Kyd.			
Y	M	D	

Bat.			

Coll.	

FSC	

**Please report in thousands of Canadian dollars**

**1. Reporting year**

Report must cover your most recent fiscal year that **ended** any time between **April 1, 2004 and March 31, 2005.**

**From**

	Year	Month	Day
010			

**to**

	Year	Month	Day
040			

If the reporting period is less than 12 months, please indicate the circumstances in the Comments section at the end of the questionnaire.

**2. Environmental monitoring**

*If the expenditure is zero, please write "0" in corresponding box.*

**Include**

- ◆ Expenditures related to equipment, supplies, labour and purchased services required for monitoring pollutants emitted by this establishment. Expenditures associated with participation in the National Pollutant Release Inventory (NPRI) and other similar programs are to be included

Operating expenses	Capital expenditures	Total
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
100	110	120

**3. Environmental assessment and audits**

*If the expenditure is zero, please write "0" in corresponding box.*

**Include**

- ◆ Expenditures for reviews of current operations for compliance with regulations (audits)
- ◆ Expenditures to evaluate the environmental impact of proposed programs or projects (assessments)
- ◆ Expenditures for associated legal and consulting costs

Operating expenses	Capital expenditures	Total
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
130	140	150

**4. Site reclamation and decommissioning**

*If the expenditure is zero, please write "0" in corresponding box.*

**4.1 Expenditures on site reclamation made during your fiscal year 2004 for any active site belonging to your establishment**

Operating expenses	Capital expenditures	Total
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
161	171	181

**4.2 Expenditures on site decommissioning made during your fiscal year 2004 following the closing down of a site (even if closing occurred before 2004)**

Operating expenses	Capital expenditures	Total
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
162	172	182

**Exclude**

- ◆ Fines or compensation for environmental damage (this is to be reported in Question 8)
- ◆ Provisions for future environmental liability

**Please report in thousands of Canadian dollars**

**5. Protection and restoration of wildlife and habitat**

If the expenditure is zero, please write "0" in corresponding box.

**Include**

- ◆ Expenditures made to protect or restore wildlife and habitat that could be or have been adversely affected by this establishment's operations

**Exclude**

- ◆ Expenditures for site reclamation and decommissioning which are already reported in Question 4
- ◆ Expenditures for aesthetic purposes

Operating expenses	Capital expenditures	Total
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
190	200	210

**6. Pollution abatement and control (end-of-pipe processes) and waste management**

Abatement and control of pollution are performed using end-of-pipe equipment or installations. **These end-of-pipe processes are not an integral part of production;** their sole purpose is to abate or to control undesirable substances resulting from normal production. *Refer to page 13 of this questionnaire.*

**6.1 Pollution abatement and control and waste management expenditures**

If the expenditure is zero, please write "0" in corresponding box.

**Include**

- ◆ Expenditures for equipment or facilities that are separately identifiable and that have been installed exclusively to reduce or eliminate pollutants resulting from production
- ◆ Expenditures related to hazardous and non-hazardous waste collection, disposal and treatment done by your establishment's or company's employees not already reported in Question 4 or 5
- ◆ Purchase of hazardous and non-hazardous waste services not already reported in Question 4 or 5. Any sewerage management services or any other purchase of services reported in Question 11

**Exclude**

- ◆ Expenditures specific to workers' health and safety
- ◆ Expenditures on waste management or services reported in Question 4 or 5
- ◆ Expenditures for on-site recycling (Question 7)

Operating expenses	Capital expenditures	Total
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
250	220	270

**6.2 Did you report capital expenditures in Question 6.1 (cell 260)?**

- Yes     No <sup>275</sup> ► *Go to Question 6.3*



What proportion of capital expenditures reported in Question 6.1 (cell 260) was spent on reducing or abating each of the following? *Refer to page 13 of this questionnaire.*

Substances released to air	Substances released to surface waters	On-site releases to land/underground injection	Noise, vibration or radiation
280 %	290 %	300 %	310 %

**= 100%**

**6.3 Does your establishment track the quantity (kg, tonnes, etc.) of non-hazardous solid waste it produces?**

- Yes     No <sup>2050</sup>

**Does this establishment record the share of its non-hazardous solid waste that is disposed of versus that which is recycled or reused?**

- Yes     No <sup>2055</sup>



**7. Pollution prevention**

"Pollution prevention is the use of processes, practices, materials, products or energy that avoid or minimize the creation of pollutants and waste, and reduce overall risk to human health or the environment."

*Pollution Prevention - A Federal Strategy for Action, Government of Canada (1995)*

This question identifies expenditures and methods used for the purpose of preventing or minimizing pollution and waste, or promoting resource conservation. **Refer to page 13 of this questionnaire.**

**7.1 Expenditures on pollution prevention**

*If the expenditure is zero, please write "0" in corresponding box.*

**Include**

- ◆ Expenditures for equipment or facilities integrated to a production process that avoid or minimize the production of pollutants and waste
- ◆ Expenditures for equipment or facilities related to leak and spill prevention. They may include expenditures on the following: spill containments; dyke extensions; and accessories (valves, pumps)
- ◆ Expenditures for equipment or facilities used for conserving energy or water
- ◆ Expenditures for equipment or facilities associated with recirculation, recovery, reuse and **on-site** recycling of materials or substances
- ◆ Expenditures related to operational or process changes aimed at pollution prevention. Examples include product re-design (e.g., feedstock/raw material substitution), good operating practices (e.g., modification of process, staff training), etc.

**Exclude**

- ◆ Expenditures specific to workers' health and safety
- ◆ Expenditures already included in Questions 2 to 6

Operating expenses	Capital expenditures	Total
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
500	510	520

**7.2 Did you report capital expenditures in Question 7.1 (cell 510)?**

Yes   
  No <sup>525</sup>   
 ▶ Go to Question 7.3

**What proportion of capital expenditures reported in Question 7.1 (cell 510) was spent on preventing or minimizing each of the following? Refer to the information for Question 6.2 on page 13 of this questionnaire.**

Substances released to air	Substances released to surface waters	On-site releases to land/ underground injection	Noise, vibration or radiation	Other
530 %	540 %	550 %	560 %	570 %

**= 100 %**

**Please report in thousands of Canadian dollars**

**7. Pollution prevention (Concluded)**

**7.3 Pollution prevention methods**

If you prevented or reduced waste, pollutants or conserved resources in your fiscal year 2004, please indicate how it was achieved by checking the appropriate box(es). Please include all projects whether or not they are required by regulation, convention or voluntary agreement. Refer to page 13 of this questionnaire for a description of each method.

	Yes	No
Product design or reformulation . . . . .	810 <input type="checkbox"/>	<input type="checkbox"/>
Equipment or process modifications (integrated process) . . . . .	830 <input type="checkbox"/>	<input type="checkbox"/>
Recirculation, on-site recycling or reuse or recovery of materials or substances . . . . .	850 <input type="checkbox"/>	<input type="checkbox"/>
Materials or feedstock substitution, solvent reduction, elimination or substitution . . . . .	870 <input type="checkbox"/>	<input type="checkbox"/>
Improved inventory management or purchasing techniques . . . . .	875 <input type="checkbox"/>	<input type="checkbox"/>
Prevention of leaks and spills . . . . .	880 <input type="checkbox"/>	<input type="checkbox"/>
Good operating practices or pollution prevention training . . . . .	885 <input type="checkbox"/>	<input type="checkbox"/>
<b>Other (Please specify)</b> . . . . .	890 <input type="checkbox"/>	<input type="checkbox"/>
_____		
_____		
_____		

**8. Environmental charges**

If the expenditure is zero, please write "0" in corresponding box.

\$ '000 CDN

760
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**Include**

- ◆ Permits, fees, levies, special assessment and related fees
- ◆ Any fines, penalties, or damage awards paid to government agencies or to individuals
- ◆ Other charges paid to regulating bodies in order to allow operations to take place at this establishment

**9. Other environmental protection expenditures**

If the expenditure is zero, please write "0" in corresponding box.

\$ '000 CDN

770
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**Include**

- ◆ The operating costs of administrating your environmental program not included elsewhere
- ◆ Environmental training and information programs not included elsewhere
- ◆ Any other additional expenditures not specified elsewhere that are required to comply with environmental regulations, conventions or voluntary agreements

**Exclude**

- ◆ Research and development expenditures

**Please report in thousands of Canadian dollars**

**10. Total expenditures on environmental protection**

If the expenditure is zero, please write "0" in corresponding box.

Cell 801: includes total from operating expenses reported in questions 2 to 9.

Cell 802: includes total from capital expenditures reported in questions 2 to 7.

They should also include all data for which breakdowns were not available.

Operating expenses \$ '000 CDN	Capital expenditures \$ '000 CDN	Total \$ '000 CDN
801	+	802
	=	803

**10.1 In order to help us reduce the need for further follow-up inquiries, please provide a brief explanation to account for significant changes in environmental protection expenditures made by your establishment (either increased or decreased compared to previous reporting periods). (e.g., "We installed low-NO<sub>x</sub> burners in 2004 - Question 7")**

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**11. Purchase of environmental services**

Of the total operating expenses and capital expenditures on environmental protection reported in Question 10 (cell 801 and cell 802), what proportions of these were purchased from a private contractor or government? Your best estimate is acceptable. If the proportion is zero, please write "0" in the corresponding box.

**Include**

- ◆ All expenditures associated with the use of a waste collection and treatment service or a sewerage service provided by a private contractor or a federal, provincial/territorial or local government
- ◆ Any other purchase of environmental services provided by a private contractor or a federal, provincial/territorial or local government. (examples include the purchase of environmental monitoring services; environmental assessment and audit services; construction and engineering services associated with the installation, repair or maintenance of pollution prevention, abatement and control infrastructure or equipment)

**Exclude**

- ◆ Any expenditures for environmental services provided by your establishment's or company's employees (own-account work)
- ◆ Expenditures for on-site recycling

% of total operating expenses reported in cell 801	% of total capital expenditures reported in cell 802
301 %	502 %

**12. Greenhouse gas emission reduction technologies**

**12.1 Did this establishment extract, refine, transport or distribute fossil fuels (e.g., coal, bitumen, crude oil or natural gas) in your fiscal year 2004?**

Yes  Go to Question 12.2      No  <sup>2000</sup> Go to Question 12.3

**12.2 Did this establishment use systems or equipment to reduce fugitive or vented greenhouse gas emissions in your fiscal year 2004?** Refer to page 14 of this questionnaire for the definition of fugitive greenhouse gas emissions and related technologies.

Yes       No  <sup>2001</sup>

**Did this establishment use systems or equipment to reduce greenhouse gas emissions other than fugitive or vented emissions (e.g., from the combustion of fossil fuels)?**

Yes       No  <sup>2002</sup>

**12.3 Did this establishment generate electricity in your fiscal year 2004?**

Yes  Go to Question 12.4      No  <sup>1999</sup> Go to Question 12.5

**12.4 Did this establishment use systems or equipment to reduce greenhouse gas emissions from the generation of electricity in your fiscal year 2004?** Refer to page 14 of this questionnaire for examples and the definition of fugitive greenhouse gas emissions and related technologies.

Yes       No  <sup>2003</sup>

**12.5 Did you use one or more of the following systems or equipment in your fiscal year 2004?**

Please check all that apply. Refer to page 14 of this questionnaire for a description of each technology or process.

		<b>Yes</b>	<b>No</b>
1. Cogeneration .....	1282	<input type="checkbox"/>	<input type="checkbox"/>
2. Alternative fuel systems or equipment .....	2006	<input type="checkbox"/>	<input type="checkbox"/>
3. Fuel substitution .....	1284	<input type="checkbox"/>	<input type="checkbox"/>
4. Waste energy recovery/reuse (e.g. heat recovery) .....	2031	<input type="checkbox"/>	<input type="checkbox"/>
5. Use of energy management or monitoring system(s) to improve efficiency .....	2032	<input type="checkbox"/>	<input type="checkbox"/>
6. Performed energy audit in the last three years (2002-2004) .....	2033	<input type="checkbox"/>	<input type="checkbox"/>
7. Other systems, equipment or employee training that improved energy efficiency .....	1292	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify most important</i>			
_____			
_____			

**Renewable energy source:**

		<b>Yes</b>	<b>No</b>
8. Small, mini- or micro-hydroelectric facility .....	2004	<input type="checkbox"/>	<input type="checkbox"/>
9. Solar energy systems or equipment .....	1288	<input type="checkbox"/>	<input type="checkbox"/>
10. Wind energy systems or equipment .....	1289	<input type="checkbox"/>	<input type="checkbox"/>
11. Biomass energy (e.g., energy crops and waste-to-energy) .....	1285	<input type="checkbox"/>	<input type="checkbox"/>
12. Geothermal .....	1290	<input type="checkbox"/>	<input type="checkbox"/>
13. Other renewable energy systems or equipment .....	2005	<input type="checkbox"/>	<input type="checkbox"/>
<i>Please specify most important</i>			
_____			
_____			

**Please report in thousands of Canadian dollars**

**12. Greenhouse gas emission reduction technologies (Continued)**

**12.6** Did you answer "Yes" to any part of Questions 12.2, 12.4 or 12.5?

Yes  Go to Question 12.7

No  2007 Go to Question 12.9

**12.7** What were your operating expenses and capital expenditures in fiscal year 2004 on the systems or equipment reported in Question 12.2, 12.4 or 12.5? *If the expenditure is zero, please write "0" in the corresponding box. Your best estimate is acceptable.*  
Please exclude fuel costs.

Operating expenses \$ '000 CDN		Capital expenditures \$ '000 CDN		Total \$ '000 CDN
<input type="text" value="2008"/>	+	<input type="text" value="2009"/>	=	<input type="text" value="2010"/>

**12.8** What proportion of your capital expenditures in fiscal year 2004 on machinery and equipment that reduced your greenhouse gas emissions was spent on goods manufactured in Canada? *If the proportion is zero, please write "0" in the corresponding box. Your best estimate is acceptable.*

<input type="text" value="2011"/>	%
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**12.9** During the last three years, 2002 to 2004, did this establishment put into operation new or significantly improved systems or equipment that reduced greenhouse gas emissions? *Refer to page 15 of this questionnaire for a description of "new or significantly improved".*

Yes

No  2012 Go to Question 12.10

**Rank the overall impact of these new or significantly improved systems or equipment to reduce greenhouse gas emissions. Please check the appropriate box.**

2013  Low

2014  Moderate

2015  High

**12. Greenhouse gas emission reduction technologies (Concluded)**

**12.10 Obstacles and drivers**

During the last three years, 2002 to 2004, which of the following factors were obstacles or drivers to the adoption of new or significantly improved systems or equipment to reduce greenhouse gas emissions?

Please check all that apply.

**Possible obstacles**

Indicate the obstacles even if the system or equipment was not adopted.

- 1. Lack of information or knowledge related to new or significantly improved systems or equipment . . . 2016
- 2. Lack of available new or significantly improved systems or equipment. . . . . 2017
- 3. Lack of skilled personnel to put new or significantly improved systems or equipment into operation . . . . . 2018
- 4. High cost of equipment . . . . . 2019
- 5. Lack of financing (internal, private or government) . . . . . 2020
- 6. Regulatory/policy barriers . . . . . 2021
- 7. Other (Please specify) \_\_\_\_\_ 2022
- 8. None . . . . . 2023

**Possible drivers**

- 1. Sufficient return on investment . . . . . 2024
- 2. Regulations . . . . . 2025
- 3. Voluntary agreement . . . . . 2026
- 4. Public relations . . . . . 2027
- 5. Corporate policy/culture/awareness . . . . . 2028
- 6. Other (Please specify) \_\_\_\_\_ 2029
- 7. None . . . . . 2030

FOR INFORMATION ONLY

### 13. Environmental management practices

Please indicate the environmental management practices adopted or utilized by this establishment in your fiscal year 2004 to avoid or minimize pollution or to conserve resources. Refer to page 15 of this questionnaire for a description of each practice.

- |  | Yes                          | No                       |
|--|------------------------------|--------------------------|
| 1. Did this establishment use an environmental management system? .....  | 951 <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Did this establishment use Life Cycle Management, Life Cycle Assessment or Design for Environment for decision making? .....                | 965 <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Was this establishment ISO 14000 certified? .....   | 953 <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Did this establishment develop and implement a pollution prevention plan? .....   | 970 <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Did this establishment implement any environmental voluntary agreement, or did it participate in any voluntary environmental program? ..... | 955 <input type="checkbox"/> | <input type="checkbox"/> |
- Examples include Environmental Performance Agreements (EPAs) or Voluntary Challenge and Registry (VCR).  
If yes, please list programs, accords or agreements.

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|--|------------------------------|--------------------------|
| 6. Did this establishment have a "green" procurement policy? .....   | 957 <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Were any of the goods produced by this establishment certified by an environmental program, such as the "Enviro Choice Program" operated by Terrachoice Inc.? .....   | 959 <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Did this establishment publish or contribute to annual or other reports on its environmental performance or sustainable development? .....  | 963 <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Did this establishment experience any cost savings as a result of implementing any of the environmental management practices outlined in this question or environmental technologies outlined in Question 4 or pollution prevention methods outlined in Question 7? ..... | 969 <input type="checkbox"/> | <input type="checkbox"/> |
| 10. <b>Other</b> (Please specify) .....  | 967 <input type="checkbox"/> | <input type="checkbox"/> |

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## Certification

I certify that to the best of my knowledge, the information provided in this questionnaire is correct and complete.

Signature 	Date 0015      Year      Month      Day  _   _        _        _        _
Name of person completing this questionnaire (type or print) 0013	Telephone 0017       _ _        _ _        _ _        _ _        _ _        _ _        _ _  Ext. 0027
Title 0014	Fax 0016       _ _        _ _        _ _        _ _
Website address 0020	Email address 0018

Approximately how long did it take to collect the data and complete this survey?      935      hours      936      minutes

In the future, would you prefer to receive this survey in electronic format?      862       Yes       No

## Comments

We invite your comments or suggestions on the following or any other topics related to the Survey of Environmental Protection Expenditures. We appreciate your assistance.

- Questionnaire content
- New questions of interest to your industry
- Clarity of questions and provision of sufficient examples
- Order and flow of questions
- Timing of receipt of questionnaire and the period given for response
- Alternative sources of information to further reduce response burden.
- Potential for electronic data reporting

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If you have any questions, please contact us.  
Telephone (toll free) 1-800-255-7726  
Fax: 1-800-755-5514 (within Canada)  
Email: [enviro.oid.exp@statcan.ca](mailto:enviro.oid.exp@statcan.ca)

Please return this questionnaire in the envelope provided

**Thank you for your cooperation !**





## Survey of Environmental Protection Expenditures

### Guide to Definitions and Classification Details



#### Definitions

##### **Establishment**

An establishment is defined as the most homogeneous unit of production for which a business maintains accounting records. From these accounting records, it is possible to assemble all the data elements required to compile the total sales or shipments, inventories, cost of materials and services, labour and capital used in production.

##### **Environmental protection expenditures**

Environmental protection expenditures are defined as all operating expenses and capital and repair expenditures that are incurred in order to anticipate or to comply with Canadian or international environmental regulations, conventions or voluntary agreements. They consist of expenditures for pollution prevention, abatement and control, expenditures for protecting and restoring wildlife and habitat, expenditures for environmental monitoring, environmental assessments and audits, and expenditures for reclamation and decommissioning of sites. **Environmental protection expenditures incurred that are not in response to current or anticipated Canadian or international regulations, conventions or voluntary agreements should be excluded. In addition, expenditures to improve employee health, workplace safety and site beautification should also be excluded.**

Expenditures to produce pollution prevention, abatement and control equipment for sale are also excluded as they would appear twice in the expenditure data produced by Statistics Canada. Expenditures for environment-related research and development are also excluded since they are collected elsewhere in Statistics Canada.

**Environmental conventions or voluntary agreements** refer to any formal, multi-party commitment by an industry or an industry association for instance, to meet specific targets in terms of habitat protection, waste reduction, or the elimination or reduction of specific materials that are considered to be harmful or toxic to the natural environment in Canada. Examples include the following: the Montreal Protocol (elimination of CFCs by 1998); the Canada-U.S. Air Quality Agreement; the "Responsible Care" program from the Canadian Chemical Producers Association; the Voluntary Challenge and Registry (VCR) Program on climate change; etc.

**Environmental regulations** refer to any current Canadian federal, provincial or municipal law or international legislation that is intended to protect or to restore the environment in Canada. Expenditures related to anticipated legislation may be included as long as its provisions are known.

##### **How to report**

Please report expenditures in **thousands of Canadian dollars for your 2004 fiscal year**. If, for certain categories, no expenditures have been incurred, **please write "0" in the corresponding box**. Where precise data are not available, your best estimate is acceptable. If additional information is available in an annual report or an environmental performance report, **please include a copy** when you return the questionnaire.

##### **To report capital expenditure:**

**Include** all relevant outlays for machinery and equipment and their installation and repair that have been capitalized, as well as for the construction of non-residential facilities (contractors or own employees). For construction, include all costs associated with demolition, planning and design (such as engineering and consulting fees), any materials supplied to construction contractors for installation and any costs associated with the purchase of land that are neither amortized nor depreciated.

**Exclude** any provisions for future environmental liability.

##### **To report operating expenses**

**Include** all expenses related to environmental protection incurred for labour, materials and supplies, maintenance and repair, and purchased services (include fuel and electricity expenses for machinery and equipment whose sole purpose is to protect the environment).

**Exclude** depreciation on machinery and equipment.

### **For logging activities**

Use Question 5 to report additional expenditures for logging caused by environmental regulation or convention. **Include** the extra cost of any practice that would not otherwise be followed in the absence of environmental regulation or convention. **Exclude** the foregone revenues resulting from regulations or conventions that reduce the allowable harvest.

### **For mining activities**

Use Question 6 or 11 to report any expenditures that are related to the handling and treatment of mine tailings and that are required by environmental regulation. Even if some of these activities are now considered to be "standard practice", include related expenditures if they are required by regulation or convention. Use Question 9 to report imputed interest on funds held in trust against future environmental liabilities. Report only actual expenditures.

### **For petroleum operations**

Please report separately, if possible, environmental protection expenditures associated with different petroleum operations: exploration, refining, chemical products, pipeline transportation.

### **Question 6) Pollution abatement and control and waste management expenditures**

**6.1** Pollution abatement and control (end-of-pipe processes) can be described as equipment and processes that treat pollution and wastes *after* they have been created. Examples of these types of equipment or processes include scrubbers at the end of emission stacks, biological and chemical systems for treating water (such as a water treatment plant), filtration systems, cyclones or other barrier systems. These end-of-pipe processes are not an integral part of production; their sole purpose is to abate or to control undesirable substances resulting from normal production.

**6.2** **Substances released to air** - emissions of pollutants (including greenhouse gases) to the atmosphere.

**Substances released to surface waters** - releases of pollutants to water bodies.

**On-site releases to land/underground injection** - releases of pollutants to land and/or injected into the ground within the boundaries of your establishment.

**Noise, vibration or radiation** - control of noise, vibration or radiation.

### **Question 7) Pollution prevention**

Pollution prevention is technologies, equipment or processes that reduce or eliminate pollution at the source instead of at the end-of-pipe or stack. Examples include the installation of more efficient processes that consume less energy or inputs, the redesign or reformulation of the production process to reduce pollution or emissions, reuse, recirculation or recycling of materials on-site (does not include materials sent off-site for recycling).

### **7.3 Pollution prevention methods**

Examples are listed for each category of pollution prevention. *Note:* lists are not exhaustive.

**Product design or reformulation** - changing product specifications to reduce or eliminate the use of toxic substances; modifying product design or composition to make them more environmentally friendly; modify packaging.

**Equipment or process modifications (integrated process)** - instituting recycling within a process; switching from the use of solvents to mechanical paint-stripping devices; modified or installed rinse systems; improved rinse equipment design; improved rinse equipment operation; modifying equipment, layout or piping; use of a different process catalyst; institute better controls on operating bulk containers or changing from small volume containers to bulk containers to minimize discarding of empty containers.

**Recirculation, on-site recycling or reuse or recovery of materials or substances generated during production** - such as using a small distillation unit to reclaim solvents on-site; vapour recovery; recovery of sludge; water recirculation; reuse of water for refrigeration condenser operation. *Excludes materials transferred or recycled off-site.*

**Materials or feedstock substitution, solvent reduction, elimination or substitution** - the use of aqueous-based rather than solvent-based cleaners; increased purity of raw materials; substituted raw materials; other raw material modifications.

**Improved inventory management or purchasing techniques** - avoiding the unnecessary generation of waste by ensuring that materials do not stay in inventory beyond shelf life; eliminate shelf-life requirements for stable materials; instituting better labelling procedures; instituting a clearinghouse to exchange materials that would otherwise be discarded.

**Prevention of leaks and spills** - taking measures to prevent releases such as installing splash guards and drip trays around equipment; modified containment procedures for cleaning units; improved draining procedures; improved storage or stacking procedures; improved procedures for loading, unloading and transfer operations; installed overflow alarms or automatic shut-off valves; installed vapour recovery systems; implemented inspection or monitoring program of potential spill or leak sources.

### 7.3 Pollution prevention methods (concluded)

Examples are listed for each category of pollution prevention. *Note:* lists are not exhaustive.

**Good operating practices or pollution prevention training** - changing production schedules to minimize equipment and feedstock changeovers; improved maintenance scheduling, record keeping or procedures; training staff to recognize and implement pollution prevention opportunities.

**Other, specify** - please specify your pollution prevention activities if they are not listed in the preceding categories.

### Question 12) Greenhouse gas emission reduction technologies

Examples are listed for each of the technologies and processes found in Question 12. *Note:* lists are not exhaustive.

**Greenhouse gases:** The group of chemical compounds that are responsible for the so-called 'greenhouse effect.' The most important greenhouse gases produced by economic activity are *carbon dioxide* (CO<sub>2</sub>), *methane* (CH<sub>4</sub>), *nitrous oxide* (N<sub>2</sub>O), *chlorofluorocarbons* (CFCs), *hydrofluorocarbons* (HFCs), *perfluorocarbons* (PFCs) and *sulphur hexafluoride* (SF<sub>6</sub>).

**Fugitive or vented greenhouse gas emissions from fossil fuels:** Intentional or unintentional releases of greenhouse gases from the production, processing, transmission, storage and delivery of fossil fuels. Released gas that is combusted before disposal (e.g., flaring of natural gases at oil and gas production facilities).

**12.1** *Transportation* refers to the transport of fossil fuels from the field or processing plant to the local distribution centre.

*Distribution* refers to the distribution of natural gas or oil to the individual consumer.

**12.2** **Examples of systems or equipment to reduce fugitive or vented greenhouse gas emissions from the extraction, refining, transportation or distribution of fossil fuels** - high efficiency flares; lower emission pneumatic valves; flash tank separators; floating roof tanks; leak detection and repair programs.

**Examples of systems or equipment to reduce greenhouse gas emissions other than fugitive or vented emissions** - enhanced recovery technologies; high efficiency motors or engines; energy management systems; maintenance planning; drag reducing agents; electric micro turbines; energy recovery systems such as waste heat recovery; cogeneration; renewable energy sources; switching to lower or zero-carbon energy sources; CO<sub>2</sub> capture or disposal.

**12.4** **Examples of systems or equipment to reduce greenhouse gas emissions from the generation of electricity** - high efficiency motors or engines; energy management systems; maintenance planning; drag reducing agents; electric micro turbines; energy recovery systems such as waste heat recovery; cogeneration; renewable energy sources; switching to lower or zero-carbon energy sources; CO<sub>2</sub> capture or disposal.

### 12.5 Description of the systems and equipment listed in Question 12.5:

- 1. Cogeneration** - systems and equipment used to produce both heat and electricity from biomass (organic matter from forest and agricultural sources), waste and industrial residues, and other fuel sources.
- 2. Alternative fuel systems or equipment** - process equipment for production or use of biofuels (ethanol, biodiesel); clean fuel systems (reformulated fuel and oxygenated fuels); fuel cell technologies; hydrogen (production, storage, distribution and use, infrastructure); and advanced batteries. Also included are industrial equipment and engine systems that use alternative fuels.
- 3. Fuel substitution** - switching from a carbon fuel such as coal or petroleum to a lower carbon (such as natural gas) or carbon-free fuel.
- 4. Waste energy recovery/reuse (e.g., heat recovery)** - a conservation system whereby some space heating or water heating is done by actively capturing byproduct heat that would otherwise be ejected into the environment.
- 5. Use of energy management or monitoring systems** - an energy conservation feature that uses computers, instrumentation, control equipment and software to manage a building's energy use for heating, ventilation, air-conditioning, lighting and for business-related processes.
- 6. Performed energy audit in the last three years (2002-2004)** - an analysis of the energy consuming systems within a facility and the identification of potential areas for reducing energy consumption.

## 12.5 Description of the systems and equipment listed in Question 12.5: (concluded)

7. **Other systems, equipment or employee training that improved energy efficiency** - please specify any other equipment or systems not listed in Question 12.5 that improved energy efficiency or energy conservation. Examples include: installation of more efficient process equipment such as boilers, turbines and furnaces; process control equipment; energy efficient engines and motors; low NO<sub>x</sub> burners.
8. **Small, mini- or micro-hydroelectric facility** - Micro-hydro = less than 100 kW; Mini-hydro = 100 kW to 1 000 kW (1MW); Small hydro = 1 MW to 25 MW (50 MW in British Columbia).
9. **Solar energy systems or equipment** - active and passive solar systems; photovoltaics; solar thermal generators; solar water and space heating systems.
10. **Wind energy systems or equipment** - horizontal and vertical axis turbines; towers and other types of equipment used to generate energy and electricity.
11. **Biomass energy** - systems and equipment (turbines, boilers, process equipment) that use organic matter such as forest and agricultural residues to produce electricity, steam, or heat.
12. **Geothermal** - hot water or steam extracted from the Earth's interior and used for geothermal heat pumps, water heating or electricity generation.
13. **Other renewable energy systems or equipment** - please specify your renewable energy systems and equipment if they are not listed in the preceding categories (e.g., systems and equipment for energy production from wave, tidal, and ocean thermal energy conversion systems).

**12.9 New or significantly improved systems or equipment to reduce green house gas emissions:** A *new system or piece of equipment* is one that is new to the establishment and whose characteristics or intended uses differ significantly from those systems or equipment previously used by the establishment. A *significantly improved system or piece of equipment* is an existing system or piece of equipment whose performance has been significantly enhanced or upgraded. Excludes maintenance, repair and replacement in kind.

## Question 13) Environmental management practices

1. An **environmental management system** is a management structure that allows an organization to assess and control the environmental impact of its activities.
2. **Life Cycle Management, Life Cycle Assessment** refer to tools that identify and measure direct and indirect environmental, energy and resource impacts associated with a product, process or service through its design, production, usage and final disposal. *Design for Environment* is the integration of environmental considerations into the design, production, distribution, use and end-of-life of products.
3. **ISO 14000** is an internationally recognized set of standards and guidelines primarily concerned with environmental management systems developed by the International Organization for Standardization.
4. A **pollution prevention plan** establishes a plan to meet or exceed compliance and improve the efficiency and environmental performance of an establishment, a specific operation or a particular product.
5. **Voluntary actions** include codes of environmental practice, guidelines, emission and waste reduction targets, as well as agreements with governments.

(Continued ...)

**Question 13) Environmental management practices (concluded)**

6. **Green procurement** describes the procurement of goods and services that minimize environmental impacts compared with goods and services with similar performance requirements. The costs and environmental impacts of a product at various stages of its life cycle are taken into consideration, such as the process used to manufacture the product (including raw materials), transportation, storing, handling and operating and disposal of the product.
7. **Eco-labelling programs** such as Enviro Choice (operated by TerraChoice Environmental Services Inc. for Environment Canada) are designed to encourage manufacturers and suppliers to develop environmentally preferable products and services. These eco-labelling programs are meant to help consumers identify products and services that are less harmful to the environment.
8. Your establishment can either publish its own **environmental report** or be a contributor to the parent company's environmental report or annual report that includes a section dealing with its environmental performance or sustainable development.

FOR INFORMATION ONLY



# Survey of Environmental Protection Expenditures, 2004

### Correct as required

Company name

Establishment name

C / O

Address

City

Province/Territory

Postal code



## Please read before completing

### PURPOSE OF THE SURVEY

This survey provides a measure of the expenditures made by industry for environmental protection in Canada in response to Canadian and international environmental regulations, conventions and voluntary agreements. The survey also aims at identifying environmental management practices and technologies used in Canadian industry for the purpose of preventing or abating pollution. These data will be aggregated with information from other sources to produce official estimates of environmental protection expenditures.

The results of this survey will be published in the Statistics Canada publication *Environmental Protection Expenditures in the Business Sector, 2004*, Catalogue No. 16F0006XIE.

### CONFIDENTIALITY

Statistics Canada is **prohibited by law** from publishing any statistics which would divulge information obtained from this survey that relates to any identifiable respondent, without the previous written consent of that respondent. The data reported will be treated in strict confidence, used for statistical purposes and published in aggregate form only. The confidentiality provisions of the *Statistics Act* are not affected by either the *Access to Information Act* or any other legislation.

### AUTHORITY

This survey is conducted under the authority of the *Statistics Act*, Revised Statutes of Canada, 1985, Chapter S19. **COMPLETION OF THIS QUESTIONNAIRE IS A LEGAL REQUIREMENT UNDER THE STATISTICS ACT.**

### INQUIRIES

If you require assistance in completing this questionnaire or if you have any questions or comments regarding this survey, please contact:

**Operations and Integration Division  
Statistics Canada  
Ottawa, ON, Canada, K1A 0T6**

Telephone (toll-free): **1-800-255-7726**

Fax: **1-800-755-5514**

Email: **enviro.oid.exp@statcan.ca**

The questionnaire is available in an electronic spreadsheet format. Please contact the Operations and Integration Division if you prefer to use this reporting option.

In all correspondence concerning this questionnaire, please quote the identification number that appears on the address label.

**Important:** Please read the Definitions and concepts on page 6 before answering. If your response for an item is zero, please write "0" in the corresponding box rather than leaving the cell blank.

**Please return this questionnaire within 30 days of receipt.**

If you are unable to do so, kindly inform the Operations and Integration Division of the expected completion date.

### Statistics Canada use only

Rec.			
Y	M	D	

Ed.			
Y	M	D	

Kyd.			
Y	M	D	

Bat.			

Coll.	

FSC	

**Please report in thousands of Canadian dollars**

**1. Reporting year**

Report must cover your most recent fiscal year that **ended** any time between **April 1, 2004 and March 31, 2005.**

Year				Month			Day		
010									

From

Year				Month			Day		
040									

to

If the reporting period is less than 12 months, please indicate the circumstances in the Comments section at the end of the questionnaire.

**2. Pollution prevention, abatement and control and waste management**

**2.1 Pollution prevention, abatement and control and waste management expenditures**

*If the expenditure is zero, please write "0" in the corresponding box.*

**Include**

- ◆ Expenditures for end-of-pipe pollution abatement and control facilities and equipment
- ◆ Expenditures for pollution prevention equipment or facilities integrated to a production process, that prevent or minimize the creation of pollutants and waste
- ◆ Expenditures for equipment or facilities related to leak and spill prevention. They may include expenditures on the following: spill containments, dyke extension, accessories (valves, pumps) or emission detection equipment
- ◆ Expenditures for equipment or facilities used for conserving energy or water
- ◆ Expenditures for equipment or facilities associated with recirculation, recovery, reuse and recycling of materials or substances
- ◆ Expenditures related to operational or process changes aimed at pollution prevention. Examples include product re-design (e.g., feedstock/raw material substitution), good operating practices (e.g., modification of process, staff training), etc.
- ◆ Pollution monitoring expenditures
- ◆ Expenditures for hazardous and non-hazardous waste collection, disposal, treatment and recycling done by your employees
- ◆ Purchase of hazardous and non-hazardous waste and sewerage management services or any other purchase of services reported in Question 5

**Exclude**

- ◆ Expenditures specific to workers' health and safety
- ◆ Site reclamation and decommissioning expenditures (Question 3)
- ◆ Research and development expenditures associated with pollution prevention, abatement and control

<b>Operating expenses</b> \$ '000 CDN	<b>Capital expenditures</b> \$ '000 CDN	<b>Total</b> \$ '000 CDN
101	+ 102	= 103

**2.2 From the amount of capital expenditures reported in cell 102, what percentage was spent on preventing or abating each of the following?**

Substances released to air	Substances released to surface waters	On-site releases to land/underground injection	Noise, vibration or radiation	Other	
201 %	+ 202 %	+ 203 %	+ 204 %	+ 205 %	= 100%

**2.3 Does your establishment track the quantity (kg, tonnes, etc.) of non-hazardous solid waste it produces?**

Yes                       No <sup>2050</sup>

**Does this establishment record the share of its non-hazardous solid waste that is disposed of versus that which is recycled or reused?**

Yes                       No <sup>2055</sup>

**Please report in thousands of Canadian dollars**

**3. Other environmental protection expenditures.** *If the expenditure is zero, please write "0" in the corresponding box.*

**Include**

- ◆ Expenditures for site reclamation and decommissioning
- ◆ Expenditures for protection and restoration of wildlife and habitat
- ◆ Expenditures for environmental audits and assessments
- ◆ Expenditures for training on environmental matters
- ◆ Administration costs directly associated with environmental protection projects
- ◆ Other expenditures not elsewhere specified required to comply with environmental regulations, conventions, or voluntary agreements

**Exclude**

- ◆ Environment-related research and development expenditures

<b>Operating expenses</b>	<b>Capital expenditures</b>	<b>Total</b>
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
401	402	403

**4. Total expenditures on environmental protection.** *If the expenditure is zero, please write "0" in the corresponding box.*

This question is the sum of Questions 2 and 3.

<b>Operating expenses</b>	<b>Capital expenditures</b>	<b>Total</b>
\$ '000 CDN	\$ '000 CDN	\$ '000 CDN
410	411	412

**4.1 In order to help us reduce the need for further follow-up inquiries, please provide a brief explanation to account for significant changes in environmental protection expenditures made by your establishment (either increased or decreased compared to previous reporting periods).**  
*(e.g., "We implemented a major product re-design in 2004")*

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**5. Purchase of environmental services**

**Of the total operating expenses and capital expenditures on environmental protection reported in Question 4 (cell 410 and cell 411), what proportions of these were purchased from a private contractor or government? Your best estimate is acceptable.** *If the proportion is zero, please write "0" in the corresponding box.*

**Include**

- ◆ All expenditures associated with the use of a waste collection and treatment service or a sewerage service provided by a private contractor or a federal, provincial/territorial or local government
- ◆ Any other purchase of environmental services provided by a private contractor or a federal, provincial/territorial or local government (examples include the purchase of environmental monitoring services; environmental assessment and audit services; construction and engineering services associated with the installation, repair or maintenance of pollution prevention, abatement and control infrastructure or equipment)

**Exclude**

- ◆ Any expenditures for environmental services provided by your establishment's or company's employees (own-account work)
- ◆ Expenditures for on-site recycling

**% of total operating expenses reported in cell 410**

301	%
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**% of total capital expenditures reported in cell 411**

502	%
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## 6. Pollution prevention methods

If you prevented or reduced waste, pollutants or conserved resources in your fiscal year 2004, please indicate how it was achieved by checking the appropriate box(es). Please include all projects whether or not they are required by regulation, convention or voluntary agreement.

Pollution prevention method	Yes	No
Product design or reformulation .....	810 <input type="checkbox"/>	<input type="checkbox"/>
Equipment or process modifications (integrated process) .....	830 <input type="checkbox"/>	<input type="checkbox"/>
Recirculation, on-site recycling, reuse or recovery of materials or substances <sup>1</sup> .....	850 <input type="checkbox"/>	<input type="checkbox"/>
Energy conservation and efficiency .....	860 <input type="checkbox"/>	<input type="checkbox"/>
Materials or feedstock substitution, solvent reduction, elimination or substitution .....	870 <input type="checkbox"/>	<input type="checkbox"/>
Improved inventory management or purchasing techniques .....	875 <input type="checkbox"/>	<input type="checkbox"/>
Prevention of leaks and spills .....	880 <input type="checkbox"/>	<input type="checkbox"/>
Good operating practices or pollution prevention training .....	885 <input type="checkbox"/>	<input type="checkbox"/>
Other (Please specify) .....	890 <input type="checkbox"/>	<input type="checkbox"/>

<sup>1</sup> Recirculation, recycling, reuse or recovery: recirculation, recycling, reuse or recovery of water, materials or substances generated during production, **excluding materials transferred or recycled on-site.**  
Examples: vapour recovery, recovery of sludge, water recirculation, reuse of water for refrigeration condenser operation.

## 7. Environmental management practices

Please indicate the environmental management practices adopted or utilized by this establishment in your fiscal year 2004 to avoid or minimize pollution or to conserve resources.

	Yes	No
1. Did this establishment use an environmental management system? .....	951 <input type="checkbox"/>	<input type="checkbox"/>
2. Did this establishment use Life Cycle Management, Life Cycle Assessment or Design for Environment for decision making? .....	965 <input type="checkbox"/>	<input type="checkbox"/>
3. Was this establishment ISO 14000 certified? .....	953 <input type="checkbox"/>	<input type="checkbox"/>
4. Did this establishment develop and implement a pollution prevention plan? .....	970 <input type="checkbox"/>	<input type="checkbox"/>
5. Did this establishment implement any environmental voluntary agreement, or did it participate in any voluntary environmental program? .....	955 <input type="checkbox"/>	<input type="checkbox"/>
Examples include Environmental Performance Agreements (EPAs) or Voluntary Challenge and Registry (VCR). If yes, please list programs, accords or agreements.		
6. Did this establishment have a "green" procurement policy? .....	957 <input type="checkbox"/>	<input type="checkbox"/>
7. Were any of the goods produced by this establishment certified by an environmental program, such as the "Enviro Choice Program" operated by Terrachoice Inc.? .....	959 <input type="checkbox"/>	<input type="checkbox"/>
8. Did this establishment publish or contribute to annual or other reports on its environmental performance or sustainable development? .....	963 <input type="checkbox"/>	<input type="checkbox"/>
9. Did this establishment experience any cost savings as a result of implementing any of the environmental management practices outlined in this question or Question 6? .....	969 <input type="checkbox"/>	<input type="checkbox"/>
10. Other (Please specify) .....	967 <input type="checkbox"/>	<input type="checkbox"/>



## Definitions and concepts

**Environmental protection expenditures** are defined in this survey as all operating expenses and capital and repair expenditures that are incurred in order to anticipate or comply with Canadian or international environmental regulations, conventions or voluntary agreements. They consist of expenditures for pollution prevention, abatement and control, expenditures for protecting and restoring wildlife and habitat, expenditures for environmental monitoring, environmental assessments and audits, and expenditures for reclamation and decommissioning of sites. Environmental protection expenditures incurred that *are not* in response to current or anticipated Canadian or international regulations, conventions or voluntary agreements *should be excluded*. In addition, expenditures to improve employee health, workplace safety and site beautification *should also be excluded*.

**Environmental conventions or voluntary agreements** refer to any formal, multi-party commitment by an industry, an industry association or other body, to meet specific targets in terms of habitat protection, waste reduction, or the elimination or reduction of specific materials that are considered to be harmful or toxic to the natural environment in Canada. Examples include the following: the Montreal Protocol (elimination of CFCs by 1998); the Canada-U.S. Air Quality Agreement; the "Responsible Care" program from the Canadian Chemical Producers Association; the Voluntary Challenge and Registry (VCR) Program on climate change, etc.

**Environmental regulations** refer to any current Canadian federal, provincial, or municipal law or international legislation that is intended to protect or to restore the environment in Canada. Expenditures related to anticipated legislation may be included as long as its provisions are known.

**Pollution prevention, abatement and control (PPAC) expenditures** include all outlays for the primary purpose of preventing, abating or controlling the release of pollutants and generation of waste resulting from the operations of this establishment. Expenditures to produce PPAC equipment for sale are excluded as they would appear twice in the

expenditure data produced by Statistics Canada. Expenditures for environment - related research and development are also excluded since they are collected elsewhere in Statistics Canada.

**Pollution abatement and control (end-of-pipe) expenditures** relate to expenditures on an equipment or a facility not integrated to production. Their sole purpose is to abate or control undesirable substances emitted during normal production activities. These expenditures also include waste management expenditures.

**Pollution prevention expenditures** include all expenditures for new or significantly modified integrated production processes that prevent or minimize emissions of pollutants and the amount of waste generated.

**Environmental monitoring expenditures** include all costs related to equipment, supplies, labour and purchased services that are required for the monitoring of pollutants emitted by this establishment (e.g., under the National Pollutant Release Inventory).

**Environmental assessments and audits expenditures** include expenditures for reviews of current operations for compliance with regulations (audits); expenditures to evaluate the environmental impact of proposed programs or projects (assessments); associated legal and consulting costs.

**Site reclamation and decommissioning expenditures** include expenditures to clean up environmental damage resulting from this establishment's operations; decommissioning expenditures made during the year that are associated with the closing down of an establishment or site (even if closing occurred before 2004).

**Expenditures for protection and restoration of wildlife and habitat** include expenditures made to protect wildlife and habitat from the effects of this establishment's operations or to restore stocks that have been adversely affected by such operations. They exclude expenditures for aesthetic purposes.

## How to report

Please report expenditures in **thousands of Canadian dollars**. If, for certain categories, no expenditures have been incurred, **please write "0" in the corresponding box**.

Where precise data are not available, your best estimate is acceptable. If additional information is available in an annual report or an environmental performance report, **please include a copy** when you return the questionnaire.

### TO REPORT CAPITAL EXPENDITURES

**Include** all relevant outlays in 2004 (fiscal year) for machinery and equipment and their installation and repair, as well as for the construction of non-residential facilities (by contractors or own employees). For construction, include all costs associated with demolition, planning and

design (such as engineering and consulting fees), any materials supplied to construction contractors for installation and any costs associated with the purchase of land that are neither amortised nor depreciated.

**Exclude** any provisions for future environmental liability.

### TO REPORT OPERATING EXPENSES

**Include** expenses in 2004 (fiscal year) related to environmental protection incurred for labour, materials and supplies, maintenance and repair and purchased services (include fuel and electricity expenses for machinery and equipment whose sole purpose was to protect the environment).

**Exclude** depreciation on machinery and equipment.