

# **Greenhouse Gas Emissions Inventory and Management Plan - 2004**

**Gazifère**

Une société Enbridge



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## Letter of Commitment

I am pleased to present the Enbridge 2004 Annual Update to the Voluntary Climate Change Challenge and Registry (VCR). As in the past, this update provides a summary of greenhouse gas emissions from Enbridge's major Canadian subsidiaries, the overall targets for reductions to the year 2005, a discussion about our future target setting for the period 2005 – 2010, and an outline of our corporate climate change management strategy.

Interest in and debate about climate change has increased significantly with the Federal Government's ratification of the Kyoto Protocol. However, with the recent political developments, it is not clear where or how the Federal Government will manage the issue of mandatory greenhouse gas reporting. Irrespective of these developments, Enbridge will continue to remain actively engaged in discussions with Federal and Provincial Governments, to take part in the development of policies and help create a better understanding of our business amongst policy makers. Our motivation is to help steer government and society toward constructive resolution of climate change issues, and to provide assistance to governments as they develop major policies.

I continue to believe Canadians need to be informed about the decisions that are made. Enbridge will continue to work with policy makers to find a solution that engages Canadians, building on the work that has been done to date. Enbridge will also continue to work with all stakeholders to help Canadians transform good intentions into effective environmental action.

I fully support the objectives of greenhouse gas emission reductions and believe that Canadians should all work toward reducing emissions. In response to this objective, Enbridge has set corporate targets for reducing our greenhouse gas emissions and to meet our climate change responsibilities. Enbridge will meet the 2005 targets and has recently set new corporate targets for 2010, which we report on for the first time in this report. Enbridge believes that setting and meeting such targets is part of being an open and transparent sustainable corporation.

With the anticipated closing of the VCR at the end of 2004, Enbridge remains committed to continuing to report its climate change and greenhouse gas initiatives in a clear and transparent manner. Enbridge supports public reporting, and takes its responsibility seriously to meet climate change objectives.

Voluntary measures, such as the One Tonne Challenge, particularly at the individual level, must continue to be a critical element of Canada's response to climate change. At Enbridge we know that if all Canadians work together to meet the challenge, significant greenhouse gas emission reductions can be achieved. Enbridge will continue to be a leader in helping Canada achieve its Kyoto obligations and to help us remain a sustainable world-wide organization.



Patrick D. Daniel

President & Chief Executive Officer

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# 1 Organizational Profile

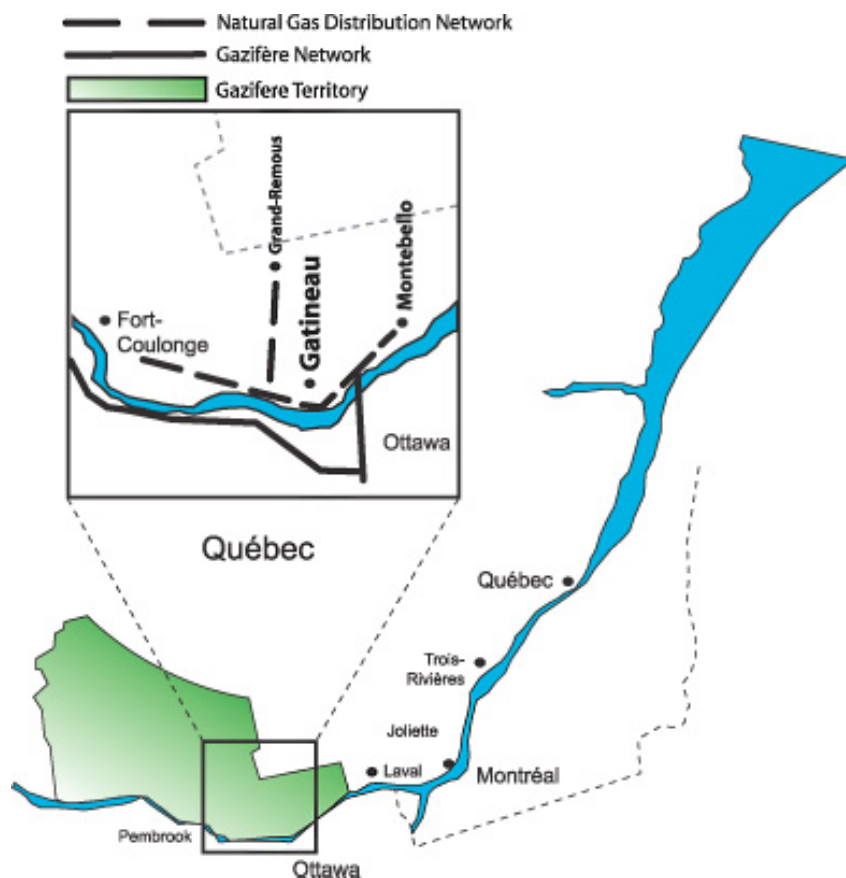
Two companies share the distribution of natural gas in Québec. **Gazifère** is the sole natural gas distributor in the Outaouais region, administrative region #07 of the province of Québec.

Gazifère supplies the municipalities of Hull, Aylmer, Gatineau, Masson-Anger and Buckingham with a distribution network that extends over 550 kilometres. In 2003, the company delivered 167 Mm<sup>3</sup> (6.21 PJ) of natural gas to 26,000 customers.

Gazifère is a private company that employs 50 people. Founded in 1959 and the company is now affiliated with the Enbridge group, which holds interests in the power industry throughout North America.

Gazifère reports its activities to the Régie de l'énergie du Québec.

**Figure 1: Gazifère's Service Area**



## 1.1 Organizational Boundaries

The Greenhouse Gas Protocol Initiative<sup>1</sup> is emerging as the corporate standard for reporting greenhouse gas emissions. This protocol recommends consolidating a corporation's emission inventory by organizational boundaries based on equity or control. Gazifère chooses to define its organizational boundary using an equity share approach.

## 1.2 Operational Boundaries

The Greenhouse Gas Protocol Initiative also recommends categorizing emissions by operational boundaries. The same categorization is followed in this report.

The company's operational boundaries include emissions from the import of electricity from the provincial grid in Quebec.

### Scope 1 – Direct Emissions

Direct emissions come from sources that are owned or controlled by the reporting company. They include four categories:

1. Stationary combustion for the production of electricity, heat or steam;
2. Physical and chemical processing;
3. Transportation, and
4. Fugitive emissions.

Canada's Large Final Emitters (LFEs) emission trading system requires fugitive emissions to be further subdivided into intentional (vented) and unintentional releases (fugitive).

Gazifère attempts to capture all significant sources of direct emissions. All efforts are made to report in as transparent a manner as possible, and changes to methodologies and assumptions, particular to the base year are documented.

### Scope 2 – Electricity Indirect Emissions

Scope 2 accounts for emissions from the generation of purchased electricity consumed by the reporting company. These emissions physically occur at the facility where electricity is generated and appear as direct emissions in the inventory of the generating company.

### Scope 3 – Other Indirect Emissions

Scope 3 is the reporting category that allows for treatment of all other emissions. These emissions may include sources such as:

- Employee business travel;
- Transportation of products, materials and waste;
- Leased assets and outsourced activities;
- Waste in landfills;
- Complete employee commuting; and
- Production of imported materials.

Gazifère will strive to include significant sources of emissions in subsequent reports.

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<sup>1</sup> See <http://www.ghgprotocol.org/> for details

**Table 1: Operation Boundaries and Emission Sources****Scope 1 – Direct Emissions**

<b>Source</b>	<b>Ownership</b>	<b>Notes</b>
Stationary Combustion Facilities	100%	Building heating, natural gas, reported
Transportation Distribution system operation	100%	Diesel, gasoline and natural gas vehicle fleets, reported.
Vented Emissions		None
Fugitive Emissions Distribution system	100%	Pipeline and meter leakage, reported.

**Scope 2 – Electricity Indirect Emissions**

<b>Source</b>	<b>Ownership</b>	<b>Notes</b>
Quebec Facilities	0%	Building cooling and lighting, reported.

**Scope 3 – Other Indirect Emissions**

<b>Source</b>	<b>Ownership</b>	<b>Notes</b>
None		

## 2 Base Year – 1990

### 2.1 Methodology

Gazifère has chosen 1990 as its base year. Each year, the company had five potential sources of direct greenhouse gas emissions (Scope 1). Greenhouse gases are also emitted by other companies as a result of Gazifère's consumption of electricity in Québec (Scope 2).

Unless specifically noted, emission estimates are based on actual consumption and emission constants published by Canada's Climate Change Voluntary Challenge & Registry. These are listed in the appendix.

#### Scope 1 – Direct Emissions

##### *Stationary Combustion – natural gas (facilities)*

Gazifère has recorded the consumption of natural gas in its offices and facilities since 1990.

##### *Transportation – diesel, gasoline and natural gas*

Gazifère did not record its consumption of diesel, gasoline and natural gas in 1990. The total consumption of gasoline equivalent fuel has been estimated from the average ratio of consumption to number of customers in 2000 to 2003, and the actual number of customers in 1990. The proportion of diesel, gasoline and natural gas consumed is assumed as the average proportion of each fuel from 2000 to 2003.

##### *Fugitive Emissions – distribution system*

Fugitive methane emissions from the distribution system are calculated using GRI - GHGCalc 1.20, software from the Gas Technology Institute<sup>2</sup>.

The estimate of emissions is based upon the company's catalogue of the lengths and materials of pipe existing in the distribution system only.

#### Scope 2 – Electricity Indirect Emissions

##### *Quebec – facilities*

The electrical utility emits greenhouse gases when generating electricity to meet Gazifère's demand. Total electricity use in the company's buildings is not available for 1990. This electricity consumption was assumed to be the average of consumption in 1994 to 1998.

This value is converted to greenhouse gas emissions using the average electrical emission intensity for Québec published by Canada's Climate Change Voluntary Challenge & Registry. The proportion of the total emission attributable to CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O are estimated assuming that the source of the emissions was coal-fired generators.

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<sup>2</sup> <http://www.gastechnology.org/>

## 2.2 Quantification

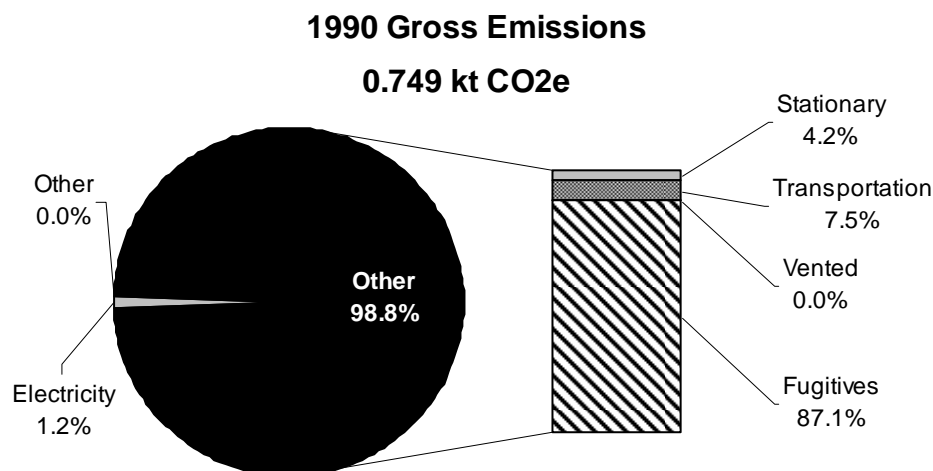
Figure 2 shows Gazifère's gross emissions by scope. As shown, nearly all of the company's gross emissions are fugitive emissions from the natural gas distribution system itself.

Table 2 displays Gazifère's emissions in detail. In 1990, the company's entire operations emitted 0.749 thousand tonnes of carbon dioxide equivalent greenhouse gases (kt CO<sub>2</sub>e). Direct emissions, those that occur from sources owned and operated by the company totalled 0.740 kt CO<sub>2</sub>e. Of this, 0.032 kt CO<sub>2</sub>e were emitted heating the company's offices. Another 0.056 kt CO<sub>2</sub>e were emitted by the company's vehicle fleet and 0.652 kt CO<sub>2</sub>e were a result of fugitive emissions from the distribution system. Finally, electricity utilities emitted 0.009 kt CO<sub>2</sub>e generating the electricity used in the company's office.

In 1990, the company delivered 246 Mm<sup>3</sup> (9.14 PJ) of natural gas. The company's measure of efficiency, total emissions per energy delivered was 81.9 t CO<sub>2</sub>e / PJ.

In Table 2, labelled *Previous Estimate*, are the emission estimates documented in last year's report. There is a significant change in electricity indirect emissions as a result of a change in the Quebec electricity grid average emission intensity as provided by the Voluntary Challenge and Registry.

**Figure 2: 1990 Emissions by Scope**



**Table 2: 1990 Emissions – Detailed by Source****Scope 1 - Direct Emissions**

Source	Volume	CO2 (kt)	CH4 (kt)	N2O (kt)	CO2e (kt)	Previous Estimate (kt CO2e)
Stationary Combustion						
- natural gas (facilities)	0.0167 Mm3	3.16E-02	6.18E-07	5.51E-07	<b>3.18E-02</b>	3.18E-02
Transportation						
- diesel	6,493 liters	1.77E-02	4.54E-07	1.30E-06	<b>1.81E-02</b>	1.80E-02
- gasoline	14,730 liters	3.48E-02	3.68E-06	3.83E-06	<b>3.60E-02</b>	3.57E-02
- natural gas	0.0008 Mm3	1.55E-03	1.80E-05	5.06E-08	<b>1.94E-03</b>	1.93E-03
Vented Emissions						
Fugitive Emissions						
- distribution system	0.0457 Mm3		3.10E-02		<b>6.52E-01</b>	6.52E-01
<b>Total</b>		<b>8.56E-02</b>	<b>3.11E-02</b>	<b>5.73E-06</b>	<b>7.40E-01</b>	7.39E-01

**Scope 2 - Electricity Indirect Emissions**

Source	Volume	CO2 (kt)	CH4 (kt)	N2O (kt)	CO2e (kt)	Previous Estimate (kt CO2e)
Quebec						
- facilities	262 MWh	8.88E-03	7.81E-08	1.14E-07	<b>8.91E-03</b>	3.54E-03
<b>Total</b>		<b>8.88E-03</b>	<b>7.81E-08</b>	<b>1.14E-07</b>	<b>8.91E-03</b>	3.54E-03

**Scope 3 - Other Indirect Emissions**

Source	Volume	CO2 (kt)	CH4 (kt)	N2O (kt)	CO2e (kt)	Previous Estimate (kt CO2e)
<b>Total</b>						0

**Total Net Emissions**

Source	CO2 (kt)	CH4 (kt)	N2O (kt)	CO2e (kt)	Previous Estimate (kt CO2e)
Scope 1 - Direct Emissions	8.56E-02	3.11E-02	5.73E-06	<b>7.40E-01</b>	7.39E-01
Scope 2 - Electricity Indirect Emissions	8.88E-03	7.81E-08	1.14E-07	<b>8.91E-03</b>	3.54E-03
Scope 3 - Other Indirect Emissions					
<b>Net</b>	<b>9.45E-02</b>	<b>3.11E-02</b>	<b>5.84E-06</b>	<b>7.49E-01</b>	7.43E-01

**Productivity and Intensities**

	Previous Estimate
Energy Delivered (PJ)	9.14
Distribution System Length (km)	511
Direct Emission Intensity (t CO2e / PJ)	80.9
Direct Emission Intensity (t CO2e / km)	1.45
Total Emission Intensity (t CO2e / PJ)	81.9

Notes: Italicized entries are based on estimated consumption.  
Other indirect emissions are displayed for symmetry with other tables even though the company did not partake in these activities in 1990.  
Individual columns may not sum exactly to the total amount due to round off errors.

## 3 Results Achieved

### 3.1 Current Year – 2003

In 2003, Gazifère delivered 167 Mm<sup>3</sup> (6.21 PJ) of natural gas to approximately 26,000 customers. Even though the company has more customers, the total amount of deliveries in 2003 was 32% less than in 1990, due to a change in customer base (fewer industrial customers). The company's gross emissions were 1.15 kt CO<sub>2</sub>e, approximately 54% more than in 1990 (Figure 3). This increase has been caused by the expansion of the distribution system to service residential customers.

Table 3 lists Gazifère's emissions in 2003 in detail. The company's direct emissions were 1.14 kt CO<sub>2</sub>e (55% more than in 1990). Electricity indirect emissions were 0.006 kt CO<sub>2</sub>e (29% less than in 1990). The company's total emission intensity, total emissions per energy delivered, was 185 t CO<sub>2</sub>e / PJ, 2.3 times the amount in 1990.

### 3.2 Existing Activities / Projects

#### Scope 1 – Direct Emissions

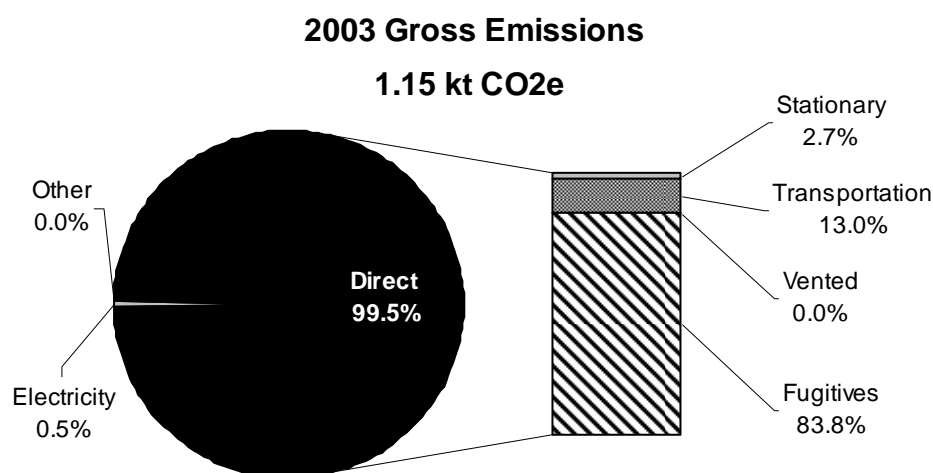
*Transportation – diesel, gasoline and natural gas*

The company promotes the use of natural gas by its vehicle fleet. In 2003, the consumption of natural gas by the company's vehicle fleet was 13% times the amount in 2000. The program is limited by the number of natural gas refuelling stations in operation in their franchise area.

*Fugitive Emissions – distribution system*

Gazifère currently has an on-going leak survey and detection program that operates in conjunction with the Enbridge Consumers Gas Eastern Region program. Enbridge Gas Distribution Inc. operates this leak detection program and it identifies leaks within the gas distribution system and includes distribution system upgrades to minimise emissions.

Figure 3: 2003 Emissions by Scope



**Table 3: 2003 Emissions – Detailed by Source****Scope 1 - Direct Emissions**

Source	Volume	CO2 (kt)	CH4 (kt)	N2O (kt)	CO2e (kt)	Previous Estimate (kt CO2e)
Stationary Combustion						
- natural gas (facilities)	0.016 Mm3	3.10E-02	6.07E-07	5.41E-07	<b>3.12E-02</b>	3.12E-02
Transportation						
- diesel	17,600 liters	4.80E-02	1.23E-06	3.52E-06	<b>4.92E-02</b>	4.73E-02
- gasoline	40,929 liters	9.66E-02	1.02E-05	1.06E-05	<b>1.00E-01</b>	9.67E-02
- natural gas	0.0001 Mm3	1.23E-04	1.43E-06	4.02E-09	<b>1.54E-04</b>	1.22E-02
Vented Emissions						
Fugitive Emissions						
- distribution system	0.068 Mm3		4.59E-02		<b>9.64E-01</b>	9.83E-01
<b>Total</b>		<b>1.76E-01</b>	<b>4.59E-02</b>	<b>1.47E-05</b>	<b>1.14E+00</b>	1.17E+00

**Scope 2 - Electricity Indirect Emissions**

Source	Volume	CO2 (kt)	CH4 (kt)	N2O (kt)	CO2e (kt)	Previous Estimate (kt CO2e)
Quebec						
- facilities	288 MWh	6.30E-03	5.92E-08	8.61E-08	<b>6.33E-03</b>	6.90E-04
<b>Total</b>		<b>6.30E-03</b>	<b>5.92E-08</b>	<b>8.61E-08</b>	<b>6.33E-03</b>	6.90E-04

**Scope 3 - Other Indirect Emissions**

Source	Volume	CO2 (kt)	CH4 (kt)	N2O (kt)	CO2e (kt)	Previous Estimate (kt CO2e)
<b>Total</b>						0

**Total Net Emissions**

Source	CO2 (kt)	CH4 (kt)	N2O (kt)	CO2e (kt)	Previous Estimate (kt CO2e)
Scope 1 - Direct Emissions	1.76E-01	4.59E-02	1.47E-05	<b>1.14E+00</b>	1.17E+00
Scope 2 - Electricity Indirect Emissions	6.30E-03	5.92E-08	8.61E-08	<b>6.33E-03</b>	6.90E-04
Scope 3 - Other Indirect Emissions					
<b>Net</b>	<b>1.82E-01</b>	<b>4.59E-02</b>	<b>1.48E-05</b>	<b>1.15E+00</b>	1.17E+00

**Productivity and Intensities**

	Previous Estimate
Energy Delivered (PJ)	6.69
Distribution System Length (km)	not reported
Direct Emission Intensity (t CO2e / PJ)	175.0
Direct Emission Intensity (t CO2e / km)	not reported
Total Emission Intensity (t CO2e / PJ)	175.1

Notes: Italicized entries are based on estimated consumption.  
 Other indirect emissions are displayed for symmetry with other tables even though the company did not partake in these activities in 1990.  
 Individual columns may not sum exactly to the total amount due to round off errors.

**Scope 3 – Other Indirect Emissions****Recycling**

Gazifère has implemented a waste paper recycling program but the amount of paper recovered has not been documented. The supplier provides recycling bins, but these have not been weighed, but are estimated to hold approximately 100 lbs. each of paper products. More accurate information will be obtained in the future.

**Table 4: Emission Reductions from Existing Projects**

Emission Reductions (kt CO2e)														
Program	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Scope 1 - Direct Emissions														
Transportation														
- vehicle fleet	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-04	1.44E-03	<b>0.00E+00</b>
<b>Total</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>0.00E+00</b>	<b>2.77E-04</b>	<b>1.44E-03</b>	<b>0.00E+00</b>

**Table 5: Historical Emissions with Actions 1990 to 2003**

<b>Scope 1 - Direct Emissions (kt CO<sub>2</sub>e)</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Stationary Combustion														
- natural gas (facilities)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Transportation														
- diesel	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.06	0.05	0.04	0.05
- gasoline	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.10	0.08	0.10
- natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Vented Emissions														
Fugitive Emissions														
- distribution system	0.65	0.68	0.71	0.73	0.76	0.79	0.82	0.84	0.90	0.91	0.96	0.97	0.98	0.96
<b>Total</b>	<b>0.74</b>	<b>0.78</b>	<b>0.81</b>	<b>0.85</b>	<b>0.88</b>	<b>0.92</b>	<b>0.96</b>	<b>0.98</b>	<b>1.06</b>	<b>1.08</b>	<b>1.15</b>	<b>1.15</b>	<b>1.13</b>	<b>1.14</b>
<b>Scope 2 - Electricity Indirect Emissions (kt CO<sub>2</sub>e)</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Quebec														
- facilities	8.91E-03	3.83E-03	1.16E-02	5.16E-03	5.44E-02	4.50E-03	3.79E-03	1.85E-03	7.98E-03	4.98E-03	3.13E-03	4.34E-03	2.68E-03	6.33E-03
<b>Total</b>	<b>8.91E-03</b>	<b>3.83E-03</b>	<b>1.16E-02</b>	<b>5.16E-03</b>	<b>5.44E-02</b>	<b>4.50E-03</b>	<b>3.79E-03</b>	<b>1.85E-03</b>	<b>7.98E-03</b>	<b>4.98E-03</b>	<b>3.13E-03</b>	<b>4.34E-03</b>	<b>2.68E-03</b>	<b>6.33E-03</b>
<b>Scope 3 - Other Indirect Emissions (kt CO<sub>2</sub>e)</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Total</b>														
<b>Total Net Emissions (kt CO<sub>2</sub>e)</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Scope 1 - Direct Emissions	0.74	0.78	0.81	0.85	0.88	0.92	0.96	0.98	1.06	1.08	1.15	1.15	1.13	1.14
Scope 2 - Electricity Indirect Emissions	0.01	0.00	0.01	0.01	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Scope 3 - Other Indirect Emissions														
<b>Net</b>	<b>0.75</b>	<b>0.78</b>	<b>0.83</b>	<b>0.85</b>	<b>0.94</b>	<b>0.92</b>	<b>0.96</b>	<b>0.99</b>	<b>1.06</b>	<b>1.08</b>	<b>1.15</b>	<b>1.16</b>	<b>1.13</b>	<b>1.15</b>
<b>Productivity and Intensities</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Energy Delivered (PJ)	9.14	7.94	8.30	5.08	4.80	5.18	6.06	7.04	7.93	7.50	7.98	6.10	6.78	6.21
Distribution System Length (km)	511	557	611	663	715	758	805	841	926	958	1,025	1,060	1,106	1,074
Direct Emission Intensity (t CO <sub>2</sub> e / PJ)	80.9	97.6	98.0	167	184	177	158	140	133	144	144	189	167	184
Direct Emission Intensity (t CO <sub>2</sub> e / km)	1.45	1.39	1.33	1.28	1.24	1.21	1.19	1.17	1.14	1.13	1.12	1.09	1.02	1.07
Total Emission Intensity (t CO <sub>2</sub> e / PJ)	81.9	98.1	99.4	168	196	178	159	140	134	144	144	190	167	185

Notes: Italicized entries are based on estimated consumption.  
Individual columns may not sum exactly to the total amount due to round off errors.

**Table 6: Historical Emissions without Actions 1990 to 2003**

<b>Scope 1 - Direct Emissions (kt CO<sub>2</sub>e)</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Stationary Combustion														
- natural gas (facilities)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Transportation														
- diesel	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.06	0.05	0.04	0.05
- gasoline	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.11	0.08	0.10
- natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vented Emissions														
Fugitive Emissions														
- distribution system	0.65	0.68	0.71	0.73	0.76	0.79	0.82	0.84	0.90	0.91	0.96	0.97	0.98	0.96
<b>Total</b>	<b>0.74</b>	<b>0.78</b>	<b>0.81</b>	<b>0.85</b>	<b>0.88</b>	<b>0.92</b>	<b>0.96</b>	<b>0.98</b>	<b>1.06</b>	<b>1.08</b>	<b>1.15</b>	<b>1.15</b>	<b>1.13</b>	<b>1.14</b>
<b>Scope 2 - Electricity Indirect Emissions (kt CO<sub>2</sub>e)</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Quebec														
- facilities	8.91E-03	3.83E-03	1.16E-02	5.16E-03	5.44E-02	4.50E-03	3.79E-03	1.85E-03	7.98E-03	4.98E-03	3.13E-03	4.34E-03	2.68E-03	6.33E-03
<b>Total</b>	<b>8.91E-03</b>	<b>3.83E-03</b>	<b>1.16E-02</b>	<b>5.16E-03</b>	<b>5.44E-02</b>	<b>4.50E-03</b>	<b>3.79E-03</b>	<b>1.85E-03</b>	<b>7.98E-03</b>	<b>4.98E-03</b>	<b>3.13E-03</b>	<b>4.34E-03</b>	<b>2.68E-03</b>	<b>6.33E-03</b>
<b>Scope 3 - Other Indirect Emissions (kt CO<sub>2</sub>e)</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Total</b>														
<b>Total Net Emissions (kt CO<sub>2</sub>e)</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Scope 1 - Direct Emissions	0.74	0.78	0.81	0.85	0.88	0.92	0.96	0.98	1.06	1.08	1.15	1.15	1.13	1.14
Scope 2 - Electricity Indirect Emissions	0.01	0.00	0.01	0.01	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Scope 3 - Other Indirect Emissions														
<b>Net</b>	<b>0.75</b>	<b>0.78</b>	<b>0.83</b>	<b>0.85</b>	<b>0.94</b>	<b>0.92</b>	<b>0.96</b>	<b>0.99</b>	<b>1.06</b>	<b>1.08</b>	<b>1.15</b>	<b>1.16</b>	<b>1.14</b>	<b>1.15</b>
<b>Productivity and Intensities</b>														
Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Energy Delivered (PJ)	9.14	7.94	8.30	5.08	4.80	5.18	6.06	7.04	7.93	7.50	7.98	6.10	6.78	6.21
Distribution System Length (km)	511	557	611	663	715	758	805	841	926	958	1,025	1,060	1,106	1,074
Direct Emission Intensity (t CO <sub>2</sub> e / PJ)	80.9	97.6	98.0	167	184	177	158	140	133	144	144	189	167	184
Direct Emission Intensity (t CO <sub>2</sub> e / km)	1.45	1.39	1.33	1.28	1.24	1.21	1.19	1.17	1.14	1.13	1.12	1.09	1.02	1.07
Total Emission Intensity (t CO <sub>2</sub> e / PJ)	81.9	98.1	99.4	168	196	178	159	140	134	144	144	190	168	185

Notes: Italicized entries are based on estimated consumption.  
Individual columns may not sum exactly to the total amount due to round off errors.

## 4 Business as Usual Projection

### 4.1 Basis for Projection

#### Energy Delivered

Gazifère's Volumetric & Market Analysis Group estimates that the volume of natural gas delivered will increase by approximately 1.6% per year (Figure 4).

#### Scope 1 – Direct Emissions

##### *Stationary Combustion – natural gas (facilities)*

Future consumption of natural gas in the company's buildings and offices is assumed to remain constant.

##### *Transportation – diesel, gasoline and natural gas (vehicle fleet)*

The total consumption of gasoline equivalent fuel is forecast from the average ratio of consumption to number of customers in 2000 to 2003, and the number of customers forecast by Enbridge Gas Distribution Inc.'s Volumetric & Market Analysis Group. The proportion of diesel, gasoline and natural gas consumed is assumed to remain the same as in 2003.

##### *Fugitive Emissions – distribution system*

The total length of the distribution system is assumed to grow to 666 km by 2010. The length in intervening years is linearly interpolated with the proportion of steel to plastic pipe was assumed constant.

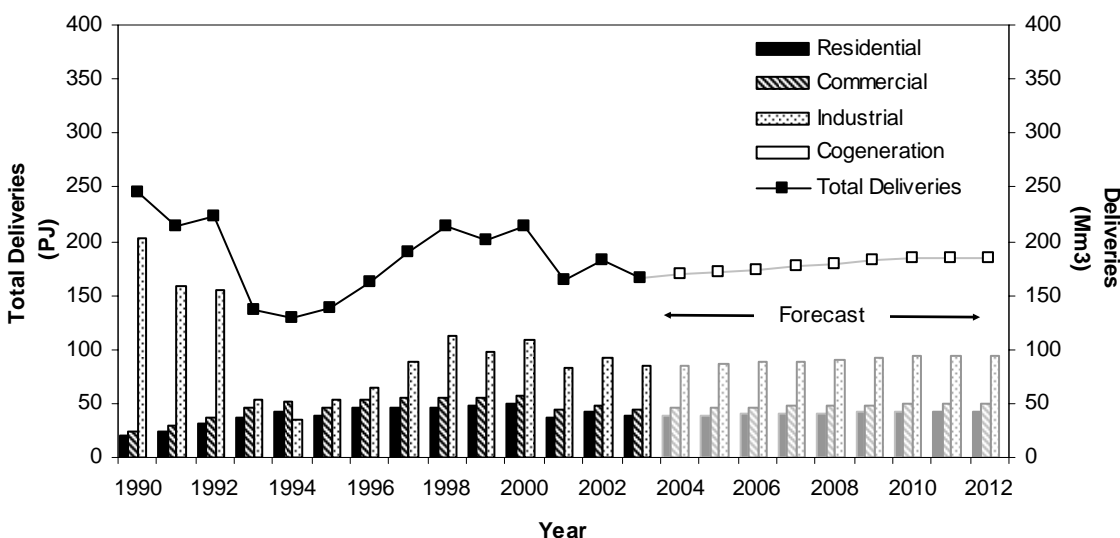
The number of services is estimated from the current ratio of the number of services to deliveries and amount of natural gas delivered in the future.

#### Scope 2 – Indirect Emissions

##### *Electricity – facilities*

Future electrical consumption in Gazifère's buildings and facilities is assumed to be a constant at the 2003 level.

**Figure 4: Historical and Future Deliveries**



## 4.2 Quantification

By 2005, Gazifère expects to deliver 171 Mm<sup>3</sup> (6.38 PJ) of natural gas to 28,000 customers. By 2010, the company expects to have 33,000 customers that will consume 185 Mm<sup>3</sup> (6.89 PJ) of natural gas. From 2003 to 2010, direct emissions are expected decrease by approximately 5% (Figure 5). They are expected to be 1.16 kt CO<sub>2</sub>e and 1.20 kt CO<sub>2</sub>e in 2005 and 2010 respectively. By 2010, direct emissions are expected to be 62% more than the amount emitted in 1990. This increase is mostly caused by the expansion of the distribution system to meet customer demand.

The company's total emission intensity (Figure 6), a measure of efficiency, is expected to continue decreasing. By 2010 the total emission intensity would be 175 t CO<sub>2</sub>e / PJ, 2% better than in 2003.

Figure 5: Direct Emissions

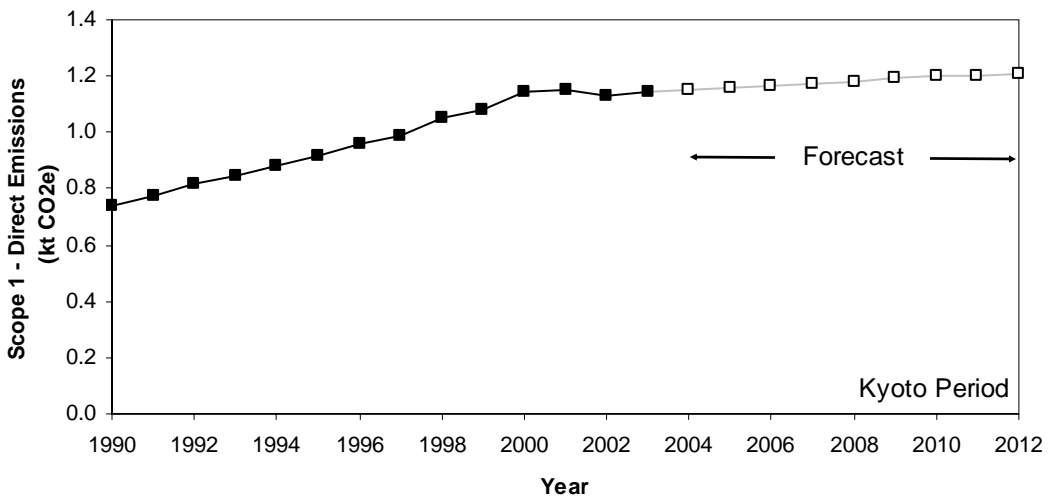


Figure 6: Total Emission Intensity

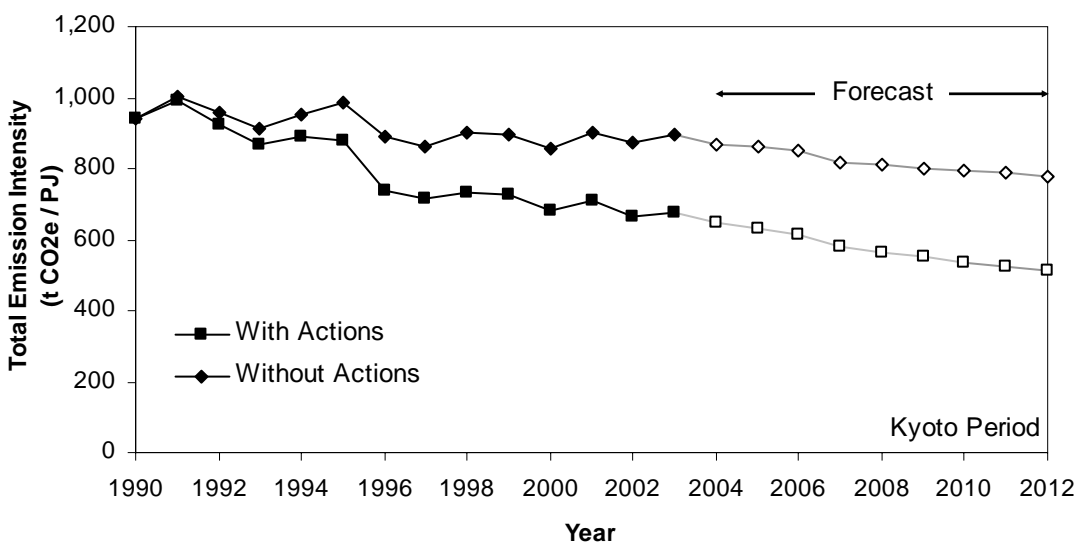


Table 7: Forecasted Emissions

## Scope 1 - Direct Emissions (kt CO2e)

Source	1990	2000	2003	2004	2005	2006	2010
Stationary Combustion							
- natural gas (facilities)	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Transportation							
- diesel	0.02	0.06	0.05	0.05	0.05	0.05	0.05
- gasoline	0.04	0.10	0.10	0.10	0.10	0.10	0.11
- natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vented Emissions							
Fugitive Emissions							
- distribution system	0.65	0.96	0.96	0.97	0.98	0.98	1.01
<b>Total</b>	<b>0.74</b>	<b>1.15</b>	<b>1.14</b>	<b>1.15</b>	<b>1.16</b>	<b>1.17</b>	<b>1.20</b>

## Scope 2 - Electricity Indirect Emissions (kt CO2e)

Source	1990	2000	2003	2004	2005	2005	2010
Quebec							
- facilities	8.91E-03	3.13E-03	6.33E-03	6.33E-03	6.33E-03	6.33E-03	6.33E-03
<b>Total</b>	<b>8.91E-03</b>	<b>3.13E-03</b>	<b>6.33E-03</b>	<b>6.33E-03</b>	<b>6.33E-03</b>	<b>6.33E-03</b>	<b>6.33E-03</b>

## Scope 3 - Other Indirect Emissions (kt CO2e)

Source	1990	2000	2003	2004	2005	2005	2010
<b>Total</b>							

## Total Net Emissions (kt CO2e)

Source	1990	2000	2003	2004	2005	2005	2010
Scope 1 - Direct Emissions	0.74	1.15	1.14	1.15	1.16	1.17	1.20
Scope 2 - Indirect Emissions	8.91E-03	3.13E-03	6.33E-03	6.33E-03	6.33E-03	6.33E-03	6.33E-03
Scope 3 - Other Indirect Emissions							
<b>Net</b>	<b>0.75</b>	<b>1.15</b>	<b>1.15</b>	<b>1.16</b>	<b>1.16</b>	<b>1.17</b>	<b>1.21</b>

## Productivity and Intensities

	1990	2000	2003	2004	2005	2005	2010
Energy Delivered (PJ)	9.14	7.98	6.21	6.31	6.38	6.47	6.89
Distribution System Length (km)	511	1,025	1,074	1,084	1,093	1,103	1,146
Direct Emission Intensity (t CO2e / PJ)	80.9	144	184	182	181	180	174
Direct Emission Intensity (t CO2e / km)	1.45	1.12	1.07	1.06	1.06	1.06	1.05
Total Emission Intensity (t CO2e / PJ)	81.9	144	185	183	182	181	175

Notes: Individual columns may not sum exactly to the total amount due to round off errors.

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## 5 Target Setting

### 5.1 Commitment to Targets

Gazifère does not have any company specific direct emission or emission intensity targets. The company has combined with other Enbridge companies to provide an overall reduction target for the corporation.

### 5.2 Process for Target Review and Update

Annually, Enbridge Inc.'s *Climate Change Task Force* reviews the progress of the key business units of the Enbridge group of companies to their individual greenhouse gas targets. The *Climate Change Task Force* is responsible for the formalization of an Enbridge Inc. wide GHG management strategy. This strategy will include, when appropriate, the use of offsets and market instruments to help all companies within the Enbridge Inc. group of companies set and reach emission targets in accordance with Canada's climate change commitments. The approval of the targets is provided by the Committee of the Board of Directors with advice from the Climate Change Task Force.

## 6 Appendix

### 6.1 Constants

#### Stationary Sources

	Natural Gas (Industrial)		Propane	
CO <sub>2</sub>	1.891	kg/m <sup>3</sup>	1.500	kg/l
CH <sub>4</sub>	3.7E-05	kg/m <sup>3</sup>	2.4E-05	kg/l
N <sub>2</sub> O	3.3E-05	kg/m <sup>3</sup>	1.1E-04	kg/l
<b>CO<sub>2</sub>e</b>	<b>1.902</b>	<b>kg/m<sup>3</sup></b>	<b>1.534</b>	<b>kg/l</b>
Energy	0.03723	GJ/m <sup>3</sup>	23.60	GJ/m <sup>3</sup>

From: Voluntary Challenge and Registry's 2004 Guide to Entity & Facility-based Reporting

#### Non-stationary Sources

	Diesel (Automobile)		Gasoline (Automobile)		Natural Gas (Automobile)	
CO <sub>2</sub>	2.730	kg/l	2.360	kg/l	2.758	kg/kg
CH <sub>4</sub>	5.0E-05	kg/l	2.5E-04	kg/l	3.2E-02	kg/kg
N <sub>2</sub> O	2.0E-04	kg/l	2.6E-04	kg/l	9.0E-05	kg/kg
<b>CO<sub>2</sub>e</b>	<b>2.793</b>	<b>kg/l</b>	<b>2.446</b>	<b>kg/l</b>	<b>3.460</b>	<b>kg/kg</b>
Energy	38.68	GJ/m <sup>3</sup>	34.66	GJ/m <sup>3</sup>	0.03723	GJ/m <sup>3</sup>
	Turbo (Aviation)					
CO <sub>2</sub>	2.550	kg/l				
CH <sub>4</sub>	8.0E-05	kg/l				
N <sub>2</sub> O	2.5E-04	kg/l				
<b>CO<sub>2</sub>e</b>	<b>2.629</b>	<b>kg/l</b>				
Energy	35.93	GJ/m <sup>3</sup>				

From: Voluntary Challenge and Registry's 2004 Guide to Entity & Facility-based Reporting

#### Commercial Aviation

	Take-off		Distance	
CO <sub>2</sub>	32.38	kg/takeoff	0.0996	kg/p-km
CH <sub>4</sub>	3.0E-02	kg/takeoff	9.4E-05	kg/p-km
N <sub>2</sub> O	3.2E-03	kg/takeoff	9.8E-06	kg/p-km
<b>CO<sub>2</sub>e</b>	<b>34.01</b>	<b>kg/takeoff</b>	<b>0.1046</b>	<b>kg/p-km</b>

From: Voluntary Challenge and Registry's 2004 Guide to Entity & Facility-based Reporting

#### Sequestration

Species	
Evergreens	9.05 kg CO <sub>2</sub> /tree/yr
Deciduous	6.07 kg CO <sub>2</sub> /tree/yr

From: Voluntary Challenge and Registry's 2004 Guide to Entity & Facility-based Reporting

#### Waste

Material	Recycling (t CO <sub>2</sub> e / t recycled)	Composting (t CO <sub>2</sub> e / t recycled)
Aluminum	-1.93	
Cardboard	-3.48	
Fine paper	-4.17	
Food scraps		-0.74
Glass	-0.07	
HDPE	-1.40	
Newsprint	-1.46	
Other paper	-3.77	
Other plastic	-1.11	
PET	-2.82	
Steel	-0.90	
Yard waste		0.36

Note: Negative values denote an emission reduction. Positive values denote an emission.

From: ICF Consulting 2001. Determination of the Impact of Waste Management Activities on Greenhouse Gas Emissions. Environment Canada Contract No. K223200068.

## Fugitive Methane Emissions

Pipelines			Services			Gas Processing Plants		
Cast Iron	4.25E+03	m <sup>3</sup> / km	Copper	7.3	m <sup>3</sup> / service	Plants	0.082	Mm <sup>3</sup> / plant
Unprotected steel	1.96E+03	m <sup>3</sup> / km	Unprotected steel	48.7	m <sup>3</sup> / service	Reciprocal compressors	0.116	Mm <sup>3</sup> / comp
Protected steel	5.45E+01	m <sup>3</sup> / km	Protected steel	5.0	m <sup>3</sup> / service	Centrifugal compressors	0.219	Mm <sup>3</sup> / comp
Plastic	7.02E+01	m <sup>3</sup> / km	Plastic	0.3	m <sup>3</sup> / service	Dehydrator venting	121	m <sup>3</sup> / Mm <sup>3</sup>
Plastic Permeability	1.79E-02	m <sup>3</sup> / km	Service length	20	m			

From:

- Gas Technology Institute 2001. GRI-GHGCalc 1.20
- USEPA 1999. Final report on U.S. methane emissions 1990-2020: inventories, projections and opportunities for reductions. Report EPA 430-R-99-013. Available at [http://www.epa.gov/ghginfo/pdfs/03-natural\\_gas.pdf](http://www.epa.gov/ghginfo/pdfs/03-natural_gas.pdf)

## 6.2 Variables

### Electrical Emission Intensities (kg CO<sub>2</sub>e / kWh)

Province	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Alberta	1.046	1.056	1.061	1.059	1.063	1.058	1.049	1.054	1.032	1.022	1.001	0.985	0.985	0.985	0.985	0.985	0.985	0.985	0.985	0.985	0.985
Manitoba	0.027	0.019	0.016	0.013	0.011	0.008	0.011	0.011	0.033	0.020	0.034	0.015	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
New Brunswick	0.400	0.385	0.427	0.380	0.440	0.590	0.432	0.552	0.552	0.495	0.501	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571
Ontario	0.223	0.208	0.203	0.150	0.127	0.143	0.150	0.202	0.264	0.261	0.295	0.302	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.293	0.293
Quebec	0.034	0.015	0.044	0.020	0.209	0.016	0.015	0.007	0.031	0.018	0.011	0.015	0.009	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
Saskatchewan	0.767	0.767	0.856	0.806	0.858	0.813	0.809	0.833	0.845	0.847	0.877	0.924	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888

From: Voluntary Challenge and Registry's 2004 Guide to Entity & Facility-based Reporting

### Automobile Fuel Efficiency (litres / 100 km)

Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cars	10.7	10.6	10.5	10.5	10.4	10.3	10.3	10.2	10.5	10.9	11.2	11.2	11.6	11.5	11.5	11.5	11.4	11.4	11.4	11.3	11.3
Gas Trucks	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	23.7	22.2	25.8	24.4	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Light Diesel Trucks	21.9	21.8	21.8	21.7	21.7	21.6	21.8	22.0	23.1	24.3	25.4	24.4	25.2	25.5	25.1	25.1	25.1	25.1	25.1	25.1	25.1
Heavy Diesel Trucks	41.3	41.2	41.0	40.9	40.7	40.6	39.3	38.0	39.8	41.7	43.5	39.8	40.0	39.2	37.5	36.2	34.9	33.6	32.4	31.1	29.8

Notes:

- Values in 2000 are from Transport Canada 2001. Canadian Vehicle Survey, Annual 2000 Catalogue no. 53-223 p. 31
- Values in 2001 are from Transport Canada 2002. Canadian Vehicle Survey, Annual 2001 Catalogue no. 53-223-XIE p. 36
- Values in 2002 are from Transport Canada 2003. Canadian Vehicle Survey, Annual 2002 Catalogue no. 53-223-XIE p. 36
- Values in 2003 are from Transport Canada 2004. Canadian Vehicle Survey, Annual 2003 Catalogue no. 53-223-XIE p. 36
- Values pre-2000 are from Analysis and Modelling Group 1999. Canada's Emissions Outlook: An Update. National Climate Change Process <http://www.nrcan.gc.ca/es/ceo/update.htm>
- Values post-2003 are extrapolated from trends in the 2000 to 2003 data. Where no obvious trend is visible as the average of data values from 2000 to 2003 has been used.

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## 7 Disclaimer

This report contains projections based on the corporation's current plans and assumptions of the economic climate. Actual results could differ due to changes in: general economic, market and business conditions; supply and demand for energy; commodity prices and currency exchange rates; and the regulatory process. As well, technical capabilities and issues; environmental issues; the maintenance of satisfactory relationships with unions, employee associations and joint ventures; the uncertainties resulting from potential delays or changes in plans; and the occurrence of unexpected events may affect the corporation's capability to execute and implement these plans.