

# Greenhouse Gas Inventory

## Baseline Year 2003



## City of Brandon

Partners for Climate Protection

Milestone #1: Greenhouse Gas Inventory & Forecast

Prepared by:  
William Bates  
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## Introduction

This greenhouse gas inventory was produced in connection with Partners for Climate Protection (PCP), a program managed by the Federation of Canadian Municipalities (FCM) and ICLEI-Local Governments for Sustainability. This partnership was set up in order to lower greenhouse gas emissions of communities on the corporate and community levels. Currently there are 168 communities across Canada who belong to PCP and over 600 municipalities worldwide who participate in ICLEI's program. There is a five-milestone process to complete as a municipality in order to achieve their commitment to the PCP program.

### The Five-Milestone Process Includes:

**Milestone 1:** Creating a greenhouse gas emissions inventory and forecast

**Milestone 2:** Setting an emissions reductions target

**Milestone 3:** Developing a local action plan

**Milestone 4:** Implementing the local action plan or a set of activities

**Milestone 5:** Monitoring progress and reporting results

In order to gain recognition for Milestone one of the PCP program local governments are responsible for the completion of two inventories, one for the corporate side, or local government operations of the municipality, and another for the community side, as well as a forecast of emissions in the future.

Emissions are reported in an orderly fashion based on a number of sectors listed below. They are broken down by corporate and community, and a baseline year of 2003 was used for both inventories

#### Corporate Inventory (2003)

- Buildings
- Vehicle Fleet
- Streetlights & Traffic Signals
- Water & Wastewater
- Solid Waste

#### Community Inventory (2003)

- Residential Buildings
- Commercial Buildings
- Industrial Buildings
- Transportation
- Solid Waste

As data was entered a further breakdown of each category was created. Indicators were listed within the software, (population, square footage of buildings, etc) and were not always used as they were not always applicable or feasible to acquire. Some indicators were not used as they have no effect on the overall outcome of calculating emissions, nor are they mandatory. Where information was available they were used.

One of the major challenges with the inventory was the gathering of data from 2003. As a result, there were a number of assumptions made as some numbers were backdated using a growth rate of 2%. With this said, the predictive nature of this inventory and complete accuracy should be viewed with caution.

## Corporate Inventory Summary

The inventory summarizes the energy consumption for all municipal activities including, buildings, vehicle fleet, streetlights, traffic signals, waste, and water and wastewater treatment. In total there was 4,153 tonnes (t) of greenhouse gas emissions (\*eCO<sub>2</sub>) on the corporate side of this inventory (Table 1). The total amount of energy type is shown in table 2.

Table 1: Corporate costs and total eCO<sub>2</sub> emissions broken down by sector.

Sector	Total Cost (\$)	Total eCO <sub>2</sub> (t)
Buildings	656,814	1,736
Vehicle Fleet	429,955	610
Streetlights	636,981	120
Water and Sewage	679,684	641
Corporate Waste	-	1,046
<b>Total</b>	<b>2,403,433</b>	<b>4,153</b>

The figure to the right shows the breakdown of eCO<sub>2</sub> emissions based on the responsible sector. Where 43% of municipal emissions were from buildings, 26% waste, 15% is a result of city operated vehicles, 13% water and sewage treatment, and 3% of emissions are from city operated streetlights.

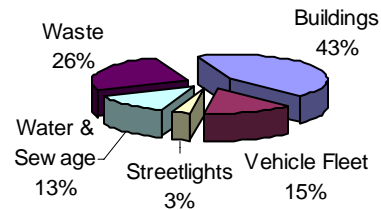


Figure 1: Shows the breakdown of emissions based on sector.

Table 2: Corporate costs and emissions summary broken down by energy type.

Energy Type	Total Use	Total Cost (\$)	Total eCO <sub>2</sub> (t)
Electricity (kWh)	24,284,672	1,525,283	899
Natural Gas (cum)	860,814	448,195	1,599
Diesel (L)	114,588	236,556	313
Gasoline (L)	125,670	193,399	297
Waste	-	-	1,046
<b>Total</b>	<b>-</b>	<b>2,403,433</b>	<b>4,153</b>

\*eCO<sub>2</sub> refers to a unique way of determining the amount of GHG emitted. For example, methane (CH<sub>4</sub>) is 21 times the global warming potential as CO<sub>2</sub>. Therefore, eCO<sub>2</sub> of CH<sub>4</sub> = CO<sub>2</sub> x 21. Hence they are able to be viewed as an equal value of their relative impacts.

## Community Inventory Summary

This section summarizes the energy consumption and emissions for the City of Brandon as a community. The sectors included are residential, commercial, industrial, transportation and waste. Table 3 and figure 2 below show the breakdown of the different sectors and their respectful emissions. As one will see, the transportation is the highest contributor. The major reason for this is due to emission coefficients in Manitoba being considerably lower than other provinces. This is because the majority of energy is generated from hydroelectric power, unlike several other provinces which are significantly more coal powered. The total emissions generated by the community of Brandon, Manitoba are 325,240t eCO<sub>2</sub>, whereas the total amount, and type of energy consumed is shown in table 4.

Table 3: Shows breakdown of total emissions based on responsible sector.

Sector	Total eCO <sub>2</sub> (t)
Residential	62,018
Commercial	69,383
Industrial	1,006,648
Transportation	166,335
Community Waste	19,081
<b>Total</b>	<b>1,323,466</b>

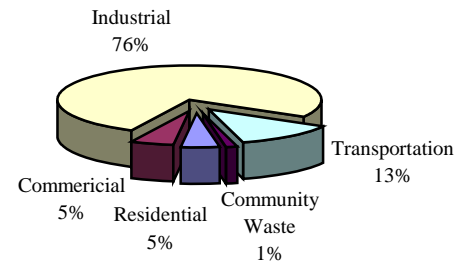


Figure 2: breakdown of emissions based on sector.

Table 4: Breakdown of emissions and total energy consumption based on type of energy.

Energy Type	Total Use	Total eCO <sub>2</sub> (t)
Electricity (kWh)	2,288,809,393	84,686
Natural Gas (cum)	560,280,735	1,053,363
Diesel (L)	18,838,628	51,441
Gasoline (L)	47,817,844	112,940
Propane (L)	813,843	1,245
Waste	-----	19,081
<b>Total</b>	<b>-----</b>	<b>1,303,675</b>

Note: a further breakdown of individual sectors as well as indicators can be found in the hardcopy of the inventory.

## Corporate Inventory Forecast

Milestone one of the PCP program not only includes the GHG emissions inventory, but a forecast as well. The purpose of creating a forecast of emissions for both the corporate and community side of the inventory is to evaluate reduction measures implemented in subsequent years. The PCP program requires at the minimum, a simple forecast reflecting a business-as-usual scenario 10 years into the future (2013). Brandon's current growth is approximately 2% annually, and over a 10 year period emissions, based on this 2% growth rate, will rise to 4984t eCO<sub>2</sub> as compared to 2003 levels of 4153t eCO<sub>2</sub> (table 5).

Table 5: Shows breakdown of baseline emissions and projected emissions 10 years into the future. These numbers are based on a 2% increase in emissions annually.

Sector	eCO <sub>2</sub> (t) (2003)	eCO <sub>2</sub> (t) (2013 BAU)
Buildings	1,736	2,083
Vehicle Fleet	610	732
Streetlights	120	144
Water and Sewage	641	769
Corporate Waste	1,046	1,255
<b>Total</b>	<b>4,153</b>	<b>4983.6</b>

The aim of implementing environmentally friendly practices is to lower corporate emissions 20% below the baseline year of 2003. The figure on the right shows the projected increase of emissions without implementation of any emissions lowering practices. It also shows the projected level of emissions with a 10% and 20% reduction. In order to achieve PCP's recommended targets the municipal operations for the City of Brandon will have to lower emissions by a total of 809t of eCO<sub>2</sub> by 2013. This number is not absolute as local governments are able to revise their targets as emission reduction plans develop.

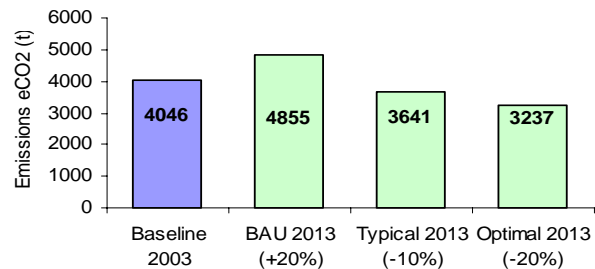


Figure 3: A representation of 2003 emission levels, and the expected increase in emissions with and without implementation of any sustainable practice.

Note: information or a further breakdown of individual sectors can be found in the hardcopy of the inventory.

## Community Inventory Forecast

The community inventory is the last requirement to meet to complete milestone one of PCP's five milestone process. It is recommended by PCP that a 6% reduction in community generated GHG emissions below baseline values be set as the target. This lowering of emissions will also occur within 10 years. In table 6 below values for business-as-usual emissions, 10% reduction, and a 20% reduction all over 10 years are broken down.

Table 6: a representation of different forecasts and reduction rates broken down on each community sector.

Sector	Total eCO2 (t) 2003	Total eCO2 (t) 2013 (BAU)	Total eCO2 (t) 2013 (-10%)	Total eCO2 (t) 2013 (-20%)
Residential	62,018	74,422	55,816	49,614
Commercial	69,383	83,260	62,445	55,506
Industrial	1,006,648	1,207,978	905,983	805,318
Transportation	166,335	199,602	149,702	133,068
Community Waste	19,081	22,897	17,173	15,265
<b>Total</b>	<b>1,323,466</b>	<b>1,588,158</b>	<b>1,191,119</b>	<b>1,058,772</b>

As it is more difficult for local governments to lower community wide emissions, the reduction target is significantly lower than the corporate side. With local municipal initiatives, and environmental strategic plan implementation in combination with external programs by other organizations, one can expect this reduction in GHG emissions to be an attainable goal. This review of the greenhouse gas inventory and forecast includes a basic introduction into milestone two of the program. Milestone two involves setting an emission reduction target as the above are only recommended and are flexible. These reduction targets must be endorsed by the City Council. At this time or endorsement, milestone two can be recognized and earned (refer to *Developing Inventories for Greenhouse Gas Emissions and Energy Consumption: A Guidance Document for Partners for Climate Protection in Canada*).