

**Corner Brook
Greenhouse Gas Inventory
Milestone #1 and #2
Partners for Climate Protection**

Submitted to:
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The Municipality of Corner Brook

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1.0 INTRODUCTION

AMEC Earth & Environmental, a division of AMEC Americas Limited (AMEC), in conjunction with the Municipality of Corner Brook is pleased to present the results of this study to the Government of Newfoundland and Labrador, Department of the Environment and Conservation to assist in the development and provision of a Carbon Footprint Analysis for Corner Brook. The prime objectives of this work were as follows:

- a) Present a Protocol for measuring current and future eCO₂ conditions for the municipality;
- b) Identify Green House Gas (GHG) sources and sinks for the municipality;
- c) Inventory the rates of the sources and sinks using a combination of utility/billing information, and spreadsheet calculations;
- d) Provide a GHG Emission Inventory Report with suggestions to reach aggressive eCO₂ emissions targets; this will satisfy all the requirements of Milestone 1 and 2 of the Partners for Climate Protection (PCP) and satisfy some of the requirements for Milestone 3;
- e) Provide and advise on a plan for the calculation of eCO₂ that can be used on an annual or semi-annual basis for the municipality; and
- f) Provide a GHG emission inventory protocol and template that can easily be modified and adapted for other municipalities.

AMEC has obtained and reviewed Climate Registry Carbon Accounting standards, Newfoundland and Labrador Climate Change Action Plan (2005), and the Climate Registry's Protocols among many other documents in order to prepare this report. Our report is structured to address each of the above-referenced objectives.

1.1 Community Profile

The City of Corner Brook is located in the western Newfoundland. The 2006 Census of Canada indicated that the population of the city was 20,083 with 8,483 dwellings. The city continues to grow, both in terms of population and infrastructure, and has a thriving business community (Town of Corner Brook, Aug 25 2009).

1.2 Partners for Climate Protection

The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. The PCP is the Canadian component of ICLEI's (Local Governments for Sustainability) Cities for Climate Protection network, which involves more than 900 communities worldwide (PCP website, Aug 25, 2009).

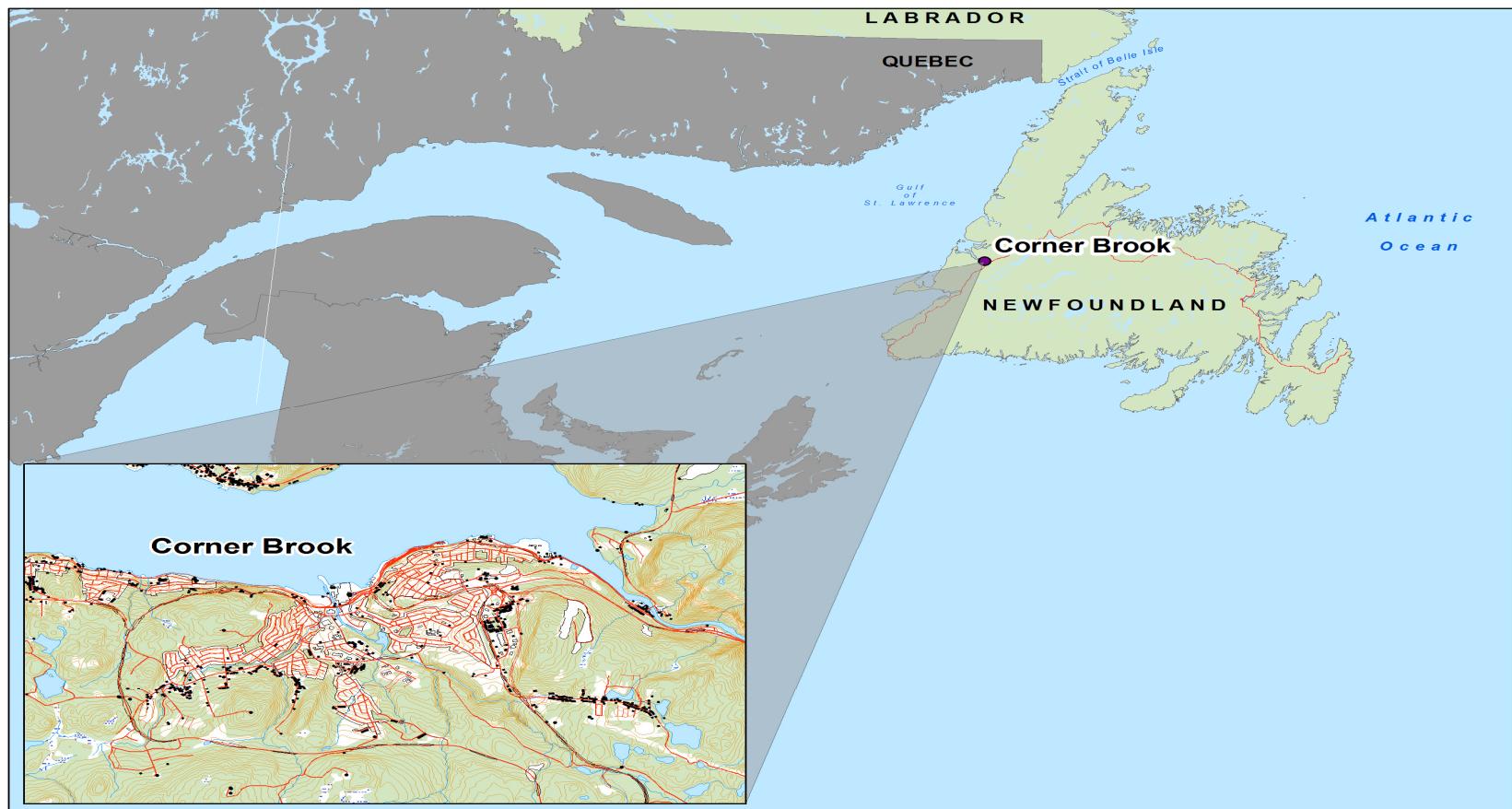


Figure 1-1. Location of Corner Brook

1.2.1 Joining the Partners for Climate Protection Program

The City of Corner Brook joined the Partners for Climate Protection in 2003 but has not been able to complete any of five milestones, which includes a GHG Emissions Inventory. This report satisfies the first two milestones and gives the City the tools to complete the other milestones and be in compliance with the PCP.

1.2.2 Partners for Climate Protection Process

PCP uses a five milestone framework to guide municipalities to reduce greenhouse gas emissions. The five milestone process is a performance-based model which remains flexible; milestones do not need to be completed in sequential order and each milestone provides an opportunity for municipal capacity building.

The five milestones are:

- 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; and
- Milestone 5: Monitoring progress and reporting results (PCP website, August 25, 2009).

This Project satisfied milestones 1 and 2, by creating a greenhouse gas inventory and forecast for Corner Brook as well as setting an emissions reduction target. Additionally, the results of this report aid the City in the development of a local action plan.

2.0 Methodology

Developing a one-time estimate of the current and future carbon footprint is relatively straight forward; however, the challenge of the Project was the careful documentation and management of the method and future expectations. In order to ensure that the approach developed meets the best current standards and the best standards for future verification and audit, the World Business Council on Sustainable Development & World Resources Institute Corporate Accounting and Reporting Standards (Corporate Standard) (2004) (GHG Protocol) and International Standards Organization for Standardization (ISO) 14064: International Standard for GHG Emissions Inventories and Verification (2006) approaches were followed and adhered to. ISO has released a series of standards on GHG reporting that requires a consistent and well documented approach. The key aspect of this approach is a “process” standard on accounting and reporting of GHG emissions. The use of recognized standards in foot print development adds weight and credibility to the body of work provided and helps to anticipate any future

change in government policy. It is also important to note that the Climate Registry's Protocol is also based upon ISO 14064-1.

The Project focused on using the GHG Protocol/ISO 14064 process structure to direct and document all steps of the Carbon Footprint Analysis. In so doing, the final product meets the necessary GHG Protocol/ISO 14064 requirements, but more importantly ensures it is well documented and can be used and updated as needed. A very tight, well defined approach was necessary to provide sufficient guidance and direction to allow for rapid re-assessment and modification for different proposals and approaches.

Similarly, there are many other significant considerations that were defined through the GHG Protocol/ISO 14064 process as part of the Project. Our approach was designed to not only follow the GHG Protocol/ISO 14064 process, but also to ensure that key decisions and assumptions are made at appropriate times during the Project and are well documented.

In an effort to clearly understand, document and communicate the complexity of calculating an accurate Carbon Footprint for this municipality, AMEC professionals visited Corner Brook at the beginning of the Project and presented methodology and data requirements. Results of the Project will also be presented to the City.

2.1.1 Terminology and Calculations

All estimates have been calculated using the ICLEI spreadsheet available on the PCP website. Some of the calculations had to be modified based on the available data. These calculations that have been added to the spreadsheet have been clearly marked within the spreadsheet itself.

Calculations are presented in CO₂ equivalence (eCO₂), which represents how much global warming a given type and amount of greenhouse gas may cause, using the functionally equivalent amount or concentration of carbon dioxide (CO₂) as the reference. Only CO₂, NO₂, and CH₄ were considered for this study.

2.1.2 Baseline Year

The PCP program suggests that local governments compile their inventories for 2000 or for the year with the best available information. As the best available, detailed, and completed information at the time of the project initiation was **2008**, this was deemed the best year for the baseline. The emissions reduction targets and forecasting will be 10 years after the baseline year (**2018**).

2.1.3 Footprint

The footprint of the inventory covered the jurisdictional boundaries of Corner Brook. The NL Power municipality code for Corner Brook is 701.

As some of the reference material had calculations based on larger areas (provincial-wide, regional-wide, or Canada-wide), those estimates had to be scaled to the municipality by multiplying the original estimate by the population of the city divided by the population included in the original estimate.

There are two situations that are hard to quantify and have not been considered in this quantification report; services Corner Brook provides to nearby communities (although none were identified in town meetings) and services provided by other organizations to Corner Brook (garbage collection). As these situations were not clearly catalogued and not easily accessible, they were not assessed further in this report. It is assumed, however, that these situations will offset each other and would not have a large impact on the overall GHG budget.

2.1.4 Data Sources

The data were collected from a variety of sources as outlined below in **Table 2-1**. All data within the spreadsheet is referenced and the references are listed in section 8.0 of this report.

Table 2-1 List of Data Sources

Data	Name and Title	Department	Contact Information
All Municipal Information (Buildings, fleet info, water and wastewater)	Rhea Hutchings Supervisor of Sustainable Development	Sustainable Office, City of Corner Brook	(709) 637-1574 rhutchings@cornerbrook.com
Residential and General Service Accounts (kWh)	Sharon Keough	Newfoundland Power	skeough@newfoundlandpower.com
Detailed General Service Accounts (kWh)	Marcia Sheppard	Newfoundland Power	msheppar@newfoundlandpower.com
Emission Factor for Grid	Trent Carter, Ecologist	Environmental Services Newfoundland and Labrador Hydro	(709) 737-1955 TCarter@nlh.nl.ca
2006 Census Data 2001 Census Data	-	Statistics Canada	http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E
Estimates of Heating Oil Usage	Glen Ewaschuk Senior Economist	Demand Policy & Analysis Division Office of Energy Efficiency Natural Resources Canada	(613) 947-8758 Glen.Ewaschuk@NRCan-RNCan.gc.ca

2.2 Inventory Quantification Support Spreadsheet

This GHG Inventory was produced using a modified version of the ICLEI Inventory Quantification Support Spreadsheet ("IQSS") and the associated International Local Government Greenhouse Gas Emission Protocol. The IQSS is designed to summarize both Corporate and Community emissions and to provide indicators against which the emissions may be benchmarked. While every effort has been made to include data for all benchmarks, this has not always been possible where either data was missing or where there was a high degree of uncertainty.

2.2.1 Corporate Emissions

Corporate GHG Emissions are broken down into the five categories of Buildings, Vehicle Fleet, Street Lights, Water & Sewage and Corporate Waste.

2.2.2 Community Emissions

Community GHG Emissions are broken down into the five categories of Residential Buildings, Commercial & Industrial Buildings, Transportation, Community Waste and Commercial, Industrial & Institutional ("C, I and I") Waste.

3.0 Milestone #1- GHG Emissions Inventory and Forecast

3.1 The Corporate (Local Government) Inventory

The local government operations inventory considers five sectors:

- Buildings
- Vehicle Fleet
- Outdoor Street Lighting
- Water & Sewage – includes wastewater and potable water
- Corporate Waste - collected at facility that is owned and operated by the local government

As the local government only picks up and transports waste to the collection facility run by the Regional Waste Management Authority, all solid waste collected within the City of Corner Brook was allocated to the community inventory as detailed in Section 3.2.2.

The other four sectors are illustrated in **Figure 3-1** and outlined below. This totalled **1,605 tonnes** of eCO₂ for the corporate inventory for the City of Corner Brook.

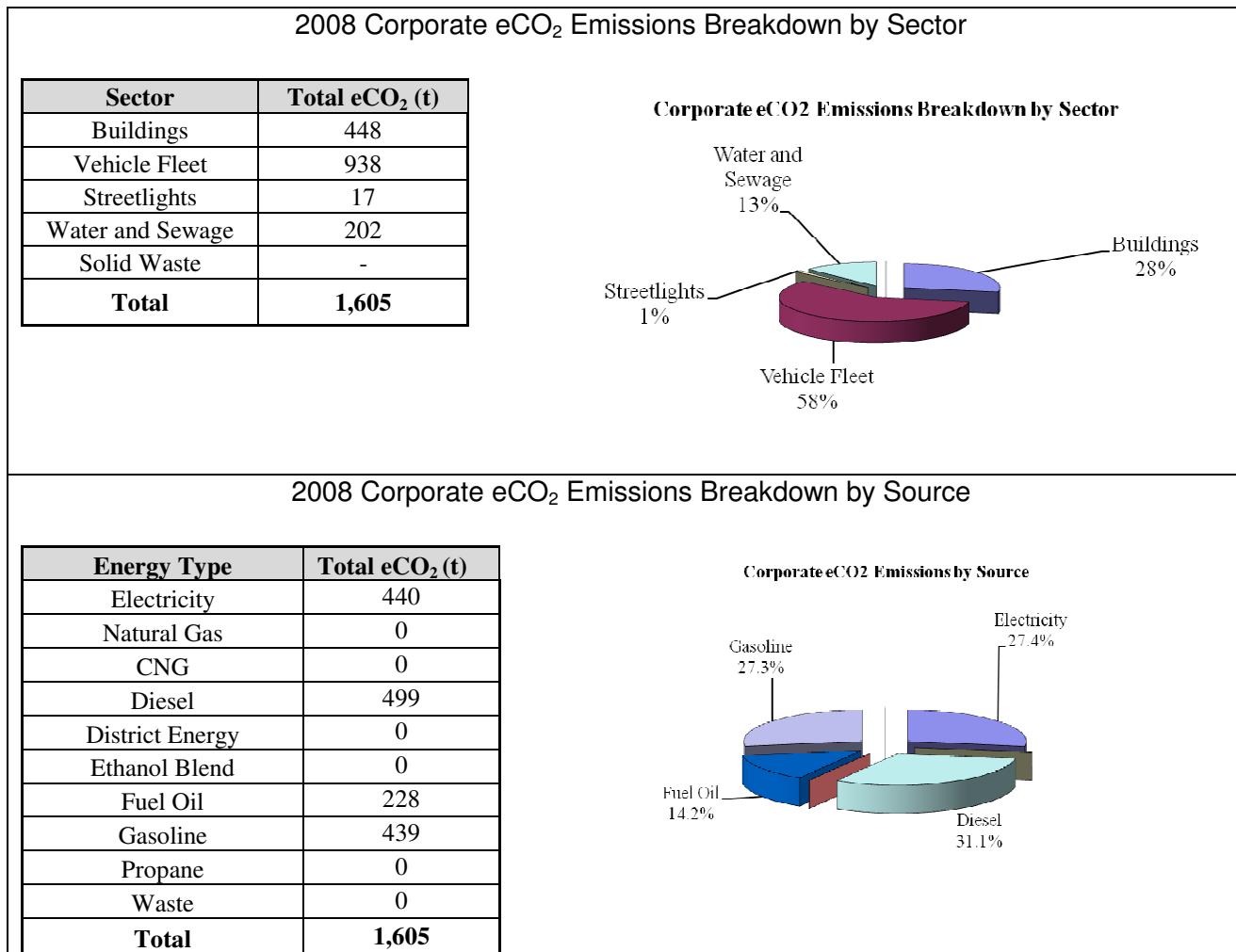


Figure 3-1. Breakdown of Corporate Inventory by Sector and Source

3.1.1 Buildings

The City of Corner Brook pays utilities on twenty-six (26) facilities consisting of two (2) animal shelters, two (2) emergency fire services, eight (8) eight recreational facilities, two (2) memorial/museum, three (3) municipal depot, two (2) storage buildings, two (2) city halls and five (5) other buildings.

For each facility, the amount of electricity consumed (kWh) and area (m^2) was collected. The top five emitters are listed in **Table 3-1**.

Table 3-1 Highest Facility Emissions

Address	Function	Emissions (t eCO ₂)	Emissions per 1000 m^2
2 Charles Street	Municipal Depot	64	0.98
Lewin Parkway	Central Fire Station	46	0.97
2 Mount Bernard	City Hall	20	1.31
Wellington Street	Other (Lions Rec Centre)	13	NA
40 Brook St	Municipal Depot	12	NA

3.1.2 Vehicle Fleet

The City of Corner Brook has a vehicle fleet. The number of light and heavy vehicles that belong to the city could not be provided. The total eCO₂ of the light and heavy vehicle fleets were calculated using the city's fuel billing statements. The annual eCO₂ emission is listed below in **Table 3-2**.

Table 3-2 Fleet emissions

Fleet	Annual eCO ₂ Emissions (t)
Light and Heavy	938

3.1.3 Street, Traffic, and Area Lights

All the street, traffic, and crosswalk lights and their corresponding emissions are listed in **Table 3-3**. A total of 16.80 tonnes of eCO₂ is released every year due to lighting.

Table 3-3 Emissions from Electricity for Lights

Light Type	Annual eCO ₂ Emissions (t)
ST MARKS AVE Crosswalk	0.71
TRAFFIC LT GRENFELL AND ELIZAB Crosswalk	0.13
MAIN ST street lighting	1.90
BROADWAY street lighting	1.69
TODD ST street lighting	1.45
MAIN ST street lighting	0.81
MAIN ST street lighting	0.84
MAIN ST street lighting	0.43
WEST ST street lighting	0.36
47 WEST ST street lighting	0.91
MT BERNARD AVE street lighting	1.36
HERALD AVE street lighting	0.12
MAIN ST street lighting	0.70
COBB LANE street lighting	0.15
MAYFAIR AVE street lighting	0.05
WEST VALLEY AND OCONNELL DRIV traffic lights	0.45
LEWIN PARKWAY traffic lights	0.74
O'CONNELL DR traffic lights	0.52
TRAFFIC LIGHT-CONFEDERATION D traffic lights	0.65
TRAFFIC LIGHTS-OCONNELL DR & traffic lights	0.68
LEWIN PARKWAY (LIGHTS) traffic lights	0.72
COR MAIN & WEST ST traffic lights	0.54
LEWIN PARK WAY traffic lights	0.36
MAIN ST & MILL RD traffic lights	0.27
TRAFFIC LT MAIN ST & MT BERNAR traffic lights	0.27
BROADWAY traffic lights	0.01
Total	16.80

3.1.4 Water and Waste Water System

All electricity consumption for water and wastewater was identified and is listed in **Table 3-4**. A total of 202 tonnes of eCO₂ is released every year due to the water and wastewater system.

Table 3-4 Water and Waste Water Systems

System	Annual eCO ₂ Emissions (t)
GEORGETOWN ROAD (sewer)	4
GEORGETOWN ROAD (sewer)	1
STATION ROAD COBR (sewer)	7
HUMBER ROAD (sewer)	0
51 RIVERSIDE DR (sewer)	12
MILL RD (sewer)	0
COBB LANE (sewer)	0
2 MT BERNARD AVE (sewer)	10
GEORGETOWN ROAD (water)	2
MACEACHERNS AVE (water)	1
BARRETT'S ROAD (water)	0
WOODCREST AVE (water)	2
CARIBOU ROAD (water)	2
237 COUNTRY ROAD (water)	1
SUNNYSLOPE DR (water)	1
BURNT POND ROAD (water)	10
SECOND POND (water)	9
THIRD POND (water)	65
OAKES ROAD (water)	1
ELIZABETH ST (water)	10
ELIZABETH ST (water)	1
WESTMOUNT (water)	2
BAYVIEW HGTS HGTS (water)	6
2 OLD HUMBER ROAD (water)	0
EAST VALLEY ROAD (water)	2
BROOK ST (water)	1
WEST VALLEY ROAD (water)	1
OCONNELL DR (water)	1
OCONNELL DR (water)	1
WEST VALLEY REG ROAD (water)	4
TCH WEST (water)	13
FUDGES RD & PREMIER DR (water)	2
MCLEODS LANE CORNER BROOK (water)	0
16 HUMBER ROAD (water)	1
SUNNYSLOPE DR (water)	1
MAIN ST (water)	16
LUNDRIGAN DR (water)	6
SUNNYSLOPE DR (water)	6
Total	202

3.2 The Community Inventory

The community inventory considers four sectors:

- Residential Buildings
- Commercial and Industrial Building
- Transportation
- Community Waste
- Commercial, Industrial, and Institutional Waste

These five sectors are illustrated in **Figure 3-2** and outlined below. This totalled **181,463** tonnes of eCO₂ for the community inventory for the City of Corner Brook. It is important to note that the waste estimates also include municipal wastes.

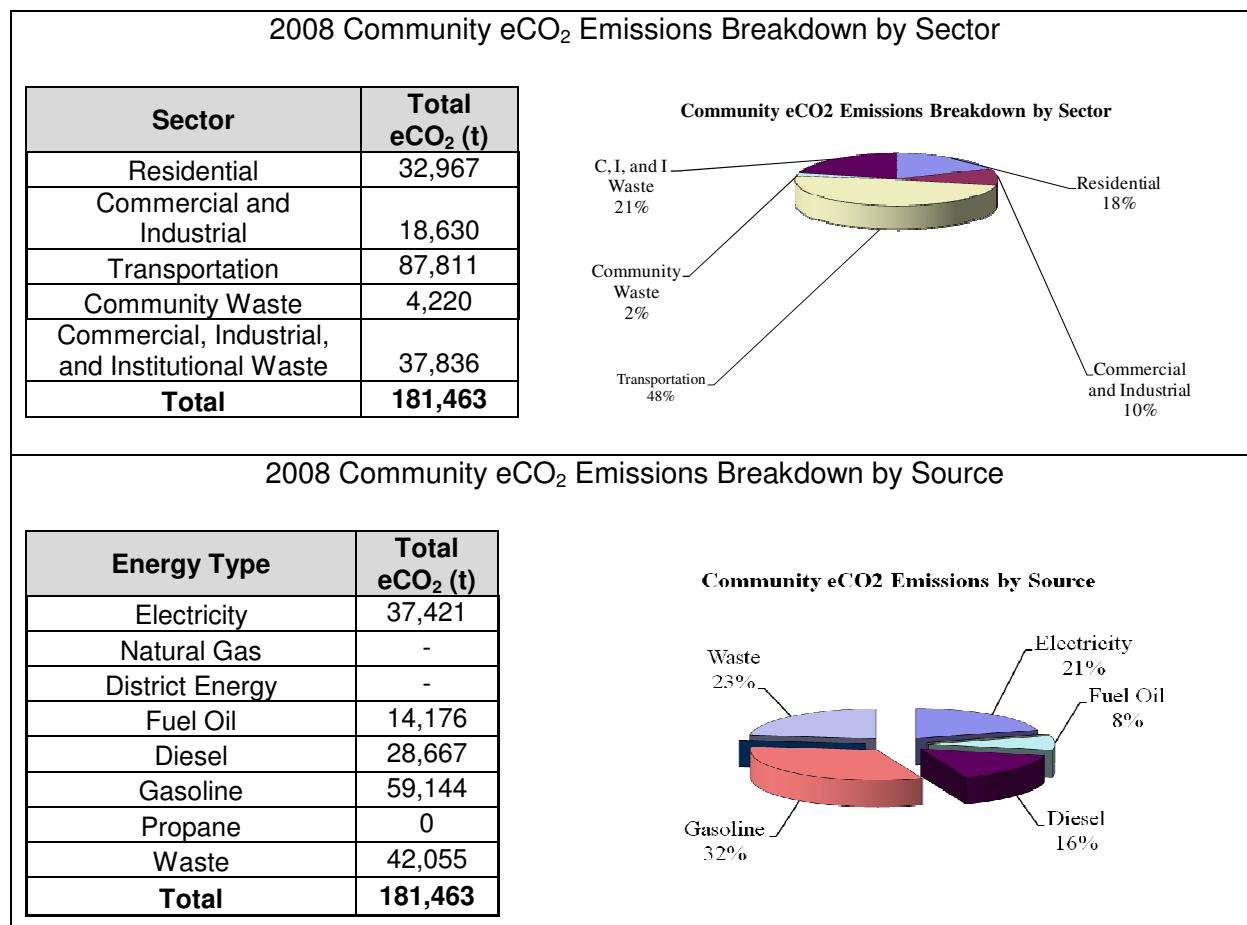


Figure 3-2. Breakdown of Community Inventory by Sector and Source

3.2.1 Residential Sector

As can be seen in **Figure 3-3**, the majority of the emissions from the residential sector comes from electricity (57%, or 18,791 tonnes) followed by fuel oil (43%, or 14,176 tonnes).

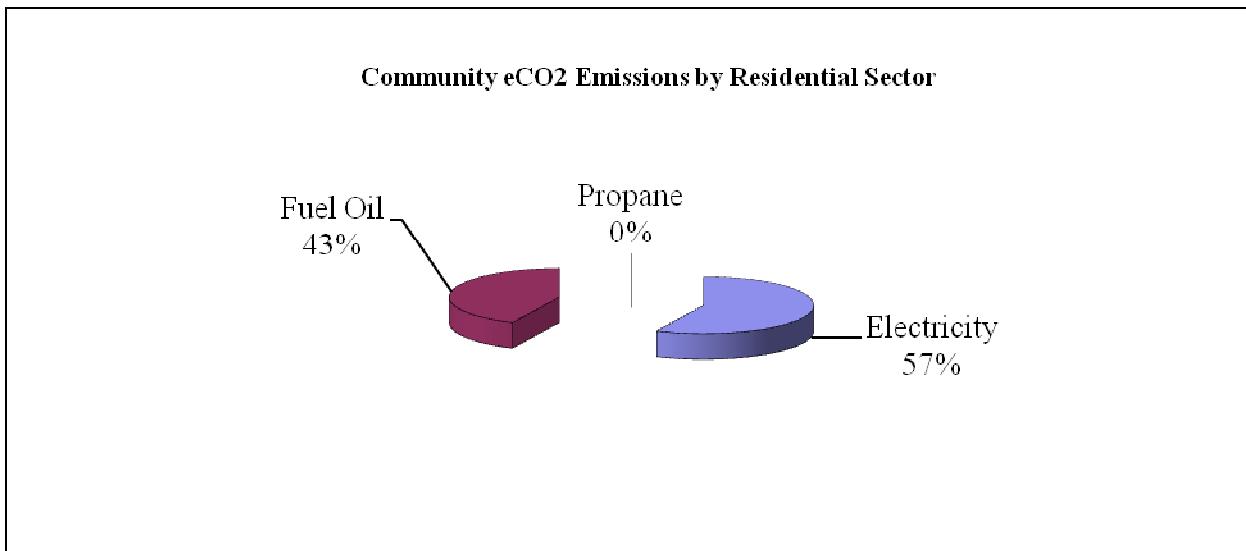


Figure 3-3. Breakdown of Residential Sector by Source

3.2.2 Commercial, Industrial, and Institutional Sectors

The commercial sector accounts for **18,630 tonnes** of eCO₂ which breaks down to ~20.93 tonnes per establishment or ~2.66 tons per employee.

3.2.3 Transportation

Transportation was based on the net and gross sales of gasoline and diesel fuel in NL, respectively. Data for gross diesel in NL was unavailable due to confidentiality restrictions (Alex Smale, Department of Transportation, personal communication). Diesel consumption by transportation was responsible for **28,667 tonnes** of eCO₂ and gasoline was responsible for **59,144 tonnes** of eCO₂.

3.2.4 Community Waste

Community waste was partitioned into residential waste and waste from commercial, industrial, and institutional sources (CII). A total of **37,836 tonnes** of eCO₂ was contributed to CII and **4,220 tonnes** were contributable to residential waste.

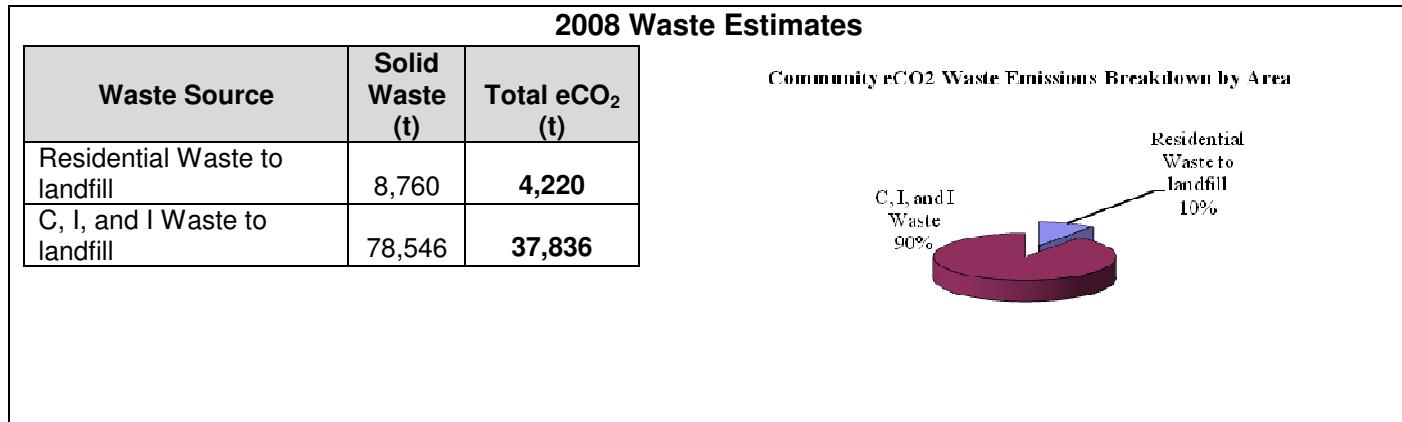


Figure 3-4. Breakdown of Residential Sector by Source

3.3 Average Household Inventory

Household emissions were also estimated by scaling the community wide estimates into the number of households. As can be seen, the largest source by far in the average household is gasoline from the automobile.

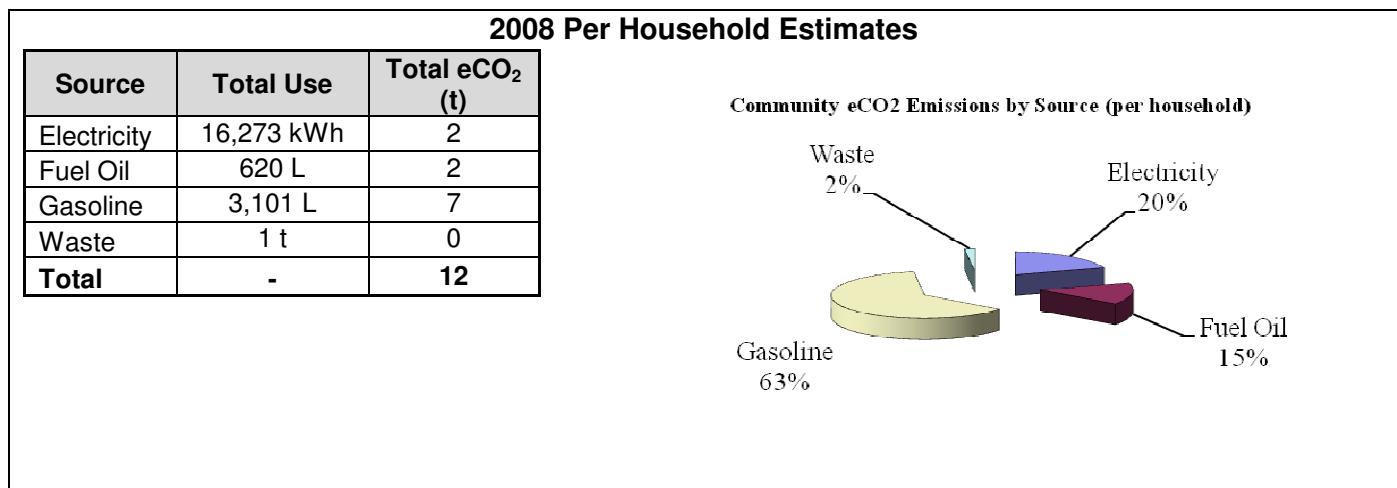


Figure 3-5. Breakdown of Residential Sector Per Household

3.4 GHG Forecast

3.4.1 Growth Estimates

Population growth is based on census results from 2001 and 2006 and new residences and business are based on number of permits from the last 5 years as well as census results from 2001 and 2006.

This data was compiled and illustrated in **Figure 3-6**. Based on these projections, the population in Corner Brook from 2008 to 2018 is projected to shrink from **20,083** to **20,035** and the number of businesses is projected to increase from **890** to **1778**, a decrease of 0.2% and an increase of 100%, respectively.

It was assumed that the municipal infrastructure would grow at a similar rate (50%).

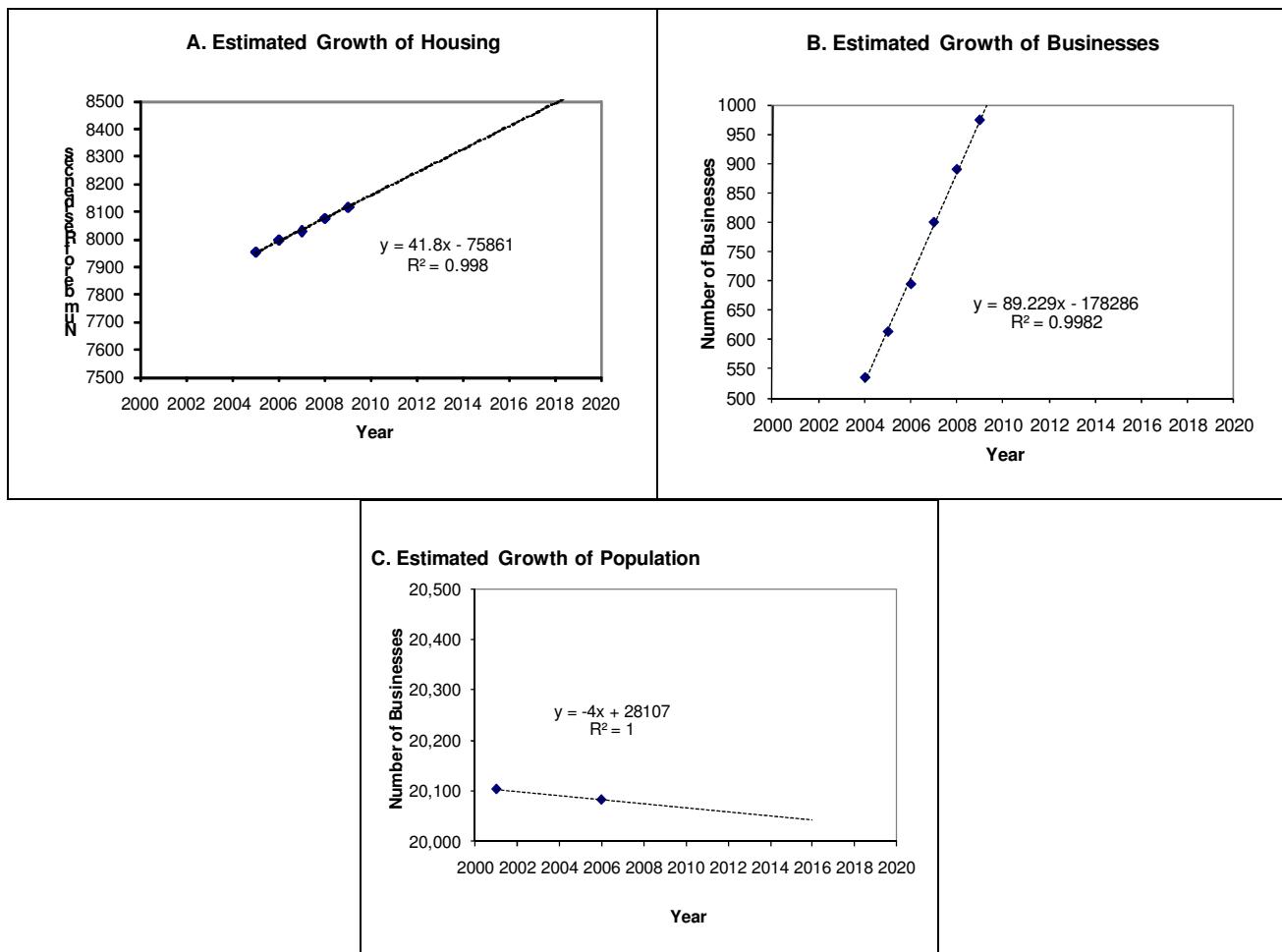


Figure 3-6. Forecasts of Growth of (a) housing, (b) business, and (c) population

3.4.2 GHG Forecast

The forecast is a projection of the inventory for 2018 assuming a business as usual model. It is also assumed that the emission coefficients will remain the same, although there is a possibility that this may change due to the lower Churchill hydro development project.

Using these assumptions, the GHG emissions in 2018 for the community is forecast to be **244, 242 tonnes** of eCO₂, a 35% increase from 2008. The corporate inventory is projected to increase to **2,025 tonnes** of eCO₂, a 24% increase from 2008.

4.0 Milestone #2- Developing GHG Reduction Targets

4.1 Recommended Emissions Targets

An emission reduction target is the quantity of emissions the municipal government aims to reduce through various emissions reduction measures outlined in a local action plan. The PCP recommends the following reductions:

- A **20% reduction** in GHG emissions below baseline levels for municipal operations within 10 years.
- A **six percent** reduction in GHG emissions below baseline levels for the community within 10 years.

For Corner Brook, this would equal a reduction of **327 tonnes** of GHG reductions by 2018 by the municipal operations and **10,888 tonnes** reduction on the community level as compared to the 2008 levels.

Note that these are not the required targets from the PCP but just suggested targets. It is up to the municipality to set their own targets.

5.0 Milestone #3- Developing a Local Action Plan

A local action plan (LAP) is a strategic document that outlines how your municipality will achieve its GHG emissions reduction target. Links must also be established between the LAP and the municipal government's official plan and other planning documents.

Many communities develop two separate LAPs — one for municipal operations and one for the community as a whole. Although the reduction potential from the community is significantly greater than that from municipal operations, PCP encourages municipal governments to develop and implement a plan for municipal operations first. By going first, your municipality can demonstrate leadership and provide a positive example for the community to follow. Also, the experience gained in making the smaller municipal LAP can then be applied to the community-wide LAP, which is typically more complex to develop and implement, requiring input and

coordination from many stakeholders, such as citizens' groups, non-governmental organizations and the private sector.

An LAP generally includes:

- a summary of baseline emissions forecasts and targets (Section 3.0 and 4.0 of this report);
- a set of existing and proposed emissions reduction actions (section 5.1);
- implementation strategies, including the resources involved; and
- input from stakeholders.

5.1 Existing Emission Reduction Actions

The City of Corner Brook has already enacted some important GHG reduction initiatives as outlined below.

All calculations for reduction actions are listed in **Appendix 3**.

Waste Diversion Initiatives

2011 Backyard Composting Program – the sale and distribution of 300 backyard composting bins (in addition to the 750 that were sold in 2006). According to MMSB, organics make up to 30% of household wastes in Newfoundland and Labrador. A 30% reduction in waste for 1050 homes in Corner Brook would result in a reduction of 221 tonnes.

2011 E-waste Collection Program – On January 22nd, 2011, the City set up a community wide collection event, whereby approximately 7 tons of e-waste (computers, computer accessories, electronics and small appliances, etc) was collected at a central location.

Wood Waste Diversion Program – All wood waste is separated from the normal garbage stream and through a partnership with Corner Brook Pulp and Paper Limited; the wood waste is chipped and used as a fuel source at the mill to displace Bunker C fuel oil.

Fall leaf Program – Every fall the City of Corner Brook collects fall leaves and yard waste to local composting projects

Curbside giveaway Program – First implemented this past fall and will become a bi-annual event during spring and fall. The City encourages residents to place unwanted but useful items at the curb with 'FREE' tags that other residents can take away. Encourages reuse and waste diversion.

Curbside Recycling Program – In 2006 the City implemented a curbside recycling program. Paper and cardboard products can be placed at the curb during regular garbage collection in a blue bag for pick up.

Ban on cardboard entering landfill – No cardboard is accepted at the Corner Brook Waste Disposal Site. In cases where cardboard is disposed of, a divertible surcharge applies. Each ton of paper and cardboard diverted from the landfill is estimated to reduce CO₂ emissions by **1.4 tonnes**.

Garbage Bag limits – Having bag limits on curbside waste reduces the amount of waste sent to the landfill and encourages more waste to be diverted into the current cardboard and paper recycling or other potential programs like the composting initiatives. Bag limits send a message aimed at changing behaviour and setting community standards for waste. Other communities have implemented “pay as you throw” (PAYT) and bag limits and have seen reductions in waste by as much as 50%. The City has a garbage bag limit of 4 bag per week. Any additional bags have to be tags with a purchased garbage bag sticker. For Corner Brook to reduce their waste by 50%, this would translate into a reduction in **2,110 tonnes** of eCO₂.

Public Space Recycling – The City has purchase a series of public space recycling receptacle in the effort to encourage recycling while in public areas.

Reductions in Motor Vehicle Usage

FREE transit during Clean Air Day – The City offers free transit to all City residents during Clean Air Day in June each year to promote alternative modes of transportation.

Transit Improvement Plan

Anti-Idling Municipal Policy – The City has an anti-idling policy for municipal fleet. Municipally-owned vehicles account for an average of 50% of corporate greenhouse gas emissions. Municipalities can achieve reductions in the fleet sector by including information on climate-friendly actions in driver instruction procedures and encouraging employees to use alternative transport. In 2001, the City of Mississauga (ON) partnered with Natural Resources Canada (NRCan) to deliver a pilot anti-idling program. NRCan's online tool kit of anti-idling ideas and promotional materials was used in combination with personal interventions to address idling issues with residents, the private sector and professional drivers (including GO public transit staff and school bus drivers). The campaign reached 69% of the city's residents; a survey of those reached reported a decrease in idling times by three to four times, compared to citizens who had not been exposed to the project. School bus drivers achieved similar idling time reductions and the city's public transit company adopted a policy to decrease its maximum bus idling time from 15 minutes to five minutes.

If Corner Brook anti-idling campaign increased fuel efficiency by 25% (the estimate for Gander's anti-idling campaign), this could translate into a GHG reduction of **235 tonnes** of eCO₂ or 71% towards the 327 tonne goal.

Carpool management Plan – A new carpool management plan will become effective this spring to assist with the 5 allotted carpool spaces at the new City Hall.

Bikepaths – The City of Corner Brook has also introduced a share the road policy for cyclers to travel more easily throughout the city. Throughout the city are share the road signs and bike stencils on the pavement to show motorist that cyclist also have a right to use the roads for transportation. In addition the City has developed a network of bikepaths that extend throughout the Community.

Water Use Reduction Initiatives

Residential Water Metering Pilot Project – As part of an over effort to determine water usage in the City and identify leaks in the distribution system, and encourage water conservation behaviours, 120 residential household have volunteered to be part of this pilot project. They are metered and the City is continually communicating the monthly water usage in addition to educational material and water conservation tips. In addition commercial businesses are being metered to effectively determine the water usage community wide and implement reduction strategies.

Other Current Initiatives

LED Seasonal lights giveaway – the City gave away LED lights for free in December 2010 for the purposes of encouraging more efficient lighting and energy use throughout the City.

Take Charge NL – The City participated in the take charge NL community challenge

New City Hall (LEED) – The new City Hall (which will be occupied this spring) will be the first certified LEED building in NL with a silver rating. Some of the features include geothermal heating, WOW energy performance system, green roof, etc.

Donated land to community garden – The City donated land to the Western Environment Center for the purpose of a community garden. The City recently approval expansion of the site for the 2011 summer.

Smoke free/scent free policy – Implemented a new smoke free/scent free policy

Enhancing Community Development to Climate Change

This pilot project, which is a partnership between MUN and MNL, will assess how changes in weather and climate might affect this area and explore adaptation options to deal with current and future changes. It would also provide tools and resources which can assist our future sustainable planning.

5.2 Proposed/Potential Emission Reduction Actions

There are numerous programs and initiatives that can be implemented in order for Corner Brook to meet its target reductions. Listed below is a non-exhaustive list of several options that are available, many of which based on the *Quick Action Guide: Municipal Action on Climate Protection*. Other resources that can be used to gather ideas regarding GHG reduction initiatives are outlined in **Table 5-1**. It is also important the proposed actions have variable amounts of GHG reductions, financial costs, and effort. It is up to the Town and residents of Corner Brook to decide what is the most cost-effective option to take.

Table 5-1 List of References and guides to reducing GHG emissions

Author	Title	Description
Government of Alberta	¹ Alberta's 2008 Climate Change Strategy	Can view community initiatives from Alberta that have been enacted to reduce GHG emissions
Government of Alberta	² Alberta's Action Plan to Reduce GHG Emissions	Can view community initiatives from Alberta that have been enacted to reduce GHG emissions
Conservation Corps of Newfoundland and Labrador	³ Climate Change Education Centre	Provides public education and outreach that covers a wide scope of climate change related information.
Pew Centre on Global Climate Change	⁴ State and local net greenhouse gas emissions reduction programs	Can view community initiatives from all over the US that have been enacted to reduce GHG emissions
Federation of Canadian Municipalities	⁵ <i>Quick Action Guide: Municipal Action on Climate Protection-20 steps you can take to curb greenhouse gas emissions-now!</i>	List of 20 steps to reduce GHG emissions that includes examples of successful programs in other parts of Canada
Government of Manitoba	⁶ Manitoba Action Plan to Reduce GHG Emissions	Can view community initiatives from Manitoba that have been enacted to reduce GHG emissions

¹<http://www.environment.alberta.ca/2430.html>

²<http://environment.alberta.ca/2792.html>

³www.climatechangeeducation.ca/&title=Climate%20Change%20Education%20Centre

⁴<http://www.pewclimate.org/states.cfm>

⁵http://www.sustainablecommunities.fcm.ca/files/Capacity_Building_-_PCP/pcp-quick-action-guide-En.pdf

⁶<http://www.gov.mb.ca/conservation/climate/index.html>

Corporate Inventory Initiatives

Tree Planting Scheme

If Corner Brook were to undertake a tree planting program whereby each lot built within a subdivision must plant a tree in the front of the property. CBS has a similar policy and has an estimated CO₂ reduction of **96 tonnes**.

Paperless Meetings

Corner Brook could institute a policy of paperless meetings. All Council and committee meetings could be paperless and reference material could be viewed digitally. CBS instituted a similar program and saves an estimated **0.2 tonnes** of CO₂ annually.

Municipal Fleet

Alternative Fuel

Many alternative fuels such as ethanol, biofuel, or natural gas can be used in existing engines with little or no modifications. If Corner Brook were to switch to a 20% biodiesel mixture, the emissions relating to the municipal fleet, would decrease by **100 tonnes**. Just this change alone would help Corner Brook to the almost one third of the way to the 327 ton reduction target.

Traffic Lights

Traffic lights accounted for three percent of the corporate inventory emissions. LED lights are 80-90% more efficient and last ten times longer than ordinary lights. If all current lights in Corner Brook were replaced by LEDs, this would decrease emissions due to lights by approximately **14 tonnes**.

New Building Guidelines

LEED Canada is Leadership in Energy and Environmental Design Green Building Rating System. The LEED council works to change industry standards, develop best design practices and guidelines, advocate for green buildings, and develop educational tools to support its members in implementing sustainable design and construction practices. Using LEED approved designs and architects will reduce the GHG emissions from any future buildings built within the municipality as compared to standard practices. The new City Hall (which will be occupied this spring) will be the first certified LEED building in NL with a silver rating.

Community Inventory Initiatives

Clothesline Initiatives

The average Household clothes dryers emit two kg of eCO₂ per load. If all of the residents of Corner Brook use their clothesline even 30% of the time in lieu of the dryer, over **1,938 tonnes** of eCO₂ emissions would be eliminated every year assuming an average family rate of 400 loads per year¹.

¹ 400 loads per year is average for a single family home in the US according to *Washington Post Nature's Dryer Revisited Thursday August 17, 2006*

Residential Energy Efficiency Initiatives

Municipalities promote residential energy efficiency in many different ways. Several communities host non-profit organizations that provide residential audits of waste, water and energy use under Natural Resource Canada's EnerGuide for Houses Program. Once evaluations are completed, staff provide residents with recommendations for infrastructure and lifestyle changes they can make to generate financial savings and reduce their GHG emissions. The Town of Okotoks (AB) has undertaken a groundbreaking project by developing a 74-home subdivision that will demonstrate solar seasonal storage technology. Through the winter, homes will be heated with solar energy collected during the spring, summer and fall and distributed by a district heating system. The project is the first of its kind to employ solar seasonal storage in North America. It will lead to GHG reductions of approximately 2.4 tonnes per year, per household, along with a reduction in water use of 200 litres per household, per day as a result of added water conservation measures. Corner Brook had 299 new home permits issued in 2008. If a similar project to the one in Okotoks was undertaken, this would result in a reduction of **115 tonnes**.

Water Conservation Initiatives

Rain barrels at reduced prices

Other municipalities such as the City of Vancouver (BS) manufacture and sell rain barrels at 50% of their cost. Barrels are useful in serving the practical purpose of collecting rainwater for use in home gardening, but also useful in raising public awareness of wasteful irrigation practices. This means less water is pumped and treated. A 30% reduction in the amount of energy used for pumping would reduce the inventory by **45 tonnes**.

Clean Water Awareness Programs

More than 220 Canadian communities have joined an awareness and outreach initiative called the Yellow Fish Road Program. Working with volunteer groups like the Girl Guides of Canada, your municipality can co-ordinate this education and outreach program designed to raise awareness of the importance of clean water, the water supply process, and the need to protect water sources by keeping harmful chemicals out of storm sewer systems. Volunteers use a special stencil to paint yellow fish beside storm sewer drains and hand out literature to remind residents not to dump chemicals down the storm sewer. If residents can be taught the importance of protecting and conserving clean water, these lessons may translate into reduced water use. Improved water conservation means reduced water treatment and pumping requirements, less energy use at treatment facilities and a reduction in associated GHG production. The City of Calgary (AB) employed the Yellow Fish Road Program as part of its campaign to teach thousands of the city's children about clean water issues.

Transportation Initiatives

Transportation accounts for over 80% of the community GHG emissions. Community programs such as bike-friendly infrastructure, commuter challenges, and carpooling initiatives offer a cost-effective way to make a significant impact on GHG emissions reduction targets.

Bike-friendly infrastructure

Bike lanes, trails and racks make cycling a safer, more attractive option for travel and commuting. For example, employers might be encouraged to provide a bicycle for employees to travel to local meetings. With a little research, employers can determine which type of bike and equipment will be most useful to employees. In the City of Fredericton (NB) cyclists, skiers, snowshoers and pedestrians alike can enjoy some 65 km of linear trails. By giving priority to the continued expansion and development of linear trails in its Capital City Municipal Plan, Fredericton has committed itself to developing a city-wide trail network that will enhance the recreational and commuting options of its residents.

Commuter Challenges

The Commuter Challenge is a friendly competition between Canadian communities to encourage as many people as possible to use sustainable and active modes of transportation. Environment Canada organizes the event for one week each spring. Community registration is easily completed online. Many communities promote the event through their transportation departments and often partner with local non-profit groups to increase the awareness of the program and participation. Intercommunity challenges between government and large business spur friendly rivalries. More than 97 communities participated in the 2004 Commuter Challenge, reducing their GHG emissions by more than 600 tonnes. Municipalities of all sizes participated in the Challenge, including: Annapolis Royal (NS), Sackville (NB) and Montreal (QC).

Carpooling Initiatives

If every person were to buddy up and reduce vehicle use by one third this would translate into a savings of **26,343 tonnes** of GHG emissions per year. This action alone could achieve the community reduction goal.

Community Gardening

Surplus municipal land can be given new life when allocated to community groups interested in gardening. These gardens provide many benefits to the community, including the fact that food is produced locally, thereby reducing emissions generated by transporting food from outside the community. Community gardens also improve community security and spirit, and serve as meeting places and educational tools for school children. Further, the plants in these gardens will sequester carbon, offsetting a portion of a community's GHG emissions and improving air quality. Many municipalities have established partnerships with community groups to deliver garden programs and promote additional urban greening initiatives such as rooftop gardening. The City of Vancouver's (BC) Parks Board allows non-profit groups to establish gardens on unused parkland. The city provides the land, clears the grass and adds compost, while

community groups establish educational programs for school children and other residents. To date, ten gardens have been planted.

5.3 Cost/Benefit of Initiatives

Listed below in **Table 5-2** is the potential initiatives outlined above, the potential annual reductions, and the type of effort the initiative would take. Notice that only four of the twelve listed have a substantial capital expenditure.

Table 5-2 List of References and guides to reducing GHG emissions

Initiative	Potential Savings (tonnes)	Process
Waste Diversion	2,110	Ongoing
Motor Vehicle Usage Reductions	235	Ongoing
Water Reduction Initiatives	-	Ongoing
LEED Certified City Hall	-	Ongoing
Tree Planting	96	Procedural
Paperless Meetings	0.2	Procedural
Alternative Fuels	100	Capital Expenditure
Traffic Lights	14	Capital Expenditure
Clothesline Initiative	1,938	Educational
Residential Energy Efficiencies	115	Capital Expenditure
Water Conservation	45	Capital Expenditure
Carpooling	26,343	Educational

5.4 Local Action Plan- Next Steps

One of the most important steps of creating a local action plan is engaging the public. Public meetings should be held to engage, educate, motivate, and support local residents in regards to the local action plan. The meeting will include a background presentation as well as a community discussion.

The presentation will include a background presentation on the importance of GHG emissions reductions, a summary of the GHG inventory, the projections for 2018, and the targets. The public participation component of the meeting will include listing and explaining potential current and potential town initiatives to reduce the GHG emissions as outlined in Section 5.1 and 5.2 above. People can then voice their opinion on the various pros and cons of each initiative and bring other ideas to the table.

The ideas and reviews from the meeting will then be synthesized to create a Local Action Plan. Implementation strategies should include but are not limited to:

- Details on costs, responsibilities, schedules, and funding sources
- Plans to monitor the progress made towards the emissions reduction target and the implementation status of GHG reduction measures
- Consider integrating your GHG plans with Air Quality and Community Energy plans

It is important to note that public funding is available to help municipalities with Milestone #2 through Milestone #5. Information on these funds is available on the sustainable communities' website².

² <http://www.sustainablecommunities.fcm.ca/GMF>

6.0 Summary

On January 29, 2010, Canada inscribed in the Copenhagen Accord, its 2020 economy-wide target of a 17 per cent reduction in greenhouse gases from 2005 levels. Corner Brook's strong and aggressive commitment to a target reduction plan will help Canada to reach that goal; not only by reducing its own GHG emissions, but by paving the way for other communities within NL to fulfill their obligation to making this world more sustainable.

7.0 References

(all references used for the baseline calculations are included in **Appendix A**)

McPherson, E.G., and J.R Simpson. 1999. Guidelines for calculating carbon dioxide reductions through urban forestry programs. Gen. Tech. Rep. PSW-171. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Federation of Canadian Municipalities (year?). *Quick Action Guide: Municipal Action on Climate Protection-20 steps you can't take to curb greenhouse gas emissions-now!*

APPENDIX A

List of References

APPENDIX B

GHG Inventory Spreadsheet

APPENDIX C

Table of Calculations for GHG Reductions and Annual Savings

Table C-1. Table of Calculations for GHG Reductions and Annual Savings for Corner Brook

Initiative	Calculation	Values	Potential Savings (tonnes)
Bag Limits	$\Delta GHG_{an} = \%_R * B$ Whereas: ΔGHG_{an} = Annual amount of eCO ₂ reductions (in tonnes) due to activity $\%_R$ = Amount of potential reductions (%) in waste with bag limits ¹ B = Total eCO ₂ emissions (tonnes) produced from waste in Corner Brook in 2008	$\%_R = 50\%$ $B = 4220$	2,110
Composting	$\Delta GHG_{an} = R * \%_R$ Whereas: ΔGHG_{an} = Annual amount of eCO ₂ reductions (in tonnes) due to activity $\%_R$ = Amount of potential reductions (%) in waste if organic matter is removed and composted ² R = Estimated total eCO ₂ emissions (tonnes) produced from waste in Corner Brook in 2008	$\%_R = 30$ $R = 4220$	221
Anti-idling Campaign	$\Delta GHG_{an} = \%_R * B$ Whereas: ΔGHG_{an} = Annual amount of eCO ₂ reductions (in tonnes) due to activity B = 2008 eCO ₂ (in tonnes) emissions for the entire municipal fleet $\%_R$ = Reduction in emissions anti-idling campaigns (%)	$B = 938$ $\%_R = 25$	235
Tree Planting	$\Delta GHG_{an} = c * B$ Whereas: ΔGHG_{an} = Annual amount of eCO ₂ reductions (in tonnes) due to activity c = amount of eCO ₂ (tonnes) absorbed by a red maple per year ³ B = number of trees planted in 2008 (#)	$c = 0.5484$ $B = 96$	53
Alternative Fuel	$\Delta GHG_{an} = \%_R * B$ Whereas: ΔGHG_{an} =Annual amount of eCO ₂ reductions (in tonnes) due to activity B = 2008 eCO ₂ (in tonnes) emissions for the diesel fleet $\%_R$ = Reduction in emissions from 20% biodiesel mix (%)	$B = 499$ $\%_R = 20$	100
Traffic Lights	$\Delta GHG_{an} = \%_R * B$ Whereas: ΔGHG_{an} = Annual amount of eCO ₂ reductions (in tonnes) due to activity B = 2008 eCO ₂ emissions for traffic lights (tonnes) $\%_R$ = Reduction (%) in emissions from LED lights ⁴	$B = 17$ $\%_R = 80$	14

Initiative	Calculation	Values	Potential Savings (tonnes)
Clothesline Initiative	$\Delta GHG_{an} = \%_R * B$ <p>Whereas: ΔGHG_{an}= Annual amount of eCO₂ reductions (in tonnes) due to activity $\%_R$ = Percent of the time using the clothesline in lieu of the dryer (%) B = Estimated 2008 emissions (in tones) from dryer use in Corner Brook</p> $B = C * \#_L * \#_F$ <p>Whereas: C = average amount of eCO₂ per load for a dryer (kg) $\#_L$ = Average amount (#) of loads of laundry for year for a family⁵ $\#_F$ = Number of families (based on residences) in Corner Brook(#)</p>	$\%_R = 30$ $B = 6325$ $C = 2$ $\#_L = 400$ $\#_F = 8075$	1,938
Residential Energy Efficiencies	$\Delta GHG_{an} = C * R$ <p>Whereas: ΔGHG_{an}= Annual amount of eCO₂ reductions (in tonnes) due to activity C = Total eCO₂ tonnes reduction per year from each household¹ R = new homes in 2008 (#)</p>	$C = 2.4$ $R = 48$	115
Water Conservation	$\Delta GHG_{an} = \%_R * B$ <p>Whereas: ΔGHG_{an}= Annual amount of eCO₂ reductions (in tonnes) due to activity $\%_R$ = Amount of reduction (%) in water usage due to rain barrels¹ B = Annual amount of eCO₂ emissions in 2008 from lift station (tonnes)</p>	$\%_R = 30\%$ $B = 150.3$	45
Carpooling	$\Delta GHG_{an} = \%_R * B$ <p>Whereas: ΔGHG_{an}= Annual amount of eCO₂ reductions (in tonnes) due to activity $\%_R = 30\%$ = Amount of potential reductions (%) in waste all commuters sharing a ride B = Estimated amount of eCO₂ emissions (in tonnes) from commuters in 2008</p>	$\%_R = 30\%$ $B = 87,811$	26,343

¹Savings per household estimated from Okotoks (AB) example in Federation of Canadian Municipalities *Quick Action Guide: Municipal Action on Climate Protection-20 steps you can take to curb greenhouse gas emissions-now!*

²Estimated amount of household waste that is compostable in Newfoundland and Labrador (<http://www.mmsb.nf.ca>)

³Estimates based on M.-C. Lambert, C.-H. Ung, and F. Raulier "Canadian national tree aboveground biomass equations", 2005 NRC Canada and 2006 IPCC Guidelines for national Greenhouse Gas inventories", Table 4.3 and 4.4 of Chapter 4: Forest Land

⁴LED lights are estimated to be 80% more efficient than incandescents

⁵This assumes that no clotheslines are currently being used whereas some clothesline use is probably common but no estimate is available