



City of Fredericton

FIRST TO KYOTO

CORPORATE UPDATE

Toward Milestone Five

for Greenhouse Gas Emissions Reduction and Monitoring

PREPARED FOR:

The Federation of Canadian Municipalities (FCM)
ICLEI – Local Governments for Sustainability
Partners for Climate Protection (PCP)

PREPARED BY:

City of Fredericton

IN PARTNERSHIP WITH:

Dr. Shawn Dalton, Director
Environment and Sustainable Development
Research Centre, University of New Brunswick

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1 INTRODUCTION AND SUMMARY

1.1 Background

In 2000, the City of Fredericton joined Partners for Climate Protection (PCP) as administered by the Federation of Canadian Municipalities (FCM). The City then began a project called 'First to Kyoto' aimed at reducing the greenhouse gas emissions of the corporation/municipal operation by 20 percent below benchmark levels (2000) by 2010.

Early in 2006 the City of Fredericton submitted its First to Kyoto Corporate Action Plan for Greenhouse Gas Emissions Reduction for municipal operations. The report presented that the City's corporate greenhouse gas emissions increased by 1.96 percent between 2000 and 2004. PCP accepted the results, and Fredericton was awarded Milestones 1 through 3 of the PCP Five Milestone Framework. Milestone 4 was subsequently awarded in 2008 for Implementation of the Action Plan and related GHG reduction activities for municipal operations.

This Update Report is submitted towards achievement of Milestone Five for Monitoring Progress of the Corporate GHG Reduction Plan.

1.2 Introduction to this Report

This update report provides the inventory and measurement results of the City of Fredericton's GHG emissions over the period of 2000 through 2008 (with adherence to the GHG emission accounting protocol of the PCP program).

As discussed in the 2006 Inventory and Action Plan, the City of Fredericton's benchmark year is 2000 due to unavailable data for the recommended 1990 base year. At that time, PCP accepted the 2000 base year for all future work.

Of note, despite having submitted Corporate results for the 2000–2004 period, this report updates those results as well due to the introduction of new spreadsheet coefficients by ICLEI/PCP which affect the results of that time period and influence future measurements as well.

The GHG emissions presented in this report are those that are released by the City of Fredericton as a result of its corporate operations, as per the following categories:

1. Buildings
2. Vehicle Fleet (excluding transit as per PCP guidelines)
3. Streetlights and Traffic Signals
4. Water and Sewage
5. Solid Waste



1.3 *Summary of Findings*

The 2006 Corporate Inventory and Action Plan for Greenhouse Gas Reduction, which presented measurement results for the 2000 to 2004 period, stated the following.

“In order to carry on with this leadership role in Fredericton and beyond, it will be necessary that the City as a corporate entity take some fairly aggressive action to reach its target of reducing its emissions by 20 percent below 2000 levels, by 2010. The two greatest contributors to its overall corporate emissions are the water and sewage facilities, and the streetlights. In total, the City needs to reduce its emissions by 4697 tonnes, or about one third of its current emissions of 13262 tonnes.”

The current report presents updated calculations for the entire 2000 to 2008 period and results reveal that the **City of Fredericton’s corporate greenhouse gas emissions decreased by 17.24 percent** over the period (2242 tonnes eCO₂), due to a number of aggressive emissions reduction strategies and actions as discussed herein.

As indicated previously, due to new coefficients introduced by ICLEI/PCP new measurements were generated for the 2000 to 2004 period. Original results showed a 1.96 percent increase in GHGs over this time period, but with use of new coefficients this changed to an increase of 9.27 percent.

Thus, it was due to particularly aggressive energy and GHG reduction initiatives and activities undertaken over the 2004 to 2008 timeframe, which resulted in the 17.24 percent decrease over the entire period (2000–2008).

These aggressive initiatives and activities are discussed in detail in this report.



2 CORPORATE ACTION PLAN UPDATE AND GHG REDUCTION PROGRESS

Since the 2000–2004 GHG measurement process was conducted a range of initiatives in various measurement categories were implemented or completed, such as: upgrading of municipal buildings to render them more energy efficient; a full-scale streetlight rationalization (wattage reduction); and traffic signal retrofit to LED technology. These initiatives, amongst others, played a significant role in reducing GHG emissions from City operations particularly over the 2004–2008 period.

The details of these initiatives and others are presented, by sector, in the subsequent sections. These initiatives are the basis for the full greenhouse gas emissions analysis story by sector, as presented in Section 3.

2.1 *Buildings*

Greenhouse gas emissions from City of Fredericton buildings decreased by 1552 T eCO₂ over the 2000 to 2008 period, which equates to a reduction of 30 percent in this sector. This significant reduction in emissions has been accomplished due to several major initiatives in this sector as described in subsequent sections, some of which began as far back as 1999.

Municipal Buildings Initiative (MBI)

The City's Municipal Building Initiative (MBI) aims to improve the energy efficiency of all municipal buildings by upgrading lighting, heating/ventilation, air conditioning, and arena ice plant systems. The primary goal is to increase efficiency of these facilities, while reducing GHG emissions, and increasing staff and user comfort and safety. Over the long-term it has been calculated that the upgrades will reap financial savings to the City in the order of 20 to 25 percent over the next 20 years.

The MBI began in 1999 with the major retrofit of 18 city-owned facilities that were deemed high-energy users. And while the retrofits of the original 18 facilities were finished in 2001, additional MBI retrofitting has been ongoing on these as well as on other facilities, including:

- Increasing the R-value of roofing insulation when buildings require new roofing.
- Replacing overhead doors with high R-value doors as required.
- Replacement of old low efficiency oil fired heating appliances with high efficiency natural gas appliances.
- Continuous replacement of old light fixtures with energy efficient fixtures.
- Installation of motion sensors on lighting.
- Close monitoring of the digital control system that controls the HVAC system for main facilities, and making necessary adjustments and scheduling to optimize energy consumption.



- Replacement of failing HVAC equipment new energy efficient models.
- Increased information to raise employee attention and education about energy consumption practices.

The energy efficient improvements as a result of the Municipal Building Initiative and continued aggressive upgrading, resulted in savings of nearly 2 million kWh of electricity between 2000 and 2004, or an average of 457 021 kWh annually. Overall energy consumption from City facilities has continued to decline since 2004, which has resulted in the significant 30 percent GHG reduction over the 2000 to 2008 time period.

Building Replacement Program

The City carried out several building replacement projects in the post-2004 period, where an old inefficient building is taken out of service once a new efficient facility comes on line. Examples of this policy in action include:

1. Two new fire stations to replace two old fire stations (new facilities have solar hot water, amongst other high efficiency characteristics).
2. Two old arenas (Nashwaaksis and Coliseum) taken out of service and replaced with Willie O'Ree Centre (natural gas). And newest arena facility, Grant-Harvey, to come online within next two years will be equipped with geo-thermal heating and cooling. Once open, an older arena will be taken out of service.

NR Can and Efficiency NB Building Labeling Program

The City of Fredericton is participating in the Building Labeling Pilot project, launched by Natural Resources Canada (NRCan) and Efficiency NB. The purpose of the project is to establish energy benchmarking for commercial and institutional buildings. Each building in the pilot study is assigned an energy index (kWh/sq. m). This will determine the energy performance of the buildings included in the study and enable comparison to other similar buildings within the overall study group. The project also identifies buildings, which can be targeted for energy saving measures in the future. The City joined this pilot with 12 of its primary buildings.

- Fredericton Public Library
- Fredericton City Hall
- Two Nations Crossing
- St. Mary's Depot
- Regent Street Depot
- Kimble Fire Station
- North Side Fire Station (new)
- York Fire Station
- Fredericton Police Station
- Fredericton Transit
- Sutton House
- Stepping Stone Centre



2.2 Vehicle Fleet

The Vehicle Fleet sector is the only GHG measurement category that showed an increase in emissions between 2000 and 2008. Emissions increased by 719 T eCO₂ – a 30 percent rise over this time period.

Between 2000 and 2004 emissions from the City's fleet decreased slightly (0.41%); and then showed a rise as of the 2008 measurement process. Despite the City transitioning to a lower emissions fleet via older vehicles in the fleet continually being replaced as required with more fuel-efficient models; the fleet has continued to grow in size, mirroring the growth City programs and associated staff.

Environmental factors also played a role in the increase, in that the winters of 2007 and 2008 were characterized by heavy snowfall, which resulted in increased road clearing and fuel usage.

However, despite the increase in emissions from fleet, several very successful initiatives and progressive policies have been implemented in this sector, which are expected to result in progressive reduction in GHGs over the 2009–2010 period.

One such policy is the directive that no City vehicles be taken home by employees (unless in special circumstances), as has been the practice in the past. This will reduce GHGs, fuel consumption, and operational costs. As well, the successful

Anti-idling and Fuel Reduction program is discussed in detail below.

Anti-idling and Fuel Reduction Initiative

This initiative was implemented in January 2006 by the Engineering and Public Works Department, and began with over 160 vehicles in the City's Engineering and Public Works Department, many of which are heavy equipment vehicles.

The characteristics of this initiative include such components as:

- Use of innovative technology, such as LED roof warning lights for heavy equipment working on streets and roadways. These lights ensure that traffic is alerted but the vehicles do not idle to keep lights operating, thus reducing vehicle emissions.
- Drastic changes to standard operating procedures, such as formerly vehicles that would have been started at 7:15am and left to idle until work began at 7:40am are now started when work begins at 7:40am.

Additionally, as part of this program, a Fuel Committee was formed which is tasked with such things as:

- Comparing fuel economies of equipment to be purchased, and incorporating these in to the equipment specifications to guide purchasing decisions.
- Evaluating and changing work procedures to improve fuel economy (e.g. ensuring tenders include having materials delivered to work site, instead of typical practice of



stockpiling materials at depots and then trucking it to the site as required)

The initiative has been monitored since inception, and annual results show a decrease in both diesel and gas usage for a majority of months of the year (in both 2007 and 2008) on a year-over-year basis; bringing total overall usage down on a year-over-year basis. Initial measurements for 2009 reveal a similar result.

In the Engineering and Public Works department the practices associated with this initiative have taken hold and have become standard operating practice / 'business-as-usual' operations. The program has tremendous popularity and success amongst City employees. It is proving to be a successful grassroots / employee-driven initiative. It is anticipated that the program will be extended across all City operations, including supplier vehicles and delivery vehicles delivering to City buildings.

2.3 Streetlights

The Streetlights sector (including traffic signals) showed a reduction in GHG emissions of 715 T eCO₂ between 2000 and 2008; a decrease of 42 percent over this time period.

The City has significantly reduced energy consumption for streetlights through a Streetlight Rationalization Program that began in 2005. As of 2008, the program, which has reduced wattage on 872 streetlights out of an approximate total of 4,000

utility owned fixtures, has saved 250,000 kWh per year. And for new developments more efficiently spaced streetlight placement and lower wattage fixtures are inherent.

The City has also replaced seven 250-watt high-pressure sodium lights with equivalent LED fixtures in a test program that has shown metered power savings of 55 percent (4,900 kWh). In addition, a Traffic Signal LED Conversion Initiative has also achieved a significant reduction in energy consumption by converting all 67 traffic signal and walk lights in the city to energy efficient LED (light emitting diode) lamps (from incandescent). Other advantages of using LEDs include longer life with moisture and dust resistance; UV stabilized shell; lower maintenance; increased safety with no sudden failure, and sun phantom protection (minimizes bright sun interference).

The installation of LED traffic signal is characterized by an 80 to 90 percent reduction in energy consumption over incandescent lights, which represents savings of 1552 kWh per month.

2.4 Water and Wastewater

Greenhouse gas emissions generated by the Water and Waste Water Utility decreased by 647 T eCO₂ between 2000 and 2008, a reduction of 18 percent.

Since the 2004 GHG measurement exercise, the Water and Wastewater Utility has carried out a number of activities that contributed to a reduction in greenhouse gas emissions from this



sector, despite the addition of several new booster stations during this time.

The operational changes, as follows, were coupled with a several environmental and societal factors that also contributed to the reduction in GHGs:

- Replacement of a number of old pumps with new energy efficient models.
- Continued work on minimizing water waste and leakage in the network.
- Separation of sewer network from rainwater network to minimize water sent to treatment plant and energy consumed by water treatment.
- Increase in public awareness around water conservation and water 'ethic' has contributed to more conservative actions when it comes to water and electricity usage.
- Weather – the summer of 2008 was wet (higher average rainfall) when compared to the summers of 2000 and 2004 (previous measurement years), which means less water utilized for water lawns, etc.

The citizen/public component, which factors into this sector versus other corporate sectors, is key as discussed previously. In addition to cultivating a water conservation ethic in Fredericton; economic incentives/disincentives can be employed to motivate citizens to curb their water usage. This economic component has been put into action via a water utility rate increase that will occur for four years beginning in current year (2009). The result of this rate increase, coupled with public education campaigns

via the Green Matters greenhouse gas reduction campaign (discussed further in section 3.2), will be more evident in the 2009 and 2010 GHG measurement processes.

2.5 Solid Waste

Solid Waste GHG emissions decreased by 77 T eCO₂ between over the 2000 to 2008 time period, a reduction of nearly 50 percent in this sector.

The Fredericton Region Solid Waste Commission, which is responsible for all waste and recycling in the Fredericton region, launched its Landfill Gas Management System (LGMS) in 2006, the first of its kind in New Brunswick. The LGMS is designed to significantly reduce greenhouse gases generated through landfill garbage.

Biodegrading garbage in a landfill emits methane, which is an odourless gas. Other gases come to the surface with the methane. The LGMS is designed to combat CH₄. Another benefit is the LGMS also destroys the majority of associated gasses. A blower, which applies a vacuum to a well field, brings the landfill gas to the LGMS flare, which operates at approximately 930 degrees Celsius. The end result is methane and trace gases are burned off at a destruction rate greater than 99 per cent. And there is no visual flare or residue as a result of the system.

Landfills are a significant source of greenhouse gas, and this system is resulting in significant elimination of greenhouse and



landfill gas that contributes to global warming when released to the atmosphere. In fact, approximately 60,000 tonnes a year of CO₂ equivalent will be eliminated from the atmosphere through the LGMS process.

As depicted in Figure 1 in the following section, solid waste contributes less than one percent to overall municipal GHG emissions. Therefore, this is not a primary target for reduction. However, it is important to note that the Fredericton Region Solid Waste Commission (FRSWC) is an active partner in the City's environmental programming related to the Green Matters campaign and the First to Kyoto initiative, and this sector is playing a critical role in GHG reductions at the community level. As discussed, the Landfill Gas Capture System, which began in 2006 is effectively reducing emissions from this sector, contributes greatly to reduced GHGs in both community and corporate measurements.

As well, Fredericton's focus on total environmental footprint and sustainability goals will continue to place significant importance on activities that lead to reduction in waste to the landfill, despite the small portion of GHGs this sector comprises.



3 GREENHOUSE GAS EMISSIONS ANALYSIS & TARGETS

3.1 GHG Emissions Analysis 2000-2008

TABLE 1 – Corporate GHG Emissions, by Sector (2000 and 2008)

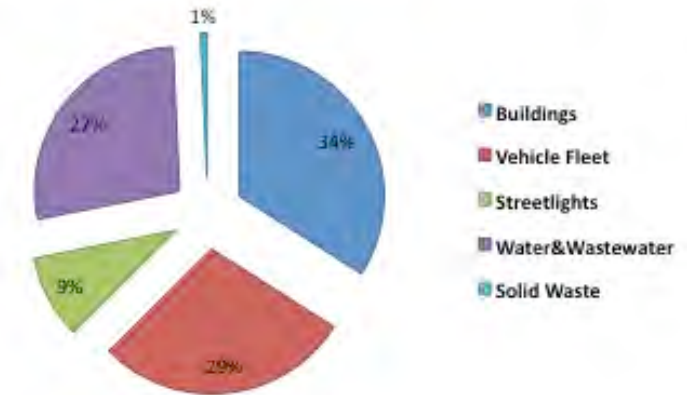
YEAR	Building	Vehicle Fleet	Street lights	Water & Wastewater	Solid Waste	TOTAL eCO ₂ (T)
2000	5184	2352	1721	3595	155	13007
2008	3662	3071	1006	2948	78	10765
Chg T eCO ₂	-1522	+719	-715	-647	-77	-2242
% Chg	-29.4	+30.6	-41.6	-18.0	-49.6	-17.2

As presented in Table 1, the City of Fredericton’s corporate greenhouse gas emissions decreased by over 17 percent, or 2242 metric tonnes (T) of CO₂, between 2000 and 2008.

In order to meet its corporate commitment to reduce to 20 percent below its benchmark year (2000) by 2010, the City will must reduce GHG emissions to 10406 T. This represents a decrease of 359 T, or just over 3 percent below 2008 levels.

The following figure shows the proportion of corporate emissions in 2008 from the five categories/sectors analyzed in this study as per FCM/PCP guidelines.

FIGURE 1 – Percent Corporate GHG Emissions, by Sector, 2008



Buildings

The Buildings sector accounts for the majority of they City’s GHG emissions at 34 percent. This sector includes all greenhouse gas emissions associated with energy consumption to heat and light City/corporate structures and facilities, as well as operate equipment powered by energy that is sourced from these structures.

As noted in Table 1, total greenhouse gas emissions for municipal buildings decreased by over 29 percent between 2000 and 2008, despite the addition of new buildings and facilities to the corporate system. This is a significant achievement, and is



attributable to the continual energy efficiency upgrading of municipal buildings as discussed in the previous section.

Vehicle Fleet

The Vehicle Fleet sector accounts for nearly 30 percent of the City's total GHG emissions. This sector includes all emissions produced by on and off-road vehicles in the City's vehicle fleet, excluding the City's public transit system (which is captured under the Community GHG Measurement protocol as stipulated by FCM/PCP), as well as all equipment used by the City, such as: lawn mowers, snow plows, etc. The GHG emissions calculations include the consumption of gas and diesel by the entire municipal fleet.

Between 2000 and 2008 emissions in this sector increased by 719 tonnes of CO₂, an increase of just over 30 percent.

Streetlights

The Streetlights sector comprises 9 percent of the City's total GHG emissions, and includes all GHG emissions associated with the energy required to power the City's streetlight and traffic light systems. Between 2000 and 2004 the total GHG emissions from street and traffic lights in Fredericton increased by less than 1 percent.

And after this analysis period, starting in 2005, the City began rationalizing its streetlight provision with a substantial anticipated reduction in energy consumption, hence GHG emissions. The benefits from this initiative will be realized in the 2005–2010 period of emissions calculations, which should yield

very positive outcomes with respect to GHG emissions reductions from this sector. As presented in Figure 8, under a business-as-usual scenario, the output from streetlights would be expected to increase from 4642.3T in 2004 to 9675.3 in 2010. However, as stated previously and described in detail in later sections, this is unlikely to happen as the City has already begun to significantly decrease electricity consumption from streetlights and traffic signals.

Water and Sewage

The Water and Sewage sector includes all GHG emissions associated with the energy consumed to operate the City's water distribution, treatment and wastewater facilities networks. This sector increased its GHG emissions by 1307.4T, an increase of 36.4 percent between 2000 and 2004. If this rate persists, the anticipated increase between 2005 and 2010 will be 3360.3T, as depicted in Figure 9. Again however, based on emissions reductions strategies for the water & sewage sector as presented later in this document, business-as-usual conditions are not expected to persist to yield this negative outcome.

Solid Waste

The Solid Waste sector includes all GHG emissions associated with waste materials generated by the City's corporate operations. At 159T in 2004, this represents a relatively small proportion of the municipality's overall greenhouse gas emissions, and increased a mere 2.8 percent between 2000 and 2004. As presented in Figure 10, if this rate were to persist, GHG emissions from the Solid Waste sector would increase only slightly between 2005 and 2010 (less than 6T).



3.2 Progress Towards GHG Emissions Targets

As prescribed in the 2006 Corporate Action Plan, the overall cap for emissions for the City of Fredericton is 20 percent below 2000's output of 13007 T, or approximately 10406 T. This represents a reduction of approximately 360 T eCO₂ below 2008 output of 10765T - or just over a 3 percent reduction in overall emissions from 2008 levels.

As presented in Table 2 and previously in Figure 1, the three greatest contributors to GHG emissions (as per 2008 measurements) at the municipal level in Fredericton are: buildings, vehicle fleet, and water & wastewater.

Thus, given the magnitude and proportion of their contribution of the overall municipal GHG emissions, these categories are the most obvious targets for future emissions reductions.

As also presented in Table 2, the 2010 targets as stipulated in the 2006 Corporate Action Plan have been met and exceeded in several sectors: water & wastewater (24% below target) and solid waste (51% below). Of note, emissions in the streetlights sector showed impressive reduction as well, and as of 2008 are within 3 percent of the target.

TABLE 2 – GHG Emissions (2000, 2004 rev., 2008) and Targets*, by Sector

YEAR	Buildings	Vehicle Fleet	Street lights	Water & Wastewater	Solid Waste	TOTAL eCO ₂ (T)
2000	5184	2352	1721	3595	155	13007
2004 (rev)	4613	2342	1880	5218	159	14212
2008	3662	3071	1006	2948	78	10765
2010 targets*	3007	2342	976	3922	159	10406
2008 actual vs. target	+22%	+31%	+3%	-24%	-51%	+3.3%

* Targets set in 2006 Corporate Action Plan

Buildings

It is reasonable to expect that further reductions in emissions will be reaped from continued energy efficiency upgrades to City facilities, however, where possible the addition of any new buildings in 2009 and 2010 would have to be accompanied with closure of old/energy inefficient buildings in order for this to materialize, as previously discussed in the Building Replacement Program description.

As well, the Building Labeling Project will yield data that will assist in comparing the energy efficiency of various City buildings to prioritize where additional energy savings can be exploited.



Water & Wastewater

There is potential for continued emissions reductions in the Water & Wastewater sector over the 2009–2010 period as a result of a comprehensive energy audit having been conducted, and new actions to be implemented over this time.

However, it is important to note that beyond utility–controlled energy reduction initiatives stemming from the audit of the water utility, this sector will continue to be challenging in regards to GHG reductions. Achieving significant reductions in the water & wastewater sector is heavily dependant on citizen participation in terms of water conservation efforts.

Reducing the GHG emissions generated by the water delivery and treatment system will require a reduction in the overall volume consumed and disposed of – that is, a reduction in daily household use. This component is currently being addressed in the Community Action Plan via the Green Matters public campaign (www.greenmattersfredericton.com) to reduce greenhouse gas emissions from all sources. A rotated seasonal campaign focused on water use is 'Every Drop Counts ~ Reduce your Water Consumption', which aims to educate the public on the importance of a water conservation ethic and the practice of water saving techniques. The campaign also promotes: home retrofits to replace toilets, showerheads, and taps with low–flow and water efficient devices; use of rain barrels; etc.

Potentially the most effective and perhaps most challenging strategy for reducing water distribution and treatment requirements, and associated GHG emissions, will be twofold:

1. Encourage reduction in individual household consumption rates via changes in personal habits; and installation of water saving devices (low–flow, etc.).
2. Encourage alternative building design and construction to reduce water consumption (e.g. through installation of toilets that use gray water from sinks, dishwashers, and showers; or through the use of gray water to irrigate lawns)

Vehicle Fleet

Due to the 30 percent increase in vehicle fleet emissions between 2000 and 2008 this sector will be of particular interest in terms of reduction activities in the next several years. It is anticipated that the combined strategies of: replacing older vehicles with newer fuel–efficient models (of smaller size and/or hybrids where possible); coupled with the 'business–as–usual' anti–idling and fuel reduction initiative extended across the corporation, will yield a reduction in emissions in this sector in the 2009 and 2010 round of measurements.

The sum of the parts

All of these initiatives together have significant potential to guarantee the City remains on the impressive GHG reduction track that has been set in motion over the 2000–2008 time period.



4 CONTINUED MONITORING AND EVALUATION STRATEGY

As detailed in the 2006 Corporate Action Plan for GHG Reduction, internal monitoring and reporting mechanisms were subsequently implemented to track emissions from City sources in order to track progress towards the 20 percent reduction goal by the end of 2010.

Internal Monitoring and Reporting

Annual Greenhouse Gas Measurements

GHG measurements and monitoring of the five sectors/categories required by FCM for greenhouse gas accounting will be conducted at the end of both 2009 and 2010, when data for each year is available. The 2010 corporate GHG measurement results will be compared against the City's 'First to Kyoto' commitment for a reduction of 20 percent in emissions from municipal sources.

As of 2008, the City's Energy Analyst assumed internal responsibility for the GHG measurement process, in conjunction with subject-matter experts, such as Dr. Shawn Dalton (UNB Environment and Sustainable Development). This City of Fredericton/UNB partnership has existed since the original GHG measurement process was undertaken for the 2000-2004 period.

Since that time the data collection and measurement process has become more robust and fine-tuned so that City departments are now collecting data that can be fed directly into the GHG measurement process with minimal preparation and manipulation.

Several standard practices have been recommended that will make data acquisition smoother and more efficient to 2010 and beyond: 1) Each municipal department to prepare a year-end report (discussed in following section) focused on specific information and data related to GHG emissions by sector; and 2) Each department incorporate a section into its year-end report, dedicated specifically to progress on the First to Kyoto goals. This section should have at least two components:

3. Initiatives undertaken at the departmental level to reduce greenhouse gas emissions (see ISO section on following page).
4. The effects of these initiatives. This is an opportunity for each department to report on GHG emissions either indirectly or directly via the ISO process discussed in the subsequent section.

These recommendations and evolving reporting mechanisms will continue to influence current and future changes to reporting protocols; and will be progressively instituted as 'business-as-usual' practice for departmental reporting.



II Categorical Comparisons

Categorical comparisons amongst the five sectors (buildings, vehicle fleet, streetlights, water & wastewater, solid waste) are important for several reasons. First, the categorical analysis of greenhouse gas emissions measurements provides an opportunity to regularly calculate the relative contribution of each sector to the City's overall greenhouse gas emissions figure. This allows the City to allocate resources to reductions strategies with potential for greatest impact.

Second, City departments have taken a very strong interest in the First to Kyoto project from a departmental GHG emissions perspective; and reporting on the efficacy of reductions strategies by sector allows them to track departmental progress and its contribution to the City's overall GHG reduction goals to 2010 and beyond. This ISO reporting protocol, in place as of Fall 2009, will assist in this regard. The new requirement is discussed below.

Third, understanding the relationships among the sectors/categories is vital, particularly relative to Community GHG measurements, because there will be increasing emissions trade-offs. For example, in order to reduce private vehicle use in Fredericton, the City may choose to increase the complement of transit buses and continue to expand transit routes. And in fact, this example reality as the City works towards its active transportation and mass transit goals.

Finally, continuing to monitor and publicly report on each of these sectors will continue to education citizens on their vital role in both community and corporate GHG reduction activities. For example, the cultivation of a water conservation ethic in Fredericton contributes to the GHG reduction goals on the corporate side of the emissions measurement system.

ISO Reporting on Environmental Initiatives

In 2004, the City of Fredericton become the first city in Canada and one of only a few in North America to achieve ISO 9001:2000 certification for its entire corporation.

ISO 9001:2000 is a rigorous, international standard that provides a framework for quality management. It assists organizations in improving the quality of their products and services. First published in 1987, by the International Organization of Standardization in Geneva, Switzerland, ISO 9001:2000 has earned a global reputation as the basis for establishing quality management systems. ISO helps organizations to institutionalize the right attitude by supporting it with the right policies, procedures, records, technologies, resources and structures.

The certification was confirmed by QMI through an independent audit of the City's management strategies and business processes.

The standard represents an international consensus of good management practices and is recognized worldwide as assurance that an organization is operating effectively. Registration to ISO



9001:2000 is a tangible expression of a firm's commitment to quality that is internationally understood and accepted.

The City began working toward ISO 9001:2000 certification in 1999. The exercise has required a great deal of work by staff. The City of Fredericton is a large operation, which can best be described as not just one organization, but as many businesses working under one umbrella. The municipality provides over 150 services.

While other organizations often register only part of their operation, the City of Fredericton decided it was important for the entire organization to become registered. This is because so many processes are interrelated and impact on the quality of municipal services. Widely used in the private sector, the ISO 9001:2000 standards are generic enough to apply to any organization.

As of Fall 2009, reporting on environmental initiatives and progress by Departments will be an ISO requirement and will be incorporated into the Quality Management System (QMS). This new reporting requirement will facilitate and provide baseline information, by Department and initiative, on projects, goals, and progress, so environmental strategies can be articulated and tracked. The new ISO reporting process will be monitored and will be streamlined and refined where necessary.

The City of Fredericton will publicly report its progress and GHG emissions reduction strategies in the appropriate venue each year. To date, reports on the progress of First to Kyoto have

been made to the Public Safety and Environment Committee of the City Council and well as release to the public. An annual progress report to the full Council is made each year, as part of the municipal reporting process.

III External Opportunities

As a PCP member and local leader on a number of environmental initiatives, the City of Fredericton has demonstrated a commitment to adoption of leading edge strategies to provide a safe, healthy environment for its citizens. One aspect of this is understanding Fredericton's standing, relative to other municipalities of similar size and demographic composition.

The City of Fredericton will continue to monitor and, where appropriate, avail itself of new opportunities to reduce greenhouse gas emissions, adopt new strategies and technologies to do so, and provide local leadership in this arena. It will obviously be necessary to stay abreast of advances in technologies that allow the City of Fredericton to continue to provide this leadership.

IV Additional Emissions Reductions Categories

As discussed in the 2006 Corporate GHG Inventory and Action Plan, the core emissions reduction categories required by FCM/PCP are logical, as they include the obvious primary GHG sources that can be most readily tracked. However, there are additional mechanisms for reducing greenhouse gases that are



not currently accounted for in current measurement protocol and process. An example is the urban forest, which sequesters carbon, reduces the need for air conditioning in the summer, and reduces heating costs by sheltering buildings from winter winds. Currently, there is no mechanism to account for, or report on, this function of the urban forest, which in a City like Fredericton, with 68 percent forest cover, may be significant.

The City of Fredericton's long-term commitment to reducing energy consumption may in the future include a variety of strategies that are currently not included in the FCM/PCP accounting standards.

In fact, at present time the City is undertaking a complete urban forest inventory via specialized software, which will then be used to calculate the carbon sequestration ability of Fredericton's urban forest. This will allow the City to move further into far reaching and long-term municipal policy developments to place an economic/market value on the urban forest, which will aid in concrete conservation and protection goals.

In addition, there is an opportunity to maximize this information to develop and test new means of building urban residential, commercial, and industrial developments in a way that reduces lost of forest cover, employs the contours of the landscape and its existing vegetative structure to buffer new buildings from winter winds and summer sun, thereby minimizing energy consumption for heating and cooling.

4.1 Overcoming Barriers

The City of Fredericton recognizes and takes responsibility for the fact that there are considerable barriers to overcome with regards to the planned aggressive approach to greenhouse gas emissions reduction at the corporate level. The most significant barriers are identified as follows:

Cost

Making strategic environmental purchasing choices is often a more expensive option, in the short run, than the alternative. This is true whether in the purchase of hybrid vehicles for the City fleet or expanding the recycling program. The City recognizes this barrier and is committed to continuing to incorporate and account for this increased cost in departmental budgets, while making the case for the long run return on investment; decreased energy usage and GHG emissions; reduction in toxins and improved air quality for employee satisfaction and safety; and the many other positive environmental outcomes from making these strategic environmental choices.

Staff Training and Education

The success of many of the initiatives described in this document depend on well-trained City staff feeling ownership of the initiatives and pride in their success in reducing both energy consumption and greenhouse gas emissions. As such, the City is committed to ongoing education and re-training of staff, so they are able to meet the challenges that come with carrying out new work processes; using new products; driving and maintaining



different vehicles; building new energy efficient structures; installing new temperature control systems, etc.

Resistance to Change

Many of the initiatives currently underway and planned for the future involve change on many levels. Change in how the corporate entity does business; change in how employees do their job; and change in how citizens receive municipal services.

As such, the City recognizes the ongoing change management effort that is required for these GHG reduction initiatives to be successful at all levels. To mitigate resistance to change the City is committed to maintaining a planned communication protocol and open dialogue between the Climate Change Team in the City Administrator's Office, City departmental staff, and City Council on behalf of the citizens of Fredericton.

On a corporate level many initiatives have been undertaken, or will be in 2009, to support the 'change effort; and motivate City employees to make environmentally friendly and sustainable choices in their work, such as:

- No-Foam Challenge – to eliminate use of styrofoam in all City departments in functions, meetings, events and kitchens.
- Active Transportation Committee – focuses on engaging staff and citizens to actively (using non-motorized forms of transportation) commute and recreate. The committee focuses on ways to improve safety on sidewalks, streets and trails. And also makes recommendations on educational and

promotional efforts for active transportation to encourage the reduction of greenhouse gas emissions from using these modes of transportation.

- Green Planet Wellness (www.greenplanetwellness.com), of which the City is a member and employees sign up and receive points for environmental actions at work and at home.
- Environmental Purchasing Policy – for all City departmental purchases, to be implemented in 2009 as part of the Quality Management System and ISO.
- The Paper Challenge – in Fall 2009, the City will issue a Departmental challenge to reduce all paper use and track reduction on a year-over-year basis. This program will include such components as: paper-less City Council; default double-sided copying and printing; inter-office reusable envelopes; etc.



5 EXTERNAL FACTORS AFFECTING GHG REDUCTION GOALS

5.1 *Regional Context*

Fredericton is a small city nested in a growing region; according to the 2006 Canadian Census, there were 50,535 people living in Fredericton (up 5 percent from 2001 Census). And within the total Census Agglomeration the population was 85,688 (also an increase of 5 percent from 2001). In fact, the Greater Fredericton Region has a total population of 124,172. As such, the City of Fredericton provides amenities and services to many citizens who are not actually residents of Fredericton proper. In fact, an increasing number of new houses in the larger Fredericton area are built just beyond City boundaries.

As is the case with most urban centers, the City of Fredericton in effect provides and maintains infrastructure and facilities that are used by residents of a region that is home to over nearly 125,000 people; more than double the population of the City proper. Roads are built to handle additional incoming and outgoing traffic, and must be kept clear of snow in the winter and in good repair in the summer. Traffic lights must be constructed, maintained, and paid for in order to facilitate the travel of commuters from surrounding areas.

City sports and recreational facilities host regional events; and many sports programs are populated by a high number of

participants from outside city boundaries. And residents of the City, as well as residents of the surrounding areas, utilize public parks, playgrounds, green spaces, and swimming pools in Fredericton.

It is well documented that regional growth, often termed urban sprawl, contributes to higher levels of greenhouse gas emissions due to increased commuting from outlying areas into the city. In addition, as described previously, regional growth represents a potential added burden on the municipal infrastructure. Thus, this regional growth story in Fredericton must be incorporated into any municipal greenhouse gas emissions reductions strategy. The City's commitment and actions to reduce GHG emissions will continue to be a powerful means of engaging, facilitating and encouraging regional cooperation in the Fredericton area; as well as from the Government of New Brunswick on issues of provincial jurisdiction, such as urban sprawl and ribbon development extending just beyond the boundaries of New Brunswick's urban centers.

5.2 *Climate*

As a Canadian city, Fredericton is subjected to fairly dramatic fluctuations in temperature between summer highs and winter lows. This can cause a draw on power sources during both peak seasons, as residents attempt to stay either cool or warm. This includes air conditioning and heating municipal buildings, facilities and vehicles.



These weather realities are anticipated to experience increasing volatility as climate change effects intensify in all regions of the globe.

The ability to forecast for peaks and lows in energy consumption related to hot and cold seasons will decrease due to this volatility. Thus, as it affects short-term (year over year) GHG measurements, there will very likely be years where emissions are higher or lower than anticipated due to unseasonably warm or cool weather, as well as variability in snowfall amounts, that cannot be accounted for with forecasting models.



6 SUSTAINABILITY. BY DESIGN.

Since the 2006 Corporate Action Plan was developed, the City has not only been implementing documented action plan items; but has also been aggressively setting a new vision and course on the road to sustainability and 'smart' growth.

This vision encompasses both prongs of the greenhouse gas measurement process: corporate/municipal operations; and the community. New developments in both areas are presented in the following sections.

6.1 Corporate & Community Sustainability

Energy Analyst

In 2008 an Energy Analyst was hired by the City to focus specifically on reduction in the consumption of energy and hence greenhouse gas emission from all municipally generated sources.

Environmental Purchasing Policy

As discussed previously, in early 2009 a process began to develop and implement a City of Fredericton Environmental Purchasing Policy as part of the Quality Management System and ISO process.

Sustainability Plan

In early 2009, a process began to formalize a Sustainability Plan for the City of Fredericton. A plan will be developed by

September 2009, which will include and coordinate the initiatives discussed herein. The Sustainability Plan will also include a broader perspective and long-range related to 'Smart Growth' and Sustainable Development to guide overall future growth/development plans within in the City encompassing the following categories:

- Water Use / Conservation Ethic
- Energy
- Waste Reduction, Recycling and Composting
- Transportation and Public Transit
- Trails and Bikeways
- Urban Forest, Parklands and Green space
- Municipal Buildings and Operations
- Development Practices (including Brownfields)

Environmental Policy Guide ~ Towards a Green & Sustainable Fredericton

An Environmental Policy Guide for the City of Fredericton was researched and prepared in 2008. It will be used as a practical tool as part of the Sustainability Plan to guide Council in making environmental-related decisions on a wide array of areas affecting community life, including but not limited to the following:

- Anti-idling bylaws
- Parking rates
- Water rates
- Plastic bag ban
- Drive-thru moratorium/ban



- Waste reduction (e.g. garbage tag system)
- Recycling advancements
- Urban forest protection
- Development regulations



APPENDIX A – ACKNOWLEDGEMENTS

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City of Fredericton staff of the following Departments:

- Engineering and Public Works
- Finance
- Corporate Services
- Development Services

The Fredericton Pollution Control Commission

The Fredericton Region Solid Waste Commission

NB Power

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Lisa Scott
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Climate Action Fund

Province of New Brunswick Environmental Trust Fund



APPENDIX B – DATA TABLES

FCM/PCP data tables completed by the City of Fredericton, in undertaking the Measurement and Monitoring of Corporate Greenhouse Gas Emissions for achievement of Milestone 5, are provided with this submission in electronic format in MS Excel files titled:

- Fredericton GHG_2004 updated April 2009.xls
- Fredericton 2008 GHG_May 2009.xls
- GHG Summary Table_2009.xls