Transportation Association of Canada (TAC)

2007 Environmental Achievement Award Submission

Fredericton

what a city should be.

1 NOMINATION INFORMATION

NAME OF NOMINATED ORGANIZATION	City of Fredericton
PROJECT TITLE	FIRST TO KYOTO – Corporate Greenhouse Gas (GHG) Reduction Initiative
NAME OF NOMINATOR	Murray Jamer
POSITION	Director of Engineering & Public Works
PHONE FAX	506-460-2037 506-460-2013
E-MAIL	murray.jamer@fredericton.ca
ADDRESS	P.O. Box 130 397 Queen Street (City Hall) Fredericton, New Brunswick E3B 4Y7

2 DESCRIPTION OF ORGANIZATION

The City of Fredericton, New Brunswick's Capital City, is situated along the banks of the beautiful St. John River, in the heart of the province. Fredericton is a great place to live, work and play. Graced with tree-lined streets, Victorian homes, top attractions, arts and cultural events, a variety of sporting facilities, kilometres of trails, acres of parks and green space, two universities, and an airport, Fredericton is one of the most successful and vibrant small cities in North America.

Fredericton's core population is 50,000. However, Fredericton's Census Agglomeration (CA) population is 81,355 – which encompasses the larger metropolitan area of Fredericton including surrounding unincorporated areas and New Maryland. This is an important consideration, as a significant portion of the City's services and infrastructure, including roadways, road illumination and traffic lighting systems are put in place to account for the flow of our surrounding population into and out of the core City area for work and recreational activities.

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 employs 630 people and provides over 150 services to its citizens. The City as a corporate entity has celebrated many achievements. In 2000, the City's commitment to pollution prevention was evidenced when it joined the Partners for Climate Protection (PCP) program of the Federation of Canadian Municipalities (FCM). Also in 2000, the City was a finalist in the Energy Efficiency Canada Awards', sponsored by Natural Resources Canada. And in 2004 the City of Fredericton became the first city in Canada and one of only a few in North America to achieve ISO 9001:2000 certification for its entire corporation.

The year 2006 was a very significant year for the City's environmental initiatives and commitment; the City was awarded the prestigious Greenhouse Gas Reduction Award by the Canadian Council of Ministers of the Environment (CCME), as part of the CCME's Pollution Prevention Awards. As a result of this award, Fredericton was named an Environment Canada Pollution Prevention Success Story for its corporate pollution prevention initiatives, and featured on their website as well as in their on-line magazine *Envirozine*. Furthermore, the City completed an inventory and measurement of its greenhouse gas emissions as a corporate entity, and submitted these results and a Corporate Action Plan to the Federation of Canadian Municipalities & Partners for Climate Protection. The GHG emissions results, goals and action plan were approved by FCM & PCP, and the City is now continuing to aggressively reduce GHGs to meet its goal of a 20 percent reduction by 2010, over 2000 levels, consistent with Kyoto Protocol targets. Thus far in 2007, the City is embarking on a large community engagement process aimed at a city-wide/community GHG reduction initiative. This public campaign is called "Green Matters" – and its goal is to reduce community GHG emissions by 6 percent by 2010, over 2000 levels. This campaign is just getting underway, and both corporate and community GHG emissions will continue to be monitored and tracked each year leading up to the 2010 target year, in order to track progress and adjust initiatives and campaigns based on emissions results by sector.

3 PROJECT DESCRIPTION – 'FIRST TO KYOTO'

The City of Fredericton has undertaken a wide range of initiatives to reduce its greenhouse gas (GHG) emissions and to increase its energy efficiency. The City understands the important leadership role it can play in the local community - many of these initiatives lie at the interface between the municipal government and the citizens it serves. By demonstrating strong corporate leadership, the City of Fredericton has laid the groundwork necessary to encourage individual, corporate, and institutional citizens to reduce their own emissions.

The City's pollution reduction and prevention initiatives come under the overarching **FIRST TO KYOTO** project and include a wide-variety of corporate and community initiatives to reduce GHGs and promote a healthy environment in which to live and work in Fredericton. The transportation-related corporate initiatives submitted in this application, are described in detail in the following sections, according to the following project information:

1. Project Objectives
2. Project Characteristics
3. Project Date
4. Results Achieved

3.1 Streetlight Power Reduction Initiative

Project Objective

The objective of this two-year initiative (2005-2006) was to reduce energy consumption by 20 percent from a base year of 1998, while still maintaining a consistent and appropriate level of service to citizens, accounting for:

- Vehicle and pedestrian transportation safety
- Security and crime prevention
- Lighting patterns for new developments
- Guidelines of the Illumination Engineering Society (IES)

Project Characteristics

In 2005, this initiative included the following modifications to 497 streetlight fixtures on the south side of the City:

- 108 fixtures – reduce 200W to 150W
- 16 fixtures – reduce 200W to 100W
- 373 fixtures – reduce 150W to 100W

These modifications represent an annual reduction of 134, 600 kwh, equating to annual savings of $27,000.

In 2006, 305 fixtures on the north side of the city were replaced as follows:

- 141 fixtures – reduce 200W to 150W
- 27 fixtures – reduce 200W to 100W

- 137 fixtures – reduce 150W to 100W

These modifications represent an annual reduction of 93,436 kwh, equating to annual savings for the City of approximately $16,000.

Project Date

The Streetlight Power Reduction Initiative was a 2-year project began in 2005 and was completed in 2006.

Results Achieved

The target goal of the Streetlight Power Reduction Initiative was to reduce energy consumption by 20 percent from a base year of 1998. The final evaluation of data is pending, however thus far, the key attributes of this initiative are two-fold: a reduction in energy consumption of 28,036 kwh per year; which equates to an annual cost savings to the City of $43,000.

3.2 Traffic and Walk Lights Conversion to LED Initiative

Project Objective

The objective of this initiative is to change all traffic signal lights and walk lights to energy efficient LED lamps (from incandescent), so as to: increase efficiency by reducing energy consumption (as part of an overall plan to reduce GHG emissions); save money; improve signal performance; and enhance safety.

Project Characteristics

The traffic and walk lights power reduction initiative involves the conversion of the 68 traffic signals in the city, from incandescent lamps to LED (light emitting diodes) lamps. The project began in 2003 and to date, 61 of the 68 traffic signals have been replaced, with the remainder to be replaced this year (2007). The details of the conversion are as follows:

- 24 hours of staff time spent per intersection (2 people X 12 hours)
- Does not disrupt normal signal operation
- Upgrade to signal is happening at the same time

The other advantages of the conversion to LED are: longer life; lower maintenance; increased safety; no sudden failure; UV stabilized shell; moisture and dust resistance; sun phantom protection.

Project Date

The initiative began in 2003, with the first LED intersection, and to date, 61 of 68 traffic signals have been retrofitted with LED lamps. The remaining retrofits will be completed in 2007.

Results Achieved

This initiative is characterized by an 80 to 90 percent reduction in energy usage per signal per month (or 1552kwh) and an 80 to 90 percent reduction in costs per signal per month (or $172), as detailed below:

- Power usage per signal = 1774 kwh/mo. (before retrofit) versus 222 kwh/mo. (after retrofit)
- Power cost per signal = $217/mo. (before retrofit) versus $45/mo. (after retrofit)

When all retrofits are complete the cost savings will be over $100,000 per year.

3.3 Conversion to Water-Based Paint for Traffic Lines

Project Objective

The objective of the switch to water-based paint from solvent-based paint for traffic lines is two-fold: 1) Increased safety of employees (i.e. elimination of health issues around use of solvent-based paint and thinners); and 2) Improve environmental outcomes (i.e. reduction in air pollution in the form of volatile organic compounds (VOCs) that are released into the air by solvent-based paints, and reduction in hazardous waste).

Project Characteristics

Acrylic waterborne traffic paints are safe, non-toxic and less hazardous to the environment and to the people who handle them. Waterborne traffic paints are generally classified as non-hazardous waste and can be disposed of very economically compared to solvent-based paints, as waterborne paints are formulated with very low levels of solvent (usually alcohols) and often no (or very low levels) of lead or chromates. Waterborne acrylic paints are a more environmental- and user-friendly alternative to solvent-based coatings.

The City has specifically identified the following advantages to using water-based paint for traffic lines:

- Lower volatile organic compounds (VOC) - less impact on the environment
- Low odor - a health benefit to workers using the paint
- Less concern over worker exposure to hazardous solvents
- Lower or no risk of fire from handling flammable solvents
- Easy and safer cleanup and less hazardous disposal

The conversion to water-based paint involved significant changes in equipment, which staff has been trained to use and maintain (i.e. line lasers, airless sprayers, airless paint trucks with stainless steel fittings and paint tank). Appropriate staff has also been trained in the specific practices of use of the paint re: cleaning, storage, disposal, etc.

Project Date

The City of Fredericton tested water-based paint for traffic lines in the fall of 1990, and completely converted to water-based paints for all traffic line applications in the spring of 1991, except for crosswalks, which were converted to water-based paint in 2002.

Results Achieved

The City of Fredericton has fifteen years of experience in using exclusively water-based paint for traffic line applications, so it is very much a nationally recognized leader on the use and benefits of water-based paints. The City being asked to present on this topic at the Environment Canada Workshop in Calgary in September 2005 evidences this experience and recognized leadership. This presentation was in regard to Environment Canada's upcoming regulations around 'Volatile Organic Compounds (VOCs) and their use in Architectural and Industrial Maintenance Coatings', as proposed in March 2005. These upcoming Environment Canada regulations mandate that traffic paint meet much stricter standards than previously.

Specifically, VOCs shall not exceed 150 grams/litre. The City of Fredericton already meets these standards, and has since the municipality switched completely to water-based traffic paints in 1991 and crosswalk paint in 2002.

The City of Fredericton uses approximately 12,000 litres of water-based traffic line paint annually; this represents approximately 1.7 tonnes of VOCs emitted from this source. If the City were still using solvent-based paint, the VOC emissions would have been in the order of 5.4 tonnes. Thus, through use of water-based paint in its traffic line applications, the City prevented approximately 3.7 tonnes of VOCs from being emitted into the atmosphere in one year alone (a reduction of nearly 70 percent). As such, the cumulative effect of this conversion is significant, given that the City has been using water-based paints for the past fifteen years for traffic line applications, and for the past 4 years for crosswalk applications.

3.4 Gas Reduction and Anti-idling Program

Project Objective

The objective of this program is to reduce GHG emissions and pollutants, lower fuel costs, and increase the health & safety of employees and citizens by reducing harmful vehicle emissions into the air.

Project Characteristics

The gas reduction and anti-idling program began in January 2006 and currently involves 159 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 that are working on streets and roadways. These lights ensure that traffic is alerted but the vehicles do not have to idle to keep lights operating, thus reducing vehicle emissions.
- Drastic changes to standard operating procedures such as formerly 159 vehicles that would have been started at 7:00-7:15am and left to idle until work began at 7:40am, are now started right 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)

Project Date

The project started in January 2006 with results to be monitored each year to determine emissions reductions and fuel savings. Results for the first year of the program are pending. After several years of monitoring the program, and based on successfully achieving its goals, it is anticipated to be rolled into standard operating practice / 'business-as-usual' operations and to be extended across all City operations and vehicle fleet as described previously.

Results Achieved

Fuel saving and GHG emission results are still pending, however, popularity and success of the program amongst City employees is tremendous. The project is proving to be a successful grassroots / employee-

driven initiative which has had great support and success thus far, and it is anticipated that once results are available and success assured, the program will be spread across all City departments and apply to all City fleet vehicles, transit buses and perhaps City supplier vehicles and delivery vehicles delivering to City buildings.

4 COMMITMENT TO ENVIRONMENT

The City of Fredericton's commitment to pollution prevention is significant and longstanding. This commitment is evidenced by the projects presented in this application, as well as numerous other involvements and initiatives:

1. The City has been involved in environmental improvement, pollution prevention, and energy use reduction initiatives for well over a decade. For instance, in the case of the water-based paints initiative, the City has been a recognized national leader on this front since 1991.

2. In 2006, the City was awarded the prestigious Greenhouse Gas Reduction Award by the Canadian Council of Ministers of the Environment (CCME). This is one category of the CCME's Pollution Prevention Awards and Fredericton is the first municipality to ever to have been granted this award since the CCME Awards began in 1997.
http://www.ccme.ca/ourwork/pollution.html?category_id=19

3. Also in 2006, the City was recognized by Environment Canada as a Pollution Prevention Canadian Success Story for its corporate environmental work, including the projects presented in this submission. http://www.ec.gc.ca/pp/en/storyoutput.cfm?storyid=130 (also see attachment to this submission)

4. Additionally, the City was profiled in Environment Canada's *Envirozine* – their on-line environmental magazine. http://www.ec.gc.ca/EnviroZine/english/issues/69/get_involved_e.cfm

5. The City was a finalist in the Energy Efficiency Canada Awards' in 2000, sponsored by Natural Resources Canada.

6. The **First to Kyoto** project - which the City committed to in 2000 (when it joined the Partners for Climate Protection program of the Federation of Canadian Municipalities (FCM)). First to Kyoto includes a wide variety of pollution prevention, energy and greenhouse gas reduction (GHG), and other environmental-related initiatives, some of which are included in this application. Through this project the City:
   - Has completed a corporate inventory of GHG emissions, with targets in place for reductions moving into the future – the initiatives presented in this application are part of that progress.
   - Has completed a community inventory of GHG emissions in in March 2007, and with this will be a wide range of programs and policies to support citizens' commitment to reduction of household greenhouse gas emissions.

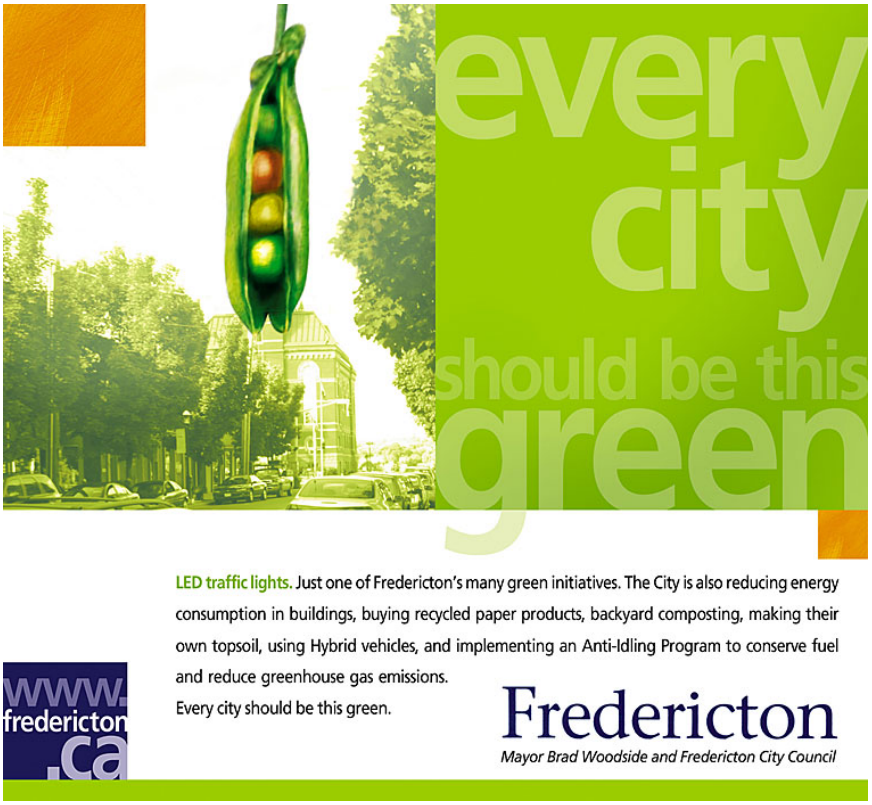
7. City of Fredericton staff members have been trained in energy management through the Municipal Building Initiative (one of the projects included in this application), and have participated in numerous International exchanges related to environmental initiatives (to Thailand and the New England states, US). Furthermore, City representatives disseminate information related to pollution prevention, energy reduction and other environmental initiatives via speeches at a variety of conferences across the country, and provide regular updates on this front to the City's Public Safety and Environment Committee.

8. In 2004 the City of Fredericton became the first city in Canada and one of only a few in North America to achieve ISO 9001:2000 certification for its entire corporation. While other organizations often register only part of their operation, the City 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. The certification was confirmed by QMI through an independent audit of the City's management strategies and business processes. The City began working toward this certification in 1999, and the exercise required a great deal of work by staff. Although registration has been achieved, the City's commitment to quality continues. Registration is not permanent and must be renewed every 3 years. At the City's request, the Registrar will return every 6 months to monitor progress.

9. The City has an ongoing commitment to identify and reduce emissions through changes in standard operating procedure and/or purchasing decisions. Generally, these initiatives are both cost-effective and have minimal impact on the standard operating procedures of the staff in various City divisions and departments. Examples include an anti-idling policy for the City vehicle fleet in winter and summer, corporate waste reduction and recycling efforts, learning to use new energy efficient equipment, etc. The following additional reductions strategies are still to be implemented:
   - Reducing the size of the City's fleet of vehicles and switching, where possible, to biodiesel as an alternate fuel source (currently being tested on City transit buses).
   - Raise awareness among managers and staff, of opportunities for reduction through purchasing decisions and changes in departmental standard operating procedures.
   - Work with the Engineering and Public Works Department to identify and implement means of reducing GHG emissions for public works facilities, including reducing demand for clean water among major users in the city, and thereby also reducing the amount of waste water requiring treatment by municipal facilities

These initiatives require the full participation and cooperation of municipal staff at all levels. To this end, a City 'Green Team' was created in early 2007, comprised of both senior and junior staff members from all City departments. The Green Team serves both an idea/brainstorming function for new initiatives and campaigns, as well as an advisory role around current and proposed environmental programs and implications.


every
city
should be this
green
LED traffic lights. Just one of Fredericton's many green initiatives. The City is also reducing energy consumption in buildings, buying recycled paper products, backyard composting, making their own topsoil, using Hybrid vehicles, and implementing an Anti-Idling Program to conserve fuel and reduce greenhouse gas emissions.
Every city should be this green.
www.fredericton.ca
Fredericton
Mayor Brad Woodside and Fredericton City Council

5 TRANSFERABILITY

All of the initiatives described in this submission are transferable to other jurisdictions. Most specifically, Fredericton's leadership role with regard to conversion to water-based traffic line paint has been utilized to prompt other jurisdictions to convert as well. Specifically, the City of Fredericton made a presentation on this topic at the 2002 Canadian Public Works Association Conference, and also at the September 2005 Environment Canada Workshop in Calgary. Many other municipalities have been hesitant to convert due to perceived quality issues, however, Fredericton's fifteen-year use of water-based paint, with excellent results, is a critical factor in urging other jurisdictions to move to this environmentally friendly alternative.

Similarly, the City's experience and methods used in the Streetlight Power Reduction Initiative, and the Traffic and Walk Light LED Replacement program are highly transferable to other jurisdictions. In researching and implementing these initiatives City staff conducted extensive research, and have become highly trained and knowledgeable in these specific areas. This knowledge has been shared via the ICLEI[1] Clean Air – Cool Planet exchanges programs with the New England states (New York, New Jersey, Massachusetts, New Hampshire and Maine) as well, as Glaang, Thailand. In particular, the City made presentations in Thailand in March 2005 on both the LED traffic signals conversion and on the Municipal Building Initiative.

The City of Fredericton remains committed to the knowledge transfer of its experiences on the pollution prevention and reduction front. The City made a presentation at the Clean Air – Cool Planet conference in Portland, Maine in December on its pollution prevention initiatives, as well as at the Federation of Canadian Municipalities (FCM) Sustainability Conference in February 2006.

In addition, to the best of our knowledge, the City of Fredericton is the first municipality in New Brunswick to organize a rational and precise plan for street lighting reduction. Several other municipalities in the province have contacted City staff for advice regarding their approach regarding the reduction/rationalization of street lighting in their municipalities, while still maintaining citizen satisfaction and safety.

[1] Local Governments for Sustainability Organization

6 INNOVATION

The initiatives presented in this application present several areas of innovation. First, the City of Fredericton was the first municipality in Canada to convert to water-based paint for traffic line applications. This conversion solved a major problem and health concern – it eliminated the need to use, and hence dispose of, harmful solvents (toluene).

Second, with regard to the Streetlight Reduction Initiative, one of the key factors in the lighting reduction is the innovative use of GIS mapping of the City's lighting inventory. Without the GIS map, there would not be an efficient and practical way to analyze the City's lighting requirements. The GIS mapping permits exact detail on specific lighting factors, such as: what the lighting spacing is; the roadway geometry; or the neighbouring land use; all of which are factors in determining what street lighting the City should have there versus what is there. A staff member with the City's Engineering Division was a key player in developing this mapping inventory. For data collection, summer students went around all the city streets with maps to mark on the location of existing lights and their respective wattage. Furthermore, the GIS inventory is a tool that allows the City to track and record any changes, print reports on inventory, add other attributes, and ensure accuracy of monthly billings and statements, in order to manage the service better.

There are several other innovative transportation-related environmental initiatives currently being tested by the City of Fredericton, that are also part of the First to Kyoto group of initiatives, as follows:

1. Use of bio-diesel in City buses. This pilot project is a collaborative effort by a group of New Brunswick farmers who are producing the bio-fuel; the University of New Brunswick Chemical Engineering Department who are testing and recording level of emissions from the various forms and combinations of bio-fuel used in the buses; and the City of Fredericton who is providing the buses for the pilot.

2. LED and QL Induction Streetlight Pilot Project in a Fredericton neighbourhood to determine whether this method of street lighting is more efficient, cost-effective and acceptable to the public. If it meets these goals, this pilot project will extend to other parts of the city.