

The City of Bathurst

Partners for Climate Protection Program



Revised Milestone #5 Report

Monitoring Progress / Reporting Results

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Introduction and Background

The City of Bathurst (the City) is one of 17 Partners for Climate Protection (PCP) member municipalities in New Brunswick and one of approximately 230 member municipalities in Canada. The PCP program is a joint partnership between the Federation of Canadian Municipalities (FCM) and ICLEI - Local Governments for Sustainability. Jabresh Environmental Services was engaged by Bathurst Sustainable Development (BSD) on behalf of the City to prepare this Milestone #5 report. The purpose of this report is to present information on the progress made by the City and to report results. Specifically, it includes an inventory of the greenhouse gas (GHG) emissions generated by the Corporation of the City of Bathurst and also by the Community at large for the year 2010, making comparisons to the Milestone #1 inventory developed in the early years of the City's participation in the PCP program.

The 2010 GHG inventory was developed in a manner consistent with the development of the 2000 baseline (Milestone #1) inventory using data supplied by BSD, the City, NB Power, and other sources of reliable and publicly available information and data. The report was to be of sufficient detail to satisfy the requirements of the Federation of Canadian Municipalities (FCM) PCP program's Milestone #5 reporting.

Joining Partners for Climate Protection

The City of Bathurst joined the FCM ***Partners for Climate Protection*** (PCP) program in April 2000. The City agreed to work toward reducing both Corporate and Community GHG emissions following the *“Five Milestone”* PCP program. This report has been developed to indicate the results of the City's participation in the PCP program.

Bathurst Sustainable Development was established in 1998 to engage governments, community and business in protecting the Nepisiguit Watershed and addressing climate change. BSD initiated a number of climate change related projects on behalf of the City to assist it in reducing its GHG emissions. These initiatives have been reported to the FCM in the ***“City of Bathurst Milestone #4 Report”*** (Revised, January 2014).

The City was recognized as a Sustainable Community by Natural Resources Canada (NRCan) in April 2000, and became part of the Sustainable Communities Initiative project. The City and BSD jointly signed a resolution making them the 81st Canadian municipality to join the PCP program. The resolution acknowledged that climate change and global warming is a threat to people, agreed to establish a greenhouse gas (GHG) emissions inventory for City operations (Corporate) and for the Community, agreed to set emission reduction targets, and agreed to report on progress toward meeting those targets.

The Kyoto Green Plan for the City of Bathurst

Corporate and Community GHG emissions inventories (Milestone #1) were completed as part of a Sustainable Communities Initiative (SCI) project sponsored by Natural Resources Canada (NRCan). Recommendations for a Corporate and a Community-wide GHG emission reduction strategy (Milestone #3) were also developed under the SCI project. The resulting report, ***“The Cities for Climate Change Program - Local Plan of Action for CO₂ Emissions Reduction, Bathurst, New Brunswick”*** was presented to City Council in May 2002. Council approved the report for implementation. A ***Kyoto Technical Committee*** was established to plan and oversee implementation of the GHG emission reduction projects.

A Milestone #4 report was developed in 2012 and revised in 2014. It is a summary of the initiatives undertaken by the City and its partners to reduce Corporate and Community GHG emissions. This Milestone #5 report is a compilation of the current GHG emissions, indicating where and how these emissions have changed since the initiation of the PCP program by the City.

Milestones #1 to #3

The Milestone #1 report indicated that the City’s own (Corporate) emissions were 32,708 tonnes in 1995, and that they had increased to 43,885 tonnes in 2000.

Corporate GHG emissions are typically in the range of 5% or less of the Community total. The Milestone #1 Corporate GHG emissions inventory was re-examined during preparation of the original version of this report (2012). The original Corporate GHG inventory was heavily dominated by the estimated electricity consumption for street lights (87+%). A 2001 letter from NB Power indicated that street lighting in the Province accounts for less than 0.5% of electricity consumed across the province. Further, a 2011 analysis by NB Power indicated traffic, street and area light electricity consumption by the City in 2010 at 619,274 kWh or 2,228 GJ. For both 1995 and 2000, street lighting electricity consumption was reported in the Milestone #1 report at 259,200 GJ. The number of operating lights has remained similar over the 15 year period (1995 to 2010), and energy consumption has been reduced by converting all traffic lights to LED and replacing a number of 250 w HPS lamps with 132 w LED heads. It is thus assumed that there was a transcription error in the Milestone #1 report. For this report, the 1995 and 2000 estimates for street lighting are adjusted to 2,592 GJ (720,600 kWh).

The GHG emissions from solid waste management were reported as a combined total in the baseline. This report (see below) assumes 1% of those emissions are associated with waste produced by the City.

The Corporate and Community GHG inventories for 1995 and 2000 were adjusted to reflect the streetlight energy consumption adjustment and the separation of the GHG emissions associated with solid waste management.

The revised Corporate GHG emissions for the City of Bathurst, for the purposes of this report, are thus 4,416 tonnes in 1995. They increased by 32% and stood at 5,837 tonnes in 2000, the PCP baseline year. Community GHG emissions were adjusted to 123,273 tonnes in 1995. They increased by 28% to 157,493 tonnes in 2000.

The Milestone #3 report does not indicate that specific GHG emission reduction targets were established by the City in Milestone #2. FCM suggested that Corporate GHG emission reduction targets should be about 20%, and that the Community reduction target should be about 6%. The latter target is consistent with Canada's original (Kyoto) commitment to GHG emission reductions. If these FCM recommendations were accepted, the City would have agreed to reduce its Corporate GHG emissions by 1164 tonnes (20%), from 5,821 tonnes in 2000 to 4,658 tonnes in 2010. The City would also have been agreeing to reduce its Community-wide GHG emissions by 9,451 tonnes (6%) from 157,509 tonnes to 148,058 tonnes.

It is assumed that these targets were implicitly adopted by the City in joining the PCP program.

Milestone #4

The Milestone #4 report lists and describes the initiatives undertaken or facilitated by the City and by BSD to reduce both the Corporate and the Community-wide GHG emissions following the signing of the 1998 PCP agreement.

Milestone #5 - Methodology

This report is prepared to indicate the changes in GHG emissions over the 10 year period of the PCP program. The 2010 GHG emission calculations were performed on a basis that attempts to be consistent with the Milestone #1 inventory.

The 1995 and 2000 GHG inventories were developed using software created by Torrie-Smith Associates for the national PCP program. This report relies on raw energy consumption data for 2010 as provided by the City, NB Power and other reliable sources. Where possible, comparisons were made with the Milestone #1 2000 GHG emissions inventories for the City, and also with other provincial and national inventories for the same periods to help reassure that the findings are realistic and that any inconsistencies could be explained.

The Corporate and Community GHG emission inventories presented herein for 2000 are as they were presented in the Milestone #1 report to FCM except for the streetlight and solid waste adjustments as described above.

The City provided 2010 data directly from their records on the consumption of fuel oil, propane and diesel fuel. NB Power provided data on electricity consumption, by meter, as billed to the City. The latter data was separated into general building consumption and consumption related to the water and sewer systems.

The GHG intensity factor that was used to convert the 2000 electricity data to GHG emissions was reported to have been 0.533 kg/kWh. This is relatively consistent with the electricity consumption intensities in Appendix 13 of Canada's 15 April 2013 National Inventory Report (NIR) of Greenhouse Gas Emissions to the United Nations Framework Convention on Climate Change (UNFCCC). The reported intensities in this recent NIR are 0.52 kg/kWh for 2000 and 0.53 kg/kWh for 2010. These intensities have been adjusted by Canada over time as data and definitions for the national reports are refined and adjusted by Canada and the UNFCCC. No adjustments were made to the 2000 Milestone #1 inventory to reflect this slight change in GHG intensity for that year.

The electricity GHG intensity used for 2010 was the intensity factor for New Brunswick (0.54 kg/kWh) found in the National Inventory Report (NIR) by Canada (11 April 2012) to the UNFCCC (Appendix 13). The intensity used by Efficiency NB for calculating GHG emission reductions from energy efficiency measures (EEM) was also considered. That intensity in 2012 was 0.807 kgeqCO₂/kWh. It was expected that this intensity would be higher as the bulk of the "marginal" electricity that is saved through the ENB *Energy Smart* programs is likely to be fossil fuel generated. This factor is also not consistent with the intensity factor used in the Milestone #1 inventory. It could be argued that the GHG intensity factor for the electricity consumption reductions by the City should be higher. However, this would require a more in-depth analysis and the PCP program reportedly relies on the provincial or utility average electricity GHG intensity to develop the inventories reported in Milestones #1 and #5. Therefore, the electricity intensity of 0.54 kg/kWh for 2010, as reported in the 2012 NIR to the UNFCCC, was used to develop the Milestone #5 GHG inventory. Because of the minor change in the 2013 report, no adjustment was made to the 2010 inventory in this report revision.

Fuel oil and propane intensity factors are stable as the carbon content of these fuels does not vary appreciably. The factors used herein are 2.83 kg/litre for fuel oil and diesel fuel, 2.35 kg/litre for gasoline, and 1.53 kg/litre for propane.

The Nepisiguit-Chaleur Solid Waste Commission (NCSWC) provided information on the operation of the landfill. The NCSWC was incorporated in 1987, and began construction of a regional solid waste management facility at Red Pine (Allardville). Recycling and other programs were commenced. The NCSWC installed methane capture and destruction technology at an existing landfill and at the new landfill in 2008. The Corporate GHG emissions from the management of solid waste are typically in the

order of 1% of the Community emissions. In addition to not tracking solid waste production separately, these relatively minor Corporate GHG emissions were reported in the Community inventory (2,438 tonnes in 1995; 1,621 tonnes in 2000). The Corporate GHG emissions from solid waste management in 2000 were thus in the order of 16 tonnes. With ongoing attention to internal management of waste production and the continuing focus on improved recycling programs, it is anticipated that Corporate Solid Waste production would not have changed substantially or may have declined. With the capture and conversion of methane to CO₂ (95% eqCO₂ emission reduction), the overall landfill emissions would have been reduced by in the order of 90%, allowing for less than 100% methane capture and less than 100% combustion efficiency. The methodology is discussed further below in calculating the Community GHG emissions, and is consistent with Canada's 2013 National Inventory Report to the UNFCCC. Corporate GHG emissions associated with solid waste management are thus anticipated to be less than 2 tonnes for 2010.

The GHG intensity factors used to convert the non-electricity energy data to GHG emissions are those used by Canada or the Province in their conversions.

Milestone #5 - Corporate GHG Emissions

The following table provides the detailed information used to develop the 2010 Corporate GHG inventory:

Bathurst, New Brunswick
 Corporate Greenhouse Gas Emissions
 Detailed Report for 2010

Source Sectors	Raw Data Reported	Energy Consumed (GJ)	GHG Emissions (tons eqCO ₂)
Buildings	4,884,380 kWh	17,570	2,638
	145,127 L #2 fuel oil	5,625	411
	23,569 L propane	494	36
Subtotal			3,085
Vehicle Fleet	128,346 L diesel	4,974	363
	53,037 L gasoline	1,711	125
Subtotal			488
Streetlights	619,274 kWh	2,228	334
Water/Sewage	5,079,804 kWh	18,273	2,743
Waste	Not Reported (est. 1% of Total)		2
Other	0		
TOTAL		50,875	6,652

The following table summarizes the 2010 GHG emissions compared to the revised 2000 Milestone #1 inventory:

Bathurst, New Brunswick
Corporate Greenhouse Gas Emissions
Summary Report for 2010

Source Sectors	2000 (eCO₂ tonnes)	2010 (eCO₂ tonnes)	Change (%)
Buildings	2,613	3,085	+18
Vehicle Fleet	612	488	-20
Streetlights	384	334	-13
Water/Sewage	2,212	2,743	+24
Waste	16	2	-90
Other	0	0	-
TOTAL	5,837	6,652	+14.0

This analysis indicates that despite significant efforts by the City to reduce energy consumption in its buildings over this period, energy consumption and GHG emissions have actually increased. This increase in energy consumption was due to an increase in the number of City buildings, the total amount of space being utilized, and changes in the patterns of use. A new City Hall was constructed in 2003 and a seven building waterfront village was added during this period. These changes are consistent with the City becoming more of a regional service provider to outlying areas.

Water and sewer related energy consumption has risen despite a decrease in population. This increase is due to an expansion of water and sewer infrastructure by the City during this period. This expansion included the addition of nine new sewage pumping stations. The water treatment plant was upgraded. This resulted in a tripling of its treatment capacity. There may be some offsetting emission reductions in the Community inventory as a result of provision of improved water and sewer services to properties within the City.

The City did see positive results with respect to reduce energy consumption and emissions as a result of its management of vehicle fleet, and from street, area and traffic light changes, as well as from its management of solid waste.

As noted in the methodology, Efficiency NB would have assigned higher GHG intensities to electricity consumption reduction (lights). However, the same could be applied to the increases in electricity consumption (buildings, water and sewer). The consistent use of the average intensity thus paints a relatively accurate picture of the changes from 200 to 2010.

Overall, considering the 32% GHG emissions increase from 1995 to 2000 (6.4% per year), the City has done very well in slowing the rate of increase to 1.42% per year, and actually reducing GHG emissions in some important areas between 2000 and 2010. The efforts of the PCP program could thus be justifiably considered as having **reduced Corporate GHG emissions by close to 3,000 tons per year** as compared to what might have resulted had the City continued with “Business as Usual”.

Milestone #5 – Community GHG Emissions

The 2010 inventory for the Community was developed in a manner similar to that for the Corporate portion of this report. A minor adjustment was made to the Milestone #1 GHG inventory report for 2000 to account for the transfer of solid waste emissions to the Corporate inventory.

NB Power provided a summary of electricity consumption by rate class – Residential, Commercial and Industrial. The Province indicated that the use of residential fuel wood appeared to be little changed. Data on fuel oil and propane use was not readily available. The 2000 report indicated that fuel oil and propane were less than 10% of the total residential energy supply, and no fuel oil or propane use was reported in the 2000 Milestone #1 report for either the Commercial or the Industrial sectors. For consistency, fuel oil was assumed to continue to supply 10% of the Residential energy in 2010, thus assuming a consumption change similar to electricity.

The same GHG intensity factors were used for all sources of energy as were used in developing the Milestone #5 Corporate emissions inventory are were used for the Community inventory.

For the transportation sector, the 2011 Canadian census data for motive fuels consumption for New Brunswick indicates a 17% increase in fuel consumption per capita. For automobiles, this increase was added to the 2000 total (17,490 tons eqCO₂), and the result (20,463 tons) was reduced by the population decline of 5% to yield a 2010 result of 19,440 tons eqCO₂. Vans and light trucks were treated similarly to yield 2010 emissions of 16,199 tons eqCO₂. Census fuel consumption by heavy trucks indicates there has been little change per capita. The 2010 emission estimate for heavy trucks was thus reduced by the population decline to 15,248 tons eqCO₂. Bus emissions for 2010 were assumed to be zero. The overall increase in vehicle GHG emissions was thus estimated to be 5.7%. This is comparable to the provincial inventory increase of 6.0% for the same period.

Because landfill GHG emissions have significantly decreased as a result of technology changes at the landfill in 2008, the actual tonnage of solid waste delivered to the landfill is of less importance in terms of calculating the GHG emissions change. However,

given the introduction of recycling programs and the various public education programs delivered during the PCP program (Milestone #4 report), it is conservatively assumed that the rate of organic solid waste production delivered to the landfill has been decreased by 20%. A further 5% volume reduction, related to the declining population of the City, was also assumed. Finally, it has been variously reported in the media and elsewhere that landfill gas systems are 85 – 95% efficient. It is conservatively assumed that the system here is 90% efficient. These factors were thus applied to the 2000 landfill GHG emission of 1621 tons eqCO₂ to calculate the 2010 emissions.

The following table depicts the raw energy and solid waste data, as well as the detail on its conversion to GHG emissions.

Bathurst, New Brunswick
 Community Greenhouse Gas Emissions
 Detailed Report for 2010

Source Sectors	Raw Data Reported	Energy Consumed (GJ)	GHG Emissions (tons eqCO ₂)
Residential	90,712,226 kWh	326,303	48,985
	13,000 cords wood	325,000	2,899
	Fuel oil (see text)	71,643	5,241
Subtotal			57,125
Commercial	97,062,257 kWh	349,145	52,414
Industrial	7,106,524 kWh	25,563	3,838
Transportation			
Automobiles	see text		19,440
Heavy trucks	see text		15,248
Vans and light truck	see text		16,199
Sub total			50,887
Waste	see text		123
TOTAL			164,387

The following table summarizes the 2010 GHG emissions compared to the 2010 Milestone #1 emissions:

Bathurst, New Brunswick
Community Greenhouse Gas Emissions
Summary Report for 2010

Source Sectors	2000 (eCO₂ tonnes)	2010 (eCO₂ tonnes)	Change (%)
Residential	58,073	57,125	-1.6
Commercial	45,741	52,414	+14.6
Industrial	3,942	3,838	-2.6
Transportation (Total)	48,126	50,887	+5.7
Automobiles	17,490	19,440	+11.1
Vans/Light Trucks	14,574	16,199	+11.1
Heavy Trucks	16,051	15,248	-5.0
Transit Buses	11	0	-100
Waste	1,605	123	-92.3
Other	7	0	-100
TOTAL	157,493	164,387	+4.4

As with the Corporate emissions change, it should be noted that the efforts of the City and BSD through the PCP program measurably slowed the rate of increase in GHG emissions from a 28% increase over 5 years (5.6% per year) from 1995 to 2000 to a 4.4% increase over 10 years (0.44% per year) over the 2000 to 2010 period. This effort could be legitimately construed as **a saving of over 80,000 tons per year of GHG emissions** by 2010 as a result of the PCP program if one were to make a comparison to “Business as Usual”.

It is observed that residential energy consumption has declined, partially as a result of a declining population but also as a result of residential participation in the Efficiency New Brunswick *Energy Smart* programs and general interest in energy efficiency spurred by programs operated by BSD.

Commercial energy consumption has risen as a growing number of services are provided community and to the region around the City. Efficiency NB reports that there has been little uptake of their efficiency programs for commercial and institutional buildings in the City.

Energy consumption and emissions have declined in the industrial sector.

Transportation related emissions specific to this or any other city are difficult to precisely determine. The estimates here reflect what has been happening across the province with respect to per capita transportation fuels consumption, and also the provincial emission estimates developed by Environment Canada. This generalization may or may

not apply well to this City over this specific 10 year period. The transportation emissions changes were compared to those reported by Environment Canada for 2010 in the 2013 National Inventory Report to the UNFCCC. This Milestone #5 report arrived at different breakdowns in the changes in each category of vehicles in the transportation sector, but the overall GHG emissions change for the Province from 2000 to 2010 was an increase of 6%. This compares favourably with the 5.7% calculated herein for the City of Bathurst.

Emissions from the disposal of solid waste have shown the largest decline as recycling and composting programs were introduced, and landfill gas capture and destruction technology were added to the landfill itself.

Summary

Corporate GHG emissions rose by 14.2% from 2000 to 2010. This increase is against an intended commitment to reduce them by 20%.

The City was successful in reducing GHG emissions from its street lighting, solid waste management, and from its vehicle fleet. Energy consumption and GHG emissions increased from City buildings and the water and sewer utility as a result of the construction of new buildings and the expansion of water and wastewater system capacities, but potential building emissions were well managed by efficiency initiatives and operating changes at all City buildings.

Community energy consumption and GHG emissions increased by 4.4% overall. This increase is against an intended 6% reduction. The increase was mainly in the Commercial and Institutional sectors. While it has been reported that publicly owned Institutional buildings (federal, provincial) have undergone energy efficiency retrofits, there may be additional opportunities to emphasize future programs for those buildings and expansion into the Commercial sector. There were reductions in electricity consumption in the Residential and Industrial sectors. GHG emissions from solid waste disposal were significantly reduced.

While the City may not have been successful in meeting its intended targets, there was a considerable slowing of the rate of growth of energy consumption and greenhouse gas emissions, even though there were expansions to the municipal and commercial services provided to the community and the region during the period of the program. There is considerable activity continuing within the Corporation and in the wider Community that will continue to bear fruit in further reducing the rate of increase of GHG emissions and, in time, should result in measurable emission reductions.

Beyond PCP / Milestone #5

The City of Bathurst continues to undertake initiatives to continue actively managing its GHG emissions. Specifically, the City is continuing to replace its own street and area lights with light emitting diode (LED) lamps. They have recently replaced 23 high pressure sodium (HPS) lamps and will be replacing 28 low pressure sodium (LPS) lamps in 2012.

Bathurst Sustainable Development remains engaged with the Province, the City and other community organizations. The Climate Change Action Center continues to operate. Reports are regularly completed and filed with the Province and City and made available to the public on the BSD web site. Most recently, BSD has been involved with a Children's Garden, Outdoor Biodiversity Centers, and in developing Green Plans with and for Community Schools. BSD continues to work with Efficiency New Brunswick to continue to engage the public in reducing their energy consumption and GHG emissions through promotion of active transportation and residential energy evaluations.

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