HALIFAX
REGIONAL MUNICIPALITY

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Info. 3

Environment and Sustainability Committee
April 7, 2011

TO: Chair and Members of the Environment and Sustainability Committee

SUBMITTED BY: Phillip Townsend, Director, Infrastructure and Asset Management

DATE: March 21, 2011

SUBJECT: **Partners for Climate Protection Milestone 5 Recognition**

INFORMATION REPORT

ORIGIN

- September 13, 2005, Committee of Whole: Corporate Greenhouse Gas Emissions – Local Action Plan
- Regional Plan: 2.4.5 Emissions Reduction Functional Plan

BACKGROUND

Partners for Climate Protection program:
http://fmv.fcm.ca/Partners-for-Climate-Protection/
The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments that have committed to reducing greenhouse gases and acting on climate change. PCP is the Canadian component of ICLEI's Cities for Climate Protection (CCP) network, which involves more than 900 communities worldwide. PCP is a partnership between the Federation of Canadian Municipalities (FCM) and ICLEI – Local Governments for Sustainability.

- 215 current members (all Canadian municipalities)
- Only 7 other municipalities have completed Milestone 5

The PCP program has two streams: corporate and community. To successfully complete the program and receive "Milestone 5 recognition" in either stream, municipalities must complete five milestones:

1. Create a GHG emissions inventory and forecast
2. Set a reduction target
3. Develop a Local Action Plan to Reduce GHGs
4. Implement the Local Action Plan to Reduce GHGs
5. Measure progress and report results

Municipalities do not have to achieve their reduction target to receive recognition, but they must demonstrate to FCM and ICLEI that they have tracked GHG reductions, engaged stakeholders and decision-makers, and if necessary, reassessed their reduction target.

DISCUSSION

In early March 2011, Sustainable Environment Management Office (SEMO) submitted Halifax Regional Municipality's (HRM) application to receive recognition for completion of all five milestones in the corporate stream of the PCP program (see Attachment 1). HRM's submission included:

1. HRM 2008 Corporate GHG Emissions Inventory
2. Progress Report: Greenhouse Gas Emission Reductions 2005-2011
3. Stakeholder and Decision-Maker Engagement Report
4. Reassessing HRM's Corporate GHG Reduction Target Report

On March 17, 2011, SEMO received notice that FCM and ICLEI wanted to grant HRM formal recognition for completing all the milestones in the PCP program for our corporate operations. HRM has now joined an exclusive club of Canadian local governments that have demonstrated leadership and a commitment to reducing greenhouse gases in response to climate change. FCM will send a letter of recognition to Mayor Kelly.

Completing the corporate PCP program is a significant accomplishment and HRM will strive to continue its work on GHG reductions. SEMO is currently developing a new 2020 corporate target and reduction plan, to be completed by July, 2011.

BUDGET IMPLICATIONS

There are no budget implications associated with this report.

FINANCIAL MANAGEMENT POLICIES / BUSINESS PLAN

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Project and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Project and Operating reserves, as well as any relevant legislation.

COMMUNITY ENGAGEMENT

None

ATTACHMENTS

1. HRM Partners for Climate Protection Milestone 5 submission

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A copy of this report can be obtained online at http://www.halifax.ca/commcoun/cc.html then choose the appropriate Community Council and meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by: Lauralee Sim, Environmental Performance Officer – SEMO, 490-3665

Report Approved by: Richard MacLellan, SEMO Manager, 490-6056

HALIFAX
REGIONAL MUNICIPALITY

P.O. Box 1749
Halifax, Nova Scotia
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March 14, 2011

Partners for Climate Protection
24 Clarence Street
Ottawa, Ontario
K1N 5P3

Attention Devin Causley

Dear Mr. Causley:

Re: Halifax Regional Municipality's Formal Submission – Milestone 5

Please accept this collection of reports as the Halifax Regional Municipality's (HRM) formal submission for recognition of Milestone 5 (corporate) under the joint Federation of Canadian Municipalities (FCM) and the ICLEI Partners for Climate Protection Program. Within the following pages, you will find:

1) HRM 2008 Corporate GHG Emissions Inventory
2) 2011 Progress Report: Greenhouse Gas Emission Reductions 2005-2011
3) Stakeholder and Decision-Maker Engagement
4) Reassessing HRM's Corporate GHG Reduction Target

Please do not hesitate to contact me (902-490-3665; simlI@halifax.ca), or Richard MacLellan, Manager, Sustainable Environment Office (902-490-6056; maclelri@halifax.ca), with any questions or comments about this submission.

Sincerely,

Lauralee Sim, Environmental Performance Officer

Attachments (4)

Cc: Richard MacLellan, Manager, Sustainable Environment Management Office, HRM
file

HRM CORPORATE GREENHOUSE GAS EMISSIONS INVENTORY 2008

May 2010

Prepared by:

Shannon Miedema, Environmental Performance Officer

Sustainable Environment Management Office
Infrastructure & Asset Management
Halifax Regional Municipality
www.halifax.ca/environment/semo

HALIFAX
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Naturally GREEN

EXECUTIVE SUMMARY

HRM is committed to reducing greenhouse gas emissions in order to decrease its overall impact on the climate. This report details HRM's corporate greenhouse gas (GHG) emissions inventory for fiscal year 2008. HRM measured its corporate and community emissions in 2004/2005, using data from fiscal year 2002. As a result of the 2002 estimates, HRM Regional Council approved a Local Action Plan for reducing corporate GHGs, as well as a corporate emissions reduction target of 20% below 2002 levels by 2012.

Total corporate emissions for 2008 were estimated to be 115,564 tonnes of equivalent carbon dioxide emissions. The 2002 inventory estimated 121,352 tonnes. However, the 2002 and 2008 inventories cannot technically be compared due to several developments since 2002, including corporate changes within HRM and significant differences in data quality and availability. Despite the problems with comparability, based on the 2008 inventory results, HRM will not meet its 2012 reduction target. However, HRM has completed many successful energy efficiency projects and actions in order to reduce overall GHG emissions at the corporate level, particularly in the buildings sector, the number one corporate source of GHG emissions. HRM is committed to an ongoing effort of GHG emissions monitoring and reduction, and anticipates setting new targets for 2020 and 2050 that are in line with provincial and national goals.

HRM plans to revise its Local Action Plan to include new measures for reductions, and to re-estimate its corporate emissions inventory on an annual basis. Future inventory estimates will be comparable to the 2008 estimate, allowing HRM to track its progress more effectively moving forwards. HRM plans to begin an estimation of community-wide emissions in the near future, and to begin working with the larger community towards absolute reductions in GHG emissions in the municipality.

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1. BACKGROUND

Halifax Regional Municipality (HRM) joined the Partners for Climate Protection (PCP) program in 1997, and committed to taking action against climate change. The PCP is led by the Federation of Canadian Municipalities (FCM) and ICLEI-Local Governments for Sustainability. The PCP is a network of more than 200 Canadian municipal governments committed to reducing greenhouse gas (GHG) emissions in their corporate operations and in their communities. Further information on the PCP program is available on the FCM website through the following link: http://gmf.fcm.ca/Partners-for-Climate-Protection/.

In 2004, ICLEI Energy Services (ICLEI) was hired to measure HRM's corporate and community GHG emissions to provide a baseline and suggest a reduction target. Data from 1997 and 2002 fiscal years were used for this estimate, and the suggested target was to reduce GHG emissions by 20% below 1997 levels by 2012 (ICLEI 2005). HRM decided to focus on corporate emissions first, in order to clean up its own house and lead by example. However, a community emissions inventory for 2008 will be conducted and a target will be set once the corporate emissions, inventory system and targets are advanced. Once the community inventory is re-measured and a system for ongoing measurement is in-place, HRM's Community Energy Plan will be revised and actions will be taken to reduce community GHGs.

In 2005, HRM hired Dillon Consulting to write a Corporate Greenhouse Gas Emissions Reduction Local Action Plan (Dillon 2005). HRM Regional Council approved the Local Action Plan (LAP), along with a revised corporate GHG emissions reduction target of 20% below 2002 levels by 2012.

2. INTRODUCTION

This report has been prepared in order to evaluate HRM's progress on its corporate GHG emissions reductions since setting a reduction target in 2005. It is important to understand the status of HRM's emissions in order to measure the success of its efforts based on the LAP.

This report is also required as part of the PCP program requirements for achieving the fifth and final milestone. The milestones in the PCP program are as follows:

- ✓ Milestone 1: Create a GHG Emissions Inventory and Forecast
- ✓ Milestone 2: Set a Reduction Target
- ✓ Milestone 3: Develop a Local Action Plan
- ✓ Milestone 4: Implement the Local Action Plan
- • Milestone5: Measure Progress and Report Results

In order to complete Milestone 5, HRM must assess its progress and submit a report to the PCP program for approval. HRM must demonstrate that it took actions to reduce GHG emissions, and that these actions resulted in real reductions.

HRM is committed to an ongoing effort of GHG emissions monitoring, and anticipates setting new targets for 2020 and 2050 that are in line with provincial and national goals. The *NS Environmental Goals and Sustainable Prosperity Act* (EGSPA) states that GHG emissions will be at least 10% below 1990 levels by 2020. The federal government has committed to reducing GHG levels by 20% from 2006 levels by 2020. Canada's long-term goal is to reduce emissions by 60 to 70% from 2006 levels by 2050.

3. METHODS

Since the 2002 inventory, ICLEI has released a new protocol for emissions analysis titled, International Local Government GHG Emissions Analysis Protocol (IEAP) (ICLEI 2009). This protocol differs somewhat from the previous protocol that was used in measuring HRM's corporate emissions in 2004. Furthermore, HRM has seen some significant organizational changes since 2002. Namely, the responsibility for stormwater and wastewater management has shifted from HRM to Halifax Water. Therefore, some sources of GHG emissions that were previously considered as corporate emissions are now considered community-wide emissions.

3.1 Measured GHGs

GHG emission inventories are estimated in tonnes of equivalent carbon dioxide (eCO_2). The six major GHGs that contribute to climate change are:

- carbon dioxide (CO_2)
- methane (CH_4)
- nitrous oxide (N_2O)
- perfluorocarbons (PFCs)
- hydrofluorocarbons (HFCs), and
- sulphur hexafluoride (SF_6)

In most cases, the emissions from CO_2, CH_4 and N_2O from fossil fuel combustions, electricity generation, waste disposal and wastewater are the most significant sources of GHG emissions in community and government operations inventories. Therefore, HRM's 2008 inventory calculates CO_2, CH_4 and N_2O emissions.

3.2 Scopes of Emissions

The ICLEI 2009 Protocol (herein referred to as the IEAP) categorizes government operations emissions into three different scopes. Scope 1 emissions are direct emissions sources owned or operated by the local government. A municipal vehicle powered by gasoline is an example of a Scope 1 emission. Scope 2 emissions are indirect emission sources limited to electricity, district heating, steam and cooling consumption. Purchased electricity used by the local government is an example of a Scope 2 emission. It is associated with the generation of greenhouse gas emissions at a power plant. Scope 3 emissions are all other indirect and embodied emissions over which the local government exerts significant control or influence, such as emissions resulting from contracted waste hauling services.

The IEAP requires local government to report Scope 1 and 2 emissions. Scope 3 emissions are optional. HRM's 2008 corporate inventory includes Scope 1 and 2 emissions.

3.3 Emissions Calculations

Energy consumed (e.g. litres (L) of fuel or kilowatt-hours (kWh) of electricity) is the relevant measure of energy use for the inventory. These measures are used in conjunction with emission factors to determine emissions, using the following general equation:

Fuel consumed x emission factor = emissions

Emissions must be converted into eCO_2 so that all energy can be compared under a common unit of analysis. Different gases have different warming potentials, which are accounted for in the calculations. Emission factors, or coefficients, are specific to each individual energy source and measured in tonnes of GHG/unit of fuel. These numbers are published in the National Inventory Report by Environment Canada, 2008. The 2008 electricity coefficient for Nova Scotia is 0.790 kg/kWh.

Sample Calculation:

An HRM fleet passenger car burns 1860.8 L of diesel fuel in fiscal year 2008. To calculate the vehicle's annual eCO_2 emissions:

eCO_2 = (1860.8 x emission coefficient for CO_2) + (1860.8 x emission coefficient for N_2O) + (1860.8 x emission coefficient for CH_4)

= (1860.8 x 0.00273) + (1860.8 x 0.0000004) + (1860.8 x 0.0000002)

= 4 tonnes

3.4 Tiers of Data

The IEAP defines three tiers of data, based on the level of methodological complexity. Inventory reports must explicitly state the tier used for collecting each type of data in the analysis. Tier 1 is the basic method, often using country-level defaults recommended by the Intergovernmental Panel on Climate Change (IPCC). Tiers 2 and 3 are much more demanding in terms of complexity and data requirements, and are considered to be more accurate while requiring higher levels of effort.

Tier 1: A tier 1 emission estimate is the result of the use of any of the following for an emission source:

- a default emission factor (provided by the IPCC);
- national average fuel use per capita;
- national average solid waste generation per employee, and
- methane recovery system effectiveness estimates based on the assumption that the system meets regulatory guidelines.

Tier 1 is only to be used in cases where more accurate data is unavailable.

Tier 2: Tier 2 estimates require an intermediate level of complexity and locally specific data. Generally the use of a Tier 2 approach requires:

- a country-specific emission factor;
- engineering estimates of energy used based on system use and design;
- estimates of heating fuel use based on known historical use modified for population changes and variations in annual temperatures (heating degree days);
- fuel use estimated from distance traveled times average fuel efficiencies;
- methane recovery system effectiveness estimates based on system design;
- total community distance travelled estimates based on systematic traffic counts and road segment lengths, and
- quantity of fuel used in a year based on known price paid times average fuel cost in that year.

Tier 3: Tier 3 estimates are the most complex and require the most specific data. A Tier 3 approach considers the following variables:

- type of fuel combusted;
- combustion technology;
- operating conditions;
- control technology;
- quality of maintenance;
- age of the equipment used to burn the fuel;
- metered energy use;
- metered methane recovery, and
- quantity of solid waste as weighed at a transfer station.

HRM's 2008 inventory incorporates Tier 2 and 3 estimates.

3.5 Data Types & Sources

Data collection involved the engagement and collaboration of multiple HRM Business Units as well as service providers. The Sustainable Environment Management Office (SEMO) acknowledges these efforts with thanks.

Data for the 2008 HRM Corporate GHG Emissions Inventory was drawn from several sources, as listed in Table 3-1.

Table 3-1: Data Sources

SECTOR	TYPE OF DATA	SOURCE	SCOPE	TIER
Buildings (includes emergency generators)	Power	• NSPI (power utility) • Estimates	2	2 & 3
	Furnace Oil	• Invoices through SAP (HRM's accounting program) • Estimates	1	2 & 3
	Natural Gas	• Heritage Gas	1	2
	Diesel	• SAP		
Lighting (includes street, traffic, park, sports fields lights)	Power	• NSPI	2	2 & 3
Fleet (includes transit)	Gasoline	• SAP	1	3
	Diesel	• SAP	1	3

3.6 Assumptions

Some assumptions had to be made during the process of creating HRM's 2008 Corporate GHG Emissions Inventory. The most complex category for HRM corporate emissions is the building sector. HRM owns more than 200 buildings, but leases some of these buildings to community groups or private companies. Therefore, HRM does not receive regular invoices in order to track fuel and power consumption in these buildings. Data were available for the larger of these buildings, such as the Metro Centre, Dartmouth Sportsplex, and other large recreation centres and arenas, through a benchmarking initiative that HRM Infrastructure and Asset Management has been implementing for several years. HRM also leases space in some buildings, and therefore must calculate a percentage used of total power and fuel throughout a fiscal year.

When fuel and power data were not readily available, assumptions were made in order to calculate estimated amounts, and are noted in the spreadsheets in Appendix B.

A relatively small number of HRM buildings have not been captured in this analysis. These primarily consist of park washrooms and some small community centres. Upon completion of the 2008 corporate inventory, HRM plans to implement a process for continued monitoring and analysis of its annual GHG emissions. It is hoped that as efforts continue, all buildings will be more easily accounted for. It is anticipated that HRM will seek permission from operators of leased HRM buildings to allow service providers of fuel and power to share annual consumption figures with HRM for calculation and tracking purposes.

4. INVENTORY RESULTS

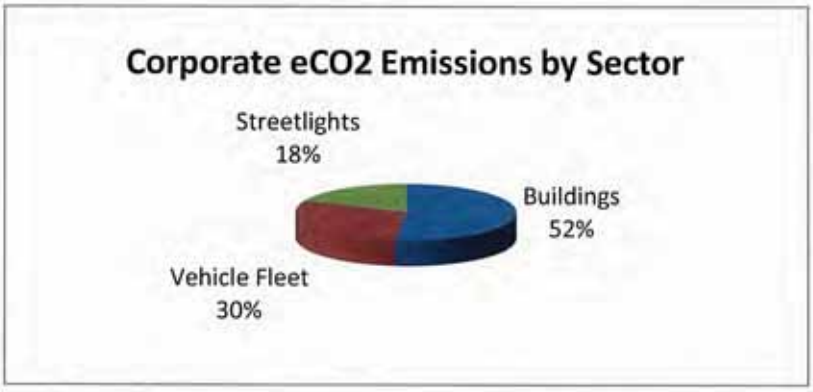
4.1 Inventory Summary

Total corporate emissions for 2008 were estimated to be 115,564 tonnes eCO_2. Table 4-1 shows the breakdown of emissions by sector. Figure 4-1 displays this breakdown by percentage.

Table 4-1: Emissions by Sector

Sector	Total eCO2 (t)
Buildings	59,620
Vehicle Fleet	34,538
Streetlights	21,407
Total	**115,564**

Figure 4-1: Emissions by Sector

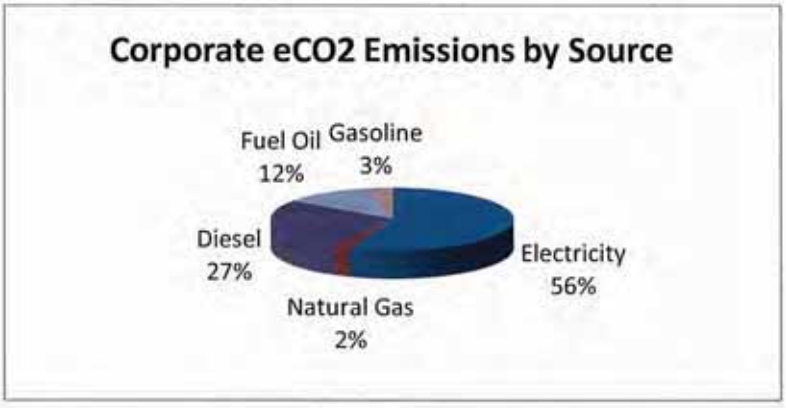


As seen in the above table and figure, HRM buildings are the largest source of corporate emissions, followed by fleet and then streetlights. Table 4-2 shows the breakdown of HRM emissions by source. Figure 4-2 displays this breakdown by percentage.

Table 4-2: Emissions by Source

Energy Type	Total Use	Total eCO2 (t)
Electricity	81,335,923	64,255
Natural Gas	1,513,155	2,861
CNG	0	0
Diesel	11,265,512	30,762
District Energy	0	0
Ethanol Blend	0	0
Fuel Oil	4,874,644	13,795
Gasoline	1,647,232	3,891
Propane	0	0
Total		**115,564**

Figure 4-2: Emissions by Source



As seen in the above table and figure, electricity represents the largest source of corporate GHG emissions. This is partly because HRM uses a substantial amount of electricity in both its buildings and lighting sectors, but also because electricity generation in Nova Scotia is primarily derived from coal, leading to higher GHG emissions than if it were generated by other sources.

The large use of diesel can be attributed to HRM's transit vehicles, both buses and passenger ferries. Natural gas can be expected to increase as a heating source for buildings in the years to come, as its availability expands throughout HRM. This will decrease overall emissions from heating, as natural gas results in fewer emissions than fuel oil or electricity.

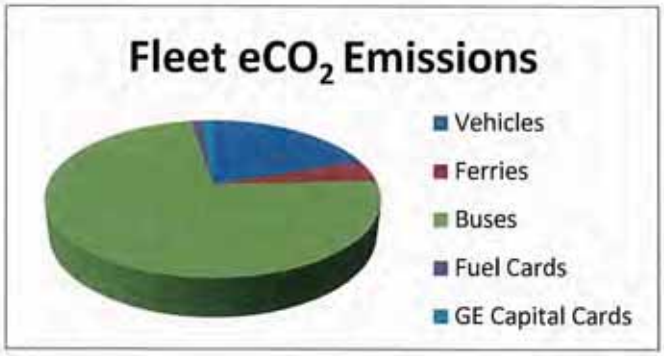
4.2 Fleet

Fuel consumption per fleet vehicle is tracked in HRM's accounting system, SAP. Table 4-3 displays fuel consumption by fleet type, with totals in litres as well as eCO_2. Total eCO_2 emissions from HRM fleet, including transit, are 34,538 tonnes. Figure 4-3 illustrates the breakdown of fleet emissions by category. The detailed GHG calculations by vehicle can be viewed in the spreadsheets attached as Appendix A.

Table 4-3: Fleet Fuel Consumption

TYPE	DIESEL	GAS
Vehicles	1,245,067	1,435,364
Ferries	564,557	--
Buses	9,266,634	--
Fuel Cards	55,341	138,699
GE Capital Cards	91,964	73,168
TOTAL (L)	**11,223,563**	**1,647,232**
TOTAL eCO_2 (t)	**30,647**	**3,891**

Figure 4-3: Fleet eCO2 Emissions



As evident in Figure 4-3, transit buses are responsible for the large majority of the HRM fleet's GHG emissions. While bus emissions add to HRM's corporate inventory, they help to reduce HRM's community-wide inventory by providing public transit and ultimately reducing the number of single-occupancy vehicle trips in the municipality.

HRM is currently conducting a pilot project to reduce emissions from transit buses with an engine upgrade. If this project proves effective, large-scale bus retrofits may be an action item for reducing GHGs in the future. Furthermore, in 2009 HRM experimented with a 20% biofuel blend in its transit buses. Despite some difficulties with the product, efforts are ongoing and should ultimately result in further GHG reductions.

4.3 Lighting

Emissions from streetlights, traffic lights, park and sports field lights, and any other lights not associated with buildings on lands owned by HRM were calculated in the 2008 inventory. Usage data (in kilowatt-hours) was provided by Nova Scotia's electricity utility, Nova Scotia Power Inc. (NSPI).

It is estimated that HRM used a total of 27,097,175 kWh of electricity for lighting purposes in 2008. This translates into 21,407 tonnes of eCO_2. Detailed lighting calculations are attached as Appendix A.

4.4 Buildings

As mentioned previously, the buildings sector was the most complex in terms of calculating GHG emissions. Power and fuel consumption per building are listed in detail in Appendix A. All assumptions made for estimates where data were not available are noted in Appendix B.

It is estimated that HRM buildings used a total of 54,238,748 kWh of power, 4,874,644 L of furnace oil, and 1,513,155 L of natural gas. 41,949 L of diesel was used in emergency generators. This translates into a total of 59,620 tonnes of eCO_2 for HRM buildings.

Efforts to reduce HRM building emissions include boiler retrofits, natural gas conversions, energy efficiency audits and updates, and more. All new HRM buildings are currently being built to the LEED (Leadership in Energy and Environmental Design) Silver standard. As HRM continues to build in a greener, more energy efficient manner, and to upgrade many of its older buildings, building-related emissions will decline.

5. DISCUSSION

5.1 Comparing Results

While it would be ideal to compare HRM's 2008 inventory to its 2002 inventory, this is not possible for several reasons. First, the HRM corporate inventory no longer includes emissions related to waste water and storm water, as these are now controlled by Halifax Water and not by HRM. These emissions will now be considered in the community inventory.

Second, emissions related to solid waste will now be considered only in the community inventory and not the corporate inventory. ICLEI advised HRM that this is the best practice, since corporate waste cannot readily be accounted for as separate from total community waste.

Third, data availability and quality in 2008 is far superior to the data used in 2002. For example, for the 2002 inventory, an estimate of emissions from lighting was made based on HRM-tracked costs alone. In 2008, the kWh from all metered and unmetered lights owned or leased by HRM were accounted for, as all data was provided by NSPI. Based on these facts, it is assumed here that the 2002 estimate was far less than the actual emissions associated with HRM lighting for that year.

Fourth, the 2008 inventory captures many more of HRM's buildings than the 2002 report. Approximately 135 buildings were included in the 2002 report, while approximately 190 buildings were included in the 2008 report. This is a result of new SAP reports that were able to provide building-specific fuel consumption, as well as the availability of NSPI data for all power used in buildings under HRM accounts. In 2002, most of the data came from paper files and estimation, and does not appear to have been quite as inclusive. There was an 'all other buildings' category in the 2002 inventory, which included approximately 143 buildings with an average size of 3000 square feet. Rough estimates for fuel and power consumption were made for this group of buildings. Estimates were also made for many of HRM's larger buildings for which data could not be easily obtained. Calculations were based on an estimated cost per square foot associated with a given fuel. Therefore the 2008 report includes a more comprehensive list of HRM buildings, with more accurate consumption numbers and less estimation.

5.2 Noteworthy Findings

While the 2002 and 2008 reports cannot technically be compared, there are some interesting findings that deserve consideration. First, the increase in building emissions between 2002 and 2008 is minimal despite the development of some new, large buildings and the inclusion of more of HRM's buildings in the 2008 inventory. Diesel for emergency generators was also included in the buildings section of the 2008 inventory. Total eCO_2 emissions for buildings in 2002 were 56,078 tonnes, and were 59,620 tonnes in 2008. This is a great achievement, due primarily to the many building retrofits conducted by HRM as part of its GHG Emissions Reduction Local Action Plan (LAP). As more retrofit, renewable and district

energy, and LEED construction projects are completed in HRM, overall building emissions are expected to decline.

Fleet calculation methods in 2002 and 2008 were similar, and therefore can be more easily compared. Total emissions from the HRM fleet have risen since 2002, from 27,789 to 34,538 tonnes of eCO_2. Much of this increase can be attributed to the expansion of Metro Transit in the last few years. If we were to only examine the emissions from transit, in 2002 it resulted in 19,256 tonnes and in 2008 it resulted in 26,845 tonnes. This is an increase in emissions by 7,589 tonnes. Since the difference in total fleet emissions between 2002 and 2008 is only 6,749 tonnes, this implies that there was an overall decrease in emissions with the rest of the HRM fleet, excluding transit.

Since 2002, Metro Transit has introduced the MetroLink (bus rapid transit service to downtown) and MetroX (commuter transit service to Tantallon), and it has continued to expand its service network throughout HRM. The increase in emissions from Metro Transit expansion is acceptable to HRM, as it will ultimately result in a decrease in community emissions. Increased public transit reduces the need for single-occupancy vehicle trips within the municipality. These gains in GHG reductions will be clear once an updated estimate is calculated for the community-wide inventory.

The lighting estimates for 2002 and 2008 are the most difficult to compare. In 2002, lighting emissions were estimated based on costs and annual budgets, wattage and average run times. Traffic light emissions were estimated based on streetlight emissions. NSPI provided power consumption, in kWh, for all HRM accounts for the 2008 inventory. This led to a much more complete capturing of the data.

While the 2008 estimate is 21,715 tonnes and the 2002 estimate is 10,371 tonnes, it is assumed that HRM lighting emissions have remained relatively constant since 2002. While HRM has installed some new lighting, what with the development of new communities, for example, it certainly has not doubled the amount of lighting in the municipality. Furthermore, HRM has undertaken significant lighting retrofits that are reducing emissions substantially. All HRM traffic lights are in the process of being replaced by LED traffic lights, estimated to use 80% less energy than traditional traffic lights. LED streetlights are also being tested, estimated to use 60% less energy than traditional streetlights. As HRM moves forward and recalculates its corporate inventory for 2009, 2010 and so on, a more realistic trend in lighting emissions should result.

5.3 The 2012 Reduction Target

Even if HRM were to adjust the 2002 estimate to make it as similar as possible to the 2008 estimate, the HRM corporate GHG reduction target of 20% below 2002 levels by 2012 will not be met. There are several contributing factors for this result, discussed below.

The LAP commitment using absolute numbers based on corporate growth leaves HRM 6% above 2002 levels

The reduction measures in the Local Action Plan (LAP) were estimated to reduce total emissions by 18,884 tonnes, which was estimated to result in the production of 109,917 absolute tonnes of GHGs in 2012. Dillon suggested these actions based on an assumption that it was acceptable to consider emissions in relative terms, instead of in absolute terms, in order to account for HRM's population and municipal growth. Relative emissions account for growth, and they do not represent actual emissions (total emissions numbers are "adjusted" to account for growth). Absolute emissions are the quantity of GHG emissions that HRM is actually emitting.

Our actions must go above and beyond the LAP to meet the 20% commitment, which was a target set in absolute, not relative terms. It is essential (and accepted practice) to measure absolute emissions, because without an absolute reduction in GHG emissions (for HRM, NS, Canada and globally), society will continue to face the serious risks and consequences of climate change.

Wind power contracts failed to be implemented

Wind Power Contracts were completed by HRM; however, the Province and NSPI prevented their execution. It was anticipated that wind power would be one of the major ways for HRM to reduce its emissions.

Funding

The LAP called for $12 million in funding. HRM has executed approximately $7 million in projects to-date, with about half of the funds coming from programmes such as the EcoTrust Fund.

Growth

HRM has expanded Metro Transit significantly, resulting in an increase of GHG emissions corporately. As mentioned previously, this will be positive for reducing community-level emissions. HRM has also expanded its building network since 2002, with several new community facilities and fire stations to better service the municipality.

Time lag between setting the target and implementing LAP actions

While the target was set in 2005, projects were not 'shovel-ready', so to speak. They required research, reward, capacity-building and incubation. Therefore, project implementation began closer to 2007. This lag period, while necessary, slowed HRM's progress in reaching its 2012 target. However, the many actions taken by HRM, as well as those planned for the future, will likely begin to decrease corporate emissions more substantially in the years to come.

While the 2012 target will not be met as planned, HRM has succeeded in realizing some significant reductions in emissions at the corporate level, particularly in the buildings sector. HRM has implemented many of the LAP measures for lighting, buildings and transit, all resulting in substantial reductions in GHG emissions. HRM's ongoing commitment to reducing GHGs will continue to decrease emissions over time. HRM is also looking ahead to new reduction targets for the future.

5.4 Economic Considerations

While HRM is committed to reducing GHG emissions for environmental reasons, there is also a significant economic benefit in doing so. Reduced energy use leads to reduced energy costs. Also, infrastructure updates result in lower maintenance and replacement costs in the future. Regional Council has approved a progressive funding tool for future energy efficiency projects in HRM. Energy savings from projects are saved in a reserve and used to fund new energy projects. This 'piggy bank' provides the necessary, consistent support for energy efficiency projects to continue in HRM.

The cost for energy is another important economic factor for consideration. Unit prices for energy have increased between 2002 and 2008. For example, the average cost of gasoline for HRM rose from $0.46/L to $0.76/L and the average cost of diesel rose from $0.39/L to $0.82/L – a 39.5% and 52.4% increase, respectively. As non-renewable sources of energy, such as coal and oil, become more scarce and expensive to extract, they become more expensive. Being proactive in incorporating renewable energy technologies will help curb the increasing cost of energy over time, and help to reduce overall emissions.

HRM has invested approximately $6.8 million in energy efficiency projects in the last five years, resulting in savings of $1,214,000 per year. Therefore, the overall return on investment (ROI) on HRM taxpayers' dollars is 18.75%. The savings from HRM's major energy efficiency projects completed between 2005 and 2009 are listed below in Table 5.1.

Table 5-1: Energy efficiency project costs and savings

PROJECT	COST ($)	SAVINGS ($)
Vending Misers	7,500	7,500
Transit Facility Energy Performance Contract	Phase 1: 850,000 Phase 2: 850,000	Phase I: 200,000 Phase 2: 100,000
LED Traffic Lights	700,000	150,000
Alderney 5	3,600,000	350,000
Halifax North Memorial Library Lighting Retrofit	30,000	7,000
Gas Conversions to High Efficiency	750,000	400,000

6. RECOMMENDATIONS FOR NEXT STEPS

The following next steps are recommended in the continuation of HRM's efforts to reduce GHGs corporately and at the community level:

6.1 Update the GHG LAP

The GHG LAP must be updated, to see what actions have been completed in the LAP, what actions were not or could not be implemented, and which actions remain ongoing. New potential actions for continuing to decrease corporate GHGs will be added.

6.2 Apply for the corporate completion of PCP Milestone 5

Prepare and submit a report to FCM, requesting the completion of the PCP Program for HRM corporately. Work remains for the HRM community component of the PCP Program.

6.3 Calculate the corporate 2009 inventory

HRM will maintain momentum on the annual estimation of its corporate inventory. The 2009 inventory will be calculated and compared to the 2008 numbers.

6.4 Update HRM's community inventory

HRM's community-level emissions will be estimated for the 2008 fiscal year, and a reduction target will be recommended for adoption by HRM Council.

6.5 Revise community energy plan

Once a reduction target is approved, HRM's Community Energy Plan will be revised, with concrete actions for reducing emissions. This report will be similar to the corporate LAP.

7. CONCLUSION

HRM has made good progress in reducing its corporate GHG emissions in the last several years. The 2012 target is no longer really applicable, because the 2002 and 2008 GHG inventories cannot technically be compared due to large differences in data quality and availability, as well as inventory protocols and structural changes within HRM. However, HRM celebrates its many successes in completed energy efficiency projects, particularly in the buildings sector, resulting in major GHG emissions reductions. While HRM assumed corporate responsibility for increased emissions due to expanded public transit, this is seen as a positive situation for HRM when looking at the bigger picture. Improved transit will decrease community-wide emissions and improve the sustainability of transportation throughout the municipality. The transit expansion will continue to result in environmental and social rewards for the entire HRM community in years to come.

HRM plans to revise its LAP to include new measures for reductions, and to re-estimate its corporate emissions inventory on an annual basis. Future inventory estimates will be comparable to the 2008 estimate, and HRM will be able to track its progress more effectively from here on. HRM looks forward to setting new targets for the future that are in line with provincial and federal targets.

HRM continues to work on energy efficiency projects, with several large projects underway during the writing of this report. The progressive funding tool approved by Regional Council will allow HRM's efforts to continue in this critical area.

HRM plans to begin an estimation of community-wide emissions in the near future, and to begin working with the larger community towards absolute reductions in GHG emissions in the municipality. This will require substantial community engagement and collaboration. Ultimately, HRM aims to complete the PCP program at both the corporate and community levels. HRM wishes to be a leading Canadian municipality in the very challenging area of climate change mitigation.

8. REFERENCES

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APPENDIX A: GHG CALCULATION SPREADSHEETS

Vehicle Fleet

Corporate Inventory

HRM Fleet, including transit

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
TRANSIT	FERRIES		0	564,557	1,532
TRANSIT	BUSES		0	9,266,634	25,303
FL001: 1 TON 2 WH DR	52TD005		0	6,260	17
	52TD012		0	2,378	6
	52TD013		0	4,032	11
	52TU001		0	4,975	14
	53TC001		0	1,581	4
	53TD003		0	3,028	8
	53TU001		0	2,444	7
	53TU002		0	2,532	7
	53TU003		0	4,517	12
	53TX001		0	3,585	10
	53TX002		0	3,466	9
	53TZ001		0	2,103	6
	53TZ002		0	1,951	5
	53TZ003		0	2,042	6
	B400		0	1,463	4
	B401		0	827	2
	B402		0	2,113	6
	P341		0	1,014	3
	P501		0	1,791	5
	52TP010	3,317	8		0
	52TZ009	2,401	6		0
	52TZ010	1,877	4		0
	52TZ011	4,107	10		0
	52TZ012	1,816	4		0
	52TZ013	1,943	5		0
	52TZ014	2,450	6		0
	71TZ036	381	1		0
FL002: 1 TON 2 WH DR 4-DR	52TD001		0	4,643	13
	52TD002		0	2,093	6
	52TD003		0	1,934	5
	52TD004		0	4,962	14
	52TD007		0	3,164	9
	52TD008		0	3,408	9
	52TD009		0	1,324	4
	52TD010		0	4,846	13
	52TD011		0	2,082	6
	P425		0	3,549	10
	52TZ022	6,018	14		0
	52TZ023	6,251	15		0
	52TZ049	7,656	18		0
FL003: 1 TON 4X4	53TD001		0	3003.80	8
	53TD002		0	2589.18	7
	53TF001		0	945.50	3
	53TF002		0	1691.20	5
	62TZ001	1504.00	4		0
FL004: 1 TON 4X4 4 DOOR	52TF001		0	2420.60	7
	52TF002		0	1352.40	4
	53TC002		0	1784.00	5
FL005: PASSENGER VEHICLE	51CZ003		0	771.90	2
	51CZ004		0	667.80	2
	51CZ005		0	938.20	3
	31CZ002	551.40	1		0
	31CZ007	1860.80	4		0
	31CZ016	458.10	1		0
	31CZ017	7301.20	17		0
	31CZ018	6746.40	16		0
	31CZ019	5374.80	13		0
	31CZ020	7244.00	17		0
	31CZ021L	2625.40	6		0
	31CZ022L	1042.70	2		0
	32TZ001	13791.80	33		0
	32TZ002	11513.20	27		0
	51CZ006	706.60	2		0
	51CZ007L	1173.50	3		0
	51CZ009L	1929.80	5		0
	51CZ010L	348.10	1		0

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	51CZ013L	677.30	2		0
	51CZ014L	315.30	1		0
	51CZ015L	1095.50	3		0
	51CZ016L	787.60	2		0
	51CZ017L	804.70	2		0
	51CZ018L	1566.80	4		0
	51CZ019L	1677.00	4		0
	51CZ020L	2301.30	5		0
	51CZ021L	566.00	1		0
	51CZ022L	1314.40	3		0
	51CZ023L	953.70	2		0
	51CZ024L	1498.30	4		0
	51CZ025L	1104.20	3		0
	51CZ026L	986.70	2		0
	51CZ027L	897.90	2		0
	51CZ028L	1140.50	3		0
	51CZ029L	1379.30	3		0
	51CZ030L	774.30	2		0
	51CZ031L	394.20	1		0
	51CZ032L	795.30	2		0
	51CZ033L	836.70	2		0
	51CZ034L	332.00	1		0
	51CZ035L	1859.10	4		0
	51CZ036L	832.00	2		0
	51CZ037L	1232.70	3		0
	51CZ038L	603.60	1		0
	51CZ039L	1519.70	4		0
	51CZ040L	1487.60	4		0
	51TZ028	3283.30	8		0
	51VZ014	2092.00	5		0
	61CZ002	1138.80	3		0
	61VZ009	987.9	2		0
	71CZ006	1249.00	3		0
	71CZ016	1489.80	4		0
	71CZ043L	114.00	0		0
	71CZ050	598.20	1		0
	71CZ052	1175.50	3		0
	71CZ053	1329.30	3		0
	71CZ058	736.40	2		0
	71CZ071	78.30	0		0
	71CZ072	244.70	1		0
	71CZ073	160.20	0		0
	71CZ074	249.60	1		0
	71CZ075	276.10	1		0
	71CZ076	283.60	1		0
	71CZ077L	371.60	1		0
	71CZ078L	304.60	1		0
	71CZ079	374.3	1		0
	71CZ080	686.70	2		0
	71CZ081	146.60	0		0
	71CZ082	109.90	0		0
	71CZ090L	1682.30	4		0
	71CZ091L	396.80	1		0
FL006: 1/2 TON 4X4	51TZ030	5148.30	12		0
	71TZ004	3228.80	8		0
	71TZ020	5409.2	13		0
	71TZ021	3054.40	7		0
	P415	80.00	0		0
FL007: LOADER	55LP001		0	21710.90	59
	61QZ007		0	466.70	1
	H73135		0	5109.30	14
	H73136		0	799.1	2
	H73137		0	5501.20	15
	H73138		0	3253.40	9
	H73140		0	5022.80	14
	H73142		0	9203.70	25
	H73143		0	134.40	0
	WR90		0	150.00	0
FL010: 3/4 TON 4WD PU	51TZ029	3951.00	9		0
	52TP001	6862.10	16		0
	52TP002	1504.50	4		0
	52TP003	1105.70	3		0
	52TP004	3382.90	8		0
	52TP005	3030.00	7		0
	52TP006	1439.20	3		0
	52TP007	3494.10	8		0
	52TP008	2702.00	6		0
	52TP009	2278.10	5		0

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	52TS001	1529.70	4		0
	52TS002	1299.50	3		0
	52TZ019	4421.70	10		0
	52TZ020	4400.00	10		0
	52TZ021	3203.60	8		0
	52TZ032	2748.50	6		0
	52TZ033	6123.20	14		0
	52TZ042	2715.20	6		0
	52TZ044	5906.00	14		0
	52TZ045	5134.40	12		0
	52TZ046	5196.00	12		0
	52TZ048	5432.60	13		0
	52TZ050	4814.80	11		0
	52TZ051	5213.40	12		0
	52TZ054	2144.30	5		0
	62TZ002	1839.50	4		0
	62TZ003	2126.50	5		0
	P455	257.00	1		0
FL011: 3/4 CU YD-BOB CAT	51EH002		0	1233.70	3
	51EH005		0	807.70	2
	51EZ002		0	1512.20	4
	51EZ003		0	2364.30	6
	51EZ004		0	70.70	0
	51EZ006		0	533.80	1
	51EZ007		0	1046.00	3
	51EZ008		0	254.30	1
	51EZ009		0	1486.10	4
	C-010		0	96.70	0
	C-122		0	139.70	0
FL012: 3/4 TON 2 WH DR	52TZ001	5121.10	12		0
	52TZ002	5674.00	13		0
	52TZ003	2734.70	6		0
	52TZ004	2688.60	6		0
	52TZ005	3890.70	9		0
	52TZ006	2078.00	5		0
	52TZ007	4737.30	11		0
	52TZ015	3298.70	8		0
	52TZ016	6136.70	14		0
	52TZ017	4305.00	10		0
	52TZ018	4060.40	10		0
	52TZ024	1277.20	3		0
	52TZ025	2785.00	7		0
	52TZ026	3996.70	9		0
	52TZ027	3438.60	8		0
	52TZ028	5337.50	13		0
	52TZ029	3024.50	7		0
	52TZ030	1510.10	4		0
	52TZ031	1399.40	3		0
	52TZ034	4939.50	12		0
	52TZ035	5634.50	13		0
	52TZ036	4121.70	10		0
	52TZ037	1549.80	4		0
	52TZ038	2223.80	5		0
	52TZ039	2373.30	6		0
	52TZ040	4460.10	11		0
	52TZ041	4867.80	11		0
	52TZ043	3837.30	9		0
	52TZ052	6703.90	16		0
	62TZ005	11071.70	26		0
FL013: 3/4 YD BACKHOE	53LH001		0	3071.80	8
	53LH002		0	2388.16	7
	53LH003		0	2767.20	8
	53LH004		0	4930.40	13
	53LH005		0	2191.90	6
	53LH006		0	3180.00	9
	H73133		0	883.80	2
	H73141		0	3178.20	9
FL014: 5 TON DU (SPR & PLOW)	54TS001		0	9243.00	25
	54TS002		0	8823.20	24
	54TS003		0	10634.80	29
	54TS004		0	9625.50	26
	54TS005		0	11373.80	31
	54TS006		0	9318.60	25
	54TS007		0	8901.60	24
	54TS008		0	7995.40	22
	54TS009		0	10496.90	29
	54TS010		0	13184.40	36
	55TW017		0	10582.70	29

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	55TW018		0	5696.20	16
	55TW020		0	8400.50	23
	55TW021		0	6912.80	19
	B204		0	314.40	1
	B205		0	553.40	2
	B206		0	8296.50	23
	B207		0	5314.80	15
	B208		0	2141.10	6
	B209		0	881.60	2
	B210		0	256.20	1
	B211		0	5911.70	16
	B219		0	7231.10	20
	B220		0	6723.70	19
	B221		0	4412.50	12
	B222		0	6992.80	19
	B223		0	4921.00	13
	H78158		0	256.30	1
	H78173		0	7587.22	21
FL015: 5 TON TRUCK	54TD001		0	4060.00	11
	54TD002		0	4977.20	14
	54TD003		0	1537.60	4
	54TD004		0	3762.18	10
	54TK001		0	8408.82	23
	54TZ001		0	1798.80	5
	55TZ002		0	5766.40	16
	64BZ001		0	12989.80	35
	B200		0	1506.10	4
	H78130		0	5235.47	14
	H78131		0	3032.50	8
FL016: IT CUBE VAN	H78237		0	4245.69	12
	62VZ012	4543.50	11		0
FL018: 1 T C/W ARIAL DEVICE	52VQ001		0	2161.90	6
	52VQ002		0	4117.90	11
	53TC003		0	3555.30	10
	53TC004		0	3796.60	10
	53TQ001		0	5467.24	15
	53TQ002		0	4375.40	12
	53VB001		0	6744.61	18
	B500		0	2544.11	7
	B501		0	1917.90	5
	B502		0	3912.57	11
	B503		0	1428.90	4
	B504		0	5249.30	14
	P500		0	1102.60	3
FL021: ARTICULATED TRACTOR	52DA001		0	2611.50	7
	52DA002		0	74.50	0
	52DA003		0	1560.80	4
	52DA006		0	592.80	2
	52DA007		0	5092.90	14
	52DA008		0	4024.20	11
	54LA001		0	7214.90	20
	K118		0	90.20	0
	K120		0	29.70	0
FL033: CB/S JET CLEAN TRUCK	55TY001		0	13129.02	36
	55TY002		0	5403.44	15
	B166		0	7436.00	20
	B212		0	6828.80	19
	B213		0	1607.16	4
	C-180		0	1933.40	5
	H72172		0	1365.70	4
	H721781		0	5289.65	14
FL036: COMPACT ROLLERS (S)	51ZA001		0	630.60	2
FL037: COMPACT ROLLERS (L)	H74145		0	157.90	0
FL045: DS CA VAN V6 (AUTO)	51VZ003	2276.50	5		0
	51VZ004	661.00	2		0
	51VZ005	922.30	2		0
	51VZ006	1882.80	4		0
	51VZ007	2282.70	5		0
	51VZ008	928.20	2		0
	51VZ009	556.10	1		0
	51VZ010	1117.80	3		0
	51VZ011	5216.10	12		0
	51VZ012	3301.10	8		0
	61VZ002	172.90	0		0
	61VZ003	533.90	1		0
	61VZ004	1333.60	3		0
	61VZ005	1888.30	4		0
	61VZ006	1659.30	4		0

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	61VZ010	1101.80	3		0
	71VZ009	2868.90	7		0
	71VZ010	4995.60	12		0
FL049: FARM TRACTOR	51LZ001		0	570.20	2
	51QZ001		0	697.80	2
	51QZ002		0	637.56	2
	51QZ003		0	568.60	2
	51QZ004		0	1647.30	4
	51QZ005		0	827.60	2
	52QB001		0	2529.60	7
	52QB002		0	1906.20	5
	61QZ001		0	1170.80	3
	61QZ002		0	653.00	2
	61QZ003		0	525.60	1
	61QZ004		0	1220.10	3
	61QZ006		0	1123.50	3
	H76121		0	147.00	0
FL052: 3 TON TRUCK	52TD014		0	1172.60	3
	53TD004		0	4936.30	13
	53TD005		0	4328.00	12
	53TK001		0	4036.90	11
	53TK002		0	9488.22	26
	53TK003		0	3621.15	10
	53TK004		0	3734.54	10
	53TS001		0	3201.70	9
	53TS002		0	639.18	2
	53TS003		0	2151.00	6
	53TS004		0	428.40	1
	53TS005		0	2448.10	7
	53TS006		0	2138.70	6
	53TS007		0	7079.10	19
	53TS008		0	3422.30	9
	53TS009		0	4768.00	13
	53TS010		0	2028.70	6
	53TS011		0	5825.10	16
	53TS012		0	7645.90	21
	53TS013		0	5219.10	14
	53TS014		0	2912.70	8
	53TS015		0	6965.70	19
	53TS016		0	5643.90	15
	53TS018		0	6064.70	17
	53TS019		0	9244.50	25
	53TS020		0	7338.60	20
	53TS021		0	8676.10	24
	53TU004		0	3888.90	11
	53TZ004		0	2987.99	8
	53TZ006		0	3916.20	11
	53TZ007		0	3742.93	10
	53TZ008		0	4390.00	12
	53TZ009		0	3609.90	10
	53TZ010		0	2984.00	8
	53TZ011		0	2909.20	8
	53TZ012		0	113.90	0
	53TZ013		0	118.10	0
	54TQ002		0	9961.20	27
	55TD004		0	11013.40	30
	H78180		0	520.40	1
FL054: 1/2 TON P/U TR	51TZ008	4478.70	11		0
	51TZ009L	4290.60	10		0
	51TZ010L	3081.30	7		0
	51TZ011L	2938.70	7		0
	51TZ012L	3259.00	8		0
	51TZ013L	2077.20	5		0
	51TZ014L	4785.80	11		0
	51TZ015L	2327.50	5		0
	51TZ016L	4804.20	11		0
	51TZ017L	3358.70	8		0
	51TZ018L	3460.00	8		0
	51TZ019L	2773.80	7		0
	51TZ020L	13000.00	31		0
	51TZ021L	10826.80	26		0
	51TZ022L	2795.70	7		0
	51TZ023L	5907.90	14		0
	51TZ024L	4217.60	10		0
	51TZ025L	2276.20	5		0
	51TZ026L	3983.10	9		0
	51TZ027L	1164.80	3		0
	52TP011	1209.10	3		0

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	52TZ047	3736.50	9		0
	71TZ052	157.30	0		0
	71TZ052L	2363.60	6		0
	71TZ053L	4006.40	9		0
	71TZ054L	2388.10	6		0
	71TZ055L	3253.60	8		0
	71TZ056L	1687.60	4		0
	71TZ057L	1808.00	4		0
	71TZ058L	2215.60	5		0
	71TZ059L	800.10	2		0
	71TZ060L	4057.20	10		0
	71TZ061L	3996.10	9		0
	71TZ062L	3256.10	8		0
	71TZ063	274.40	1		0
	71TZ063L	3431.10	8		0
	71TZ064	250.90	1		0
	71TZ064L	4311.50	10		0
	71TZ065L	1652.00	4		0
	71TZ066L	3114.30	7		0
	71TZ067L	2763.20	7		0
	71TZ069L	1475.10	3		0
	71TZ070L	6091.60	14		0
	71TZ071L	3231.10	8		0
FL066: LOADER MTD SNOW B	L103		0	620.60	2
FL095: TANDEM DU TR C/W	55TD001		0	7431.80	20
	55TD002		0	7495.30	20
	55TW001		0	7198.80	20
	55TW002		0	11402.20	31
	55TW003		0	10410.36	28
	55TW004		0	17982.70	45
	55TW005		0	11088.00	30
	55TW006		0	19561.30	53
	55TW007		0	10290.30	28
	55TW008		0	22241.10	61
	55TW009		0	10114.30	28
	55TW010		0	13274.90	36
	55TW011		0	17960.80	49
	55TW012		0	25068.70	68
	55TW013		0	23668.80	65
	55TW014		0	20047.30	55
	55TW015		0	17663.90	48
	55TW016		0	19839.20	54
	55TW019		0	4841.20	13
	66TZ001		0	21628.40	59
	B201		0	1825.60	5
	B202		0	6016.60	16
	B203		0	7851.90	21
	B215		0	5583.30	15
	B217		0	9221.60	25
	B218		0	12919.50	35
FL104: FS CARGO VAN	52VZ003		0	1999.90	5
	53VZ001		0	1478.00	4
	31VZ008	2212.00	5		0
	51VZ013	2857.90	7		0
	52VZ001	1724.50	4		0
	52VZ002	3496.90	8		0
	52VZ004	2583.80	6		0
	52VZ005	5699.90	13		0
	52VZ006	3323.80	8		0
	52VZ007	2340.90	6		0
	52VZ008	1797.70	4		0
	52VZ009	418.50	1		0
	52VZ010	630.20	1		0
	61VZ007	1793.80	4		0
	62VZ001	2330.70	6		0
	62VZ002	1984.30	5		0
	62VZ003	5774.60	14		0
	62VZ004	2577.30	6		0
	62VZ006	1264.00	3		0
	62VZ007	3751.00	9		0
	62VZ008	5658.90	13		0
	62VZ009	386.00	1		0
	62VZ011	2536.80	6		0
	62VZ015	4003.40	9		0
	62VZ016	4613.40	11		0
	62VZ017	3996.00	9		0
	62VZ018	3271.20	8		0
	62VZ019	5307.70	13		0

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	62VZ020	3096.30	7		0
	62VZ021	1340.40	3		0
	62VZ022	4750.60	11		0
	62VZ023	3476.40	8		0
	62VZ025	5504.00	13		0
	71VZ011	3141.20	7		0
FL105: TR HWAY LINE PAINTER	55TI001		0	5591.96	15
FL107: TR POT HOLE PATCHER	54TZ002		0	341.10	1
	H78174		0	3766.10	10
FL108: 5 T C/W ARIAL DEVICE	54TB001		0	2278.86	6
	54TQ001		0	7933.50	22
	H72158		0	1119.50	3
FL109: TRUCKSTER	61UZ002		0	575.00	2
	61UZ003		0	146.70	0
	SE455		0	185.00	1
	SE456		0	205.10	1
FL111: SERVICE VEHICLES	53TQ003		0	3831.80	10
	53TQ004		0	2067.20	6
FL120: EXCAVATOR	51XZ001		0	336.10	1
	51XZ002		0	395.80	1
	53XZ001		0	3323.80	9
	54XZ001		0	768.50	2
FR001: CAR	06-373C		0	642.50	2
	00-131C	961.10	2		0
	00-133C	1052.40	2		0
	00-135C	2086.40	5		0
	00-136C	894.60	2		0
	01-146C	798.20	2		0
	02-282C	1515.8	4		0
	02-283C	977.40	2		0
	02-284C	1172.50	3		0
	02-285C	391.20	1		0
	02-286C	796.00	2		0
	02-287C	997.80	2		0
	03-308C	72.50	0		0
	03-326C	919.30	2		0
	03-327C	1473.00	3		0
	07-400C	1027.80	2		0
	07-407C	1349.10	3		0
	07-408C	1037.00	2		0
	07-409C	862.20	2		0
	07-411C	1924.10	5		0
	08-423C	873.70	2		0
	08-433C	1398.90	3		0
	08-441C	804.40	2		0
	08-442C	610.70	1		0
	97-100C	705.20	2		0
	97-102C	665.60	2		0
	97-104C	54.20	0		0
FR002: PICK-UP	07-418U		0	6011.00	16
	07-419U		0	5640.60	15
	08-429U		0	100.00	0
	00-130U	171.50	0		0
	00-132C	884.60	2		0
	00-138U	1769.20	4		0
	00-139U	3747.00	9		0
	01-274U	416.10	1		0
	01-275U	1411.30	3		0
	02-278U	3428.90	8		0
	02-279U	1045.80	2		0
	02-280U	902.70	2		0
	03-313U	4627.70	11		0
	03-315U	3377.70	8		0
	03-317U	83.80	0		0
	03-328U	977.30	2		0
	04-330U	1303.60	3		0
	04-337U	2728.90	6		0
	05-355U	2905.50	7		0
	05-356U	60.90	0		0
	05-358U	1405.00	3		0
	05-359U	6035.10	14		0
	05-360U	1733.20	4		0
	06-372U	1918.20	5		0
	07-389U	1252.10	3		0
	07-410U	4651.20	11		0
	07-414U	4616.60	11		0
	07-415U	5099.20	12		0
	08-450U	246.20	1		0

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	09-451U	370.90	1		0
	09-452U	842.10	2		0
	09-453U	490.10	1		0
	09-454U	205.90	0		0
	09-456U	330.90	1		0
	09-457U	365.30	1		0
	97-106U	123.60	0		0
	98-115U	945.80	2		0
	98-116U	1157.70	3		0
	98-260U	160.90	0		0
	99-119U	3509.70	8		0
	99-123U	1928.70	5		0
	99-125U	2179.50	5		0
	99-126U	925.10	2		0
	99-127U	2129.90	5		0
FR003: VAN	06-379U		0	1772.50	5
	07-413U		0	4254.20	12
	97-105U		0	244.70	1
	00-129U	9425.40	22		0
	00-134V	8662.90	20		0
	00-137V	273.20	1		0
	01-140V	2229.70	5		0
	01-141V	1583.50	4		0
	01-149V	7198.80	17		0
	03-309V	1931.10	5		0
	03-325U	2995.00	7		0
	03-334U	1904.00	4		0
	04-335U	945.10	2		0
	04-350U	1633.20	4		0
	06-392V	960.50	2		0
	07-393U	2701.30	6		0
FR006: ENGINE	03-331E		0	5019.90	14
	03-332E		0	4957.40	14
	04-353E		0	4264.00	12
	06-390E		0	1113.90	3
	06-397E		0	1151.90	3
	07-402E		0	4551.00	12
	86-202U		0	356.90	1
	89-50E		0	2711.70	7
	92-230E		0	431.20	1
	92-75E		0	1215.50	3
	92-76E		0	1000.20	3
	93-81E		0	944.40	3
	93-83E		0	839.80	2
	95-249E		0	756.70	2
	95-92E		0	1818.00	5
	96-253E		0	635.50	2
	97-01E		0	4681.40	13
	97-02E		0	284.12	1
	97-108E		0	371.20	1
	97-109E		0	213.49	1
	97-110E		0	4422.90	12
	29538	198.00	0		0
	29893	36.30	0		0
	30746	64.90	0		0
FR007: AERIAL	02-305L		0	458.05	1
	87-37Q		0	116.50	0
	95-93P		0	357.20	1
FR008: SNORKLE	89-48P		0	1304.90	4
FR009: QUINT	01-143Q		0	8793.00	24
	01-144Q		0	7644.30	21
	07-417Q		0	8999.10	25
	08-439Q		0	9586.20	26
	90-57Q		0	1685.00	5
	90-59Q		0	3216.00	9
	95-248Q		0	498.10	1
	28374	15.80	0		0
FR010: ANTIQUE	60-06A	21.10	0		0
FR012: RESCUE UNIT	07-404R	1461.10	3		0
	30106	155.00	0		0
	03-321R	154.60	0		0
	08-422R	1426.70	3		0
	99-266R	72.70	0		0
FR014: TACTICAL	92-73R		0	3482.60	10
	92-73TS		0	1812.60	5
	95-95R		0	356.30	1
	95-95TS		0	247.10	1
FR015: TANKER	00-270T		0	325.30	1

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	02-298T		0	87.40	0
	02-302T		0	6112.20	17
	04-339T		0	342	1
	06-375T		0	135.00	0
	06-377T		0	1556.40	4
	06-380T		0	246.90	1
	07-431T		0	473.1	1
	89-214T		0	544.8	1
PL001: MARKED VEHICLE	20	945.80	2		0
	27	1882.30	4		0
	37	588.90	1		0
	38	4914.80	12		0
	40	2481.10	6		0
	49	5267.40	12		0
	55	1103.60	3		0
	57	3374.50	8		0
	60	9680.50	23		0
	61	7856.30	19		0
	62	2011.60	5		0
	63	2272.30	5		0
	66	1478.20	3		0
	67	429.20	1		0
	71	5596.90	13		0
	73	7572.60	18		0
	74	6616.90	16		0
	75	14961.10	35		0
	76	1193.40	3		0
	101	13661.70	32		0
	102	4613.00	11		0
	103	7015.10	17		0
	104	61.70	0		0
	108	2121.60	5		0
	111	1938.50	5		0
	118	42.20	0		0
	131	218.50	1		0
	137	2329.70	6		0
	139	3560.90	9		0
	142	11761.70	28		0
	143	322.20	1		0
	144	1566.60	4		0
	147	1942.40	5		0
	150	821.90	2		0
	151	3510.30	8		0
	154	2936.30	7		0
	155	1564.00	4		0
	159	10510.20	25		0
	162	2565.40	6		0
	163	2431.70	6		0
	192	1727.80	4		0
	196	469.60	1		0
	197	830.60	2		0
	199	1591.30	4		0
	201	442.30	1		0
	222	2754.80	7		0
	223	4295.10	10		0
	236	1222.60	3		0
	103A	433.80	1		0
	142A	3568.80	9		0
	147A	38.70	0		0
	206L	2923.40	7		0
	207L	4250.00	10		0
	208L	3693.20	9		0
	209L	823.10	2		0
	210L	555.20	1		0
	211L	1434.20	3		0
	212L	1228.80	3		0
	213L	1128.10	3		0
	214L	885.00	2		0
	215L	1012.80	2		0
	216L	1129.80	3		0
	217L	982.00	2		0
	218L	1007.10	2		0
	62A	105.00	0		0
	C21	7018.10	17		0
	C22	11625.20	27		0
	C23	21896.70	52		0
	C24	1372.80	3		0
	C24A	270.40	1		0

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	C25	5410.70	13		0
	C26	6974.50	16		0
	C30	919.40	2		0
	C31	15698.30	37		0
	C33	1590.30	4		0
	E41	13611.40	32		0
	E42	6199.30	15		0
	E43	1186.90	3		0
	E45	2417.70	6		0
	E46	2732.80	6		0
	E47	471.20	1		0
	E50	3102.50	7		0
	E54	3925.90	9		0
	E56	3831.90	9		0
	K9-2	3097.00	7		0
	K9-3	3899.90	9		0
	K9-4	5640.60	13		0
	K9-5	2786.50	7		0
	K9-6	1335.00	3		0
	K9-7	4236.80	10		0
	K9-8	4314.10	10		0
	K9-8A	293.30	1		0
	P34	6096.20	14		0
	P36	4718.30	11		0
	T16	3321.00	8		0
	T17	4159.00	10		0
	T18	4602.60	11		0
	T19	2287.00	5		0
	T28	2089.90	5		0
	T79	2859.10	7		0
	W10	1471.10	3		0
	W11	6949.40	16		0
	W12	16843.50	40		0
	W14	2598.30	6		0
	W2	7022.40	17		0
	W3	3373.00	8		0
	W4	6694.60	16		0
	W5	427.30	1		0
	W6	3032.10	7		0
	W6A	1255.20	3		0
	W7	26076.00	62		0
	W7A	3355.20	8		0
	W9	2707.50	6		0
PL002: UNMARKED VEHICLE	219		0	6953.30	19
	220		0	380.50	1
	39	2553.00	6		0
	58	1938.00	5		0
	59	2274.90	5		0
	65	1011.20	2		0
	68	501.60	1		0
	69	3822.00	9		0
	72	2652.70	6		0
	78	2250.20	5		0
	100	1791.80	4		0
	105	2717.50	6		0
	107	897.20	2		0
	109	993.10	2		0
	110	2201.20	5		0
	112	3159.40	7		0
	114	38.40	0		0
	115	1799.70	4		0
	119	1367.40	3		0
	120	1515.60	4		0
	121	452.00	1		0
	122	2095.70	5		0
	123	1943.80	5		0
	124	583.30	1		0
	125	2078.60	5		0
	127	624.00	1		0
	128	541.00	1		0
	129	1274.50	3		0
	130	1785.70	4		0
	132	3189.90	8		0
	133	990.80	2		0
	134	971.50	2		0
	136	2456.10	6		0
	138	1795.60	4		0
	140	2541.70	6		0

		Gasoline (L)		Diesel (L)	
Vehicle Type	Vehicle Name/Technical Object Number	Total Use	Total eCO2	Total Use	Total eCO2 (t)
	141	1258.50	3		0
	144	1566.60	4		0
	146	1491.00	4		0
	148	1106.40	3		0
	149	804.00	2		0
	152	2372.30	6		0
	153	831.30	2		0
	156	2312.30	5		0
	157	939.30	2		0
	158	5772.80	14		0
	160	1415.30	3		0
	161	1383.90	3		0
	164	3290.20	8		0
	165	1027.60	2		0
	166	2980.90	7		0
	167	1061.30	3		0
	168	1431.80	3		0
	169	1013.40	2		0
	170	2335.10	6		0
	171	1729.60	4		0
	172	3668.00	9		0
	173	1318.80	3		0
	174	1182.50	3		0
	176	2658.10	6		0
	177	1245.60	3		0
	178	634.00	1		0
	179	1716.20	4		0
	180	2446.90	6		0
	181	602.40	1		0
	182	190.30	0		0
	183	1061.70	3		0
	184	1392.10	3		0
	185	2730.40	6		0
	186	2685.80	6		0
	187	236.20	1		0
	188	2359.30	6		0
	189	1279.80	3		0
	190	539.70	1		0
	191	2680.90	6		0
	193	2527.70	6		0
	194	1941.40	5		0
	195	2169.20	5		0
	198	1822.20	4		0
	200	1139.00	3		0
	221	5665.10	13		0
	224	3095.50	7		0
	226	2809.00	7		0
	227	1620.10	4		0
	228	1314.30	3		0
	229	4236.70	10		0
	230	2773.20	7		0
	231	1545.20	4		0
	232	1389.10	3		0
	233	1376.70	3		0
	234	527.30	1		0
	235	944.60	2		0
	237	2179.30	5		0
	239	331.80	1		0
	240	1206.60	3		0
	241	582.90	1		0
	05004	1203.20	3		0
	05317	1152.10	3		0
	131A	85.80	0		0
	133A	309.60	1		0
	202L	2352.10	6		0
	203L	981.30	2		0
	204L	2682.30	6		0
	205L	3281.80	8		0
	K9-9	6969.60	16		0
	R16	237.80	1		0
TR012: SERVICE VANS	33TZ010		0	4303.60	12
OTHER	GE CAPITAL CARDS	73,168	173	91,964	251
OTHER	FUEL CARDS	138,699	328	55,341	151
Total	Total	1,647,232	3,891	11,223,563	30,647

Lighting

Corporate Inventory

Includes street, traffic, sportsfield and park lights.

	Electricty (kWh)	
Lighting Group Name	**Total Use**	**Total eCO2 (t)**
1 FRENCH VILL STN RD	1,213	1
100 LEIBLIN DR	9,024	7
100 PENHORN DR	10,200	8
101 WYSE RD INFO SIGN	5,601	4
11 MOUNT HOPE AVE	7,920	6
110 APPIAN WAY PARK LIGHTS	540	0
115 SMITHS RD	3,951	3
1216 BEDFORD HWY	17,640	14
1225 OLD SACKVILLE RD	9,048	7
125 HIGHFIELD PARK DR (NOW 101 HIGHFIELD PARK)	64,560	51
1291 MINEVILLE ROAD	540	0
130 OCHTERLONEY & 19 IRISHTOWN RD	1,848	1
130 ROSEMARY DR PARK LIGHTS	4,320	3
14 PRINCE ALBERT RD	8,496	7
1600 BED HWY TRF LGH	27,810	22
1603 LOWER WATER	34,110	27
1820 BEDFORD HWY	3,314	3
190 CHAIN LAKE DR	9,825	8
194 A WAVERLEY RD BOAT RAMP	2,400	2
2 A LETHBRIDGE AVE	1,800	1
20 WYSE RD	20,235	16
2057 OWLS HEAD	739	1
207 WINDSOR JCT RD	1,800	1
210 THOMAS RADDALL DR	113,115	89
2239 PROSPECT RD	6,480	5
2240 OLD SAMBRO RD	1,800	1
22746 HIGHWAY 7 PARK LIGHTS	1,800	1
2419 CREIGHTON ST	214	0
255 BISSETT	551	0
2583 BARRINGTON ST	40,200	32
26 LEAMAN DR	9,475	7
26 THOMAS RADDALL DR	4,900	4
2790 OXFORD ST	3,624	3
294 HERRING COVE RD PARK LIGHTS	804	1
30 CHARLES RD	1,248	1
30 JOHN BRENTON DR POLE #2	683	1
30 JOHN BRENTON DR POLE #3A	663	1
30 JOHN BRENTON DR POLE #3B	1,585	1
3550 NOVALEA DR	1,987	2
39 POLARA ST STLT	780	1
416 HAMMONDS PLAINS RD	743	1
427 WINDSOR JCT RD	4,595	4
43 BORDEN AVE	35,522	28
50 CIRCLE DR	1,907	2
535 PORTLAND ST BUS TERM	5,604	4
57 GANDER AVE PARK LIGHTS	1,845	1
609 COLBY DR	924	1
6235 AFRICVILLE RD	167	0
640 WINDMILL RD	5,496	4
645 WINDMILL RD	5,496	4
6908 CHEBUCTO RD	106	0
7 1/2 DUSTAN ST	2,010	2
71 FIRST LAKE DR	1,980	2
7124 ST MARGS BAY RD	1,200	1
8 VALLEYFORD RD	65,745	52
91 ALDERNEY DR	5,558	4
92 DOWNS AVE	1,129	1
920 BEDFORD HWY	11,040	9
99 FLAMINGO DR ICE RINK	960	1
AKERLEY BLVD	13,155	10
ALBRO LAKE BEACH	780	1
ALBRO LAKE RD	1,620	1
ALDERNEY DR	79,680	63
ARMCREST DR PLAYGROUND	3,000	2
ARMDALE ROTARY ST	31,546	25
ATLANTIC ACRES - SIGN	3,312	3
BALDEAGLE PLACE	109,836	87
BALL FIELD BY COLE HBR PL	3,807	3
BALLFIELD (B J HIGGINS)	8,550	7
BARRINGTON ST BRIDGE APPROACH ENCLOSE	111,960	88
BAYERS LAKE DR	12,309	10

	Electricty (kWh)	
Lighting Group Name	Total Use	Total eCO2 (t)
BAYERS LAKE PARK	14,040	11
BAYERS LAKE	3,312	3
BEAVERBANK RD	916	1
BEAZLEY FIELD	3,048	2
BEAZLEY FIELD--LIGHTS	11,700	9
BED HWY HAM PL RD	36,270	29
BEDFORD & MAIN AVE	46,620	37
BEDFORD HWY & CONVOY RUN	26,190	21
BEDFORD HWY	2,941	2
BEDFORD IND PARK - SIGN	1,560	1
BEDFORD	4,720	4
BEECH HILL RD	3,129	2
BEECHVILLE	4,656	4
BENNETT PARK	7,200	6
BETWEEN SUSSEX & DENTITH	351,972	279
BIRCH COVE LKSD TERR	1,536	1
BIRCH COVE	648	1
BISSETT RD	71,040	56
BOUTILIERS PT RD	624	0
BRIDGEVIEW DR LIGHT	10,430	8
BUS SHELTER LACEWOOD DR TRANSIT MET	10,640	8
BUS SHELTERS TRANSIT TOB	8,820	7
CALDWELL RD	8,640	7
CALEDONIA RD	3,195	3
CAMPHILL CEMETERY	5,475	4
CITY HALL PARADE SQUARE	54,900	43
CLEMENT ST	1,200	1
COBEQUID RD BUS TERMINAL	15,143	12
COGSWELL	185,685	147
COLE HBR RD & HUGH ALLEN	6,682	5
COMMODORE DR LIGHT	84,000	66
COMMODORE DR	92,040	73
COMMONS TENNIS COURT	18,201	14
COMMUNITY CNTR LANE	12,982	10
CONNOLLY RD / SACKVILLE DR	2,661	2
CONROSE PARK	3,602	3
CONVOY RUN	90,270	71
COR BURNSIDE V R SMITH DR	1,521	1
COR HOLLAND AVE	7,200	6
COR OF PORTLAND & ALDERNEY	11,075	9
COR VICTORIA RD/WINDMILL RD	19,020	15
CORNER AGRICOLA SEBASTIAN	9,472	7
CORNER OF MAIN & HARTLEN	10,044	8
CORNER TRUNK 7 BROOKS DR	612	0
CORONATION OLAND CRESCENT DIST 7	598,441	473
CORRECTIONAL CTR BALLFLD	5,600	4
COUNTRYVIEW DR LIGHT	138,650	110
COWIE HILL	1,107	1
CR MAIN & CALEDONIA RD	53,550	42
CRANBERRY CRES	1,800	1
CRN BURNSIDE WRIGHT AVE	3,100	2
CRN-GLENDALE & METRO	260,040	205
DART SIGN TOP OF ALDERNEY	540	0
DENNIS NAUGLE BALLFIELD	6,010	5
DINGLE FLEMMING PARK	11,949	9
DINGLE RD LIGHT	24,548	19
DIST 1 2750 DUTCH VILLAGE	223,176	176
DIST 1 ST LIGHTS NON-CORE	908,655	719
DIST 18 STR LIGHTS HOLDING ACCOUNT	153,432	121
DIST 18 STREET LIGHTS NON-CORE AREA	326,712	258
DIST 19 STREET LIGHTS NON-CORE	72,816	58
DIST 2 ST LIGHTS NON-CORE AREA	239,892	190
DIST 20 STREET LIGHTS CORE AREA	1,022,304	808
DIST 22 ST LIGHTS CORE AREA	714,792	565
DIST 22 STREET LIGHTS NON-CORE AREA	449,976	355
DIST 23 ST LIGHTS NON-CORE AREA	679,644	537
DIST 3 STREET LIGHTS NON-CORE AREA	811,080	641
DIST 4 STR LIGHTS CORE AREA	644,928	509
DIST 4 WINCH HOUSE TERENCE BAY	257	0
DIST 5 STR LIGHTS CORE	1,135,548	897
DISTRICT 10 RAVINE PK CRE	155,028	122
DISTRICT 3 HERRING CV	243,168	192
DISTRICT 5 BAY RD	359,124	284
DTM SPTPLX COMPOUND-BUS TER MET	17,434	14
DUNBRACK & CONNECTOR	7,365	6
DUNBRACK ST	281,685	223
EISENHAUER BALL	8,375	7
ELLIOTT ST	66,880	53
FAIRFIELD RD	1,330	1
FAIRVIEW CEMETERY	38,299	30

	Electricty (kWh)	
Lighting Group Name	Total Use	Total eCO2 (t)
FALL RIVER RD RTE#2	7,524	4
FENERTY/FENWOOD	1,162,524	591
FERGUSONS COVE RD	8,712	4
FISH HATCHERY PARK	1	0
FIVE CORNERS SIGN	540	0
FLAT LAKE DR	2,561	2
FLEMMING PARK	21,076	11
FOREST HILL DR	34,536	18
FOREST HILLS & CIRCASSION	8,785	4
FORESTHILL DR & TRUNK 7	22,500	11
FORT NEEDHAM ST	9,980	5
FREDERICK AVE	533	0
GEORGE ST-LOWER END	5,279	3
GLENBOURNE CRT	363,552	185
GLORIA AVE PLAYGROUND	3,591	2
GRAND DESERT	7,224	4
GRANVILLE MALL	30,555	24
GREENWOOD HEIGHTS BALL PARK	1,106	1
HAMMONDS PL & KINGSWOOD	444	0
HARBOURVIEW PARK CEMETARY	768	1
HARTNETT HILL	4,880	3
HATCHETT LK FIRE DPT LITE	1,200	1
HD CHEZZETCOOK	890	1
HEMLOCK DR PARK LIGHTS	1,152	1
HIGH TIMBER DR LOT TL	3,120	2
HIGHFIELD & PINECREST-TRANSIT MET	14,032	11
HIGHWAY 101	10,308	8
HIGHWAY 3	16,419	13
HIGHWAY 7	9,602	5
HUBBARDS	624	0
IDA ST	191,184	151
INTERSECTION	2,362	2
ISLEVILLE ST	5,790	3
JAYDEN DR	384	0
JOHN MCNEIL BALLFIELD	177	0
JUBILEE & SACKVILLE DR	4,034	3
JUDGES STAND LAKE BANOOK	5,716	5
KETCH HARBOUR	384	0
LAKE BANOOK	4,370	3
LANDRACE	1,080	1
LARRY UTECK LIGHT	2,104	2
LED TRAFFIC LIGHTS FOR HRM	110,134	87
MACINTOSH ST	190,740	151
MAIN ST	28,620	23
MAYBANK COURT	5,400	4
MEMORIAL PARK	2,328	2
MERV SULLIVAN PK	11,960	9
METROPOLITAN AVE	5,136	4
MILLWOOD DR	2,030	2
MOIRS MILL RD	1,836	1
MORASH PARK	1,800	1
MOUNT HOPE AVE	19,650	16
MYRA RD	3,000	2
NON CORE AREA STLTS	1,045,920	826
NON STREET LIGHTING RESIDUAL	167,166	132
NORTH COMMONS FOUNTAIN	16,870	13
NORTH COMMONS LIGHTS	46,300	37
OLD BEAVERBANK RD	1,350	1
OYSTER POND ST	360	0
PARK RD	8,917	7
PARKING BOOTH	36,080	29
PELZANT ST	2,328	2
PENHORN MALL	408	0
PENHORN MALL TRANSIT MET	15,178	12
PINE ST	3,048	2
PINEHILL PLAY	1,560	1
PLEASANT & BONNAVENTURE	8,012	6
PLEASANT STREET-LAWN BOWLING	2,678	2
POINT PLEASANT DR	1,400	1
POINT PLEASANT PARK	39,275	31
PRATT & WHITNEY DR	72,340	57
PRINCE ALBERT RD	416,748	329
PRINCE ST	112,410	89
RAGGED LAKE	1,560	1
RAVENSCRAIG DR	3,251	3
RENFREW ST	384	0
RIVERSIDE AVENUE	1,392	1
RIVERSIDE DR	408	0
ROMANS AVE PARK LIGHT	1,200	1
ROSS RD	612	0

	Electricty (kWh)	
Lighting Group Name	**Total Use**	**Total eCO2 (t)**
ROXHAM CLOSE DIST 8	486,264	384
SACKVILLE HERITAGE PARK	724	1
SHEET HBR (WEST RIVER)	780	1
SHELDRAKE LAKE	1,175	1
SHEPPARDS RUN LIGHTS	768	1
SHIPYARD RD	33,920	27
SHUBIE CAMPGROUND	1,815	1
SHUBIE CAMPGROUND LIGHTS	10,020	8
SHUBIE PARK POLE #4	216	0
SHUBIE PARK POLE #4A	1,178	1
SHUBIE PARK POLE #4B	2,327	2
SHUBIE PARK POLE #5	4,696	4
SHUBIE PARK POLE #6	933	1
SHUBIE PARK POLE #6A	4,273	3
SHUBIE PARK POLE #6B	3,238	3
SHUBIE PARK POLE #7	10,119	8
SHUBIE PARK POLE #8	4,447	4
SOCIAL HALL	56,772	45
SOUTH PK & UNIVERSITY AVE	9,567	8
STREET LIGHTING	7,336,368	5,796
STREET LIGHTS CORE AREA	2,049,804	1,619
STREET LIGHTS HOLDING ACCOUNT	141,456	112
SULLIVANS POND	106,050	84
THEAKSTON AVE	4	0
TL-111 PORTLAND ST	8,424	7
TL-BAKER RD	29,076	23
TL-PORTLAND ST	8,352	7
TRAFFIC WALK TRK #1 BEAVERBANK RD	2,644	2
TRAFFIC-DART NTHEND OVHD CROSSWALK SIGNS	176,508	139
TRUNK 7 MAGAZINE HILL	408	0
UNION ST	2,868	2
UNIVERSITY AVE	1,800	1
VICTORIA PARK	9,269	7
VICTORIA RD	96,390	76
WALKWAY GLENMORRIS SCH	384	0
WANDERERS GROUNDS	15,202	12
WATER & GEORGE ST	107,160	85
WATER CURTAIN WORKS	400	0
WEST PETPESWICK	2,448	2
WOODLAWN AVE	4,680	4
WRIGHT AVE	98,576	78
WRIGHT/MACDONAL	2,208	2
WYSE BOLAND	780	1
TOTAL	**27,097,175**	**21,403**

Buildings

Corporate Inventory

Where estimates were made, assumptions are noted for each relevant building in Appendix B.

		Electricty (kWh)		Natural Gas (cum)		Fuel Oil (L)		Diesel (L)	
Address	Building Name	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)
1 METROPOLITAN AVE	Fire Station # 9	138,670	110		0	18,864	53		0
1 SECOND ST	Fire Station #14	29,160	23		0	11,035	31		0
10 KIDSTON RD	Captain William Spry Community Centre	768,193	607		0	159,522	451		0
10 THORNHILL DR UNIT #2	Police Satellite Office	57,520	45		0		0		0
1018 FALL RIVER RD	Fall River West School	14,017	11		0	5,238	15		0
10353 HIGHWAY 3	JD Shatford Library	39,160	31		0	35,058	99		0
1070 OLD SAMBRO RD	Fire Station # 62	32,750	26		0	5,069	14		0
11 STATION RD	Head of St. Margaret's Bay Community Centre	39,240	31		0		0		0
11 TURNER DR	Turner Drive Depot	502,352	397		0	153,340	434		0
11 WINDMILL RD	Halifax Regional Police	3,995	3		0	5,474	15		0
110 WYSE RD	Dartmouth Sportsplex	3,052,742	2,412	377,880	715		0		0
111 CLAYTON PARK DR	Northcliffe Recreation Centre	394,040	311		0	124,068	351		0
111 DRYSDALE RD	Spryfield Lions Arena	942,206	744		0	12,185	34		0
11229 HIGHWAY 333	Fire Station # 55	40,786	32		0	6,460	18		0
1138 OLD SAMBRO RD	Harrietsfield/Williamswood Community Centre	30,909	24		0	8,301	23		0
114 WOODLAWN RD	Woodlawn Library	89,760	71		0		0		0
1150 COLE HARBOUR RD	Fire Station #17	283,577	224		0	5,964	17		0
1156 SACKVILLE DR	Fire Station #10	69,570	55		0	11,764	33		0
12 WESTWOOD BLVD	St. Margarets Centre	1,978,800	1,563		0	88,152	249		0
1213/1215 COLE HARBOUR RD	Cole Harbour Activity Centre	8,322	7		0	5,963	17		0
12390 HWY 224	Musquodoboit Valley Bicentennial Theatre & Cultural Centre	22,075	17		0	15,810	45		0
1247 BEDFORD HWY	Fire House Youth Centre	17,786	14		0	16,799	48		0
1300 ST MARGARETS BA RD	Enviro-Care	11,709	9		0	11,988	34		0
134 PINECREST DR	Dartmouth North Community Centre	300,627	237	21,467	41		0		0
1359 FALL RIVER RD	Gordon R. Snow Community Centre & Fire Station # 45	364,875	288		0		0		0
14 HIGHWAY 336	Fire Station # 39	23,959	19		0	7,240	20		0
14 PURCELLS COVE RD	Chocolate Lake Community Recreation Centre	85,080	67		0	28,521	81		0
142 BEDFORD HWY		17,700	14		0	5,116	14		0
1452 QUEEN ST	Queen Street Apartments (Transition)	3,086	2		0		0		0
1492 ST MARGARETS BAY RD	Beechville Lakeside Timberlea Recreation Centre	60,400	48		0	23,001	65		0
1496 BEDFORD HWY	Bedford Tower	59,175	47		0		0		0
15 CONVOY RUN	Fire Station #8	199,980	158		0	27,059	77		0
15 FORT SACKVILLE RD	Scott Manor - Fort Sackville Manor House	15,299	12		0	6,960	20		0
15 MONIQUE	Gerald B. Gray Arena	719,600	568		0	14,294	40		0
15 RAGUS RD	Bowles Arena	757,200	598		0	9,656	27		0
150 THORNHILL DR	Thornhill Transit Facility	522,936	413	82,758	157		0		0
15750 HIGHWAY 7	Fire Station # 31	10,401	8		0	3,623	10		0
1581 BEAVERBANK RD	Fire Station # 48	182,759	144		0	47,812	135		0
1588 BARRINGTON ST	Khyber Building	17,480	14		0	12,219	35		0
160 WEST PENNANT RD	Fire Station # 63	14,395	11		0	1,982	6		0
1606 Bell Road	Public Gardens Greenhouse & Power House	100,360	79		0		0		0
1641 FAIRFIELD RD	St. Mary's Boat Club	64,320	51		0	11,088	31		0
1680 BELL RD	Wanderer's Grounds Parks Depot	103,580	82	27,684	52	12,715	36		0

		Electricty (kWh)		Natural Gas (cum)		Fuel Oil (L)		Diesel (L)	
Address	Building Name	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)
17 CONRAD RD	St. Therese Community Centre	10,617	8		0	5,267	15		0
171 OAKMOUNT DR	HRM Admin Bldg/Salt Dome/Garage	116,180	92		0	65,535	185		0
17559 HIGHWAY 7	Fire Station # 30	38,948	31		0	5,896	17		0
1765 OSTREA LAKE	Fire Station # 25	18,829	15		0	4,220	12		0
1800 BEDFORD HWY	Bedford Leisure Centre	16,275	13		0	5,707	16		0
1807 CALDWELL RD	Fire Station # 16	241,120	190		0	24,890	70		0
182 STONEWICK CROSS	Stonewick Residential Building (Transition)	1,766	1		0		0		0
1841 ARGYLE ST	Halifax City Hall	588,561	465		0	67,235	190		0
191 JOSEPH ZATZMAN DR UNIT #3-4	Joseph Zatman Dr. Bldg (Corporate Administration)	23,400	18		0	3,483	10		0
1929 ROBIE ST	Queen Elizabeth High School	77,028	61		0	146,951	416		0
1955 TROLLOPE ST	Citadel Community Centre	21,703	17		0	28,116	80		0
196 WAVERLEY RD	Waverly Road Fire Garage	108,240	86		0		0		0
1970 GOTTINGEN ST	Centennial Pool	567,440	448		0	136,842	387		0
1975 GOTTINGEN ST	Halifax Regional Police Headquarters	1,818,600	1,437		0	225,542	638		0
2 CHAPMAN ST	Northbrook Police Training Centre	301,288	238	39,450	75		0		0
2 OCHTERLONEY ST	Alderney Landing	667,214	527	59,282	112	18,305	52		0
200 ILSLEY AVE	Ilsley Transit Facility	4,084,553	3,227	630,899	1,193		0		0
202 BROWNLOW AVE	Storage Facility	81,775	65		0		0		0
2040 OLD GUYSBOROUGH RD	Fire Station # 47	23,842	19		0	13,682	39		0
2050 HAMMONDS PLAINS RD	Fire Station # 50	78,120	62		0	9,130	26		0
21 MOUNT HOPE AVE	Eric Spicer Municipal Building	1,991,890	1,574		0	130,187	368		0
2101 PROSPECT RD	Fire Station # 52	26,905	21		0	8,380	24		0
213 BISSETT RD	Works Depot	81,696	65		0	18,260	52		0
22 LAKESIDE DR	Fire Station # 43	23,461	19		0	8,823	25		0
22 POWERS RD	Fire Station # 34	40,238	32		0	7,605	22		0
22404 HIGHWAY 7	Macphee House	5,773	5		0	1,327	4		0
22835 HIGHWAY 7	Fire Station # 28	25,545	20		0	13,688	39		0
2285 GOTTINGEN ST	Halifax North Memorial Public Library	521,400	412		0		0		0
230 PLEASANT ST	North Woodside Community Centre	129,674	102		0	26,262	74		0
2385 CROWELL RD	Fire Station # 19	30,243	24		0		0		0
24 BROOKS DR	East Preston Recreation Centre	67,222	53		0	16,740	47		0
24 GOVERNMENT WHARF RD	Visitor Information Centre	1,150	1		0		0		0
240 DINGLE RD	Flemming Park Buildings	16,020	13		0	2,209	6		0
2433 HIGHWAY 2 (LAKE THOMAS DR)	Fire Station # 41	33,289	26		0	12,600	36		0
245 HERRING COVE RD	Fire Station # 6	36,280	29		0	12,266	35		0
2501 GOTTINGEN ST	George Dixen Centre	107,920	85		0	12,753	36		0
25718 HWY 7 DUFFERIN	Samuel R Balcom Community Centre	10,219	8		0	8,256	23		0
2578 WEST SHIP HARBOUR ROAD	Fire Station # 27	744	1		0		0		0
26 ELLIOT ST	Findlay Community Centre	80,828	64		0	31,564	89		0
26 MYRA RD	Fire Station # 58	64,969	51		0	13,292	38		0
26 NEWCASTLE ST	Evergreen House Park - Alexander James	14,003	11		0	10,323	29		0
26291 HIGHWAY 7	Fire Station # 33	10,517	8		0	2,173	6		0
27 VIMY AVE	Centennial Arena	1,061,268	838		0	51,762	146		0
2748, 2786 AGRICOLA ST/ 2773 Robie St	Bloomfield Centre	245,460	194		0	146,051	413		0
28971 HIGHWAY 7	Fire Station # 29	39,520	31		0	13,027	37		0
28975 HIGHWAY 7	Moser River Community Centre	50,190	40		0		0		0
2901 WINDSOR ST	Halifax Forum	2,050,328	1,620		0	246,949	699		0
2931 LAWRENCETOWN RD	Fire Station # 20	27,143	21		0	5,343	15		0
30 JOHN BRENTON DR	Shubie Park Canteen Building	38,978	31		0		0		0
3035 HIGHWAY 7	Fire Station # 21	38,383	30		0	9,555	27		0
3168 HIGHWAY 7	Lake Echo Community Centre	89,833	71		0	4,610	13		0
3182 HIGHWAY 2	Fall River Recreation Centre (Transition)	7,127	6		0	5,989	17		0

		Electricty (kWh)		Natural Gas (cum)		Fuel Oil (L)		Diesel (L)	
Address	Building Name	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)
32 GLENDALE AVE	Glendale Library	28,800	23		0	9,940	28		0
32 RIVERSIDE AVE	Fire Station # 24	29,598	23		0	12,358	35		0
3214 LAKE THOMAS DR (Hwy 2)	Fire Station # 45	24,084	19		0	3,746	11		0
33 CRICHTON AVE	Crichton Centre	44,160	35		0	8,430	24		0
330 LACEWOOD DR	Keshen Goodman Library	645,600	510		0	54,839	155		0
331 PLEASANT ST	Fire Station # 15	27,450	22	8,978	17	2,337	7		0
3372 DEVONSHIRE AVE	Needham Community Recreation Centre	246,240	195		0	71,790	203		0
3380 DEVONSHIRE AVE	Richmond Family Court		0		0	39,897	113		0
3395 DEVONSHIRE AVE	Devonshire Arena	367,084	290		0	33,490	95		0
36 GLENMORE RD	Fire Station # 38	25,111	20		0	15,316	43		0
36 HOLLAND AVE	Dr. Gerald J. LeBrun Memorial Centre	959,880	758		0	13,954	39		0
3610 PROSPECT RD	Fire Station # 54	58,620	46		0		0		0
3646 HAMMONDS PLAINS ROAD	Tantallon Library	293,525	232		0	39,038	110		0
375 COWIE HILL EXT DR	HRM Parks and Grounds Depot	291,040	230		0	71,716	203		0
3790 MACKINTOSH ST	Mackintosh Street Maintenance Services	87,119	69		0	30,768	87		0
3825 MACKINTOSH ST	Public Works Building	490,080	387		0	95,936	272		0
39 CORBETT RD	Fire Station # 35	24,117	19		0	13,571	38		0
40 & 60 ALDERNEY DR	Alderney Gate	2,608,726	2,061	142,871	270		0		0
4032 MOOSELAND RD	Fire Station # 32	8,423	7		0		0		0
409 GLENDALE AVE	Sackville Sports Stadium	3,023,941	2,389		0	212,935	603		0
4132 HIGHWAY 2	Fire Station # 42	35,654	28		0	11,033	31		0
429 COBEQUID RD	Cobequid Road Municipal Operations Facility	46,717	37		0	14,637	41		0
43 WENTWORTH ST	Feeding Others of Dartmouth		0		0	4,159	12		0
44 SIMMONDS RD	North Preston Community Centre	201,600	159		0	29,760	84		0
4408 ST MARGARETS BAY RD	Fire Station # 59	33,844	27		0	25,776	73		0
4413 HWY 357 MEAGHERS GRANT	Fire Station # 36	23,402	18		0	12,502	35		0
45 CONNOLLY RD	Sackville Heights Community Centre	121,360	96		0	21,522	61		0
45 HIGHFIELD PARK DR	Fire Station # 12	214,380	169		0	45,499	129		0
45 KNIGHTSRIDGE DR	Fire Station # 7	142,932	113		0	71,355	202		0
45 OCHTERLONEY ST	Dartmouth Seniors Centre	191,520	151		0	30,691	87		0
46 LAKECREST DR	Lakecrest Carpentry Shop	6,480	5		0	5,305	15		0
47 WENTWORTH ST	Grace Hiltz (Transition)	2,043	2		0	7,318	21		0
479 PATTON RD	Fire Station # 11	33,750	27		0	17,405	49		0
50 CALEDONIA RD	East Dartmouth Community Centre	313,560	248		0		0		0
5077 GEORGE ST	Halifax Ferry Terminal	300,540	237		0	30,303	86		0
51 FOREST HILLS PKY	Cole Harbour Place	3,768,480	2,977		0	355,811	1,007		0
51 OLD TRUNK RD	Fire Station # 26	39,020	31		0	9,343	26		0
5251 DUKE ST	Duke Tower, Floors 3 & 4	227,600	180		0	40,502	115		0
5284 DUKE ST	Halifax Metro Centre	6,594,048	5,209		0	260,017	736		0
5381 SPRING GARDEN RD	Spring Garden Road Public Library	344,960	273		0	71,469	202		0
54 LOCKS RD	Fairbanks Centre	146,809	116		0		0		0
5543 HIGHWAY 7	Fire Station # 23	52,668	42		0	18,792	53		0
5663 WEST ST	Fire Station # 3	146,040	115		0	58,124	164		0
5680 ST MARGARETS BAY RD	Fire Station # 57	4,590	4		0	4,721	13		0
57 KETCH HARBOUR RD	Fire Station # 60	26,840	21		0	6,011	17		0
57 OCHTERLONEY ST	Quaker House Museum	6,525	5		0		0		0
5711 SACKVILLE ST	Wanders Grounds greenhouses, sheds, furnace building, header house	8,786	7		0	68,106	193		0
5718 POINT PLEASANT DR	Point Pleasant Building #7	42,725	34		0	7,628	22		0
5753 SACKVILLE ST	Public Gardens greenhouses, dry canteen	108,845	86		0		0		0
5802 HWY 357 (ELDERBANK)	Fire Station # 37	23,131	18		0		0		0
5816 COGSWELL ST	The Commons Pavillion	32,760	26		0	12,914	37		0
5816 CUNARD ST	North Commons	3,891	3		0		0		0

		Electricty (kWh)		Natural Gas (cum)		Fuel Oil (L)		Diesel (L)	
Address	Building Name	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)	Total Use	Total eCO2 (t)
5830 LADY HAMMOND RD (DUFFUS ST)	Fire Station # 4	77,820	61		0	28,231	80		0
596 LUCASVILLE RD	Wallace Lucas Community Centre	17,465	14		0	7,335	21		0
5988 UNIVERSITY AVE	Fire Station # 2	97,470	77		0	21,450	61		0
600 HIGHWAY 277	Fire Station # 40	10,428	8		0	8,930	25		0
62 CALEDONIA RD	Beazley Park	91,688	72		0	28,590	81		0
636 SACKVILLE DR	Acadia School/Sackville Public Library	617,520	488		0	17,818	50		0
6691 FOURTH ST	Larry O'Connell Centre	5,348	4		0	5,661	16		0
68 PARKHILL RD	Adventure Earth Centre	6,614	5		0	9,496	27		0
6890 CHEBUCTO RD	Residence (Transition)	10,190	8		0		0		0
690 MAIN ST (HWY 7)	Fire Station # 18	60,420	48		0	12,154	34		0
6955 BAYERS RD	St. Andrews Community Recreation Centre	98,000	77		0	34,746	99		0
7 WALKER AVE	Sackville Metro Link	213,120	168		0		0		0
7090 BAYERS RD	Fire Station # 5	42,300	33		0	18,283	52		0
711 POCKWOCK RD	Upper Hammonds Plains Community Centre	40,368	32		0	8,669	25		0
7900 HIGHWAY 7	Musquodoboit Harbour Public Library	143,960	114		0	8,440	24		0
8 CAIN ST	Fire Station # 22	19,786	16		0	2,368	7		0
80 GRONO RD	Riverline Community Centre	15,665	12		0	8,049	23		0
80 SANDY COVE RD	Fire Station # 53	70,320	56		0		0		0
81 ILSLEY AVE	Corporate Administration	212,525	168		0	7,049	20		0
843 FALL RIVER RD	Fire Station # 44	37,446	30		0	9,938	28		0
8579 ST MARGARETS BAY RD	Fire Station # 56	68,664	54		0	27,133	77		0
86 KING ST	Fire Station # 13	58,260	46		0	46,935	133		0
866 PORTLAND ST	Portland Hills Transit Facility	127,826	101		0		0		0
88 ALDERNEY DR	Dartmouth Ferry Terminal	500,518	395	75,764	143	22,812	65		0
88A CRICHTON AVE/ 20 BOATHOUSE LANE	Oakwood House	6,403	5		0	5,483	16		0
9 ATLANTIC ST	Woodside Ferry Terminal	279,680	221		0	37,690	107		0
9 SPRING ST	Bedford Teachery	5,855	5		0	5,252	15		0
90 ALDERNEY DR	Halifax Regional School Board Offices	639,700	505	46,123	87	6,074	17		0
947 MITCHELL ST	Environmental Depot	60,375	48		0	10,055	28		0
948 POCKWOCK RD	Fire Station # 51	18,097	14		0	8,648	24		0
964 KETCH HARBOUR	Fire Station # 61	11,553	9		0	3,456	10		0
EMERGENCY GENERATORS	Multiple Locations		0		0		0	41,949	115
Total		**54,238,748**	**42,849**	**1,513,155**	**2,861**	**4,874,644**	**13,795**	**41,949**	**115**

APPENDIX B: ASSUMPTIONS FOR ESTIMATES

ADDRESS	BUILDING NAME	POWER (KWH)	HEATING FUEL (L)	NATURAL GAS (CUM)
1 METROPOLITAN AVE	Fire Station # 9	138,670	18,864	
1 SECOND ST	Fire Station #14	29,160	11,035	
10 KIDSTON RD	Captain William Spry Community Centre	768,193	159,522	
10 THORNHILL DR UNIT #2	Police Satellite Office	57,520		
1018 FALL RIVER RD	Fall River West School	14,017	5,238	
10353 HIGHWAY 3	JD Shatford Library	39,160	35,058*	
1070 OLD SAMBRO RD	Fire Station # 62	32,750	5,069	
11 STATION RD	Head of St. Margaret's Bay Community Centre	39,240		
11 TURNER DR	Turner Drive Depot	502,352	153,340	
11 WINDMILL RD	Halifax Regional Police	3,995	5,474	
110 WYSE RD	Dartmouth Sportsplex	3,052,742		377,880
111 CLAYTON PARK DR	Northcliffe Recreation Centre	394,040	124,068	
111 DRYSDALE RD	Spryfield Lions Arena	942,206*	12,185*	
11229 HIGHWAY 333	Fire Station # 55	40,786	6,460	
1138 OLD SAMBRO RD	Harrietsfield/Williamswood Community Centre	30,909	8,301	
114 WOODLAWN RD	Woodlawn Library	89,760		
1150 COLE HARBOUR RD	Fire Station #17	283,577	5,964	
1156 SACKVILLE DR	Fire Station #10	69,570	11,764[R]	
12 WESTWOOD BLVD	St. Margarets Centre	1,978,800*	88,152*	
1213/1215 COLE HARBOUR RD	Cole Harbour Activity Centre	8,322	5,963	
12390 HWY 224	Musquodoboit Valley Bicentennial Theatre & Cultural Centre	22,075**	15,810**	
1247 BEDFORD HWY	Fire House Youth Centre	17,786	16,799	
1300 ST MARGARETS BA RD	Enviro-Care	11,709	11,988	
134 PINECREST DR	Dartmouth North Community Centre	300,627*		21,467
1359 FALL RIVER RD	Gordon R. Snow Community Centre & Fire Station # 45	364,875		
14 HIGHWAY 336	Fire Station # 39	23,959	7,240	
14 PURCELLS COVE RD	Chocolate Lake Community Recreation Centre	85,080	28,521	
142 BEDFORD HWY		17,700	5,116	
1452 QUEEN ST	Queen Street Apartments (Transition)	3,086		
1492 ST MARGARETS BAY RD	Beechville Lakeside Timberlea Recreation Centre	60,400	23,001	
1496 BEDFORD HWY	Bedford Tower	59,175		
15 CONVOY RUN	Fire Station #8	199,980	27,059	
15 FORT SACKVILLE RD	Scott Manor - Fort Sackville Manor House	15,299	6,960	
15 MONIQUE	Gerald B. Gray Arena	719,600	14,294	
15 RAGUS RD	Bowles Arena	757,200	9,656*	
150 THORNHILL DR	Thornhill Transit Facility	522,936		82,758
15750 HIGHWAY 7	Fire Station # 31	10,401	3,623	
1581 BEAVERBANK RD	Fire Station # 48	182,759	47,812	
1588 BARRINGTON ST	Khyber Building	17,480	12,219	
160 WEST PENNANT RD	Fire Station # 63	14,395	1,982	
1606 Bell Road	Public Gardens Greenhouse & Power House	100,360		
1641 FAIRFIELD RD	St. Mary's Boat Club	64,320	11,088**	
1680 BELL RD	Wanderer's Grounds Parks Depot	103,580	12,715	27,684
17 CONRAD RD	St. Therese Community Centre	10,617***	5,267	
171 OAKMOUNT DR	HRM Admin Bldg/Salt Dome/Garage	116,180	65,535	
17559 HIGHWAY 7	Fire Station # 30	38,948	5,896	
1765 OSTREA LAKE	Fire Station # 25	18,829	4,220	
1800 BEDFORD HWY	Bedford Leisure Centre	16,275	5,707	
1807 CALDWELL RD	Fire Station # 16	241,120	24,890**	
182 STONEWICK CROSS	Stonewick Residential Building (Transition)	1,766		
1841 ARGYLE ST	Halifax City Hall	588,561	67,235	
191 JOSEPH ZATZMAN DR UNIT #3-4	Joseph Zatman Dr. Bldg (Corporate Administration)	23,400	3,483	
1929 ROBIE ST	Queen Elizabeth High School	77,028	146,951	
1955 TROLLOPE ST	Citadel Community Centre	21,703^	28,116^	
196 WAVERLEY RD	Waverly Road Fire Garage	108,240		
1970 GOTTINGEN ST	Centennial Pool	567,440	136,842*	

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[R] Value provided by HRM Rural Fire Services.

* Value provided by building operator.

** 2007 data used. Fuel numbers adjusted by accounting for Heating Degree Days in 2007 vs 2008.

*** Based on amount spent for electricity, and compared to power cost and kWh for building of similar size and use.

^ Based on building of similar size and use.

! Based on 2003 estimate and assumes 2/3 the cost of electricity.

ADDRESS	BUILDING NAME	POWER (KWH)	HEATING FUEL (L)	NATURAL GAS (CUM)
1975 GOTTINGEN ST	Halifax Regional Police Headquarters	1,818,600	225,542	
2 CHAPMAN ST	Northbrook Police Training Centre	301,288		39,450
2 OCHTERLONEY ST	Alderney Landing	667,214***	18,305	59,282
200 ILSLEY AVE	Ilsley Transit Facility	4,084,553		630,899
202 BROWNLOW AVE	Storage Facility	81,775		
2040 OLD GUYSBOROUGH RD	Fire Station # 47	23,842	13,682	
2050 HAMMONDS PLAINS RD	Fire Station # 50	78,120	9,130	
21 MOUNT HOPE AVE	Eric Spicer Municipal Building	1,991,890	130,187	
2101 PROSPECT RD	Fire Station # 52	26,905	8,380	
213 BISSETT RD	Works Depot	81,696***	18,260	
22 LAKESIDE DR	Fire Station # 43	23,461	8,823	
22 POWERS RD	Fire Station # 34	40,238	7,605	
22404 HIGHWAY 7	Macphee House	5,773	1,327	
22835 HIGHWAY 7	Fire Station # 28	25,545	13,688	
2285 GOTTINGEN ST	Halifax North Memorial Public Library	521,400		
230 PLEASANT ST	North Woodside Community Centre	129,674^	26,262	
2385 CROWELL RD	Fire Station # 19	30,243		
24 BROOKS DR	East Preston Recreation Centre	67,222	16,740	
24 GOVERNMENT WHARF RD	Visitor Information Centre	1,150		
240 DINGLE RD	Flemming Park Buildings	16,020	2,209	
2433 HIGHWAY 2 (LAKE THOMAS DR)	Fire Station # 41	33,289	12,600	
245 HERRING COVE RD	Fire Station # 6	36,280	12,266	
2501 GOTTINGEN ST	George Dixen Centre	107,920	12,753	
25718 HWY 7 DUFFERIN	Samuel R Balcom Community Centre	10,219***	8,256	
2578 WEST SHIP HARBOUR ROAD	Fire Station # 27	744[R]		
26 ELLIOT ST	Findlay Community Centre	80,828***	31,564	
26 MYRA RD	Fire Station # 58	64,969	13,292	
26 NEWCASTLE ST	Evergreen House Park - Alexander James	14,003	10,323	
26291 HIGHWAY 7	Fire Station # 33	10,517	2,173	
27 VIMY AVE	Centennial Arena	1,061,268	51,762*	
2748, 2786 AGRICOLA ST/ 2773 Roble St	Bloomfield Centre	245,460	146,051	
28971 HIGHWAY 7	Fire Station # 29	39,520	13,027	
28975 HIGHWAY 7	Moser River Community Centre	50,190		
2901 WINDSOR ST	Halifax Forum	2,050,328	246,949**	
2931 LAWRENCETOWN RD	Fire Station # 20	27,143	5,343	
30 JOHN BRENTON DR	Shubie Park Canteen Building	38,978		
3035 HIGHWAY 7	Fire Station # 21	38,383	9,555	
3168 HIGHWAY 7	Lake Echo Community Centre	89,833***	4,610	
3182 HIGHWAY 2	Fall River Recreation Centre (Transition)	7,127	5,989	
32 GLENDALE AVE	Glendale Library	28,800	9,940*	
32 RIVERSIDE AVE	Fire Station # 24	29,598	12,358	
3214 LAKE THOMAS DR (Hwy 2)	Fire Station # 45	24,084	3,746	
33 CRICHTON AVE	Crichton Centre	44,160	8,430	
330 LACEWOOD DR	Keshen Goodman Library	645,600	54,839*	
331 PLEASANT ST	Fire Station # 15	27,450[R]	2,337	8,978
3372 DEVONSHIRE AVE	Needham Community Recreation Centre	246,240	71,790	
3380 DEVONSHIRE AVE	Richmond Family Court		39,897	
3395 DEVONSHIRE AVE	Devonshire Arena	367,084	33,490	
36 GLENMORE RD	Fire Station # 38	25,111	15,316	
36 HOLLAND AVE	Dr. Gerald J. LeBrun Memorial Centre	959,880	13,954	
3610 PROSPECT RD	Fire Station # 54	58,620		
3646 HAMMONDS PLAINS ROAD	Tantallon Library	293,525	39,038**	
375 COWIE HILL EXT DR	HRM Parks and Grounds Depot	291,040	71,716	
3790 MACKINTOSH ST	Mackintosh Street Maintenance Services	87,119	30,768	
3825 MACKINTOSH ST	Public Works Building	490,080	95,936	
39 CORBETT RD	Fire Station # 35	24,117	13,571	
40 & 60 ALDERNEY DR	Alderney Gate	2,608,726		142,871
4032 MOOSELAND RD	Fire Station # 32	8,423		
409 GLENDALE AVE	Sackville Sports Stadium	3,023,941*	212,935*	
4132 HIGHWAY 2	Fire Station # 42	35,654	11,033	
429 COBEQUID RD	Cobequid Road Municipal Operations Facility	46,717	14,637	
43 WENTWORTH ST	Feeding Others of Dartmouth		4,159	
44 SIMMONDS RD	North Preston Community Centre	201,600	29,760	

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^ Based on building of similar size and use.

! Based on 2003 estimate and assumes 2/3 the cost of electricity.

ADDRESS	BUILDING NAME	POWER (KWH)	HEATING FUEL (L)	NATURAL GAS (CUM)
4408 ST MARGARETS BAY RD	Fire Station # 59	33,844	25,776	
4413 HWY 357 MEAGHERS GRANT	Fire Station # 36	23,402[R]	12,502	
45 CONNOLLY RD	Sackville Heights Community Centre	121,360	21,522	
45 HIGHFIELD PARK DR	Fire Station # 12	214,380	45,499	
45 KNIGHTSRIDGE DR	Fire Station # 7	142,932	71,355	
45 OCHTERLONEY ST	Dartmouth Seniors Centre	191,520	30,691**	
46 LAKECREST DR	Lakecrest Carpentry Shop	6,480	5,305	
47 WENTWORTH ST	Grace Hiltz (Transition)	2,043	7,318	
479 PATTON RD	Fire Station # 11	33,750	17,405	
50 CALEDONIA RD	East Dartmouth Community Centre	313,560		
5077 GEORGE ST	Halifax Ferry Terminal	300,540	30,303	
51 FOREST HILLS PKY	Cole Harbour Place	3,768,480*	355,811*	
51 OLD TRUNK RD	Fire Station # 26	39,020	9,343	
5251 DUKE ST	Duke Tower, Floors 3 & 4	227600!	40502*	
5284 DUKE ST	Halifax Metro Centre	6,594,048**	260,017**	
5381 SPRING GARDEN RD	Spring Garden Road Public Library	344,960	71,469*	
54 LOCKS RD	Fairbanks Centre	146,809		
5543 HIGHWAY 7	Fire Station # 23	52,668	18,792	
5663 WEST ST	Fire Station # 3	146,040	58,124	
5680 ST MARGARETS BAY RD	Fire Station # 57	4,590	4,721	
57 KETCH HARBOUR RD	Fire Station # 60	26,840**	6,011	
57 OCHTERLONEY ST	Quaker House Museum	6,525		
5711 SACKVILLE ST	Wanders Grounds greenhouses, sheds, furnace room building, header house	8,786	68,106	
5718 POINT PLEASANT DR	Point Pleasant Building #7	42,725	7,628	
5753 SACKVILLE ST	Public Gardens greenhouses, dry canteen	108,845		
5802 HWY 357 (ELDERBANK)	Fire Station # 37	23,131		
5816 COGSWELL ST	The Commons Pavillion	32,760	12,914	
5816 CUNARD ST	North Commons	3,891		
5830 LADY HAMMOND RD (DUFFUS ST)	Fire Station # 4	77,820	28,231	
596 LUCASVILLE RD	Wallace Lucas Community Centre	17,465	7,335	
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600 HIGHWAY 277	Fire Station # 40	10,428	8,930	
62 CALEDONIA RD	Beazley Park	91,688	28,590	
636 SACKVILLE DR	Acadia School/Sackville Public Library	617,520	17,818	
6691 FOURTH ST	Larry O'Connell Centre	5,348	5,661	
68 PARKHILL RD	Adventure Earth Centre	6,614	9,496	
6890 CHEBUCTO RD	Residence (Transition)	10,190		
690 MAIN ST (HWY 7)	Fire Station # 18	60,420	12,154	
6955 BAYERS RD	St. Andrews Community Recreation Centre	98,000	34,746	
7 WALKER AVE	Sackville Metro Link	213,120		
7090 BAYERS RD	Fire Station # 5	42,300	18,283	
711 POCKWOCK RD	Upper Hammonds Plains Community Centre	40,368	8,669	
7900 HIGHWAY 7	Musquodoboit Harbour Public Library	143,960	8,440**	
8 CAIN ST	Fire Station # 22	19,786	2,368	
80 GRONO RD	Riverline Community Centre	15,665	8,049	
80 SANDY COVE RD	Fire Station # 53	70,320		
81 ILSLEY AVE	Corporate Administration	212,525	7,049	
843 FALL RIVER RD	Fire Station # 44	37,446	9,938	
8579 ST MARGARETS BAY RD	Fire Station # 56	68,664	27,133	
86 KING ST	Fire Station # 13	58,260	46,935	
866 PORTLAND ST	Portland Hills Transit Facility	127,826		
88 ALDERNEY DR	Dartmouth Ferry Terminal	500,518	22,812	75,764
88A CRICHTON AVE/ 20 BOATHOUSE LANE	Oakwood House	6,403^	5,483	
9 ATLANTIC ST	Woodside Ferry Terminal	279,680	37,690	
9 SPRING ST	Bedford Teachery	5,855	5,252	
90 ALDERNEY DR	Halifax Regional School Board Offices	639,700***	6,074	46,123
947 MITCHELL ST	Environmental Depot	60,375	10,055	
948 POCKWOCK RD	Fire Station # 51	18,097	8,648	
964 KETCH HARBOUR	Fire Station # 61	11,553	3,456	

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^ Based on building of similar size and use.

! Based on 2003 estimate and assumes 2/3 the cost of electricity.

Progress Report

Greenhouse Gas Emission Reductions 2005-2011

Halifax Regional Municipality

Prepared by Lauralee Sim, Environmental Performance Officer
Sustainable Environment Management Office
http://www.halifax.ca/environment/semo.html
January, 2011

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Acronyms Used in the Report

eCO_2	Equivalent Carbon Dioxide
FCM	Federation of Canadian Municipalities
GHG	Greenhouse Gas
HRM	Halifax Regional Municipality
ICLEI	International Council for Local Environmental Initiatives
LAP	Local Action Plan
LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
NG	Natural Gas
NSP	Nova Scotia Power
PCP	Partners for Climate Protection

Greenhouse gases, Climate Change and HRM

Purpose of the Progress Report

Climate change is one of the world's greatest challenges this century and HRM is one of the many municipalities across Canada that have committed to reducing their contribution to the issue by reaching greenhouse gas (GHG) reduction targets. The purpose of this report is to record HRM's actions that have reduced corporate GHG emissions since 2002 and to assess HRM's progress toward reaching its target of reducing corporate emissions to 20% below 2002 levels by 2012. This report can help HRM look beyond 2012 and guide the development of new targets for the future. The progress report can also be used to apply for formal recognition of Milestone 5 completion under the Federation of Canadian Municipalities' (FCM) Partners for Climate Protection (PCP) program.

The report begins by describing HRM's GHG story since 1997 and analysing HRM's overall progress. It then reviews GHG savings from buildings, vehicle fleet and lighting initiatives and highlights key lessons learned and areas of opportunity in each sector. Careful consideration of these lessons will be helpful to HRM for the future and to other municipalities beginning their GHG reduction plans and actions. The report concludes with final notes on the necessity of thinking beyond the 2012 target and beyond corporate reductions.

What are GHGs and Why Pay Attention to Them?

Greenhouse gases have been naturally present in our atmosphere for millennia. They act as a blanket that enables plants and animals to survive where they otherwise would not. However, since the onset of the industrial revolution in the mid-nineteenth century, greenhouse gas levels in the Earth's atmosphere have risen at an unexpectedly high rate. The fossil fuels we burn (coal, oil and natural gas) to power electrical equipment, move vehicles and heat (and cool) spaces and water release GHGs into the atmosphere faster than the planet's natural systems can re-absorb them. After almost two centuries of emitting so many greenhouse gases, we are now feeling the effects of an intensified "greenhouse effect", which has led to what is commonly referred to as climate change. As global temperatures rise, HRM will see direct impacts such as sea level rise (HRM reviewed a number of scenarios and is using an estimated 73cm by 2100 in Halifax Harbour for planning purposes. Scenarios consider a combination of sea level rise and land subsistence along with projected emission scenarios by the IPCC, 2007[1]) and increased storm intensity (which, coupled with rising sea levels, could bring even more devastating results than recent Hurricanes Juan or Earl). See http://www.halifax.ca/climate/ClimateChangeIntroduction.html for more information about HRM and climate change impacts.

Despite the immensity of the global problem of climate change, every Canadian municipality has a significant role to play. The FCM estimates that municipal governments directly or indirectly influence about 44% of GHG emissions in Canada[2]. As the primary regulators of development and land use, municipalities shape the spatial

[1] Forbes et al. (2009). Halifax harbour extreme water levels in the context of climate change: Scenarios for a 100-year planning horizon Prepared for Natural Resources Canada. http://www.halifax.ca/regionalplanning/documents/OF6346final.pdf

[2] EnviroEconomics. (2009). Act Locally: The Municipal Role in Fighting Climate Change. Prepared for the Federation of Canadian Municipalities. http://www.fcm.ca//CMFiles/FCM_Climate_En_Final1RSG-1272009-2598.pdf

distribution of the economy, transportation system and energy use patterns. They also exert influence over waste management and building design. Finally, their high level of interaction with the community often makes engaging households and businesses easier for them than higher levels of government[3]. Preliminary approaches to municipal GHG reductions tend to centre on reducing energy demand for heating, cooling, transportation and power by increasing energy efficiency and simply using less. Another approach, replacing fossil fuel energy sources with renewable energy sources (solar, geothermal, wind, etc.), is becoming increasingly common. These approaches can all be associated with reduced fuel costs in the long term, so they ultimately not only save GHGs but they also save money.

Measuring GHGs

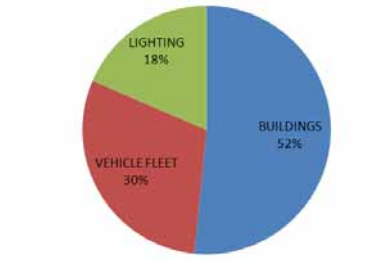
In order to effectively and strategically reduce its GHG emissions, HRM must know where its emissions are coming from. Measuring emissions and creating a baseline set of data enables a municipality to locate its most significant places for improvement and to track increases or decreases over time. By measuring emissions at a project level, HRM can evaluate the effectiveness of particular actions and learn where to put its efforts in future projects to gain further GHG savings. In a context where HRM has committed to actively reducing its emissions, GHG measurements are allowing GHG savings to play an increasing role in decision-making.

Most authorities recognize six greenhouse gases in the Earth's atmosphere[4]. Like other local governments, however, HRM measures three primary GHGs: carbon dioxide (CO_2), nitrous oxide (N_20) and methane (CH_4) because they are the most significant sources of emissions in community and government operations. Because each GHG has a different level of impact on climate change, in order to compare the gases they are measured in equivalent CO_2 (eCO_2) and reported in units of mass (usually tonnes in this report). For example, CH_4 has 21 times the impact of CO_2 so one tonne of CH_4 is equivalent to 21 tonnes of CO_2 (21 eCO_2).

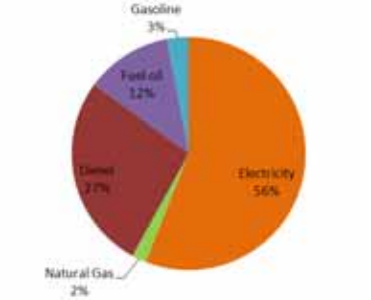
Where Do HRM's GHG Emissions Come From?

HRM corporate emissions primarily come from buildings, fleet and lighting (see below) and thus, HRM's actions are categorized by these sectors in this report. In terms of source, electricity is responsible for the largest proportion of HRM corporate GHG emissions; a result of Nova Scotia's significant reliance on burning coal to generate electricity[5]. GHG emissions also derive from diesel and gasoline (primarily used for transportation), fuel oil (used for heating and cooling buildings), and natural gas (used to heat buildings).

2008 Corporate eCO_2 Emissions by Sector[6]



2008 Corporate eCO_2 Emissions by Source[7]



[3] EnviroEconomics. (2009). Act Locally: The Municipal Role in Fighting Climate Change. Prepared for the Federation of Canadian Municipalities. http://www.fcm.ca//CMFiles/FCM_Climate_En_Final1RSG-1272009-2598.pdf

[4] water vapour (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), chlorofluorocarbongs (CFCs)

[5] Nova Scotia Department of Energy. (April 2010). Renewable Electricity Plan. http://www.gov.ns.ca/energy/resources/EM/renewable/renewable-electricity-plan.pdf

[6] Miedema, Shannon. (May 2010). HRM Corporate Greenhouse Gas Emissions Inventory 2008. http://www.halifax.ca/environment/documents/HRMCorporateGHGEmissionsInventory2008May2010ReducedFile.pdf

[7] Ibid.

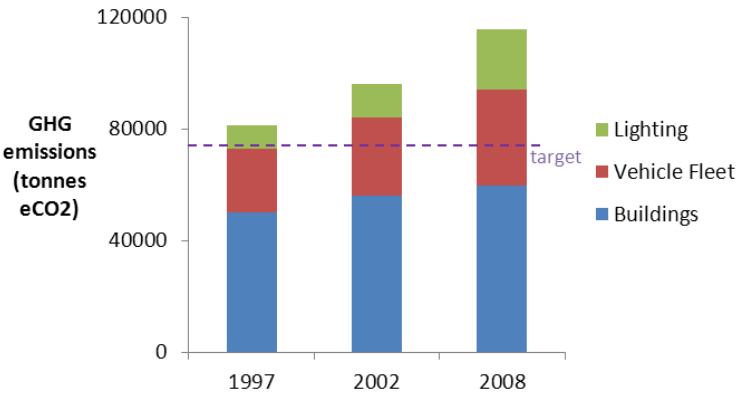
The HRM Corporate GHG Story: 1997-2011

Background

1997 marked the first of several landmarks for HRM when it became one of the first cities in Canada to join FCM's 20% Club and commit to reducing its GHGs 20% by 2012. The 20% Club evolved into "Partners for Climate Protection" (PCP), a joint initiative of the FCM and the International Council for Local Environmental Initiatives (ICLEI) that commits members to achieving five established milestones to reduce their corporate emissions and their community emissions[8]. By 2005, HRM had completed the first three milestones of the program in both the corporate and community spheres: it had completed GHG emissions inventories for the 1997 and 2002 fiscal years, refined its target to *20% below 2002 levels by 2012* and created two Local Action Plans (LAP) to Reduce GHG Emissions including one corporate LAP and one community LAP. HRM has been moving toward completion of milestone 4 (implementation of its LAPs) and is now ready to request formal recognition of milestone 5 completion in the corporate sphere.

As part of the PCP final milestone process, HRM carried out a 2008 corporate GHG inventory, which aimed to present a picture of GHG reduction progress. Unfortunately, the picture that emerged was not as good as many had hoped. Rather than revealing decreasing corporate emissions, the 2008 inventory showed that HRM was actually producing 20% *more* emissions than in 2002 (see below)[9].

Corporate Emissions 1997-2008[10]



[8] Federation of Canadian Municipalities. (2010). Partners for Climate Protection. http://fmv.fcm.ca/Partners-for-Climate-Protection/ The five established milestones are: 1) an inventory of GHG emissions, 2) reduction targets, 3) construction of an action plan, 4) plan implementation and 5) the recording of results.

[9] Miedema, Shannon. (May 2010). HRM Corporate Greenhouse Gas Emissions Inventory 2008. http://www.halifax.ca/environment/documents/HRMCorporateGHGEmissionsInventory2008May2010ReducedFile.pdf

[10] Note that in accordance with recent ICLEI GHG inventory protocol, this image does not include solid waste emissions. It also does not include wastewater and storm water emissions because Halifax Water has now become a separate entity from HRM. Transit emissions are included in the graph.

However, there was more to the story. First, data collection methods for 2008 were much more complex than for 2002. Therefore, while the 2008 inventory captured a more accurate picture of GHG emissions, it included more emissions sources. HRM now understands that its 2002 data was significantly underestimated. Unfortunately, with underestimated baseline data, assessing progress toward a corporate target is challenging (i.e. if HRM's actual emissions in 2002 were much higher than its estimated 2002 emissions, a 20% reduction would mean greater absolute reductions[11] than the LAP calls for). See the HRM Corporate Greenhouse Gas Emissions Inventory 2008 for more a more comprehensive discussion on the challenges of directly comparing HRM's 2002 and 2008 data[12].

Second, several factors beyond HRM operations have influenced local GHG emissions. Some have facilitated GHG reductions while some have escalated challenges to GHG reductions:

- HRM, one of the fastest growing regions in Atlantic Canada, grew from a population of about 362,700 in 2002 to 398,000 in 2009 (9.7% growth in seven years) leading to an increased demand for municipal services.
- Generous funding for capital projects from higher levels of government has spurred construction in HRM over the last five years. Therefore, HRM will have built more new buildings than anticipated before the target date of 2012. Despite impressive improvements in energy efficiency measures, new buildings have increased HRM's corporate emissions.
- Metro Transit's fleet has expanded significantly since 2002, partly in response to the adoption of the 2006 Regional Plan that stressed the importance of public transit in a sustainable future for HRM. Metro Transit kilometres travelled and service hours increased immensely from 2002 to 2010 (86% increase in kilometres travelled and 48% increase in service hours). HRM has even constructed a second large transit garage to hold its expanding fleet. A growing fleet comes with growing emissions but when considered in the larger picture, more transit service will likely correspond with fewer community emissions from the transportation sector.
- Wind energy in the province has not developed as quickly as anticipated. Without this renewable source of electricity, Nova Scotia continues to rely heavily on coal-generated electricity, which produces high amounts of GHGs. Currently, almost 80% of the electricity consumed in Nova Scotia comes from coal, petroleum-coke or fuel oil[13].
- The cost of non-renewable energy worldwide has risen, which has made energy efficiency projects more financially attractive.

Because of the challenges of directly comparing 2002 to 2008 data, this report compares *total GHG savings planned versus achieved* since 2002 in order to assess progress. As stated above, this approach cannot provide a complete assessment of HRM's progress toward its GHG target but the savings outlined in the 2005 Corporate LAP serve as a solid baseline in the absence of accurate 2002 data. The limitations of this method are reviewed in the final section of the report.

This approach allows for the inclusion of actions that have taken place/ will take place between HRM's most recent GHG inventory and the end of the 2010/11 fiscal year. Consequently, this analysis accounts for GHG reductions accomplished between April 2002 and March 2011.

[11] Absolute reductions refer to reductions based on a specified quantity, rather than reductions based on a percentage or a per capita value.

[12] Miedema, Shannon. (May 2010). HRM Corporate Greenhouse Gas Emissions Inventory 2008. http://www.halifax.ca/environment/documents/HRMCorporateGHGEmissionsInventory2008May2010ReducedFile.pdf

[13] Nova Scotia Department of Energy. (April 2010). Renewable Electricity Plan. http://www.gov.ns.ca/energy/resources/EM/renewable/renewable-electricity-plan.pdf

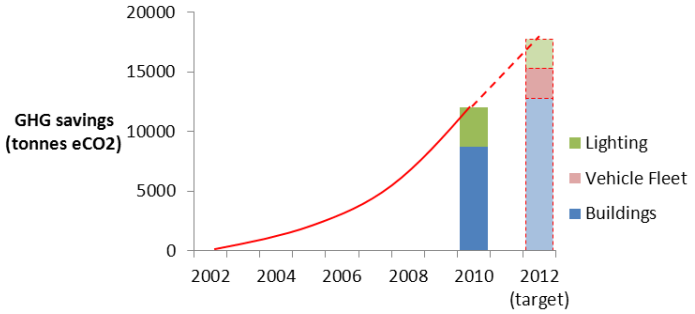
Most GHG savings reported here are estimates based on staff interviews and where possible, fuel use before and after particular actions. Staff consultations also provided information on the status of GHG savings initiatives, lessons learned and future opportunities.

Overall Corporate GHG Savings and HRM's Target

Collectively, all corporate actions to reduce GHGs since 2002 have resulted in at least 11,994 tonnes eCO_2 annual savings. Because the corporate LAP called for a total of 17,708 tonnes of eCO_2 annual savings, HRM has achieved 68% of the LAP savings two years before the target deadline.

If GHG savings were gained on a linear scale (an equal amount of savings achieved every year), HRM would not likely achieve its target; however, this has not been the case. Instead, new GHG savings have generally grown every year since 2002 implying that if this trend continues, it is possible that HRM will reach 17,708 tonnes eCO_2 savings by 2012. If staff keep up the determination and continue to build on lessons learned so far, there is a good chance HRM will achieve the savings the LAP called for by 2012.

Total GHG Savings and Target[14]



Savings have been achieved in each of the three primary sectors responsible for GHG emissions: buildings, vehicle fleet and lighting.

Building GHG Savings

HRM is on track with its building GHG savings. HRM has achieved about 68% of its targeted savings and staff are confident that their knowledge and experience will propel them forward at a faster rate in the coming years.

Vehicle Fleet GHG Savings

Vehicle fleet savings are more challenging to track because the most significant savings have come from policy and behavioural changes that are more difficult to quantify. Nevertheless, vehicle initiatives are making a difference and HRM's police, fire and municipal fleet have consumed less fuel every year since at least 2007.

Transit savings, while not discussed in the corporate LAP, warrant mention in this report because HRM has direct influence over certain aspects of transit emissions. Actions such as operator training, the purchase of more fuel-

[14] Despite a lack of data between 2002 and the present, the information in the "status" column in the appendices confirms that every year, a greater number of projects are completed. The red line on the graph represents estimated GHG savings from 2002 to 2011 based on this type of information.

efficient diesel technology and the installation of high efficiency thermal cooling systems in buses are responsible for avoiding more than 1700 annual tonnes eCO_2.

Lighting GHG Savings

Lighting is the only sector that will have surpassed its savings target two years early. The LAP called for 2442 annual tonnes eCO_2 savings but HRM will have reached 3300 annual tonnes eCO_2 savings by March 2011. With two years remaining, HRM has already overshot its lighting target by 35%.

The three sections that follow provide a more detailed analysis of the savings achieved in each sector. Appendices A, B and C list all of HRM's corporate GHG reductions actions and their associated savings. It should be noted that some initiatives cannot be associated with measurable savings. For example, the outcomes of newly introduced policies and practices that limit GHG emissions (e.g. Anti-Idling, Vehicle Right Sizing Filter) are difficult to quantify and are therefore not represented in the graphs below despite their definite contribution to GHG savings. Therefore, HRM's actual savings are likely slightly greater than the savings portrayed in the report.

Additionally, other important actions that influence GHG levels but do not fall under any GHG inventory protocol are not included in this report. The destruction or preservation of urban forests falls into this category because of a forest's natural capacity to absorb CO_2 from the atmosphere. HRM is currently completing an Urban Forestry Master Plan that aims to protect and enhance HRM's urban forests. Efforts such as these will also positively affect the amount of GHGs the municipality emits.

The final section of the report discusses the value and the meaning of these savings, within the larger context of greenhouse gas measuring and reporting in HRM.

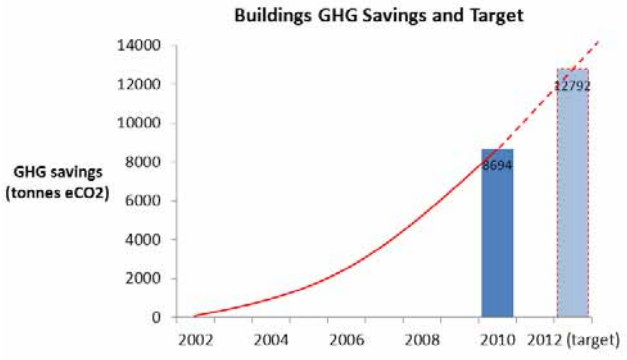
Building GHG Savings

More than half of HRM's GHG emissions come from heating, cooling, and powering its buildings, which means that buildings represent a significant opportunity for GHG savings. In 2008, HRM buildings were responsible for 59,620 tonnes eCO_2.

Acutely aware of growing GHG and energy issues, HRM staff have actively shifted their approach to designing and managing buildings over the last five years by focusing on improving energy performance. If it were not for their determination, HRM buildings would emit about 8,700 more tonnes of eCO_2 every year. By the end of the 2010/11 fiscal year, HRM will have achieved about 68% of the savings prescribed in the LAP. The momentum, experience and expertise that staff have gained thus far suggest that HRM's rate of GHG savings from buildings will only continue to increase into the future. Given this consideration, HRM is likely to meet its building GHG savings target by the end of the 2012/13 fiscal year.

Retrofits

More than 80% of current GHG savings from buildings are being derived from major and minor retrofits. Major retrofits such as natural gas conversions, refrigeration unit upgrades, lighting retrofits and heat recovery have taken place at several of HRM's largest buildings: Dartmouth Sportsplex, Metro Transit Facility (200 Ilsley Ave.), Alderney 5 Complex, Centennial Pool, Halifax Police Department, Sackville Sports Stadium and Cole Harbour Place. Collectively, these retrofits are saving HRM more than 4600 tonnes eCO_2 every year. See Appendix A for descriptions of energy upgrades at each of these buildings and their associated savings. Minor retrofits (including boiler replacement, insulation improvements, HVAC control upgrades, lighting retrofits, and the installation of vending misers) have contributed to almost 2600 tonnes eCO_2 savings.



Natural Gas

HRM is also currently converting several oil heating systems to natural gas (NG) heating systems. Though still a fossil fuel, the burning of NG emits less carbon dioxide per unit heat produced than oil or coal. It is therefore considered a "cleaner" fossil fuel. The distribution of NG is relatively new to HRM; in 2002, (HRM's baseline GHG year) the region did not have access to the gas but by the end of the 2010/11 fiscal year, about 16 HRM buildings (along with multiple private buildings) will generate heat from NG. Conversions (excluding conversions that have been part of major retrofits) are saving HRM almost 1500 tonnes eCO_2 annually.

New Buildings

As a result of the availability of provincial and federal funding, HRM has significantly increased capital spending on new buildings over the last five years. However, HRM's high rate of new building construction is expected to slow down in the coming years. Though every new building contributes to more emissions and increases HRM's total GHG output, new building designs are incredibly energy efficient. Staff estimate that today's building designs are at least 25% more energy efficient than the status quo 5-10 years ago. Significant savings are the result of design features such as geothermal heating (five years ago, HRM had no geothermal systems and by March 2011, it will have seven systems), high efficiency natural gas boilers, and heat recovery systems (e.g. a system designed to use the heat produced from ice generation to heat water and space). See Appendix A for more details about new building energy savings and efficiency features. Besides the concrete GHG savings, one of the most important effects of designing and constructing innovative new buildings has been the experience and expertise gained within HRM staff. With every new project, staff learn enough from their successes and challenges to apply their experience to the next project. Simultaneously, the consulting and contracting community capacity has also been growing, which will not only continue to assist future HRM projects, but also continue to spur progressive building projects in other regions of Atlantic Canada.

The indicator that most represents the considerable shift at HRM is the now common practice of designing and building to LEED Silver standards (Leadership in Energy and Environmental Design[15]). Few gave the LEED rating system much credit in 2005 but in the intervening years, HRM staff have fully acknowledged the system's ability to force important discussions between designers and clients. LEED is not a perfect system (for example, it does not yet recognize geothermal energy) but staff have found it an extremely useful tool to ensure that new HRM buildings are much more energy efficient and user-friendly than the status quo.

Lessons Learned

In the larger picture, HRM is now considered a leader in the region. The first step to gaining this status was hiring two internal energy auditors over the last six years. These positions have been integral to developing internal knowledge and capacity by investigating and implementing innovative energy projects, breaking down silos that separate business units, and kick-starting a building benchmarking procedure critical to monitoring HRM's progress. Outsourcing this work would not have produced the same results. Also essential to success has been the establishment of the Energy and Underground Services Reserve that fuels new energy projects with money saved from past energy projects (the reserve functions essentially as a piggy bank). As a sustainable source of funding, it ensures the availability of seed money to spark new energy projects.

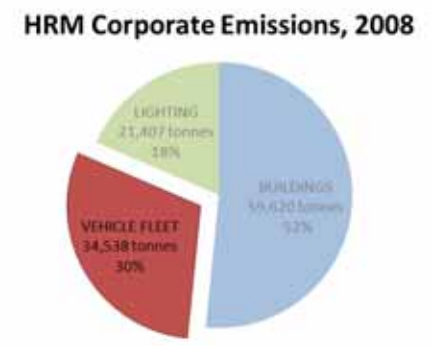
Not only is HRM reducing its contribution to global climate change, but HRM's building energy improvements have also brought financial savings because of reduced fuel and electricity requirements. This has been particularly important in the context of rising energy costs. The millions of dollars HRM has spent on energy projects, have given its taxpayers a return on investment in the range of 18.75%. Communicating this type of result has made energy projects even more attractive and justifiable and therefore, likely to continue in the future.

While HRM Facility Development staff continue to improve energy performance from a technical perspective, it is also important for building users to help reduce GHGs. Turning off lights and computers and turning the heat down by just a few degrees would go a long way toward further reductions. There is opportunity for HRM to investigate various ways of promoting energy-saving behaviour to employees and other HRM-building users.

[15] Information about LEED Canada can be found on the Canada Green Building Council website: http://www.cagbc.org/ Retrieved January 23, 2011

Vehicle Fleet GHG Savings

About 30% of HRM's corporate emissions derive from its vehicle fleet but of this 30%, only 22% come from police, fire and municipal vehicles. The remainder come from transit vehicles. Vehicle fleet GHG savings are more difficult to track than buildings or lighting because vehicle fleet initiatives at HRM have not been carried out in single, self-contained projects. Instead, most GHG savings have come from policy and procedural shifts. Even though the results of these shifts are more difficult to quantify, they represent a larger cultural shift in the organization and are likely to produce sustainable savings in the long term.



Transforming HRM's Fleet

HRM's fleet is transforming to become more fuel efficient. Smarter decisions about fleet purchases are being made with initiatives such as the Vehicle Right Sizing Filter and Life Cycle Analysis, which ensures that new vehicles are sized to match the use. The filter also ingrains fuel efficiency and emissions in the decision-making process. Fleet Services staff hope to augment the effects of this filter with the purchase of new computer software that will help track usage, maintenance and repairs to determine the ideal point at which to replace fleet vehicles. Additionally, they are developing a policy to ensure that under-utilized vehicles are reviewed and their necessity assessed.

HRM staff are also exploring alternative vehicles and fuels. 20-30 light gas vehicles have already been replaced with diesel units, which emit fewer GHGs per litre consumed than gasoline. HRM will be acquiring two hybrid SUVs before the end of the fiscal year and currently provides five Smart Cars for employee use.

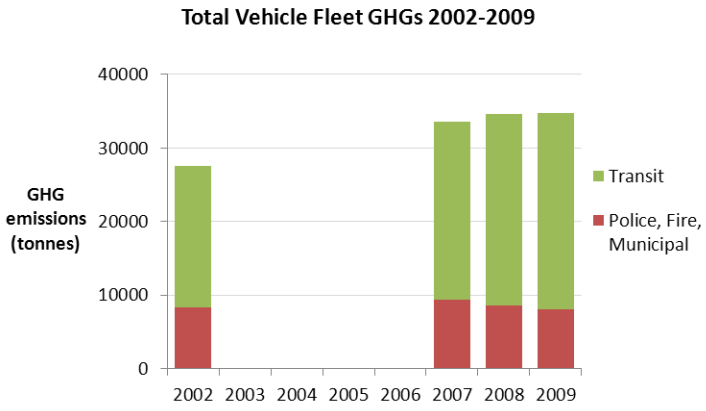
Shifting Driver Behaviour

Other fleet initiatives are transforming the way HRM's vehicles are driven. HRM has engaged Clean Nova Scotia to administer Fleet Wiser[16] and Drive Wiser[17] programs for HRM. While the implementation of the program has encountered several challenges, Clean Nova Scotia staff assert that each of the programs have the potential to lead to at least 5% fuel and GHG savings. Therefore, if administered across all fire, police and municipal services, HRM could see more than 400 annual tonnes eCO_2 savings if the programs are carried out and applied. These savings would also be associated with financial savings, so it is recommended that Fleet Services move forward with Clean Nova Scotia to implement these programs.

Further savings have been derived from an anti-idling campaign and internal policy to restrict idling to a maximum of one minute and to prohibit HRM staff from using drive-through services while operating HRM vehicles. Fleet Services is currently developing a policy to restrict employees from taking HRM vehicles home. This policy will restrict excessive and unnecessary trips and will therefore save fuel and avoid GHG emissions.

[16] Clean Nova Scotia. FleetWiser. Retrieved January 21, 2011: http://www.clean.ns.ca/content/Sustainable_Fleet
[17] Clean Nova Scotia. DriveWiser. Retrieved January 21, 2011: http://www.clean.ns.ca/content/DriveWiseR

Despite the fact that HRM's fleet savings to date have been difficult to quantify, fleet initiatives are indeed reducing fuel consumption and GHG emissions. HRM's police, fire and municipal fleet, have consumed less fuel every year since at least 2007 (see right). Given that many of the actions listed in Appendix B are still in progress, HRM can expect to continue to see fleet GHG savings in the coming years.



While HRM's large land mass requires that many buildings are distributed across the region, transportation costs (financial, energy and GHG costs) should be considered when siting new facilities or relocating existing ones. The integration of this type of thinking into office and facility siting will further support the GHG reductions already being made within the fleet sector.

Transit

About 78% of HRM's vehicle emissions come from transit vehicles. In fact, Metro Transit vehicles were responsible for 23% of all corporate emissions in 2008, making transit a key venue for GHG reductions. However, transit is a prime example of the intricate link between corporate and community emissions. Whereas increased transit service will result in greater corporate emissions, it will also lead to fewer community emissions from the transportation sector (from residents choosing to ride a bus over driving a single-occupancy personal motor-vehicle). Transit emission reductions were considered in HRM's *Community* LAP, but because HRM has direct influence on emissions from transit vehicles, some reduction initiatives are included in the progress report (particularly, those related to its fleet and operations).

HRM's most significant GHG savings come from a new transit operator program called Smart Driver. Under the program, transit operators learn driving techniques that save fuel and avoid excess GHGs (e.g. reduced idling techniques, ideal acceleration rates). Metro Transit is hoping to train all of its operators by the new fiscal year. A pilot project in 2010 demonstrated a 6% improvement in fuel economy and when this is applied to the entire fleet, Metro Transit will likely see GHG savings in the range of 1600 annual tonnes of eCO_2.

In addition to operator training, Metro Transit's fleet is continuously becoming more fuel efficient. Improvements in North American diesel engine technology have resulted in fewer GHG emissions per kilometer travelled, implying that as Metro Transit replaces old buses with new units, its fleet will emit fewer GHGs per bus on average. In fact, new diesel technology saves almost as much fuel as modern hybrid technology. Metro Transit currently operates two hybrid buses but expects that its future fleet will consist primarily of efficient diesel vehicles rather than hybrid units.

Finally, Metro Transit is installing "mini-hybrid" systems in some of its vehicles. The system is a high efficiency thermal cooling system for municipal buses that reduces fuel consumption by about 10%. HRM will have installed 12 systems by the end of the fiscal year, which will save about 102 tonnes eCO_2 in total.

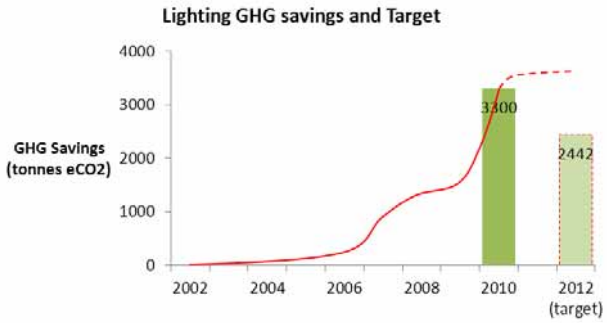
By the end of March, 2011, Metro Transit will be avoiding more than 1700 annual tonnes eCO_2. See Appendix B for details about each initiative and associated GHG savings.

Lighting GHG Savings

Street lights, traffic signals and sportsfield lights are collectively responsible for about 18%, (21,407 tonnes eCO_2 in 2008) of HRM's corporate GHG emissions. While HRM does not have direct control over the sources of energy used to generate the electricity required to operate these outdoor lights, HRM can influence how efficiently its lights use the electricity. So far, HRM's primary GHG savings have come from new technology made available in the last five years: high efficiency LED (Light-Emitting Diode) traffic lights and LED street lights. By the end of the current fiscal year, HRM will be saving a total of 3300 tonnes annually, which is 35% more than the lighting GHG savings called for in the LAP.

Traffic Signals

LED traffic signal lamps are about 84% more efficient than equivalent incandescent lamps. By the end of March, 2011, all of HRM's approximately 260 traffic signals will have been converted to LED technology, which will save the municipality about 2,371 tonnes eCO_2 every year.



Street Lights

The 2500 LED street light conversions that will have been completed by March, 2011 will avoid an additional 929 tonnes eCO_2. LED street lights reduce energy consumption by an average of about 60% over traditional incandescent lamps.

If all of the 15,000 HRM-owned and operated street lights within its boundaries were to be converted, the municipality could avoid 5574 tonnes eCO_2. High costs and long payback periods however, are significant barriers to more conversions. Fortunately, other entities are interested in similar projects. First, a local firm, LED Roadway, recently requested funding from the Sustainable Development Technology Canada (a foundation created by the federal government to finance and support new, clean technologies) to test new specialized LED street light technology that comes with the possibility of greater control over lighting levels. With the ability to dim street lights, HRM could save electricity, money and GHGs by reducing lighting levels when possible, and therefore reduce total electricity demand. If granted funding, the local firm will convert 2400 incandescent HRM street lights to the new technology. Second, Nova Scotia Power (NSP) is considering converting its street lights across the province to LED lamps. Of the 40,000 street lights in HRM, NSP owns about 25,000 units (HRM owns and operates the remaining 15,000), but because HRM covers the cost of electricity and these units are included in the corporate GHG inventory, NSP's LED initiative would have significant impacts in HRM. The conversion of 25,000 incandescent lamps to LED lamps would save about 9290 tonnes eCO_2 annually.

Sportsfield Lights

HRM has not yet implemented any sportsfield lighting initiatives that would bring energy savings. Sportsfields require higher lighting levels than streets and LED technology cannot currently produce the required sportsfield levels. GHG savings from sportsfield lighting will therefore likely come from changes in how HRM *manages* this type of lighting, rather than lamp conversions. For example, sportfield lights are turned on with an automated control system and cannot be turned off unless a staff member is physically present at the field to turn the switch. While HRM has not yet invested in a control system that would allow staff to manage lights from a central office, the technology to do so currently exists and is being used in other cities. This is one avenue to explore to achieve further GHG savings from lighting.

Policy

Besides the hard GHG savings accumulated from LED technology, HRM is also working on adjusting the current Sub-division Bylaw to require developers to install LED street lights and accommodate underground wires in new subdivisions. The LED street lights will reduce electricity demand and the underground wiring requirement would force developers to design more efficient street lighting.

Lessons Learned

HRM staff stress that the 3300 tonnes eCO_2 savings accomplished so far could not have been achieved alone. They attribute HRM's success to acting quickly on funding opportunities as they have arisen. For example, the payback period for the street light conversions would have been about 12 years if HRM had covered 100% of the costs. By obtaining funding from the provincial government and NSP, however, HRM reduced the payback period to 5-6 years, which was more palatable under a tight municipal budget. Staff will continue to seek unique funding opportunities to continue reducing lighting energy demands.

Moving Forward

HRM is becoming increasingly better and more efficient at delivering GHG reduction projects. Already, HRM has seen its small projects lead to bigger and more ambitious initiatives. HRM is also increasing its financial capacity to deliver these types of projects through its continuously growing energy efficiency reserve piggybank. These trends have ensured that GHG savings have not grown linearly, but rather, increased exponentially. With reason to believe that these trends will continue, it is possible that HRM will achieve the total GHG savings the Corporate LAP called for.

However, by just reaching its "savings target", HRM will *not* achieve its GHG reduction target of 20% below 2002 levels by 2012. With significantly underestimated 2002 data, it is difficult to say precisely how much eCO_2 HRM needs to save to reach its target, but it is certainly more than the 17,708 tonnes the LAP called for (which was to reduce HRM's absolute emissions to 18.4% below the estimated 2002 levels).

HRM must strive to achieve its target in absolute terms because the planet and its atmosphere are only affected by actual emissions produced, regardless of population growth or economic factors that might spur building construction. In other words, the quantity of emissions avoided does not matter; rather, *absolute* emissions are the bottom line. While a lack of accurate data did not permit a focus on absolute reductions in this report, continued GHG measurements in the coming years will permit stronger analyses and give the municipality a clearer picture of areas of opportunity.

Looking beyond 2012, HRM should now focus on setting a new target for 2020. First, HRM should consider adjusting the base year from 2002 to 2008. The higher quality baseline data will enable HRM to set an ambitious but achievable target, develop a realistic action plan to reach the target and better assess progress along the way. Second, HRM should look to the Province of Nova Scotia for guidance. The Province has a legislated target of reducing GHG emissions to at least 10% below 1990 levels by 2020. It is also aiming to see 25% of its electricity generated from renewable sources by 2015. As the largest municipality in Nova Scotia, HRM should align its goals with provincial targets to help achieve success on a larger scale. Third, HRM should consider excluding transit emissions from its target because transit service expansions (which are usually associated with increases in emissions) help reduce transportation emissions from the community. Slight increases in transit emissions are therefore acceptable. After setting a target, HRM must develop a corporate action plan to help it achieve its goal. This progress report outlines several opportunities for further reductions in each sector and therefore, offers a place to start.

As HRM continues to get its house in order, it is already beginning to boost its efforts to influence the community sphere through integrating land use and transportation planning, influencing the design and construction market, and creating unique programs for community members and businesses to participate in. Given that 98% of emissions in the region fall under the responsibility of the community rather than municipal operations, the community is where the most significant changes must occur. HRM must soon update its community GHG

inventory. Similar to the corporate process, HRM can then assess the community's progress on LAP implementation, establish a 2020 target, and engage the community to develop a plan to get there.

There is no doubt that HRM has come a long way and that its staff have gained experience and knowledge that will prove invaluable as it continues to reduce corporate GHG emissions. With continued effort, HRM can do its part to mitigate the effects of climate change and inspire its residents and other municipalities to do the same.

Contributors

Thanks to all who participated in gathering information critical to this progress report.

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Appendix A: Building GHG Reduction Initiatives and Savings

Initiative (LAP actions indicated)	Status	Description	Annual eCO_2 savings (tonnes)	Notes
Major Projects				
Dartmouth Sportsplex (B1, B5, B15b)	Complete	Installation of Jet Ice to raise freezing temp of water (1996), energy management computer on pool HVAC system (1997), lighting retrofit (2000), refrigeration plant heat recovery system (2001), retrofit of pool HVAC dampers (1999), door retrofits (1999-2004), electric eye showers (2002), electronic time urinal flushes (2003), refrigeration plant retrofit (2003), oil to NG (2008)	1100	1100 annual tonnes from the retrofits achieved since 2002. A large portion of these savings are from the NG conversion and the refrigeration plant retrofit
Metro Transit Facility Energy Performance Contract (B4, B15b)	Phase 1 is complete; Phase 2 to be complete by the end of 2010	After the completion of both phase 1 and 2, the Metro Transit Facility will have seen: oil to NG conversion, lighting retrofits in offices and garage, replacement of air handling units with new units that recover heat, paint shop conversion from propane to NG, replacement of A/C unit with more efficient unit.	1100	550 tonnes from phase 1, 650 tonnes from phase 2
Alderney 5 (B10, B15a1, B15b)	Virtually complete; two more buildings to be added to cooling system	Oil to NG conversion, geothermal cooling, lighting retrofits in Alderney Gate and Ferry Terminal	900	50 more tonnes will be saved after adding remaining two buildings to geothermal cooling system
Centennial Pool and Halifax Police Department (B15a1, B15b)	To be complete by March 2011	Oil to NG conversion, heat recovery from pool to heat water and space, district heating, solar heating	446	180 tonnes from pool, 201 from HPD, 65 tonnes for solar heating
Sackville Sports Stadium (B15a1)	Phase 1 to be complete by March 2011; Phase 2 to be complete by March 2012.	New energy management system, new pool dehumidification/heat recovery, lighting retrofit	80	80 tonnes of savings from phase 1; phase 2 will bring 300 tonnes of savings
Cole Harbour Place (B15a1)	Complete	Oil to NG conversion, new energy management system, lighting retrofit, heat recovery to heat water and space	1000	
Total GHG savings from major projects 2002-2011			**4626**	

Natural Gas (NG) conversions				
Oil to NG conversions (B9, B15a2, B15b)	Complete	Woodside Fire Stn; Kings St fire Stn; Highfield Park Fire Stn; Dartmouth North Community Centre; Public Gardens Greenhouses; Northbrook Community Centre/School; 150 Thornhill Dr. (Metro Transit Garage)	399	Does not include NG conversions in major projects.
Oil to NG conversions (B9, B15a2, B15b)	To be complete by March 2011	Halifax Ferry Terminal, St. Andrew's Community Centre	79	
Halifax Metro Centre (B15a1, B15b)	Complete	Oil to NG conversion	1000	HRM does not operate the Metro Centre but gave money for the conversion.
Total GHG savings from NG conversions excluding major projects			**1478**	

Minor Retrofits				
North Branch Library (B2)	Complete	Lighting retrofit	60	North Branch Library was one of HRM's few stand-alone lighting retrofits.
Efficiency NS-funded lighting retrofits (B14)	To be complete by end of the current fiscal year	40 small buildings will undergo lighting retrofits this year under Efficiency Nova Scotia's "Small Business Lighting Solutions" program.	1500	Efficiency Nova Scotia is covering 80% of the costs to replace old light bulbs with new efficient ones.
Vending Misers	Installed at 30 vending machines in HRM buildings	Vending misers are small pieces of equipment that power down vending machines when no motion is detected and repower the machine only when needed.	30	Vending misers have had minimal impacts on our overall corporate GHGs but when applied to the community, 10,000 tonnes eCO_2 could be saved (i.e. if all vending machines in HRM, both public and private, were to use vending misers).
General building retrofits (B3, B15a1, B15a2)	Complete	Various efficiency measures (high efficiency boilers, insulation, new windows, HVAC controls, lighting) have been implemented in several small buildings including five fire stations and the Captain Spry Community Centre.	1000	
Total GHG savings from energy efficiency projects			**2590**	

New Buildings				
LEED Silver standard for new buildings (B15c)	Ongoing	Building to LEED Silver standards is now common practice for new HRM buildings.	-	This practice represents a significant corporate culture shift over the last five years. Staff recognize that LEED is not a perfect measure of the ideal building but they understand that it is a useful tool. They also note that LEED does not always imply fewer GHGs (e.g. large glass buildings require more heat than a well-insulated building in cold climates; geothermal technology does not garner any points).
Geothermal heating in new buildings (B11, B15c)	4 complete at end of 2010; 3 to be complete by March 2011	Gordon Snow, East Dartmouth Community Centre, Prospect Road, Alderney 5 (geothermal cooling)	-	HRM is a leader in the region. Five years ago, HRM had no geothermal projects.
New energy efficient buildings	Ongoing	e.g. Canada Games Centre (LEED Silver, 200 solar panels water heating, solar air ducts, , high efficiency NG boilers, heat recapture, heat pumps); 4-Pad Arena/BMO Centre (heat recovery, NG boilers); Ragged Lake Transit Facility (LEED Silver, reduced lighting demand)	-	Most new buildings are contributing to increasing HRM's total GHGs but their design lessens their impacts on corporate GHGs.
Overall new building savings			**25%**	**HRM's new buildings are using at least 25% less energy than they would if HRM staff were not actively trying to reduce corporate building energy demands**

Other initiatives (administrative, and policy)				
Building rationalization program (B6)	To be completed by end of March 2011	The Building Rationalization Program is an effort to investigate buildings in HRM's inventory to assess which buildings are under HRM's responsibility.	-	Additional buildings in HRM's inventory affects the amount of emissions in its GHG inventory.
Wind Energy Regulations (long term goal in LAP)	Proposed plan amendments will to go to Council in early 2011	HRM is working on new wind energy regulations that will clarify where and how small and large scale wind turbines can be built in HRM. The proposed amendments to Land Use By-laws will make it easier to develop wind turbines under some conditions and therefore promote the use of this renewable source of energy.	-	

Investigated but not currently implemented				
Six Energy Performance Contracts (EPCs) (B8)	EPCs have not been implemented	LAP calls for EPCs at City Hall, Halifax Police Station, Halifax Main Library, Eric Spicer Building, Alderney Gate Complex, and Captain Spry Building.	-	HRM is continuing to improve energy performance on its own, which has proven more effective than outsourcing energy efficiency projects through EPCs. Several of the buildings recommended for EPCs have undergone retrofits through other mechanisms.
Biofuel in buildings (B12)	Investigated but not implemented	LAP suggested using biofuel rather than oil to heat municipal buildings.	-	HRM carried out trials and research to understand the implications of using biofuel instead of oil to heat buildings. Staff found that the operational risks did not outweigh the financial and energy/GHG return.
Waste oil recovery for use in boilers (B13)	Investigated but not implemented	At the time of the LAP's development, HRM staff were looking into re-using waste vehicle oil to heat buildings (for example, re-using oil from buses to heat the transit garage).	-	Staff ultimately found the payback too small for the level of effort required to put an oil-reuse system in place.
Green power purchase (B16)	No longer available	At the time of the LAP's development, HRM could have purchased a portion of their electricity from NSP as green power (It could purchase a block of wind energy to be delivered to the power grid system where it would displace an equal amount of electricity derived from fossil fuel).	-	Green power in this form is no longer available from NSP.
Community Energy project (B7, B15b)	Investigated but not implemented	At the time of the LAP's development, HRM was discussing the creation the first of three "energy nodes" that would form a skeleton community district energy system.	-	Funding issues halted the project but the discussion led to other positive projects and relationships.
Green office/ employee policy (B17)	Not completed	The LAP suggests gathering basic info to track progress on energy initiatives (turning off lights, computers, etc.), paper, transport, and procurement of office equipment.	-	While these types of initiatives have not yet been carried out, they have potential to significantly affect a building's GHG emissions.
Buildings Energy Management Plan (B15a, Appendix D of LAP)	Not completed in a formal manner	2005 LAP suggests tracking building energy features like utility bills and trends, reviewing skin and exterior insulation values, inspection of doors, walls and window conditions, checking building mechanical equipment and systems and electrical equipment systems.	-	HRM does this as best as it can on an ongoing basis but does not have the staff resources to thoroughly inspect all corporate buildings with an energy efficiency lens.

Appendix B: Vehicle Fleet GHG Reduction Initiatives

Initiative (LAP actions indicated)	Status	Description	Annual eCO_2 savings (tonnes)	Notes
Transforming HRM's Fleet				
Replace gas vehicles with diesel units (VF2)	20-30 vehicles will have been replaced by the end of the current fiscal year	HRM has begun replacing light duty gas vehicles with diesel units.	-	Savings directly attributed to this initiative are difficult to estimate because of the range of distances various vehicles travel and the range of fuel they consume.
Explore alternative fuels and vehicles (VF8)	Ongoing	HRM will be acquiring two hybrid SUVs before the end of the fiscal year. HRM staff have also investigated using compressed natural gas to fuel motor vehicles but the infrastructure costs are currently far too great to justify the investment.	-	Savings have not been recorded yet and are difficult to predict.
Smart Cars	Five Smart Cars purchased	When an employee drives a Smart Car to a meeting rather than, for example an SUV, they are responsible for fewer GHG emissions. HRM is currently examining the benefits of the Smart Cars and ways to better promote their use to employees.	-	GHG savings are difficult to estimate because it is hard to know whether a Smart Car trip would have otherwise been taken in a car, an SUV, transit, other mode, or even taken at all. The primary purpose of the Smart Car fleet is to offer a way of getting to and from work-related meetings so that staff can walk, cycle or ride the bus to work (and not feel that they need a personal vehicle for work purposes).
Vehicle Right Sizing Filter and Life Cycle Analysis (VF10)	Filter is currently being used	The Vehicle Right-Sizing Filter was designed to ensure that HRM purchases vehicles that are appropriately sized for the intended use. It includes an SUV justification form that ensures a real need for an SUV before its purchase. The Life Cycle Analysis ensures that vehicle purchase decisions are made with fuel efficiency and emissions in mind.	-	GHG savings are difficult to estimate. After being used for about one year, HRM is already seeing a shift in how we purchase vehicles.
Vehicle Use Policy (VF1, VF6)	Policy currently being developed	Since 2002, HRM's fleet has grown by about 100 vehicles to meet increasing community service demands. However, staff are currently developing a Vehicle Use Policy that could lead to fleet downsizing. For example, one vehicle may adequately replace three vehicles that travel less than 10,000km/year.	-	
Improve vehicle efficiency with computer software (VF4, VF10)	RFP currently soliciting proposals	HRM would like to invest in software that would help track vehicle usage, maintenance and repairs in order to determine the ideal point at which to replace fleet vehicles.	-	Generally, replacing vehicles will reduce overall fleet emissions because newer models are usually more efficient. Greater fuel efficiency also implies greater cost savings.

Shifting Driver Behaviour				
Adopt an HRM fleet driver training program (VF5)	In progress but may not be complete by March 2011.	HRM has engaged with Clean Nova Scotia to implement FleetWiser and DriveWiser programs. The programs would instruct fleet managers and supervisors on how to manage vehicles to achieve maximum fuel efficiency and municipal operations drivers on driving techniques to improve fuel efficiency. Clean Nova Scotia expects the program to realize at least 5% fuel (and GHG) savings. If the techniques were applied to the entire municipal operations fleet which generally produces emissions in the range of 5000 tonnes, a 5% savings would lead to 250 tonnes eCO_2 savings per year. If applied to all municipal, police and fire vehicles, HRM could see more than 400 tonnes eCO_2 savings per year.	-	As of Dec 2010, Clean Nova Scotia had gathered baseline fuel consumption data and given two municipal planning supervisor workshops. Clean Nova Scotia hopes to run a pilot project over the next few months and monitor fuel savings in 8-16 light duty vehicles.
Anti-idling campaign and policy (VF7, VF10)	Community-wide anti-idling campaign in 2006; Internal policy adopted in 2008.	HRM has adopted an anti-idling policy for all employees using HRM vehicles, including transit vehicles. Its central idling limitation states that "vehicles shall be shut down whenever idling periods are expected to exceed one (1) minute". HRM also used community-based social marketing to conduct a community-wide anti-idling campaign in 2006.	-	GHG savings are difficult to estimate because the reduction in idling is nearly impossible to quantify. However, several staff members claim to have witnessed a shift in behaviour, which indicates at least partial compliance with the policy
Reduce unnecessary vehicle use (VF5)	Policy currently being developed	Staff are currently developing a policy that would restrict employees from taking HRM vehicles home. This policy would restrict excessive trips in HRM vehicles and therefore save fuel and avoid GHG emissions.	-	

Transit				
Transit vehicle replacements	Ongoing	Diesel engine efficiency improvements over the last few decades have resulted in fewer GHG emissions per km travelled. Therefore, as transit buses are replaced with newer, more efficient units, HRM's transit fleet will emit an average of fewer GHGs per unit. New diesel engine buses save almost as much fuel as hybrid buses.	-	GHG savings are difficult to estimate. New heavy-duty vehicle greenhouse gas emission regulations (proposed for 2014 and newer models) will further improve transit-related emissions.
Mini-hybrid systems for buses	Systems installed in 4 buses; 8 more to be installed by March 2011	The Mini-Hybrid Thermal System is a high efficiency, next generation thermal cooling system for municipal transit. Retrofitted transit vehicles use up to 10% less fuel and therefore, save about 10% GHGs.	102	The 12 systems save a total of about 102 tonnes eCO_2 annually. Each system saves an average of 3100 L fuel per year (37200 L total), which would produce 102 eCO_2 tonnes.

Hybrid buses	Two hybrid buses are currently in use	With help from the provincial government, Metro Transit put 2 hybrid buses on HRM streets in March 2010. The hybrid buses use up to 30% less fuel than regular buses.	46	
Transit operator training program (VF5)	Currently training new drivers and will bring in all operators by new fiscal year	The Smart Driver Program teaches transit operators efficient driving techniques that save fuel and GHGs.	1638	Expected tonnes eCO_2 from transit in 2010/11 = 27306 (based on estimated 10,000,000L of fuel consumed). 6% of total transit fleet eCO_2 is 1638 tonnes.
Total GHG savings from transit			**1786**	

Investigated but not currently implemented				
Biodiesel fuel initiative (VF3)	Initiated but terminated when supplier could no longer provide the fuel	HRM began using biodiesel in its fleet in 2004. After sorting through quality issues, fleet services recognized that the fuel did emit fewer GHG emissions than regular diesel. Unfortunately, HRM's supplier no longer produces the fuel so HRM diesel vehicles are once again using regular diesel.	-	

Note that commuter initiatives such as commuter trip reduction program and parking incentives for alternative fuel or vehicle use are not included because emissions associated with these activities will be included in community inventories and action plans in the future.

Appendix C: Lighting GHG Reduction Initiatives and Savings

Initiative (LAP actions indicated)	Status	Description	Annual eCO_2 savings (tonnes)	Notes
More efficient lighting				
LED traffic signal program (SL1, SL2, SL5)	All HRM traffic signals will have been converted by March 2011	LED traffic signal lamps save up to 85% power. Beginning four years ago, HRM began converting all of its approximately 260 traffic signals (set of lights at an intersection) to LED lamps with the help of provincial and NSP funding.	2371	993.8 tonnes were saved from the conversion of the first 109 signals and 1376.8 tonnes are being saved from remaining 151 signals.
LED street lights	300 street lights converted to LED in 2008; 2200 more to be converted by March 2011	LED technology in street lights is relatively new. By March 2011, HRM will have converted about 2500 of the 15,000 street lights it owns and operates (16.7%).	929	HRM's street light GHG savings have come from two sets of conversions: 111.5 tonnes from the first 300 conversions and 817.7 tonnes from the next 2200 conversions. HRM pays to power an additional 25,000 street lights within its boundaries that NSP owns. Note that NSP is considering converting its lights in the rest of HRM and the province to LED over ten years, which would save HRM even more GHGs.
		TOTAL	**3300**	**This is 35% more than what the 2005 LAP called for**
Changing policy				
Regulations for new subdivisions (SL8)	In progress	Staff are working on proposed Sub-division Bylaw amendments that would require developers to plan for underground wires and LED street lights. An underground wiring requirement would force developers to design street lighting more efficiently.	-	
Investigated but not currently implemented				
Solar-powered bus stop lighting (SL3)	Pilot project initiated	In 2005, HRM piloted Carmanah Technologies solar-powered LED bus stop lighting system i-STOP on bus stop poles. Unfortunately vandalism deterred staff from purchasing more and extending the project.	-	
Solar-powered transit shelter lighting (SL4)	Pilot project initiated	Metro Transit has purchased one solar-powered light to date. Solar powered lighting is generally offered as an extra option by transit shelter manufacturers but at a significant cost. HRM has not committed to purchasing more solar lighting at this time.	-	

Solar-powered LED street lights (SL7)	Not initiated	Solar LED street light technology is currently available but it comes at a significant cost. While solar may be useful in remote areas, there is no economic justification for their purchase in serviced areas at the present. Their payback period is much longer than electric LED technology.	-	
Decrease hours of operation (SL6)	Not initiated	Reducing lighting operations by 15 minutes per day was expected to save up to 228 tonnes per year, according to the LAP.	-	HRM has not reduced its lighting operation times because it follows national guidelines in order to avoid liability issues. The national guidelines are currently being reviewed but are out of HRM's control. However, new street light technology that will allow greater control over lighting, including the ability to dim street lights may contribute to more savings. A local firm, LED Roadway, has recently applied to Sustainable Development Technology Canada for funding to test this new technology in 2400 street lights in HRM. Should this initiative successfully go forward, it could more than double the street light GHG savings HRM has already seen.

Stakeholder and Decision-Maker Engagement

Stakeholder and decision-maker engagement on GHG issues and the PCP Milestone process has not taken a formal structure at HRM. While working groups and particular individuals have, at various times, moved the milestone process forward, HRM believes that a de-centralized approach is ideal for fuelling deep cultural shifts toward concern for climate change and GHG reduction within the organization.

Since 1997, HRM's primary decision-makers, members of Regional Council, have taken a rising interest in greenhouse gas reduction, particularly because of HRM's increasing familiarity with intense storms and rising sea levels resulting from climate change. HRM's GHG reduction target is frequently referenced in reports and recommendations to Council, which has further ensured that GHG emissions are considered in decision-making processes. The Energy and Underground Services (EUGS) Committee (a committee of seven councillors that met every month until recently) served as a key tool to engage Regional Council on these issues. In a committee setting, staff were able to engage councillors in meaningful discussions about the implications of greenhouse gases and the importance of energy performance improvements. The Councillors on this committee were then able raise critical issues in an informed manner at the Regional Council level. In December 2010, the EUGS Committee transformed into the Environment and Sustainability Committee, which will serve a similar function in terms of engaging Council on GHG-related topics.

HRM staff have largely led the way in the PCP Milestone process. As a consultant prepared HRM's Corporate Local Action Plan to Reduce GHG Emissions, staff formed a temporary working group to better understand HRM's opportunities and challenges and support the development of the Local Action Plan to Reduce GHG Emissions (LAP). The implementation of the LAP has been carried out by staff in various departments. While there is still plenty of progress to be made, the overlapping goals of saving money, decreasing fuel consumption and reducing GHG emissions have begun to tear down traditional silos that separate municipal departments. Completion of the final milestone enabled one more opportunity for staff engagement. In late 2010, staff members responsible for corporate LAP actions were interviewed about progress and lessons learned thus far. Primary themes that emerged from these interviews are included in the 2011 Progress Report, which will be presented to the Environment and Sustainability Committee in March, 2011.

Finally, it is worth noting that HRM is now working more closely with contractors than ever before to ensure the success of energy efficiency projects, particularly in the buildings sector. Strengthening contractor capacity has been crucial to implementing the LAP but it has also had effects elsewhere in the region. Staff have noted several HRM successes replicated in other municipalities as a result of contractors taking their lessons learned to other places.

Reassessing HRM's Corporate GHG Reduction Target

The Sustainable Environment Management Office (SEMO) recently assessed HRM's progress toward its greenhouse gas (GHG) reduction target (20% below 2008 levels by 2020) and concluded that:

1) Two years before the deadline, HRM has achieved at least 68% of the savings recommended in the 2005 Corporate Local Action Plan to Reduce GHG emissions (LAP). If staff continue to build on what they have started and apply lessons learned so far, HRM has a good chance at achieving the savings the LAP called for by 2012.

2) However, by just reaching its "savings target", HRM will not be achieving its GHG reduction target of 20% below 2002 levels by 2012. With significantly underestimated 2002 data, it is difficult to say precisely how much eCO_2 HRM needs to save to reach its target, but it is more than what the LAP called for. Ultimately, inaccurate base data (2002 data) led to the development of a target that was not measurable and a plan that did not take us to our target.

In order to set a new target, SEMO recommends adjusting the target's base year to 2008 because HRM's 2008 data reflects corporate emissions much more accurately than its 2002 data. HRM should consider 2020 for its next target deadline in order to align itself with Nova Scotia's provincial GHG reduction targets.

HRM is looking to set its new corporate GHG reduction target at 25-30% below 2008 levels by 2020. Predicted reductions may come from:

1) **Buildings**
   In 2008, HRM buildings were responsible for 59,620 tonnes eCO_2 (67% of total corporate emissions excluding transit) but HRM can realistically reduce its building emissions to about 45,000 tonnes by 2020. This is based on an estimated 15% reduction in electricity and 10% reduction in heating fuel demand from HRM facilities. Reductions can be accomplished through various means, beginning with a retro-commissioning process in HRM facilities with the goal of identifying energy savings opportunities. Staff also plan to continue various energy efficiency projects and natural gas conversions, which will play a substantial role in reaching new targets. The expected increase to 25% renewable electricity in Nova Scotia will also help decrease corporate GHGs from buildings.

2) **Vehicle Fleet**
   In 2008, HRM's non-transit fleet produced 7693 tonnes eCO_2 (9% of total corporate emissions excluding transit). With continued improvements in how HRM purchases new vehicles and uses its existing units, HRM can reach a 10% reduction in GHG emissions from its fleet. Therefore, vehicle emissions can be reduced to about 6900 tonnes eCO_2.

3) **Lighting**
   In 2008, street lights, traffic lights and sportsfield lights were responsible for 21,407 tonnes eCO_2 (24% of total corporate emissions excluding transit). Since then, street light and traffic light conversions to LED technology have further reduced lighting emissions to about 19,000 tonnes. If HRM achieves its goal of replacing all of its street lights with LED lamps, HRM can bring lighting emissions to about 14,500 tonnes eCO_2 by 2020. With the predicted increases in renewable electricity in the province, these emissions may decrease even further to about 12,200 tonnes eCO_2.

If the above predictions prove true, HRM could reduce its emissions to about 64,100 tonnes eCO2 by 2020, or 28% below 2008 levels. Before solidifying this target, however, SEMO will further consult with staff directly responsible for buildings, fleet and lighting to develop a new GHG reduction plan.

Notes on the proposed target

- By aiming for a reduction of 25-30% below 2008 levels by 2020, corporate HRM is ambitiously trying to help Nova Scotia reach its 2020 goal. Based on published provincial GHG levels (found in the Environmental Goals and Sustainable Prosperity Act Progress Report 2010[1]), Nova Scotia must decrease its total emissions to 17.8% below 2008 levels by 2020 to achieve its target.
- The recommended 25-30% reduction target accounts for a significant improvement in provincial electricity emissions due to the expanded use of renewable electricity sources. About 72% of HRM's corporate emissions come from electricity generation, which implies that if Nova Scotia achieves its regulated target of 25% renewable electricity by 2015, HRM's emissions will decrease significantly even without implementing its own energy savings projects. HRM may see even further GHG reductions if the province reaches its new goal of achieving 40% renewable electricity by 2020 (set in Nova Scotia's Renewable Electricity Plan, April, 2010[2]). However, because this new goal of 40% renewable electricity has not yet been incorporated into provincial regulations and is not within HRM's control, it has not been included in the proposed corporate reduction target.
- The proposed corporate target does not include emissions from Metro Transit because transit service expansions (which usually result in emissions increases) help reduce transportation emissions from the community. Slight increases in transit emissions are therefore acceptable and should not be included in a corporate reduction target.

[1] http://www.gov.ns.ca/nse/egspa/docs/EGSPA.2010.Annual.Report.pdf

[2] http://www.gov.ns.ca/energy/resources/EM/renewable/renewable-electricity-plan.pdf