THE TOWN OF NEW GLASGOW'S ENERGY SUSTAINABILITY AND LOCAL ACTION PLAN 2007 TO 2013

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Town of New Glasgow

Clean Nova Scotia
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ACKNOWLEDGMENTS

This type of project represents the combined efforts of a number of people, including:

The leadership of Mayor Ann MacLean and New Glasgow Town Council.

Members of the Energy Savings Task Force: Councillors Jack Lewis and Henderson Paris; Town Engineer Bob Funke; Kim Dickson, director of communications and marketing; Bob Christie, executive director of the Pictou Harbour Environmental Protection Project; Lorna MacIsaac, coordinator of the New Glasgow Development Commission; and Earl MacKenzie, chair of the Residential Energy Committee.

For their technical contributions: Travis Frank, engineering student for the Town of New Glasgow; and Pam Duggan, engineering student for Clean Nova Scotia.

Previous research carried out by Mark Geck, a community energy coordinator hired by the Town of New Glasgow, in his March 2004 report *New Glasgow Corporate and Community Equivalent Carbon Dioxide Emissions for 1994 and 2003*.

Staff of Clean Nova Scotia in Dartmouth, including Judy McMullen, executive director, Debra Hawkins, finance and administration officer, Charlene Boyce Young, communications coordinator, Gary McKegney, an energy advisor, and others.

All members of the Residential Energy Committee, Commercial and Institutional Energy Committee and Town Operations Energy Committee.

Murray Wong, a summer student for the Town of New Glasgow.

Project sponsors: Town of New Glasgow, Clean Nova Scotia, Nova Scotia Department of Energy and the federal Eco-Action program.

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EXECUTIVE SUMMARY

This energy sustainability and local action plan arose from the actions of many people and organizations (see Acknowledgments) between July 2006 and March 2007. During that period, an energy savings task force was established to oversee the project. Community and town operations energy and greenhouse gas inventories were reviewed and developed. An extensive community consultation campaign was carried out. The public and town endorsed proposed GHG reduction targets.

This plan offers proposed actions from April 1, 2007 until 2013, which is 10 years from the chosen base year of 2003. Details of the plan came through an analysis of existing energy use and practical ways of reducing greenhouse gas emissions in the coming years.

The action plan is based on the five-milestone framework of Partners for Climate Protection, a program of the Federation of Canadian Municipalities. The PCP program is a partnership between FCM and ICLEI-Local Governments for Sustainability. The PCP framework is based on the Cities for Climate Protection (CCP) Protocol, an international program of ICLEI. The Town of New Glasgow originally joined the PCP program in 1998 and carried out a number of energy savings actions at that time. The town re-established its commitment to the program in 2006.

A significant amount of effort was put into developing realistic reduction targets. For the community, a 6% target was proposed and endorsed at a public town hall meeting on March 8, 2007. About 60 people attended. On June 18, 2007, Town Council adopted the 6% community reduction target from 2003 levels by 2013.

The target for town operations was complicated since several energy savings actions – such as installing energy-efficient street lights, using LED (Light Emitting Diode) traffic lights and using energy-efficient boilers and a groundwater heat system – had been completed between 1998 and 2003. Following a detailed analysis of further potential actions, it was decided that a 10% reduction for town operations by 2013 would be reasonable. This reduction was approved by Council on March 12, 2007.

The plan begins with an Introduction (pg. 7) that provides an overview of the project. This is followed by a Background section (pg. 8) on the Town of New Glasgow, PCP, greenhouse gases and climate change. The emissions inventory, forecast and reduction targets (pg. 11) provide details on the technical aspects of the plan. This is followed by the main focus of the report: the sustainability and local action plan (pg. 21), including details of public consultation and project structure. The plan contains estimates of how reduction targets can be achieved and how the plan will be implemented. Section 4.4 (pg. 31) shows pie charts for emissions and projected reductions for the community and town operations.

The plan structure encourages community participation. Three committees have been formed: Residential Energy Committee, Commercial and Institutional Energy Committee and Town Operations Energy Committee. The committees report to the energy task force, which in turn reports to town council.

The Town of New Glasgow has shown leadership by re-establishing its commitment to PCP and approving reasonable greenhouse gas targets for the community and town operations.

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LIST OF SYMBOLS AND ABBREVIATIONS

CH_4 - methane
CO_2 - carbon dioxide
CVS - Canadian Vehicle Survey (Transport Canada)
EPA - Environmental Protection Agency
FCM - Federation of Canadian Municipalities
GHG - greenhouse gases
ICLEI - International Council for Local Environmental Initiatives
L - litres
PCP - Partners for Climate Protection
VKT - vehicle kilometres travelled

1. INTRODUCTION

The goal

The overall goal of the *Financial Savings and the Future of Energy in New Glasgow* project is to work toward cost savings through energy and greenhouse gas reductions, which will contribute to climate change mitigation, putting New Glasgow on the road to sustainability.

Objectives

1. To create a comprehensive analysis of existing research and steps needed to elaborate and complete an overall inventory of New Glasgow's energy consumption and costs.
2. To engage the community in consultations on the issues surrounding meeting the project goal through outreach sessions to increase awareness and gain insight with community members.
3. To use the community consultations to help build consensus, awareness and support for meeting the project goal.
4. To use the inventory information gathered through objective one to assess existing costs and forecasted savings that can be used to help build a case to present to the community, ultimately to help with the adoption of a GHG reduction target.
5. To conclude the project with adopted targets and a strong starting point for a local energy action plan to meet the set targets.

Rationale

Up to half of Canada's GHG emissions (350 million tonnes) are under the direct or indirect control or influence of municipal governments. Communities can cut GHG emissions from municipal operations and community-wide initiatives with investments in environmental infrastructure, but a municipality requires citizen consultation and support. In Canada, over 140 municipal governments are addressing climate change through committing to reducing GHGs by participating in the PCP program.

New Glasgow is ready to follow the appropriate steps needed to keep up with the rest of the world, and take the lead on climate change mitigation at the municipal level in Nova Scotia.

The town is now on track to fulfill the first three milestones by March 31, 2007. These are:

Milestone 1: Create a greenhouse gas emissions inventory and forecast
Milestone 2: Set an emissions reduction target
Milestone 3: Develop a local action plan (LAP)

The town will also begin work on the final two milestones in 2007-08. These are:

Milestone 4: Implement the LAP
Milestone 5: Monitor progress and report results

2. BACKGROUND

2.1 Local Context

The Town of New Glasgow, with the East River flowing through it, is located on the Northumberland shore of Nova Scotia, Canada (see *Figure 2.1).* New Glasgow is the largest town in Pictou County and is surrounded by the towns of Stellarton, Westville, Trenton and Pictou and the rural Municipality of Pictou County.

Figure 2.1: Map of New Glasgow and surrounding towns

2.2 Demographics

The 2006 Statistics Canada census figures show New Glasgow had a marginal increase in population over the previous five years. The 2006 population was 9,455, a 0.2% increase over the 2001 population of 9,432. This increase represents a significant change from the previous five-year period (1996 to 2001) in which the population dropped by 3.9%. The population for the 2003 base year would be expected to be close to the 2001 census population of 9,432. As such, most calculations in this report are based on the 2001 census figures, since 2006 figures only became available in March 2007.

The Statistics Canada 2001 Community Profile for New Glasgow show the town had an area of 9.93 square kilometres, or 993 hectares. This resulted in a population density of 950.2 people per square kilometre.

2.3 Nature of the Community

Life in New Glasgow offers a refreshing combination of urban amenities and country charm and is a great community in which to raise a family. There is diversity in employment opportunities, quality educational facilities, an appealing quality of place and many lifestyle and recreational choices. New Glasgow has a rich cultural mosaic and strong traditions of athletic, arts and cultural excellence.

The town is nestled in the heart of a scenic treasure trove that is Pictou County, a region in which ancient mountain ranges give birth to a trio of river systems that yield to miles of coastline. From the waterways of this region flowed the lifeblood of its early settlement in the form of access, transportation, energy and raw materials.

As the largest town and leading commercial service centre the range and quality of services of a modern, self-sufficient community are all readily available. Built upon traditional industries of coal, steel, farming, fishing and ship building; today, the retail, manufacturing, forestry, pulp and paper, food retail/distribution, technology and tourism are among the economic engines of the Pictou County region.

New Glasgow is the leading commercial service centre of northeastern Nova Scotia. New Glasgow and its neighbouring communities comprise the fourth largest urban area in Nova Scotia.

– Excerpts from Town of New Glasgow website (www.newglasgow.ca)

2.4 Description of PCP

The PCP program consists of a network of over 140 municipal governments in Canada. These municipalities are committed to the reduction of greenhouse gases and action on climate change. The PCP program outlines five milestones to work toward these goals. See Rationale in Introduction (pg. 7) for milestone details.

2.4.1 On target for milestone achievements

By the end of March, the *Financial Savings and the Future of Energy* project is on target to have completed first three milestones of the PCP program.

The milestones include developing a community and corporate energy use and greenhouse gas inventory, setting GHG emission reduction targets and developing a local action plan.

The FCM reports that as of Dec. 13, 2006, 142 municipal governments in Canada are participating in the PCP program. Of those, 18 have completed milestones three or higher for both the corporate and community sectors.

New Glasgow is poised to join this group at the end of March 2007 and then move on to the higher milestones.

Only seven municipalities in Canada have completed the fourth milestone or higher, which is the objective for New Glasgow project for the coming year.

2.5 Greenhouse Gases and Climate Change

Most energy in Nova Scotia is produced by burning fossil fuels, such as coal and oil. These are major sources of greenhouse gas emissions to the atmosphere. The greenhouse effect, which in moderation helps our planet sustain life, is intensifying and causing global warming.

The overall average temperature of the Earth is predicted to rise 1.4 to 5.8 degrees Celsius by the end of the century. Temperature changes in Canada could be significantly higher. Potential impacts include more extreme weather, such as droughts and storms, changes to marine and land ecosystems and destruction of wildlife habitat.

Reducing fossil fuel use will result in fewer greenhouse gases, slowing the rate of climate change.

The Earth's atmosphere naturally acts as a greenhouse. Solar energy passes through the atmosphere from the sun and either reaches the earth's crust or is reflected away. The solar energy that reaches the ground warms the earth and is radiated outwards. A quantity of this radiant heat escapes from the earth while a portion is trapped in the atmosphere by greenhouse gases. These greenhouse gases (such as water vapour, carbon dioxide, methane and nitrous oxide) are naturally occurring in the atmosphere; however, human activities have increased the amount of these gases present in the atmosphere.

The increase in greenhouse gases being produced due to human activities has a direct affect on global warming because the additional gases intensify the natural greenhouse effect. It is the human-induced enhanced greenhouse effect has the potential to warm the planet at a rate that has never been experienced in human history, and is therefore the cause of concern, as outlined by the Government of Canada. The United States EPA describes that global warming has been linked to the dramatic melting of ice and permafrost in Arctic regions as well as the ever rising sea levels.

Due to the danger of climate change and the diminishing resources of fossil fuels, many communities and cities have set targets to reduce greenhouse gas emissions. By making these commitments they will be doing their part in the battle against global warming as well as helping slow the depletion of non-renewable energy sources.

3. EMISSIONS INVENTORY, FORECAST AND REDUCTION TARGETS

The first step in this inventory was to verify the original findings from an inventory carried out in 2003 and 2004 by Mark Geck, a community energy technician hired by the Town of New Glasgow. By going through the inventory, areas that needed to be assessed were identified and gaps were noted. Many of the calculations were rechecked and will be discussed for each relevant section.

The emission coefficients for energy use were verified with the Halifax Regional Municipality Corporate Action Plan to Reduce Greenhouse Gas Emissions. Emission coefficients for electricity use for 2003 were found on the "Torrie Smith and Associates" program used for calculating the inventory. Coefficients were calculated based on data from Statistics Canada and have been confirmed to be correct by the staff at "Torrie Smith and Associates".

For the purpose of this study, the Town of New Glasgow was divided into sections, to provide an organized analysis. These divisions follow the recommendations of the Partners for Climate Protection. For Corporate New Glasgow, the sectors are Buildings, Vehicle Fleet, Streetlights, Water and Sewage, and Waste.

3.0.1 Buildings

The Buildings sector will include all buildings in the town that are considered to be municipal buildings, such as the town hall or a fire station. Table 3.1 presents the electricity use for corporate New Glasgow. The information in the table was obtained from Nova Scotia power bills from the New Glasgow Town Office and from the Geck inventory completed in 2004. The sections of the table that are represented by a dashed line indicate buildings that were unable to supply electricity use for 2003. For the Forbes Lake Water Treatment Plant, the electricity will be recorded as zero. This is because the electricity use will appear in the Water and Sewage Inventory, and therefore counting this building's electricity use twice is avoided.

Table 3.1: Corporate Electricity Use (2003)

	Building	Total Use (kWh)	Cost ($)
1.	Engineering and Public Works Office	35,958.00	2,794.00
2.	Forbes St. Youth Center	19,709.00	1,709.00
3.	Fraser's Mountain Radio	2,062.00	241.00
4.	Forbes Lake Water Treatment Plant	559,755.00	32,421.00
5.	Library & Fire Hall	271,896.00	19615.00
6.	North End Recreation	-	-
7.	Parkdale Union Bathroom	15,316.00	1,387.00
8.	Parking Booth	14,057.00	3,044.00
9.	Police Department	26,8740.00	11,775.00
10.	Rink Bed	113,520.00	9,774.00
11.	Rink Plant	5,9750.00	5,144.00
12.	Town Garage	90,315.00	6,783.00
13.	Town Office	102,152.00	7,897.00
14.	Union Race Track	12,154.00	1,047.00
15.	Union Sportsplex	6,144.00	551.00

16.	Ward 1 Rec.	29,361.00	2,655.00
17.	Water Building	56,197.00	4,416.00
18.	West Side Rec.	-	-
19.	West Side School	58,603.00	5,108.00
Total		1,715,689.00	116,361.00

The data used in the Canadian cities Greenhouse Gas Emissions software for total fuel use for the building section of the inventory workbook is from another (original) energy inventory. Though the data was unable to be verified, through discussions with the New Glasgow Town Office, it is considered accurate since there are no indications that it is inaccurate. The data includes the building name, as well as the fuel use in litres, and the total cost. This data is presented in Table 3.2 as well as in the final inventory workbook found in Appendix A.

Table 3.2: Corporate Fuel Oil Use (2003)

	Building	Total Use (L)	Cost ($)
1.	Engineering and Public Works Office	-	-
2.	Forbes St. Youth Center	-	-
3.	Fraser's Mountain Radio	-	-
4.	Forbes Lake Water Treatment Plant	35,872.00	16,559.00
5.	Library & Fire Hall	39,959.00	18,642.00
6.	North End Recreation	5,447.00	2,562.00
7.	Parkdale Union Bathroom	-	-
8.	Parking Booth	-	-
9.	Police Department	15,366.00	7,234.00
10.	Rink Bed	46,931.00	25,835.00
11.	Rink Plant	-	-
12.	Town Garage	26,857.00	12,673.00
13.	Town Office	15,495.00	7,467.00
14.	Union Race Track	-	-
15.	Union Sportsplex	-	-
16.	Ward 1 Rec.	2,851.00	1,443.00
17.	Water Building	-	-
18.	West Side Rec.	248.00	119.00
19.	West Side School	36,919.00	17,440.00
Total		225,945.00	109,974.00

The data presented in Table 3.1 and Table 3.2 was entered into the Building section of the Inventory software. This software calculates the amount of carbon dioxide, nitrous oxide, and methane that is emitted due to the electricity and fuel use of the corporate building sector.

3.0.2 <u>Vehicle Fleet</u>

The information needed for input into the software for the vehicle fleet section was obtained through charge-card billing receipts for 2003. The original data was collected by Geck and is shown in Table 3.3 and Table 3.4. Table 3.3 presents the breakdown of the fuel usage per department as well as the costs. Table 3.4 displays

the number of kilometres travelled as well as the number of vehicles for each department.

Table 3.3: Corporate New Glasgow Fuel Consumption (2003)

Department		Diesel		Gas (Regular, Super, and Premium)	
		Diesel (L)	Diesel ($)	Gasoline (L)	Gasoline ($)
1.	Environmental	1,337	997.88	33,346	27,913.14
2.	Fire	3,276	2,445.07	1,991	1,666.62
3.	Police	0	0.00	55,825	46,729.77
4.	Recreation	705	526.18	3,916	3,277.99
5.	Rink	23	17.17	1,245	1,042.16
6.	Transportation	126,222	94,207.01	43,501	36,413.64
7.	Water	19,484	14,542.02	0	00.0
Total		151,047	112,735.33	139,824	117,043.32

Table 3.4: Corporate New Glasgow Vehicle Fleet Use (2003)

Department		Number of Vehicles	Distance Travelled (km)
1.	Environmental	2	12,805
2.	Fire	6	4,900
3.	Police	6	222,484
4.	Recreation	2	19,365
5.	Rink	1	6,250
6.	Transportation	24	99,0124
7.	Water	11	14,0012
Total		52	1,395,940

The data presented in Table 3.3 and Table 3.4 was entered into the greenhouse gas inventory software.

3.0.3 <u>Streetlights</u>

The data used in the Canadian cities Greenhouse Gas Emissions software for street and traffic light use was from the original energy inventory. It was obtained from Nova Scotia Power bills kept by the New Glasgow Town Office. The data includes the type of light or the location the lights, as well as the electricity use in kWh, the cost, and the number of each light. This data is presented in Table 3.5.

Table 3.5: Street and Traffic Light Electrical Use (2003)

Location / Type		Use (kWh)	Cost ($)	Light (#)
1.	1000W Metal Additive	7,752.00	1,010.13	2
2.	100W High Intensity Sodium	203,073.00	49,151.95	407
3.	100W Traffic Control Lights	54,640.83	3,977.85	203
4.	116W Traffic control Lights	17,797.30	1,288.77	57
5.	150W High Intensity Sodium	7,698.16	1,607.14	11
6.	250W High Intensity Sodium	114,126.88	20,360.19	106

7.	250W Misc. Un-metered Connection	144.00	34.24	2
8.	400W High Intensity Sodium	50,515.00	8,062.20	38
9.	400W Mercury Vapour Light	154.00	23.42	1
10.	60W Traffic control Lights	184.00	13.97	1
11.	69W Traffic control Lights	54,909.90	4,069.80	300
12.	70W High Intensity Sodium	234,934.93	69,907.34	682
13.	860W Traffic Control Lights	2,250.23	242.90	1
14.	Bike Patrol	1,500.00	104.00	1
15.	Bob's Account	72.00	6.00	1
16.	Duff Cemetery/ Sampson Trail	6,055.00	521.00	40
17.	George St. Carmichael Park	37,959.00	3,383.00	8
18.	RA-5 Crosswalk	3014.67	314.39	4
19.	Riverfront St. Lighting	2,6070.00	1,938.00	6
20.	Sampson Building	989.00	119.00	4
21.	Union St. temp. hook-up	8.00	1.00	1
22.	Stadium Sign	593.00	107.00	1
23.	South End Playground	7,852.00	709.00	3
24.	Vale Rd. Park	4,107.00	358.00	4
Total		836,399.9	167,310.29	1,884

The data presented in Table 3.5 was entered into the software in order to calculate the total greenhouse gas emissions.

3.0.4 Water and Sewage

Table 3.6 presents the data supplied by the Engineering and Public works staff from the original inventory for electricity and output values for water and sewage facilities. This information could not be verified following conversations with New Glasgow employees; however, is assumed to be credible.

Table 3.6: Water and Sewage Electricity Use (2003)

Facility or Facility Group		Electricity		Output (1000L)
		Total Use (kWh)	Total Cost ($)	
1.	Abercrombie Rd. Pump	14943.00	981.00	475,000.00
2.	Arch St. Pump	108,788.00	7,044.00	140,000,000.00
3.	East River Rd. Pump	6,543.00	617.00	475,000.00
4.	Forbes Lake Water Treatment Plant	559,755.00	32,421.00	33,000,000.00
5.	May St. Lift	627.00	85.00	56,000.00
6.	Munro Res. Building	106,976.00	6,053.00	-
7.	Plymouth Pump Station	26,058.00	2,234.00	-
8.	Reservoir St. Pump	75,156.00	4,756.00	-
Total		898,846.00	54,191.00	174,006,000.00

3.0.5 Corporate Waste

New Glasgow's waste is handled by the Mount William Landfill site. It was found through New Glasgow Town Office bills and the staff at the landfill that in 2003 there were 17.4 tonnes of waste from the corporate sector. This was found through work done by Geck; however, this information was unable to be verified through conversations with Carol MacKenzie, manager of the waste reduction program at the landfill. MacKenzie stated that the landfill does not have a breakdown for corporate waste for the towns in Pictou County and therefore does not have a record for New Glasgow. The coefficients for each type of waste are built into the greenhouse gas software and could not be viewed for a sample calculation. The software yielded a value of 7 tonnes of eCO_2.

3.0.6 Corporate Summary

The summary of the corporate section of this study is presented in the following tables. Table 3.7 presents the total energy costs and the total equivalent carbon dioxide emissions by sector. Figure 3.1 shows a pie chart summary of eCO_2 emissions. Table 3.8 presents total energy costs and eCO_2 emissions by their source.

Table 3.7: Energy Costs and eCO_2 Emissions by Sector (Corporate 2003)

Sector	Total Cost ($)	Total eCO_2 (tonnes)
Buildings	193,914	1,366
Vehicle Fleet	229,779	779
Streetlights	167,310	525
Water and Sewage	54,191	566
Corporate Waste	-	7
Total	645,194	3,242

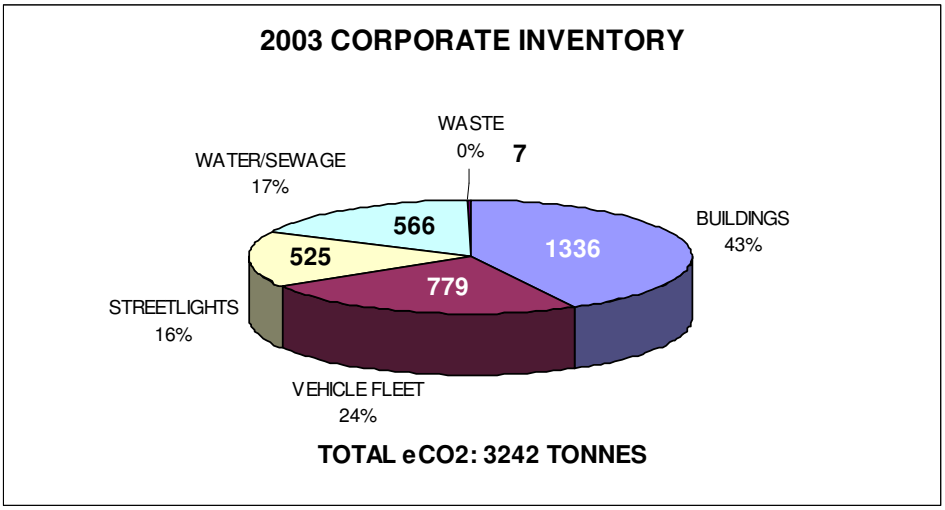


Figure 3.1: Summary of eCO2 emissions per sector (Corporate 2003)

Table 3.8: Energy costs and eCO_2 Emissions by Source (Corporate 2003)

Energy Type	Total Use	Total Cost ($)	Total eCO_2 (tonnes)
Electricity	2,891,180 kWh	305,441	1,819
Diesel	151,047 L	112,735	426
Fuel Oil	225,945 L	109,974	639
Gasoline	139,824 L	117,043	353
Waste	-	-	7
Total		645,194	3,242

3.0.7 Residential

The residential sector of New Glasgow's community section consumed 37,700,000 kWh of electricity in 2003, as verified by John Aguinaga of Nova Scotia Power.

Through conversations with Steve Harder, coordinator of the *Financial Savings and the Future of Energy in New Glasgow* project, it was determined to be a safe assumption that there will be a negligible amount of residentially used diesel in 2003. Diesel will primarily be used as a fuel source in generators, as in the case of power outages, and this use is not routinely recorded.

The original work on this energy inventory found the amount of fuel per user through conversations with David Hovell of the Canadian Oil Heat Association. Hovell was not available for verification; however Debbie Jamieson, President of the Nova Scotia Chapter, was contacted. It was assumed that since a typical NS home will consume between 2,800 and 3,500 L of fuel oil per year, an average of that range (3,150 L) will serve as the best fit for the purposes of this study.

Based on the number of residential consumers in New Glasgow found in a heating and energy use survey conducted in 2004 (2,652) the total amount of fuel oil used was calculated to be 8,353,800 L.

Residential propane use for New Glasgow was determined using a comparison with Nova Scotia's propane use. As stated in the ESAT database from Statistics Canada, the residential sector of Nova Scotia used 31.0 megalitres of propane in 2003.

3.0.8 Commercial

The commercial sector of New Glasgow consumed 35,400,000 kWh of electricity in 2003, as verified by Aguinaga of NSP.

The same assumptions for the residential use of diesel were applied to the commercial sector as well. Diesel will primarily be used as a fuel source in generators, as in the case of power outages. This energy source would not be used routinely and therefore is assumed to be zero.

Based on conversations with Jamieson of the oil heat association, it was decided that commercial business fuel use will vary widely and therefore an average cannot be assumed as was for residential use. Therefore, the commercial fuel use that was used was taken from data found in the original inventory. By contacting fuel oil suppliers it was found that 880,811.01 litres of fuel is used commercially, however this may be an underestimate as three of the ten suppliers did not respond to the request. Because this is the most accurate information found to date, it was used to find the equivalent carbon dioxide emissions due to commercial fuel use.

A Statistics Canada database states that in 2003 Nova Scotia's commercial propane demand was 89.4 mega litres, or 89,400,000 L. The Pictou County District Planning Commission reported that there were 316 commercial establishments in New Glasgow in 2003, of which 38 are propane users.

An indicator that is used in the PCP workbook is commercial floor area. Through conversations with Beth MacDonald, of the Pictou Regional Development Commission, it was determined that the floor area information it no longer recorded. In the past, these records were kept by the NS Department of Finance – Economic and Stats Division, however they currently only maintain these records for the Halifax Metro Area.

3.0.9 Industrial

Through conversations with Aguinaga of NSP, it was established that the Industrial sector of New Glasgow consumed 1,600,000 kWh of electricity in 2003. This was entered into the software to calculate the various greenhouse gas emissions.

3.0.10 Transportation

Transport Canada conducted a survey entitled Canadian Vehicle Survey (CVS) for 2000 that was used in calculating vehicle use in New Glasgow. In Table 2 of the Transport Canada survey, it is reported that in Nova Scotia the average vehicle-kilometres travelled per capita was 12,229. As defined in the survey, a vehicle-kilometre is a measure of distance driven and serves as "the principle means for measuring vehicle activity". This per capita use is based on the population 16 years of age or older, as reported by the CVS. Through contact with Brian MacLeod from Statistics Canada, it was found that the population of New Glasgow in 2003 that was 16 or older was 7,961.

It was assumed that the error due to the difference in the survey base year (2000) and the population year (2003) was negligible. Under this assumption the total number of VKT was found to be 97,355,069.

The total number of VKT was used in the software to find the total equivalent CO_2 emissions. This was found to be 38,585 tonnes.

3.0.11 Community Waste

The community of New Glasgow sent 2,223.17 tonnes of waste to the Mount Williams Landfill in 2003, said the waste reduction manager. The organics were composted and the recyclables recycled. The breakdown is presented in Table 3.9.

Table 3.9: Community Waste Breakdown (2003)

Waste	Amount (tonnes)
Organic	709.87
Recyclables	548.31
Garbage	964.99
Total	2,223.17

3.0.12 Community Inventory Summary

The summary of the community inventory for this study is presented in the following tables. Table 3.10 and Figure 3.2 present the total energy costs and the total equivalent carbon dioxide emissions by sector. The total energy costs and eCO_2 emissions by their source are presented in Table 3.11.

Table 3.10: Energy Costs and eCO_2 Emissions by Sector (Community 2003)

Sector	Total eCO_2 (tonnes)
Residential	47,819
Commercial	24,936
Industrial	1,007
Transportation	38,585
Community Waste	645
Total	112,992

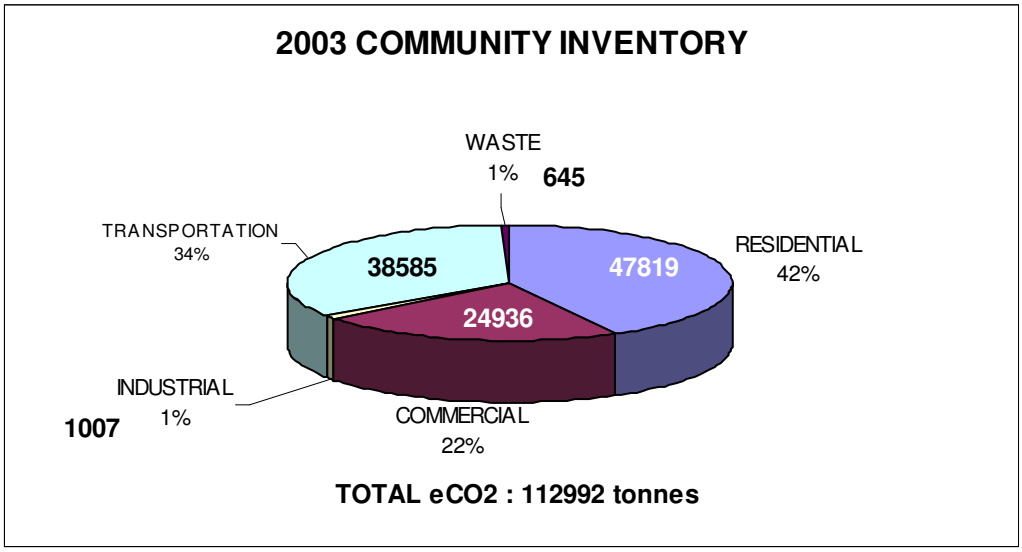


Figure 3.2: Community inventory summary

Table 3.11: Energy Costs and eCO_2 Emissions by Source (Community 2003)

Energy Type	Total Use	Total eCO_2 (tonnes)
Electricity	7,4700,000 kWh	47,018
Fuel Oil	9,234,611 L	2605
Propane	431,789 L	946
Total	-	96,931

3.1 Emission Coefficients

See Appendix B for details.

3.2 Forecast and Emissions Comparison

Corporate

A corporate forecast is conducted by discussing the future status of this sector. Through conversations with Judy Smith at Torrie-Smith Associates, it was discovered that TSA recommends program users to make a copy of their base year and commence to add new buildings that were being planned or built, and delete any that they knew were going to be sold or demolished. Due to time restraints, employees of the New Glasgow Town Office were unable to provide such projections and estimates and therefore a forecast of the corporate sector was not conducted.

Community

Torrie-Smith Associates' Canadian Cities Greenhouse Gas Emissions Strategy Software was used to calculate the emissions forecast for the town of New Glasgow. This software requires the input of growth multipliers for the community forecast calculations; the calculations for these multipliers are shown below. A growth multiplier can be defined as the forecasted change for a given sector, over the forecast time. For example, as stated in the program help section, if you estimate that electricity consumption in the residential sector is going to be 15% higher in the forecast year, then the growth multiplier will be 1.15. For the town a ten-year time frame was considered, giving a forecast year of 2013.

See Appendix B for calculation details.

3.3 Reduction Targets

Only emissions reductions implemented since the base year can be counted towards meeting the municipality's/community's emissions reduction targets. Measures enacted prior to the base year (19XX) can be included in the analysis for tracking and informational purposes, but their impact has already been accounted for in the base year inventory. Including those impacts a second time as a reduction measure is considered double counting.

The PCP program outlines a generally accepted reduction target to be adopted by participating municipalities. The suggested target for town operations (corporate) is a 20% reduction in emissions over a period of time, ending in the forecast year, in this case 2013. But in New Glasgow's case, since a number of energy reductions were made between 1998 and 2003 and therefore can't be included or accounted for in the current target, the approved corporate target for this part of the project is a 10% reduction. Of this, a 9% reduction has been shown, with a remaining 1% to come from other reductions between 2007 and 2013. The suggested community target is a 6% reduction. See tables 3.12 and 3.13.

Table 3.12: Projected eCO_2 Emissions by Sector (Corporate)

Sector	1994 (t)	2003 (t)	10% reduction (t)
Buildings	1,491	1,366	1,229.4
Vehicle Fleet	762	779	701.1
Streetlights	622	525	472.5
Water / Sewage	255	566	509.4
Corporate Waste	13	7	6.3
Total	3,097	3,242	2,918.7

Table 3.13: Projected eCO_2 Emissions by Sector (Community)

Sector	2003 (t)	2013 (t)	6% reduction (t)
Residential	47,819	47811	44,949.8
Commercial	24,936	24,713	23,439.8
Industrial	1007	977	946.6
Transportation	38,585	37,041	36,269.9
Waste	645	526	606.3
Total	112,992	111,068	106,222.6

4 NEW GLASGOW SUSTAINABILITY (LOCAL ACTION) PLAN

4.0.1 Background on public consultation

The success of an action plan that would begin in 2007 and continue until 2013 depends on extensive public consultation and collaboration. As such, much of the focus of the work over the nine months of the project was on engaging the public in ways of saving energy and money, which would in turn improve local air quality and reduce GHG emissions.

Do New Glasgow residents care about energy savings? This was a key question that needed to be answered at the town's first energy savings town hall meeting on Oct. 11, 2006. So the event was extensively advertised and promoted using news releases, newspaper ads, radio contests, websites and posters. Representatives of eight organizations, government departments and companies were had booths to provide residents with good information on energy savings. Free energy-savings items were given away. The mayor addressed the town hall meeting. A PowerPoint presentation was delivered outlining the project, results of the energy and greenhouse gas inventory and suggested GHG targets. About 100 people attended.

The project's task force decided to hold three ward meetings in late November 2006 to give all residents the opportunity to participate. Mailouts were sent to 4,500 households that provided 15 tips on ways of saving energy, outlined key energy issues, listed a toll-free phone number and website addresses for more information and also advertised the meetings. Mailouts were sent to 4,500 households, contacting nearly all of New Glasgow's 9,400 residents. Total attendance was 38, or an average of about 12 per meeting. The ward meetings and town hall meeting resulted in 16 people who wanted to volunteer on the project. One of the most satisfying aspects of the ward meetings was that residents came up with 64 ideas on ways of saving energy.

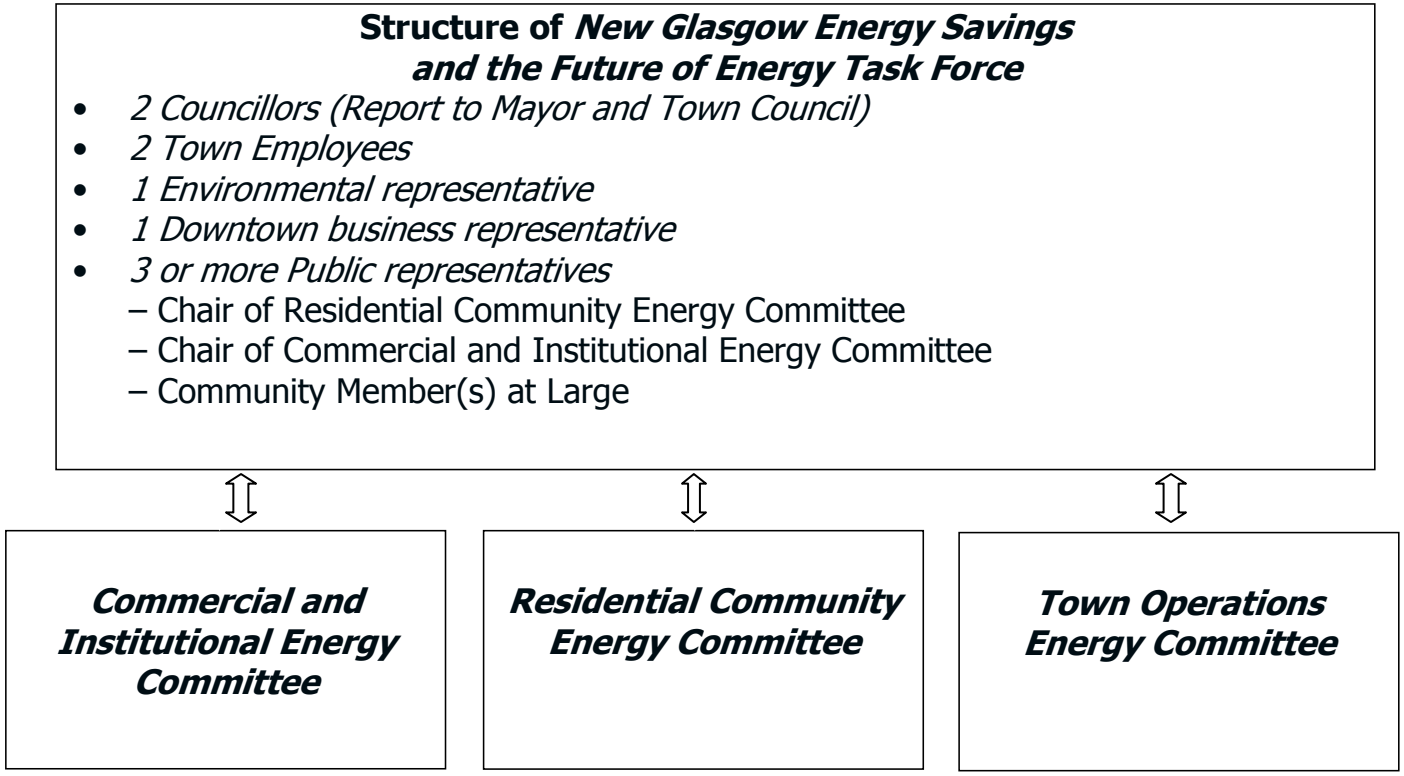
After an unsuccessful attempt to hold a workshop for the commercial and institutional sectors in the fall of 2006, another workshop was organized in late January 2007. Attendance at the workshop was about 30, and seven people volunteered to sit on the Commercial and Institutional Energy Committee.

A second energy savings town hall meeting was held on March 8, 2007. Residents were updated on work that had been carried out and provided with information on the types of actions needed to reduce community GHG emissions by 6%. After some questions and discussion, the about 60 people who attended the meeting ratified the target, to be reached by 2013. As well, about two-thirds of the people filled out a two-page survey indicating energy-savings actions they'd already carried out, along with actions they'll take in the future. Town council in March endorsed a 10% GHG reduction target for town operations.

The last major event under the current project was the distribution in late March of an energy savings calendar that runs from April 2007 to March 2008. The calendar listed events, activities and tips on ways of saving energy. About 5,000 copies were distributed to all households and businesses in the town.

4.0.2 Project structure

The project recognizes that different sectors have different interests and needs, so three committees have been established, all reporting to the task force, which in turn reports to town council.



4.1 Administrative Objectives

1. Town will look into options for funding a part-time coordinator to supervise implementation of local action plan, which would result in the completion of Milestone 4 of the Partners for Climate Protection Program. The coordinator would also work on monitoring and reporting results of the plan, which would start to fulfill Milestone 5.

2. Energy Task Force could become council committee to oversee implementation of plan.

4.2 Long-term Goals (>5 years)

These are statements of intent to reduce GHG emissions, such as:

- Develop town policies that encourage GHG reductions. These policies could be developed by the mayor and town councillors in consultation with the energy task force and various town energy committees. (Policy examples include: requiring that fuel efficiency be given serious consideration in the purchase of new vehicles; requiring workers who want to enter the town garage to check with the foreman first to reduce heat loss.)
- Incorporate energy efficiency into town's strategic plan (Could be carried out during the next review of strategic plan.)
- Include energy-efficiency standards in future developments (Could be carried out in consultation with town council, town staff and the Pictou District Planning Commission)
- Set bylaws to help reduce emissions (Could be carried out in consultation with town council, various town committees and the planning commission)
- Other goals (to be developed over time)

4.3 Short-term goals (< 5 years)

	Actions	
4.3.1 Corporate (Municipal Operations)	**Quantitative (measurable, with targets where feasible)**	**Qualitative (sets more general direction)**
4.3.1.1 **Buildings**	**Town hall** energy recommendations included: ▪ Lighting retrofits – replace existing T12 system with T8 electronic ballasts *(Energy Savings: 7,420 kWh Elec; Savings: $739; Cost: $6,440; Payback: 8.4 yrs)* ***5 tonnes $C0_2$ emissions reductions*** ▪ Daylight harvesting *(ES: 1,606 kWh Elec; S: $91; C: $375; PB: 4.1 yrs)* ***1 tonne CO_2 emissions reductions*** ▪ Insulate attic *(ES: 15,663 kWh Htg; S: $1,263; C:$1,800; PB: 1.4 yrs)* ***10 tonnes CO_2 emissions reductions*** ▪ Incandescent to compact fluorescent *(ES: 3,087 kWh Elec.; S: $320; C: $106; PB: 0.3 yrs)* ***2 tonnes CO_2 emissions reductions*** **Total estimated cost of improvements to the town hall is $8,721.** ***Total estimated CO_2 emissions reductions of 18 tonnes.***	*General comments that apply to all buildings* Start with information in energy consultant Ian Storey's energy audits (detailed in Quantitative column), prioritize (based on payback and other considerations) and implement as funding permits over the next five years. Consult and seek suggestions from Town Operations Energy Committee on other practical ways to save energy in town buildings. Implement a system that allows each department to retain some of energy savings so that there is an incentive to reduce energy.
Buildings **(Cont.)**	**Fire hall/library** energy recommendations included: ▪ Lighting retrofits – replace existing system with T8 electronic ballasts *(ES: 33,345 kWh Elec; S: $2,969; C: $19,950; PB: 6.7 yrs)* ***21 tonnes CO_2 emissions reductions*** ▪ Daylight harvesting *(ES: 4,990 kWh Elec.; S: $282; C: $1,625; PB: 5.8 yrs)* ***3 tonnes CO_2 emissions reductions***	*General direction for fire hall/library* Consensus following a tour of the fire hall was that most of the heat loss occurs through four main front doors in building. An inspection of the fire hall showed that weather-stripping was either missing or improperly installed along several sections of doors. It was suggested that a contractor be hired to install, replace or adjust weather stripping as

	▪ Lighting retrofit of exit signs to LED *(ES:1,139 kWh Elec; S: $83; C: $250; PB: 3 yrs)* ***1 tonne CO_2 emissions reductions*** **Total estimated cost of improvements to the fire hall/library is $21,775.** ***Total estimated CO_2 emissions reductions of 25 tonnes.***	needed. In the future, Fire Chief Russell Mosher said the fire hall doors should be replaced. The chief said the front and back doors are old and also need to be replaced.
Buildings **(Cont.)**	**New Glasgow Stadium** energy recommendations included: ▪ **Purchasing** – Meter consolidation/rate change *(ES: not given; S: $7,397; C: $30,000; PB: 4.1 yrs)* ▪ **Control** – HID lighting *(ES: 19,066 kWh Elec.; S: $1,077; C: $4,780; PB: 4.4 yrs)* ***12 tonnes CO_2 emissions reductions*** – Ice surface *(ES: 56,276 kWh; S: $3,180; C: $2,000; PB: 0.6 yrs)* ***35 tonnes CO_2 emissions reductions*** ▪ ***Equipment upgrade*** *– Lighting retrofits from T12 to T8* *(ES: 8,736 kWh Elec; S: $813; C: $5,880; PB: 7.2 yrs)* ***5 tonnes CO_2 emissions reductions*** *– Desuperheater* *(ES: 80,854 kWh Htg; S: $6,518; C: $35,000; PB: 5.4 yrs)* ***N/A*** *– Lighting Retrofit Exit to LED (ES: 2,278 kWh Elec; S: $167; C: $500; PB: 3 yrs)* ***2 tonnes CO_2 emissions reductions*** *– Change incandescent to compact fluorescent* *(ES: 230 kWh; S: $117; C: $91; PB: 0.8 yrs)* ***0 tonnes CO_2 emissions reductions***	*General direction for New Glasgow Stadium* Darren Blackadar, who is responsible for the operation of the stadium, will continue to look for ways to reduce energy use.

	Total estimated cost of improvements for the New Glasgow Stadium is $78,251. ***Total estimated CO_2 reduction of 54 tonnes.*** Most of the recommendations, with the exception of a $175,000 heat recovery condenser, are expected to be submitted for the 2007 capital budget.	
Buildings **(Cont.)**	**Town garage** energy recommendations included: ▪ Timer on electric heat *(ES: 1,643 kWh Elec; S: $93; C: $350; PB: 3.8 yrs)* ***2 tonnes CO_2 emissions reductions*** ▪ Lighting retrofits – to T8 *(ES: 9,509 kWh Elec.; S: $808; C: $4,480; PB: 5.5 yrs)* ***9 tonnes CO_2 emissions reductions*** ▪ Insulate *(ES: 12,958 kWh Htg; S: $1,045; C: $15,300; PB: 14.6 yrs)* ***12 tonnes CO_2 emissions reductions*** ▪ Rebalance heating system *(ES kWh Htg: 6,479; S: $522; C: $2,000; 3.8 yrs)* ***6 tonnes CO_2 emissions reductions*** ▪ Install waste oil heater *(ES: No details; S: $2,194; C: $10,164; PB: 4.6 yrs)* Staff said that the almost 15 years of estimated payback on insulating the town garage would be a drawback to having the work done. **Total estimated cost of improvements for the**	*General direction for town garage* Suggestions from town staff on ways of saving energy included: – Having a policy so that workers who want to enter the town garage should check with the foreman first to reduce heat loss. – Adding to the maintenance list that heat for pressure reducing valve (PRV) pits be turned off from spring until fall (depending on when temperatures get milder). – Using thermometers at different locations in town garage to show the difference in temperature between lower level and upper level (garage ceilings are about 20 feet high). The difference in temperatures should show if additional fans are needed to circulate air. – Use an existing door and hardware (which currently aren't being used) inside the heated part of the garage to replace the middle door, which has a number of air leakages. – Check with town to see if we can get oil bills and electricity bills for town garage so employees will know when energy savings occur (Some of the bills have been received from Storey firm). – Sealing of the upper part of unheated part of garage with studding and chipboard could reduce

	town garage, excluding the $15,300 for insulation, is $16,994. ***Total estimated 29 tonnes CO_2 emissions reductions.***	flow of cold air into attic part of heated section of garage. – Employees should be encouraged to turn off lights when not in use.
Buildings **(Cont.)**	**Police Station.** No energy audit was conducted of the police station, likely because the facility is still fairly new (completed in 1997), so the actions proposed are included in the qualitative column.	*General direction for police station* Police Chief Lorne Smith, Deputy Chief Delaney Chisholm and Office Manager Carol Dunbar provided the following information and suggestions: The police station has five heating zones. Some areas are in use 24 hours a day, but there could be some savings by reducing heating and lighting in areas not in constant use. Installation of low-flow shower heads is also recommended. Closing two doors in the bay where prisoners are brought into the station could occur when the town hires full-time guards. Currently, the doors aren't closed because of potential safety concerns with officers handling prisoners. It was unclear whether the police station has older T12 lighting ballasts or the more energy efficient T8 electronic units. The system will be checked.

4.3.1.2 Fleet	Reduce idling times for town public works employees to 10 seconds in summer, spring and fall, except when weather is excessively cold or wet. Reduced idling of vehicles may not be practical for winter months since heat is often needed for workers to keep warm. Decrease overall fleet gasoline and diesel use by 10 to 20% over the next five years, through buying more fuel efficient vehicles, reducing distance travelled and driving in a more energy-efficient way. Use of biodiesel should also be considered.	Provide staff with good information on ways of reducing vehicle fuel use, such as having Gerry MacDonell of the Eco-Efficiency Centre outline the benefits of an anti-idling workshop. This was done on Jan. 24, 2007. MacDonell will check with Centre officials to see if they can carry out an anti-idling workshop for the town. A check with Clean NS on the DriveWiser program indicated that for a town works anti-idling program, Natural Resources Canada might make a good partner. Police Chief Smith said that for police platoon fleet vehicles, larger Crown Victoria cars are needed to ensure adequate space and safety. But for other vehicles, more fuel-efficient models could be considered. Key for police department is to ensure safety of officers or public isn't jeopardized. Other energy savings could occur by installing LED (Light-emitting diode) lights on the police, fire department and public work cars and other vehicles. Pricing of thermostats on block heaters should be investigated to reduce electricity use.
4.3.1.3 Street-lighting Traffic signals	Since 1998, most of the street lights have been replaced with more energy efficient units and traffic light have been replace with LED (Light Emitting Diode) units.	As street lights and traffic lights need replacement or new lights are installed, use lights that are more energy efficient.
4.3.1.4 Wastewater and Water	Continue efforts to reduce wastewater and use of water	Less water used will also result in less energy being required.
4.3.1.5 Solid Waste	Reduce corporate waste by 6 to 20 per cent over the next five years.	Continue with waste reduction actions implemented by Pictou County Solid Waste.

4.3.2 Community	Quantitative (measurable, with targets where feasible)—Suggestions below from Jan. 10 first meeting of Residents' Community Energy Committee meeting	Qualitative (sets general more general direction)
4.3.2.1 Residential (In the Home)	1. Turn down thermostat by 2 degrees Celsius (number determined by self-reporting, plus overall energy savings verified by power bills) 2. Turn off dishwasher dry cycle (number determined by self-reporting, plus overall energy savings verified by power bills) 3. Use energy-efficient shower heads (number determined by self-reporting, plus overall energy savings verified by power bills) 4. Promote home energy audits (measure number carried out) 5. (a) Insulate (number determined by self-reporting, plus overall energy savings verified by power bills) (b) Use cold water in washer (self-reporting, verified by power bills)	Hold a Power Bill contest, as part of the 12 months of energy-savings calendar (see example below) and include tips throughout the year on ways of saving energy in the home. Encourage residents to self-report energy savings on an energy page as part of town's website Promote home energy savings with a booth at the Pictou County Home Show in early May. Possible draws for prizes. Examine possible partnerships with Conserve Nova Scotia (e.g., solar hot water heating rebate, retire furnace rebate, wood-heating appliance rebate) and Clean Nova Scotia (e.g., EnerInfo Line of 1-800-670-4636, EnerGuide, Towards a Brighter Future, Quagmire and Pick-Me-Up) for appropriate programs.
4.3.2.2 Transportation (On the Road)	1. Encourage car pooling (record number of participants and calculate energy/GHG savings based on number of people in vehicle) 2. Reducing school bus idling (determine number of buses that idle less) 3. Driving less and combining errands (self-reporting) 4. Drive for fuel efficiency	Promote car-pooling month (possibly Sept. 2007). Promote anti-idling for school buses (possibly Sept. 2007) Promote driving 10% less or 10% slower (possibly in November 2007) There was also interest in using biodiesel and public transportation. The group felt these activities would have a significant impact but was uncertain how feasible these options were. More research is needed on biodiesel as a fuel substitute.
4.3.2.3	1. Promote walking to school or work	Educate young people to encourage parents to

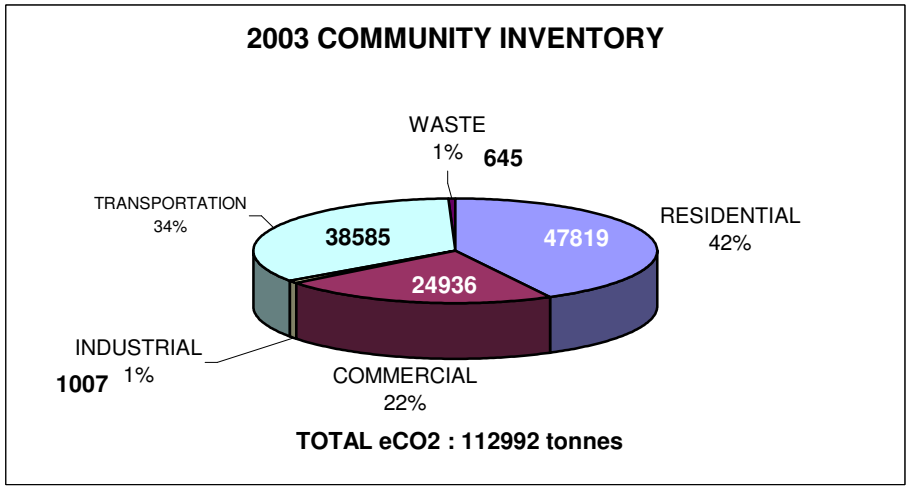
Lifestyle and Community	2. Turn down thermostat 2 degrees or more 3. Ward competitions to turn lights out for two hours on east and west sides	reduce energy use. Encourage use of mugs ('Get mugged' promotion). Encourage young people to turn off computer and play outdoors.
4.3.2.4 Residents' survey	Have students survey New Glasgow households to determine energy-saving actions since base year of 2003. Survey will also indicate number of people using electricity, fuel oil or propane for heating.	Also provide residents with ways of saving energy in their homes and on the road.
4.3.2.5 Commercial/ Institutional	Majority of members of Pictou County New Car Dealers Association have indicated they will promote their most fuel-efficient vehicles in April 2007, which will provide good data on the difference in efficiency between new car and trade-in, showing amount of reduced emissions, assuming same distance travelled. Other businesses—such as appliance dealers and home oil suppliers—will be contacted about carrying out other energy savings promotions	Will involve local newspaper, The News, to contact car dealers to arrange for a page promoting benefits of driving more energy-efficient vehicles. Promote Clean Nova Scotia's Small Business Energy Efficiency Service. At meeting of Commercial and Institutional Energy Committee, there was interest in locating a building for use as a demonstration project on ways of saving energy.
4.3.2.6 Waste (3 Rs)	Support county-wide waste reduction targets.	Cooperate and support ongoing waste reduction efforts.

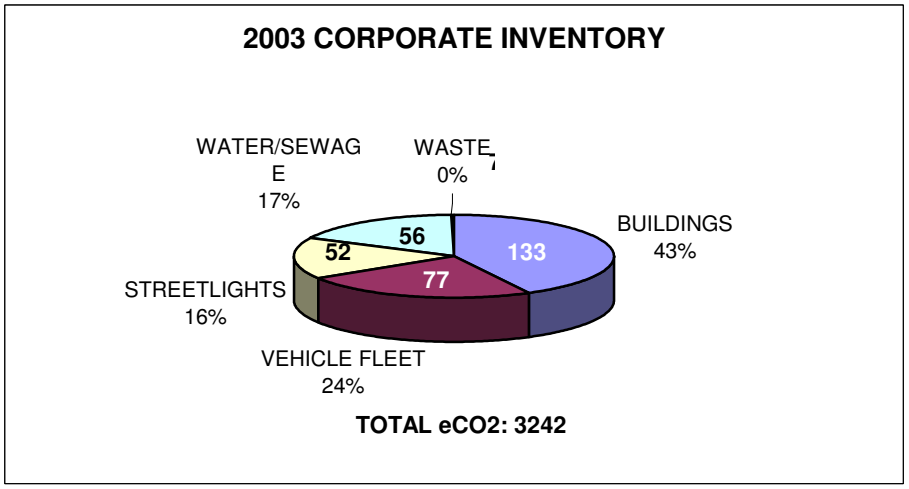
4.3.3 The 12 Months of Energy Savings in New Glasgow Calendar

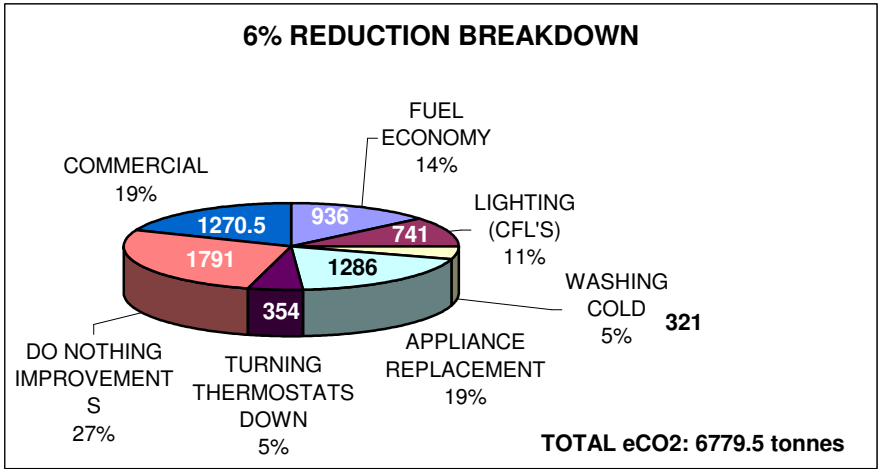
April 2007 *Fuel-efficient vehicle promotion—PC Auto Dealers Assn* *Promote Power Bill Contest and energy savings tips (turn thermostat down 2 degrees, + replace 3 bulbs with CFLs)*	May 2007 *Tree planting campaign—part of Communities in Bloom* *Promotion of energy savings in the home—booth at Home Show*	June 2007 *Environment Week events/activities* *Town employees' anti-idling program*
July 2007 *Walk/bike to work—sponsored by police dept. and residents' energy committee* *Power bill contest winners and tips (turn off dishwasher dry cycle, use energy efficient shower heads)*	August 2007 *Dry clothes outdoors (prize of a drying rack for winter indoor drying)* *Water conservation month*	September 2007 *Reduce school bus idling* *Promote transportation efficiency* *Power bill contest winners and tips (insulate and use cold water in washer)*
October 2007 *Promote use of weather stripping and caulking/ Seniors Helping Seniors* *Promote home energy audits*	November 2007 *Drive 10% slower, and 10% less by combining errands* *Power bill contest winners and tips (reminder to turn down thermostats and use CFL)*	December 2007 *LED lights promotion (replace 5 strings of lights for Christmas—save $7)* *Promotion of energy-saving appliances*
January 2008 *Ward challenges to reduce lighting* *Power bill contest winners*	February 2008 *Church-sharing initiative* *Promote winter lifestyle activities (skating, c-x skiing, snowshoeing)*	March 2008 *R-2000 promo/realtors' open houses of energy efficient houses* *Power bill contest winners, plus tips (and grand prize winner)*

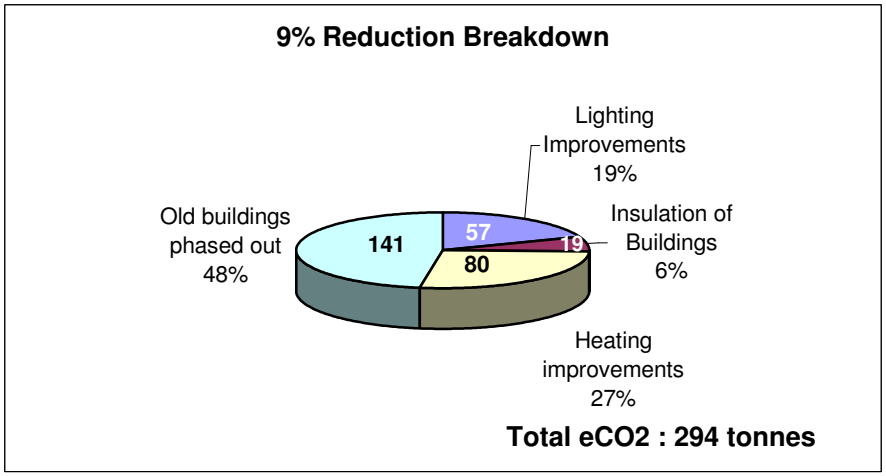
4.4 Greenhouse Gas Reduction Actions (from 2007 to 2013)

The pie charts below show the community and corporate inventories and the reduction targets of 6 and 9% respectively. Town Council has approved a 6% reduction for the community and a 10% corporate reduction, both by 2013.









Priority	Objective (s)	Approach/ Strategy	Specific Steps	Anticipated Reductions (identify targets)
4.4.1 Reduce total community GHG emissions by 2013 (112,992 tonnes in 2003)	– Accurately forecast anticipated GHG emissions in 2013	Apply software created by Torrie Smith Associates for Cities for Climate Protection Campaign of the International Council for Local Environmental Initiatives	Have engineering student review figures and forecasts	Based on a growth multiplier calculated from 1994 figures to 2003, the forecast total GHG emissions for 2013 is 111,201, an estimated **GHG reduction of 1,791 tonnes**
4.4.1.1 Reduce community residential sector GHG emissions (47,819 tonnes in 2003)	– Encourage installation of average of 5 CFL bulb per household (assuming none per household)	Emphasize savings of more than $30 per year	Part of power bill contest/and energy savings calendar/website	Estimated electricity reduction of 1,177,659 KWh and estimated **GHG reduction of 741 tonnes**
	– Encourage average of 25% of residents washing and rinsing in cold water (assuming they all now wash in warm and rinse in cold)	Emphasize importance of water conservation and savings from using less hot water	Promote on website Part of power bill contest/and energy savings calendar	Estimated electricity reduction of 510,741 kWh and estimated **GHG reduction of 321 tonnes**
	– Encourage refrigerator replacement of late 1990s' models with Energy Star models (assuming one-third replacement by over next six years)	Emphasize increased energy efficiency and long-term savings of Energy Star appliances	Promote on website and by advertising Energy savings calendar	Estimated electricity reduction of 498,078 kWh and estimated **GHG reduction of 314 tonnes**
	– Encourage replacement of more energy efficient oil furnaces (assuming	Emphasize significant savings by increasing efficiency and using less oil	Promote on calendar, website and possibly by advertising of oil	Estimated light fuel oil reduction of 344,177 litres and estimated **GHG reduction of 972 tonnes**

	one-third replacement and furnace efficiency will increase to 89%, from 78%) – Encourage residents with oil furnaces to turn down their thermostats by 3 degrees Celsius (assuming 25% of residents turn down thermostats for 8 hours each night)	Emphasize significant savings by increasing efficiency and using less oil	heat dealers Promote on calendar, website and possibly by advertising of oil heat dealers	Estimated light fuel oil reduction of 125,307 litres and estimated **GHG reduction of 354 tonnes** **Total estimated GHG reductions for residential sector of 2,465 tonnes**
4.4.1.2 Reduce community transportation sector GHG emissions (38,585 tonnes in 2003)	– Accurately forecast anticipated GHG emissions in 2013 for transportation sector	Apply projected fuel efficiency improvements for gasoline cars, gasoline light trucks, diesel cars and diesel light trucks	Have engineering student ensure proper figures are entered and checked	Estimated fuel savings and GHG reductions for: Cars, 5,486,951 litres gasoline and **522 tonnes**; Light trucks, 4,548,244 litres gasoline and **401 tonnes**; Cars, 13,873 litres diesel and **1 tonne**; Light trucks, 112,152 litres diesel and **11 tonnes** **Total estimated GHG reduction of 935 tonnes for transportation sector**
4.4.1.3 Reduce community commercial sector emissions (24,936	Focus of Commercial and Institutional Energy Committee will be on looking for commercial facilities as demonstration project			**Estimated GHG reduction for commercial sector is 1,270.5 tonnes**

tonnes in 2003)	to encourage energy savings			
4.4.1.4 Reduce community waste sector emissions (645 tonnes in 2003)	Continue with county-wide efforts to reduce waste			Because of significant previous savings on waste, it is difficult to estimate future savings
Summary of Community GHG Savings	**Savings that will result from general improvements** **Replacement of appliances and furnaces** **Commercial Sector reductions** **Fuel economy** **Using compact fluorescent light bulbs** **Washing in cold water** **Turning down thermostats** **Total**			**Estimated GHG reduction of 1,791 tonnes** **Estimated GHG reduction of 1,286 tonnes** **Estimated GHG reduction of 1,270.5 tonnes** **Estimated GHG reduction on 936 tonnes** **Estimated GHG reduction of 741 tonnes** **Estimated GHG reduction of 321 tonnes** **Estimated GHG reduction of 354 tonnes** **6,779.5 tonnes**
Priority	**Objective (s)**	**Approach/ Strategy**	**Specific Steps**	**Anticipated Reductions (identify targets)**

4.4.2Reduce town operations emissions (3,242 tonnes in 2003)	– Reduce emissions from town hall	Implement I.B. Storey recommendations with paybacks of less than 10 years	Insulate attic	Estimated electricity savings of 15,663 kWH and estimated **GHG reduction of 10 tonnes**
			Change incandescent bulbs to CFLs	Estimated electricity savings of 3,087 kWh and estimated **GHG reduction of 2 tonnes**
			Retrofit lighting to T8 from T12	Estimated electricity savings of 7,420 kWh and estimated **GHG reduction of 5 tonnes**
			Undertake daylight harvesting	Estimated electricity savings of 1,606 kWh and estimated **GHG reduction of 1 tonne**
	– Reduce emissions from town garage	Implement I.B. Storey recommendations with paybacks of less than 10 years	Retrofit lighting to T8 from T12	Estimated electricity savings of 9,508 kWh and estimated **GHG reduction of 6 tonnes**
			Timer on electric domestic hot water heater	Estimated electricity savings of 1,643 kWh and estimated **GHG reduction of 1 tonne**
			Rebalance heating system	Estimated electricity savings of 6,479 kWh and estimated **GHG reduction of 4 tonnes**

	– Reduce emissions from library/fire hall	Implement I.B. Storey recommendations with paybacks of less than 10 years	Retrofit lighting to T8 from T12	Estimated electricity savings of 33,345 kWh and estimated **GHG reduction of 21 tonnes**
			Undertake daylight harvesting	Estimated electricity savings of 4,990 kWh and estimated **GHG reduction of 3 tonnes**
			Change exit lights to LED	Estimated electricity savings of 1,139 kWh and estimated **GHG reduction of 1 tonne**
	– Reduce emissions from New Glasgow Stadium	Implement I.B. Storey recommendations for projects with paybacks of less than 10 years	Install HID lighting control	Estimated electricity savings of 19,066 kWh and estimated **GHG reduction of 12 tonnes**
			Ice surface control usage	Estimated electricity savings of 56,276 kWh and estimated **GHG reduction of 35 tonnes**
			Retrofit lighting to T8 from T12	Estimated electricity savings of 8,736 kWh and estimated **GHG reduction of 5 tonnes**
			Retrofit exit lights to LED	Estimated electricity savings of 2,278 kWh and estimated **GHG reduction of 1 tonne**

			Change incandescent lighting to CFL	Estimated electricity savings of 230 kWh and estimated **GHG reduction of 0 tonne** **Total estimated GHG reduction of 107 tonnes for town buildings. Estimated total cost of work is $125,741**
Consider projects with higher than 10 years payback and smaller projects that still require costing		Implement I. B. Storey recommendation of projects with paybacks of more than 10 years	Undertake EcoChill project in partnership with Pictou County YM-YWCA (11.5 yr. payback)	**Total project budget is $298,800. Annual GHG savings for Stadium are estimated at 30 tonnes and for the YMCA 80 tonnes for a total of 110 tonnes**
			Insulate town garage (14.7 yr payback)	Estimated electricity savings of 12,958 kWh and estimated **GHG reduction of 8 tonnes**
	– Reduce emissions from Ward 1 Recreation Centre		Insulate and weather-strip	Estimated savings of 485 litres of fuel oil and estimated **GHG reduction of 1 tonne**
			Install heating control	Estimated savings of 299 litres of oil/estimated **GHG reduction of 1 tonne**

Summary of corporate GHG savings	**Old buildings phased out** **Heating improvements** **Lighting improvements** **Insulation of buildings**			**Estimated GHG reduction of 141 tonnes** **Estimated GHG reduction of 80 tonnes** **Estimated GHG reduction of 57 tonnes** **Estimated GHG reduction of 19 tonnes**
Total				**294 tonnes of equivalent-CO_2 emissions**

4.5 Implement action plan (Milestone 4) [April 1, 2007 to March 31, 2008]

If funding is approved, the action plan will be implemented by the part-time energy savings and sustainability coordinator, with the help of town staff and volunteers.

4.6 Monitor progress and report results (Milestone 5) [Throughout 2007 and until 2013]

If funding is approved, monitoring will be carried out by the energy coordinator, Town Engineer and other town staff.

5. CONCLUSION

Much has been accomplished from July 2006 to March 2007. The challenge now will be to maintain the momentum until 2013. This will require commitment, dedication and ongoing funding and resources.

The Town of New Glasgow, in partnership with Clean Nova Scotia, has shown leadership by re-establishing its commitment to reducing greenhouse gas emissions and approving reasonable reduction targets for the community and town operations.

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7. APPENDICES

APPENDIX A: PCP workbook results

2003 General information

Name of municipal government:	New Glasgow
Province/Territory:	Nova Scotia
Corporate Inventory Year	2003
Community Inventory Year	2003

2003 Buildings

Building	Electricity Use				Fuel Use
	Total eCO_2 (t)	Total N_2O (kg)	Total CO_2 (kg)	Total CH_4 (kg)	Total eCO_2 (t)
Engineering and Public Works	34	67	33,693	2	0
Forbes St. Youth Centre	19	36	18,467	1	0
Fraser's Mountain Radio	2	4	1,932	0	0
Forbes Lake Water Treatment	0	0	0	0	102
Library & Fire Hall	255	503	254,767	16	113
North End Recreation	0	0	0	0	15
Parkdale Union Bathroom	14	28	14,351	1	0
Parking Booth	13	26	13,171	1	0
Police Department	252	497	251,809	16	43
Rink Bed	107	210	106,368	7	133
Rink Plant	56	111	55,986	4	0
Town Garage	85	167	84,625	5	76
Town Office	96	189	95,716	6	44
Union Race Track	11	22	11,388	1	0
Union Sportsplex	6	11	5,757	0	0
Ward 1 Rec.	28	54	27,511	2	8
Water Building	53	104	52,657	3	0
West Side Rec.	0	0	0	0	1
West Side School	55	108	54,911	3	104
Total	1,085	2,137	1,083,109	68	639

2003 Vehicle Fleet

Vehicle Department	Gasoline	Diesel	Total eCO_2 (t)	Total eCO_2 (t)/ 1000 km	Total eCO_2 (t)/ vehicle
	Total eCO_2 (t)	Total eCO_2 (t)			
Environmental	79	4	82.41	6.44	41.21
Fire Department	5	9	13.65	2.79	2.27
Police	132	0	131.85	0.59	21.98
Recreation	9	2	11.17	0.58	5.59
Rink	3	0	3	0.048	3.00
Transportation	103	345	447.41	0.045	18.64
Water	0	53	53.2	0.038	4.84
Total	330	412	742.7	0.053	14.28

2003 Streetlights

Location / Type	Total eCO_2 (t)	Total N_2O (kg)	Total CO_2 (kg)	Total CH_4 (kg)	Total eCO_2 (t)/streetlight
1000W Metal Additive	7	14.34	7,263	0.455	3.64
100W High Intensity Na	191	375.68	190,279	11.92	0.47
100W Traffic Control Lights	51	101.08	51,198.6	3.21	0.25
116W Traffic control Lights	17	32.95	16,676	1.04	0.29
150W High Intensity Na	7	14.24	7,213	0.452	0.66
250W High Intensity Na	107	211.13	106,936	6.69	1.01
250W Misc. Un-metered	0	0.2664	134	0.0084	0.07
400W High Intensity Na	47	93.45	47,332	2.96	1.25
400W Mercury Vapour	0	0.2849	144	0.0090	0.14
60W Traffic control Lights	0	0.3404	172	0.108	0.17
69W Traffic control Lights	52	101.58	51,450	3.223	0.17
70W High Intensity Sodium	221	434.63	220,134	13.79	0.32
860W Traffic Control Lights	2	4.16	2,108	0.132	2.11
Bike Patrol	1	2.77	1,405	0.088	1.41
Bob's Account	0	0.1332	67	0.00422	0.07
Duff Cemetery/ Sampson Trail	6	11.20	5,673	0.355	0.14
George St. Carmichael Park	36	70.22	35,567	2.228	4.46
RA-5 Crosswalk	3	5.57	2,824	0.176	0.71
Riverfront St. Lighting	24	48.23	24,427	1.53	4.08
Sampson Building	1	1.83	929	0.058	0.23
Union St. temp. hook-	0	0.0148	7	0.000469	0.01

up					
Stadium Sign	1	1.09	555	0.0348	0.56
South End Playground	7	14.53	7,357	0.4609	2.46
Vale Rd. Park	4	7.59	3,848	0.241	0.96
Total	1,247	1,547.31	783,698.6	49.1737	0.42

2003 Water and Sewage

Facility or Facility Group Name	Electricity Use			
	Total eCO_2 (t)	Total N_2O (kg)	Total CO_2 (kg)	Total CH_4 (kg)
Abercrombie Rd. Pump	14	28	14,002	1
Arch St. Pump	102	201	101,934	6
East river Rd. Pump	6	12	6,131	0
Forbes lake Water Treatment Plant	526	1,036	524,490	33
May St. Lift	1	1	587	0
Munro Res. Building	100	198	100,237	6
Plymouth Pump Station	24	48	24,416	2
Reservoir St. Pump	71	139	70,421	4
Total	844 t	1,663	842,218	52

2003 Waste

Waste to landfill (tonnes): 17.4

eCO_2 Emissions (t): 8

Indicator	Indicator Value	Total eCO_2 (t)/Indicator
Employees	15	0.56

2003 corporate Inventory Summary

Corporate eCO2 Emissions Breakdown by Sector

2003 Residential

Fuel Type	Total eCO_2 (t)	Total N_2O (kg)	Total CO_2 (kg)	Total CH_4 (kg)
Electricity	35397	69745	35,324,900	2,212.99
Fuel oil	23642			
Propane	496			
Total	59534			

Indicator	Indicator Value	Total eCO_2 (t)/Indicator
Population	9432	6.312
Households	4221	14.10

2003 Commercial

Fuel Type	Total eCO_2 (t)	Total N_2O (kg)	Total CO_2 (kg)	Total CH_4 (kg)
Electricity	33237	65490	33169800	2077.98
Fuel oil	2493			
Propane	165			
Total	35,895			

Indicator	Indicator Value	Total eCO_2 (t)/Indicator
Employees	7,020	5.11
Establishments	316	113.59

2003 Industrial

Fuel Type	Total eCO_2 (t)	Total N_2O (kg)	Total CO_2 (kg)	Total CH_4 (kg)
Electricity	1502	1,499,200	2,960	93.92
Total	1502	1,499,200	2,960	93.92

2003 Transportation

	Total eCO_2 (t)				
	Auto	Light Truck	Heavy Truck	Bus	**Total**
Gasoline	12960	10742	1200	0	24902
Diesel	38	316	10979	9	11342
Propane	275	0	0	0	275
Total	13272	11059	12180	9	36519

APPENDIX B: Calculations

3.0.1 Buildings

The following sample calculations present the carbon dioxide emissions for the electricity use and the eCO_2 emissions for fuel use at the Library / Fire Hall.

Total C02(kg) = Electricity x Coefficient(C02)

TotalC02(kg) = 271896kWh x0.626kg/kWh

TotalC02(kg) = 170207

$$Total.eCO_2(tonnes) = Fuel \times Coefficient_{CO_2} + Fuel \times Coefficient_{N_2O} + Fuel \times Coefficient_{CH_4}$$
$$Total.eCO_2(tonnes) = 39959 \times 0.00283 + 39959 \times (1.30\text{E}-08) + 39959 \times (2.60\text{E}-08)$$
$$Total.eCO_2(tonnes) = 113.1$$

3.0.2 Vehicle Fleet

The following calculations represent the Environmental Department's total equivalent CO_2 emissions for gasoline use as well as diesel use.

$$Total.eCO_2(tonnes) = Gasoline \times Coefficient_{CO_2} + Gasoline \times Efficient_{N_2O} + Gasoline \times Cefficient_{CH_4}$$
$$Total.eCO_2(tonnes) = 33346 \times 0.00236 + 33346 \times (1.65\text{E}-06) + 33346 \times (2.40\text{E}-07)$$
$$Total.eCO_2(tonnes) = 78.75$$

$$Total.eCO_2(tonnes) = Diesel \times Coefficient_{CO_2} + Diesel \times Efficient_{N_2O} + Diesel \times Cefficient_{CH_4}$$
$$Total.eCO_2(tonnes) = 1337 \times 0.00273 + 1337 \times (4.00\text{E}-07) + 1337 \times (2.00\text{E}-07)$$
$$Total.eCO_2(tonnes) = 3.65$$

3.0.3 Streetlights

A sample calculation is shown below for kilograms of carbon dioxide emitted by the electricity use of the 1000W metal additive lights.

TotalC02(kg)=Electricity x *Coefficient(C02)*

TotalC02(kg)=7752kWh x *0.626kg/kWh*

TotalC02(kg)= 4852.75

3.0.4 Water and Sewage

The following sample calculation shows the amount of CO_2 emitted by the Abercrombie Rd. pump.

Total C02(kg) = Electricity x Coefficient(C02)

Total C02(kg) = 14943KWh x 0.626 kg/KWh

Total C02(kg) = 9354 kg

3.0.5 Waste

The software has cells for the breakdown of the waste and it was assumed that there would be even amounts of each. The coefficients for each type of waste are built in and could not be viewed for a sample calculation to be done. The software yielded a value of 7 tonnes of eCO2.

3.0.6 Corporate Summary

No sample calculation was available for the corporate summary.

3.0.7 Residential

The sample calculation below represents the carbon dioxide emitted by the residential sector.

TotalC02(kg)=Electricity x *Coefficient(C02)*

TotalC02(kg)=37700000kWh x *0.626kg/kWh*

TotalC02(kg)= 23600200

The calculation for residential fuel oil use follows.

$$FuelUse(L) = FuelUsers \times {}^{Fuel}\!/_{User}$$

$$FuelUse(L) = 2652 \times 3150$$

$$FuelUse(L) = 8353800$$

This fuel value was then used in the software to obtain a total value of eCO_2 emissions, in tonnes, of 23,642.

$$Total.eCO_2(tonnes) = Fuel \times Coefficient_{CO_2} + Fuel \times Coefficient_{N_2O} + Fuel \times Coefficient_{CH_4}$$
$$Total.eCO_2(tonnes) = 8353800 \times 0.00283 + 8353800 \times (1.30\text{E}-08) + 8353800 \times (2.60\text{E}-08)$$
$$Total.eCO_2(tonnes) = 23641.58$$

3.0.8 <u>Commercial</u>

The sample calculation below represents the carbon dioxide emitted by the electricity use of the commercial sector.

TotalC02(kg)=Electricity x *Coefficient(C02)*

TotalC02(kg)=35400000kWh x *0.626kg/kWh*

TotalC02(kg)= 22160400

The eCO_2 was found to be 2492.73 tonnes and is shown in the following calculation.

$$Total.eCO_2(tonnes) = Fuel \times Coefficient_{CO_2} + Fuel \times Coefficient_{N_2O} + Fuel \times Coefficient_{CH_4}$$
$$Total.eCO_2(tonnes) = 880811.01 \times 0.00283 + 880811.01 \times (1.30\text{E}-08) + 880811.01 \times (2.60\text{E}-08)$$
$$Total.eCO_2(tonnes) = 2492.73$$

A variety of data was used to find a proportionality estimate of the number of commercial establishments in Nova Scotia. This was found to be 31526.

$$\frac{NovaS\cot ia_{population}}{NewGlasgow_{population}} \cong \frac{commercial.establishments_{NovaS\cot ia}}{commercial.establishments_{NewGlasgow}}$$
$$\frac{940996}{9432} \cong \frac{commercial.establishments_{NovaS\cot ia}}{316}$$
$$commercial.establishments_{NovaS\cot ia} \cong \frac{(316 \times 940996)}{9432}$$
$$commercial.establishments_{NovaS\cot ia} = 31526$$

Using the calculated amount of commercial establishments in Nova Scotia, the amount of propane per establishment was found to be 2835.75.

$$\frac{propane}{establishments_{NovaS\cot ia}} = \frac{89400000}{31526}$$
$$\frac{propane}{establishments_{NovaS\cot ia}} = 2835.75 \frac{L}{establishment}$$

The total amount of commercial propane use was found to be 107,758.5 L, as shown in the calculation below.

$$propane_{NewGlasgow}(L) = \frac{propane}{establishments_{NovaS\cot ia}} \times establishments_{NewGlasgow}$$
$$propane_{NewGlasgow}(L) = 2835.75 \times 38$$
$$propane_{NewGlasgow}(L) = 107758.5$$

This amount of propane found as the total commercial use for New Glasgow was then entered into the software to find the emissions related to this energy source. The total equivalent carbon dioxide was found to be 165.87 tonnes and is shown in the following calculation.

$$Total.eCO_2(tonnes) = propane \times Coefficient_{CO_2} + propane \times Coefficient_{N_2O} + propane \times Coefficient_{CH_4}$$

$$Total.eCO_2(tonnes) = 107758.5 \times 0.00153 + 107758.5 \times (0) + 107758.8 \times (3.00\text{E}-08)$$

$$Total.eCO_2(tonnes) = 165.87$$

3.0.9 <u>Industrial</u>

The sample calculation below represents the carbon dioxide emitted by the electricity use of the industrial sector.

TotalC02(kg)=Electricity x *Coefficient(C02)*

TotalC02(kg)=1600000kWh x *0.626kg/kWh*

TotalC02(kg)= 1001600

3.0.10 <u>Transportation</u>

The total number of vehicle kilometres travelled (VKT) was found to be 97,355,069, as shown in the calculation below.

$$VKT_{NewGlasgow} = VehicleKilometres_{per.capita} \times population_{16+}$$

$$VKT_{NewGlasgow} = 12229 \times 7961$$

$$VKT_{NewGlasgow} = 97355069$$

The sample calculation shown below is for the emissions produced through gasoline use in cars that was found to be 12959.57 tonnes.

$$eCO_2(tonnes) = TotalVKT \times \%VKT_{gas/car} \times \frac{Efficiency_{gas/car}}{100} \times (Coefficient_{CO_2} + Coefficient_{NO_2} + Coefficient_{CH_4})$$

$$eCO_2(tonnes) = 97355069km \times 0.5317 \times \frac{10.6(L/100km)}{100} \times (0.00236 + (1.65\text{E}-06) + (2.40\text{E}-07))(tonnes/L)$$

$$eCO_2(tonnes) = 12959.57$$

3.3 Forecasts and growth multipliers

Residential

For the residential sector of New Glasgow there were growth multipliers calculated based on a 1994 energy survey done for the town of New Glasgow. The electricity growth multiplier was found to be 0.94 and the household was 1.06.

$$\%change_{peryear} = \left[\frac{electricity_{2003} - electricity_{1994}}{electricity_{1994}}\right] \div (2003 - 1994)$$

$$\%change_{peryear} = \left[\frac{37700000 - 39900000}{39900000}\right] \div (9)$$

$$\%change_{peryear} = -0.00613$$

$$growth.multiplier = 1 + \left\{(\%change_{peryear}) \times 10\, years\right\}$$

$$growth.multiplier = 1 + \left\{-0.00613 \times 10\right\}$$

$$growth.multiplier = 0.939$$

$$\%change_{peryear} = \left[\frac{households_{2003} - households_{1994}}{households_{1994}}\right] \div (2003 - 1994)$$

$$\%change_{peryear} = \left[\frac{4221 - 4010}{4010}\right] \div (9)$$

$$\%change_{peryear} = 0.005846$$

$$growth.multiplier = 1 + \left\{(\%change_{peryear}) \times 10\, years\right\}$$

$$growth.multiplier = 1 + \left\{0.005846 \times 10\right\}$$

$$growth.multiplier = 1.058$$

Commercial

The growth multiplier calculated for the commercial sector of New Glasgow was for electricity use. This was based on 1994 survey data and was found to be 0.99.

$$\%change_{peryear} = \left[\frac{electricity_{2003} - electricity_{1994}}{electricity_{1994}}\right] \div (2003 - 1994)$$

$$\%change_{peryear} = \left[\frac{35400000 - 35824800}{35824800}\right] \div (9)$$

$$\%change_{peryear} = -0.00132$$

$$growth.multiplier = 1 + \left\{(\%change_{peryear}) \times 10\, years\right\}$$

$$growth.multiplier = 1 + \left\{-0.00132 \times 10\right\}$$

$$growth.multiplier = 0.987$$

Industrial

The growth multiplier calculated for the industrial sector of New Glasgow was only found for electricity use. This was based on 1994 survey data and was found to be 0.97.

$$\%change_{peryear} = \left[\frac{electricity_{2003} - electricity_{1994}}{electricity_{1994}}\right] \div (2003 - 1994)$$

$$\%change_{peryear} = \left[\frac{1600000 - 1643200}{1643200}\right] \div (9)$$

$$\%change_{peryear} = -0.00292$$

$$growth.multiplier = 1 + \left\{(\%change_{peryear}) \times 10\, years\right\}$$

$$growth.multiplier = 1 + \left\{-0.00292 \times 10\right\}$$

$$growth.multiplier = 0.971$$

Transportation

Transportation growth was based on the forecasted population growth. This follows the assumption that the number of kilometres travelled per person will remain constant relative to this study. The population change was based on 1994 data and is shown below.

$$\%change_{peryear} = \left[\frac{population_{2003} - population_{1994}}{population_{1994}}\right] \div (2003 - 1994)$$

$$\%change_{peryear} = \left[\frac{9432 - 9812}{9812}\right] \div (9)$$

$$\%change_{peryear} = -0.004303$$

$$growth.multiplier = 1 + \left\{(\%change_{peryear}) \times 10\, years\right\}$$

$$growth.multiplier = 1 + \left\{-0.004303 \times 10\right\}$$

$$growth.multiplier = 0.957$$

Therefore the growth multiplier for transportation is assumed to be 0.96. In the TSA Program, the transportation forecast is divided into fuel use. The assumption was made to use the calculated growth factor for each of the fuel types; gasoline, diesel and propane.

Waste

A growth multiplier of 0.82 was calculated for the community waste sector of New Glasgow. This calculation was based on survey data for 1994 and is shown for below.

$$\%change_{peryear} = \left[\frac{waste_{2003} - waste_{1994}}{waste_{1994}} \right] \div (2003 - 1994)$$

$$\%change_{peryear} = \left[\frac{2223 - 2667}{2667} \right] \div (9)$$

$$\%change_{peryear} = -0.0185$$

$$growth.multiplier = 1 + \left\{ (\%change_{peryear}) \times 10\, years \right\}$$

$$growth.multiplier = 1 + \left\{ -0.0185 \times 10 \right\}$$

$$growth.multiplier = 0.815$$