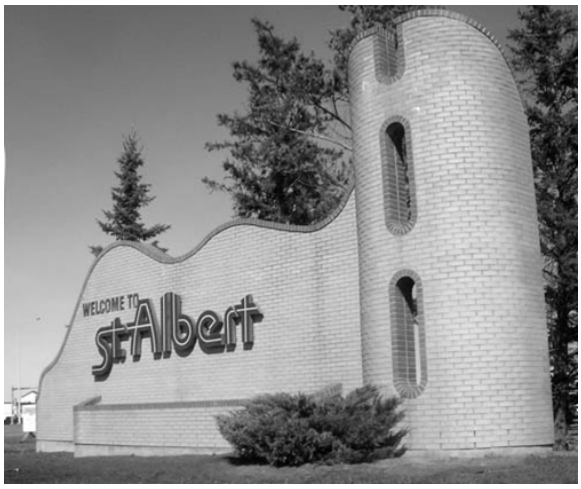

CITY OF ST. ALBERT

Greenhouse Gas Inventory Forecast and Targets PROJECT

Final Report
August 26, 2010

Stantec

Page left intentionally blank to facilitate double-sided printing

TABLE OF CONTENTS

Page left intentionally blank to facilitate double-sided printing

1.0 INTRODUCTION

BACKGROUND

In 2009, the City of St. Albert developed an Environmental Master Plan (EMP) aimed at improving environmental performance and achieving tangible environmental outcomes for the City and the community. Goal #2 of the EMP is to *"reduce non-renewable energy consumption and greenhouse gas emissions."* At the time the EMP was developed, the City set targets to reduce corporate GHG emissions by 20% below 1990 levels by 2020, and; community GHG emissions by 6% below 1990 levels by 2020.

In March of 2010, City Council passed a resolution to join the Partners for Climate Protection (PCP) program, a joint initiative of the Federation of Canadian Municipalities (FCM) and ICLEI – Local Governments for Sustainability. The PCP program is a network of Canadian municipal governments committed to taking action to reduce greenhouse gas (GHG) emissions at the corporate level and throughout the community. The City of St. Albert was the 200th municipality to join the PCP program.[1] As a PCP member, the City is committed to completing the five program milestones, which include:

1. Create a GHG emissions inventory and forecast;
2. Set GHG emissions reduction targets;
3. Develop a local action plan;
4. Implement the local action plan, and;
5. Monitor progress and report results.

The deliverables of this project are intended to fulfill the requirements for Milestones 1 and 2 of the PCP program.

Actions to monitor and manage energy consumption and GHG emissions are frequently divided into the realm of:

- ***Corporate:*** Emissions that the City creates through its activities (and which it has control over), such as municipal building operations, vehicle fleets, utility services, procurement; and
- ***Community:*** Emissions created through the activities of residents and businesses in the community. The City cannot directly control these emissions, but can influence them through planning and program activities.

[1] Press release: http://www.sustainablecommunities.fcm.ca/files/News_Releases/News-Releases-2010/PCP_release-200members-EN.pdf

The greatest challenge for municipal governments trying to address community energy consumption and GHG emissions is that these activities are not traditionally within municipal jurisdiction. The concept of municipal jurisdiction is referred to as the "spheres of influence" and is explained below and in Figure 1.

Figure 1: Municipal Government "Spheres of Influence"

- The centre sphere represents the most direct control a City can have, which is within its own internal operations (e.g., facilities, vehicle fleets, procurement).
- The middle sphere represents areas in which the City has indirect influence, through the development of bylaws, programs, pricing structures and so on (e.g., water treatment and distribution, wastewater treatment, roads, solid waste collection, street and traffic lighting, public transit, and land use planning).
- The outer sphere shows areas that are outside the jurisdiction of the City; such as energy, which has traditionally been provided by regulated utilities or the private sector. In these areas the City may influence change via partnerships.

This project was initiated to compile corporate and community GHG emissions inventories and forecasts for the City of St. Albert. Further, the project is intended to inform the development of ambitious, yet achievable GHG emissions reduction targets for corporate operations and the community. Once endorsed by staff, key stakeholders, and Council, the baseline inventories and forecasts will provide the basis for GHG management planning in St. Albert, and the targets will provide the incentive and direction necessary for the City to achieve Goal #2 of the EMP.

CONTEXT

There is increasing evidence that global climate change resulting from emissions of carbon dioxide and other greenhouse gases is having a significant impact on the ecology of the planet. In addition, climate change is expected to negatively impact global economic growth and development. In 2005, the UK government commissioned an independent economic review called the Stern Review, which states that the *"costs of stabilizing the climate are significant but manageable; delay would be dangerous and much more costly"*.

Beyond the costs associated with delayed action, there are cost savings to be realized through efforts to conserve energy and to use it more efficiently, and economic opportunities available to communities that develop local energy supply and infrastructure. Actions to encourage **energy efficiency and conservation** and to promote implementation of **renewable energy** will assist local governments in developing **energy resilient communities**, in addition to **mitigating climate change**.

It addition to uncertainty around energy supply and pricing, we must face the reality that our use of energy is resulting in increasing atmospheric concentrations of greenhouse gases (GHGs), which is the most significant contributor to global climate change. Figure 2 shows the GHG emissions trend in Canada over the period from 1990 to 2006.

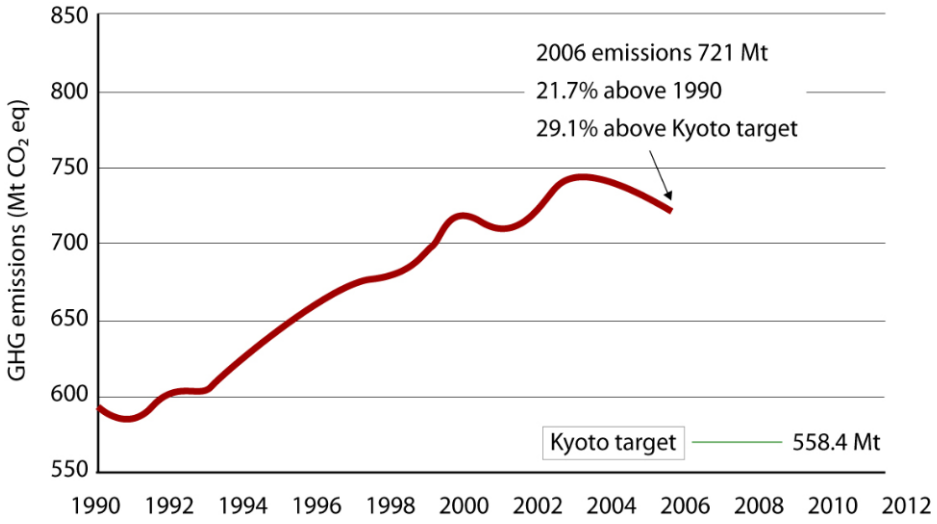

Figure 2: Canadian GHG Emissions Trend[2]

[2] National Inventory Report: Greenhouse Gas Sources and Sinks in Canada, 1990-2006.

FEDERAL LEGISLATION AND INITIATIVES

The United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP 15) took place in December 2009 in Copenhagen, Denmark. At the conference, global leaders came together to determine whether—and how—the world will take action to avoid significant climate change over the next half century. The resulting Copenhagen Accord requires industrialized countries to set economy-wide GHG emissions reduction targets for 2020 and to allocate funds to assist developing countries in reducing emissions.[3] The Government of Canada has set a target to reduce country-wide emissions by 17% below 2005 levels by 2020; however, no plan has been released outlining how this target will be achieved.[4]

The Federal Government has announced its intention to require automakers to improve fleet-wide fuel economy and reduce fleet-wide GHG emissions by roughly 5% every year, beginning with 2012 model year vehicles[5]. These improvements will greatly assist municipal governments in reducing GHG emissions from transportation, which tend to comprise the largest portion of a community's GHG emissions.

PROVINCIAL LEGISLATION AND INITIATIVES

Alberta has a strong, fossil-fuel focused and export-oriented economy. Approximately 90% of electricity in the province is thermal-based, from fossil fuels such as coal and natural gas. Alberta is Canada's largest emitter of greenhouse gases. In 2004, provincial GHG emissions were 223 megatonnes (Mt), compared to Ontario at 207 Mt, Quebec at 91 Mt, and British Columbia at 66 Mt. Alberta's *Climate Change Strategy* (2008) commits to reducing province-wide GHG emissions from business-as-usual levels by:

- 20 megatonnes by 2010 (i.e. meet intensity target from 2002 plan)
- 50 megatonnes by 2020 (i.e. stabilize GHG emissions)
- 200 megatonnes by 2050 (i.e. 14% below 2005 levels)

[3] Copenhagen Accord (http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf)

[4] Canada's target aligns with the target set by the United States. The European Union has committed to reducing GHG emissions by 20% below 1990 levels by 2020.

[5] U.S., Canada Finalize New Auto Fuel Economy Standards (http://www.industryweek.com)

The Province proposes to meet the 200 Mt reduction target through: (1) energy efficiency and conservation activities (estimated to reduce emissions by 24 Mt); (2) carbon capture and storage technology (estimated to reduce emissions by 139 Mt), and; (3) green energy production (estimated to reduce emissions by 37 Mt).

To support these targets, the Province of Alberta has enacted the *Climate Change and Emissions Management Act*, which requires facilities that emit more than 100,000 tonnes of GHG emissions annually to reduce emissions intensity by 12% per year.[6]

How much is 200Mt?

More than the total current GHG emissions from all the other Western provinces and 3 territories combined.

Roughly the same amount as current GHG emissions from Denmark, Finland and Sweden combined.

Approximately equivalent to GHG emissions from transportation in Canada.

The *Provincial Energy Strategy* outlines a number of initiatives that will assist in reducing GHG emissions at the local level, including:[7]

- A *Renewable Fuel Standard* requiring 5% ethanol content in gasoline and 2% renewable content in diesel;
- A Green Transit Incentive Program (Green TRIP) to promote the use of public transit and reduce personal vehicle use;
- Improved building codes and support for building retrofits to reduce the environmental footprint of buildings;
- A commitment to work with municipal governments to encourage wise urban planning and a reduction in urban sprawl.

[6] Climate Change Central (http://www.climatechangecentral.com/)

[7] Launching Alberta's Energy Future: Provincial Energy Strategy (http://www.energy.alberta.ca/Org/pdfs/AB_ProvincialEnergyStrategy.pdf)

2.0 METHODOLOGY

INVENTORY PROTOCOL

The methods used to develop the City of St. Albert's corporate and community GHG inventories is in keeping with the Partners for Climate Protection (PCP) best practices and guidance.[8] To quantify GHG emissions in the identified sectors, the International Local Government GHG Emissions Analysis Protocol (IEAP) is employed as the preferred inventory guidance document for municipalities participating in the PCP program.[9]

To design a GHG inventory that suits both the structure and business goals of an organization, an approach for developing the basic inventory by business line (or other reasonable division), and then consolidating GHG emissions across the entity, must be clearly defined. Based on discussions with the City and guidance of the IEAP, an "operational control" approach was used. This approach requires that the City account for emissions from every source unit over which it implements operating policies. The inventory includes all important sources of GHG emissions occurring within the City of St. Albert's organizational (corporate) and geopolitical (community) boundaries. Three classifications or "scopes" are used to categorize emissions sources, differing slightly when applied in the context of corporate and community-scale inventories. Differentiating between emission scopes helps to avoid the possibility of double counting emissions and misrepresenting emissions when reporting. GHG emissions are presented in Table 1 by category or "scope:"

Table 1: Emissions Sources by Scope

Scope	Corporate Inventory	Community Inventory
Scope 1	Direct emission sources owned or operated by the City of St. Albert (e.g., gasoline or diesel use by fleet vehicles).	Direct emission sources located within the St. Albert (e.g., natural gas or propane used for heating).
Scope 2	Indirect emissions that result from the use of electricity to run City operations. (e.g., electricity use in civic facilities).	Indirect emissions that result from activities within St. Albert (e.g., electricity, district heating, etc).
Scope 3	Indirect emissions from sources that are not owned or controlled by the City (e.g., optional reporting categories such as employee commuting, paper use, etc)	Indirect emissions that occur as a result of activity within St. Albert (e.g., methane emissions from waste generated in St. Albert, which decomposes at landfills outside St. Albert).

[8] Developing Inventories for Greenhouse Gas Emissions and Energy Consumption (http://www.sustainablecommunities.fcm.ca/files/Capacity_Building_-_PCP/pcp-ismd-pub-en.pdf)

[9] ICLEI – Local Governments for Sustainability (http://www.iclei.org/index.php?id=ghgprotocol)

Municipal governments offer different services, via different mechanisms to their residents. Calculating the GHG emssions profile can be complicated because of how services are delivered and on who's 'balance sheet' they may appear. GHG emissions inventories need to reflect the operations of the municipal government and the way in which it interacts with the community. At the same time, it is important that the analysis conforms to international standards for reporting to ensure consistency and comparability. Table 2 shows the sectors in which data was compiled and reported for the City of St. Albert's GHG emissions inventory.

Table 2: GHG Emissions Inventory Reporting Sectors

Corporate	Community
Buildings	Residential Buildings
Vehicle Fleet	Commercial Buildings
Streetlights	Industrial Buildings
Water and Wastewater	Transportation
Solid Waste	Solid Waste

To simplify reporting, GHG emissions are normalized and reported as metric tonnes of carbon dioxide equivalents (tonnes CO_2e); with CO_2e representing the sum of the individual GHGs weighted to represent the atmospheric effects of CO_2 – the most abundant greenhouse gas – relative to individual Global Warming Potentials (GWP). The GWP is a measure of the warming effect that a particular GHG will have on the atmosphere relative to the impact of CO_2. A summary of GHGs and their respective GWPs is presented in Table 3.[10]

Table 3: Global Warming Potential of Greenhouse Gases

Greenhouse Gas	Global Warming Potential (100 year)
Carbon Dioxide (CO_2)	1
Methane (CH_4)	23
Nitrous Oxide (N_2O)	296
Perfluorocarbons (PFCs)	6,500 – 9,200
Hydrofluorocarbons (HFCs)	12 – 12,000
Sulphur Hexafluoride (SF_6)	22,200

[10] Intergovernmental Panel on Climate Change, Third Assessment Report (2001). Working Group 1 Technical Summary (http://www.ipcc.ch/ipccreports/tar/vol4/english/090.htm#c6)

The amount of GHGs emitted from a source is multiplied by the appropriate GWP to estimate CO_2e emissions. These results are summed to provide the City with the total tonnes CO_2e emitted for the 2008 baseline year.The spreadsheet tool provided by the PCP program was used to estimate GHG emissions for the City of St. Albert.[11]

EMISSIONS FACTORS

Emissions from energy consumption are calculated using emission intensity values (or emissions factors), which specify the amount of CO_2e produced per kilowatt hour (kWh) of electricity consumed. The emissions factor is then multiplied by the total energy (kWh) used to determine the total amount of CO_2e produced.

$$CO_2e\ (kg) = Energy\ Use\ (kWh) * coefficient\ (kg\ of\ CO_2e/kWh)$$

Electricity coefficients vary by region and are dependent on the annual average mix of fuel types used to produce the electricity within a particular electrical or provincial grid. The PCP spreadsheet has not been updated to reflect the provincial electricity intensity values released in the 2008 National Inventory Report.[12] However, the provincial emissions factors were updated by Stantec for the purposes of this project. Table 4 summarizes the emissions factors used to calculate GHG emissions for the City of St. Albert.

Table 4: Emissions Factors used for St. Albert's GHG Inventory

Source	Emission Factor (tonnes CO_2e/unit)
Electricity (MWh)	0.880
Natural Gas (GJ)	0.00188
Gasoline (L)	0.00236
Diesel (L)	0.00273
Municipal Solid Waste (MSW)	0.482

[11] GHG Inventory Quantification Support Spreadsheet (http://gmf.fcm.ca/Partners-for-Climate-Protection/Toolkit.asp)

[12] Canada's 2008 Greenhouse Gas Inventory: http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=83A34A7A-1

DATA COLLECTION

CORPORATE

Data for corporate operations was retrieved directly from City staff in the form of spreadsheets, reports and email correspondence (Table 5).

Table 5: Corporate Inventory Data Collection Staff Contacts

Sector	Data source/contact	Notes
All	Meghan Myers, Environmental Coordinator	Coordinated all data collection, including facility waste survey
Fleets	Karen Cimolai, Infrastructure Technical Coordinator	Fleet list and fleet fuel consumption
Buildings and Infrastructure	Joel DeBlock, Senior Business Analyst	Energy and natural gas usage for buildings, streetlights, water and wastewater infrastructure, etc.
Buildings	Doug Todd, Asset Management Manager	Buildings list
N/A	Carol Bergum, Long Term Planner	Data for forecasting community emissions
Buildings	Mark Hussey, Infrastructure Manager	Floor space area for buildings

COMMUNITY

Table 6 outlines the data sources and contacts for the community inventory.

Table 6: Community Inventory Data Collection Sources

Sector	Data source/contact	Notes
All	Meghan Myers, Environmental Coordinator City of St. Albert	Coordinated all data collection
Building Electricity Consumption	Alison Thomas, Stakeholder Relations Manager Fortis Alberta (403) 514-4386 allison.thomas@fortisalberta.com	Monthly electricity consumption for buildings in the community
Building Natural Gas Consumption	ATCO Gas (780) 733-2736 gagan.duhra@atcogas.com,	Monthly natural gas usage by buildings in the community.
Transportation	Vehicle kilometres per inhabitant (2007 Canadian Vehicle Survey Summary Report); St. Albert Population (2006 Census); Average vehicle fuel economy (Natural Resources Canada Office of Energy Efficiency)	Figures used to estimate transportation emissions
Solid Waste	Tonnes of solid waste disposed at landfill (Solid Waste Management System Review, 2009)	Figures used to estimate solid waste emissions

MONITORING

It is recommended that the City track corporate energy consumption data annually in order to compile a corporate energy and GHG emissions inventory on a yearly basis.

The Province of Alberta is initiating a project that will investigate data sources and availability in an effort to assist municipal governments in compiling community-scale energy and GHG emissions inventories. Given the current availability of community-scale data for St. Albert – the need to use figures that are not available on an annual basis in order to estimate transportation emissions – a community energy and GHG emissions inventory could be compiled every 2 to 5 years. To support monitoring efforts at the community-scale, the City of St. Albert may wish to consider tracking a series of secondary indicators, such as those proposed in Table 7. This would require that the City establish a baseline level of performance for each indicator and track progress over time. In addition, the City could consider establishing targets for each of the indicators.

Table 7: Potential Secondary Indicators for Energy and GHG Emissions

Indicator	Measurement Unit	Data Source
1. GHG emissions from buildings (total and per capita)	Residential, Institutional, Commercial, and industrial tonnes CO2e/account (total emissions divided by the number of accounts by sector)	Consumption data provided by Utilities (Fortis and ATCO)
2. Energy efficient homes	Percent of existing homes renovated to high efficiency standards (i.e. exceeding EnerGuide for Homes 80).	City could track this at time of issuing building permits
3. Residential density	Gross dwelling units per hectare (by neighbourhood or in the City Centre)	City records
4. Housing diversity	Number and percent of dwellings by structural type (i.e. Single-family, Duplex, Multi-family, Modular).	Statistics Canada
5. Alternative commutes	Percent of residents using alternative transportation to get to work (i.e. shuttle bus, walking, cycling).	Statistics Canada
6. Median commuter trip distance	Kilometres (Standard distances from Census: less than 5km, 5 – 9.9km, 10 – 14km, 15 – 19.9km, 20 – 24km, 25 – 29.9km, 30km and greater)	Statistics Canada
7. Solid waste disposed (total and per capita)	Total municipal solid waste (measured in tonnes) sent to landfill divided by the population of St. Albert	City records
8. Alternative energy supply	Number of alternative energy systems installed (e.g. solar roofs, geo-exchange, micro wind turbines, etc).	City could track this at time of issuing building permits

3.0 CORPORATE INVENTORY, FORECAST & TARGETS

INVENTORY SUMMARY

A GHG emissions inventory of the City of St. Albert's corporate operations was compiled for the 2008 baseline year. GHG emissions from the City of St. Albert's corporate operations totalled 30,716 tonnes CO_2e. A summary of the GHG emissions by sector is provided in Table 8.

Table 8: Corporate GHG Emissions by Sector (2008)

Sector	GHG Emissions (tonnes CO_2e)
Buildings	18,404
Vehicle Fleet	5,082
Streetlights	4,370
Water and Sewage	2,679
Solid Waste	181
TOTAL	**30,716**

Figure 3 shows the amount and proportion of GHG emissions by sector.

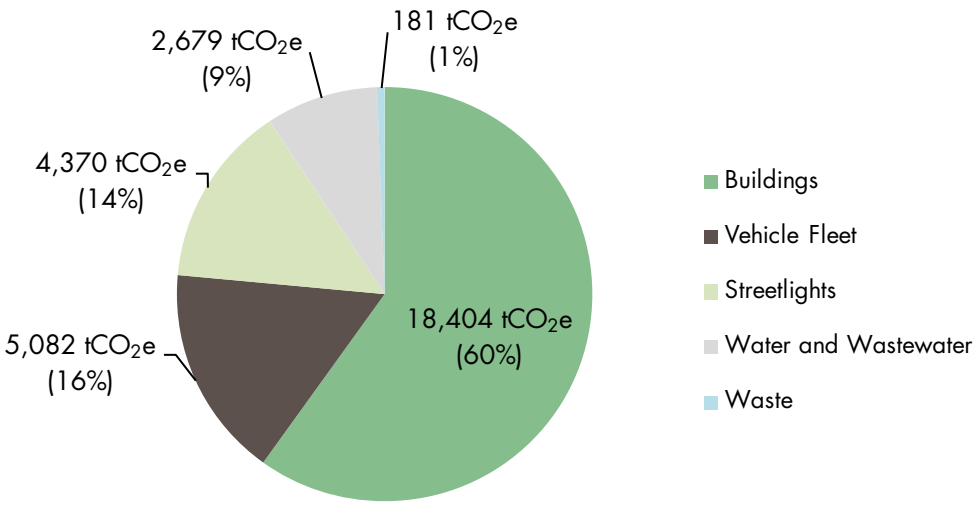

Figure 3: Corporate GHG Emissions by Sector (2008)

A summary of the energy consumption and GHG emissions by energy source is presented in Table 9.

Table 9: Corporate Energy Consumption and GHG Emissions by Source (2008)

Source	Energy Consumption (various units)	GHG Emissions (tonnes CO_2e)
Electricity	21,324,781 kWh	18,766
Natural Gas	134,818 GJ	6,687
Diesel	1,367,278 L	3,733
Gasoline	719,047 L	1,349
TOTAL		**30,535***

* *This figure does not include GHG emissions from solid waste (181 tonnes CO_2e).*

Figure 4 shows the amount and proportion of GHG emissions by source.

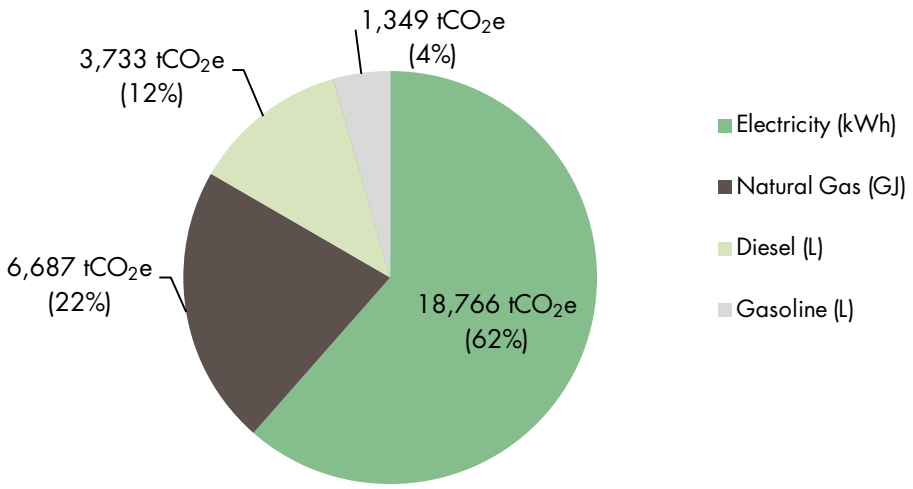

Figure 4: Corporate GHG Emissions by Source (2008)

The detailed consumption data used to compile the corporate inventory is provided in Appendix A.

FORECAST

A **GHG forecast by population** was developed for the period from 2008 to 2030. This forecast assumes no intervention to reduce GHG emissions. Rather, GHG emissions grow in step with population at a rate of 1.5% annually. This growth rate was provided by City of St. Albert staff and is more conservative than the 2.6% growth rate used to project population in the Municipal Development Plan (MDP). Under this scenario, GHG emissions are expected to grow from 30,716 tonnes CO_2e in 2008 to 42,620 tonnes CO_2e in 2030.

A **business-as-usual (BAU) forecast** was also developed for the City of St. Albert. This forecast is driven by population growth, but considers efficiency improvements expected as a result of senior government policy, which will occur regardless of action taken by the City of St. Albert (i.e. the City continues with business as usual). The efficiency improvements that were assumed to create the BAU forecast are:

- A 30% reduction in energy demand in new commercial construction by 2012 as a result of planned improvements to the Model National Energy Code for Buildings (MNECB)
- A 22% improvement in fleet fuel emissions from passenger vehicles as a result of natural turnover of the fleet by 2030 (federal policy initiative)
- A 12% annual improvement in the GHG intensity of electricity beginning in 2012 (applied to streetlighting and water and wastewater infrastructure)

As a result of these assumptions, emissions are expected to increase at a lesser rate from 30,716 tonnes CO_2e in 2008 to 35,815 tonnes CO_2e in 2030 (Figure 5).

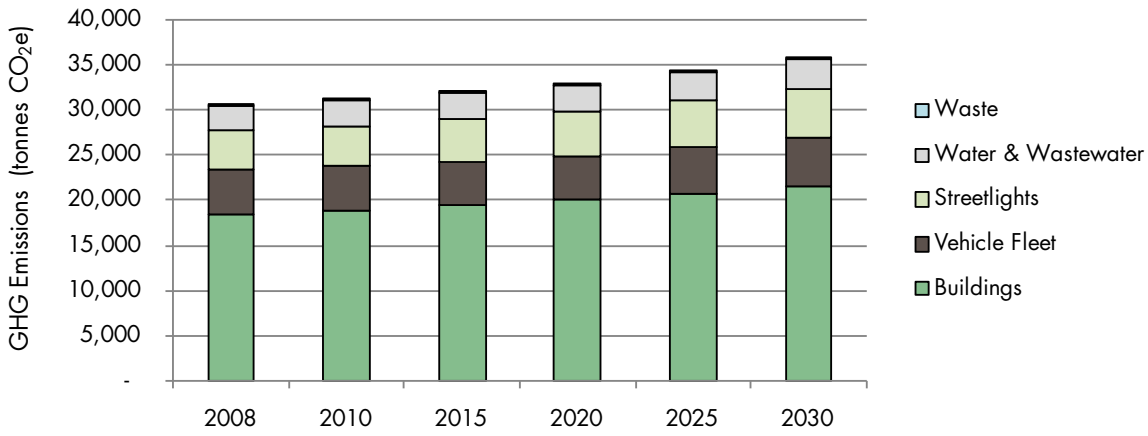

Figure 5: Business-as-usual forecast of corporate GHG emissions, 2008 - 2030

TARGETS

The PCP program recommends that members adopt a target to reduce corporate GHG emissions by 20% over the baseline within a 10-year period. For this project, a corporate target was derived by making some assumptions around measures that the City can feasibly implement and the estimated GHG reduction potential of these measures. These reductions were then subtracted from the BAU forecast in order to come up with targets for 2020 and 2030. This approach to target-setting places a degree of responsibility for emissions reductions on senior levels of government, and clearly shows the reductions that the municipal government will target. This is an important point, as collaborative action is required to mitigate climate change and municipal governments alone should not bear the full responsibility for reducing GHG emissions.

Assumed corporate GHG reduction measures and their estimated reduction impact are outlined in Table 10.

Table 10: GHG Reduction Measures Assumed in Corporate Target

GHG Reduction Measure	Estimated GHG Reduction Impact
Energy efficient new buildings	50%
Energy retrofits to existing buildings	40%
Green power purchases	5%
10% biodiesel (B10)	10%
Vehicle right-sizing	10%
LED streetlighting	80%
Waste diversion practices	50%

With successful implementation of these corporate GHG reduction measures, the City might expect an approximate reduction of 23% below 2008 levels by 2020 (which is equal to a 28% reduction from the BAU forecast) and an approximate reduction of 44% below 2008 levels by 2030 (which is equal to a 52% reduction from the BAU forecast). As a result of this analysis, the following corporate GHG emissions reduction targets are recommended:

Reduce corporate emissions by 20% below 2008 levels by 2020
Reduce corporate emissions by 40% below 2008 levels by 2030

Figure 6 shows the GHG emissions forecast and anticipated reductions for corporate operations, where: **A**=reductions expected as a result of senior government actions; **B**=achievable reductions by the City of St. Albert, and; **C**=remaining GHG emissions.

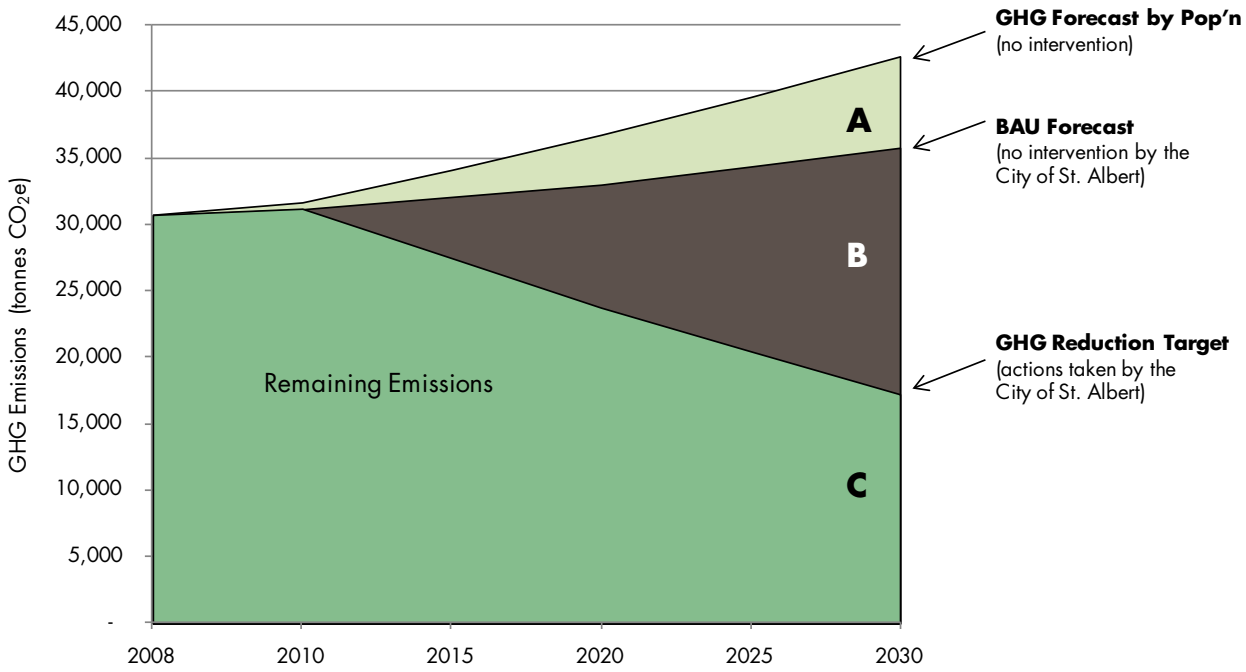

Figure 6: Corporate GHG Emissions Forecast and Target

In addition to the 2020 and 2030 targets, it is recommended that the City of St. Albert consider adopting a visionary, long-term target to demonstrate their corporate leadership on the issues of energy conservation and climate change. Taking a visionary approach to setting long-term targets is necessary because, at this point in time, it is impossible to predict future conditions that might allow for more detailed analysis around a long-term target. As such, the following **visionary target** is recommended for corporate operations:

Reduce corporate emissions by 60% below 2008 levels by 2050

4.0 COMMUNITY INVENTORY, FORECAST & TARGETS

INVENTORY SUMMARY

A community-wide GHG emissions inventory for the City of St. Albert was compiled for the 2008 baseline year. Community-wide GHG emissions for St. Albert totalled 711,303 tonnes CO_2e, which is equivalent to 12.3 tonnes CO_2e per capita. A summary of the GHG emissions by sector is provided in Table 11.

Table 11: Community GHG Emissions by Sector (2008)

Sector	GHG Emissions (tonnes CO_2e)
Residential	288,377
Commercial	70,791
Industrial	120,058
Transportation	226,779
Solid Waste	5,299
TOTAL	**711,303**

Figure 7 shows the amount and proportion of GHG emissions by sector.

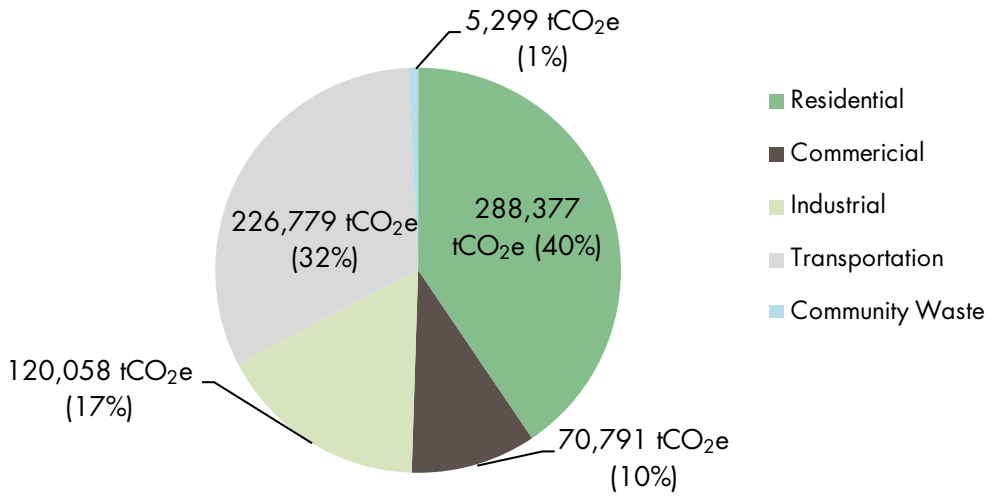

Figure 7: Community GHG Emissions by Sector (2008)

A summary of the energy consumption and GHG emissions by source is presented inTable 12.

Table 12: Energy Consumption and GHG Emissions by Source (2008)

Source	Energy Consumption (various units)	GHG Emissions (tonnes CO_2e)
Electricity	339,992,833 kWh	299,194
Natural Gas	3,629,867 GJ	180,032
Gasoline	3,330,000 GJ*	226,800
TOTAL		**706,026****

**This figure is an estimate and was derived by working backwards from the GHG emissions estimate for transportation (see Appendix B for more detail).*
***The total does not include emissions from solid waste.*

Figure 8 shows the GHG emissions attributed to electricity, natural gas, and gasoline consumption in the community.

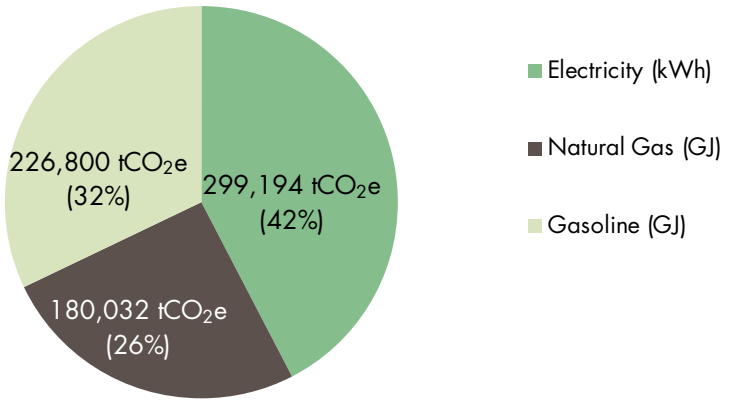

Figure 8: Community GHG emissions by Source (2008)

The detailed consumption data used to compile the community inventory is provided in Appendix B.

FORECAST

A **GHG forecast by population** was developed for the period from 2008 to 2030. This forecast assumes no intervention to reduce GHG emissions. Rather, GHG emissions grow in step with population at a rate of 1.5% annually. This growth rate was provided by City of St. Albert staff and is more conservative than the 2.6% growth rate used to project population in the Municipal Development Plan. Under this scenario, emissions are expected to grow from 711,303 tonnes CO_2e to 986,979 tonnes CO_2e by 2030.

A **business-as-usual (BAU) forecast** was also developed for the City of St. Albert. This forecast is driven by population growth, but considers efficiency improvements expected as a result of senior government policy, which will occur regardless of action taken by the City of St. Albert (i.e. the City continues with business as usual). The efficiency improvements that were assumed to create the BAU forecast are:

- A 25% reduction in energy demand in new residential construction by 2012 as a result of anticipated improvements to the Alberta Building Code
- A 30% reduction in energy demand in new commercial construction by 2012 as a result of planned improvements to the Model National Energy Code for Buildings (MNECB)
- A 22% improvement in fleet fuel emissions from passenger vehicles as a result of federal policy initiatives
- A 15% improvement in fleet fuel emissions from commercial vehicles as a result of federal policy initiatives
- A 12% annual improvement in the GHG intensity of electricity starting in 2012

As a result of these assumptions, emissions are expected to increase at a lesser rate from 711,303 tonnes CO_2e in 2008 to 865,926 tonnes CO_2e in 2030 (Figure 9).

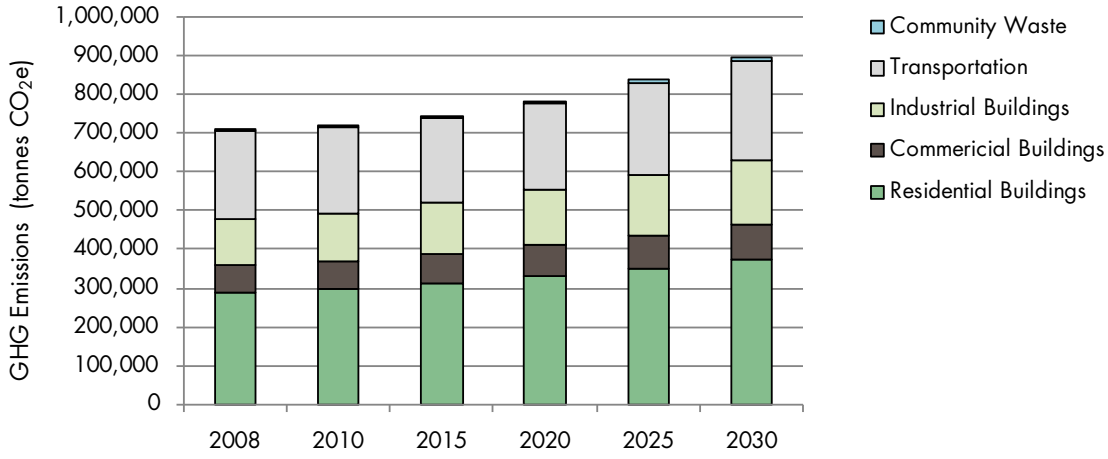

Figure 9: Business-as-usual forecast of community GHG emissions, 2008 - 2030

TARGETS

The PCP program recommends that members adopt a target to reduce community GHG emissions by 6% over the baseline within a 10-year period. For this project, a community target was derived by making some assumptions around measures that the City (and community partners) can feasibly implement.

In order to understand the GHG impact of these measures, it is helpful to understand the policy instruments available to municipal governments to reduce energy consumption and GHG emissions in the community. These policy instruments include outreach/education, non-financial incentives, financial incentives, and regulation. The GHG reduction potential of these policy instruments increases from outreach to regulation. That is, outreach has the lowest impact on influencing behaviours to reduce energy and emissions; whereas regulation has the greatest potential impact to influence behaviours. The assumptions made in order to develop community GHG emissions reduction targets for 2020 and 2030 are outlined in Table 13.

Again, this approach to target-setting places a degree of responsibility for emissions reductions on senior levels of government, and clearly shows the reductions that the municipal government (and community partners) will target. This is an especially important point in the context of community-scale emissions. Municipalities do not have direct control over emissions from buildings, transportation and solid waste. While they may influence change through the use of various policy instruments, the impact on reducing emissions will vary depending on the behaviours and actions of individuals.

Table 13: GHG Reduction Measures Assumed in Community Target

GHG Reduction Measure	Estimated Reduction Impact	Policy Instrument	Estimated Uptake
Energy efficient new buildings	30%	Regulation	90%
Energy retrofits to existing building	50%	Financial Incentive	50%
Green power purchases	40%	Financial Incentive	50%
10% biodiesel (B10)	10%	Non-financial incentive	20%
Vehicle right-sizing	40%	Outreach	5%
Land use planning (smart growth)	40%	Regulation	90%
Waste diversion	75%	Regulation	90%

With successful implementation of these community GHG reduction measures, the City might expect an 11% reduction from 2008 levels by 2020 (which is equal to a 18% reduction over the BAU forecast or per capita emissions of 10.9 tonnes CO_2e) and an 18% reduction from from 2008 levels by 2030 (which is equal to a 33% reduction over the BAU forecast or per capita emissions of 10.5 tonnes CO_2e). As a result of this analysis, the following community GHG emissions reduction targets are recommended:

Reduce community emissions by 10% below 2008 levels by 2020
Reduce community emissions by 20% below 2008 levels by 2030

Figure 10 shows the GHG emissions forecast and anticipated reductions for the community of St. Albert, where: **A**=reductions expected as a result of senior government actions; **B**=achievable reductions by the City of St. Albert and community partners, and; **C**=remaining GHG emissions.

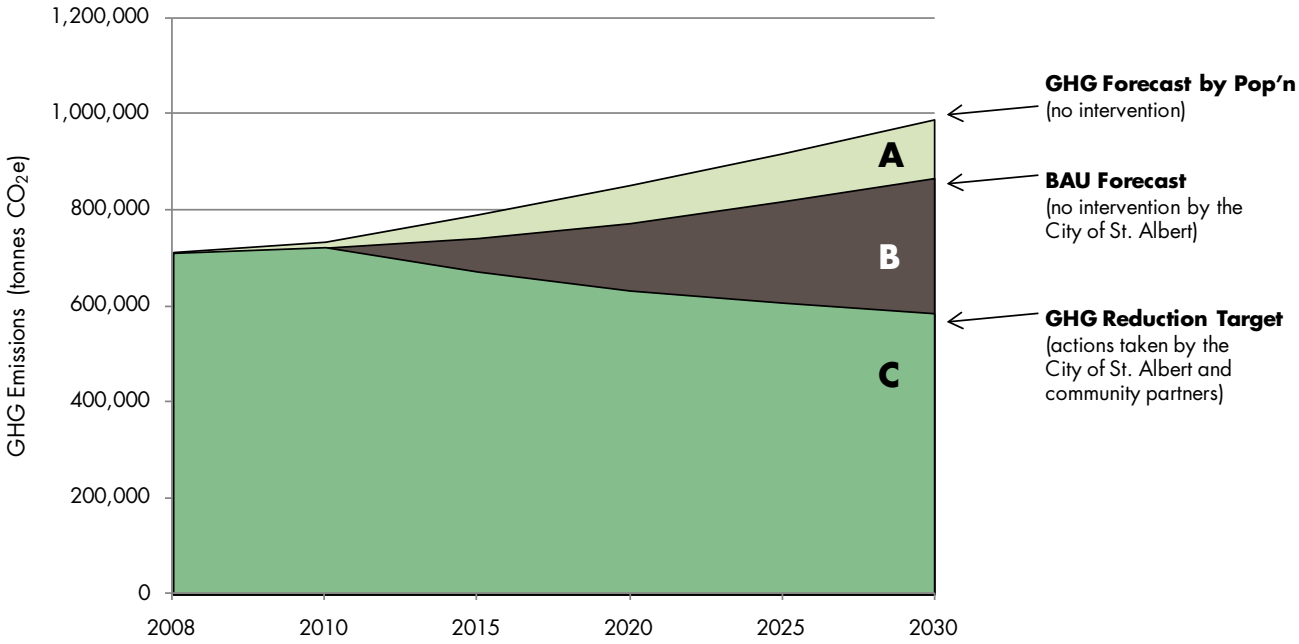

Figure 10: Community GHG Emissions Forecast and Target

It is further recommended that the City of St. Albert consider adopting a visionary, long-term target to demonstrate leadership on the issues of energy conservation and climate change. Another reason to adopt a visionary target is because, at this point in time, it is impossible to predict future conditions that might allow for more detailed analysis around a long-term target. As such, the following **visionary target** is recommended:

Reduce community emissions by 50% below 2008 levels by 2050

5.0 NEXT STEPS

The next step (and PCP milestone) for the City of St. Albert is to create a local action plan to articulate what measures the City (corporate operations) and the community want to implement in order to reduce energy consumption and GHG emissions. Local action planning involves engagement with City staff, Council, and community members to develop goals, actions and implementation strategies to realize reductions in energy and GHG emissions. Engagement is an important part of the local action planning process, as partnerships and commitment from residents are essential in order for municipal governments to have the support and impact necessary to reduce community energy consumption and GHG emissions. Based on the learning from this project, there are a few key areas where further opportunities to reduce energy and emissions are apparent.

Buildings (corporate):
Buildings account for approximately 50% of the City's corporate GHG emissions profile. Energy consumption in civic facilities such as recreation complexes (i.e. pools, rinks, etc) tends to be higher than other buildings. This is the case in St. Albert, where facilities such as Servus Place, Fountain Park Pool, and Akinsdale Arena are among the highest consuming facilities in the City's buildings portfolio. Another large energy consumer is City Hall, where electricity consumption was approximately 37.1kWh/ft^2 in 2008. Electricity consumption in comparable buildings in the prairies is approximately 19.4 kWh/ft^2. These consumption statistics indicate that there may be further reduction opportunities (in addition to those already implemented by the City) to pursue. The City may need to consider implementing measures with longer payback periods in order to further reduce energy and emissions from its facilities.

Fleet Vehicles (corporate):
Fleet vehicles account for approximately 16% of the City's corporate GHG emissions profile. Actions to reduce fleet vehicle emissions include right-sizing, utilization management, driver training, idling reduction, purchasing alternative fuel vehicles, performing regular maintenance, trip and route planning, etc. Programs to assist municipal governments in greening their fleet, such as E3 Fleet (www.e3fleet.com) and the Enviro-Fleets pilot program being developed by the PCP program, can provide guidance to further reduce emissions from fleet operations.

Land Use (community):
While emissions from land use are not directly calculated in a community GHG inventory, land use policies and practices influence emissions from transportation and buildings. Opportunities exist, even in smaller urban areas such as St. Albert, to increase density in nodes (e.g., downtown, around shopping centres, etc) and to incorporate different housing types so as to provide a greater diversity of options for residents with different needs. Creating more complete, compact communities affects the energy consumed to heat and cool buildings, and creates opportunities for district energy, as well as providing alternative transportation options (e.g., walking, cycling, transit, etc). All of these activities have a significant impact on a community's GHG emissions profile and the City can affect change in these areas through smart land use planning choices.

Prioritizing which measures to undertake can be a challenging exercise for communities as many factors must be considered including: cost, impact on reducing emissions, ease of implementation, availability of technology, public support, etc. These criteria (and more) should be considered when developing implementation strategies during the local action planning process. A tool that has proved to be helpful in the prioritization of GHG reduction measures is the marginal abatement cost curve, which plots the cost per tonne of greenhouse gas emissions reduced. An example is shown in Figure 11.

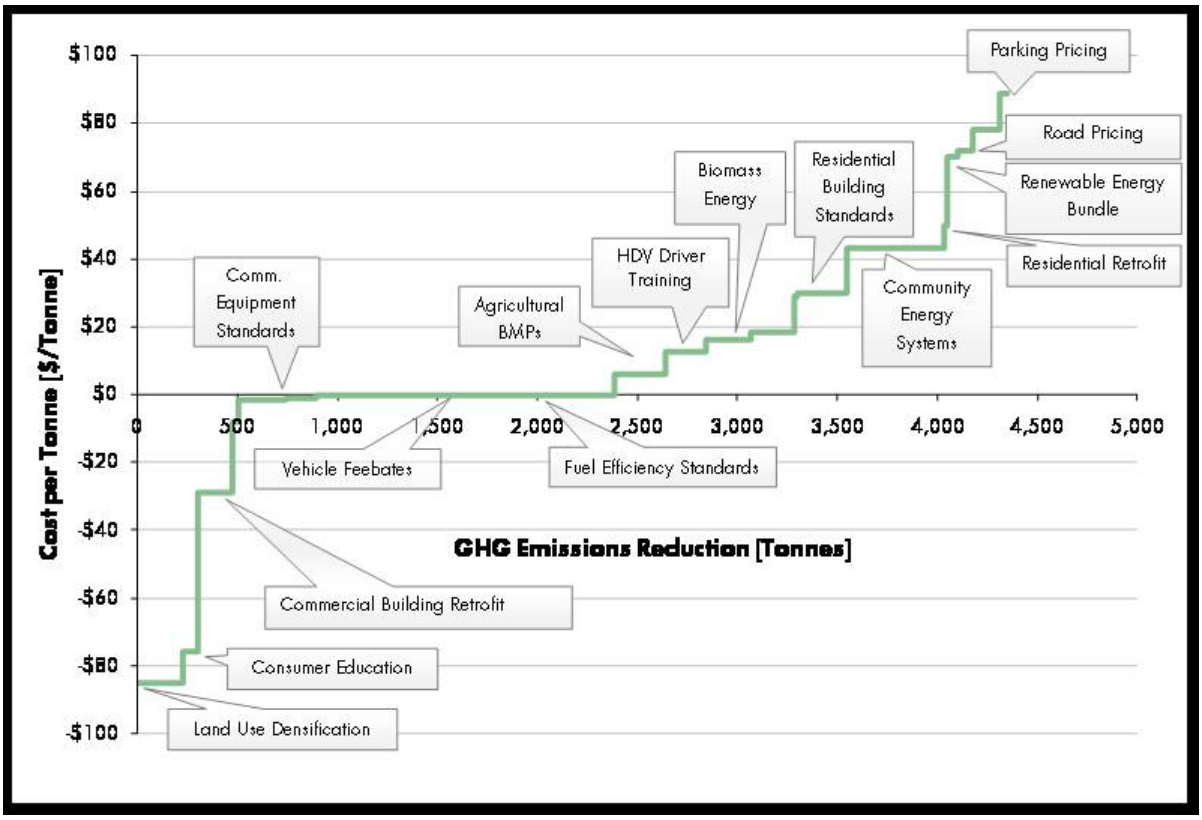

Figure 11: Example of a Marginal Abatement Cost Curve (for British Columbia)

To inform local action planning it may be helpful to see what other communities have done to reduce energy consumption and GHG emissions. Case studies and best practices are abundant and come from a variety of sources, some of which include:

- A series of community energy case studies prepared by Stantec for Natural Resources Canada.[13]
- A discussion paper prepared by Stantec for the City of Edmonton's *The Way We Green* initiative, which provides an overview of best practices and a list of additional resources for communities to explore.[14]
- An annual report from the PCP program on the impact that PCP members are having on energy and GHG emissions.[15]

Financial support to assist municipal governments in developing and implementing local action plans also exists. The FCM Green Municipal Fund (GMF) provides grants to support sustainability planning and local action planning efforts. Low-interest loans are also available to support capital projects that reduce energy and GHG emissions.[16]

With baseline inventories and forecasts completed, and emissions reduction targets proposed, the City of St. Albert is well-positioned to take their energy and emissions planning efforts to the next level.

For more information about this project, please contact:

City of St. Albert
Office of Environment
Second Floor, 5 St. Anne Street
St. Albert, AB T8N 3Z9
Phone: 780-459-1746
Fax: 780-458-1974
Email: environment@st-albert.net

---

[13] Natural Resources Canada, Community Energy Case Studies: http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/buildings_communities/communities/case_studies.html

[14] Best Practices in Sustainable Cities: http://thewaywegreen.ca/2010/05/18/amy-seabrooke-best-practices-sustainable-cities/

[15] Demonstrating Results: Municipal Initiatives for Reducing GHGs, National Measures Report 2009: http://www.sustainablecommunities.fcm.ca/files/Capacity_Building_-_PCP/Demonstrating-result-reducing-GHGs_EN.pdf

[16] FCM Green Municipal Fund: http://www.sustainablecommunities.fcm.ca/GMF/

Page left intentionally blank to facilitate double-sided printing

APPENDIX A
CORPORATE INVENTORY DETAIL

CORPORATE INVENTORY DETAIL

BUILDINGS

Electricity consumption and fuel usage data was collected for each facility owned and operated by the City of St. Albert. Table A-1 lists City facilities and corresponding energy consumption and GHG emissions. In 2008, City facilities consumed 13,715,578 kilowatt hours (kWh) of electricity and 127,711 gigajoules (GJ) of natural gas. This accounted for 18,404 tonnes CO_2e, which represents approximately 60% of corporate GHG emissions.

Table A-1: Energy and GHGs from City of St. Albert Facilities

Facility Name	Facility Address	Electricity (kWh)	Natural Gas (GJ)	GHG Emissions (t CO_2e)
St. Albert Place (City Hall)	5 St Anne St	2,133,526	13,770	2,560
Servus Place - Operations	400 Campbell Dr	5,801,851	26,321	6,411
Servus Place - Operations	B-300 Carnegie Dr	-	1,157	57
Servus Place - Operations	300 Carnegie Dr.		13,909	690
Fountain Park Recreation Centre	4 Cunningham Road, SW 03 54 25 W44,	1,760,244	21,958	2,638
Akinsdale Arena	66 Hebert Rd	1,067,964	5,781	1,227
Akinsdale Clubhouse	36 Alpine Blvd	-	169	8
Public Works Site	7 Chevigny St	925,158	10,771	1,348
Transit Building	225 Carnegie Dr	667,762	12,982	1,232
Transit Washroom	520 Rivercrest Cres	8,782	-	8
Current RCMP Building	96 Bellerose Dr	457,476	2,555	529
Former RCMP Building	25 Sir Winston Chr Av	42,596	576	66
Firehall #1	18 Sir Winston Chr Av	133,258	1,259	180
Firehall #2	100 Boudreau Road	68,900	646	93
Firehall #3	100 Giroux Rd	61,660	4,718	288
Firehall #3	100 Giroux Rd	84,549	-	74
Tourist Information Centre	71 St Albert Tr	56,479	442	72
Grosvenor Pool	1 Grenfell Av	53,628	2,751	184
Willoughby Clubhouse & Courts	6 Willoughby Dr	20,021	161	26

Facility Name	Facility Address	Electricity (kWh)	Natural Gas (GJ)	GHG Emissions (t CO_2e)
Alpine Rink and Players Box	36 Alpine Bv	24,094	270	35
Water Park (changehouse)	165 Sturgeon Rd	94,574	893	128
Water Park Concession	165A Sturgeon Rd	14,189		12
Clock Tower	1 Perron St	30,262	-	27
Larose Clubhouse	145 Larose Dr	13,499	-	12
St Albert Children's (Theatre?)	Bay 1B 215 Carnegie Dr	5,167	391	24
P.W. Parks Satellite Yard	4 Meadowview Dr	4,705	222	15
Heritage Park Fountain	38A Harwood Dr	6,323		6
Oakmont Rink & Shack	120 Oakmont Drive	9,017		8
Delbrook Rink & Shack	1 Delbrook Bv	1,632	-	1
Fowler Track Outlet	63A Sir Winston Chr Av	5,396	158	13
Mission Rink and Shack	?	5,150		5
Mission Tennis Courts	9 Mission Av	4,785		4
Former Tourist Information Centre	1 Sturgeon Rd	5,655		5
Lions Park Building	21 Sir Winston Chr Av	3,318		3
Grandin Clubhouse	5 Grenfell Av	18,502		16
Old Parks Building (Green Quonset)	13 Riel Dr	1,442		1
Larose Rink and Shack	135 Larose Dr	11,953	255	23
Grosvenor Rink & Shack	42 Grosvenor Bv	3,224	56	6
Gatewood Rink & Shack	17 Gatewood Av	7,678	250	19
Flagstone Rink & Shack	51 Flagstone Cr	4,723	257	17
Salisbury Rink	81 Salisbury Av	3,314	52	5
Gloucester Rink & Shack	7 Gloucester Dr			0
Princeton Rink & Shack	20 Princeton Cr	5,461	-	5

Facility Name	Facility Address	Electricity (kWh)	Natural Gas (GJ)	GHG Emissions (t CO_2e)
Erin Ridge Rink & Shack	40 Erin Ridge Dr	4,086		4
Braeside Rink & Shack	59 Sir Winston Chr Av	1,819	46	4
Deer Ridge Rink & Shack	120 Deer Ridge Dr	5,865	56	8
Kingswood RW Park Building	395 Sir Winston Chr Av	16,259	536	41
Stanski Bldg PW Parks	B 395 Sturgeon Rd	2,132	-	2
Lacombe Lake Skating Shack	R 151 Mckenney Av	6,952	121	12
Kin-Ex Arena	66 Hebert Rd	-	3,683	183
City of St Albert	34 Mission Av	869		1
City of St Albert	10 Grange Dr	6,624		6
West RWP Node	9 Tache St	204		0
McKenney Avenue / Liberton Drive	McKenney Avenue / Liberton Drive	2,622		2
Deer Ridge & Delaney Place	Deer Ridge & Delaney Place	-		0
71 City Annex W	71 City Annex W	35,701		31
Morgan Crescent Mckinney Avenue	Morgan Crescent / Mckinney Ave	3,744		3
20 Gate Avenue	20 Gate Avenue	780	-	1
Arts and Heritage Foundation Total	A - 9 Mission Ave.	-	253	13
50 Heritage Drive - 4240	50 Heritage Dr.	-	55	3
Garage Operations -	A-300 Carnegie Dr.	-	231	11
TOTAL		**13,715,578**	**127,711**	**18,404**

VEHICLE FLEET

The fleet data provided by City staff included: cars, pick-up trucks, RCMP vehicles and transit services, including, buses and street sweepers. Data was broken down by series type and vehicle type. RCMP and transit data was provided as a lump sum (Table A-2). In 2008, the total amount of gasoline consumed by the fleet was 719,047 litres (L), and diesel amounted to 1,367,278 L. Fleet fuel consumption accounted for 5,082 tonnes CO_2e or approximately 16% of corporate GHG emissions.

Table A-2: Fuel Use and GHGs from City of St. Albert Fleet

Series	Vehicle Type	Gasoline (L)	Diesel (L)	GHG Emissions (tonnes CO_2e)
41 Series	Car	11,258		27
	Car	12,398		29
	Car	6,268		15
	Car	12,543		30
	Car	15,719		37
	Car	15,328		36
	Car	1,427		3
42 Series	Mini	4,917		12
	Mini	17,442		41
	Mini	3,003		7
	Mini	726		2
	1/2 Ton	18,304		43
	3/4 Ton	6,785		16
	3/4 Ton	13,147		31
	3/4 Ton	8,706		21
	3/4 Ton	22,342		53
	3/4 Ton	5,019		12
	1 Ton		1,523	4
	1 Ton		1,077	3
	1 Ton		6,592	18
	1 Ton		18,692	51
	1 Ton		24,802	68
	1 Ton		2,049	6
	1 Ton		3,525	10
	1 Ton		108	0
43 Series	1/2 Ton	6,849		16
	1/2 Ton	6,780		16
	1/2 Ton	6,133		14
	1/2 Ton	9,063		21
	1/2 Ton	6,863		16
	1/2 Ton	9,656		23
	1/2 Ton	10,669		25
	1/2 Ton	5,553		13
	1/2 Ton	5,783		14
	1/2 Ton	4,402		10
	1/2 Ton	4,898		12
	1/2 Ton	3,780		9

Series	Vehicle Type	Gasoline (L)	Diesel (L)	GHG Emissions (tonnes CO_2e)
	1/2 Ton	11,462		27
	1/2 Ton	3,344		8
	1/2 Ton	8,710		21
	1/2 Ton	7,756		18
	1/2 Ton	24,829		59
	1/2 Ton	6,728		16
	1/2 Ton	12,218		29
	1/2 Ton	26,620		63
	1/2 Ton	16,386		39
	1/2 Ton	12,211		29
	1/2 Ton	5,810		14
	1/2 Ton	32,486		77
	1/2 Ton	7,995		19
	1/2 Ton	7,995		19
	1/2 Ton	12,005		28
44 Series	3/4 Ton	4,335		10
	3/4 Ton	7,512		18
	3/4 Ton	3,623		9
	3/4 Ton	2,629		6
	3/4 Ton	8,811		21
	3/4 Ton	18,292		43
	3/4 Ton	14,141		33
	3/4 Ton	22,247		53
	3/4 Ton	18,555		44
	3/4 Ton	11,154		26
	3/4 Ton	15,456		37
	3/4 Ton	16,678		39
	3/4 Ton	26,820		63
	3/4 Ton	15,289		36
45 Series	1 Ton		5,199	14
	1 Ton		10,424	28
	1 Ton		10,951	30
	1 Ton		6,463	18
	1 Ton		12,298	34
	1 Ton	4,051		10
	1 Ton	7,910		19
	1 Ton	9,698		23
	1 Ton		426	1
	1 Ton		13,044	36
	1 Ton		10,618	29
	1 Ton		16,864	46
	1 Ton		2,665	7
	1 Ton		18,846	51
	1 Ton		12,846	35
RCMP FLEET	Various Vehicles	59,530		141
Transit Fleet	Buses, Sweepers etc		1,188,266	3,245
TOTAL		**719,047**	**1,367,278**	**5,082**

STREETLIGHTS

Energy consumption for streetlighting was provided by City staff in spreadsheet format. Streetlight data was broken down into crosswalk lights, field lights, pedestrian stop signals, traffic lights and various others. The full list of streetlights, including electricity consumption and GHG emissions is provided in Table A-3. In 2008, electricity consumed to power streetlights was appoximately 4,965,500 kWh. This resulted in 4,370 tonnes CO_2e of GHG emissions, which accounts for approximately 14% of corporate emissions.

Table A-3: Energy and GHGs from Street and Traffic Lights

Streetlight Category	Address	Electricity (kWh)	GHG Emissions (tonnes CO_2e)
Crosswalk Lights	Mission & Mount Royal	0	0
Crosswalk Lights	Crosswalks, City of St Albert	3,318	3
Crosswalk Lights	Crosswalks, City of St Albert	3,318	3
Crosswalk Lights	Crosswalks, City of St Albert	3,318	3
Crosswalk Lights	Crosswalks, City of St Albert	3,318	3
Crosswalk Lights	Crosswalks, City of St Albert	3,318	3
Crosswalk Lights	Crosswalks, City of St Albert	3,318	3
Crosswalk Lights	Woodlands Park/Sturgeon, St Albert	3,318	3
Crosswalk Lights	Crosswalks, City of St Albert	3,318	3
Crosswalk Lights	Crosswalks, City of St Albert	3,318	3
Crosswalk Lights	Crosswalks, City of St Albert	6,624	6
Crosswalk Lights	Granville & Grosvenor Crosswalk	0	0
Crosswalk Lights	SE 07 54 25 W4 Giroux Rd West of Lockhart Dr NE, St. Albert	672	1
Crosswalk Lights	SW 08 54 25 W4 Corner of Larose Dr & Leddy Ave, St. Albert	672	1
Field Lights	Riel Sports Field	0	0
Lighting	Street Lights, City of St Albert	21,647	19
Pedestrian Stop Signals	Cunningham & Farmstead, St Albert	3,318	3
Pedestrian Stop Signals	Fairview & SWCA, St Albert	3,318	3
Pedestrian Stop Signals	Cunningham & Hebert, St Albert	3,318	3
Pedestrian Stop Signals	Bishop & SWCA, St Albert	3,318	3
Pedestrian Stop Signals	McKenney & Langley, St Albert	3,318	3
Pedestrian Stop Signals	Crosswalks, Civic Centre, St Albert	3,318	3
Pedestrian Stop Signals	Durham & Giroux, St Albert	3,318	3
Pedestrian Stop Signals	Leddy & Dawson, St Albert	3,318	3
Pedestrian Stop Signals	Primeau & Boudreau, St Albert	3,318	3
Pedestrian Stop Signals	Westwood/Boudreau, St Albert	3,318	3
Pedestrian Stop Signals	Hebert & Akins, St Albert	3,318	3
Pedestrian Stop Signals	S.W.C.A./Woodlands Road, St Albert	3,318	3
Pedestrian Stop Signals	Graham/Gainsborough, St Albert	3,318	3
Pedestrian Stop Signals	Dufferin & Giroux, St Albert	3,318	3
Pedestrian Stop Signals	Boudreau & Brunswick, St Albert	3,318	3
Pedestrian Stop Signals	Pedestrian Stop Signal, St Albert	3,318	3

Streetlight Category	Address	Electricity (kWh)	GHG Emissions (tonnes CO_2e)
School Zone Flashing Amber Lights	17 Sycamore Avenue	4,687	4
School Zone Flashing Amber Lights	8 Sycamore Avenue	4,687	4
Speed Advisory Lights	St. Anne & Hwy. 2, St Albert	3,318	3
Speed Advisory Lights	Sterling & Hwy. 2, St Albert	3,318	3
Street Lights	Lacombe Park Streetlights	6,624	6
Street Lights	Street Lights, City of St Albert	4,569,748	4021
Street Lights	Street Lights, City of St Albert	3,318	3
Street Lights	1 Piedmont Cr, St Albert	3,318	3
Street Lights	Red Willow Park, St Albert (East)	3,318	3
Street Lights	Red Willow Park, St Albert (West)	3,318	3
Street Lights	Red Willow Park, St Albert (Centre)	1,335	1
Street Lights	St Thomas St, St Albert	3,318	3
Traffic Lights	Leclair Way & Ray Gibbon Dr. St. Albert-Traffic Lights	0	0
Traffic Lights	Coal Mine Road and St. Albert Trail	3,318	3
Traffic Lights	NW 34-53-25-W4 (Sunset and Arlington)	3,039	3
Traffic Lights	Deer Ridge & Dubonnet Way, St. Albert	3,318	3
Traffic Lights	Deer Ridge & Hogan Road, St. Albert	3,318	3
Traffic Lights	13 Flagstaff Avenue	2,928	3
Traffic Lights	St. Anne & Hwy. 2, St Albert	6,624	6
Traffic Lights	Gate & Hwy. 2, St Albert	4,308	4
Traffic Lights	Hebert Road & Sunset, St Albert	5,633	5
Traffic Lights	Traffic Lights, City of St Albert	4,308	4
Traffic Lights	Bellerose Dr. & Hwy. 2, St Albert	6,294	6
Traffic Lights	Hwy. 2 & St. Vital Ave., St Albert	5,963	5
Traffic Lights	St. Anne & Perron, St Albert	5,633	5
Traffic Lights	Gervais & Grange, St Albert	4,969	4
Traffic Lights	Sterling & Hwy. 2, St Albert	4,969	4
Traffic Lights	Green Grove & SWCA, St Albert	5,299	5
Traffic Lights	Giroux & Hwy. 2, St Albert	6,294	6
Traffic Lights	Bellerose/Inglewood, St Albert	5,299	5
Traffic Lights	Hebert Road & Hwy. 2, St Albert	6,624	6
Traffic Lights	Campbell/Boudreau Road, St Albert	6,023	5
Traffic Lights	Lennox & Hwy. 2, St Albert	6,294	6
Traffic Lights	Boudreau Road & Akins, St Albert	4,969	4
Traffic Lights	Tache & S.W.C.A., St Albert	4,639	4
Traffic Lights	Levasseur & 170 St., St Albert	3,978	4
Traffic Lights	Dawson & McKenney, St Albert	3,318	3
Traffic Lights	Arlington & Hebert, St Albert	3,978	4
Traffic Lights	Boudreau Road & S.W.C.A., St Albert	6,023	5
Traffic Lights	S.W.C.A./Riel, St Albert	4,308	4
Traffic Lights	Bellerose & Safeway, St Albert	6,573	6

Streetlight Category	Address	Electricity (kWh)	GHG Emissions (tonnes CO_2e)
Traffic Lights	Sturgeon Rd./Boudreau, St Albert	6,023	5
Traffic Lights	Giroux & Deer Ridge, St Albert	5,633	5
Traffic Lights	Bellerose & Boudreau, St Albert	6,023	5
Traffic Lights	Hebert & Boudreau, St Albert	4,639	4
Traffic Lights	SWCA/Kingswood, St Albert	5,633	5
Traffic Lights	Boudreau & Ironwood, St Albert	5,299	5
Traffic Lights	S.W.C.A./Levasseur, St Albert	5,633	5
Traffic Lights	Hebert Rd, St Albert	5,784	5
Traffic Lights	NE-04-054-25-4, City of St. Albert	3,318	3
Traffic Lights	NE 28 52 25 4, City of St. Albert	4,969	4
Traffic Lights	NE 9 54 25 4, City of St. Albert	6,344	6
Traffic Signal	Bellerose Drive & Oakmont Drive / Edward Way	8,381	7
Traffic Signal	Campbell Road & Poirier Avenue	7,567	7
Traffic Signal	Sir Winston Churchill Ave & Poirier Ave	5,380	5
Unmetered Light Poles	B 1 Sturgeon Rd St Albert	3,318	3
Yard Light	17 Riel Dr St Albert	20,481	18
Total		**4,965,539**	**4,370**

WATER AND WASTEWATER

Table A-4 shows electricity and natural gas consumption for water and wastewater infrastructure , which was provided by City staff in spreadsheet form. In 2008, the City of St. Albert consumed 2,643,664 kWh of electricity and over 7,107 GJ of natural gas in the provision of water and wastewater infrastructure. This accounted for 2,340 tonnes of CO_2e or 9% of the City's corporate GHG emissions profile.

Table A-4: Energy and GHGs from Water and Sewer Infrastructure

Facility or Facility Group Name	Address	Electricity (kWh)	Natural Gas (GJ)	GHG Emissions (tonnes CO_2 e)
Riel Dr. Lift Station	17 Riel Dr	5,333	786	44
Quonset Hut at Former P.W.	7 Riel Dr	-		-
Grandin Pond Pump	39 Grandin Road	1		0
Heritage Lk Well Pump	1A Harwood Dr	35,717		31
Sturgeon Pump Station	37 Sunset Bv	819,887		722
Grandin Booster Station	10 Galarneau Pl	9,987		9
Lacombe Water Pumphouse	139 Larose Dr	452,928		399
Oakmont Pumphouse	521 Oakridge Dr	1,098,576		967
Erin Ridge Lift Station	Erin Ridge Lift Station	17,351		15
NE 10 54 25 W4	245 Sturgeon Rd	540		0

Facility or Facility Group Name	Address	Electricity (kWh)	Natural Gas (GJ)	GHG Emissions (tonnes CO_2 e)
Sewage Lift Station	1A Sturgeon Rd	23,647		21
Firehall Lift Station	20 Sir Winston Chr Av	14,750		13
Grange Dr. Lift Station	10A Gate Av	15,953		14
Mission Ave Forcemain Pump	89 Mission Av	3,318		3
Rivercrest Lift Station	502R Rivercrest Cr	65,513	509	83
Oakmont Sewer Lift Station	35 Otter Cr	39,483		35
Median Well Pump	0 Delisle Co	314		0
Glacier Pk Pump Station	B 7 Glacier Pl	5,963		5
Erin Ridge Drive / Boudreau Rd.	Erin Ridge Drive / Boudreau Rd.	2,390		2
Sunset Reservoir	37 Sunset Blvd	-	402	20
Lacombe Reservoir	?	-	4,074	202
Oakmont Reservoir	521 Oakridge Dr. S.	-	1,334	66
Mission Grinding Station	112A Mission Ave	16,446		14
Dorchester Lift Station	194 Deer Ridge Dr	15,565	2	14
Total		**2,643,664**	**7,107**	**2,679**

SOLID WASTE

Solid waste data for corporate operations was collected through a short survey distributed to facility managers. Table A-5 highlights the results of the corporate solid waste surveys including information on the number, size and pick-up frequency of waste collection bins. distributed to facilities. Estimates of the amount of waste in the bins at the time of pick-up were provided by facility managers (who generally noted that bins were ¾ full to full). As such, the solid waste calculations assumed that bins were 80% full at the time of pick-up.

In addition to data on the amount of waste sent to landfill, the surveys provided information on waste diversion activities at City facilities. Almost all of the facilities participate in a take back program for batteries. The batteries are taken to the Edmonton Ecostation for proper hazardous materials disposal. Recycling of paper and cardboard is also common in City facilities and certain facilities recycle various metals and plastics.

From the surveys, it was estimated that a total of 376 tonnes of waste was sent to the landfill annually. Multiplying this value by the waste emission factor from the PCP spreadsheet, it was determined that approximately 181 tonnes CO_2e were generated by waste at corporate facilities. This represents less than 1% of the City's corporate GHG emissions profile.

Table A-5: GHG Emissions from Corporate Solid Waste Data

Location	Bin			Waste to Landfill (Tonnes)	Notes
	Number	Volume (yd^3)	Pick-Up Frequency (yearly)		
Firehall #1	1	6	12	11	3/4 full or better
Firehall #2	1	6	12	11	3/4 full or better
Firehall #3	1	4	12	7	3/4 full or better
Business & Tourism Development	1	2	52	16	probably not full when picked up
Fountain Park Pool	1	6	24	22	full when picked up
St. Albert Place	1	6	60	55	full or over-flowing when picked up
NABI	2	2	52	32	full or over-flowing when picked up
RCMP	1	6	52	48	full when picked up
Transit	1	6	52	48	full when picked up
Public Works	1	6	24	22	full when picked up
Public Works	1	10	24	37	full when picked up (picked up more frequently in winter and summer)
Akinsdale/Kinnex Arenas	3	6	12	33	full most of the year; half full in summer
Servus Place	1	30	10	46	full when picked up
TOTAL Waste to Landfill (tonnes)				**376**	
TOTAL GHG Emissions (tonnes CO_2e)				**181**	

Page left intentionally blank to facilitate double-sided printing

APPENDIX B
COMMUNITY INVENTORY DETAIL

COMMUNITY INVENTORY DETAIL

RESIDENTIAL, COMMERCIAL AND INDUSTRIAL BUILDINGS

Fortis Alberta provided all electricity consumption data for the community emissions inventory. Fortis divides data into various rate categories. Table B-1 outlines the assumptions made for this inventory, in terms of how rate categories align with residential, commercial and industrial buildings sectors.

Table B-1: Fortis Alberta Rate Categories and Descriptions by PCP Sector

Rate Category	Description	PCP Sector
11	Single family dwellings, multi-use residential, mobile home parks etc.	Residential
21 and 26	Rural areas point of service, farms (includes residences)	Residential
31	Street lighting services	Commercial
38	Yard lighting services	Commercial
41 and 44	Small General – demands less than 75 kW, as well as water pumping services.	Commercial
61	General Services – 2,000 kW or less	Industrial
63	Large General Services – demand greater than 2,000 kW.	Industrial

Table B-2 shows the energy consumption and GHG emissions attributed to buildings in the community.

Table B-2: Energy Consumption and GHG Emissions from Buildings

Sector	Electricity Consumption (kWh)	Natural Gas Consumption (GJ)	GHG Emissions (tonnes CO_2e)
Residential	174,408,602	2,719,848	288,377
Commercial	29,901,581	896,765	70,791
Industrial	135,682,649	13,255	120,058
TOTAL	**339,992,833**	**3,629,868**	**479,226**

As Fortis Alberta was not able to separate consumption data for municipal building operations from consumption data for residential, commercial and industrial buildings in the community, data from municipal operations was subtracted from total building consumption data.

TRANSPORTATION

Data from which to estimate GHG emissions attributed to community transportation was difficult to find. While traffic counts and road lengths were supplied by the City, these figures could not easily be converted into Average Annual Daily Traffic Counts (AADT), which would be used to calculate annual vehicle kilometers traveled (VKT) on St. Albert's roads. Further data (daily VKT on St. Albert roads) was obtained from the City of Edmonton's Regional Transportation Model; however this data did not include travel on local roads and as such could not provide an accurate estimate of GHG emissions. Table B-3 outlines the data used to obtain an estimate of 226,779 tonnes CO_2e from community transportation.

Table B-3: Data Compiled to Estimate GHG Emissions from Transportation

Vehicle kilometres per inhabitant (km/person)[1] *(2007 Canadian Vehicle Survey Summary Report)*	13,759
St. Albert Population (persons) *(2006 Census of Canada)*	57,719
Average vehicle fuel economy (L/100km)[2] *(Natural Resources Canada Office of Energy Efficiency)*	12.1

The calculation performed to obtain the estimate was as follows:

=((13,759 km/person*57,719 persons)/100)*12.1 L/100km*CO_2 coeffient for gasoline

=((13,759 km/person*57,719 persons)/100)*12.1 L/100km*0.00236 tonnes CO_2e/L

=226,779 tonnes CO_2e

[1] 2007 Canadian Vehicle Survey Summary Report (http://oee.nrcan.gc.ca/publications/statistics/cvs07/pdf/cvs07.pdf)

[2] Transportation Sector Alberta Table 30: Car Explanatory Values (http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tablestrends2/tran_ab_30_e_4.cfm?attr=0)

From this estimate, energy consumption from gasoline was approximated using the sources outlined in Table B-4.

Table B-4: Data Compiled to Estimate Gasoline Consumption from Transportation

Alberta transportation energy	438 PJ
Alberta personal transportation energy[3]	174 PJ
Alberta population (2008)	3.3 million
City of St. Albert population (2008)	59,000

The calculation performed to obtain the estimate of energy consumption from gasoline was as follows:

St. Albert transportation energy = 438 PJ*(59,000/3,300,000)

= 7.9 PJ

St. Albert personal transportation: = 7.9 PJ *(174/438)

=3.3 PJ

=3,300,000 GJ

SOLID WASTE

In 2009, the City of St. Albert completed a 'Solid Waste Management System Review' for waste removal throughout the City. The report identified that 18,037 households, 9,091 of which received waste management service from City crews, and 8,946 of which were provided weekly collection by Waste Management. The amount of municipal solid waste (MSW) collected and disposed at the landfill has remained relatively stable from 2005 to 2007 at approximately 11,000 tonnes per year. This figure was multiplied by the emissions coefficient for waste to obtain an estimate of 5,299 tonnes CO_2e from community solid waste.

[3] Natural Resources Canada Office of Energy Efficiency http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tablestrends2/tran_ab_1_e_4.cfm?attr=0)