2012 | CITY OF ST. ALBERT

Local Action Plan for Energy Conservation and Reducing Greenhouse Gas Emissions

City of St. Albert
Cultivate Life

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The preparation of this plan was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities.
Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

Executive Summary

In 2009, the City of St. Albert's Environmental Master Plan established a goal to:

> Reduce non-renewable energy consumption and greenhouse gas (GHG) emissions.

This goal is in line with many other municipalities, the provincial government, the federal government and international efforts. The benefits of efforts to conserve non-renewable energy and reduce GHG emissions include:

- reducing energy bills for the City, households and businesses;
- reducing the vulnerability of households and businesses to unexpected jumps in energy prices;
- improving health and quality of life by reducing air, land and water pollution in our community and surrounding areas;
- reducing St. Albert's contribution to climate change; and
- contributing to St. Albert and Alberta's reputation as environmental stewards.

The City of St. Albert has already started many actions that will help reduce energy use and GHG emissions. This Local Action Plan describes the current state of energy use and GHG emissions in St. Albert, as well as a strategy for maximizing the benefits of reducing non-renewable energy consumption and GHG emissions in the short-, medium-, and long-term for the City of St. Albert, its residents and its businesses.

Corporate Energy Use and Emissions

The City of St. Albert's buildings, fleet, water services (for the entire community) and waste (from municipal government activities only) make up the 'Corporate' portion of this plan. Greenhouse gas emissions from corporate (i.e. municipal government) activities was estimated to be 30,719 t CO_2eq. in 2008 as shown in Figure 1.

These emissions are created primarily by energy use within the municipal government's buildings, street lighting and fleet. The total cost of this energy use is estimated to be $5.6 million in 2008 as shown in Figure 2.

Action planning for reducing energy use and emissions in the City of St. Albert operations includes opportunities in all major emission areas: buildings and facilities, fleet, street lights, water and wastewater, and waste. There are also opportunities that cross emission categories including the use of distributed energy and the development of procurement policies to reduce emissions from the production of products the City uses.

Figure 1: St. Albert GHG corporate inventory by municipal sector, 2008

Source: City of St. Albert[1]

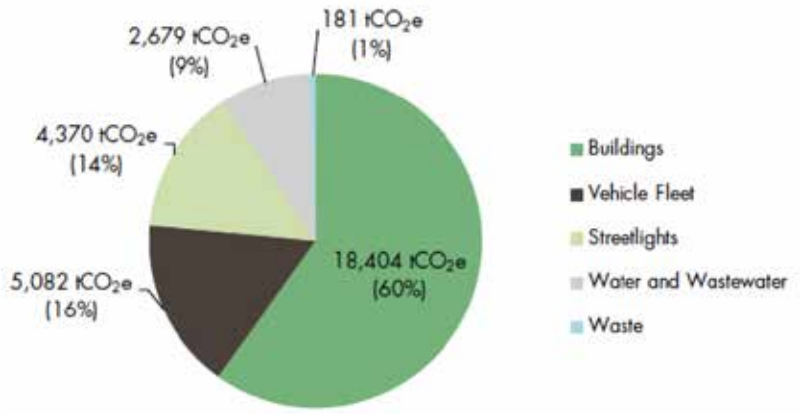
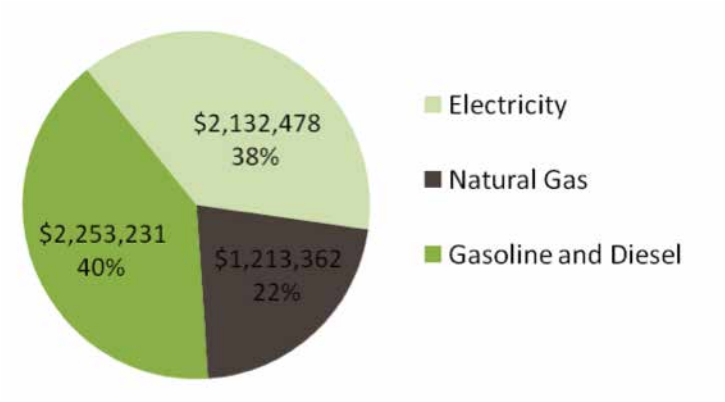


Figure 2: $5.6 million, estimated corporate energy costs by energy source, 2008



The actions included in this plan under the corporate category are: municipal benchmarking program.

Buildings and Facilities

- Adopt a corporate Green Building Policy that includes minimum energy performance for new City buildings.
- Benchmark municipal building energy use with the Municipal Climate Change Change Action Centre program.
- Continue to conduct energy efficiency audits to identify cost-effective retrofits, and plan and implement energy upgrades for existing City buildings.
- Create a facility energy management system that includes training and feedback systems for building managers and operators, and a best management practice system such as BOMA BESt or LEED EBOM.
- Pilot a behavioural change campaign to measure its effectiveness before broad deployment.

Fleet

- Formalize the City's vehicle purchasing policy to assess vehicle needs and ensure high-efficiency vehicles are selected for purchase.
- Re-investigate the use of low carbon fuel alternatives for the City fleet.

- Continue to ensure that vehicles are maintained in order to ensure peak operating efficiency.
- Broaden current driver behaviour training.
- Develop an overall fleet fuel management strategy and program to actively manage fuel use over time.

Street Lighting

- Review timing and usage settings for street lights with FortisAlberta to identify and implement opportunities to reduce energy use.
- Upgrade to energy efficient ballasts and bulbs on municipal owned lights.
- Work with FortisAlberta to ensure street lighting incorporates the most efficient opportunities available (LED).
- Investigate opportunities to further trial wind and solar street lights.

Water and Wastewater

- Work with the Alberta Capital Region Wastewater Commission to follow through on recommendations from the energy audit of the water and wastewater distribution system facilities.
- Continue to advance water demand management programs.

Waste

- Continue waste management programs for municipal operations.

Distributed Energy

- Investigate opportunities to implement renewable energy generation in municipal buildings.

Procurement Policies

- Continue to develop a green procurement policy to control the purchasing of products, services and contractors to reduce upstream GHG emissions.
- Investigate the feasibility of purchasing green power for City operations during the next electricity contract renewal.

Community Energy Use and Emissions

All of the energy use and GHG emissions within city boundaries (except those included in the Corporate inventory outlined previously) are considered 'Community' emissions within this plan. Total community GHG emissions in St. Alberta for 2008 are estimated to be 711,303 t CO_2e as shown in Figure 3.

The total cost of this energy use in St. Alberta is estimated to be $170 million in 2008 as shown in Figure 4.

Figure 3: St. Albert GHG community inventory by source, 2008

Source: City of St. Albert[2]

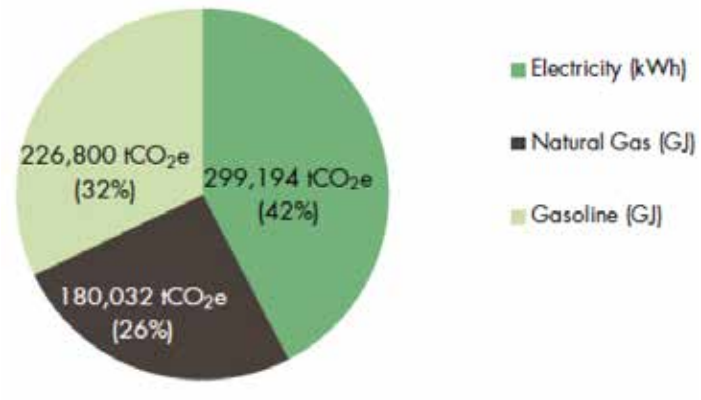
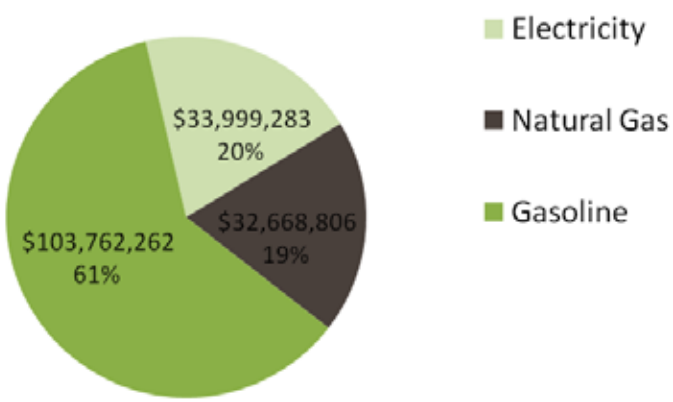


Figure 4: $170 Million, estimated community energy costs by energy source, 2008



Action planning for reducing energy use and emissions within the community includes opportunities in the following areas: the provincial electricity grid, community design, energy efficiency and conservation, distributed energy, vehicle efficiency and fuel type, and waste diversion and landfill gas capture.

Provincial Electricity Grid

- Work with other municipalities to engage the provincial government to develop policies that shift the make-up of Alberta's electricity grid from primarily coal-fired power plants to a greater percentage of natural gas and wind power plants.

Community Design

- Remove barriers to developing compact, mixed use, transit-oriented neighbourhoods.
- Increase transit service in 'high use' areas.
- Increase the quality of public spaces and infrastructure in compact neighborhoods to encourage uptake of units in these areas.
- Continue regional planning with neighbouring communities through the Capital Region Board.
- Continue to encourage employers to locate in St. Albert to increase local employment available and reduce commuter traffic.
- Provide incentives to buying / building in compact, mixed-use, transit-oriented neighbourhoods, and using transit.
- Introduce parking policies that encourage the use of transit, walking and cycling such as paid parking and reducing the number of parking spaces per development.
- Discuss targets for increasing densities, walking, cycling and transit use during the next review of the Municipal Development Plan, Transportation Master Plan, and in work with the Capital Region Board.
- Make changes to approval processes to increase densities, mixture of uses, walking, cycling and transit use within our city.

Energy Efficiency and Conservation

- Explore options for introducing a consumer feedback system.
- Work with others to engage the provincial government regarding energy efficiency standards for new buildings.
- Introduce an energy efficiency checklist for new developments (to raise awareness of energy efficiency opportunities).
- Develop a home retrofit program to make it easy for homeowners to undertake cost effective upgrades prior to sale and demonstrate the ability to pass the cost onto buyers.
- Host energy management training for local organizations.
- Provide incentives for energy efficient equipment, buildings and/or energy managers for large facilities.
- Introduce bylaws requiring minimum energy efficiency standards for new buildings and / or at the time of sale of existing buildings.

Distributed Energy

- Remove barriers to distributed energy.
- Design new neighbourhoods to take advantage of free heat from the sun.
- Identify areas with good district energy potential.
- Provide incentives for distributed generation.
- Require all new buildings with solar access to be built 'solar-ready'.
- Introduce a bylaw requiring on-site energy generation for large buildings.

- Introduce a bylaw requiring district energy for new developments where it is currently economically feasible.

Vehicle Efficiency and Fuel Type

- Work with fleets on fuel management programs.
- Provide incentives and disincentives for efficient vehicles, alternative fuels or idle reduction technologies. Incentives could also include preferred parking for hybrid and electric vehicles, and public charging stations.
- Encourage, incent and eventually require plug-ins for loading docks, truck stops and garages.

Waste Diversion and Landfill Gas Capture

- Investigate the costs and benefits of waste diversion and landfill gas capture within the context of all City of St. Albert waste management objectives. (Includes the consideration of waste management alternatives such as composting, recycling, anaerobic digestion, incineration, and landfill gas capture.)
- Consider ways to encourage GHG reductions in waste collection activities when contracts are renewed in 2014.

Conclusion

The actions contained within this plan for energy conservation, reducing GHG emissions and transitioning to increased use of renewable energy are similar to actions being taken by other municipalities both within and outside of Alberta. These actions are designed to put the City of St. Albert on track to meet its GHG reduction targets of reducing corporate emissions by twenty per cent below 2008 levels by 2020, and reducing community emissions by six per cent below 2008 levels
by 2020.

The path to increased energy conservation, reducing GHG emissions and transitioning to increased use of renewable energy at this scale is not a simple task. The City of St. Albert will need to work with other orders of government, businesses and citizens to meet these targets. Through a robust measurement, management and reporting approach, the City of St. Albert will work towards accomplishing the actions outlined within this plan in an efficient, effective and transparent manner.

1.0 Introduction

In 2009, the City of St. Albert's Environmental Master Plan established a goal to:

> Reduce non-renewable energy consumption and greenhouse gas (GHG) emissions.

St. Albert's future will improve from actions implemented to meet this goal; benefits include:

- reducing energy bills for the City, households and businesses;
- reducing the vulnerability of households and businesses to unexpected jumps in energy prices;
- improving health and quality of life by reducing air, land and water pollution in our community and surrounding areas;
- reducing St. Albert's contribution to climate change; and
- contributing to St. Albert and Alberta's reputation as environmental stewards.

The City of St. Albert has already started many actions that will help reduce energy use and GHG emissions. This Local Action Plan describes the current state of energy use and GHG emissions in St. Albert, as well as a strategy for maximizing the benefits of energy consumption and GHG emissions in the short-, medium-, and long-term for the City of St. Albert, its residents and its businesses.

1.1 Motivation for Local Action Plan

While the City of St. Albert's Environmental Master Plan may have been the impetus for this project and report, our community recognizes the importance of protecting the environment so that it can remain an integral part of maintaining the long-term economic and social wealth of the community. There are many benefits to taking action to reduce energy use and GHG emissions, plus costs to not taking action.

Economic benefits

- Lowering energy costs to businesses and residents for transportation/ mobility, infrastructure, heating, lighting and cooling.
- Creating new revenue streams from local energy production and supporting local jobs while keeping money in our community through focusing on local energy efficiency projects.
- Improving fiscal sustainability of municipal infrastructure so that revenue streams can be used for more value added activities.
- Creating opportunities to support our community's economic development programs.

Social benefits

- Improving outdoor and indoor air quality and reducing health costs and impacts.
- Creating more comfortable and affordable homes that are resistant to temperature variations and external noise.
- Improving physical health through promoting active travel like walking and biking.
- Creating more complete neighbourhoods, facilitating social interaction and greater well-being.
- Creating an age-friendly community.

Costs of inaction

Governments around the world are working on reducing GHG emissions because the impacts of man-made climate change are likely to be severe if we do not take action. Globally, the impacts of climate change in the future if GHG emissions continue to grow include[3]:

- water shortages for over one billion people;
- food shortages for hundreds of millions of people;
- hundreds of millions of people permanently displaced;
- the extinction of up to 40 per cent of species;
- more expensive and extreme weather events; and
- a permanent loss of quality of life of up to 20 per cent of GDP worldwide.

St. Albert will not be immune from these impacts, as climate change is expected to have both direct and indirect impacts on all parts of the world.

Direct impacts for St. Albert are expected to include more severe storms, floods, droughts, diseases and heat stress. Local ecosystems will change faster than ever before and there will be a significant loss of natural species.

Indirectly, St. Albert will face the consequences of natural disasters, conflict and economic disruptions increasing worldwide. This includes major changes to the global agricultural industry due to an increase in storms, droughts and unusual weather, and major changes to the global economy as a whole.

1.2 Current federal and provincial government activities to reduce GHG emissions and energy use

All levels of government and international bodies are working to reduce GHG emissions. As St. Albert works to develop a Local Action Plan, work is also being undertaken by the provincial and federal governments.

The Government of Canada has committed to reducing national GHG emissions by 17% below 2006 levels by 2020. They were also part of a G8 leaders statement noting that developing countries should work to reduce GHG emissions by 80% by 2050. The federal government is now working to regulate GHG emissions on an industry-by-industry basis.[4] It is currently in the process of creating GHG emission regulations for the oil and gas sectors, and has recently adopted new regulations for the power sector and GHG emissions/fuel efficiency standards for cars and trucks.

Also at a federal level, the Federation of Canadian Municipalities (FCM) provides support through the Partners for Climate Protection (PCP) program and the Green

Municipal Fund, which provides funding for leading environmental initiatives undertaken by municipalities and their partners.

Provincially, the Government of Alberta has a climate change strategy that includes working with municipalities on reducing GHG emissions. This has resulted in the creation of the Municipal Climate Change Action Centre (MCCAC), which is primarily focused on helping municipalities conduct upgrades of municipal buildings. This program is a partnership between Alberta Urban Municipalities Association (AUMA), the Alberta Association of Municipal Districts and Counties (AAMDC), and the Government of Alberta through Alberta Environment and Alberta Municipal Affairs.

Currently, the Province:

- supports greener transit initiatives (GreenTRIP)
- implements a program to price the carbon at industrial emitters including electric generation plants
- explores opportunities for carbon capture and storage

and is working on:

- ###adopting of the National Energy Code for Buildings (i.e., new energy efficiency standards for large buildings)
- a renewal of its Climate Change Strategy
- ###the creation of an initiative to make Alberta the national leader in energy efficiency and sustainability

1.3 Partners for Climate Protection

This Local Action Plan is being developed within a larger management framework as outlined by the Partners for Climate Protection Program, an initiative supported by the Federation of Canadian Municipalities and ICLEI–Local Governments for Sustainability. More than 225 Canadian communities are participating in the PCP program.

The PCP program is a five-step approach to take smart strategic action to reduce greenhouse gas emissions. The steps are:

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.

In March 2010, St. Albert City Council passed a resolution to join the PCP program as its 200th participant; it has since worked through steps 1 and 2 of the program. This plan is designed to meet the requirements for Step 3 of the PCP Program.

1.4 GHG emissions reduction targets

Targets can be a source of inspiration, urgency and accountability for GHG reduction planning. In 2010, City Council adopted the following targets for GHG reduction:

a. Reduce corporate emissions by 20 per cent below 2008 levels by 2020

b. Reduce community emissions by 6 per cent below 2008 levels by 2020.

By comparison, other municipalities have adopted the following GHG reduction targets:

Edmonton

- Reduce corporate emissions by 50% below 2008 levels by 2020
- Reduce community emissions by 20 per cent below 1990 levels by 2020 and eventually become carbon neutral

Calgary

- Reduce corporate emissions by 50% below 1990 levels by 2012
- Reduce community emissions by 20% below 2005 levels by 2020; 50% below 1990 levels by 2036 and 80% below 2005 levels by 2050

These levels of GHG reduction provide aspirational goals for the City of St. Albert to also consider as it moves forward with the implementation of this plan.

2.0 Current state of energy use and GHG emissions

2.1 Energy use and community context

The City of St. Albert lies on the northwest boundary of the City of Edmonton in mid-central Alberta. St. Albert is bounded by Edmonton on the south and east, and Sturgeon County on the north and west. The much-treasured Sturgeon River runs through the centre of the city, and while St. Albert is divided somewhat from Edmonton by a transportation and utility corridor, there are many economic, transportation, social and cultural links between the two communities and other communities in the region.

One example of these regional links is the Capital Region Board (CRB). The CRB is a regional non-profit corporation made up of an elected official from each of the 24 towns, villages, cities and counties in the vicinity of Edmonton. The board is committed to "*working together to ensure the long-term economic prosperity and quality of life for all citizens of the Region.*"

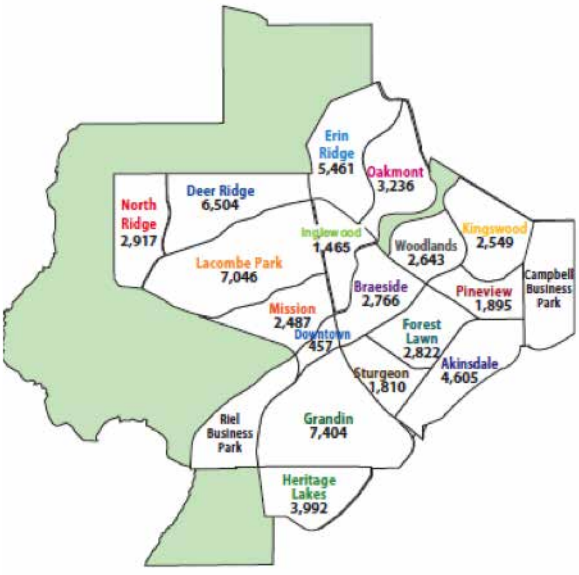
The Board was created initially to prepare and implement a integrated Capital Region Growth Plan, focusing initially on land use, intermunicipal transit services, affordable housing and GIS mapping services.

2.1.1 Population and neighbourhood development trends

During the early part of the 20th century, St. Albert grew to 1,129 people, but from 1951-1976 the population increased to 24,000, at an annual growth rate of about 13%. The rate slowed somewhat between 1986 and 2006 to 2.5% and again to 1.5% from 2006–2011. In 2011, the city's population reached 61,466 according to the most recent federal census, with 18 major neighbourhood nodes (See Figure 5). The neighbourhood of North Ridge has experienced the most growth between 2005 and 2010, with an estimated increase from 957 to 2,917 residents. Other neighbourhoods experiencing relative growth include Erin Ridge, Oakmont and Kingswood. Though small in comparison to other neighbourhoods, the downtown population also grew by about 50% from 310 to 457 residents.[5]

Figure 5: City neighbourhood nodes

Source: City of St. Albert



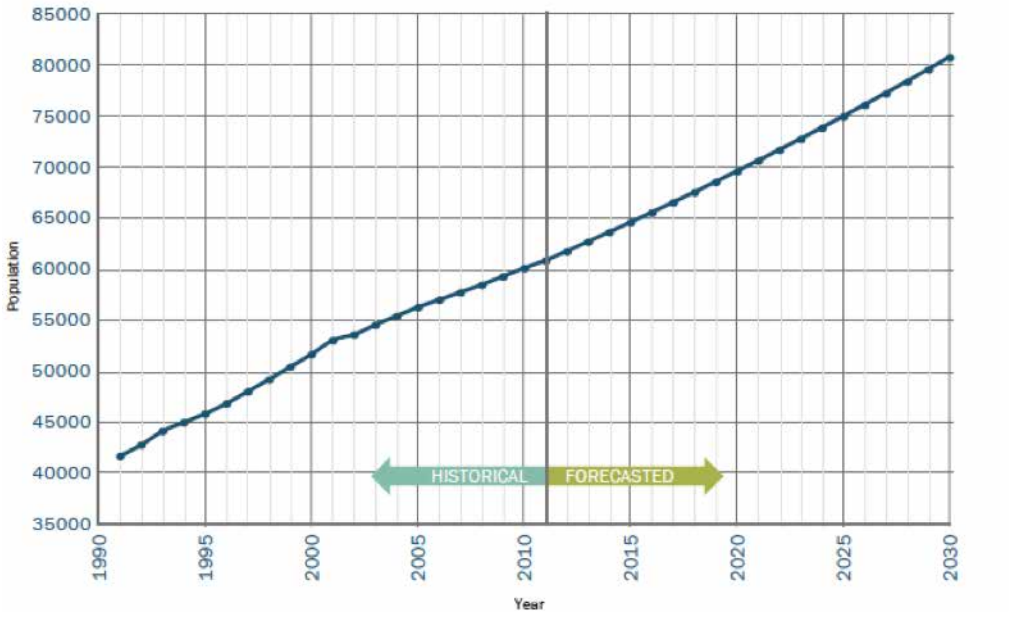
Mobility of community members is generally lower than neighbouring Edmonton, with 90% of residents living at the same address in 2005 as in 2006, and 54% living at the same address in 2001 as 2006. Edmonton in comparison had 80% living at the same address in 2005 as in 2006, and 46% living at the same address in 2001 as 2006.[6]

2.1.2 Population growth and forecasts

The 2011 federal census gave St. Albert's population as 61,466. The municipal census every two to five years also provides population estimates; that survey showed St. Albert's population on April 2, 2012 at 60,994 residents, an increase of 856 people or 1.4% since the last municipal census in 2010. With a growth rate between 2006 and 2011 of 1.5% and between 2010 and 2012 of 1.4%, population growth rates used for forecast should likely be lower than the 2.6% articulated in the Municipal Development Plan. The GHG Emissions Inventories, Forecasts, and Reduction Targets report completed in 2008 estimates 1.5% population growth, while the recent Water Conservation Plan report notes that St. Albert's population could reach over 80,000 by 2030 (see Figure 6). In all scenarios, growth pressure on our community will likely lead to increased GHG emissions in a business-as-usual scenario.

Figure 6: Population growth and projections for St. Albert

Source: City of St. Albert[7]



2.1.3 Residential dwellings and land use

Community members are primarily housed in single-family detached dwellings (74%, 17,325 dwellings in 2010). However the neighbourhood of Grandin, the largest neighbourhood in 2010 with 3,126 dwellings, contains an almost equal share of multiple family dwellings like duplexes, townhouses, and apartments. Most of the single family homes are owned (90%), compared to other forms of housing where ownership rates sit around 60%. In comparison, according to the 2006 federal census, the ownership rates of housing in Edmonton were just 63%. In 2006, the average value of owned dwellings in St. Albert was $276,978, which is slightly higher than that of Edmonton ($255,525). St. Albert's housing is generally newer than neighbouring Edmonton as just over half the dwellings in St. Albert were constructed before 1986, compared to Edmonton's 63%. In addition, only 4% of occupied dwellings were in need of a major repair, versus 6% in Edmonton.[8]

Residential development and street patterns largely follow a curvilinear pattern of cul-de-sacs, crescents, and limited neighbourhood connectivity, channeling traffic toward collector roads. Exceptions to this are the older areas including downtown and Mission and Sturgeon neighbourhoods. These areas follow a more interconnected network of streets that allow for shorter blocks and multiple travel routes, and encourages pedestrian activity. The development in most areas has mainly consisted of low-density development with approximately 18.4 dwelling units per net residential hectare.[9]

City Council recently approved an amendment to the Municipal Development Plan (MDP) to reflect the Capital Region Board Growth Plan desire for minimum densities in new neighbourhoods. The amendment calls for densities of 30 dwelling units per net residential hectare and a minimum of 30% medium (three or more units in one building) or high density (undefined) residential units in all new neighbourhoods.

With respect to existing neighbourhood design, the current MDP also encourages secondary suites and low-density infill in existing neighbourhoods as well as review of medium-density opportunities in neighbourhoods that were established prior to 1980.

2.1.4 Commercial and industrial land use

Commercial land is mainly located along St. Albert Road, running north/south from the south city limit to the north boundary, with small pockets in a few of the local neighbourhoods. Major nodes include the downtown and regional shopping centres north of Villeneuve Road, south of Leclair Way, and just north of downtown in the Inglewood neighbourhood. A few industrial areas lie on the eastern boundary in the Campbell Industrial Park and also near the south boundary in the Riel Business Park.[10] On January 21, 2013, the City designated 250 hectares of annexed land on the west side of the City as industrial use, based on several studies articulating the need for more industrial lands.

In addition to the new zoning, the Economic Development department is working to help drive growth in the commercial and industrial sectors. The recent efforts to developjob growth in our city should help tocreate future incentives for residents to work in St. Albert; however, the current lack of commercial property combined with the attraction of jobs in Edmonton contributes to the significant commuter travel patterns in and out of St. Albert.

Figure 7: Downtown Redevelopment Plan

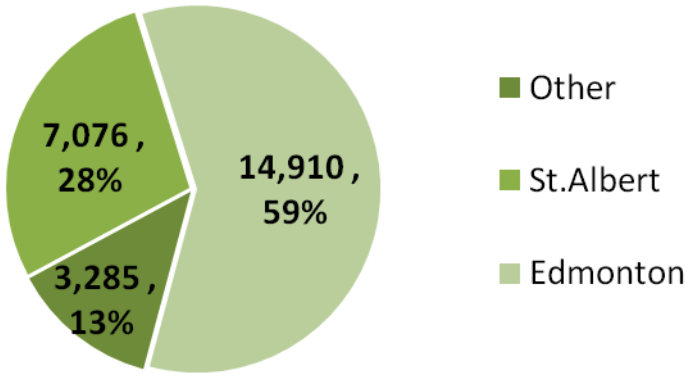
One other important City initiative is the Downtown Area Redevelopment Plan approved in 2010. The plan seeks to "... create a vibrant place where residents, visitors, businesses and government come together...". Creating this special place could help to drive more compact residential dwelling options as well as reduce the current need to commute to Edmonton for employment, entertainment or shopping. It could also encourage increased pedestrian activity and reduced vehicle use.

2.1.5 Transportation and travel patterns

The majority (65%) of St. Albert's working population of 31,879 works outside of St. Albert. Of the 25,272 full-time workers, 72% work outside of St. Albert, with 59% employed in Edmonton, 13% elsewhere and the remaining 28% in St. Albert. See Figure 8. The much smaller part-time workforce of 6,607 primarily works in St. Albert (61%,), with 33% working in Edmonton. With this significant proportion of the workforce working outside of St. Albert, not surprisingly, only 9% of St. Albert's workforce in 2006 took public transit or active modes of transportation like walking or bicycles to work, compared to Edmonton's 20%. However, despite having so many working outside the community (65% of the total workforce), St. Albert's active commuting pattern compares favourable to that of Lethbridge, Alberta where only 16% of the workforce is employed outside the community.

Figure 8: St. Albert full time workforce place of work

Source: City of St. Albert



With so many of St. Albert's workforce working in Edmonton, it follows that many trips are into and out of the community. A recent household survey indicates that only 36% of residents' trips stay within St. Albert, while the remaining 64% have a trip end outside of the City. Edmonton

is an endpoint for about 25% of trips, with the majority of those trips ending in northwest and central Edmonton.

A total of 6,100 daily mass transit trips occur to and from St. Albert during a typical weekday, with about 4,900 or 80% of them between St. Albert and Edmonton. A majority of these trips (3,800) have central Edmonton as a destination, due to the centrally concentrated employment and education attractions in this area of Edmonton.

2.1.6 Vehicles in St. Albert

The information on vehicle types and driving behaviour is somewhat limited for the City of St. Albert. However, a mix of local information and general vehicle trends can help to provide some context.

According to Alberta Transportation, St. Albert has 49,572 vehicles registered as of March 31, 2012. Since 2008, when St. Albert's first GHG emissions inventory was created, the total number of vehicles registered has dropped by almost 2,000.[12]

As of 2009, Alberta households had on average 1.87 vehicles, which was above the Canadian average of 1.47 vehicles, and the highest number amongst all the provinces.

Since 1990, technology improvements have improved vehicle efficiency for vehicles across Canada. For example, the fuel consumption ratings for new cars and wagons has decreased from 8.2 L/100km in 1990 to 7.1 L/100km in 2008. The results for larger vehicles is trending in a similar direction, which is beneficial as Alberta's share of light duty vehicles is primarily (55%) made up of vans, SUVs and pick-up trucks.[13]

As of 2009, Alberta households had on average 1.87 vehicles, which is above the Canadian average of 1.47 vehicles, and the highest number amongst all the provinces.

Source: Transport Canada.

In 2011/2012 St. Albert had 2.2 vehicles registered per household; this number has dropped since 2008.

Source: City of St. Albert 2010 Census

2.1.7 Energy markets for electricity and natural gas

Alberta's energy market is based on a competitive and relatively open market model for both electricity and natural gas. Prices for electricity and natural gas are based on market rates with delivery charges also included in a customer's bill. The Alberta Utilities Commission plays a role to help ensure the safety and reliability of energy delivery as well as reasonable and just rate by regulating most aspects of the energy system.

Electricity services

Alberta's electricity system is made up of numerous infrastructure parts and different types of organizations to manage each part. Electricity originates at the primarily coal- and natural gas-fired generation stations and is distributed via a network of major transmission lines throughout the province. Most of these transmission lines are owned and operated by Alta Link and Epcor, but regulated by the Alberta Utilities Commission. To facilitate the import and export of electricity, the transmission lines are also connected to a regional electricity grid that includes B.C. and many of the western states in the U.S. Distribution systems made up of distribution lines (smaller than transmission lines) and systems help energy flow from the transmission lines to the point of use at residences or commercial operations. The main transmission lines running near St. Albert are managed by Alta Link, while Fortis Alberta manages the community distribution system. Fortis has three stations to bring electricity from the transmission line into the city, with the largest on the south, one on the north and another newer one on the east. The majority of the community distribution

lines are placed underground. Based on current usage, the distribution system has an adequate amount of capacity to meet community needs and no major upgrades are planned.

Customers purchase electricity from a variety of electricity sellers (retailers) who in turn purchase electricity from larger markets. Customers are able to select a regulated or non-regulated rate option. The designated regulated rate provider for St. Albert is Epcor Energy Services.

Natural gas services

Natural gas in St. Albert is delivered via a main high-pressure pipeline and then through a local distribution network of lower pressure pipelines owned and managed by ATCO Gas. The capacity of the pipeline network is adequate for the foreseeable future growth (likely the north and west) in St. Albert, with the addition of extra distribution nodes and capacity upgrades to regulation locations as demanded by new developments in the area.[14] The City of St. Albert recently signed on to an updated franchise agreement with ATCO Gas that will be in place for ten years. The agreement, tied to the gas distribution revenues from St. Albert customers, is in exchange for use of land right of ways etc., and is a common arrangement amongst Alberta municipalities. ATCO also delivers energy efficiency outreach programs and commercial energy efficiency assessment services via their ATCO Energy Sense Program.

The regulated rate provider in St. Albert is Direct Energy Regulated Services, but a non-regulated number of gas retailers also service the area.

2.2 Corporate energy use

2.2.1 Transit

Existing local transit services provide routes from about 5:30 a.m. to 7:00 p.m. and connect to one or two of the local transit exchanges in the community. The Village Landing transit station provides 500 parking stalls that are fully utilized early in the morning for park and ride commuter traffic to Edmonton. Most commuter buses also connect through the more northern St. Albert Exchange station. A conceptual plan has been developed for a South Transit Centre/ Park and Ride station, which will help to meet parking demands that exceed the availability at the Village Landing station. The south station is also integral to a future light rail transit (LRT) connection to Edmonton and will provide room to grow for 30 years into the future. St. Albert has supported recommendations for land acquisition, fare integration with Edmonton transit services and LRT station alignment studies.[15]

St. Albert's transit fleet consists of 49 buses, with 15 articulated (dual length) buses and 31 conventional buses. There are also two Handibus vehicles for paratransit services. The average age of the fleet in 2008 was eight years.

The Long-Term Transit Department Plan addresses a few items related to GHG emissions, including identifying the benefits of transit in supporting reductions in GHG emissions. It also suggests that growing concern about GHG emissions may encourage greater demand for public transit. Under the goal of 'Sound Stewardship of the Environment' the plan notes efforts to educate on the benefits of public transportation, staying abreast of alternative fuel opportunities, and implementing a transit environmental management system. Additional strategies somewhat related to GHG emissions include the projected $44-million

St. Albert's neighbourhood design principle calls for a transit stop within a maximum of 400 metres walking distance of all residents. This distance scales downward for both higher density developments and seniors locations.

replacement schedule of the fleet and any new purchasing opportunities between 2009 and 2020. Most importantly, the overall emphasis in the plan on customer service should help to ensure positive transit experiences that will support current and increased future ridership.

One land use policy worth noting with respect to transit is St. Albert's neighbourhood design principle that calls for a transit stop within a maximum of 400 metres walking distance of all residents. This distance is smaller for both higher density developments and seniors locations. While it does not mean the transit stops will get frequent services, it does ensure that opportunities are available for relatively easy access to transit.

Looking specifically at operations, St. Albert Transit incorporated a 'Smart Driver' Program in 2011 to provide focused training for bus operators on fuel-efficient driving techniques.

2.2.2 Solid waste system

The City of St. Albert manages the community residential solid waste program with over 19,000 households throughout the city and a small handful of multi-family dwellings, along with some institutional buildings including churches. Collection from commerical businesses and the majority of institutions (schools, for example) is carried out by a number of commercial waste collection agencies.

At present, the residential program collects solid waste destined for the landfill, mixed recyclables, and organic waste. Collection systems for the latter two waste streams have only been developed recently (2009 and 2011 respectively) and are credited with helping our community meet the residential waste diversion goal of 65% and the solid waste target of 125 kg per person, eight years ahead of schedule.[16] St. Albert's long-standing 'pay-as-you-throw' user fees for waste destined for the landfill is also a critical factor in the recent results, as the program created resident demand for alternative approaches to managing waste. [17]

While the landfilled waste is collected by the City and taken to the Roseridge Commission Landfill near Morinville (23 km east of St. Albert) for disposal, the recycling and organic waste is collected by third-party organizations contracted by the City. Standstone Enviroservices collects organics in the summer and winter and takes the materials to Roseridge Commission's organics composting site, which sits next to the landfill, and Evergreen Ecological Services collects co-mingled recycling and takes it to their material recovery facility in Strathcona County for material separation and eventual sale. Both these contracts are set for renewal in June 2014. The City also operates a recycling depot site, which increasingly accepts more diverse recycled waste streams.

The City coordinates a number of education and outreach activities throughout the year to help encourage ongoing waste diversion of daily consumables as well as to manage large waste items like appliances.

Upcoming changes and improvements to the solid waste system may include increased education to help people become more familiar with the program, as well as an emphasis on the recycling stream component. Some materials that are not accepted as of yet, such as plastic film, Styrofoam, wood, drink cups etc. will hopefully either be added to the recycling stream in the near future or travel to a new Edmonton waste-to-biofuel facility. Other opportunities might include increased focus on the commercial, construction, demolition and institutional waste streams that are not

Recent expansion of St. Albert's waste collection services into mixed recyclables and organic waste has helped our community meet the residential waste diversion goal of 65% and helped reduce solid waste associated GHG emissions.

currently included in city efforts to reduce waste. From an operations perspective, dual stream collection trucks may also provide enhanced energy use and reduced emissions through more waste efficient collection activities.

2.2.3 City infrastructure

Water and wastewater

The City of St. Albert manages the community water distribution and wastewater collection system through a system of pipes and pumps that move the water from the regional supply with electrical pumps to residential and commercial customers. Wastewater is collected and sent to the regional wastewater treatment plant. St. Albert's Utility Master Plan from 2007 noted that the water distribution system and wastewater collection systems are functioning to an acceptable level, though it still recommended some improvements between 2010 and 2025. These improvements may be opportunities for energy-efficient approaches.

Water treatment and distribution

Drinking water treatment, distribution and in-home water heating can use a significant amount of energy and are good targets for energy efficiency opportunities. Drinking water for the distribution system is provided by the E.L Smith Epcor Water Serivces water treatment plant (100% owned by the City of Edmonton). This treatment plant along with the Rossdale treatment plant are part of a regional drinking water system, and the transmission of water outside of Edmonton is managed by the Regional Customers Water Group of which St. Albert is a member.

The total volume of water used annually in St. Albert amounts to just under 6,000 megalitres and though this has increased since 1991 it has decreased from a more recent peak in 2002. St. Albert's residential customers use 77% of this potable water, with 6% of all potable water lost through major distribution leaks and the remaining 18% split between commercial, industrial and municipal uses. Per capita water consumption per day is currently 250 litres which is down from a high in 1992 and 2002 of 350 litres. Conservation activities have included campaigns around lawn watering, leaky toilets and leak reports, and webpages with conservation information.

The community has a target of 200 litres per person per day to reach by 2020; a detailed water efficiency plan was adopted in 2012 to help meet this target.

Wastewater collection and treatment

Wastewater treatment plants often use significant amounts of energy and produce high GHG emissions. The regional wastewater treatment plant is operated by the Alberta Capital Region Wastewater Commission, of which St. Albert is a member along with twelve other communities. The wastewater treatment plant has three stages of treatment and captures process gases for various heating needs in the facility. The sludge that exits the treatment plant is settled out and ultimately composted or used on agricultural fields.

St Albert has 250 km of sewers and 10 sewage lift stations that all use energy for pumping. St. Albert does make a point of locating lift stations at the lowest depth to encourage gravity-fed movement throughout the system.

The regional wastewater treatment plant operated by the Capital Region Waste Water Commission captures process waste gases and uses them to supply heating needs for the facility.

Street lighting

The majority of St. Albert's street lighting systems are managed through a contract with FortisAlberta, through which the City pays a fee per light fixture. Most the street lights managed by Fortis are relatively efficient high-pressure sodium, and most fixtures are equipped with individual sunlight sensors that determine when the lights turn on and off. Lights in older parts of the city have one light sensor for multiple fixtures. Many lights also have dimming system to adjust the amount of light output. There may be some opportunities to switch these lights over to more efficient light emitting diodes (LED), and this approach will be pursued before or during the next contract renewal phase.

Traffic lights

The City's traffic light systems are managed through the Transportation Branch of the City's Engineering Department. In 2007, the City upgraded all traffic signals and pedestrian cross walks to LED modules. Over 1,800 inefficient bulbs were replaced with the much more efficient and long lasting LED bulbs, saving the City between $50,000 and $80,000 anually. The City is implementing an intelligent traffic system that uses cameras and radio signals to react to traffic. This is a big step up from magnetic intersection detectors and timing improvements and will help to ease energy use and emissions related to traffic congestion. On the other hand reducing traffic congestion can lead to increases in vehicle use, cancelling out any benefits.

In 2007, the City upgraded all traffic signals and pedestrian cross walks to LED modules. Over 1,800 inefficient bulbs were replaced with the much more efficient and long-lasting LED bulbs, saving the City between $50,000 and $80,000 annually.

2.2.4 City facilities

The City of St. Albert maintains and manages a host of facilities ranging from offices to maintenance garages and recreation centres complete with rinks and pools. Most facilities also have parking lots adjacent to the buildings that provide both overhead lighting as well as block heater systems in the winter months. The building stock ranges in age, with Servus Credit Union Place and Fire Hall No.3 representing two of the newest City-owned facilities.

Greenhouse Gas emissions related to facilities are highlighted in Table 1, identifying the top ten City facilities by total GHG emissions. Facilities with a greater share of emissions represent a potentially concentrated opportunity for GHG reductions.

Table 1: City facilities in order of GHG emissions

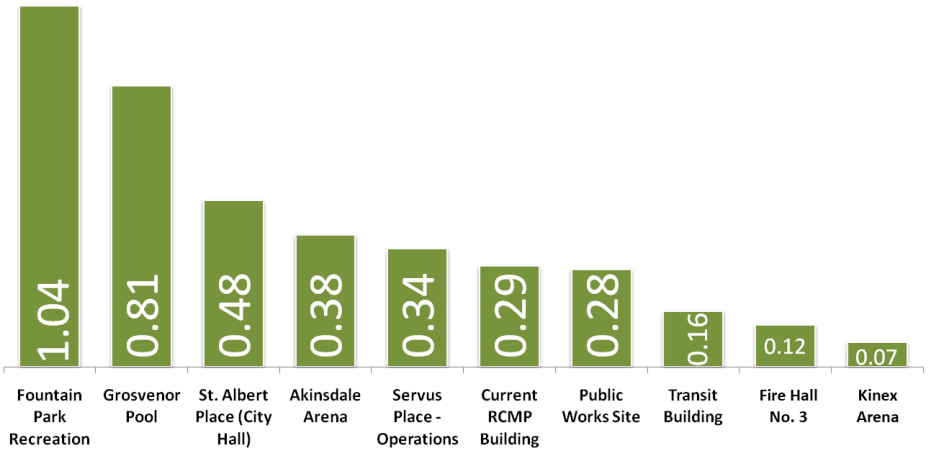
Facility Name and description	GHG emissions (t CO_2e)			Floor Area (m2)	CO_2e intensity (t/m2)
	From electricity	From natural gas	Total		
Servus Place Three rinks, two fieldhouses, watercentre, fitness facility, etc.	5106	2052	7158 (High)	21025	0.34
Fountain Park Recreation Centre Competition pool, leisure pool, hot tub, sauna, squash courts	1549	1089	2638	2528	1.04 (High)
St. Albert Place (City Hall) Offices, library, museum, art studios and Arden theatre	1878	683	2560	5340	0.48
Public Works Site Offices, 12-bay garage, vehicle wash, workshops	814	534	1348	4849	0.28
Transit Building Offices, 15-bay garage, wash bay, workshop	588	644	1232	7607	0.16
Akinsdale Arena One rink, clubhouse	940	287	1227	3190	0.38
RCMP Building Offices	403	127	529	1854	0.29
Fire Hall No.3 Offices, Emergency Centre, 9-bay garage, training facilities	54	234	288	2500	0.12
Grosvenor Pool Change rooms and outdoor pool, dive tank	47	136	184	226	0.81
Kinex Arena One rink	0	183	183	2451	0.07

Sorting the same facilities by GHG intensity (Figure 9) places the spotlight on the buildings with the highest GHG emissions per square metre, as potentially the best opportunities for reductions and benchmarking. The major differences between facilities are likely due in part to varying uses, but in the case of the similar use for the transit building and public works building there may be opportunities for direct benchmarking.

Aside from City Hall, the most emissions-intensive facilities of the top ten are all recreation facilities, highlighting the contribution of heating pool water and cooling ice to the City's energy use and subsequent GHG emissions.

Figure 9: City facilities ranked by GHG emissions intensity

Source: City of St. Albert[24]



As noted in the 2008 City and Community GHG Inventory Report, many buildings have rolled through energy efficiency studies and upgrades since 2004. Most of the improvements focused on low-hanging fruit such as heat recovery systems at arenas and pools, commissioning of HVAC equipment at newer facilities like Fire Hall No. 3 and Servus Place, improvements to HVAC controls and schedules for setting back temperatures at night, control devices on block heater plugs to scale back energy use as the temperature increases, and lighting retrofits in the arenas. Opportunities remaining include projects with very secure investments but longer payback periods. The City Asset Manager has an energy efficiency budget each year to spend on studies or projects, and recent work has identified good opportunities in the lighting realm with improvements in LED-technology.

One recent project worth noting is City Fire Hall No. 3, which received Gold Certification for Leadership in Energy and Environmental Design (LEED), an environmental designation from the Canada Green Building Council. The facility also purchases low-impact renewable electricity through Bull Frog power, essentially negating GHG emissions from the electricity purchases. The project did however require post-construction commissioning to ensure energy and GHG reduction improvements.

Figure 10: Fire Hall #3

2.2.5 City fleets

The City's 221 vehicles account for a large proportion of corporate emissions. The fleet described in the 2008 inventory consists of a variety of cars, small and large trucks, police vehicles, transit fleet and special equipment. Other equipment that was not part of the 2008 inventory, but considered for inclusion in the 2011 inventory, include emergency services vehicles and fire equipment. These additional vehicles are not insignificant, adding about 30 per cent more to the vehicles fleet emissions. In total, a large majority of the vehicle emissions come from the transit fleet specifically, followed by the gasoline vehicles and finally the vehicles running on diesel.

Emissions from vehicles are primarily a result of the type/size of vehicle, the fuels used and the amount of use the vehicle gets. Current purchasing practices employed by the City include an assessment of what the vehicle is going to be used for and an attempt to size the vehicle correctly for the job. All purchases go through one person, and the goal is to get the best fit for the job required. The City has a 20-year replacement plan that outlines triggers for vehicle replacements each year. Fleet managers are part of fleet management associations. Attempts have been made in the past to convert vehicles to natural gas but the results were not promising at the time and the conversions were ended. There are some concerns currently that air quality objectives for diesel fleets are impeding the efficiency of the vehicles and causing increased fuel use and resulting GHG emissions.

Defensive driver training is in place to some degree, but there is not a major focus on efficient driving with the municipal fleets. This may be an area for low-cost high-impact improvements that could be hosted by existing City staff since the St. Albert Transit drivers have already engaged in this program

Fuel costs are primarily paid for by the Asset Manager's budget, then charged out to the various departments along with maintenance and capital costs. The payment is not completely tied to use.[18]

2.3 GHG Inventories – highlights

The City of St. Albert completed inventories in 2008 for both corporate and community emissions.

2.3.1 Corporate emissions

The City of St. Albert completed a corporate emissions inventory in 2008 and then again in 2010 and 2011. There remains some discrepancies in the 2010 and 2011 inventories related to transportation and street lighting so the numbers are not included below. Additionally, the inventory from 2008 does not include GHG emissions from commercial municipal solid waste, fire trucks, and the municipal portion of regional water treatment and wastewater plants. Regardless of whether these GHG sources were included in the inventories, all will be considered as opportunities for exerting influence for GHG reductions.

The following section presents the 2008 inventory summary. Corporate emissions totaled 30,716 t CO_2eq., just 4 per cent of the overall community emissions. Emissions are broken out by sectors in Figure 11.

The majority of St. Albert's corporate emissions are a result of building sector activities, representing 60 per cent of all emissions. Building sector emissions also include lighting for parking lots. Municipal vehicle fleets and street lights contribute relatively equal amounts of emissions at 16 per cent and 14 per cent respectively. Major infrastructure for water and wastewater follow with nine per cent of emissions, while waste is the smallest sector at just one per cent.

City of St. Albert energy use accounts for the majority of GHG emissions. Figure 12 from the 2008 inventory outlines emissions by energy source. Of the emissions related to energy, most come from electricity use and the related electric generation infrastructure at 62 per cent. Natural gas accounts for the next largest category of emissions at 22 per cent and finally, gasoline and diesel fuels contribute to a combined 16 per cent CO_2e.

Figure 11: St. Albert GHG corporate inventory by municipal sector, 2008

Source: City of St. Albert [19]

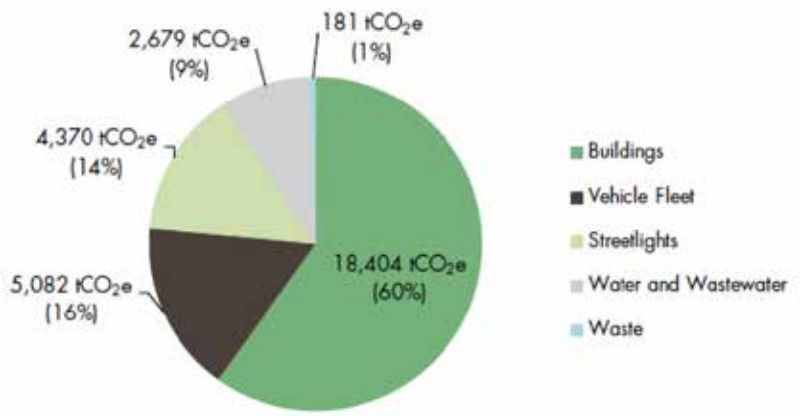
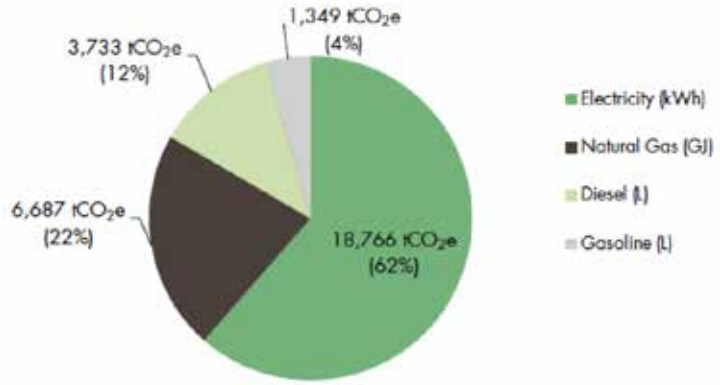


Figure 12: St. Albert GHG corporate inventory by energy source, 2008

Source: City of St. Albert [20]



2.3.2 Community emissions

Community emission totaled 711,303 t CO_2e in 2008, or 12.3 t CO_2e per capita. Figure 13 shows the proportion of GHG emissions from each sector.

The largest share of St. Albert's emissions comes from energy use in the residential building sector (40 per cent). Residential transportation energy use accounts for another 32 per cent, making the total residential sector the greatest source of emissions in St. Albert by far. This is not surprising given the high ratio of residential to commercial property in the community.

The industrial and commercial sector make up the bulk of the remaining emissions at 17 per cent and 10 per cent respectively, with residential/ City solid waste making up only one per cent. It should be noted that the solid waste results do not include commercial or industrial waste. For comparison, a more complete GHG inventory done by the City of Edmonton shows that solid waste makes up five per cent of the GHG emissions for all sectors.

Energy use accounts for 99 per cent of GHG emissions at the community level and it is useful for action planning to understand where the emissions originate. Figure 14 from the 2008 inventory outlines emissions by energy source. Most emissions come from electricity use and the related electric generation infra-structure at 42 per cent. Gasoline accounts for the next largest category of emissions at 32 per cent and finally, natural gas use contributes 26 per cent.

Figure 13: St. Albert GHG community inventory by sector, 2008

Source: City of St. Albert [21]

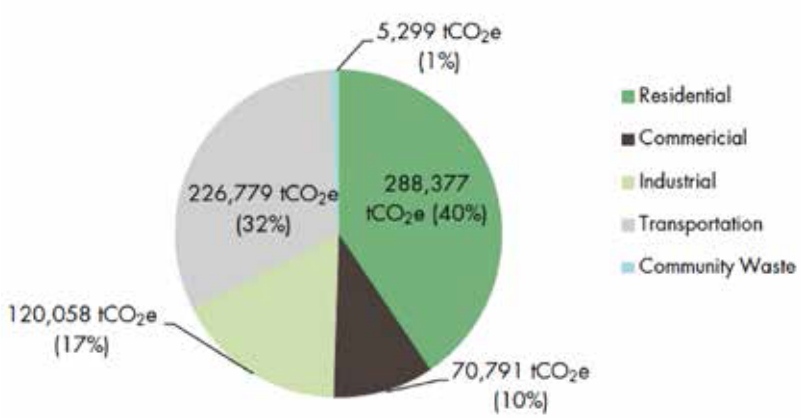
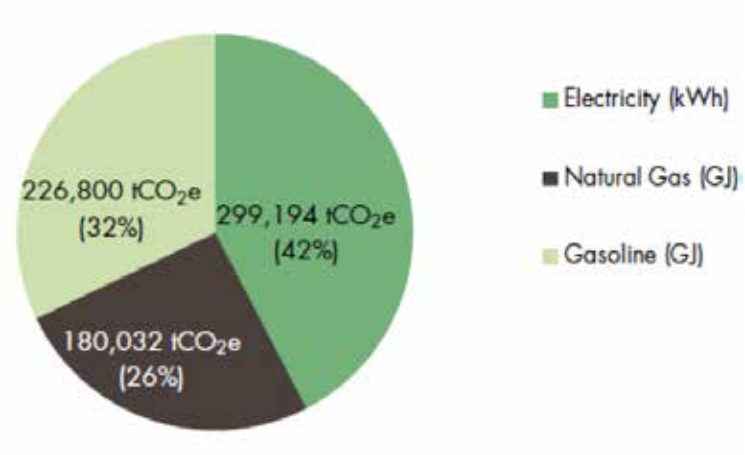


Figure 14: St. Albert GHG corporate inventory by energy source, 2008

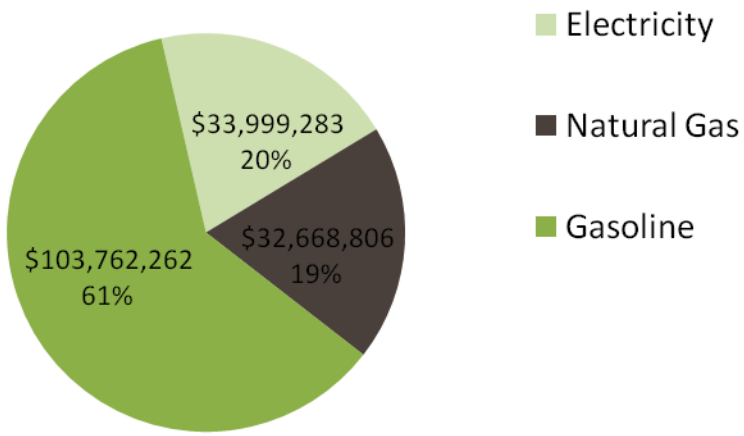


2.4 Cost of energy use

Based on the consumption of energy outlined in St. Albert's 2008 emissions inventory, the community spent approximately $170 million on energy.[23] This amounts to approximately $2,800 per person, with the majority (61%) of spending focused on transportation activities. A breakdown of these costs is provided below in Figure 15.

The City alone spent an estimated $5.6 million dollars on energy in 2008. A breakdown of this spending is provided below in Figure 16.

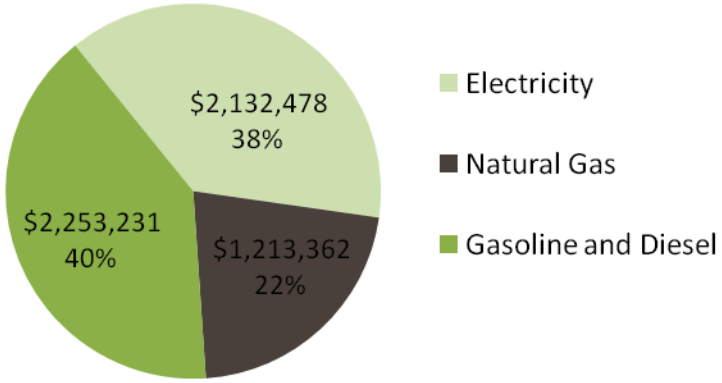
Figure 15: $170 million, estimated community energy costs by energy source, 2008



2.5 Key insights for actions

There are some key insights that can help in prioritizing and implementing actions to reduce non-renewable energy and GHG emissions. These insights and are summarized on the next page for both the community and City operations.

Figure 16: $5.6 million, estimated corporate energy costs by energy source, 2008



Key insights for Community GHG reductions

- The City's role in influencing community GHG reductions is quite broad, but limited in comparison to the influence it has over its own operations. With 72% of community GHG emissions resulting from the residential sector, community capacity building to support GHG reduction opportunities will be essential.
- Home ownership is high and community member transience is relatively low. Both these characteristics can be leveraged to help to foster private investments in home energy efficiency and on-site renewable energy systems.
- Existing community planning (Municipal Development Plan and Downtown Redevelopment Plan) and regional planning such as the Capital Region Board Growth Board are essential for encouraging community design that is increasingly compatible with more energy efficient transportation, building and energy supply approaches.
- A significant amount of community emissions come from electricity for buildings and infrastructure. In addition to increasing energy efficiency and on-site low carbon energy systems, reducing these emissions will likely require a reduction in the proportion of Alberta electricity coming from traditional fossil fuel generation systems.
- The cost of energy (especially electricity and vehicle fuel) is increasing and has been doing so at a faster rate than other consumer goods. While natural gas prices are currently low, other energy prices are generally quite high in comparison. Focusing initial community efforts on electricity and gasoline reduction activities will likely result in better financial and GHG reduction returns.
- The City has been successful at engaging community members in waste diversion and water efficiency projects. Both these cases could be celebrated and drawn upon in implementing outreach and behaviour-based GHG reduction activities.
- Vehicle commuting emissions make up a very large share of community GHG emissions. Vehicle energy costs are also quite high in comparison to electricity and natural gas costs. Both these characteristics should help to support further initiatives for mass transit to and from Edmonton as well as the development of local employment opportunities.

Key insights for Corporate GHG reduction actions

- The City of St. Albert has a strong culture of continuous improvement, frequent data gathering, and management systems to support implementation. This culture along with annual inventory reporting and department-by-department check-in could be leveraged to help drive GHG reductions.
- The Environment and Sustainability Department has various environmental/GHG champions throughout the organizations. This structure could increasingly support corporate master planning aligned with GHG reductions, initiatives to further capacity building and specific investments to reduce GHGs.
- Key departments and staff have a good understanding of what is needed to reduce GHG emissions and have already implemented initial actions in this area (building retrofits, transit smart driver training etc.). Celebrating and communicating current successes as well as further supporting their work should help yield GHG reductions.

- While GHGs from certain activities are not included in the City of St. Albert GHG Inventory (such as the water services that occur outside of the city), the City can still leverage its influence over these activities such as through contracts with suppliers and regionally-owned and operated facilities like the wastewater treatment plant.
- The majority of corporate emissions come from electricity for buildings and infrastructure. In addition to increasing energy efficiency and on-site low carbon energy systems, reducing these emissions will likely require a reduction in the proportion of Alberta electricity coming from traditional fossil fuel generation systems.
- The cost of energy (especially electricity) is increasing and has been doing so at a faster rate than other consumer goods. While natural gas prices are currently low, electricity prices are generally quite high in comparison. Focusing initial efforts on electricity reduction will likely result in better financial and GHG reduction returns.
- Energy efficiency and renewable energy technologies are constantly evolving and becoming more cost competitive. Staying abreast of new developments and municipal funding opportunities will help to ensure earlier application and more significant GHG reductions over time.

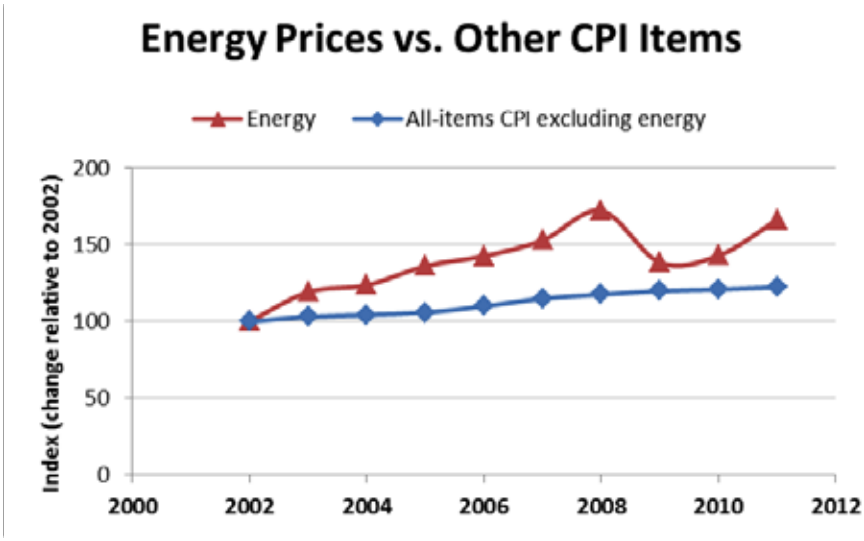
2.6 Future energy prices

Greenhouse gas emission reduction goals are primarily driven by St. Albert's Environmental Master Plan; however, reducing emissions through energy efficiency as well as some renewable approaches can result in significant economic savings as well as local job creation activities. Understanding pricing trends and forecasts provide some insight into what strategies will be most effective.

The City of St. Albert and community spend a significant amount on energy, and though the total amount may have dropped since the 2008 inventory due to price reductions, an overall upward pricing trend remains. One example of the overall upward pricing trend is displayed in a Consumer Price Index (CPI) figure from Edmonton's Energy Transition Paper. The CPI is an indicator of changes in consumer prices comparing a standardized basket of goods over time. The basket includes items such as energy, food, bus and taxi fares, newspapers, cable tv, haircuts, restaurant meals etc. The chart reveals that the growth in energy prices as part of

Figure 17: Energy price index vs. other CPI Items, 2000–2012

Source: Statistics Canada



the Consumer Price Index over the past decade has surpassed the growth in prices for all the other products and services measured by the CPI.[24]

The recent rise in energy prices since 2000 and 2001 is being driven by price increases for all energy types including electricity (Figure 18), gasoline (Figure 19), and even natural gas (Figure 20) though at a much slower pace. Due to the record volume of natural gas available in North America, natural gas prices are back down closer to 2000 prices as measured by the Henry Hub natural gas distribution hub pricing in the U.S. and the AECO-C spot pricing. Both measures represent the leading price setting benchmarks in North America.

The price increases of the past decade are expected to continue for the next twenty year as projected in Figure 21. These energy price projections are adjusted for inflation expectations and largely based on the U.S. Energy Information Administration numbers, with some small variations to localize the results for Alberta and Edmonton.

Figure 18: Electricity price trends per kWh, 2000-2010

Source: National Energy Board[25]

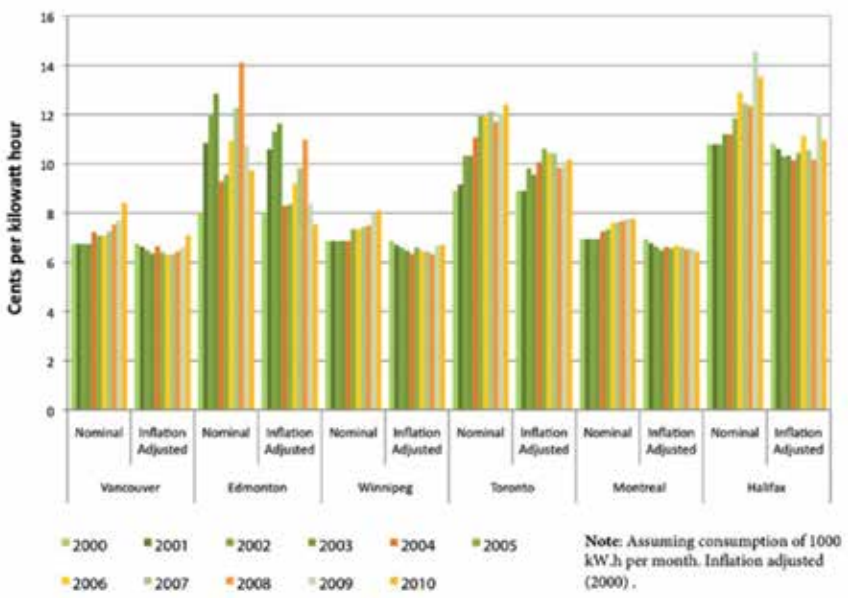


Figure 19: Edmonton retail gasoline rates, 2000-2012

Source: Statistics Canada[26]

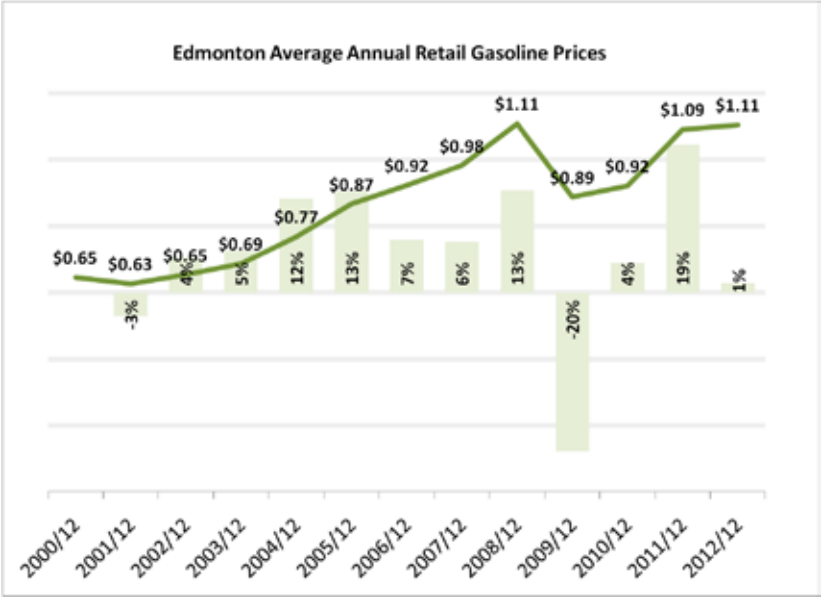


Figure 20: Natural gas price trends, 2000-2010 (MMBtu =1.05 GJ)

Source: National Energy Board[27]

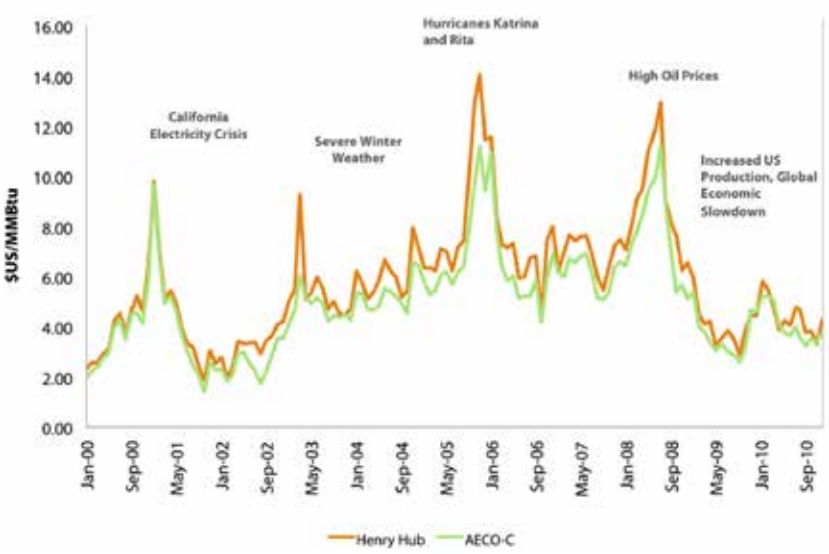
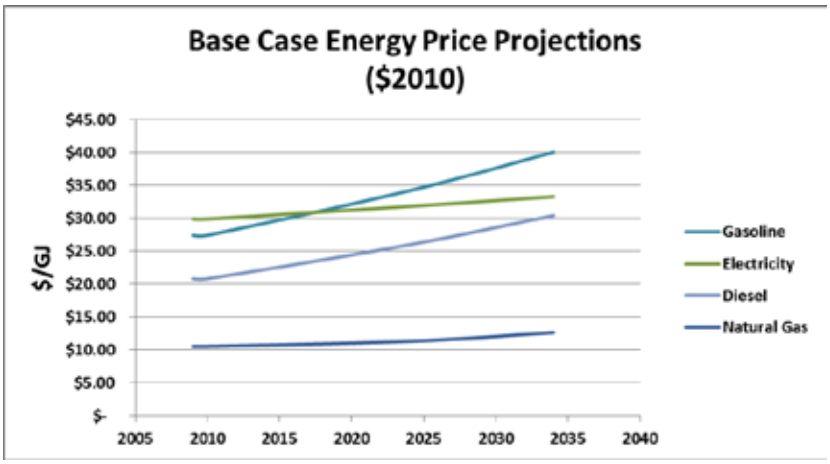


Figure 21: Edmonton energy price projections under business as usual

Source: Edmonton's Energy Transition Paper



3.0 Action on corporate energy use and emissions

The following actions for the City of St. Albert to undertake were identified based on best practices in other jurisdictions and reviewed by City staff and the City's Environmental Advisory Committee to determine their suitability.

3.1 Buildings and facilities

Buildings operated by the City of St. Albert accounted for roughly 60% of all corporate emissions in 2008. There are a number of ways to reduce energy use and GHG emissions from City of St. Albert buildings including:

- Green building policy for new construction
- Energy efficiency benchmarking, audits and retrofits for existing buildings
- Energy management systems
- Behavioural change systems

3.1.1 Green building policy for new construction

The most cost-effective time to reduce energy use in a building is during its design and construction. A City policy to achieve a high level of energy efficiency for all new buildings can achieve significant energy and GHG reductions over the building's lifetime.

The City of St. Albert has recently achieved success through the approach by achieving LEED Gold certification for its new fire hall. A City policy to achieve LEED Gold or similar levels of energy efficiency would help ensure other future buildings are similarly energy efficient

Action: Adopt a corporate Green Building Policy that includes minimum energy performance for new City buildings.

3.1.2 Energy efficiency benchmarking, audits and retrofits for existing buildings

Benchmarking the energy use in existing buildings compared to similar buildings on a per square metre basis can be a quick way to identify buildings that are currently relatively high consumers. The Municipal Climate Change Action Centre (MCCAC) currently provides this service to Alberta municipalities and would allow the City of St. Albert to compare its facilities to those of other Alberta municipalities.

Action: Benchmark municipal building energy use with the MCCAC municipal benchmarking program.

An energy efficiency audit of an existing building will identify the cost-effective energy efficiency potential for retrofits in more detail and help plan an approach to achieve the most feasible energy and GHG reduction. The focus areas for building retrofit opportunities include:

Lighting: Lighting systems often provide excellent opportunities for cost-effective energy savings. For example, fluorescent tubes can be replaced with more efficient versions and have paybacks of one to three years. As well, compact fluorescent light bulbs (CFLs) or more advanced LEDs can replace standard incandescent bulbs and reduce electricity consumption by over 75%. Often, higher efficiency lighting technologies also have longer lifetimes than conventional light bulbs, offering maintenance savings and productivity improvements as well.

Insulation and building envelope: Limiting heat loss from a building can be an effective way to reduce energy consumption if the building is particularly leaky, if the building has ineffective insulation due to water damage or if insufficient insulation was installed during construction.

High efficiency HVAC equipment: Older, less efficient heating, ventilation and air conditioning equipment (HVAC - including boilers, furnaces, pumps, fans and motors) can be replaced with new, high efficiency models.

Heat recovery: Some buildings and facilities such as wastewater treatment plants can release a significant amount waste heat through hot water drains or air ventilation exhausts. Heat recovery systems can recover the heat and return it to the building heating system. A heat recovery ventilator (HRV) is an effective tool for providing fresh air to the inside of the building in the most energy efficient manner possible. The HRV unit is able to capture up to 85% of the energy from the outgoing stale air. Heat exchanger units on warm water drains at community pool change rooms or on ice rink cooling systems can also capture waste heat and transfer it back into the building heating system.

Controls: Controls can be used on both lighting and HVAC equipment to ensure that systems are running at the most optimal efficiency. For lighting, dimmers and sensors are popular for both indoor and outdoor applications. heating, ventilation and air conditioning equipment (HVAC) controls for buildings include basic programmable thermostats with setbacks during unoccupied hours and sensors/switches that appropriately sense the indoor or outdoor conditions to ensure the optimal delivery of fresh air, heating or cooling.

Energy monitoring: Monitoring and verification of energy consumption offers additional information to help optimize the retrofit design. Monitoring will also provide a means of accurately calculating the energy costs to help justify the additional capital investment.

Recommissioning: Over time, the needs for building heating, cooling and ventilation services can change. Recommissioning involves optimizing building control systems for current usage patterns of occupants and can result in significant energy savings without any capital costs.

The City of St. Albert already has an active building retrofit program that has resulted in significant energy savings and added comfort for occupants. Continued advancement and enhancement of this program would result in even greater energy and GHG reductions.

Action: Continue to conduct energy efficiency audits to identify cost-effective retrofits, and plan and implement energy upgrades for existing City buildings.

3.1.3 Management systems

Any reductions in energy use that are achieved will disappear over time without ongoing monitoring and management of energy. The City of St. Albert can help ensure ongoing energy savings by implementing an energy management program beyond current practices. This program includes:

- Ensuring key building management personnel have training and regular feedback on the energy consumption of buildings they are responsible for.
- Regularly assessing strategies for reducing energy use through best management practices.

Action: Create a facility energy management system that includes training and feedback systems for building managers and operators, and a best management practice system such as BOMA BESt or LEED EBOM.

3.1.4 Behavioural campaign

Beyond facility-wide management, energy savings can be achieved through changes to occupant behaviours. These behaviours include reducing the number of energy-using devices installed (i.e. plug loads) and turning off lights and equipment when they're not needed.

Since behavioural change campaigns have experienced mixed results in other jurisdictions, this action will not be a priority for the short term.

Action: A first step in this area is to pilot a behavioural change campaign to measure its effectiveness before broad deployment.

3.2 Vehicle fleet

The emissions from the vehicle fleet of St. Albert accounted for 16% of the corporate emissions in 2008. Emission reduction opportunities for the municipal fleet include:

- Right-sizing of vehicles and improved fuel economy through a vehicle purchasing policy
- Using low-carbon fuels
- Vehicle maintenance
- Driver behaviours
- An overall fleet fuel management program

3.2.1 Vehicle purchasing policy

A policy to assess vehicle needs (including size and power) and ensure high-efficiency vehicles are considered can be used to reduce fuel use, save money and reduce GHG emissions from a corporate fleet. This is currently done informally, but a formalized program will help to ensure the process is continued over time.

Action: Formalize the vehicle purchasing policy to assess vehicle needs and ensure high-efficiency vehicles are selected for purchase.

3.2.2 Low-carbon fuels

Fuels such as ethanol, biodiesel, natural gas and electricity can be used to reduce overall GHG emissions compared to gasoline and diesel.

While gasoline and diesel sold in Alberta and Canada is required to have some renewable fuel component (e.g. ethanol and biodiesel), there are opportunities for bulk fuel purchasers to source gasoline and diesel with higher blend ratios or biofuels with lower life cycle emissions (e.g. biofuels from waste products such as waste grease and tallow). The cost of these fuels depends on the price that can be negotiated with suppliers.

Other fuels, like natural gas and electricity, require different vehicles and fuelling infrastructure. While these add to vehicle costs, the cost of the fuels is less than gasoline and diesel. Overall costs are dependent on the use of the particular vehicles.

Action: Re-investigate the use of low carbon fuel alternatives for the City fleet.

3.2.3 Vehicle maintenance

Proper maintenance of vehicles, in particular proper tire inflation and periodic engine tune-ups, can reduce the fuel consumption of vehicles.

Action: Continue to ensure that vehicles are maintained in order to ensure peak operating efficiency.

3.2.4 Driver behaviours

Vehicle fleets have been shown to be able to reduce fuel use by changes to driving styles through driver training, monitoring and feedback systems. The City of Edmonton is an example of a municipality that has implemented such a program, and the St. Albert transit fleet drivers have also gone through this training. There are opportunities to broaden this training to all drivers, and to refresh past training. For non-transit drivers, this can include training regarding trip planning to reduce the total amount of distance travelled.

Action: Broaden current driver behaviour training.

3.2.5 Fleet fuel management

An overall fleet management strategy is a good way to incorporate the various initiatives that will have the greatest impact on reducing emissions into one strategy. The components of the strategy would include:

- A vehicle purchasing policy
- Fuel purchasing strategy
- Vehicle maintenance program
- Driver training
- Regular monitoring of fuel use and costs for all vehicles and fleet equipment, including mowers, backhoes, tractors, pumpers etc.
- Feedback for drivers on fuel use
- Review work planning of non-transit drivers to reduce the total amount of distance travelled

Action: Develop an overall fleet fuel management strategy and program to actively manage fuel use over time.

3.3 Street lights

Streetlights account for approximately 14per cent of the corporate emissions for St. Albert. Two standard actions to reduce emissions are ensuring that lighting is sufficient but not excessive and upgrading the energy efficiency of lighting systems. Another opportunity is to install wind and solar hybrid-powered lights in areas that do not currently have electrical service.

3.3.1 Review timing and use schedules

Ensuring street lights are timed to provide illumination only when needed and modified to accommodate seasonal variation can reduce the overall electricity usage. Modifying the light intensity (if system permits) can also provide mechanisms for reduced energy consumption.

Action: Review timing and usage settings for street lights with FortisAlberta to identify and implement opportunities to reduce energy use.

3.3.2 Upgrade to energy efficient ballasts and bulbs

Street lights can be changed to 'dark sky friendly' high-pressure sodium bulb or LED bulb options. Mercury vapour bulbs, which are the most common current street light bulb technology, can be changed to high pressure sodium and achieve a four-year simple payback with a reduction in maintenance costs.

Action: Upgrade to energy efficient ballasts and bulbs on municipally-owned lights.

Action: Work with Fortis to ensure street lighting incorporates the most efficient opportunities available (LED).

3.3.3 Pilot wind and solar street lights

Wind and solar hybrid powered street lights offer an opportunity to reduce operating expenditure and provide lighting options for areas without electricity infrastructure. These systems are viable in most unelectrified locations and can operate with as little as one charge every four days. St. Albert already has some examples of these for flashing school zone lights and portable digital traffic signs.

Action: Investigate opportunities to further trial wind and solar street lights.

3.4 Water and wastewater

Water and wastewater operations account for nine per cent of the corporate emissions in St. Albert. Opportunities to reduce the energy consumption follow a similar approach to other sectors by having a systematic approach to achieve emission reductions and improve efficiency.

3.4.1 Conduct an energy efficiency audit

An energy audit of the water and wastewater system can identify the cost-effective efficiency potential for retrofits and help plan an approach to achieve the greatest feasible GHG reduction.

Energy consumption can eat up a massive 20 to 40 per cent of a water or wastewater facility's operating budget. The largest single consumers of electricity in the water industry are pumps. They run regularly, and often are running at a higher level than absolutely necessary. Using variable speed drives and re-sizing pumps and control valves can go a long way to reduce the amount of energy that is used in water and wastewater operations systems. Aeration is another area that can benefit from re-evaluating the sizing and operation of the system. Significant savings can be achieved by actively controlling aeration based on the needs of the specific system.

A water system master plan is useful to assess and plan for the incremental energy efficiency improvements and track progress in reducing overall energy consumption.

Action: Work with the Alberta Capital Region Wastewater Commission to conduct an energy audit of the water and wastewater distribution system facilities to identify cost-effective energy efficiency potential and to help plan an approach to achieve the greatest feasible GHG reduction.

3.4.2 Demand management

Managing the demand for water resources in a community can help reduce the overall volume of water needing treatment and the subsequent wastewater needing to be handled. Reducing water consumption both in the community and at corporate buildings will save energy for processing the water plus reduce the overall demand on local watersheds, an additional benefit to the local environment.

Action: Continue to advance water demand management programs.

3.5 Solid waste

Due to continued focus on reducing waste from municipal operations, emissions from solid waste only account for one per cent of corporate emissions. Reductions can still be realized through simple measures such as reducing waste generation and continually processing the waste to separate different waste streams. Reducing the volume of waste generated is the most effective means of reducing associated emission and decreases land use. By enhancing recycling and organic waste separation policies, waste can further be reduced as the organic and recyclable stream can be diverted to off-site uses.

Action: Continue waste management programs for municipal operations.

3.6 Distributed energy

Developing distributed or renewable energy generation on corporate buildings or other sites offers the opportunity to generate a portion of energy supply with low or no associated emissions. There are many options to choose from, each with its respective advantages and disadvantages and varying degree of complexity. The options include:

- Solar photovoltaic (PV) panels for generating electricity
- Solar water heaters
- Solar air heaters
- Ground source heat pumps
- On-site cogeneration of electricity and heat (also known as combined heat and power plants) using natural gas or biomass

Solar energy

The opportunities to capture solar energy can seem limited for cities in Canada, but Alberta and St. Albert have a better year-round solar resource than leading solar countries such as Germany and Japan. PV panels can be used on any building where there is not significant shading, while solar water heaters are typically used for buildings with high amounts of hot water use such as pools. Solar air heaters are feasible for buildings that have a large south-facing wall with no windows, like public works buildings or transit garages.

Ground source heat pumps

The total GHG emissions of ground source heat pumps depends on the source of the electricity used to run them. In Alberta, ground source heat pumps are currently estimated to moderately decrease overall GHG emissions compared with natural gas furnaces, but this decrease will become even greater as the GHG intensity of the electricity grid lowers.

Natural gas cogeneration

Cogeneration of electricity and heat for a building or facility is increasingly common for large consumers of heat. The total GHG emissions of a natural gas cogeneration system are significantly lower than sourcing electricity from the provincial grid and heat from a separate system.

Biomass

Biomass can come from wood, agriculture waste products or municipal waste, and can be used as a low net carbon, renewable fuel source where suitable sources exist. Location-specific studies are required to determine the suitability of using biomass as a fuel source for electricity or heat production.

Action: Investigate opportunities to implement distributed energy generation in municipal buildings.

3.7 Green procurement policy and green power purchasing

While not part of the GHG inventory, a green procurement policy such as the one being developed by the City of St. Albert can be used to guide the purchasing of products, services, and contractors to reduce upstream GHG emissions. By supporting companies and services that have better environmental and social performance relative to their competitors, the City can support GHG reductions beyond its own operations.

Action: Continue to develop a green procurement policy to control the purchasing of products, services, and contractors to reduce upstream GHG emissions.

Municipal purchasing of green power is typically implemented separately from a green procurement policy (which focuses more on other products and services). As emissions from electricity account for over half of the City's corporate GHG emissions, shifting to green power has the potential to significantly reduce the City's corporate inventory. This can be done by negotiating a green power requirement during the next time the City's contract for electricity is up for renewal. Alternatively, the City could purchase green power certificates, as was done for Fire Hall No. 3 during its first three years of operation.

Action: Investigate the feasibility of purchasing green power for City operations during the next electricity contract renewal.

3.8 Corporate action planning

Action Planning for City of St. Albert Buildings and Facilities

Action	Level of effort / budget	Timeline	Funding Sources
Adopt a corporate Green Building Policy that includes minimum energy performance for new City buildings.	Less than $50,000	Short-term 2013-2014	Internal
Benchmark municipal building energy use with the MCCAC municipal benchmarking program.	Less than $50,000	Short-term 2013-2014	N/A
Continue to conduct energy efficiency audits to identify cost-effective retrofits, and plan and implement energy upgrades for existing City buildings.	Between $50,000 and $100,000	Ongoing	Operations budget FCM Green Municipal Fund
Create a facility energy management system that includes training and feedback systems for building managers and operators, and a best management practice system such as BOMA BESt or LEED EBOM.	Less than $50,000	Ongoing + one time certification	Operations budget
Pilot a behavioural change campaign to measure its effectiveness before broad deployment.	Between $50,000 and $100,000	Medium-term 2015-2016	Internal FCM Green Municipal Fund

Action Planning for the City of St. Albert Vehicle Fleet

Action	Level of effort / budget	Timeline	Funding Sources
Formalize the City's vehicle purchasing policy to assess vehicle needs and ensure high-efficiency vehicles are selected for purchase.	Less than $50,000	Short-term 2013-2014	N/A
Re-investigate the use of low carbon fuel alternatives for the City fleet.	Less than $50,000	Short-term 2013-2014	N/A
Continue to ensure that vehicles are maintained in order to ensure peak operating efficiency.	Less than $50,000	Ongoing	N/A
Broaden current driver behaviour training.	To be determined based on past training.	Short-term 2013-2014	Internal
Develop an overall fleet fuel management strategy and program to actively manage fuel use over time.	Less than $50,000	Short-term 2013-2014	N/A

Action Planning for the City of St. Albert Street Lights

Action	Level of effort / budget	Timeline	Funding Sources
Review timing and usage settings for street lights with Fortis to identify and implement opportunities to reduce energy use.	Less than $50,000	Short-term 2013-2014	N/A
Upgrade to energy efficient ballasts and bulbs on municipal owned lights.	To be determined	Short-term 2013-2014	Internal FCM Green Municipal Fund
Work with Fortis to ensure street lighting incorporates the most efficient opportunities available (LED).	Less than $50,000	Short-term 2013-2014	Part of street light contract
Investigate opportunities to further trial wind and solar streetlights.	Less than $50,000	Short-term 2013-2014	Infrastructure budget

Action Planning for the City of St. Albert Water and Wastewater

Action	Level of effort / budget	Timeline	Funding Sources
Work with the Alberta Capital Region Wastewater Commission to follow through on recommendations from the energy audit of the water and wastewater distribution system facilities.	Less than $50,000	Short-term 2013-2014	Existing operating budget
Continue to advance water demand management programs.	Less than $50,000	Ongoing	Existing budget

Action Planning for the City of St. Albert Waste

Action	Level of effort / budget	Timeline	Funding Sources
Continue waste management programs for municipal operations.	Less than $50,000	Ongoing	Existing budget

Action Planning for the City of St. Albert Distributed Energy

Action	Level of effort / budget	Timeline	Funding Sources
Investigate opportunities to implement renewable energy generation in municipal buildings.	Less than $50,000	Medium-term 2015-2016	Internal FCM Green Municipal Fund

Action Planning for the City of St. Albert's Procurement Policies

Action	Level of effort / budget	Timeline	Funding Sources
Continue to develop a green procurement policy to control the purchasing of products, services, and contractors to reduce upstream GHG emissions.	Less than $50,000	Short-term 2013-2014	Existing budget
Investigate the feasibility of purchasing green power for City operations during the next electricity contract renewal.	Less than $50,000	To be determined	Internal

4.0 Action on community energy use and emissions

Community GHG emissions for the City of St. Albert were over 711,000 tonnes of CO_2e in 2008. Six categories for reducing community GHG emissions have been identified for the Local Action Plan:

- Provincial electricity grid
- Community design
- Building and industrial energy efficiency and conservation
- Distributed energy
- Vehicle efficiency and fuel
- Waste diversion and landfill gas capture

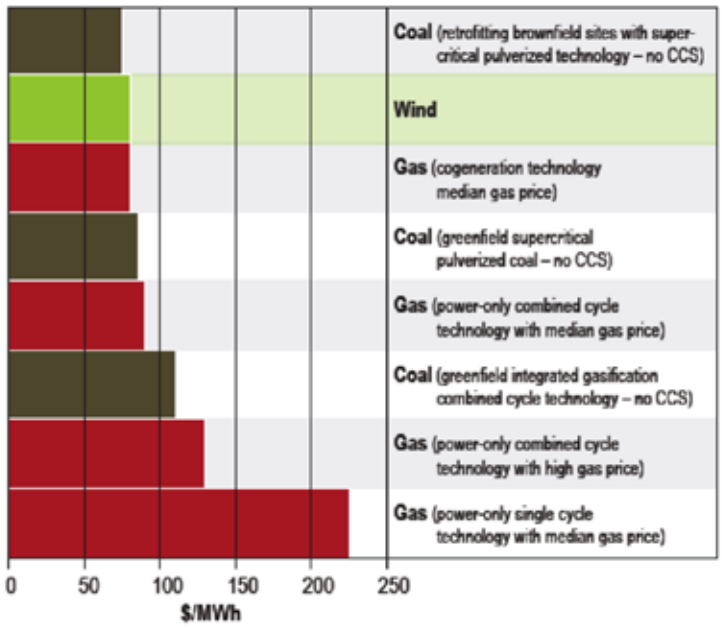
4.1 Provincial electricity grid

Currently, electricity in Alberta is relatively GHG-intensive due to the province's heavy reliance on coal-fired power plants. The City of St. Albert can contribute to a shift away from coal-based electricity and towards lower GHG emissions by working with others to engage the provincial government.

Action: Work with other municipalities to engage the provincial government to develop policies that shift the make-up of Alberta's electricity grid from primarily coal-fired power plants to a greater percentage of natural gas and wind power plants.

The cost of electricity from new lower-emission power plants (using natural gas or wind power) is similar to the cost of electricity from new high-emission power plants (using coal).[28]

Figure 22: Cost per MWh of various power generation technologies in Alberta[29]



4.2 Community design

Residential emissions accounted for 40% of the City's total community GHGs in 2008. The layout and design of a community has a significant impact on the amount of GHG emissions that come from personal transportation and, to a lesser extent, GHG emissions that come from energy use in buildings. Communities that are more compact with a mixture of uses, high-quality public spaces, and convenient walking, cycling and transit infrastructure have been shown to have lower GHG emissions.[30, 31]

Compact neighbourhoods require less infrastructure (roads and utilities) than neighbourhoods that are spread out. This makes them less expensive to build, operate and maintain.[32]

The cost of transit, walking and cycling is less than the cost of private vehicles when you consider the costs of both the infrastructure (roads and train lines) and vehicles (purchasing and operating cars and buses).[33]

Actions:

- **Remove barriers to developing compact, mixed use, transit-oriented neighbourhoods**
- **Increase transit service in high-use areas.**
- **Increase the quality of public spaces and infrastructure in compact neighborhoods to encourage uptake of units in these areas.**
- **Continue regional planning with neighbouring communities through the Capital Region Board.**
- **Continue to encourage employers to locate in St. Albert to increase local employment available and reduce commuter traffic**
- **Provide incentives to buying / building in compact, mixed-use, transit-oriented neighbourhoods, and using transit.**
- **Introduce parking policies that encourage the use of transit, walking and cycling such as paid parking and reducing the number of parking spaces per development.**
- **Discuss targets for increasing densities, walking, cycling and transit use during the next review of the MDP, TMP, and in work with the Capital Region Board.**
- **Make changes to approval processes to increase densities, mixture of uses, walking, cycling and transit use within our city.**

4.3 Building and industrial energy efficiency and conservation

Residential, commercial and industrial buildings accounted for 68% of total community GHG emissions in 2008. GHG reductions can be achieved by reducing electricity and natural gas use in buildings and industrial facilities through energy efficiency and conservation.

The potential GHG reductions possible through energy efficiency depend on the product:

- New homes can be built to consume 85% less energy than homes currently being constructed, although a 25% reduction in energy use (approximately Energuide 80) is more readily available in today's market.[34]
- An average of 10% improvement in energy efficiency has been achieved for broad home renovation programs in the past,[35] although some studies

estimate that up to 25% energy reduction for a single house is reasonable to expect.[36, 37]

- A 25% improvement in energy efficiency is often cited for new large buildings compared with conventional practice,[38,39] although some buildings are constructed to be 60% better.[40,41]
- Some studies estimate that up to 25% reduction in energy use in existing large buildings is possible through renovations,[42,43] although based on the performance of residential retrofit programs, an average reduction of 10% may be a more reasonable expectation.
- Energy Star appliances must be 10% to 50% more efficient than the minimum Energy Efficiency Standards in Canada.
- Lighting — existing buildings[44]
    - Replacing general T12 lighting technology with standard or next generation T8 bulb technology can reduce electricity consumption by 26% and 39% respectively.
    - Bulb replacement (as above) plus space redesign that reduces the number of lighting fixtures can reduce electricity consumption by 56% and 67% respectively for standard T8 or next generation T8 bulb technology.
    - Replacement of incandescent bulbs with CFL or LED bulbs can reduce electricity use by 75% and 90% respectively.
- Lighting — new construction
    - Choice of lighting technology coupled with fewer fixtures and improved control systems (e.g., daylighting or occupancy sensors) offers the opportunity to achieve a 17% to 40% reduction in energy consumed by lighting.[45] Note that the average electricity savings possible for new buildings is generally lower than existing buildings as new buildings are already typically built with more efficient lighting than most existing buildings.
- Plug load
    - Energy Star labeled equipment can generate an electricity savings of 75% for computer and monitor equipment (24 W per unit) and 40% for photocopier systems (61 W per unit). Refrigeration units that are upgraded to high-efficiency multiplexed compressors have the potential to generate energy savings of 25%.[46]

- Consumer feedback systems
  - Electricity meters that are visible in people's homes that offer simple feedback have demonstrated a 5% to 10% energy savings, while more complex systems that provide detailed current and historical consumption analysis have demonstrated up to 18% reduction in energy use.[47,48,49]
  - Consumers who have been given feedback on their energy use via utility bills have reduced their energy use by between 0% to 10% depending on the context and quality of information given.[50]
  - Studies have shown that consumers will pay more for energy efficient buildings.[51,52,53] Having a third-party certified label that is easy for consumers to understand has been demonstrated to increase the likelihood that energy considerations will be taken into account in purchasing decisions. Increasing the market value of an energy efficient building increases the incentive for existing owners to perform energy upgrades.

As a whole, energy efficiency and conservation is considered one of the top ways to reduce GHG emissions for buildings, and is recognized as the most cost-effective of GHG reduction options.

Actions:

- **Explore options for introducing a consumer feedback system.**
- **Work with others to engage the Provincial Government regarding energy efficiency standards for new buildings.**
- **Introduce an energy efficiency checklist for new developments (to raise awareness of energy efficiency opportunities).**
- **Develop a home retrofit program to make it easy for homeowners to undertake cost-effective upgrades prior to sale and demonstrate the ability to pass the cost onto buyers.**
- **Host energy management training for local organizations.**
- **Provide incentives for energy efficient equipment, buildings and/or energy managers for large facilities.**
- **Introduce bylaws requiring minimum energy efficiency standards for new buildings and / or at the time of sale of existing buildings.**

4.4 Distributed energy

Energy generation within a city includes devices such as:

- Solar photovoltaic (PV) panels for generating electricity
- Solar water heaters
- Solar air heaters
- Ground source heat pumps
- On-site cogeneration of electricity and heat (also known as combined heat and power plants)

Distributed energy also often includes district energy systems that connect the heating and cooling systems of many buildings together.

Passive solar heating (e.g. placing windows on the south side of buildings to take advantage of free heat from the sun) is also a form of distributed energy although it could also be considered energy efficiency as it reduces the amount of energy needed to heat buildings.

Actions:

- **Remove barriers to distributed energy.**
- **Design new neighbourhoods to take advantage of free heat from the sun.**
- **Identify areas with good district energy potential.**
- **Provide incentives for distributed generation.**
- **Require all new buildings with solar access to be built 'solar-ready'.**
- **Introduce a bylaw requiring on-site energy generation for large buildings.**
- **Introduce a bylaw requiring district energy for new developments where it is currently economically feasible.**

4.5 Vehicle efficiency and fuel

In 2008, transportation accounted for 32% of the community emissions for the City of St. Albert. Aside from shifting people from cars to walking, cycling and transit (as described in the community design section), there are a number of ways to reduce GHG emissions from vehicle use. These include:

- Purchasing more efficient vehicles
- Increasing the uptake of alternative fuels (biofuels, natural gas and electricity)
- Changing driving behaviours

Depending on the opportunity, a number of approaches have been used to reduce fuel use. These include incentives, energy management programs and regulations.

- Hybrid electric cars are 34% to 60% more efficient at converting energy to motion than conventional vehicles.[54] Hybrid electric delivery trucks can reduce GHG emissions by 25% compared to conventional diesel delivery trucks.[55]
- Fully electric cars are 80% to 90% more energy efficient than conventional cars from a vehicle perspective, but overall emissions depend on where the electricity comes from.[56,57] In Alberta, where the majority of electricity comes from burning coal, generating electricity is approximately three times as carbon intensive as burning gasoline. As a result, EVs in Alberta are expected to generate about one-third fewer GHG emissions than gasoline cars given

today's technology. If vehicles could be charged using mainly wind power, EVs would emit up to 90% fewer emissions than conventional cars, depending on the vehicle.[58] Tailpipe emissions for electric vehicles are zero.

- Compressed natural gas in light-duty vehicles reduces GHG emissions by around 25% relative to gasoline.[59]
- Adding 10% ethanol to gasoline can reduce life cycle greenhouse gas emissions by between 3.9% and 6.3% depending on the ethanol feedstock.[60]
- Adding 5% biodiesel to diesel fuel can reduce life cycle greenhouse gas emissions by between 2.8% and 4.8% depending on the biodiesel feedstock.[61]
- Drivers can reduce their fuel use by using fuel efficient driving techniques and keeping their car well maintained.[62] Larger-scale demonstration of this is most often seen in commercial fleets where driver engagement programs have shown 10% to 20% reduction in fuel use.[63] Programs aimed at the general public, on the other hand, are estimated to achieve only 1% to 2% in GHG reductions.[64]
- In addition to reducing idling through driver behaviour and vehicle maintenance, idling of delivery vehicles can be reduced through the use of specialized equipment such as electrical plug-ins in loading bays, auxiliary power units on trucks to allow refrigeration units to continue running without using the truck engine, and onboard computers that help drivers with speed management, optimum shifting, optimum route selection and idle reduction. Plug-in refrigeration units have demonstrated fuel savings of over 60%. Onboard computers have been shown to reduce carbon emission by 13%.[65]

Actions:

- **Work with fleets on fuel management programs.**
- **Provide incentives and disincentives for efficient vehicles, alternative fuels or idle reduction technologies. Incentives could also include preferred parking for hybrid and electric vehicles, and public charging stations.**
- **Encourage, incent and eventually require plug-ins for loading docks, truck stops and garages.**

4.6 Waste diversion and landfill gas capture

Solid waste accounted for 1% of St. Albert's community emissions in 2008. Methane, a greenhouse gas, is generated when municipal waste or garbage decomposes in landfills. The amount of methane emissions are estimated based on the composition and amount of waste in the landfill, as well as how long it has been there.

Methods of reducing GHG emissions from solid waste are to reduce the amount of organic material going to landfill (including through the use of waste to energy projects, recycling and composting), and to capture the methane produced in the landfill for burning.

Many cities currently have waste diversion goals of 80%, including the diversion of an even greater percentage of organic waste. Waste diversion of this magnitude would significantly reduce future methane emissions from this waste. (Note that waste that is already in the landfill will continue to produce methane even if this level of waste diversion is achieved.)

Greater than 90% recovery of methane can be achieved at landfills with final cover and an efficient gas extraction system.[66]

Actions:

- **Investigate the costs and benefits of waste diversion and landfill gas capture within the context of all City of St. Albert waste management objectives. (Includes the consideration of waste management alternatives such as composting, recycling, anaerobic digestion, incineration, and landfill gas capture.)**
- **Consider ways to encourage GHG reductions in waste collection activities when contracts are renewed in 2014.**

4.7 Community action planning

Action Planning for the Provincial Electricity Grid

Action	Level of effort / budget	Timeline	Funding Sources
Work with other municipalities to engage the provincial government to develop policies that shift the make-up of Alberta's electricity grid from primarily coal-fired power plants to a greater percentage of natural gas and wind power plants.	Less than $50,000	Short-term 2013-2014	Internal

Action Planning for Community Design

Action	**Level of effort / budget**	**Timeline**	**Funding Sources**
Remove barriers to developing compact, mixed use, transit-oriented neighbourhoods.	Less than $50,000	Short-term 2013-2014	Internal
Increase transit service in 'high use' areas.	To be determined based on increases in use and growth of transit services	Short-term 2013-2014	Internal Provincial GreenTRIP
Increase the quality of public spaces and infrastructure in compact neighborhoods to encourage uptake of units in these areas.	To be determined based on goals outlined in City's open space guidelines	Ongoing	Internal
Continue regional planning with neighbouring communities through the Capital Region Board.	Less than $50,000	Ongoing	Existing budget
Continue to encourage employers to locate in St. Albert to increase local employment available and reduce commuter traffic	Less than $50,000	Ongoing	Existing budget
Provide incentives to buying / building in compact, mixed-use, transit-oriented neighbourhoods, and using transit.	Depends on program design	Long-term Beyond 2016	Internal
Introduce parking policies that encourage the use of transit, walking and cycling such as paid parking and reducing the number of parking spaces per development.	Less than $50,000	Long-term Beyond 2016	Existing budget
Discuss targets for increasing densities, walking, cycling and transit use during the next review of the MDP, TMP, and in work with the Capital Region Board.	Less than $50,000	Ongoing	Existing budget
Make changes to approval processes to increase densities, mixture of uses, walking, cycling and transit use within our city.	Less than $50,000	Following MDP update	Existing budget

Action Planning for Energy Efficiency and Conservation

Action	Level of effort / budget	Timeline	Funding Sources
Explore options for introducing a consumer feedback system.	Less than $50,000	Short-term 2013-2014	Internal FCM Green Municipal Fund
Work with others to engage the Provincial Government regarding energy efficiency standards for new buildings.	Less than $50,000	Short-term 2013-2014	Existing budget
Introduce an energy efficiency checklist for new developments (to raise awareness of energy efficiency opportunities).	Less than $50,000	Medium-term 2015-2016	Internal
Develop a home retrofit program to make it easy for homeowners to undertake cost-effective upgrades prior to sale and demonstrate the ability to pass the cost onto buyers.	Over $100,000	Medium-term 2015-2016	Internal Provincial government
Host energy management training for local organizations.	Less than $50,000	Medium-term 2015-2016	Internal Part of another program
Provide incentives for energy efficient equipment, buildings and/or energy managers for large facilities.	Over $100,000	Medium-term 2015-2016	Internal Provincial government
Introduce bylaws requiring minimum energy efficiency standards for new buildings and / or at the time of sale of existing buildings.	Less than $50,000	Long-term Beyond 2016	Internal FCM Green Municipal Fund

Action Planning for Distributed Energy

Action	Level of effort / budget	Timeline	Funding Sources
Remove barriers to distributed energy.	Depends on barrier	Medium-term 2015-2016	Internal
Design new neighbourhoods to take advantage of free heat from the sun.	Less than $50,000	Short-term 2013-2014	Internal FCM Green Municipal Fund
Identify areas with good district energy potential.	Less than $50,000	Medium-term 2015-2016	Internal FCM Green Municipal Fund
Provide incentives for distributed generation.	$$$	Medium-term 2015-2016	Internal Provincial government
Require all new buildings with solar access to be built ‘solar-ready’.	Less than $50,000	Long-term Beyond 2016	Internal FCM Green Municipal Fund
Introduce a bylaw requiring on-site energy generation for large buildings.	Less than $50,000	Long-term Beyond 2016	Internal FCM Green Municipal Fund
Introduce a bylaw requiring district energy for new developments where it is currently economically feasible.	Less than $50,000	Long-term Beyond 2016	Internal FCM Green Municipal Fund

Action Planning for Vehicle Efficiency and Fuel Type

Action	Level of effort / budget	Timeline	Funding Sources
Work with fleets on fuel management programs.	Less than $50,000	Ongoing	Internal
Provide incentives and disincentives for efficient vehicles, alternative fuels or idle reduction technologies. Incentives could also include preferred parking for hybrid and electric vehicles, and public charging stations.	Depends on program design	Medium-term 2015-2016	Internal Provincial government
Encourage, incent and eventually require plug-ins for loading docks, truck stops and garages.	Depends on program design	Medium-term 2015-2016	Internal Provincial government

Action Planning for Waste Diversion and Landfill Gas Capture

Action	Level of effort / budget	Timeline	Funding Sources
Investigate the costs and benefits of waste diversion and landfill gas capture within the context of all City of St. Albert waste management objectives. (Includes the consideration of waste management alternatives such as composting, recycling, anaerobic digestion, incineration, and landfill gas capture.)	Less than $50,000	Short-term 2013-2014	Existing budget
Consider ways to encourage GHG reductions in waste collection activities when contracts are renewed in 2014.	Less than $50,000	Short-term 2013-2014	Existing budget

5.0 Progress indicator options

An indicator is a measure that reveals a state or a trend from ongoing data collection. It can help to reveal progress toward a desired direction as well as opportunities for improvement. Combining indicator reporting with an action planning cycle helps to ensure that timely knowledge informs effective actions.

Numerous indicators can be used to track progress and so it is important to select a reasonable set. The ideal criteria for indicators includes:

- Somewhat under the influence of the City and Community
- Meaningful
- Measurable with available data
- Affordably measured
- Easier to understand
- Comparable
- Valid for the outcome you are trying to measure

In order to track the progress of the major strategies suggested in this plan, the City will continue to update the community and corporate GHG inventory and begin to track a series of secondary indicators for both corporate operations and the community.

5.1 Corporate indicators

Indicators to include in annual monitoring and reporting are listed below in Table 2.

Table 2: Corporate GHG reduction strategy indicators

Corporate Indicator	Measurement Details and Options	Rationale	Data Source
Primary Indicator			
Total corporate GHG emissions	Suggest reporting the total, and continue to provide breakouts by sector and source. It would also be useful for communication purposes to normalize the results using per capita.	In order to stabilize concentrations of GHG in the atmosphere the total amount needs to drop. Focusing only on per capita emission reductions will not lead to total reductions.	City of St. Albert, consumption and billing data provided by Fortis and ATCO
Departmental total GHG emissions and GHG intensity	GHG emissions/energy use/energy costs for each municipal department as coded from accounts	Helps to assign responsibility and therefore action. City GHG targets are based on absolute GHG. Some departments might be growing and providing more services.	City of St. Albert, consumption data provided by Fortis and ATCO
Departmental total energy use and intensity	GJ used for each municipal department as coded from accounts Possible denominators could include: departmental budgets or total population served	Culture of linking energy use to dollars saved. Helps to assign responsibility and therefore action. Focuses on energy efficiency actions to drive GHG reductions.	City of St. Albert, consumption data provided by Fortis and ATCO
Departmental total energy spending and intensity	Dollars spent on energy for each municipal department as coded from accounts. Possible denominators could include: departmental budgets or total population served	Dollars are a unit that everyone can understand. Dollars and cost savings are a part of the current culture. Helps to assign responsibility and therefore action. Focuses on energy efficiency actions to drive GHG reductions.	City of St. Albert, consumption and billing data provided by Fortis and ATCO
Secondary department specific indicators			
Water GHG/energy/$ intensity	GHG/energy/$ from water and wastewater systems per volume of water treated	Water and sewage distribution/collect represent a large component of City emissions. Some departments might be growing and providing more services.	City of St. Albert, Public Works, consumption and billing data provided by Fortis and ATCO
Building GHG/energy intensity	Top ten consuming facilities per square meter	Buildings represent the largest source or emissions. Provides information for asset manager. Some departments might be growing and providing more services.	City of St. Albert, Public Works, consumption and billing data provided by Fortis and ATCO
Vehicle fleet GHG/ energy intensity	Total per vehicle km travelled	Vehicles represent the second largest source or emissions. Provides performance information for asset manager. Some departments might be growing and providing more services.	City of St. Albert, Public Works, consumption and billing data provided by Fortis and ATCO
Street light GHG/ electricty intensity	Total per street light	Provides information for asset manager. Some departments might be growing and providing more services.	City of St. Albert, Public Works, Consumption and Billing data provided by Fortis and ATCO

5.2 Community indicators

Indicators to include in annual monitoring and reporting are listed below in Table 3.

Table 3: Community GHG reduction indicators

Community Indicator	Measurement Details and Options	Rationale	Data Source
Primary Indicator			
Total community GHG emissions	Suggest reporting the total, and continue to provide breakouts by sector and source. It would also be useful for communication purposes to normalize the results per capita.	In order to stabilize concentrations of GHG in the atmosphere the total amount needs to drop. Focusing only on per capita emission reductions will not lead to total reductions.	City of St.Albert, consumption and billing data provided by Fortis and ATCO
Secondary Indicators			
Residential density	Density of dwelling units per net residential hectare, might be possible to break out new vs. existing neighbourhoods.	Increased density supports the potential for district energy applications and transit service.	City of St. Albert Planning
Housing diversity	This can be reported as total numbers or mix of unit types as is currently done, or amalgamated into one diversity index. Might be possible to break out new vs. existing neighbourhoods.	St. Albert is primarily made up of detached residential dwellings, other housing types tend to use less energy and provide more affordable options.	City of St. Albert Planning
Local workforce	Proportion of the workforce that works in St. Albert.	A significant amount of emissions comes from residents needing to travel to work. More people working in St. Albert results in a potentially higher commercial/industrial tax base	City of St. Albert, Statistics Canada
Proximity to transit	Proximity of dwellings to quality transit stops, or proportion if dwellings within 400m of quality transit.	Mass transit is one of the most significant means to reduce GHG emissions. A higher number may also correlate with increased density and ridership.	City of St. Albert
Energy efficient buildings	Proportion of new units built to an energy efficiency standard. These results could be broken out by commercial and residential.	Buildings represent a significant source of GHG emissions. New buildings are great cost-effective opportunities to implement efficiency initiatives.	City of St. Albert Planning or Building Services, Canadian Home Builders Association.
Transit ridership	Transit ridership is already measured, but it might be useful to make it a per capita measure to give some perspective on the uptake of transit.	Mass transit is one of the most significant means to reduce GHG emissions.	City of St. Albert
Registered vehicles	Registered passenger use vehicles per capita and perhaps broken out by other variations like gasoline vs. diesel.	Vehicles are one of the largest sources of emissions in St. Albert.	Alberta license registration data
Building energy/GHG intensity	Energy use/GHG per unit of floor space, for commercial and residential buildings.	This indicator will help to assess the efficiency improvements in dwellings.	City of St. Albert, Assessment Authority, consumption and billing data provided by Fortis and ATCO
Green electricity	Proportion of building energy use from green energy retailers.	Green energy is one of the fastest and most effective ways to reduce GHG emissions from buildings.	Green energy retailers, Fortis
On-site renewables	Number of dwellings with access to on-site renewable energy system like fireplaces, solar thermal or voltaic.		City of St. Albert building permits

Glossary of terms

CCS – Carbon Capture and Storage – capturing carbon dioxide from power plants or very large industrial facilities and sequestering it underground.

Cogeneration – generating electricity and heat at the same facility; the heat is used within the facility or in a nearby application.

Consumer Feedback System – providing consumers with detailed information about their energy use; e.g., through power bills or an online system

Combined Cycle Power Plant – uses both a gas turbine and a steam turbine to generate electricity; highly efficient way of generating electricity, but not as efficient as a cogeneration plant

Distributed Energy – small-scale energy generation systems; e.g., photovoltaics (PV), solar water heaters, ground source heat pumps, cogeneration plants, district energy, passive solar heating

Energy Labelling – a label on a product that indicates its relative energy usage; e.g. EnerGuide labels on appliances.

Greenfield – an urban or industrial development on a site that was previously an agricultural or natural area.

MDP – Municipal Development Plan – the City's highest-level strategy for land development.

Photovoltaic – generates electricity from sunlight

Single Cycle Power Plant – uses only one type of turbine as opposed to the combined cycle plants that use multiple turbines; least efficient of power plants, but also the lowest cost to build

Solar Ready – new buildings are built so solar panels can be easily added to roofs; typically involves installing a conduit from the roof to the electrical and mechanical room.

Transfer of Development Credits – a system where areas to be developed need to purchase 'credits' from areas that are to be left undeveloped; this spreads the profits of land development over a larger number of land owners while keeping the total amount of land developed low.

TMP – Transportation Master Plan – the City's highest-level strategy for development of St. Albert's transportation system.

Appendix

Stakeholder Engagement Workshops

The purpose of the City Staff and Environmental Advisory Committee Workshops was to gather input on selection of approaches for reducing GHG emissions – both corporate and community – as well as to identify timeline, responsibilities and confirm orders of magnitude costs for each selected option. The City Staff workshop was conducted on February 26, 2013 and the EAC workshop was held on March 28, 2013.

A preliminary background report that included a snapshot of the current emission reduction projects, challenges and opportunities was provided to participants for reviewing prior to their respective workshops.

The workshops provided a visual snapshot of the situation analysis including the identified gaps and opportunities, current GHG sources as well as a process to select and prioritize ideas for GHG reduction initiatives.

The approaches for GHG reductions were compiled from existing City initiatives, leading practices from other communities, and new ideas brainstormed from the groups during the workshops. All the actions for each of the corporate and the community plan were presented according to the type of approach and included key considerations as well as icons representing the timing, ease of implementation and significance of the GHG reduction.

Figure 23: Example of situation analysis – Corporate GHG Emissions by Sector

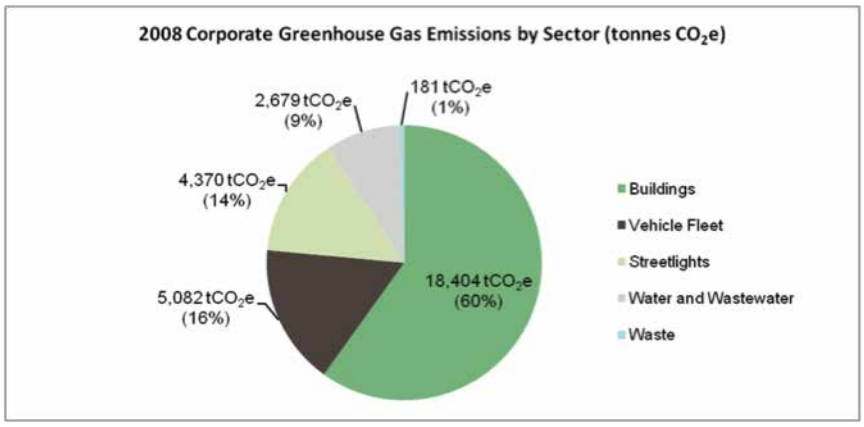
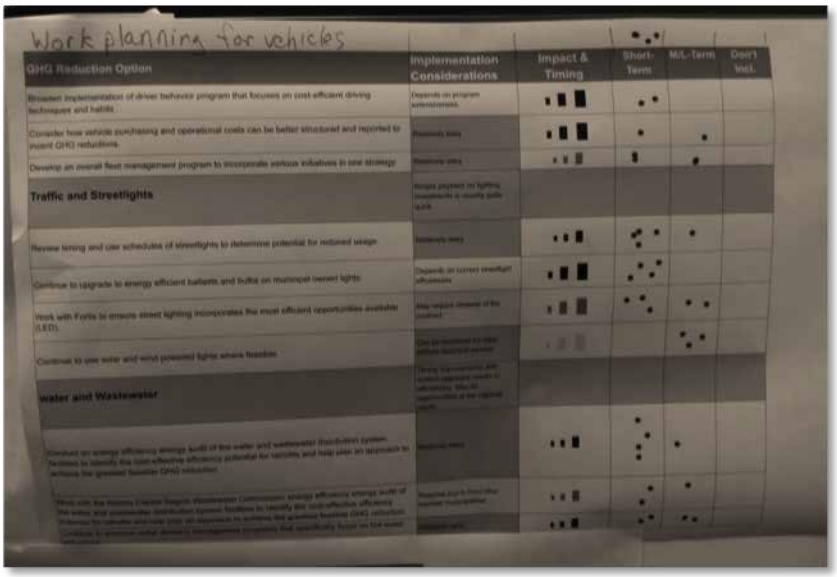


Figure 24: Example of recommended approaches and participant voting



After a brief summary of all the various approaches, participants were provided the opportunity to make specific recommendations on the inclusion and logical timing for the approaches.

Workshop notes and preferences for the various GHG reduction approaches are included for reference below.

The feedback gathered from these workshops made a valuable contribution to the recommendations in the final report.

City Staff Workshop #1 – February 26, 2013

Flipchart vision and opportunities notes

Corporate Vision Ideas

- Purchase green energy
- Only buses allowed
- Carpooling everywhere
- Sensors and controls pervasive
- 60% of workforce works in St. Albert
- Invest in energy generation capacity – solar, nuclear?
- New civic buildings incorporating new ways of doing things
- Geothermal/solar more pervasive
- Electronics, very efficient with controls to turn them off e.g. monitors
- Building a conservation culture, games, prizes, challenges between departments
- Funding to help the transition

Activities in 2013 – Opportunities for GHG reductions

- Purchasing policy
- Bus purchases in 2014
- Utilities master plan
- Transportation master plan

Community Vision Ideas

- All furnaces and water tanks – energy efficient
- Active transportation – walk and bike
- Mass transit improvements – trains, redevelopment transit corridor
- Wind power; mass transit
- 90-100% of people work in St. Albert, no need to for big commutes and transit

Activities in 2013- Opportunities for GHG reductions

- More development in the next five years – may increase emissions. Opportunity for more efficient building
- Light industrial area opportunity
- Park and ride facility to support mass transit
- Community sustainability policy – help to engage citizens
- MDP 2015 rewrite.
- Implementation of downtown plan opportunities

City GHG Reduction Approaches for Consideration

GHG Reduction Option	Implementation Considerations	Impact (increases over time) Large = bigger impact Black = more certain	Participant Votes Regarding Timing		
			Short-Term	Mid to Long-Term	Don't Include
Building and Industrial Energy Efficiency Audits and Retrofits	Typically saves more money than it costs				
Continue to conduct energy efficiency audits to identify cost-effective retrofits and plan approach to improving building efficiency	Relatively easy		9		
Conduct energy audit to identify sources of waste heat and potential re-use applications	Relatively easy, but waste heat projects still somewhat uncommon		9		
Commission a study to determine whether District Heating would offer significant benefit to the City	Requires moderate investment; best fit with a large new development		1	1	
Conduct benchmarking of all existing corporate buildings, monitoring and reporting energy use to users	Relatively easy		7		
Consider how building energy operational costs can be better structured and shared to incent GHG reductions	Relatively easy		4		
Pilot a behavioral campaign in one department or sector aimed at achieving organizational GHG environmental objectives	Requires resources and support from organizational leadership		2		
Benchmark municipal building energy use on the MCCAC municipal benchmarking program	Relatively easy		4		
Vehicle Fleet	Most efficiency approaches save more than they cost, low carbon fuels cost impacts are less known				
Formalize the vehicle purchasing policy to assess vehicle needs and ensure high-efficiency vehicles are selected for purchase	Requires resources and support from organizational leadership		5		
Re-investigate the use of low carbon fuel alternatives for the City fleet, especially natural gas	Relatively easy		4		
Continue to ensure that vehicles are maintained in order to ensure peak operating efficiency	Relatively easy if not already being done		4		
Implement a driver behavior program that focuses on cost-efficient driving techniques and habits	Depends on program extensiveness		10	1	
Consider how vehicle purchasing and operational costs can be better structured and reported to incent GHG reductions	Relatively easy		1	1	
Develop an overall fleet management program to incorporate various initiatives in one strategy	Relatively easy		3		

GHG Reduction Option	Implementation Considerations	Impact (increases over time) Large = bigger impact Black = more certain	Participant Votes Regarding Timing		
			Short-Term	Mid to Long-Term	Don't Include
Street lights	Simple payback on lighting investments is usually quite quick				
Review timing and use schedules to determine potential for reduced usage	Relatively easy		5	2	
Continue to energy efficient ballasts and bulbs on municipal-owned lights	Depends on current street light efficiencies		5	2	
Work with Fortis to ensure street lighting incorporates the most efficient opportunities available (LED)	May require renewal of the contract		3	1	
Investigate opportunities to pilot wind and solar street lights	Can be beneficial for sites without electrical service		5		
Water and Wastewater	Timing improvements with system upgrades results in efficiencies. May be opportunities at the regional plants				
Conduct an energy efficiency energy audit of the water and wastewater distribution system facilities to identify the cost-effective efficiency potential for retrofits and help plan an approach to achieve the greatest feasible GHG reduction	Relatively easy		5		
Work with the Alberta Capital Region Wastewater Commission energy efficiency energy audit of the water and wastewater distribution system facilities to identify the cost-effective efficiency potential for retrofits and help plan an approach to achieve the greatest feasible GHG reduction	Requires buy-in from other member municipalities			3	
Continue to advance water demand management programs that specifically focus on hot water reductions	Relatively easy			3	
Distributed Energy	The overall cost of distributed generation compared with conventional energy depends on the energy source and application				
Investigate opportunities to implement renewable energy generation building and facility energy audits	Relatively easy		2	5	

GHG Reduction Option	Implementation Considerations	Impact (increases over time) Large = bigger impact Black = more certain	Participant Votes Regarding Timing		
			Short-Term	Mid to Long-Term	Don't Include
Green Procurement	Increase in purchasing costs depends on the application, but GHG reductions from efficiency gains would cost less than gains from renewable energy				
Develop a green procurement policy to control the purchasing of products, services, and contractors to reduce upstream GHG emissions	Requires political will		6		
Investigate the feasibility of purchasing green power for City operations during the next electricity contract renewal	Relatively easy		2		
Carbon Fund and Offsets	Local GHG reduction efforts may help your reductions more in the long-run than purchasing offsets from distant sources; a balance is possible				
Investigate the potential for purchasing carbon offsets to compensate for City emissions after direct emission reduction actions are undertaken	Requires dedication of resources and political support				1
Establish a carbon fund to establish a price on emissions and combine the with the energy efficiency budget and distribute that revenue directly to emission reduction projects	Requires stakeholder and public support to be implemented; may depend on other actions			2	1
Educate public about policy, energy types/use so they support City initiatives	Relatively easy		1		

Community GHG Reduction Approaches for Consideration

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Provincial Electricity Grid	Level of GHG reduction and impact on electricity price depends on policy design				
Work with others to engage the provincial government to develop policies that shift the make-up of Alberta's electricity grid from primarily coal-fired power plants to a greater percentage of natural gas and wind-based power plants	Relatively easy for the City to undertake		3	3	
Community Design	Communities with lower energy use also tend to have reduced overall costs for municipality and commuters				
Discuss setting targets for increasing densities, walking, cycling and transit use during the next review of the MDP and TMP	The discussion is relatively easy for the City to undertake during the next review of the MDP and TMP			7	
Shift funding from roads to transit	Can reduce overall costs for municipality and commuters. Ease of implementation depends on level of shift		1		6
Remove barriers to developing compact, mixed use, transit-oriented neighbourhoods	Ease of implementation depends on barriers		1	3	
Provide incentives to buying / building in compact, mixed-use, transit-oriented neighbourhoods, and using transit	Requires significant budget and new implementation mechanisms		2	1	
Introduce parking policies that encourage the use of transit, walking and cycling	Requires political will		2		
Increase the quality of public spaces and infrastructure	Requires significant budget and changes to City processes		1		
Introduce a system to allow transfer of development credits	Can help distribute economic benefits of development among a larger number of landowners and reduce demand for greenfield development. Requires time to establish			1	
Make changes to the approval processes to increase densities, mixture of uses, walking, cycling and transit use within the city	Requires stakeholder and public support; and changes to City processes		2		
Continue regional planning with neighbouring communities	Depends on political atmosphere		4	3	
Building and Industrial Energy Efficiency and Conservation	Typically saves more money than it costs.				
Explore options for introducing a consumer feedback system	Relatively easy for the City to work with others to explore this option				
Introduce an energy efficiency checklist for new developments (to raise awareness of energy efficiency opportunities)	Requires political will		1	2	

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Develop a home retrofit program to make it easy for homeowners to undertake cost-effective upgrades prior to sale and demonstrate the ability to pass the cost onto buyers	Requires significant budget and new implementation mechanisms		3	1	
Host energy management training for local organizations	Relatively easy to undertake, but unknown level of impact		1	2	
Provide incentives for energy efficient equipment, buildings and/or energy managers for large facilities	Requires significant budget, but implementation mechanisms already exist			2	
Require energy labelling for detached and semi-detached houses at time-of-sale once sufficient stakeholder and public support has been built	Requires stakeholder and public support to be built. May require other actions to be undertaken to build this support		4		
Introduce bylaws requiring minimum energy efficiency standards for new buildings and / or at time of sale of existing buildings	Requires stakeholder and public support to be built. May require other actions to be undertaken to build this support			3	1
Distributed Generation	The overall cost of distributed generation compared with conventional energy depends on the energy source and application				
Remove barriers to distributed energy	Ease of implementation depends on the barriers		1		
Design new neighbourhoods to take advantage of free heat from the sun	Very cost-effective way to reduce energy use, but would require changes to how neighbourhoods are designed		1	2	
Identify areas with good district energy potential	Relatively easy for the City to identify areas where large, medium to high density new developments are expected		2	1	
Provide incentives for distributed generation	Requires significant budget, but implementation mechanisms already exist			2	
Require all new buildings with solar access to be built 'solar-ready'	Requires stakeholder and public support to be built		5		
Introduce a bylaw requiring on-site energy generation for large buildings	Requires stakeholder and public support to be built – may require other actions to be undertaken to build this support				
Create a municipal district energy and cogeneration system	Requires significant investment and a suitable location (e.g. a new development with large heat demands)				
Introduce a bylaw requiring district energy for new developments where it is currently economically feasible	Requires stakeholder and public support to be built – may require other actions to be undertaken to build this support				

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Vehicle Efficiency and Fuel					
Work with fleets on fuel management programs	Relatively easy for the City to host meetings with fleet operators				
Provide incentives for efficient vehicles, alternative fuels or idle reduction technologies	Requires significant budget and new implementation mechanisms		1		
Encourage, incent and eventually require the electrification of loading spaces, truck stops and garages	Requires dedication of resources and eventual stakeholder buy-in		1		
Waste Diversion and Landfill Gas Capture					
Investigate the costs and benefits of waste diversion and landfill gas capture within the context of all City of St. Albert waste management objectives	Relatively easy to include in waste management planning			3	
Consider ways to encourage GHG reductions in waste collection activities when contracts are renewed in 2014	Relatively easy		3		

Environmental Advisory Committee Workshop #1 – February 26, 2013

Corporate GHG Reduction Approaches for Consideration

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Building and Industrial Energy Efficiency Audits and Retrofits	Typically saves more money than it costs.				
LEED Required/Green Building Policy			3	3	
Increase greenspace				2	
Continue to conduct energy efficiency audits to identify cost-effective retrofits and plan approach to improving building efficiency.	Relatively easy		5		
Conduct energy audit to identify sources of waste heat and potential re-use applications.	Relatively easy, but waste heat projects still somewhat uncommon			4	
Commission a study to determine whether District Heating would offer significant benefit to the City.	Requires moderate investment. Best fit with a large new development.				5
Conduct benchmarking of all existing corporate buildings, monitoring and reporting energy use to users.	Relatively easy		5		
Consider how building energy operational costs can be better structured and shared to incent GHG reductions.	Relatively easy		1		
Pilot a behavioral campaign in one department or sector aimed at achieving organizational GHG environmental objectives.	Requires resources and support from organizational leadership			4	
Benchmark municipal building energy use on the MCCAC municipal benchmarking program.	Relatively easy		2	1	
Vehicle Fleet	Most efficiency approaches save more than they cost, low carbon fuels cost impacts are less known				
Formalize the vehicle purchasing policy to assess vehicle needs and ensure high-efficiency vehicles are selected for purchase.	Requires resources and support from organizational leadership		3	1	
Re-investigate the use of low carbon fuel alternatives for the City fleet, especially natural gas.	Relatively easy		3	2	
Continue to ensure that vehicles are maintained in order to ensure peak operating efficiency.	Relatively easy if not already being done		3		

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Work planning for vehicles			3		
Broaden implementation of driver behavior program that focuses on cost-efficient driving techniques and habits .	Depends on program extensiveness		2		
Consider how vehicle purchasing and operational costs can be better structured and reported to incent GHG reductions.	Relatively easy		1	1	
Develop an overall fleet management program to incorporate various initiatives in one strategy.	Relatively easy		2	2	
Traffic and Streetlights	Simple payback on lighting investments is usually quite quick				
Review timing and use schedules of streetlights to determine potential for reduced usage.	Relatively easy		4	1	
Continue to upgrade to energy efficient ballasts and bulbs on municipal owned lights.	Depends on current streetlight efficiencies		4		
Work with Fortis to ensure street lighting incorporates the most efficient opportunities available (LED).	May require renewal of the contract		3	2	
Continue to use solar and wind powered lights where feasible.	Can be beneficial for sites without electrical service			3	
Water and Wastewater	Timing improvements with system upgrades results in efficiencies. May be opportunities at the regional plants.				
Conduct an energy efficiency energy audit of the water and wastewater distribution system facilities to identify the cost-effective efficiency potential for retrofits and help plan an approach to achieve the greatest feasible GHG reduction.	Relatively easy		4	1	
Work with the Alberta Capital Region Wastewater Commission energy efficiency energy audit of the water and wastewater distribution system facilities to identify the cost-effective efficiency potential for retrofits and help plan an approach to achieve the greatest feasible GHG reduction.	Requires buy-in from other member municipalities		2	1	
Continue to advance water demand management programs that specifically focus on hot water reductions.	Relatively easy		2	2	

Community GHG Reduction Approaches for Consideration

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Distributed Energy	The overall cost of distributed generation compared with conventional energy depends on the energy source and application.				
Investigate opportunities to implement renewable energy generation building and facility energy audits.	Relatively easy			4	
Green Procurement	Increase in purchasing costs depends on the application, but GHG reductions from efficiency gains would cost less than gains from renewable energy.				
Continue to develop a green procurement policy to control the purchasing of products, services, and contractors to reduce upstream GHG emissions .	Requires political will		6		
Investigate the feasibility of further purchasing green power for City operations during the next electricity contract renewal .	Relatively easy		2	3	
Carbon Fund and Offsets	Local GHG reduction efforts may help your reductions more in the long-run than purchasing offsets from distant sources. A balance is possible.				
Investigate the potential for purchasing carbon offsets to compensate for City emissions after direct emission reduction actions are undertaken.	Requires dedication of resources and political support		1		4
Establish a carbon fund to establish a price on emissions and combine the with the energy efficiency budget and distribute that revenue directly to emission reduction projects.	Requires stakeholder and public support to be implemented; may depend on other actions				4

Community GHG Reduction Approaches for Consideration

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Provincial Electricity Grid	Level of GHG reduction and impact on electricity price depends on policy design				
Work with others to engage the provincial government to develop policies that shift the make-up of Alberta's electricity grid from primarily coal-fired power plants to a greater percentage of natural gas and wind-based power plants.	Relatively easy for the City to undertake. Part of Calgary and Edmonton action on energy.		4	1	
Community Design	Communities with lower energy use also tend to have reduced overall costs for municipality and commuters				
Discuss setting targets for increasing densities, walking, cycling and transit use during the next review of the MDP, and TMP , and in work with the Capital Region Board.	The discussion is relatively easy for the City to undertake during the next review of the MDP and TMP			4	
Increase transit service in high-use areas.	Typically requires notable budget increases		5		
Continue to encourage employers to locate in St. Albert	Depends on the type of encouragement undertaken		3	3	
Remove barriers to developing compact, mixed use, transit-oriented neighbourhoods	Ease of implementation depends on barriers		2	2	
Provide incentives to buying / building in compact, mixed-use, transit-oriented neighbourhoods, and using transit.	Requires significant budget and new implementation mechanisms		1	2	
Introduce parking policies that encourage the use of transit, walking and cycling such as paid parking and reducing the number of parking spaces per development.	Requires political will		1	4	
Increase the quality of public spaces and infrastructure in compact neighborhoods to encourage uptake of units in these areas.	Requires significant budget and changes to City processes		4	1	
Introduce a system to allow transfer of development credits.	Requires time to establish				4
Make changes to the approval processes to increase densities, mixture of uses, walking, cycling and transit use within the city.	Requires stakeholder and public support; and changes to City processes		1	2	

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Continue regional planning with neighbouring communities through the Capital Region Board.	Depends on political atmosphere		2	1	
Building and Industrial Energy Efficiency and Conservation	Typically saves more money than it costs				
Explore options for introducing a consumer feedback system.	Relatively easy for the City to work with others to explore this option		5		1
Introduce an energy efficiency checklist for new developments (to raise awareness of energy efficiency opportunities).	Requires political will		1	3	
Develop a home retrofit program to make it easy for homeowners to undertake cost effective upgrades prior to sale and demonstrate the ability to pass the cost onto buyers.	Requires significant budget and new implementation mechanisms		1	2	1
Host energy management training for local organizations.	Relatively easy to undertake, but unknown level of impact		2	3	
Provide incentives for energy efficient equipment, buildings and/or energy managers for large facilities.	Requires significant budget, but implementation mechanisms already exist		2	2	
Require energy labelling for detached and semi-detached houses at time-of-sale once sufficient stakeholder and public support has been built.	Requires stakeholder and public support to be built. May require other actions to be undertaken to build this support.			2	4
Introduce bylaws requiring minimum energy efficiency standards for new buildings and / or at time of sale of existing buildings.	Requires stakeholder and public support to be built. May require other actions to be undertaken to build this support.		1	1	3
Work with others to engage the province on Buildings			4		
Distributed Generation(i.e. Solar PV, Solar waterheating, biomass, geothermal, co-generation)	The overall cost of distributed generation compared with conventional energy depends on the energy source and application				
Remove barriers to distributed energy.	Ease of implementation depends on the barriers			1	1
Design new neighbourhoods to take advantage of free heat from the sun.	Very cost effective way to reduce energy use, but would require changes to how neighbourhoods are designed		1		1

GHG Reduction Option	Implementation Considerations	Impact & Timing	Short-Term	M/L-Term	Don't Incl.
Identify areas with good district energy potential.	Relatively easy for the City to identify areas where large, medium to high density new developments are expected			4	
Provide incentives for distributed generation.	Requires significant budget, but implementation mechanisms already exist		1	3	
Require all new buildings with solar access to be built 'solar-ready'.	Requires stakeholder and public support to be built			3	1
Introduce a bylaw requiring on-site energy generation for large buildings.	Requires stakeholder and public support to be built. May require other actions to be undertaken to build this support.			4	1
Create a municipal district energy and cogeneration system.	Requires significant investment and a suitable location (e.g. a new development with large heat demands)				4
Introduce a bylaw requiring district energy for new developments where it is currently economically feasible.	Requires stakeholder and public support to be built. May require other actions to be undertaken to build this support.			4	1
Vehicle Efficiency and Fuel					
Work with fleets on fuel management programs.	Relatively easy for the City to host meetings with fleet operators		4	1	
Provide incentives for efficient vehicles, alternative fuels or idle reduction technologies. Incentives could also include preferred parking for hybrid and electric vehicles, and public charging stations.	Requires significant budget and new implementation mechanisms		3	4	
Encourage, incent and eventually require the plug-ins for loading docks, truck stops and garages.	Requires dedication of resources and eventual stakeholder buy-in			2	2
Waste Diversion and Landfill Gas Capture					
Investigate the costs and benefits of waste diversion and landfill gas capture within the context of all City of St. Albert waste management objectives. (Includes the consideration of waste management alternatives such as composting, recycling, anaerobic digestion, incineration, and landfill gas capture.)	Relatively easy to include in waste management planning		3	2	
Consider ways to encourage GHG reductions in waste collection activities when contracts are renewed in 2014.	Relatively easy		6		

Endnotes

1. City of St, Albert GHG Inventory Forecast and Targets, 2010 Final Report
2. City of St, Albert GHG Inventory Forecast and Targets, 2010 Final Report
3. Row, et. al. 2012. *Edmonton's Energy Transition Discussion Paper* – Appendix A.
4. Environment Canada. 2013. *Reducing Canada's greenhouse gas emissions: Target 1.1: Climate Change Mitigation – Relative to 2005 emission levels, reduce Canada's total greenhouse gas emissions 17% by 2020.* http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=AD1B22FD-1
5. City of St. Albert Census, 2010
6. 2006 Federal Census, Community Profiles, Statistics Canada
7. City of St. Albert, Water Conservation, Efficiency and Productivity Plan (2012), 22. http://www.stalbert.ca/uploads/files/WaterConservationReport_FINAL_Rev2_AUG21.pdf
8. 2006 Federal Census, Community Profiles, Statistics Canada
9. "Net residential area" is defined as the land required for residential purposes within a residential neighbourhood. This excludes environmental and municipal reserve, roadways (including local, collector and arterial), public utilities, stormwater management facilities, and commercial, industrial and institutional lands
10. Transportation Master Plan, 2008 and MDP, 2007
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