City of Chilliwack

Integrated Air Quality, Energy and Greenhouse Gas

Corporate Action Plan

Prepared for
City of Chilliwack

Prepared by
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Vancouver, BC

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Summary

The City of Chilliwack has undertaken an integrated air quality, energy and greenhouse gas (GHG) action plan for both its corporate operations and the community as a whole. This document addresses the corporate operations component by:

- Setting a baseline of energy consumption and GHG emissions,
- Defining actions for reducing energy consumption, air emissions and GHG emissions,
- Supporting the City in meeting its commitment to be carbon neutral in municipal operations as part of the Climate Action Charter,
- Identifying reduction targets for the implementation of the plan, and
- Supporting the City in minimizing its impact on local air quality.

Corporate Energy and GHG Emissions: 2010

In 2010 the City's corporate (i.e. municipal operations) energy profile was:

- Consumption of 163,744 GJ of energy,
- Energy purchases of $3,000,000,
- Resulting carbon (GHG) emissions of 4,387 tonnes.

Energy and GHG Emission Reduction Target

As a sign of commitment to best energy practices, it is proposed that the City set a target:

- *To reduce energy consumption by 10 % over 5 years (2012 - 2017), with associated reductions in greenhouse gas emissions reductions of 15 %.*

Key Actions for Meeting the Target

In order to reduce energy consumption to the target level, the City will undertake a range of actions. The key actions that will result in the greatest reductions include:

- Alternative energy evaluations and retrofits for buildings in the Chilliwack Landing area (e.g. potential energy integration for Chilliwack Landing Leisure Centre, Cultural Centre, Prospera Centre, Chilliwack General Hospital, etc.),
- Completion of retrofits on other municipal buildings (based on previous audits),
- Evaluation of remaining municipal buildings (both owned and leased out) and completion of retrofits,
- Green procurement policies, particularly in relation to fleet vehicles,

- Energy management systems for the fleet, and
- Use of life cycle costing and green building practices for new facilities and major renovations.

Summary Listing of Corporate Actions

Corporate Action 1: Evaluate alternative energy options for the Chilliwack Landing Leisure Centre and Cheam Centre

Corporate Action 2: Finish implementing building audit recommendations and conduct audits on remaining facilities

Corporate Action 3: Evaluate alternative energy options prior to replacing existing heating systems

Corporate Action 4: Develop an energy management program for the fleet

Corporate Action 5: Continue exploring fuels and technologies to reduce emissions from fleet vehicles

Corporate Action 6: Complete conversion of fleet vehicles to LED lights

Corporate Action 7: Capture the energy of the WWTP digester biogas

Corporate Action 8: Explore methods of reducing greenhouse gas emissions at the WWTP through process modifications and biosolids management

Corporate Action 9: Explore opportunities for energy integration (e.g. district energy) in the Chilliwack Landing area

Corporate Action 10: Continuously reduce energy requirements for water and wastewater infrastructure

Corporate Action 11: Evaluate efficient lighting and identify retrofit opportunities

Corporate Action 12: Replace parks equipment for mowing and trimming with cleaner alternatives

Corporate Action 13: Investigate opportunities to reduce energy requirements for sports fields

Corporate Action 14: Develop a Green Procurement Policy

Corporate Action 15: Form a Corporate Green Committee

Corporate Action 16: Develop an Energy Efficiency or Green Building Policy for new municipal buildings

Corporate Action 17: Use life cycle costing for new facilities and major renovations (and alternative energy)

Corporate Action 18: Explore options to reduce road dust

Table of Contents

List of Figures

List of Tables

1 Introduction

1.1 Objectives of this Corporate Action Plan

The corporate plan objectives are to:

- Set a baseline of energy consumption and GHG emissions for municipal corporate operations.
- Define actions for the municipality to implement that will reduce energy consumption, air emissions and GHG emissions for municipal operations.
- Support the City in meeting its commitment to work toward being carbon neutral in municipal operations as part of the Climate Action Charter.
- Support the City in minimizing its impact on local air quality.

1.2 Drivers for Energy Management

Historically, energy costs are a small component of a municipality's operating expenses. Today thought the energy landscape is changing. Electricity costs are forecast to rise substantially in the next few years, gasoline and diesel prices are approaching peak prices not seen since 2008, and natural – while currently at a low price – has experienced some dramatic price swings in the past decade. All energy consumers should be preparing themselves for continued uncertainty and volatility in energy costs.

Many local governments have taken formal steps to manage their energy costs. The benefits of energy management include:

- Demonstrating responsible use of tax payer funds;
- Reducing financial uncertainty to the municipality by reducing exposure to volatile or rising energy prices;
- Leveraging municipal investments with incentive or grant funding for municipal facilities;
- Providing an example to the community of a best practices operator;
- Reducing the environmental footprint of the local government through reduced emissions of carbon and air contaminants; and
- Demonstrating co-benefits for air quality that can be achieved with energy management.

1.3 Climate Action Charter Commitment

The BC **Climate Action Charter** is a voluntary provincial-municipal initiative to encourage local governments to reduce their energy use and 'carbon footprint'. Initiated in 2008, currently 180 local governments have singed the Charter including the City of Chilliwack.

Participating local governments commit to measuring and reporting energy use, taking steps to reduce carbon emissions and reporting on their progress. The Charter – including subsequent

development of the requirements by a joint Provincial- Municipal working group has defined two stages of progress.

- "Making Progress": Communities commit to (i) measuring their energy use and carbon footprint, (ii) taking action to reduce these, and (iii) report on their progress.

- "Carbon Neutrality": Communities commit to the three components of "Making Progress" as well as (iv) procure carbon offsets for any remaining emissions to become carbon neutral.

Signatories to the Charter that have demonstrated either of these stages are eligible to receive the CARIP grant.[1]

1.4 City of Chilliwack Corporate Initiatives

The City has the following initiatives that relate to this corporate plan:

- **Climate Action Charter**: As a signatory to the Climate Action Charter, the City is committed to take voluntary action to reduce its energy consumption and GHG emissions, and to work toward achieving 'carbon neutrality' in its municipal operations.
- **Idle-Free Policy for Municipal Fleet**: In September 2004 council adopted an idle-free policy for the municipal fleet to eliminate unnecessary idling.
- **City Building Energy Retrofits**: The City has been working with Honeywell since 2006 to carry out audits and retrofits to City-owned buildings to improve energy efficiency. This includes installation of programmable thermostats, upgrades to lighting, and upgrades to certain HVAC systems.
- **Fleet Right-Sizing**: In 2008, the City started a fleet right-sizing initiative to ensure the most fuel efficient and cost-effective vehicle is selected for a given application.
- **Tree Planting**: Recognizing the carbon sequestration benefit of trees, the City has a tree planting program, which involves in-house activities plus coordination with outside volunteer groups to plant trees in the community.
- **Lighting**: The City replaced all green and red traffic lights and ornamental Christmas lights with LED bulbs. Most fleet beacon lights have also been replaced with LED.

[1] The Climate Action Revenue Incentive Program (CARIP) provides a grant to each Charter local government in an amount equal to the carbon tax paid directly by the municipality.

2 Corporate Energy and GHG Emissions Inventory and Forecast

2.1 Components of the Inventory

Corporate energy consumption and emissions are those that the local government creates through its activities (and which it has control over) such as municipal building operations, recreation centres, vehicle fleets, and utility services. Emissions and energy consumption in the corporate inventory derive from:

- **Municipal buildings:** Municipal Hall, Public Works facilities, emergency services (Fire and RCMP), recreation and cultural centres.
- **Infrastructure:** services that include water and sewage pumping, street lighting and traffic lighting, and civic facilities such as parks etc.
- **Vehicles and fleets:** fuel consumed by municipal staff in the execution of their service provision. This is almost exclusively gasoline and diesel fuels but also includes propane.

What's a GHG?

Greenhouse gases (GHG) are gases that trap heat in the atmosphere. They include carbon dioxide, water vapour, nitrous oxide, methane and ozone. Humans add GHGs to the air primarily by burning fossil fuels (gasoline, natural gas, oil, etc.) that emit carbon dioxide. Some other human activities, like landfilling solid waste, emit methane.

A tonne of GHG is created when we consume about 385 litres of gasoline (about 10 fill ups).

2.2 Operational Profile

The City of Chilliwack provides services for a population of 82,000. The key facilities and infrastructure operated to deliver services include:

- Buildings: 6 fire halls, a municipal hall, a public works yard, a library, a museum, several parks buildings, buildings at the landfill, and various community service buildings.
- Recreation centres: 3 swimming pools, 2 ice rinks, a curling rink and several sports centres.
- Fleet vehicles: 7 cars, 72 pick-up and light trucks and vans, 27 single and tandem axle trucks, 32 pieces of off-road equipment (e.g. backhoes, graders, loader, sweepers, tractors, excavators), mowers, ATV, forklifts, and approximately 20 pieces of small equipment (e.g. chainsaws, weed eaters). Fire Department vehicles: 16 light trucks and vans and 23 pumpers and tankers.
- Wastewater treatment plant, sanitary sewer lift stations, and sewer pump stations.
- Water reservoirs, booster stations, and wells.
- Street and traffic lighting throughout the City.

2.3 Overview of the 2010 Inventory

For 2010, the total corporate energy consumption is 163,744 gigajoules. This energy spending has a value of over $3,000,000 dollars annually.2

Total GHG emissions subject to Climate Action Charter commitments are 4,487 tonnes of CO2 equivalents.3

Table 1 provides a breakdown of these emissions by operational area; a detailed breakdown is provided in Appendix A. These emissions include facilities owned by the City of Chilliwack that are leased or operated by other organizations.

What's a GJ?

A giga-joule (GJ) is a measure of energy. We buy natural gas in GJ but other energy as kilowatt-hours (electricity) or litres of fuel.

One GJ has the same energy as:

- 25 - 30 litres of diesel or gasoline fuel, or
- Two 20 lb propane tanks, or
- The electricity consumption of a typical house for two weeks, or
- The natural gas use for three days of space and water heating of a typical home.

The inventory is divided into several groups:

- Buildings are the general buildings owned and operated by the City.
- Community / Recreation Centres are recreational facilities. These are highlighted separately from the buildings due to their large energy use profile
- Fire Halls
- Parks includes sports field lighting facilities.
- Water / Sewer includes pumps, lift stations and drainage pumping installations
- Lighting includes street and traffic lighting (both BC Hydro and Chilliwack maintained).
- Fleet includes gasoline and diesel vehicles (does not include personal vehicles used for work purposes)
- Supported Facilities are Chilliwack owned, but operated by others (service groups, museums etc.)
- Unclassified Accounts are a small number of electricity accounts that have vague descriptions that make classification difficult. Almost always they are for various minor

[2] The corporate inventory has been prepared separately from this plan project. The most current data compiled is for the 2010 year.

[3] The BC Charter includes some unique boundaries of scope compared to other reporting protocols. To ensure equity between local governments the Charter includes (i) only "traditional municipal services" (a included a definition), (ii) excludes policing and landfill operations, and (iii) requires services to be reported whether they are delivered by the municipality or contracted out. Full details are available at: http://www.toolkit.bc.ca/sites/default/files/CarbonNeutralWorkbook.V2_noapdcs_03.12_0.pdf

infrastructure services. Typically future inventory updates clarify the category of these accounts.

Table 1: Municipal Operations Energy Consumption and GHG Emissions (2010)

End-Use	Energy	Units of Purchase	Energy (in units purchased)	Energy (as GJ)	GHG Emissions (as CO_2e)	*Approximate* Retail Value ($)
Buildings	Electricity	kWh	6,103,733	21,973	159	$427,000
	Natural Gas	GJ	6,224	6,224	317	$75,000
Community / Recreation Centres	Electricity	kWh	5,870,174	21,133	153	$411,000
	Natural Gas	GJ	24,443	24,443	1,247	$293,000
Fire Halls	Electricity	kWh	713,567	2,569	19	$50,000
	Natural Gas	GJ	1,903	1,903	97	$23,000
Parks	Electricity	kWh	304,025	1,094	8	$21,000
	Natural Gas	GJ	57	57	3	$1,000
Water / Sewer	Electricity	kWh	9,825,348	35,371	255	$688,000
	Natural Gas	GJ	9,084	9,084	463	$109,000
Lighting	Electricity	kWh	3,863,435	13,908	100	$270,000
Fleet	Gasoline	L	284,932	10,258	678	$285,000
	Diesel	L	258,018	9,805	720	$258,000
	Propane	L	6,064	152	9	$5,000
Supported Facilities	Electricity	kWh	371,535	1,338	10	$26,000
	Natural Gas	GJ	2,833	2,833	144	$34,000
Unclassified Accounts	Electricity	kWh	166,438	599	4	$12,000
Total				**162,744**	**4,387**	**$2,988,000**

Notes to Table 1:

1) Prospera Centre Ice Rink has not been included in the 2010 inventory. However, because this facility offers a "traditional municipal service: - i.e. recreation) and is partially supported by municipal funds, the carbon footprint may need to be included in the City's Climate Action Charter commitments. If required this will be added at future inventory updates. An estimate of the Carbon footprint for the Prospera Center is about 640 tonnes of GHG emissions. Clarification may result in a portion or all of this inventory being added to the City's charter commitments.

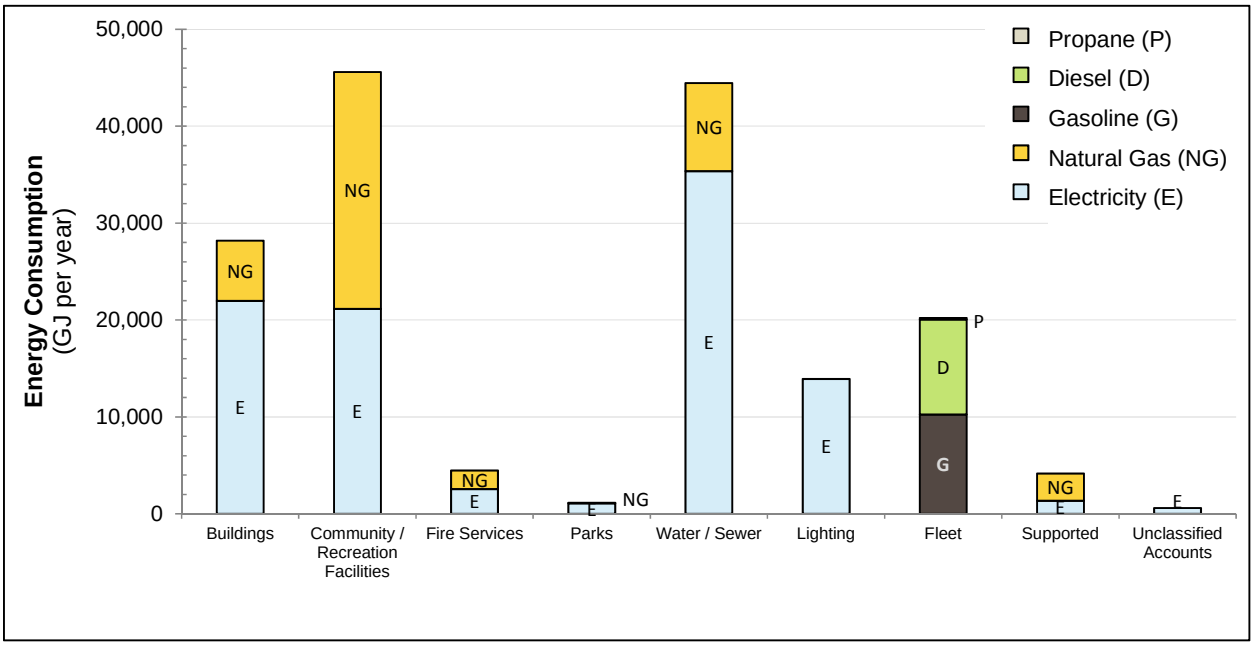
2) Costs cited are approximate based on typical retail prices for the energy consumption only. These values are not derived from billing data. Actual billings will differ from this value due to different rate schedules, fixed charges, and price variability through the year.

3) A description of each of the end use categories is provided in Section 2.3

2.4 Energy Use by Sector

The distribution of **energy consumption** by sector is shown in Figure 1. Buildings, recreation centres and water works (water / sewer / drainage) consume significantly more energy than other end uses. Water works are currently the largest energy users, with high electricity usage (all natural gas consumption occurs at the sewage treatment plant). Recreation centres use only slightly less energy.

Figure 1: Energy Consumption of Municipal Operations (2010)



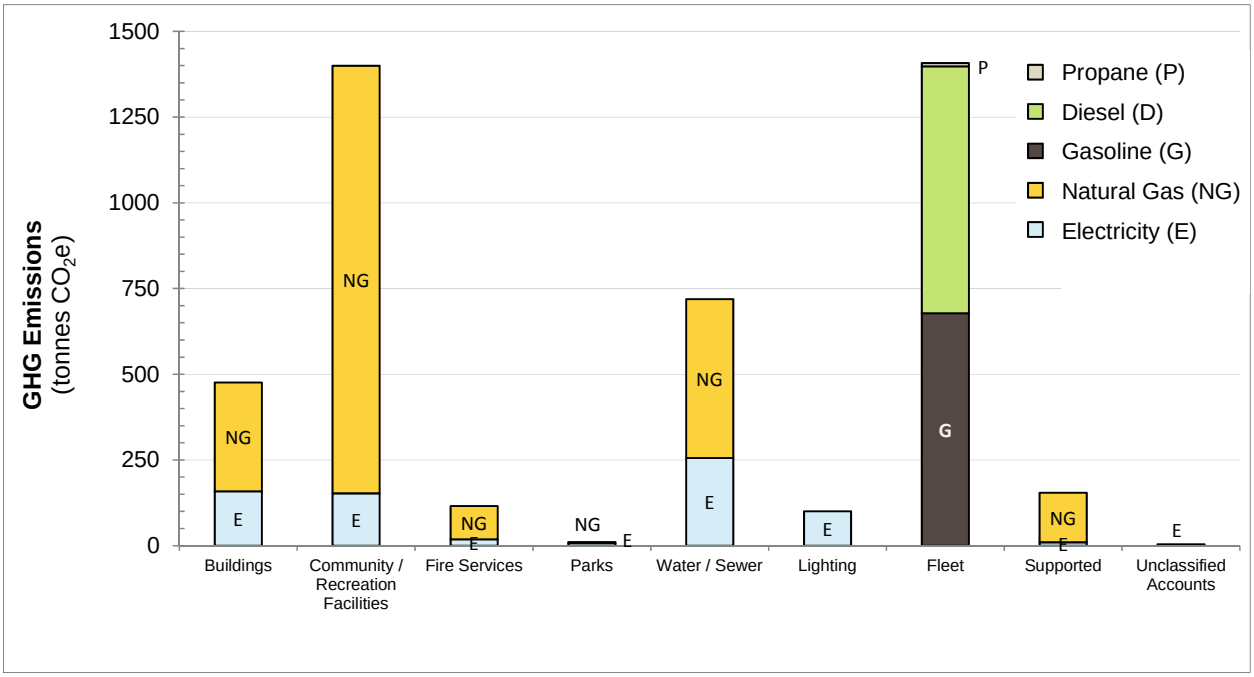
Note: A description of each of the end use categories is provided in section 2.3

2.5 Carbon Emissions by Sector

Figure 2 shows the distribution of **greenhouse gas emissions** by sector. Here it is evident that recreation centres produce the most GHGs, due to their higher use of natural gas. This is closely followed by Leased facilities. The fleet produces significant GHGs due to the use of gasoline, diesel and propane.

Fossil fuels (natural gas and vehicle fuels) result in the majority of the GHG emissions while electricity related emissions are small by comparison. This is because the bulk of the electricity in BC is generated by hydro power which results in few GHG emissions.

Figure 2: GHG Emissions from Municipal Operations (2010)



Note: A description of each of the end use categories is provided in section 2.3

Currently contracted services are not included in the inventory due to the lack of availability of fuel consumption data for these services. The Charter guidance document indicates that for contracts starting in 2012, the carbon of those contracted services should be included in the inventory. In the second quarter of 2012, the Ministry is expected to publish guidance for capturing contracted services into inventories.

2.6 Major Energy Consumers

A list of the municipal facilities that consume more than 1,000 GJ of energy per year is shown in Table 2 along with their associated carbon emissions. These facilities consume 68% of the energy and produce 58% of the carbon emission for the City's inventory.

Table 2: Energy Consumption and GHG Emissions for Municipal Facilities using more than 1000 GJ per year (2010)

Facility	2010			
	Elec kWh	NG GJ	Total Energy GJ	GHG Tonne CO_2e
The Landing - Leisure Centre	2,502,000	12,006	21,013	677
Sewage Treatment Plant	3,262,800	9,084	20,830	548
Education Park (old CFB Chilliwack)	3,602,400	0	12,969	94
Twin Rinks	1,286,357	4,833	9,463	280
Cheam Leisure Centre	1,084,800	4,509	8,414	258
Exhibition Building - Heritage Park	735,670	1,862	4,510	114
Well #9 - Tamihi Way	1,177,920	0	4,241	31
Overhead Street Lighting	1,045,466	0	3,764	27
Municipal Hall	550,080	917	2,897	61
Wells #6 & #7 - Watson Elementary School	803,520	0	2,893	21
Fire Hall No. 1 (Downtown) / FVRD Office - Electricity	497,520	844	2,635	56
Public Works / Parks Operations	296,320	1,333	2,400	76
Chilliwack Cultural Centre	589,200	271	2,392	29
Wells #1 & #2 - 45070 Watson Rd	622,260	0	2,240	16
Pump - Mcgillvray	461,400	0	1,661	12
Well (Keith Wilson building)?	431,820	0	1,555	11
The Landing - Evergreen Hall	118,920	1,058	1,486	57
Animal Control Facility / Incinerator	70,379	1,081	1,334	57
Salish Library	184,080	633	1,295	37
The Landing - Sports Centre	0	1,218	1,218	62
Pump Station - Wolfe Rd (Schweyey / Chilliwack Mtn)?	315,000	0	1,134	8
Total of these facilities	19,637,912	39,646	110,343	2,533
Total Municipal Inventory	27,218,255	44,544	162,744	4,387
Share of the total City inventory from these facilities	72%	89%	68%	58%

Note:

1. *Data shown based on extracts from utility records. Some facilities may not have natural gas data if they have no natural gas connection or their natural gas consumption may not be paid for by the City. This utility information may be private and is currently not available.*
2. *Electricity values shown as zero have their electricity from other neighbouring facilities (e.g. the Landing s[ports center and leisure center).*
3. *Data does not currently include the Prospera Center. Clarification of the component of this attributable to the City is still to be determined.*

2.7 Leased-Out Buildings

The City of Chilliwack owns a number of buildings that are currently leased out to other organizations (see list in Table 3).[4] Some of these organizations perform functions that fall within the scope definition of a traditional municipal service (e.g. recreation, community halls), while others are excluded (e.g. policing). The City does not have direct day-to-day operational control over these buildings (and in some cases is not responsible for the utility costs).

The City can work with tenants to identify energy conservation actions. To assist this it can require within new operational agreements that the tenants allow the City to access utility information and site access in order to (i) evaluate conservation opportunities and (ii) to compile the energy inventory as required.

Table 3: Facilities Owned by the City and Leased to Others

Facility	Address	Comments
Yarrow Community Hall	4670 Community Street	Not previously identified. Capture data at next inventory update
Hope River Hall - Chilliwack Lion's Hall	47130 Hope River Road	Currently captured as a 'supported' facility
Mount Cheam Lion's Hall	45580 Spadina Ave	Currently captured as a 'supported' facility
Armourie Building on Princess Avenue	45707 Princess Avenue	Not previously identified. Need to confirm by use if it should be included
Ambulance Building	8530 Young Road	Leased to BC Building Corporation. Exclude from City inventory as this is included in the BCBC inventory required for their reporting.
Chilliwack Airport Terminal Building	46244 Airport Road	Currently captured as a 'supported' facility. Can be excluded from BC reporting as aviation is not a 'traditional municipal service'. Included for FCM PCP reporting.
Chilliwack Curling Club Building	9291 Corbould Street	Currently captured as a 'supported' facility.
Chilliwack Cultural Centre Building	9201 Corbould Street	Currently grouped with 'community/recreational' buildings.
Hobby Hill Parent Participation Preschool	5650 Teskey Way	Included as a 'supported' facility. Could be excluded from BC reporting because education is outside the municipal scope. NB: Energy consumption is small – uses less than a small house.
Chilliwack Family Place	45845 Wellington Avenue	Currently captured as a 'supported' facility.
Rotary Club Townsend Park Services Building	45130 Wolfe Road	Currently captured as a 'supported' facility.
Chilliwack Museum & Archives	45820 Spadina Avenue	Currently captured as a 'supported' facility.
Rotary Pool	46245 Reece Avenue	Currently captured as a 'supported' facility.
Cheam Leisure Centre	45501 Market Way	Currently grouped with 'community/recreational' buildings.
Chilliwack Leisure Landing Centre	1-9145 Corbould Street	Currently grouped with 'community/recreational' buildings.

[4] There may be uncertainty over whether a facility is "City owned" with a third party operator, or "leased out". Generally if the utility bills are paid for by a third party, it has been considered a leased out facility and the inventory is compiled under 'supported facilities'. If the utility bills are paid for by the City, then it is considered simply a City building and is captured in the appropriate category (e.g. recreation, etc.). The key difference is that utility and operating information is more difficult to obtain for buildings with a third party paying the utility bills. (e.g. the Cultural center is classed as a City building because the City pays the utilities, while the Museum is classed as a supported facility because the museum pays the utility bills). In practice the operating agreements may be much more complex – this distinction is only for the purpose of obtaining utility information).

Facility	Address	Comments
Chilliwack Search & Rescue	46195 Fifth Avenue – civic address	Not currently captured. Not a traditional municipal service.
Chilliwack Policing Society Wellington Avenue	45879 Wellington Avenue	Excluded. Policing is not included in the traditional municipal services definition. Note also that this is a facility leased by the City, not from the City.
Keywest Jewellers - Yale Road(NB Slated for demolition).	46152 Yale Road – civic address	To be excluded. Not a traditional municipal service.
Hospitality Centre on Luckakuck Way (Tourism Chilliwack)	44150 Luckakuck Way	Not previously identified. Capture data at next inventory update.
Heritage Park (Luckakuck Way)	7778 Lickman Road	Included under 'buildings'
RCMP Building on Airport Road at Keirnan Drive	45924 Airport Road	Not included. Policing is not included in BC's 'traditional services' definition.

2.8 Energy and GHG Emissions 25-year Forecast (2012 - 2037)

The City of Chilliwack's energy consumption and GHG emissions are related to the provision of services to the municipal population, and thus the City's population was used as the basis for this forecast[5]. Based on Chilliwack's 2012 estimated population of 83,450 and a projected population of 127,400 for the year 2037,[6] the municipality's energy consumption is forecast to be as much as 210,000 GJ with Charter GHG emissions of 5,700 tonnes CO_2e.[7]

These estimates are based on a "business as usual" scenario and do not consider potential reductions in GHG intensities related to different energy sources. These forecasts are estimates only as the energy use (and greenhouse gas emissions) from the provision of municipal services does not grow smoothly with population increases but rather increases in steps as new facilities are developed. Some components of municipal consumption may not increase as fast as the rate of population growth.

2.9 Implications of the Inventory for Action Plan Development

For corporate emissions, the most significant areas of energy consumption and GHG emissions are:

- Municipal buildings, in particular recreation centres, have by far the largest energy consumption in all corporate operations. There may be opportunities to reduce this through energy conservation practices, building upgrades, and possibly through heat exchange systems. Buildings also produce the most GHG emissions.

[5] Long-term capital plans are sometimes used to estimate energy use and greenhouse gas emissions from projected facilities and infrastructure but are usually not available, and often no more reliable than a population-based estimate.

[6] Population Forecasts for Engineering Department, City of Chilliwack

[7] These are estimates based on population growth and not based on any capital or infrastructure plans. The objective is to highlight that a growing community will create more energy demands on the local government. Generally, the energy consumption of a local government increases with population for some services (e.g. street lighting and water pumping) and in discrete steps for others as new facilities are added. Overall the growth is less than the growth of population. For here we estimated that energy use would grow at ½ the rate of population growth.

- Water, sewer and drainage services also have significant energy consumption. This is related to the pumping and distribution energy requirements.
- The fleet may provide some opportunities for improvement, but these will not have as much impact on the total consumption as changes in building energy use. Diesel-fuelled vehicles are the most significant component of the total fleet GHG emissions.

This plan identifies actions that can reduce the most significant sources of emissions for corporate activities.

3 Corporate Action Plan

The City of Chilliwack's Corporate Action Plan was developed in a series of steps as follows:

- **Corporate inventory**: An inventory of corporate activities that consume energy and produce greenhouse gas emissions was compiled to estimate annual energy consumption and greenhouse gas emissions for the base year of 2010.
- **Background review**: The current corporate policies and initiatives in the City's operations were identified and assessed with regard to air quality, energy and GHG emissions through discussion with City staff and review of documents.
- **Activity research**: Research was conducted on current activities being undertaken in other jurisdictions (particularly in BC) to address corporate operations in a municipal context. These activities and examples helped inform the development of actions for the City of Chilliwack.
- **Action planning workshop**: A workshop was held with City staff to review potential types of actions and define activities that would be feasible to implement in order to reduce energy consumption and greenhouse gas emissions for corporate operations.

The result of the above process was the development of 18 corporate actions. The actions have been grouped according to the City's organizational structure, and the expected department to undertake the action. The actions are described through this chapter and are summarized in Table 4 along with the following information for each action:

- the municipal department the action is associated with,
- the current energy consumption by the activity, and
- whether the activity is expected to impact air quality, energy conservation, and/or GHG emissions.

Table 4: Summary of Corporate Actions and 5-year Plan

Municipal Department	2010 Energy Usage	Action #	Action	Level of Impact		
				Air Quality	Energy Conservation	GHG Emissions
Municipal Buildings & Recreation Centres (existing)	73,773	1	Evaluate alternative energy and retrofit opportunities for the Chilliwack Landing Leisure Centre and Cheam Centre[1]		high	high
		2	Finish implementing building audit recommendations and conduct audits on remaining facilities		high	high
		3	Evaluate alternative energy options prior to replacing existing heating systems		high	high
Fleet	20,214	4	Develop an energy management program for the fleet	med	med	high
		5	Continue exploring fuels and technologies to reduce emissions from fleet vehicles	med		med
		6	Complete conversion of fleet vehicles to LED lights	low	low	low
Utilities	55,424	7	Capture the energy of the WWTP digester biogas		high	high
		8	Explore methods of reducing GHG emissions at the WWTP through process modifications and biosolids management			low
		9	Explore opportunities for energy integration (eg. district energy) in the Chilliwack Landing area		high	high
		10	Continuously reduce energy requirements for water and wastewater infrastructure		low	low
Lighting	13,827	11	Evaluate efficient lighting and identify retrofit opportunities		med	low
Parks and Recreation	1,152	12	Replace parks equipment for mowing and trimming with cleaner alternatives	med		low
		13	Investigate opportunities to reduce energy requirements for sports fields		low	
Environmental Services	n/a	14	Develop a Green Procurement Policy	low	med	med
		15	Form a Corporate Green Committee		low	low
Municipal Buildings (new)	n/a	16	Develop a Green Building Policy for new municipal buildings		high	high
		17	Use lifecycle costing for new facilities and major renovations (and alternative energy)		high	high
Operations	n/a	18	Explore options to reduce road dust	med		

[1]This study will only be undertaken if Landing Leisure Centre not included in the district energy system

3.1 Actions for Municipal Buildings (Existing)

Existing municipal buildings account for over 60% of the total energy consumption from the City's corporate activities. Actions to reduce energy consumption from municipal buildings can have substantial impacts on the City's overall energy consumption costs and GHG emission levels. Four actions have been identified.

Corporate Action 1: Evaluate alternative energy options for the Chilliwack Landing Leisure Centre and Cheam Centre

The Chilliwack Landing Leisure Centre and Cheam Centre are recreation complexes that have a swimming pool area, workout facilities and courts. Recreation facilities are large energy consumers, and often represent one of the largest opportunities for emission reduction measures.

- The Landing Leisure Centre consumes 2.5 million kWh of electricity, 12,000 GJ of natural gas and emits 677 tonnes of CO_2e, which accounts for over 13% of the corporate inventory.

- The Cheam Centre consumes 1.1 million kWh of electricity, 4,500 GJ of natural gas and emits 258 tonnes of CO_2e, which accounts for over 5% of the corporate inventory.

Potential sources of alternative energy that can be explored for the Leisure Centre include: developing a heat transfer system between the pool and the ice rink, installing solar panels for heating, use of biogas heat from the sewage treatment facility, or potentially connecting to a geo-exchange system under the playing fields. Several cities in BC have undertaken solar retrofits to swimming pools[8].

Savings may also be realized through an energy retrofits. As an example, an energy modeling report for the Cheam Centre Renovation Project (completed in 2010) identified a number of energy saving measures that could be implemented. Some efficiency measures were implemented and provisions left to implement others at a later date.

Costs for energy studies vary depending on the scope but could be commissioned for $20,000 to $40,000. The evaluation of potential energy saving opportunities for the Landing Leisure Centre can also be included as part of a larger energy integration program in the Chilliwack Landing area (refer to Action 9).

The City will evaluate the following options to determine the cost-benefit of energy saving opportunities on the Chilliwack Landing Leisure Centre:

[8] Solar heating retrofits to swimming polls have included:
A. City of Quesnel installed solar panels on the roof of their recreation centre for all of their domestic water. It was completed with a grant from the Municipal Rural Infrastructure Fund (federal) and a SolarBC grant (provincial).
B. Hyde Creek Community Centre in Port Coquitlam installed 42 solar panels in 2004. Furthermore, the pool underwent a larger energy retrofit that included two heat reclamation units for evaporating pool water and a demand-based ventilation system.
C. Kelowna is currently retrofitting Athans Aquatic Centre with assistance from a SolarBC grant.

A. Developing a heat transfer system between the Leisure Centre and Prospera Centre[9],
B. Installing solar panels for heating domestic and pool hot water,
C. Retrofitting a heat reclamation system to capture heat from evaporating pool water.
D. Implementing the energy conservation measures defined in the Cheam Centre Renovation Project energy Modeling Report.

Corporate Action 2: Finish implementing building audit recommendations and conduct audits on remaining facilities

The City of Chilliwack retained Honeywell in 2006 to conduct a Building Energy Report on its facilities. The report reviewed energy consumption at 37 facilities and conducted audits of 7 facilities (Chilliwack Landing Leisure Centre, Twin Rinks, Municipal Hall, Civic Services Building & Parks Operations Building, Chilliwack Library, and Evergreen Hall). It identified potential savings of $90,000 per year in energy costs and 273 tonnes greenhouse gas emissions per year. The City has worked with Honeywell since 2006 to implement many of the recommendations, though there remain outstanding measures. There are several facilities that have not undergone audits, in particular those owned by the City but leased by other organizations.

The City will continue implementing the economically viable measures recommended in the Building Energy Report:

A. Chilliwack Landing Leisure Centre:
    - Install a Gravity Film Exchange (GFX) Drain water Heat Recovery System,
    - Install heat recovery stack economizers for the boilers, and
    - Install motion sensors in the dressing rooms to control the lights.

B. Twin Rinks:
    - Install motion sensors in the dressing rooms to control the lights, and
    - Install new Building Automation System.

C. Other buildings:
    - HVAC upgrades, and
    - Control systems.

D. In addition to the above measures from the Honeywell report, the efficiency of the Landing Leisure Centre boiler should be increased.

[9] The City previously commissioned a report to evaluate the feasibility of building a heat transfer system between the Chilliwack Landing Leisure Centre (a swimming pool) and the Prospera Centre (an ice rink). These two facilities have very different energy use profiles making them excellent candidates for a heat transfer system. The report clearly identified the benefit and potential savings of implementing the system, but did not fully account for all costs. The City may wish to prepare a business case to evaluate the feasibility of such a system and include costs for installation of the piping between the facilities to determine a realistic payback period. Assumptions should consider very low changes in electricity and gas rates.

This program is underway and some savings have already been achieved. As a rough estimate, if half of the energy savings measures remain to be achieved, there is opportunity for approximately 3,000 GJ of annual savings (cost savings in the range of $30,000 per year)[10]. Determining the costs of these measures requires further analysis. Further reductions can be found if the leased-out buildings are also audited and upgraded.

The City will also audit and undertake energy efficiency work at owned facilities that are leased to other organizations and facilities that the City makes financial contributions toward the operation of and therefore fall under the City's obligations for the Climate Action Charter.

Corporate Action 3: Evaluate alternative energy options prior to replacing existing heating systems

Boilers are used to operate the heating systems in large municipal buildings. These boilers often have long lifespans and so many boilers (while inefficient), are still functional. As a result, there is often a poor business case to replacing a working boiler mid-way through its life.

However, at the natural end of equipment life, the business case for alternative & renewable energy sources is more promising. That is, money must be spent regardless to replace equipment, and the *incremental* cost to incorporate renewable technologies is less than the *full* cost of replacing functioning equipment. In addition to avoided fossil fuel costs, renewables can reduce the cost of offsets which may need to be purchased.

This action will ensure that these options are evaluated when the opportunities arise. This evaluation would typically include a business case incorporating both the capital and operational costs.

The City will evaluate alternative energy options prior to replacing old boilers. Alternative energy options may include air source heat pumps, geoexchange (i.e. ground source heat pumps), and solar thermal. Lifecycle costs should be considered when evaluating these technologies.

[10] This is based on a roughly estimated 7% of the buildings and Landing Recreation Center total energy consumption.

3.2 Actions for Fleet

The fleet accounts for over 27% of the total energy consumption from the City's corporate activities. The fleet also produces emissions that impact local air quality. Three actions have been identified to address energy consumption and emissions.

Corporate Action 4: Develop an energy management program for the fleet

To track the significant energy consumption associated with the fleet, the City can develop a fleet management system. There is the option to join an existing system, such as E3 Fleet[11]; however, the City may prefer to develop a system more specific to Chilliwack's needs.

The City will develop a fleet management system. This system may include:

A. Providing driver efficiency training to all staff on a 3-year cycle. In-car training costs approximately $70-$80 per hour per participant[12].

B. Continuing to phase out older vehicles that are less fuel efficient and have higher tailpipe emissions. Currently, vehicles from earlier than 2004 are being removed from the fleet.

C. Formalizing a general fleet right-sizing and low emissions policy. Right-sizing of vehicles to the task at-hand is presently being performed on a routine basis.

D. Continuing to check the tire inflation pressure every night on all Public Works and Parks vehicles. Kal-Tire is performing this service free of charge as part of their contract.

E. Identifying opportunities for electric (or low-emission) vehicles[13]. This may be included in a larger Green Procurement Policy (see Action 14). An electric car has recently been purchased for use by the meter reader and is anticipated to reduce fuel consumption by 2600 L per year. The pay-back period has been estimated at 6 years and the car is anticipated to remain in the fleet for 7-8 years.

F. Continuing with internal idling policy education with reminders to staff. Examples include:

- Bumper stickers: vehicles can be labelled with rear facing bumper stickers indicating to the public the City's commitment to reducing vehicle idling.
- Pay slip inserts: key messages for idling reduction.
- Reminder to managers: communicate messages to staff.

[11] The E3 Fleet Management System is a national green fleet rating system developed by the Fraser Basin Council. It was modeled on the LEED™ Green Building rating system, and transferred to the automotive sector. The system sets out specific rating requirements which are used in the rating process to determine the points awarded. http://www.e3fleet.com/mc/page.do?sitePageId=41622&orgId=clcc

[12] Nicholas Lamm at http://greenworkplace.ca provided this cost estimate.

[13] The City of Ann Arbor, Michigan implemented a green fleet policy in 2004. In 2006, staff provided a report showing GHG and Air Quality contaminant reductions seen following implementation of the policy: http://www.a2gov.org/government/publicservices/systems_planning/energy/Documents/systemsplanning_greenfleetsreport2005_2006-04-10.pdf

G. Monitoring vehicular idling time. Twenty-five vehicles are presently outfitted with GPS tracking systems that can easily deliver this type of information.

H. Pilot testing real-time emissions calculators on fleet vehicles.

I. Continuing to outfit new heavy trucks with engine pre-heating systems that lower fuel consumption and tailpipe emissions and reduce maintenance costs.

Corporate Action 5: Continue exploring fuels and technologies to reduce emissions from fleet vehicles

The City currently uses approximately 258,000 litres of diesel, 285,000 litres of gasoline, and 6,000 Litres of propane annually to operate its fleet vehicles (propane is currently being phased out completely).

Metro Vancouver is taking action to reduce emissions from its corporate diesel engines, and furthermore, is developing a regional diesel emission reduction program. As part of this process, Metro Vancouver is evaluating diesel clean-up technology that can be retrofitted onto existing diesel vehicles.

A. Moving forward, *the City will* consider energy, air quality, and GHG emissions when evaluating alternative fuel options for its fleets (such as biodiesel, electric, hybrid)[14]. By considering these additional criteria, alternative fuel options may appear more attractive than when reviewed solely on price.

B. *The City will* evaluate and pilot test new technologies for reducing emissions from fleet vehicles (e.g. Metro Vancouver retrofitted a select number of vehicles with diesel oxidation catalyst technology).

Corporate Action 6: Complete conversion of fleet vehicles to LED lights

In the past, corporate vehicles that carried beacon lights for road construction activities were forced to idle while the lights were in operation. New LED technology no longer requires idling to operate the beacons. The City has undertaken an initiative to replace beacons and turning signal lights with LED technology in fleet vehicles where possible.

The City will replace headlights with LED technology where possible.

3.3 Actions for Utilities (water / sewer / lighting)

Utilities account for approximately 15% of the total GHG emissions from the City's corporate activities. Three actions have been identified to address these.

[14] This activity is an example of where energy, GHG and air quality objectives may not all be met. For example, diesel engines tend to be more fuel efficient, historically they emitted higher levels of particulates.

Corporate Action 7: Capture the energy of the WWTP digester biogas

Digester biogas is generated as part of the sewage treatment process at the Chilliwack wastewater treatment plant (WWTP) and is a source of energy – typically with an energy content about half that of natural gas. Prior to 2012, digester biogas from the WWTP was being flared. Construction is currently underway to install a new biogas boiler to heat existing and new digesters at WWTP by using biogas generated at the plant. An additional biogas boiler and storage tank are required to fully realize the benefit of heat recovery from the biogas.

The City will construct an additional biogas boiler and storage tank at the WWTP.

Corporate Action 8: Explore methods of reducing greenhouse gas emissions at the WWTP through process modifications and biosolids management

It may be possible to reduce greenhouse gas emissions associated with biosolids produced at the WWTP through process modifications. Although greenhouse gas emissoins from biosolids are not included in the corporate greenhouse gas inventory, there may be an opportunity to create carbon offsets through reductions in greenhouse gases from biosolids.

The City will conduct an assessment to determine the viability of greenhouse gas reductions through modifications to WWTP processes. The assessment can be completed at a cost of approximately $20,000.

Corporate Action 9: Explore opportunities for energy integration (e.g. district energy) in the Chilliwack Landing area

District energy is the distribution of energy to many facilities from a common source distributed through buried pipes to energy users. Older systems circulated steam from boilers, but newer systems typically use hot water which can be created from many sources. In the Lower Mainland most systems are for space and water heating, though district energy can provide cooling as well.

The economic viability of district energy systems relates closely to the physical proximity of customers to the system (reducing the amount of pipeline infrastructure). Consequently, district energy systems tend to be located in urban cores serving commercial, institutional and/or residential customers that are relatively close in proximity. The heat source may be from one of numerous sources – e.g. geothermal, biomass (generally wood chips and wood waste), sewage heat recovery, etc.

Gas Tax funding has been secured to complete a pre-feasibility study for energy integration in the Chilliwack Landing neighbourhood in 2012. This study will look at energy consumption and waste heat production at a number of facilities (Leisure Centre, Prospera Centre, Cultural Centre, Evergreen Hall, Chilliwack General Hospital, schools, etc.), and determine the

opportunities for energy sharing between these facilities, including a district energy system to supply heat beyond the energy sharing opportunities.

The City will undertake a pre-feasibility study to estimate the potential for implementing an energy integration and/or district energy system in the Chilliwack Landing neighbourhood.

Corporate Action 10: Continuously reduce energy requirements for water and wastewater infrastructure

The City operates numerous pump stations in the community in order to provide water to homes and businesses, liquid waste to the treatment facility, and drainage for flood protection. Water and wastewater currently use approximately 44,455 GJ energy to operate, approximately 31% of the corporate energy use. The City can work to reduce load on the system, improve the efficiency of existing equipment, and consider energy requirements when planning for new developments.

The City will work to improve the efficiency of the water and wastewater system by:

A. Reducing the load: e.g. continuing with water demand management activities (sprinkler regulations, encouraging low-flow devices, etc) and implementing inflow and infiltration control measures to reduce the amount of rain and groundwater entering the sanitary system;

B. Improving the efficiency of existing equipment: Older pumps tend to be inefficient because they run at a constant speed. New pump stations are commonly built with variable frequency drive motors for operational reasons, but these are also more energy efficient. The City has already been switching to pumps with variable frequency drive motors.

C. Evaluating opportunities through BC Hydro's incentive programs (e.g. BC Hydro offers incentives to upgrade large pump station equipment).

D. Include energy considerations in new development planning. The City has several closed water systems that require booster pumps to run constantly to maintain system pressure, and typically have high energy requirements. The alternative is to have a system that uses a water tower / reservoir, which provides pumping on an as-needed basis and is less costly to operate. Building a reservoir has higher initial capital costs, borne by the developer. The City has implemented a policy that requires the building of reservoirs for new developments that would otherwise require a closed water system and plans to incorporate this requirement in the Subdivision and Land Development Bylaw.

3.4 Actions for Lighting

Lighting accounts for approximately 8% of the City's energy budget and results in only 2% of the total GHG emissions from the City's corporate activities. While not a large part of the City's

GHG inventory it is an area that is prominent in the community, and presents an opportunity for showcasing the City's actions on energy efficiency. One action has been identified to demonstrate leadership and conserve energy.

Corporate Action 11: Evaluate efficient lighting and identify retrofit opportunities

Lighting currently consumes 13,800 GJ of energy annually. The City will not find significant reductions in energy consumption or GHG emissions by retrofitting lighting; however, there is an opportunity to show visible leadership in the community for energy conservation and, potentially, for showcasing alternative energy options. The City may also find cost savings over the lifetime of the lights.

The City will consider purchasing LED lights for street lighting to demonstrate conservation (as the technology is proven to provide sufficient lighting levels), or installing on-site solar powered lighting to demonstrate that solar is a valid energy option in Chilliwack. For example, in Dawson Creek, solar powered streetlights were installed as part of an effort to integrate solar power into the community. In Tumbler Ridge, one street has been retrofitted with LED lights as a pilot project. They have been in operation for 2 years, and are performing well with good light levels. Based on the energy used in the first two years, the payback period has been calculated to be approximately 4.5 years, and the lights are expected to last 10 to 13 years.

3.5 Actions for Parks

Parks and Recreation account for less than 1% of the total energy consumption from the City's corporate activities (excluding energy consumption related to recreation centres – already included in municipal buildings). Two actions have been identified that may reduce local air emissions and conserve energy.

Corporate Action 12: Replace parks equipment for mowing and trimming with cleaner alternatives

Some small garden equipment used in parks maintenance, such as weed eaters and lawnmowers, use two-stroke engines. These engines use an oil and gas mixture that produce more smoke, carbon monoxide, hydrocarbons, and particulate matter than four-stroke motors that require only gasoline. Consequently, the City is currently replacing the gasoline used in small equipment with alkylate petrol. Alkylate petrol contains 99% less harmful hydrocarbons and emits substantially lower amounts of substances contributing to acidification, eutrophication and the formation of ground level ozone.

The City will also investigate opportunities to replace two-stroke equipment with cleaner alternatives. Options include:

A. Electric weed eaters. These can reduce emissions from two-stroke gasoline weed eaters.

B. Continue purchasing two-stroke equipment with catalytic converters and air injection systems, or replacing two-stroke equipment with four-stroke equipment when possible.

The Chilliwack parks system is comprised of manicured open space, sports fields, and natural areas. At present, approximately 55% of the system is naturalized. *The City will* endeavor to increase this percentage through the naturalization of manicured areas as feasible. Opportunities may be taken on the perimeter and margins of open space in an attempt to respect the recreational needs of the community. Increasing naturalized areas will reduce the need for mowing.

Corporate Action 13: Investigate opportunities to reduce energy requirements for sports fields

Sports fields consume energy through the use of lighting and, in some cases, electricity, heat and hot water for change facilities. The City is currently investigating opportunities for remote control of facility systems in order to reduce energy consumption, staff time, and vehicle trips. There may also be opportunities to retrofit lighting or select more efficient lighting for new fields.

The City will investigate opportunities for reducing energy requirements through measures such as:

A. Installation of reduced voltage lighting for new fields.

B. Replacement of existing bulbs with LED lights when the technology is ready (for fields and parking lots etc.)

C. Installation of timer switches requiring users to activate lights for evening use (if no remote control system is installed).

3.6 Actions for Environmental Services

Many actions can be implemented that help to foster more sustainable practices but may not directly reduce the City's energy consumption. However, they may have an impact across other departments in the City's operations. They also present opportunities for education of staff and corporate leadership in the community. Two actions have been identified.

Corporate Action 14: Develop a Green Procurement Policy

Adopting a green procurement policy enables an organization to consistently consider environmental criteria in addition to financial and quality criteria when making a purchase. Organizations may define various types of criteria, including: recycled content, energy ratings, product lifespan, presence of toxic materials, packaging, etc. Some of these criteria require

understanding of potential lifecycle costs and impacts of products. Agencies that have undertaken this initiative locally include Metro Vancouver and the City of Richmond[15].

The City will develop a green procurement policy that may include:

A. Guidelines for selecting appropriate fleet vehicles ("right-sizing") (see also fleet actions),
B. Listing labelling programs to look for (e.g. Energy Star, Environmental Choice),
C. Requiring recycled content in paper purchases,
D. Setting vehicle standards for contractors,[16]
E. Requiring reporting of energy consumption and greenhouse gases for contracted services included in the Climate Action Charter (e.g. waste collection), and
F. Including energy conservation targets in facility management contracts and possibly providing incentives or requirements for conservation.

Corporate Action 15: Form a Corporate Green Committee

Creating a green committee with representatives from each department can bring awareness to behaviours and practices that increase energy efficiency and decrease waste in corporate operations. To be most effective, the green committee should have commitment and participation from senior management.

The City will form a corporate green committee to encourage behaviours such as:[17]

A. Turning off monitors and lights when not in use;
B. Recycling, waste reduction and composting;
C. Promoting alternative / green commuting methods, including organizing a corporate carpool, rewards for bike-to-work week etc.; and
D. Providing Lunch 'n Learn opportunities where staff learn about green technologies and practices affecting corporate and community emissions.

3.7 Actions for New Municipal Buildings

Construction of new municipal buildings and facilities will increase the energy consumptions and carbon footprint of the City's operations. To minimise this, new facilities should be built to high

[15] The Sustainability Purchasing Network website provides several tools and examples: www.buysmartbc.com.

[16] For example, FVRD has the following policy: *"THAT the Electoral Area Services Committee support adoption by the Fraser Valley Regional District Board of a procurement policy that requires heavy duty diesel vehicle owners to provide approved safety inspections and emission tests that are no more than six months old as prerequisites to contracting such vehicles for work in FVRD electoral areas."*

[17] BC Hydro provides a guide for creating a Green Committee: http://www.bchydro.com/guides_tips/green_your_business/conservation_culture/Form_A_Green_Team.html

energy efficiency standards. Two actions have been identified to reduce future impact of new construction and renovations.

Corporate Action 16: Develop an Energy Efficiency or Green Building Policy for new municipal buildings

Setting a policy for new construction will establish the minimum requirement for the development of new facilities. This can be based on the energy consumption alone using an energy standard such as the National Model Energy Code for buildings (NMECB) or ASHRAE 90.1[18], or could be a Green Building standard such as the LEED (Leadership in Energy and Environmental Design) system of the Green Building Council[19]. Recent Chilliwack municipal building construction projects have already included the ASHRA 90.1 standard. Green buildings encompass a wider range of features than simply energy efficiency.

Adopting a green building policy for new construction defines the expected standards desired. Meeting these requirements from the outset of a facility development minimizes the cost of achieving these standards. Incorporating green features later in the process becomes increasingly expensive as the project gets closer to construction. One often cited statistic is that achieving LEED silver certification results in a 3% capital cost premium, which pays for itself in the first 5-7 years through operational cost savings.

The City will develop a green building policy for new construction and major renovations to ensure new municipal buildings attain higher energy standards than the BC Building Code.

Corporate Action 17: Use life cycle costing for new facilities and major renovations (and alternative energy)

A challenge for incorporation of energy efficiency is the different funding pools for capital and operational projects. Resources are always limiting, and lowest upfront costs are often a deciding factor in facility development. Many renewable and alternative energy systems have higher up-front costs and so will rate poorly when only capital costs are considered.

Life cycle costing (or total cost of ownership) for a municipal building or renovation is the evaluation of the costs and benefits associated with the building's lifespan, including construction and operation over the long-term. By developing a business case which includes both capital and operating costs, it can be determined whether the operating cost savings will justify the incremental capital cost.

Life cycle costing can often be challenging for residential and commercial buildings, which may change owners numerous times throughout their lives and therefore the person or company

[18] The NMECB was developed by the Federal Government. Ashrae is the American society for heating, refrigeration, and air conditioning and they define performance standards. The 90.1 standard is for energy efficiency.

[19] The LEED rating system evaluates the design and construction of buildings in a number of categories – one of which is energy consumption. Beyond a minimum requirement it does not mandate a number of 'points' to be attained in the energy category. Some policies require "LEED with a minimum number of points in the energy and atmosphere category).

receiving the operating cost savings may be different than those who fronted the initial capital cost increases. Municipalities are in a desirable position of having a high level of certainty regarding the long-term ownership of their buildings and are therefore in an ideal position to take advantage of life cycle costing.

The City will include lifecycle costing in business cases for new facilities and major renovations by requesting lifecycle costing information in Requests for Proposals, and within internally generated business cases.

3.8 Actions for Operations

One action is identified that provides potential for reducing local particulate matter associated with unpaved roads.

Corporate Action 18: Explore options to reduce road dust

Road dust forms when previously deposited matter on the road surface is disturbed by vehicles or wind (e.g. mud, vehicle exhaust, winter traction materials, tire debris, etc). Current research suggests that road dust contributes to particulate levels (both PM_{10} and $PM_{2.5}$) that impact local air quality. Seasonal variations are often observed due to application of traction material over winter months.[20]

The City will explore opportunities to reduce road dust, and thereby reduce local particulate levels, through:

A. Behaviour changes: wheel washing for farm vehicles, gravel trucks and construction equipment and limiting speeds on unpaved roads.

B. Surface changes: applying treatments to unpaved roads where feasible. The City currently treats all gravel roads with magnesium chloride annually to suppress dust.

C. Aggregate treatment: washing or screening prior to application to remove fine particulate.

D. Traction material application: pre-wetting traction material with liquid sodium chloride to help adhere the material to the road surface.

E. Cleaning: road sweeping as soon as possible after melting using wet sweeping[21]. The City presently conducts road sweeping (wet and dry), especially in the spring to clean up winter sand and gravel.

[20] These measures are intended to demonstrate best management practices. There are a number of sources of particulate emissions in the airshed and road dust from traction material is not expected to be a major contributor. However, taking action on all sources of emissions is important.

[21] Further description of these options is available from the Ministry of Environment report "Best Management Practices to Mitigate Road Dust from Winter Traction Materials", 2005.

4 Implementation

It is recommended that the City undertake a 5-year implementation of identified actions in order to make significant reductions in energy consumption and greenhouse gas emissions. This section outlines a reduction target, estimated emission reductions for undertaking identified actions, and staff and funding requirements.

4.1 Energy and Reduction Potential

A number of factors affect the potential reductions and many of these are site specific. Some conservation activities have already been implemented (e.g. the WWTP biogas recovery) and the savings from these will become evident in future updates to the inventory. For the purpose of target setting, reduction assumptions (from 2010 levels to 2015) include:

- Electricity savings of 5% (representing a combination of energy efficiency improvements for buildings as well as increases in demand for operations).
- Natural Gas consumption is reduced by 15% (reflecting the reduced purchases from biogas recovery at the WWTP and other heat retrofit opportunities).
- Fleet fuel consumption is reduced by 10% (reflecting result achieved in other municipalities based on a moderate level of effort and attention).

Combined, the impact of achieving these reductions would be result in overall reductions of an 8 % reduction in total energy use, and a 12% reduction in GHG emissions.

As a sign of commitment, it is proposed that the City round up to set ‘stretch’ targets of:

- To reduce energy consumption by 10 % (over five years (2012 – 2017), with associated reductions in greenhouse gas emissions reductions of 15 %.

4.2 Personnel Requirements

Many of the activities fit within existing staff roles and in fact staff have initiated some of these activities prior to the plan being formalized. At present, no new staff compliment is anticipated. While this plan may add to existing staff responsibilities, the actions are well aligned with their existing mandates.

4.3 Funding

The intent of this Plan was to identify actions that the City could undertake where the costs of the proposed actions would be offset by energy savings. Some feasibility studies are required to ensure project viability, and the City can apply for funding assistance through senior

government programs (e.g. Gas Tax, Local Government Infrastructure Planning Grant) or utility providers.

4.4 Monitoring and Reporting

Plan activities require monitoring and reporting. This includes:

- Compiling energy use annually for reporting to the Climate Action Charter. Note that much of this information is already compiled for the CARIP grant applications.
- Reporting to the Charter on actions taken in the past year. This is also a requirement of receiving the CARIP grant.