



Canada's Tournament Capital



Corporate Energy and Emissions Management Plan



December 2013





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Highlights

The Corporate Energy and Emissions Management Plan:

- Allows the City of Kamloops to address the challenge of climate change;
- Reduces energy costs and positions the City as a leader of sustainability in Kamloops;
- Confirms our commitment to energy sustainability and the Climate Action Charter;
- Reflects the unique challenges of Kamloops, a growing community with increasing servicing needs;
- Recognizes that continuous improvement, systems thinking and innovation will be required to meet our commitments;
- Requires us to monitor our successes and failures to ensure the City is meeting the expectations of our community; and
- Continues to build on the momentum created by the Sustainable Kamloops Plan.



The Three Components of the Plan:

- 1) Current Energy Needs and Emissions Profile;
- 2) Reduction Opportunities and Planned Actions; and
- 3) Carbon Offset Credit Opportunities.



Our Commitment

As outlined in the Sustainable Kamloops Plan, energy sustainability and reducing greenhouse gas (GHG) emissions are central to the community's sustainability. Building from the integrated nature of the Sustainable Kamloops Plan, the Corporate Energy and Emissions Management Plan (CEEMP) has five key commitments that align with the diverse goals and targets outlined in the Sustainable Kamloops Plan. These objectives include:

- Using carbon neutral energy at all City facilities by 2035;
- Producing the equivalent of 10% of City (corporate) energy needs through alternative energy systems by 2020;
- Being building energy self-sufficient by 2050;
- Reducing consumption of fossil fuels for transportation by 25% by 2020; and
- Constructing all new municipal building to equivalent of LEED gold standard.

Through the Energy Management program agreement, the City has also made a commitment to reducing our annual corporate energy consumption. This agreement commits the City to:

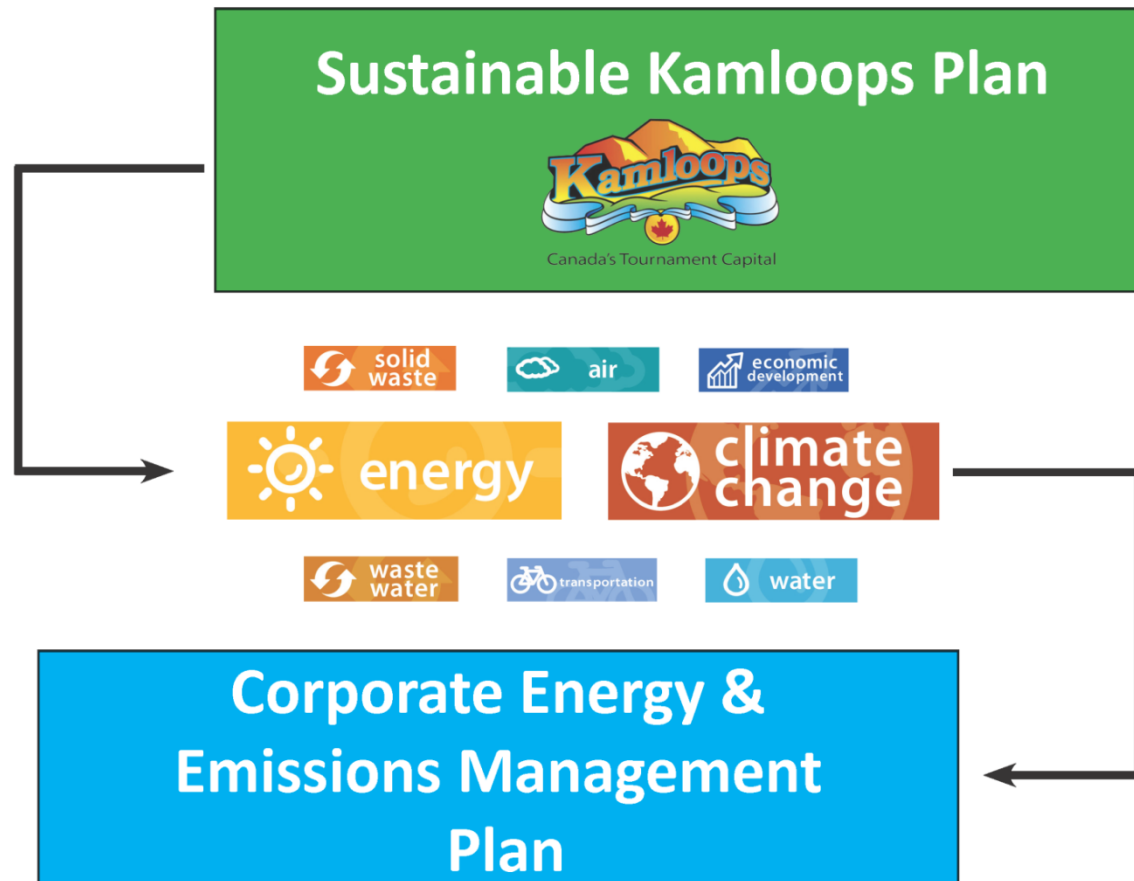
- Reducing corporate electricity consumption by 1 GWh annually.

As a signatory to the BC Climate Action Charter, the City has committed to:

- Becoming a carbon neutral government; and
- Reporting the City's corporate energy use and GHG emissions annually.



Figure 1: Integrating the Corporate Energy and Emissions Management Plan with the Sustainable Kamloops Plan





Introduction and Background

With a population of 85,678¹, the City of Kamloops is the fourth largest municipality in British Columbia outside of the Lower Mainland. It encompasses almost 30,000 hectares of land and stretches 25 km up the Thompson River valley across diverse landscapes. As one of the fastest-growing communities in the province, Kamloops is projected to reach 120,000 residents by 2036.²

The City of Kamloops is an organization of approximately 650 employees within six departments. The City:

- Operates over 40 recreational and institutional facilities;
- Manages over 436 pieces of equipment in its fleet;
- Maintains over 100 outdoor parks and sports fields and facilities;
- Manages the infrastructure required to deliver water, sewer and drainage services;
- Maintains up to 1600km of lane roadway in addition to numerous construction projects;
- Operates traffic and street-lights;
- Offers solid waste and recycle pick-up services; and,
- Provides fire and safety services³ throughout the community.

The City of Kamloops has taken many measures to enable a sustainable future for the community. These measures include, but are not limited to, the development of the Sustainable Kamloops Plan, investing in innovative energy technologies at the Tournament Capital Centre, and installing water meters in all buildings served by the City's water utility. Building from these measures and many others, this CEEMP re-iterates the City's dedication to:

- Being an energy-wise government;
- Progressing forward with City's commitments under the BC Climate Action Charter; and

¹ Statistics Canada. 2012. Kamloops, British Columbia (Code 5933042) and Thompson-Nicola, British Columbia (Code 5933) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released February 8, 2012.

www12.statcan.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E (accessed February 13, 2012).

² This assumes an annual growth rate of 1.25%. See the KAMPLAN (2004) and Development Cost Charge By-law Update (2010).

³ Excludes BC Transit and the RCMP vehicle fleet.



- Acting as an environmental sustainability leader.

Through the City's experiences associated with the implementation of this plan, the City will progress with the development of a comprehensive Community Energy and Emissions Management Plan in 2012. The plan will include commitments and planned actions to work towards targets set out in the Sustainable Kamloops Plan for community-wide energy management and reduction.

Why Have a Corporate Energy and Emissions Management Plan?

The CEEMP provides the foundation and direction needed to reduce energy use, as well as costs and GHG emissions from City operations. It also serves to support the City's role as a key service provider within the community. The development of this Plan is a result of four key drivers, which include the need to:

- 1) Act locally to address a global challenge;
- 2) Respond to recently implemented climate change policies and programs;
- 3) Recognize the importance of energy security and the impact of rising energy costs; and
- 4) Continue as leaders of change within Kamloops and beyond.

The following provides an overview of the key drivers as they relate to the City of Kamloops corporate operations and community sustainability objectives.



The Key Drivers

1) The Need to Act Locally to Address a Global Challenge

Climate change represents one of the greatest environmental challenges facing our planet. The planet's climate is changing at a faster pace than any other time in recorded history.⁴ The scientific community agrees that the consumption of fossil fuels is likely the principal cause of global climate change⁵ and is due to the fact that the combustion of fossil fuels results in the release of carbon dioxide; one of several GHGs.⁶

The opportunity exists to mitigate the effects of climate change. This is possible through leadership and action to reduce GHG emissions from the global community, national and provincial governments and municipalities.

The City of Kamloops has a long-standing commitment to addressing this challenge. For example, in 1996 the City of Kamloops joined the Partners for Climate Protection program to work with other municipal and regional governments across Canada to reduce locally-produced GHG emissions. In 2007, the City also became a signatory to the BC Climate Action Charter. As a signatory to the Charter, the City committed to:

- Accurately track energy use and GHG emissions;
- Make emission reductions; and
- Progress towards becoming a carbon neutral organization through the purchase of carbon offset credits.

⁴ See the "Fourth Assessment Report: Climate Change 2007", produced by the Intergovernmental Panel on Climate Change. Available at: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml

⁵ Ibid.

⁶ Other examples of GHGs include Methane, Nitrous oxide, Water vapor, Perfluorocarbons (PFCs), Sulphurhexafluoride (SF6) and Hydrofluorocarbons (HFCs).



In order to uphold the City's commitment under this Charter, this Plan provides:

- A detailed review and analysis of municipal operations to highlight energy saving and GHG emission reduction opportunities from municipal buildings and facilities, fleet vehicles, and infrastructure;
- A series of actions that will support the City's efforts to become a carbon neutral organization and progress towards its commitments under the BC Climate Action Charter; and
- A series of principles that will guide the City of Kamloops decision-making processes with respect to investments and actions pertaining to offset credits.

Recognizing the City's current commitment to carbon neutrality, there is a need to strategically evaluate how the City will reduce GHG emissions to achieve net zero emissions. This Plan provides such an evaluation and sets the course of action.

2) Respond to New Climate Change Policies

Like all consumers of fossil fuels, the City of Kamloops is subject to the Provincial Carbon Tax. For example, in 2010, the City paid approximately \$135,000 in carbon taxes based on a rate of \$20 per tonne. In 2012, the provincial carbon tax will increase to \$30 per tonne and the City can expect to pay approximately \$225,000 per year in carbon taxes. However, as a signatory to the BC Climate Action Charter, the City is eligible to apply for a carbon tax rebate under the Climate Action Rebate Incentive Program (CARIP). Through the CARIP, the City can expect to receive 100 percent of its carbon tax payments rebated.

In parallel, as a signatory to the BC Climate Action Charter, the City is working to become a carbon neutral government. As illustrated in Figure 2 (next page), it is evident the City would need to purchase approximately \$220,000⁷ of carbon offset credits to be carbon neutral in 2012.

⁷ Assuming a carbon offset credit value of \$25 per tonne in 2012.

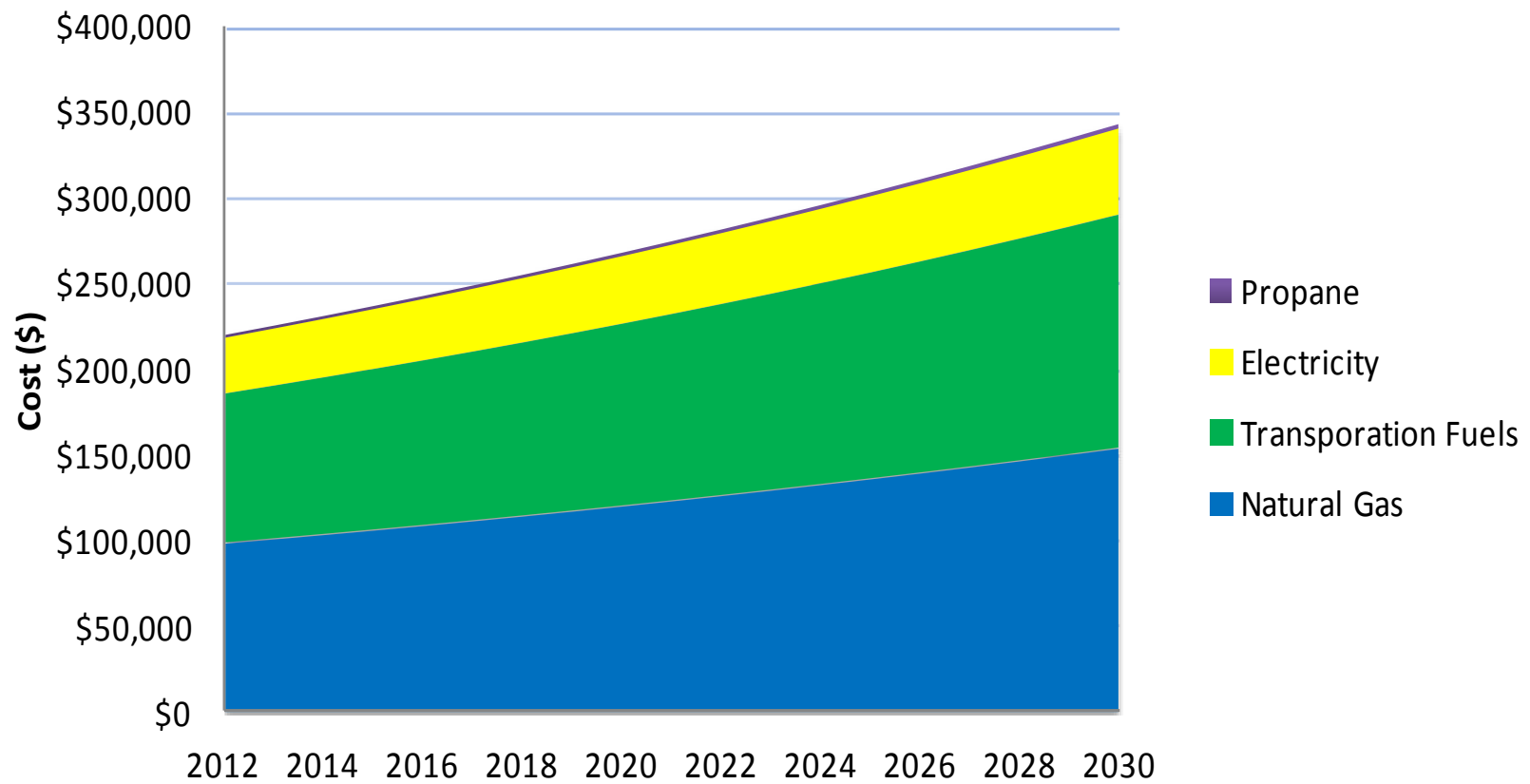


Going forward, assuming there are no significant changes in the City's energy and emissions management practices, the City would need to purchase approximately \$350,000/yr in carbon offset credits to be carbon neutral in the year 2030. Cumulatively, from 2012 to 2030, the City would be responsible for over \$5.3 million⁸ in carbon offset credits, if emissions are not reduced.

Figure 2: Potential Offset Credit Cost for the City of Kamloops⁹

⁸ This is based on 2011 dollars and a carbon price forecast that reaches \$33 per tonne by 2030.

⁹ These costs are based on the City's total corporate energy use forecast and GHG emissions profile and a carbon price forecast that reaches \$33 per tonne by 2030. This cost profile does not account for any anticipated or planned reductions in GHG emissions that the City may make. The actual number credits required to be carbon neutral will be reflective of the City's emission profile from the preceding year.





An Overview of Carbon Offsets

What is a Carbon Offset?

A carbon offset credit is a credit for GHG emission reductions achieved by one party that can be used to compensate (or offset) the GHG emissions from another party. There are a number of established carbon markets throughout the world whereby the exchange of carbon credits occurs. The most notable carbon markets have been established in Europe, Alberta and here in BC.

How are Carbon Offsets Created?

Offset credits are created when a private or public organization undertakes a project to avoid, or sequester GHG emissions. Project activities typically fall under three general categories:

- Fuel switching (i.e. from natural gas to electricity);
- Energy efficiency (i.e. the replacement of old boilers for highly efficient boilers);
- Sequestration (i.e. biologically or mechanically capturing and storing emissions).

Who Buys Carbon Offsets in BC?

Currently, the BC carbon market is sustained by the commitments of public agencies and the voluntary pledges of private companies. For example, in 2010 the Government of BC committed (through legislation) to have all of its ministries and agencies be carbon neutral. Similarly, most local governments in BC are signatories to the Climate Action Charter which provides a framework that commits municipalities to have carbon neutral operations for the year 2012 and beyond.

Who Sells Carbon Offsets in BC?

Any public or private organization is eligible to pursue an offset project. However, the BC Emission Offset Regulation requires that a project must be: Measurable → Reliable → Additional; and → Verifiable.

Who Connects Buyers and Sellers?

The carbon market in BC is primarily facilitated by the Pacific Carbon Trust (PCT). The PCT offers brokerage services and a trading platform to connect parties that have created carbon credits (credit suppliers) to parties that are required to, or voluntarily wish to, offset their GHG emissions (credit purchasers).

Why Carbon Offsets?

Carbon credit markets work to:

- find the most cost-effective emissions reduction projects;
- incent action that would not have otherwise been taken;
- enable parties to define the cost of achieving an emissions reduction target; and
- achieve the desired environmental outcome.



3) Energy Security and Rising Costs

An Overview of Our Energy Supply

Electricity

The City of Kamloops' electrical power needs are served by BC Hydro. BC Hydro is responsible for operating the Province's electrical power generation, transmission and distribution system. Power in BC is primarily produced from hydroelectric facilities, and is complemented by power generated from natural gas, wind and cogeneration facilities.

Natural Gas

Western Canada is home to some of the world's most prolific and important natural gas resources. Considering that BC and Alberta provide over 85% of all of Canada's natural gas needs, it is highly likely that the City sources the majority of its natural gas from regional supplies.

Transportation Fuels

While the oil market is global in nature, it is important to acknowledge that BC relies primarily on transportation fuels produced in Alberta. Therefore, the fuels used to power the City of Kamloops' vehicle fleet have likely been sourced from the Province of Alberta. Other sources of transportation fuels include Washington State and California.

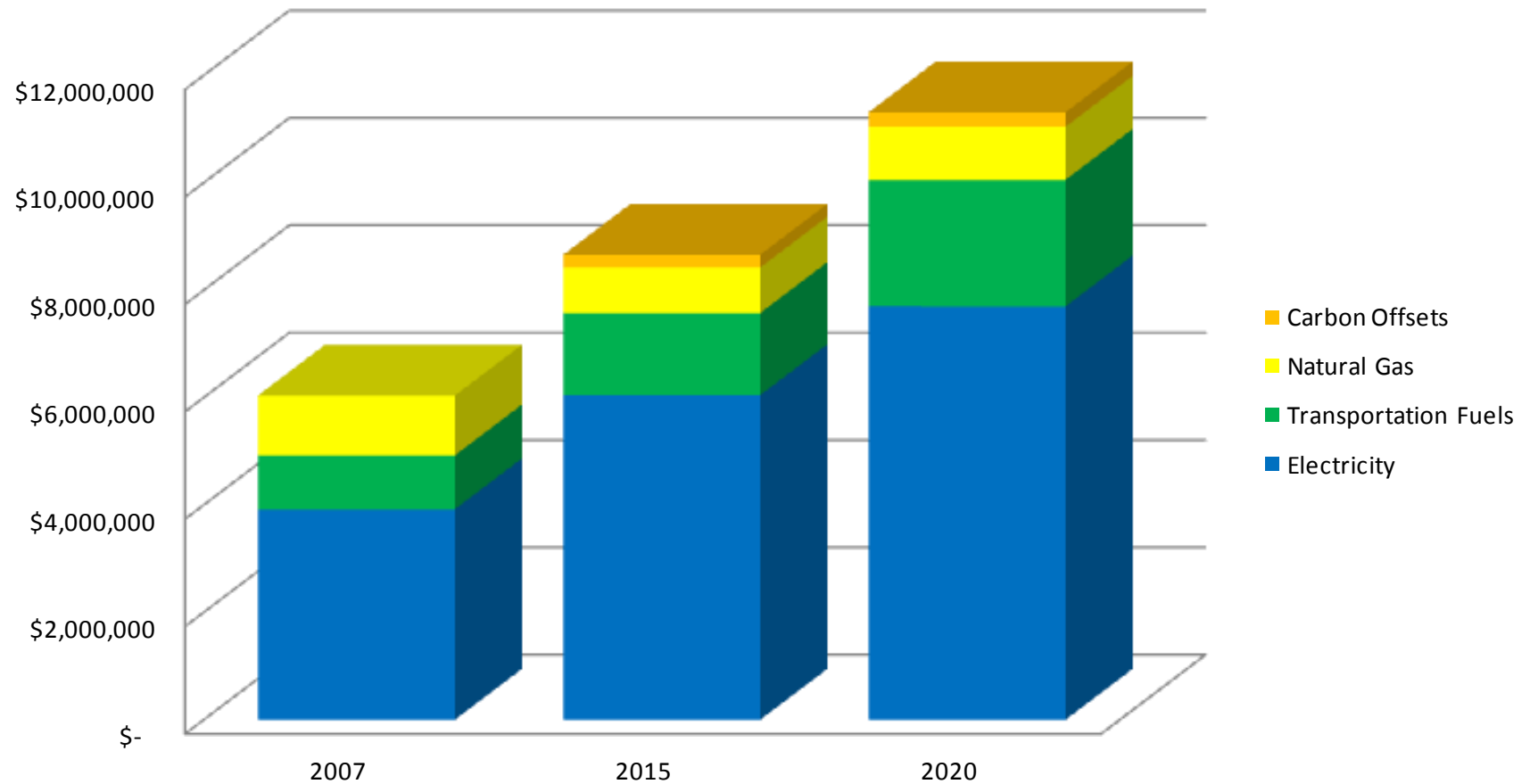
Energy security is becoming a critical issue for both the global community and local communities in BC. Access to stable, reliable, and affordable supplies of energy is fundamental to the City's continued progress. However, ever-increasing global competition for energy resources, a diminishing supply of traditional sources of energy, continually rising costs of energy at rates typically greater than inflation and a strong social consciousness about the environmental impacts of energy has provided the impetus for both global and local action. The City of Kamloops recognizes the need to address these issues to ensure the long-term economic resiliency and social well-being of the community.

As the City considers the global challenges of energy security and rising prices, it is clear that Kamloops is not isolated. Based on energy price forecasts,¹⁰ it is evident that the cost of operating the City's administrative buildings, community facilities and corporate fleet will continue to rise. As illustrated in Figure 3, without significant changes to our energy management practices our annual corporate energy costs could dramatically increase; rising from approximately \$6 million to \$11 million over the next decade.

¹⁰ Energy costs were calculated based on Natural Resources Canada's Energy Outlook (<http://www.nrcan.gc.ca/publications/energy-outlook/788>) and BC Hydro Rate Change Policies.



Figure 3: Actual and Forecasted Energy and Carbon Costs for the City of Kamloops





Community Leadership

The City of Kamloops has a long-standing commitment in supporting community sustainability. For example, in 1996 the City joined the Partners for Climate Protection (PCP) program and committed to reducing the community's GHGs and acting on climate change. Additionally, in 2007 the City signed the BC Climate Action Charter, pledging to cut GHG emissions, and in 2010, the City adopted the Sustainable Kamloops Plan which outlined a sustainability blueprint for the City. As a result, many positive changes have been implemented throughout the community. Some examples include:

- Introducing curb-side recycling collection using a split-body, 1-pass system (collection trucks that can collect both waste and recycling at the same time) which saves on fuel and emissions;
- Installing water meters to encourage efficient water use which will inherently reduce electricity usage in pumping facilities;
- Purchasing hybrid vehicles for the City's fleet;
- Curbing outdoor burning practices that impact local air quality;
- Integrating land use and transportation planning at City-wide, neighbourhood and site levels to reduce vehicle travel demand;
- Constructing three Leadership in Energy and Environmental Design (LEED) buildings, including the Tournament Capital Centre, the McArthur Island Sports Center and the Kamloops Centre for Water Quality;
- Planning and working towards implementing a landfill gas collection system with the potential for on-site electrical generation;
- Upgrading incandescent traffic signal lamps to light emitting diode (LED) lighting to reduce energy use by nearly 80%;
- Incorporating a waste heat recovery system at the McArthur Sports Centre to utilize waste heat from the ice refrigeration plant to supplement building heating;
- Development of the Airshed Management Plan which will be adopted by Council in 2012; and



Objectives and Targets

Based on the City's commitments outlined on Page 2, this Plan includes ambitious, yet realistic objectives to enhance energy sustainability and reduce emissions. These targets include:

- Using carbon neutral energy at all City facilities by 2035;
- Producing the equivalent of 10% of City (corporate) energy needs through alternative energy systems by 2020;
- Being building energy self sufficient by 2050;
- Reducing consumption of fossil fuels for transportation by 25% by 2020; and
- Constructing all new municipal building to equivalent of LEED gold standard.
- Reducing corporate electricity consumption by 1 GWh annually.
- Becoming a carbon neutral government; and
- Reporting the City's corporate energy use and GHG emissions annually.

As part of this Plan, the City of Kamloops will continue to position itself as a community leader in sustainable energy and emissions management. It aims to enhance the overall sustainability of Kamloops and establish a clear path to enable best-practices in energy and emissions management.





Understanding the City's Energy Needs and Emissions Profile

Corporate Energy and Emissions Baseline

A comprehensive energy use and GHG emission baseline is of critical importance to the success of this plan. It will provide a clear reference point from which the City can measure and monitor the effectiveness of this Plan and the actions outlined within it. This approach will also help staff to identify the critical areas of energy consumption and to implement energy saving opportunities which best suit the organization and the environment.

For the purposes of the CEEMP, the City of Kamloops will measure its performance relative to a 2007 baseline year. This represents the year in which the City of Kamloops committed to the BC Climate Action Charter and initiated energy use and GHG emission reduction activities. The City of Kamloops 2007 Corporate Energy and Emissions Baseline is:

2007 TOTAL ENERGY USE: 319,850 GJ

2007 GHG EMISSIONS: 8,254 TONNES

Table 1 provides a high-level overview of the City's consumption of electricity, natural gas and transportation fuels over the course of 2007. The corresponding GHG emissions and expenditures were calculated based on those totals.



Table 1: City of Kamloops Corporate Energy and Emissions Inventory Summary (2007)

	Energy Use (GJ)	Energy Use (%)	GHG Emissions (tonnes CO ₂ e)	GHG Emissions (%)	Annual Expenditures (\$)	Annual Expenditures (%)
Electricity	196,885	62%	1,210	15%	\$3,900,000	65%
Natural Gas	84,223	26%	4,236	51%	\$1,100,000	18%
Gasoline/Diesel	37,742	12%	2,739	33%	\$1,000,000	17%
Propane	1,013	0%	68	1%	\$1,000	0%
TOTAL	319,863	100%	8,254	100%	\$6,001,000	100%

As illustrated in Table 1, the majority of the City's energy needs are met from electricity. As a result, electricity has long represented the City's greatest utility cost at approximately 65% of the City's total energy expenditures. However, since electricity in BC is primarily generated from hydroelectric—which has a low carbon footprint—the resulting GHGs only represent 15% of the City's emission profile.

The bulk of the City's emissions result from the use of natural gas (51%) in buildings and facilities and transportation fuels (33%) which are required to operate vehicles and equipment. Therefore, in order to manage GHG emissions within the City's corporate profile, the focus needs to be put in these areas.

NOTE: It is important to highlight that GHG emissions from the City's landfills are not included in this GHG baseline. These emissions will likely be accounted for in the City of Kamloops Community Energy and Emissions Inventory.¹¹ Similarly, emissions resulting from transit operations are managed by BC Transit and are not included in this Plan or in the City's emissions inventory.

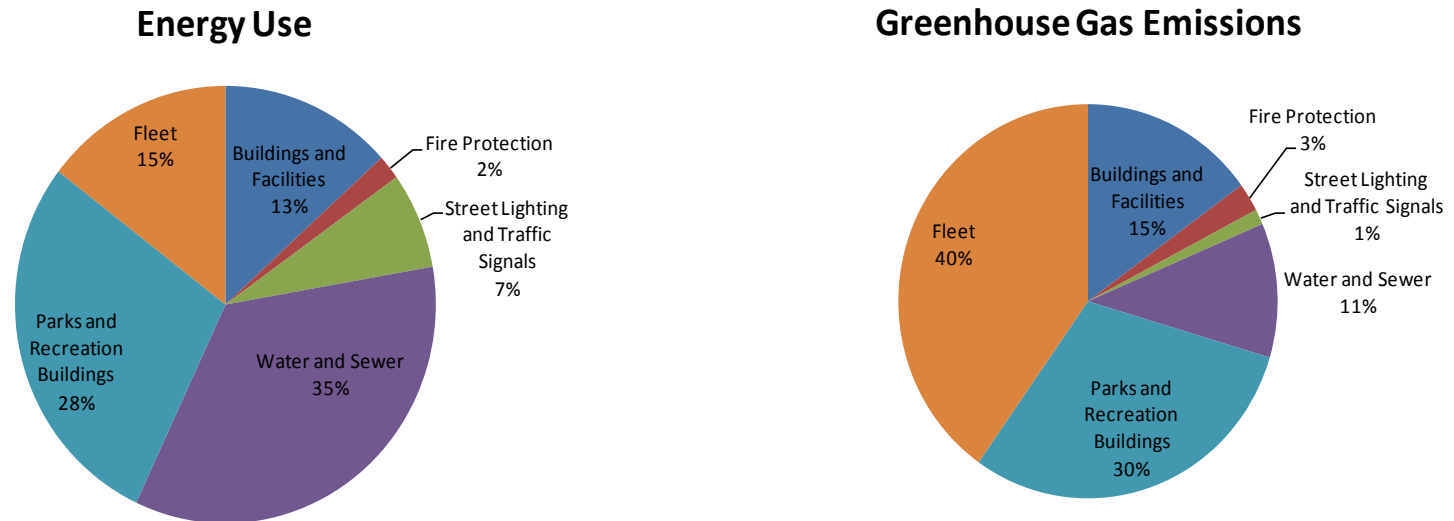
Energy and Emissions: By Service Area and Assets

¹¹ Available at: http://www.env.gov.bc.ca/cas/mitigation/ceei/RegionalDistricts/Thompson-Nicola/ceei_2007_kamloops_city.pdf



The following figures illustrate energy use and GHG emissions by key City service areas and assets.

Figure 4: Composition of Corporate Energy Consumption (left) and Emissions (right)¹²



As highlighted in Figure 4, from an energy consumption perspective, it is evident that a significant portion (35%) of the City's energy use is associated with the delivery of water and wastewater services. These services rely primarily on electricity and, therefore, only represent a small portion (approximately 11%) of the City's GHG profile.

The operation and maintenance of the City's parks and recreational facilities require a significant input of energy wherein the main source is natural gas. As a result, nearly 30% of energy use and GHG emissions result from these operations.

The corporate fleet¹³ represents approximately 15% of the City's total energy use. Since transportation fuels have a high carbon intensity per unit of energy, the operation of the fleet represents approximately 40% of the City's emissions profile.

¹² Based on 2010 data.

¹³ The corporate fleet represents all City vehicles and motorized equipment.



Corporate Energy and Emissions Forecast

Kamloops is one of the fastest-growing communities in the province and is projected to reach a population of 120,000 by 2036.¹⁴ This translates into almost a 40% population increase, or approximately 1,400 more people per year. This growth is expected to increase the demand on City services, which will likely lead to an increase in the amount of energy needed to operate the City's facilities, infrastructure and fleet. Based on anticipated population growth projections (~1.25% between 2012-2020), and without significant changes in the City's energy and GHG management practices, the City's total energy use and GHG emissions will increase. Table 2 highlights the anticipated increase of each energy type based on the City's growth projection.

Table 2: 2007 and Forecasted Energy Use

Energy	2007	2020	2030
Electricity	55,000 MWh ¹⁵	65,000 MWh	74,000 MWh
Natural Gas	83,000 GJ	85,000 GJ	96,000 GJ
Gasoline	410,000 liters	460,000 liters	520,000 liters
Diesel	644,000 liters	990,000 liters	1,125,000 liters
Propane	44,000 liters	47,000 liters	53,500 liters

As illustrated in Figure 5, the City's total GHG emissions could reach 10,000 tonnes by 2020¹⁶ and further increase to 11,000 tonnes by 2030; assuming a "business-as-usual" scenario.

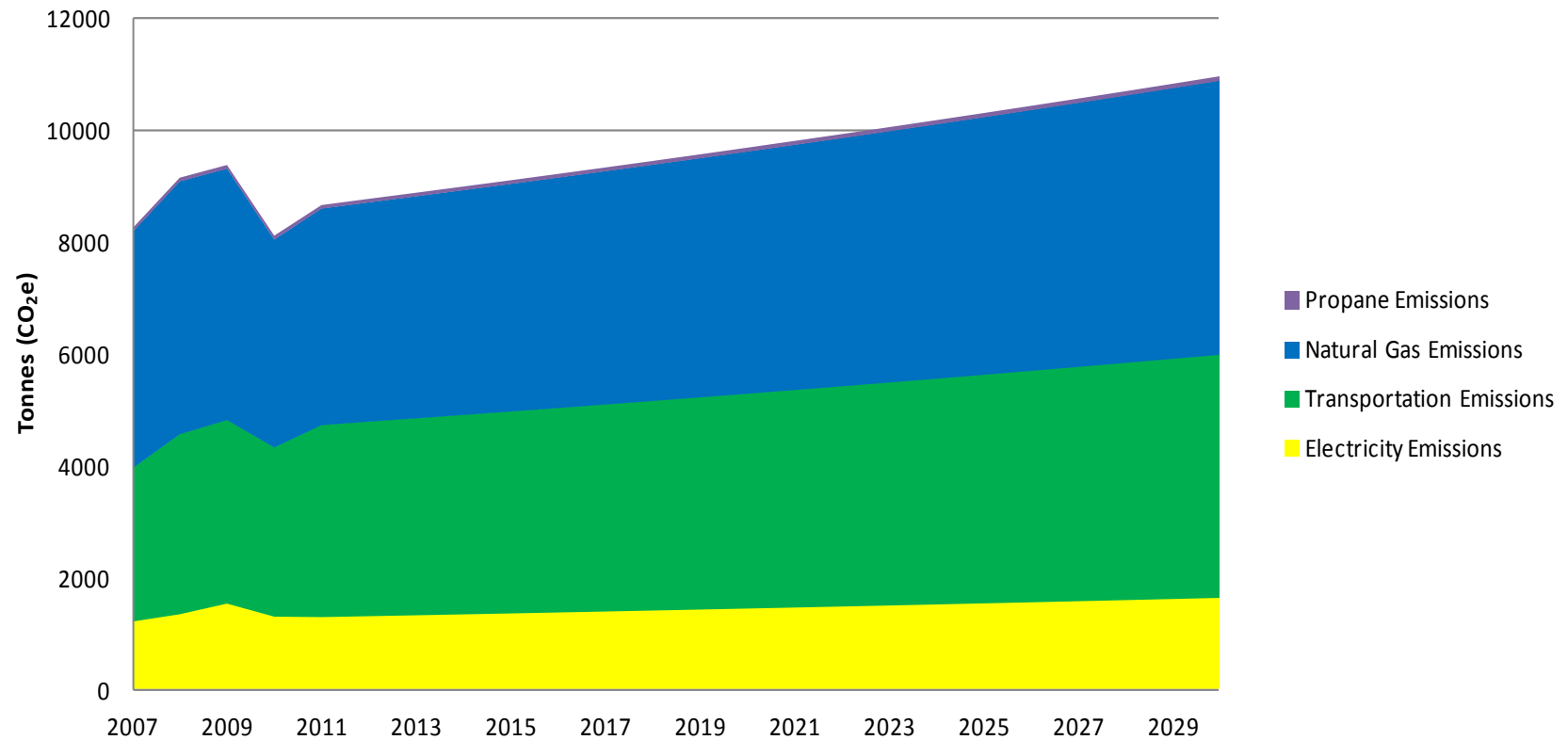
¹⁴ This assumes an annual growth rate of 1.25%. See the KAMPLAN (2004) and Development Cost Charge Bylaw Update (2010).

¹⁵ MWh is a megawatt hour. 1 MWh = 1,000 kWh.

¹⁶ This growth rate incorporates street lighting additions of approximately 50poles/year, 1 to 2 booster stations per year, building expansions and renovations, as well as averages out the load resulting from the Sewage Treatment Plant over the forecasting period.



Figure 5: Actual and Forecasted GHG Emissions¹⁷ (under Business as Usual Scenario)



¹⁷ Figure 5 shows a significant decrease in the City's natural gas consumption between 2009-2010. This fluctuation can be attributed to boiler upgrades to the Canada Games Aquatic Centre, Interior Savings Centre as well as seasonal variations.



Reduction Opportunities and Planned Actions

The City of Kamloops Corporate Energy Team has identified a number of energy and emissions management actions. These have been categorized under four major headings: Buildings and Facilities, Fleet and Equipment, Infrastructure, and Awareness and Leadership. There are twelve commitments in the plan identified are:

- **Buildings and Facilities**
 - Commitment 1: High Energy Performance of New Municipal Buildings and Facilities to Emulate a LEED Gold Standard
 - Commitment 2: Conduct Audit and Retrofit Activities in City Buildings and Facilities
 - Commitment 3: Include Alternative Energy or High Efficiency Assessments for Replacements, Renovations, & Maintenance Activities
 - Commitment 4: Develop and Implement Ongoing Energy Management Activities
- **Fleet and Equipment**
 - Commitment 5: Continue Implementation of Green Fleet Management Activities
- **Infrastructure**
 - Commitment 6: Maximize the Energy Efficiency of the City's Water and Wastewater Systems
 - Commitment 7: Investigate Alternative Energy Sources
 - Commitment 8: Evaluate and Implement Lighting Upgrades and Alternatives
- **Awareness & Leadership**
 - Commitment 9: Establish a Procurement Policy that Considers Energy Costs and GHG Emissions
 - Commitment 10: Encourage Energy Conservation Behaviors in the Workplace
 - Commitment 11: Expand Energy Monitoring and Reporting Systems and Tools
 - Commitment 12: Financing the Corporate Energy and Emissions Plan

While most of the actions outlined in this Plan will reduce energy use and GHG emissions, some of the identified actions are dependent on further research and analysis. Appendix 1 provides an Implementation Evaluation Matrix to highlight the financial costs and benefits of each action, as well as potential impacts to the City's corporate energy use and GHG emissions profile.



Buildings and Facilities

This category encompasses all of the City of Kamloops' administration and municipal buildings in addition to the Firehalls, the RCMP building and each of the recreation facilities. The actions within this category aim to see the City maximize opportunities for delivering long-term environmental and financial benefits. For example, the City is committed to pro-actively integrating the benefits of energy sustainability when developing new buildings using design for environment principles, and regularly auditing and upgrading existing buildings to achieve the highest level of efficiency that is feasible. In addition to the outlined investments in City buildings, it is recognized that energy management practices must be developed to support the wise use of energy by City employees and community users of buildings and facilities.

<i>Number of Buildings and Facilities¹⁸</i>	<i>40</i>
Annual Electricity Consumption	17,750,000 kWh
Annual Natural Gas Consumption	71,250 GJ
Annual Propane Consumption	44,500 liters
Annual GHG Emissions	4,097 tonnes CO₂e¹⁹

ANTICIPATED EMISSIONS REDUCTIONS BY 2020 FROM BUILDINGS AND FACILITIES: 1840 TONNES*
ANTICIPATED ENERGY SAVINGS BY 2020 FROM BUILDINGS AND FACILITIES: 40,000 GJ NATURAL GAS*

**Based on implementation of all actions listed in Commitments 1, 2, 3, and 4.*

¹⁸ Not including washrooms/changerooms in parks, leased buildings or booster stations. These are included in "infrastructure".

¹⁹ CO₂e = Carbon Dioxide equivalents.



Recent, Planned and Proposed Commitments

Commitment 1: High Energy Performance of New Municipal Buildings and Facilities to Emulate a LEED Gold Standard

<u>Actions</u>	<u>Implementation Year</u>	<u>Cost</u>	<u>Benefit</u>
1. Implement energy saving technologies and designs into the Aberdeen Firehall No. 7.	2011 (complete)	\$40,000	\$200/yr
2. Optimize energy use in the new Sewage Treatment Plant Administration Building.	2013	\$40,000*	\$2,000/yr

Expected Benefits:

Once a building has been constructed it is very challenging and often expensive to reduce its energy use footprint. Therefore, the City will strive to maximize the energy performance of all new City buildings and facilities. This is expected to:

- Require minimal, if any, additional construction costs;
- Lower the long-term operating and maintenance costs;
- Increase the financial and community value of buildings; and
- Significantly lower corporate energy use and GHG footprint.



Commitment 2: Conduct Audit and Retrofit Activities in City Buildings and Facilities			
<u>Actions</u>	<u>Implementation Year</u>	<u>Cost</u>	<u>Benefit</u>
1. Complete a comprehensive Fortis energy audit at the RCMP Building, Public Works Yard, Tournament Capital Centre Fieldhouse, Canada Games Pool and Interior Savings Center	2010 (complete)	\$0	n/a
2. Complete detailed lighting audits at Westsyde Pool, Tournament Capital Centre Fieldhouse, Canada Games Pool, Brock Arena and Interior Savings Center	2011 (complete)	\$0	n/a
3. Pursue recommendations from energy audits to improve system controls, enhance the efficiency of lighting and heating and cooling systems at City facilities.	2011-2020	\$132,000*	\$49,700/yr
4. Complete a study examining the cooling requirements of the City Hall server room. Evaluate the possibility of heat recovery; examine efficient cooling options, and establish a long term plan for server room cooling requirements.	2012	\$10,000	n/a
5. Implement recommendations of the server room cooling requirements energy study.	2013	TBD	TBD
<u>Expected Benefits:</u> In addition to the anticipated reduction of emissions (approximately 530 tonnes per year), the actions listed above are likely to contribute significant benefits to the City over the long-term. These benefits are likely to include: reducing energy costs, providing more attractive community amenities and extending the lifecycle of the City's assets.			



Commitment 3: Include Alternative Energy or High Efficiency Assessments for Replacements, Renovations, & Maintenance Activities			
<u>Action</u>	<u>Implementation Year</u>	<u>Cost</u>	<u>Benefit</u>
1. Implement geothermal heating for the field house expansion at Tournament Capital Centre. This action significantly increased the energy performance of the entire facility	2008 (complete)	\$242,000	\$45,000/yr
2. Complete boiler upgrades at Westsyde Pool, Tournament Capital Centre, and Interior Savings Centre. These upgrades have resulted in improved water heating for pools, domestic water, and heating systems while reducing energy consumption (1999-2009)	2009 (complete)	\$300,000	\$65,000/yr
3. Integrate the energy management plan with our asset management program to evaluate aging assets and compare the cost of continued operation versus the cost of replacement with energy efficient equipment.	2013	\$0	n/a
4. Install solar power systems in parks washrooms to reduce power requirements and possibly eliminate the need for BC Hydro service at these locations.	2012 - 2014	\$15,000	\$300/yr
<u>Expected Benefits:</u> The City's recent investments into these facilities have significantly reduced their total energy use and GHG footprint by over 200 tonnes. For example, the City has seen a significant reduction in the total amount of natural gas required to operate the Tournament Capital Centre. This reduction has led to a 28% emissions reduction in that facility.			



Commitment 4: Develop and Implement Ongoing Energy Management Activities	
<u>Actions</u>	<u>Implementation Year</u>
1. Review all building and facility utility bills on a bi-monthly basis.	Ongoing
2. Consider hiring a Sustainability Coordinator and Energy Manager.	Complete & Ongoing
3. Create an Energy and Emissions Management link on the CityNet homepage to show up-to-date energy and emissions data at the top 10 energy consuming facilities.	2012
4. Develop load profiles for each building and facility to monitor energy performance.	Ongoing
5. Create an Energy Team to generate ideas for future energy and emissions reduction projects.	Complete
6. List the status of the planned actions in the Reduction Opportunities and Planned Actions section of this document with the Sustainable Kamloops Plan initiatives and update annually.	Ongoing
7. Revisit and update the CEEMP every five years.	Ongoing
<u>Expected Benefits:</u> While it is difficult to measure the impact of all of these specific actions, the City recognizes the long-term benefits associated with developing a culture of energy sustainability within the administration. It is also recognized that this culture must be enabled with the appropriate resources to help the City meet its short and long term commitments.	



Fleet & Equipment

This category is made up of heavy duty equipment, compact cars, pickup and service trucks, solid waste collection vehicles and all road maintenance vehicles (snow removal, street sweepers). Currently the City of Kamloops' fleet consists of approximately 436 pieces of equipment but this number varies depending on seasonal and or service requirements. The City fleet accounts for approximately 40% of the City's total GHG emissions. The City has already undertaken several initiatives to reduce fuel consumption and GHG emissions. Future green-fleet activities include replacing older vehicles with best-in-class fuel efficiency vehicles, further incorporation of fuel conservation into fleet maintenance practices, and exploring the option of using alternative fuels with a lower carbon footprint.

<i>Number of Vehicles and Equipment</i>	<i>436</i>
Annual Gasoline Consumption	410,000 liters
Annual B5 Diesel Consumption	644,000 liters
Annual GHG Emissions	2,739 tonnes CO₂e

ANTICIPATED EMISSIONS REDUCTIONS BY 2020 FROM THE FLEET: 1125 TONNES*

ANTICIPATED FUEL SAVINGS BY 2020 FROM THE FLEET: 550,000 LITERS*

**Based on implementation of all actions listed in Commitment 5.*



Recent, Planned and Proposed Commitments

Commitment 5: Continue Implementation of Green Fleet Management Activities			
<u>Actions</u>	<u>Implementation Year</u>	<u>Cost</u>	<u>Benefit</u>
1. Reduce unnecessary fleet idling through a corporate anti-idling initiative.	2008 (complete)	\$1500	\$500
2. Continue to support inclusion of alternative fuels for City fleet through the: <ul style="list-style-type: none"> a. Investigation of compressed natural gas fuel for new solid waste trucks. b. Use of B5 biodiesel for all diesel fleet vehicles and equipment. c. Piloting of a hydrogen-assist system on a shop service truck. 	2011 (ongoing)	a. \$40,000 ²⁷ b. \$49,000/yr c. \$3,000-\$8,000	a. \$5,000 b. \$4,600 c. \$0
3. Review biodiesel on a bi-annual basis to align with current fleet requirements.	2013	n/a	n/a
4. Continue fleet 'right-sizing' efforts by implementing a: <ul style="list-style-type: none"> a. Hybrid vehicle replacement council policy for compact cars. b. Diesel light and medium truck replacement for gasoline trucks. c. Incentive program for departments to retire older/unneeded vehicles. 	2006 (complete)	a. \$4,000 ea b. \$10,000ea c. \$0	a. \$500 b. \$1,000 c. \$250
5. Offer an eco-driving course to City staff to enhance driving practices.	2013	< \$1,000	\$1,000
6. Use compressed natural gas/propane/other fuels on multiple fleet vehicles.	Ongoing	\$5,000 ea	\$500



7. Investigate the expansion of a GPS vehicle tracking program and the potential benefits of the data collected regarding route tracking and idle time.	2013	\$125,000	Up to \$80,000
Expected Benefits: The City's corporate fleet represents the largest portion of the City's GHG emissions profile; therefore the actions listed above represent a significant portion of expected reductions. Specifically, it is anticipated that these actions will avoid over 1500 tonnes of GHG emissions per year.			

Infrastructure

This category includes street lighting, water and wastewater facilities as well as the City's "green" infrastructure such as parks and sports fields. Each of these services is highly dependent on electricity; therefore, actions outlined below will not have a significant impact on the City's GHG footprint. Rather, they will significantly reduce the total amount of energy required to operate the City's infrastructure and, ultimately, the cost.

Some initiatives include user control lighting, applying dimming hardware to outdoor lighting, replacing old lighting technologies with LED technologies, installing variable frequency drives on pumps, and controlling demand charges within pumping operations.

ANTICIPATED EMISSION REDUCTIONS BY 2020 FROM CITY INFRASTRUCTURE: 175 TONNES*

ANTICIPATED ELECTRICITY SAVINGS BY 2020 FROM CITY INFRASTRUCTURE: 4.6 GWh*

**Based on implementation of all actions listed in Commitments 6, 7, and 8.*

Number of Assets	350+
Annual Electricity Consumption	37,000,000 kWh ²⁰

²⁰ kWh = kilowatt hour



Annual Natural Gas Consumption	12,000 GJ
Annual GHG Emissions	1,418 tonnes CO₂e

Recent, Planned and Proposed Commitments

Commitment 6: Maximize the Energy Efficiency of the City's Water and Wastewater Systems			
<u>Actions</u>	<u>Implementation Year</u>	<u>Cost</u>	<u>Benefit</u>
1. Conduct an air systems audit at Kamloops Centre for Water Quality.	2011 (complete)	\$0	See 6.2
2. Implement actions recommend by air system energy audit.	2013 - 2020	\$250,000	\$32,000
3. Complete the installation of residential water meters.	2011-2014	n/a	\$195,000
4. Complete energy review of the Sewage Treatment Centre Design and implement recommendations.	2011 (complete)	0	See 6.5
5. Install turbo blowers at the Sewage Treatment Centre.	2013	\$380,000 ²⁸	\$105,000
6. Complete a Water System Energy Optimization Study.	2012	0	See 6.7
7. Implement actions recommended by the Water System Energy Optimization Study.	2013 - 2020	TBD	TBD
8. Upgrade pumps and equipment at the Pulp Mill Lift Station.	2015	\$50,000-\$200,000	\$15,000
9. Investigate meter network reading options. Compare benefits of reading device installed in a vehicle compared to the use of a fixed communication network system to relay data.	2015 - 2016	TBD	TBD



10. Investigate the benefits and costs associated with the upgrade of commercial water meters to RF data collection system.	2017	TBD	TBD
<u>Expected Benefits:</u> These actions could reduce total energy consumption by over 10 GWh by 2020. The energy savings will significantly impact the City's financial bottom line and would yield nearly a 25% reduction in electrical use.			

Commitment 7: Investigate Alternative Energy Sources			
<u>Actions</u>	<u>Implementation Year</u>	<u>Cost</u>	<u>Benefit</u>
1. Complete a Landfill Gas Generation Study at Mission Flats Landfill and implement a landfill gas collection system that could be used to generate electrical power.	In Progress	\$2.6M	> \$ 400,000
2. Undertake an energy study of the Summit Trunk sewer line from Summit Drive to the Sewage Treatment Centre. Consider re-routing to use gravity feed and eliminate pumping through the pulp mill lift station or consider energy generation through installation of in-line turbines.	2014-2015	TBD	TBD
3. Conduct a preliminary feasibility study to capture hydraulic energy in pressure reducing valves to determine the suitability of future investments.	2013	\$210,000* ea	\$24,000
4. Explore the feasibility of electrical generation using the methane captured at the Sewage Treatment Centre lagoons.	2016	TBD	\$225,000



5. Investigate retrofitting City buildings to incorporate solar hot water technologies to reduce the building's GHG footprint and demonstrate the City's commitment to sustainable energy.	2013	See Appendix 1
6. Investigate District Energy System opportunities.	Ongoing	See Appendix 1
7. Investigate carbon sink opportunities (i.e. Tree Planting)	2013	See Appendix 1
<u>Expected Benefits:</u> The City's commitment to supporting local renewable energy supplies is significant and its potential benefits should not be understated. While the actions of this commitment will likely require a significant investment to be made by the City, they could result in approximately 30,000 tonnes of GHG emission reductions by 2020. If successfully implemented, these actions could lead to an opportunity to generate and sell carbon offset credits.		

Commitment 8: Evaluate and Implement Lighting Upgrades and Alternatives			
<u>Actions</u>	<u>Implementation Year</u>	<u>Cost</u>	<u>Benefit</u>
1. Implement LED lighting at the new North Shore transit exchange. This action has reduced energy use by 50% relative to other lighting technologies.	Complete	\$12,500	\$1,000
2. Convert Museum lighting from incandescent bulbs to LED.	Complete	\$9,600*	\$1,800
3. Implement adaptive LED street-lighting technologies throughout the City.	2012-2014	\$673,000*	\$68,000



4. Implement a user-control lighting system at sports fields and recreational facilities to provide users the ability to directly impact energy consumption.	2012	\$2,400	\$3,200
5. Investigate the feasibility of a solar lighting program.	2013	\$0	n/a
6. Review lighting in city facilities. Identify savings potentials and evaluate suitable product types. Implement lighting upgrades as identified.	2012 - 2015	\$0	TBD
<u>Expected Benefits:</u> Lighting the streets of Kamloops requires a significant amount of electricity. The City spent over \$1 million in lighting in 2010 alone. By implementing these actions, the City can significantly reduce energy costs. For example, the recent lighting upgrades at the Museum have reduced the building's electrical consumption by over 30% and resulted in significant operational cost savings.			

Awareness & Leadership

While often overlooked, awareness and leadership are often the most effective, cost-efficient and critical component of any energy and emissions management plan. Supporting a work environment that enables leadership and action will ultimately support the long-term sustainability of this Plan and the City's future actions. While the City has outlined a number of quantifiable actions and investments, it is anticipated that efforts to build internal capacity through education and awareness will provide significant benefits. By promoting energy conservation behaviors throughout the City of Kamloops organization, it is anticipated that further reductions of the operations of the City's buildings and facilities, fleet and equipment and infrastructure will be achieved.

ANTICIPATED NUMBER OF STAFF ENGAGED IN SUSTAINABLE ENERGY MANAGEMENT: 100%



Planned/Proposed Commitments

Commitment 9: Establish Policies that Considers Energy Costs and GHG Emissions	
<u>Actions</u>	<u>Implementation Year</u>
1. Further encourage sustainability reporting practices in the submission of reports to Council. When possible, anticipated energy and GHG metrics will be reported.	2011 (complete)
2. Include sustainability criteria in all RFP requirements.	2012 (complete)
3. Develop a sustainable purchasing policy.	2012
4. Include energy costs and GHG emissions in the total cost of ownership considerations when evaluating new equipment and device purchases during the project evaluation and design process.	2012
5. Update the Official Community Plan to include favourable consideration for energy costs associated with new development from a community and organizational perspective. Urban growth management boundaries will be set.	2013 - 2014
6. Develop a community energy and emissions management plan, as outlined in the Sustainable Kamloops Plan.	2013
7. Support the purchasing of energy-wise technologies and ensure the City purchases Energy Star computers, appliances and equipment.	2012
<u>Expected Benefits:</u> The City's procurement policies and practices can have a lasting impact on long-term energy use and GHG emissions. Moreover, they can influence the market demand for local, greener, and more energy-wise products.	

Commitment 10: Encourage Energy Conservation Behaviors in the Workplace



<u>Actions</u>	<u>Implementation Year</u>
1. Present baseline energy data to City managers bi-annually.	Ongoing
2. Present changes on energy prices and rate structures to City managers regularly.	Ongoing
3. Develop and implement employee awareness events.	2011-2012
4. Support energy reduction contests between City departments.	2012 (ongoing)
5. Develop resources and programs to ensure energy reduction behaviors continue after events and contests are completed.	2012
6. Support employee behavior changes with energy management tools where possible. An example of this is the use of software to manually shut down and wake up computers.	Ongoing
<u>Expected Benefits:</u> Supporting a work environment that promotes energy conservation is one of the most cost-effective ways to reduce energy costs and GHG emissions. It is anticipated that the City's efforts to support employee awareness and action will significantly enhance corporate energy performance in a very cost-effective fashion.	

Commitment 11: Expand Energy Monitoring and Reporting Systems and Tools			
<u>Actions</u>	<u>Implementation Year</u>	<u>Cost</u>	<u>Benefit</u>
1. Utilize data from power monitors installed in the City's LEED designed buildings (McArthur Sports Center, Tournament Capital Centre, Kamloops Centre for Water Quality, and Fire Hall No. 7).	2013	-	-
2. Execute the use of the SmartTool software developed by the Government of British Columbia to monitor and measure energy use and emissions	2011 (complete)	\$9,000	-



3. Purchase and use a power meter to record and monitor power quality at locations where billing indicates poor power factor. Install correction hardware where required.	2011 (ongoing)	\$3,000	> \$15,000
4. Evaluate the value of sub-metering at the High Lift Station.	2012	\$30,000 ²⁹	-
5. Investigate development of an automated system for tracking and reporting energy account data.	2012	\$0	-
Expected Benefits: The City of Kamloops has over 400 accounts with BC Hydro, over 60 accounts with Fortis BC, and several accounts with transportation fuel providers. Having the appropriate energy monitoring and reporting tools in place will help profile the City's energy use and actively identify opportunities to reduce energy use and emissions.			

Commitment 12: Financing the Corporate Energy and Emissions Plan

Actions

Implementation Year

1. Dedicate Climate Action Rebate Incentive Program Rebates to City sustainability programs and activities. 2012 & ongoing
2. Develop a revolving Energy Savings Fund.
 - Use this fund to maximize the value of funding provided by BC Hydro, Fortis BC, and senior levels of government to fund energy and emissions reduction projects.
 - Dedicate any offset credit revenues to the Energy Savings Fund to further reduce energy consumption and GHG emissions. 2012 & ongoing
 - Allow individual departments who save money through energy conservation to re-invest these funds into projects within their department.
3. Continue to utilize and leverage external funding programs to support energy saving activities. Ongoing



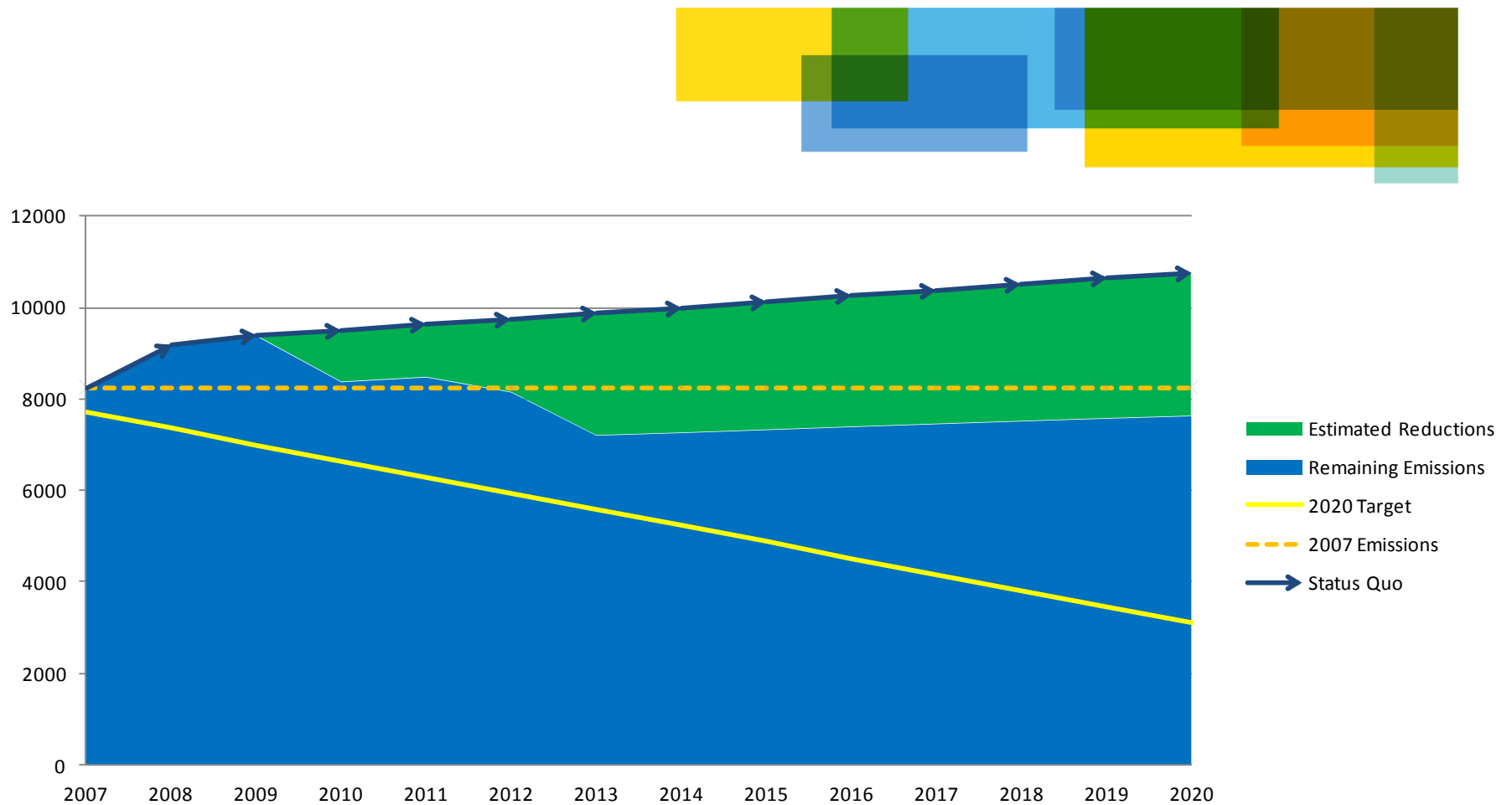
Expected Benefits:

One of the greatest challenges to the implementation of this plan will be access to financial resources. To ensure the City is positioned for success, the City is committed to developing a comprehensive financing strategy that secures monies from funding agencies, recycles energy cost savings into new projects, and supports the development of new revenues.

The Expected Impact of the City's Actions

By implementing the actions and projects outlined in the previous section, the City could reduce its corporate GHG emissions profile by approximately 3100 tonnes by 2020. This represents a 30% reduction in GHG emissions relative to the City's 2007 Business-As-Usual emissions. To achieve carbon neutrality the City will likely need to purchase offset credits. It is estimated that to achieve neutrality in 2012, approximately 8400 tonnes of carbon credits will need to be purchased. In 2020, nearly 7500 tonnes of credits will need to be purchased to achieve carbon neutrality.

Figure 6: The Impact of Each Action in Terms of Total Anticipated Emission Reductions



To achieve the goals and targets set out in the Sustainable Kamloops Plan pertaining to energy and emissions reductions, the City will have to re-visit this document and update the reduction opportunities and planned actions lists. The items outlined in this version of the document aim to bring the City's emissions below the 2007 baseline level. Once that goal has been achieved, new actions will need to be laid out to further reduce emissions and energy use to achieve the targets of the Sustainable Kamloops Plan, including using carbon neutral energy at all City facilities by 2035.



Carbon Offsets and Kamloops Approach to Carbon Neutrality

As the City of Kamloops works to reduce its GHG emissions footprint and progresses to become a carbon neutral organization, carbon offset credits²¹ offer an important tool in supporting the long-term objectives of this plan. Not only can they provide the City with an opportunity to meet its Climate Action Charter objectives, but may enable the City to exceed them.

To help facilitate the budgetary decision-making processes with respect to the role of carbon offset credits the following high-level principles are recommended:

- 1) The City will first and foremost explore carbon offset project opportunities within its own operations.
Objective: The City envisions that it will become a net seller of carbon offset credits.
- 2) The City will preferentially invest in local projects that result in real, measurable and verifiable emissions reductions.
Objective: The City wishes to invest in projects that will support local green economic development opportunities.
- 3) Should the City of Kamloops become a net seller of carbon offset credits, revenues will be allocated into a dedicated Energy Savings Fund.
Objective: These revenues would be re-invested into initiatives that support the sustainability of corporate operations and the community.

The City has identified two projects that would achieve substantial GHG emission reductions. These two projects involve capturing methane at the Mission Flats Landfill Site as well as at the new Sewage Treatment Centre.

- 1) **The Mission Flats Landfill Methane Capture Project:** By capping key sections of the Mission Flats Landfill, the City of Kamloops could prevent the release of methane gas into the atmosphere. This gas, if captured, would be an ideal fuel source for heat and power generation. Based on a recent study conducted on behalf of the City of Kamloops, the Mission Flats Landfill Methane

²¹ A carbon offset credit is a reduction in GHG emissions made in order to compensate for or to offset an emission made somewhere else.



Capture project could prevent the release of approximately 1,425 tonnes of methane or 16,460 tonnes of CO₂e in 2012.²² In the year 2020 this project could prevent the release of over 1,675 tonnes of methane emissions or 19,345 tonnes of CO₂e.

- 2) Sewage Treatment Centre Upgrades:** The City of Kamloops is currently undertaking a significant upgrade to the Sewage Treatment Centre. As planned, the upgrades will include the capping of sewage lagoons to manage odours and methane emissions from organic matters at the facility. Based on preliminary estimates this upgrade will manage over 477 tonnes²³ of methane emissions or 9,087 tonnes of CO₂e.²⁴

From a GHG management perspective, these two projects represent an opportunity to reduce over 28,000 tonnes of CO₂e , or over three times the City's 2010 GHG emissions baseline. The carbon offset credits for the landfill gas capture project have already been factored into the project life-cycle costs until 2016. Further investigation of potential credits beyond the year 2016 is required in the event that regulations change or are amended.

²² Should the City decide to pursue this opportunity, offset credits would likely be worth over \$400,000 per year until 2016. After 2016 these reductions would not qualify to be offset credits since the Government of British Columbia will be regulating the capture of methane emissions from landfills starting in 2016. The potential value of these offset credits has been generated by the best available information to Urban Systems and the City of Kamloops. This value should be seen as an estimate, as it is based on assumptions regarding future events and carbon market prices. Actual results will vary from the information presented here and the variations may be material.

²³ Preliminary estimate derived from information collected by Urban Systems.

²⁴ Should the City decide to pursue this opportunity, offset credits would likely be worth over \$225,000 per year. The potential value of these offset credits has been generated by the best available information to Urban Systems and the City of Kamloops and therefore seen as an estimate. It is based on assumptions regarding future events and carbon market prices. Actual results will vary from the information presented here and the variations may be material.



Conclusion

The City of Kamloops' CEEMP reflects a clear understanding that there is no single action or approach that will enable the City to meet its objectives and targets. Rather, this Plan suggests that energy and emissions management cannot happen in isolation. It requires all City departments to work collectively, in an integrated and explicit fashion to enable action and enhanced performance.

With the implementation of this Plan, the City will report regularly on its progress in taking action and measuring its achievements. The status of planned actions listed in the Reduction Opportunities and Planned Actions section will be updated annually in cooperation with the Sustainable Kamloops Plan initiatives. The CEEMP will be revisited and updated every five years.

In conclusion, the CEEMP represents a key and integrated component of the implementation of the Sustainable Kamloops Plan and enhancing community sustainability. While the City has taken many steps in the past to reduce energy costs and emissions, this Plan charts a clear path forward into the future. This path is about action, not words. It is about leadership, responsibility and making Kamloops a more livable and sustainable community.



Appendix 1: Implementation Evaluation Matrix -- Summary

The following provides an overview of the key actions identified in Reduction Opportunities and Planned Actions section of the CEEMP. To facilitate decision-making processes the *Implementation Evaluation Matrix* highlights:

- Action Type, which includes:
 - Energy efficiency and conservation;
 - Fuel Switching;
 - Management;
 - Energy Tracking;
 - Emissions Avoidance/Offset.
- Departmental Responsibility, as defined by the City's existing organizational units.
- Level of Investment required (capital and operation and maintenance), which is defined by:
 - Low – less than \$10,000
 - Medium – between \$10,000 to \$50,000
 - High – greater than \$50,000
- Level of Impact to Energy Use and Cost, which is defined by:
 - Low – results in less than a 1% savings in energy use and cost
 - Medium – results in an energy savings between 2% and 10%
 - High – results in an energy savings greater than 10%
- Level of Impact to GHG Reductions
 - Low – results in less than a 1% reduction in emissions
 - Medium – results in an energy savings between 2% and 10%
 - High – results in an energy savings greater than 10%
- Long-term Value
 - Low – provides little to no financial payback to the City and minimal impact to energy and emissions
 - Medium – enables the City to re-coup its investments and moderate energy and emissions benefits are achieved
 - High – the City is able to earn a financial return on the investment and significant energy and emission benefits are achieved



Commitment 1: High Energy Performance of New Municipal Buildings and Facilities to Emulate a LEED Gold Standard

*Price excludes additional funding.

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANUAL GHG REDUCTION, tonnes by 2020
1.1	Aberdeen Firehall Green Upgrades	Energy Efficiency and Conservation	Fire Department	Buildings and Facilities	\$40,000	\$200	> 30	0.06
1.2	Sewage Treatment Plant Building Energy Efficiency Measures	Energy Efficiency and Conservation	Public Works & Sustainability	Buildings and Facilities	\$40,000*	\$2,000	20	0.52

Commitment 2: Conduct Audit and Retrofit Activities in City Buildings and Facilities

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANUAL GHG REDUCTION, tonnes by 2020
2.1	Comprehensive Energy Audits	Energy Efficiency and Conservation	Public Works & Sustainability	Buildings and Facilities	0	See 2.3	See 2.3	See 2.3
2.2	Detailed Lighting Audits	Energy Efficiency and Conservation	Public Works & Sustainability	Buildings and Facilities	0	See 2.3	See 2.3	See 2.3
2.3	Implementation of Energy Audit Recommendations ²⁵	Energy Efficiency and Conservation	Public Works & Sustainability/Parks and Recreation	Buildings and Facilities	\$80,200*	\$30,000	2.6	188

*Price excludes additional funding.

²⁵ Energy Audits were performed by Fortis BC at the RCMP Building, Public Works site, Canada Games Pool and Interior Savings Center. Costing and payback periods are available for each of these.



2.3	Implementation of Lighting Audit Recommendations ²⁶	Energy Efficiency and Conservation	Parks and Recreation	Buildings and Facilities	\$51,800*	\$19,700	2.6	5.75
2.4	Server Room Cooling Requirements Study	Energy Efficiency and Conservation	Public Works & Sustainability	Buildings and Facilities	0	NA	NA	NA
2.5	Implementation of Server Room Energy Study	Energy Efficiency and Conservation	IT	Buildings and Facilities	TBD	TBD	TBD	TBD

Commitment 3: Include Alternative Energy or High Efficiency Assessments for Replacements, Renovations, & Maintenance Activities

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANUAL GHG REDUCTION, tonnes by 2020
3.1	Geothermal Heating at TCC	Fuel Switching	Parks and Recreation	Buildings and Facilities	\$242,000	\$45,000	5.4	970
3.2	Boiler Upgrades at Westsyde Pool, TCC, ISC and Courthouse	Energy Efficiency and Conservation	Public Works & Sustainability	Buildings and Facilities	\$300,000	\$65,000	< 5	205
3.3	Integrate Energy Management Plan with Asset Management	Management	Public Works & Sustainability	Awareness and Leadership	No Additional Investment	NA	NA	NA
3.4	Solar Parks Buildings	Energy Efficiency and Conservation	Parks and Recreation	Buildings and Facilities	\$15,000	\$300	>20	6.14

Commitment 4: Develop and Implement Ongoing Energy Management Activities

²⁶ Lighting Audits were performed at Westsyde Pool, TCC Fieldhouse, Canada Games Pool, MacArthur Island Sportscenter and Interior Savings Center. Costing and payback periods are available for each of these.



	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	LEVEL OF INVESTMENT	LEVEL OF IMPACT TO ENERGY USE	LONG-TERM VALUE
4.1	Review all Building Utility Bills on a Bi-Monthly Basis	Energy Tracking	Public Works & Sustainability	Measurement & Monitoring	Low	Medium	High
4.2	Hire Sustainability Coordinator and Energy Management Coordinator	Energy Efficiency and Conservation	All	Awareness and Leadership	Low	Medium	High
4.3	Link on CityNet for Top 10 Data	Energy Tracking	Public Works & Sustainability	Measurement & Monitoring	Low	Medium	High
4.4	Load Profiles	Energy Tracking	Public Works & Sustainability	Measurement & Monitoring	Low	Medium	High
4.5	Create Energy Team	Management	Public Works & Sustainability	Awareness and Leadership	Low	Medium	High
4.6	Planned Actions Updated Annually	Management	Public Works & Sustainability	Awareness and Leadership	Low	High	High
4.7	Corporate Energy and Emissions Management Plan Updated every Five Years	Management	Public Works & Sustainability	Awareness and Leadership	Medium	High	High



Commitment 5: Continue Implementation of Green Fleet Management Activities

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANUAL GHG REDUCTION,
5.1	Anti-Idling Initiative	Energy Efficiency and Conservation	Public Works & Sustainability	Fleet	\$1,500	\$500	3	1.25
5.2.a	CNG for Solid Waste Trucks	Energy Efficiency and Conservation	Public Works & Sustainability	Fleet	\$40,000 ²⁷	\$6,000	7	14.2
5.2.b	Use B5 Diesel	Fuel Switching	Public Works & Sustainability	Fleet	\$49,000/year	\$4,600	NA	167
5.2.c	Hydrogen Assist Pilot	Fuel Switching	Public Works & Sustainability	Awareness and Leadership	\$3,000-\$8,000	0	NA	NA System Removed
5.3	Review Biodiesel Bi-Annually	Management	Public Works & Sustainability	Fleet	No Additional Investment	NA	NA	NA
5.4.a	Hybrid Replacement Policy	Fuel Switching	All	Fleet	\$4,000ea	\$500	8	0.66
5.4.b	Diesel Replacement for Light/Medium Trucks with Gasoline	Fuel Switching	Public Works & Sustainability	Fleet	\$10,000	\$1,000	10	2.4
5.4.c	Incentive Program to retire older/unneeded vehicles	Energy Efficiency and Conservation	All	Fleet	\$0	\$250	< 1	0.6
5.5	Offer an Eco-Driving Course to City Staff	Energy Efficiency and Conservation	Public Works & Sustainability	Fleet	< \$1,000	\$1,000	1	375
5.6	CNG/Propane for Fleet Vehicles	Fuel Switching	Public Works & Sustainability	Fleet	\$5,000ea	\$500	10	N/A
5.7	GPS Vehicle Tracking for Route Planning and Idle Time Recording	Energy Efficiency and Conservation	Public Works & Sustainability	Fleet	\$125,000			346

²⁷ Assumes CNG filling station to be provided by others.



Commitment 6: Maximize the Energy Efficiency of the City's Water and Wastewater Systems

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANUAL GHG REDUCTION, tonnes by 2020
6.1	Air Systems Audit at KCWQ	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	0	See 6.2	See 6.2	See 6.2
6.2	Implementation of Air Systems Audit Recommendations at KCWQ	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	\$170,000*	\$32,000	5.4	5.5
6.3	Installation of Residential Water Meters	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	NA	\$195,000	NA	52.8
6.4	Sewage Treatment Plant Upgrade Energy Audit	Energy Efficiency and Conservation	Engineering Services	Infrastructure	0	See 6.5	See 6.5	See 6.5
6.5	Install Turbo Blowers at Sewage Treatment Plant	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	\$380,000 ²⁸	\$105,000	3.6	48.4
6.6	Water System Energy Optimization Study	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	0	See 6.7	See 6.7	See 6.7
6.7	Implementation of Water System Energy Optimization Study Recommendations	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	TBD	TBD	TBD	TBD
6.8	Pulp Mill Lift Station Pump Upgrade	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	\$50,000-\$200,000	> \$15,000	3 - 13 yrs	2.4
6.9	Meter Reading Network Investigation	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	TBD	TBD	TBD	0.95
6.10	Upgrade Commercial Water Meters to RF	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	TBD	TBD	TBD	0.95

²⁸ This is the incremental cost to the City of Kamloops to install turbo blowers when compared to the cost of standard blowers. This numbers includes the PowerSmart incentive offered by BC Hydro.



Commitment 7: Investigate Alternative Energy Sources

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANUAL GHG REDUCTION, tonnes by 2020
7.1	Landfill Gas Capture	Emissions Avoidance	Public Works & Sustainability	Infrastructure	\$2.6 M	> \$400,000	6.5	19,345
7.2	Energy Study of Summit sewer trunk line	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	TBD	TBD	TBD	TBD
7.3	Investigate the Capture Hydraulic Energy from PRV in Water System	Fuel Switching	Public Works & Sustainability	Infrastructure	\$210,000*ea	\$24,000	8.8	6
7.4	Methane Capture off Lagoons at Sewage Treatment Plant	Emissions Avoidance	Public Works & Sustainability	Infrastructure	-	\$225,000	-	9,087

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	LEVEL OF INVESTMENT	LEVEL OF IMPACT TO ENERGY USE	LONG-TERM VALUE
7.5	Solar Hot Water Investigation	Fuel Switching	Public Works & Sustainability	Buildings and Facilities	Medium	Medium	Medium
7.6	Investigate District Energy System Opportunities	Fuel Switching	All	Infrastructure	High (TBD)	> \$90,000	Medium
7.7	Investigate Carbon Sink Opportunities	Emissions Offset	Public Works & Sustainability	Measurement & Monitoring	Medium	Low	High



Commitment 8: Evaluate and Implement Lighting Upgrades and Alternatives

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANUAL GHG REDUCTION, tonnes by 2020
8.1	LED Lighting at North Shore Transit Exchange	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	\$12,500	\$1,000	12.5	0.3
8.2	Museum Lighting Upgrade	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	\$9,600*	\$1,800	5.3	0.53
8.3	Implement Adaptive Streetlighting w/LED Lighting	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	\$673,000*	\$68,000	<10	11
8.4	User Control Lighting System at Sports Fields and Recreational Facilities	Energy Efficiency and Conservation	Parks and Recreation	Infrastructure	\$2,400	\$50	>20	0.9
8.5	Investigate Solar Lighting	Energy Efficiency and Conservation	Public Works & Sustainability	Infrastructure	0	NA	NA	NA
8.6	City Wide Lighting Review and Upgrades	Energy Efficiency and Conservation	All	Infrastructure/Buildings & Facilities	0	NA	NA	NA

Commitment 9: Establish a Procurement Policy that Considers Energy Costs and GHG Emissions

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	LEVEL OF INVESTMENT	LEVEL OF IMPACT TO ENERGY USE	LONG-TERM VALUE
9.1	Sustainability Section Incorporated into Council Reports	Management	All	Awareness and Leadership	Low	Medium	High



9.2	Sustainability Criteria to be Included in all RFP Requirements	Management	All	Awareness and Leadership	Low	High	High
9.3	Develop a Sustainable Purchasing Policy	Management	All	Awareness and Leadership	Medium	High	High
9.4	Total Cost of Ownership Evaluation to Include Energy Costs and GHG Emissions	Management	All	Finance	Low	Medium	High
9.5	Official Community Plan to be Updated with Consideration for Energy Costs and GHG Emissions	Management	Development and Engineering Services	Awareness and Leadership	Medium	Medium	High
9.6	Community Energy and Emissions Management Plan	Management	Public Works & Sustainability	Awareness and Leadership	Medium	High	High

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANNUAL GHG REDUCTION, tonnes by 2020
9.7	Purchase Energy Star Computers, Appliances and Equipment	Energy Efficiency and Conservation	All	Awareness and Leadership	\$100ea	\$30	3	0.01

Commitment 10: Encourage Energy Conservation Behaviors in the Workplace

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	LEVEL OF INVESTMENT	LEVEL OF IMPACT TO ENERGY USE	LONG-TERM VALUE
10.1	Present Baseline Data to Managers Bi-Annually	Energy Efficiency and Conservation	All	Measurement & Monitoring	Low	Medium	High
10.2	Updates and Presentations on Rate Structures	Energy Efficiency and Conservation	All	Measurement & Monitoring	Low	Low	High



10.3	Employee Awareness Events	Energy Efficiency and Conservation	All	Awareness and Leadership	Low	Low	High
10.4	Energy Reduction Contests between Departments	Energy Efficiency and Conservation	All	Awareness and Leadership	Low	Low	Medium
10.5	Continued Energy Aware Behaviour after Contests Complete	Energy Efficiency and Conservation	All	Awareness and Leadership	Medium	Medium	Medium
10.6	Support Behaviour Change with Tools	Energy Efficiency and Conservation	All	Awareness and Leadership	Medium	Medium	High

Commitment 11: Expand Energy Monitoring and Reporting Systems and Tools

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	LEVEL OF INVESTMENT	LEVEL OF IMPACT TO ENERGY USE	LONG-TERM VALUE
11.1	Utilize Power Monitors in LEEDs Buildings	Energy Efficiency and Conservation	Public Works & Sustainability/Parks & Recreation	Measurement & Monitoring	Medium	Medium	High
11.2	Sign on to SmartTool Software	Management	Public Works & Sustainability	Measurement & Monitoring	\$9,000	Low	Medium

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	INVESTMENT	ANNUAL OPERATION SAVINGS	PAYBACK, YRS	ANUAL GHG REDUCTION, TONNES BY 2020
11.3	Incorporate Power Factor Measurements into Preventative Maintenance Procedures	Energy Efficiency and Conservation	Public Works & Sustainability	Awareness and Leadership	\$3,000	> \$15,000	< 1	NA



11.4	Submetering at High Lift Station	Energy Efficiency and Conservation	Public Works & Sustainability	Measurement & Monitoring	\$30,000 ²⁹	NA	NA	NA
11.5	Investigate Development of an Automated Energy Tracking System	Energy Efficiency and Conservation	Public Works & Sustainability	Measurement & Monitoring	0	NA	NA	NA

Commitment 12: Financing the Corporate Energy and Emissions Plan

	INITIATIVE	ACTION TYPE	RESPONSIBILITY	CATEGORY	LEVEL OF INVESTMENT	LEVEL OF IMPACT TO ENERGY USE	LONG-TERM VALUE
12.1	Dedicate CARIP Rebates to Sustainability Related Activities	Management	All	Finance	Low	High	High
12.2	Develop Revolving Energy Savings Fund	Management	All	Finance	Low	High	High
12.3	Utilize and Communicate Funding Programs	Management	All	Finance	Low	Medium	High

²⁹ Submetering would be installed to allow the City to better track and manage energy costs between KCWQ and High Lift Station. There is no direct operation savings, but better energy tracking would allow for better analysis of energy use and associated costs. This in turn would lead to better determination of the most effective energy conservation measures and projects to take on at these two facilities.



Appendix 2: Detailed Emission Reduction Opportunities

The following table provides a detailed breakdown of the key actions and projects likely to be taken by the City from 2012 through to 2020. These actions will significantly reduce the City’s total energy use and GHG emissions.



		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	BAU Emissions	9,438.53	9,556.51	9,675.96	9,796.91	9,919.37	10,043.37	10,168.91	10,296.02	10,424.72	10,555.03	10,686.97
	2007 Emissions Baseline	8,253.00	8,253.00	8,253.00	8,253.00	8,253.00	8,253.00	8,253.00	8,253.00	8,253.00	8,253.00	8,253.00
Actions												
Commitment 1: High Energy Performance of New Municipal Buildings and Facilities to Emulate a LEED Gold Standard												
Action 1.1	The City will implement energy saving technologies and designs into the Aberdeen Firehall No. 7			0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Action 1.2	The Sewage Treatment Administrative Building will be built to optimize energy use				0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Commitment 2: Conduct Audit and Retrofit Activities in City Buildings and Facilities												
Action 2.3	Pursue recommendations from energy audits to improve system controls, enhance the efficiency of lighting and heating and cooling systems at City facilities	-	-	-	219.63	251.26	282.89	314.52	346.15	377.78	409.41	441.04
Commitment 3: Include Alternative Energy or High Efficiency Assessments for Replacements, Renovations, & Maintenance Activities												
Action 3.1	Implement geothermal heating for the field house expansion at Tournament Capital Centre. This action significantly increased the energy performance of the entire facility	973.00	973.00	973.00	973.00	973.00	973.00	973.00	973.00	973.00	973.00	973.00
Action 3.2	Complete boiler upgrades at Westsyde Pool, Tournament Capital Centre, and Interior Savings Centre and Courthouse.	153.00	153.00	418.00	418.00	418.00	418.00	418.00	418.00	418.00	418.00	418.00
Action 3.4	Install solar power systems in parks washrooms to reduce power requirements and possibly eliminate the need for BC Hydro service at these locations.			0.68	1.36	2.05	2.73	3.41	4.09	4.77	5.46	6.14
Commitment 5: Develop and Implement Ongoing Energy Management Activities												
Action 5.1	Reduce unnecessary fleet idling through a corporate anti-idling initiative			1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Action 5.2a	CNG for Solid Waste Trucks			-	39.92	49.10	60.39	74.28	91.36	112.38	138.22	170.01
Action 5.2b	Use B5 Diesel			150.90	152.79	154.70	156.63	158.59	160.57	162.58	164.61	166.67
Action 5.4a	Hybrid vehicle replacement council policy for compact cars			-	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
Action 5.4b	Diesel light and medium truck replacement for gasoline trucks			2.40	4.80	7.20	9.60	12.00	14.40	16.80	19.20	21.60
Action 5.4c	Incentive program for departments to retire older/unneeded vehicles.			6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Action 5.5	Offer an eco-driving course to City staff to enhance driving practices.				352.38	356.78	361.24	365.76	370.33	374.96	379.64	384.39
Action 5.6	Use compressed natural gas/propane/other fuels on multiple fleet vehicles			11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Action 5.7	Investigate the expansion of a GPS vehicle tracking program and the potential benefits of the data collected regarding route tracking and idle time.				317.14	321.10	325.12	329.18	333.30	337.46	341.68	345.95



Commitment 6: Maximize the Energy Efficiency of the City's Water and Wastewater Systems												
Action 6.2	Implement actions recommend by air system energy audit.			5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
Action 6.3	Complete the installation of residential water meters.	15.84		31.68	52.80	52.80	52.80	52.80	52.80	52.80	52.80	52.80
Action 6.5	Install turbo blowers at the Sewage Treatment Centre				48.40	48.40	48.40	48.40	48.40	48.40	48.40	48.40
Action 6.8	Upgrade pumps and equipment at the Pulp Mill Lift Station.								2.40	2.40	2.40	2.40
Action 6.9	Investigate meter network reading options. Compare benefits of reading device installed in a vehicle compared to the use of a fixed communication network system to relay data.						1.90	1.90	0.95	0.95	0.95	0.95
Action 6.10	Investigate the benefits and costs associated with the upgrade of commercial water meters to RF data collection system.								0.95	0.95	0.95	0.95
Commitment 7: Investigate Alternative Energy Sources												
Action 7.1	Complete a Landfill Gas Generation Study at Mission Flats Landfill and implement a landfill gas collection system that could be used to generate electrical power.				19,345.00	19,345.00	19,345.00	19,345.00	19,345.00	19,345.00	19,345.00	19,345.00
Action 7.3	Conduct a preliminary feasibility study to capture hydraulic energy in pressure reducing valves to determine the appropriateness of future investments				23.00	35.40	37.50	37.50	37.50	37.50	37.50	37.50
Action 7.4	Explore the feasibility of energy conversion of the captured methane emissions at the Sewage Treatment Centre lagoons.					9,087.00	9,087.00	9,087.00	9,087.00	9,087.00	9,087.00	9,087.00
Commitment 8: Evaluate and Implement Lighting Upgrades and Alternatives												
Action 8.1	Implement LED lighting at the new North Shore transit exchange.				0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Action 8.2	Convert Museum lighting from incandescent bulbs to LED.				0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Action 8.3	Implement adaptive LED street-lighting technologies throughout the City				12.86	12.86	12.86	13.96	15.06	16.16	17.26	18.36
Action 8.4	Implement a user-control lighting system at sports fields and recreational facilities to provide users the ability to directly impact energy consumption.				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Action 8.6	City wide lighting review of existing facilities. Identify savings potentials and evaluate suitable product types. Implement lighting upgrades as identified				5.81	5.81	5.81	5.81	5.81	5.81	5.81	5.81
Commitment 9: Establish a Procurement Policy that Considers Energy Costs and GHG Emissions												
Action 9.1	Purchase Energy Star Computers, Appliances and Equipment			0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	Total Reduction Opportunities	1,126	1,142	1,600	22,012	31,166	31,226	31,286	31,352	31,420	31,492	31,571
	Target	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600
	Required Offsets	8,313	8,415	8,075	12,215	21,246	21,183	21,117	21,056	20,995	20,937	20,884
	Reductions Relative to 2007 Baseline	14%	14%	19%	267%	378%	378%	379%	380%	381%	382%	383%
	Reductions Relative to BAU Forecast	12%	12%	17%	225%	314%	311%	308%	305%	301%	298%	295%
	Note- all units in tonnes of greenhouse gas emissions.											



The figure below profiles the emission reduction actions and projects that have been taken and likely to be undertaken by the City until 2020.

