

City of Kimberley **Greenhouse Gas Emissions Reduction Plan**

Milestones **1**, **2** and **3** of the Partners for Climate Protection Framework

Prepared August 2009
for the City of Kimberley by:

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science. knowledge. community.



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This report has been prepared by Megan Walsh and is intended for use by the City of Kimberley. Megan Walsh accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



BACKGROUND

In April 2008, the City of Kimberley became a member of Partners for Climate Protection (PCP). This program, facilitated by the Federation of Canadian Municipalities and ICLEI•Local Governments for Sustainability (ICLEI), has over 175 member•municipalities from across the country.

The joint ICLEI/Federation of Canadian Municipalities (FCM) Partners for Climate Protection program provides resources and support for the completion of a voluntary five•milestone process, resulting in the development and implementation of a greenhouse gas (GHG) emissions reduction plan. The five milestones include:

- 1. Creating a GHG emissions inventory and forecast**
- 2. Setting an emissions reduction target**
- 3. Developing a local action plan**
- 4. Implementing the local action plan**
- 5. Monitoring progress and reporting results.**

Milestone 1 requires an emissions inventory of community and municipal•sourced emissions for the following sectors:

Municipal Emissions:	Community Emissions*:
<ul style="list-style-type: none">• Vehicle fleet• Municipal Waste• Water and Sewage• Buildings• Streetlights	<ul style="list-style-type: none">• Residential buildings• Commercial buildings• Industrial buildings• Waste• Transportation

*The Province of British Columbia provides all communities with an inventory developed through their Community Energy and Emissions Inventory initiative. This data has been used to allow fair comparison with other communities.

Further to the PCP commitments, the City of Kimberley has joined municipalities across the Province in signing on to the Climate Action Charter, which commits the City to working towards carbon neutrality in their operations by 2012. Carbon neutrality for local governments means that emissions are reduced as much as possible before 2012, and that offsets are purchased to capture the remaining emissions. Emissions will have to be reported on an annual basis after 2012, and offsets paid based on the annual inventory reports. There is currently a carbon neutral initiative ongoing throughout the East Kootenay, Central Kootenay and Kootenay•Boundary regional districts. This process will provide a framework for future reporting of emissions. The GHG reduction plan provides ideas and recommendations for specific emission reduction opportunities within the City of Kimberley, as well as community•sources emissions. These two processes are complimentary in their objectives of facilitating emission accounting and reduction at the local government level.



INTRODUCTION

For decades, scientists have observed significant changes in all ecosystems as a result of climatic change. While climatic change can be attributed to natural forces and feedback loops in the environment, there are anthropogenic influences that accelerate and accentuate the impact and severity of climate change. The burning of fossil fuels is recognized as one of the most significant contributors to climate change, and our development and land-use patterns are increasing the vulnerability and sensitivity of our communities to the impacts of climate change.

Addressing climate change requires an understanding of the opportunities for both mitigation (reduction of GHG emissions) and adaptation (response to, and preparation for, inevitable changes). Reducing greenhouse gas emissions at the local level is sometimes perceived as an insignificant action; that the impact of reductions at such a small scale will not contribute to global impacts. The fact is, however, that there are actions being taken in over one-hundred communities in British Columbia alone. The cumulative impact of energy efficiency and emission reduction is significant, and can only inspire further action. There are benefits of mitigation actions beyond greenhouse gas emission reductions; reducing energy and fuel consumption results in reduced operating costs of homes, vehicles and government facilities. It means cleaner air and healthier lifestyles. Possibly most significant, taking climate action means that communities are dedicated to actively planning and preparing for a sustainable and resilient future.

This report is comprised of three parts, consistent with the first three milestones of ICLEI/FCM's Partners for Climate Protection framework. Milestone 1 is the greenhouse gas emission inventory. Emissions have been calculated for the community and City based on the year 2007, consistent with the Provincial reduction targets. An inventory for 2008 is being developed for the City through the Carbon Neutral strategy, but will have to be compiled by the City (or a contractor) in subsequent years. Forecasts of emissions are also part of Milestone 1, and have been developed based on information provided about the growth projections for the community. Milestone 2 outlines the reduction targets for the community and City emissions, and Milestone 3 outlines the reduction strategies identified throughout workshops with staff and the community. Reduction strategies are summarized in the body of the report, and detailed information about the cost effectiveness and funding opportunities, the GHG emission reduction potential and the cost of implementation can be found in Appendix A (Municipal reduction strategies) and Appendix B (community reduction strategies).

The key to a resilient and sustainable community is the integration of processes. As this document is reviewed, opportunities for integration of GHG reduction strategies into existing policies and bylaws should be identified.

METHODOLOGY

The development of a greenhouse gas emissions inventory is the first step in developing a greenhouse gas emissions reduction plan. A greenhouse gas emissions inventory provides the necessary baseline data to which future inventories will be compared, and reductions can be measured.

Recognizing the need for a local government specific protocol, with the support of the World Resources Institute and the World Business Council for Sustainable Development, ICLEI developed the Local Government Greenhouse Gas Emissions Protocol (LGGHG Protocol). Unique from other GHG emissions inventory protocols, the LGGHG Protocol is aimed specifically to assist local governments accurately measure GHG emissions. Recently, the Province of British Columbia has released several documents to guide the development of municipal inventories for the purposes of the Carbon Neutral targets. Where applicable, Provincial protocols have been followed so as to maintain consistency with other municipalities. Where there is no clear protocol at the Provincial level, guidelines from the LGGHG have been used to guide the inventory process.

The three main activities in the development of GHG emission inventory are:

- 1. Data Collection**
- 2. Data Processing**
- 3. Inventory Reporting**

Table 1 outlines the specific information required to complete the GHG inventory. For the City of Kimberley, data was collected from utility bills provided by city staff, from fuel logs for the vehicle fleet and the Regional District of East Kootenay waste services.

Table 1: Data Requirements by Sector

Sector	Information Required	Source
Buildings	Electricity and heating data including: <ul style="list-style-type: none">• kWh for each building for one complete year• Litres of fuel used in each building (i.e. Natural Gas, Propane, Diesel, etc.) Additional indicators: sq. feet of each building; hours or days of operation	<ul style="list-style-type: none">• Utility bills• Year end reports or financial reports• Utility provider

Sector	Information Required	Source
Streetlights	Total kWh for streetlights and lighted signs under municipal jurisdiction Additional indicators: types and quantities of each bulb	<ul style="list-style-type: none"> • Utility bills • Year end reports • Utility provider
Vehicle Fleets	Total fuel usage (gasoline, diesel and propane; others where applicable) for each municipal vehicle Additional indicators: cost of maintenance per vehicle; average days of use; model and year of each vehicle; present value	<ul style="list-style-type: none"> • Fuel tracking records at municipal fuelling site • Annual kilometres travelled records • Financial records
Water and Sewage Operations	Electricity and heating data: <ul style="list-style-type: none"> • kWh for all lift and pump stations, sewage treatment operations, etc. • Litres of fuel for heating of operations buildings (i.e. natural gas, propane, etc.) 	<ul style="list-style-type: none"> • Utility bills • Year end reports or financial reports • Utility provider
Waste	Total waste in kilograms or tonnes generated by the local government *note: waste is not generally separated between community and municipal sources, an estimation based on # of bins may be necessary	<ul style="list-style-type: none"> • Transfer stations where weight and source of waste are recorded • Estimation based on bins and other waste creation activities

The following sections detail the processes of data collection and processing.

Baseline Year

The Province of BC has established their 33% reduction of GHG by 2020 below 2007 levels. To be consistent with the Provincial goal the year 2007 has been used for the Kimberley inventory baseline year. An inventory for 2008 emissions is currently being compiled in a Regional-level initiative, which will support the Carbon Neutral target for municipal emissions only.



Emission factors

The quantity of GHG emissions per unit of energy consumed is determined by an emission factor that is unique to the type of fuel or energy used by a local government in their operations. An emission factor allows one to convert energy use into the associated greenhouse gas emissions. The following formula is a simplified example of converting energy data into emissions to demonstrate the use of an emission factor³:

$$\text{Fuel consumed} \times \text{emission factor} = \text{emissions}$$

Emission inventories generally report total emissions in units of carbon dioxide equivalents. The 'equivalents' represent a number of greenhouse gases that are weighted, depending on their global warming potential. The main greenhouse gases identified by the Intergovernmental Panel for Climate Change (IPCC) include: carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), and halocarbons compounds (i.e. chlorine, fluorine, etc.)⁴. The most significant gases resulting from municipal operations are CO₂, N₂O and CH₄, therefore these will be the gases used to calculate the carbon dioxide equivalent (CO₂e) in tonnes.

The Local Government GHG Protocol categorizes the use of emissions factors based on a three-tiered system. Tier I uses default emissions factors provided by the Intergovernmental Panel on Climate Change. Tier II uses a country-specific (or Province if available) emissions factors and Tier III requires complex details such as combustion technology, operating conditions, control technology, etc. For the City of Kimberley GHG emissions inventory, the most relevant and regional-specific emissions factors were used in data processing. This satisfies Tier II requirements. Table 2 outlines the emissions factors used in the GHG inventory for Kimberley. As required by Tier II data guidelines, nationally-derived emissions factors were used where available. A Province-specific electricity emissions factor was used, as published by BC Hydro, to be consistent with the approach taken by the Province of British Columbia in their inventory Protocol.

Table 2: Emission Factors

Emission Source	Emission Factor	Data Source
Electricity	22 t CO ₂ e /GWh	BC Hydro, 2007
Gasoline	2538 g CO ₂ e/L	Transport Canada, 2006
Diesel	2784 g CO ₂ e/L	Transport Canada, 2006
Solid Waste	0.482 tCO ₂ e/t waste	PCP/ICLEI Inventory DB
Natural Gas	0.051 tCO ₂ e/GJ	NIR, Env. Canada 2007
Heavy Oil	0.003145 tCO ₂ e/L	NIR, Env. Canada 2007
Propane	0.00154 tCO ₂ e/L	Prov. of BC LG Protocol 2009

³ ICLEI (2008). International Local Government GHG Emissions Analysis Protocol

⁴ IPCC (2007) Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

MILESTONE 1

Emissions Inventory for the City of Kimberley

As indicated above, the year 2007 was chosen as the baseline year for the City of Kimberley GHG emissions inventory. As required by the Partners for Climate Protection framework, the emissions for the following five sectors were calculated:

1. Municipal fleet
2. Streetlights
3. Water and Sewage
4. Buildings
5. Waste

It should be noted that according to the Province of BC emission inventory boundaries for local government, waste is not included in their Protocol. This is due to the lack of equality between municipalities in their methods of tracking and monitoring waste at the corporate level. Waste for the City of Kimberley has been included in this report as required by Partners for Climate Protection, but also because waste reduction initiatives provide opportunity to reduce overall emissions.

Emissions Inventory for the Municipal Fleet

The City of Kimberley has kept records of the vehicle fleet by litres of fuel used on a monthly basis. While the detailed fleet information is useful for those vehicles driven on a daily basis, the emissions inventory should provide a snapshot of all emissions produced, including by vehicles driven on a seasonal basis, or equipment used on occasion (i.e. lawnmowers). Table 3 summarizes total emissions for gasoline and diesel consumed by the municipal fleet, including the fuel used for small pieces of equipment. A further assessment of the fleet by E3 Fleets from Fraser Basin Council will be able to provide very specific recommendations based on the fuel used by each individual vehicle.

Table 3: Total Fuel Consumed (Municipal)

Fuel Type	Total L Used	Total Annual CO ₂ e (t)
Gasoline	54,379	135.01
Diesel	77,545	230.14
Total	131,924 L	365.15 t CO ₂ e

Emissions Inventory for Streetlights

Streetlights include all overhead, ornamental, traffic, crossing and outdoor lighting that is maintained and paid for by the City of Kimberley. Because lighting uses only electricity for energy, the emissions are very low. There are still opportunities for energy efficiency and reduction, however the reduction of greenhouse gases from any action will be minimal. Table 4 summarizes the energy used and emissions associated with electricity use by streetlights.

Table 4: Streetlight Energy and Emissions

Details	Electricity (kWh)	GWh	Annual Cost (\$)	CO ₂ e (t)
Overhead Street Lighting	213,588	0.21	\$48,017.52	4.7
Ornamental Street Lighting	142,155	0.14	\$9083.74	3.1
Platzl Lights	45,360	0.045	\$3639.84	1
Parkade /Downtown Lights	10,945	0.011	\$921.74	0.24
Decorative St. Lights	4,248	0.004	\$393.35	0.093
Total	416,296 kWh	0.42 GWh	\$62,056.19	9.13 t CO ₂ e

Emissions Inventory for Buildings

The sources of emissions for municipal buildings are electricity and natural gas. Using bills from Terasen Gas and BC Hydro, the total energy use and emissions for each building were calculated. Using the emissions factors described in the Methodology section, the total emissions for each building were calculated.

All buildings that are owned and/or operated by the City of Kimberley are included in this inventory. The Province of British Columbia have set boundaries on leased facilities that are owned by municipalities, stating that only those facilities which provide a 'traditional' service need to be included in a corporate inventory. In Kimberley, such a facility would include the Curling Rink, which is owned by the City, but operated and maintained by a separate Society. The Kimberley Health Services Centre is not a traditional service (i.e. municipalities do not generally provide health care services for the community), however it has been included in this inventory for completeness.

The Public Works department uses waste oil as a heating source for part of the year. The source of the oil is their own machinery, and so the exact quantity consumed in a year is unknown. Public Works were able to provide an estimate of approximately 3000 gallons a year, which has been added to the total CO₂e quantity. Table 5 outlines the total energy used and emissions produced by each municipally owned building.

Table 5: Building Energy use and Emissions for 2007

Location	Electricity (kW)	GWh	CO ₂ e (t)	Natural Gas (GJ)	CO ₂ e (t)
Aquatic Centre	798,120	0.80	17.56	6435.2	328.2
Civic Centre	472,320	0.47	10.39	2460.9	125.51
Public Works (all)*	169,920	0.17	3.74	2298.6	163.86*
City Hall/Fire Dept.	164,000	0.16	3.61	1304	66.5
Library/Museum	132,780	0.13	2.92	1084.4	55.3
Marysville Arena	168,284	0.17	3.7	510.02	26

Location	Electricity (kW)	GWh	CO ₂ e (t)	Natural Gas (GJ)	CO ₂ e (t)
Centennial Hall	64,080	0.06	1.41	575.7	29.36
RCMP Building	79,903	0.08	1.76	363.1	18.52
Fire Stn. 2	19,023	0.02	0.42	171.4	8.74
Curling Rink	172,620	0.17	3.80	1419	72.37
Kimberley Health Centre	20,450.57	0.02	0.45	3146	160.45
Oughtred Hall	9,247	0.01	0.20	-	-
Total	2,270,748	2.27	49.94	19,768.32	1008.18

*The public works garage burns waste oil for heat during winter months. This was added to the fuel total. Approx. 3000 gallons are consumed annually. The emissions factor is 0.003145t/L.

Table 6 summarizes total energy use for natural gas and electricity for all municipal buildings. Total emissions are also expressed in tonnes of CO₂e.

Table 6: Summary for Building Emissions

Energy Source	Consumption	Total Emissions
Natural gas	19768.32 GJ	1008.18 t CO ₂ e
Electricity	2.27 GWh	49.94 t CO ₂ e
Waste Oil	3000 gallons	42.89 t CO ₂ e
Total Emissions		1,101 t CO ₂ e

Emissions Inventory for Sewage and Water Operations

Energy use and GHG emissions from the sewage and water operations are calculated separately. This sector encompasses all lift stations, treatment plants and the water supply dam and operations. Also included are irrigation systems for public parks within the City. See Table 7 for a detailed table of the water lift stations, sewage facilities and water source energy use and associated emissions.

The energy source for all water operations in Kimberley is primarily electricity. The sewage treatment operations have lower than usual emissions because of the sole reliance on electricity. There is a propane tank located at the Chlorination Station, but this is only relied on as a backup. According to the Propane provider, the tank is filled approximately every other year. An average of 3 years of use was taken to determine annual consumption at the Matthew Creek chlorination station. This amount is added at the end of the Table 7.

Table 7: Sewage and Water Operation Emissions

Location	Electricity (kW)	GWh	CO ₂ e (t)
North Star Pumpouse	79,560	0.08	1.75
Chlorine Station: Mark Creek Plant	34,370	0.03	0.76
Chlorine Station: Matthew Creek Water*	22,400	0.02	0.49
Chlorinator: 101 St. Marys Lake Rd.	16,206	0.02	0.36
Valve House: Lower Mine Road	5339	0.01	0.12
Valve House:Teck Transfer	14,809	0.01	0.33
Valve House:Forest Crowne	9354	0.01	0.21
Valve House: Norton Ave	14,760	0.01	0.32
Valve House: Knighton Rd.	14,886	0.01	0.33
Valve House: Chapman Camp	9017	0.01	0.2
Prv Station: Lois Creek	65,599	0.07	1.44
Prv Station: Spokane St.	18,460.67	0.02	0.41
Lights/Irrigation: Central Park	1674	0.00	0.04
Lights/Irrigation: Garden Park	4929	0.00	0.11
Swan Sub Park/Light & Irrigation	501	0.00	0.011
Lois Creek Park	832	0.0008	0.02
Pump Station: Old Cominco	25,857	0.03	0.57
1260 Prv 501 G. Sorensen Way	14,262	0.01	0.31
Sewer Poll Cntr. St Marys Lake Road	816,720	0.82	17.97
Lift Station: Morrison Sub Sewer	5,804.62	0.01	0.13
Fertilizer: Float in Reservoirs	259	0.00	0.01
St. Marys Lake Rd.	741	0.00	0.02
Total	1,176,340.3 kW	1.18 GW	25.96
Total Emissions (tCO₂e) from electricity		26 tCO₂e	
Total Emissions from Propane* (Matthew Creek backup)		0.15 tCO₂e	
TOTAL		26.15 tCO₂e	

Emissions Inventory for Waste – Municipal

Determining the total waste created by the Municipality is the most difficult value to obtain. Due to the method of disposal (i.e. no scale, general transfer station for use by all citizens and municipal sectors) and the lack of disposal bins at various municipal buildings, it is challenging to identify the amount of waste generated by municipal operations. For this reason, the Province has not included this within the boundaries for the carbon neutral commitments. Waste reduction, however, is often a simple and achievable way to reduce emissions, and so has been included in this inventory.

At a meeting with City staff members, it was estimated that the municipality is responsible for approximately 9 large garbage bags weekly, between all facilities. This weekly volume of

waste produced by municipal operations occupies approximately the space of one 4 cubic yard bin. This value can be converted into tonnes of GHG emissions by multiplying the value by the conversion factor for non-compacted waste. It should be noted that this is a rough estimate of the actual emissions created by waste at the municipal level. More accurate values could be achieved if the municipality were to conduct a full waste audit to determine exact quantity of waste. This would be a separate and significant initiative.

Calculation:

- 1 x 4 cubic yard bin (emptied 1 _ week)
- Total annual volume at full capacity: 208 cubic yards of waste

EPA uncompacted mixed solid waste volume to weight conversion³: 200lbs/y_ MSW

- (200 lbs) x (208 y³) = 41,600 lbs or 18.87 tonnes
- [CO₂e = (18.87 t waste) x (0.482 tCO₂/t waste) = 9.10 t CO₂e]

Total municipal solid waste emissions: 9.10 t CO₂e

Summary of Emissions for City of Kimberley for 2007

Table 8 summarizes the total emissions in tonnes of CO₂e for each sector of the City of Kimberley municipal operations in 2007.

Table 8: Summary of Emissions

Sector	Emissions – CO ₂ e (t)
Buildings	1101
Streetlights	9.13
Water/Sewage	26.15
Vehicle Fleet	365.15
Waste	9.10
TOTAL	1510.53 tCO₂e

EMISSIONS INVENTORY FOR THE COMMUNITY OF KIMBERLEY

As with the Corporate Inventory, there are five sectors for which energy data must be collected in the completion of the community-based GHG emissions inventory. The five community sectors include:

- 1. Residential buildings**
- 2. Commercial buildings**
- 3. Industrial buildings**
- 4. Transportation**
- 5. Waste**

The inventory for community emissions was developed using data provided by the BC Ministry of Environment. The MoE has developed a community emissions inventory for each municipality in British Columbia. The data provided by MoE has been used as baseline for

this report, and where appropriate, additional data was collected to better reflect the actual situation in the community. This affected only the waste amount, which was provided by the Regional District of East Kootenay Solid Waste Management department.

The Provincial inventory reports are being used by many communities throughout British Columbia. The consistency of the data collection methodologies allow us to fairly compare emission reductions between communities. Future improvements and refinements to the inventory will be back-cast, and the total baseline emissions for the community can be adjusted if the data collection methodologies are refined.

Building Sector

The municipal inventory looked at three sectors of buildings: Commercial, Residential and Industrial. The Tables 9a – 9c summarizes total emissions from these sources. The Province obtained the energy use information directly from the utility providers. For Kimberley, this included Terasen Gas and BC Hydro.

Table 9a: Residential Emissions

Energy Source	Energy Use	CO ₂ e Emissions
Electricity	104,496 GJ	639 t CO ₂ e
Natural Gas	268,045 GJ	13,710 t CO ₂ e
Total Emissions		14,349 t CO₂e

Table 9b: Commercial Building Emissions

Energy Source	Energy Use	t CO ₂ e Emissions
Electricity	67,932 GJ	415 t CO ₂ e
Natural Gas	124,884 GJ	6,388 t CO ₂ e
Total Emissions		6,803 t CO₂e

Table 9c: Industrial Building Emissions

Energy Source	Energy Use	t CO ₂ e Emissions
Electricity	19,999 GJ	122 t CO ₂ e
Natural Gas	0 GJ	0 t CO ₂ e
Total Emissions		122 t CO₂e

Transportation Sector

Vehicles used by citizens as well as by commercial and industrial operations were included in this inventory. Data was collected from ICBC to determine the number of cars owned by residents of Kimberley. The current inventory protocol for community emissions uses only average mileage to determine emissions from vehicle fleets. It is anticipated that a more concise method of tracking fuel use at the community level will be developed in the future. Again, changes to the inventory can be back-cast if necessary. This inventory includes all vehicles owned by residents in Kimberley, including cars, trucks, motorhomes, and

motorcycles. The fuels included are propane, diesel and gasoline. Table 10 summarizes total emissions from the community transportation sector.

Table 10: Community Transportation Emissions

Fuel	Quantity (L)	Emissions (t CO ₂ e)
Gasoline	9,070,997 L	22,655 t CO ₂ e
Diesel	903,137 L	2,510 t CO ₂ e
Propane	58,063 L	88 t CO ₂ e
Total Emissions		25,253 t CO₂e

Waste Sector

Data was collected from the Regional District of East Kootenay Solid Waste department to determine a number reflective of the actual waste disposal from the community of Kimberley in the year 2007. The following equation calculates the emissions from the disposal of waste in the community. It should be noted that this figure does not include recycled materials. The landfill into which waste is deposited does not have methane gas capture technology, or flaring.

Total Community Waste: 3745.2 t
 = (3745.2 t waste) x (0.482 t CO₂e/t waste)
 = **1805.19 t CO₂e**

Summary of Community Emissions

Table 11 summarizes total emissions for the community of Kimberley. It should be noted that this emissions inventory does not account for vehicle traffic through the community for tourists. It would be advised that a GHG emission reduction campaign be developed to targets visitors to the community, particularly when the community implements projects to reduce their own GHG emissions.

Table 11: Summary of Community Emissions

Sector	CO ₂ e (t)
Residential Buildings	14,349
Commercial Buildings	6,803
Industrial Buildings	122
Vehicles and Transportation	25,253
Waste	1805
TOTAL	48,332 t CO₂e

The results of Milestone 1 have been used to guide the development of the following sections. It should be noted that the inventory will be updated through the Carbon Neutral Kootenay initiative for municipal emissions only. The Province of BC has committed to providing municipalities with community inventories to help the process of monitoring reductions in the future.

Determining the forecast for emissions is a challenge in communities where the population trends indicate a decline in permanent residents. For many communities in the Kootenay region, the influx of second homeowners and increased tourism has resulted in a decline in the permanent resident population. Generally, the emissions profile would mirror projections in population. For Kimberley, although census data demonstrates a decline in population of about 5% between 2001 and 2006, we are aware that development is increasing. This means that the City will have to continue to expand services such as sewage and streetlights, and possibly expand recreational facilities in the future to meet the demand of either tourists or second homeowners.

City of Kimberley Forecast and Targets

Table 12 outlines the specific forecasts that have been developed based on the City of Kimberley emissions only (i.e. not community emissions; these are detailed in a later section). It should be noted that the exercise of forecasting emissions, as stated by the Community Energy Association is ‘flawed’ because of the inability to predict future availability of technologies, the economy or the potential for behavioral change. It is required by PCP, however, and is a useful exercise for developing reduction targets that are realistic.

Table 12: Forecasts for Business As Usual Emissions for the City of Kimberley (2020)

Sector	Forecasted Changes	Resulting Increase (%)
Buildings	<ul style="list-style-type: none"> Incidental 5% increase of emissions from buildings by 2020 through expansion or additions, considering new technologies and energy retrofits Potential building of new conference facility (approximately 60 tonnes CO₂e emissions) Approx. 10.45% increase in the sector by 2020 	7.6%
Streetlights	<ul style="list-style-type: none"> Expansion of streetlighting to new developments, estimated to be 13 new developments, totalling ~987 units; Approx. 10% by 2020 	Negligible
Water & Sewage	<ul style="list-style-type: none"> Expansion of water services to new developments (28% increase in building starts by 2020 from baseline; similar growth as 1997-2008) Build-out of 987 units estimated by 2020 Improvements to Mark Creek; potential micro-hydro to offset electricity use 	0.6%

Sector	Forecasted Changes	Resulting Increase (%)
Vehicle Fleet	• Increase of operations estimated at 5% by 2020	1.5%
Waste	• Forecasted increase to be in-line with operational increases, as 5% by 2020	Negligible
Total Increase from Baseline (%)		9.1%

Table 13 summarizes the forecasted emissions profile for the City of Kimberley operations, comparing the baseline scenario with the anticipated increases in each of the sectors.

Table 13: Summary of Emissions Forecast for the City of Kimberley (2020)

Sector	Baseline Emissions 2007 (t CO ₂ e)	BAU Emissions 2020 (t CO ₂ e)	BAU: Total increase of 137.3 tonnes, or ~9% over the baseline year of 2007 by 2020.
Buildings	1101	1216.05	
Streetlights	9.13	10.04	
Water/Sewage	26.15	28.77	
Vehicle Fleet	365.15	383.4	
Waste	9.10	9.56	
Total	1510.5 t CO₂e	1647.8 t CO₂e	

When developing reduction targets for the City of Kimberley, it must be kept in mind that there is forecasted to be a 9% increase in emissions by 2020 and that there is already an established interim target of carbon neutral by 2012.

City staff was presented with several options for reduction targets. The options included:

- 1. Partners for Climate Protection recommends a reduction for corporate emissions of 20% below baseline emissions within ten years.**
- 2. The Province of BC has established a reduction target of 33% below baseline emissions by 2020. Some communities are adopting this target for corporate, some for both corporate and community emissions.**
- 3. Select a reduction target that is midway between these, or include an option to re-evaluate the inventory and adjust the targets to be more aggressive in the future.**

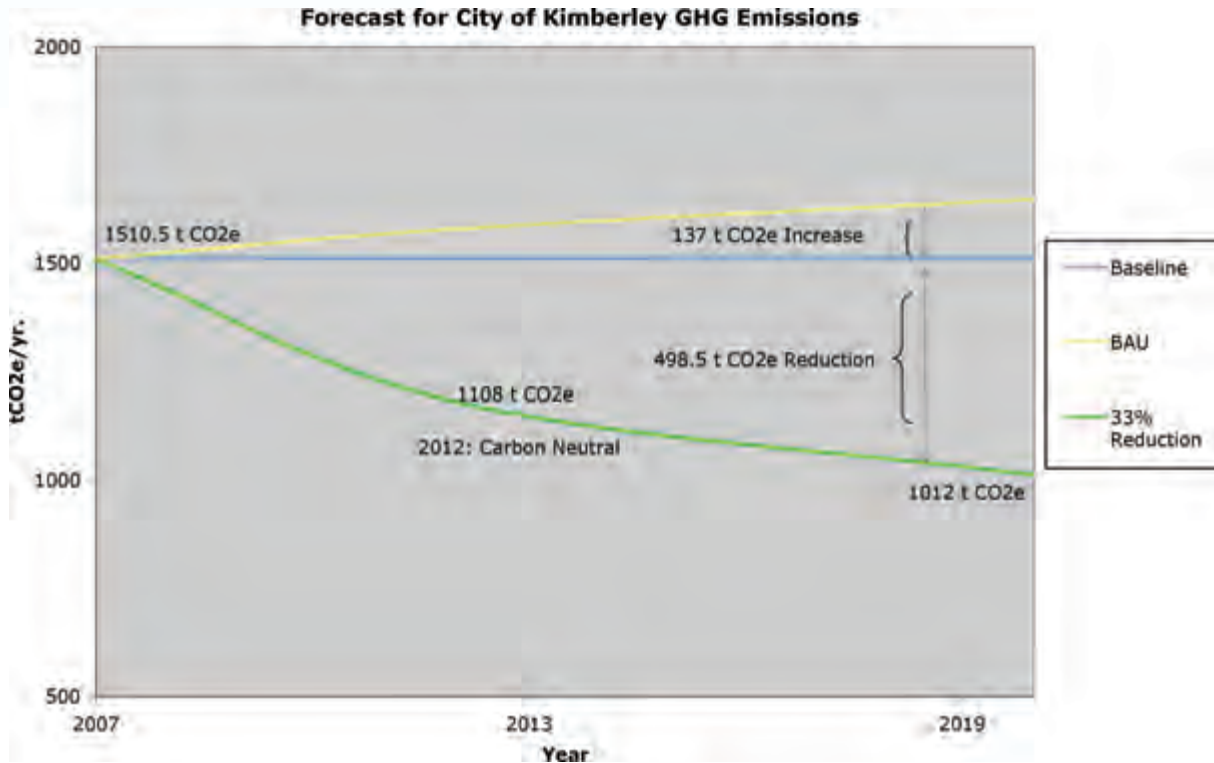
Staff chose to adopt the reduction targets that have been established by the Province of BC, with the commitment to revisit the target within approximately 5 years to re-asses and adjust if necessary. The following points summarize the implications of the target of 33% below baseline emissions by 2020.

- A 33% reduction from baseline emissions would require the reduction of 498.5 t**

CO₂e, which would result in an annual total of 1012 t CO₂e.

- According to the BAU forecast, by 2020 the City of Kimberley can expect an increase in their emissions by 9%, or 137.3 tonnes by 2020.
- To capture the forecasted emissions, the City of Kimberley must reduce a total of 635.8 t CO₂e by 2020 to reach the desired 1012 t CO₂e.

Figure 1 below demonstrates the reduction target of 33% below baseline by 2020, considering the forecasted emissions.



Community of Kimberley Forecast and Targets

As previously mentioned, the forecast for emissions tends to mirror both population and economic growth in a community. The census data has shown a recent decrease in population. The City of Kimberley, however, has been working recently to encourage increased business and light industry in the community, most notably with the recent publication of the Kimberley Community Profile and Business Guide. The closure of the Sullivan Mine has left opportunity for new industry and commercial development in the community.

It is estimated that by 2020 there will be an additional 987 units developed in the community. Between 1997 and 2008, there was a 27% increase in taxable properties, or about 954 new properties. The dramatic projected increase in housing (although likely mostly occupied by part-time residents) will contribute to the overall emissions profile of residential homes. Table 14 details the forecasted increase in emissions to 2020 for the community. Of course, if external factors such as the economy, technology or new industry change, this forecast would also need to be adapted. The forecast should be reviewed as the community develops.

Table 14: Community of Kimberley Forecasted Emissions (2020)

Sector	Forecasted Changes	Increase from baseline (%)
Residential Buildings	<ul style="list-style-type: none"> • Build-out of approximately 987 residential units by 2020; Little/no increase in population • Increase in 'green building' and more stringent building codes, requiring reduced energy and water consumption • Approx. 10% increase of emissions, considering less than fulltime occupancy in proposed units 	3%
Commercial Buildings	<ul style="list-style-type: none"> • Strong push for increased commercial business in Kimberley • Increase emissions from commercial buildings, of approximately 10% by 2020 	1.4%
Industrial Buildings	<ul style="list-style-type: none"> • Increase in industrial buildings of approximately 15% by 2020; anticipated development of light industrial activity. 	Negligible
Transportation	<ul style="list-style-type: none"> • Small increase in local vehicle use, but majority associated with tourists and vacation properties • For now, estimated at just less than 1% per year (total of 10% by 2020), but should be revisited as the CEEI's are refined for transportation. 	5.2%
Waste	<ul style="list-style-type: none"> • Increase in waste by approximately 10% as collected from new developments 	0.4%
Total Increase from Baseline (%)		10%

The following table summarizes the baseline and forecasted business as usual scenarios.

Table 15: Forecast for Business As Usual Community Emissions (2020)

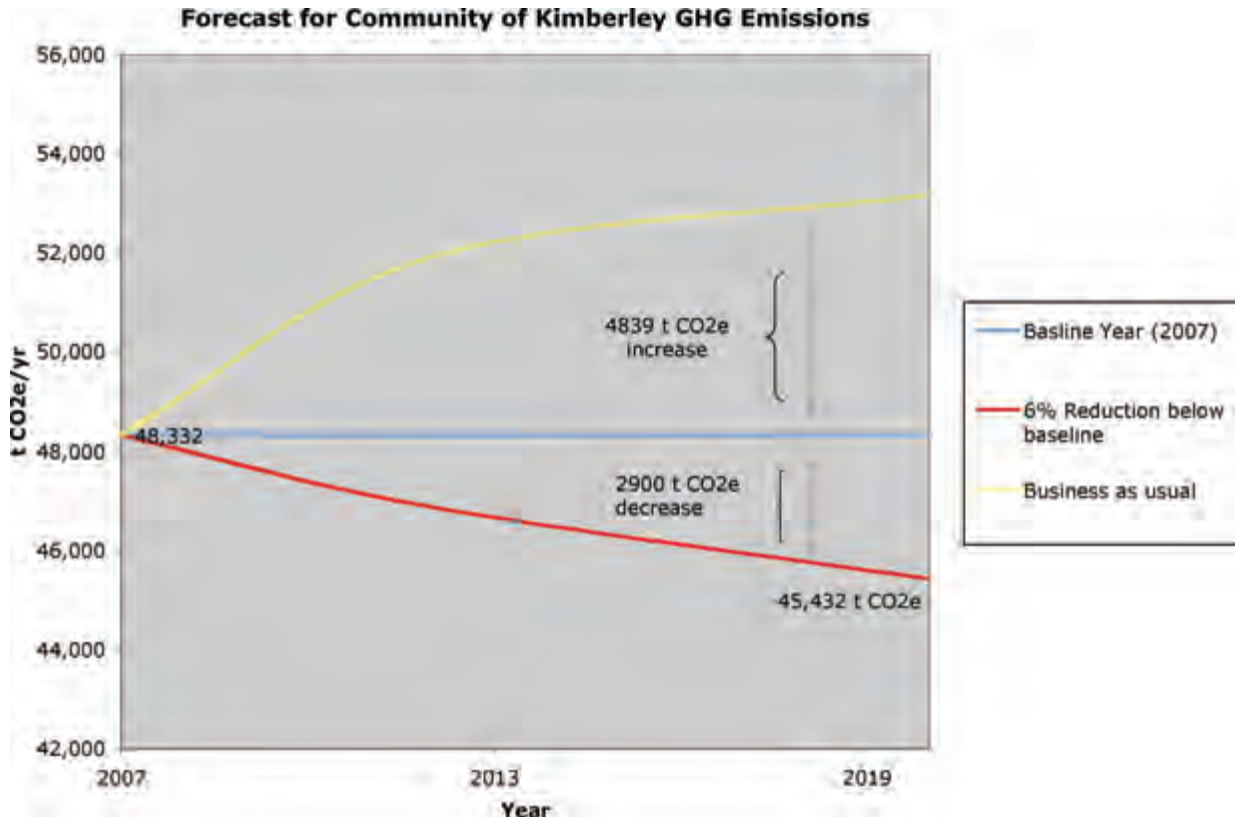
Sector	Baseline Emissions 2007 (t CO ₂ e)	BAU Emissions 2020 (t CO ₂ e)	BAU: Total increase of 4839 tonnes, or ~10% over the baseline year of 2007 by 2020
Residential Buildings	14,349	15,784	
Commercial Buildings	6,803	7483	
Industrial Buildings	122	140	
Vehicles and Transportation	25,253	27,778	
Waste	1805.2	1986	
Total	48,332 t CO₂e	53,171 t CO₂e	


Partners for Climate Protection recommends setting a reduction target of 6% below baseline levels for community emissions. Community emission reductions are much more difficult to achieve than corporate emissions due to the reliance on behavioral change and participation in projects. Furthermore, the initiatives may require financial investment from the City of Kimberley to implement some of the reduction options (i.e. trail development, composting program, etc.). All initiatives will require some degree of community awareness and promotion.

Upon presentation of the emissions forecast to the City of Kimberley staff, the 6% reduction target was determined to be most appropriate for the community. The following points summarize the implications of a 6% reduction below baseline by 2020. The emission forecast and reduction scenario is graphically demonstrated in Figure 2.

- **A 6% reduction from baseline emissions would require the reduction of 2900 t CO₂e, which would result in an annual total of 45,432 t CO₂e.**
- **According to the BAU forecast, by 2020 the community can expect an increase in their emissions by about 10%, or 4839 t CO₂e.**
- **To capture the forecasted emissions, the community must reduce a total of 7739 t CO₂e by 2020 to reach the desired 45,423 t CO₂e.**

Figure 2: Reduction Targets and Forecast for the Community of Kimberley





Summary of Forecasts and Reduction Targets:

City of Kimberley

- Forecasted increase of 137.3 t CO₂e over baseline by 2020
- Reduction target of 33% below baseline by 2020
- Total reductions required to meet target: 635.8 t CO₂e

Community of Kimberley

- Forecasted increase of 4839 t CO₂e over baseline
- Reduction target of 6% below baseline by 2020
- Total reductions required to meet target: 7739 t CO₂e

MILESTONE 3

Greenhouse Gas Emission Reduction Strategies

Milestone 3 of the Partners for Climate Protection framework is the development of a greenhouse gas emission reduction plan. For this reduction plan, each initiative was considered based on the following three criteria:

Cost-Effectiveness

Is the cost of the initiative going to be recovered through decreased energy costs? Is there a less than 10-yr. payback? Is there funding available to support implementation?

Greenhouse gas emission reduction potential


What is the estimated reduction of GHG emissions as a result of this initiative? Where possible, the quantity has been estimated.

Ease of Implementation

Are there communities that have successfully implemented this initiative? Are there materials and resources already available? Is there capacity either at the City or within the community to implement this initiative?

Developing a reduction plan requires input from community and staff, and ideally will include an estimation of the reduction potential for the recommended strategies. Since January 2009, there have been several consultations with staff and one main consultation with the public to provide opportunity for input into the GHG emission reduction plan.

A workshop was held for the community on May 28th 2009. The workshop was open to all residents, and approximately 30 people attended the 3-hour event. Representatives were present from various community groups, as well as several Council members, and Mayor Jim Ogilvie. The proceedings from that meeting are located in Appendix C and include all of the recommendations that were put forward by the community, as well as a summary of the observed changes in the community. Because this report focuses on the top initiatives based on the criteria described above, there are many great ideas that were developed in



the workshop that are not included. Further research may be necessary to determine the feasibility of the ideas, and should be considered perhaps by local community groups to lead in the future.

A very valuable workshop was held at the City of Kimberley, which was attended by about 12 staff representing various operations at the City. This was a productive meeting, and allowed for input regarding the reduction strategies that staff would like to see in place.

The following sections summarize the reduction strategies for the City of Kimberley and Community emissions, based on the input from the sessions described above, as well as a great deal of research that has been done to identify reduction strategies that have been successfully implemented in other communities. The full implementation recommendations (funding opportunities, GHG emission reduction potential, case studies, etc.) can be found in Appendix A for the Municipal emissions and Appendix B for the community.

Unique to many greenhouse gas emission reduction strategies, the reduction opportunities in this report have been quantified where possible, based on engineer studies, case studies or successful application in other communities. ***These quantifications are an estimate, and may or may not reflect the actual reductions that will be achieved through implementation.*** The reduction strategies have been developed with the intention of meeting the reduction targets set for 2020. Where possible, case studies and suggested policies have been included in the report and appendix so that implementation is successful. Communities across Canada have facilitated implementation of reduction strategies through a variety of means, but all successful initiatives must have a champion or leader to ensure plans are followed through, and successes are monitored.

The Provincial government has mandated that all Official Community Plans must integrate GHG emission reduction targets and strategies by May 31st 2010. This is an opportunity for some of the strategies below to be integrated into the planning processes for the community. As part of the OCP, targets may be reviewed and amended if necessary, upon regular review of the OCP. The development of a sustainable and resilient community requires integration of planning processes, and a commitment to a dynamic approach to decision making. This plan is intended to provide the guidance towards a sustainable community, but is only one step in the process. Successful implementation will require commitment from the City and community, and a desire to see change.

MUNICIPAL ENERGY AND EMISSION REDUCTION OPPORTUNITIES

The Municipal target of 33% below baseline emissions by 2020 means a reduction of 635.8 t CO₂e must be achieved. The following sections summarize the emission reduction strategies that will help the City of Kimberley achieve these reductions, and meet the targets. Although not the focus of this particular report, these reduction strategies can also be used in meeting the carbon neutral target for corporate emissions by 2012.

Reduction strategies are broken into the sectors of buildings, utilities (streetlights and water operations), vehicles and waste. Table 16 summarizes the recommendations. See Appendix A for details of each recommendation, including case studies and examples of successful

implementation. Where possible, estimations of the potential greenhouse gas emission reduction potential have been quantified. These quantifications are based on successful implementation of the strategies in other communities, therefore results may vary in the application in Kimberley. In many cases, a full assessment is required to determine accurate reduction potentials.

Table 16: Recommended Municipal Emission Reduction Strategies


Sector	Recommendation	Reduction Comments
	<p>Conduct a full engineering assessment on the feasibility of a heat recovery system at the Civic Centre.</p> <p>Assess the feasibility of connecting the Curling Rink with the Civic Centre.</p> <p>Implement recommendations from Opportunity Assessment including:</p> <ul style="list-style-type: none"> • Lighting retrofit • Pulse start metal halides for ice surface lighting • Adjusting controls on zamboni room boiler to reduce energy use when not in use. 	<p>Heat recovery options between the ice rink and curling rink may result in reductions of over 100 t CO₂e</p>
	<p>Replace all T12 lamps with T8 (high-performance if desired), and magnetic ballasts with electronic ballasts at the time of retrofit.</p> <p>Install light sensors where possible.</p> <p>Perform lighting performance assessment to reduce number of lamps where overlit. (Areas of City Hall, for example, were found to be highly over-lit for office purposes).</p>	<p>Certain reduction of lighting costs, but minimal GHG emission reduction due to the low emission factor of electricity.</p>
Buildings	<p>Complete a full feasibility study for the application of solar panels on the Aquatic Centre as a source for hot water (domestic and pool water).</p> <p>Implement solar panels as per feasibility study recommendations (funding sources below) for domestic hot water, and pool water if possible.</p>	<p>Potential reduction of emissions of potentially 150 tonnes, based on other similar projects. This is achievable particularly if paired with control adjustments (humidity).</p>
	<p>Develop a Green Building Policy for all future new buildings, or acquisitions of buildings by the Municipality. Set a minimum performance standard for new buildings.</p> <p>Develop an energy and water conservation policy for all existing buildings, which guides specifications for retrofits or additions and encourages the implementation of renewable energy.</p> <p>Review and adapt the Official Community Plan to reflect changes in municipal buildings policies.</p>	<p>Reduce emissions from future buildings (reduced forecast). Implementing green building standards to new buildings could cut energy use by up to 30%. Forecasted emissions could be reduced by 30 t CO₂e</p>

Sector	Recommendation	Reduction Comments
Utilities: Streetlights and Water & Sewage Operations	<p>Replace all mercury vapour lamps as required with high-pressure sodium lamps.</p> <p>Replace traditional light fixtures with flat-lens fixtures that direct light more efficiently downwards.</p>	<p>Potential reduction of 3 t CO₂e, with certain reductions in operating costs</p>
	<p>Investigate the feasibility of solar-powered lights at public parks and pedestrian areas.</p> <p>Pursue partnership and funding to support a solar light project as a demonstration of dedication for alternative energy sources.</p>	<p>High public awareness initiative, very minimal GHG reduction</p>
	<p>Establish a water distribution leak detection and repair program.</p> <p>Monitor the identification and repair of leaks, as well as the change in the input and output of water into the City system.</p> <p>Implement a system to track leakage reduction and quantify energy savings as a result.</p>	<p>Studies must be completed to determine severity of leaks; minimal GHG reduction due to use of electricity.</p>
	<p>Set a community water conservation target. This can be a combined consumption reduction and efficiency target (i.e. 20% reduction in consumption).</p> <p>Implement a community-wide water conservation initiative to address conservation targets, and to reduce emissions from water and sewage operations.</p> <p>Develop a low-flow water fixture and appliance exchange program for residents and municipal buildings.</p> <p>Improve monitoring of water consumption through water metering.</p>	<p>Community reduction in water consumption results in reduced emissions for water treatment and pumping. With 20% target, approximately 11 t CO₂e can be reduced.</p>

Sector	Recommendation	Reduction Comments
Vehicle Fleet	<p>Develop an annual or bi-annual driver behaviour workshop. Use the workshop to discuss fuel-efficient driving behaviours and re-iterate the importance of reduced idling.</p> <p>Explore options of block or interior cab heaters for winter months to reduce idling, particularly during morning meetings.</p> <p>Explore the option of alternative transportation for summer months. A bike fleet may be feasible where multiple people are required on a job, requiring only one truck-trip for equipment.</p> <p>Develop a route-planning system. Determine each morning where vehicles are needed, and how to most efficiently deliver people and equipment to each site.</p> <p>Monitor reductions through the E3 Fleet Program.</p>	Idling reduction and driver behavior can reduce fuel consumption considerably. Reducing unnecessary trips will also contribute, results in reductions of approximately 55-75 t CO ₂ e.
	<p>Develop a policy to ensure vehicle replacement considers 'right-sizing' of vehicles. Make internal operational decisions on the vehicles assigned for each job or purpose.</p> <p>Develop a Vehicle Purchasing Policy to guide future purchases for the Vehicle Fleet.</p>	Right sizing vehicles and implementing a vehicle purchasing policy can reduce the forecasted emissions dramatically. Approx. 30 t CO ₂ e
Municipal Waste	<p>Implement a comprehensive recycling program at all municipal buildings.</p> <p>Consider composting facility for municipal buildings, such as a vermicomposting system.</p> <p>Encourage behavioral change to reduce waste coming into buildings (i.e. waste-free lunches, no plastic water bottles, etc.).</p> <p>Reduce excessive use of paper by adjusting printers, etc. to double-sided function</p>	Reducing waste by 30% will reduce approximately 3 t CO ₂ e. More accurate waste tracking may reveal higher quantities of waste.
Emission Reduction Potential	Quantified:	~ 400 t CO ₂ e
	Estimated (Behavioral/Policy Based):	At least 200 t CO ₂ e

COMMUNITY ENERGY AND EMISSION REDUCTION OPPORTUNITIES

The community of Kimberley has a target of reducing emissions by 6% below baseline by 2020. Reaching this target requires a reduction of emissions of 7739 t CO₂e, based on the forecasted and baseline emissions. It should be noted that if developments do not proceed as planned within the next ten years, the forecasted emissions may be reduced. A review of the forecast could be completed within five years, and adjusted if necessary.



Achieving reductions in community emissions is particularly challenging, as it requires behavioral change on the individual level. For those that are aware of the importance of GHG reduction, or of sustainable communities, this may be an easy task. For most however, a great deal of education and awareness is necessary before change occurs. Although the following strategies result in the reduction of emissions at the community level, many will require the resources and initiative of the City of Kimberley to facilitate and/or coordinate the reductions strategies. Creating partnerships within the community (i.e. with Wildsight, or other similar, existing organizations) can relieve some of the organizational pressure from the City.

Table 17 summarizes the reduction strategy recommendations for community emissions. Where possible, the potential emission reductions were quantified, however it should be noted that the actual reduction potential is highly dependent on the success of education and awareness programs. Monitoring of implementation is the best method of determining reductions.

One of the general recommendations that should be reflected in all strategies is the idea of centralizing resources. Creating a location, whether physically or online that provides a 'one-stop-shop' for residents will ease the implementation of many of the community measures. This, along with the identification of champions for this project within the City will ensure the success of the reduction strategy. It is important for the implementation stage that residents are aware of where to access resources, how to implement the strategies, and what support exists to help them take action. Further details to all recommendations listed below can be found in Appendix B.

Table 17: Recommended Community Emission Reduction Strategies

Sector	Recommendation	Reduction Comments
Residential Buildings	<p>Implement development guidelines or policy that encourages or requires all new residential homes to meet minimum energy efficient standards. Consider setting a standard of EnerGuide 77 or 80 (Built Green Gold or Platinum, respectively) for new buildings.</p> <p>Develop sustainability or energy efficiency guidelines or checklists for new developments.</p> <p>Amend existing bylaws, policies or building codes to allow for sustainable and low impact development strategies.</p>	<p>Considerable potential for reducing forecasted emissions through green building codes. Potential for 400-500 t CO₂e reduction in forecast.</p>
	<p>Provide local residents with the tools and resources necessary to facilitate residential retrofit programs such as: website of audit links, funding sources, a community directory of local contractors.</p> <p>Consider providing incentives for energy audits (i.e. financial incentives or provision of energy efficient fixtures), and promotion of ecoEnergy audits and retrofits.</p> <p>Develop an incentive program for homeowners that choose to renovate 'green' (i.e. waived or reduced building inspection fees).</p>	<p>CAEE target of 20% reduction in energy demand. 2500 t CO₂e reduction from homes possible through retrofits, demand management, incentives, etc.</p>
	<p>Provide local residents with the tools and resources necessary to facilitate residential solar hot water systems.</p> <p>Consider providing incentives for installation of systems such as rebates on materials or tax credits.</p> <p>Inclusion of solar harvesting for energy production in new building policies.</p>	<p>50 systems installed by 2020 would reduce at least 100 t CO₂e</p>
	<p>Increase participation in the Team Power Smart program in Kimberley. Encourage at least 200 additional homeowners to join and reduce their energy consumption by 10%.</p>	<p>Education and participatory based. Minimal GHG reductions</p>
	<p>Partner with local organizations to establish a resource centre, located at a municipal building or other centrally located space, where materials, grant applications and other 'green home' resources are available.</p> <p>Offer incentives to builders who build to higher energy efficient standards.</p> <p>Dedicate a webpage or link to tracking participation in the various programs offered to the community. Provide on-line resources and links to facilitate individual action, and to provide a centralized location for all residential-related reduction opportunities.</p>	<p>Education based recommendations. Successful marketing and involvement of the community will result in significant behavioral change, and associated GHG emission reduction.</p>


Sector	Recommendation	Reduction Comments
Commercial/ Industrial Buildings	At least 30% of lodgings in Kimberley participate in an energy or environmental rating program.	Primarily education and awareness based.
	Develop a reward system to recognize environmental stewardship at local businesses.	20% energy reduction for commercial buildings equals 638 t CO ₂ e from natural gas reduction and 207 t CO ₂ e from electricity reduction.
	Set reduction targets for energy reduction among commercial businesses of a 10% reduction by 2015 and 20% by 2020.	
	Engage commercial, retail and small businesses in an energy audit and assessment of energy reduction opportunities, delivered by BC Hydro. Provide the tools and resources necessary for the commercial sector to access incentives and rebates for energy retrofits through the Chamber of Commerce.	
Transportation	Further promote Kimberley as an Idle Free community. Work with local residents and organizations to deliver information through workshops, local media, schools and businesses.	Modest 5% reduction in fuel consumption by 2020 with idle free campaigns, workshops, etc. will reduce 1263 t CO ₂ e.
	Monitor (through surveys, observation, data collection) the successes and behavioral change as a result of Idle Free signage and awareness initiatives. Expand signage to include downtown zones, parks and schools.	Co-benefit of improved air quality.
	Provide bike facilities (i.e. racks, storage rooms at businesses, etc.) to encourage bike commuters and local bike transportation. Amend Road Design Standards to include bike lane development on major roads within the City. Encourage alternative transportation through the continued education and promotion of existing programs such as Commuter Challenge, Walk to Work Week and Bike BC. Integrate trail connections into Policy for all new developments. Expand community bus service, working with the RDEK, to reduce vehicle traffic between Kimberley and Cranbrook.	Significant policy and education recommendation. Successful implementation could result in further 5-10% reduction in fuel consumption. Implementation of a transit system between Kimberley and Cranbrook will significantly increase reduction opportunities.
	Implement a lawnmower exchange program, in coordination with local retailers, or through the municipal government to encourage the use of reel, or four-stroke engine mowers. Provide a 'loan' mower at City Hall, or a resource centre to allow interested homeowners test a reel, or push mower.	Minimal reduction potential immediately. Public awareness and education must be successfully implemented.

Sector	Recommendation	Reduction Comments
Waste	Conduct a feasibility study for the implementation of a curbside recycling program. Work with the RDEK to implement a pilot recycling program.	Potential for 20% reduction in waste with curbside recycling. ~350 t CO ₂ e
	Conduct a feasibility study for the implementation of a curbside composting program. Encourage the composting of yard waste. Consider banning organic yard waste from the landfill (i.e. household organic waste pile at the Transfer Station). Provide backyard composters at a subsidized cost along with composting reading material. Education and awareness around safe backyard composting opportunities, and vermicomposting programs.	Significant opportunity for emission reduction with diversion of organic waste from streamflow. Considering less than 100% participation, approximately 300-400 t CO ₂ e reduction is possible.
	Encourage the reduction of the use of plastic bags at all retail stores in Kimberley. Consider enforcing a voluntary ban. Participation of local cafés and restaurants in a reusable mug incentive program. Retrofit all public garbage bins to include recycling bins. This has been successfully implemented at many roadside rest stops throughout BC and Alberta. Promote and advertise waste reduction events, such as Waste Reduction Week, or Zero Waste days (see: Recycling Council of BC http://www.rcbc.bc.ca/)	Community awareness and education based recommendations. Successful campaigns and implementation of recommendations may result in further reductions, and encourage waste reduction at home.
Emission Reduction Potential	Quantified:	~6400 t CO ₂ e
	Estimated (Behavioral/Policy Based): **For community emissions, it is very difficult to predict participation in initiatives, or tendency for behavioral change. Initiatives should be monitored over time to determine accurate reduction potentials.	Potential for significant additional reductions (1000t plus) with successful community engagement.

CONCLUSIONS AND NEXT STEPS

The City of Kimberley is one of the leaders in the Kootenay region in taking action on climate change, both through adaptation and mitigation processes. It is hoped that through these processes, ideas for integration of the recommendations into Policy and Bylaws have been developed. The ultimate purpose of climate action is to be aware of current and future opportunities, and to make change to take advantage of, and prepare for the changes that are inevitable.

Next steps of this process should include the development of an implementation committee with representatives from the City, Community and business. It will be crucial in putting recommendations into actions that there be representation and participation from a wide range of stakeholders. Ideally, this committee will integrate the adaptation and mitigation processes, and act as the umbrella organizing team for the coordination of initiatives throughout the community and municipal operations.



Continuous monitoring is important to be able to measure the changes and successes. The City has already started to adapt some of the account procedures to be able to better track and measure energy and fuel consumption. Identifying opportunities within the daily tracking protocols (i.e. travel, energy use, etc.) to integrate tracking of emissions will help with future reporting requirements.

As an on-going process, 'sustainability' is not something that is achieved, but rather is lived and integrated into every organization, individual and government. Recognizing the opportunities to enhance and improve sustainability is the challenge. The City of Kimberley is a leader, and should continue to demonstrate the potential of positive change to all communities in our Province.



APPENDIX A

MUNICIPAL REDUCTION STRATEGIES





MUNICIPAL GHG EMISSION REDUCTION STRATEGIES

The following section details the recommendations for municipal GHG emission reduction opportunities. Each recommendation listed in the summary table, Table 16 in the main body of the document is detailed below. A GHG emission reduction strategy should be a living document. Staff may want to contribute ideas and opportunities in the future. This may be an item integrated into staff meetings, etc.

Municipal Buildings

Total Baseline Emissions = 1101 t CO₂e

The City of Kimberley has significant opportunity to reduce greenhouse gas emissions through improved efficiency of current facilities. In June 2009, all of the City facilities had an energy efficiency opportunity assessment. The opportunity assessment involved a high level review of the opportunities for improved energy efficiency, and identified areas for potential upgrade and retrofit that would result in overall improved energy efficiency, and reduce greenhouse gas emissions.

The report Energy Efficiency Opportunity Assessment of Corporate Buildings: City of Kimberley should be reviewed and all recommendations considered for upgrades to the City buildings. This section expands on some of the significant opportunities, and provides case studies and examples where similar retrofits have been completed in other communities. Also included in this section are options for policies that will guide future energy efficient decisions.

Civic Centre Heat Recovery

The Community Energy Association describes the recovery of waste heat as “one of the most cost-effective renewable energy forms...”³ The Opportunity Assessment identifies heat recovery as an option for the ice rink. Given the proximity to the curling rink, connecting these two facilities is certainly an option, as ice rinks tend to have expel more waste heat than can be used by the facility itself⁴ (unless, as part of a large complex with multiple recreational facilities). As part of the opportunity assessment, it was identified that the Curling Rink is in close enough proximity to the Arena that it would likely be feasible to proceed with a heat recovery option between the two buildings, and perhaps connecting the ice plants, removing the need to use water as the heat rejection method. This is an excessive use of water, and the use of the fluid cooler in the Civic Centre for the curling rink is a potentially feasible option.

³ Renewable Energy Guide: Heating our Communities. Community Energy Association. (2007).

⁴ Ibid.

**Recommendations:**

Conduct a full engineering assessment on the feasibility of a heat recovery system at the Civic Centre.

Assess the feasibility of connecting the Curling Rink with the Civic Centre.

Implement recommendations from Opportunity Assessment including:

- *Lighting retrofit*
- *Pulse start metal halides for ice surface lighting*
- *Adjusting controls on zamboni room boiler to reduce energy use when not in use.*

Cost Effectiveness:

As quoted above, the option of recovering waste heat is usually the most cost-effective option for renewable energy. Using waste heat within the Civic Centre would certainly reduce the use of natural gas, resulting in cost savings. The actual cost of implementation should be assessed by a professional heat recovery specialist, however generally the payback for heat recovery systems are relatively short (see Case Studies below). The initial opportunity assessment estimates that a savings of 13% of annual energy costs is possible. Pursuing the option of connecting the Curling Rink with the Civic Centre would add additional, and likely significant costs (estimates at other locations range from \$400,000-\$600,000 for heat recovery and piping between buildings), however the cost savings at the Curling Rink would be significant. Furthermore, the ice plant at the Curling rink is aged and will need to be replaced in the near future. Long-term savings should be considered in determining the approach for this renovation.

Funding may be available for this type of project from the following sources:

- Natural Resources Canada:

<http://www.oee.nrcan.gc.ca/commercial/financial-assistance/existing/retrofits/index.cfm>

- Green Municipal Fund:


<http://gmf.fcm.ca/GMF/GMF-2009-call-for-applications/Energy-2009-call-for-application.asp>

GHG Emission Reduction Potential:

The most significant reduction of greenhouse gas emissions can be achieved where natural gas consumption is reduced. A heat recovery system would certainly achieve a reduction in natural gas consumption for the Civic Centre. According to Natural Resources Canada, a “traditional refrigeration unit expels heat from the condenser unit that is approximately equal to three times the energy consumed by the compressor.” GHG emission reduction for the retrofits recommended above may equal 20 tonnes. Other estimates from projects in similar facilities have yielded between 50 and 80 tonnes of GHG emission reduction. Considering the potential of increasing efficiency at the Curling Rink, the reduction potential would be much higher.

Ease of Implementation:

Heat recovery is not a new technology, and the expertise exists in British Columbia. A full engineering assessment with heat recovery technologists would have to be conducted. This is a project that could be completed in a short time period once commenced, however the



City may want to consider funding opportunities, which may prolong the process. Often a feasibility assessment with the full energy reduction opportunities is required before grants are applied for. It is recommended that this feasibility assessment be completed as soon as possible so that the process of applying for grants and confirming the contractor can proceed.

Case Studies: Recently implemented projects:

The District of Vanderhoof is implementing a heat reclamation for Zamboni water heating at their arena. They anticipate the project to reduce GHG emissions by 20% (for their arena, 18.5 tonnes annually). They will also reduce water use, and operational costs.

The City and Regional Municipality of Dauphin are incorporating heat reclamation as part of the construction of a new arena. The heat reclamation and refrigeration system had a cost of \$323,000, but has resulted in reduced heating costs by \$45,000 per year. They are investigating the possibility of using the heat in other areas of the complex (common area, swimming pool, etc.), potentially saving an additional \$30,000 per year.

Municipal Building Lighting and Controls Retrofit

As identified in the Opportunity Assessment, a lighting retrofit should be implemented across the board in all corporate facilities. Original lighting in most municipal facilities will be T12 lights. T8 lights are now available, which reduce energy consumption by up to 33%. Magnetic ballasts should also be replaced with electronic ballasts when lighting is upgraded. Electronic ballasts are more efficient, saving 3W-8W per ballast.⁵ Now available are high-performance T8s, which although more expensive than the traditional T8s, last longer and are even more efficient.⁶ Where possible, light sensors should be installed in common rooms to reduce unnecessary lighting. Sensors can reduce energy use in areas particularly where the occupancy is unpredictable. BC Hydro identifies conference rooms, restrooms, corridors and storage areas as the most effective for sensors. Office spaces still achieve energy reductions, but at a lower rate of 13-50% (compared with up to 85% energy use reduction in the other spaces).

Recommendations:

Replace all T12 lamps with T8 (high-performance if desired), and magnetic ballasts with electronic ballasts at the time of retrofit.

Install light sensors where possible.

Perform lighting performance assessment to reduce number of lamps where overlit. (Areas of City Hall, for example, were found to be highly over-lit for office purposes).

⁵ http://www.bchydro.com/powersmart/technology_tips/buying_guides/lighting/fluorescent_ballasts.html

⁶ http://www.bchydro.com/powersmart/technology_tips/buying_guides/lighting/full_size_fluorescent_lamps.html



Cost-Effectiveness:

T8 lamps can last up to 30 years in an office environment, and may require servicing or cleaning once every 3 years. The energy savings of up to 25-30% for the conversion of T12 to T8 lamps is significant, and will result in reduced energy bills. Successful implementation of motion sensors will also improve energy efficiency. According to BC Hydro, retrofitting an existing T12 lamp and magnetic ballast with a T8 lamp and electronic ballast will be \$55 per fixture. The payback, depending on lighting load, is estimated to be between 2 and 6 years.

Funding may be available from:

- BC Hydro: Contact Customer Service or go to: <http://www.bchydro.com/ecatalog/eCatServlet?cmd=techincentives&catId=105>

GHG Emission Reduction Potential:

Because lighting is entirely electricity powered, the GHG emission reduction potential is quite low. In BC our electricity is predominately hydro-power, and so the associated emissions are low. This initiative will contribute a small reduction in emissions to the municipal buildings. Only about 5% of the total emissions from City of Kimberley buildings are the result of electricity use.

Ease of Implementation:

This retrofit has begun in some buildings, including the Civic Centre and Centennial Hall. All other buildings, except the Aquatic Centre have T12 lamps. Lamps are readily available, and incentives exist through BC Hydro. The City may want to conduct a light study to ensure that areas are not being overlit, and that the lamps are installed in optimum spacing.

Case Studies:

The **City of Dryden** completed a feasibility study to determine payback for a retrofit of lighting from T12 to T8 for their City Hall. They calculated a potential reduction of energy use by 18,509kWh, and a payback of about 9 years. This does not include incentives or rebates.

The **City of Burnaby** completed a lighting retrofit at their recreation complex as part of a bundled energy efficiency project, and Port Moody saw significant savings in electricity after an energy efficient retrofit at their arena.

Office GHG Reduction Tips Livesmart BC for Offices and BC Hydro Green Your Business

- Turn off monitors and computers when not in use
- Purchase LCD monitors when replacing; use 80-90% less energy
- Buy sustainable and/or recyclable supplies
- Conduct a waste assessment
- Avoid disposable dishes and water bottles



Solar Hot Water at the Aquatic Centre

The Community Energy Association states that “public swimming pools are one of the best uses of solar hot water systems for local governments. They have steady, year-round loads, require relatively low temperatures and domestic hot water requirements are also quite large, adding to the available load.” The City of Kimberley Aquatic Centre is outfitted with braces for solar panels, and Council has considered the installation of solar panels to the building.

Recommendations:

Complete a full feasibility study for the application of solar panels on the Aquatic Centre as a source for hot water (domestic and pool water).

Implement solar panels as per feasibility study recommendations (funding sources below) for domestic hot water, and pool water if possible.

Cost-Effectiveness:

The Community Energy Association estimates that the application of solar panels on a municipal swimming pool costs between \$100,000 and \$200,000, with a typical payback of 8-12 years. This does not consider the availability of funding for this type of project. The solar energy would replace a significant amount of natural gas, reducing the overall costs of fuel for the building. Payback with funding would be significantly lower, and would result in reduced energy costs for the lifetime of the building.

Funding:

- EcoAction – Renewable Heat Funding
<http://www.ecoaction.gc.ca/ECOENERGY-ECOENERGIE/heat-chauffage/index-eng.cfm>
- Solar BC – Will contribute upon successful bid to EcoAction
<http://www.solarbc.ca/install/local-governments>
- Build Canada – currently closed, funding continuing until 2017
<http://www.th.gov.bc.ca/BCFCC/>

GHG Emission Reduction Potential:

As with the arena retrofit, where natural gas consumption can be reduced the resulting emission reductions are significant. In Port Coquitlam, solar panels were installed to heat domestic hot water for their recreation building, with the option of heating the pool in the future. The result was a 44% reduction in natural gas consumption due to the solar panels, as well as a heat recovery system. As a conservative estimate, if the Kimberley aquatic centre could reduce natural gas consumption with solar panels by 20%, a reduction of 66 tonnes of GHG emissions could be achieved. As estimated in the Opportunity Assessment, a further 21% of overall energy savings could be achieved by ensuring the air handling systems are operating at optimal efficiency. Noted in particular was the level of relative humidity at the pool, which is using potential double the heating energy than is required. Additional emission reduction could be as high as 70 tonnes. A professional should complete a full assessment to determine the exact savings.



Ease of Implementation:

It is clear that there is interest and willingness to pursue the option of solar hot water heating at the Aquatic Centre, as the facility was designed with the option in place. There is a general political interest from Council to complete the feasibility study. There are grants available for implementation, and the technology is known, tried and true. Once the City determines the retrofit is desired, there are engineering companies that can assess, install and monitor the system.

Case Studies:

The **City of Port Coquitlam** completed a retrofit in 2004 at their recreation centre, which included heat recovery, solar thermal panels and a high efficiency boiler. The solar panels alone resulted in a \$4000 savings a year, and the total annual savings of the whole retrofit was approximately \$40,000-\$50,000.

New Municipal Building Policies

The City of Kimberley has plans for the development of a large Conference and Paralympic Centre. Although not currently budgeted for, there may be future developments, renovations or acquisition of buildings by the City. It is important for both mitigation and adaptation purposes that new buildings be constructed with consideration of future climate and energy scenarios. When new buildings are constructed, there is an immediate opportunity to reduce operating and maintenance costs by ensure the most energy and water efficient technologies are incorporated. Where budget is an issue, at the very least buildings should be designed to have appropriate aspect so as to take advantage of passive solar heating and lighting. Furthermore, efforts should be made to ensure that water capturing, solar capturing and where applicable wind capturing technologies are incorporated into the building design. Municipalities that are growing and developing have a significant opportunity to demonstrate leadership in green building. The City of Kimberley is no exception.

Recommendations:

Develop a Green Building Policy for all future new buildings, or acquisitions of buildings by the Municipality. Set a minimum performance standard for new buildings.

Develop an energy and water conservation policy for all existing buildings, which guides specifications for retrofits or additions and encourages the implementation of renewable energy.

Review and adapt the Official Community Plan to reflect changes in municipal buildings policies.

Cost Effectiveness:

Developing policies use only staff time. Implementing the policy, and ensuring energy efficient standards for new buildings may result in higher upfront capital costs. The savings of an energy efficient building, however, has been demonstrated, and particularly where simple design such as solar aspect can be incorporated, the long-term savings are significant.

**Funding:**

- Green Municipal Funds provides funding or loans for the construction or renovations of energy efficient buildings, or buildings that incorporate renewable energy.
<http://www.sustainablecommunities.fcm.ca/GMF/GMF-2009-call-for-applications/Energy-2009-call-for-application.asp>
- EcoEnergy Renewable Energy Initiative
<http://www.ecoaction.gc.ca/ecoenergy-ecoenergie/faq-2-eng.cfm>

GHG Emission Reduction Potential:

Part of the forecast of emissions for the City includes the development of a large conference centre based on a facility of similar size, built to traditional building standards. It is estimated that construction that meets a standard of Built Green Gold, for example, is 30% more efficient than traditional construction. Although further assessment should be done to calculate potential savings in construction of a facility to Built Green Gold, or LEED Silver or Gold standards, a reduction in the forecasted emissions of 20 t/CO₂e could result. Applying an energy efficiency policy to all buildings could significantly reduce current consumption.

Ease of Implementation:

Developing a Policy is one piece of this recommendation, and is perhaps the easier piece. Implementing and following the Policy may be a challenge, particularly where the capital costs of a project are significantly higher than if traditional building standards were required. It is recommended that the capital costs be compared with a long-term operating cost analysis when considering new building construction. The long-term savings in energy, and the potential to produce excess energy (i.e. through solar power production), may reduce the payback period.

Case Studies:

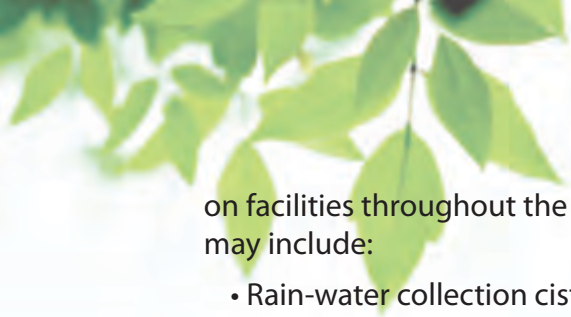
The **Town of Banff** has implemented a Green Building Policy which requires all new buildings to meet a minimum of LEED Silver certifications.

The **Municipality of Saanich** has developed the 'Energy Conservation Policy for the Municipality of Saanich', which is included in Appendix D. This Policy is geared more towards existing buildings, and has the objective to "increase the energy efficiency of new and existing structures, equipment, and transportation systems in the Municipality.."

Municipal Building Audits and Retrofits: General Recommendations

In general, and as identified in the Opportunity Assessment document, there is potential for general upgrade of boilers, improved weather-stripping and insulation of facilities, and as described above, a lighting retrofit where old T12 lamps still exist. Continuing the replacement and improvement of garage doors, insulation and windows should be considered for the Public Works buildings.

In general, the City of Kimberley may wish to consider highlighting demonstration projects



on facilities throughout the community as a means of public education. Some examples may include:

- Rain-water collection cistern for use in the building (toilets) or landscaping
- Solar hot water heaters
- Photovoltaic solar panels for space/water heating
- Green roof installation (demonstration project)

Similar initiatives could be implemented at a number of municipal buildings, and it is recommended that the City of Kimberley consider the positive impact of leadership in creating low-energy and sustainable communities.

UTILITIES (WATER AND STREETLIGHTS)

Total Baseline Emissions = 35.28 t CO₂e

Streetlight Replacement Program

There have been significant improvements to street lighting technology, and many municipalities across the country are implementing streetlight replacement programs to take advantage of the electricity reduction, and improved longevity of the lamps. In many communities, fixtures and ballasts are being replaced to produce more directed, efficient lighting, reducing the wattage of light required to produce the same effect as the mercury vapour lamps. As with any retrofits that focus entirely on electricity use reduction, the associated GHG emission reductions are not significant. In terms of demonstrating commitment to energy conservation, however, replacing streetlights is a visible initiative, and at the very least, will reduce operating costs for the City. Retrofitting the streetlights with a flat-lens fixture ensures more efficient lighting by reducing the wattage required for the same quality light.

The Town of **Norman Wells** replaced inefficient boilers and hot water heaters in their Fire Hall, Community Hall, Maintenance Shop, Arena and Staff residence, resulting in approximately 166 tonnes CO₂e reduction per year. The total payback for the project was only 5 years.


Recommendations:

Replace all mercury vapour lamps as required with high-pressure sodium lamps.

Replace traditional light fixtures with flat-lens fixtures that direct light more efficiently downwards.

Cost Effectiveness:

With potential energy savings of 35%, there is significant potential for costs savings if the lamps are replaced as older ones burnout. It may be inefficient to undertake an entire replacement process at once, however the incremental replacement is feasible, and strongly recommended. BC Hydro has recognized the benefit of reduced wattage streetlights, and



the effectiveness of the flat lens fixtures. They have developed an incentive program to help municipalities switch out the current lamps and fixtures. The incentives in some cases will result in a lower cost for HPS lamps than for mercury vapour.

Funding:

- BC Hydro Power Smart Rebate for Streetlight

http://www.bchydro.com/news/articles/conservation/power_smart_rebates.html

GHG Emission Reduction Potential:

The potential for greenhouse gas emission reduction is quite minimal for this initiative because of the sole energy source of electricity. The cost savings, however, could be significant, and as mentioned above, the project would demonstrate the City's commitment to energy conservation. The estimated GHG emission reduction is approximately 2 tonnes of GHG emissions annually once all fixtures are replaced. This is a conservative estimation, and would likely be higher if the flat lenses were implemented allowing for lower wattage lamps.

Ease of Implementation: There are local sources for the lamps, incentives available, and a general need to replace lamps on a regular basis. These factors results in a relatively simple ease of implementation. Staff would have to source appropriate supplier of high-pressure sodium bulbs and flat lens fixtures (if desired). The conversion could likely be completed by City staff over time.

Case Studies:

Although an example from a large City, the success of the City of Calgary is being high-lighted throughout BC as a demonstration of a successful retrofit program:

Between 2002 and 2005, the City of Calgary retrofitted their 37,000 street-lights with more efficient flat-lens high-pressure sodium fixtures. Unlike conventional "cobra head" lighting fixtures, flat lens fixtures prevent light from wastefully entering the night sky. Having reduced their lamp wattage from 200W to 100W on residential roads, and from 250W to 150W on collector roads, Calgary saves an estimated \$1.7 million annually in electrical costs. The retrofit's costs will be paid off by 2012. ⁷

Solar Powered Public Lighting

The City of Kimberley has excellent solar potential, but the application of solar technology must be carefully considered because of the generally prohibitive costs. Becoming more popular, however, is the idea of solar powered streetlighting for public parks and pedestrian areas. According to the Weather Network, the City of Kimberley receives an average of 2229 hours of sunshine a year (Kelowna gets about 2000). A full replacement of lighting in the City would not be recommended due to cost, but implementing solar lighting at public parks as demonstration projects may very well be feasible for the City, and would reduce operating and maintenance costs. Although the GHG reduction potential is minimal, demonstrating a commitment to renewable energy and alternative solutions is valuable. There may be potential for excess power generation, which could be captured in the electrical grid.



Recommendations:

Investigate the feasibility of solar-powered lights at public parks and pedestrian areas.

Pursue partnership and funding to support a solar light project as a demonstration of dedication for alternative energy sources.

Cost Effectiveness:

The City of Vancouver implemented a number of solar lamps in public parks. The lamps were very expensive, and so broad application throughout the City is not an option. The City of Kelowna, however, was able to obtain funding from the Federal Government, and partner with a solar lighting supplier to offset the costs. The City paid approximately \$150,000 for installation, as part of a \$1 million dollar project. It is anticipated that there would be a considerable payback, but improved battery technology means the battery life is approximately 5 years, and LED lamp life approximately 10 years.

Funding may be available through SolarBC, however their intake for Solar Communities has ended. SolarBC has many resources available to help find funding for solar projects. <http://www.solarbc.ca/>

GHG Emission Reduction Potential: Streetlighting contributes so insignificantly to the overall emission profile that the opportunity for significant emission reductions is very low. This project would be a potential energy and cost savings opportunity if funding was attained, however the emission reduction would be minimal.

Ease of Implementation:

The technology for solar streetlights exists, and has been implemented in several communities in BC, as highlighted in the Case Studies section below. It would be advised that the City partner with a solar company to install the fixtures, and that funding be pursued for successful and cost effective implementation.

Case Studies:

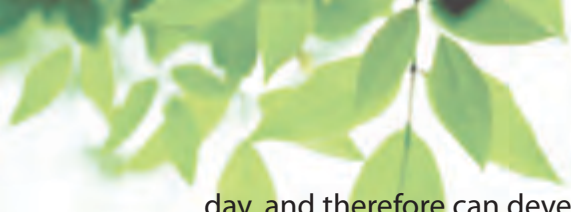
The **City of Kelowna** has been working with Carmanah Technologies Corporation to equip parks, paths and other public spaces with solar-powered LED lamps. The City has committed to installing 100 Carmanah EverGen lights.

The **City of Dawson Creek** become a Solar Community under SolarBC and has also installed solar powered streetlights as a continuing demonstration of their dedication to renewable energy. The City has also installed solar hot water heaters on many municipal buildings.

Water leak and detection Initiative

The water distribution infrastructure in communities is one utility that is used all day, every

7 <http://content.calgary.ca/CCA/City+Hall/Business+Units/Roads/Streetlights/EnviroSmart+Streetlight+Retrofit/EnviroSmart+Streetlight+Retrofit.htm>



day, and therefore can develop small leaks and damages to the pipes. The Water Use and Loss in Water Distribution Systems guidance document was developed by the National Guide to Sustainable Municipal Infrastructure in 2003, and stated: "Water loss carries a significant price tag, both economic and environmental... Proper accounting of water used and lost will help reduce the costs associated with potable water and lead to a more sustainable product."⁸

Many municipalities have developed programs for water distribution leak detection and repair. The City of Kimberley, according to an interview with the mayor with Wildsight (prior to elections), the City staff has been increasingly aware of leak detection. A water loss reduction program can help to continuously monitor and detect leaks, and assess the need for repairs.

Recommendations:

Establish a water distribution leak detection and repair program.

Monitor the identification and repair of leaks, as well as the change in the input and output of water into the City system.

Implement a system to track leakage reduction and quantify energy savings as a result.

Cost Effectiveness:

Implementing a leak detection program is not overly costly, however the costs of accessing and repairing leaks can be expensive, as it would often require exposing the water mains. It is cost effective to be delivering and treating water efficiently, and will result in savings in the long-term. The co-benefits to the water distribution system includes: reduction of water treatment and pumping costs; reduction of wastewater treatment costs; and reduction of damage to infrastructure.

Funding through Towns for Tomorrow may be possible at the next intake. Current intake is closed.

<http://www.townsfortomorrow.gov.bc.ca/>

GHG Emission Reduction Potential:

The potential for energy savings results from the efficient delivery and treatment of water. The savings are dependent on the success of the leak detection and repair initiative. This should be further studied and monitored to understand determine more precise water loss quantities. Electricity is the main source of energy for the distribution of water throughout Kimberley, so the associated emission reductions are minimal, however water conservation, as noted throughout the Adaptation Plan developed for the community, is crucial.

The **Halifax Regional Water Commission** implemented a program in 2001, which has since saved **31.8 million litres** of water per day, or 11.6 billion per year. The water loss reduction strategy has resulted in an approximate annual reduction in costs of \$200,000 and emissions of **3,250 tonnes** of GHG emissions.

⁸ Water Use and Loss in Water Distribution Systems: A Best Practice by the National Guide to Sustainable Municipal Infrastructure (2003).



Ease of Implementation:

The City of Kimberley, as with many municipalities, is aware of the existence of leaks throughout the water system. The actual repairing of leaks adds challenge to the implementation, however a leak detection program can be phased in, beginning with an overall water distribution system assessment. Identifying the major leak locations and determining a 'triage' for leak identification and repair may be a more realistic approach to a leak detection and repair program than to address every small leak. The costs associated with major improvements and repairs are likely to be a barrier to immediate attention to leaks.

Case Studies:

The **City of Fernie** conducted a full water distribution system analysis, which determined the water use level of the community. The analysis identified the community as a large consumer of water, and noted that there was significant loss throughout the system due to leaks in the distribution mains. The results of the analysis recommended a water conservation study, one of the major aspects of that being a leak detection and repair program.

The City of Kelowna has developed a Water Sustainability Action Plan, which includes a policy on leak detection and repair:

Reduce Water System Leakage That Results in Water Loss

*Confirm percentage of water system losses as part of the utility's overall unaccounted for water formula. Identify costs associated with delivery and lost revenue.

*Enhance the current leak detection program by identifying priority areas and completing leak detection surveys.


*Develop a 5 year revolving plan to rectify system leakage.

*Work with all other water purveyors within [Kelowna] to ensure a consistent approach to water system leakage is being applied.⁹

Water Conservation

The Province of British Columbia has set a target to become 33% more water efficient by 2020. The Province has a target to reduce new demand, encourage consumers to reduce their consumption and provide education and enforcement of the Water Act to achieve this goal. Communities across the Province are recognizing the savings (energy and money) associated with reduced water consumption.

Reducing water consumption is an important mitigation and adaptation measure, as it addresses the need to reduce energy use (and therefore lower associated emissions), and the need to conserve water as supply becomes more variable with changes in snow-



pack and precipitation. Water conservation measures, although applied throughout the community, ultimately reduce the emissions through the municipal water system. The community inventory does not capture individual home water consumption, however the municipal inventory must account for drinking water supply, distribution, and wastewater treatment and discharge. Recommendations for water consumption reduction are included in the municipal reduction strategy section for this reason. It will ultimately be up to the consumers, however to contribute to the target of water conservation.

Recommendations:

Set a community water conservation target. This can be a combined consumption reduction and efficiency target (i.e. 20% reduction in consumption).

Implement a community-wide water conservation initiative to address conservation targets, and to reduce emissions from water and sewage operations.

Develop a low-flow water fixture and appliance exchange program for residents and municipal buildings.

Improve monitoring of water consumption through water metering.

Cost Effectiveness:

Water conservation reduces the use of energy of the water and sewage operations, lowering overall operating costs. The implementation of water conservation programs may require investment of the municipal government to establish education and awareness programs for the community. Many programs already exist, and would require very limited investment. For major projects, such as a water metering initiative, a subsidy or similar incentive for participation in the initiative may require greater investment by the municipality. Lower cost implementation may be limited to providing resource materials and guidance documents to water conservation. Higher cost programs may include the provision of incentives or rebates for low flow water fixtures. Rebates are available through BC Hydro to offset the cost of some low-flow appliances and fixtures. The City may choose to supplement the rebate, or at least provide a resource centre where this information is available. http://www.bchydro.com/rebates_savings/appliance_rebates.html

GHG Emission Reduction Potential:

Reducing the energy use for water and sewage operations will directly reduce the greenhouse gas emissions. The estimated energy use for supply and treatment of surface water is 0.375kWh/m³, and for collection and treatment of sewage is 0.175kWh/m³ for primary treatment, and 0.320 kWh/m³ for secondary treatment.¹⁰ A target of 20% reduction of water consumption and increased efficiency through low-flow water fixtures (i.e. reduction in waste water) of 15%, the GHG reduction would equal approximately 11.4 t/ CO₂e per year.

9 City of Kelowna Water Sustainability Plan. http://www.getwatersmart.com/peak_demand_initiative.html


10 Greenhouse Gas Emission Assessment Guide: For British Columbia Local Governments. (2008). Community Energy Association and Ministry of Community Services.



Ease of Implementation:

While there are programs and resources readily available for the implementation of water conservation initiatives, the participation of the community in voluntary initiatives may be a challenge. The City of Kimberley should consider dedicating a website, or better yet, a physical location (as described in overall policy and recommendations below) that would centralize the information for residents in the community. Depending on the scope of the initiative, developing resource materials would be quite easy to implement, while designing a rebate program and providing low-flow fixtures, for example, would be more complex. Partnering with a local organization may be beneficial to help implement the community-wide water conservation efforts.

(see case study on next page)



Case Studies:

There is a wide range of resources available in British Columbia to support the development of water conservation strategies. Furthermore, many communities throughout the Province have begun to implement water conservation initiatives, particularly in the Okanogan, Lower Mainland and coastal regions.

This list is some of the sites for excellent water conservation initiatives and ideas:

<http://www.livingwatersmart.ca/>

<http://www.waterbucket.ca/>

<http://www.poliswaterproject.org/>

<http://www.waterbalance.ca/>

Excellent water conservation project development document:<http://www.poliswaterproject.org/publication/243>

Initiatives from Local Governments:

The Village of Lumby has developed a Water Conservation Strategy that guides the implementation of a water metering program, water restriction guidelines, an educational program focussing on current water use, and identify water leaks throughout the distribution system.

http://www.lumby.ca/council/greenhouse_gas_strategy.html

The Capital Regional District has implemented a fixture rebate program for water efficient appliances and fixtures. Residents whose home was built before 2005 are eligible for a rebate on low-flow toilets. Further educational resources are available on their website, as well as tips for general water efficiency around the home.

<http://www.crd.bc.ca/water/conservation/rebates/bathroom.htm>

Policies from Local Government

The City of Chilliwack has a water system that is 100% metered. Water rates are determined by their bylaw: The Chilliwack Waterworks Regulation Bylaw 2004, No. 2995. Information about water use and water conservation in Chilliwack:

<http://www.chilliwack.ca/main/page/cfm?id=1240>

The District of Lantzville's Subdivision and Development Bylaw No. 55, 2005, incorporates low impact development standards for roads and storm water management, as well as alternatives for impervious surfaces, etc.,

http://www.lantzville.ca/upload/dcd263_BylawNo55.pdf

The District of Metchosin has adapted the Rain Water Bylaw to encourage onsite management of rainwater, establishing a performance target of 90% rainfall being addressed on site.

<http://www.district.metchosin.bc.ca/467/467.pdf>



VEHICLE FLEET

Total Baseline Emissions: 365.15 t CO₂e

The City of Kimberley has already demonstrated leadership through increased efficiency in the vehicle fleet. The recent decision by Council to purchase a more expensive piece of heavy machinery because of its fuel economy demonstrates the willingness to invest in fuel efficient vehicles with the understanding that cost savings will be realized over the long-term. The City has a policy to reduce idling of staff vehicles, which should continue to be promoted and enforced. Although not committed to through the Community Action on Energy and Emissions grant, the City should continue to pursue a fleet rating through E3 Fleets. This process has been initiated through the collection of vehicle fleet information for the inventory, and will continue as the City sets up a cardlock system for easier tracking of fuel consumption.

Municipal Fleet Fuel Efficiency

The City of Kimberley has established an Idle Free Policy for the municipal fleet. Municipal and commercial fleets that have implemented an Idle Free policy have seen reductions of 10-15% in fuel use. Further actions can be taken to reduce the amount of idling occurring such as the use of block heaters, continued education and awareness programs.

Right-sizing for efficient vehicle use refers to the process of identifying the use of a particular vehicle, and determining whether the vehicle suits the needs of the job for which it is used. For example, if the purpose of a vehicle is to transport people between offices, it may not be necessary to drive a pick-up truck. A more appropriate vehicle may be a small or medium-sized vehicle. The potential for more efficient use of vehicles will result in reduced fuel use, costs and emissions.


During the staff consultation, staff acknowledged that unnecessary trips were being taken to transport people around to job sites. Due to the number of trucks on the fleet, sometimes only 3 people can be transported at once, requiring that multiple trips be taken between the works yard and the job site. One recommendation from this meeting was to establish a bicycle fleet, particularly for use during the summer months when the City takes on additional summer students staff. The Vehicle Replacement Policy recommendation below may also be an option to determine the types of vehicles that should be purchased in the future.

Recommendations:

Develop an annual or bi-annual driver behaviour workshop. Use the workshop to discuss fuel-efficient driving behaviours and re-iterate the importance of reduced idling.

Explore options of block or interior cab heaters for winter months to reduce idling, particularly during morning meetings.

Explore the option of alternative transportation for summer months. A bike fleet may be feasible where multiple people are required on a job, requiring only one truck-trip for equipment.



Develop a route-planning system. Determine each morning where vehicles are needed, and how to most efficiently deliver people and equipment to each site.

Monitor reductions through the E3 Fleet Program.

Cost Effectiveness:

These recommendations are predominately behavioural based, all of which result in a reduction of fuel consumption. Idling for 10 minutes consumes over 1 cup of wasted fuel, and over 1 litre for a 5-litre engine. Over the lifetime of a vehicle, this adds up to a considerable amount of fuel, and is financially inefficient. Idling for more than 60 minutes causes more wear on an engine than turning it off and restarting.¹¹ Turning off the engine costs nothing, and results in immediate fuel savings. Purchasing a municipal bike fleet is likely very cost effective, and would encourage sustainability of the environment as well as personal health.

Funding:

- Natural Resources Canada (Deadline Oct. 15/09)

<http://oee.nrcan.gc.ca/transportation/afo/index.cfm?attr=8>

- Occasionally incentives are available for further stages of the E3 Fleet program:

<http://www.e3fleet.com/>


GHG Emission Reduction Potential:

Successful idle free campaigns at the municipal level have demonstrated a potential for 10% reduction of GHG emissions associated with idling. Setting a target for further fuel reduction of 5-10% through trip reductions and alternative transportation could result in a total reduction of 55-75 t/CO₂e annually. Aggressive participation in the reduction of reduced idling and dedication to designing efficient routes and transportation of people and equipment could further contribute to this reduction.

Ease of Implementation:

There are multiple resources and tools available to implement an idle free initiative for municipal vehicles. The challenge and barrier is often implementation of the policy by staff. Involving staff in the development of the policy and monitoring program can help overcome this barrier. Awareness and education can be very effective in helping staff participate in an idle free program. Ensuring efficient use of vehicles must be embraced by the staff, and so involving as many staff as possible in the implementation of route designs, bike fleet maintenance and idle free behaviour is crucial to the success of these recommendations.

¹¹ Natural Resources Canada. <http://oee.nrcan.gc.ca/transportation/idling/wastes.cfm?attr=8>



Case Studies:

Both the **City of Toronto** and the **City of Hamilton** have implemented Green Fleet action plans. The **City of Toronto** has started to develop a 'bike pool' to encourage City staff to take a bike instead of vehicle for work purposes. City staff are required to turn off their vehicles if idling for more than 10 seconds. They must participate in the City's driver training courses, which include Idle-Free and fuel-efficient driver training.

Right-sizing Vehicles and Purchasing Policy

Right-sizing for efficient vehicle use refers to the process of identifying the use of a particular vehicle, and determining whether the vehicle suits the needs of the job for which it is used. For example, if the purpose of a vehicle is to transport people between offices, it may not be necessary to drive a pick-up truck. A more appropriate vehicle may be a small or medium-sized vehicle. The potential for more efficient use of vehicles will result in reduced fuel use, costs and emissions. This can be done with the vehicle fleet as it exists, however when a vehicle must be replaced, the City of Kimberley should weigh the options of more fuel-efficient, smaller vehicles. Municipalities have developed policies that guide the purchase of new vehicles to ensure the most fuel efficient vehicle is being purchased for the job for which it is intended.

Recommendations:

Develop a policy to ensure vehicle replacement considers 'right-sizing' of vehicles. Make internal operational decisions on the vehicles assigned for each job or purpose.

Develop a Vehicle Purchasing Policy to guide future purchases for the Vehicle Fleet.

Cost Effectiveness:

Although a vehicle purchase is a large capital investment, it is a purchase that will inevitably be made by every municipality. Instead of considering the purchase price of a vehicle alone, the long-term fuel economy should also be considered. Investing in a more expensive vehicle upfront with higher fuel efficiency will result in cost savings for the lifetime of the vehicle. Developing a vehicle replacement policy requires only staff time, and once established should only need revision as technologies change.

GHG Emission Reduction Potential:

Fuel efficient vehicles use less fuel, and therefore produce less GHG emissions. The vehicle fleet contributes a significant portion of the emissions profile, and therefore has great potential for reductions. The City of Kimberley may wish to set a target for fuel-efficient vehicles by 2020. A conservative 10% in fuel reduction may be possible with the implementation of a vehicle replacement policy, and right-sizing policy. This would result in approximately 30 t CO₂e reduction.



Ease of Implementation:

Right sizing existing vehicles could be done at the same time as the route designation. Staff involvement would be valuable to ensure that there is representation from all operations within the City. Developing a Vehicle Purchasing Policy has been done in other communities, some examples of which are included in the Case Study section below.

Case Studies:

The **City of Dawson Creek** has developed a Green Vehicle Policy which guides the behaviours of idling, purchasing, right-sizing and maintenance for the municipal fleet. They have established a target of 20% reduction in emissions from the fleet from 2004 levels by 2016. This policy is included in Appendix E.

The **Municipality of Jasper** has developed a Green Procurement Policy which guides the purchasing of new vehicles for the municipal fleet. They commit to “purchasing vehicles that reduce fuel consumption and reduce emissions contributing to poor air quality and climate change.”

MUNICIPAL WASTE

Total Baseline Emissions: 9.10 t CO₂e

The City of Kimberley produces very little waste, however the waste is also not tracked by bin, and is collected at the same time as the community waste collection. It is advised that if the City would like to understand their waste-stream more accurately, that a complete waste audit be conducted. The Province of British Columbia has determined that for the purposes of the Carbon Neutral targets, waste should not be included in the boundaries of the inventories. The differences between and municipal waste reporting, and the inequality of tracking processes between communities makes it difficult to fairly compare waste. Because this process is separate (although complimentary) to the Carbon Neutral process, waste has been included. There are always opportunities to improve waste diversion and to reduce the amount of recyclables going into the waste stream. The very simple initiatives of recycling and composting can make a significant difference in the office space, reducing waste production to a very minimal amount.

The following recommendations will guide the City of Kimberley in ensuring their waste diversion practices are sufficient, however it will be up to the staff and administration to change behaviors and reduce the amount of waste created at the office. There are also policy changes that can be made, such as the banning of plastic water bottles in municipal buildings, which the City of Vancouver recently implemented.

Recommendations:

Implement a comprehensive recycling program at all municipal buildings.

Consider composting facility for municipal buildings, such as a vermicomposting system.



Encourage behavioral change to reduce waste coming into buildings (i.e. waste-free lunches, no plastic water bottles, etc.).

*Reduce excessive use of paper by adjusting printers, etc. to double-sided function.
Comprehensive recycling and composting systems in all Municipal buildings*

The City of Kimberley does have several designated recycling bags or bins throughout the buildings. A review of the number of desk-side paper recycling bins should be conducted, and options for comprehensive recycling of glass, cans, tetra-pac, plastics and tins should be available for staff. There is opportunity to improve the 'user-friendliness' of the recycling program, and to enhance an educational component. Education at the office space may influence behaviours in the home, which will lead to overall community waste reduction. A multi-bin system (i.e paper, cans, glass) is recommended, with additional paper recycling bins placed at key locations (i.e. photocopiers, printers, etc.). Each desk/office should have a dedicated paper recycling bin, and the reduction of paper use should be controlled by having automatic double-siding at photocopiers.

Cost Effectiveness:

The price for recycling bins is quite minimal (approx. \$150-200 for simple multi-product separating bins). The cost of implementing a program is also minimal, as the process is already set in place. This initiative would simply enhance and improve the current recycling program. Composting in municipal buildings could be implemented using vermicomposting, the implementation of which is approximately \$60/bin.

Funding:

- Green Municipal Funds has a waste-diversion funding stream. This may be desirable in combination with a broader community waste reduction initiative.

<http://www.sustainablecommunities.fcm.ca/GMF/GMF-2009-call-for-applications/Waste-2009-call-for-application.asp>

GHG Emission Reduction Potential:

Approximately 30-40% of the waste stream is paper or paper products that have a potential to reduce the total amount of waste going to the landfill. Additional recyclables include cans, bottles, glasses, e-waste and printer cartridges. Providing opportunity for alternative waste disposal of old electronics, batteries, cartridges, lightbulbs, etc. will allow for significant reduction of waste ending up in the landfill. Reducing waste by 30% annually by 2020 will reduce the emissions from this sector by approximately 3%.

Ease of Implementation:

The initial barrier of implementation will be dedicating a small amount of money to the purchase of appropriate recycling bins. General awareness and education will be required to ensure participation by staff. The City may wish to implement a waste diversion target, and develop a method for monitoring waste at each municipal facility. The implementation of a waste-monitoring program would be essential for tracking purposes, and could potentially be completed by Staff.



APPENDIX B

COMMUNITY GHG EMISSION REDUCTION STRATEGIES





COMMUNITY GHG EMISSION REDUCTION STRATEGIES

The following section details the reduction opportunities for buildings, waste and transportation. Where possible, the strategies have been quantified. Strategies with a focus on education and awareness are difficult to quantify, but it is expected that emission reduction will result through successful implementation. For many initiatives, once momentum is gained and the community is aware and involved, significant change is possible.

RESIDENTIAL BUILDINGS

Total Baseline Emissions: 14,349 t CO₂e

Residential buildings are the second largest contributors of GHG emissions in Kimberley following the transportation sector. The majority of emissions result from the use of natural gas. As identified in the emissions forecast, the population of Kimberley has been in decline recently, but development continues to rise. The strategies below deal with both new and existing residential homes.

New Home Construction Standard

There are several programs that exist to rate new home construction, including LEED, Built Green and enerGuide.

Communities throughout BC have implemented guidelines or policies that require all new developments to meet minimum standards to ensure that only energy efficient and water smart homes are being constructed. Recent amendments to the Local Government Act has extended the ability of local governments to establish Development Permit Area's that facilitate the reduction of greenhouse gas emissions and encourage energy and water conservation. The amended Local Government Act can be found at: http://www.leg.bc.ca/38th4th/3rd_read/gov27-3.htm.

Implementing a minimum standard for new developments can drastically reduce the forecasted emissions. The City of Kimberley is partnering with local builders, and supporting a Green Building workshop and Conference in the fall of 2009. There is already interest among the builders and developers in 'green development', and the City of Kimberley can implement tools from the policy perspective to help move forward on green building standards.

Recommendations:

Implement development guidelines or policy that encourages or requires all new residential homes to meet minimum energy efficient standards. Consider setting a standard of EnerGuide 77 or 80 (Built Green Gold or Platinum, respectively) for new buildings.

Develop sustainability or energy efficiency guidelines or checklists for new developments.

Amend existing bylaws, policies or building codes to allow for sustainable and low impact development strategies.



Cost Effectiveness:

Builders wanting to meet Built Green standards must be recognized as a 'Built Green' certified builder, which requires a short course delivered through the Canadian Home Builders' Association-BC. For the homeowner, a home built to EnerGuide 80 standards will consume approximately 30% less energy than a house built to minimum building standards. The operational costs of the home are therefore drastically reduced.

Funding:

- Several options are available at Green Buildings BC <http://www.greenbuildingsbc.com/Home/NewBuildings/HowtoBuildGreen/FundingAssistanceResources.aspx>

GHG Emission Reduction Potential:

The energy savings for EnerGuide 80 homes are approximately 30% over and above the standard building construction. The GHG reduction potential associated with this reduction has been estimated to be approximately 15%. If implemented for all new residential homes, the forecasted emissions could be reduced by approximately 323 tCO₂e. It should be noted that this estimation should be monitored and re-evaluated as homes are developed. The reduction opportunities may be improved as technology improves.

Ease of Implementation:

The current Subdivision Servicing Bylaw, Development Permit Areas and Building Codes may require review to ensure there are not barriers within these policies and bylaws that would prevent a developer from implementing green building design. While developing a policy to support energy efficient construction may not be difficult, enforcing it and requiring all developers to become recognized by Built Green or EnerGuide for New Homes may be a barrier to implementation. With appropriate communication between developers and the municipality, the easier implementation will be. The City of Kimberley has already started to take the appropriate steps towards supporting the buildings industry in exploring green building techniques. Appendix F of the main document provides an example of a Sustainability Checklist used by the City of Port Coquitlam on which proposed developments are 'marked' for their sustainability and energy efficient design standards. Appendix G also includes a bylaw developed by the City of Vancouver that guides energy efficient construction for new homes.

The following section of the **City of Nelson's** OCP considers energy efficiency and land use management:

Goal 4: The City will discourage the conversion of residential buildings into solely tourist accommodation in residential neighbourhoods through the development permit process.

Goal 7: The City will endorse and promote LEED and Smart Growth principles in new development and redevelopment of existing properties.



Notes from the Community:

At the recent community consultation held in May 2009, community members suggested that they support changes to the Subdivision Servicing Bylaw that would allow for the installation of rainwater harvesting systems in all new buildings, and to give current homeowners the ability to install such systems in existing homes. Rainwater harvesting at the residential level is widely popular in European countries and the trend has begun to spread throughout North America. As sewage collection and treatment costs begin to rise, residential rainwater harvesting will prove to be more cost effective for such operations. Residents on Salt Spring Island, BC have difficulty finding freshwater, as a result, Islands Trust Fund installed a rainwater harvesting system at their office at Ruby Alton Nature Reserve. The system was installed so that it could be used as a demonstration system as well; it highlights the various systems and technology available. The public may come and view the system. Tours have been coupled with an educational awareness program on rainwater harvesting aimed to assist islanders in combating current freshwater issues. For more information please see <http://www.islandstrustfund.bc.ca/projects/rainwater.cfm>.


Residents at the community input session were interested in a bylaw that would allow for urban livestock within City limits, as well as the installation of grey water systems in all new buildings. Each of these strategies has GHG reduction potential but would require fundamental changes to bylaws and potentially health codes. These actions could be considered by City staff and Council but are not explicitly recommended in this report.

Residential Home Retrofits (for existing homes)

Residential buildings are the second largest emitters of GHG emissions in the community inventory contributing 14,349 t CO₂e. As a result of these figures there is ample opportunity for GHG emission reduction in this sector. As a former mining town, the City of Kimberley has many older, inefficient mining era homes. Although retrofits to older homes may seem daunting and costly, there is significant opportunity for energy saving through home retrofitting. The general trend in the community is to upgrade the older houses, but often with little consideration to opportunities to do so in the optimally efficient manner. Government agencies and not-for-profit organizations are currently providing resources such as funding for energy saving retrofits. In order to simplify the learning process, a local home retrofit workshop could be hosted providing homeowners with resources required to begin a retrofit project such as; types of retrofits, costs, funding opportunities, payback timelines and material/technology suppliers.

There are two potential applications of a residential home retrofit program:

1. Encourage homeowners to take simple steps to improve the efficiency of their homes through purchasing of low-energy appliances, changing showerheads, lightbulbs, etc. This would be a low-cost opportunity for homeowners to make small, but important changes in their homes.



2. Promote the ecoEnergy audit and retrofit program. This requires initial costs by the homeowner to perform and audit, but also provides significant opportunity for grants and incentives to fund retrofits. This could be implemented through the City. Discussion with staff suggested the City could provide information on ecoEnergy audits and green retrofits, and that the building inspection fee could be waived upon successful implementation of the retrofits.

Recommendations:

Provide local residents with the tools and resources necessary to facilitate residential retrofit programs such as: website of audit links, funding sources, a community directory of local contractors.

Consider providing incentives for energy audits (i.e. financial incentives or provision of energy efficient fixtures), and promotion of ecoEnergy audits and retrofits.

Develop an incentive program for homeowners that choose to renovate 'green' (i.e. waived or reduced building inspection fees).

Cost Effectiveness:

Option 1 has relatively low costs associated with implementation, and the results would be reduced energy bills. Option 2 requires greater upfront investments by the homeowners, but there are significant grants available through www.livesmartbc.ca and local utility providers, that offset the costs of the energy audit and the retrofits. Funding for home and business retrofits are readily available from a variety of government, businesses and not for profit organizations making generally expensive retrofits affordable. It would be advised that the City of Kimberley consider the financial incentive of a waived building inspection, however this would be a loss for the City economically. The development of a 'Reno-Checklist' or similar educational document could be spearheaded by the City, but implemented jointly with a local organization.

Funding:

Organizations offering monetary incentives for retrofits include: ecoEnergy, BC Hydro, and SolarBC.

GHG Emission Reduction Potential:

The amount of GHG emission savings from home retrofits is difficult to quantify as projects can vary from small scale such as weather stripping to large scale such as solar hot water systems. Smaller projects such as bulb replacement from incandescent to CFL are affordable and easily done. For every household that changes their most frequently used bulbs to CFL the expected saving is 0.227 t CO₂e per year. If only 300 homes in Kimberley changed their most frequently used bulbs to CFLs than the community could expect a reduction of approximately 68 t CO₂e. Through the Community Action on Energy and Emissions grant, the community has committed to a 20% reduction in average energy demand per home by 2020. This could result in emission reductions of up to 3000 tonnes if majority of this reduction were in natural gas consumption (i.e. hot water tanks, heating, etc.).



Ease of Implementation:

This program would not be difficult to implement in Kimberley, as there are existing resources in place, and educational materials to draw on to develop a 'Made in Kimberley' version of a home renovation program. It would be recommended that resources and support be provided through the City of Kimberley website, or similar venue. Having a 'Sustainable Kimberley' resource centre, for example, would allow for centralization of all green resources.

Application in Kimberley

A participatory and educational workshop could feature a visit to a local home that has undergone energy-saving retrofits, allowing participants to see firsthand retrofit options. The City of Kimberley, or partner organization could create a website to provide homeowners with updates on retrofit incentives and funding opportunities available both locally and provincially. To celebrate successes, local projects could be featured on the City website and a forum could exist so that homeowners can share information on their projects or offer services.

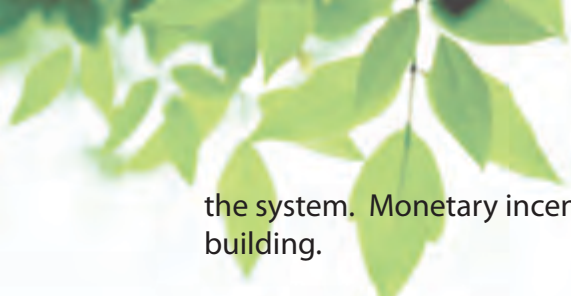
Case Study

Vancouver, BC – **City Green Solutions**, based in Vancouver, BC, offers a series of workshops for those interested in sustainable living. The workshops provide information on sustainable planning and design, energy efficiency and heating for home and business as well as guest expert sustainability presentations and information on retrofit incentives and available funding. In addition to the workshops, City Green Solutions also has a comprehensive website that offers information on incentives available for retrofits to existing homes, new homes and multi-unit residential buildings. The website also features retrofit success stories <http://www.citygreen.ca/>.

Promoting the Use of Solar Hot Water

Harvested solar energy has many applications at the residential level and is particularly feasible in hot water heater systems. This type of energy is not only renewable it also does not contribute to the creation of GHG emissions as it offsets fossil fuel consumption. In addition to these benefits, solar hot water systems pay for themselves in their lifetimes and the payback time line will become even shorter as energy prices continue to rise. Kimberley is geographically situated in a location that receives ample solar energy with over 2000 hours of sunlight a year. Cranbrook, only 32 km away, receives the most sunshine of any community within B.C. The community strongly supported such an initiative at the recent Community Consultation, and there were even suggestions of the commissioning of a local solar farm.

Solar BC is program of the BC Sustainable Energy Association which provides the resources necessary for home owner and municipalities to get started on their solar hot water projects. Not only does the website (www.solarbc.ca) provide information on installers, costs and incentives, but the program offers a \$1000 incentive at the point of sale of



the system. Monetary incentives are also offered to bulk buying groups and new home building.

Kimberley may also consider applying to become a Solar Community through Solar BC. This program highlights communities that promote solar hot water in BC. See <http://www.solarbc.ca> for further details.

Recommendations:

Provide local residents with the tools and resources necessary to facilitate residential solar hot water systems.

Consider providing incentives for installation of systems such as rebates on materials or tax credits.

Inclusion of solar harvesting for energy production in new building policies.

Cost Effectiveness:

SolarBC estimates that the installation of a typical new solar hot water system to be approximately \$6700. With the use of rebates and incentives from the following programs; SolarBC, Livesmart, ecoEnergy, PowerSense and Home Reno Tax Credit up to \$3475, a majority of the system costs can be reimbursed. In addition, pay back of the system will become shorter as fuel prices continue to rise. Finally, users can expect a decrease in their energy bills as they switch the type of energy primarily used to heat water in their homes.

GHG Reduction Potential: The use of solar hot water in a home produces zero GHG emissions. Solar hot water heaters can supplement up to 60% of the energy required to heat water for a family of four. When used at capacity, 2 tCO₂e can be saved per household. If 50 systems were installed within Kimberley, 100 tCO₂e could be saved from the 14,349 tCO₂e created by residential buildings. In addition, equipment required for solar hot water systems are also available locally and are typically made with recycled materials which reduces GHG emissions associated with the manufacturing of the system.

Ease of Implementation: Promoting the installation of solar hot water heaters would be easily implemented in Kimberley as many incentives and resources are already in place. SolarBC could provide materials, and the initiative could be promoted through the City.



Case Study

Julia Roberts of Nelson, BC installed a solar hot water system on her roof after being interested in the technology for over 30 years. Ms. Roberts says that the installation and maintenance are very easy and that the only change from her previous system is that she now tracks weather more frequently. Ms. Roberts took advantage of the various incentives to make the purchase of the system affordable. For more case studies see <http://www.solarbc.ca/learn/case-studies> which includes municipal and bulk buy cases.

Solar Community

Tofino is known for its winter storms and year round rain. However, this community was selected by Solar BC to be one of 7 Solar Communities throughout the province. The designation of a Solar Community will begin laying the foundation for the larger Community Energy Plan. The District hopes to demonstrate to other communities throughout BC that a small community can have a large impact when it comes to energy saving. They will begin by installing solar heating on their community centre and hope to in the near future convert their 'stump dump' (a dump for organic construction waste) into a solar farm (www.tofino.ca).

Participate in Team Power Smart

BC Hydro has set a goal for energy consumption, and is challenging BC residents to contribute to making BC electricity self sufficient by 2016. In order to reach the target of self-sufficiency, BC Hydro has initiated several incentive programs to encourage the individual to contribute to lowering BC's electricity demand. Included in these incentive programs is the **Team Power Smart** program. This is both an individual and a community-based program. As an individual one can participate and enjoy exclusive offers, rebates and incentives. As an additional benefit, homeowners will reduce their electricity bill and will consequently save money (<http://www.bchydro.com/powersmart/>). By joining, homeowners commit to reducing their electricity consumption by 10%. BC Hydro has compiled several energy saving documents to help one meet this personal goal; these documents are readily available online. In addition, one can monitor their electricity savings online and set goals for further energy conservation.

The program is also open to those renting housing units within the City. The only downfall is that one who does not hold an account will not be able to track their savings online, however, their participation will contribute to the community challenge. Energy savings in a community is tallied with all other participants from that community, and the community results are compared with others. Currently in Kimberley there are 133 participants. By increasing Kimberley's status in the community challenge, The City will be taking a positive step towards decreasing residential greenhouse gas emissions. In addition, Kimberley will be aiding BC Hydro and the government of BC to achieve their 2016 target of being self-sufficient in electricity production.

**Recommendation:**

Increase participation in the Team Power Smart program in Kimberley. Encourage at least 200 additional homeowners to join and reduce their energy consumption by 10%.

Cost Effectiveness:

In order for an individual to participate in this program, there are very little costs involved. Joining the initiative is free, and as part of the program, the consumer saves energy, as well as saving money on their electricity bills. The participants may also take advantage of monetary incentives offered through the program, further increasing the efficiency of their homes.

Funding:

- BC Hydro has many rebates, incentives and cash-back offers as part of Team Power Smart. <http://www.bchydro.com/powersmart/>

GHG Emission Reduction Potential:

This program was implemented by BC Hydro to encourage BC residents to reduce their energy consumption by 10% in order for the province to meet its set target of energy self-sufficiency by 2016. By initiating this program, BC Hydro is stating that combined individual participation can have a serious impact on electricity consumption in the province. Because the reductions of energy use are limited to electricity consumption, the greenhouse gas emission potential is relatively low, however it supports behavioral change, which will likely result in other actions being taken by the individuals involved in the program.

Ease of Implementation:

Currently, there are approximately 133 program participants in Kimberley. Increasing participation in this program can be very easily accomplished as the program is already in existence. The BC Hydro website is user friendly and gives adequate directions for signing up for the program and highlights the program incentives among many other features. BC Hydro is currently marketing the program through a series of TV and newspaper advertisements. The City of Kimberley, or Wildsight as the local environmental organization, could further promote the program and encourage participation.

Application in Kimberley

As this program has already been implemented and there are currently participants in the City of Kimberley, encouraging other local participation should be an easy task. A well-read medium could be chosen to advertise in such as the local newspaper or lifestyle magazine. Promoting the program as a community challenge through local advertising would be cost effective.

Case Study and Contact Information

The BC Hydro Team Power Smart website (www.bchydro.com/powersmart) highlights program success stories at the residential, commercial, industrial and public service levels. One example of success is described below:

A Powell River, BC family took a chance on the sun and is now reaping in the benefits. Jeremy Mercer and his wife invested \$35,000 into a solar collection system, and soon saw that their dependence on BC Hydro was dropping exponentially. They have surpassed the proposed target of reduced BC Hydro electricity dependence of 10% with a decrease of 75%. During peak sunny times they even produce electricity for the grid. Although, initially the system was costly, The Mercer's are now saving money by reducing the amount of energy they buy from BC Hydro.

BC Hydro has now implemented a program that allows low income households to apply for free energy saving kits which includes simple and easy to install energy saving tools such as low flow showerheads and weather stripping (http://www.bchydro.com/powersmart/residential/energy_saving_kits.html).

Team Power Smart also highlights community involvement. When one registers to participate they are automatically added to the community challenge. The more participants, the higher ranked a community is. As of date, Vancouver has the greatest number of participants followed by Surrey, Burnaby, Saanich and Richmond. Although the population of Kimberley is small in comparison to these bigger centres, an effort can still be made to increase Kimberley's participation.

General Opportunities for Residential GHG Reduction

There are a number of approaches that the City of Kimberley, or partner organizations can take to increase the knowledge and awareness of residents GHG emissions within the community. The following points are **education-based** recommendations that although are not quantifiable, will assist in facilitating change in the community, and ensure access to the information and resources necessary for individuals to take action in their own homes.

- Partner with local organizations to establish a resource centre, located at a municipal building or other centrally located space, where materials, grant applications and other 'green home' resources are available.

The City of Ottawa has established a resource centre in their City Hall, which is managed by a local non-profit organization. The centre provides resources, including an EnviroBoutique where energy and water efficient products and fixtures are available for purchase. <http://www.envirocentre.ca/>

- 
- Offer incentives to builders who build to higher energy efficient standards.

The City of Calgary offers rebates on building permits of 10%, 20% or 30% respectively for homes built to bronze, silver and gold standards under the Built Green program.

- Dedicate a webpage or link to tracking participation in the various programs offered to the community. Provide on-line resources and links to facilitate individual action, and to provide a centralized location for all residential-related reduction opportunities.

COMMERCIAL BUILDINGS

Total Baseline Emissions: 6803 t CO₂e


Commercial buildings contribute a small percentage of overall emissions for the community of Kimberley, however there are many opportunities for energy reduction which will result in GHG emission reduction. The following section identifies some of the opportunities that exist for commercial GHG emission reduction.

Encourage participation in Green Awards at local lodging facilities

There are a few Green Award Programs available to the accommodation and lodging industries that promote greening business and saving money. Currently, in Kimberley no lodging facilities participate in the major 'green' programs offered nationally. The community relies heavily on the tourism industry, and as a result, there are many lodging facilities within the City. Some of the different programs available to these facilities are highlighted below.

Terra Choice Environmental Marketing and Audubon International work together on the Audubon Green Leaf Program, which is based on the principle of what is good for the environment, can be good for business. This program allows the hospitality industry to save money and work towards their environmental commitments. In addition, the program assists travelers in choosing environmentally sound lodging options. There are two levels of commitment in the program. The first level introduces participants to eco-efficiency and environmental issues associated with the hospitality industry. The second level is based on a rating system. Participants are rated based on their eco-efficiency through an audit, then provided with a report that provides them guidance to achieve the next level of rating. There are five easy steps required to participate in the program they begin with the Audubon Green Leaf Eco Rating Survey, followed by the payment of an annual participation fee, analysis of the survey by TerraChoice Environmental, receipt of a Green Leaf Rating and verification of your information/random checks.

The Hotel Association of Canada (HAC) is an organization that promotes and protects its members. As part of their ongoing programs and services, the association offers the Green Key Eco Rating program to their members. The program is a graduated rating scheme



encouraging participants to improve their environmental and fiscal performance. The program is voluntary to members of the Hotel Association of Canada, however, participation is strongly encouraged as there are many benefits including professional respect and monetary savings. In addition, the program is open to any lodging property even if it is not a member of the HAC.

Participants in the Green Key Program undergo a Green Key Audit through which they are given a rating from 1-5 based on their environmental performance. In addition, hoteliers are provided with guidance to reducing their operation costs and their environmental impacts. Alongside positive feedback from guests, participants benefit from marketing (and can now advertise their Green Key Rating with CAA), team building and positive public relations. The program is user friendly and easy to access as it is completed entirely online. The audit consists of multiple choice questions covering sustainable operation including: energy conservation, water conservation, solid waste management, hazardous waste management, indoor air quality, community outreach, building infrastructure, land use and environmental management. The HAC hopes to have a team of auditors prepared to conduct on site audits in the next year.

Recommendation:

At least 30% of lodgings in Kimberley participate in an energy or environmental rating program.

Cost Effectiveness:

The only cost associated with this program is the participation fee required by the lodging facilities (Averaging around \$350 per annum). The City could provide further incentive to participate in this program by offering to pay a portion of the participation fee. In addition, the potential savings on energy bills following upgrades and changes recommended by The Canadian Hotel Association, should be emphasized to local lodging facilities. Suggested promotional tools include holding an information session open to managers of lodging facilities to promote participation in the program. The Chamber of Commerce may wish to organize and promote the opportunity for energy savings and GHG reduction at local hotels and lodgings in Kimberley.

GHG Emission Reduction Potential:


This program offers small greenhouse gas reduction potential to the overall reduction goal. However, there is opportunity for reductions at the individual hotel level, which will nonetheless contribute to the larger community goal, especially in a community with many lodging facilities like Kimberley.

Ease of Implementation:

This program is easy to implement in Kimberley as the program is already in existence. Resources such as websites are already in place. The main barrier is a local champion or leader to spearhead a campaign to encourage further involvement in the programs.

Application in Kimberley

Currently in Kimberley there are no lodging facilities that participate in the above mentioned programs. In a community that relies on tourism and has many lodging facilities there is plenty of opportunity for participation in such programs and as a result,



reductions in GHG emissions and opportunities for monetary savings. It would be quite easy to encourage other local lodging facilities to participate in such programs as they directly benefit from the program. Upon successful implementation, they may also use their rating as a marketing tool through advertisement promotion. In addition, The Hotel Association of Canada advertises participating facilities.

Case Study and Contact Information


Many lodging facilities participate in environmental rating programs; in fact, program awards have been won by local facilities. The case studies below highlight some success stories from the Green Key program initiated by the Hotel Association of Canada (http://www.hotelassociation.ca/site/programs/green_key.htm).

Island Lake Lodge, located in Fernie, is the most recent recipient of the Hotel Association of Canada's Hall of Fame Award of Excellence in the Energy and Environment category. The award is granted to a lodging property that integrates environmental management into their daily program while maintaining quality services for their guests. Island Lake Lodge was awarded the title due to its commitment to preserving the environment and reducing its energy consumption in its daily activities. The main point of consideration for this award was the installation of two micro hydro stations, which produces 100% of the lodge's electrical needs. Island Lake Lodge currently holds a rating of 4 out of 5 green keys which gives them a percentile rating of 60-79.9. This rating indicates that the lodge demonstrates national leadership and commitment to protecting the environment through their mature practices and policies, which have shown results.

Siwash Lake Ranch located near 70 Mile House, BC is a leader in the industry and has been granted a perfect rating of 5 Green Keys. This indicates that the ranch demonstrates the highest social and environmental standards in all aspects of their business and operations. In addition, the facility implements the highest quality of technologies, programs and policies that coincide with international environmental standards for sustainable lodging operations. Siwash Lake Ranch satisfies these criteria by operating off the grid using solar energy to meet the ranch's electrical needs. The ranch aims to minimize its footprint through environmental policies and procedures. The staff and owners share their knowledge of environmental stewardship with interested clients. In addition, the ranch has worked with Ducks Unlimited Canada to enhance wetlands surrounding Siwash Lake.

Commercial GHG Energy Efficiency Program

The small business and commercial industry in Kimberley creates few emissions in comparison to other sectors. There is however, opportunity for emission reduction in this sector. Currently, BC Hydro offers a program to the business and commercial sector, providing incentives for the purchase of energy efficient products including lighting, LED exit signs, controls and sensors and HVAC systems. BC Hydro is currently providing a complementary energy audit walk-through program to businesses located in the Lower



Mainland and Victoria, however, recent communication with BC Hydro has determined that if a minimum of 7 businesses were to participate in the assessment within a 100 km radius of each other, an auditor could travel to the Kootenays to conduct the assessments within several days. The Chamber of Commerce could facilitate this program by advertising it to its members and encouraging businesses to participate in this free energy assessment.

Whether delivered by BC Hydro or a local energy auditor, business will find that by replacing lighting, windows, or heating and cooling systems, the cost savings are significant.

Recommendations:

Develop a reward system to recognize environmental stewardship at local businesses.

Set reduction targets for energy reduction among commercial businesses of a 10% reduction by 2015 and 20% by 2020.

Engage commercial, retail and small businesses in an energy audit and assessment of energy reduction opportunities, delivered by BC Hydro.

Provide the tools and resources necessary for the commercial sector to access incentives and rebates for energy retrofits through the Chamber of Commerce.

Cost Effectiveness:

BC Hydro has a very comprehensive listing of potential retrofit ideas for the business and commercial sector. The resources are available free on the website, with the incentives for energy efficient fixtures and products available at: <http://www.bchydro.com/ecatalog/>. In order to gain the most benefit from initiative, business should have an energy audit, which could be arranged through BC Hydro. Further discussion should take place with BC Hydro to arrange the complementary walk-through. This initiative could be very cost effective if this service were provided free of charge.

GHG Emission Reduction Potential:

The easiest things to change in an office or commercial setting are lights, exit signs and use of electronic equipment. Retrofits of this nature will reduce the energy use of the building or office space, but will not significantly reduce GHG emissions, because of the low emission factor for electricity in British Columbia. Consequently, reduction targets could be created separately for electricity and natural gas. A target of 50% reduction in electricity from baseline values would be 207.5 tCO₂e which is an achievable target. A natural gas reduction of 10% would be 638.8 tCO₂e which could be achieved through various reduction strategies including programmable thermostats.

Ease of Implementation:

The Power Smart program for commercial businesses is already set up by BC Hydro. Local promotion of the program would be quite simple, as the information and marketing materials are available from BC Hydro. If BC Hydro is unable to provide the complementary building walk-through, this may be a barrier, and any audits would have to be paid for by the businesses.



Application in Kimberley

GHG emission reductions could be easily achieved in the commercial sector if a resource centre were established in the city. The program could be run through the Chamber of Commerce, allowing businesses easy access to resources such as energy and supplier information for green procurement opportunities (i.e. CFL lightbulbs or recycled toilet paper). In addition, the Chamber could coordinate for participation in a BC Hydro energy audit for small businesses as the program could be advertised in a newsletter.

TRANSPORTATION

Total Emissions: 25,253 t CO₂e

Kimberley is a rural community where residents must rely on vehicle transportation to get around. Typically, due to the rural nature of Kimberley and the often poor road conditions in the winter, people own larger trucks or vehicles which tend to consume more fuel per kilometer traveled. Within the community of Kimberley, however, there is great opportunity to reduce vehicle emissions through the facilitation of non-vehicle transportation. Furthermore, the driving habits of unnecessary idling can have significant impacts on the fuel consumption of vehicles, as well as the air quality in the community. This section identifies several opportunities for emission reduction in the transportation sector. Of course, much of the change must be facilitated through education and awareness.

Idle Free Kimberley Campaign

The transportation sector is the largest contributor of GHG emissions to the community inventory with 25,253 t CO₂e of emissions. Consequently, there is plenty of opportunity for reduction in this sector.

Through Wildsight's Clean Air Campaign, Idle Free zones have been created at 12 local schools and businesses. The City itself has established an idle free policy for the city fleet. Idling vehicles has been recognized as an activity that contributes largely to the creation of GHG emissions and is costly to idling individuals.

Recommendations:

Further promote Kimberley as an Idle Free community.


Work with local residents and organizations to deliver information through workshops, local media, schools and businesses.

Monitor (through surveys, observation, data collection) the successes and behavioral change as a result of Idle Free signage and awareness initiatives.

Expand signage to include downtown zones, parks and schools.

Cost Effectiveness:

There are very little costs involved in the implementation of this program. Sign generation, wages and public awareness are the only aspects of the project that involve costs and funds



are available to cover these costs. Funding opportunities should be investigated through Natural Resources Canada (<http://oee.nrcan.gc.ca/transportation/afo/index.cfm?attr=8>). The deadline for funding applications is October 15th, 2009, and can be applied to by local government or non-profit organizations to cover up to 90% of eligible costs.

GHG Emission Reduction Potential:

If each Canadian who drives a light duty vehicle, avoided idling for just three minutes every day in the calendar year, then we would reduce our carbon dioxide emissions by 1.4 million tonnes per annum. In addition, we would be saving 630 million litres of fuel per year. Consequently, this program offers good opportunity for reducing our greenhouse gas emissions and may take a couple of years to notice results. Potential emission reduction upon successful implementation in Kimberley is 1263 tonnes GHG emissions based on reduced fuel consumption by approximately 5%. It is anticipated that as the program is more widely accepted and recognized, potential reductions could be greater.

Ease of Implementation:

This program has been proven to be successful in a wide range of communities across Canada and within the Kootenays. Success stories are highlighted below. There are a variety of websites available that offers information on implementing community-based Idle Free campaigns. For example, Natural Resources Canada (<http://oee.nrcan.gc.ca/transportation/idling/material/tool-kit-introduction.cfm>), provides the general public with campaign resources, which offers information on all steps of a campaign as well as useful tools such as signs, letters and dialogues on intervention among many other features.

Application in Kimberley

Communities in the Kootenays including Kimberley itself, as well as Fernie and Invermere are already leading the way in GHG emission reduction in the transportation sector with Idle Free Campaigns. Such a program would be easily expanded given the recent success with the implementation of the program in the community. Public awareness of the negative impacts of idling and the new Idle Free Campaign would be necessary which could include advertisements in the local news paper. Finally, Idle Free signs should be posted at idling hotspots identified throughout town and the signs posted at City entrances to identify the community as 'Idle Free.'



Case Study and Contact Information

Idle Free campaigns have been successful in many communities across Canada, from small towns such as Fernie, to bigger cities, the program has been implemented to help reduce GHG emissions across the country. Some of these success stories are highlighted below.

An Idle Free Campaign has already been implemented in Fernie, BC. Idling data has been collected; idling hot spots have been identified. As part of Environment Week 2009 celebrations in Fernie, Idle Free Signs were posted at various locations throughout Fernie on Clean Air Day. A workshop was held to inform motorists on how to green their vehicles and students at the local elementary school delivered mock idling tickets during a no idling blitz in town.


In Vancouver, BC, Better Environmentally Sound Transportation (<http://www.best.bc.ca/>), and the provincial government worked together to reduce idling at ferry terminals, schools and workplaces. The program involved several different aspects of implementation including, outreach, education and implementing an idling bylaw. Volunteers distributed anti idling window decals and confronted idling drivers and asked them to sign an anti-idling pledge. At schools, student volunteers informed idling parents about the downfalls of idling. At the workplace, emphasis was put on the potential monetary savings involved with reducing idling in fleet vehicles. As well, the campaign focused on the recognition that companies could receive for their leadership.

The Northern Climate ExChange (<http://www.taiga.net/nce/>) is an organization focusing on circumpolar climate change in the North that introduced an anti idling program in Whitehorse, YT. The program focused on three main benefits to minimizing idling in Whitehorse including, saving money, reducing greenhouse gas emissions and preventing wear and tear on vehicles. The organization created 140 idle free areas in the community including parking lots, drop off zones, schools and delivery areas. Idle free signs were posted in these areas, reminding motorists to turn off their engines while in these zones. Also, parents were reminded to turn off their engines at schools.

ALTERNATIVE TRANSPORTATION:

Increased bike trail system and biking infrastructure

Further effort put towards increasing and improving bike infrastructure and developing alternative transportation options could help reduce GHG emissions attributed to transportation within Kimberley. Better infrastructure can increase ridership; communities with extensive bike lanes have experienced an increase in use for commuting purposes by 3 times. The Province of BC has developed a biking initiative entitled Bike BC, which provides funding opportunities to municipal governments wanting to improve their biking infrastructure, including bike lanes, trails and lockers.



Staff have begun requiring that new developments tie into existing trail facilities where their development is within close proximity. This is an excellent policy that should be formally integrated into the development bylaws to ensure that all new developments have access to trails that connect with the main systems throughout the community.

Recommendations:

Provide bike facilities (i.e. racks, storage rooms at businesses, etc.) to encourage bike commuters and local bike transportation.

Amend Road Design Standards to include bike lane development on major roads within the City.

Encourage alternative transportation through the continued education and promotion of existing programs such as Commuter Challenge, Walk to Work Week and Bike BC.

Integrate trail connections into Policy for all new developments.

Expand community bus service, working with the RDEK, to reduce vehicle traffic between Kimberley and Cranbrook.

Cost Effectiveness:

Infrastructure would have to be created for this program, and as a result, there are costs involved. The Province of BC is motivated to reduce vehicle emissions, and have developed some funding opportunities available for this type of project. Applications for 2009-2010 funding are available through BikeBC's Cycling Infrastructure Partnerships Program. Applications and information are available at <http://www.th.gov.bc.ca/BikeBC/CIPP.html>.

GHG Emission Reduction Potential:

This program has the capacity to reduce fuel consumption again by an additional 10% as with the Idle Free program. The possibility for even greater reduction exists if the program is successful for more residents in the community. Promotion and education will increase the participation in the initiative, and result in increased GHG emission reduction, improved air quality and general improved health and fitness of the community.

Ease of Implementation:

There is potential for barriers associated with behavioral change in terms of encouraging people to get out of their cars and engage in active transportation. Creating additional bike lanes would require planning from several departments at the City of Kimberley, and may also require amendments to road design standards for some neighborhoods or core streets.

Application in Kimberley

Improvements to existing trails and an increase in trails within and surrounding the city will promote further biking as a means of transport within the City. Making the downtown core more biker friendly with the addition of bike racks would increase ridership and consequently decrease GHG emissions associated with vehicle transportation.



Bike BC

Bike BC is a provincially funded program that aims to provide cyclist throughout the province with the resources and infrastructure required to safely participate in the program. The province has provided funding for this program to increase ridership as part of a strategy that will promote healthy living and address climate change issues. Local governments may apply for funding through the Cycling Infrastructure Partnerships Program (<http://www.th.gov.bc.ca/BikeBC/CIPP.html>) to help finance increased infrastructure and equipment necessary to increasing the number of cyclist in a community and decreasing the quantity of trips made with vehicles.

Community Bus Service

The City of Kimberley and BC Transit provide a bus service between Kimberley and Cranbrook. At the recent community consultation, one major recommendation was increased service between the two communities as many people commute daily for work. Currently service is provided on two weekdays, with 3 trips a day. If service were increased to provide daily shuttles between the two communities at times that would accommodate for the average work day, then it is likely that ridership would increase.


On Salt Spring Island, the Capital Regional District and BC Transit have developed a bus service that has successfully contributed to GHG emission reduction. After several unsuccessful attempts, public transit is provided following a feasibility study and consultation with the public, and the service is financially viable. Although GHG emission reductions from this program have not yet been calculated, it is estimated that the bus service has eliminated 31,000 trips in its first year of operation as service is provided to amenities and ferry terminals. Expected advantages of the service include reduced congestion at the weekly summer market and ferry terminals.

Gas Lawnmower Trade In Program

Although not a 'vehicle', the opportunity to reduce greenhouse gas emissions through the reduction of gas lawnmower use is significant, and relatively easy to implement, and so is included in the community reduction strategy.

The Clean Air Foundation encourages Canadians to reduce their greenhouse gas emissions through a program entitled Mow Down Pollution. This program encourages Canadians to retire their old gas lawn mowers and trimmers, which are greenhouse gas emitting culprits. The program runs at The Home Depot for ten days during the spring. Old lawnmowers and trimmers can be exchanged for an instant rebate on a new push reel, electric, cordless electric, low emission gas mower or trimmer. Since the program began in 2001, 26 800 pieces of gas powered lawn equipment have been retired and permanently recycled.

The operation of a gas powered lawn mower for an hour can emit as many harmful air pollutants as a brand new car that has driven 550 km. Annually, in Canada, approximately 80,000 tonnes of emissions are released from gas powered lawn equipment. The most



environmentally sound alternative to a gas powered lawnmower or trimmer is the reel push mower. However, this type of equipment is not practical for those living in rural areas with large lawns. In such cases, homeowners can resort to a four stroke engine with a spill proof can; this option emits less greenhouse gases in comparison to the traditional alternative.

Recommendation:

Implement a lawnmower exchange program, in coordination with local retailers, or through the municipal government to encourage the use of reel, or four-stroke engine mowers.

Provide a 'loan' mower at City Hall, or a resource centre to allow interested homeowners test a reel, or push mower.

Cost Effectiveness:

This program has minimal costs involved as it has been implemented successfully in other communities, and there are opportunities for funding. However, there are costs involved to the consumer should they choose to replace their old piece of lawn equipment. In addition, transportation costs will be involved as the nearest Home Depot is located in Cranbrook, BC. Opportunities for a partnership with a local retailer may be an option to reduce the need to travel for the exchange program.

GHG Emission Reduction Potential:

Environment Canada estimates that 10% of Canada's greenhouse gas emissions are generated from off road gasoline powered engines, including lawn mowers and trimmers. Annually, each gas-powered lawn mower creates 48kg of GHG emissions. Consequently, this program provides good opportunity for greenhouse gas emission reduction, despite the fact that it may take a few years to notice a result.

Ease of Implementation:

This program has been proven to be successful in a wide range of municipalities. Resources are available though the Clean Air Foundation website (www.cleanairfoundation.org), which provides information on the program including greenhouse gas emission stats, a link to The Home Depot site and program success. The closest participating Home Depot to Kimberley is in Cranbrook. Kimberley residents would have a 10 day window of opportunity to drive to Cranbrook with their old piece of lawn equipment to receive a rebate on a new machine and to have their old one recycled. Also, Farbrook Auto Recycling in Cranbrook, is a member of BC Auto Recyclers Association and will recycle old pieces of lawn equipment throughout the year. Again, investigating the opportunity to partner with a local retailer would be ideal.

Another interesting concept that could aid in reducing GHG emissions associated with lawn maintenance is a reel mower rental program. The program could be run by the City, which would purchase 2 or 3 reel mowers, to be rented out to members of the community on a need basis. The program could be coupled with an information sessions highlighting the significant emissions produced by gas powered lawn mowers, and it could provide residents with information maintaining their lawn equipment to ensure that they are running as clean as possible. Not only would this program contribute to GHG emission reductions but it would also promote active living and a sense of community sharing.



Case Study and Contact Information

The Clean Air Foundation website (www.cleanairfoundation.org) highlights the program success from previous years. In addition, the website lists the net emission reductions from year to year.

Since the program began in 2001, the number of recycled gas powered lawn mowers and trimmers have been increasing exponentially. The 2007 campaign experienced a record number of retired inefficient machines with a value of 5,700 recycled pieces of equipment. Currently, the 2008 results are not available.

COMMUNITY WASTE

Total Emissions: 1805 t CO₂e

Waste collection is a service provided by the Regional District of East Kootenay. Behavioural changes, and education and awareness could be implemented by the City of Kimberley, however changes to the waste pick-up services, or implementation of a new service (such as curbside recycling, or organic waste) would need to be coordinated with the RDEK. The following recommendations would significantly reduce waste within the community, and were discussed extensively with the community at the Workshop in May 2009. There is a great interest in alternative waste services, and waste reduction within the community.

Curbside Recycling Collection

Currently the City of Kimberley does not have a curbside recycling program. Residents must take their own recyclables to the local Transfer Station or to recycle bins located at the Overwaitea, at all schools within the City jurisdiction and at select businesses. Within the province there are 75 municipalities that have curbside recycling programs including 4 municipalities within the RDEK.

Recommendations:

Conduct a feasibility study for the implementation of a curbside recycling program.

Work with the RDEK to implement a pilot recycling program.

Cost Effectiveness:

In order to implement and run a curbside recycling program there would be significant costs involved. A feasibility study should be conducted, but some of the initial capital costs may include: the purchase of recycling bins (which could be purchased by participants at a subsidized cost), City or municipal resources such as vehicles and staff, and other pieces of equipment. The program could also be contracted out to a waste disposal company which is the approach taken by other municipalities within the District. Contracting comes with obvious costs which could be covered with increases in taxes.

**Funding:**

- Green Municipal Funds Waste Diversion – as mentioned, could be combined to reduce municipal waste.

<http://gmf.fcm.ca/GMF/GMF-2009-call-for-applications/Waste-2009-call-for-application.asp>

GHG Emissions Reduction Potential:

GHG reduction is possible with a curbside recycling program through an increase in recycling participation as waste would be diverted from the landfill. Feasibilities studies have been conducted in BC and have demonstrated that there is greater participation in curbside recycling compared to depot drop off recycling programs (See case study below). A target of 20% waste diversion may be reasonable for the community of Kimberley. Setting other restrictions on the transfer station (i.e. no yard waste in the household garbage, no woods, metals, etc.) would drastically contribute to the further reduction of solid waste.

Ease of Implementation:

This type of program has proven to be successful in many municipalities across Canada. As a result, there are plenty of resources available for the implementation of this program. At the recent community consultation the public expressed plenty of support to implementing such a program in Kimberley. The challenges may exist around logistics between the City and RDEK. Further discussion should take place to determine applicability in Kimberley.

Application in Kimberley

A curbside recycling program would be very successful in Kimberley as there is plenty of community support for such a program and there are plenty of resources available throughout the province and country. Feasibility studies conducted throughout the province suggest that a biweekly blue bag collection is most cost effective in comparison to a blue box system. The program could begin as a pilot project in one neighbourhood and could be coupled with a curbside organic waste collection program. Waste management in the City of Kimberley falls under the jurisdiction of the RDEK, and as a result, the City and the RDEK would have to work together on such a project. Not only will an increase in participation in recycling through curbside collection reduce GHG emissions, there will also be less strain on the local landfill as waste will be diverted from it.



Case Study and Contact Information

In 2005, The City of Nelson released a feasibility report on the success of their curbside recycling pilot program. The goal of the program was to generate information on how to best provide the residents of Nelson with a recycling program. Curbside recycling and neighbourhood depot recycling were compared for cost effectiveness, recycling participation and quantity of waste diverted from the landfill. The majority of the public preferred the curbside recycling program although this system is more costly to residents and the City. The City of Nelson and the RDCK have determined that a blue bag curbside collection would cost marginally more than neighbourhood depots and significantly less than a blue box system. The results of the pilot curbside recycling program in Nelson indicate an increase of 5% in tonnes of recycled materials via curbside recycling compared to neighbourhood depots. It should be noted that the City of Nelson at the time of the study, had a high rate of recycling with a value of 30% using only the drop off depots. Generally the provincial standard for blue bag residential recycling rate for is 39%, with some communities such as Hope achieving even higher rates (41%). As a result, it can be assumed that residential recycling rates associated with a new blue bag program could reach such a rate.

Solid Waste Restrictions


Several communities throughout BC have banned improper disposal of recyclable material to lessen the strain on local landfills. Each community enforces the ban in different ways. Either the company providing waste service that drops off a solid waste load at a transfer station containing recyclables will be fined and can then in turn fine their clients. Or, district waste collectors can fine residents who place recyclables with their waste. Some communities have also developed bylaws banning recyclables in garbage. Depots or curbside recycling programs make such bans more reasonable and help prevent illegal dumping. Bans have been implemented in communities such as Nanaimo, Central Okanagan, Cowichan Valley and Kitimat-Stikine Regional Districts.

As of June 1st, 2009, The City of Vernon has been taking progressive actions in coping with waste management. The City is now providing recycling services, via a curbside recycling program, to the commercial and industrial area. Curbside collection occurs in most areas of the City and is mandatory for these two sectors. Recycling services are rarely available to the commercial and industrial sectors which forces a company to dispose of their recyclables themselves. This new program will help reduce strain on the local landfill and will result in reduced GHG emissions.

http://www.vernon.ca/services/operations/solid_waste/recycling.html

Organic Waste Collection

The waste sector of Kimberley's GHG emissions contributes to 1805 t CO₂e of the total 48,332 t CO₂e. Although this contribution is small (3.72%) to overall GHG emissions at the community level, in addition to a curbside residential recycling program there is further opportunity to reduce this value and consequently contribute to the overall GHG emission reduction goal at the community level.



In Canada, nearly 50% of our household waste is organic and compostable. Reduction benefits beyond solid waste management are possible including GHG reduction potential as decomposition of waste would shift from anaerobic (primarily methane byproduct) in a landfill to aerobic (primarily carbon dioxide byproduct) in a properly churned composting system. Methane has a global warming potential 21 times greater than carbon dioxide. As a result, carbon dioxide is a more favorable byproduct when a byproduct is inevitable. Generally, the quantity of GHG emitted from aerobic decomposition is less than that of anaerobic decomposition.

The quantity of potential reductions in GHG emissions is varying between studies. One quantification suggests that by composting a family of three's organic waste rather than sending it to a landfill, the family is reducing their CO₂ footprint by 125 kg per year. The State of California suggests that for every tonne of organic food waste diverted from landfill to a composter, there is a reduction of one tonne of GHG emission (USCC, 2008).

In addition to reducing GHG emissions by diverting waste into compost other benefits include a reduced reliance on national peat reserves, and consequently, less extraction of peat, which has many negative impacts including effects on reservoir water quality. In addition, utilizing compost may result in improved soil health, reduced soil loss, increased water storage and infiltration and a reduction in inputs of contaminants.

Recommendations:

Conduct a feasibility study for the implementation of a curbside composting program.

Encourage the composting of yard waste. Consider banning organic yard waste from the landfill (i.e. household organic waste pile at the Transfer Station).

Provide backyard composters at a subsidized cost along with composting reading material.

Education and awareness around safe backyard composting opportunities, and vermicomposting programs.

Cost Effectiveness:

In order to implement and run a curbside composting program there would be significant costs involved. A feasibility study should be conducted, but some of the costs include: the purchasing of composting carts or bins (but could then be leased or sold to participants at a price that could help divert the cost of the cart); City or municipal resources such as vehicles and staff, and other pieces of equipment, such as building supplies and tools would be required to build and maintain the compost pile. Many of these resources are currently available due to the similarities between solid waste management and composting. Grants are available to help fund this program through a variety of organizations that support greenhouse gas reduction which would help pay for costly facilities. In terms of providing backyard or vermin-composting options, municipalities could provide the materials, or at least resources at little to no cost for residents in the community to implement voluntarily.

**Funding:**

- Green Municipal Funds Waste Diversion – as mentioned, could be combined to reduce municipal waste.

<http://gmf.fcm.ca/GMF/GMF-2009-call-for-applications/Waste-2009-call-for-application.asp>

GHG Emissions Reduction Potential:

An organic waste collection program would assist in solid waste management issues. Waste diversion has large GHG reduction potential as decomposition would shift from anaerobic to aerobic. Reduction results will be realized in a few years time from implementation. Estimated reduction is 450 t CO₂e.

Ease of Implementation:

This type of program has proven to be successful in a variety of municipalities across Canada. As a result, there are plenty of resources available for all types of systems and programs. The public is aware of such programs and there has been community interest in an organic waste collection program at community consultations.

Application in Kimberley

According to the RDEK's waste services, the community of Kimberley created 3745.2 tonnes of waste in the year of 2007. A third to fifty percent of this value is composed of compostable material. Organic waste management can be a success in Kimberley despite the presence of wildlife in the area, if properly managed and maintained.

Various successful programs exist throughout the country utilizing different methods of pickup and waste storage. Large composting carts (similar to recycling carts) could be purchased and rented out to participants. These carts are filled by the participants in their backyards and there is a pick up of the contents by a large truck that empties the contents immediately into the truck. Another option includes having participants purchase smaller bins with more frequent curbside collection. Thirdly, the responsibility could be placed entirely on the participant by having them drop off their organic waste themselves during set drop off times.

In Canada, communities tend to choose from two processing systems; either a compost pile/windrow system or an in vessel system. The first option has proven to be successful in many communities including areas that are constantly dealing with wildlife issues such as Whitehorse, YT. Generally, the pile is located in an isolated area such as at a landfill where attractants already exist, and often, the pile is surrounded by a barbed wire or electric fence in attempts to keep animals out of the area. The pile is also churned often to encourage aerobic decomposition and to minimize odours. In-vessel storage implies that the decomposing organic matter is stored inside a vessel which indicates that the process is clean and odour free. This process is highly effective, but is the more costly of the two systems.



Case Study and Contact Information

The City of Whitehorse originally began their curbside composting program as a pilot project in 2000 with 250 volunteer households. In 2001, another community was added to the program and by 2002 the program existed to all curbside collection areas. Surveys suggested that participation in the program was low due to inconvenience of bagging composting. Consequently, by the spring of 2009 every household along curbside pickup routes will have wheel carts for compost and garbage pickup. Wheel carts have proven to be most convenient for participants as well as for city waste collection staff. Residents will receive a cart for garbage and a compost pail and cart. Pickup occurs bi-weekly for each type of waste. There are no costs for program participants due to funding provided by the Federation of Canadian Municipalities (\$75 000) and a legacy grant provided by Canada Winter Games (\$40 000). The curbside compost is collected bi-weekly and brought to the landfill where it is introduced into a windrow system. The program accepts all types of organic waste including food waste, cooked and raw meat, soiled paper and yard waste. After a year's time in the windrow system, the compost is done and ready for sale.

Ladysmith is the first municipality in the province of BC to provide curbside collection of organic waste. The weekly program began in 2006 and since then approximately 33 tonnes of garbage has been diverted from the landfill per month and recycling has increased by 14%. Leachate and methane associated with the breakdown of organics in a landfill have reduced significantly since the program began as well. The Town of Ladysmith has developed a policy framework to ensure that residents would participate in the program. Under bylaw, single family homes and duplexes are required to participate in the program.


Due to the success of this program, other municipalities on Vancouver Island will be following Ladysmith's and implementing their own curbside organic waste collection service.

The **City of Port Coquitlam** provides curbside composter at a subsidized cost of \$25 to residence.

General Waste Reduction Awareness and Policies

There was a great deal of interest from the participants in the Community consultation regarding waste diversion and reduction in Kimberley. The following strategies have been implemented in other communities, and would significantly contribute to the reduction of local waste production.

- Encourage the reduction of the use of plastic bags at all retail stores in Kimberley. Consider enforcing a voluntary ban.



The community of **Leaf Rapids**, Manitoba was the first community in Canada to develop a bylaw banning the use of disposable plastic bags. The bylaw came into effect in 2007. See Appendix H for the Leaf Rapids bylaw.

- Participation of local café's and restaurants in a reusable mug incentive program.
- Retrofit all public garbage bins to include recycling bins. This has been successfully implemented at many roadside rest stops throughout BC and Alberta.
- Promote and advertise waste reduction events, such as Waste Reduction Week, or Zero Waste days (see: Recycling Council of BC <http://www.rcbc.bc.ca/>)



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APPENDIX C

COMMUNITY CONSULTATION PROCEEDINGS

**Meeting Proceedings from:
Greenhouse Gas Emissions Reduction Plan Community Input Session**

**May 28th, 2009
Kimberley, BC**



SPECIAL THANKS AND ACKNOWLEDGEMENTS

The Community Input Session was a great success and significantly due to the incredible participation by the community of Kimberley. A big thanks to all of those who attended the session; your input is valuable and demonstrates commitment to helping shape our community for a sustainable future.

A special thanks to the volunteers from that night, including: Erna Jensen-Shill, Eli Baker, Ingrid Liepa and Pamela . These were the leaders during our breakout sessions, and were a great help in the preparations before the event.

The food was delicious; Curry, papodams, tea, coffee and fresh organic cookies provided by Rhonda at The Mountain Range.

Thank you to the City of Kimberley for providing the venue at Centennial Hall.

And finally, a big thanks to the funders that have contributed to this project over the past year, as well as directly to the Community Input session. These funders include; Community Action on Energy and Emissions, and the City of Kimberley.

COMMUNITY INPUT SESSION: BACKGROUND

The City of Kimberley Greenhouse Gas Emissions Plan has been in the works since January 2009. This plan was initiated after the City of Kimberley signed Partners for Climate Protection (PCP), followed shortly after by the Climate Action Charter. As a signatory to PCP and Climate Action Charter, the City of Kimberley has engaged in a process of developing a greenhouse gas emissions plan in partnership with Megan Walsh. The PCP program guides municipal governments through five milestones, the first three (indicated in bold below) of which are encompassed by the project with Ms. Walsh. The five milestones are:

- 1. Develop a baseline inventory of emissions**
- 2. Set reduction targets**
- 3. Develop a GHG reduction action plan**
- 4. Implement the reduction plan**
- 5. Monitor and measure progress**

A community input session took place on May 28th , 2009, and was attended by about 30 community members with varying backgrounds. There was representation from Mayor and Council, from non-profit, from the business sector, from temporary and very long-term residents, local consultants and other interested citizens.

All of the comments and input provided throughout the community input sessions have been compiled below. All comments have been read and whenever possible, incorporated into the recommendations. The next step is to quantify as best as possible the potential emission reduction, the ease of implementation and the cost of each initiative. An action

plan will be developed, and suggested implementation timelines will be provided to the City of Kimberley. The following sections outline the information that was presented during the community input session, and summarizes the comments and input collected through the breakout sessions.

Overview of Information Presented

The first section of the community engagement covered the process of developing a greenhouse gas emission reduction plan, the commitments that have been made by the local government, and an overview of climate science.

The purpose of this engagement process was to:

- Gather input into the development of reduction strategies and recommendations
- Gather local 'citizen science'
- Develop initiatives that meet the needs of residents
- Inform communities of challenges and opportunities with the respect to climate change

The following key points describe the commitments and frameworks that are guiding the development of the GHG emission reduction plan:

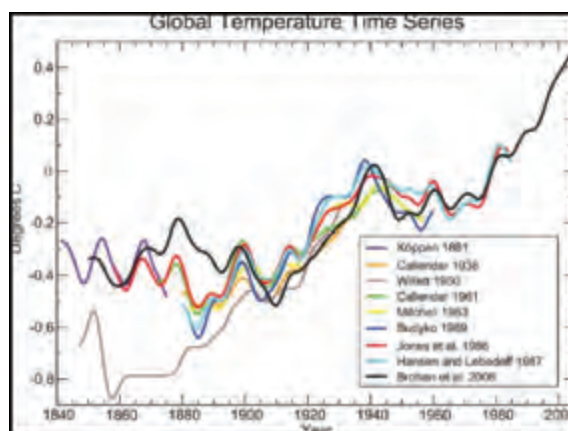
- The process is supported by Community Action on Energy and Emissions and the City of Kimberley.
- There are several commitments that the City of Kimberley has made that require climate action. These include: Joining Partners for Climate Protection, and signing the Climate Action Charter
- Provincial legislation has been passed to require that municipal governments incorporate greenhouse gas emission reduction targets, goals and strategies into their Official Community Plan by May 2010.

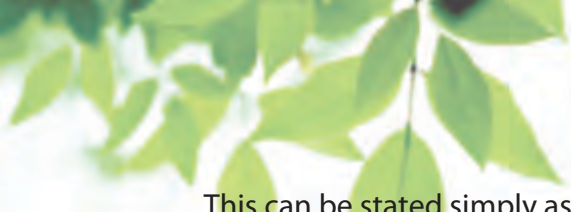
Beyond the commitments that have been made by the Provincial and Municipal governments, it is widely acknowledged that changes in our climate to some degree is inevitable; it is more cost effective to be proactive. Taking action to reduce local greenhouse gas emissions means better air quality and reduced health issues associated with emissions. Finally, taking action to reduce energy consumption and increasing efficiency means money is saved by residents and the City.

Climate Change 101

Climate change is defined by the Intergovernmental Panel on Climate Change (2007) as:

A change in the state of the climate that can be identified by changes in the mean or variability of its properties, and that persists for an extended period (decades, centuries).





This can be stated simply as:

- Changes that are unusual
- Changes that are not within the expected variability
- Last longer than weeks or months
- Caused by natural or human activities

Scientists are observing a change in climate that is significantly different than historical records demonstrate. Figure 1 (Global Temperature Time Series) demonstrates the dramatic trend of temperature increase. Global models from later 1800's to early 2000's demonstrate a similar story, that there is dramatic increase in temperatures and that the trends suggest a continuing warming. The characteristics of change as observed by scientists include:

- At a rate greater than ever observed in history before
- Consequences more dramatic and potentially catastrophic than historically
- At a rate that may be too fast for species to adapt (including humans)
- "Unequivocal" warming - dramatic changes in sea level/temp, glacier retreat, global temps

Globally, there are visible impacts of climate change that are playing out today. When considered, impacts of climate change can be recognized locally, in Kimberley. The next section of the engagement identifies those changes.


Community Input Opportunity #1

In breakout groups of about 6 participants, facilitators guided a brainstorming session to determine what observations residents have made that might be attributed to a changing climate. This was an extremely informative exercise, as there was input from residents that were born and raised in Kimberley, as well as those that had recently moved to Kimberley. Participants contributed observations that they had made from their own hometowns, as well as from the Kimberley and area.

Participants were asked two questions:

1. What is different today than what you remember in years or decades past?
2. What have you observed in the backcountry, your garden, the air, the water, etc. that you think has changed (for better or worse)?

The following table outlines the observations that were made by the participants:



Recent appearance of the pine beetle.	Short and less extreme cold snaps (not as cold, doesn't last as long).	Changes to snowpack – pocket glaciers have disappeared, ice climbing routes have disappeared, avalanches more severe/unprecedented areas.	More wind and larger gusts of wind.	Season shifts causing later/cooler spring, warmer/late fall.
Swallows seen at new times of year.	New bird species seen in the area.	Changes in environment around historic backcountry cabins.	Later spring runoff.	Gardening zone has recently changed 3 to 4.
More wildfire smoke in area.	More deer in town and out.	Longer frost-free season.	Drier summers.	Changes in soil – more erosion observed on trails.
Huckleberry season is shorter.	Changes in bear hibernation periods – generally shorter hibernations.	Longer stretches in winter without snow.	Fewer songbirds in area.	Used to be a lot more birch, fir and tamarack in the local forests – logging has changed.
More ungulates in town.	More logging/clearcuts.	Burning more wood during the winter – longer winters? Spring is later.	Less snowpack.	Increased interest in green living and general environmental awareness.

Climate Projections

A presentation of the climate projections for the Kimberley region were presented as developed by the Pacific Climate Impacts Consortium (PCIC). PCIC works with global climate models to determine the potential changes to temperature and precipitation according to climate trends in a specific region.

The projections in Kimberley can be summarized by the following:

**** DINNER BREAK! ****

Informal discussion at tables, while enjoying The Mountain Range catering.

Emissions Inventory Presentation

The emissions inventory for the community was presented immediately after dinner as a pre-cursor to the small group discussion regarding potential reduction strategies. The emissions inventory for the community was prepared initially by the Province of BC, Ministry of Environment. As part of the process for reducing GHG emissions at the community level, the Province has developed the Community Energy and Emissions Inventory, which is provided to each municipality throughout the Province to help local governments more easily develop targets and reduction strategies for community emission reductions.

The community inventory was localized with waste data from the Regional District of East Kootenay. It is anticipated that the Province will refine the methodology for the community inventories, and that the accuracy will only improve. Inventories will continue to be provided to communities in the future.

The following table summarizes the emissions for the community of Kimberley. Community of Kimberley Emissions (2007: Province of BC).

Sector	CO ₂ e (t)
Residential Buildings	14,349
Commercial Buildings	6,803
Industrial Buildings	122
Vehicles and Transportation	25,253
Waste	1805
TOTAL	48,332 t CO ₂ e

Community Input Opportunity #2

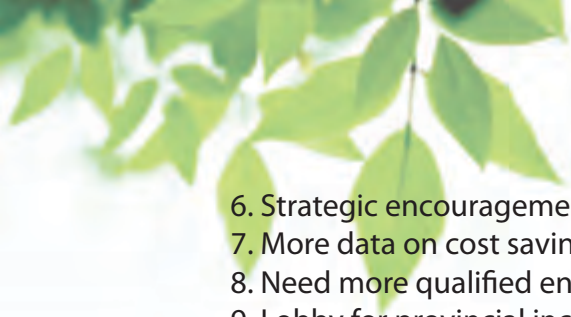
The remainder of the evening focussed on small group discussion and brainstorming potential reduction strategies for Kimberley. Each group was assigned to a different sector (i.e. Business/Commercial, Residential, Waste and Transportation), and were to come up with a series of potential GHG emission reduction strategies within their sector. Specifically, the question posed was:

What are some initiatives that the City of Kimberley/the community could undertake to reduce greenhouse gas emissions in the four main sectors?

Although greenhouse gas emission reduction was the focus, participants were encouraged to write down any ideas that may also contribute to overall community sustainability or resiliency. The results of the session are summarized below.

Business/Commercial

1. Energy efficient renovations/building workshop.
2. Building up local trades-people with green building skills.
3. Publicly recognizing any steps being taken by local businesses.
4. Green trades fair.
5. Chamber hosting GHG reduction workshops for businesses.

- 
6. Strategic encouragement of green trades/skills.
 7. More data on cost savings from GHG reduction activities.
 8. Need more qualified energy auditors in the area.
 9. Lobby for provincial incentives for businesses.
 10. Providing expertise to do basic energy/building auditing for businesses.
 11. Identify local business as champion.
 12. Chamber acting as facilitator for bulk orders of green materials – e.g. insulation, low flow toilets, for businesses.
 13. Attracting local businesses that help us towards Net “0” emissions.
 14. Minimize garbage.
 15. Single pane window inventory.
 16. Develop simple self-audit tool for businesses to use.
 17. City development permitting requiring high-energy efficiency standards.
 18. Develop and implement incentives for businesses to reduce emissions.
 19. Encourage multiple use of commercial buildings and allow for “micro” commercial/business spaces.
 20. Eco award through Chamber – adding a prize that includes a retrofit.
 21. Promotion of local purchasing – locally sourced resources.
 22. Green transportation options.
 23. Starting Kimberley carbon offset company for visitors to purchase offsets.
 24. Making connection between an action and the amount of CO₂e reduced – make a bank of potential initiatives.

Waste

1. Create curbside organic waste pickup program and facility.
2. Bearproof bins for residential garbage/return to garbage cans instead of bag pickup.
3. Create curbside recycling program.
4. Greywater collection/recycling (eg. Earthship system cycles water 4 times before it is discarded).
5. Increase on stormwater treatment efficiency.
6. Create plastic bag ban program.
7. Enhance waste education – especially with youth.
8. Promote grass cycling.
9. Promote vermiculture composting.
10. More recycle bins around the community.
11. Increase deposit fee for bottles (eg. 50 cents).
12. Localize food production – build 100,000 square foot greenhouse for community.
13. Heat capture from arenas.
14. Utilize waste energy – e.g. microhydro on Mark Creek.
15. Eliminate waste street lighting (and encourage night tourism).
16. Support Earthship-type building in the community.
17. Encourage Roof top gardens/Living roofs – with changes to building codes.
18. Solar collectors on roof tops – arena, curling rink, Rotary drive houses.
19. Wind turbine at top of ski hill.
20. Water use bylaws – fines for wasting water – eg. watering driveways – water metering.
21. Start using pine beetle waste to create building blocks.



Transportation

1. Expanded trail system for biking/walking.
2. Making a bike lane within the community to encourage more riding.
3. Create mass bike share program.
4. More bike racks to lock bikes.
5. Two-stroke engine free zone (reduction for lawnmowers, etc).
6. Biodiesel plant and fueling station.
7. Designate specific idle-free zones.
8. Right-sizing of city fleet vehicles.
9. Use biofuels from local sources.
10. Bavarian mining railway to use biofuel.
11. Kim-Cran transportation – need better transit options for commuters.
12. Adding cars to the Kimberley's car/truck share.
13. Use recycled asphalt for roads.
14. Provide municipal incentives for electric scooters.
15. Solar recharging for electric scooters/bikes.
16. Promote workplace carpooling incentives.
17. Freight system – encourage collaboration between businesses to reduce # trucks.
18. Encourage sourcing of local products, food, etc. to reduce transportation.
19. Create local program to offset local transportation emissions.

Residential

1. Promote growing own food, eating locally.
2. Create bylaw that allows for urban livestock (eg. chickens).
3. Use eco-friendly products.
4. Use energy efficient products.
5. Reducing heat loss/leaks in home – weatherizing, blinds, etc.
6. Build homes more efficiently – e.g. solar aspect, heat exchange, straw bale.
7. Create green building bylaws e.g. Low flow fixtures only in new homes
8. Reduce energy loss as much as possible.
9. More high efficiency woodstove use.
10. Reducing numbers of appliances, turning off appliances
11. Promote alternative energy e.g. solar panels, geothermal, wind power, solar thermal.
12. Amendments to building code to allow rainwater collection, greywater systems, cisterns.
13. Promote heat recovery systems.
14. Create Concentrator Hill solar panel project.
15. Create thrift and community recycling (“free” store, freecycling).
16. Workshops, education activities – monthly information sharing.
17. Have climate change information website linked to city website.
18. Lobby provincial and federal governments for incentives to retrofit commercial/residential properties.
19. Educate on water conservation.
20. Using drinking water for potable uses, grey water system for non-potable uses.
21. Communicate ideas – need to blitz all forms of communication



Additional Input Question – To me a sustainable Kimberley is:

- Lively neighbourhoods that integrate residential, commercial and public use
- Strong buy local ethic and behaviour
- A town with backyard chickens
- A town with easily accessible public transport to Cranbrook
- Has a local food industry – local large scale greenhouse
- Has more sidewalks, one side of some roads for cyclists only
- People earning good incomes in harmony with nature
- A town using locally available materials to produce locally used goods
- Using local resources as much & as wisely as possible
- Walkable, bikeable, gardenable
- Has far fewer lawns & more vegetable gardens and/or native plant landscapes
- Has more home based businesses
- Green tradespeople providing free estimates
- Local good industry (greenhouse)
- Readily available public transport within Kimberley
- Enforce 'no idle' policy for municipal vehicles
- Real recognition on part of major landowner (RCR, Teck) of need for change
- City: encourage more small businesses that are 'carbon neutral'
- A community that can live off of local resources
- Replace diesel power generators with new technology
- Education: start with kids! (sustainable living)
- Make free plastic bags illegal at retail – makes us reuse bags if we have to pay for it
- Community education to build consensus about progressive future action

Next Steps

After compilation of all community and staff contributions, initiatives will be further research based on their cost effectiveness, greenhouse gas emission reduction potential and ease of implementation.

The top initiatives will be selected and researched in more detail, including identifying opportunities for funding and resource support. Greenhouse gas emission reduction targets will be developed, and initiatives that support the reduction targets will be quantified and included in the final report.

A technical review will be performed by Federation of Canadian Municipalities, and finally the report will be approved and endorsed by Council.

Ensuring successful implementation of the final GHG emission reduction plan will certainly require effort from both the municipality and community. It is recommended that an implementation committee be developed. An OCP revision and by-law review will likely be required to adopt some of the recommendations from this report, but this also represents a perfect opportunity to integrate new standards into development guidelines and community growth strategies.

For any additional questions or comments about this project, please contact Megan Walsh at walsh.megan@gmail.com or 250.531.0690.



APPENDIX D

ENERGY CONSERVATION STRATEGY (Saanich)



COUNCIL POLICY

SUBJECT: ENERGY CONSERVATION POLICY FOR THE MUNICIPALITY OF SAANICH
--

DATE: NOVEMBER 4, 1985

REFERENCE: 85/CW

The Energy Conservation Policy of the Municipality of Saanich is:

to increase the energy efficiency of new and existing structures, equipment, and transportation systems in the Municipality, through activities and programs which encourage conservation of energy resources, while maintaining the Municipality as an attractive place to live and do business.

Towards this end, the Municipality will work towards these goals:

1. **REFITTING EXISTING BUILDINGS**

All buildings, and particularly residential buildings, in the Municipality shall be made as energy efficient as is economically possible. This will be determined on the basis of the costs of the conservation measures versus current and predicted energy prices. These refitting programs shall initially be implemented through voluntary actions. However, they may be assisted by incentive grants from senior governments or advice from the Municipality or from the Conservation Energy Society of British Columbia. A guiding principle of these programs will be that residential property owners who implement energy conservation measures pay no more for their combined fuel and weatherproofing costs than they previously paid for heating fuel alone.

2. **LAND USE POLICIES**

The Municipality will encourage building designs and configurations that reduce energy requirements and take advantage of solar energy. In addition, the Municipality will encourage land use policies that increase access to public transit, reduce the need for travel and generally are in accord with the Community Plan.

3. **RENEWABLE ENERGY**

The Municipality shall encourage the application of various renewable energy technologies and alternate energy systems to reduce consumption of nonrenewable energy resources in the residential and commercial sectors. The Municipality shall facilitate the use of such systems by removing administrative barriers and encouraging solar-oriented residential development. In addition, the Municipality shall increase public awareness of various energy saving alternative technologies, such as composting and recycling, that will reduce the overall energy consumption by the Municipality and its citizens.

4. **TRANSPORTATION SYSTEMS**

The Municipality shall support reduced consumption of nonrenewable fuels by taking measures to increase the efficiency of the various transportation and traffic regulation systems operating within the Municipality. These measures will encourage individuals to choose the most fuel-efficient methods of travel appropriate to their needs, promote the energy efficient movements of goods, and provide examples for the use of fuel-efficient vehicles.

5. **MUNICIPAL PROGRAMS**

The Municipality shall endeavor to reduce energy consumption in its own buildings and equipment by implementing the most energy efficient conservation measures and changing operational procedures.

6. **ROLE OF THE MUNICIPALITY**

The role of the Municipality is to support this Energy Conservation Policy and its implementation. The Municipality shall therefore set an example by introducing energy conservation measures directly within its own areas of responsibility. It shall also encourage similar efforts from the private sector through education and incentive programs. For example, fact sheets or brochures on energy conservation could be handed out by the Planning or Development Departments as guides to builders or other applicants when refitting or new buildings are being considered.

The Municipality's efforts shall include an ongoing campaign to promote energy conservation by informing all sectors of available programs and conservation techniques, developing financial incentives, seeking out support for the Municipality's conservation program from regional, Provincial and Federal governments, and regulating conservation actions where appropriate.

7. **CONSERVATION COMMITTEE**

To assure the proper review and evaluation of the Municipality's energy conservation program, a Conservation Committee may be appointed by the Mayor and confirmed by Council.

This Committee will advocate conservation actions, monitor the progress of implementation, and propose appropriate changes to the policy as they see fit. The Committee will make periodic reports to Council on its activities, and will issue an in-depth analysis of policy implementation activities and effects not later than three years from the time the policy is formally adopted.



APPENDIX E

GREEN VEHICLE POLICY (Dawson Creek)





GREEN VEHICLE POLICY

Background

In 2004, Dawson Creek completed a baseline study on its municipal energy consumption. One of the study's recommendations was the creation of a green vehicle policy that would guide vehicle purchasing decisions and operating practice in order to help reduce energy consumption. An overview of the different components and options for a green vehicle policy was prepared and presented to Dawson Creek in February, 2006. The policy that follows reflects the goals and direction that Dawson Creek chose from these options. For background information on each section, please see the *Dawson Creek Green Vehicle Policy Working Paper*.

Rationale

- Gasoline and diesel fuels used for transportation produce greenhouse gas (GHG) emissions that contribute to climate change, and local air emissions (Criteria Air Contaminants – CACs) that degrade local air quality. This policy will help to reduce vehicle emissions.
- New vehicles will be an ongoing expense in Dawson Creek. This policy will ensure that life cycle costs are considered for new vehicle purchases and that vehicle efficiencies are maximized.
- Many of the policy options described here can be adapted and expanded to the community level. This policy provides a starting point to engage on other transportation issues throughout the municipality.

Goals and Objectives

The goals and objectives of this policy are:

- To reduce emissions from the municipal vehicle fleet to levels that are 20% below 2004 levels by 2016 by:
 - Reducing idling
 - Reducing single occupancy trips
 - Purchasing more efficient vehicles and fuels
 - Right-sizing vehicles
- To consider the life cycle costs of municipal vehicle operations when purchasing vehicles.
- To maximize vehicle efficiency.
- To provide a framework for lessening the environmental impact of vehicle operations that can be expanded to the larger community.


Guidelines

1. Purchasing

1.1. *Right-sizing*

Vehicles should be purchased according to the average or usual anticipated use of the vehicle. Occasional vehicle needs that exceed the capacity of the vehicle purchased should be met through vehicle sharing or renting. The following use requirements should be considered when purchasing a vehicle:

- engine size
- vehicle weight

- 
- average carrying capacity
 - average passenger capacity
 - average terrain

These use requirements should accompany and form part of any recommendation made to the Chief Administrative Officer and Chief Financial Officer under the Purchase of Capital Equipment Policy.

1.2. Life cycle cost

Life cycle costs should be considered for all vehicle purchases. Life cycle costs should include: capital costs, maintenance costs, fuel costs, and resale costs.

2. Fuel Choice

2.1. Fuel choice

The lowest GHG emission fuel possible should be purchased for all vehicles in the fleet. Consideration of fuels should include:

- purchasing low emission fuel for the whole fleet (i.e. low-sulphur gasoline or biodiesel)
- purchasing vehicles that run on alternative fuel sources

3. Operating

3.1. Idling

Idling should be reduced among all municipal vehicles where possible. The following guidelines should be followed by all municipal vehicle operators:

- Reduce warm-up idling (no more than 30 seconds as long as windows are clear)
- It takes more gas to idle for more than 10 seconds than it does to restart your vehicle. If stopped for more than 10 seconds, vehicles should be turned off, except in the following circumstances:
 - In traffic
 - In the course of performing a specific duty that requires that the vehicle be left running
 - If the temperature is below -10C
 - If doing so would compromise human safety or the mechanical integrity of the vehicle

3.2. Vehicle sharing

Single occupancy vehicle trips should be minimized. Vehicles should be shared between departments to ensure maximum efficiency for vehicle use.

3.3. Driver education

Driving procedures to increase the efficiency of vehicle operations, including anti-idling, should be included in driver training programs that municipal staff are required to take.

4. Maintenance and monitoring

4.1. Maintenance

Maintenance on municipal vehicles should continue to ensure that preventative maintenance continues to maximize the efficiency of all vehicle operations.

4.2. Monitoring

All vehicles should be monitored to track fuel consumption, fuel costs, mileage, and maintenance costs.

5. Evaluation

5.1. Monitoring objectives

The objectives in this policy should be measured at regular intervals to ensure that the policy is effectively moving Dawson Creek towards its goals.

5.2. Policy evaluation

This policy should undergo regular evaluation to ensure that it is enabling Dawson Creek to move towards its goals.

APPROVED BY COUNCIL:

DATE: May 29, 2006



APPENDIX F

SUSTAINABILITY CHECKLIST (Port Coquitlam)



OUR VISION

Port Coquitlam will aspire to be a complete community, unique because of its small town atmosphere, its strong sense of pride and where:

- Citizens have a collective sense of belonging, and contribute to the quality of life in the community.
- The community celebrates a vibrant culture and heritage.
- The environment is nurtured for present and future generations.
- A dynamic economy contributes to prosperity and the opportunity to work close to home.
- Planned development strengthens the character of the community, helping to create safe and affordable neighbourhoods.

– Port Coquitlam Official Community Plan (OCP), 2005

USING TRIPLE BOTTOM LINE ASSESSMENT TO ACHIEVE SUSTAINABILITY GOALS

The City of Port Coquitlam is committed to fiscally, socially and environmentally responsible land use development. Sustainable development integrates the three systems that support us – the economy, the environment and our society. Each of these systems must be functioning and healthy for us to survive and enjoy a high quality of life. To be sustainable, we must understand how these systems interact, and make sure our activities do not compromise the ability of any of the systems to function currently and in the future.

New development is essential to achieve a complete community in which to live, work and play. The location, composition, density, and design of new development projects can have an immense, cumulative impact on our community's ability to: sustain a healthy economy and reasonable cost of living; to provide effective and accessible public services; to secure adequate choice and opportunity for present and future generations of residents; to protect our environment; and to ensure we all continue to enjoy a high quality of life.

***Sustainability:** To improve the social, environmental and economic well being of the community through good planning and land use management (OCP, 2005)*

Developers and their consultants are important partners in maintaining and improving our community's high quality of life. By providing sustainability criteria at the earliest development stage, the City enables developers and their consultants to create the most sustainable project possible. The Sustainability Checklist provides a comprehensive assessment of a development project's contribution to sustainability by balanced scoring of environmental, economic and social criteria. The balanced scoring of 1/3 environmental, 1/3 economic and 1/3 social is called triple bottom line assessment.

Please note, in total, the checklist describes an *ideal* – it is highly unlikely that any one project will earn maximum points in all sections, and no pass/fail standard has been set. Different types of development will result in a range of scores, and some sections may not be applicable to all development, which will be noted in the assessment. The checklist assessment will indicate how well a proposed application performs relative to the sustainability and complete community goals contained in our OCP and Corporate Strategic Plan, and help identify any areas where improvement is desirable and possible. It will inform decisions in the development approval process as to how well a proposed development achieves community sustainability.

INSTRUCTIONS

All Rezoning and Development Permit applicants are required to complete the Sustainability Checklist, as follows:

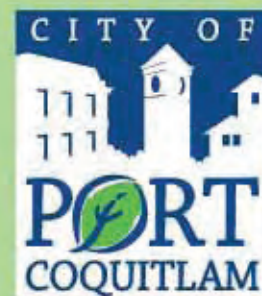
1. **Self-Scoring** – Applicants are to review and complete the checklist, as an initial assessment. The criteria are weighted differently so the maximum score for each criterion reflects its importance to sustainability goals. To calculate the score, multiply the points for a given answer by the criteria's weight and enter it into the designated TBL column. The first page divides the weighting score into 50% for the economic and social columns. The second page directs the scores to be placed in the unshaded column.
2. **Supplementary Information** – Statistical data indicated by an asterisk (*) is to be provided (e.g. the number of permanent employees, floor area ratio, property tax base increase) as well as a completed copy of the LEED Canada-NC 1.0 Project Checklist or best practice checklist for each application. Consultation with City staff may be of assistance in estimating this data. If needed, provide any additional description of how the proposed development incorporates the sustainability criteria.
3. **Submit Application** – Submit the completed checklist, data and supplementary information as part of the rezoning or development permit application.
4. **Final Assessment** – City staff will review the checklist and discuss with the applicant. Following the consultation with the applicant, a final checklist will be completed by staff for review by the Community and Economic Development Committee and Council, as part of the application process.

OTHER RESOURCE MATERIALS

- Official Community Plan – www.portcoquitlam.ca
- 2002 Strategic Plan – www.portcoquitlam.ca
- Zoning Bylaw – available at City Hall
- Downtown Plan – available at City Hall
- Canada Green Building Council website – www.cagbc.org
- SmartGrowthBC website – www.smartgrowth.bc.ca

FOR MORE INFORMATION, CONTACT:

Planning Division
2nd Floor, City Hall, 2580 Shaughnessy Street
Port Coquitlam, BC V3C 2A8
Tel 604.927.5410
Fax 604.927.5331
Email planning@portcoquitlam.ca
www.portcoquitlam.ca



SUSTAINABILITY CHECKLIST

REZONING AND DEVELOPMENT PERMIT APPLICATIONS

	<i>Points</i>	<i>Wt</i>	<i>Total</i>	<i>Soc</i>	<i>Env</i>	<i>Eco</i>
1. Land Use						
<ul style="list-style-type: none"> Mix of uses provided or uses consistent with OCP Adds to the diversity of uses within an existing neighbourhood, such as employment, housing, retail, civic, educational, cultural, recreational 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5	(50%)		(50%)
2. Housing						
<ul style="list-style-type: none"> Offers or adds a mix of housing types, sizes and tenure, including special needs¹ Provides units with a wide-range of pricing options that will be sold or leased 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10	(50%)		(50%)
<ul style="list-style-type: none"> Provides subsidized or rental housing² 	No – 0 Yes – 5	1	/5	(50%)		(50%)
3. Community character and design						
<p><i>a) Design</i></p> <ul style="list-style-type: none"> Building design follows required architectural style and demonstrates innovation Building orientation towards open space, views and/or daylight Treatment of façade breaks down massing and articulates depth, verticality & street edge Scale and massing of buildings relate to neighbourhood structures Provides crime prevention through environmental design Incorporates enhanced durability/longevity of construction materials. 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10	(50%)		(50%)
<p><i>b) Public Space</i></p> <ul style="list-style-type: none"> Creates or enhances community spaces, such as plazas, squares, parks & streets Strong connections to adjacent natural features, parks and open space Builds or improves pedestrian amenities, such as sidewalks, transit shelters, bike racks and connections to civic, cultural, school and retail/service uses 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10	(50%)		(50%)
<p><i>c) Density & Infill</i></p> <ul style="list-style-type: none"> Maximizes FAR or dwelling unit/acre density¹ Results in infill/redevelopment and enhanced community fabric² 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5	(50%)		(50%)
<p><i>d) Transportation</i></p> <ul style="list-style-type: none"> Accessible by multiple modes of transport, emphasizing public transit including future planned Parking does not visually dominate the street view & allows easy, safe pedestrian building access Interconnected road system with direct street connections, short block lengths, no cul-de-sacs Provides traffic speed & demand management 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5	(50%)		(50%)

	Points	Wt	Total	Soc	Env	Eco	
4. Environmental Protection & Enhancement							
a) <i>Lands</i> <ul style="list-style-type: none"> Does not intrude on ALR or designated open lands Protects riparian areas and other designated environmentally sensitive areas Provides for native species habitat restoration/improvement Redevelops environmentally contaminated site 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10				
b) <i>Servicing</i> <ul style="list-style-type: none"> Does not require extension of existing municipal infrastructure (e.g. roads, water and sewer) Located in existing commercial and transportation nodes 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5				
c) <i>Construction/Design</i> <ul style="list-style-type: none"> Provides LEED certification (certified, silver, gold, platinum) or accepted green building best practices (e.g. Built Green BC, Green Globes)³ 	None – 0 Certified – 2 Silver – 3 Gold – 4 Platinum – 5	4	/20				
5. Social Equity							
<ul style="list-style-type: none"> Contains elements of community pride and local character, such as public art Provides affordable space for needed community services Conducts public consultation, including documenting concerns & providing project visuals 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	2	/10				
6. Economic Development							
a) <i>Employment</i> <ul style="list-style-type: none"> Provides permanent employment opportunities¹ Increases community opportunities for training, education, entertainment or recreation 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5				
b) <i>Diversification and Enhancement</i> <ul style="list-style-type: none"> Net increase to property tax base¹ Promotes diversification of the local economy via business type and size Improves opportunities for new and existing businesses, including eco-industrial and value-added Developer demonstrates experience with similar projects 	None – 0 Poor – 1 Good – 2 to 3 Excellent – 4 to 5	1	/5				
TRIPLE BOTTOM LINE SUMMARY				Social/Environmental/Economic	/35 (%)	/35 (%)	/35 (%)
				Application Total	/105 (%)		

¹ Per the instructions, please provide statistical data for these indicators, such as floor area ratio, estimated number of employees, number of housing types, sizes and tenures.

² Subsidized Housing encompasses all types of housing for which some type of subsidy or rental assistance is provided, including public, non-profit and co-operative housing, as well as rent supplements for people living in private market housing. It also includes emergency housing and short-term shelters.

Enhanced community fabric includes multiculturalism, mobility accessibility, integration with neighbourhoods and crime prevention through environmental design.

³ Please provide a copy of the green building checklist chosen. For example: LEED Canada-NC 1.0 Project Checklist can be obtained at: <http://www.cagbc.org/uploads/LEED%20Canada-NC%20Project%20Checklist.xls>
 Green Globes at: http://www.greenlobes.com/design/Green_Globes_Design_Summary.pdf



LEED Canada-NC 1.0 Project Checklist

Project Name

City, Province

Yes ? No

Sustainable Sites 14 Points

Y	Prereq 1	Erosion & Sedimentation Control	Required
	Credit 1	Site Selection	1
	Credit 2	Development Density	1
	Credit 3	Redevelopment of Contaminated Site	1
	Credit 4.1	Alternative Transportation, Public Transportation Access	1
	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
	Credit 4.3	Alternative Transportation, Alternative Fuel Vehicles	1
	Credit 4.4	Alternative Transportation, Parking Capacity	1
	Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space	1
	Credit 5.2	Reduced Site Disturbance, Development Footprint	1
	Credit 6.1	Stormwater Management, Rate and Quantity	1
	Credit 6.2	Stormwater Management, Treatment	1
	Credit 7.1	Heat Island Effect, Non-Roof	1
	Credit 7.2	Heat Island Effect, Roof	1
	Credit 8	Light Pollution Reduction	1

Yes ? No

Water Efficiency 5 Points

	Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
	Credit 2	Innovative Wastewater Technologies	1
	Credit 3.1	Water Use Reduction, 20% Reduction	1
	Credit 3.2	Water Use Reduction, 30% Reduction	1

Yes ? No

Energy & Atmosphere 17 Points

Y	Prereq 1	Fundamental Building Systems Commissioning	Required
Y	Prereq 2	Minimum Energy Performance	Required
Y	Prereq 3	CFC Reduction in HVAC&R Equipment	Required
	Credit 1	Optimize Energy Performance	1 to 10
	Credit 2.1	Renewable Energy, 5%	1
	Credit 2.2	Renewable Energy, 10%	1
	Credit 2.3	Renewable Energy, 20%	1
	Credit 3	Best Practice Commissioning	1
	Credit 4	Ozone Protection	1
	Credit 5	Measurement & Verification	1
	Credit 6	Green Power	1



Project Totals (pre-certification estimates)

70 Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-70 points

APPENDIX G

ENERGY EFFICIENT HOME BYLAW (Vancouver)



BY-LAW NO. 9691

**A By-law to amend Building By-law No. 9419 regarding
green building strategy for one family homes
one family homes with secondary suites, and two family homes**

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This By-law amends the indicated provisions of the Building By-law.
2. In Table 9.25.2.1 of Part 9 of Division B and the notes to that table, Council:
 - (a) from the first column, strikes out “(insulation to 600 mm below grade)”;
 - (b) from the first sub-column of the second column, strikes out “Less than 4500 Celsius Degree Days⁽¹⁾”;
 - (c) from the first sub-column of the second column, strikes out the “3.5” that is in the same row as “Frame Walls”, and substitutes “3.85”;
 - (d) from the first sub-column of the second column, strikes out the “2.1” that is in the same row as “Foundation Walls”, and substitutes “3.85”;
 - (e) from the first sub-column of the second column, strikes out the “1.8” that is in the same row as “Unheated Concrete Slabs on Ground at or above grade”, and substitutes “2.1”;
 - (f) from the first column, strikes out “Unheated Concrete Slabs on Ground at or above grade”, and substitutes “Concrete Slabs on Ground at, above, or below grade (insulation under all slab area and around edge of slab)”;
 - (g) from the first column, strikes out “Radiant Heating Slabs on Ground (insulation under all slab area and around edge of slab⁽⁴⁾)”;
 - (h) from the first sub-column of the second column, strikes out the “2.1” that is in the same row as “Radiant Heating Slabs on Ground (insulation under all slab area and around edge of slab⁽⁴⁾)”;
 - (i) strikes out the second sub-column of the second column entitled “4500 and Greater Celsius Degree Days⁽¹⁾”, and the contents of the second sub-column of the second column;
 - (j) strikes out Notes 1) and 2); and
 - (k) re-numbers Notes 3), 4), and 5) as Notes 1), 2), and 3).

3. After Part 11 of Division B, Council adds:

**“Part 12
Environmental Protection**

Section 12.1. General

12.1.1. Application

12.1.1.1. Scope

1) The scope of this Part shall be as described in Subsection 1.3.3. of Division A except that this Part shall apply only to one-family dwellings, two-family dwellings, and one-family dwellings with secondary suites.

12.1.2. Definitions

12.1.2.1. Defined Terms

1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

12.1.3. Conflicts

1) In case of a conflict between any provision of this Part 12 and any other provision of this By-law, the Part 12 provision shall prevail.

Section 12.2. Building Envelope Performance and Energy Efficiency

12.2.1. Building Envelope Performance

12.2.1.1. Windows

1) Windows shall have a maximum thermal conductance (U value) of 2.00 W/(K·m²).

12.2.2. Energy Efficiency

12.2.2.1. Light Fixtures

1) At least 40% of hard wired, electrically powered light fixtures shall be hard wired so as not to accept incandescent or halogen light bulbs.

12.2.2.2. Energy Usage Display Meter

1) Electrical installations shall have an energy usage display meter in the dwelling unit capable of calculating and displaying electrical consumption on at least a monthly basis.



12.2.2.3. Hot Water Tanks

1) Electrically powered hot water tanks shall have insulation that provides a minimum RSI value of 1.76.

12.2.2.4. Hot Water Tank Piping

1) The first 3 m of non-recirculating hot water piping leading from both electrically powered and gas powered hot water tanks, and the last 1 m of piping prior to connecting to the hot water tank, shall have insulation that provides a minimum RSI value of 0.35.

2) Despite Sentence 12.2.2.4.(1), the entire hot water piping system, if it is of constant recirculation design, shall have insulation that provides a minimum RSI value of 0.35.

12.2.2.5. Gas-Fuelled Fireplaces

1) Gas-fuelled fireplaces shall use electronic ignitions.

2) Gas-fuelled fireplaces shall be direct vented so that all products for and of combustion circulate to and from the dwelling unit without the use of a chimney.

12.2.2.6. Toilets

1) Toilets shall be of dual flush design, with a maximum single flush consumption of 6 litres.

12.2.2.7. Heat recovery ventilators

1) Each dwelling unit, in the case of a one-family dwelling or two-family dwelling, and each one-family dwelling with secondary suite shall have one heat recovery ventilator.

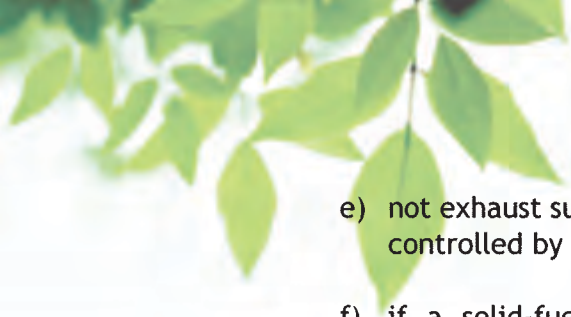
2) Each heat recovery ventilator shall

a) be designed and tested to meet the CSA International Standard CAN/CSA-F326 M91 (“Residential Mechanical Ventilation Systems”),

b) be installed by persons trained by the Heating, Refrigeration and Air Conditioning Institute of Canada or equivalent,

c) supply outdoor air directly to the principal living area, each bedroom, and any floor without a bedroom,

d) be operated by centrally located manual controls or by automatic controls,

- 
- e) not exhaust supplemental exhausts in the kitchens and bathrooms which shall be controlled by a manual switch in the room being served,
 - f) if a solid-fuel-fired appliance is present, be installed to operate without depressurizing the house in any operating mode,
 - g) be located in an accessible location within the dwelling unit, having a minimum headroom clearance of 2 m,
 - h) have an air intake equipped with a damper or bird screen, and be a minimum of 450mm above finished grade,
 - i) have an air exhaust equipped with a damper or bird screen, and be a minimum of 100mm above finished grade,
 - j) have supply-air ducts carrying un-tempered air through heated spaces insulated to at least RSI 0.5 (R-2.9), and
 - k) have exhaust ducts in unheated spaces insulated to RSI 0.5 (R-2.8).

3) Door under-cuts or transfer grilles shall be installed in doors to rooms where both supply and return air ducts are not located.

12.2.2.8. Energuide Rating System Audit

1) Before issuance of an occupancy permit, the Chief Building Official shall be provided with an Energuide Rating System Audit, as defined by the EnerGuide™ Rating Service of Natural Resources Canada.

12.2.2.9. Vertical Service Shaft

1) A vertical service shaft shall extend from the service room, which contains the service water heater, to the attic space, consisting of at least two 50 mm PVC pipes, capped at both ends, and having at least a 20° angle.

12.2.2.10. Cable Raceway

1) Each dwelling unit shall have a cable raceway leading from the electricity circuit panel to an enclosed outlet box in the garage or carport.

2) A raceway not smaller than size 21 shall be provided to accommodate future conductors of a separate branch circuit intended to supply a future receptacle for use with the electric vehicle charging system.

3) An outlet box for the receptacle referred to in Sentence (2) and approved for the purpose shall be provided in a parking space or a parking stall of a storage garage or carport intended for use with the electric vehicle charging system.

4) The raceway described in Sentence (2) shall be installed between the dwelling unit panel board and the outlet box referred to in Sentence (3).

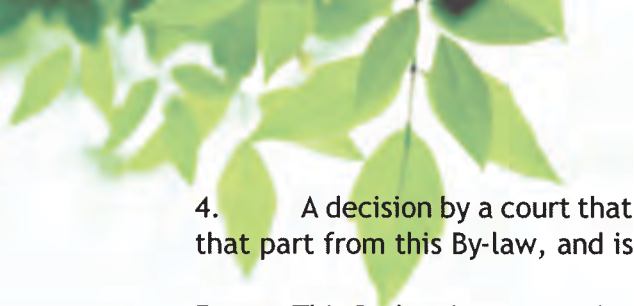
12.3 Objective and Functional Statements

12.3.1. Objective and Functional Statements

1) For the purposes of compliance with this By-law as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Table 12.3.1.1. (See A-1.1.2.1.(1) in Appendix A.)

**Table 12.3.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 12
Forming Part of Sentence 12.3.1.1.(1)**

Acceptable Solutions	Objectives and Functional Statements
12.2.1.1. Windows	
(1)	[F51, F52, F53, F54, F55, F61, F63, FEP01-OEP1]
12.2.2.1. Light Fixtures	
(1)	[FEP1-OEP1]
12.2.2.2. Energy Usage Display Meter	
(1)	[FEP1-OEP1]
12.2.2.3. Hot Water Tanks	
(1)	[FEP1-OEP1]
12.2.2.4. Hot Water Tanks	
(1)	[FEP1-OEP1]
(2)	[FEP1-OEP1]
12.2.2.5. Gas-Fuelled Fireplaces	
(1)	[F40, F41, F43, F44, FEP1-OEP1, OEP3]
(2)	[F40, F41, F43, F44, F54, F55, FEP1-OEP1, OEP3]
12.2.2.6. Toilets	
(1)	[F72, FEP1-OEP4]
12.2.2.7. Heat Recovery Ventilators	
(1)	[F40, F44, F50, F51, F52, F53, F54, F63, OEP1]
12.2.2.8. EnerGuide Rating System Audit	
(1)	[OEP1, OEP5]



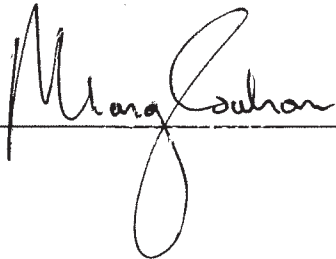
4. A decision by a court that any part of this By-law is illegal, void, or unenforceable severs that part from this By-law, and is not to affect the balance of this By-law.

5. This By-law is to come into force and take effect on the date of its enactment.

ENACTED by Council this 8th day of July, 2008



Mayor



City Clerk



APPENDIX H

PLASTIC BAG BYLAW (Leaf Rapids)





Plastic Bag Ban By-law

TOWN OF LEAF RAPIDS

By-Law No. 462

Being a By-Law of the Town of Leaf Rapids for the establishment of Single Use Plastic Shopping Bags.

WHEREAS Single Use Plastic Shopping Bags are a very visible component of litter throughout the Town of Leaf Rapids, lake side, trails, roadside and the nuisance grounds;

AND WHEREAS Single Use Plastic Shopping Bags have a negative impact on our wildlife habitat and are not environmentally friendly;

AND WHEREAS the Town of Leaf Rapids incurs a significant cost to clean up the Single Use Plastic Shopping Bags each year;

AND WHEREAS local businesses can reduce merchandise cost by not having to purchase Single Use Plastic Shopping Bags;

AND WHEREAS the Town of Leaf Rapids has provided education to shoppers and school children about the environmental advantages and reduced cost of using reusable shopping bags;

AND WHEREAS by using a multi-use shopping bag, residents are reminded of the positive impact of recycling;

NOW THEREFORE upon passing this By-Law, the Council of the Town of Leaf Rapids, enacts as follows:

- 1. THAT the Town of Leaf Rapids will be Single Use Plastic Shopping Bag free effective April 2, 2007.***
- 2. THAT retailers in the Town of Leaf Rapids will not be permitted to give away or sell plastic shopping bags that are intended for single use.***
- 3. THAT a person who contravenes this By-Law of the Town of Leaf Rapids is guilty of an offence and is liable on summary conviction of a fine of not more than \$1000.00.***
- 4. THAT where a contravention continues for more than one day, the person is guilty of a separate offence for each day it continues.***
- 5. THAT on passing of this By-Law, By-Law No. 457 is hereby rescinded.***
- 6. DONE AND PASSED as a By-Law of the Town of Leaf Rapids at the Townsite of Leaf Rapids, in the Province of Manitoba, this 22nd day of March, 2007, A.D.***

EXEMPTIONS TO THE BY-LAW

Small plastic bags that are used to store non-packaged goods such as: a) Dairy products b) Fruit, vegetables or nuts c) Confectionery d) Cooked foods, hot or cold e) Ice f) Smaller bags for fresh meat, fish, candy and poultry g) Bags that cost more than \$1.50