City of Revelstoke Community Energy and Emissions Plan

DRAFT document for review

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For the Community Energy and Emissions Plan project.

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- John Guenther (City Planning)
- Alan Mason (City Economic Development)
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Executive Summary

<<to be added in the final version>>

Introduction

The development of a Community Energy and Emissions Plan (CEEP) is an exercise that communities across the province are engaged in. Interest in this planning process has been influenced partially by the amendments to the Local Government Act (Bill 27), requiring all local governments to integrate greenhouse gas (GHG) emission reduction targets into their Official Community Plans (OCP). But in addition to that, communities are increasingly recognizing the benefit of examining energy consumption and local GHG emissions – that action on these issues leads to more healthy, sustainable communities.

In the realm of energy and emissions planning, Revelstoke is committing to changes in both municipal and community operations. Revelstoke has recently hired a Sustainability Coordinator who has been working hard at developing the City's carbon neutral plan. This process, although separate from the CEEP, demonstrates the leadership and commitment of the City of Revelstoke to addressing energy and emissions.

This Community Energy and Emissions Plan builds on a previous energy plan that was developed for the community 1997. This document addresses energy consumption and GHG emissions on the community-wide scale, as is described further in section 3.1. The CEEP process in Revelstoke also focused significantly on the district energy system that currently exists in the community. The feasibility for expansion of that system has been assessed, and guidance has been provided that will help to support the growth of the district energy system, and of the Revelstoke Community Energy Corporation.

Section 1 of this report provides the **Background and Methodology** to the project. As a project with multiple deliverables, and a large project team, the methodology explains the processes that took place over the course of the project.

Section 2 provides the **energy and emissions inventory**, which forms the base of the analysis on potential recommendations and actions.

Section 3 summarizes the current Official Community Plan goals, policies and targets that have been developed and adopted.

Section 4 is a detailed compilation of a wide range of energy efficiency and emission reduction **opportunities**. This section provides details on opportunities relevant to each sector of the inventory. The opportunity assessment should be used as a resource in the future for additional projects and ideas.

Section 5 summarizes the results of the **community outreach** and engagement sessions.

Sections 6 and 7 summarize the **recommendations for community energy and emission goals, policies and targets**, as well as **revised targets** based on the results of the recommended action.

Section 8 provides details for **implementation**, including recommended prioritized steps, funding opportunities and recommended partnerships.

The appendices provide supporting materials and are referenced throughout the document. Also provided in the document are weblinks to examples or resources where applicable.

1. Background and Methodology

1.1. What is a Community Energy and Emissions Plan?

A community energy and emissions plan (CEEP) evaluates a community's existing energy use and greenhouse gas (GHG) emissions, and identifies opportunities to reduce energy consumption and emissions, improve efficiency, and increase the local renewable energy supply. A CEEP encompasses land use and transportation planning, residential, commercial, and institutional building and site planning, solid waste, and renewable energy supply. In the case of Revelstoke's CEEP, it also involves a component of alternative energy expansion. Unique to this CEEP process is a study looking at the feasibility of district energy expansion in the community.

A CEEP can be used to complement or enhance existing policies, and to identify priority community action strategies. This document, paired with the District Energy Expansion Pre-Feasibility Study will help to inform future decision making in Revelstoke.

1.2. Why do a Community Energy and Emissions Plan in Revelstoke?

There are a variety of reasons that a community may wish to develop a CEEP. Each community has priorities and opportunities that allow the local government to pursue such work based on local factors, such as a timeliness of an Official Community Plan review, or opportunity for a major grant or funding application. In general, however, there are a number of reasons why a CEEP can be an important document for planning and community action:

- Reduce energy consumption and greenhouse gas emissions
- Save $$ on bills
- Build economy of scale for community wide projects/retrofits
- Reduce vulnerability to energy price fluctuations
- Contributes to a sustainable and resilient community

Revelstoke has shown leadership in energy planning and infrastructure as one of the first communities in BC to complete an energy plan in 1997, and in the creation of the Revelstoke Community Energy Corporation (RCEC) in 2005. With RCEC completing it's first phase of development and the City committing to community-wide greenhouse gas emissions in 2010, an updated Community Energy and Emissions Plan is now needed.

1.3. Energy Plan Methodology

The Revelstoke CEEP process is unique to that of many other communities because of Revelstoke's recognized leadership in district energy system development. Currently serving 10

customers, the Revelstoke Community Energy Corporation (RCEC) is looking at the feasibility of expanding the system to provide district energy to more customers. Further, RCEC is learning how new tools and principles can be used by the Corporation to enhance their business plan. As a result, there are three different deliverables from the Revelstoke CEEP project:

1. **Community Energy and Emissions Plan**: Identifying targets and strategies for energy conservation and GHG emission reduction
2. **District Energy Expansion Pre-feasibility Study**: Evaluating the viability of district energy expansion in the community
3. **RCEC Business Plan Tools and Principles**: To guide the future operations of the Revelstoke Community Energy Corporation.

The CEEP consulting team took an integrative approach to this project, recognizing that expansion of a district energy system would impact the future energy profile of the community, and would require policy support through land use and development. The following chart demonstrates the opportunities for integration between the processes, and methodology by which the CEEP project was completed.

<<insert project flow chart for final>>

The specific methodologies followed for the District Energy Expansion Pre-feasibility study and the RCEC Business Plan are detailed in those reports. The following steps are specific to the methodologies employed for the CEEP report.

1. **Baseline Inventory** - An inventory is an accounting of energy consumption and GHG emissions that occur within the community. The BC Ministry of Environment developed the Community Energy and Emissions Inventory (CEEI) initiative, which provides every municipality and regional district in the Province with a baseline energy and emissions profile for their community. The 2007 CEEI is the basis for the Revelstoke inventory in this plan[1].

2. **Forecasting and Projections** - A business as usual (BAU) forecast integrates potential population growth with proposed legislation to understand what future energy and emissions would look like without implementing any strategies or policies to reduce energy use and emissions. Understanding the future growth scenario of a community can help develop realistic targets and recommendations.

3. **Opportunity Assessment** - The opportunity assessment is the process of identifying potential opportunities in the community to reduce energy and emissions. A wide range of opportunities are identified, including tangible actions, policies and outreach/awareness strategies.

4. **Community Outreach & Stakeholder Engagement** - Activities to share updates and results from the CEEP process, and to gather input and ideas from the community. For this process, outreach also included an on-line survey.

[1] The Community Energy and Emission Inventory reports for each community can be found at the following link: http://www.env.gov.bc.ca/cas/mitigation/ceei/reports.html

5. **Recommendations** - Based on the forecast, opportunity assessment and input from the community, a number of strategies and policies are identified that are deemed to be most appropriate for Revelstoke.

6. **Target Setting** - By quantifying the recommendations, the potential energy and emission reductions can be estimated, and realistic targets can be developed for the community. Targets are developed for 2020 and 2030 for Revelstoke.

7. **Implementation** - Ensuring successful implementation is an important part of long-term sustainability of a CEEP. Opportunities for funding are identified, as well as recommendations for community engagement and outreach, and development of local partnerships.

1.4. Previous Energy Planning Activities in Revelstoke

Revelstoke has been a leader in energy planning in BC. A community energy plan was completed in 1997, one of the first in Canada. This plan included an inventory, goals and objectives, and actions for reducing energy consumption and increasing energy resiliency. Recommended actions from the 1997 plan are summarized in the following table.

Recommendation	**Status**
Include an Energy Goal and Energy Objectives in the Official Community Plan.	Complete
Amend text in Revelstoke Vision Statement to clarify vision.	Changes have not been made to the Vision Statement. Energy is mentioned under Environment in the Vision Sustainability Framework.
Formally commit to stabilizing or reducing greenhouse gas emissions for the community and for municipal operations.	Done for Bill 27 compliance, with initial targets.
Continue to encourage infill development, particularly in Central and South Revelstoke. Foster non-automotive modes of transportation and gradually restrict parking in the Central Business District.	Smart Growth development covered in OCP. Transport plan under development. Unified Development Bylaw under development.
Investigate the feasibility of increasing the frequency of public transit service to every 30 minutes during peak period times during the winter months and optimize the routing and scheduling of the service.	Not done, although City Transit Committee in place for several years to liaise with BC Transit to improve service. Routes recently reviewed by BC Transit.
Encourage the reintroduction of passenger rail service to Revelstoke and test the service on a pilot basis.	Not done. Has been explored several times and is in OCP as a policy to be pursued.
Add to OCP 13.6 the following criteria for the location of any new government offices, public facilities or large buildings to encourage utilizing the proposed district energy system and to support transit and cycling in the community.	Not in OCP.
If the Mt. Mackenzie ski hill development proceeds, incorporate energy considerations into the planning and design of the site at as early a stage in the process as possible.	No requirements in OCP. Use of DE was discussed initially, but was not pursued.
Conduct joint water/energy retrofits of residential buildings.	Not done.
Conduct energy retrofits of municipal buildings and	Some work underway.

infrastructure and school district buildings.	
Adopt the National Energy Code for Houses.	Not possible under Local Government Act.
Encourage the development of a wood waste fueled district energy system.	RCEC began operation in 2005.
Establish a Revelstoke Energy Initiatives Committee (or include the responsibility under an existing Committee) that is responsible for coordinating and overseeing the implementation of the Community Energy Plan and the dissemination of energy-related information.	Not done.
Disseminate energy saving information to households and businesses, including fact sheets	Not done.
Share information and experiences with nearby municipalities, particularly the City of Kamloops	Considerable knowledge transfer done with regards to DE system.
Regularly monitor implementation of the Community Energy Plan and the performance of energy indicators.	Not done.

Although not all actions were completed, the City made some significant steps towards implementing the plan, including incorporating energy and emissions into planning documents and developing the DE system. The City has also taken other steps towards reducing energy and emissions, including:

- Signing the provincial Climate Action Charter, with its commitment to carbon neutrality in civic operations beginning in 2012.
- Implementing a development checklist which includes energy conservation factors.
- Co-funding a bus service between downtown and RMR.
- Operating a wood stove exchange program.

This CEEP has considered the actions recommended in the 1997 report, and provides an update that reflects the changes in the community, as well as the new provincial legislation mandating greenhouse gas emission targets and reduction strategies.

2. Community Energy and Emissions Inventory

2.1. Energy Sources in Revelstoke

There are many different sources of energy used in buildings in Revelstoke, some local but most imported:

- Electricity is provided by BC Hydro from the provincial grid. While power outages do occur, reliability is considered to be very high. Hydro power could be considered a local energy source being generated at the Revelstoke Dam, although the dam is used to supply power across British Columbia.

- The primary heating fuel is propane, delivered within the community by a piped propane system owned by Terasen Gas. Propane is delivered by tanker-truck and railcar, and is off-loaded at an above-ground storage site. While there are currently no plans to bring natural gas to Revelstoke, there are virtually no limits to the expansion of the propane system. The customer cost of propane is roughly 50% higher than natural gas.

- Minor amounts of trucked propane and heating oil are supplied by local dealers, although the fuel is imported to the community and stored by distributors.

- A small, but potentially increasing, source of heating energy is district energy, provided by locally sourced biomass (and some propane). There are large amounts of local biomass available, both from Downie Timber (the current source), from low grade logs that are currently sold as pulp logs and from biomass waste in the forests. The amounts meet and exceed current needs, although supply is dependent on future mill operations. The current system provides steam for the dry kilns at the sawmill and hot water for heating at City buildings, including for heating the water at the Aquatic Centre, and several private buildings downtown.

- Local biomass, in the form of firewood, also plays a significant role in heating homes in Revelstoke.

Vehicle fuels are primarily gasoline and diesel. These are supplied by major fuel companies, with the fuels imported from elsewhere. There are currently no bio-diesel or other alternative fuelling stations in Revelstoke. There are some very small quantities of mobile propane and possibly natural gas used in vehicles.

2.2. Baseline Community Energy and Emissions Profile

There are a variety of protocols for developing emissions and energy inventories with varying levels of detail in the sectors that are analyzed, and sources of data deemed acceptable. The baseline inventory for the community of Revelstoke is based on the 2007 CEEI Report prepared by the BC Ministry of Environment. Appendix A provides the technical details for the methodology used to produce the CEEI inventory.

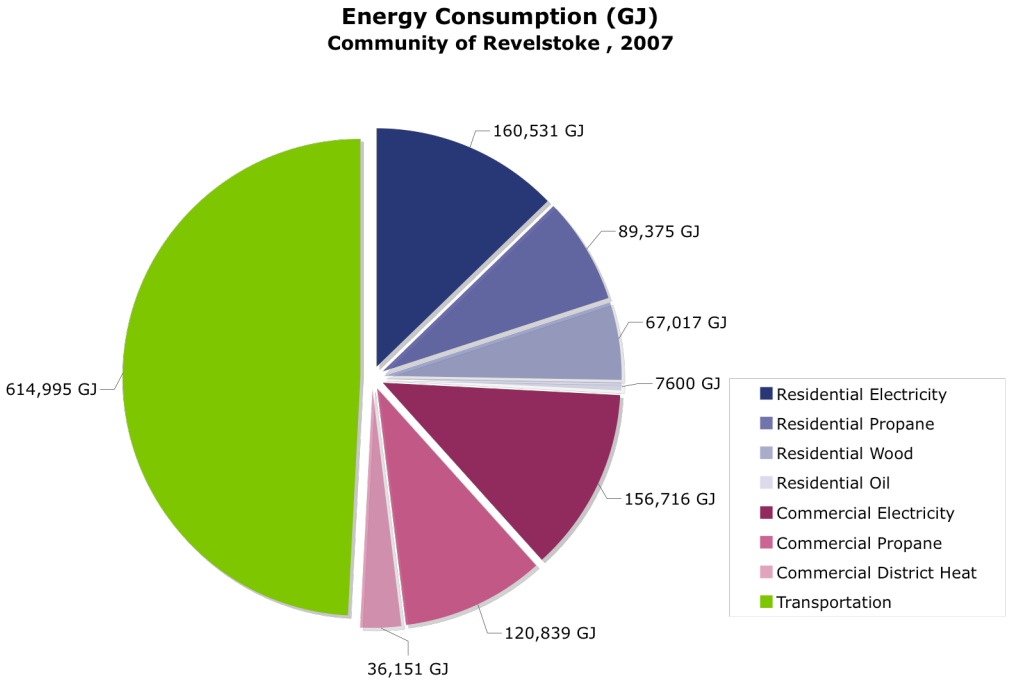
The CEEI inventory considers 4 main sectors: Residential Buildings, Commercial/Small Industrial Buildings, Solid Waste and On-Road Transportation. The CEEI reports do not include district energy, which has been added to account for the buildings connected to the DE system.

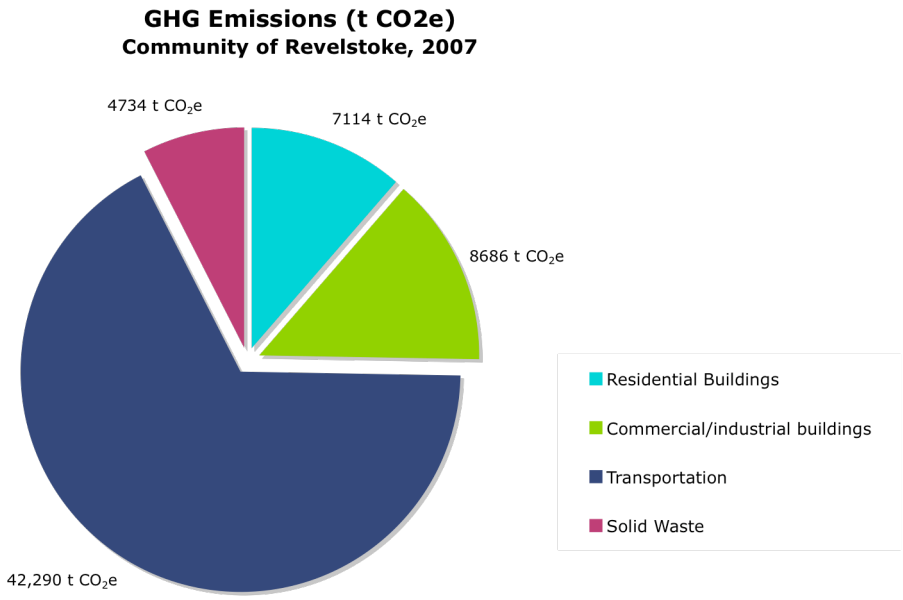
Some sectors, including rail and air travel, are not included in the CEEI inventories. These are considered to be relatively small (less than 5% of total emissions) and difficult to determine, and are therefore not included. Some large industrial data is withheld due to privacy concerns. Road traffic from the TransCanada Highway is also excluded, as only vehicles registered within Revelstoke are considered within the scope of the inventory.

The baseline year used for the inventory is 2007, as per the CEEI report, consistent with the baseline year used by the Province in their GHG reduction target. A detailed inventory can be found in Appendix B. The following tables summarize the energy and emissions. Energy costs have been included for comparison, although these are only approximate.

Sector	Energy Type	Energy Consumption (GJ)	Emissions (CO_2e)	Energy Cost ($)	Sector Total
Residential Buildings	Electricity	160,531	1,100	$2,898,000	324,523 GJ 7,114 t CO2e
	Propane	89,375	5,453	$1,698,000	
	Wood	67,017	25	NA	
	Heating Oil	7,600	536	$198,000	
Commercial/ Institutional Buildings	Electricity	156,716	1,074	$2,394,000	313,706 GJ 8,686 t CO2e
	Propane	120,839	7,371	$2,054,000	
	District Heat	36,151	240	$542,000	
Transportation	Gasoline	420,813	28,738	$12,023,000	614,995 GJ 42,290 t CO2e
	Diesel Fuel	189,983	12,385	$4,960,000	
	Other Fuel	4,199	167	$110,000	
Solid Waste	n/a	n/a	4,734	NA	4,734 t CO2e
Total Energy and Emissions		**1,253,224 GJ**	**62,824 t CO2e**	**$26,877,000**	

The inventory results are represented below in pie chart form.





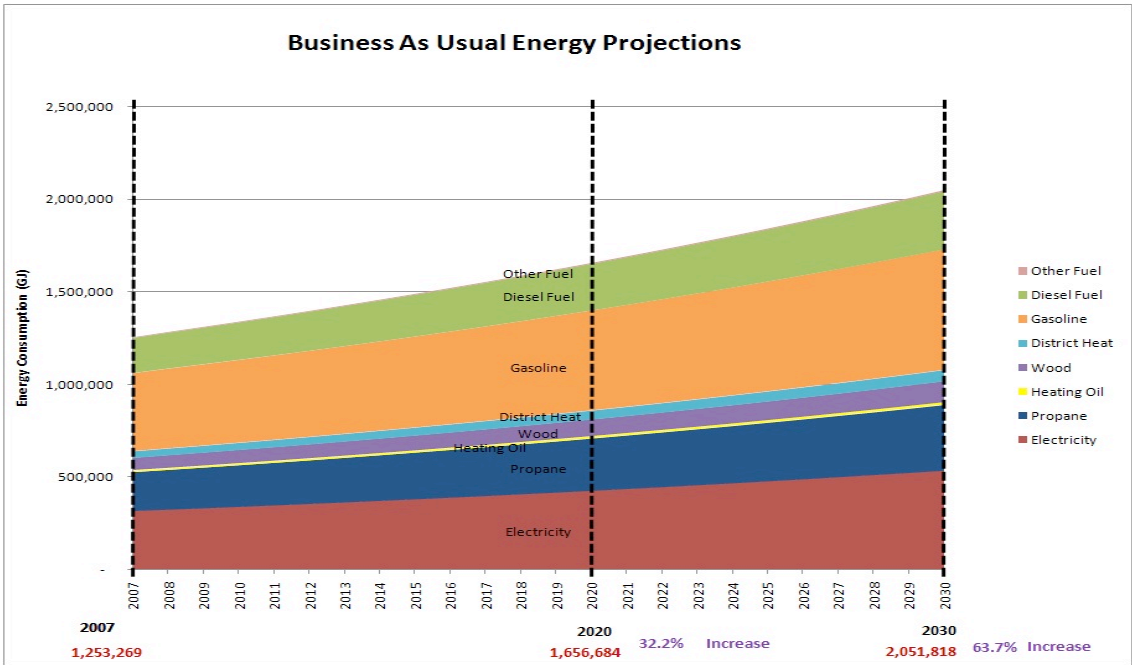
While buildings account for just over 50% of energy use, they create about 25% of emissions. This is because electricity, which is produced primarily from hydro-electric dams that produce few emissions, is a major source of energy for both residential and commercial buildings in Revelstoke.

2.3. Community Energy and Emissions Forecast

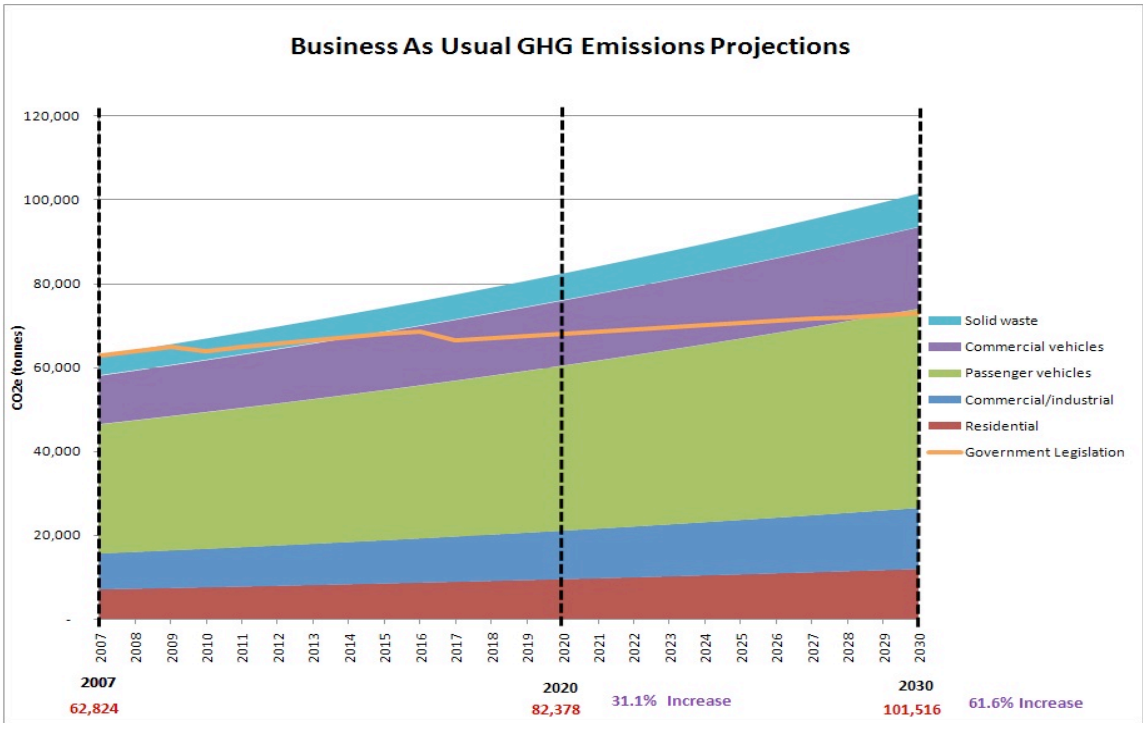
For the CEEP, the business as usual (BAU) forecast is based on population growth projections that were developed for the City of Revelstoke Transportation Master Plan. It is important that population projections that are used for energy and emissions mirror the data used in other municipal processes. It is acknowledged that over time, and with more processes and studies at the municipality, the projections may change. Future decision making should reflect the reality of the population at the time of implementation.

Population growth, as determined through the Transportation Master Plan, is projected to reach 27,5000 equivalent population (residents and resort visitors) over 50 years. For the purposes of the CEEP, this growth projection was converted to a compounding growth rate of 2.3% for commercial and residential buildings and waste. A compounding growth rate of 1.9% was applied to personal on-road vehicles, as the CEEI methodology does not include non-resident vehicles.

The following charts show the projected energy and emissions for each of the 4 sectors identified in the inventory. The BAU forecast assumes implementation of no new energy conservation or GHG emission reduction strategies. The following chart shows the projected energy consumption forecast for the BAU scenario, broken down by energy type.



Proposed federal and provincial legislation will have an impact on future energy and emissions. The orange line shows the impact of future policies and legislation in the areas of buildings efficiency, vehicle efficiency, and electricity generation sources. Some assumptions have been made as to the pace of implementation as well as the continuing improvement of standards over the long term (2020 – 2030). The following chart shows projected emissions for the BAU scenario, broken down by sector.



3. OCP Goals, Policies and Targets

The current OCP contains a number of goals and policies related to energy consumption and GHG reduction. These are further expanded by the recently passed OCP - GHG Amendments, which include reduction targets as required under Bill 27, The Local Government (Green Communities) Statutes Amendment Act, 2008.[2] Section 3.2 further details the GHG Amendment.

It is not the intent of this plan to substantially re-write these goals and policies. Rather, this plan will review the existing goals with the opportunities and recommended actions that arise, and suggest modifications and additions where appropriate.

3.1. OCP Goals and Policies:

The OCP was most recently updated in July 2009. Within that document are a number of goals that are directly related to energy consumption and GHG emissions:

1. Consider future climate change impacts in all development decision making.
2. Promote a well-designed compact community by following smart growth principles.
3. A community transportation network that guides development and provides for safe, efficient travel, with increasing reliance on transit, cycling and walking.
4. Reduce the need to landfill waste.
5. Energy self-sufficiency through energy conservation and renewable, secure and sustained energy options.

There are several amendments that are recommended for these Goals that will help to integrate energy and emissions planning into the OCP. These recommendations are outlined in section 6.

In addition to the amendments to the Goals, there are additional opportunities for policy changes that are identified through each section of the Opportunity Assessment. Further, the most relevant and effective policies will be identified in the Implementation section.

3.2. Summary of Bill 27 OCP Amendments

The City of Revelstoke has amended the OCP according to Bill 27 legislation. The 'Greenhouse Gas Amendment' includes the City's 6% emission reduction target, but also identifies a number of 'Sustainability Goals' that will be implemented to help achieve the GHG emission reduction target, as well as general sustainability within the community. The goals focus on the need to enhance smart growth regulations, policies and principles to ensure GHG emissions are reduced through zoning, etc., as well as the need for the City to demonstrate leadership by addressing corporate emissions and sustainability.

The Smart Growth Development Checklist and Unified Development Bylaw are two policy recommendations that were identified in the GHG Amendment. These are described in further detail in the following Section.

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[2] The Bill 27 – 2008: Local Government (Green Communities) Statutes Amendment Act can be read in full at: http://www.leg.bc.ca/38th4th/1st_read/gov27-1.htm

3.3. Community Master Planning

There are a number of important master planning processes happening concurrently to the CEEP. These planning documents will be important in the implementation of the CEEP, as the policies developed in the following Master Plans will influence several of the recommendations in this document. Most significant will be the opportunity to use these Master Plans in land use decision making. More information about these plans can be found on the City of Revelstoke website.

The three main master planning initiatives are:

1. **Unified Development Bylaw**[3] – An alternative to the regulatory based-approach to development. Supports and facilitates smart growth by integrating zoning across neighborhood, block and building scales, with also considering transportation, land use and other smart growth principles.

2. **Transportation Master Plan** – Identifying and planning for transportation needs and priorities in Revelstoke over a 25-year planning period. Looking at opportunities for transit, walking, biking and traffic management.

3. **Parks, Recreation and Culture Master Plan** – Focusing on the development, expansion and connectivity of parks and trails in Revelstoke and CSRD Area B. Long-term vision for parks and setting of priorities and timelines for implementing changes and improvements.

All of these planning initiatives are expected to be finalized by early to mid-2011. Where possible, the CEEP has identified the opportunities for linkages between these planning documents and the recommendations for energy and emission reduction.

One smart growth tool has been developed and adopted by the City, and provides opportunity for increased awareness of sustainable development practices. The **Smart Growth Development Checklist**[4] is used as a tool to evaluate development proposals based on a variety of sustainability criteria. The Checklist covers land use, waste, transportation, development plans, as well as social and economic considerations.

Section 4, the Opportunity Assessment, identifies where these tools and Master Plans can be used to encourage energy conservation and emission reduction.

4. Opportunity Assessment

The baseline energy and emissions profile helps to set the stage for identifying opportunities that are relevant and feasible for Revelstoke. Acknowledging the existing policies and targets is

[3] Revelstoke has a separate Unified Development Bylaw website that is active throughout the development of the UDB. The link is: http://revelstokeudb.com/

[4] The Smart Growth Development Checklist can be found under the Planning section of the City of Revelstoke website, at: http://www.cityofrevelstoke.com/

also important, as it helps to identify gaps and opportunities for the City of Revelstoke to facilitate energy and emission reduction through policy. There are several key components of the opportunity assessment. These include:

- Physical site visit – identify potential alternative energy opportunities; understand the types of buildings (residential and commercial) that exist; assess the applicability of alternative transportation modes
- Community consultation – survey to determine what types of support would be most useful and applicable for the residents in the community to reduce energy and emissions
- Stakeholder engagement – identify the issues and opportunities from the perspective of key individuals from the building, industry, non-profit and business sectors
- Technical assessment – drawing on previous case studies, proven technologies, technical knowledge and new policy opportunities

The following sections identify the opportunities for each of the sectors included in the inventory. In addition, opportunities are also identified for land use, as future decisions in land use planning can have a significant impact on creating opportunities for energy and emission reduction.

4.1. Land-use and Development

Land use policies have an enormous impact on energy consumption and emissions. Studies have indicated that emissions can vary by as much as 100% between neighbourhoods within the same city. There are a number of land use policies that can be used to encourage energy efficiency and greenhouse gas emission reduction. When the Local Government Act was amended in 2008 to require GHG emission reduction targets in all OCPs, amendments were also made to several other sections of the Act that help to facilitate energy and emission reduction.

In Revelstoke's OCP, the following goal is stated: "*Promote a well designed compact community by following smart growth principles.*" There are several policies that have been identified in the OCP to support this goal. These include:

- Establish the City's Urban Growth Area in accordance with the delineation indicated in Schedule E to prevent urban sprawl and promote a compact community;
- Strengthen and direct development towards existing neighbourhoods by permitting intensified land uses and infill development within the Urban Growth Area supported by existing water and sanitary sewer services;
- Encourage less intensive land uses which do not require community sewer services outside the Urban Growth Area;
- Work co-operatively with the Columbia-Shuswap Regional District, Parks Canada, BC Hydro, RMR and provincial agencies to complete regional plan for fringe area development in the vicinity of the City of Revelstoke boundary which addresses City service extensions, failing water and septic systems, traffic, environmental values, housing and land use;

- Do not extend community water and/or sanitary sewer services outside the Urban Growth Area unless consistent with an adopted urban growth strategy, or for public safety reasons, as determined by City Council.

In addition to the goal and policies identified in the OCP, the City of Revelstoke has also developed a Smart Growth Development Checklist. This integrates some land use criteria into a comprehensive development checklist, serving as an educational tool for both staff and developers.

The following sections identify the opportunities for land use policy development that encourage energy efficiency and emissions reduction.

4.1.1. Urban Growth Area

The City of Revelstoke has identified an urban growth boundary. Additional policies can be added to *require* all future development to take place within the established growth boundary. Doing so sets a standard for core infill and efficient use of available space or brownspace conversion.

Establishing guidelines for development and land use along the growth area boundary can be achieved in such a way that enhances and supports other existing policies and plans. For example, requiring a minimum buffer between developments and the urban growth area boundary could deter expansion of neighbourhoods beyond that boundary, and satisfy recommendations from the Wildfire Protection Plan regarding wildfire interface areas.

4.1.2. Mixed-Use Development

A Unified Development Bylaw is currently in development at the City of Revelstoke. This bylaw will be very effective in facilitating growth that is diverse, compact, and designed to encourage alternative transportation. Currently the OCP does encourage mixed used development. Further policies to encourage densification may indicate specific downtown core development to encourage mixed use, specifically 2nd/3rd floor residential units on commercial buildings where applicable.

4.1.3. Intensification

Creating compact communities prevents sprawl and encroachment on undeveloped lands. Intensification of development focused on existing residential areas can enhance the vitality of a neighborhood, and potentially create better economies of scale for programs such as curbside recycling and transportation networks. Specific development bylaws can support intensification. Minimum widths for subdivided residential properties can be reviewed, and with appropriate community consultation, amended to allow for the development of more compact neighbourhoods. Allowing secondary suites and carriage cottages in residential areas are aspects of compact neighbourhoods.

4.1.4. Centralization / Clustering

Particularly important for district energy (DE) expansion opportunities, future development land use planning should consider the opportunity to cluster developments. As identified in the

District Energy Expansion Pre-Feasibility Report, an efficient district energy system requires clustered 'nodes' of density.

4.2. On-Road Transportation

In Revelstoke, the transportation sector accounts for over 60% of the community's baseline emissions profile. Like many small communities in the Columbia Valley, residents are reliant on their vehicles for travel within and outside the community, as transportation services within and between small communities are limited.

Revelstoke does have a public transportation system, which is under review, and is currently engaged in a Transportation Master Plan. Public input has been gathered for transportation issues through the Transportation Master Plan process, as well as the Community Energy and Emissions Plan. Through these processes, there were several themes that reoccurred as opportunities to improve transportation options to reduce vehicle use and the associated emissions. These themes include:

- Enforce the Anti-Idling Bylaw
- Expand and maintain bike trails and lanes (including in the winter)
- Expand and maintain sidewalks
- Centralize schools/businesses to reduce transportation needs
- Expand transit system

The OCP explicitly states transportation as a key goal:
A community transportation network that guides development and provides for safe, efficient travel, with increasing reliance on transit, cycling and walking.

Supporting this goal is a number of key policies. These are an excellent basis from which further policies can be identified, given the results of the energy and emissions inventory, as well as the CEEP opportunities assessment. The policies are summarized below:

- Actively promote the use of modes of transportation other than private automobiles, particularly including transit, biking/walking routes and 'complete streets';
- Define a bike route plan;
- Encourage hotel shuttle service to community amenities;
- Support 'Car Share' and 'Ride Share' programs;
- Encourage public investment in bicycle infrastructure such as covered bike racks, bike lockers, bike crossings, and shower facilities;
- Encourage passenger rail services to Revelstoke.

There are several opportunities for reducing emissions associated with transportation for both personal and commercial vehicles. The following sections identify the opportunities and challenges with on-road vehicle emission reductions.

4.2.1. Reducing Vehicle Fuel Consumption and Emissions

Reducing vehicle fuel consumption and emissions includes not only efficiency improvements, but also choosing the right vehicles and ensuring vehicles are operated to maximize efficiency. Driver behaviour contributes significantly to the efficiency of vehicles and simple adjustments to vehicle operations can reduce fuel consumption, reduce emissions and save money.

Vehicle Efficiency Improvements

Vehicle efficiency is expected to improve significantly over the next few years due to recent US legislation. While hybrid vehicles will play a key role in these improvements, increased engine efficiency and aerodynamic improvements will also be important. Residents can be encouraged to take advantage of these higher efficiency vehicles, in conjunction with right sizing and alternative fuels (see below).

Vehicle Maintenance

Maintaining personal vehicles can contribute significantly to fuel efficiency. Simple actions such as regular tire pressure checks, air filter changes and perform regular oil changes. Some municipalities, such as the City of Burnaby provide useful information and tips through brochures and websites.[5]

Co-operation from and participation of local vehicle maintenance shops in annual vehicle tune-up programs, and community 'tune-up' workshops may help encourage individuals to ensure regular maintenance of their vehicles.

Vehicle Selection / Right Sizing

Past improvements to vehicle efficiency have been offset by increased size of vehicles. Trucks and SUVs use almost twice as much fuel as small cars so there is significant opportunity to reduce emissions by shifting to different vehicle types. As well as smaller cars and trucks, motorbikes and scooters (which have much lower fuel use) can also play a role.

In Revelstoke over 60% of personal vehicles are classified as Trucks, Vans, & SUVs. Due to the climate and the recreational activities enjoyed by residents, there is a tendency for there to be more trucks on the road than in an urban environment.

Car Shares are an excellent way for individuals to have access to a vehicle when needed, while choosing alternative transportation or a more efficient vehicle as their primary mode of transportation. Revelstoke has started a Car Share co-op, and currently offers 3 vehicles to members. The City could help support car sharing by allowing City vehicles to be included in the pool when not in use.

Alternative Fuels

Pure electric vehicles and combined gas/electric plug-in hybrids are expected to be introduced by a number of manufacturers in the next few years. The desire to see infrastructure for electric

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[5] The City of Burnaby link is:
http://www.burnaby.ca/cityhall/departments/engnrn/drivesmart.html
The NRCan Office of Energy Efficiency also provides a variety of information for personal and commercial vehicle maintenance and efficient operation.
http://oee.nrcan.gc.ca/transportation/personal/vehicle_maintenance.cfm

vehicles has been identified by the community, but the cost of electric vehicles will likely slow the uptake of the technology. The Province continues to explore opportunities to expand electric vehicle technologies with a 'Plug-In Vehicle Project', which is currently exploring opportunities for policy implementation. Electric cars are likely to play a major role in emissions reductions over the next 20 years.

Biodiesel tends to be the most common alternative to standard gas and diesel-fueled vehicles. Currently, Revelstoke does not have a commercial distributor of biodiesel, however the suggestion did get raised through the CEEP surveys conducted in October 2010 and a new business has just started to provide this service. The Province of British Columbia developed the *Renewable and Low Carbon Fuel Requirements Regulation* in 2008, requiring 5% renewable content in gasoline, and 3% renewable content in diesel by 2010, increasing a percentage each year. The City of Revelstoke is in the process of converting their diesel vehicles and machines to a biodiesel blend.

Idle Free

Idling is thought to be responsible for 5-7% of vehicle emissions. Revelstoke currently has an Anti-Idling Bylaw, and signs posted throughout the community. However, as was suggested multiple times throughout the CEEP community outreach and surveys, enforcement of the Anti-Idling Bylaw would increase compliance. Reducing vehicle idling does require individual behavioural change, but there are resources readily available[6] that could be distributed throughout the community to inform residents of the costs of idling.

Commercial Vehicle/Fleet Efficiency

Natural Resources Canada Office of Energy Efficiency has a program call FleetSmart[7], which provides commercial vehicle fleets with resources and tools to improve fuel efficiency and reduce emissions. Training is available for managers and operators of vehicles in the commercial sector, including city-wide transit operations. 'SmartDriver for Transit' is a specific program offered for transit operators, focusing on methods of reducing fuel consumption.

4.2.2. Transportation Demand Management

Transportation demand management (TDM) covers a variety of strategies that are intended to reduce the demand for vehicle use, and identify opportunities for alternative modes of transportation. According to preliminary findings of the Transportation Master Plan study, there are currently about 3040 vehicle trips per hour within the community. It would be feasible to significantly reduce these vehicle trips by facilitating opportunities for alternative transportation.

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[6] There are several sources for information about Idle Free Campaigns. These include:
- Idle Free BC: http://www.idlefreebc.ca/
- Natural Resources Canada: http://oee.nrcan.gc.ca/communities-government/idling.cfm
- The Greater Toronto Area Clean Air Partnership has an excellent website with a wide variety of Idle Free resources, including some for schools: http://www.cleanairpartnership.org/idle_free_for_schools

[7] FleetSmart resources and tools can be found at: http://fleetsmart.nrcan.gc.ca/

Expansion of Transit Services

In order to be a significant contributor to energy use and GHG reductions, transit service needs to be frequent and convenient. This is especially so for small communities. There are currently two routes that run Monday-Saturday during the daytime, with poor frequency and no night service. Two runs are provided for Kamloops and Kelowna Heath Connections and a free shuttle service is provided from various downtown locations to Revelstoke Mountain Resort in winter.

BC Transit is currently working with the City's Transit Committee to explore opportunities to expand and design transit services to better meet the needs. In addition, the Transportation Master Plan is looking at a wide variety of strategies to expand the public transit system within Revelstoke. Results of surveys completed in the Transportation Master Plan study and the CEEP suggest that residents would like to see an expansion of transit options within the community. Suggestions included the expansion to 3 community transit routes, and expanded shuttle service into the summer and additional winter trips. There is opportunity to encourage multi-modal trips, by ensure buses are equipped with bicycle racks, and stops or main transit hubs are linked to trail networks.

As resort development increases over time, providing adequate service between downtown and the resort will become increasingly important. Other resorts have had success with free transit for visitors, encouraging them to leave their cars at their hotel when going out. With tougher driver alcohol-level laws, transit service will become more important in order to bring visitors and locals to establishments in town.

Another opportunity may be transit routes for designed for high school students in areas that are not currently served by school bus routes.

Improvement of bicycle/walking routes and facilities

Revelstoke is relatively flat and compact, excellent for cycling and walking. Expansion and maintenance of trails was the most common recommendation from the CEEP and Transportation Master Plan surveys. Improving bikes lanes and trails can lead to increased use of alternative transportation. For many, sharing the road with cars and trucks is a deterrent to bike use. Clearly marked lanes and trails provide a safer experience for bikers. Providing bike facilities, such as covered bike parking locations, encourages the use of bikes for commuting.

Respondents to the CEEP survey indicated the desire to see winter maintenance of trails, including clearing of snow to allow for continued bike commuting into the downtown core. Change room facilities can help employees feel better about commuting to work, however the size of Revelstoke may not warrant the need for change rooms, particularly given the proximity of the Community Centre and change room facilities to downtown. Creating secure bike storage at the Community Centre may increase biking to work.

Passenger Rail Service

Re-establishing passenger rail service to Revelstoke has been a community priority for some time. This will require extensive consultation and coordination with rail companies and different levels of government. Presumably some sort of subsidy would be required, as rail companies have not seen sufficient profit potential to establish the service themselves. Although there may

be other benefits to re-establishing rail service, the impact on energy consumption and GHG emissions is likely to be small.

4.2.3. Policy tools for local government

There are several policy tools that can be used to facilitate alternative transportation and reduced vehicle use. The following policy tools are opportunities for Revelstoke. The Recommendations section details the policies found to be most relevant for Revelstoke, given the existing and planned infrastructure, and the opinions gathered through the public engagement sessions and the CEEP Survey.

In the new Smart Growth Development Checklist, the City of Revelstoke requires developers to indicate the walking distance from a planned development to bus stops, trails, greenways and cycling routes. This serves is an excellent method of education for developers, and is perhaps the precursor to a policy requiring a minimum distance to these alternative transportation modes. This is covered further in the Land Use section.

Biking/Walking Infrastructure

Require multi-family and commercial developments to provide bike facilities (such as inside/covered bike storage facilities. Road design standards should be required to provide clearly marked bike lane and signage. (Note: alternative transportation infrastructure is noted as criteria in the Smart Growth Development Checklist, but is currently not a requirement supported by policy)

Off-Street Parking Reserve Fund

In the Local Government Act (Section 906), "owners or occupiers of land or buildings who are required under a bylaw to provide a certain number of off-street parking spaces or loading spaces [are allowed] to instead pay that money into an off-street parking reserve fund."[8] Amendments to that Section now allow municipalities to dedicate reserves from that fund to encourage or facilitate active/alternative transportation infrastructure. This policy was a recommendation that was identified in the Revelstoke Active Transportation Plan in January 2010.

Parking Strategies

Discourage single-occupancy vehicle use with prioritized parking policy for carpool cars and high-occupancy vehicles. An opportunity may include providing priority spaces for short term parking, encouraging the use of alternative commuting modes of transportation for employees.

Alternative transportation can be encouraged through changes in the parking strategy of a community's downtown core. Implementing paid parking, or even reducing the number of available parking spots may discourage individuals to bring their car into the downtown core. Given reliable alternatives (i.e. transit or bike routes), there may be reduced car travel. There are currently several scenarios under investigation through the Transportation Master Plan.

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[8] West Coast Environmental Law. Bill 27: Opportunities and Strategies for Green Action by BC Local Governments.

Drive-Through Ban

Drive-through bans can be implemented for future development of businesses through zoning bylaws. This helps to reduce unnecessary idling, which is known to be an issue at drive-through businesses.

Multi-Modal Transportation Connectivity

Currently a policy in the OCP stating: "Actively promote the use of modes of transportation other than private automobiles, particularly including transit, biking/walking routes and 'complete streets.'" Require transit and/or access to biking and walking paths within a minimum distance from major facilities or high-traffic areas. Ensure integration of trail planning networks with future and current transit routes (i.e. integration of Parks Master Plan and Transportation Master Plan).

4.3. New and Existing Buildings

Buildings account for a significant component of Revelstoke's energy consumption and emissions. The residential and commercial building sector accounts for approximately 51% of the total energy consumption, and 25% of total emissions in the baseline inventory. Currently, the OCP does not have explicit goals around existing residential home or commercial building energy efficiency.

In the GHG Amendment of the Official Community Plan, a sustainability policy recommends the development of an incentive-based checklist to be used as criteria for all land use actions, including building developments. The policy recommends a checklist be developed that *"promotes staff education, enhances public awareness through 'green' streamlining option in the development and building permit processes; and allocates rewards for low impact development."*

A sustainability checklist has been approved, and is entitled 'Smart Growth Development Checklist.' Within this document, there are criteria that encourage low impact development. For new developments the following components are assessed in the Checklist:

- Energy efficiency of proposed structures (e.g., building location responding to daily sun/shade patterns, high performance envelopes, passive solar gain, solar shading, natural ventilation, ground heating/cooling, high efficiency fixtures, consideration of heat island effect);
- Enhanced durability of construction materials;
- Design attempts to maximize exposure to natural light.

Buildings also have significant opportunities for energy reductions, and is one of the sectors local governments have the most influence over. Effective policy development can ensure that future buildings are designed and built efficiently. The following sections identify opportunities for new and existing buildings, in both the commercial and residential sector.

4.3.1. Existing Residential Building Retrofits

Existing homes in British Columbia are usually somewhat inefficient, with minimum insulation, high air leakage, and older furnaces. Homes can be rated in terms of energy consumption with the EnerGuide (EG) for Homes rating system, developed by NRCan. The average EG rating for existing homes in BC is about EG63 while the current building code achieves about EG77, roughly a 38% reduction in energy consumption.

Major areas of potential improvement in existing homes are:

- Increased levels of insulation.
- High efficiency low-e windows.
- Weatherstripping, caulking and sealing to reduce air leakage.
- High efficiency furnaces, heat pumps, or wood stoves.
- Programmable thermostats.
- Energy efficient lighting and appliances.
- Low-flow water fixtures and DHW tank blankets.

These measures can range from low cost/short payback (efficient lighting) to high cost/long payback (new windows). Paying the upfront cost of energy retrofits is a major barrier to residential energy efficiency. Household energy consumption is also very dependent on occupant behaviour (i.e. adjusting thermostat and turning off lights/appliances), which can have a significant impact on energy savings.

4.3.2. Existing Commercial Building Retrofits

Many commercial buildings in BC have undertaken energy efficiency retrofits, largely due to the influence of BC Hydro Power Smart programs. However, most still have significant opportunities for improvement, including lighting upgrades, boiler replacement, variable speed drives, and computer building controls. Smaller commercial buildings may sometimes be more similar to residential buildings, with the energy savings opportunities listed above.

Commercial building owners are more likely to invest in energy efficiency upgrades than residential homeowners, but upfront capital cost is still a stumbling block. Perhaps more significant is commercial lease structures, where tenants pay the energy bills, reducing the incentive for the building owner to improve efficiency.

4.3.3. New Residential Building Efficiency

While the current building code requires improved levels of efficiency, it is still significantly lower than what is achievable, or even what the provincial government's energy policy[9] calls for (EG80). There are industry programs[10] designed to increase levels of efficiency in new homes (Built Green, LEED for Homes) but take-up has been slow. With most new homes built by developers focused on the bottom line, there is little incentive for higher efficiency levels other than buyer preferences, which still tend to focus on other aspects of the home.

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[9] BC green building and energy policy: http://www.housing.gov.bc.ca/building/green/

[10] Some industry programs that have been developed to encourage efficient buildings are:

- Built Green (BC link): http://www.chbaci.ca/builtgreenbc.htm
- LEED (Canadian link): http://www.cagbc.org/leed/what/index.php

While many of the aspects of energy efficiency are similar to existing homes (insulation levels, furnace efficiency, etc.), energy consumption of new homes can also be influenced by site selection, orientation, and design for passive solar gain. This is an area that local governments can influence.

One aspect of energy consumption in homes that is often overlooked is the impact of building size. Smaller homes use less energy than larger homes, and multi-family homes (with shared walls) use less than single family homes. Local governments have direct control over this through zoning.

4.3.4. New Commercial Building Efficiency

Since 2008, new commercial buildings have had to comply with a provincial energy code. This should improve efficiency levels for what would have been the worst performing buildings, Many commercial buildings are now pushing for higher levels of performance through programs such as LEED. The latest energy efficiency standard, 90.1-2010, is slated to be 30% more efficient than 90.1-2004 which is the basis of the building code. With no indication from the Province that the code requirements will be increased, there is plenty of opportunity for local governments to take the lead in improving commercial building efficiency.

4.3.5. Local Government Policies and Actions

There are quite a number of different policies and actions that the City can take to influence energy efficiency within buildings. These can be incentive based policies that encourage people to take action or mandatory requirements. Many of these policies can also be applied to building level renewable energy systems.

Direct incentives/rebates.

Direct incentives are not usually favoured by local governments as this level of government lacks the resources to have a significant impact. But direct incentives can be used for targeted actions, where the goal is to raise awareness or create further opportunities. Reduced permit fees are a form of direct incentive that has been used by the District of Saanich, targeting those in the process of undertaking construction work to incorporate energy efficiency and greenhouse gas emission reduction. Direct incentives cannot be provided to businesses under the Local Government Act.

Reduced development cost charges.

This is a special type of direct incentive that can be offered through legislation enacted in 2008[11]. The incentive is larger than would likely be offered through other incentive programs. If current DCCs are lower than actual servicing costs, they can be increased to offset lost revenue from the incentive. Otherwise the cost of this incentive must be borne by the City.

Priority permit processing.

Time is often more valuable than money, and having a permit approved more quickly can be a strong incentive for developers/builders. A number of BC municipalities have implemented this. One drawback is that it implies that normal permit processing is not as quick as it might be.

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[11] Local Governments (Green Amendment) Act http://www.leg.bc.ca/38th4th/3rd_read/gov27-3.htm

Tax exemptions.
Local governments can provide tax breaks to businesses for the inclusion of energy efficiency features in new buildings. There is an argument to be made that there is little impact on municipal resources as new buildings do not require as many municipal services (infrastructure is new) and the tax revenues are incremental to the existing tax base.

Density bonuses.
A bonus of allowable floorspace/units can be made to a developer/builder for including energy efficiency features in a building. The additional density should be considered carefully in terms of its impact on the community and how it fits with the OCP. It may be preferable to reduce allowable density first and then offer the density bonus.

Local improvement charges (LIC).
An LIC is a way in which the cost of energy efficiency upgrades could be paid for by the City and the cost repaid by homeowners over time. It is not clear whether local governments have the legislative authority to do this, but the Province has shown a willingness to allow it on a pilot basis. A drawback of this approach is that the City would be responsible for the upgrade and its maintenance.

Development permit area (DPA) guidelines.
DPA guidelines can be used to prescribe certain aspects of building design, including orientation, shading, and location of windows. Combined with subdivision requirements they can result in improved passive solar design of homes. DPA guidelines are restricted to shape and form and cannot prescribe efficiency measures within the home.

Rezoning policy.
A rezoning policy lays out expectations of a municipal council when reviewing a rezoning application. It cannot explicitly state requirements for rezoning approval, but can be a guide to what is likely to be approved. With appropriate wording and strong council support it can effectively become a mandatory requirement. To be less prescriptive, a list of desired environmental features with a scoring mechanism can be incorporated into the policy. This could be done in conjunction with the City's Smart Growth checklist. A rezoning policy could also be used to encourage connection to the City's district heating system.

District energy service bylaw.
The City has the ability to require connection to the district energy system through a municipal bylaw. This would improve the certainty and viability of any system expansion, and has been done elsewhere in BC[12]. A service bylaw for district heat would probably only apply to new buildings (although legally it could be applied to existing buildings as well) and only for larger buildings (for reasons of cost effectiveness).

[12] Example: The City of North Vancouver established a Hydronic Heat Energy Service Bylaw to create a district heating service area for Lower Lonsdale, with a requirement that all new or retrofitted buildings over a certain size be connected to and use the system. Bylaw can be retrieved at: www.cnv.org/c//DATA/2/98/BYLAW%207575.PDF

4.4. Renewable Energy

In the Official Community Plan, the following goal was developed to guide the expansion of local energy opportunities and achieve "*Energy self-sufficiency through energy conservation and renewable, secure and sustained energy options.*"

Renewable Energy
Energy captured from natural resources that is naturally replenished or renewed within a human lifespan. Solar, wind and hydro are renewable; biomass is renewable if consumption does not exceed regeneration.

The City of Revelstoke has been recognized as a leader in the field of district energy with the development of the Revelstoke Community Energy Corporation, which is responsible for the implementation of the current system fuelled by waste wood from the Downie Timber Ltd. sawmill. There is still an interest, however, in the development of this and other renewable energy resources to improve energy security and further reduce greenhouse gas emissions.

The cost of renewable energy technologies has been dropping, making these systems more attractive, but they still tend to be considerably more expensive than conventional energy sources. The Official Community Plan identified a number of key policies that support the goal of exploring alternative energy solutions. These policies are summarized below:

- Work with energy utilities to explore, develop and implement approaches to achieve energy self-sufficiency including energy conservation practices;
- Support the development of low impact alternative and renewable energy sources, such as wind power, hydro, solar, biomass or geothermal projects having:
    - minimal impacts on natural ecosystems;
    - minimal impacts on community water supplies;
    - minimal impacts on recreational amenities;
    - limited visual impacts from infrastructure and transmission lines; and
    - meaningful community consultation.

In BC, low energy prices (particularly in northern BC where natural gas prices are lower), large transportation distances, and cold climates can make renewable energy a challenge. However, there are some promising opportunities for renewable energy in the Revelstoke area.

Solar Thermal

Solar thermal is the use of solar energy to heat water that is used for hot water and space heating. While this is the most cost effective use of solar energy, it is still a fairly long payback in most cases. The best applications for solar thermal are those that have a consistent year round heating requirement and relatively low temperature requirements. The best application is usually for heating swimming pools, while buildings with large water heating loads (e.g. hotels or hospitals) are also potential candidates. In residential applications it is usually used for water heating. Although solar can be used for space heating, it is not an ideal application as the highest loads occur in the winter, when there is the least solar energy available.

Revelstoke has a moderate-medium solar resource[13], similar to much of the province. Areas of the City that are further away from the mountains and facing south have the best potential. The high cost of propane in Revelstoke (relative to natural gas elsewhere) does increase the viability of solar thermal. However, fog and low hanging cloud in the valley will reduce viability.

While most solar energy systems use hot water panels mounted on the roof of a building, passive solar is another means of using the sun's energy. Orienting houses or buildings to the south, minimizing windows on the east, west, and north sides, and incorporating appropriate shading can all significantly reduce heating requirements. Passive solar is something that local governments have control over through the use of development permit guidelines.

Solar Photovoltaics

Solar photovoltaics (PV) is the generation of electricity from solar panels. While the price of PV has come down recently, it is still a very expensive technology. PV will generally not be cost effective versus electricity from BC Hydro. It may be cost effective for applications that require significant lengths of distribution wiring (e.g. streetlights, remote signage) or for homes that are off the BC Hydro grid (not generally applicable in Revelstoke).

Wind

Wind power is generally most viable on a large scale. Although small wind turbines are available for use on buildings, they are much more expensive per kW than large wind turbines. Their relatively low mounting height and obstructions from surrounding buildings also reduce the effectiveness of small turbines. Therefore wind power opportunities are likely to be limited to large turbines feeding power into the grid. These projects are usually developed by specialty wind power companies with the technical expertise and financial backing to undertake large projects.

Based on BC Hydro's wind resource maps[14], the City of Revelstoke does not have particularly good wind potential. Where there are good wind resources is high up on mountain ridges, where access to transmission is difficult and costs high. The most likely location for a viable wind turbine would be at the top of Mt Mackenzie, where there is already access and power lines in place. This could potentially be developed by the ski resort or by a private developer. It would need further study to determine viability. Another suggestion is that the Mica dam might be a good location for wind turbines, as the necessary infrastructure is in place and winds are funneled down Revelstoke Lake. There would likely be room for one or two large turbines on the dam. This project would need to be undertaken by or in conjunction with BC Hydro.

Biomass and District Energy

Revelstoke already has a biomass based district heating system operating in the city core – the first in BC. It uses wood waste from the Downie Timber Ltd. sawmill and serves ten buildings, plus the Downie kilns. This system reduces GHGs in Revelstoke by 4 – 5% and has considerable potential for further reductions through expansion of the system. Viability of expansion has

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[13] BC Hydro has developed solar energy maps in partnership with Canadian Cartographics Ltd.
[14] BC Hydro provides information about wind energy, and a link to their wind resource map at: http://www.bchydro.com/planning_regulatory/energy_technologies/wind_energy/wind_mapping.html

been assessed through a pre-feasibility study, and shows that, based on current projected resident and tourism-related population growth, there is good viability for expansion in all three neighbourhoods that were examined - Central/South, Highway Corridor, and Resort. For district energy expansion to be successful, it is important that policies are in place to provide sufficient density, centralize development within DE service areas, and require or strongly encourage connection to the system (see Section 4.1 for description of policies).

Usually, connection to DE is only viable for larger buildings because of piping and connection costs. However, there appears to be some interest from homeowners in connecting to the DE system. Alternatives to make this possible should be examined, and a pilot might be considered.

Biomass, in the form of firewood or wood pellets, is already a significant energy source for residential heating. The use of wood stoves presents an opportunity for single family homes to reduce GHGs by switching to wood. High efficiency certified wood stoves operate at a higher efficiency and dramatically reduce particulate emissions than non-certified stoves. Revelstoke has been involved in a wood stove exchange program over the past few years, which encourages homeowners to switch to certified stoves.

Micro-hydro

Micro-hydro is the most common form of renewable power generation in BC, with dozens of small run-of-river power projects operational and many more planned. Two plants exist near Revelstoke. The best sites for micro-hydro tend to have high precipitation rates and large elevation changes, as in the Revelstoke area. There are a number of sites near Revelstoke that have been identified as promising for micro-hydro, including some which are operational and sell power to BC Hydro and at least one system providing private power. However, none of these rivers and creeks are within the City boundaries. Most viable micro-hydro sites already have water rights secured by Independent Power Producers, and municipal involvement is likely limited to a minor role. As well, some residents have expressed concerns about the environmental impacts of this potential renewable power source.

There was originally a city-owned dam on the Illecillewaet River within the City boundaries which has been dismantled. Although this might potentially be a viable micro-hydro project, the elevation drop is minimal which would mean a large volume of flow would be required and the dam would need to be rebuilt. This is very unlikely to be allowed, or tolerated by the public.

Other suggestions by residents for hydropower included the use of the old - bridge crossing on the Columbia as a location to install turbines that would generate power from the river current, and a plan to reclaim land with a dike system on the Columbia with power generation downstream. Both these projects would likely have long paybacks and would need much more investigation as to their impacts.

Although municipal water supplies have been used elsewhere for power generation, the flows and elevation drop in Revelstoke are much smaller and would not be viable for electricity generation.

Geo-exchange

Geo-exchange is extraction of low temperature heat within the ground through the use of heat pumps. The use of this technology has been growing rapidly in BC. Most geo-exchange systems have been installed in individual homes or buildings, including in Revelstoke, but larger systems serving multiple buildings are now being developed. Commercial/institutional buildings are generally more cost effective than homes due to larger size, but economics will vary from project to project.

Almost any ground can be used for geo-exchange, but the type of soil will impact the cost and effectiveness of the ground field. In Revelstoke, areas near the Columbia River are likely to be good sites for geo-exchange, due to soils deposited by the river and saturation of soils. Higher elevations are likely to be rocky and more difficult to work with.

Groundwater can also be used as a heat source in an open-loop system. This can be lower cost than a closed loop system, but will depend on the availability of groundwater. There is an active well at the golf course, which indicates that groundwater may be readily available on a small scale. However, a test well near the Downie Timber Ltd. operations did not identify a suitable aquifer. Areas near the Columbia are more likely to have groundwater potential than higher elevations.

Wastewater Heat Recovery

Similar to geo-exchange, wastewater can be used as a heat source. A new outfall pipe is planned to redirect wastewater to the Columbia, which could potentially be routed near buildings that could use the heat. However, the outfall temperature is very low in winter, which will make recovery difficult. The timing of the new outfall construction is unknown, but this option could be further investigated when the project moves forward.

Although it is possible to collect heat from sewer pipes prior to treatment, it is technically more challenging and the flow volumes in Revelstoke would preclude this option.

Air-source Heat Pumps

Air-source heat pumps extract heat from ambient air and use it for space heating. They are usually used in houses or small commercial buildings, but larger systems are also available. The Revelstoke climate is quite favourable to the use of heat pumps and the lack of natural gas improves the viability.

4.5. Solid Waste

Waste decomposition in landfills creates greenhouse gases. Thus diverting waste streams from landfills is often considered a ‘low hanging fruit’ to reduce greenhouse gas emissions. However, the waste sector represents the smallest contributor (about 7.5% to the overall emissions profile for the community of Revelstoke), which will limit the overall impacts of waste reduction.

The City of Revelstoke is currently coordinating with the Columbia-Shuswap Regional District (CSRD) to provide a waste diversion strategy. Revelstoke does not have curbside recycling as of Fall 2010, however this is one potential strategy that is being considered by the City and CSRD.

The OCP identifies the following goal for waste reduction: *Reduce the need to landfill waste.* There are a number of policies that have been identified in the OCP. The following summarizes those policies:

- Continue to work towards becoming a Zero Waste community;
- Explore opportunities for a community composting program including a fee-structured green dump site for household organic waste;
- Establish a construction waste recycling program in conjunction with the Columbia Shuswap Regional District;
- Continue to work with the Regional District on a feasibility study for a joint compost/septage facility.

The Smart Growth Development Checklist also addresses solid waste by including a question regarding waste management for new developments: "Does the project provide enhanced waste diversion facilities (e.g., on-site recycling, on-site composting, bear proof containers)?" Although this is not a policy, it does provide some awareness to the idea of integrating waste management into development plans.

The following section identifies a number of opportunities for waste reduction in Revelstoke.

4.5.1. Solid Waste Diversion

Recycling

Currently recycling is available at central drop-off points. Curbside recycling results in higher waste diversion rates. The City of Revelstoke and the CSRD are currently investigating options for curbside recycling, and it is expected that the CSRD will begin providing curbside pick up for single family homes in 2011.

The CSRD recently released a Construction and Demolition Toolkit[15] which provides details to a new fee-structure to encourage the separation and recycling of construction and demolition materials. Materials are to be separated for recycling and processing by the following types: asphalt shingles, concrete/asphalt pavement/bricks, refuse, gypsum/drywall, metal, wood waste and yard and garden.

Providing waste diversion solutions that are simple and convenient can help ensure participation in the program.

[15] The Construction and Demolition Toolkit can be found at the following link: http://www.csrd.bc.ca/siteengine/activepage.asp?PageID=71

Organic Waste Diversion (Composting)

It is estimated that after product packaging, organic kitchen waste makes up the largest component of household waste.[16] The Recycling Council of British Columbia suggests that a community wanting to achieve Zero Waste must consider organic waste diversion a priority. There are several potential opportunities for organic waste diversion:

- Backyard Composting Program
  - Municipalities can provide backyard composters for a reduced cost
  - Education must be a significant component of a backyard composting program, particularly in communities such as Revelstoke, where wildlife attractants are an issue
  - Uptake of backyard composters is not likely to be as widespread as a curbside program

- Central Composting Facility
  - Provision of a centralized facility for household organic waste processing
  - Requires residents to collect and deliver organics
  - Participation depends on willingness of residents to collect and transport their organics to the centralized facility

- Curbside Organic Waste Collection
  - Most convenient approach for residents, therefore the most likely have to have successful participation rate
  - Much more likely to be used by businesses
  - Effective systems are very costly to implement
  - End-product completely useable for landscaping, gardens, municipal use, etc.

4.5.2. Landfill Gas Collection

The Revelstoke landfill is owned and operated by the CSRD. Because of its size, there is no requirement to collect and flare landfill gas, which would reduce emissions significantly. If landfill gas is collected, it can also potentially be used for heating or power generation.

The CSRD is currently looking at collecting and flaring landfill gas from the Salmon Arm landfill (which also is not required to do so) in order to generate carbon offsets.

Although on a smaller scale, a similar collection and flaring system could be put in place in Revelstoke. The sale of offsets could pay for some or potentially all of the cost. The first phase of the landfill will be capped in 2015, allowing time for further investigation of this option.

Carbon Offsets

A carbon offset is an action that reduces greenhouse gas emissions that is used to counterbalance (or offset) a source of emissions. For example, one may wish to purchase an offset to balance the emissions from an airplane trip. Or, a municipality may purchase offsets to counter emissions they cannot reduce.

[16] Recycling Council of British Columbia.

4.5.3. Policies for solid waste reduction

Landfill Restrictions

Policies can be used to encourage the diversion of waste from the landfill by banning certain products from landfill disposal. The Regional District of Kootenay Boundary has implemented a ban against landfilling all items that can be recycled. This also includes yard and garden waste. This would be a critical policy to implement in order to achieve Zero Waste. Appropriate education and awareness initiatives must be implemented to identify the alternative disposal options for products banned from the landfill.

CSRD Bylaw 5542, regulates the use of refuse disposal facilities in the region. This bylaw prohibits the burial of: construction and demolition waste identified as recyclable or reusable; recyclable wastes such as cardboard, batteries, metal, food cans, glass jars; waste containers (unless crushed). These regulations are visible at the landfill. Further education for households and businesses would help reduce landfilling recyclable materials.

Plastic Bag Ban

A number of communities across Canada have banned the use of plastic bags by businesses. This can reduce the volume of plastic in the landfill. However, plastic bags do not release methane in the landfill, so there is no local GHG reduction associated with such a ban.

Pay-as-you-throw Waste Policy

There are several ways to implement a 'Pay-as-you-throw' waste policy. The basic garbage collection fee can be for a maximum number of bags or bins per household. For households exceeding that maximum, an additional charge can apply. The policy can be applied in a variety of ways.

It was clear through the CEEP Surveys that some residents would like to see a maximum bags/household policy enacted. Such a policy must be accompanied with clear options for waste diversion, as well as an 'Illegal Dumping' policy to deter dumping of waste outside sanctioned landfill areas.

4.6. Public education and outreach

Effective public education and outreach is essential to reaching energy and emission reduction targets. Many of the opportunities listed above require outreach support in order to be successful. Not only must the City of Revelstoke demonstrate leadership by addressing energy consumption and GHG emissions in their own operations, but resources and tools must be made available to support the community in the implementation of positive actions.

This section details some of the opportunities for public education and outreach in Revelstoke.

4.6.1. Residential Buildings

Localized Information Resources

The barrier for many residents in Revelstoke, as identified through the survey, is a lack of basic information about the simple, low cost changes an individual can make in their own home. Creating concise information brochures or lists of options, indicating relative impacts on energy and emissions reduction, with sources of materials and further information would fill this need.

There are several possible alternatives to meet this need:

- The City could take on this role, perhaps as a task for the new Environmental Sustainability Coordinator.

- RCEC could expand its role to include energy information and education. This would require funding from outside RCEC's current operations.

- The North Columbia Environmental Society (NCES) may be an effective organization to support community education. The NCES has just recently released their 'Sustainability Toolkit', which covers a wide variety of the issues identified in the CEEP. This toolkit is an excellent starting point for expanding the literature and resources available to residents of Revelstoke.

This information could be made available to the community at a number of key locations or hubs, and through workshops (see below) to ensure information is available to residents who are interested in learning of the actions they can take at home to reduce energy and emissions.

Home retrofit package

Providing a retrofit package available at cost or subsidized to residents will initiate action at the residential level, and provide an opportunity for increased awareness. Such a package would include energy efficient products and materials as well as practical information. The Town of Canmore did a similar initiative, and went door-to-door to every household in the community, offering compact fluorescent lights, low-flow showerheads and reusable bags.

Workshop Series

There are a wide number of topics that could be presented to a community that would help to educate on residential energy and emission reduction. A workshop series may draw on local experts, or bring in specialists from around the Province to talk about topics ranging from home heating retrofits, green building and design, landscaping for energy efficiency, etc. It would be important to ensure that there is support and follow-up from workshops to ensure residents are support in implementing the ideas developed at the events.

The real estate, development and builder sectors provide opportunities to inform and educate individuals on home energy efficiency. Involving realtors, developers and builders in workshops and educational sessions, or offering sessions specifically for these individuals, will improve the awareness of homebuyers and sellers as to benefits of an energy efficient home.

Information with Permit Applications

The City can provide information to builders at the time of building permit or development permit application, providing an opportunity to inform these key players at a critical time in the development and renovation processes.

Power Smart for Residential Homes
BC Hydro has a wide variety of resources available through the Power Smart Program[17] for residential homes. Promoted through a local organization in Revelstoke, or by the City, the Power Smart program can help homeowners actually track their electricity consumption. Signing onto Power Smart commits the homeowner to a 10% reduction in electricity, and provides access to a variety of rebate and incentives. See Appendix C for more information about programs from BC Hydro available for residential homes.

Retrofit incentives
As the local provider of propane, Terasen offers incentives for retrofitting existing homes. Federal and provincial governments also offer incentives. These incentives change over time. Current information about these incentives should be included in information materials, workshops and with permit applications.

4.6.2. Commercial Buildings

'Green' Business Award Program
Providing recognition for positive actions in a community can inspire action by other individuals or organizations. Whether coordinated by the City or the Chamber of Commerce, annual recognition of businesses that have taken leadership in reducing energy and emissions can be an opportunity for greater awareness in the community.

Power Smart for Commercial Buildings[18]
Similar to the Power Smart program for residential buildings, BC Hydro provides a program for commercial businesses that promotes energy efficiency through Energy Studies, Products and Incentives, and a wide variety of general resources.

Workshops and Speakers
The Chamber of Commerce tends to be an excellent venue for providing information to a large number of local businesses. Opportunities exist for the Chamber to partner with either the City or local organizations to organize and facilitate a series of events on topics such as minimizing electricity use and costs, reducing building heat loss or transportation cost cutting.

4.6.3. Transportation

Bike Maintenance and Commuter Skills Workshop
The Revelstoke Cycling Association may be an ideal organization to facilitate a series of workshops educating cyclists in Revelstoke about bike maintenance and safe biking techniques.

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[17] The BC Hydro Power Smart for Residential Homes program provides a wide variety of resources and incentives for energy efficiency. See:
http://www.bchydro.com/powersmart/residential.html
[18] BC Hydro has a Power Smart program specifically for businesses:
http://www.bchydro.com/powersmart/business.html

Providing hands-on learning opportunities for the public may encourage more use of biking for commuting and travel purposes.

Bike to Work Week

Initiated in Victoria, BC, this event has garnered participation from communities across the province. This year, Revelstoke hosted its first Bike to Work Week. The challenge is typically towards the commercial sector, however a 'Bike to School Week' has also been implemented to include youth in the event. The event encourages employees who may not typically bike to work to try it out for a week. It is an opportunity for inter-business competition, while creating awareness around the co-benefits of biking to local air quality and human health.

Idle Free Awareness Campaign

Although Revelstoke does have an Anti-Idling bylaw, awareness and education must accompany the bylaw to encourage residents to turn off their engine. Dispelling the myths around idling (i.e. length of time required to warm up a car, impacts on the starter, etc.) is an important component of an educational campaign. Whether it is increased signage and communication from the City, or engagement of a leadership group at a highschool to go 'on-the-ground' with education in the community, creating more awareness around the existing bylaw and the simplicity of the action may encourage more drivers to 'turn off their engine.' One challenge is the educating the tourism sector about this community value.

4.6.4. Waste

Recycling and Waste Guide

The North Columbia Environmental Society has developed a waste fact sheet, providing high-level information about waste and recycling in Revelstoke. It would be useful to have a very comprehensive guide to identify the locations throughout town where specific items can be recycled (i.e. ink cartridges, CFL bulbs, paint, batteries, etc.). Often businesses will take certain items that they recycle already, for example a print shop may accept ink cartridges. Most Rona locations will accept old CFL bulbs, powertools and batteries.

Developing a comprehensive guide can help residents, temporary residents and tourists divert waste from the landfill. Not only will this reduce waste and the associated emissions, but it will keep harmful products from ending up in the landfill.

Reusable Mug Incentives

Many café's are now providing an incentive for consumers using re-usable mugs. In Revelstoke, the Modern is one such example of a café providing a *disincentive* for not bringing your own mug: you will be charged 25 cents extra.

Plastic Bag Reduction

Some communities have opted to implement a ban on plastic bags (See Section 4.6.3), however businesses are increasingly looking at ways to encourage re-usable bags. Where a ban does not exist, businesses are voluntarily encouraging the reduction of plastic bag use. This is happening in Revelstoke now (eg. Legends and Heroes, PT Market and others). This can be achieved by applying a charge for plastic bag use, providing an alternative to plastic, or simply not providing

bags at all, requiring consumers to bring their own. Greenerfootprints.com is an organization that provides tips and suggestions for reducing plastic bag use for both consumers and retailers.

Zero Waste Lunch Challenges: Local School Involvement
Awareness of youth to waste reduction opportunities is critical in starting to create a community culture around 'Zero Waste.' Once-a-week zero waste lunches can help start the conversation about waste reduction, and specifically about excessive packaging.

4.7. Summary of Opportunity Assessment

The following table summarizes and qualitatively quantifies the actions identified in the opportunity assessment. Note that the quantification is very general in nature, based on experience and rule-of-thumb. Individual situations may vary. Policy tool are examined in a separate table which follows.

The actions are quantified using the following criteria:

Viability: Poor = marginal or no financial viability
Fair = mid to long term paybacks, but cost effective over life cycle
Good = short to medium term paybacks, generally under 10 years.

Energy / GHG Impact: Small = <1500 GJ / <100 tonnes
Medium = 1500 to 15000 GJ / 100 to 1000 tonnes
Large >15000 GJ / > 1000 tonnes

Reference	Opportunity	Viability	Potential Energy Impact	Potential GHG Impact
4.1	***Land-use and Development***			
4.1.1	Urban growth area	Good	High	High
4.1.2	Mixed-Use Development	Good	High	High
4.1.3	Intensification	Good	High	High
4.1.4	Centralization/Clustering	Good	High	High
4.2	***On-Road Transportation***			
4.2.1	*Reducing Vehicle Energy Consumption & Emissions*			
	Vehicle efficiency improvements	Good	High	High
	Vehicle selection/right-sizing	Good	Med	Med
	Vehicle maintenance	Good	Med	Med
	Alternative fuels	Poor - Good	High	High
	Idle free	Good	Med	Med
	Commercial vehicle/fleet efficiency			
4.2.2	*Transportation Demand Management*			
	Expansion of Transit Services	Poor - Fair	Med	Med
	Improvement of Walking/cycling Routes & Facilities	Fair - Good	Med	Med
	Passenger rail service	Poor	Low – Med	Low - Med
4.3	***New and Existing Buildings***			
4.3.1	Existing residential building retrofits	Fair - Good	High	High
4.3.2	Existing commercial building retrofits	Good	High	High
4.3.3	New residential building efficiency	Fair	Med	Med
4.3.4	New commercial building efficiency	Good	Med	Med
4.4	***Renewable Energy***			
	Solar Thermal	Poor - Fair	Med	Med
	Solar Photovoltaics	Poor	Low	Low
	Wind	Poor	High	Med
	Biomass and District Energy	Fair - Good	High	High
	Micro-hydro	Fair - Good	High	High
	Geo-exchange	Fair	Med	Med
	Wastewater Heat Recovery	Poor - Fair	Low	Low
	Air-source Heat Pumps	Fair - Good	Med	High
4.5	***Solid Waste***			
4.5.1	*Waste Diversion*			
	Curbside Recycling	Fair - Good	NA	Med
	Construction waste recycling	Fair - Good	NA	Med
	Organic Waste Diversion - Composting	Fair - Good	NA	Med
4.5.2	Landfill gas collection	Fair - Good	NA	High

Policy opportunities are provided in the following table, with the estimated cost to the City of implementing the policy.

Implementation cost: Low = moderate staff time and minimal direct cost
Med = significant staff time or moderate direct cost
High = significant staff time and/or significant direct cost

Reference	Policy/Initiative	COR Implementation Cost	Potential Energy/GHG Impact
4.2.3	*Transportation Policies*		
	Walking/cycling infrastructure	Med - High	Med
	Parking reserve fund	Low	Low
	Parking strategies	Low	Med
	Enforcement of anti-idling bylaw	Med	Med
	Drive-thru ban	Low	Low
4.3.5	*Buildings/Small scale renewable Policies*		
	Direct incentives/rebates	Med - High	Low - Med
	Permit checklist	Low	Low
	Reduced development cost charges	High	Low
	Priority permit processing	Low	Low
	Tax exemptions	High	Low
	Density bonuses	Low	Low - Med
	Local improvement charges	High	Low
	Development permit area guidelines	Med	Low
	Rezoning policy	Low	Med
	District energy service bylaw	Low	High
4.5.3	*Solid Waste*		
	Landfill restrictions	Low	Med - High
	Plastic bag ban	Low	Low
	Pay-as-you-throw waste policy	Low	Med

5. Community and Stakeholder Engagement and Participation

The CEEP project was guided by a very active and engaged Steering Committee. On the committee were representatives from the City, Council, utility providers, the Revelstoke Community Energy Corporation and Columbia Basin Trust. Input has been provided by the steering committee at every step of the process.

In October 2010, a series of outreach activities were held in Revelstoke to gather information directly from local residents and stakeholders within the community. This was an essential piece of the opportunity assessment, as it provides an indication of the types of initiatives residents would find most beneficial. The project team and Steering Committee used a number of approaches to invite residents to learn about the project and provide their ideas. Invitations were extended by:

- Personal calls to local utility staff and energy providers, leaders of key organizations and teachers;
- Notices on the City and project websites, the community cable TV channel and in the City's regular posting in one newspaper;
- Email invitations to 58 organizations and individuals that spanned City Council, staff, advisory committees and neighbourhood groups; federal, provincial and regional elected officials, agencies and local institutions; RCEC customers; environmental, business and community groups; and businesses involved in the energy sector and heavy energy users;
- Posters placed around the community;
- A press release that was included in both local newspapers;
- Radio announcements;
- Offers to make presentations at regular meetings of community groups.

A project backgrounder and background information on district energy and RCEC were prepared by the project team. These were posted on the City and project websites, and were distributed with the invitations, and available during the outreach events.

On October 21 the following outreach events were hosted by the City, RCEC and the project team, with assistance from Steering Committee members:

- A morning workshop attended by all of City Council and four staff members;
- A lunch meeting with 22 individuals and representatives of organizations who were invited to share their expertise and ongoing interest in community energy use and emissions reduction;
- An afternoon meeting with the RCEC Board and invited participants which focused on a review of the team's progress on the DEEP and the Tools and Principles for an RCEC Business Plan;
- An evening open house with over 20 participants which began with a presentation about the project, followed by a trade show of booths hosted by the project team, RCEC, the City's contracted Environmental Sustainability Coordinator, BC Hydro Powersmart Team, Terasen, and Verda-Tech, a local energy efficiency consulting firm.

Discussions were recorded during these events. Also at these events, two main questions were posted on poster board, and sticky notes were provided to gather input and ideas from meeting participants. The questions were:

1. List the three ways the community could improve energy efficiency and reduce GHG emissions
2. What are the barriers that prevent you personally from doing more to reduce GHG emissions and improve energy efficiency?

A survey was developed by the project team to gather more detailed information about what types of policies, strategies and tools would help residents reduce their own greenhouse gas emissions**. Over 150 responses** were collected, all of which provided a great deal of insight into the preferences of the community, as well as an impressive breadth of ideas and suggestions for energy and emission reduction in the community.

5.1. Results of Community Outreach

Appendix D provides a more detailed summary of the community engagement and survey results from the October event in Revelstoke, including comments and ideas collected from the public. The intention of the survey was to determine whether residents would find support from the City to be helpful in reducing personal energy and emissions, and if so, what *type* of support would be most effective (i.e. actions, policies, incentives, etc.). There are a wide variety of actions that can be taken by individuals without facilitation from the City, however this survey focused on tools that would help further individual actions. The results are presented by question, and the number of votes tabulated for each option are indicated in parentheses.

5.1.1. Residential Energy and Emission Reduction

The question was posed as to whether residents felt the City of Revelstoke could help individuals become more energy efficient and reduce greenhouse gas emissions. 75% of respondents felt that yes, the City could help reduce energy and emissions at home.

A number of choices were provided as to *how* the City could help individuals. The following charts summarizes the questions, votes and general comments.

Options	**Votes**
Financial incentives that encourage greenhouse gas emission reduction and energy efficiency at home (e.g. rebates for energy audits, waived/reduced inspection fee for green retrofits, etc.)	90
Implement policies or bylaws that require improved standards of energy efficiency at home (e.g. Development Permit Area requirements around building orientation, water conservation or alternative energy)	77
Provide information and education to homeowners about greenhouse gas emissions and energy efficiency.	63
General Comments and Ideas: • I am not in favor of an overall ban on wood burning stoves. I am in favor of an incentive to change older woodstoves into high efficiency stoves. • I think education is way more important than bylaws, already we have so many rules and bylaws, and still we don't get results, innovative education and ways of presenting the info always work better • Give funds to allow an organization to perform CO2 audits of homes in Revelstoke. • Reduced development charges or hook up fees for people who pass a high energy standard in new buildings (especially individual owners)	

5.1.2. Commercial Energy and Emission Reduction

Survey participants were asked whether the City of Revelstoke could help individuals become more energy efficient and reduce greenhouse gas emissions at work. 71% of respondents felt that yes, the City could help employees/workplaces be more energy efficient and reduce emissions.

A number of choices were provided as to *how* the City could help individuals at work become more energy efficient/reduce emissions. The following table summarizes the results.

Options	**Votes**
Provide information and education to business owners about greenhouse gas emissions and energy efficiency.	68
Implement policies or bylaws that require improved standards of energy efficiency at work (e.g. Bylaw complimentary to the Building Code requiring all businesses to turn off lights after shut-down; implement maximum off street parking for businesses)	62
Financial incentives that encourage greenhouse gas emission reduction and energy efficiency in commercial buildings (e.g. Implement a Revitalization Tax Exemption)	61
General Comments and Ideas: • Provide recycling pick up at the office. Fine office for not complying. • I think a lot of businesses do well at making an effort. A lot of people in Rev bike to work, heating is turned down whenever possible. • Including meters installed in visible areas (water and energy). • Extend the Revelstoke Community Energy Corporation's heating system to the City centre	

5.1.3. Solid Waste

Acknowledging that solid waste causes GHG emissions from decomposition, survey participants were asked whether waste reduction initiatives in the community would help to reduce household waste. 91% of respondents felt that more initiatives would help residents reduce their household waste.

Several initiatives were provided, which were ranked by the respondents. The following table summarizes those responses:

Options	**Votes**
Provide a comprehensive local guide for waste diversion (e.g. where to take batteries, CFL bulbs, oil, paint, electronics)	111
Implement a City-wide organic-waste composting program	107
Implement a building material recycling program	102
General Comments and Ideas: • Promote bulk buying by education and any incentives possible • It has been proven in other communities that when I curbside recycling program is in place, people are more likely to recycle. I think Revelstoke should look at a curbside compost pick up as well for individuals who are not able to compost but would like to reduce their waste. • Apply costs to those who have excess garbage. 2 bins per week per family seems excessive to me. By recycling, we never have more than a half bin per week. • Education on "reduce" is the only cost effective initiative.	

5.1.4. Transportation

Survey participants were asked whether they would like to see initiatives that reduce vehicle emissions in Revelstoke. 85% of respondents said yes, they would like to see more initiatives in the community that facilitate emission reduction from transportation.

Respondents ranked a number of options, the results of which are in the table below.

Options	**Votes**
Improve trail connectivity and ensure accessibility for non-motorized forms of transportation (e.g. walking/cycling)	106
Improve transit services	81
Improve facilities for low-carbon transportation (e.g. bike racks, bike shares, hybrid plug-in spaces, etc.)	77
Implement bike share program	35
Encourage car pooling	34
Expand car-share opportunities	31
Reduce number of available parking spots	12
General Comments and Ideas: • We really need more bike racks/ secure bike storage downtown. Trail connectivity that would allow for snow shoeing, or cross country skiing to work in winter would/ could have wonderful health spin off benefits for users. • None of the above. Until we are forced to get off fossil fuels any measure is only token and only somewhat effective. • Impose fines on those who idle vehicles longer than a certain amount of time, perhaps 2 minutes • Encourage lower emission alternative fuels that can be retrofitted to existing vehicles. Incentives for conversion goes a long way as well.	

5.1.5. District Energy

In 2003, the community input was sought about the creation of the Revelstoke Community Energy Corporation. The initiation of the existing system in 2005 created more a focus for community education. However, there has been very little education in the community about RCEC and district energy in recent years.

A question was posed to survey participants about whether the City should be supporting the expansion of district energy to get a sense of the support in the community for district energy, but also to understand the level of awareness is among residents. 50% of respondents said yes, they think the City should support district energy expansion. 9% said no, and 41% said that they did not know; they required more information.

6. Recommended Community Goals, Policies and Actions

The opportunity assessment has identified a number of potential actions that Revelstoke could implement to reduce energy consumption and GHG emissions. This assessment has been supported by public outreach to assess which actions might be supported by the community, and to identify community priorities. These activities have been considered together to determine what actions are recommended. Some of the influencing factors are:

- An existing district heating system with public support
- Large and active cycling community, with relatively compact and flat geography
- RMR development, with an influx of tourists and resort related employment
- Limited City budgets and unwillingness to increase taxation
- High cost of living and limited disposable income
- Limited awareness of general public of what actions to take

Key actions that will have maximum impact, likelihood of implementation, and public support have been targeted. This is not meant to dismiss other opportunities as not being worthwhile or to discourage them from being pursued. Rather, it is intended to focus Revelstoke's efforts in the areas most likely to be successful and achieve the desired level of energy and GHG reductions. Actions have been kept as practical as possible, taking into account political and financial realities and limits to people's willingness to change or spend money. The choice of recommended actions and policies is somewhat subjective, but has taken a number of considerations from the opportunity assessment into account:

- Influence of local government
- Impact on energy and emissions
- Technical viability
- Financial viability
- Implementation cost
- Public support
- Geographic constraints

This section first identifies the recommendations for changes to the OCP Goals, followed by a series of recommended actions that will contribute to energy efficiency and GHG emission reduction in the community.

6.1. OCP Goals

To more closely align the OCP goals with the actions and policies presented in this plan, we recommend the following changes to the OCP:

- Create a new heading in Section 3.1 called Greenhouse Gas Emissions.
- Add a goal "Reduce community GHG emissions" under this new section.
- There are a number of policies under Air Quality, which directly reference GHG emissions and should be relocated to the new GHG section, where appropriate.
- Create a policy to "Consider energy efficiency and emission reduction in all development decision making" in the new GHG section.

- Add " …and the GHG emissions from decomposition of waste." to the goal "Reduce the need to landfill waste."

With these changes, there will be an overarching GHG reduction goal as well as four goals that target different sectors. Most of the goals in the table below exist in the current OCP. We recommend that each have indicators relative to energy and emissions that are suggested below to track progress made over time. See section 8.5.

Goal	Indicators	Data Source
Reduce community GHG emissions by 6% relative to 2007.	• Overall GHG emissions, tonnes CO2e	CEEI
Promote a well designed compact community by following smart growth principles.	• % multi-family homes • Dwellings within 400 m of commercial centres	CEEI secondary indicators Planning Dept
A community transportation network that guides development and provides for safe, efficient travel, with increasing reliance on transit, cycling and walking.	• % commuters walk, cycle, or take transit • # of vehicles per capita	CEEI secondary indicators CEEI
Reduce the need to landfill waste and the GHG emissions from decomposition of waste.	• Per capita waste landfilled • Solid waste GHGs per capita	CEEI CEEI
Energy self-sufficiency through energy conservation and renewable, secure and sustained energy options.	• Energy consumption per dwelling • Total energy consumption of commercial buildings	CEEI CEEI

6.2. Recommended Actions for Energy Efficiency and GHG Reduction

The recommendations have been grouped under the relevant OCP goals, as recommended above. Responsibility has been identified and a proposed timeline for implementation.

Responsibility Codes:
Ec Dev Dept = City Economic Development Department
Eng Dept = City Engineering Department
Planning Dept = City Planning, Building and Bylaw Enforcement Department
PR&C = City Parks, Recreation and Culture Department

6.2.1. Land-use

Goal: Promote a well-designed compact community by following smart growth principles.

The existing OCP includes policies for the key opportunities to support energy efficiency, including an urban growth area, mixed use development, density intensification and centralization/clustering. One action is recommended to support DE expansion.

	Action	Timeline	Responsibility
1.1	Focus new development within the planned area of DE expansion and increase density to that required for DE expansion.	Phased through 2030	Planning Dept

6.2.2. Transportation

Goal: A community transportation network that guides development and provides for safe, efficient travel, with increasing reliance on transit, cycling and walking.

	Action	Timeline	Responsibility
2.1	Expand cycling infrastructure to support year round use of cycling, including bike paths with winter snow clearing, increased signage, covered bike racks, lockers, etc.	2015	Eng Dept
2.2	Expand use of car share service	Ongoing	Car Share Society
2.3	Expand the free transit service between RMR and downtown, as seasonal use levels increase.	Ongoing	Ec Dev Dept & RMR
2.4	Develop a parking strategy that encourages walking and cycling and supports small/high efficiency vehicles.	2012	Eng Dept.

6.2.3. Buildings and Renewable Energy

Goal: Energy self-sufficiency through energy conservation and renewable, secure and sustained energy options.

	Action	Timeline	Responsibility
3.1	Expand the DE system to include high density nodes of new construction within the south-central, highway corridor, and resort neighbourhoods. Investigate feasibility of single-family home hook-up pilot project.	Phased through 2030	RCEC & Eng. & Planning Depts
3.2	Develop a package of low cost, practical energy efficiency products for homeowners, to be sold at cost (or subsidized), along with information and support.	Available by 2012	City/RCEC
3.3	Explore community support to implement a service bylaw to require all new high density developments to connect to the DE system when cost effective. Implement if supported.	2012	Planning Dept and RCEC
3.4	Develop a rezoning policy that requires rezoning applicants to achieve a minimum number of points on the development checklist before rezoning is recommended.	2012	Planning Dept

6.3. Solid Waste

Goal: Reduce the need to landfill waste and the GHG emissions from decomposition of waste.

	Action	Timeline	Responsibility
4.1	Implement curbside recycling for all homes and businesses with pay-as-you-go for waste collection.	2012 single family homes 2016 others	CSRD
4.2	Support expanded Bear Aware backyard composting with eventual curbside organics recycling.	2011	CSRD & Bear Aware
4.3	Install landfill gas collection and flaring at the Revelstoke landfill.	2016	CSRD

6.4. Outreach and Public Engagement

	Action	Timeline	Responsibility
5.1	Implement a comprehensive public education program to encourage individual actions by increasing awareness of RCEC, energy efficiency, and GHG reduction issues including information hubs and targeted workshops.	2012	
5.2	Implement a targeted awareness program for homeowners that identifies the best retrofit measures, to be delivered in conjunction with the low-cost product package (Action 1.4)	2012	
5.3	Implement focused awareness programs for the hotel and hospitality sector about energy efficiency options for their operations.	2012	
5.4	Continue to promote the Idle Free campaign, and improve awareness and enforcement of the initiative.	Ongoing	Planning Department
5.5	Training for building design and construction sector on home and commercial building retrofits (incl. energy efficiency, emission reduction, etc.).	2012	

7. Recommended Targets

Based on the recommended actions and policies above, estimates of the GHG and energy reduction potential have been made, and are included in Appendix E. Savings estimates have been based on experience in other communities, case studies, and rule of thumb estimates, and should be considered approximate. Some of the actions (e.g. district heating, landfill gas collection) need further study, while others will depend on the level of funding and participation of the community. The savings estimates can be considered “conservative, yet optimistic”. In other words, although the savings estimates for each action are not particularly aggressive, they will require council commitment, public support and individual action. The reduction estimates are not intended to provide a definitive target, but rather to provide guidance as to the range of reductions that is likely to occur.

Savings estimates and target recommendations are provided for 2020 and 2030. An assumption has been made that higher level governments will continue their reduction efforts beyond programs and legislation already announced. As less is known about actions after 2020, the savings assumptions are lower after 2020. This results in relatively little increase in savings by 2030 compared to 2020. Thus, there is considerably more upside potential than indicated in the 2030 estimates.

The recommended targets are premised on the idea that the 2020 target should be more conservative, while the 2030 target can be more inspirational. As 2030 draws nearer, more defined actions can be determined and new opportunities may come available.

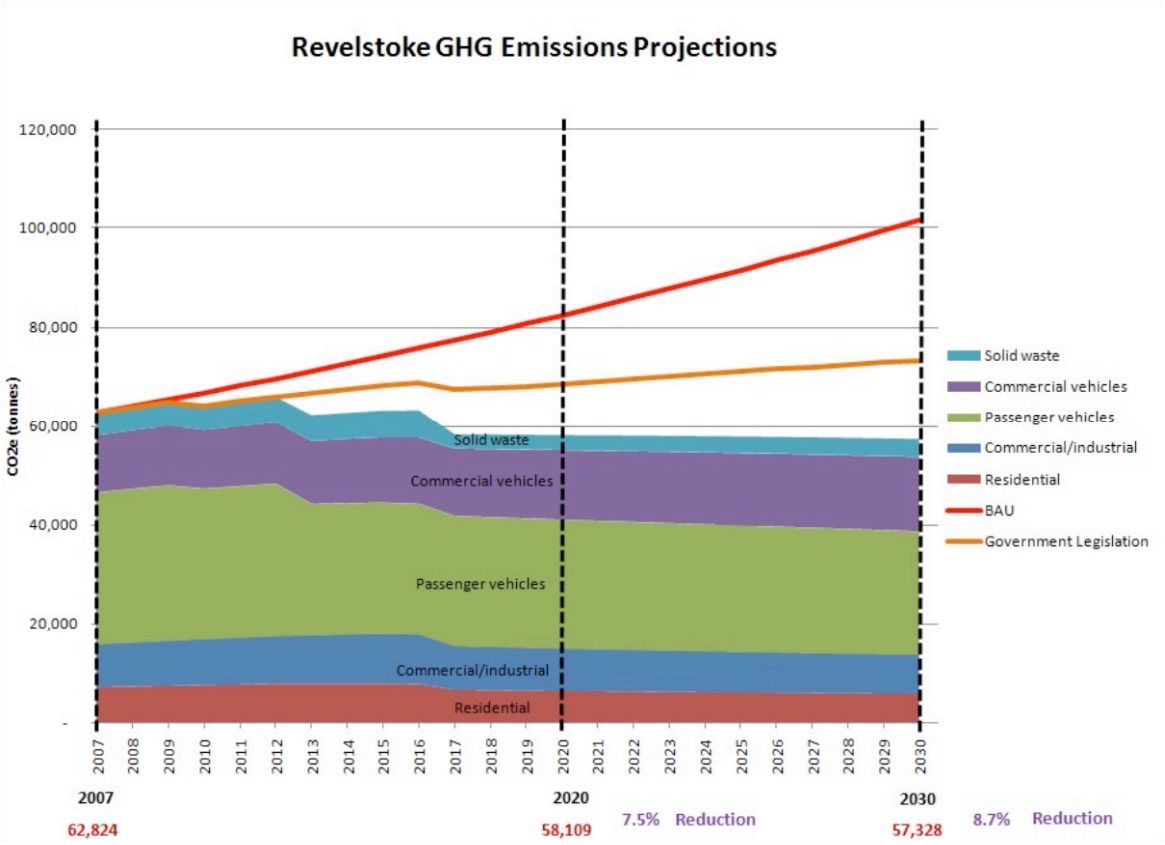
7.1. Recommended Targets for Emission Reduction

The GHG reduction estimates for the recommended actions are 7.5% by 2020 and 8.7% by 2030, in comparison to the 2007 baseline, and accounting for the projected increases in population

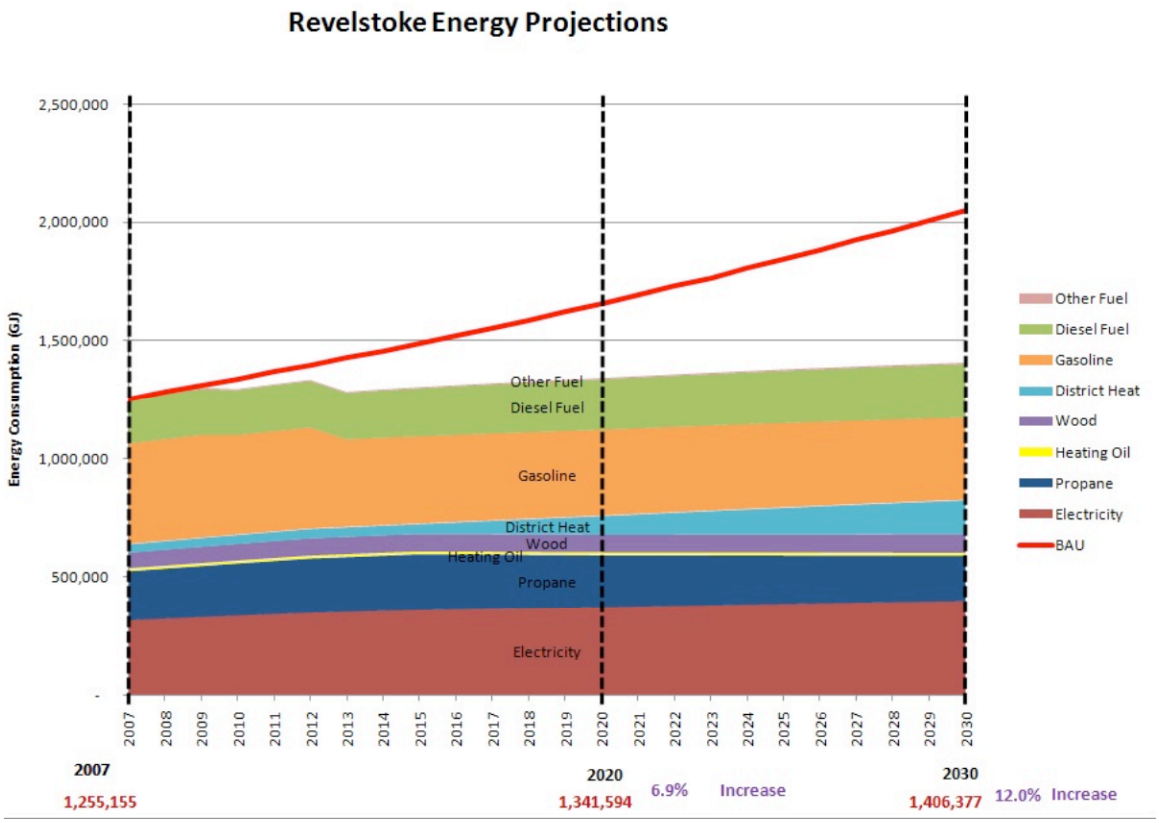
and GHG emissions. This translates to a reduction from the BAU scenario of 29% in 2020 and 43% in 2030.

The recommended GHG reduction targets, compared to the 2007 baseline are:

8% by 2020
15% by 2030



Energy consumption projections, with the recommended actions, indicate a 6.9% increase by 2020 and a 12.0% increase by 2030, in comparison to the 2007 baseline. This translates to a reduction from the BAU scenario of 19% in 2020 and 31% in 2030.



8. Implementation

8.1. Prioritization Approaches

The recommendations have focused on measures with the most impact and best chance of success. Some recommendations have little or no cost and can be implemented immediately. Others will take longer to implement, and in some cases need further study prior to implementation. Still others will be ongoing, with successive stages as budgets allow.

It is important that background work begin soon on larger projects, particularly the district energy system expansion. This will allow for funding to be pursued and for the project to be ready to construct as development proceeds.

Short Term (1-3 years)

- Adoption of plan, targets, and revised OCP goals
- DE expansion planning, including related land-use planning and development of a service bylaw.
- Parking strategy.
- Homeowner energy efficiency package.
- Rezoning policy.
- Residential curbside recycling and backyard composting.
- Landfill gas collection study and planning.

Medium to Long Term (4 – 10 years)

- DE system construction.
- Curbside recycling for business and curbside organics collection.
- Landfill gas collection system construction.

Ongoing or Staged Implementation

- Expansion of cycling infrastructure, car share program, and RMR shuttle service.
- Public engagement

8.2. Adoption of Plan and Policies

The first step in successful implementation of the plan will be to have it formally adopted by Council. A presentation to council by staff and members of the consulting team is planned, in order to allow council to fully understand the recommendations and ask questions. Upon adoption of the plan, the new GHG reduction targets should be incorporated into the OCP, as required by provincial legislation. The recommended changed to the OCP goals outlined in Section 8.1 should also be incorporated.

While the OCP is typically reviewed on a 5-year basis, it would be beneficial to review the reduction targets and energy and emissions actions in the OCP on an annual basis. The Community Energy and Emissions Inventory will be provided by the Province every other year, which provides a mechanism on which to assess changes and successes.

8.3. Implementation of Recommendations

While an implementation strategy for each recommendation will need to be fully developed by staff, the following section provides some detail and key considerations for each recommendation.

8.3.1. Focus new development within the planned area of DE expansion and increase density to that required for DE expansion.

District energy is an important focus of the CEEP, and focusing development and density is critical for the viability of the district energy system. This should be one of the first priorities for Revelstoke, and done in conjunction with further DE feasibility studies.

- Determine DE expansion zones (See the District Energy Expansion Pre-Feasibility Plan).
- Establish minimum desirable energy density levels and required building density needed to achieve that.
- Ensure that the UDB and zoning bylaw are in conformance with these requirements.

8.3.2. Expand cycling infrastructure

In order to reduce vehicle use, alternatives such as cycling and walking must be considered safe and convenient. As it will take time to get people out of their cars, cycling infrastructure improvements do not need to take place all at once, but can be phased in as budgets allow. Cycling improvements should be incorporated into other infrastructure projects whenever possible and should receive regular maintenance similar to roads and other infrastructure.

- Winter snow clearing of bike paths.
- Improved signage.
- Covered bicycle racks.
- Require bicycle racks in all new developments.

- Bicycle path lighting where security or safety is a concern.
- A portion of DCC funds should be dedicated to bicycle improvements.

8.3.3. Expanded car-share program

The Revelstoke car share is currently very small. The City can help to promote and expand the program, as an alternative to car ownership.

- Promote car sharing to staff and citizens.
- Consider subsidizing car-share memberships for City staff.
- Consider loaning City vehicles to the car-share when not in use.

8.3.4. Expand the free transit service between RMR and downtown

In the long term the shuttle service between RMR and downtown has good potential for reducing vehicle use by both residents and visitors, as well as supporting economic activity in the downtown by bringing visitors to downtown. To be well used, the service should be regular and frequent.

- Make the service permanent.
- Develop a long-term funding solution and/or cost sharing mechanism with RMR.
- As the resort expands and ridership can support it, expand service to evenings and mid-day, with increased frequency.

8.3.5. Develop an energy efficient parking strategy

While parking meters are often associated with a parking strategy, care needs to be taken to not drive business away from the downtown. Strategies that reward behavior are probably the best place to start, with punitive strategies introduced later.

- Priority parking spaces for small cars, hybrids, electric vehicles, scooters, and motorbikes.
- Public charging stations for electric vehicles.
- Reduced parking requirements for businesses and multi-family developments.
- Pay parking at RMR to encourage use of shuttle.

8.3.6. Expand the DE system to include high density nodes of new construction within the south-central, highway corridor, and resort neighbourhoods.

DE expansion is a major undertaking that will need full commitment from council, detailed feasibility studies, and a long-term financing plan. The current economic slowdown provides some breathing room to establish a long-term vision for RCEC and be ready when development picks up.

- Based on the district energy pre-feasibility study, confirm areas for DE expansion.
- Initiate feasibility studies for the selected areas.
- Establish how expansion will be financed.

Through the community surveys and outreach, it was apparent that there is interest from several homeowners to be connected to the district energy system. While the District Energy Expansion Pre-Feasibility study did not focus on single-family homes, there may be an opportunity to investigate the feasibility of a single-family home hook-up pilot project. This would require leadership and resources on the part of RCEC, but may be an approach to raising awareness about the technology and the opportunities for expansion in the community.

8.3.7. Explore community support to implement a service bylaw to require all new high density developments to connect to the DE system when cost effective. Implement if supported.

A means of ensuring the connection of most new buildings to the DE system is essential to providing financial stability. Although there are different ways of doing this, a service bylaw is the most straightforward method.

- Review how other municipalities have established service bylaws for district energy (e.g. North Vancouver, Gibsons).
- Consult with the public and local businesses to determine support for such a bylaw.

8.3.8. Develop a package of low cost, practical energy efficiency products for homeowners, to be sold at cost (or subsidized), along with information and support.

Convincing homeowners to implement energy efficiency retrofits has long been a struggle. Factors that discourage homeowners include a lack of knowledge about which measures are cost effective, and the high cost of many retrofits. The intent of the City providing a retrofit package would be to identify easy, cost effective measures that can be implemented at a reasonable cost.

- Develop a package of low-cost measures applicable to most homes. This would likely include CFLs, a programmable thermostat, low-flow shower head and faucet aerators, hot water tank blanket, weatherstripping and wallplate gaskets.
- Consider having a person(s) available to assist homeowners with installing the products. This could be a summer student or a sub-contracted company.
- Investigate potential cost savings by the City bulk ordering materials.
- Consider to what extent the City (or other partners) are willing to subsidize the package.

8.3.9. Develop a rezoning policy that requires rezoning applicants to achieve a minimum number of points on the development checklist before rezoning is recommended.

The existing development checklist acts as an education tool for builders. However, it could be used as a more prescriptive requirement for rezoning applications. It should be noted that a rezoning policy cannot be mandatory (council always has final say on approval) but it can be used to express expectations that the City has for rezoning.

- Develop a points system for the checklist. Items that are a higher priority for the City should be given more weighting.
- Develop a council rezoning policy that outlines council expectations for rezoning applications, including point levels to be achieved.

8.3.10. Implement curbside recycling for all homes and businesses with pay-as-you-go for waste collection.

Curbside recycling is already proposed for single family residences in the coming year. This should be supported with pay-as-you-go waste collection, and expanded over time to include multi-family and commercial recycling.

- Implement curbside recycling for single family homes this year.
- Initiate a study on how to expand recycling to multi-family and commercial.
- Introduce charges for larger bin sizes and/or multiple bins.

8.3.11. Support expanded backyard composting with eventual curbside organics recycling.

With curbside recycling only just beginning, backyard composting will likely be the primary means of composting for the near future.

- Conduct public outreach to promote increased composting and determine barriers.
- Work with groups such as Bear Aware to address areas of concern.
- Investigate options for composting in multi-family developments.
- Consider curbside pickup for commercial businesses and/or multi-family.

8.3.12. Install landfill gas collection and flaring at the Revelstoke landfill.

Although the landfill is operated by the CSRD, emissions form part of Revelstoke's community inventory. The first phase of the landfill will not be capped until 2015, providing time to investigate the potential collection of landfill gas.

- With the CSRD, initiate a study of the cost of gas collection and volume of gas that would be collected.
- Investigate the potential value of carbon credits with the Pacific Carbon Trust, or opportunities to use the credits for local offsets (e.g. CSRD and member municipalities, public institutions, local businesses).
- Investigate possible uses for the collected gas, besides flaring.

8.3.13. Implement a comprehensive public education and engagement program to increase awareness of RCEC, energy efficiency, and GHG reduction issues including information hubs and targeted workshops.

Public engagement is important to successfully implement energy and emissions actions. It helps encourage residents and businesses to take action as well as building support for City actions.

- Identify a lead organization or individual as a coordinator for energy and emission related community and engagement (i.e. Sustainability Coordinator, staff of RCEC, partnership with NCES, etc.).
- Establish Energy and Emission Information Hubs at central locations throughout the community (i.e. the Community Centre, City Hall, museum, etc.).
- Contribute to a dedicated column in the Revelstoke Times Review
- Presentations to Neighborhood Meetings
- Recommended quarterly community workshops each year focused on a different topic, drawing on local expertise or case studies where possible

8.3.14. Develop a targeted awareness program for homeowners that identifies the best retrofit measures, to be delivered in conjunction with the low-cost product package (Action 1.4)

The awareness program will be aimed at increasing take-up of the product package as well as encouraging further action by home-owners.

- Emphasize that the product package is relatively low cost, easy to install, and focuses on the most cost effective measures.
- Develop an information sheet to go with the package that provides tips on saving energy (e.g. turning down hot water tank temperature) and identifies higher cost measures that are usually cost effective. Also include information on other programs available (e.g. BC Hydro, LiveSmart, etc).

- Work with other utility providers to ensure additional rebates and incentives are communicated to the public.

8.3.15. Develop focused education and engagement programs for the hotel and hospitality sector.

This sector is expected to have the highest level of growth in the future and is concerned about its image.

- Develop an information package on low cost, cost effective energy efficiency measures for the sector, similar to the one for homeowners.
- Work with the sector to support other actions, such as cycling infrastructure and composting.

8.3.16. Continue to promote the Idle Free campaign, and improve awareness and enforcement of the initiative

An issue that was raised repeatedly in the community surveys, promoting the idle free initiative is a low-hanging fruit that has been initiated, but requires further effort and enforcement for maximum effectiveness.

- Public awareness campaign about the Idle Free Bylaw through brochures and information hubs (including resources from organizations such as http://www.idlefreebc.ca/ and http://oee.nrcan.gc.ca/communities-government/idling.cfm
- Targeted campaigns at known idle locations (i.e. school pick-up zones, post office, etc.)
- Initial enforcement of Idle Free Bylaw through educational 'tickets'. These warning tickets can be a one-page leaflet with information about idling.

8.3.17. Training for building design and construction sector on home and commercial building retrofits

While building codes and standards will continue to be modified to require higher standards of energy efficiency, the construction and development sector has great opportunity to start influencing change immediately. There are many existing standards for home construction (i.e. LEED and Built Green), but awareness and training is required to start integrating efficient building construction into the business as usual approach to construction and development.

- Establish a local builders association
- Establish membership and/or partnership with the Canadian Home Builders' Association of British Columbia (CHBACB), Built Green and LEED
- Coordinate a workshop series through the local builders association as a mechanism to inform the building design and construction sector about energy efficiency construction

8.4. Partnerships and Implementation

Successful implementation of the recommendations in this report will require the coordination and participation of various groups, organizations and levels of government. Successful implementation may require the creation of a committee; whether coordinated by the City with membership of various groups and community members, or formed as a community-led initiative, there should be involvement of the following groups and organizations:

- City of Revelstoke
- RCEC
- North Columbia Environmental Society
- Chamber of Commerce

- Columbia-Shuswap Regional District
- Revelstoke Mountain Resort
- Hotel Association
- Carshare Society

Further to these local groups and organizations, it would be critical as implementation proceeds to involve the following groups and organizations as appropriate:

- BC Hydro
- Terasen Gas
- Province of British Columbia
- Parks Canada
- Canadian Pacific Railway
- Transport Canada

8.5. Monitoring and Reporting

As mentioned in section 8.2, it is recommended that the energy and emission targets and actions be reviewed each year. This annual monitoring of progress and actions should be performed by the group or individual determined as the lead on implementation for the CEEP (as discussed in 8.3.15), and a brief update provided for the community. The following sections identify specific frameworks or protocols that will aid with monitoring and reporting the progress of the CEEP over the longterm.

8.5.1. Monitoring

The inventory for this CEEP was developed based on the Province's Community Energy and Emissions Inventory. This was intentional, so that energy and emissions can be easily tracked and monitored into the future. The Province has committed to providing updated CEEI reports to all communities in BC every other year. It should be noted that each iteration of the CEEI report will improve upon the previous, expanding the scope of the data collected. For this CEEP, the inventory was enhanced with data for local district energy. If this information is not included in the next iteration of the CEEI, it will have to be included locally. Using the CEEI reports as a monitoring tool will be the easiest and most efficient approach for the City of Revelstoke.

In addition to tracking the overall energy and GHG emissions, each indicator associated with the OCP goals (Section 6.1) should also be monitored. Most of these can also be found within the CEEI inventory or its associated secondary indicators. One indicator, population within 400m of commercial centres, is not available through CEEI and will need to be tracked by the City. A method of determining this indicator should be developed, and if possible backcasted to 2007.

The Federation of Canadian Municipalities Partners for Climate Protection[19] initiative provides a framework for monitoring as part of their 5-step action plan model. The following steps comprise the 'Monitoring' framework, or Milestone 5 of their model:

- Track the results of specific emissions reduction measures
- Update the inventory (they recommend every 3-5 years, but CEEI reports will likely be produced more often than this)
- Engage stakeholders and decision-makers
- Report to stakeholders (and FCM if applicable)

Part of the monitoring may include providing the community with regular opportunities for input. This can be important to ensure education and awareness efforts are effective, and also allow for dialogue, possibly leading to new ideas and actions.

[19] More information about the Partners for Climate Protection framework can be found at: http://fmv.fcm.ca/Partners-for-Climate-Protection/

Partners for Climate Protection provides a toolkit which offers more detailed resources for communities wishing to monitor progress on energy and emissions targets. The Toolkit can be found at http://fmv.fcm.ca/Partners-for-Climate-Protection/Toolkit.asp.

8.5.2. Reporting

The frequency of reporting should be determined by the implementation group or individual, but it would be useful for communication and awareness purposes to provide a community update report at least every other year, to coincide with the inventory update. It may be beneficial to provide short updates for the community through a regular newspaper article, or information hubs, however a full report of monitored results would ensure accountability.

Much like this CEEP reported on the progress of implementing the recommendations from the 1997 energy plan, reporting biennially provides an opportunity to review the recommendations, and update on the progress of implementation.

8.6. Funding Opportunities

The following table summarizes some of the most relevant funding sources for implementation of the CEEP recommendations. Provincial and Federal funding can change annually, however CivicInfo BC does maintain a list of current funding opportunities for local governments (http://www.civicinfo.bc.ca/18.asp). Some of the opportunities below are relevant not only for local governments, but for home and business owners.

Organization	Program	Details
BC Hydro	Rebates & Savings for Residential homes	A wide variety of rebates and incentives for energy saving appliances, fixtures and retrofits. http://www.bchydro.com/rebates_savings/
	Energy Conservation Assistance Program	Providing low-income BC Hydro account holders with home energy evaluation, energy advice and installation of energy saving products. http://www.bchydro.com/powersmart/residential/ps_low_income/energy_conservation.html
	Power Smart Partners	This program is aimed at large energy users (spend over $50,000/year on electricity), and provides funding and support for studies and implementation. http://www.bchydro.com/powersmart/commercial/power_smart_partners.html
	Product Incentive program	This program is aimed at smaller facilities (although larger facilities are also eligible) and provides rebates for the installation of energy efficient technologies. http://www.bchydro.com/rebates_savings/product_incentive_program.html
Terasen Gas	Offers for residential homes	A variety of rebates and offers from Terasen to encourage energy efficiency. http://www.terasengas.com/Homes/Offers/default.htm

	Offers for commercial businesses	A variety of rebates and offers specifically for commercial customers. http://www.terasengas.com/Business/Offers/default.htm
EcoAction / Natural Resources Canada	EcoEnergy Retrofit - Buildings	This program provides grants up to $10 per GJ saved for small and medium sized commercial/institutional buildings. http://oee.nrcan.gc.ca/commercial/financial-assistance/existing/retrofits/index.cfm?attr=0
Transportation and Infrastructure (BC)	Cycling Infrastructure Partnership Program	Opportunity currently closed, but deadline is typically September for new funding. Watch website for opportunity. http://www.th.gov.bc.ca/BikeBC/CIPP.html
Ministry of Community Development (BC)	BC Local Government Infrastructure Planning Grant Program	Provided to study feasibility, costs, technology and location of proposed projects; includes transportation. www.cserv.gov.bc.ca/lgd//infra/infrastructure_grants/infrastructure_planning_grant.htm
Federation of Canadian Municipalities	Green Municipal Fund	Supports municipal initiatives across Canada that benefit the environment, local economies and quality of life. Funding available for: - Sustainable community plans, - Feasibility studies and field tests, - Loans and grants for capital projects. http://www.sustainablecommunities.fcm.ca/GMF/
Province of BC	Towns for Tomorrow	Funding opportunity closed for this year, but may be available in future years. For more information: http://www.townsfortomorrow.gov.bc.ca/index.html
Columbia Basin Trust	Community Development and Environ. Initiatives	CBT provides a number of funding opportunities for communities throughout the Basin. Full list is here: http://www.cbt.org/Funding/?Programs

9. Conclusion

<<finalized after Draft review>>

Appendices

Appendix A: Community Energy & Emissions Inventory Initiative – methodologies and data sources

Appendix B: Baseline Inventory

Appendix C: BC Hydro Incentives

Appendix D: Detailed summary of community outreach

Appendix E: Energy & GHG Reductions Estimates from Recommended Actions

Appendix A

Community Energy and Emissions Inventory Methodology and Data Sources

The Ministry of Environment provides the following description of data sources for the CEEI reports:

> For buildings, energy and GHG emissions figures from electricity and natural gas use are based on energy consumption data ("actual") provided by BC Hydro, FortisBC, Terasen Gas and Pacific Northern Gas. Community-level consumption and emissions for heating oil, propane and wood is derived by first estimating the total energy required for heating and other uses, and then subtracting the electricity and gas consumption from this total. The remainder can then be attributed to heating oil, propane or wood – using a ratio for each based on other available data.
>
> GHG emission estimates for on-road transportation are based on activity data (e.g., the number and type of vehicles licensed for on-road use) provided by the Insurance Corporation of British Columbia, fuel consumption rates published by Natural Resources Canada and estimates of vehicle kilometres travelled (derived by sampling ICBC vehicle transfer forms).
>
> GHG emissions estimates for community solid waste (landfills) are based on estimates of landfill gas production calculated from the mass of solid waste tipped at landfills and attributed to contributing municipalities and unincorporated areas. For 2007 CEEI Reports, this data was obtained from either regional district staff or other resource materials.[20]

Emissions Factors used in the conversion of energy to carbon dioxide equivalents. The following table summarizes the emissions coefficients and emission factors for each of the energy types consumed in buildings.

Fuel Type	Units	Emissions Coefficient			Emission Factor
		CO_2	CH_4	N_20	CO_2e
Electricity	Tonnes/GWh				
BC Hydro					24.666
Fortis BC					6
Nelson Hydro					3
Natural Gas	Kg/GJ	50.00	0.0010	0.0009	
Propane	Kg/GJ	59.66	0.0010	0.0043	
Heating Oil	Kg/GJ	70.23	0.0007	0.0008	
Wood	Kg/GJ	0	0.0028	0.0010	

The following table summarizes the emissions coefficients for fuel used in on-road transportation vehicles.

[20] Ministry of Environment, BC. *Technical Methods and Guidance Document for 2007 CEEI Reports: Community Energy and Emissions Inventory (CEEI) Initiative*. May 2010.

Fuel Type	Units	Emissions Coefficient		
		CO_2	CH_4*	N_2O*
Gasoline	Kg/L	2.289	Variable	Variable
Diesel Fuel	Kg/L	2.663	Variable	Variable
Other Fuel (Propane & Natural Gas)	Kg/L	1.532	Variable	Variable
Global Warming Potential		1	21	310

* assigned according to emissions technology of the vehicle

Appendix B – Community Energy and Emissions Inventory

Revelstoke
Community Energy & Greenhouse Gas Emissions Inventory: 2007

Population: **7,273**

BUILDINGS	Type	Connections	Consumption		Energy/Connection		Energy (GJ)	CO2e (t)	Energy & Emissions Total Energy (GJ)	Energy & Emissions Total CO2e (t)
RESIDENTIAL	Electricity	3,417	44,591,867	kWh	13,050	kWh	160,531	1,100	324,523	7,114
	Propane	-	89,375	GJ	-	GJ	89,375	5,453		
	Heating Oil	-	7,600	GJ	-	GJ	7,600	536		
	Wood	-	67,017	GJ	-	GJ	67,017	25		
COMMERCIAL/SMALL-MED INDUSTRIAL	Electricity	684	43,532,269	kWh	63,644	kWh	156,716	1,074	313,706	8,686
	Propane	239	120,839	GJ	506	GJ	120,839	7,371		
	District Heat	-	36,151	GJ	-	GJ	36,151	240		
SUBTOTAL	Electricity	4,101	88,124,136	kWh			317,247	2,174	638,229	15,800
	Propane	-	89,375	GJ			210,214	12,824		
	Heating Oil	-	7,600	GJ			7,600	536		
	Wood	-	67,017	GJ			67,017	25		
	District Heat	-	36,151	GJ			36,151	240		

ON ROAD TRANSPORTATION	Type	Vehicles	Consumption		Litres/Unit		Energy (GJ)	CO2e (t)	Energy & Emissions Total Energy (GJ)	Energy & Emissions Total CO2e (t)
Note: Where there is consumption, but no vehicles indicated, quantity <10 and is withheld.										
SMALL PASSENGER CARS	Gasoline	1,051	1,499,293	L	1,427	L	52,475	3,581	54,370	3,715
	Diesel Fuel	47	48,610	L	1,034	L	1,862	133		
	Other Fuel	<10	852	L	-	L	33	1		
LARGE PASSENGER CARS	Gasoline	692	1,611,426	L	2,329	L	56,400	3,842	58,369	3,978
	Diesel Fuel	17	48,132	L	2,831	L	1,843	131		
	Other Fuel	<10	3,288	L	-	L	126	5		
LIGHT TRUCKS, VANS, AND SUVS	Gasoline	2,837	8,552,795	L	3,015	L	299,348	20,474	333,438	22,791
	Diesel Fuel	310	794,669	L	2,563	L	30,436	2,171		
	Other Fuel	41	95,403	L	2,327	L	3,654	146		
COMMERCIAL VEHICLES	Gasoline	26	130,499	L	5,019	L	4,567	305	22,791	1,575
	Diesel Fuel	98	467,091	L	4,766	L	17,890	1,257		
	Other Fuel	<10	8,718	L	-	L	334	13		
TRACTOR TRAILER TRUCKS	Gasoline	<10	9,522	L	-	L	333	22	131,572	9,243
	Diesel Fuel	123	3,426,592	L	27,858	L	131,238	9,221		
	Other Fuel	<10	-	L	-	L	-	-		
MOTORHOMES	Gasoline	57	62,782	L	1,101	L	2,197	146	2,473	164
	Diesel Fuel	<10	5,813	L	-	L	223	16		
	Other Fuel	<10	1,384	L	-	L	53	2		
MOTORCYCLES AND MOPEDS	Gasoline	86	53,274	L	619	L	1,865	124	1,865	124
	Diesel Fuel	-	-	L	-	L	-	-		
	Other Fuel	-	-	L	-	L	-	-		
BUS	Gasoline	<10	103,637	L	-	L	3,627	244	10,118	700
	Diesel Fuel	11	169,473	L	15,407	L	6,491	456		
	Other Fuel	-	-	L	-	L	-	-		
SUBTOTAL	Gasoline	4,749	12,023,228	L			420,813	28,738	614,995	42,290
	Diesel Fuel	606	4,960,380	L			189,983	13,385		
	Other Fuel	41	109,645	L			4,199	167		

SOLID WASTE	Type	Estimation Method	Mass (t)	CO2e (t)	Energy & Emissions Total CO2e (t)
COMMUNITY SOLID WASTE	Solid Waste	Waste-In-Place	6,238	4,734	4,734

Grand Total	Type	Consumption		Energy (GJ)	CO2e (t)	Energy & Emissions Total Energy (GJ)	Energy & Emissions Total CO2e (t)
	Electricity	88,124,136	kWh	317,247	2,174		
	Propane	89,375	GJ	210,214	12,824		
	Heating Oil	7,600	GJ	7,600	536		
	Wood	67,017	GJ	67,017	25		
	District Heat	36,151	GJ	36,151	240	1,253,224	62,824
	Gasoline	12,023,228	L	420,813	28,738		
	Diesel Fuel	4,960,380	L	189,983	13,385		
	Other Fuel	109,645	L	4,199	167		
	Solid Waste	6,238	tonnes		4,734		

Information Items - Not Counted in Grand Total

INDUSTRIAL	Type	Connections	Consumption		Energy/Connection		Energy (GJ)	CO2e (t)	Energy & Emissions Total Energy (GJ)	Energy & Emissions Total CO2e (t)
LARGE INDUSTRIAL BUILDINGS	Electricity	3	Withheld	kWh	-	kWh	Withheld	-	-	-
	Natural Gas	-	-	GJ	-	GJ	-	-		

Appendix C – BC Hydro Incentives

(see attachment for now)

Appendix D: Community Engagement Summary

(to be included in final)

Appendix E: Energy /GHG Reduction Estimates from Recommended Actions

Energy and GHG Reduction Estimates for Recommended Actions

	Action/Policy	Annual Reductions by 2020			Notes
		GHGs (tonnes)	Electricity (MWh)	Other Fuels (GJ)	
1.1	Focus new development within the planned area of DE expansion and increase density to that required for DE expansion.				Supports 3.1 and Compact Development.
2	Transportation Measures	554	-	8,142	Includes 2.1, 2.2, 2.3, 2.4, and 5 as well as general shifts in public driving behaviour.
3.1	Expand the DE system to include high density nodes of new construction within the south-central, highway corridor, and resort neighbourhoods.	1,911	3,849	413	
3.2	Develop a package of low cost, practical energy efficiency products for homeowners, to be sold at cost (or subsidized), along with information and support.	156	922	4,199	
3.3	Explore community support to implement a service bylaw to require all new high density developments to connect to the DE system when cost effective. Implement if supported.				Supports 3.1
3.4	Develop a rezoning policy that requires rezoning applicants to achieve a minimum number of points on the development checklist before rezoning is recommended.	126	1,428	2,929	
4.1	Implement curbside recycling for all homes and businesses with pay-as-you-go for waste collection.	294	-	-	
4.2	Support expanded backyard composting with eventual curbside organics recycling.	54	-	-	
4.3	Install landfill gas collection and flaring at the Revelstoke landfill.	3,110	-	-	
5	Public Engagement				Supports all other actions.
	Compact Development	5,067	5,661	81,782	Includes 1.1 and City planning efforts such as the Unified Development Bylaw.

Notes

- **Caution should be used with these reduction estimates.** The CEEP is a high level planning document, and as such does not do detailed analysis at the individual action level. There are many factors which will influence the success or failure of actions, including funding levels, public support, and future fuel prices. While the assumptions made for estimatiuon of reductions are thought to be reasonable, there is considerable potential for variation from these assumptions.
- Reductions have been estimated from the baseline inventory and business as usual projections, after accounting for higher level government actions. Each reduction estimate has been estimated on a stand-alone basis, without the interactive effects of other actions. Therefore reductions are not additive.
- Some measures have no reductions calculated, as they are considered supportive of other actions and the reductions have been included there.
- Some actions, notably in transportation, were considered to small or too dependant on other actions to be estimated individually. Therefore these actions were grouped under Transportation Measures and include general changes in public driving attitudes.
- Although Compact Development is not specifically a recommended action (as it is already going on through City planning initiatives) , it is an important component of the overall reduction estimates. Therefore it has been included here as an additional item.