Prince Rupert

Community Energy & Emissions Plan - 2017

Community Energy Association

BC Hydro
Power smart

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List of Acronyms

BAU	Business as Usual
BCH	BC Hydro
CEA	Community Energy Association
CEEI	Community Energy and Emissions Inventory (inventories created by the Province for each local government)
CEEP	Community Energy and Emissions Plan
CO_2	Carbon Dioxide
DCC	Development Cost Charge
DSM	Demand Side Management (name for measures used to reduce energy consumption)
ECAP	Energy Conservation Assistance Program, a program offered through BC Hydro that provides free home energy efficiency retrofits to income qualifying households
GHG	Greenhouse Gas (there are several different anthropogenic GHGs and they have different relative impacts. When tonnes of GHGs are stated in the document the standard practice of stating this in equivalent of tonnes of carbon dioxide is followed. Carbon dioxide is the most important anthropogenic GHG.)
GJ	Gigajoules (one of the standard measures of energy)
HRR	Home Renovation Rebates, a program offered through BC Hydro to provide rebates to homeowners for energy efficient renovations
HDV	Heavy Duty Vehicles (i.e. commercial vehicles, like trucks)
kWh	kilowatt hours (standard measure of energy, typically used with electricity)
LAP	Local Area Plan
LDV	Light Duty Vehicles (i.e. the types of vehicles driven by ordinary people)
OCP	Official Community Plan
PNG	Pacific Northern Gas (local gas utility)
RGS	Regional Growth Strategy

Executive Summary

On November 21st & 22nd, a workshop was held with City of Prince Rupert staff, Council, and community representatives including the Port Authority and an advisor to local First Nations. The workshop was facilitated by the Community Energy Association. The project is funded by BC Hydro.

Prince Rupert has been working towards implementing actions to reduce greenhouse gas emissions for a number of years (e.g. the *City of Prince Rupert Energy and Greenhouse Gas Plan*, Sheltair, 2008), public transit, and the installation of LED streetlights. In 2016, Prince Rupert took the opportunity to re-visit climate action planning by working with the Community Energy Association and BC Hydro to complete a CEEP QuickStart plan. BC Hydro funds QuickStart plans across BC to fulfill their goal of accelerating action in smaller communities.

The QuickStart process provides financial support for a planning workshop and a follow-up plan based upon the QuickStart model. QuickStart is an accelerated process designed for smaller communities with limited budgets. During in-person workshops, community-specific actions are selected from a list of potential actions (ranging from high to low impact) that can be implemented by communities to reduce greenhouse gas emissions. Workshop participants select actions to include in the model and outputs from the model are 'quickly' compiled into a report. A report and a copy of the model are provided to participants.

An in-depth discussion on all of the opportunities and most of the actions occurred at the workshop. Many thanks to the workshop group who spent their day to look at energy, emissions, and energy expenditure data for the community as a whole and develop an action plan.

Context, Current Emissions and Targets

Prince Rupert is a small city (population ~ 12,000) in a fairly remote area. It is the biggest community west of Prince George, and is a major port and transportation hub, as well as being a tourist community. A high proportion of the community is quite environmentally aware.

Prince Rupert's emission profile resembles that of most rural communities in BC – a heavy dependency on automobile transport for daily needs leads to higher emissions from mobility fuels. In addition, between 2007 & 2010 Prince Rupert saw significant increases in emissions from commercial / industrial buildings and vehicles, which can probably be mainly attributed to increases in marine shipping activity.

Emissions associated with the Port, and in particular with marine traffic, are very significant. However, only a small proportion of these emissions (natural gas and electricity plus registered vehicles used at the port) are included in the Province of BC's Community Energy & Emissions Inventory (CEEI) for Prince Rupert. The Port Authority also conducts its own annual energy & emissions inventories, and these do include other sources of emissions, including marine traffic.

For the modelling process, the workshop group used an annual community population growth rate of 0.5%. It is recognised that there are significant unknowns with respect to using this figure. If proposed LNG projects progress, then this may be a substantial underestimate. But if industrial activity remains at current levels, then population growth may be lower than 0.5%. The community greenhouse gas emission reduction target used was 33% below 2007 levels by 2020, which was taken from the Official Community Plan.

In 2010 total community annual energy expenditure was approximately $41 million, and GHG emissions were approximately 81,300 tonnes. Further detail on the energy and emissions for the community can be found in the 2010 Community Energy and Emissions Inventory (CEEI) produced by the Province (see Appendix 1).*

* Note 2012 CEEI data is expected to be released by the Province in the coming months.

Action Plan

For transportation emissions, Prince Rupert has a high proportion of people that walk to work, and many people use public transit. Transportation emissions can be further tackled by managing future growth to keep a complete, compact community; enhancing public transit and active transportation; and promoting the use of electric vehicles.

Prince Rupert's buildings are predominantly heated with natural gas, and much of the building stock is older. It is highly likely that there are plentiful opportunities to improve the energy efficiency of the existing building stock.

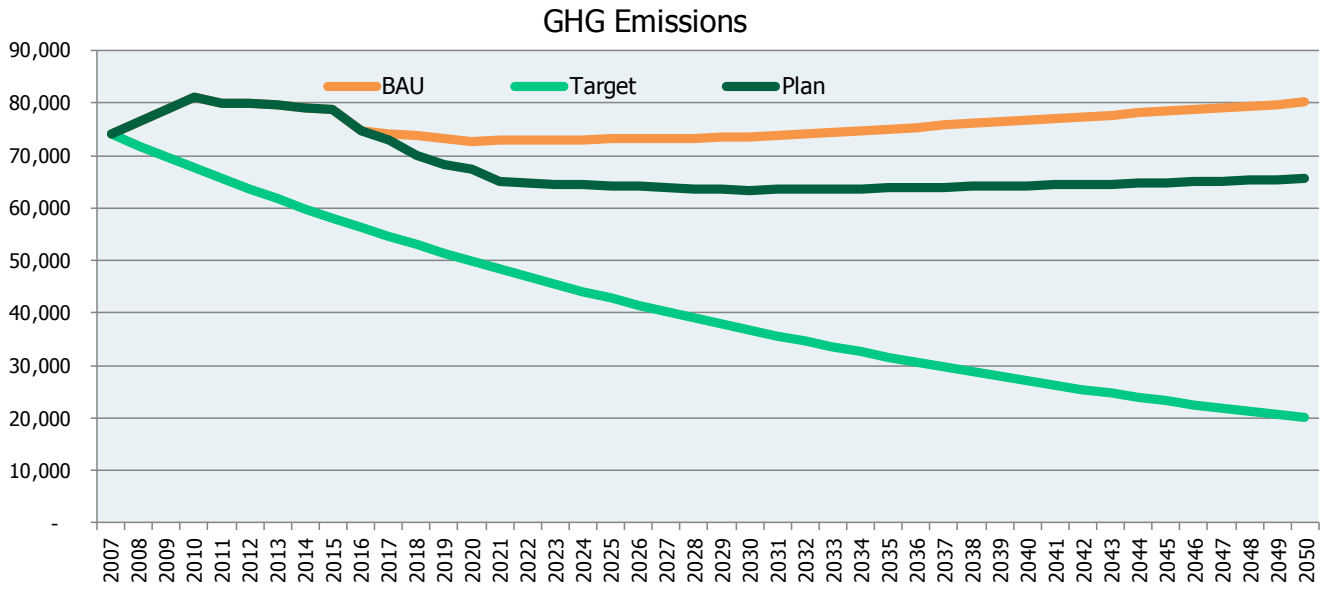
Organic waste diversion, or energy to waste, may be an excellent opportunity for the City of Prince Rupert to reduce its emissions from waste, which are higher than the provincial average.

The Port Authority is a willing partner in making energy and emissions reductions. It has already been actively looking at opportunities to reduce emissions, including from marine traffic, which is their single greatest source of emissions. The Port Authority could collaborate with the city on a number of initiatives, for mutual benefit.

Note that many of the actions assume that current levels of growth will not be substantially different. If the community will face substantial growth, then the Community Energy Association & BC Hydro should be consulted, as more opportunities should become available.

Action Selection & QuickStart Modelling Results

The estimated impact of the plan on community greenhouse gas emissions (in tonnes of GHGs per year) is shown below. Significant emissions reductions will be achieved beyond business as usual (BAU) up to year 2021. There is still a considerable gap to the long term GHG target trajectory.



Prince Rupert has policy and program levers to reduce community energy and emissions and can move closer towards its target, but many things do remain outside of the City's control including Federal and Provincial actions, technological changes, and actions taken by other significant community stakeholders. These may provide significant assistance towards meeting the target. The further into the future, the greater the impact that these items may have.

The Community Energy Association suggests that community energy and emissions plans be reviewed and updated on a five-year cycle so that ongoing actions can be amended and new actions evaluated to reflect new opportunities.

Top new actions for Prince Rupert in the year **2020**, according to impacts on annual GHG emission reductions and energy savings, are:

GHG reductions (tonnes per year)	Energy dollars kept in Prince Rupert ($/yr.)
• Organics diversion from landfill (2,000 tonnes/yr.) • Land use suite "enhanced" – i.e. continuing smart land-use patterns (1,100 tonnes/yr.) • District energy / renewable energy systems (830 tonnes/yr.)	• District energy / renewable energy systems ($1,400,000 /yr.) • Encourage biomass heating in commercial / industrial sector through leading by example ($670,000/yr.) • Land use suite "enhanced" ($560,000/yr.)

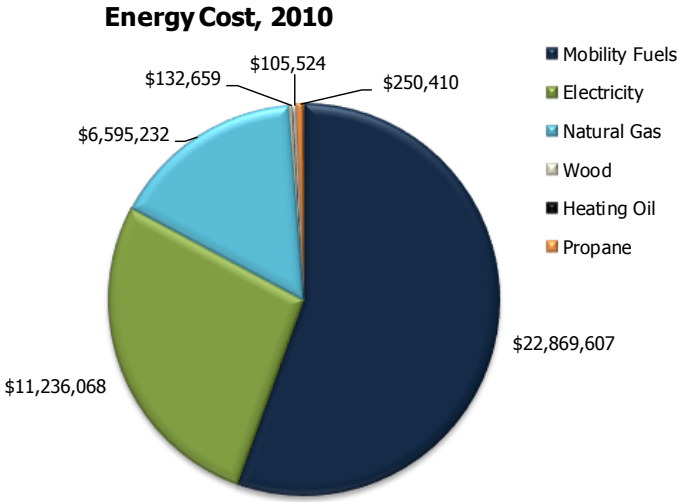
Note that some other actions may not achieve as significant benefits by 2020, but will achieve great cumulative impacts over a longer time period. These include the comprehensive home energy efficiency retrofit campaign, promotion of BC Hydro programs, and electric vehicle charging and the promotion of electric vehicles. The electrical vehicle suite alone, by 2030, is expected to reduce GHG emissions by 840 tonnes/yr and save $340,000/yr (net of electricity costs) in the community.

Note that several actions can have additional benefits, including financial benefits, that are not included in the calculation of "community energy dollars saved". E.g. implementing land use suite "enhanced" can reduce municipal infrastructure capital and operating costs, and implementing organics diverion and energy to waste (one of the proposed renewable energy solutions) could reduce costs associated with expanding landfill space.

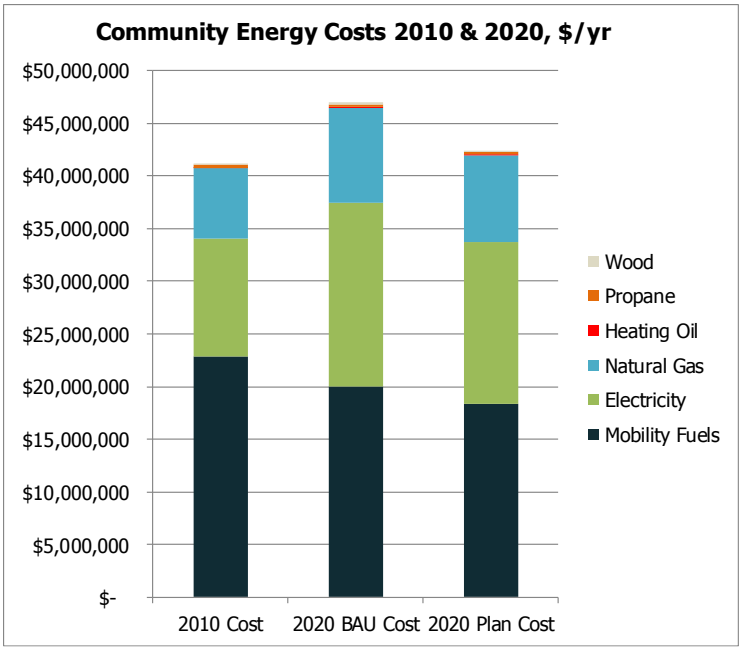
Community Financial Savings & Resilience

The chart to the right also shows the approximately $41 million ($3,200 per capita) of Prince Rupert community energy expenditures made in 2010, split by fuel type. The chart is derived from energy consumption data from the Province of BC, and local energy costing information.

Most energy dollars spent within the community on any form of energy leave the community. Therefore a significant co-benefit of implementing this plan is that reducing energy dollar expenditures through *energy efficiency* helps residents and businesses reduce their cost of living, and this increases the likelihood they may spend this on local goods and services. In addition, *locally generated energy* helps to keep energy dollars local rather than export them.



The impacts of the plan are shown in the following chart, comparing 2010 and 2020. Prince Rupert community energy costs are projected to be reduced by approximately 10% through plan implementation. The model assumes that the energy prices for electricity and natural gas have increased between 2010 & 2020, while propane, wood, and heating oil stay the same, and mobility fuels slightly decrease. Although energy prices are very difficult to predict, there is confidence that the price of electricity will increase over the next few years. The 10% plan cost reduction equates to about $4,600,000 per year ($350 per capita).



From a resilience perspective, increasing building energy efficiency through insulation, increasing opportunities for active transportation, and increasing the local food supply makes the community better able to cope with potential interruptions in energy supply. Plus energy efficiency and local generation opportunities also make the community better able to cope with fluctuations or shocks to energy prices.

Next Steps for CEEP Implementation

Next steps are:

1. Submit CEEP to Council with recommendations
2. Consider ways to incorporate the CEEP into other City documents and strategies
3. Implement the CEEP

Introduction

Through Bill 27, local governments in BC are required to make efforts towards reducing the greenhouse gas emissions of their communities. In addition, considering the energy and emissions from the community can give opportunities for increased efficiency, resiliency, and financial savings for the rural population of approximately 12,000 people. The figures in this report are based on 2010 energy and emissions inventory data from the Province and recent energy costing data.

Bill 27 background

Through the Local Government (Green Communities) Statutes Amendment Act, also known as Bill 27, municipalities and regional districts are required to include targets, policies, and actions towards reducing greenhouse gas emissions from their communities in their Official Community Plans and Regional Growth Strategies.

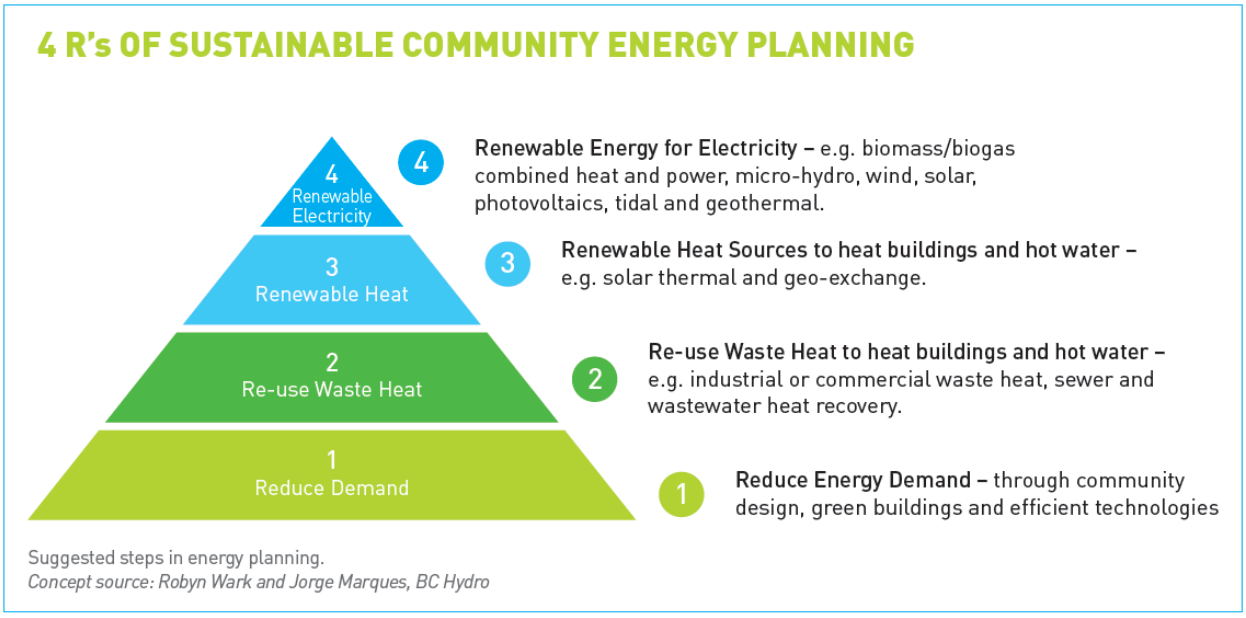
Community Energy and Emissions Planning

A Community Energy and Emissions Plan (CEEP) evaluates a community's existing energy use and greenhouse gas (GHG) emissions with a view to improving efficiency, cutting emissions, enhancing community resilience, managing future risks, and driving economic development. A CEEP usually encompasses energy efficiency, building and site planning, renewable energy supply, land use and transportation planning, and infrastructure (including solid and liquid waste management). It provides guidance to a local government in long-term decision making processes.

Most GHG emissions within a local government's jurisdiction result from energy consumption and the burning of fossil fuels. With this relationship it makes sense to combine GHG and energy planning into one integrated plan. While some communities have completed stand-alone energy or GHG action plans, the close linkages between energy and GHG emissions suggest that a combined plan is preferable. In this report the term Community Energy and Emissions Plan (and the acronym CEEP) is intended to incorporate both energy and GHG emissions, but not other emissions such as particulates or criteria air contaminants.

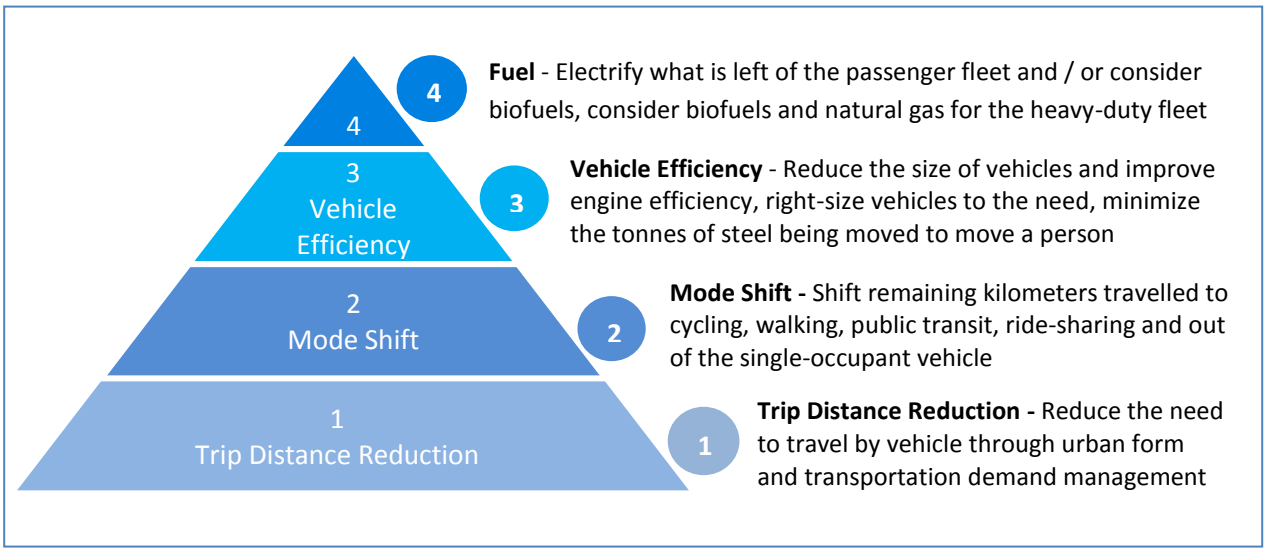
Energy Planning Hierarchy

Not all opportunities to influence energy and emissions across a community are created equally. It makes sense to reduce demand as much as possible first, since usually the best business cases are found through improving efficiency.



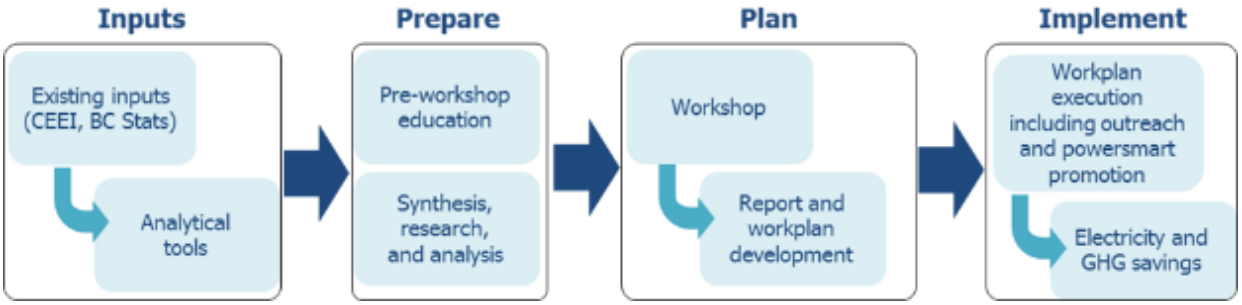
Suggested steps in energy planning.
Concept source: Robyn Wark and Jorge Marques, BC Hydro

A similar hierarchy can be applied to the transportation sector. The easiest step to take is to reduce vehicular trip distances through appropriate planning tools and transportation demand management.



CEEP Actions Overview

CEEP QuickStart is an initiative assisting BC communities within the BC Hydro electrical service area to develop a cost effective and practical CEEP including an implementation timeline. The CEEP process is depicted in the graphic below:



REGISTRATION

- Initial call with key staff to determine comprehensive community information for analysis by CEA and select preferred CEEP workshop dates

PREPARATION

- Engage in a 1 hour webinar approximately 1 week prior to your workshop to build on foundations from the pre-workshop reading

PLANNING

- Develop a CEEP in your 1.5 day workshop, led by an expert in the field, funded by BC Hydro

IMPLEMENTATION

- Complete report and gain Council approval
- Work on implementation
- Keep CEA informed of success stories
- Green your community and achieve electricity and GHG savings

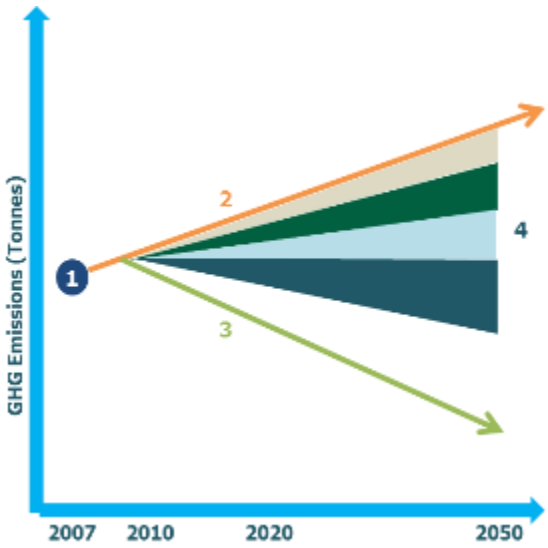
Participant Commitments

CEEP participants commit to and are responsible for:

- Taking ownership and demonstrating leadership concerning the CEEP
- Submitting the CEEP to Council for approval
- Implementing the CEEP in their community

There are four elements of a CEEP:

1. **BASELINE**: 2007 Energy and Emissions data, from the Community Energy and Emissions Inventory (CEEI), and updated 2010 CEEI data, provided by the Province
2. **BUSINESS-AS-USUAL FORECAST**
   a. Population forecast (BC Stats and local government)
   b. Impact of provincial commitments (tailpipe standards, fuel standards, building code)
3. **TARGET:** From OCP GHG reduction target (legally required), expressed as an annual percentage
4. **ACTION PLAN:** Developed from the CEEP menu of approximately 50 actions plus locally specific opportunities; and including an approach to estimating impacts.



Benefits of Developing a CEEP

The benefits of developing & implementing a CEEP are as follows:

- Reduced GHG emissions: Energy planning helps local governments effectively manage their GHG emissions. This contributes to mitigating climate change, and helps manage costs associated with carbon taxes and offsetting.
- Reduced energy costs: Energy planning improves budgeting and saves money.
- Creation of jobs and stimulation of the local economy: a CEEP can highlight opportunities for community development.
- Increased community resilience: a CEEP can increase the resilience of a community in the face of potential interruptions in energy supply, and fluctuations or shocks to energy prices.
- Improved community health: a CEEP can improve community health, e.g. through improved access to active transportation and local food, and improved air quality.
- Demonstration of leadership: a CEEP contributes to a smart community plan, more efficient infrastructure, more livable neighbourhoods, and protection of the environment; showing leadership on multiple fronts.

Action Plan

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The workshop group looked at energy, emissions, and energy expenditure data for the community as a whole and decided on an action plan. To assist with pre-workshop preparation, a one-hour preparatory webinar was held to provide background information on how energy planning initiatives can influence carbon emissions while also providing opportunities for financial savings within the community.

The workshop group was provided with a collection of actions. Each action was discussed within the group and placed in one of four categories: “yes”, “no”, “maybe”, and “already done”.

The actions were placed on a chart to create a plan for the years from 2017-2021. The group was invited to provide input on timing and sequencing of actions. Ongoing actions are also reflected in the plan. Following this, key actions were discussed in more detail.

On the second day of the workshop a GHG reduction assessment tool was introduced. The tool has been provided to staff for use in further analysis, and is populated with data derived from calculations developed to assess the impact that various actions and strategies may have on GHG emissions into the future. The tool shows the final results in user friendly charts and graphs.

Many thanks to the workshop group who spent their day to look at energy, emissions, and energy expenditure data for the community as a whole and develop an action plan.

Current Emissions and 'Business As Usual' Projections

The Province of BC has calculated the total energy use and greenhouse gas emissions from the community for 2010 through the Community Energy and Emissions Inventory (CEEI). In 2010 total community annual energy expenditure was approximately $41 million ($3,200 per capita), and GHG emissions were approximately 81,300 tonnes (6.3 tonnes per capita). Further detail on the energy and emissions for the community can be found in the 2010 CEEI, which is in Appendix 1.

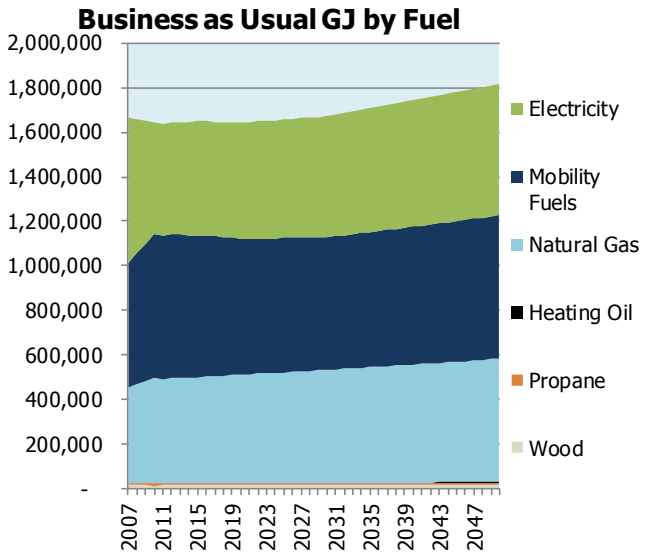
For the modelling process, the workshop group used an annual community population growth rate of 0.5% and used the 2020 reduction target of the Prince Rupert Official Community Plan (reduce emissions 33% below 2007 levels by 2020). Without an action plan, and taking into account the population projection and Provincial policies, community emissions are predicted to change according to the tables and charts in the rest of this section as "Business as Usual".

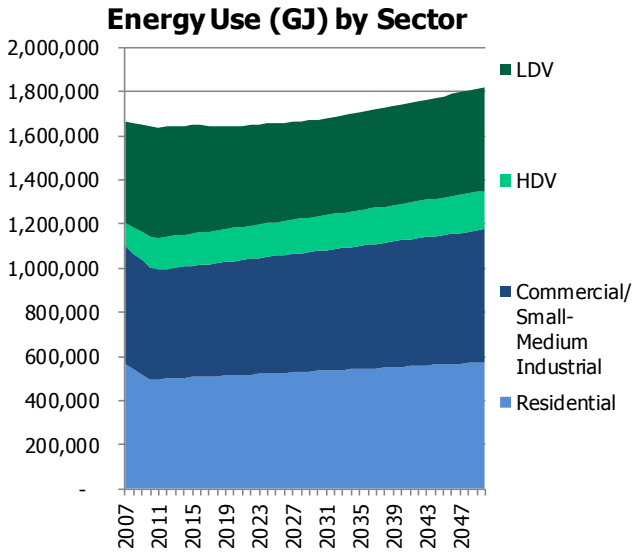
"Business As Usual" Projections & Target Overview	
Community	Prince Rupert City
Annual % target change in ghg	-3.00%
Population growth	0.50%
Default population growth	-0.48%
2007 Population	12,906
Start-year for actions	2017

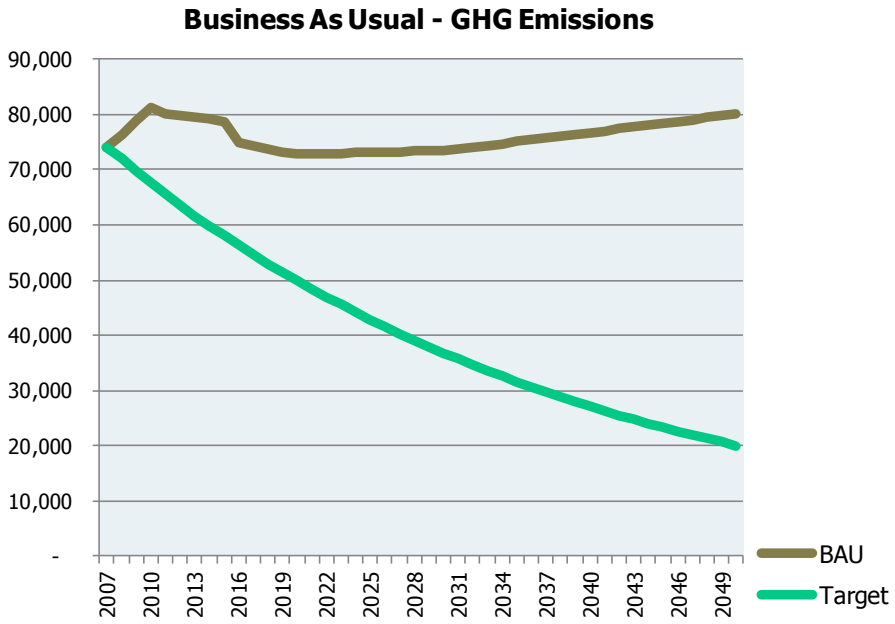
Emissions Summary		
2007 Emissions		74,116
2010 Emissions		81,256
Total Energy Expenditure	$	41,189,500
Per-capita energy cost	$	3,170
2010 Per-capita emissions		**6.25**

Targets Summary	2016	2020	2030	2050
Total reduction	-24.0%	-33%	-50%	**-73%**
Per-capita reduction	-27%	-36%	-55%	-78%
Total GHG	56,346	49,882	36,784	20,003
Per-Capita GHG	4.2	3.7	2.6	**1.3**

Business as Usual (BAU) Summary	2016	2020	2030	2050
GHG's	74,780	72,782	73,488	80,128
GHG growth	1%	-2%	-1%	8%
Population	13,389	13,659	14,357	15,863
Pop growth	483	753	1,451	2,957
Pop Grow %	4%	6%	11%	23%
Per capita emissions	5.59	5.33	5.12	5.05







Note that, emissions associated with the Port, and in particular with marine traffic, are very significant. However, only a small proportion of these emissions (natural gas and electricity plus registered vehicles used at the port) are included in the Province of BC's Community Energy & Emissions Inventory (CEEI) for Prince Rupert, due to the methodology the Province uses to estimate emissions for each community. The Port Authority also conducts its own annual energy & emissions inventories, and these do include other sources of emissions, including marine traffic.

Action Plan

The action plan developed by the workshop group is shown below. Actions that are in the CEEP Actions Guide but considered inapplicable, or that have already been done, are not included. The actions in the plan were categorized according to which year they are expected to be implemented or investigated.

Actions listed in the plan correspond to their numbers in the CEEP Actions Guide (see Appendix 2), which contains further detail about each of them.

Actions that will be selected are marked with an 'x'. Actions that are "maybes", are marked with an 'M'. A number of actions will start in a given year, but will also be ongoing actions, meaning that they will continue for the foreseeable future.

Note that the City has already done a number of actions, including converting City owned streetlights to LED, and work on public transit.

ACTION PLAN	Year					
Actions	2017	2018	2019	2020	2021	Ongoing
1 Buildings Basics						
1.1 Promote electricity, natural gas, & other energy efficiency programs	x					x
1.2 District energy / renewable energy systems		M				
1.3 Building code energy efficiency - educate & support compliance		M				
2 Buildings High-Growth Measures						
2.2 Create rezoning policy to achieve desired energy performance					M	
2.4 Density bonus for energy performance			M			
2.9 Development Permit Area - to enhance energy performance (e.g. orientation, landscaping)					M	M
2.11 Energy Step Code		M				M
3 Residential Buildings						
3.3 Education for realtors - energy efficiency & renewable energy			x			
3.4 Comprehensive energy efficiency retrofit campaign (e.g. Energy Diet)		x				x
3.5 Voluntary or mandatory energy labelling of existing or new homes			M			M
4 Commercial / Institutional Buildings and Transportation						
4.2 Encourage biomass heating through education or leading by example		M				
5 LDV Transportation Urban Form						
5.2 Land use suite "enhanced"		x				
5.3 Street design	x					
5.4 Implement 30 km/hr speed limit in parts of the community		M				
5.5 Variable DCC's to encourage infill development	x					
5.6 Flow RGS, OCP, and local area plans through to zoning		x				
6 LDV Transportation – Infrastructure & Collaboration						
6.1 Active transportation planning		x				
6.2 Improve active transportation infrastructure			x			
6.3 Anti-idling campaign / bylaw	M					
6.4 Special event planning						
6.5 Collaborate with major employers on work-related transportation	x					
6.8 Support car share cooperatives			x			
6.9 Raising awareness of ride sharing and guaranteed ride home programs						
6.10 Low carbon and electric vehicle fuelling/charging stations		x				x
6.11 Electric vehicle & e-bike awareness event		M				
6.12 Natural gas vehicle collaboration					M	
7 Waste & other						
7.1 Organics diversion					x	
7.3 Support local food production, e.g. farmers markets, community gardens				x		
8 Enabling Actions						
8.1 Review land use & transportation plans / policies for SCEEP incorporation	x					
8.3 Establish a regional energy co-operative				M		
NEW ACTION - Green Marine Program - write letter of support for Port Authority	x					

Unpacking Actions from the Action Plan

The main workshop day of November 21 included an in-depth discussion of all the opportunities and actions.

Ways to proceed with the actions were discussed and are outlined in the table. Some Action items are noted as “Ongoing” which are already in place or occur annually. Other “Action Items” will be worked upon within the next five years or “maybe” worked upon in the timeframe.

Further description on the actions can be found in the appendix.

Image - the workshop on November 21

Action	Year	Effort	Comments
Buildings - Basics			
1.1 Promote electricity and other energy efficiency programs Note: the following programs are the most relevant for the community: a) Home renovation rebates b) Energy saving kits c) Energy conservation assistance program d) Team PowerSmart e) Heat pump support f) Business energy saving incentives g) New construction program – larger commercial projects	1 - 5	Low	This action is low effort and high impact. Implementation should start in year 1, and it should be implemented each year. **Next Steps/Lead** • Create links to programs on website • Use newsletters and other regular outreach methods to promote • Promote through business licensing/building permit processes • Include in utility bill inserts, tax notices and social media releases • Promote through local community organisations **Partners** • BC Hydro / Community Energy Association • Local community organisations **Barriers/Opportunities** • Residential programs could dovetail with planned home energy retrofit campaign • The moderate to low income programs (energy saving kits & Energy Conservation Assistance Program), could benefit a lot of people in the community. The social benefits could be very great, in addition to the economic and environmental benefits

1.2 District energy / renewable energy systems - maybe	2	High	Action is a maybe. Opportunities for City action centred around 3 prospects, all of which may be very beneficial for the community. Based on the discussion in the workshops, they could be given an approximate ranking in preference as follows: 1. Hydro project linked to City reservoir 2. Biomass district heating for some civic buildings 3. Waste to energy plant by the landfill The hydro project is the highest preference because it has the greatest revenue generating potential. The waste to energy plant is the lowest because there is no existing demand for heat by the landfill, and potential bureaucratic obstacles with emissions. The opportunity for biomass district heating is described in detail in the 2011 prefeasibility / business case study report, *City of Prince Rupert, Green Heat Evaluation*, although the opportunity for City Hall identified in the report could also link with other buildings in the downtown. Other potential renewable energy projects include wind energy on Mount Hays, which the City has already done what it can to support; and tidal power, which the City may have limited ability to support. **Next Steps/Lead** • Hydro: the City will design as if the project will go ahead, and the City will continue working with the Province to remove regulatory obstacles. • Biomass: the City may choose to obtain an engineering feasibility study, and to look in more detail at ways the project could progress (e.g. with or without private sector partners, etc.) • Waste to energy: continue analysing the opportunities. **Partners** • Community Energy Association may be able to assist • Private sector partners may be interested in participating in the projects. This may include financing, ownership, operation **Barriers/Opportunities** • Hydro: primary obstacle is regulatory. Opportunity is a significant source of municipal revenue. • Biomass: obstacles include lack of a feasibility study and funding. Opportunity is to reduce corporate GHG emissions by potentially about 1/3, community GHG emissions by about 1%, and for the project to help with local economic development as well. • Waste to energy: obstacles include the potential location of the waste to energy plant being far from any heat demands, and potential bureaucratic obstacles with respect to air emissions. Opportunity is that it may be able to generate revenue (e.g. electricity sales), and

Action	Year	Effort	Comments
			extend the lifespan of the landfill which would lead to significant financial savings. • All of the prospective projects may be able to benefit from grant funding. E.g. the Federation of Canadian Municipalities' Green Municipal Fund, and the Province of BC's Community Energy Leadership Program. In addition, it is expected that further resources may become available from the Federal government in the near future.
1.3 Building code energy efficiency - educate & support compliance - maybe	2	Low	Action is a maybe. **Next Steps/Lead** • Work with Community Energy Association, Province, BC Hydro and others to identify and coordinate appropriate training • Ensure that energy training/knowledge is included in job descriptions for building inspectors **Partners** • Community Energy Association • Province • BC Hydro **Barriers/Opportunities** • Prince Rupert is a relatively remote community, and so training opportunities may not be easy to come by
Buildings – Growth Measures			
2.2 Create rezoning policy to achieve desired energy performance – maybe	5	Low	Action is a maybe. **Next Steps/Lead** • Determine impacts with level of community growth at the time • Consult partners for ideas **Partners** • Community Energy Association / BC Hydro for ideas **Barriers/Opportunities** • Opportunity to tie into the Energy Step code

Action	Year	Effort	Comments
2.4 Density bonus for energy performance – maybe	3	Medium	Action is a maybe **Next Steps/Lead** • Determine impacts with level of community growth at the time • Consult partners for ideas **Partners** • Community Energy Association / BC Hydro for ideas **Barriers/Opportunities** • Opportunity to tie into the Energy Step code
2.9 Development Permit Area - to enhance energy performance (e.g. orientation, landscaping) - maybe	5	Low	Action is a maybe The City has existing DPAs, but only around form and character. Energy provisions could be added, or separate DPAs could be created. **Next Steps/Lead** • Determine impacts with level of community growth at the time • Consult partners for ideas **Partners** • Community Energy Association / BC Hydro for ideas **Barriers/Opportunities** • None identified
2.11 Sign on to BC's stretch code when available and implement code – maybe	2	Low to Medium	Action is a maybe **Next Steps/Lead** • Determine impacts with level of community growth at the time • Educate community on stretch code opportunity • Identify needs for City staff and builder training • Sign on to stretch code • Design implementation program (linking to land use such as rezoning applications and building related requirements) **Partners** • Community Energy Association / BC Hydro **Barriers/Opportunities** • Stretch code is only applicable for new construction, so this action should only really be considered if there is a significant amount of new construction at the time
Residential Buildings			

Action	Year	Effort	Comments
3.3 Education for realtors - energy efficiency & renewable energy	3	Low	**Next Steps/Lead** • This action should be considered as an extension to the home energy retrofit campaign, and should only be implemented in that context • Work with Community Energy Association, Province and others to identify and coordinate appropriate training **Partners** • Community Energy Association **Barriers/Opportunities** • Opportunity: this should link with the planned home energy retrofit campaign • Barrier: current lack of local Energy Advisors
3.4 Comprehensive energy efficiency retrofit campaign (e.g. Energy Diet)	2	High	**Next Steps/Lead** • Continue work on innovative municipal financing mechanism idea • Conduct pilot with BC Hydro support • Evaluate results of pilot, and conduct full roll out if possible • Evaluate opportunity to link to potential future Pacific Northern Gas, provincial or federal retrofit incentive programs • Measure and celebrate results • Share success with other communities **Partners** • BC Hydro • Pacific Northern Gas **Barriers/Opportunities** • Barriers include funding, and unknown factors due to the innovative nature of the idea, and the current lack of local Energy Advisors • Opportunities include potential significant reductions in community energy consumption and emissions, and significant local economic development

Action	Year	Effort	Comments
3.5 Voluntary or mandatory energy labelling of existing or new homes – maybe	3	Medium	This action is a maybe The City of Vancouver mandates home energy labelling (EnerGuide assessments) for all new homes and all renovations over a certain value. City of Victoria has received a legal opinion stating that any local government in BC can do the same. **Next Steps/Lead** • Review existing research on programs • Council report seeking guidance for a mandatory • Determine parameters of program (existing, new, value of construction etc.) • Resource the program, train staff, or determine the closest Energy Advisor • Implement the program **Partners** • Community Energy Association / BC Hydro for ideas and past reports **Barriers/Opportunities** • The building community can be reluctant to take on additional regulation
Commercial/Institutional Buildings and Transportation			
4.2 Encourage biomass heating through education or leading by example - maybe	2	Medium	Action is a maybe **Next Steps/Lead** • This action is dependent on successful implementation of City biomass projects • If this occurs, promote the financial savings to local light industrial / commercial organizations **Partners** • TBD **Barriers/Opportunities** • Opportunity: this could be an opportunity for more organizations in the community to save money
Light Duty Vehicle Transportation – Village Design			

Action	Year	Effort	Comments
5.2 Land use suite "enhanced"	2	Medium	Much of this action, as defined in the appendix, has already been completed, but outstanding items are to establish zones for transit-oriented development and pedestrian-oriented development. **Next Steps/Lead** • Include consideration into transportation planning **Partners** • BC Transit • Northern Health • Local First Nations **Barriers/Opportunities** • None identified
5.3 Street design	1	Medium	**Next Steps/Lead** • Identify opportunities to improve design to increase pedestrian and cycling safety • Determine source of funds to support upgrades (budget, grants, etc.) • Plan improvement program **Partners** • BC Ministry of Transportation **Barriers/Opportunities** • Funding for implementation
5.4 Implement 30 km/hr speed limit in parts of the community – maybe	2	Medium	Action is a maybe. **Next Steps/Lead** • Consider where this could be implemented, but only if it makes sense for the community **Partners** • None identified **Barriers/Opportunities** • Enforcement may be difficult

Action	Year	Effort	Comments
5.5 Variable DCC's to encourage infill development	1	Medium	The City currently does not have DCC's (Development Cost Charges). When they are introduced, then the City may wish to vary them in key locations in order to encourage infill development. **Next Steps/Lead** • Consider when DCC's are introduced **Partners** • Northern Development Initiative Trust (NDIT) **Barriers/Opportunities** • Opportunity with introduction of DCC's • Great opportunity to encourage a complete, compact community • NDIT may have programs that could potentially assist this or other aspects of downtown revitalization
5.6 Flow Regional Growth Strategy, OCP, and Local Area Plans through to Zoning	2	Low	Good statements in the RGS and OCP need to be implemented all the way. **Next Steps/Lead** • Review RGS, OCP, and other documents to ensure consistency in wording/document referrals across all plans **Partners** • None identified **Barriers/Opportunities** • None identified
Vehicle Transportation – Infrastructure & Collaboration			
6.1 Active transportation planning	2	Low to Medium	**Next Steps/Lead** • City to look at opportunities to improve active transportation infrastructure e.g. through GIS / planning • Consider a bike share scheme **Partners** • Northern Health may be able to assist, due to the health benefits of active transportation • BC Transit **Barriers/Opportunities** • There are a number of opportunities to help active transportation in the community • There could be an opportunity to improve active transportation near public transit stops

Action	Year	Effort	Comments
6.2 Improve active transportation infrastructure	3	Medium to High	The City works to maintain and improve pedestrian infrastructure on an ongoing basis. **Next Steps/Lead** • Link in with the active transportation planning action **Partners** • Northern Health may be able to assist, due to the health benefits of active transportation **Barriers/Opportunities** • There are a number of opportunities to help active transportation in the community
6.3 Anti-idling campaign / bylaw - maybe	1	Low	Action is a maybe. **Next Steps/Lead** • Consider steps that could be taken to reduce idling of light and heavy duty vehicles in the community **Partners** • Northern Health may be able to assist, due to the health benefits of reducing idling • Port Authority may be able to assist, e.g. with ideas. It is already taking steps to reduce unnecessary idling **Barriers/Opportunities** • None identified
6.5 Collaborate with major employers on work-related transportation	1	Medium	**Next Steps/Lead** • Consider ways to collaborate to reduce transportation emissions **Partners** • Port Authority • Port tenant industries / companies • Port Edward **Barriers/Opportunities** • None identified

Action	Year	Effort	Comments
6.8 Support car share cooperative	3	Low to Medium	**Next Steps/Lead** • If a car share cooperative is interested in becoming established in Prince Rupert, there are a number of ways that the City could support it • The City could loosen or exempt parking restrictions for coop vehicles **Partners** • Contact other municipalities regarding how they have assisted car share cooperatives • Northern Health, and other institutions may see this as an opportunity to reduce their fleet costs **Barriers/Opportunities** • A truck could be a good opportunity for a coop
6.10 Low carbon and electric vehicle fuelling / charging stations	2	Medium	Prince Rupert currently has no public electric vehicle charging station, and so is a significant gap on the Highway 16 corridor. Terrace, Kitimat, Telkwa, Houston, Burns Lake, and Prince George all have electric vehicle charging stations. **Next Steps/Lead** • Consider ways to have a public electric vehicle charging station in the community, either a City owned one, or a business that wishes to attract more customers • Use provincial/federal funding if available, for a City owned EV charger • Seek guidance (Community Energy Association guide & rural EV charging implementation in the East Kootenays) on selecting site and installing the station • The City could also use this opportunity to look at electrifying some fleet vehicles. The City should sign on to West Coast Electric Fleets to help with this • The Port Authority may wish to partner as well, as it is also considering electrifying some vehicles **Partners** • Community Energy Association • West Coast Electric Fleets • Port Authority • Local commuter vehicle fleet owners, e.g. Northern Health • Can partner with other communities along Highway 16 to ensure that electric vehicle charging stations are along the corridor **Barriers/Opportunities** • A barrier is the current lack of funding for public EV charging stations • Opportunity: potentially to use some of the commercial lots that the City owns, and to increase tourism in downtown (as people wait for their vehicles to charge, they will want to visit local businesses)

Action	Year	Effort	Comments
6.11 Electric vehicle & e-bike awareness event - maybe	2	Low to Medium	Action is a maybe. **Next Steps/Lead** • Once a public electric vehicle charging station is installed, logical next step is to raise awareness about electric vehicles in the community **Partners** • Province of BC • Fraser Basin Council **Barriers/Opportunities** • Funding may be available from the Province to help with this
6.12 Natural gas vehicle collaboration – maybe	5	Medium	Action is a maybe. This action is aimed at heavy duty vehicles that are based in or travel through the community. The City would prefer to help electrify heavy duty vehicles rather than help fuel them with natural gas. But if electrification of heavy duty vehicles is still difficult at this point of time, could look at natural gas. **Next Steps/Lead** • Consider how best to help implement this in the community. Appropriate locations for natural gas fuelling stations, partners, etc. • The Port Authority may wish to partner **Partners** • Port Authority • Pacific Northern Gas **Barriers/Opportunities** • Because Prince Rupert is not served natural gas by FortisBC, it may not be eligible to receive rebates. This should be investigated
Waste			

Action	Year	Effort	Comments
7.1 Organics diversion	5	Medium to High	**Next Steps/Lead** • Determine site location • Select the process technology • Solicit public input and initiate effective communications with residents • Examine in detail potential capital funding options **Partners** • Regional District • City of Terrace, could ask them about what they have done **Barriers/Opportunities** • The generation of jobs, and the sale of compost for food production, as well as significant reduction in GHG emissions, are all opportunities
7.3 Support local food production, e.g. farmer's markets, community gardens, community greenhouse	4	Medium	**Next Steps/Lead** • Determine best ways to support local food in the community • Implement **Partners** • Local community groups • Local growers, fishermen etc. **Barriers/Opportunities** • Opportunity for local economic development, and to enhance community resilience
Enabling Actions			
8.1 Review land use & transportation plans / policies for CEEP incorporation	1	Low to Medium	**Next Steps/Lead** • Develop a transportation plan • Identify opportunities in the interim land-use plan • Identify other plans for CEEP incorporation **Partners** • BC Transit & Ministry of Transportation for transportation plan **Barriers/Opportunities** • None identified

Action	Year	Effort	Comments
8.3 Establish a regional energy cooperative - maybe	4	Medium to high	Action is a maybe. **Next Steps/Lead** • The City should probably not take the lead on this action, but could support grass roots interest **Partners** • Local community organizations • Peace Energy Coop • City of Nelson **Barriers/Opportunities** • There is an opportunity for projects to gain wider community acceptance, and for the community benefits to be more widely distributed through this
NEW ACTION – Green Marine program – writing letter of support	1	Low	Port Authority has requested this of the City. **Next Steps/Lead** • City to write letter **Partners** • Port Authority **Barriers/Opportunities** • Opportunity to support the Port Authority with their sustainability marketing.

Potential Community Engagement Opportunities

Community engagement provides an opportunity for the local government to present the CEEP, and to highlight some of the energy and emission reduction actions already in place. This demonstrates commitment and leadership, and sets a positive example for the community. Opportunities include:

- Invite local experts or relevant businesses/organizations to set-up a booth at an event to share the services or products they offer that will support GHG emission reductions and energy efficiency
- Encourage input into the CEEP through an interactive wall chart timeline of energy and emissions actions. Invite participants to add their own ideas or commitments to the timeline
- Incorporate the CEEP into other planning documents, and engage on the CEEP through engagement on those initiatives

Integration of the CEEP into municipal processes

The table below provides a guide to embedding the CEEP into other plans, work programs, committees and budgets. Regular reporting and five-year reviews of the plan will help ensure consistent progress.

Incorporate	Budget	Monitor	Convene	Report	Renew
Embed CEEP into other planning documents, e.g.: - OCP - Zoning Bylaw - Other plans as appropriate	Embed CEEP actions into budgeting process. Potentially allocate CARIP grant to a sustainable development fund to help implement the CEEP action plan	Monitor CEEP implementation indicators for specific actions, e.g.: - Number of homes participated in BC Hydro incentive programs or energy efficiency retrofits - Meters of cycling path or sidewalk added	Regular meetings to discuss implementation, e.g.: - Committee of Council - Staff meetings	Regular reports to Council Integrate at same time as CARIP is reported Provide statistics to Council and show community accomplishments.	Prepare for plan renewal every 3-5 years.

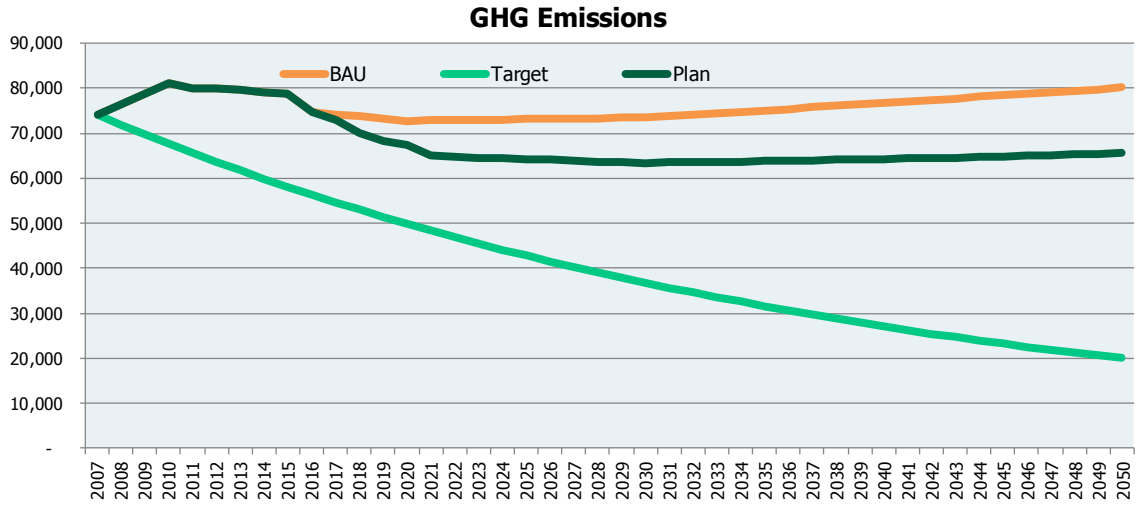
Detailed Analysis & Discussion of CEEP Impacts Actions

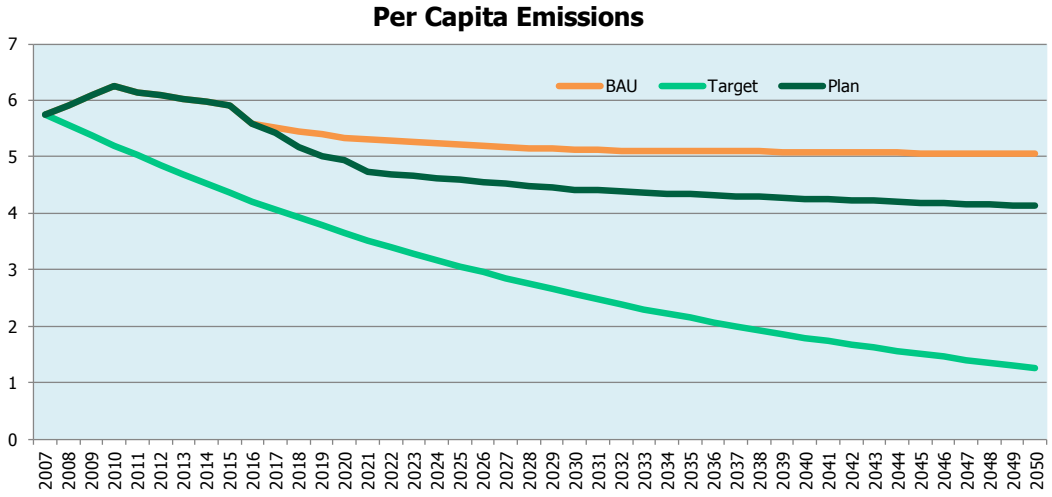
The estimated impact of the plan on community greenhouse gas emissions (in tonnes of GHGs per year) is shown below. Significant emissions reductions will be achieved beyond Business As Usual, however there is still a considerable gap to the GHG target trajectory.

Prince Rupert has levers to reduce community energy and emissions and can move closer towards its target, but many things do remain outside of the City's control including Federal and Provincial actions, and technological changes. These may provide significant assistance towards meeting the target.

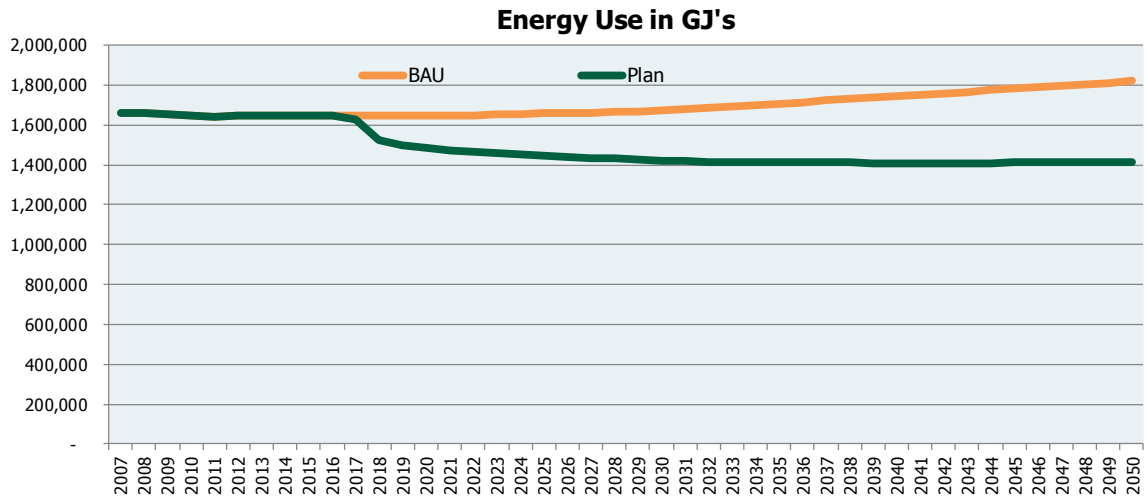
Note that actions to reduce electricity consumption or generate electricity locally will result in financial benefits for the community, but will not result in significant savings in emissions. Electricity in BC has a very low greenhouse gas intensity, and should be carbon neutral from 2016.

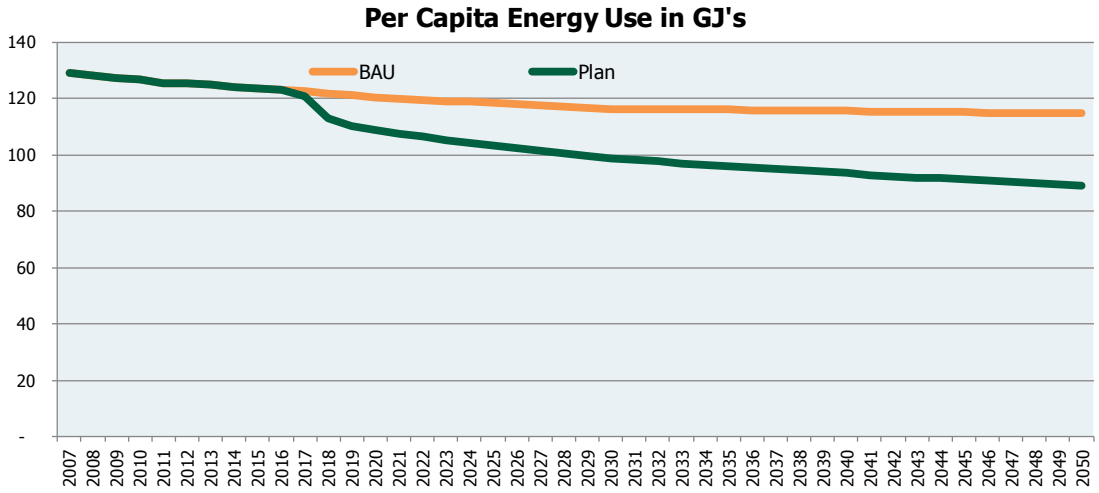
GHG Emission Reductions: Total and Per Capita



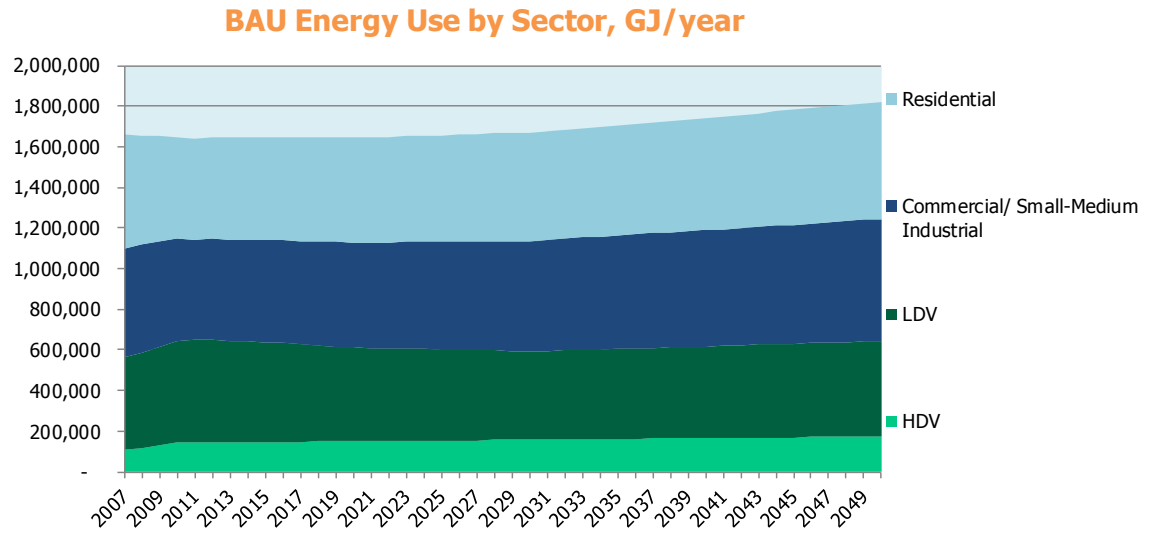


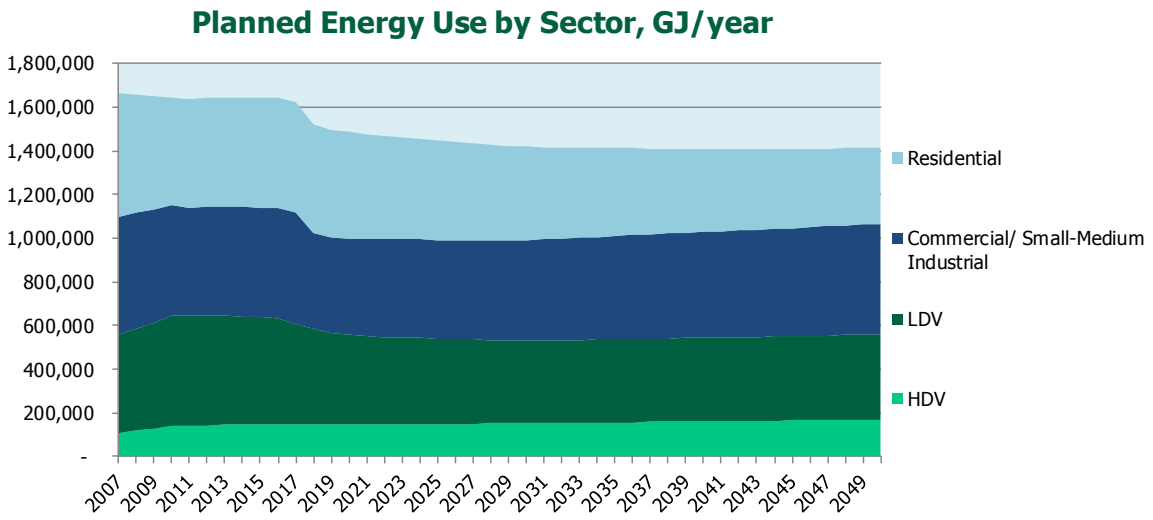
Energy Use: Total and Per Capita



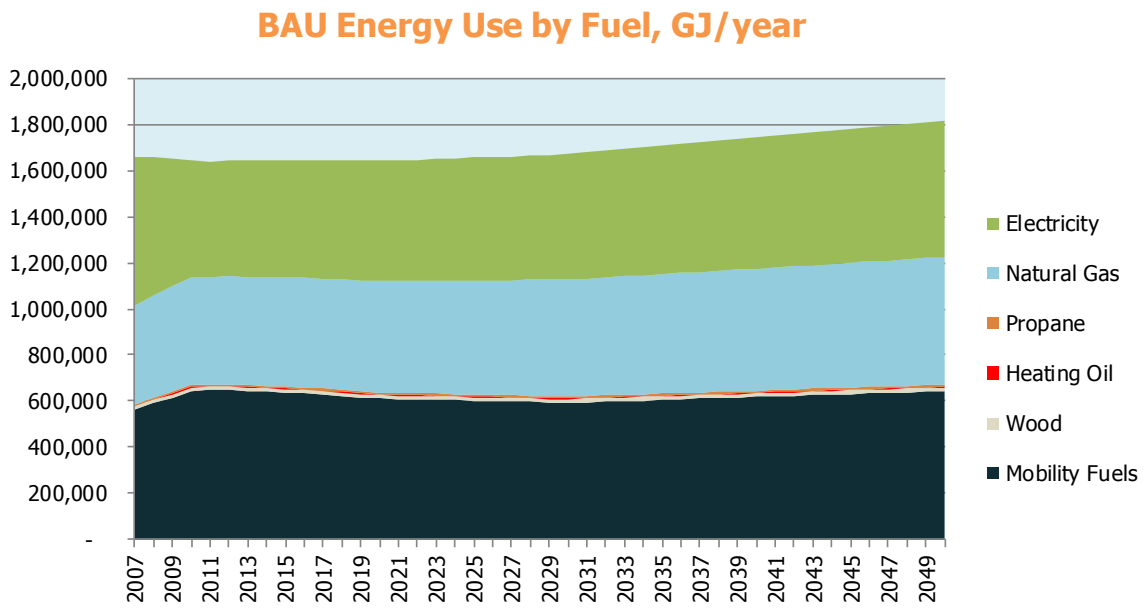


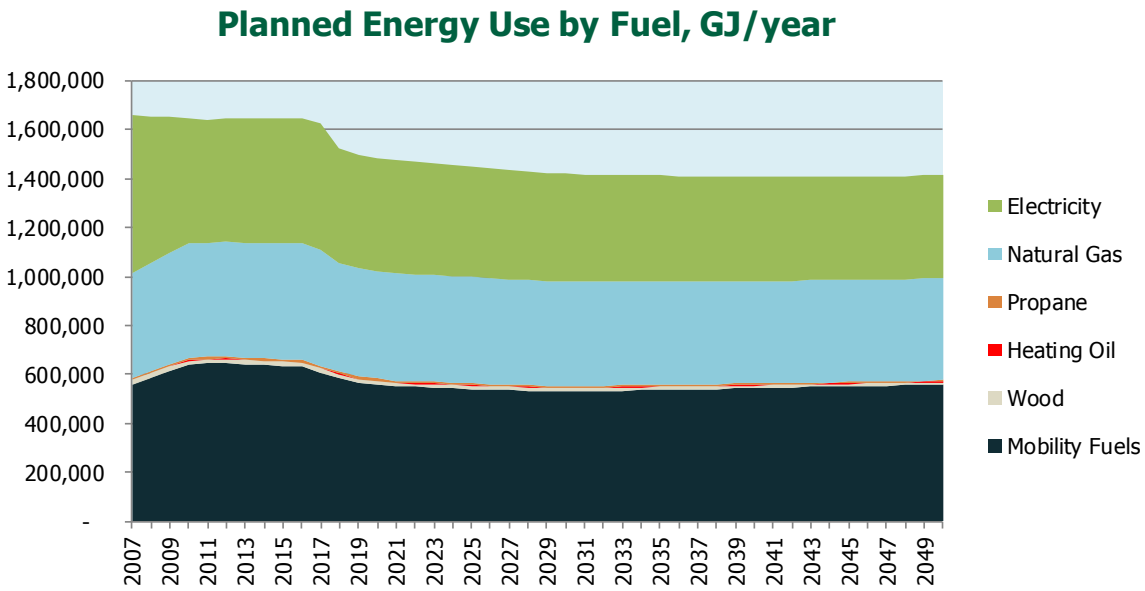
Energy Use by Sector: BAU and Planned



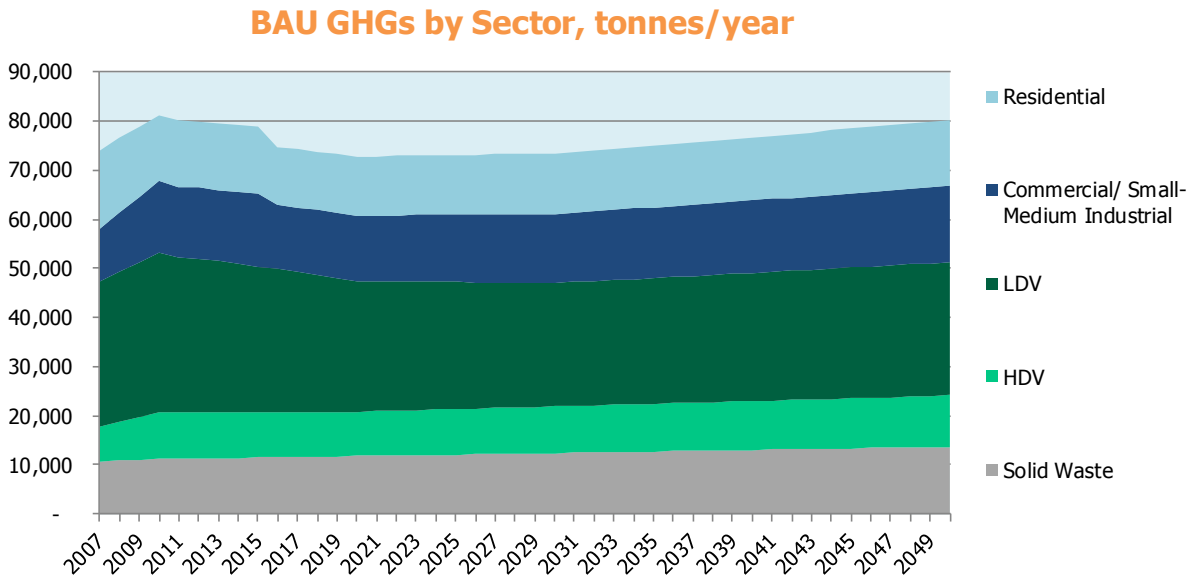


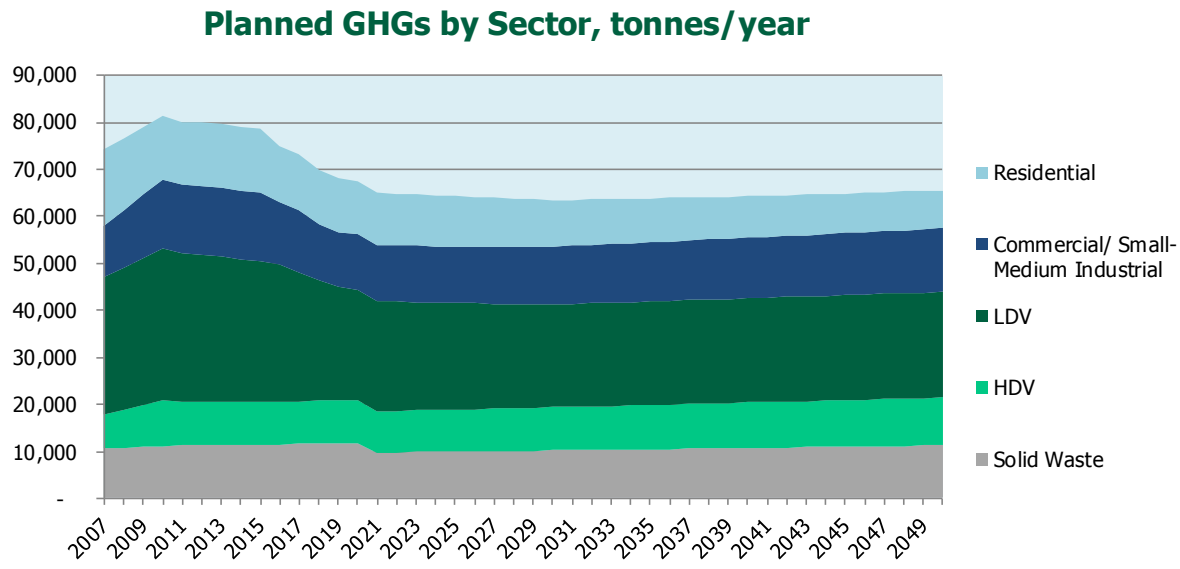
Energy Use by Fuel: BAU and Planned



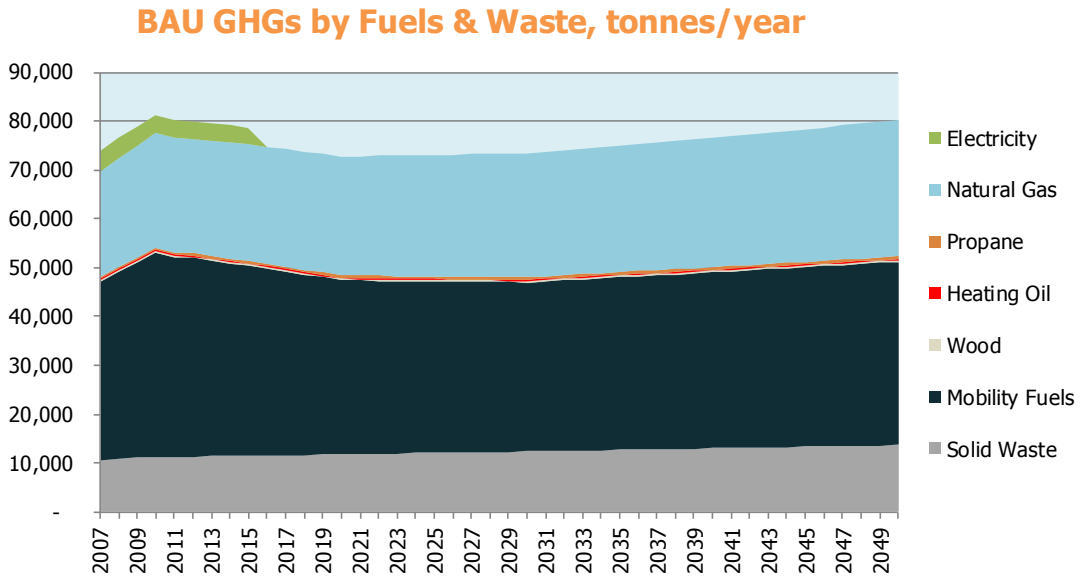


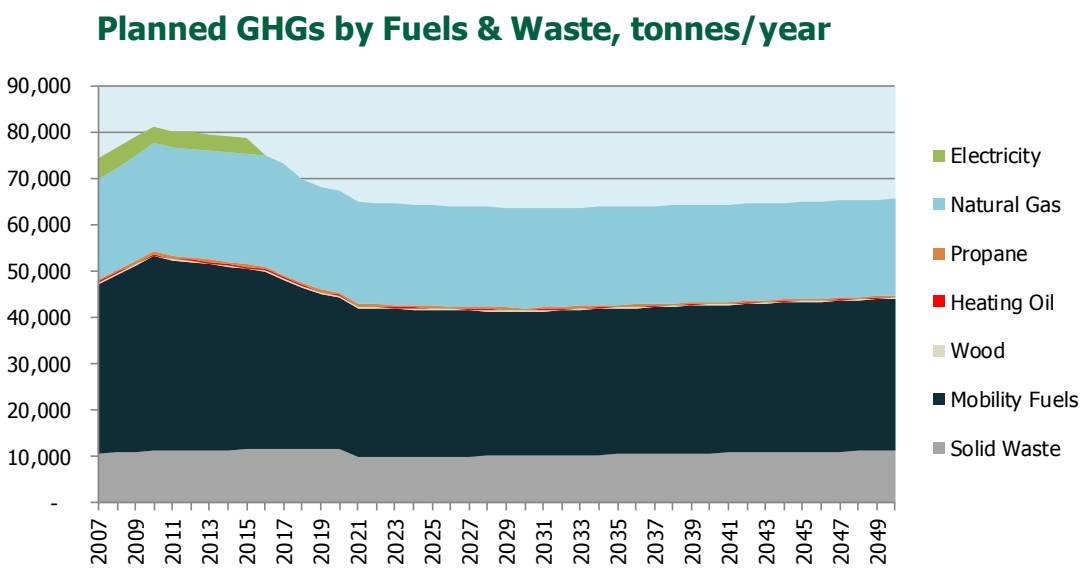
GHG Emission by Sector: BAU and Planned



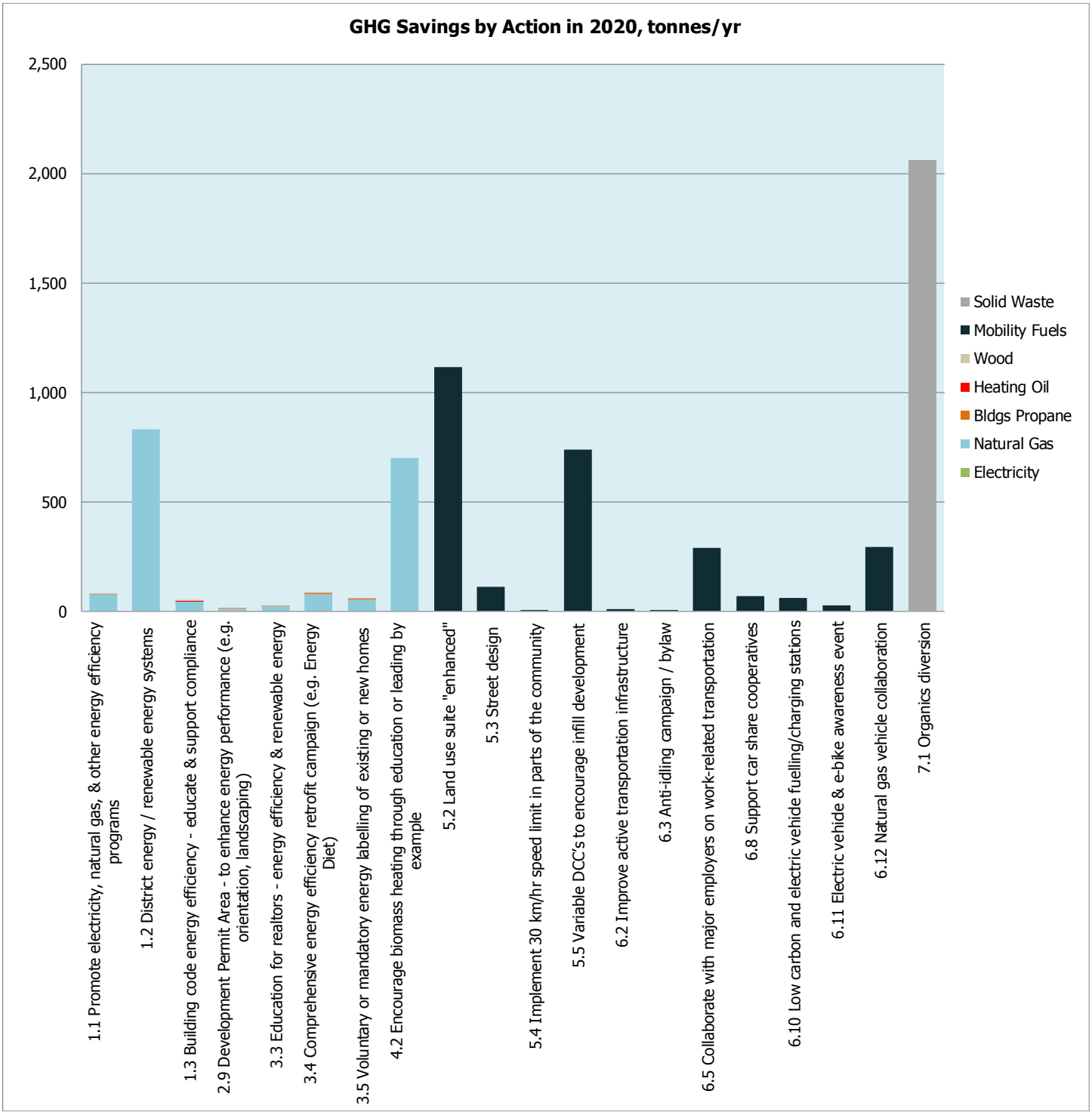


GHG Emissions by Fuel and Waste: BAU and Planned





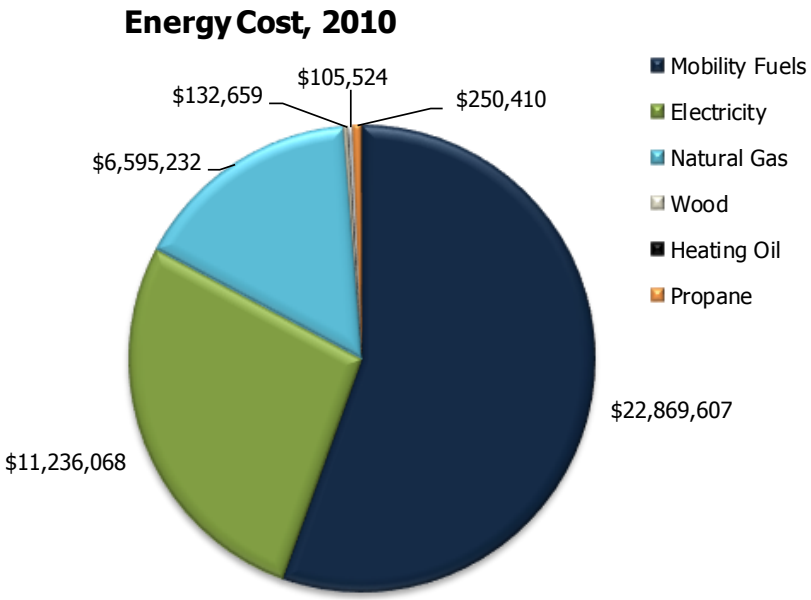
GHG Savings by Action



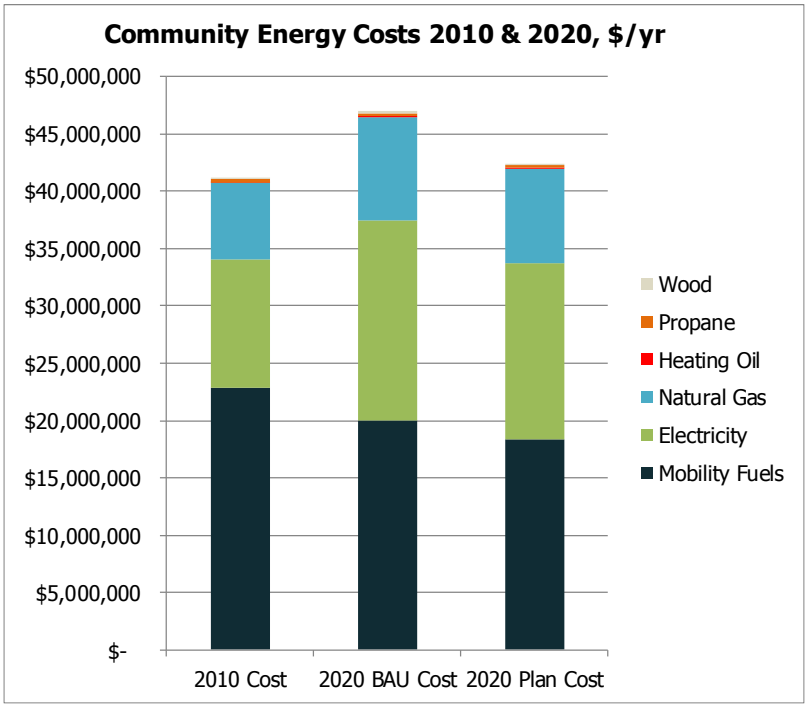
Community Financial Savings

For Prince Rupert, only a small percentage of the energy dollars spent within the community remain within the community. Therefore, a significant co-benefit of implementing this plan to reduce energy consumption and emissions is that reducing the energy dollars spent will help people, families, and businesses to reduce their expenses. In addition, using locally generated energy will help to keep energy dollars local rather than exporting them, just as consumption of local food helps the local economy.

The following chart shows the approximately $41 million ($3,200 per capita) of Prince Rupert community energy expenditures made in 2010, split by fuel type. The chart is derived from energy consumption data from the Province of BC, and local energy costing information.

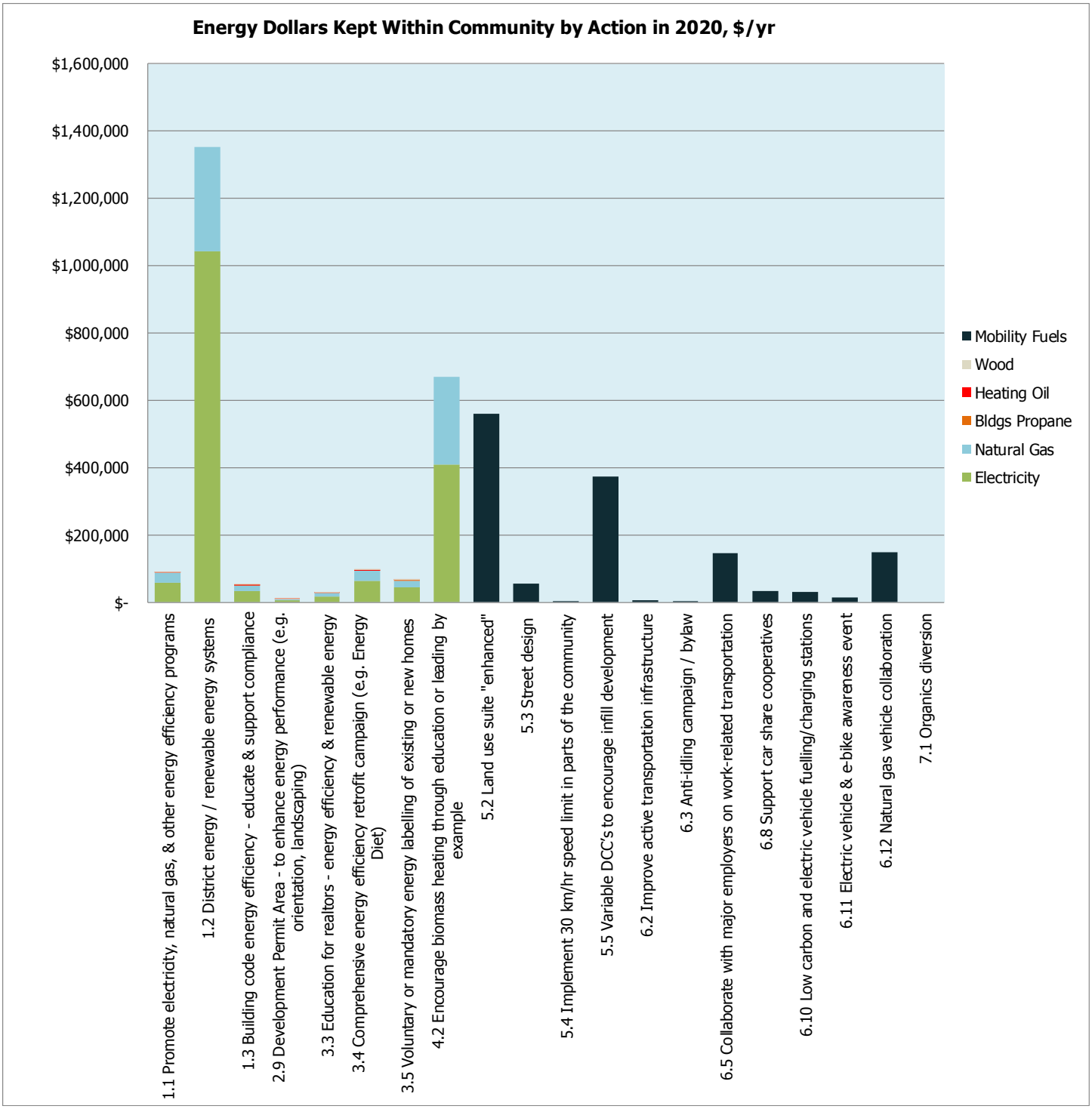


The impacts of the plan are shown in the following chart, comparing 2010 and 2020. Prince Rupert community energy costs are projected to be reduced by approximately 10% through plan implementation. The model assumes that the energy prices for electricity and natural gas have increased between 2010 & 2020, while propane, wood, and heating oil stay the same, and mobility fuels slightly decrease. Although energy prices are very difficult to predict, there is confidence that the price of electricity will increase over the next few years. The 10% plan cost reduction equates to about $4,600,000 per year ($350 per capita).



From a resilience perspective, increasing building energy efficiency through insulation, increasing opportunities for active transportation, and increasing the local food supply makes the community better able to cope with potential interruptions in energy supply. Plus energy efficiency and local generation opportunities also make the community better able to cope with fluctuations or shocks to energy prices.

Estimates for the financial savings, through keeping energy dollars local, that could be attributed to each action are shown in the following chart.


Energy Dollars Kept Within Community by Action in 2020, $/yr
$1,600,000
$1,400,000
$1,200,000
$1,000,000
$800,000
$600,000
$400,000
$200,000
$-
Mobility Fuels
Wood
Heating Oil
Bldgs Propane
Natural Gas
Electricity
1.1 Promote electricity, natural gas, & other energy efficiency programs
1.2 District energy / renewable energy systems
1.3 Building code energy efficiency - educate & support compliance
2.9 Development Permit Area - to enhance energy performance (e.g. orientation, landscaping)
3.3 Education for realtors - energy efficiency & renewable energy
3.4 Comprehensive energy efficiency retrofit campaign (e.g. Energy Diet)
3.5 Voluntary or mandatory energy labelling of existing or new homes
4.2 Encourage biomass heating through education or leading by example
5.2 Land use suite "enhanced"
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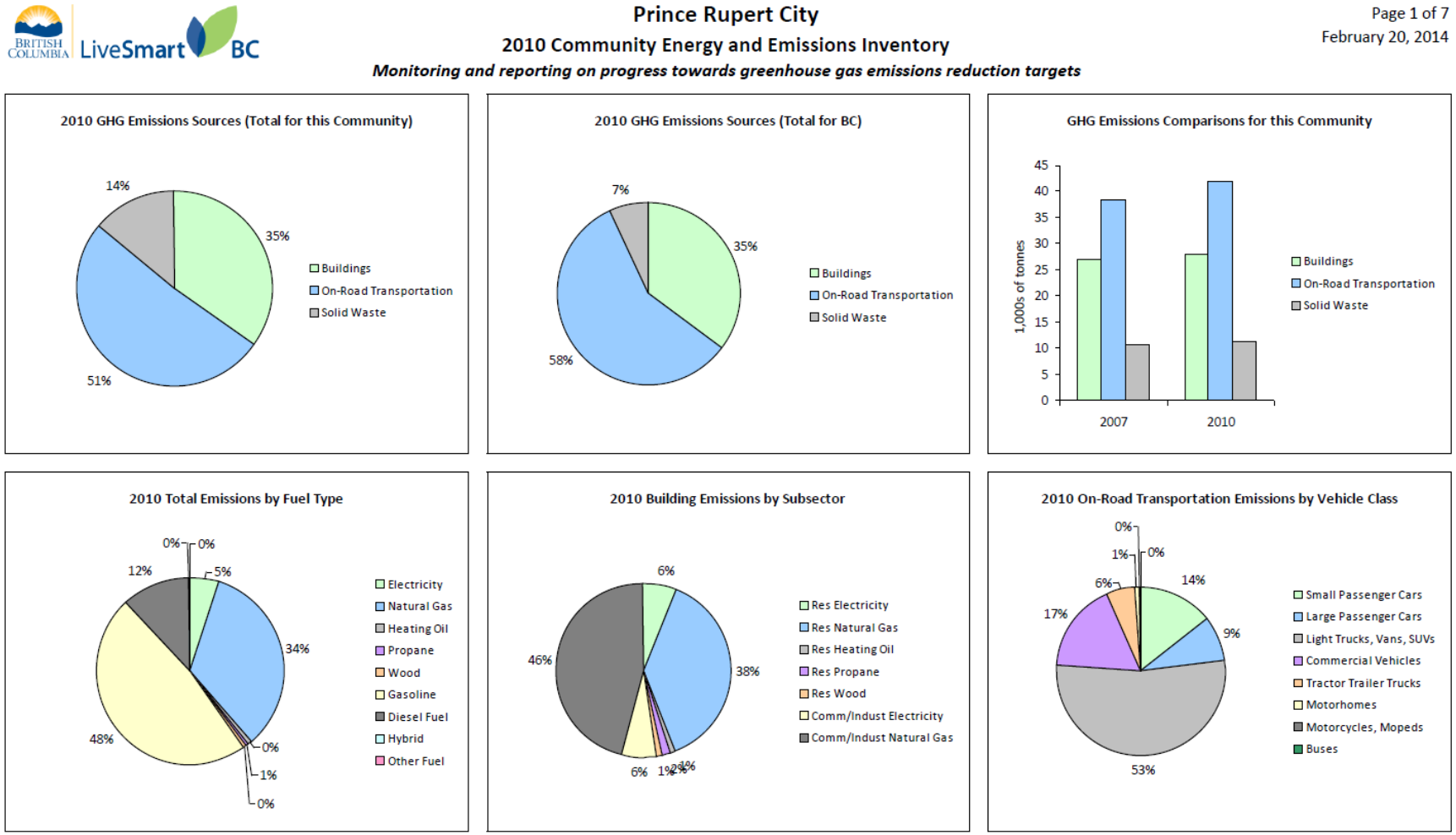
6.2 Improve active transportation infrastructure
6.3 Anti-idling campaign / bylaw
6.5 Collaborate with major employers on work-related transportation
6.8 Support car share cooperatives
6.10 Low carbon and electric vehicle fuelling/charging stations
6.11 Electric vehicle & e-bike awareness event
6.12 Natural gas vehicle collaboration
7.1 Organics diversion

Appendix 1 – 2010 Community Energy & Emissions Inventory for Prince Rupert*



* Note the 2012 CEE data is expected to be released by the Province in the next few months.

Core Items

On-Road Transportation		2007					2010				
		Connections	Consumption	Avg VKT (km)	Energy (GJ)	C02e (t)	Connections	Consumption	Avg VKT (km)	Energy (GJ)	C02e (t)
Small Passenger Cars	Hybrid								23,500	132	8
	Gasoline	1,495	2,514,630 L	18,000	88,013	5,965	1,464	2,597,370 L	19,100	90,908	5,824
	Diesel Fuel	37	65,113 L	26,500	2,494	178	40	64,983 L	24,000	2,488	171
	Other Fuel								30,100	80	4
Large Passenger Cars	Hybrid			38,800	82	6	15	26,328 L	33,000	921	59
	Gasoline	775	1,741,110 L	19,700	60,939	4,136	700	1,628,271 L	20,400	56,990	3,656
	Diesel Fuel			12,100	171	12			6,700	198	13
	Other Fuel	20	50,591 L	16,900	1,279	77			16,200	371	23
Light Trucks, Vans, SUVs	Hybrid			27,900	77	5			24,800	366	24
	Gasoline	2,914	8,153,709 L	19,200	285,381	19,480	3,183	9,521,165 L	20,800	333,241	21,569
	Diesel Fuel	90	234,833 L	15,300	8,993	640	72	226,977 L	19,400	8,693	601
	Other Fuel	19	37,080 L	11,300	938	57			9,700	200	12
Commercial Vehicles	Gasoline	270	824,719 L	18,000	28,866	1,938	312	1,018,016 L	19,300	35,630	2,277
	Diesel Fuel	294	1,182,461 L	22,700	45,288	3,181	382	1,885,753 L	27,900	72,225	4,924
	Other Fuel			10,000	234	14			14,500	206	13
Tractor Trailer Trucks	Diesel Fuel	57	833,369 L	39,300	31,918	2,242	62	886,180 L	38,300	33,940	2,314
Motorhomes	Gasoline	28	76,552 L	19,000	2,679	178	27	71,077 L	18,800	2,487	158
	Diesel Fuel	18	64,941 L	19,600	2,487	175	20	68,236 L	19,100	2,613	178
	Other Fuel			24,300	98	6					
Motorcycles, Mopeds	Gasoline	102	22,922 L	5,500	802	54	119	31,125 L	6,300	1,090	68
Buses	Gasoline			21,600	253	18			24,000	540	34
	Diesel Fuel								16,300	134	8
Totals		**6,119**	**15,802,030 L**	**18,999**	**560,992**	**38,362**	**6,396**	**15,802,030 L**	**20,637**	**643,453**	**41,938**

Prince Rupert City

2010 Community Energy and Emissions Inventory

Monitoring and reporting on progress towards greenhouse gas emissions reduction targets

Buildings		2007				2010			
		Connections	Consumption	Energy (GJ)	C02e (t)	Connections	Consumption	Energy (GJ)	C02e (t)
Residential	Wood	N/A	15,058 GJ	15,058	305	N/A	14,038 GJ	14,038	284
	Heating Oil	N/A	3,184 GJ	3,184	224	N/A	2,969 GJ	2,969	203
	Propane	N/A	8,703 GJ	8,703	531	N/A	8,113 GJ	8,113	495
	Natural Gas	2,688	263,520 GJ	263,520	13,218	2,688	210,540 GJ	210,540	10,561
	Electricity	5,957	75,857,730 kWh	273,088	1,897	5,918	72,199,500 kWh	259,918	1,805
Commercial/Small-Medium Industrial	Natural Gas	380	162,420 GJ	162,420	8,147	380	260,548 GJ	260,548	13,069
	Electricity	989	104,468,201 kWh	376,085	2,612	961	68,250,362 kWh	245,701	1,706
Totals		**10,014**		**1,102,058**	**26,934**	**9,947**		**1,001,827**	**28,123**

Solid Waste		2007				2010			
		Connections	Consumption	Energy (GJ)	C02e (t)	Connections	Consumption	Energy (GJ)	C02e (t)
Community Solid Waste	Solid Waste	0	9,669 t	N/A	10,670	0	10,469 t	N/A	11,195
Totals		**0**			**10,670**	**0**			**11,195**

Memo Items

Buildings		2007				2010			
		Connections	Consumption	Energy (GJ)	C02e (t)	Connections	Consumption	Energy (GJ)	C02e (t)
Large Industrial	Natural Gas	9	263,295 GJ	263,295	13,207	9	128,168 GJ	128,168	6,429
	Electricity	1		0	0	2		0	0
Totals		**10**		**263,295**	**13,207**	**11**		**128,168**	**6,429**

Prince Rupert City

2010 Community Energy and Emissions Inventory

Monitoring and reporting on progress towards greenhouse gas emissions reduction targets

Totals for Transportation, Buildings and Solid Waste

Fuel Type	2007 (Population: 12,906)			2010 (Population: 12,994)		
	Consumption	Energy (GJ)	C02e (t)	Consumption	Energy (GJ)	C02e (t)
Hybrid	0 L	159	11	26,328 L	1,419	91
Gasoline	13,333,642 L	466,933	31,769	14,867,024 L	520,886	33,586
Diesel Fuel	2,380,717 L	91,351	6,428	3,132,129 L	120,291	8,209
Other Fuel	87,671 L	2,549	154	0 L	857	52
Wood	15,058 GJ	15,058	305	14,038 GJ	14,038	284
Heating Oil	3,184 GJ	3,184	224	2,969 GJ	2,969	203
Propane	8,703 GJ	8,703	531	8,113 GJ	8,113	495
Natural Gas	425,940 GJ	425,940	21,365	471,088 GJ	471,088	23,630
Electricity	180,325,931 kWh	649,173	4,509	140,449,862 kWh	505,619	3,511
Solid Waste	9,669 t	0	10,670	10,469 t	0	11,195
Grand Totals		**1,663,050**	**75,966**		**1,645,280**	**81,256**

Prince Rupert City

2010 Community Energy and Emissions Inventory

Monitoring and reporting on progress towards greenhouse gas emissions reduction targets

Supporting Indicators

No new supporting indicator data have been provided in the 2010 reports. Work is currently underway to produce a complete second round of data for the indicators below in the 2012 reports (available in 2014). In the interim, we are including the same supporting indicator data that was provided in the 2007 reports. Feedback is requested on all supporting indicators; please contact us directly at

Housing Type - Private dwellings by structural type

Housing type is important for reducing building-related GHG emissions and energy consumption. A trend toward fewer single family dwellings indicates an increase in residential density, which is known to reduce transportation-related GHG emissions.

	1996		2001		2006	
	Units	%	Units	%	Units	%
Single Detached House	3,140	35	3,140	58	2,860	57
Semi-Detached House	255	3	280	5	205	4
Row House	475	5	350	6	310	6
Apartment, Duplex	660	7	610	11	755	15
Apartment, 5 storeys or higher	130	1	75	1	25	0
Apartment, under 5 storeys	1,015	11	865	16	795	16
Other Single Attached House	25	0	10	0	5	0
Movable Dwelling	180	2	130	2	105	2

Commute to Work - Employed labour force - by mode of commute

An increase in the number of people choosing to walk, cycle and use transit reduces GHG emissions. More compact, complete, connected communities should see an increase in the use of these transportation modes.

	1996		2001		2006	
	Units	%	Units	%	Units	%
Car, Truck, Van as Driver	4,730	64	4,485	68	3,570	62
Car, Truck,Van as Passenger	925	13	780	12	805	14
Public Transit	195	3	200	3	195	3
Walked	1,135	15	890	13	960	17
Bicycle	140	2	55	1	65	1
Motorcycle	10	0	15	0	10	0
Taxicab	100	1	85	1	85	1
Other Method	160	2	125	2	110	2

Parks and Protected Greenspace

Parks and protected greenspaces are important for the protection and enhancement of community carbon sinks.

	2009	
	Units	%
National Parks	0	0
Provincial Parks / Protected Areas	0	0
Local Parks	30	1
Agricultural Land Reserve	0	0
Other land use	5,495	99
Total Parks and Protected Area	30	1
Total Land Area	5,525	100

* Total is net of Indian Reserves
** Quantity of parkland may be underestimated

Residential Density

Increasing residential densities is known to reduce vehicle use resulting in fewer transportation-related GHG emissions. There are many additional benefits from more compact development.

	2009	
	Units	%
National Parks	0	0
Provincial Parks / Protected Areas	0	0
Local Parks	30	1
Agricultural Land Reserve	0	0
Other land use	5,495	99
Total Parks and Protected Area	30	1
Total Land Area	5,525	100

* Net of Crown land, parks, Indian Reserves, water features, airports, ALR,waste disposal site

Commute Distance

Shorter commute distances generally reduce GHG emissions by increasing the likelihood of people walking, cycling or using transit. Commute distance is also indicative of the 'completeness' of a community from an employment perspective.

	2006	
	Units	%
Less than 5 km	4,675	94
5 to 9.9 km	40	1
25 km or more	215	4
15 to 24.9 km	0	0
10 to 14.9 km	20	0

Appendix 2 – Actions Descriptions

The descriptions below are taken from the CEEP Actions Guide.

1. Buildings - Basics

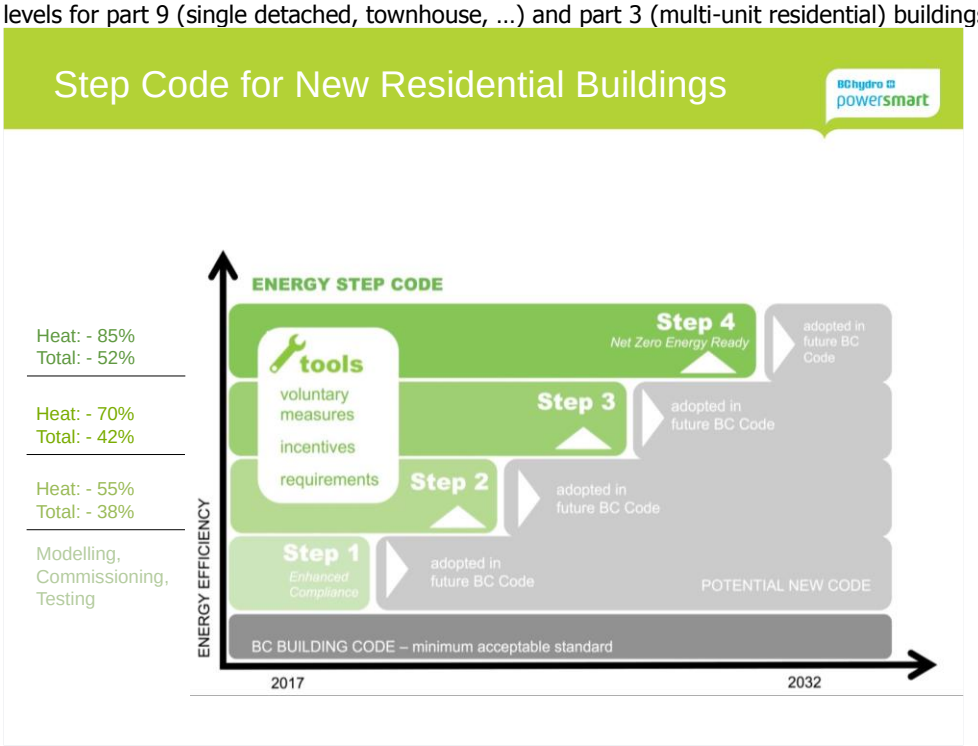
These actions are recommended for all local governments unless there is a compelling reason that a particular measure should not be implemented.

Action	Description
1.1 Promote electricity, natural gas, and other energy efficiency programs	**Key Question**: This action is recommended unless there is a reason why it cannot be done. **Description:** The BC utilities offer many electricity and natural gas conservation programs. At times, the Federal and Provincial governments also offer energy conservation programs. Local governments can assist in promotion of these programs, increasing awareness and encouraging local participation in residential and commercial sectors (e.g. communicating about BC Hydro programs during building permit application processes), so residents and businesses can save electricity and money.
	% Energy Savings Calculation: Commercial = a*b*c, Residential = d*e*f a. % of commercial customers reached b. % of reached commercial that implement c. average improvement from implementing d. % of residential customers reached e. % of those reached that implement f. average % improvement from implementing Example: (a*b*c) = (90% * 5% * 30%) = 1.4% (commercial buildings sector) (d*e*f) = (90% * 5% * 30%) = 1.4% (residential buildings sector)
1.2 District energy / renewable energy systems	**Key Question**: Is there a source of waste heat (rink, industry, sewer pipes, wastewater treatment plant, …) near to heat demand (pool, hospital, …) OR are several public-sector (municipality, regional district, provincial ministry, health authority, school district, …) facilities located close to each other? **Description:** Development permit area (DPA) guidelines can be used to require renewable energy systems external to buildings, such as a renewable district energy system. DPA's can enable the maximization of passive solar opportunities. District energy (DE) example: Revelstoke Community Energy Corporation.
	Calculation: Existing Residential = a*b*c, New Residential = a*d*c Existing Commercial = c*f*g, New Commercial = e*f*h a. % of energy used for heating & cooling for residential (77%) b. % of existing residential connected to DE c. % reduction of energy from DE for residential d. % of new residential connected to DE e. % of energy for heating and cooling in industrial/commercial/institutional (ICI) f. % reduction in heating / cooling from DE for ICI g. % of existing ICI connected to DE h. % of new ICI connected to DE Example: Energy improvements in indicated sectors:

Action	Description
	(a*b*c) = (77% * 1% * 66%) = 0.5% (existing residential buildings sector) (a*d*c) = (77% * 5% * 66%) = 2.5% (new residential buildings sector) (e*f*g) = (63% * 66% * 1%) = 10.4% (existing commercial sector) (e*f*h) = (63% * 66% * 25%) = 4.2% (new commercial sector)
1.3 Building code energy efficiency - educate & support compliance	**Key Question**: Would buildings be more energy efficient with enhanced building code enforcement and inspection, and if builders / developers have a better understanding of the code? **Description:** Greening the Building Code is an ongoing provincial initiative, improving energy performance of new housing. The energy efficiency requirements of the BC Building Code may not be reflected in some buildings due to a lack of knowledge by builders, and limited number of required inspection or enforcement practices. Local governments can help fix this by: • Changing building inspection requirements or practices. • Increasing the number of Certified Energy Assessors. • Promoting educational sessions on the BC Building Code to builders / developers in their community. The Homeowner's Protection Office regularly runs such sessions.
	% Energy Savings Calculation: New Residential = a*b, New Commercial = c*d a. % new residential buildings captured by improved enforcement b. % improvement in new commercial buildings by energy type through better enforcement c. % new commercial buildings captured by improved enforcement d. % improvement in new residential buildings by energy type through better enforcement Example: (a*b) = (80% * 15%) = 12% (new residential buildings) (c*d) = (80% * 5%) = 4% (new commercial buildings)
1.4 Reduce local government barriers to building scale renewable energy	**Key Question:** What barriers are people aware of for building scale renewable energy systems? **Description:** Some local governments have barriers in place for building scale renewable energy systems, e.g. exceedingly high fees and requirements for the installation of solar photovoltaic panels in some communities, while minimal fees and requirements in others. The fees and costs for meeting requirements in some communities for solar systems can comprise up to 20+% of the installation cost, acting as a considerable deterrent. Barriers like these can be reduced.
	% Energy Savings Calculation: Residential = a*b, Commercial = c*d a. % of homes that may install solar photovoltaics or other renewable energy systems per year b. % of annual electricity reduction for those properties that will be generated by those systems c. % of commercial buildings that may install solar photovoltaics or other renewable energy systems per year d. % of annual electricity reduction that will be generated by those systems Example: Energy improvements in indicated sectors: (a*b) = (0.1% * 50%) = 0.05% per year (residential buildings sector) (c*d) = (0.1% * 10%) = 0.01% per year (commercial sector)

2. Buildings - Growth Measures

These measures typically have the greatest applicability in communities that are growing or are land-constrained. Communities with a low/no growth rate may also find some measures useful.

Action	Description
2.1 Stretch Code	**Key Question**: Is the community growing? And Does the Community want efficient new buildings? **Description:** Stretch code can be required or incented by local governments at one of four levels for part 9 (single detached, townhouse, …) and part 3 (multi-unit residential) buildings.  **% Energy Savings Calculation**: New Buildings = a*b*c, Existing Buildings = d*e*f a. % new residential buildings covered by step code b. % energy improvement for Step (0, 38%, 42%, 52%) c. % adoption (100% for required, usually less for incentives such as zoning or density bonusing, fee-bates, expedited approvals, revitalization tax exemption, DCC reductions) Example: (a*b*c) = (100%*52%*100%) = 52 % new buildings

3. Residential Buildings

The following actions may be applicable to residential buildings.

Action	Description
3.1 Sign on to solar-ready building code provision	**Key Question**: This action should be considered. **Description:** The Province of BC has developed a model solar-ready bylaw (link below) http://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/the-codes/other-regulations/solar-hot-water-ready that local governments can sign on to and implement in their jurisdictions. This bylaw reduces the cost of installing solar hot water (SHW) after construction at minimal cost at construction time. Domestic hot water is approximately 30% of building energy use. Solar hot water can provide up to 50% - 60% of domestic hot water use cost effectively. Applies to residential only.
	% Energy Savings Calculation: (a*b*c) a. % of new residential that is single family b. % of new residential that installs SHW c. Average % reduction on total household fuel use by fuel type from SHW (typically 30% of household energy use is hot water, typical SHW installations cover 50% of domestic hot water) improvements Example: (a*b*c) = (60% * 1% * (30% * 50%) = 0.1% for new residences
3.2 Education for developers – energy efficiency & renewable energy	**Key Question:** This action is recommended unless there is a compelling reason not to implement. **Description:** Developers make key decisions as projects are being developed, that affect the energy performance of buildings over their lifecycle. While some developers pursue high performance buildings and renewable heating/cooling systems, many lack awareness of these systems and view them as increasing cost and risk. Education and showcasing can build awareness that leads to action. Applies primarily to residential development.
	% Energy Savings Calculation: (a*b*c) a. % of development community reached b. % of those in (a) who integrate energy improvements into their developments c. Average % impact by energy type of improvements Example: (a*b*c) = (20% * 10% * 20%) = 0.4% for new buildings
3.3 Education for realtors - energy efficiency & renewable energy	**Key Question:** This action should be considered. **Description:** Realtors help homeowners with their purchasing decisions, but many lack knowledge of energy efficiency and what EnerGuide or ENERGY STAR® for New Homes ratings are. This is despite the fact that energy costs can be significant for a homeowner, and should be taken into account when considering affordability. This education helps to create consumer demand for energy efficiency, and can also help to set the stage for greater use of these rating systems by a local government. Example: Nanaimo.

Action	Description
	% Energy Savings Calculation: (a*b) a. % penetration into housing market b. Average % improvement in energy efficiency Example: (a*b) = (10% * 20%) = 2% for new & existing homes
3.4 Comprehensive energy efficiency retrofit campaign (e.g. Energy Diet)	**Key Questions:** Are there a lot of existing older homes in the community (built prior to 2006)? Are utility or other incentives sufficient to proceed? And how much effort and resources is the local government, utility, and/or local non-profit able to put in to a campaign? **Description:** Energy efficiency retrofit campaigns in BC have been very successful in increasing the energy efficiency of the existing housing stock. The most successful campaigns take place at times of high rebate levels from utilities, Provincial or Federal government, and have local government participation as well. CEA has written a comprehensive publication on these campaigns, which can be found here: http://communityenergy.bc.ca/download/947/. It may be worthwhile to still conduct a campaign even when incentive levels are not particularly high, and/or when a local government, utility, or local non-profit cannot put in significant effort or resources towards a campaign. Examples: Rossland Energy Diet, Nelson EcoSave.
	% Energy Savings Calculation: (a*b*c) a. % of existing housing stock built before 2006 b. % of those in (a) who are reached through the campaign and incorporate energy improvements c. Average % impact by energy type of improvements Example: (a*b*c) = (75% * 10% * 20%) = 1.5% for existing homes

Action	Description
3.5 Voluntary or mandatory energy labelling of existing or new homes	**Key Questions:** Are there a lot of existing older homes in the community (built prior to 2006)? And/or could residents benefit from education on energy efficiency? **Description:** Local governments can encourage or mandate energy labelling of existing and/or new homes. Labelling of new homes can be encouraged or mandated at the point of sale, while for existing homes it can also take place at the point of renovation. Energy labelling can be conducted through EnerGuide ratings, which are the most widely used form of residential energy labelling in Canada, and was developed by Natural Resources Canada. EnerGuide ratings on homes can help a prospective homeowner compare different homes according to their energy efficiency, and thus allows the market to assign a value to this. It also provides encouragement to homeowners and builders to improve energy efficiency. Plus, EnerGuide ratings are educational, they come supplied with reports identifying ways homes can have their energy efficiency improved. The cost for existing homes is $325 + taxes and travel, and the cost for new homes ranges from $450-700. Local governments can choose to make this voluntary or mandatory. Voluntary applications should likely include incentives to reduce the cost of EnerGuide ratings in order to improve uptake. Both voluntary and mandatory applications should likely be coupled with education, e.g. for realtors. Example: the City of Vancouver has made EnerGuide ratings mandatory for all homes undergoing renovations with a value of $5,000 or greater (with some exemptions). Note that the City of Victoria has received a legal opinion which states that local governments have the authority to require energy audits as a condition of obtaining a building permit (existing or new homes), provided it is done by bylaw.
	% Energy Savings Calculation: (a*b*c) a. % of houses that will undergo assessments each year b. % of those in (a) that will improve energy efficiency c. Average % impact by energy type of improvements Example: (a*b*c) = (5% * 50% * 20%) = 0.5% of new & existing homes, ***per year***

Action	Description
3.6 Efficient wood stove program & bylaws	**Key Question**: Do many residents use inefficient wood fireplaces / stoves? **Description:** The Provincial Wood Stove Exchange Program encourages residents to change out their older, smoky wood stoves for low-emission appliances — including new CSA-/EPA-certified clean-burning wood stoves. Offered at the community level, the program involves funding and incentives to promote the exchange and replacement of old wood stoves. It also delivers education to help people operate their wood-burning appliances efficiently. In the Skeena region, communities contributed between $7,000 and $15,000 to offer their residents extra incentives. In addition, permit fees for installation of new appliances were waived, and additional incentives were established in the form of bylaws requiring mandatory removal of old wood stoves. Also, the City of Duncan has put in place a bylaw whereby any property sold must have wood burning stoves removed if they are not CSA / EPA certified. Many communities also hold workshops on clean & safe operation of woodstoves. Note: assumes increased efficiency of burning, results in less wood being consumed, and has little impact on fossil fuels and GHGs (since wood-burning is considered low carbon).
	% Energy Savings Calculation: (*for wood fuel only*) = (a*b) a. % of wood-stoves changed as a result of the program b. Average % improvement in efficiency per stove Example: (a*b) = (10% * 40%) = 4% for wood fuel for existing homes
3.7 Helping people source wood fuel (e.g. from community forest)	**Key Question**: Do many residents struggle to source wood fuel for their stoves, at a reasonable price? **Description:** In some rural BC communities it can be difficult to source wood fuel for wood stoves, due to restrictions on the use of waste material from the forestry industry. A local government or local non-profit may be able to help people source wood fuel, e.g. if there is a community forest, and using the waste wood from its operations.
	% Energy Savings Calculation: *(all building energy types except wood fuel)* a. % of people who use the cheaper sourced wood fuel b. % decrease in use of other energy types Example: (a*b) = (5% * 10%) = 0.5% for existing homes

4. Commercial / Institutional Buildings and Transportation

The following measures apply to the commercial / institutional sector. Note that there are likely other specific opportunities to engage this sector in specific communities.

Action	Description
4.1 Host Climate Smart Program Delivery	**Key Question**: Are there small and mid-sized businesses that would engage in climate training if offered? **Description:** ClimateSmart provides training, tools, and technical assistance to small and midsized businesses. This includes three, four-hour training sessions. Each session is run by experts experienced in advising small and medium-sized enterprises on best practices of managing and reducing GHGs. Groups consist of 10-15 enterprises, with training sessions scheduled over a ten week period. Local governments can sponsor ClimateSmart to come to their community.
	% Energy Savings Calculation: for commercial sector buildings = (a*b) and for commercial sector transportation= (c*d) a. % of commercial sector participating in climate smart b. % improvement in buildings as a result of participating in the program c. % of commercial sector participating in climate smart d. % improvement in buildings as a result of participating in the program Example: (a*b) = (2% * 15%) = 0.3% for existing commercial buildings Example: (c*d) = (2% * 10%) = 0.2% for commercial transportation
4.2 Encourage biomass heating through education or leading by example	**Key Question**: Is there a local or regional biomass supply that could be used for heating? **Description:** Buildings heating primarily with propane, heating oil, or in some cases electricity may have a strong financial case for conversion to automated forms of bioenergy such as wood pellet and woodchip. The reasons that some buildings may have not yet converted to wood pellet, despite the substantial cost savings in energy include knowledge and capital costs. Commercial buildings can be excellent candidates. Biomass heating can also have good potential for local economic development, through developing local wood fuel supply chains. Note that modern biomass heating systems are extremely clean burning. Local governments can encourage biomass heating through education or leading by example (biomass installations in local government buildings). The Community Energy Association has written two comprehensive publications on biomass heating, which can be found here: http://communityenergy.bc.ca/?dlm_download_category=heating Further calculations available in "Option 1B: Project Profile Efficient Building Retrofits and Fuel Switching" at the 'how' tab of www.toolkit.bc.ca/carbon-neutral-government.

Action	Description
	% Emissions Savings Calculation = (a*b*c) a. % of existing buildings that convert to biomass b. %of building GHG's associated with space heating c. %of heat load that biomass covers Example: (a*b*c) = (10%*70%*80%) = 5.6%, for commercial buildings
4.3 Convert local government owned streetlights to LED	**Key Question:** This action is recommended unless there is a compelling reason not to implement. **Description:** Although this is a corporate action, it is very popular among local governments, and can also be very visible to a community, providing a good example of leading by example. It could help to encourage privately owned outdoor lights to convert to LED as well. Note that in most communities, a portion of streetlights are owned by the utility, and another portion are owned by the local government. At present, it is easier to change local government owned streetlights to LED than utility owned streetlights.
	% Emissions Savings Calculation = (a*b) *(electricity only)* a. % of community commercial electricity consumption associated with local government owned streetlights b. % reduction in electricity consumption Example: (a*b) = (0.3%*30%) = 0.1%, for commercial electricity

5. Light Duty Vehicle Transportation – Urban Form

Urban form including smart growth and street design offer the greatest single opportunity for many communities to reduce emissions.

Action	Description
5.1 Land use suite lite	**Key Question**: Recommended for communities wherever politically practical. **Description:** Designate growth areas and set minimum lot sizes outside growth area; apply mixed-use zoning for downtown. This can preserve the rural character outside of downtown while enabling more residents to live in proximity to services. This can reduce transportation needs while developing areas that are most economically maintained by the local government (rather than sprawling infrastructure). Specific zoning is required for primary and secondary growth areas as well as areas outside the designated growth areas. Conservation covenants (such as through land trusts) may also be considered for agricultural lands or natural habitats.
	% Energy Savings Calculation: for Light Duty Vehicle sector= (a*b*c) a. % of community in downtown b. Degree to which the area in (a) exhibits the full implementation of supportive land use c. % reduction in transportation emissions (see Background section for guidance on emissions reduction potential) Example: (a*b*c) = (20% * 20% * 30%) = 1.2% for LDV sector
5.2 Land use suite enhanced	**Key Question**: Recommended for communities seeking significant GHG reductions **Description:** This measure extends 'Land use suite lite'. Beyond designating growth areas, urban containment boundaries could be established to further enforce where growth occurs. Also, the type of growth could be further defined through establishing zones for transit-oriented development or pedestrian-oriented development. An industrial/commercial land strategy may also be required to facilitate eco-industrial networking, transit provisioning and mobility.
	% Energy Savings Calculation: for LDV sector = (a*b*c) a. % of community covered by program b. Degree to which the area in (a) exhibits the full implementation of supportive land use c. % reduction in transportation emissions (see Background section for guidance on emissions reduction potential) Example: (a*b*c) = (50% * 25% * 30%) = 3.8% for LDV

Action	Description
5.3 Street design	**Key Question**: This action is recommended for all communities unless there is a reason why it should not be implemented. **Description:** Reconfigure streets to be 'living streets' / 'complete streets' - including formalizing hierarchy (pedestrian - bike - transit - truck - car). Typically this is a policy decision, followed by street reconfiguration as streets are regularly scheduled for resurfacing / reconstruction for pavement maintenance or installation of utilities. If new streets are required, design to support a grid pattern.
	% Energy Savings Calculation: for LDV sector = (a*b*c) a. % of community covered by program b. Degree to which the area in (a) exhibits the full implementation of supportive land use c. % reduction in transportation emissions (see Background section for guidance on emissions reduction potential) Example: (a*b*c) = (5% * 25% * 30%) = 0.4% for LDV
5.4 Implement 30 km/hr speed limit in parts of the community	**Key Question**: Is a 30km/hr speed limit feasible in parts of the community? **Description:** A 30km/hr speed limit helps to make the community safer and more appealing for pedestrians and cyclists. It also improves accessibility around the community for people of all ages. Examples: Rossland, Wells, Summerland, Penticton
	% Energy Savings Calculation: for LDV sector= (a*b*c)/d a. Number of walking/cycling trips per year b. % of trips that would have been by car c. average walking/cycling trip length d. Total LDV vehicle kilometers travelled (VKT) (estimation can be derived from CEEI data) Example: (a*b*c)/d = (36,500 * 20% * 1.5) / 200,000,000 = 0.01% LDV emissions
5.5 Variable Development Cost Charges (DCC's) to encourage infill development	**Key Question**: Is the community growing? **Description:** Some communities have flat DCC's, however real infrastructure costs can vary based on where a new building or development is located. Infrastructure costs for infill development (e.g. using existing roads and streetlights) may be much lower than for development in an outlying area. This could help encourage development near existing infrastructure, and discourage sprawl, reducing vehicle emissions.
	% Energy Savings Calculation: (a*b*c) a. % new developments covered by policy b. % of those in (a) who locate closer to existing infrastructure c. Average % reduction in trip distances achieved Example: (a*b*c) = (100% * 10% * 25%) = 2.5% reduction in vehicle emissions

Action	Description
5.6 Flow RGS, OCP, and LAP through to zoning	**Key Question**: Recommended for all communities. **Description:** It is important to flow climate and energy-related statements from the RGS or OCP through to local area / neighbourhood plans and zoning. Often good statements in the RGS/OCP just need to be implemented all the way through in a rigorous way.
	% Energy Savings Calculation: N/A – depends on OCP policies.

6. Vehicle Transportation – Infrastructure & Collaboration

Action	Description
6.1 Active transportation planning	**Key Question**: This action is recommended for all communities considering transportation demand management. **Description:** Active transportation planning processes can lead to future policy and infrastructure changes. A number of communities have researched, developed and planned active transportation initiatives through funding grants offered by the Built Environment and Active Transportation (BEAT) initiative of the BC Recreation and Parks Association (BCRPA) and UBCM. Many of these communities are small yet have started ambitious active transportation plans. Such programs can kick-start a transportation demand management (TDM) program for small or mid-size communities, especially those with little or no public transit.
	Calculation: N/A - this is a planning process which will not produce direct results itself, but may lead to projects that will produce savings.
6.2 Improve active transportation infrastructure	**Key Question**: Are there major trip destinations (commercial services, schools, hospital, employers, etc.) less than 3km from a significant number of residences for walking, and within 5-8km for cycling? **Description:** Local governments can easily promote walking. Walking is suitable for trips in small and mid-size communities where distances in town are short. Most people can walk a kilometre in 10 minutes and can walk for 30 minutes, or approximately 3 km, during good-weather months. It is reasonable to target distances of 3 km or less for the promotion of active transportation (if combined with strategies to change people's perception of the time and effort it takes to walk). Cycling is perhaps the fastest way to make a trip of less than 5 km. It is reasonable to target distances of 5 to 8 km for cycling in an active transportation strategy. Cyclists travelling 8 km or more value shower facilities at their final destination, and all cyclists value safe, secure storage for their bikes. These facilities can be installed at various sites of employment in a community, such as public institutions, businesses and regional district or municipal offices. A major barrier to increasing the number of cycling trips to workplaces is lack of secure bike lock-ups and change-room facilities. Requiring these basic facilities can be made part of the development process through a community's planning bylaw. Online tools and guidance to estimate the demand for bike routes is available. In BC, it is estimated that 2% of all trips are by bike as a default. Other important parameters include percentage of cyclists using the bike route that would otherwise have driven, and average bike trip length. Where locally-specific data are not available, the following benchmarks may be used: • % of non-recreational cyclists who would have driven, if they were not cycling: 50%. • Average BC cycling commuter distance: 5km each way, 10km return trip.

Action	Description
	% Energy Savings Calculation: for LDV sector= (a*b*c)/d a. Number of active transportation trips/year b. % of trips that would have been by car c. average trip length d. Total LDV vehicle kilometers travelled (VKT) (estimation can be derived from CEEI data) Example: (a*b*c)/d = (36,500 * 25% * 4) / 200,000,000 = 0.02% LDV emissions
6.3 Anti-idling campaign / bylaw	**Key Question**: Do a significant number of people idle vehicles in the community? **Description:** Natural Resources Canada has the position that idling for over 10 seconds uses more fuel, costs more money, and produces more CO_2 emissions than restarting your engine. There can also be substantial air quality savings. Many communities in BC have bylaws in place that prohibit idling at certain times of the year in certain places. Good places to target may be at schools and nurseries, in order to help protect the health of children. Outside the municipal office can also help to set a good example, and can be an easy place to enforce. Northern Rockies Regional Municipality has an innovative approach, using a carrot rather than a stick to encourage people not to idle. The municipality runs a campaign called "Idle-less October" in Fort Nelson, with sweet treats left on the windshields of non-idling vehicles and labels saying "Thank you for not idling!".
	% Energy Savings Calculation: for LDV sector = (a*b) a. Estimated LDV fuel consumption from idling b. Estimated reduction from anti-idling activities Example: (a*b) = (1% * 10%) = 0.1% LDV emissions
6.4 Special event planning	**Key Question**: Are large special events planned? **Description:** Local governments often promote transit for transportation to major community or sporting events in their area. There are direct benefits to having people try alternative modes of transportation during large events. Experience has shown that people will be more likely (at worst, less reluctant) to use transit after having a good experience at a special event. This was the case in Victoria in 1994 when a 12-day major sporting event saw record modal splits for transit (50% and up), which set the stage for an impressive five-year growth in ridership.
	% Energy Savings Calculation: for LDV sector = (a*b*c) a. % of LDV travel associated with travel to/from event b. % of travel population in (b) affected by action c. Average % reduction in vehicle kilometers travelled by population in (c) Example: (a*b*c) = (1% * 20% * 10%) = 0.02% LDV sector

Action	Description
6.5 Collaborate with major employers on work-related transportation	**Key Question:** Is there a major employer(s) in the community? **Description:** Collaboration with major employers such as industries, schools and hospitals can uncover opportunities to reduce commuting-related transportation emissions. UVic achieved a 27% reduction in campus parking during a 30% growth in student population and major new building activity in the past 16 years. Single-occupant vehicle traffic to campus plunged from 58% in 1992 to 37.5% in 2008, while parking rates soared from minimally priced to market-rate priced.
	% Energy Savings Calculation: for LDV sector = (a*b*c) a. % of LDV travel associated with travel to/from employer/institution b. % of travel population in (a) affected by action c. Average % reduction in vehicle kilometers travelled by population in (b) Example: (a*b*c) = (10% * 50% * 20%) = 1.0% LDV emissions
6.6 Transit suite	**Key Question**: Are there major trip destinations beyond 8km that are not sufficiently served by transit? **Description:** There are 82 transit systems serving 50 communities in BC. Three types of transit service are operated through BC Transit: conventional transit, paratransit and custom transit. • Conventional transit serves the general population using mid-size, large or double-decker buses with fixed routes and fixed schedules. Most buses are fully wheelchair accessible, with door ramps that lower. • Paratransit offers small-town, rural and suburban areas flexible routing and schedules for passengers using minibuses, taxis and vans. Many paratransit systems offer trips beyond their immediate community one or more days a week. • Custom transit serves those who cannot use conventional transit because of a disability. It operates vans and minibuses for dial-a-ride, door-to-door handyDART service. Service is also offered through contracted Taxi Supplement and Taxi Saver (discounted coupon) programs. Many factors affect transit deployment, key ones being residential density and form.
	% Energy Savings Calculation: for LDV sector = (a*b) a. % of population affected by transit measures (within approx. 400 meters of stops) b. Average % reduction in vehicle kilometers traveled for population in (b) Example: = (20% * 5%) = 1% LDV emissions

Action	Description
6.7 Intercommunity transit services	**Key Question**: Is there significant inter-community travel? **Description:** While trips between BC communities have typically relied on the private automobile, there are publicly funded transportation links between many communities, some covering distances of several hundred kilometres. These transportation links are usually established for a specific purpose and are not well known or publicized. The transit link between Vernon and UBC Okanagan in Kelowna is a key example, providing a long-distance transit link from one community to a post-secondary institution in another community. This practice is not common in small or mid-size communities and could be more widely implemented. Health Connections is a provincially funded program to address regional travel needs for rural residents who must travel long distances to access specialized nonemergency medical services. Regional health authorities have full discretion in how they seek to deliver this service. Service restrictions vary region to region, but many include intercommunity bus services. The Interior Health Authority provided an estimated 25,000 rides in 2008, with 35% of trips being medical in nature. Within the 200,000-square-kilometre Interior health region, encompassing the East Kootenay, Kootenay-Boundary, Okanagan and Thompson Cariboo Shuswap areas, these trips are a largely untapped resource for the area's 700,000-plus residents. Few people know about this service because it is not well advertised outside of doctors' offices and the medical community. Promoting these services is an opportunity for local governments.
	% Energy Savings Calculation: for LDV sector = (a*b*c) a. % of population affected by inter-community transit b. % of VKT related to inter-community travel c. % of LDV trips avoided Example: = (60% * 10% * 10%) = 0.6% LDV emissions
6.8 Support car share cooperatives	**Key Question:** Is there a sizeable population within walking distance of a potential shared vehicle? **Description:** Car cooperatives help people to become single car families, or even live in a community without owning a vehicle. This in turn can help to reduce the number of vehicle trips taken. Local governments can support car co-ops by providing them with free parking, and also enacting bylaws reducing the parking requirement for residential developments near a car share co-op space. Examples: Kootenay Carshare Coop, Okanagan Carshare Coop, Modo (Vancouver).
	% Energy Savings Calculation: for LDV sector = (a*b*c) a. % of population near potential car share co-op space b. % of (a) that would use the service c. % reduction in their LDV trips Example: = (50% * 5% * 10%) = 0.25% LDV emissions

Action	Description
6.9 Raising awareness of ride sharing and guaranteed ride home programs	**Key Question**: Are there major trip destinations beyond 8km that are not sufficiently served by transit? **Description:** Carpooling is a simple way for local governments to begin TDM while saving money, reducing congestion and conserving energy along the way. Founders of the Kootenay Carshare Coop set up a ride-sharing system for longer-distance intercommunity travel where rides could be offered or sought for travel between communities. This ride-matching service is now run by the Kootenay Rideshare and is undergoing expansion; details can be found at www.kootenayrideshare.com. "With car sharing as a choice, Car Co-op members drive much less (1400 km/year) than the average driver (6,000-24,000 km/year) in the Lower Mainland." Source: Cooperative Auto Network. (75%-94% reduction but much of this cannot be directly attributed to a coop.) Other ride sharing services exist, including Hitch Planet, Jack Bell, and people posting messages on websites such as Kijiji. Local governments can promote these services.
	% Energy Savings Calculation: for LDV sector= (a*b) a. % of population affected by ride-share b. Average % reduction in vehicle kilometers traveled for population in (b) Example: = (10% * 10%) = 1% LDV emissions

Action	Description
6.10 Low carbon and electric vehicle fuelling / charging stations	**Key Question**: Can adequate resources be allocated to implement these recommended actions? **Description:** Low carbon and electric vehicles can play a significant role in reducing emissions from light duty (passenger) vehicles. Local governments can play an enabling role in this transition. Measurement may be difficult, but without this suite or a similar one, the local transition to low carbon and electric vehicles may be delayed by many years. Battery electric vehicles may be appropriate in some communities, with current models that travel on highways and can travel for over 100km. In other areas, plug-in-electric-hybrids (PHEV) may be a more practical option. With PHEVs, most travel within the community can be done on electricity and the gasoline engine can provide power to the batteries for extended highway driving. Some models have an option to heat the cabin up before unplugging. There are several specific actions all local governments can take to prepare for low carbon and electric vehicles. • Sign on to provincial 'EV-Ready' bylaw if & when it is available. Analysis indicates 80% of charging will be done at home. • Include EV charging infrastructure in sustainability guidelines • Ensure permitting processes (for renovations particularly) are set up to smoothly address electric vehicle charging infrastructure • Consider low carbon vehicles (see action 4.3) and electric vehicles for the local government fleet to demonstrate the viability of the technology • Set up charging stations at highly visible locations, preferably where there are many amenities (e.g. downtown) For higher growth communities, a requirement for alternative fuelling could be established for new gas stations. Surrey City Council passed an innovative new fuel initiative. All new service stations in Surrey will be required to provide at least one alternative fuel source, such as hydrogen, compressed natural gas, or electric vehicle recharging, in addition to conventional gasoline, diesel and propane energy. The percentage of new car sales in BC that are electric was 0.06% in 2011, 0.16% in 2012, 0.27% in 2013, 0.37% in 2014, and 0.71% in 2015.
	% Emissions Savings Calculation: difficult to calculate, but by current assumptions, for LDV sector= (a) a. % of new vehicles purchased in BC that are electric (adding electric vehicle charging will encourage electric vehicles to be purchased in the community) Example: = 0.5% LDV emissions, ***per year***
6.11 Electric vehicle & e-bike awareness event	**Key Question**: Are there electric vehicles in or near the local community, e.g. being sold by local businesses? **Description:** Public curiosity on electric vehicles can be very high. A recent event in Kelowna run by a volunteer organization attracted approximately 100 people. Many people are unfamiliar with electric vehicles, electric scooters, and electric bikes, and could benefit from learning more about them and how they could be applied to their life. Electric vehicles have much cheaper running costs than conventional gasoline vehicles, and can help people save money.

Action	Description
	% Emissions Savings Calculation: for LDV sector= (a*b) a. % of population attending electric vehicle events b. % of attendees who purchase an electric vehicle Example: = (1% * 10%) = 0.1% LDV emissions
6.12 Natural Gas Vehicle Collaboration	**Key Question**: Are there heavy-duty fleets that could refuel where local government fleets refuel? **Description:** Gasoline and diesel have approximately 140% of the emissions per unit of energy as natural gas. Natural gas refuelling stations need a critical mass of return-to=base heavy duty vehicles (often ten or more) to be viable. The local government may have some fleet vehicles that could be converted to natural gas from diesel to meet its carbon-neutral operations commitments. Collaborating with other local return-to-base fleets (such as BC Transit, school board, waste haulers, and commercial operators) could provide the critical mass to make a refuelling station viable. This can lower the emissions from all of the participating entities. Example: BC Transit buses in Kamloops and Nanaimo, and School District 23 (Central Okanagan) school buses. Further calculations available in "Option 1A: Project Profile Low Emissions Vehicles" at the 'how' tab of www.toolkit.bc.ca/carbon-neutral-government.
	% Energy Savings Calculation = (a/b)*c, where: a. Number of heavy duty vehicle-kilometers traveled from vehicles converting to natural gas b. Total number of heavy duty vehicle-kilometers traveled c. % difference in emissions from original configuration to natural gas configuration (efficiency and carbon intensity) Example: (a/b)*c = (10,000/100,000) * 30% = 3% of emissions from existing heavy duty commercial vehicles

7. Waste

Action	Description
7.1 Organics diversion	**Key Question**: Is a significant amount of organics going to landfill that could be economically diverted? **Description:** GHG emissions from landfills are primarily from the decomposition of buried organics. Create a comprehensive composting program: • Encourage grass swapping and back-yard composting. • Create a public compost pick-up site and program. • Support existing and new capacity for reusable resources, including Free Swaps, Share Sheds, free-store for unwanted goods, and building materials depot. Organics make up approximately 43 percent of solid waste in Metro Vancouver according to the Recycling Council of BC, which also states that on average, each British Columbian generates over 600 kilograms of waste annually. By diverting organics, each of us has the opportunity to remove approximately 200 kilograms from the solid waste stream every year. Much of this "waste" can be turned into valuable compost that can be used on gardens and landscaping. Example: City of Kelowna landfill producing GlenGrow and OgoGrow. Further calculations available in "Option 1D: Project Profile Household Organic Waste Composting" at the 'how' tab of www.toolkit.bc.ca/carbon-neutral-government
	% Energy Savings Calculation for municipal solid waste sector: = (a – c)*b a. % of landfill GHG's from organics b. % of organics diverted annually c. Average % of emissions over planning period (to 2050?) form organics currently in landfill under BAU scenario Example: (a –c)*b = (80% - 25%) * 10% = 17.5% waste emissions
7.2 Encourage water conservation	**Key Question**: Could the community benefit if water consumption was reduced? **Description:** Many BC communities could benefit if water consumption was reduced. Reduced water consumption could reduce City operations costs (including energy costs) for treatment and pumping. Growing communities can defer the need for new capital investment. And communities in water challenged areas can greatly benefit through ensuring water supplies are more secure. Communities can encourage water conservation through many means, including restrictions on garden watering in summer, public education, water metering, and providing rebates. Regarding rebates, communities can partner with utilities in order to reduce the purchase cost of energy and water efficient appliances in their communities. Example: over a few years, the City of Fort St John ran a highly successful toilet rebate program, managing to exchange over 3,500 old toilets, saving 87 million litres of water over 2009. The City said this deferred the need for reservoir expansions, and saved millions of dollars.

Action	Description
	% Emissions Savings Calculation = (a*b) *(electricity only)* a. % of community commercial electricity consumption associated with water and wastewater treatment and pumping (8% for Cache Creek, 6% for Lumby) b. % of reduction in electricity consumption Example: (a*b) = (7%*10%) = 0.7%, for commercial electricity
7.3 Support local food production, e.g. farmers markets, community gardens, community greenhouse	**Key Question**: Is there local interest in growing your own food, and is it feasible locally? **Description:** Many communities support local food production through farmers markets and community gardens. Some go further and have edible landscaping, or support community greenhouses. This reduces trips required to go to the grocery store, and "food miles" i.e. the number of miles food must travel to get from the producer to the plate. There can also be economic benefits by keeping food dollars local and not exporting them. Examples: community greenhouses in Invermere and New Hazelton, food forest at a Regional District of Central Okanagan park.
	% Emissions Savings Calculation: N/A – unquantifiable at this time. Will vary between communities.

8. Enabling Actions

Action	Description
8.1 Review land use & transportation plans / policies for CEEP incorporation	**Key Question**: Recommended for all communities. **Description:** It can be necessary or helpful to review land use & transportation plans / policies to ensure that the CEEP is incorporated. This can help to ensure that the CEEP is embedded into the local government's processes, and will not be forgotten.
	Calculation: This enabling action does not have direct impacts itself, however it may help achieve results from other actions.
8.2 Organizational structure for climate action	**Key Questions**: Are there questions about who is accountable within council / board as well as within staff for climate action? Can there be benefits from establishing a committee, or incorporating into an existing committee? **Description:** Climate action crosses all departments and levels within a local government. Establishing decision-making, communication, accountability, and resourcing structures that are appropriate for the size and culture of the local government has repeatedly been proven to be critical to implementing actions in a cost-effective manner and achieving results. Taking time up-front to establish such structures is a worthwhile investment in setting implementation up for success. Key questions to answer include: • Who makes which decisions regarding climate action? • Who is expected to do what and how are they held accountable? • What new / different communication / planning is required (sewer or road work and district energy)? • What organizational structure changes are required to operationalize this? (Council climate committee? cross-departmental working group? updated job descriptions / resource allocation to include climate action? new positions? …) • How will capital, operating and human resource elements of the CEEP be funded?
	Calculation: This enabling action does not have direct impacts itself, however it may be critical to achieving results from other actions.
8.3 Establish a regional energy cooperative	**Key Question**: Is there strong interest in clean energy in the community? **Description:** Energy cooperatives are companies owned by their members, rather than by shareholders, with each member having an equal vote. Community energy cooperatives have provided an important vehicle for development of local renewable energy in Denmark, the Netherlands and Germany. In Germany, 200,000 people own shares in local wind turbines. City of Dawson Creek played an important role in establishment of the Peace Energy Cooperative, providing advice and other forms of non-financial support.
	Calculation: Impacts from this enabling action will be dependent on actions and investments of the co-op. This can provide funding and a sense of community and buy-in to climate actions.

<table>
<tr><th>Action</th><th>Description</th></tr>
<tr><td rowspan="2">8.4 Identify green economy opportunities</td><td>Key Question: This enabling action is recommended to all local governments who want to achieve economic development / diversification benefits from climate action.

Description: British Columbians pay on average $4200 per person annually for energy in their communities (i.e. electricity, natural gas and transportation fuels), not including energy consumed by industry, airlines, ferries, etc. For most communities, 70-80% of money spent on energy leaves town, going to utilities, oil companies, and provincial and federal taxes.
Local clean energy development and energy efficiency can be drivers of economic diversification in rural BC, presenting opportunities for communities to transition to a green economy, thereby generating long-term economic and community development benefits. A "green economy" is characterized by low carbon (with renewable energies replacing fossil fuels), low resource depletion and low environmental degradation.

A guide to achieving economic development potential of climate action is Clean Energy for a Green Economy available at http://communityenergy.bc.ca/?dlm_download_category=economics</td></tr>
<tr><td>Calculation: This enabling action will assist in moving other actions forward.</td></tr>
<tr><td rowspan="2">8.5 Leverage local government assets to create expertise and community-wide change</td><td>Key Question: Are actions being taken in local government (LG) operations that could be leveraged to support community-wide action?

Description:
<table>
<tr><th></th><th>LG Action</th><th>Community Opportunities</th></tr>
<tr><td>Buildings</td><td>- District energy systems
- Building energy efficiency retrofits
- New green buildings</td><td>Awareness: Increasing public awareness of clean energy and conservation, leading to a greater willingness to explore clean energy and conservation, particularly if corporate actions are deployed in a way to maximize public visibility.
Association: Visible actions that others are implementing clean energy and conservation.
Action: Local governments across BC are exploring district energy systems with their own buildings as the first buildings that provide critical mass for the system. Many local governments are also connecting public sector organizations in BC which all have carbon neutral commitments. These systems then extend to the surrounding community.</td></tr>
<tr><td>Fleet</td><td>- Biofuels
- Hybrids / EV's</td><td>Agency: Improved access to fuels and mechanics who can service biofuel, hybrid, or electric vehicles.</td></tr>
<tr><td>Other</td><td>- Carbon neutral actions</td><td>Awareness and Association: Provides local government leaders (staff and elected officials) an opportunity to gain knowledge of clean energy and conservation so they can more confidently demonstrate community leadership by implementing them where appropriate in their own business or residence.</td></tr>
</table></td></tr>
<tr><td>Calculation: Impacts of these enabling actions are highly dependent on specific actions planned for local government operations.</td></tr>
</table>

Action	Description
8.6 Long-term, deep community engagement (culture change)	**Key Question**: Do the other actions identified fall short of the desired change? **Description:** Overall, the purpose of social mobilization for British Columbia climate action is to: 1. Engage residents in developing and implementing climate solutions through collective, 'bottom-up', informal, organizational and institutional initiatives. 2. Change collective behaviour to reduce carbon footprints. 3. Build public support for (and contributions to) low-carbon climate policies and actions focused on the green economy, ecological resilience and sustainable communities, in order to achieve GHG targets, short- and long-term, as well as other provincial climate change goals. 4. Build capacity and resilience to plan and respond to climate change adaptation and mitigation. Active mechanisms can be established to pilot, replicate and monitor successful social engagement techniques, such as the Columbia Basin Community Adaptation program, and the UK Rural Community Councils community-led planning, which writes: *People need … information, a realistic assessment of the threat or diagnosis, a sense of personal control over their circumstances, a clear goal, an understanding of the strategies to reach that goal, a sense of support, and frequent feedback that allows them to see that they are moving in the right direction.* A recent study found that reasonably achievable emissions reductions are approximately 20% in the US household sector in 10 years, if "most effective non-regulatory interventions are used," such as incentives and social marking (Dietz, T., Gardner, G. T., Gilligan, J., Stern, P. C., Vandenbergh, M. P.: Household actions can provide a behavioural wedge to rapidly reduce U.S. carbon emissions, in *Proceedings of the National Academy of Sciences, 106: 44,* 18452-18456, 2009).
	Calculation: Impacts can be substantial but are highly dependent on the specific program implemented.