



# COMMUNITY ENERGY AND EMISSIONS PLAN

October 2015



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## List of Acronyms

BAU	Business as Usual
CEEI	Community Energy and Emissions Inventory (inventories created by the Province for each local government)
CEEP	Community Energy and Emissions Plan
CO <sub>2</sub>	Carbon Dioxide
DCC	Development Cost Charge
DSM	Demand Side Management (name for measures used to reduce energy consumption)
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)
HDV	Heavy Duty Vehicles (i.e. commercial vehicles, like trucks)
ICSP	Integrated Community Sustainability Plan
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
RGS	Regional Growth Strategy

## Executive Summary

As a response to the adoption of Bill 27, also known as the *Local Government (Green Communities) Statutes Amendment Act*, the City of Duncan, in collaboration with Community Energy Association, held a workshop to discuss opportunities for reducing greenhouse gas emissions within the City. The workshop was held on May 28, 2015, with members of Council and staff from the City of Duncan, as well as representatives from **Cowichan Valley Regional District, the Municipality of North Cowichan, Our Cowichan, One Cowichan, Cowichan Energy Alternatives, and Island Health**. The workshop was facilitated by the Community Energy Association, and funded by the BC Hydro PowerSmart Sustainable Communities Program.

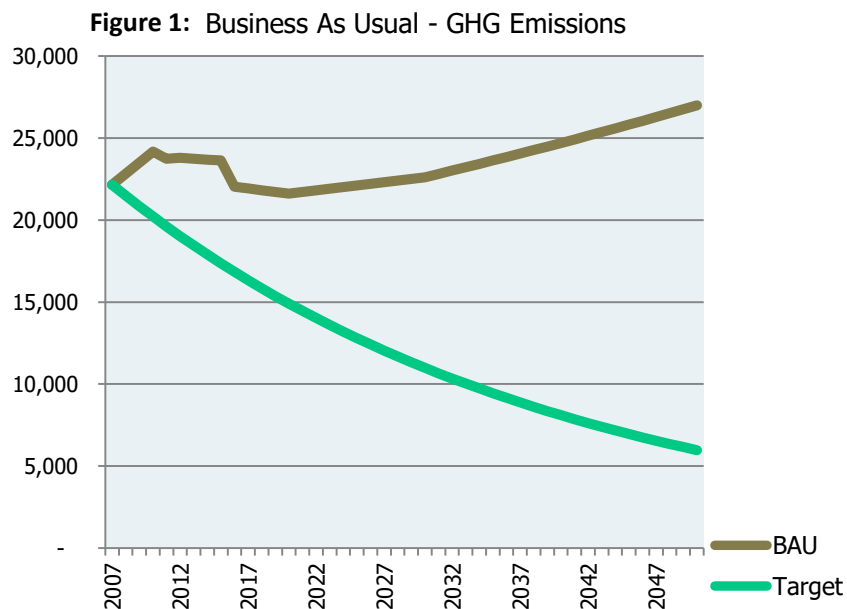
The workshop group looked at energy, emissions, and energy expenditure data for the community as a whole and decided on an action plan. This Plan was developed based on discussions from the workshop.

### Community energy and emissions – current status and business as usual

For the modelling process, the workshop group used an annual community population growth rate of 1% and used the OCP’s GHG target which is to reduce emissions 33% below 2007 levels by 2020, and by 80% by 2050.

In 2010, the total community annual energy expenditure was approximately \$15 million, while GHG emissions were approximately 24,000 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).

Without an action plan and taking into account the GHG reducing impact of Provincial and Federal policies already in place, community emissions are predicted to change relative to the target trajectory, as displayed in the following chart:



Action Plan

The City of Duncan has already initiated an impressive number of actions. The workshop group reviewed current and past actions, and was therefore tasked with identifying an action plan that would help to further reduce community energy consumption and emissions:

Table 1: CEEP Action Plan

Actions	Year		
	2015	2016	2017
<b>1   Building: Basics</b>			
1.1 – Promote BC Hydro DSM Programs	X		
1.2 – Promote natural gas DSM programs	X		
1.4 – District Energy		X	
<b>NEW ACTION</b> – Promote new Provincial heating oil to heat pumps incentives	X		
<b>2   Buildings: High-Growth Measures</b>			
2.1 – Sustainability checklist for buildings	X		
2.4 – Expediting Permit Approvals, fee rebates, other financial incentives		M	
2.6 – Development Cost Charge (DCC) reductions or waivers for GHG's	X		
<b>NEW ACTION</b> – Research effective green building standards that are not onerous for developers	X		
<b>NEW ACTION</b> – Include water efficient landscaping in existing Development Permit Areas		X	
<b>3   Residential Buildings</b>			
3.2 – Educate developers on renewable energy technologies and efficiency	X		
<b>NEW ACTION</b> – Woodstove – conduct a workshop on clean and safe operation	X		
<b>NEW ACTION</b> – Explore partnering with “Better Off North Cowichan” on an energy conservation campaign		X	
<b>NEW ACTION</b> – Solar PV bulk buy – wave or reduce municipal permitting fees			M
<b>4   Commercial/Institutional Buildings and Transportation</b>			
4.1 – Promote Business Energy Advisor program free assessments to small & mid-sized businesses	X		
<b>NEW ACTION</b> – Install LED Ornamental Streetlights	X		
<b>NEW ACTION</b> – Develop a municipal corporate green building policy and promote to community			X
<b>NEW ACTION</b> – Solar PV bulk buy – participation with municipal buildings			M
<b>5   Light Duty Vehicle Transportation: Urban Form</b>			
5.2 – Land Use Suite “Enhanced”	X		
5.4 – Flow OCP and Local Area Plans through to Zoning Bylaws	X		
<b>NEW ACTION</b> – Green the Zoning Bylaw	X		
<b>6   Light Duty Vehicle Transportation: Infrastructure &amp; Collaboration</b>			
6.4 – Special event planning		X	
6.5 – Collaborate with major employers on work-related transportation		X	
6.9 – Low carbon and electric vehicle suite			X
<b>7   Waste</b>			
7.1 – Organics diversion		X	
<b>8   Enabling Actions</b>			
8.1 – Organizational structure for climate action	X		
8.3 – Identify green economy opportunities		X	
8.4 – Leverage Local Government assets into community change		X	
8.5 – Long-term, deep community engagement (cultural change)	X		

Actions marked with an ‘M’ are items that *may be* considered for future implementation. The numbers of the actions listed above correspond to their numbers in the CEEP QuickStart Guide (see Appendix 2), which contains further details about each of them. Some new actions were also created that are not listed in the CEEP QuickStart Guide (for further details on this see the “Unpacking Actions” sub-section).

## Duncan Community Energy and Emissions Plan

For further detail on BC Hydro DSM program incentives consult the BC Hydro Power Smart website, <http://www.bchydro.com/powersmart.html>.

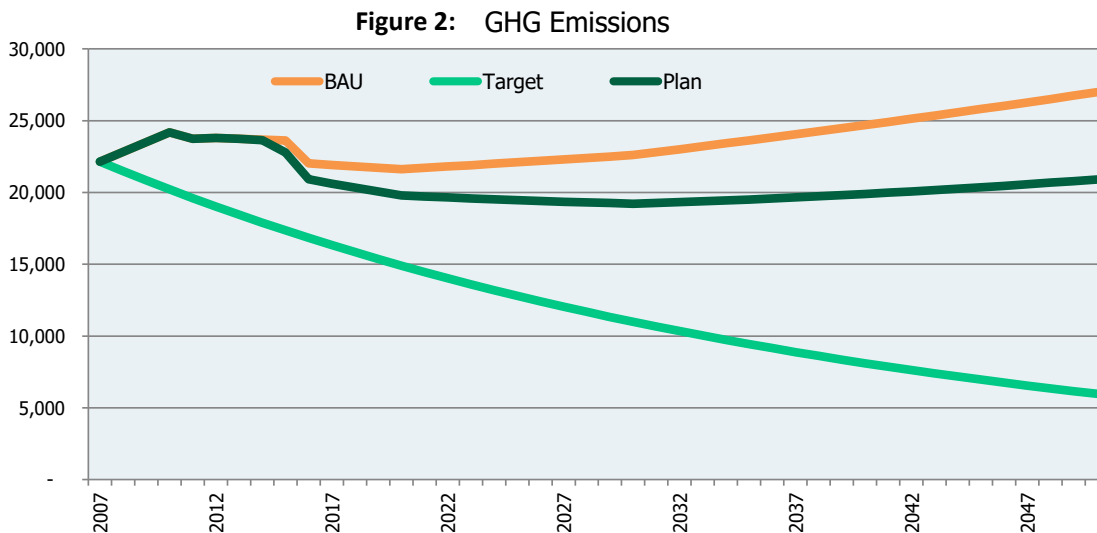
The workshop included discussion of all the opportunities, and in-depth discussion of the following:

- **5.2 Land use suite “enhanced”** – particularly on encouraging urban development forms that appeal to consumers and lead to increased density.

## 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, however there is still a considerable gap between the outcomes of the Plan and the GHG target trajectory.

Although the City of Duncan has levers to reduce community energy and emissions and can move closer towards its target, many things remain outside of the City’s control including Federal and Provincial actions, technological innovation. These may provide significant assistance towards meeting the target.



It should be noted that actions to reduce electricity consumption will also result in financial savings for the community, although they will not result in as significant savings in emissions. This is because electricity in British Columbia contributes little to greenhouse gas intensity due to using ‘clean’ energy sources, and is predicted to be carbon neutral in 2016.

The key actions that will result in the greatest annual GHG reductions by 2020 are:

- 5.2 – Land use suite “enhanced” (densification within the urban core) – 170 tonnes / year
- 1.1 – Promote BC Hydro DSM programs – 134 tonnes / year
- 1.2 – Promote Natural Gas DSM programs – 83 tonnes / year

## Next Steps

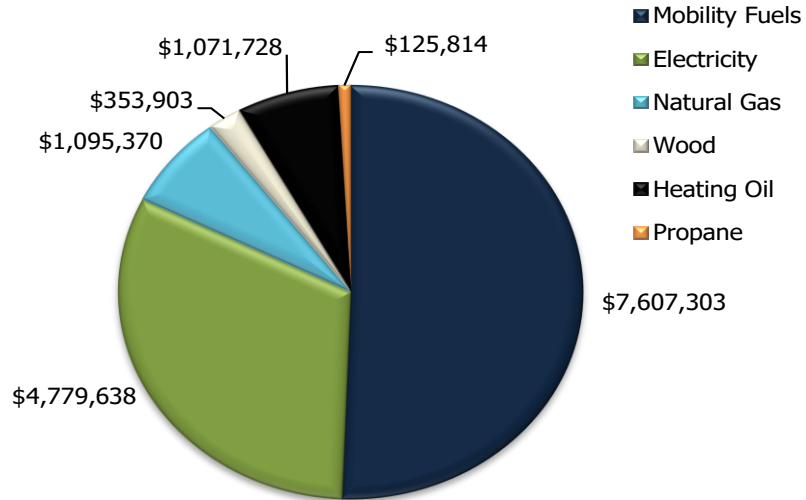
1. Incorporate CEEP into City’s policy framework.
2. Ongoing CEEP implementation.
3. Monitor and report on implementation.



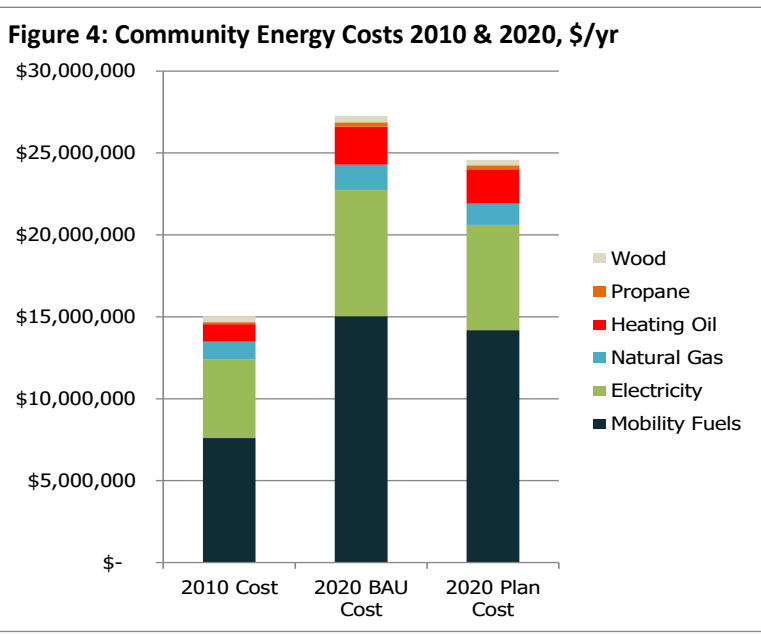
Community Financial Savings

In the City of Duncan, only a small percentage of energy spending remains within the community. Therefore, a significant co-benefit of implementing this plan to reduce energy consumption and emissions is that it will help people to reduce their overall expenses. In addition, using locally generated energy will help to keep energy spending local rather than exporting them, just as consumption of local food helps the local economy. The following chart shows Duncan’s community energy expenditures for 2010, totalling approximately \$15 million (\$3,000 per capita), split by fuel type.

Figure 3: Community Energy Costs, 2010



The following chart compares community energy costs in 2010 and 2020. Through plan implementation, total community energy costs are projected to decrease by approximately 9%. The model assumes that energy prices will increase, so in 2020 a 9% reduction will equate to about \$2.4 million per year or \$440 per capita (or \$1.5 million or \$270 per capita if energy prices remain the same). Note that although energy prices are difficult to predict, there is confidence that the price of electricity will increase.



## Introduction

The Province of British Columbia has committed to reducing greenhouse gas emissions by 33% below current levels by 2020. Supportive legislation was put into place to make this target achievable. In May of 2008, the 'Green Communities' Act (otherwise and henceforth referred to as Bill 27) amended the *Local Government Act* and *Community Charter*. Bill 27 required municipalities and regional districts to include targets, policies, and actions towards reducing greenhouse gas emissions from their communities in their Official Community Plans and Regional Growth Strategies.

As mandated by Bill 27, the City of Duncan in collaboration with the Community Energy Association, with funding from BC Hydro, developed a plan to effectively reduce greenhouse gas emissions for the community of Duncan. This report was informed by a series of workshops that help identify key action items for implementation. This report provides figures of greenhouse gas emission trajectories based on both business-as-usual operations as well as target projections that are contingent upon plan implementation. The proceeding sections detail the objective of Community Energy and Emissions Planning and the various tools employed to achieve target emission levels within the community.

The figures in this report are based on 2010 energy and emissions inventory data from the Province, and recent energy costing data.

### ***Community Energy and Emissions Planning***

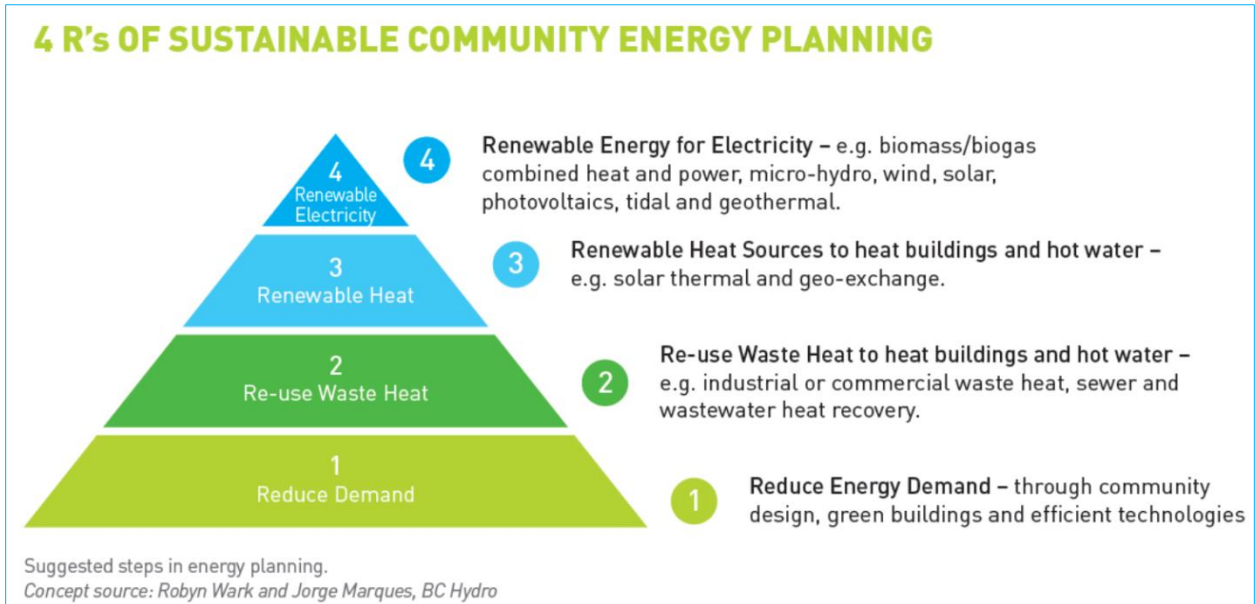
A Community Energy and Emissions Plan (CEEP) is a tool that can be used to help municipalities achieve target emissions reductions. A CEEP evaluates a community's existing energy use and greenhouse gas (GHG) emissions with a goal of improving efficiency, cutting emissions, enhancing community resilience, managing future risks, and driving economic development. A CEEP usually encompasses 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. 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.

### ***Energy Planning Hierarchy***

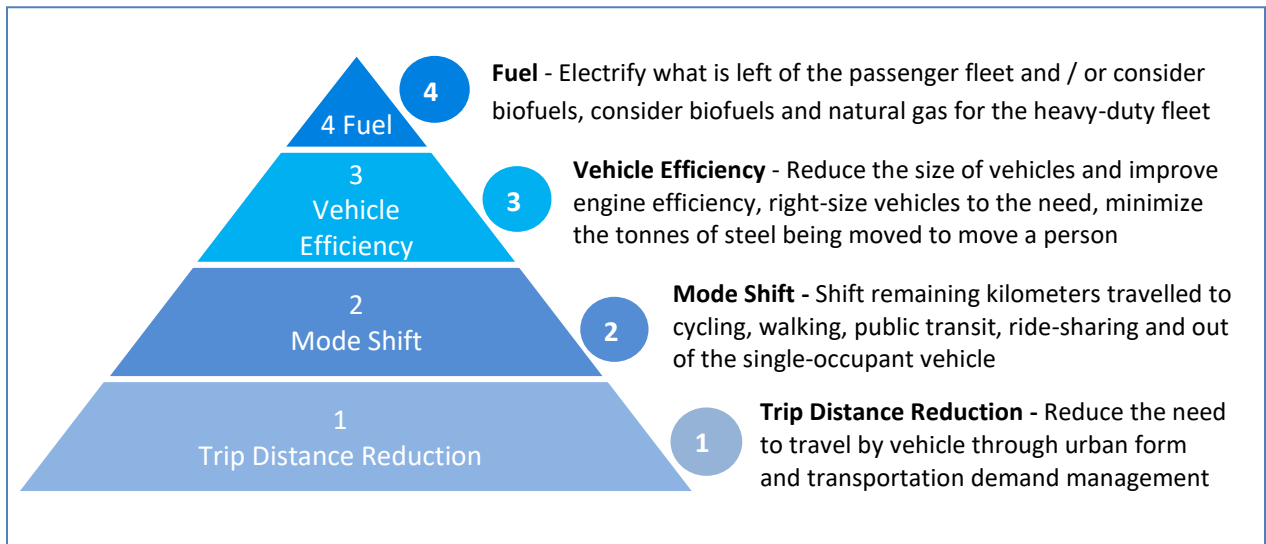
Not all opportunities to influence energy and emissions across a community are created equally. It makes sense to reduce demand as much as possible first, since the best business cases often involve improving energy efficiency.

Figure 5: Sustainable Energy Hierarchy



A similar hierarchy can be applied to the transportation sector. The image below follows a similar framework used in energy planning. In the transportation sector, the easiest step to take is to reduce vehicular trip distances through appropriate urban form (planning) and transportation demand management.

Figure 6: Sustainable Transportation Hierarchy



**CEEP QuickStart Overview**

The Community Energy and Emissions Planning (CEEP) QuickStart program is designed to provide a cost-effective way for small to mid-sized local governments to rapidly develop a practical CEEP that includes an implementation timeline. The CEEP process is depicted in the graphic below:

**Figure 7:** Quickstart CEEP Process



The graphic below explores the ‘planning’ step in the CEEP process as well as the benefits of developing a CEEP, ultimately leading to an action plan.

**Figure 8:** CEEP Information

**WHAT IS A CEEP?**

A Community Energy and Emissions Plan is a comprehensive, long-term plan to improve energy efficiency, reduce GHG emissions, and foster local green energy solutions in your community.

There are 4 elements to a CEEP:

1. **Baseline:** 2010 Energy and Emissions from CEEI (Province of BC)
2. **Forecast:** Population forecast (BC Stats and local government)
3. **Target:** From Official Community Plan (legal requirement for GHG reduction target)
4. **Action Plan:** List of actions and approaches, developed by quarter, spanning several years, to estimate impacts and locally specific opportunities

**BENEFITS OF DEVELOPING A CEEP:**

- **Reduce GHG emissions:** Energy planning helps local government effectively manage GHG emissions. This contributes to mitigating climate change, and helps manage costs associated with carbon taxes and offsetting
- **Reduction of energy costs:** Energy planning improves budgeting and save money
- **Creation of jobs and stimulation of the local economy:** a CEEP can highlight opportunities for community development
- **An opportunity to demonstrate leadership:** Your 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

On May 28, 2015, a workshop was held with members of Council and staff from the City of Duncan, as well as representatives from Cowichan Valley Regional District, the Municipality of North Cowichan, Our Cowichan, One Cowichan, Cowichan Energy Alternatives, and the Vancouver Island Health Authority. The workshop was facilitated by the Community Energy Association, and funded by the BC Hydro PowerSmart Sustainable Communities Program.

The workshop group looked at energy, emissions, and energy expenditure data for the community as a whole and decided on an action plan. The workshop group also noted that the OCP and Integrated Community Sustainability Plan, and many current and past initiatives of the City are supportive of many of the actions being discussed.

To assist with pre-workshop preparation, a short preparatory webinar was held to give participants background information on how energy planning initiatives can influence carbon emissions while also providing opportunities for financial savings within the community.

At the workshop a brief presentation was held and 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 that are included in the CEEP.

The workshop group was provided with a collection of actions, and 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 in order to create a plan that covered the years from 2015-2019. The entire workshop group was invited to provide input as to the timing and sequencing of the action items.

Following this, one of the key actions, urban development form, was discussed in more detail.

**Figure 9:** CEEP Workshop



**Current Emissions and ‘Business As Usual’ Projections**

The Province of BC calculated the total energy use and greenhouse gas emissions from the community for 2010 using the Community Energy and Emissions Inventory (CEEI). In 2010, the total community annual energy expenditure was approximately \$15 million (\$3,000 per capita), and GHG emissions were approximately 24,000 tonnes (4.9 tonnes per capita). Further detail on the energy and emissions for the community can be found in the 2010 CEEI, located in Appendix 1.

For the modelling process, the workshop group used an annual community population growth rate of 1% and used the OCP’s GHG target which is to reduce emissions 33% below 2007 levels by 2020, and by 80% by 2050.

Without the implementation of an action plan, but 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.

**Table 2: Emissions Projections & Targets**

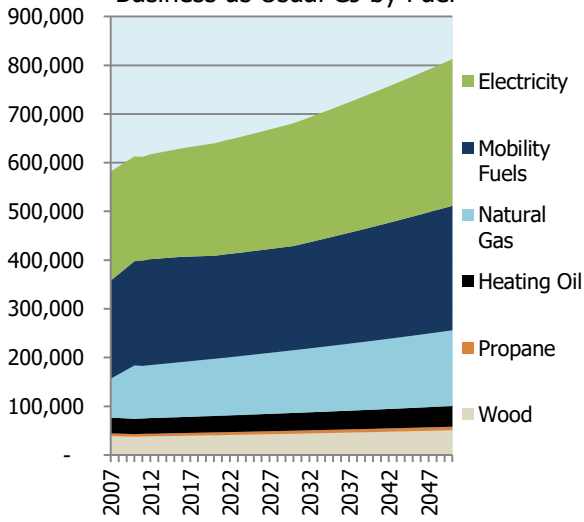
<b>“Business as Usual” Projection &amp; Target Overview</b>	
<b>Community</b>	<b>City of Duncan</b>
Annual % target change in GHG	<b>-3.00%</b>
Population Growth	1.0%
Default Population Growth	-0.22%
2007 Population	4,978
Start-year for Actions	2014

<b>Emissions Summary</b>	
2007 Emissions	22,150
2010 Emissions	24,182
Total Energy Expenditure	\$ 15,033,755
Per-capita energy cost	\$ 3,015
2010 Per-capita emissions	<b>4.85</b>

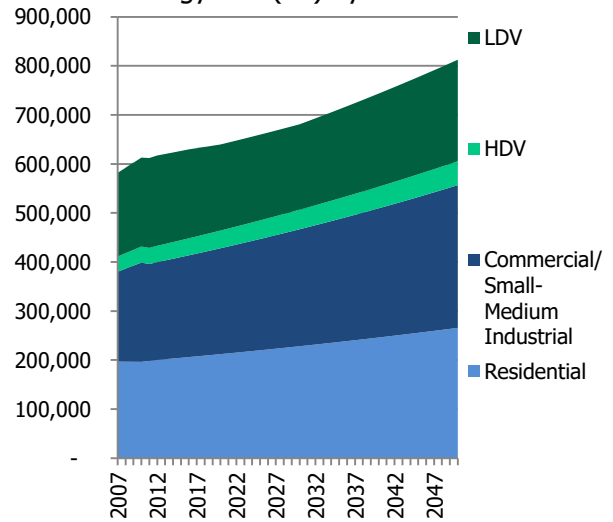
<b>Targets Summary</b>				
	<b>2016</b>	<b>2020</b>	<b>2030</b>	<b>2050</b>
Total reduction	-24.0%	-33%	-50%	<b>-73%</b>
Per-capita reduction	-34%	-44%	-63%	-83%
Total GHG	16,839	14,907	10,993	5,978
Per-Capita GHG	3.2	2.7	1.8	<b>0.8</b>

<b>Business as Usual (BAU) Summary</b>				
	<b>2016</b>	<b>2020</b>	<b>2030</b>	<b>2050</b>
GHG's	22,032	21,618	22,611	26,985
GHG growth	-1%	-2%	2%	22%
Population	5,294	5,509	6,085	7,425
Pop growth	316	531	1,107	2,447
Pop Grow %	6%	11%	22%	49%
Per capita emissions	4.16	3.92	3.72	3.63

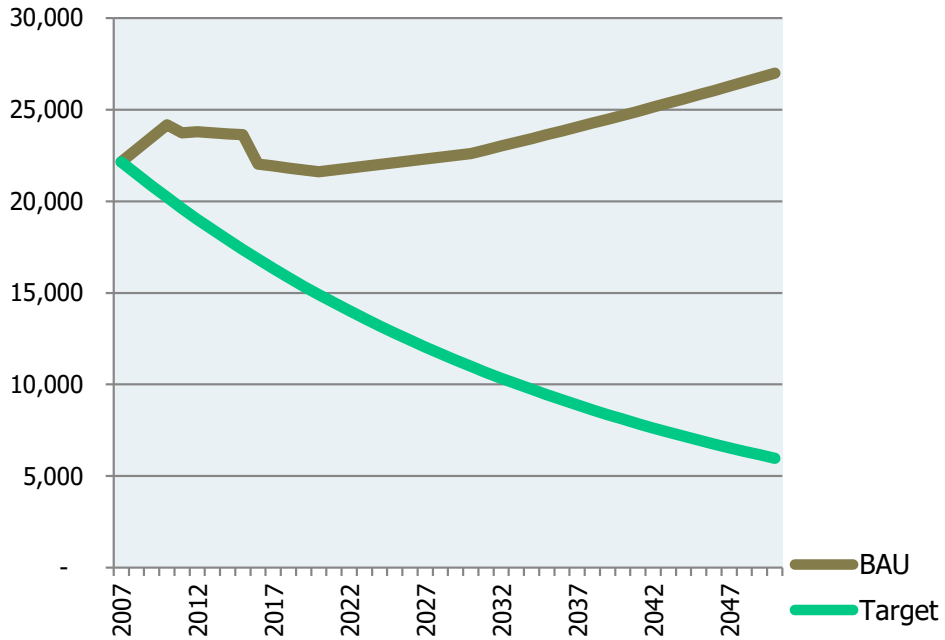
**Figure 10:**  
Business as Usual GJ by Fuel



**Figure 11:**  
Energy Use (GJ) by Sector



**Figure 12:** Business As Usual - GHG Emissions



**Actions Already Initiated**

The City of Duncan has already achieved carbon neutrality for its own operations, and for its size has undertaken an impressive array of actions relating to environmental sustainability and reductions in community energy and emissions. Current and past actions are summarized in the following table.

A number of the items listed below relate to actions in the CEEP QuickStart Action Guide, and as such have an associated number with them. Actions that do not have any number associated with them are other sustainability initiatives that are not included in the CEEP QuickStart Action Guide.

**Table 3: Current & Past Actions**

Current and Past Actions
Water Conservation Measures Ex. Cowichan Watershed Board’s ‘Water Conservation Challenge’, a toilet rebate, and water metering
GHG reduction encouraged in all Development Permit Areas
Electric Vehicle Charging Stations
University Village Local Area Plan developed with many sustainability features
Energy Mapping with the Regional District
The adoption of the Woodburning Appliance and Air Quality Bylaw
Transit Rebate for City of Duncan residents
Supporting Community Carbon Marketplace with Cowichan Energy Alternatives
Supporting local food Ex. Farmer’s Market, community gardens , and backyard chickens
Organic/yard waste pickup and recycling
Creating a vibrant downtown by promoting walkability
Leading by example through building energy retrofits and green fleet measures
Current and Past Actions included in the CEEP Quickstart Action Guide
3.1 – Sign on to solar-ready building code provisions
3.3 – Efficient woodstove rebate program
5.2 – Land Use Suite “lite”
5.4 – Street Design
6.1 – Active Transportation Planning
6.2 – Improve walking infrastructure
6.3 – Cycling and alternative transportation infrastructure improvements
6.6 – Transit Suite
6.8 – Intercommunity transit services
8.2 – Supporting regional energy co-operatives



**Action Plan**

The action plan developed at the workshop is shown below. Actions that are in the CEEP QuickStart Guide (see Appendix 2) but were considered to be inapplicable are not included below. The actions in the plan were categorised according to the year that it is expected they will be implemented or investigated.

**Table 4: CEEP Action Plan**

Actions	Year		
	2015	2016	2017
<b>1   Building: Basics</b>			
1.1 – Promote BC Hydro DSM Programs	X		
1.2 – Promote natural gas DSM programs	X		
1.4 – District Energy		X	
<b>NEW ACTION</b> – Promote new Provincial heating oil to heat pumps incentives	X		
<b>2   Buildings: High-Growth Measures</b>			
2.1 – Sustainability checklist for buildings	X		
2.4 – Expediting Permit Approvals, fee rebates, other financial incentives		M	
2.6 – Development Cost Charge (DCC) reductions or waivers for GHG’s	X		
<b>NEW ACTION</b> – Research effective green building standards that are not onerous for developers	X		
<b>NEW ACTION</b> – Include water efficient landscaping in existing Development Permit Areas		X	
<b>3   Residential Buildings</b>			
3.2 – Educate developers on renewable energy technologies and efficiency	X		
<b>NEW ACTION</b> – Woodstove – conduct a workshop on clean and safe operation	X		
<b>NEW ACTION</b> – Explore partnering with “Better Off North Cowichan” on an energy conservation campaign		X	
<b>NEW ACTION</b> – Solar PV bulk buy – wave or reduce municipal permitting fees			M
<b>4   Commercial/Institutional Buildings and Transportation</b>			
4.1 – Promote Business Energy Advisor program free assessments to small & mid-sized businesses	X		
<b>NEW ACTION</b> – Install LED Ornamental Streetlights	X		
<b>NEW ACTION</b> – Develop a municipal corporate green building policy and promote to community			X
<b>NEW ACTION</b> – Solar PV bulk buy – participation with municipal buildings			M
<b>5   Light Duty Vehicle Transportation: Urban Form</b>			
5.2 – Land Use Suite “Enhanced”	X		
5.4 – Flow OCP and Local Area Plans through to Zoning Bylaws	X		
<b>NEW ACTION</b> – Green the Zoning Bylaw	X		
<b>6   Light Duty Vehicle Transportation: Infrastructure &amp; Collaboration</b>			
6.4 – Special event planning		X	
6.5 – Collaborate with major employers on work-related transportation		X	
6.9 – Low carbon and electric vehicle suite			X
<b>7   Waste</b>			
7.1 – Organics diversion		X	
<b>8   Enabling Actions</b>			
8.1 – Organizational structure for climate action	X		
8.3 – Identify green economy opportunities		X	
8.4 – Leverage Local Government assets into community change		X	
8.5 – Long-term, deep community engagement (cultural change)	X		

The actions marked with an ‘M’ were categorised as ‘maybes’. These are action items that may be considered for future implementation.

The numbers of the actions listed above correspond to their numbers in the CEEP QuickStart Guide (see Appendix 2), which contains further detail about each of them. Some new actions were also created which are not listed in the CEEP QuickStart Guide.

For further detail on BC Hydro DSM program incentives consult the BC Hydro Power Smart website, <http://www.bchydro.com/powersmart.html>.

**Unpacking Actions from the Action Plan**

The main workshop day on May 28 included a discussion of all the opportunities, and an in-depth discussion of the following:

- 5.2 Land use suite “enhanced” – particularly finding urban development forms that will appeal to consumers and lead to increased density

During the May 28 workshop, and May 29 meeting with City staff, ways to proceed with the actions were discussed, and are outlined in the table below.

**Table 5: Action Plan Implementation**

Action	Yr	Effort	Comments
1.1 Promote BC Hydro DSM programs	1	Low	<p>Action would be ongoing.</p> <p>Many BC Hydro programs can be promoted through the quarterly community newsletter, website, and also with brochures which can be obtained through BC Hydro funded implementation support. Specific ideas for each program are listed below:</p> <ul style="list-style-type: none"> <li>• Low Income Programs could be promoted in conjunction with the Municipality of North Cowichan’s efforts to promote it (e.g. by promoting their distribution of Energy Saving Kits), and through other channels including working through the Cowichan Housing Association and other community organizations. <b>Partners:</b> BC Hydro funded implementation support, Municipality of North Cowichan, Regional Affordable Housing Directorate</li> <li>• Team PowerSmart could be promoted through community organizations and invited to the farmers market and other community events (e.g. Summer Festival, Cowichan Exhibition). <b>Partners:</b> BC Hydro funded implementation support, Community organizations, e.g. One Cowichan, Cowichan Green Community, Viridian Energy Coop</li> <li>• Leaflets on the Home Energy Rebate Offer program could be distributed when people apply for permits for residential renovations. <b>Partners:</b> BC Hydro funded implementation support</li> </ul>

Action	Yr	Effort	Comments
<p><b>1.1</b>  <b>Promote BC Hydro DSM programs</b>  <i>(continued)</i></p>			<ul style="list-style-type: none"> <li>Leaflets on the New Home or New Construction Programs could be provided at the initial enquiry stage with the City. This information may also be useful in considerations about Development Cost Charge reduction and Revitalization Tax Exemption.  <b>Partners:</b> BC Hydro funded implementation support</li> <li>The promotion of the appliance rebate program and a municipal top-up of that is a maybe. It could be researched to see if there is a substantial reduction in water consumption in addition to the reduction in energy consumption, and if so, then a municipal top-up may be justifiable.  <b>Partners:</b> BC Hydro funded implementation support</li> </ul> <p>Actions could be repeated in future years, but note that BC Hydro programs change with time.</p> <p><i>The BC Hydro funded implementation support for CEEP QuickStart alumni could assist the City with this action.</i></p>
<p><b>1.2</b>  <b>Promote natural gas DSM programs</b></p>	1	Low	<p>Action would be ongoing.</p> <p>Many of the programs can be promoted through the quarterly community newsletter, website, and also through leaflets at the front desk which can be obtained from FortisBC Gas.</p> <p>Note that these programs change with time.</p> <p>Action could tie in well with Action Item 1.1.</p> <p><b>Partners:</b> FortisBC Gas</p>
<p><b>1.4</b>  <b>District energy</b></p>	2	High	<p>Investigation of district energy, especially at the Island Savings Centre and in the University Village area, will begin in year 2. If feasible, the opportunity will likely take a number of years to realize.</p> <p>There are a variety of grant sources that local governments can utilize to investigate the feasibility of and develop such a system.</p> <p>In addition, there are private companies that the City could work with or partner with to investigate and develop this opportunity. These companies have technical expertise, experience in conducting similar projects, and finances.</p> <p>The local Community Carbon Marketplace, and the Province of BC's Climate Investment Branch may also be interested in this as a means to invest local GHG reduction / carbon offset dollars.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>Cowichan Energy Alternatives (Community Carbon Marketplace)</li> <li>Province of BC's Climate Investment Branch</li> <li>North Cowichan</li> <li>Cowichan Place partners</li> </ul>

Action	Yr	Effort	Comments
<b>NEW ACTION – Promote new Provincial heating oil to heat pump incentives</b>	1	Low	<p>The Province of BC released a new incentive program to encourage homes to shift from using heating oil to air source heat pumps. This could be easily promoted in the City of Duncan. This action could tie in with actions 1.1 and 1.2.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>Cowichan Valley Regional District and North Cowichan are interested in promoting this program</li> </ul>
<b>2.1 Sustainability checklist for buildings</b>	1	Low to medium	<p>The City already has a sustainability checklist which will be updated.</p> <p>The checklist is currently educational and used for discussion in staff recommendations. To ensure greater compliance from developers, the checklist can be tied incentives for achieving target scores.</p> <p>The Municipality of North Cowichan also has a draft checklist, and the Regional District is also interested in updating theirs.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>BC Hydro funded implementation support</li> <li>Municipality of North Cowichan</li> </ul> <p><i>The BC Hydro funded implementation support for CEEP QuickStart alumni could assist the City with this action.</i></p>
<b>2.4 Expediting permit approvals, fee rebates, other financial incentives (M)</b>	2	Medium	<p>Action is a maybe.</p> <p>Expediting is not feasible for the City, but fee rebates, although already implemented, can be looked at again. Currently, fee rebates for Development Permit and Rezoning applications are only provided if buildings are Built Green or LEED certified, but the criteria could possibly be expanded. E.g. the fee rebates could look at matching BC Hydro’s criteria for the New Home program rebates, in order to maximize impact and reduce complexity.</p> <p><i>The BC Hydro funded implementation support for CEEP QuickStart alumni could assist the City with this action.</i></p>
<b>2.6 Development Cost Charge (DCC) reductions or waivers</b>	1	Medium	<p>This action will be considered in the near future.</p> <p><i>The BC Hydro funded implementation support for CEEP QuickStart alumni could assist the City with this action.</i></p>
<b>NEW ACTION - Research effective green building standards that are not too onerous for developers</b>	1	Medium	<p><i>The BC Hydro funded implementation support for CEEP QuickStart alumni could look at this for the City.</i></p>

## Duncan Community Energy and Emissions Plan

Action	Yr	Effort	Comments
<b>NEW ACTION - Include water efficient landscaping in existing Development Permit Areas</b>	2	Medium	<p>The existing DPAs already contain language encouraging greater sustainability, but that language currently does not cover water efficient landscaping. The City has the power to encourage or even mandate water efficient landscaping through a DPA. There is existing language on this in the University Village Local Area Plan.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• BC Hydro funded implementation support</li> </ul> <p><i>The BC Hydro funded implementation support for CEEP QuickStart alumni could assist the City with this action.</i></p>
<b>3.2 Education to developers - renewable energy technologies and efficiency</b>	1	Low	<p>Collaborate with CVRD lunch and learns and North Cowichan energy reduction workshops</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• BC Hydro funded implementation support</li> <li>• BC Hydro New Home Program</li> </ul> <p><i>BC Hydro New Home Program could call in (or the Community Energy Association could call in on their behalf).</i></p>
<b>NEW ACTION - Woodstove workshop on clean &amp; safe operation</b>	1	Low	<p>Promote CVRD’s existing workshops on clean &amp; safe woodstove operation.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• Cowichan Valley Regional District</li> </ul>
<b>NEW ACTION – Explore partnering with “Better Off North Cowichan” – energy conservation campaign</b>	2	Medium to high	<p>The City of Duncan could explore working in conjunction with the Municipality of North Cowichan’s new energy efficiency retrofit campaign, “Better Off North Cowichan”.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• Municipality of North Cowichan</li> <li>• <i>BC Hydro funded implementation support (e.g. for help finding funding)</i></li> </ul>
<b>NEW ACTION - Solar PV bulk buy - waive or reduce municipal permitting fees (M)</b>	3	Low to medium	<p><b>Action is a maybe.</b></p> <p>Depending on what the municipal permitting fees are for installations of solar photovoltaic (PV) systems in Duncan, the City could look at waiving or reducing these. Costs to comply with municipal permitting for residential solar PV installations in BC at the moment are known to range from less than \$100 to about \$2,500.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• <i>BC Hydro funded implementation support (for research &amp; support)</i></li> </ul>

Action	Yr	Effort	Comments
<b>4.1</b> <b>Promote free Business Energy Advisors Program</b>	1	Low	<p>The BC Hydro funded Business Energy Advisor (BEA) program provides free energy efficiency assessments to small and medium sized businesses and organizations, so long as they are willing to make energy efficiency improvements.</p> <p>This could be promoted through providing leaflets with the business licence application process.</p> <p>The Chamber of Commerce and the DBIA could also promote this action, e.g. by having the local Business Energy Advisor attend and present.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• BC Hydro funded implementation support</li> <li>• BC Hydro Business Energy Advisor</li> <li>• Chamber of Commerce</li> <li>• Downtown BIA</li> </ul>
<b>NEW ACTION - LED Ornamental Streetlights</b>	1	Medium	<p>The City is interested in looking at converting the streetlights it owns to LED.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• Shared Services BC LED Streetlight program</li> </ul>
<b>NEW ACTION - Municipal corporate green building policy, &amp; promote to community</b>	3	Low	<p>A municipal corporate green building policy, or Life Cycle Costing policy, could be useful for the City to adopt. This could then be promoted to the community to demonstrate leading by example.</p> <p>The BC Hydro funded implementation support for CEEP QuickStart alumni could assist the City with this action through providing ready-made templates.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• BC Hydro funded implementation support</li> </ul>
<b>NEW ACTION - Solar PV bulk buy - participation with municipal buildings (M)</b>	3	Medium	<p><b>Action is a maybe</b></p> <p>Depending on the business case that could be achieved, the City could look at participating in the solar PV bulk buy through installing PV on its own buildings.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• Local solar PV bulk buy initiatives</li> </ul>
<b>5.2</b> <b>Land use suite “enhanced”</b>	1	Medium	<p>The City can attempt to encourage densified growth and reduced emissions.</p> <p>In the workshop, research on local housing preferences was presented. The conclusions from this research were that:</p> <ul style="list-style-type: none"> <li>• While residential preference tends toward single family dwellings that offer privacy and separation from neighbours, there is a significant percentage of the</li> </ul>

Action	Yr	Effort	Comments
<p><b>5.2</b>  <b>Land use suite</b>  <b>“enhanced”</b>  <i>(continued)</i></p>			<p>population that prefers to live in urban environments.</p> <ul style="list-style-type: none"> <li>• This population is largest among baby boomers, a growing percentage of the population</li> <li>• Yet these people still want privacy, affordability and independence</li> <li>• Residential forms should reflect these demands, thereby drawing more people towards the core</li> </ul> <p>In the research presentation, the proposed solutions were:</p> <ul style="list-style-type: none"> <li>• Small lot/small home subdivisions within walking distance of town centre</li> <li>• Fee simple row housing</li> <li>• Allowing carriage houses / tiny homes</li> <li>• Allowing suites in more residential zones</li> <li>• Design, orientation, and landscaping for maximum privacy</li> </ul> <p>The City may be able to achieve these measures through DPA guidelines and the update to the Zoning Bylaw.</p>
<p><b>5.4</b>  <b>Flow OCP and local area plans through to the Zoning Bylaw</b></p>	1	Medium to high	<p>This will be conducted as part of the Zoning Bylaw review.</p>
<p><b>NEW ACTION - Green the Zoning Bylaw</b></p>	1	Medium to high	<p>This could be considered as part of the Zoning Bylaw review.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• BC Hydro funded implementation support</li> </ul> <p><i>The BC Hydro funded implementation support for CEEP QuickStart alumni could assist the City with this action.</i></p>
<p><b>6.4</b>  <b>Special event planning</b></p>	2	Medium	<p><b>Action is a maybe.</b></p> <p>This action consists of encouraging people to use transit by making transit free during special events. This could be part of the Regional Transportation Plan which will be conducted by CVRD soon.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• Cowichan Valley Regional District</li> </ul>
<p><b>6.5</b>  <b>Collaborate with major employers on work-related transportation</b></p>	2	Medium	<p>This could be considered as part of the Regional Transportation Plan which will be conducted by CVRD.</p> <p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• Cowichan Valley Regional District</li> </ul>

Action	Yr	Effort	Comments
<b>6.9 Low carbon and electric vehicle suite (M)</b>	3	Medium	<b>Action is a maybe</b> The City and CVRD have already installed electric vehicle charging stations which are well used. At the appropriate time the City could consider purchasing an electric vehicle for its own fleet. This could be beneficial from a Life Cycle Costing perspective.
<b>7.1 Organics diversion</b>	2	Medium to high	Organics and yard waste pickup are already taking place, however further work could be done. The City could look at composting the waste generated from City parks, which may be of financial benefit to the City.
<b>8.1 Organizational structure for community climate action</b>	1	Low	CEEP implementation to be led by the Planner at the City, with guidance from the Environment & Sustainability Committee.
<b>8.3 Identify green economy opportunities</b>	2	Medium	This was conducted as part of the Municipality of North Cowichan's Climate Action & Energy Plan. The City could review this research, to see if any opportunities for the City can be identified.  <b>Partners:</b> <ul style="list-style-type: none"> <li>• Municipality of North Cowichan</li> </ul>
<b>8.4 Leverage Local Government assets into community change</b>	2	Medium	A number of the other actions relate to using municipal assets to help achieve community wide change. One additional action could be to obtain a Coop student through Sustainable Communities at BC Hydro, to assist with implementation of this plan.  <b>Partners:</b> <ul style="list-style-type: none"> <li>• BC Hydro Sustainable Communities</li> </ul>
<b>8.5 Long-term, deep community engagement (culture change)</b>	1	Medium to high	All activities in this plan relate to this. The workshop group considered it to be important to increase community buy-in for energy conservation, locally generated renewable energy, and building local resilience. Parallels were drawn between local energy and the local food movement, and the time it took (a few decades) to build momentum on local food.

### **Potential Community Engagement Opportunities**

Community engagement provides an opportunity for the local government to not only present the CEEP, but to highlight some of the actions that have already been taken by the municipality to save energy and reduce emissions. This demonstrates commitment and leadership, and sets a positive example for the community. Additional suggested approaches are provided below:



- Invite local experts or relevant businesses/organizations to set-up a booth at your 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.
- Invite BC Hydro to share information about incentives or other programs that are available to encourage efficiency.

### ***Next Steps***

Suggested next steps for the CEEP are:

1. Incorporate CEEP into City's policy framework.
2. Ongoing CEEP implementation.
3. Monitor and report on implementation.

### **Results of Actions**

The estimated impact of the CEEP implementation 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 between the outcomes of the Plan and the GHG target trajectory.

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

It should be noted that actions to reduce electricity consumption will also result in financial savings for the community, although they will not result in significant savings in emissions. . This is because electricity in British Columbia contributes little to greenhouse gas intensity, and is predicted to be carbon neutral in 2016.

Overview GHG Emissions

Figure 13: GHG Emissions

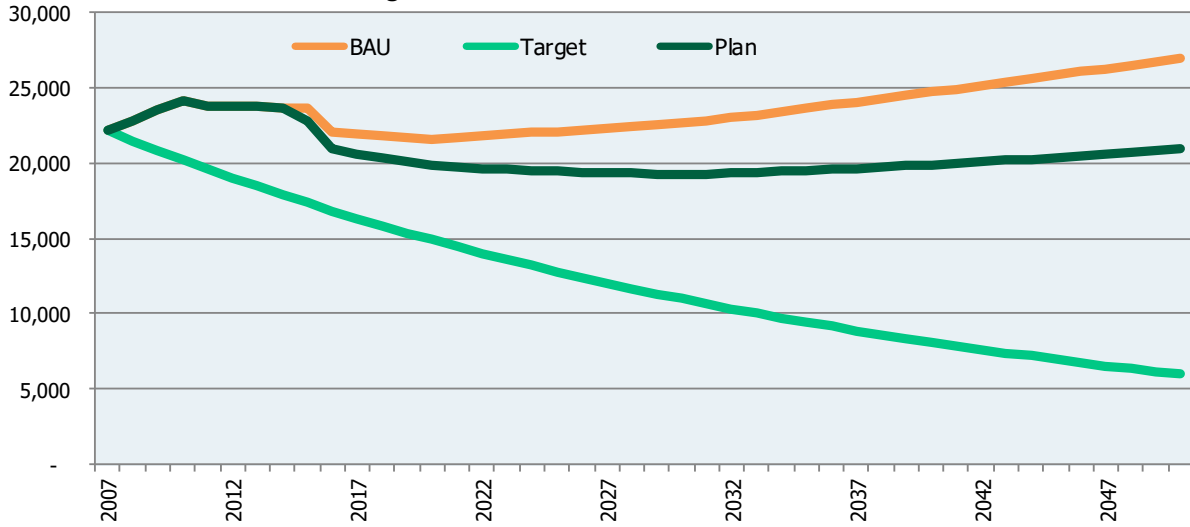
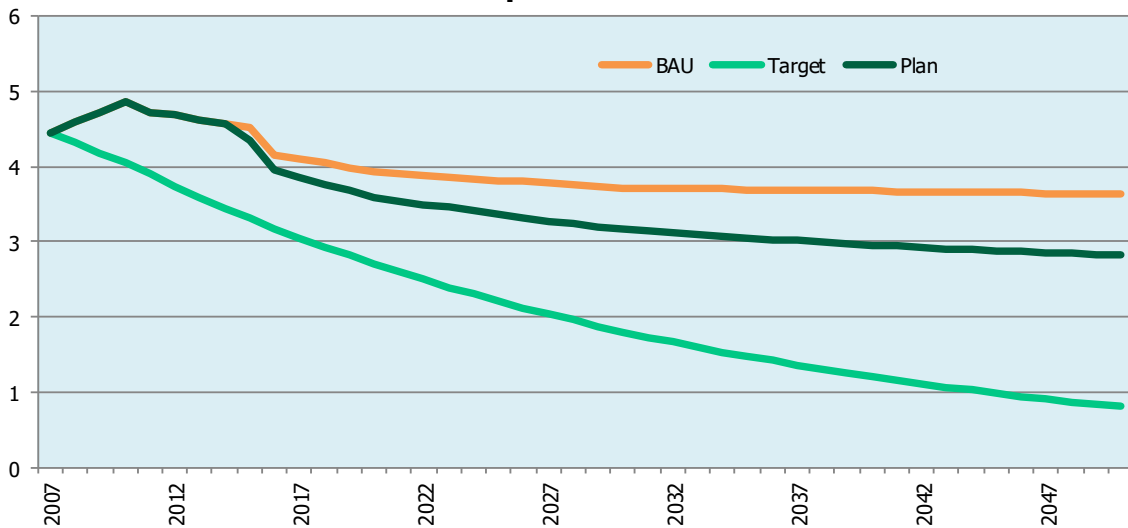


Figure 14: Per Capita Emissions



Overview Energy Use (GJ)

Figure 15: Energy Use in GJ's

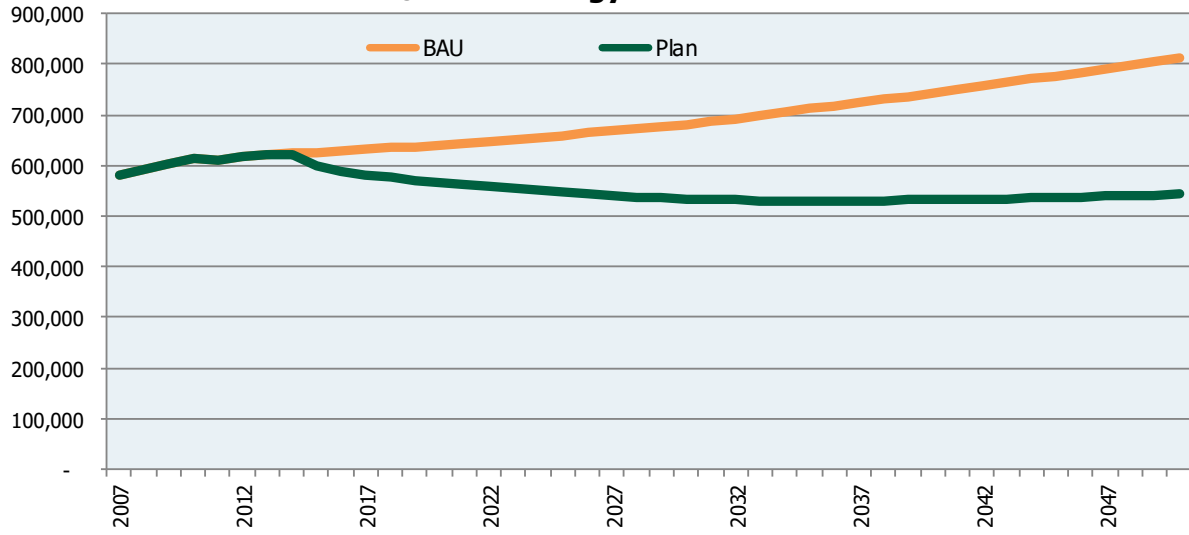
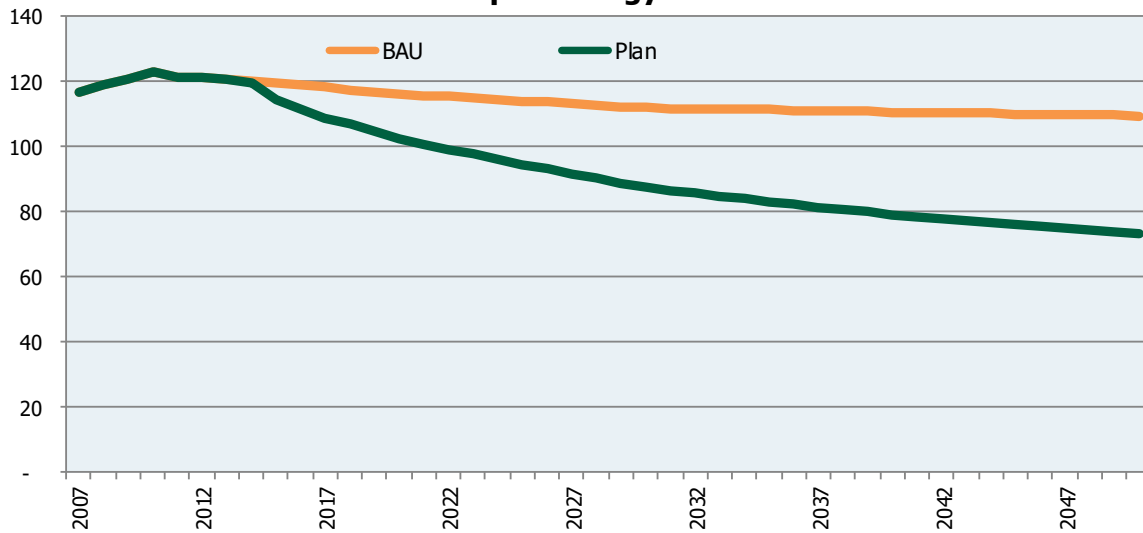
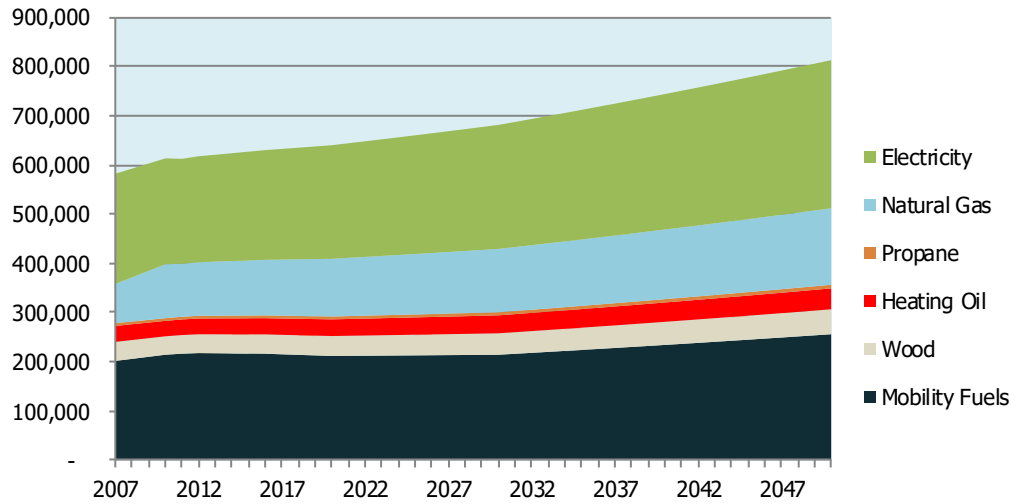


Figure 16: Per Capita Energy Use in GJ's

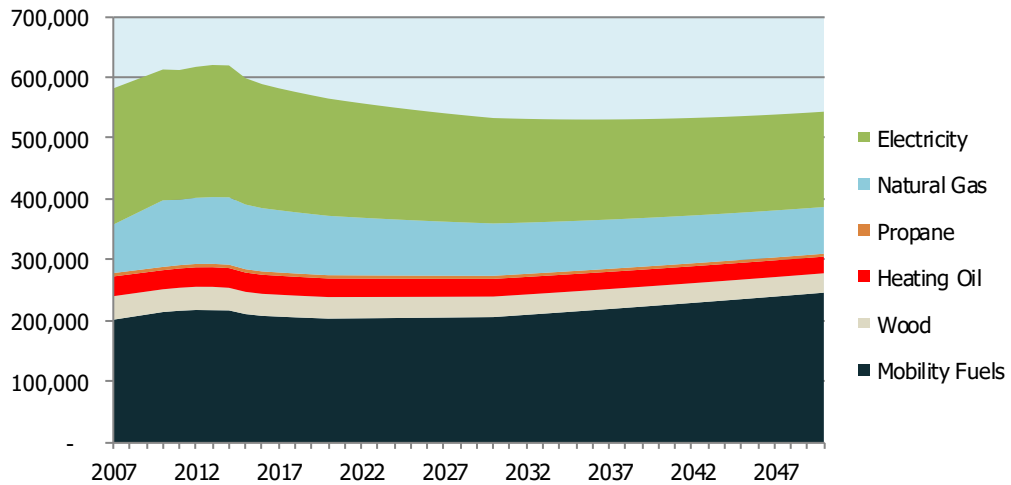


## Energy Use by Fuel

**Figure 17: BAU Energy Use by Fuel, GJ/year**



**Figure 18: Planned Energy Use by Fuel, GJ/year**



## GHGs by Sector

Figure 19: **BAU GHGs by Sector, tonnes/year**

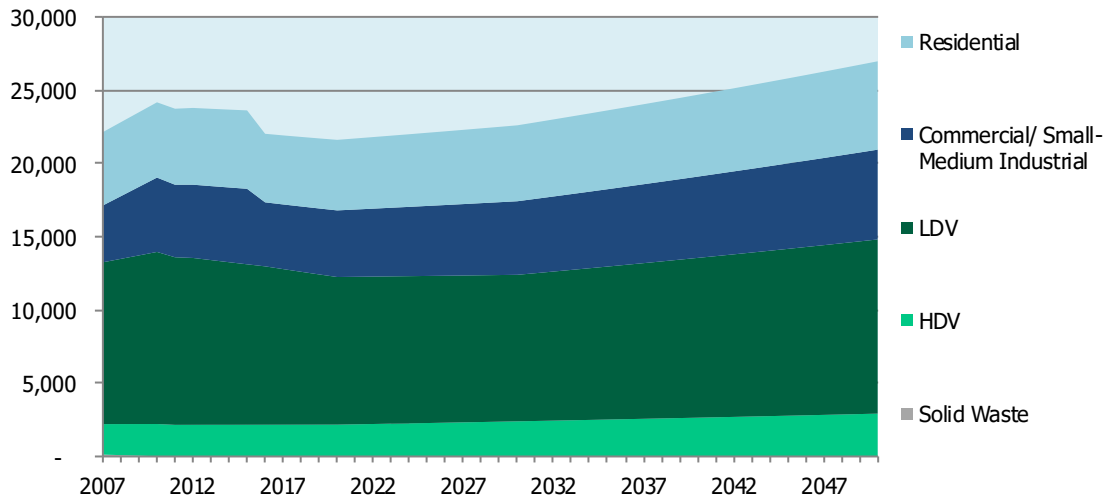
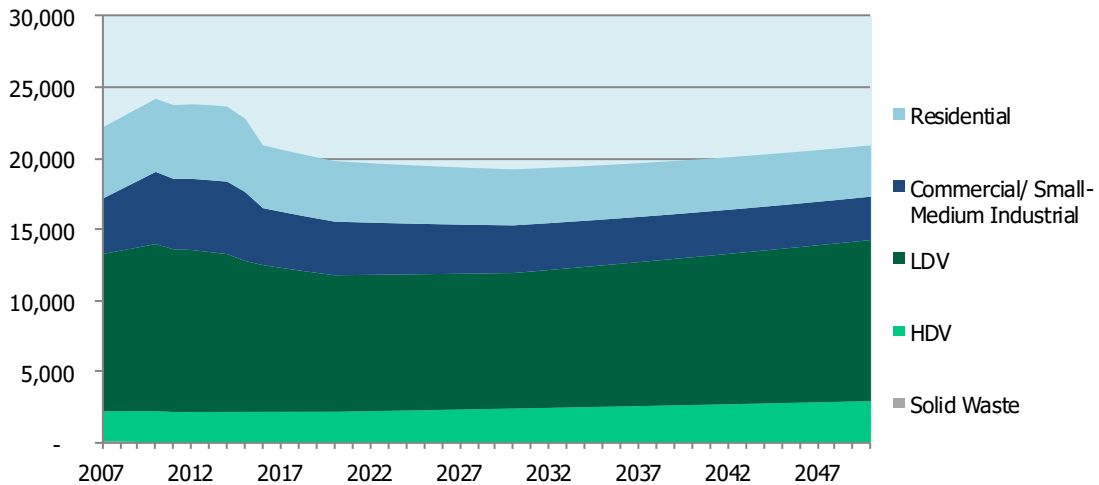
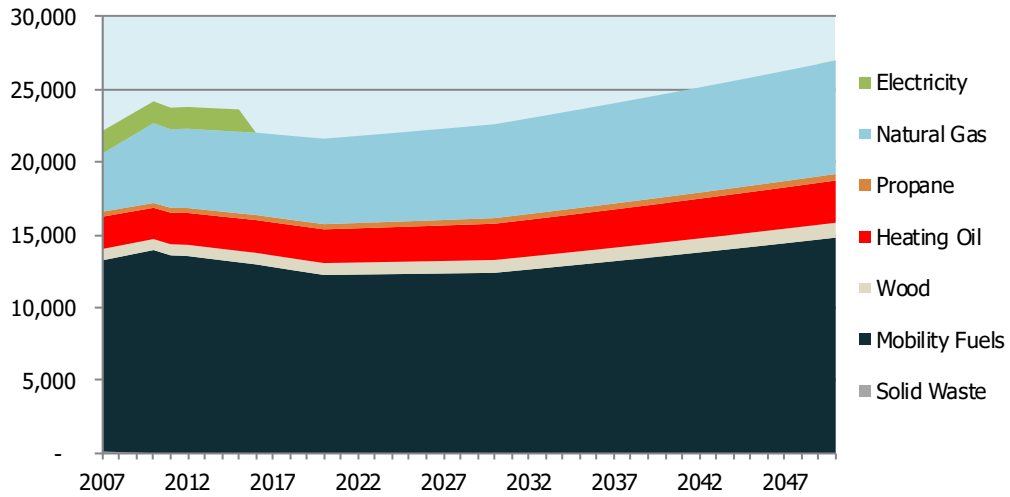


Figure 20: **Planned GHGs by Sector, tonnes/year**

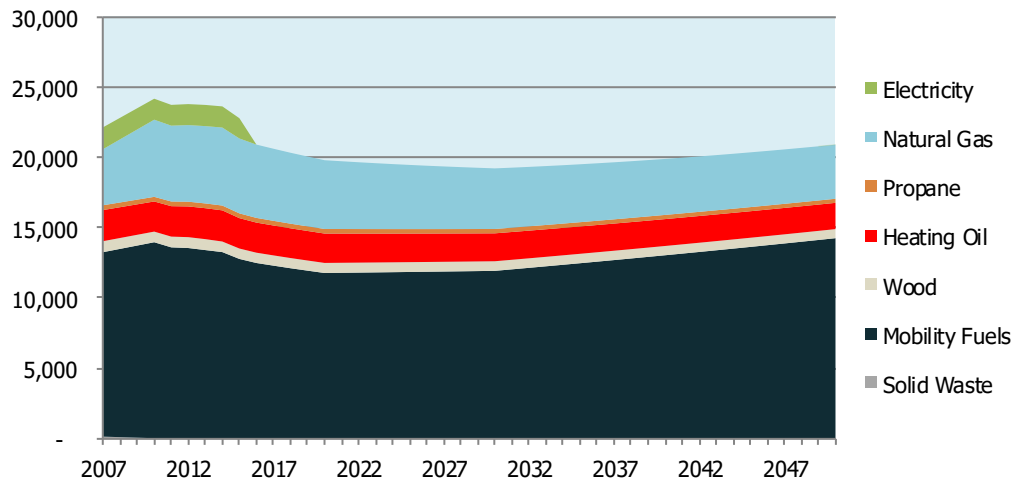


**GHGs by Fuels & Waste**

**Figure 21: BAU GHGs by Fuels & Waste, tonnes/year**

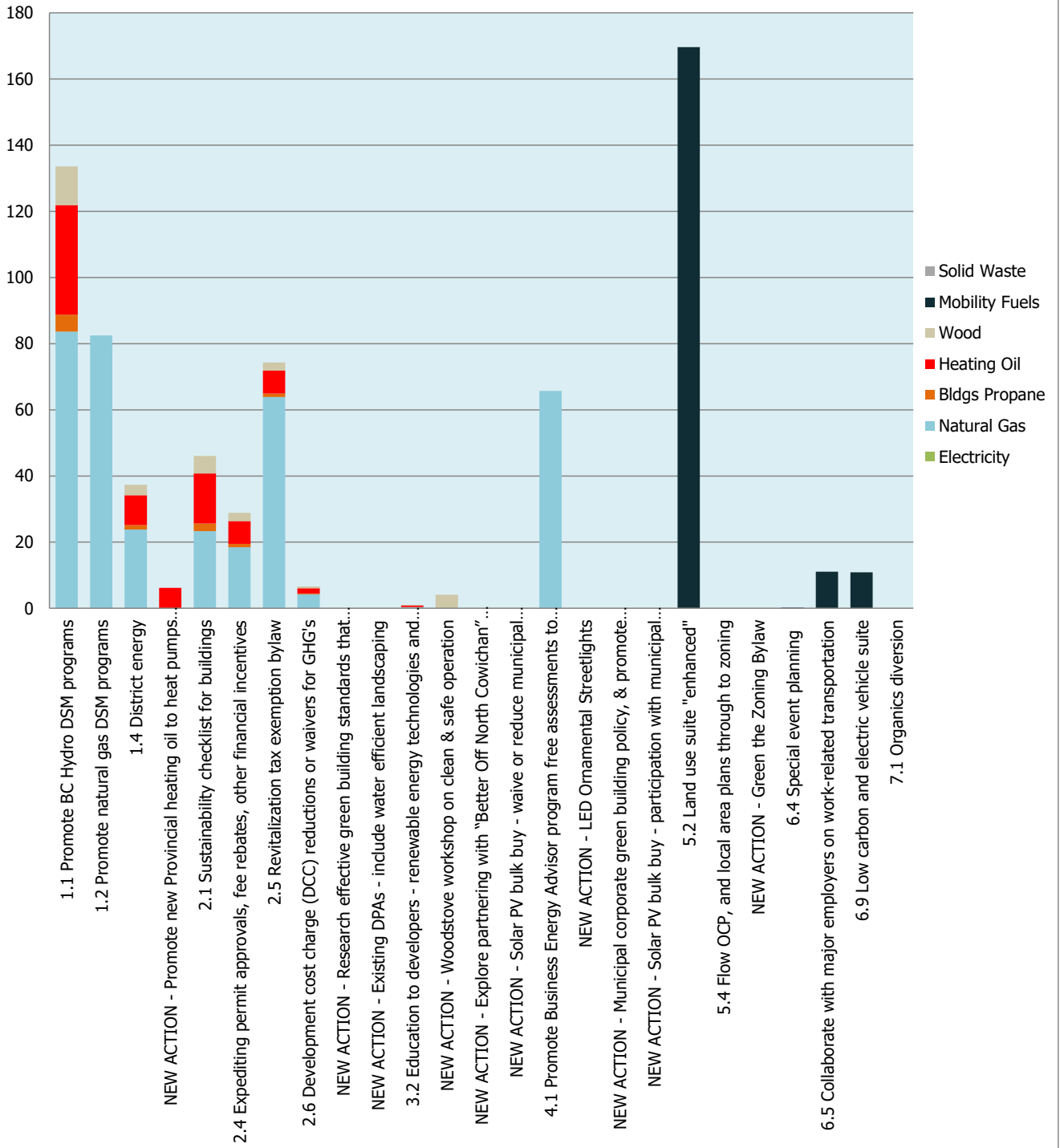


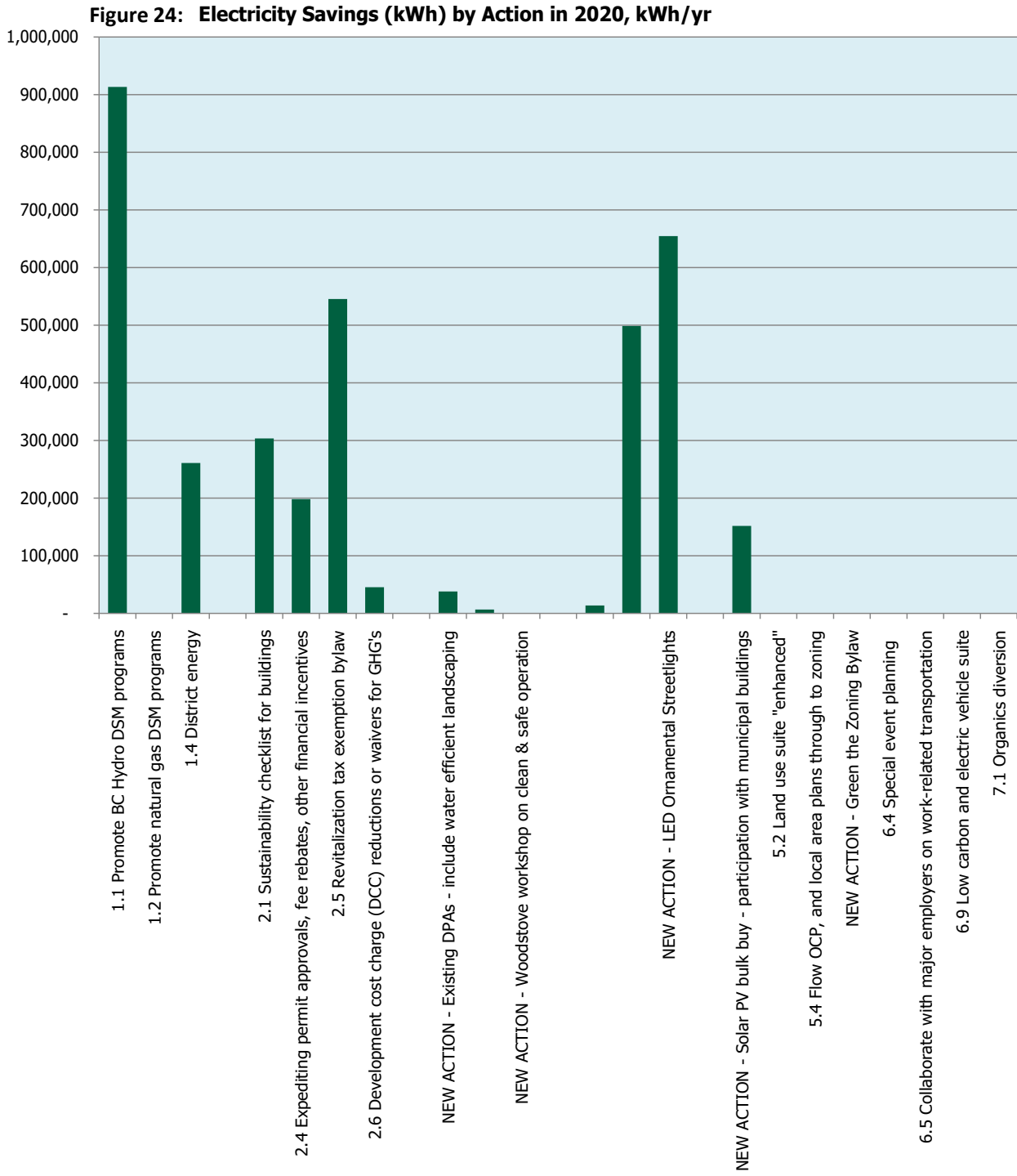
**Figure 22: Planned GHGs by Fuels & Waste, tonnes/year**



NOTE: The Province of BC has committed to a carbon-neutral electricity grid by 2016. In the model electricity emissions become zero from 2016 and remain there for the duration of the projected period.

Figure 23: GHG Savings by Action in 2020, tonnes/yr





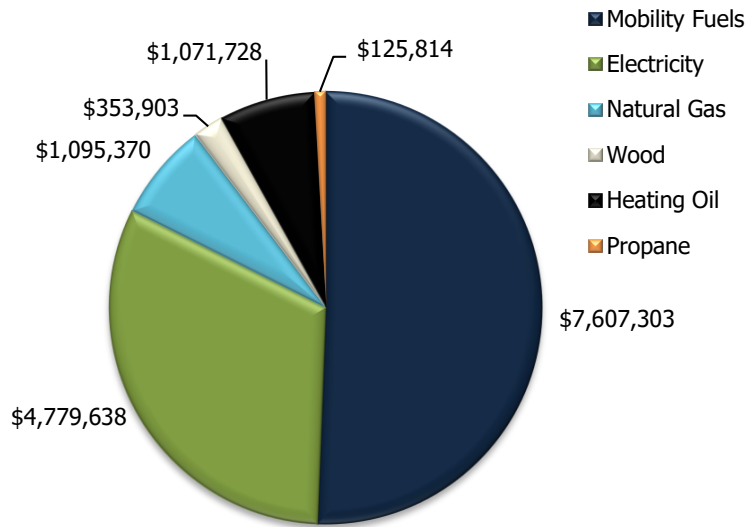


## Community Financial Savings

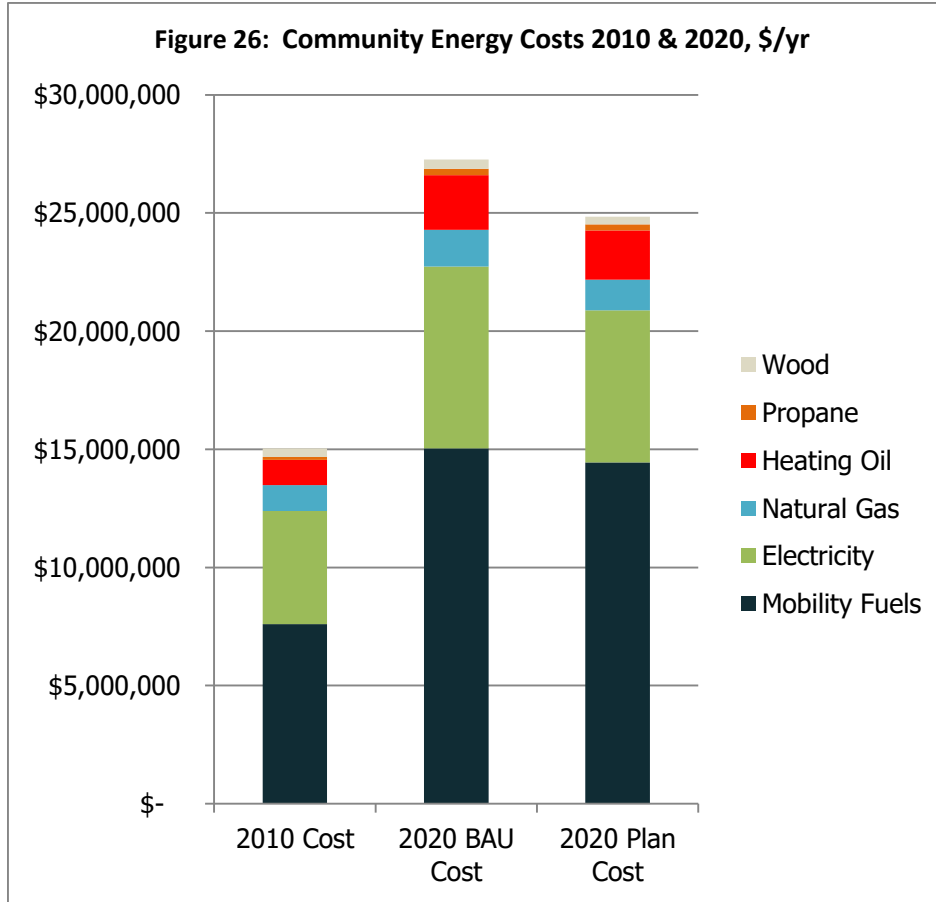
For the City of Duncan, only a small percentage of the energy dollars spent within the community remain within the community. Therefore, a significant co-benefit of implementing this plan to reduce energy consumption and emissions is that reducing the energy dollars spent will help people, families, 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 Duncan’s community energy expenditures for 2010, totalling approximately \$15 million (\$3,000 per capita), split by fuel type.

Figure 25: Energy Cost – 2010

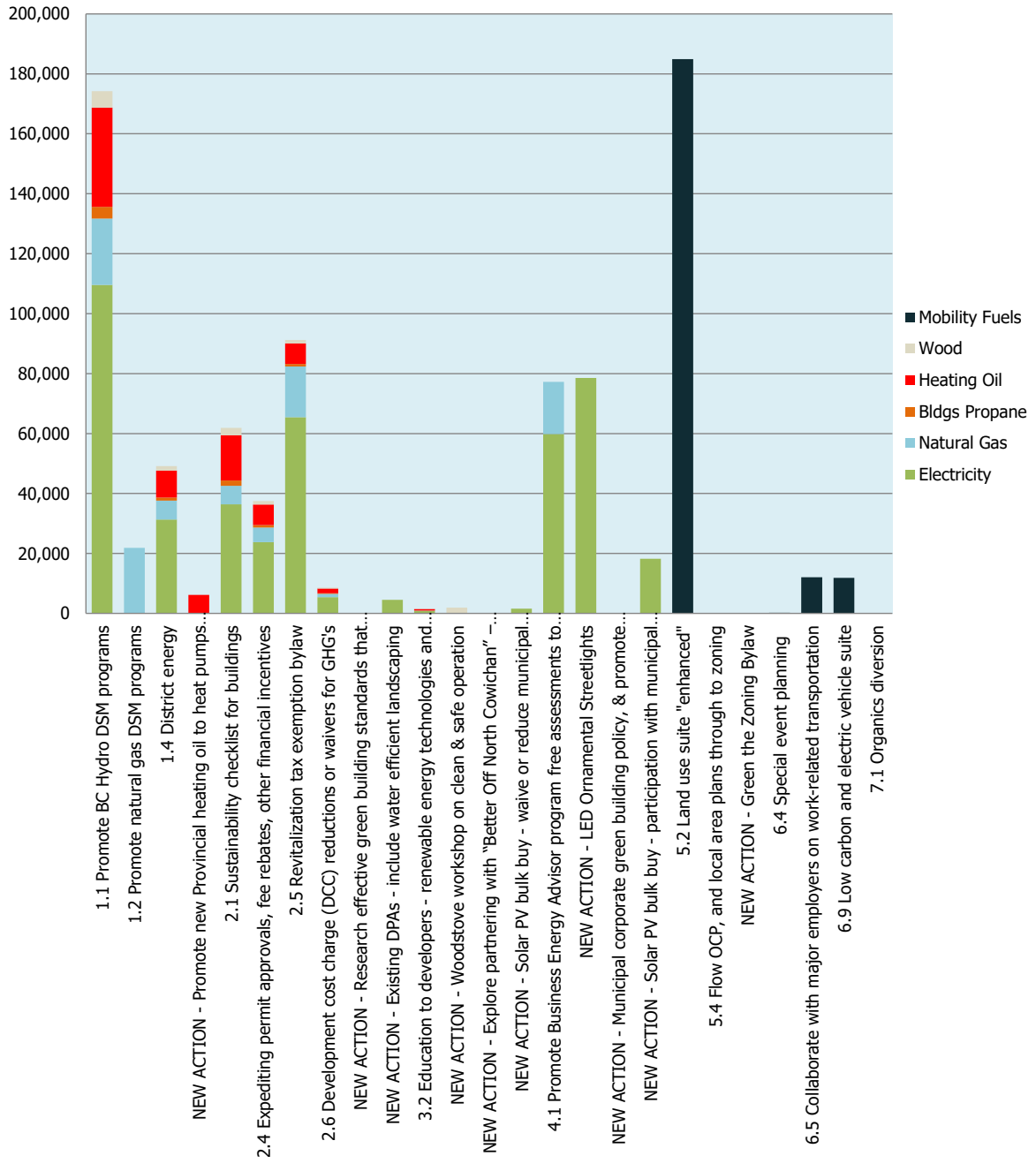


The impacts of the plan are shown in the following chart, comparing community energy costs in 2010 and 2020. These costs are projected to be reduced by approximately 9% through plan implementation. The model assumes that energy prices will increase during this time, at which time the 9% reduction will equate to about \$2.4 million per year or \$440 per capita (or otherwise \$1.5 million or \$270 per capita if energy prices remain the same). Note that although energy prices are difficult to predict, there is confidence that the price of electricity will likely increase over the next few years.



The following chart can be shows estimates of the energy savings kept within 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 “lite” and “enhanced” can reduce municipal infrastructure capital and operating costs).

Figure 27: Energy dollars kept within the community in 2020, by action, \$/yr



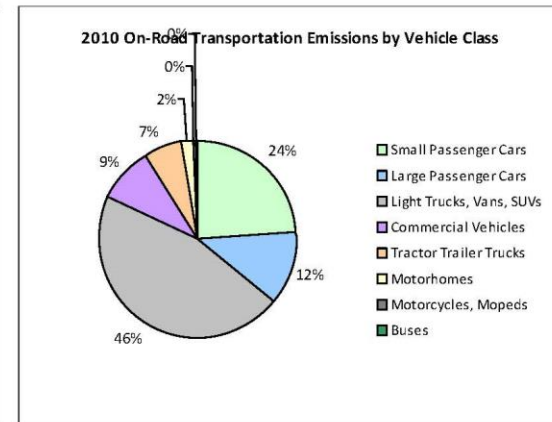
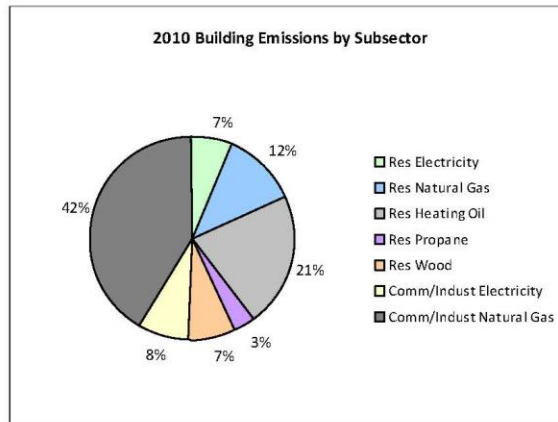
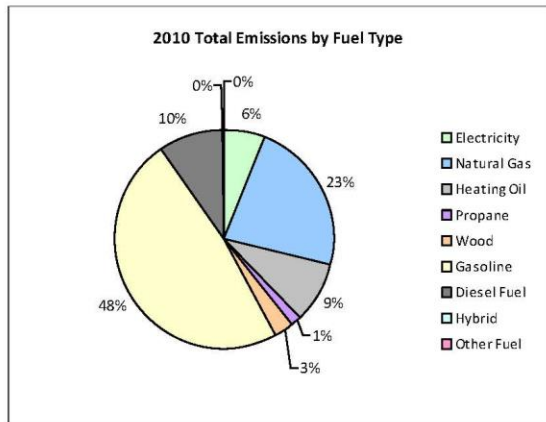
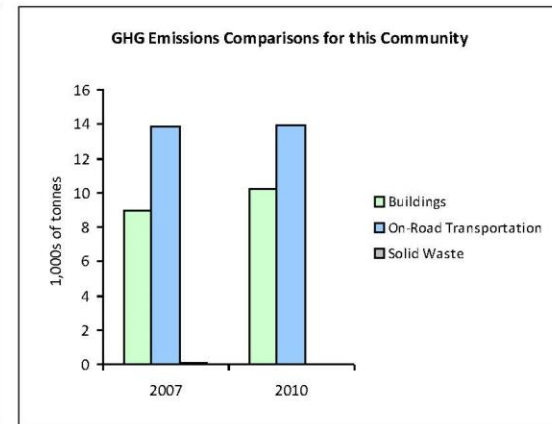
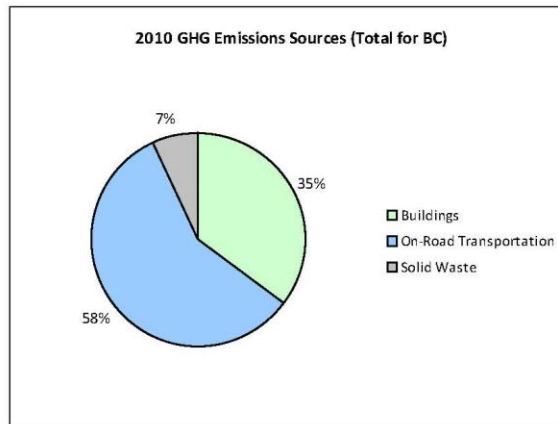
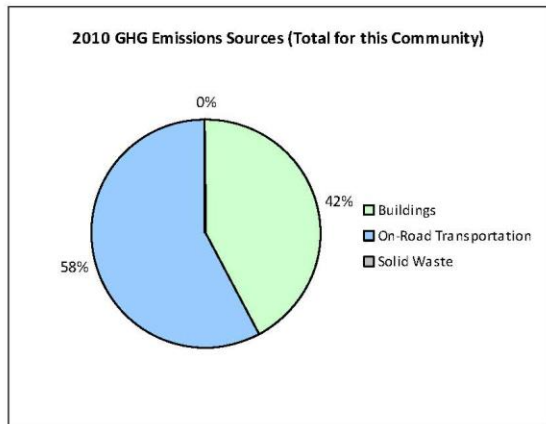
## Appendix 1 – Community Energy & Emissions Inventory for Duncan (2010)



### Duncan City 2010 Community Energy and Emissions Inventory

February 20, 2014

Monitoring and reporting on progress towards greenhouse gas emissions reduction targets



# Duncan Community Energy and Emissions Plan



## Duncan City 2010 Community Energy and Emissions Inventory *Monitoring and reporting on progress towards greenhouse gas emissions reduction targets*

### 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			33,400	55	5			30,000	106	7
	Gasoline	978	1,341,689 L	14,600	46,959	3,202	1,017	1,442,811 L	15,200	50,498	3,248
	Diesel Fuel	33	49,283 L	22,200	1,887	135	27	38,675 L	21,300	1,481	102
Large Passenger Cars	Hybrid			14,600	53	4			22,700	307	19
	Gasoline	523	822,581 L	13,700	28,791	1,971	452	725,755 L	14,100	25,401	1,638
	Diesel Fuel			11,300	262	19			11,200	327	23
	Other Fuel			13,300	71	4			15,700	36	4
Light Trucks, Vans, SUVs	Hybrid			16,200	46	2			28,500	190	12
	Gasoline	1,012	2,382,007 L	16,500	83,370	5,720	1,089	2,706,970 L	17,500	94,745	6,149
	Diesel Fuel	55	111,673 L	11,600	4,277	304	37	91,108 L	14,600	3,490	242
	Other Fuel			10,100	174	11			10,100	130	8
Commercial Vehicles	Gasoline	61	183,337 L	17,800	6,417	430	57	159,503 L	16,800	5,583	356
	Diesel Fuel	78	262,471 L	17,900	10,053	707	87	342,584 L	21,500	13,120	894
	Other Fuel			10,400	205	13					
Tractor Trailer Trucks	Diesel Fuel	24	364,280 L	34,700	13,951	980	26	352,046 L	31,900	13,483	919
Motorhomes	Gasoline	33	74,992 L	16,400	2,625	175	27	63,421 L	16,500	2,220	140
	Diesel Fuel	13	40,827 L	17,000	1,564	109	17	49,511 L	16,200	1,897	129
	Other Fuel			22,000	78	5			10,100	40	3
Motorcycles, Mopeds	Gasoline	44	9,817 L	4,900	343	23	55	14,364 L	5,800	503	32
Buses	Gasoline			11,200	141	8			15,900	277	19
	Diesel Fuel			12,500	134	8			13,300	153	11
	Other Fuel								10,600	50	4
<b>Totals</b>		<b>2,854</b>	<b>5,642,957 L</b>	<b>15,349</b>	<b>201,456</b>	<b>13,835</b>	<b>2,891</b>	<b>5,642,957 L</b>	<b>16,154</b>	<b>214,037</b>	<b>13,959</b>

# Duncan Community Energy and Emissions Plan



## Duncan 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)	CO2e (t)	Connections	Consumption	Energy (GJ)	CO2e (t)
Residential	Wood	N/A	38,686 GJ	38,686	784	N/A	37,450 GJ	37,450	759
	Heating Oil	N/A	32,396 GJ	32,396	2,284	N/A	31,360 GJ	31,360	2,145
	Propane	N/A	5,603 GJ	5,603	342	N/A	5,423 GJ	5,423	331
	Natural Gas	367	19,326 GJ	19,326	970	504	24,473 GJ	24,473	1,227
	Electricity	2,535	28,034,741 kWh	100,925	701	2,625	27,145,925 kWh	97,725	679
Commercial/Small-Medium Industrial	Natural Gas	154	60,411 GJ	60,411	3,030	198	85,064 GJ	85,064	4,267
	Electricity	667	34,166,210 kWh	122,998	854	665	32,599,079 kWh	117,357	815
<b>Totals</b>		<b>3,723</b>		<b>380,345</b>	<b>8,965</b>	<b>3,992</b>		<b>398,852</b>	<b>10,223</b>

Solid Waste		2007				2010			
		Connections	Consumption	Energy (GJ)	CO2e (t)	Connections	Consumption	Energy (GJ)	CO2e (t)
Community Solid Waste	Solid Waste	0	539 t	N/A	114	0	512 t	N/A	0
<b>Totals</b>		<b>0</b>			<b>114</b>	<b>0</b>			<b>0</b>

### Totals for Transportation, Buildings and Solid Waste

Fuel Type	2007 (Population: 4,978)			2010 (Population: 4,987)		
	Consumption	Energy (GJ)	CO2e (t)	Consumption	Energy (GJ)	CO2e (t)
Hybrid	0 L	154	11	0 L	603	38
Gasoline	4,814,423 L	168,646	11,529	5,112,824 L	179,227	11,582
Diesel Fuel	828,534 L	32,128	2,262	873,924 L	33,951	2,320
Other Fuel	0 L	528	33	0 L	256	19
Wood	38,686 GJ	38,686	784	37,450 GJ	37,450	759
Heating Oil	32,396 GJ	32,396	2,284	31,360 GJ	31,360	2,145
Propane	5,603 GJ	5,603	342	5,423 GJ	5,423	331
Natural Gas	79,737 GJ	79,737	4,000	109,537 GJ	109,537	5,494
Electricity	62,200,951 kWh	223,923	1,555	59,745,004 kWh	215,082	1,494
Solid Waste	539 t	0	114	512 t	0	0
<b>Grand Totals</b>		<b>581,801</b>	<b>22,914</b>		<b>612,889</b>	<b>24,182</b>



## Duncan 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	1,085	34	1,045	47	1,045	43
Semi-Detached House	100	3	55	2	85	4
Row House	110	3	155	7	150	6
Apartment, Duplex	25	1	25	1	35	1
Apartment, 5 storeys or higher	0	0	0	0	0	0
Apartment, under 5 storeys	820	25	910	41	1,070	44
Other Single Attached House	0	0	40	2	35	1
Movable Dwelling	0	0	5	0	0	0

#### 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	1,010	69	1,065	72	1,160	66
Car, Truck, Van as Passenger	125	9	165	11	195	11
Public Transit	25	2	10	1	35	2
Walked	285	20	215	15	300	17
Bicycle	0	0	15	1	30	2
Motorcycle	0	0	0	0	10	1
Taxicab	0	0	0	0	10	1
Other Method	15	1	0	0	15	1

#### 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	23	11
Agricultural Land Reserve	0	0
Other land use	185	89
Total Parks and Protected Area	23	11
Total Land Area	208	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	23	11
Agricultural Land Reserve	0	0
Other land use	185	89
Total Parks and Protected Area	23	11
Total Land Area	208	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	960	64
5 to 9.9 km	115	8
25 km or more	225	15
15 to 24.9 km	115	8
10 to 14.9 km	90	6



## Duncan City 2010 Community Energy and Emissions Inventory *Monitoring and reporting on progress towards greenhouse gas emissions reduction targets*

### **This is your local government's 2010 Community Energy and Emissions Inventory (CEEI) Report**

#### **What is a CEEI Report?**

CEEI Reports are a result of a multi-agency effort to provide a province-wide solution to assist local governments in BC to track and report on community-wide energy consumption and greenhouse gas (GHG) emissions as well as supporting indicators every two years. CEEI Reports are one of the many resources available through the Climate Action Toolkit (<http://www.toolkit.bc.ca>), a web-based service provided through the ongoing collaboration between UBCM and the Province.

#### **Why does my local government need a CEEI Report?**

A community energy and GHG emissions inventory can be a valuable tool that helps local governments plan and implement GHG and energy management strategies, while at the same time strengthening broader sustainability planning at the local level. CEEI reports fulfill local governments' Climate Action Charter commitment to measure and report their community's GHG emissions profile, establish a base year inventory for local governments to consider as they develop targets, policies, and actions related to BC's Local Government Act requirements, fulfill Milestone One requirements for those local government members of the Federation of Canadian Municipalities' (FCM's) Partners in Climate Protection (PCP) program, as well as supporting local government efforts to monitor progress towards Regional Growth Strategy objectives.

#### **A first in North America!**

CEEI is a first in North America and a first step for BC communities. The 2010 CEEI Reports are based on best available province-wide data. The accuracy and detail of CEEI reports will continue to improve to meet increasing local and provincial government information needs. Improvements have been made from the original draft 2007 CEEI Reports posted in Spring 2009. These include estimates for residential heating oil, propane and wood use, breaking out small from large industrial buildings, including updated land-use change and new agricultural sectors as 'memo items'. Following the 2010 CEEI Reports, inventories will be generated every two years, and will continue to improve as government information needs, international protocols and new data sources emerge.

#### **For More Information**

The full list of all BC local government 2010 CEEI Reports, User Guide, Technical Methods and Guidance Document, and additional information on the Supporting Indicators are available at: <http://www.env.gov.bc.ca/cas/mitigation/ceei/index.html> For guidance on target setting and community actions, go to <http://www.toolkit.bc.ca> and <http://www.cd.gov.bc.ca/lgd/greencommunities/targets.htm>

#### **We Need Your Feedback**

To continue to guide us on CEEI, please take the time to contact us directly at [CEEIRPT@gov.bc.ca](mailto:CEEIRPT@gov.bc.ca)

#### **Notice to the Reader**

This CEEI Report uses information from a variety of sources to estimate GHG emissions. While the methodologies, assumptions and data used are intended to provide reasonable estimates of greenhouse gas emissions, the information presented in this report may not be appropriate for all purposes. The Province of BC and the data providers do not provide any warranty to the user or guarantee the accuracy or reliability of the data contained in this report. The user accepts responsibility for the ultimate use of such data. We need your help to make these reports better,



## Appendix 2 – Actions Descriptions

The descriptions below are taken from the CEEP QuickStart 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. Energy-efficiency retrofits in buildings can yield 25%-50% savings in total energy use. Retrofits through the LiveSmart program averaged 31%.

Action	Description
<p><b>1.1 Promote BC Hydro demand side management programs</b></p> <p>Type: Social</p>	<p><b>Key Question:</b> This action is recommended unless there is a reason why it cannot be done.  <b>Description:</b> BC Hydro offers many electricity conservation programs branded as PowerSmart (PS). Local governments can assist in promotion of these programs, increasing awareness and encouraging local participation in residential and commercial sectors (e.g. communicating about PowerSmart programs during building permit application processes), so residents and businesses can save electricity and money.</p> <p><b>% Energy Savings Calculation:</b> Commercial = <math>a*b*c</math>, Residential = <math>d*e*f</math></p> <ul style="list-style-type: none"> <li>a. % of commercial customers reached</li> <li>b. % of reached commercial that engage with PS</li> <li>c. average improvement from engaging with PS</li> <li>d. % of residential customers reached</li> <li>e. % of those reached that engage with PS</li> <li>f. average % improvement from engaging with PS</li> </ul> <p>Example: <math>(a*b*c) = (90\% * 5\% * 30\%) = 1.4\%</math> (commercial buildings sector)  <math>(d*e*f) = (90\% * 5\% * 30\%) = 1.4\%</math> (residential buildings sector)</p>
<p><b>1.2 Promote natural gas demand side management programs</b></p> <p>Type: Social</p>	<p><b>Key Question:</b> This action is recommended unless there is a reason why it cannot be done.  <b>Description:</b> Natural gas providers offer natural gas conservation programs. Local governments can assist in promotion of these programs, increasing awareness and encouraging local participation in residential and commercial sectors (e.g. during building permit application processes), so local residents and businesses can save natural gas and money.</p> <p><b>% Energy Savings Calculation:</b> Commercial = <math>a*b*c</math>, Residential = <math>d*e*f</math></p> <ul style="list-style-type: none"> <li>a. % of commercial customers reached</li> <li>b. % of reached commercial that engage with programs</li> <li>c. average improvement from engaging with programs</li> <li>d. % of residential customers reached</li> <li>e. % of those reached that engage with programs</li> <li>f. average % improvement from engaging with programs</li> </ul> <p>Example: <math>(a*b*c) = (90\% * 5\% * 30\%) = 1.4\%</math> (commercial buildings sector)  <math>(d*e*f) = (90\% * 5\% * 30\%) = 1.4\%</math> (residential buildings sector)</p>
<p><b>1.3 Promote provincial / federal demand side management programs</b></p>	<p><b>Key Question:</b> This action is recommended unless there is a reason why it cannot be done.  <b>Description:</b> Federal and Provincial governments offers many energy conservation programs. Local governments can assist in the promotion of these programs locally; increasing awareness and encouraging participation in residential and commercial sectors (e.g. including program information in regular communications and in building permit application processes), so local residents and businesses can conserve energy and save money.</p>

Action	Description
Type: Social	<p><b>% Energy Savings Calculation:</b> Commercial = <math>a*b*c</math>, Residential = <math>d*e*f</math></p> <ol style="list-style-type: none"> <li>% of commercial customers reached</li> <li>% of reached commercial that engage with programs</li> <li>average improvement by energy type (elec, gas, ...) from engaging with programs</li> <li>% of residential customers reached</li> <li>% of those reached that engage with programs</li> <li>average % improvement from engaging with programs energy use by type in residential</li> </ol> <p>Example: <math>(a*b*c) = (90\% * 5\% * 30\%) = 1.4\%</math> (commercial buildings sector)  <math>(d*e*f) = (90\% * 5\% * 30\%) = 1.4\%</math> (residential buildings sector)</p>
<p><b>1.4 District energy / Renewable energy systems</b></p> <p>Type: Infrastructure</p>	<p><b>Key Question:</b> Is there a source of waste heat (rink, industry, sewer pipes, wastewater treatment plant, etc) near to heat demand (pool, hospital, etc) OR are several public-sector (municipality, regional district, provincial ministry, health authority, school district, etc) facilities located close to each other?</p> <p><b>Description:</b> 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.</p> <hr/> <p><b>Calculation:</b> Existing Residential = <math>a*b*c</math>, New Residential = <math>a*d*c</math>  Existing Commercial = <math>c*f*g</math>, New Commercial = <math>e*f*h</math></p> <ol style="list-style-type: none"> <li>% of energy used for heating &amp; cooling for residential (77%)</li> <li>% of existing residential connected to DE</li> <li>% reduction of energy from DE for residential (66%, based on Coefficient of Performance of 3 (COP 3); i.e. energy output is 3 times energy input (3 times more efficient than electric baseboard)use 66% for electric baseboard displacement, higher for natural gas / heating oil displacement.</li> <li>% of new residential connected to DE</li> <li>% of energy for heating and cooling in industrial/commercial/institutional (ICI) (63%)</li> <li>% reduction in heating / cooling from DE for ICI (66%, based on COP 3)</li> <li>% of existing ICI connected to DE</li> <li>% of new ICI connected to DE</li> </ol> <p>Example: Energy improvements in indicated sectors:  <math>(a*b*c) = (77\% * 1\% * 66\%) = 0.3\%</math> (existing residential buildings sector)  <math>(a*d*c) = (77\% * 5\% * 66\%) = 2.5\%</math> (new residential buildings sector)  <math>(e*f*g) = (63\% * 66\% * 1\%) = 0.4\%</math> (existing commercial sector)  <math>(e*f*h) = (63\% * 66\% * 25\%) = 4.2\%</math> (new commercial sector)</p>
<p><b>1.5 Improve building code enforcement</b></p> <p>Type: Operations</p>	<p><b>Key Question:</b> Would buildings be more energy efficient with better building code enforcement and inspection?</p> <p><b>Description:</b> Greening the Building Code is an ongoing provincial initiative. The current focus is on reducing buildings energy and water use, improving energy performance of new housing to the equivalent of EnerGuide 80, and including solar hot water ready homes (where practical). BC Building Code EnerGuide standard may not be reflected in some buildings due to lack of sufficient inspection and enforcement. Local governments can facilitate installation of high quality renewable energy systems by:</p> <ul style="list-style-type: none"> <li>Ensuring that building inspectors are familiar with Council support for renewable energy, and know where to go for information about renewable energy.</li> </ul>

Action	Description
	<ul style="list-style-type: none"> <li>• Creating guidelines, and passing a resolution endorsing them, to provide clear interpretation of building code issues with respect to specific technologies.</li> <li>• Increasing the number and training of inspectors.</li> </ul>
	<p><b>% Energy Savings Calculation:</b> New Residential = <math>a*b</math>, New Commercial = <math>c*d</math></p> <ul style="list-style-type: none"> <li>a. % new residential buildings captured by improved enforcement</li> <li>b. % improvement in new commercial buildings by energy type through better enforcement</li> <li>c. % new commercial buildings captured by improved enforcement</li> <li>d. % improvement in new residential buildings by energy type through better enforcement</li> </ul> <p>Example: <math>(a*b) = (80\% * 15\%) = 12\%</math> (new residential buildings)  <math>(c*d) = (80\% * 5\%) = 4\%</math> (new commercial buildings)</p>

## 2. Buildings - High Growth Measures

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

Action	Description
<p><b>2.1 Sustainability or smart growth checklist or voluntary guidelines for buildings</b></p> <p>Type: Social</p>	<p><b>Key Question:</b> Is the community expected to grow rapidly?</p> <p><b>Description:</b> Developers can be required to complete a sustainability or smart growth checklist as part of development permit or rezoning application processes. The checklist might include, for example, questions about sustainable energy features incorporated into new developments. Checklist measures are not compulsory; the aim of the checklist is to highlight local government sustainability and clean energy objectives, and to educate developers about the potential for including energy efficiency measures or renewable energy technologies in new buildings.</p> <p><b>% Energy Savings Calculation:</b> New Buildings = <math>a*b*c</math>, Existing Buildings = <math>d*e*f</math></p> <ul style="list-style-type: none"> <li>a. % new buildings exposed to checklist</li> <li>b. % of those in (a) who improve performance</li> <li>c. Average % impact in new buildings by energy type</li> <li>d. % major renovations exposed to checklist</li> <li>e. % of existing buildings doing major renovations</li> <li>f. Average % impact by energy type for major renovations</li> </ul> <p>Example: <math>(a*b*c) = (90\%*20\%*15\%) = 2.7\%</math> new buildings  <math>(d*e*f) = (90\%*1\%*15\%) = 0.7\%</math> existing buildings</p>

Action	Description
<p><b>2.2 Use zoning bylaws to define desired energy performance</b></p> <p>Type: Regulatory</p>	<p><b>Key Question:</b> Is the community expected to grow rapidly?  <b>Description:</b> Council can adopt a rezoning policy that encourages developments that incorporate renewable energy. Any development that requires a rezoning must be approved by Council, which can consider benefits to the community as part of its decision. While the OCP lays out general expectations of the community, Council can also adopt a rezoning policy, which provides a clear statement of attributes that Council will seek in making rezoning decisions. It is important to note that a rezoning policy cannot set requirements for rezoning, because Councilors are required to approach rezoning hearings with an ‘open mind.’ However, if a development does not meet stated expectations of Council, it is unlikely to be recommended by staff or approved by Council. The rezoning policy must be designed carefully to be legal and effective; example Bowen Island Municipality.</p> <p><b>% Energy Savings Calculation:</b> (a*b*c)                      a. % new buildings covered by policy                      b. % of those in (a) who improve performance                      c. Average % impact in new buildings by energy type                      Example: (a*b*c*d) = (30% * 90% * 30%) = 8% for new buildings</p>
<p><b>2.3 Density bonus for energy performance</b></p> <p>Type: Financial</p>	<p><b>Key Question:</b> Is the community expected to grow rapidly?  <b>Description:</b> Density bonusing means that a developer may be allowed to build to a higher density than is normally permitted in the zone (in terms of floor space ratio, site coverage or buildings per parcel) in exchange for the provision of amenities. It is possible that this could be used to promote renewable energy, if GHG reduction, energy security, improved air quality and economic benefits from the use of renewable energy are considered community amenities. The BC Office of Housing and Construction Standards has produced some guidance on the use of density bonuses, and drafted a model bylaw, available at: <a href="http://www.toolkit.bc.ca/tool/density-bonusing">www.toolkit.bc.ca/tool/density-bonusing</a></p> <p><b>% Energy Savings Calculation:</b> (a*b*c)                      a. % new buildings covered by policy                      b. % of those in (a) that improve performance                      c. Average % impact in new buildings by energy type                      Example: (a*b*c) = (25% * 75% * 25%) = 4.7% for new buildings</p>
<p><b>2.4 Expediting permit approvals, fee rebates, other financial incentives</b></p> <p>Type: Financial</p>	<p><b>Key Question:</b> Is the community expected to grow rapidly?  <b>Description:</b> Expedited approvals provide strong incentive for developers.                      Example: District of Saanich</p> <p><b>% Energy Savings Calculation:</b> (a*b*c)                      a. % new buildings covered by policy                      b. % of those in (a) who improve performance                      c. Average % impact in new buildings by energy type                      Example: (a*b*c) = (25% * 75% * 25%) = 4.7% for new buildings</p>
<p><b>2.5 Tax exemption bylaw</b></p> <p>Type: Financial</p>	<p><b>Key Question:</b> Is the community expected to grow rapidly?  <b>Description:</b> Tax exemptions provide significant financial incentive. A Revitalization Tax Exemption (RTE) program may be designed to encourage energy efficient development in a small area or throughout a jurisdiction. This tool could allow property owners to make energy improvements to their property and apply for a tax exemption. The benefit of a RTE is tied to the property.                      Example: District of Maple Ridge</p>

Action	Description
	<p><b>% Energy Savings Calculation:</b> (a*b*c)</p> <ul style="list-style-type: none"> <li>a. % new buildings covered by policy</li> <li>b. % of those in (a.) who improve performance</li> <li>c. Average % impact in new buildings by energy type</li> </ul> <p>Example: (a*b*c) = (25% * 75% * 25%) = 4.7% for new buildings</p>
<p><b>2.6 DCC reductions or waivers, for GHG's</b></p> <p>Type: Financial</p>	<p><b>Key Question:</b> Is the community expected to grow rapidly?</p> <p><b>Description:</b> A development cost charge (DCC) reduction or exemption provides financial incentive for developers, with costs directly borne by the local government.</p> <p><b>% Energy Savings Calculation:</b> (a*b*c)</p> <ul style="list-style-type: none"> <li>a. % new buildings covered by policy</li> <li>b. % of those in (a) who improve performance</li> <li>c. Average % impact in new buildings by energy type</li> </ul> <p>Example: (a*b*c) = (5% * 90% * 25%) = 1.1% for new buildings</p>

### 3. Residential Buildings

The following actions may be applicable to residential buildings.

Action	Description
<p><b>3.1 Sign on to solar-ready building code provision</b></p> <p>Type: Regulatory</p>	<p><b>Key Question:</b> This action is recommended unless there is a compelling reason not to implement.</p> <p><b>Description:</b> The Province of BC has developed a model solar-ready bylaw (link below) <a href="http://www.housing.gov.bc.ca/building/consultation/shwr/qanda.htm">www.housing.gov.bc.ca/building/consultation/shwr/qanda.htm</a> 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.</p> <p>Further calculations available in “Option 1C: Project Profile Solar Thermal (Hot Water) retrofits” at the ‘how’ tab of <a href="http://www.toolkit.bc.ca/carbon-neutral-government">www.toolkit.bc.ca/carbon-neutral-government</a>. The deadline has passed but a future opportunity is likely.</p> <p><b>% Energy Savings Calculation:</b> (a*b*c)</p> <ul style="list-style-type: none"> <li>a. % of new residential that is single family</li> <li>b. % of new residential that installs SHW</li> <li>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</li> </ul> <p>Example: (a*b*c) = (60% * 20% * (30% * 50%)) = 1.8% for new buildings</p>

Action	Description
<p><b>3.2 Education for developers</b></p> <p>Type: Social</p>	<p><b>Key Question:</b> This action is recommended unless there is a compelling reason not to implement.</p> <p><b>Description:</b> 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.</p> <p><b>% Energy Savings Calculation:</b> <math>(a*b*c)</math></p> <ul style="list-style-type: none"> <li>a. % of development community reached</li> <li>b. % of those in (a) who integrate energy improvements into their developments</li> <li>c. Average % impact by energy type of improvements</li> </ul> <p>Example: <math>(a*b*c) = (20\% * 10\% * 20\%) = 0.4\%</math> for new buildings</p>
<p><b>3.3 Efficient wood stove program</b></p> <p>Type: Financial</p>	<p><b>Key Question:</b> Do many residents use inefficient wood fireplaces / stoves?</p> <p><b>Description:</b> 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.</p> <p>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.</p> <p>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 GHG-neutral).</p> <p><b>% Energy Savings Calculation:</b> <i>(for wood fuel only)</i> <math>= (a*b)</math></p> <ul style="list-style-type: none"> <li>a. % of wood-stoves changed as a result of the program</li> <li>b. Average % improvement in efficiency per stove</li> </ul> <p>Example: <math>(a*b) = (10\% * 40\%) = 4\%</math> for wood fuel for existing buildings</p>

Action	Description
<p><b>3.4 Biomass Heating</b></p> <p>Type: Social, Financial</p>	<p><b>Key Question:</b> Is there a local or regional biomass supply that could be used for heating?</p> <p><b>Description:</b> Communities 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.</p> <p>Green Heat Initiative (<a href="http://www.greenheatinitiative.com">www.greenheatinitiative.com</a>) is an unbiased non-profit resource that local governments can draw upon to further assess feasibility.</p> <p>The reasons that some homes may not have yet converted to wood pellet, despite the substantial cost savings in energy include:</p> <ul style="list-style-type: none"> <li>• Knowledge</li> <li>• Individual difficulties with handling of pellets – delivery &amp; storage</li> <li>• Capital costs, particularly for those on fixed incomes</li> </ul> <p>The knowledge barrier could be covered quite easily, with an information campaign that describes the economic and environmental factors.</p> <p>The local government could help to coordinate bulk purchases of wood pellets for the community, which could help to further reduce the cost of wood pellets. Purchasing pellets in loose bulk is the cheapest option.</p> <p>To assist with the difficulties of handling pellets including for the elderly could involve automated systems such as hoppers that could be filled by an operator (?). Outdoor storage options that a pellet stove could suck or auger pellets from could also be filled by an operator (?). Alternatively, when the hopper needs refilling, the resident could use a small container to transfer the pellets from the bag into the hopper.</p> <p>Financing of pellet stove: It is estimated that the installation cost of a wood pellet stove might be approximately \$5,000, although this cost might be reduced if several pellet stove installations were coordinated together as a bulk order. Cost savings compared to propane, heating oil and electric in small villages could result in a simple payback of the order of 5 years, the estimated lifespan of a wood pellet stove (provided it is properly cleaned and maintained) to be at least greater than 10 years.</p> <p>Benefits to the project include reducing community energy expenditures, a substantial reduction in community greenhouse gas emissions, and some potential for local economic development.</p> <p>Similar benefits can be achieved in southwestern BC’s temperate climates with the use of air-source heat pumps.</p> <p>Further calculations available in “Option 1B: Project Profile Efficient Building Retrofits and Fuel Switching” at the ‘how’ tab of <a href="http://www.toolkit.bc.ca/carbon-neutral-government">www.toolkit.bc.ca/carbon-neutral-government</a>.</p> <hr/> <p><b>% Emissions Savings Calculation = (a*b*c*d)</b></p> <ol style="list-style-type: none"> <li>% of existing buildings exposed to program</li> <li>% of those exposed wh conver</li> <li>%of building GHG’s associated with space heating</li> <li>%of heat load that biomass covers</li> </ol> <p>Example: (a*b*c*d) = (100% * 40%*70%*80%) = 22.4% existing residential buildings</p>

#### 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
<p><b>4.1 Host climate-smart program delivery</b></p> <p>Type: Social</p>	<p><b>Key Question:</b> Are there small and mid-sized businesses that would engage in climate training if offered?</p> <p><b>Description:</b> ClimateSmart provides training, tools, and technical assistance to small and mid-sized 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.</p> <hr/> <p><b>% Energy Savings Calculation:</b> for commercial sector buildings= (a*b) and for commercial sector transportation= (c*d)</p> <ul style="list-style-type: none"> <li>a. % of commercial sector participating in climate smart</li> <li>b. % improvement in buildings as a result of participating in the program</li> <li>c. % of commercial sector participating in climate smart</li> <li>d. % improvement in buildings as a result of participating in the program</li> </ul> <p>Example: (a*b) = (2% * 15%) = 0.3% for existing commercial buildings                      Example: (c*d) = (2% * 10%) = 0.2% for commercial transportation</p>
<p><b>4.2 Eco-industrial networking assessment</b></p> <p>Type: Social</p>	<p><b>Key Question:</b> Are there industrial / commercial operations that may benefit from collaboration (shipping co-ordination, waste as input, sharing heat, ...)</p> <p><b>Description:</b> Eco-industrial networking is a relationship-building process that aims to minimize waste and create efficiencies among industrial and other buildings. For example, an eco-industrial network might involve locating a building with a high waste-heat output, such as an ice rink, next to a major heat consumer, such as a swimming pool, thus capturing the value of what was previously wasted. Local governments are well placed to identify and promote opportunities for eco-industrial networking. Local government can also specifically zone for eco-industrial uses and location of uses: for example, District of Ucluelet has established the Ucluelet Eco-Industrial Park zone, a comprehensive development zone.</p> <hr/> <p><b>% Energy Savings Calculation:</b> commercial sector buildings= (a*b) and for commercial sector transportation = (c*d)</p> <ul style="list-style-type: none"> <li>a. % of commercial sector included in eco-industrial networking</li> <li>b. % improvement as a result of participating in the program</li> <li>c. % of commercial sector included in eco-industrial networking</li> <li>d. % improvement as a result of participating in the program</li> </ul> <p>Example: (a*b) = (1% * 10%) = 0.1% for existing commercial buildings                      Example: (c*d) = (1% * 20%) = 0.2% for commercial transportation</p>



Action	Description
<p><b>4.3 Natural Gas Vehicle Collaboration</b></p> <p>Type: Social, Financial</p>	<p><b>Key Question:</b> Are there heavy-duty fleets that could refuel where local government fleets refuel?</p> <p><b>Description:</b> 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.</p> <p>Further calculations available in “Option 1A: Project Profile Low Emissions Vehicles” at the ‘how’ tab of <a href="http://www.toolkit.bc.ca/carbon-neutral-government">www.toolkit.bc.ca/carbon-neutral-government</a>.</p> <p><b>% Energy Savings Calculation</b> = (a/b)*c, where:</p> <ul style="list-style-type: none"> <li>a. Number of heavy duty vehicle-kilometers traveled from vehicles converting to natural gas</li> <li>b. Total number of heavy duty vehicle-kilometers traveled</li> <li>c. % difference in emissions from original configuration to natural gas configuration (efficiency and carbon intensity)</li> </ul> <p>Example: (a/b)*c = (10,000/100,000) * 30% = 3% of emissions from existing heavy duty commercial vehicles</p>

## 5. Light Duty Vehicle Transportation (LDV) – Urban Form

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

Action	Description
<p><b>5.1 Land use suite lite</b></p>	<p><b>Key Question:</b> Recommended for communities wherever politically practical.</p> <p><b>Description:</b> 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.</p> <p>Conservation covenants (such as through land trusts) may also be considered for agricultural lands or natural habitats.</p> <p><b>% Energy Savings Calculation:</b> for Light Duty Vehicle sector= (a*b*c)</p> <ul style="list-style-type: none"> <li>a. % of community in downtown</li> <li>b. Degree to which the area in (a) exhibits the full implementation of supportive land use</li> <li>c. % reduction in transportation emissions (see Background section for guidance on emissions reduction potential)</li> </ul> <p>Example: (a*b*c) = (20% * 20% * 30%) = 1.2% for LDV sector</p>

Action	Description
5.2 Land use suite enhanced	<p><b>Key Question:</b> Recommended for communities seeking significant GHG reductions</p> <p><b>Description:</b> 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.</p>
	<p><b>% Energy Savings Calculation:</b> for LDV sector = (a*b*c)</p> <ul style="list-style-type: none"> <li>a. % of community covered by program</li> <li>b. Degree to which the area in (a) exhibits the full implementation of supportive land use</li> <li>c. % reduction in transportation emissions (see Background section for guidance on emissions reduction potential)</li> </ul> <p>Example: (a*b*c) = (50% * 25% * 30%) = 3.8% for LDV</p>
5.3 Street design	<p><b>Key Question:</b> This action is recommended for all communities unless there is a reason why it should not be implemented.</p> <p><b>Description:</b> 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.</p>
	<p><b>% Energy Savings Calculation:</b> for LDV sector = (a*b*c)</p> <ul style="list-style-type: none"> <li>a. % of community covered by program</li> <li>b. Degree to which the area in (a) exhibits the full implementation of supportive land use</li> <li>c. % reduction in transportation emissions (see Background section for guidance on emissions reduction potential)</li> </ul> <p>Example: (a*b*c) = (5% * 25% * 30%) = 0.4% for LDV</p>
5.4 Flow RGS, OCP, and LAP through to zoning	<p><b>Key Question:</b> Recommended for all communities.</p> <p><b>Description:</b> 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.</p>
	<p><b>% Energy Savings Calculation:</b> N/A – depends on OCP policies.</p>

## 6. Light Duty Vehicle Transportation – Infrastructure & Collaboration

Action	Description
6.1 Active transportation planning	<p><b>Key Question:</b> This action is recommended for all communities considering transportation demand management.</p> <p><b>Description:</b> 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.</p> <p><b>Calculation:</b> N/A - this is a planning process which will not produce direct results itself, but may lead to projects that will produce savings.</p>
6.2 Improve walking infrastructure	<p><b>Key Question:</b> Are there major trip destinations (commercial services, schools, hospital, employers, etc.) less than 3km from a significant number of residences?</p> <p><b>Description:</b> Local governments can easily promote walking. Tips on promoting walking have been developed by the Central Okanagan Regional District: <a href="http://www.kelowna.ca/CM/Page1056.aspx">www.kelowna.ca/CM/Page1056.aspx</a> Other communities could create a similar resource page on their website or as a printed handout.</p> <p>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).</p> <p>One walking-infrastructure opportunity available in many communities is a walking school bus. A Walking School Bus or Bicycle Train consists of a group of children walking or cycling to school with one or more adults. It can be informally planned when two or three families take turns walking or cycling with their children to school, or more formally developed and organized with specific stops, designated participants and volunteer Walking School Bus or Bicycle Train leaders.</p> <p><b>% Energy Savings Calculation:</b> for LDV sector= (a*b*c)/d</p> <ol style="list-style-type: none"> <li>Number of walking trips/year</li> <li>% of trips that would have been by car</li> <li>average walking trip length</li> <li>Total LDV vehicle kilometers travelled (VKT) (estimation can be derived from CEEI data)</li> </ol> <p>Example: (a*b*c)/d = (36,500 * 20% * 1.5) / 200,000,000 = 0.01% LDV emissions</p>

Action	Description
<p><b>6.3 Cycling &amp; alternative transportation infrastructure improvements</b></p>	<p><b>Key Question:</b> Are there trip destinations within 5-8km of a significant number of residences?</p> <p><b>Description:</b> 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.</p> <p>A US tool to estimate demand for bike routes is available at: <a href="http://www.bicyclinginfo.org/bikecost/step1.cfm">http://www.bicyclinginfo.org/bikecost/step1.cfm</a>. It is tailored for use in the US, but can be used by BC communities. Information required includes population density in the area surrounding the bike route, and the percentage of total trips in the area already made by bicycle. Where this is not known, use the BC average figure of 2%.</p> <p>More detailed guidance on methods for estimating the likely number of users is available from the governments of New Zealand, US, UK and Australia. However, these tend to be lengthy documents; guidance from New Zealand may be of most direct use.</p> <p>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:</p> <ul style="list-style-type: none"> <li>• % of non-recreational cyclists who would have driven, if they were not cycling: 50%.</li> <li>• Average BC cycling commuter distance: 5km each way, 10km return trip.</li> </ul> <p><b>% Energy Savings Calculation:</b> for LDV sector = <math>(a*b*c)/d</math></p> <ol style="list-style-type: none"> <li>Number of cycling trips/year</li> <li>% of trips that would have been by car</li> <li>average cycling trip length</li> <li>Total LDV vehicle kilometers travelled</li> </ol> <p>Example: <math>(a*b*c)/d = (36,500 * 30% * 5) / 200,000,000 = 0.03\%</math> LDV emissions</p> <p>This calculation methodology is only relevant where bicycle facilities are constructed on commuter routes, or to other major destinations to which people travel by car. Recreational bike paths will not lead to a reduction in emissions, and may even lead to an increase in emissions, since people may drive to them.</p>
<p><b>6.4 Special event planning</b></p>	<p><b>Key Question:</b> Are large special events planned?</p> <p><b>Description:</b> 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.</p> <p><b>% Energy Savings Calculation:</b> for LDV sector = <math>(a*b*c)</math></p> <ol style="list-style-type: none"> <li>% of LDV travel associated with travel to/from event</li> <li>% of travel population in (b) affected by action</li> <li>Average % reduction in vehicle kilometers travelled by population in (c)</li> </ol> <p>Example: <math>(a*b*c) = (1% * 20% * 10%) = 0.002\%</math> LDV sector</p>

Action	Description
6.5 Collaborate with Major Employers on Transportation	<p><b>Key Question:</b> Is there major employer(s) in the community?</p> <p><b>Description:</b> 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.</p> <p><b>% Energy Savings Calculation:</b> for LDV sector = (a*b*c)</p> <p>a. % of LDV travel associated with travel to/from employer/institution</p> <p>b. % of travel population in (a) affected by action</p> <p>c. Average % reduction in vehicle kilometers travelled by population in (b)</p> <p>Example: (a*b*c) = (10% * 50% * 20%) = 1.0% LDV emissions</p>
6.6 Transit suite	<p><b>Key Question:</b> Are there major trip destinations beyond 8km that are not sufficiently served by transit?</p> <p><b>Description:</b> 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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul> <p>Many factors affect transit deployment, key ones being residential density and form.</p> <p><b>% Energy Savings Calculation:</b> for LDV sector = (a*b)</p> <p>a. % of population affected by transit measures (within approx. 400 meters of stops)</p> <p>b. Average % reduction in vehicle kilometers traveled for population in (b)</p> <p>Example: = (20% * 5%) = 1% LDV emissions</p>
6.7 Ride-sharing and guaranteed ride home programs	<p><b>Key Question:</b> Are there major trip destinations beyond 8km that are not sufficiently served by transit?</p> <p><b>Description:</b> 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 Nelson Carshare Co-op set up a ride-sharing system for longer-distance intercommunity travel where rides could be offered or sought for travel between communities.</p> <p>This ride-matching service is now run by the Kootenay Rideshare and is undergoing expansion; details can be found at <a href="http://www.kootenayrideshare.com">www.kootenayrideshare.com</a>.</p> <p>“With car sharing as a choice, Car Co-op members drive much less (1400 km/year) than the average driver (6000-24,000 km/year) in the Lower Mainland.” Source: Cooperative Auto Network. (75%-94% reduction but much of this cannot be directly attributed to a coop.)</p>

Action	Description
	<p><b>% Energy Savings Calculation:</b> for LDV sector= (a*b)</p> <p>a. % of population affected by ride-share</p> <p>b. Average % reduction in vehicle kilometers traveled for population in (b)</p> <p>Example: = (10% * 10%) = 1% LDV emissions</p>
<p><b>6.8</b> <b>Intercommunity transit services</b></p>	<p><b>Key Question:</b> Is there significant inter-community travel?</p> <p><b>Description:</b> 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.</p> <p>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. <a href="http://www.bctransit.com/health_connections/?p=2.list">http://www.bctransit.com/health_connections/?p=2.list</a></p> <p>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.</p> <p><b>% Energy Savings Calculation:</b> for LDV sector = (a*b*c)</p> <p>a. % of population affected by inter-community transit</p> <p>b. % of VKT related to inter-community travel</p> <p>c. % of LDV trips avoided</p> <p>Example: = (60% * 10% * 10%) = 0.6% LDV emissions</p>

Action	Description
<p><b>6.9 Low Carbon and Electric Vehicle Suite</b></p> <p>Type: Social, Financial</p>	<p><b>Key Question:</b> Can adequate resources be allocated to implement these recommended actions?</p> <p><b>Description:</b> 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.</p> <p>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.</p> <p>There are several specific actions all local governments can take to prepare for low carbon and electric vehicles.</p> <ul style="list-style-type: none"> <li>• Sign on to provincial ‘EV-Ready’ bylaw when it is available. Analysis indicates 80% of charging will be done at home.</li> <li>• Include EV charging infrastructure in sustainability guidelines</li> <li>• Ensure permitting processes (for renovations particularly) are set up to smoothly address electric vehicle charging infrastructure</li> <li>• Consider low carbon vehicles (see action 4.3) and electric vehicles for the local government fleet to demonstrate the viability of the technology</li> <li>• Set up a charging station at a highly visible location</li> </ul> <p>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.</p> <p><b>% Emissions Savings Calculation:</b> N/A – unqualifiable at this time, however given national and international projections, with supportive measures as outlined above, electric vehicles (split between PHEV and battery electric vehicles) could comprise 1% of passenger vehicles on the road by 2016 and up to 2% by 2020.</p>

7. Waste

Action	Description
<p><b>7.1 Organics diversion</b></p>	<p><b>Key Question:</b> Is a significant amount of organics going to landfill that could be economically diverted?</p> <p><b>Description:</b> GHG emissions from landfills are primarily from the decomposition of buried organics. Create a comprehensive composting program:</p> <ul style="list-style-type: none"> <li>• Encourage grass swapping and back-yard composting.</li> <li>• Create a public compost pick-up site and program.</li> <li>• Support existing and new capacity for reusable resources, including Free Swaps, Share Sheds, free-store for unwanted goods, and building materials depot.</li> </ul> <p>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.</p> <p>Further calculations available in “Option 1D: Project Profile Household Organic Waste Composting” at the ‘how’ tab of <a href="http://www.toolkit.bc.ca/carbon-neutral-government">www.toolkit.bc.ca/carbon-neutral-government</a></p> <hr/> <p><b>% Energy Savings Calculation for municipal solid waste sector:</b> = (a – c)*b</p> <ol style="list-style-type: none"> <li>a. % of landfill GHG’s from organics</li> <li>b. % of organics diverted annually</li> <li>c. Average % of emissions over planning period (to 2050?) from organics currently in landfill under BAU scenario</li> </ol> <p>Example: (a – c)*b = (80% - 25%) * 10% = 35% waste emissions</p>



## 8. Enabling Actions

Action	Description
<p><b>8.1 Organizational structure for climate action</b></p>	<p><b>Key Question:</b> Are there questions about who is accountable within council / board as well as within staff for climate action?</p> <p><b>Description:</b> 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.</p> <p>Taking time up-front to establish such structures is a worthwhile investment in setting implementation up for success. Key questions to answer include:</p> <ul style="list-style-type: none"> <li>• Who makes which decisions regarding climate action?</li> <li>• Who is expected to do what and how are they held accountable?</li> <li>• What new / different communication / planning is required (sewer or road work and district energy)?</li> <li>• 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? ...)</li> <li>• How will capital, operating and human resource elements of the CEEP be funded?</li> </ul> <p><b>Calculation:</b> This enabling action does not have direct impacts itself, however it may be critical to achieving results from other actions.</p>
<p><b>8.2 Establish a regional energy cooperative</b></p>	<p><b>Key Question:</b> Is there strong interest in clean energy in the community?</p> <p><b>Description:</b> 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.</p> <p>City of Dawson Creek played an important role in establishment of the Peace Energy Cooperative, providing advice and other forms of non-financial support.</p> <p><b>Calculation:</b> 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.</p>
<p><b>8.3 Identify green economy opportunities</b></p>	<p><b>Key Question:</b> This enabling action is recommended to all local governments who want to achieve economic development / diversification benefits from climate action.</p> <p><b>Description:</b> 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.</p> <p>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.</p> <p>A guide to achieving economic development potential of climate action is <i>Clean Energy for a Green Economy</i> available at <a href="http://www.communityenergy.bc.ca/node/692">http://www.communityenergy.bc.ca/node/692</a></p>

Action	Description												
	<b>Calculation:</b> This enabling action will assist in moving other actions forward.												
<b>8.4 Use local government assets to create expertise and community-wide change</b>	<b>Key Question:</b> Are actions being taken in local government (LG) operations that could be leveraged to support community-wide action? <b>Description:</b>												
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Action	Description
<p><b>8.5 Long-term, deep community engagement (culture change)</b></p>	<p><b>Key Question:</b> Do the other actions identified fall short of the desired change?  <b>Description:</b> Overall, the purpose of social mobilization for British Columbia climate action is to:</p> <ol style="list-style-type: none"> <li>1. Engage residents in developing and implementing climate solutions through collective, ‘bottom-up’, informal, organizational and institutional initiatives.</li> <li>2. Change collective behaviour to reduce carbon footprints.</li> <li>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.</li> <li>4. Build capacity and resilience to plan and respond to climate change adaptation and mitigation.</li> </ol> <p>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:</p> <p><i>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.</i></p> <p>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 marketing (Dietz, T., Gardner, G. T., Gilligan, J., Stern, P. C., Vandenberg, M. P.: Household actions can provide a behavioural wedge to rapidly reduce U.S. carbon emissions, in <i>Proceedings of the National Academy of Sciences</i>, 106: 44, 18452-18456, 2009).</p> <p><b>Calculation:</b> Impacts can be substantial but are highly dependent on the specific program implemented.</p>