Town of Ladysmith
Community Energy Plan

Photos: Tourism Ladysmith

Final Report

Prepared for:
The Town of Ladysmith
Project Contact:
Ruth Malli, City Manager

Prepared by:
The Sheltair Group
Vancouver, BC
Project Contact: Ron Macdonald
604-732-9106 ext: 306

Date: November 19, 2008

Plan Summary

The Town of Ladysmith has developed a Community Energy Plan (CEP) to reduce energy consumption and greenhouse gas (GHG) emissions - both throughout the community and from municipal operations. This energy plan is consistent with the Town's commitment to the Climate Action Charter (an agreement between the Province and signatory local governments), and supports the Province's goal of achieving a 33% reduction in emissions by 2020.

An Energy Vision for Ladysmith

"Ladysmith is one of Canada's Greenest communities. We are recognised as a leader in conservation and sustainable energy. We are committed to making the community a better place to live in a future with limited fossil fuels - a future powered by renewable energy. Our community supports the person and the pedestrian first and foremost."

Targets

Proposed Targets for the Energy plan are:

Municipal Operations:

- 10% overall reduction in total municipal GHG emissions by 2012 from 2007 levels.
- 20% overall reduction in municipal GHG emissions by 2016 from 2007 levels.

Community GHG Emissions:

- 5% reduction in community GHG emissions by 2012 from 2007 levels
- 15% reduction in community GHG emissions by 2016 from 2007 levels
- 33% reduction in community GHG emissions by 2020 from 2007 levels (proposed target to match the Provincial reduction target).

Initiatives and Actions

The plan is structured around seven major theme areas and corresponding objectives. These are:

	Initiative Area	Objective
1	Homes & how we live in them	To improve the efficiency of existing homes in Ladysmith, and to encourage energy efficient behaviour in homes.
2	How our community grows (New development)	To ensure all new growth incorporates sustainable planning principles and energy efficient building design.
3	How we get around (Transportation)	To increase the mobility of residents and visitors choosing

	Initiative Area	Objective
		car-free alternatives.
4	How we sustain ourselves (Work & economic development)	To foster a self-sustaining economy in Ladysmith.
5	Where we get our energy (Energy supply)	To shift Ladysmith's energy sources towards being community-based and clean.
6	How we operate the municipality	To demonstrate leadership in energy efficiency inside the community and beyond.
7	Defining our community	To institute a culture of sustainability and energy efficiency in Ladysmith.

Within the seven areas, a total of 31 actions are identified to be implemented.

Implementation

Implementation will require a sustained effort over several years, and possibly an ongoing commitment of time and resources. Most activities can be implemented by existing staff in terms of skill requirements. It is important to note that implementation is challenging if existing staff attempt to do it within existing resources and it should be acknowledged that specific time, effort and budget needs to be dedicated to implement the action plan.

The entire list of 31 actions will take several years to initiate and implement. Opportunistic implementation should be embraced, meaning that as priorities in the community evolve (a new sub-division, the OCP update, new government funding programs, etc.) the Town should pursue related actions.

Stable long term funding will be required to execute the actions. One option is that the Town could consider funding a community energy coordinator. This could be a partial or full time permanent or term position. This position would coordinate all activities and could be especially focused towards the community engagement activities.

Summary Listing of Initiatives and Actions

Initiative 7: Defining our community

Table of Contents

Figures

Tables

1 Introduction

1.1 The Issue of Climate Change

For many years, there has been increasing evidence that global climate change resulting from emissions of carbon dioxide and other greenhouse gases (GHGs) is causing, or will soon cause, significant environmental impact on the ecology of the planet. Recent conclusions of the 2007 Intergovernmental Panel on Climate Change (IPCC) on the climate change trends observed to date are that human-caused contributions are "more likely than not" and the expectation is that the human-caused impact in the future is "virtually certain."

There is also a growing impetus for action by all energy consumers to reduce emissions of GHGs. In 2005, the UK government commissioned an independent review called the "Stern Review", which assessed the potential economic impacts of climate change and the potential costs of stabilizing atmospheric carbon levels [1]. Among the conclusions were that climate change is expected to have serious negative impacts on global economic growth and development. It states that the *"costs of stabilizing the climate are significant but manageable; delay would be dangerous and much more costly"*. This is a significant conclusion highlighting that deferring action will be more costly than initiating action immediately.

Climate change is a global issue, caused by the daily activities of billions of humans – primarily through the consumption of fossil fuel energy. A solution to the issue will require the activities of billions of humans to conserve energy and reduce GHG emissions. All persons and entities - including local governments - have a role to play in finding these solutions.

1.2 Objectives of the Energy Plan

The Energy Plan Objectives are to:

- Define actions for the municipality to implement (alone, or in partnership with others) to reduce energy consumption and GHG emissions for both municipal operations and in the community as a whole.
- Support the overall provincial goal of a 33% reduction in GHG emissions by 2020.
- Meet the CAEE program funding commitments.
- Support the Town to meet its commitment to be carbon neutral in municipal operations by 2012 as part of the Climate Action Charter.

[1] See the Stern review at http://www.hm-treasury.gov.uk/stern_review_final_report.htm.

1.3 The Community Action on Energy and Emissions Initiative

The Town of Ladysmith has received funding through the Community Action on Energy and Emissions (CAEE) [2] program to develop a Community Energy Plan (CEP). The CAEE program is an initiative of the Ministry of Energy, Mines, and Petroleum Resources. CAEE provides funding to B.C. communities to develop planning and policy changes that will result in long term reductions in energy consumption within the community.

Ladysmith has committed to several targets as part of their CAEE application. These are:

- **Target 1** - Endorse the Province's target of reducing current greenhouse gas emissions by 33% by 2020.
- **Target 2** - All new municipal buildings must demonstrate energy performance that is 25% better than the Model National Energy Code for Buildings.
- **Target 3** - Achieve a 15% reduction target in existing civic buildings.
- **Target 4** - New detached homes - achieve an EnerGuide for New Houses rating of 80 by 2010.
- **Target 5** - Generate 10% of energy needs from community-based, clean energy resources, as defined by the Province's BC Clean Electricity guidelines, or renewable heating systems or fuels.

1.4 Climate Action Charter

In addition to participation in the CAEE program, Ladysmith is also a signatory to the Climate Action Charter. The charter commits Ladysmith to take voluntary action to reduce its energy consumption and GHG emissions, and to achieve 'carbon neutrality' by 2012 in its municipal operations.

1.5 Carbon Neutrality and Carbon offsets

Carbon neutrality means that the current (2007) annual GHG emissions are calculated. Then in subsequent years reduction measures are implemented to reduce the emissions. Any emission that cannot be reduced through conservation measures are effectively 'netted out' to zero through the acquisition of carbon offsets. An offset is a reduction in carbon dioxide emissions that have been generated through a reduction project - either in the community or elsewhere. These reductions (or offset credits) will be verified, and then can be purchased by the municipality.

The Province is establishing a new provincial crown corporation - the Pacific Carbon Trust (PCT) - to acquire offsets and administer this activity. The cost of these offsets and the nature of how the Carbon Trust will structure the transactions are currently under development by the PCT. The PCT will invest in offset projects within BC. Since it is currently impossible to reduce emissions to zero, there will always be some requirement to procure offsets.

[2] The CAEE program was formerly titled "Community Action on Energy Efficiency"

1.6 Other Provincial Action on Climate Change

The Province has been moving forward with a series of ambitious measures to advance building energy efficiency and reduce community consumption. These include changes to provincial regulations, such as the "greening" of the BC Building Code, which mandates requirements for greater building energy efficiency and increased energy efficiency standards for equipment. In addition, it includes a provision for more powers to local governments.

- **Provincial GHG Emissions Reduction Target:** The Province of BC has set a province-wide GHG emissions reduction target of 33% below 2007 levels by 2020, and it is expected that interim targets for 2012 and 2016 will be developed.
- **"Greening" the BC Building Code:** Effective September 2008, new Building Code requirements to increase energy and water efficiency came into effect. Bill 10 provides local governments with the authority to apply the "green" Building Code provisions, including higher energy efficiency standards for single family and high rise multi-family units, and well as water efficiency requirements.
- **Bill 27 – 2008: Local Government (Green Communities) Act** Bill 27 (acclaimed May 2008) includes a requirement for local governments to include GHG emission targets, policies, and actions in their OCP[3]. To achieve this objective, the legislation provides a range of *potential* new powers for local governments[4]. These include: using development permits to promote energy and water conservation; allowing parking variances to encourage alternative transportation; providing exemptions from development cost charges for small units, and local government powers to waive or reduce these charges for green developments; and allowing local governments to develop property tax exemption programs based on energy or water efficiency.

  Most of the actions that have been allowed under Bill 27 are directed towards encouraging new development to be energy, climate, and water efficient. There are several tools that could be deployed by the community as it undergoes further development.

1.7 Community Visioning

At present, the Town is going through an exercise in "Community Visioning" as a precedent to revising its official community plan. This initiative is aimed at setting the stage for future growth and sustainable development in Ladysmith. The workshop series will include presentations and involve participants in creative activities that will form the basis of a comprehensive report that will guide Ladysmith to a future as authored by the community.

While the Visioning Process addresses a broader range of actions than the Energy Plan, there are areas where they have similar objectives. Defining energy efficient development and efficient transportation are two examples. The outcomes of the Energy Plan and the community visioning will both be used to inform the development of the official community plan (OCP).

---

[3] It is currently understood that these OCP requirements would have a transitional period and not be fully required until May of 2010. This implementation schedule cannot be defined with certainty until the Bill is enacted.

[4] Each of these possible powers still requires that the local government develop an enacting bylaw and to define the conditions and process for it to apply.

2 Community Profile

The Town of Ladysmith is located on the east coast of Vancouver Island, 23 kilometres south of Nanaimo and 88 kilometres north of Victoria. The coastal town is part of the Cowichan Valley Regional District. Its eastern edge borders Ladysmith Harbour on the Georgia Straight, while the western edge is bordered by hillside.

Figure 1: Location of Ladysmith on Vancouver Island

2.1 Climate

The climate is coastal with moderate heating requirements through nearly two-thirds of the year, and some cooling requirements in the summer. A comparison of the heating and cooling requirements (expressed as degree days)[5] is shown in Table 1. The space conditioning is primarily heating demand and not air conditioning. The heating degree days provide an indication of the amount of space heating energy required. Other energy consumption such as water heating, and electricity consumption are driven by many factors unrelated to the climate.

[5] A heating degree day is the number of days that the temperature is below 18°C, multiplied by the temperature below 18. For example two days at 10°C is 2*(18-10) = 16 degree days. Similarly cooling degree days are the days and temperature above 18°C. The use of 18 deg C as the defining temperature for HDDs is a common benchmark in heating and air conditioning analysis.

Table 1: Heating and Cooling Requirements in Ladysmith and Selected Canadian Cities

Location	Heating Degree Days (Annual)	Cooling Degree Days (Annual)
Ladysmith (Nanaimo)	**3,056**	**77**
Vancouver	2,926	44
Prince George	4,728	40
Whitehorse, YK	6,811	8
Edmonton, AB	5,708	28
Toronto, ON	4,066	252

Source: www.climate.weatheroffice.ec.gc.ca/climate_normals/ for the City of Nanaimo

2.2 Population and Dwellings

Ladysmith has a population of 8,144 residents, and has been increasing at a substantial rate since the early 1990s. Between the 2001 and 2006 census, the town's population grew 10.7% [6]. A population breakdown (see Figure 2) indicates that Ladysmith's population contains a higher proportion of residents under 15 and over 65 compared to the BC average, whereas there is a lower proportion of residents in the 15 to 44 age range. This has been stabilizing over the last decade as more young families move into Ladysmith.

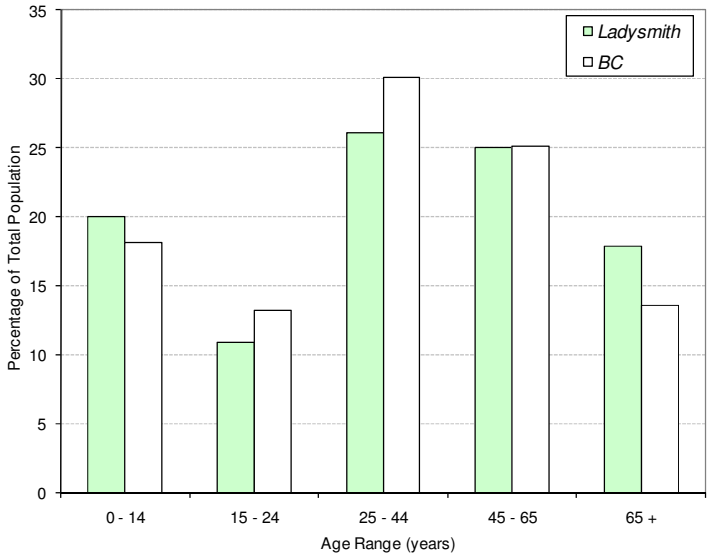

Figure 2: Population by Age Group (2006 Census of Canada)

The 2006 Census recorded 3,185 occupied dwellings in the community. The predominant housing type is detached dwellings (Figure 3) comprising approximately 72% of existing

[6] Source BC Stats Ladysmith community profile, 2007.

buildings. The next most prevalent dwelling types are low-rise apartment buildings and row houses, representing 11% and 7% of housing, respectively.

Approximately 81% (2,575 dwellings) are occupant owned, and 19% (610 dwellings) are rented.

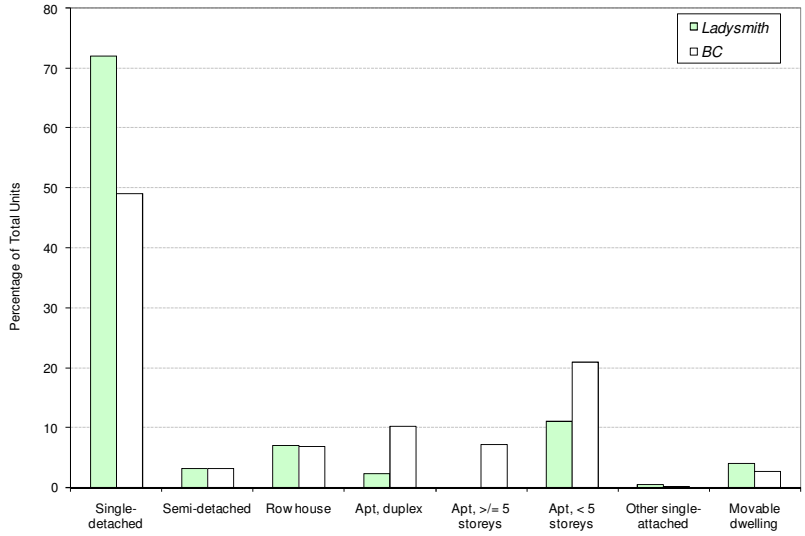

Figure 3: Housing Stock by Type (2006 Census of Canada)

A breakdown of housing by the age grouping (Figure 4) indicates that 53% were built before 1980, with over 20% of those built in the 1970s. Approximately 27% of all housing is almost 50 years or older. These older homes would have been built to less stringent energy requirements, may have deterioration of air sealing, and likely include older furnaces and water heating appliances. There was a lull in construction of new buildings during the 1980s, followed by a period of growth. New buildings constructed since 1990 represent 36% of the total stock.

Frequently there is an opportunity for improvements in energy efficiency in older buildings and these represent over one quarter of the building stock.

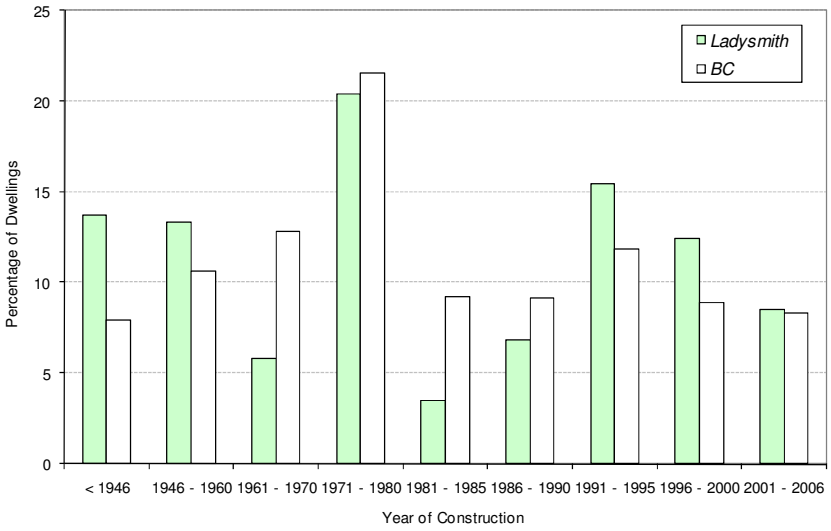

Figure 4: Housing Stock by Age of Building

2.3 Transportation

Transportation options within the Town include automobiles, cycling and walking. Public transportation through BC Transit is not currently available; however, the Town is currently fundraising to implement a trolley service that will operate between key areas of town. The Town is working with BC Transit to implement the trolley service.

Ladysmith residents currently overwhelmingly use single-occupancy vehicles to commute to work (see Table 2). Over 85% of residents commute to work as the driver of an automobile, while only 6% of residents commute as a passenger in an automobile and 7% walk or cycle. This profile only identifies the method of commuting, and does not define the distances traveled or where the residents are commuting to or from.

Table 2. Transportation Modal Split for Commuters

Mode of transportation to work	Ladysmith		BC	
	number	% of total	number	% of total
Car, truck, van, as driver	2,660	85.7%	1,353,790	71.6%
Car, truck, van, as passenger	180	5.8%	145,840	7.7%
Public transit	15	0.5%	195,145	10.3%
Walked or bicycled	210	6.8%	167,650	8.9%
All other modes	40	1.3%	27,620	1.5%
Total employed labour force 15 years and over with a usual place of work or no fixed workplace address	3,105	100.0 %	1,890,055	100.0 %

Source: Statistics Canada 2006 census community profiles
Note: Values may not sum precisely due to rounding

2.4 Future Growth

Ladysmith has experienced significant population growth over the last decade, and this is expected to continue for the immediate future at a similar rate - potentially up to 3% annually. The potential impacts of this population growth on the community's energy use will be impacted by the following:

- Update of the OCP: Currently, the OCP defines a maximum density of 60 units/ha everywhere except downtown core where it is 70 units/ha. There are plans to update the OCP in the near future based and it is likely the maximum density of units in the downtown and surrounding areas will be increased to accommodate the growing population. As well, the OCP can provide guidance towards low energy development.
- Waterfront development: Currently the OCP indicates plans for a mixed use: marina, residential, commercial, and tourism area. However, due to site-contamination issues from historical activities on the site, other options may be explored, including creating a public park area.
- Transportation: Options are constrained by the physical topography, particularly as development occurs beyond current urbanized area. The community is more or less vehicle dependant.
- Demographic Trends: A trend towards an aging population (10 or 20 years ago) has more recently been offset by more young families in the area. This may alter the types of housing that are in demand.
- Expansion of the Municipal Boundary: Any boundary expansion would be proposed to allow other lands to become serviced by the municipality. The decision to extend the municipal boundary would involve the province, in consultation with the Town. In the case of expansion, the possibility exists for the Town to define conditions of green and energy efficient development under which it would support boundary expansion.

2.5 Challenges and Opportunities for the Energy Plan in Ladysmith

There are a number of features that are unique to Ladysmith that will affect the actions in the CEP. Some of the challenges and opportunities include.

Challenges:

- Small community with a limited tax base.
- Some lower income homeowners may face financial barriers in becoming more energy efficient.
- Steep topography makes some alternative transportation (e.g. cycling and pedestrian) initiatives challenging - particularly in poor weather.

Opportunities:

- The housing stock is older - this provides opportunities for conducting retrofits that are simple and inexpensive to execute, while providing visible benefits ("low-hanging fruit" retrofits).

- High owner-occupancy of houses which makes investments in the buildings more promising than in rental stock.
- Progressive community and council willing to take action.
- Potential for new developments which can be encouraged to include and showcase energy efficiency.

3 Energy and GHG Emissions Inventories

3.1 Corporate (Municipal Operations)

Corporate energy consumption and emissions are those that the local government creates through its activities (and which it has control over) such as municipal building operations, recreation centres, vehicle fleets, and utility services.

Energy consumption and GHG emissions in the corporate inventory derive from:

- **Municipal buildings:** City Hall, the Frank Jameson Community Centre, the Expo Legacy Building, Aggie Hall, the works yard, and emergency services (Fire and RCMP).
- **Infrastructure:** services that include water and sewage pumping, street lighting and traffic lighting, and civic facilities such as parks etc.
- **Vehicles and fleets:** fuel consumed by municipal staff in the execution of their service provision. This is almost exclusively gasoline and diesel fuels, though may occasionally include propane.
- **Waste:** does not directly consume energy but when deposited into landfills, it decomposes and releases methane gas which is a greenhouse gas stronger than carbon dioxide. For the corporate inventory, the GHGs referred to are those attributed to waste generated at municipal facilities.

What's a GJ?

A giga-joule (GJ) is a measure of energy. We buy natural gas in GJ but other energy as kilowatt-hours (electricity) or litres of fuel.

One GJ has the same energy as:

- 25 - 30 litres of diesel or gasoline fuel, or
- Two 20 lb propane tanks, or
- The electricity consumption of a typical house for two weeks, or
- The natural gas use for three days of space and water heating of a typical home.

The total corporate energy consumption and GHG emissions in the corporate inventory for the year 2007 are shown in Table 3. A detailed breakdown is provided in Appendix A.

Table 3: Municipal Operations Energy Consumption and GHG Emissions (2007)

Use	Energy Type	Units of Purchase	Energy (in units of purchase)	Energy (in GJ)	GHG Emissions (CO_2e)	Approximate Retail Value ($)
Buildings	Electricity	kWh	1,196,300	4,310	40	$78,000
	Natural Gas	GJ	1,090	1,090	53	$13,000
Frank Jameson Community Centre	Electricity	kWh	1,027,800	3,700	34	$67,000
	Natural Gas	GJ	1,680	1,680	82	$20,000
Infrastructure (lighting/water/sewage)	Electricity	kWh	549,300	1,980	12	$36,000

Use	Energy Type	Units of Purchase	Energy	Energy	GHG Emissions	Approximate Retail Value
Fleet	Gasoline	L	28,200	900	67	$39,000
	Diesel	L	51,400	2,060	122	$72,000
Total				**15,720**	**410**	**$325,000**

Note: Retail value is provided for information only and is based on typical retail prices and is not derived from billing data. Actual billings will differ from this value due to different rate schedules, fixed charges, and price variability through the year. (Unit prices used here are electricity 6.5 cents per kWh, natural gas $12 per GJ, vehicle fuels $1.40 per litre - representative of 2007 prices.

A list of municipal buildings is shown in Table 4, along with their associated energy consumptions and GHG emissions. These facilities account for 80% of electricity and 100% of natural gas used by the municipality, and are responsible for 51% of total GHG emissions.

Table 4: Energy Consumption and GHG Emissions from Municipal Buildings (2007)

Facilities	Elec kWh	NG GJ	GHG tonne CO_2e
Frank Jameson Community Centre	1,027,800	1,682	116.3
Old Expo Building	516,240	224	28.0
Public Works Facility & Yard	107,718	355	21.0
Aggie Hall	35,808	248	13.3
RCMP Building	252,880	n/a	8.3
Kinsmen Festival of Lights Storage	n/a	124	6.1
Fire Hall / Police Station / Garage / Warehouse	65,936	46	4.4
Resource Centre	n/a	79	3.9
City Hall	76,110	n/a	2.5
Change House / Concession Stand / Kinsmen Shelter	66,840	n/a	2.2
Chamber of Commerce / Development Services	13,800	14	1.1
Stuart Park	13,632	n/a	0.4
Public Safety Building	13,401	n/a	0.4
Old Police Station	12,355	n/a	0.4
Community Police Station	6,844	n/a	0.2
Agricultural field	5,362	n/a	0.2
Cenotaph	3,805	n/a	0.1
Holland Creek Ballpark Club house / Washrooms	3,553	n/a	0.1
Archives	2,511	n/a	0.1
Horseshoe Pitch	2,030	n/a	0.1
Facilities Total	**2,226,625**	**2,773**	**209**
Share of Total Municipal Consumption/Emissions from these listed Facilities	**80%**	**100%**	**51%**

Note: Data shown based on extracts from utility records. Some facilities may not have natural gas data if they have no natural gas service. Facilities not showing electricity consumption is typically due to either (i) the consumption is billed to another account owned by the Town, or (ii) the consumption is paid for by a tenant and not the Town and does not appear in data extracts. Privacy requirements prevent this extract from including accounts not owned by the Town.

The distribution of energy consumption by sector is shown in Figure 5, with the Frank Jameson Community Centre using approximately the same amount of energy as all other municipal buildings combined.

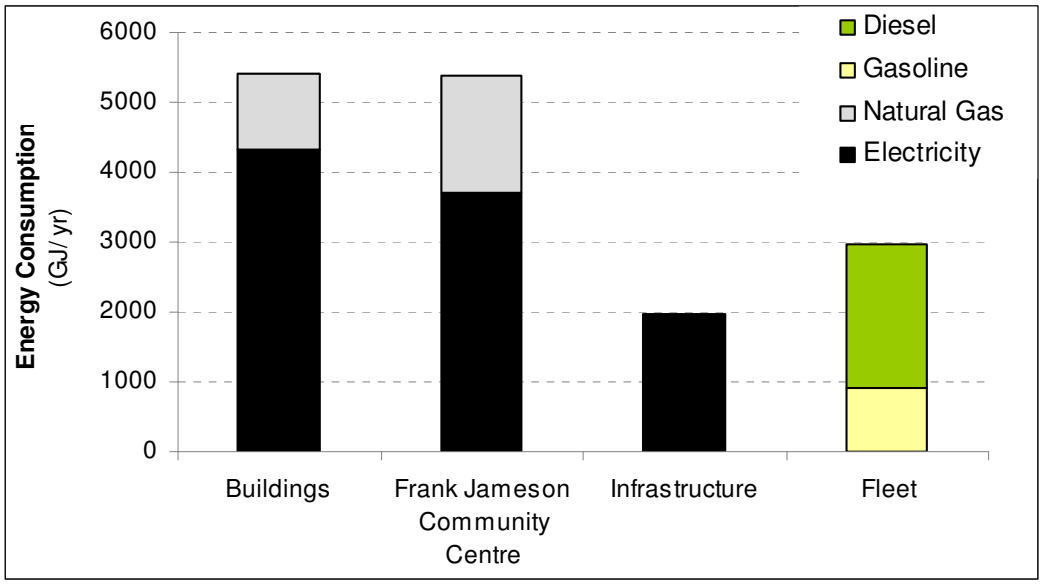

Figure 5: Energy Consumption of Municipal Operations (2007)

The distribution of GHG emissions from different sectors of municipal operations is shown in Figure 6. The Frank Jameson Community Centre alone emits more GHGs than all other municipal buildings due to its relatively higher consumption of natural gas. These emissions are still less than that resulting from the operation of the municipal fleet, with diesel accounting for the most significant contribution of GHGs.

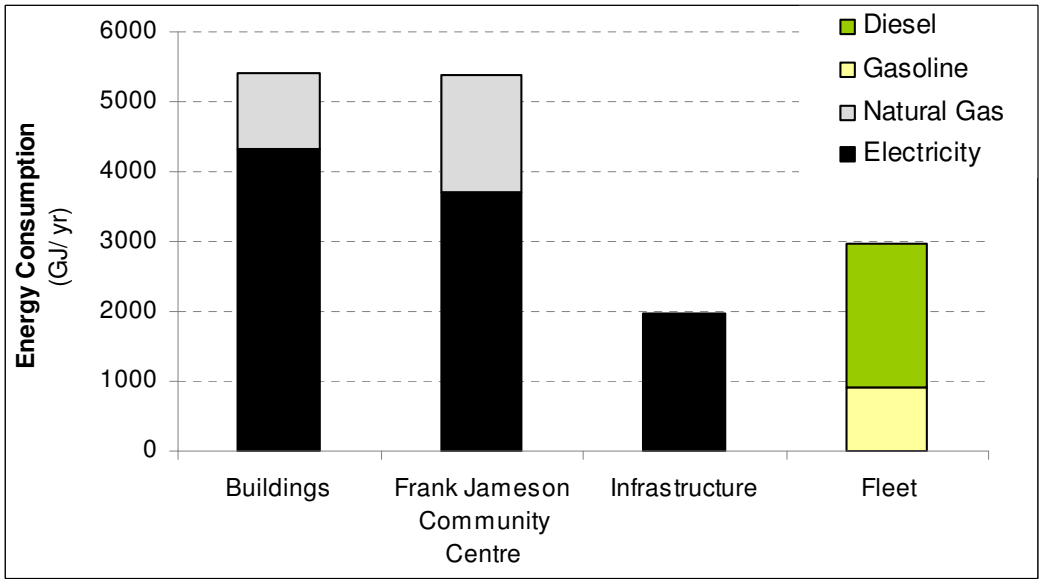

Figure 6: GHG Emissions from Municipal Operations (2007)

3.2 Community Energy and GHG Emissions Inventory

The Provincial Ministry of Environment, in support of the CAEE initiative has provided an inventory of community energy consumption and greenhouse gas (GHG) emissions. This data is based on a prototype inventory compilation that will eventually be used to provide all local governments with inventories of their community-wide emissions [7].

Energy consumption and GHG emissions in the community derive from:

- **Buildings** - The energy to heat residential, commercial and industrial buildings, as well as the activities that occur within these residences and facilities. This data is obtained from utility records and includes electricity and natural gas consumption. Other sources such as wood, fuel oil, or propane tank heat have not been quantified in the inventory[8].
- **Transportation** – Vehicular consumption and emissions, is based upon a count of the vehicles in the community, and an estimate of the number of kilometres driven.
- **Waste** - Waste does not directly consume energy but when deposited into landfills, it decomposes and releases methane gas which is a greenhouse gas stronger than carbon dioxide.

The inventoried energy and associated GHG emissions are tabulated in Table 5. **Ladysmith has total GHG emissions of 4.3 tonnes CO_2e per capit**a; compared to 4.1 tonnes CO_2e per capita for the Capital Region District and 11.0 tonnes CO_2e per capita for the City of Prince George[9]. The majority of Ladysmith's energy consumption is attributable to transportation (58%), which is reflected by transportation sources accounting for 81% of the community's GHG emissions.

Energy consumption by fuel type and end use are illustrated in Figure 7, with associated GHG emissions shown in Figure 8. A detailed breakdown is provided in Appendix A.

[7] These inventories use actual utility data for electricity and natural gas consumption. For vehicles fuels, the consumption is estimated from vehicles counts, published fuel efficiency, and assumed annual driving distances. This inventory does not include privately supplied energy such as propane or heating oil, and does not include wood or other biomass derived energy. The CEEI initiative is working to develop updates to this inventory for 2006 and 2007 by the end of 2008.

[8] Industrial energy consumption is available only for electricity as confidentiality concerns prevent the release of the natural gas data at present. The industrial electricity consumption amounts to about 20% of the building energy consumption (13% of the community total). Industrial consumption is one of the least accessible by local governments and

[9] The Prince George value of 11.0 tonne CO_2e per capita includes residential, commercial, transportation and waste sourced emissions but does not include industrial emissions.

Table 5: Community Energy and GHG Emissions (2005)

Use	Energy (as GJs)	GHG Emissions (tonnes of CO_2e)	Approximate Retail Value ($)
Residential	197,800	3,810	$ 3,234,000
Commercial	66,700	800	$ 1,157,000
Industrial[1]	n/a	-	-
Transportation (estimated)[2]	361,600	26,050	$ 14,454,000
Solid Waste	-	1,600	-
Total	626,100	32,260	$ 18,845,000
Total (per capita)	**83.1**	**4.3**	**$ 2,500**

Notes:
1) Industrial consumption data has been withheld to protect account holder privacy.
2) Transportation emissions are estimated from vehicle counts and assumed annual average travel distances. These may not match with fuel sales within the Town.
3) Retail value is provided for information only and is based on typical retail prices and is not derived from billing data. Actual billings will differ from this value due to different rate schedules, fixed charges, and price variability through the year. Unit prices used here are electricity 6.5 cents per kWh, natural gas $12 per GJ, vehicle fuels $1.40 per litre - representative of 2007 prices.

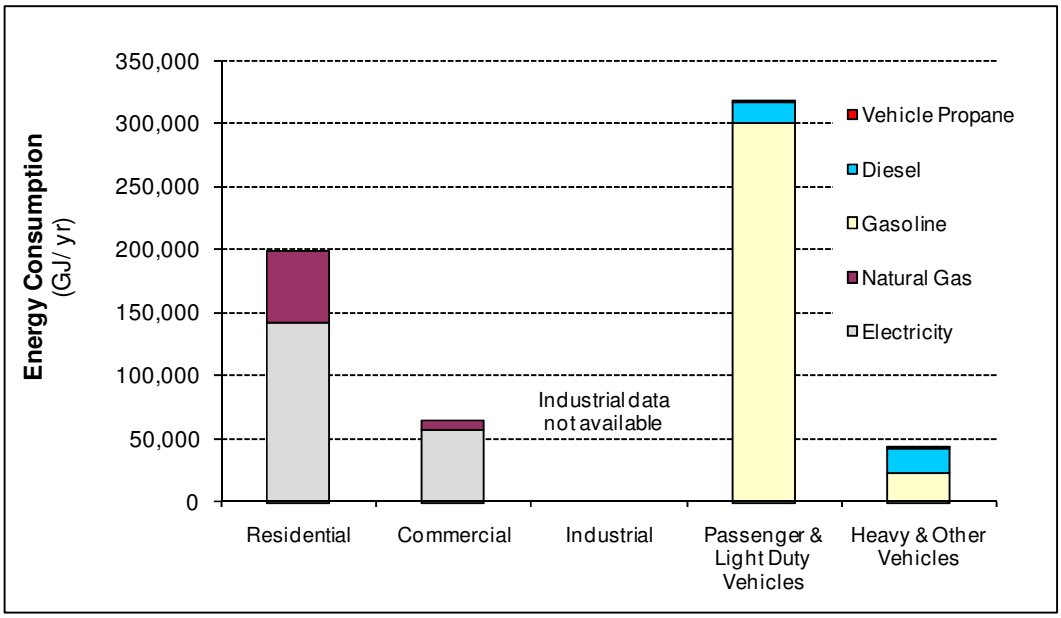

Figure 7: Community Energy Consumption by End use and Fuel Type (2005)

Source: Ministry of Environment Community Energy and Emissions Inventory (CEEI) Initiative, via the CAEE program.
Notes:
1) Only utility-provided energy is available. Other energy sources such as propane, fuel oil, and wood may be substantial but are not yet estimable.
2) Industrial energy consumption is unavailable due to privacy requirements.
3) Transportation numbers are based on vehicle registrations and assumed average travel distances and have not been checked against actual consumption data.

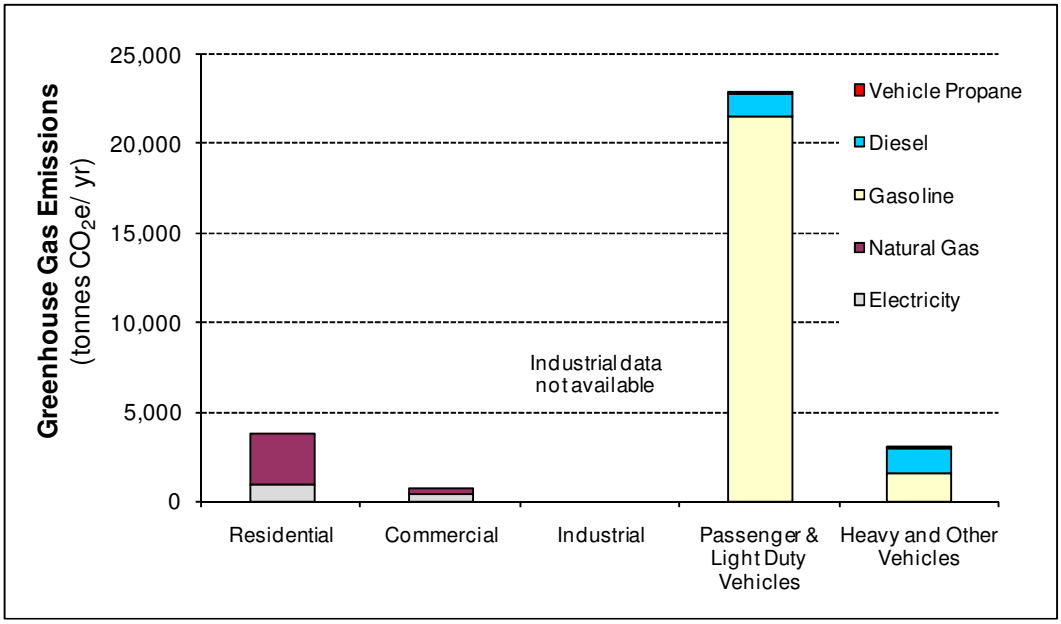

Figure 8: Community GHG Emissions by End use and Fuel Type (2005

Source: Ministry of Environment Community Energy and Emissions Inventory (CEEI) Initiative, via the CAEE program.

Notes:

1) Only utility-provided energy is available. Other energy sources such as propane, fuel oil, and wood may be substantial but are not yet estimatable.

2) Industrial energy consumption has been withheld by PNG for reasons of confidentiality.

3) Transportation numbers are based on vehicle registrations and assumed average travel distances and have not been checked against actual fuel sales data.

4 Plan Framework

A pyramid structure is useful for thinking about the plan structure. Components of the structure are:

The Vision	This paints the picture of where the community would like to go in the long term. The vision is not an easily, or swiftly attainable goal. However, it provides direction and points to the key features of the energy plan.
Areas of Action	The areas of action are the corporate operations, community energy consumption and local energy supply.
Initiatives and Actions	These are the specific areas for the plan to address.
Targets	Numerical objectives to be achieved.
Implementation	The day-to-day activities that are required to implement the plan.

Figure 9: A Pyramid Framework for Compiling a Plan

4.1 Ladysmith's Energy Vision

As a starting point, a working vision was brainstormed with the Environmental Commission. It states that in the future…

> Ladysmith is one of Canada's Greenest communities. We are recognised as a leader in conservation and sustainable energy. We are committed to making the community a better place to live in a future with limited fossil fuels - a future powered by renewable energy. Our community supports the person and the pedestrian first and foremost.

4.2 Identifying the Issue Areas (Goals / Objectives / Issues)

During a CEP workshop with the Environmental Commission, a discussion was held to identify the major areas for action that the community could pursue. The identified areas are:

- Homes & how we live in them
- New residential development
- Transportation (commuting community)
- Work & economic development
- Energy supply
- Quality of life

These initiative areas and the actions defined will be reviewed in Section 5. The reduction targets and their implementation are reviewed in Sections 6 and 7.

5 Initiative Areas and Actions

Seven initiative areas were identified in a Community Energy Planning workshop with the Ladysmith Environmental Commission. In this section, each initiative is explained as follows:

- **Objectives** – describes 2 to 3 key areas that the actions are striving to fulfill.
- **Background** – provides perspective on the issue relevant to the community of Ladysmith, identifies why the initiative is important, and gives an overview of the potential barriers to successfully addressing the initiative.
- **Strategy** – identifies the key approaches the municipality will employ to meet the objectives, whether they are incentive-based, regulatory, educational, other, or some combination of these.
- **Actions** - A list of actions that the community can undertake. Some actions are one-time activities and others are longer-term program development activities or planning requirements which require bylaws to be enacted.

Initiative 1: Homes & how we live in them

Objectives:

To improve the efficiency of existing homes in Ladysmith, and to encourage energy efficient behaviour in homes by:

- Promoting energy efficiency retrofits to homeowners.
- Increasing awareness of operating homes in an energy efficient manner.

Background:

Homes consume almost a third of the energy used in the community. There are over 3000 dwellings in the community, over 70% of these are detached homes, and more than half of the dwellings are over 25 years old. There is a high occupant ownership rate (over 80%). These conditions present an excellent opportunity to reduce community emissions through home retrofits and homeowner behaviour change. Major barriers to upgrading homes and changing homeowner behaviour include: the homeowner's finances and time, knowledge or concern about energy efficiency, and lack of skills to implement retrofit activities. Some portions of the population may have specific barriers; for example, low income residents may not have the resources for major retrofits.

Strategy:

- **Incentives** – provide modest incentives for energy audits and upgrades
- **Education** – promote the existing incentive to property owners and fund awareness and outreach activities in the community
- **Partnerships** – partner with local businesses, services and utilities to increase the Town's capacity for providing energy programs and incentives

Actions:

Action-1: Promote energy efficiency incentive programs

Use staff and municipal access points to the public as opportunities to promote existing programs to residents including Federal (ecoENERGY), Provincial (LiveSmart BC), and utility (BC Hydro and Terasen) programs and incentives. The Town will:

- Produce (or provide existing) brochures and information about relative benefits of energy efficiency retrofits available through the programs and distribute them at municipal counters.
- Provide information to staff (e.g. building inspectors, planning staff) so that they may be a resource about these incentive programs.
- Provide lists of available incentives through the Town's website (or link to the evolving Provincial "Live Smart BC" site).
- Develop and highlight sample business cases for the pay-off from retrofit projects.
- Include information with tax assessments or other mail-outs to property owners.
- Work with the plumbing & heating trades, and the construction and contracting community overall to increase the awareness and uptake of these incentives.

Action-2: Provide assistance for energy audits and retrofits to residents

Provide funding to reduce the financial barrier of paying for a home energy audit and work to reduce barriers to financing retrofits. The Town will:

- Provide a cash incentive (for example possible $100) to homeowners that perform an energy audit through the ecoENERGY program.
- Encourage banks and credit unions to develop low-interest loans for homeowners to enable energy efficiency retrofits[10].

Action-3: Provide energy retrofit kits to homeowners

Develop partnerships to enable installation of simple energy retrofits for reduced cost and increased access[11]. The Town will:

- Work with local business, service agencies, and utilities to develop an energy retrofit kit for residents at a discounted cost. The kit might include: weather caulking / stripping, programmable thermostat, compact fluorescent light bulbs, hot water tank wrap.

[10] This program could be modeled after Ladysmith's existing loan program for buying locally at Christmas time.

[11] Similar programs have been developed in many municipalities directed towards water conservation and include low flow faucet and shower fixtures. It might be possible to connect these initiatives (e.g. some form of "Save water, Save energy, Save $" promotion). Kits are often sold to residents at below market cost.

- Develop an educational brochure for the kit that clearly demonstrates the benefits of installing each item in the kit and guides residents through the installation. Include energy-saving behaviour tips in the brochure (turn off lights, use clothes line, etc).
- Promote the kit through schools, community centers, or through municipal hall on event days (clean air day, earth day, etc.).
- Hire summer students to train residents on installation of kit items.

Initiative 2: How our community grows (New development)

Objectives:

To ensure all new growth incorporates sustainable planning principles and energy efficient building design by:

- Instituting policies and principles that promote compact community development and updating the OCP to reflect that.
- Working with developers through incentives, negotiations and bylaws to reach energy efficient standards in all new homes.

Background:

Recent changes to the building code require new homes to meet an EnerGuide for Houses rating of 77[12]. The CAEE program aims to have new homes built to an EGH rating of 80 or better by 2010. With an increase in multi-family and mixed-use developments, the Town can encourage the highest standards of energy efficiency by encouraging the use of rating systems such as the LEED system (a suite of green building features) or the ASHRAE 90.1 standard (an energy efficiency benchmark).

Encouraging developers to strive for these high standards in energy efficiency for new buildings will have simultaneous benefits in other 'green' areas. These buildings have reduced water consumption, improved indoor air quality, and documented construction waste management and recycling.

These efforts are linked to the outcomes of the visioning process currently being conducted in Ladysmith addressing how we will grow in the future.

Strategy:

- **Education** – providing learning opportunities for residents, developers and trades workers in energy efficient technologies and design
- **Incentives** – offering rebates or other incentives for attaining specified energy efficiency standards
- **Policy** – updating the OCP to maintain a consistent plan for the Town's approach to handling new growth

Actions:

Action-4: Build a showcase ultra energy efficient home

Building a demonstration unit that is open to the public is an excellent tool for promoting energy efficient technologies that are currently available to prospective new home buyers and existing home owners alike. The Town will:

[12] EnerGuide is an energy consumption rating scale for detached dwellings. As of September 2008, the BC Building Code increased its requirements from 68-72 to 77. An EGH rating of 80 is considered very efficient.

- Encourage and invite a developer (through a rezoning review, or by a request for proposals process, etc.) to build a "net Zero Energy Home" in a new subdivision. The home would be on display for public viewing for an extended period of time (e.g. it could be the show home or sales office). The intent would be to showcase a Net Zero Energy home (EGH rating of 100) by including a variety of energy efficient technologies and design principles. These may include:
    - on-demand water heaters
    - heat recovery units
    - solar water heaters
    - low energy appliances and lighting
    - high efficiency windows
    - building siting and landscaping to maximize energy efficiency
- Learn from the CMHC EQuilibrium™ housing initiative that has completed twelve demonstration projects across Canada[13].

Action-5: Promote a long-term objective of "carbon neutral operations" for new buildings in the community

New development presents an opportunity to work towards Ladysmith's Energy Vision of becoming a carbon neutral community. In order to strive for this goal, the Town will:

- Develop a set of guidelines that new buildings should aspire to in order to minimize operational GHG emissions (see Text box on BC Housing).
- Encourage developers to optimize proposed building energy performance, and to design the building enclosure and domestic hot water systems to minimise demand by providing knowledge and support for exploring newer technologies and practices.
- Connect developers with BC Hydro's high performance buildings incentives.
- Increase capacity amongst municipal staff to assist proponents in including energy

BC Housing: a carbon neutral strategy for new buildings

All new BC Housing construction projects are now required to meet the intent of BC Housing's High Performance GHG Neutral Strategy as follows:

The building's energy consumption shall be reduced as much as possible. Remaining greenhouse gas emissions shall be mitigated through fuel switching to low GHG emission energy sources, including low GHG emission electricity and on-site renewable energy, and/or implementation of on- site GHG emission offset projects where practical.

To achieve its GHG neutral goal, new BC Housing projects shall achieve:

- Minimum six points for Optimised Energy Performance with the LEED rating system,
- Maximum of 10% end use energy from fossil fuels,
- Projects are encouraged to exceed this and attempt to reduce their greenhouse gas emissions as close to GHG neutral as possible, and
- Projects must report their estimated annual GHG emissions and percentage reduction relative to the reference building designed to the Model National Energy Code for Buildings 1997 or ASHRAE/IESNA 90.1 1999.

[13] http://www.cmhc-schl.gc.ca/en/inpr/su/eqho/index.cfm

efficiency considerations into development permit applications.

- Offer building permit rebates to builders for meeting selected energy efficiency standards, as measured after the completion of construction (see Action 6).
- Partner with Federal and Provincial ministry resources to evaluate new technologies.

Action-6: Encourage energy efficient development in re-zoning applications through the OCP

Rezoning is a discretionary act of council, which is usually decided upon based on a review of the relevant OCP policies to determine if the application is consistent with these desires. To encourage energy efficiency for re-zoning applications, and consistency amongst proposals, the Town will:

- Develop a policy within the OCP for re-zoning that defines energy efficient attributes that the Town would like to see included. As examples, this could include the desire for detached dwellings to be EnerGuide 80 for dwellings to incorporate green attributes.

Action-7: Provide Incentives to Builders for Energy efficient design

The Town collects permit fees for new developments. To offset the burden of designing for energy efficiency and to provide an incentive, a modest discount could be offered to builders. This also helps promote green building programs and reduces the builders outlays for certifying the building. To encourage energy efficiency for re-zoning applications for new developments, the Town will:

- Offer building permit rebates to builders for meeting selected energy efficiency standards, as measured after the completion of construction[14].

Action-8: Encourage Energy Efficient infill development in the Downtown core and surrounding area

Ladysmith's downtown core is a key commercial area with opportunities for increasing the number of people living in the vicinity while maintaining its character. This can be accomplished through infill housing, redevelopment into mixed-use residential and commercial areas and rehabilitation of the lanes system. The Town will:

- Update the OCP to encourage further infill in the downtown core and the surrounding areas.
- Rehabilitate lanes to create new commercial and residential frontages, adding human scale paths for pedestrians and enhanced street activity. This walkable, pedestrian-oriented space would encourage businesses into the downtown core and/or access to

[14] For example, the District of Saanich provides permit rebates up to 30% for using Canadian Home Builder's Association's Built Green program standards. They also include consultation sessions with energy advisors as well. There may be efficiencies associated with modeling a discount program after one that is already in place.

residences in mixed-use developments. It would also reduce the need to use vehicles to access retail and service businesses that move into the core[15]. For example, Council has recently approved a development application to use the rear lane entry as the main access to residential units in a mixed-use re-development of the Browsorium building on Warren Street. Furthermore, Council has also approved the façade improvement to the rear of a commercial building as the access point to a dance studio.

Action-9: Develop energy efficient and green criteria for boundary expansion

Currently, if an expansion of the Town's boundary is requested for a new development, the staff and council consider the potential benefits on a case-by-case basis and then make a recommendation to the Province for a decision. With respect to energy use, municipal boundary expansion typically leads to increased energy use due to increased transportation requirements. In order to attain the energy targets set by the Town of Ladysmith, boundary expansion should only be considered in exceptional circumstances, if at all. During the update of Ladysmith's Official Community Plan (OCP) in 2009 there is an opportunity to include a formalized policy statement about future boundary expansion requests. This policy statement can ensure the Town's vision for sustainable growth is at the forefront when making decisions about new development. The Town will:

- Create a policy statement that town boundary expansion is discouraged due the resulting increases in energy use and GHG emissions associated with sprawling development.
- Develop a set of criteria and a policy statement within the OCP by which a boundary expansion would be considered with a special focus on energy efficient and green criteria. These criteria may include principles such as smart growth planning, energy efficiency building design, and sustainable transportation.

Action-10: Formulate green development guidelines for public lands

The Holland Creek area and the waterfront are two key areas that are planned for future growth in the Town's existing boundaries. Because both of these areas contain public lands, there is an opportunity to attach green development requirement covenants to the land title before selling it to developers. The Town will:

- Work with the province to create a set of green development guidelines (for example through a memorandum of understanding) as requirements for development of the land. These guidelines may include principles such as: smart growth planning, energy efficient building design, and sustainable transportation.

[15] The action described here is focused on energy efficiency though there are numerous benefits beyond energy efficiency from creating suitable infill development.

Initiative 3: How we get around (Transportation)

Objectives:

To increase the mobility of residents and visitors choosing car-free alternatives by:

- Enhancing the safety and accessibility of pedestrian and cyclist infrastructure and amenities.
- Implementing a new transit service to access key locations around town.

Background:

If Ladysmith is to strive towards becoming a carbon neutral community, the emissions created from automobiles and transportation will need to be reduced. The municipality does not have direct control over the transportation choices each resident makes, nor does it have control over other influencing factors such as federal vehicle fuel efficiency standards and provincial gas taxes. However, the municipality can encourage alternatives by providing safe, pedestrian and cyclist friendly infrastructure and amenities and using regulatory tools for zoning and development that encourage alternatives to fossil fuel powered vehicles.

Strategy:

- **Evaluation** – conduct analysis of current transportation practices for town residents to inform planning decisions
- **Services and enhancements** – add new transit service, enhance pedestrian and cyclist paths and amenities
- **Regulation** – redirect development parking funds towards alternative transportation initiatives and allow low speed electric vehicles on town streets
- **Partnerships** – work with BC Transit to enhance transit service and amenities over time, explore commuter possibilities for the E&N railway with the Island Corridor Foundation, and encourage car-sharing organizations

Actions:

Action-11: Implement the trolley service

The Town is currently leading an initiative to purchase a trolley to provide bike friendly public transportation to key locations in town. The proposal includes consideration of an electric trolley in keeping with the Town's sustainability principles. Fundraising is currently underway. The intention is to operate the trolley service by donation rather than setting fixed fees. The Town will:

- Contribute funding required to implement the trolley service that has not been raised through donations and grants.
- Continue the community engagement process to determine the ideal locations for stops.
- Create a plan for amenities associated with the trolley and those key stops (e.g. benches, covered bus shelters, signs, lighting, bike racks). Work with BC Transit to investigate potential funding options for amenities.

- Evaluate ridership levels and conduct surveys to determine if the trolley is servicing the appropriate locations after the service is in operation.

Action-12: Create an alternative transportation reserve from off-street parking funds

The older buildings in Ladysmith's downtown core were not originally designed to accommodate sufficient parking to meet the Town's current standards. To address this, the existing zoning bylaw allows developers to buy up to 50% of the required parking spots at a rate of $4,000 per spot[16]. These additional parking spots are supplied by the Town's consolidated parking area behind First Avenue. As the town implements policies to infill and increase the density downtown, this option will no longer be viable for two reasons. 1) The land is being sold by the Town at a sub market rate, and 2) all available parking spots will be purchased before infill is complete. As an alternative, the Town will:

- Create a bylaw to allow developers to contribute to an alternative transportation reserve fund as allowed by the "Green Communities" amendment to the *Local Government Act*[17]. This could define the conditions under which the exemption is allowed for example, requiring the developer to also provide alternative transportation amenities within the development (e.g. installing bike racks, bike rooms, providing dedicated car-sharing parking and memberships to a car co-op for building residents).
- Use the alternative transportation reserve fund to enhance car-free opportunities in the Town, including linking existing bike lanes and sidewalks, building shelters for the trolley route and increasing the trolley service.

Action-13: Enhance car-free mobility opportunities

Although new developments are implementing bike paths and sidewalks, these are not connected to each other. In particular, older areas in town often have limited sidewalks, bike lanes and shoulders that are useable by bikes, electric scooters and pedestrians. To encourage alternative modes of transportation in Ladysmith, the Town will:

- Improve pedestrian access and safety by:
    - installing more sidewalks,
    - improving the lighting to residential areas around the core between Second and Fourth Avenues, and
    - installing more crosswalks, particularly where sidewalks are only available on one side of the road.
- Install benches along particularly steep pedestrian routes to provide rest stations for pedestrians and/or cyclists.

---

[16] Zoning bylaw 1160 (clause on p17). Current parking requirements are 1.5/dwelling unit for multi-family.

[17] Currently, local governments can allow developers to provide or pay for surface parking not on their site in order to obtain a variance for their project's parking requirement. The innovative feature of the Bill 27 is that it will allow a municipality to set terms whereby this funding can be used for a range of alternative transportation features and amenities, and not just to fund parking.

- Increase bicycle parking, particularly along First Avenue where a bike rack should be installed in each block.
- Complete bike lane connections between routes as set forth in the Town's Bike Plan. In particular to: continue adding designated bike lanes to the Fourth Avenue bike route in conjunction with road upgrades, and connect the Dogwood Drive route from the north end of Holland Creek Park (where the bike lanes currently end) down to First Avenue or up to Fourth Avenue. This will improve access between south Ladysmith and downtown.
- Create and distribute a map that shows the least steep routes for pedestrian and bicycle access to key areas of town.
- Consider designing "zig-zag" routes that break up the uphill climbs and allow for rests. Include features such as benches and bike racks where available.
- Promote electric bikes.

Action-14: Allow use of Neighbourhood Zero-Emission Vehicles on town streets

On June 6, 2008, the British Columbia Motor Vehicle Act Regulations were amended to include the definition for a neighbourhood zero emission vehicle (NZEV)[18]. As part of the amendment, municipalities now have the authority to create a by-law which would allow NZEVs on streets with speed limits above 40 km/hr, but no greater than 50 km/hr. Local jurisdictions, including the City of Vancouver and Oak Bay, have recently passed bylaws to allow NZEV's to travel on streets with a speed limit of 50km/h, restricted to the right lane except when a left hand turn is necessary or when passing another vehicle. The town will:

- Enact a bylaw allowing the use of zero-emission vehicles on town streets where speed limits do not exceed 50km/hr.

Action-15: Conduct comprehensive analysis of community transportation use

For transportation energy and GHG emissions, the current Provincially provided community energy and GHG inventory is an estimate only and is not 'fine grained' enough to discern travel patterns or use as a monitoring metric. Planning for a car- free community requires an understanding of how the public currently moves around the Town and region. Information on trip frequency, distance, reasons, and forms of transport used is necessary when designing strategies to reduce motor vehicle use. The Town will:

- Obtain funding to conduct a community specific transportation study to determine how the public moves around the town and region. Funding could be from Provincial grants, allocated from the "Gas Tax" funds, or allocated from general revenue of the Town.
- Liaise with the Ministry of Transportation, BC Transit, and Translink (Metro Vancouver region) regarding this work as they may have information compiled already (e.g. web-based research and surveys).

[18] Prior to this change, the Provincial regulations restricted NZEVs to streets with speed limits of 40 km/hr or less, and the Federal regulations prohibited them from travelling at speeds over 40 km/hr.

- Based on the study results, identify best actions to implement. As examples, potential actions may be identified to: reduce commuting travel, improve commercial access in the town and region, and improve alternative transportation amenities.

Action-16: Encourage and accommodate car-sharing opportunities

Several car-sharing companies and cooperatives are in operation throughout the province. Having car- sharing as a local amenity allows residents to move away from owning and operating their own car (or from owning a second car), and encourages other forms of transit when car use is not essential. To support the development of a car sharing network, the Town will:

- Encourage car sharing organizations to create a local network or car-share node.
- Provide amenities for car sharing such as designated parking spots for car share vehicles at municipal facilities.

Action-17: Explore and preserve opportunities for future use of E&N Railway

The existing E&N Railway service operates two trains per day through Ladysmith – one northbound to Courtenay and one southbound to Victoria. The frequency and timing of the existing train is poor for use as a commuting option. However, there are opportunities for the current use of the route for tourism promotion, and potential future use of the route for commuting. The Town will:

- Explore opportunities for enhancing current tourism potential for weekend trips to Ladysmith from the rest of the island – e.g. for the festival of lights and other events.
- Preserve the opportunity for future use of railway for commuter service. This will involve working with all communities in the corridor to ensure the line and rights of way are preserved.
- Work with the Island Corridor Foundation to facilitate commuter rail between Ladysmith and other southern island communities along the South Vancouver Island rail network.

Action-18: Explore transit service opportunities to neighbouring communities

Beyond the trolley service under development there is potential to develop service to neighbouring communities that are frequented by Ladysmith residents for work or personal trips. The Town will:

- Continue working with BC Transit to complete the transit feasibility study for Ladysmith. Work with BC Transit to explore the potential of expanding the service to provide linkages between neighbouring towns.

Initiative 4: How we sustain ourselves (Work & economic development)

Objectives:

To foster a self-sustaining economy in Ladysmith by:

- Preserving land for commerce and industry to ensure the community builds its own economy, rather than becoming a commuting ("bedroom") community.
- Attracting a diverse set of green industry businesses, including manufacturing of green products.

Background:

Ladysmith is interested in attracting and supporting green businesses and industry to ensure a strong economic base for the community that simultaneously retains local employment and tax revenues while maintaining quality of life and protection of the surrounding environment.

Strategy:

- **Marketing** – actively attract green industry
- **Policy** – create an environment that is conducive, or even rewarding, to environmentally conscientious business and ensure land and opportunities are available for establishing new businesses
- **Partnerships** – connect with local university and college programs to increase capacity in green technologies and attract potential new green businesses

Actions:

Action-19: Preserve local commercial and industrial lands to enhance local employment

By creating a business-friendly environment that has appropriately serviced land and space available for establishing new businesses, the Town can develop a strong economic base and provide local employment opportunities to its residents. This can lead to enhanced quality of life for residents who can live and work in the same community and avoid the need to commute out of town. The Town will:

- Maintain the identified commercial and industrial centres in the OCP, in particular in the Downtown and South Ladysmith Area.

Action-20: Update Economic Development Strategy to attract green industry

In keeping with its sustainability principles, green industry could be the Town's key target industries. The Town will:

- Actively attract green industry (research & development, small scale manufacturing) by marketing Ladysmith's commitment to sustainability, both in the municipal policies and in the residents at-large, and the high level of environmental awareness among residents. Highlight programs, such as the buy-local Christmas present loan program.

- Support and encourage improvements in environmental performance in local businesses.
- Assist new small businesses in incorporating green building practices into their business plans. This could be based on the program in Parksville that has a development process for assisting small businesses.
- Continue to support home-based businesses in residential areas that are not disruptive to residents.
- Make a connection with the Vancouver Island University Green Building and Renewable Energy Technician program to investigate opportunities for joint research projects, internships and other programs that will simultaneously build local capacity in green technologies and showcase Ladysmith as a leading-edge community in implementing green building practices.

Initiative 5: Where we get our energy (Energy supply)

Objectives:

To shift Ladysmith's energy sources towards being community-based, renewable, and clean by:

- Evaluating the electricity generation potential within the Town's water supply system.
- Evaluating clean and renewable energy technologies for municipal buildings.
- Encouraging clean and renewable energy technologies in new developments.

Background:

The Town set a goal of generating 10% of its energy needs from community-based, clean energy sources by 2020 (CAEE target #5). Currently the town's energy is almost exclusively supplied by natural gas, hydro electricity and fuel oil from sources outside the community. In order to generate 10% of its energy locally, the Town will need to encourage new developments to implement alternative energy systems, while also investigating the potential to implement energy systems for municipal buildings and operations. Several technologies have emerged that are available and applicable to the Ladysmith context, including ocean loop heat pumps, geothermal loop systems, solar technology and district energy systems.

Strategy:

- **Evaluation** – explore various opportunities for alternative energy production, including an assessment of possible environmental impacts
- **Cooperation** – work with developers and with provincial and federal government ministries to encourage the development of alternative energy supplies

Actions:

Action-21: Evaluate water supply electricity potential

The Town currently has two water supply areas (Holland Creek watershed and Stocking Lake watershed) approximately 2 to 3 kilometres apart and 2000 feet in elevation difference. Linking the two water sources presents a potential opportunity to generate electricity from the flow of water between these sources. To evaluate this, the Town will:

- Conduct a feasibility study for implementing this energy system. An engineering study is already planned to determine the economic feasibility of using turbines to produce energy. This study should also consider if there are any environmental or other social impacts of implementing electricity generation in this location.
- Based on the results of this evaluation develop this resource if economically feasible.

Action-22: Encourage efficient and renewable energy technologies

Several opportunities exist for developing community-based, clean energy sources in Ladysmith. The Town will:

- Participate in the 100,000 Solar Roofs program in BC.
- Encourage opportunities for the beneficial re-use of biomass from the sawmill to provide heat or electricity for the town.
- Encourage the use of district energy system using renewable energy supplies such as biomass or an ocean-loop heat pump system for a new development.
- Encourage the use of heat pumps as alternatives to either natural gas furnaces/boilers or electrical resistance heating in buildings.

Action-23: Encourage new developments to evaluate alternative energy sources or district heating systems

New developments present an opportunity to integrate alternative energy sources into the initial design of the neighbourhood and its systems. The Town will:

- Encourage substantive new developments to conduct a business case evaluation for alternative heating and cooling systems. Potential examples might include an ocean loop heat pump on the waterfront to supply new development, solar water heating, and geo-exchange heat pump systems.
- Work with developers to resolve building code and or building permit complexities that may arise from the integration of alternative energy sources into new developments.

Initiative 6: How we operate the municipality

Objectives:

To demonstrate leadership in energy efficiency inside the community and beyond by:

- Constructing and operating municipal buildings in an energy efficient manner.
- Improving the efficiency of the vehicle fleet.

Background:

As a signatory of the provincial Climate Action Charter, the Town has committed to becoming carbon neutral in its operations by 2012. In order to achieve this, the Town intends to improve efficiencies in its current buildings and fleet, and look for more energy efficient options when building and purchasing new. Furthermore, two of the Town's CAEE targets pertain directly to municipal operations: reducing energy in existing buildings (CAEE target #3) and building new buildings with high energy performance (CAEE target #2).

Strategy:

- **Policy** – create policy that incorporates climate change considerations into the Town's strategic direction and detailed policy for implementing energy efficiency (e.g. define green standards for new municipal buildings)
- **Evaluations** – find opportunities for energy savings in municipal buildings
- **Upgrades** – implement retrofits where business case deems suitable
- **Education** – train staff on energy efficient building operation and fleet practices

Actions:

Action-24: Incorporate climate change considerations into the Town's strategic direction

As a corporate entity, the town of Ladysmith has a meaningful opportunity to incorporate the themes of resource efficiency, conservation, and emissions reduction into its business planning. The town will:

- Incorporate climate change considerations within the strategic planning of the municipality.
- Encourage other decision making and plan development processes to advance the objectives of this energy plan.

Action-25: Establish permanent funding for GHG reduction initiatives

Action on climate change will need sufficient resources in terms of staff time, funds, and capacity. Permanent funding will need to be incorporated into the annual budgeting process if the Town is to be successful in delivering on the actions outlined in this plan. The Town will:

- Explore funding options for implementing the actions outlined in the plan, and for tracking progress and reporting to public.
- Establish a budget for staff, training, and procuring outside resources as necessary to meet the Town's targets.

Action-26: Reduce energy use in existing municipal buildings

Substantial savings can be achieved through a review of existing building systems, particularly if these have not been reviewed recently. The Frank Jameson Community Centre dominates the municipal energy consumption and may have particularly high potential for energy savings. To meet the CAEE target of reducing energy use in existing buildings by 15%, the Town will:

- Review and evaluate the energy efficiency of all municipal owned buildings by 2010. The evaluations should be detailed and include all energy systems – natural gas, electricity, and heating oil where applicable.
- Analyse business cases for each building and perform energy upgrades and renovations by 2012 where payback periods are seven years or less. Some opportunities that have been identified include:
    - Review of BC Hydro identified upgrades to the community centre, possible further building audits, and implementation of recommended actions,
    - Insulating Aggie Hall and Oyster Bay Drive buildings,
    - Replacing the oil furnace in the High Street building, and
    - Improving 'housekeeping' practices such as closing the garage doors etc.
- Engage and train staff on energy efficient practices in building operation. Consider implementing automated systems, such as motion detectors for lighting.

Action-27: Build all new municipal buildings with 25% better energy performance than the Model National Energy Code

To meet the CAEE target of building more energy efficient buildings, the Town will:

- Develop a green building policy for the development of new buildings. Other municipalities have adopted various levels of the LEED (Leadership in Energy and Environmental Design) standards or equivalent[19].
- Ensure that all new municipal buildings or retrofits are assessed for the potential of using air source and ground source heat pumps.

[19] LEED stand for Leadership in Energy and Environmental Design. It is an initiative of the US and Canadian Green Building Councils to improve the design and construction of buildings. It is a rating system, wherein a building is awarded points in many categories for the different features included. At the end the building is rated as "Certified", "Silver", "Gold", or "Platinum". Current LEED standards are available for commercial buildings and apply to offices and other facilities as well as multi-family housing developments.

Action-28: Identify opportunities to improve municipal fleet efficiency

The municipal fleet efficiency can be increased both through purchasing policies for new vehicles and through improved practices with existing vehicles. The Fraser Basin Council's E3 municipal fleet program [20] provides an excellent structure for improving the efficiency of the existing fleet, though it may be considered too extensive for communities with small fleets. The Town will:

- Consider hybrid vehicles when replacing current fleet vehicles. The Town has already purchased one hybrid to evaluate this option.
- Purchase electric light trucks for routine park clean-up activities and maintenance. If deemed necessary, pass a bylaw to allow vehicles to drive on roads with speed limits up to 50 km/h.
- Consider joining the E3 fleet, or implementing some of the suggested structures from this program.
- Implement fuel-efficient driver training.
- Continue executing the existing anti-idling program with municipal staff.

Action-29: Report progress towards becoming carbon-neutral

Tracking progress is necessary to determine whether the Town is on-track to reaching its targets. Making this information available publicly is important for keeping residents informed of progress, and in providing leadership for implementing energy efficient practices. The Town will:

- Track and report the progress on implementing this energy plan, and on becoming carbon-neutral by 2012. This reporting should be made available through the Town's website.
- Lobby the provincial government to improve the baseline community inventory provided through the CEEI initiative to ensure it more accurately represents the transportation use in each community. This may take the form of requiring an odometer reading at the time of auto insurance renewal to track actual mileage accrued each year.

[20] www.e3fleet.com

Initiative 7: Defining our community

Objectives:

To institute a culture of sustainability and energy efficiency in Ladysmith by:

- Setting targets and executing actions to reach those targets.
- Recognizing outstanding performance.
- Communicating progress and successes with the whole community.

Background:

The Town of Ladysmith would like to maintain the village-like atmosphere and sense of community, while enhancing local economic development opportunities, and increasing car-free opportunities. Setting targets, defining actions to meet those targets, and communicating the results will contribute towards reaching those goals.

Strategy:

- **Policy** – incorporate reduction targets into the Town's OCP
- **Communication** – keep residents informed and involved in target setting and tracking
- **Recognition** – reward businesses and residents who take action on energy efficiency

Actions:

Action-30: Establish GHG emission reduction targets, policies and actions and incorporate them into the OCP

As required by Green Communities amendment to the *Local Government Act*, all local governments must include GHG targets, policies and actions in their OCP by May 31, 2010. The Town will:

- Define a reduction target and communicate it to the community. Section 6 of this report lists proposed targets for Ladysmith.

Action-31: Recognize outstanding achievements in energy efficiency

By recognizing business and/or individual achievements in implementing energy efficiency programs or technologies, the Town can foster a culture of action towards sustainability in the community. The Town will:

- Develop a recognition program for businesses and/or individuals who achieve outstanding results in energy efficiency. This may involve rewards from the Town, or nominations of key successes for other agency awards.
- Communicate these successes to all residents.

6 Reduction Targets

6.1 Municipal Operations

The Town has committed in its CAEE targets to:

- Target 2 – Building all new buildings to an energy efficient standard.
- Target 3 – Achieving a 15% reduction in energy consumption for its existing civic buildings.

This plan also includes actions to reduce energy consumption and GHG emissions through a review of fleet operations and purchasing activities - many of which the Town has been undertaking for some time. Finally, there may be opportunities to reduce the consumption of public works activities - street lighting, water and sewage pumping, etc. through conscientious management. Implementing these activities will require several budget cycles to fund audits and evaluations, and then to fund and implement these activities.

As a start, this plan proposes that the Town set an immediate target to reduce energy consumption by 2012 (the first year of carbon neutrality') and to make further reductions by 2016.

Proposed Municipal Operations Targets:

- 10% overall reduction in total municipal GHG emissions by 2012 (from 2007 levels).
- 20% overall reduction in municipal GHG emissions by 2016 (from 2007 levels).

6.2 Community Energy and GHG Emissions

Bill 27 requires the Town to define a reduction target in its OCP. Moreover the provincial government has set a reduction target of 33% from 2007 levels by 2020 for the province overall. While it is not certain how the 33% reduction will be shared amongst citizens, industry, and governments, it is reasonable that the Town aim to match the provincial target.

The Town has committed in its CAEE targets to:

- Target 1 – Endorse the Province's target of reducing current greenhouse gas emissions by 33% by 2020.

As a start, this plan proposes that the Town set an immediate target to reduce GHG emissions in the short term and to meet the provincial goal in the long term. Achieving targets requires continuous action and initially results will be slow. As time moves forward the impact of the policy and incentives will become more pronounced.

Proposed Community Reduction Targets:

- 5% reduction in total community GHG emissions by 2012 from 2007 levels.
- 15% reduction in total community GHG emissions by 2016 from 2007 levels.
- 33% reduction by 2020 from 2007 levels (proposed target to match the Provincial reduction target).

At this time, the community's total GHG emissions are estimated to be 32,260 tonnes of CO_2 equivalents. This baseline is derived from existing available information and is likely to change over time as more accurate methods of estimating community emissions (from transportation in particular) are developed. However, based on the current baseline, the community will need to reduce its emissions by approximately 1,610 tonnes by 2012 and 10,650 tonnes by 2020.

7 Implementation

The Town of Ladysmith has shown leadership in implementing various sustainability activities at the community level. This energy plan contains 7 initiative areas and 31 actions that have the potential to make Ladysmith a leader in addressing the climate change issue as they are implemented. To implement this plan, it is recommended that climate change be developed as a program area, with a management sponsor and appropriate resources.

A program model template is provided below.

7.1 Program Description

Name

Town of Ladysmith Community Energy and GHG Reduction Plan

Objective

To enable the Town of Ladysmith to achieve reductions in energy consumption and greenhouse gas emissions within both municipal operations and the broader community.

Targets

Proposed Municipal Operations Targets:

- 10% overall reduction in total municipal GHG emissions by 2012 (from 2007 levels).
- 20% overall reduction in municipal GHG emissions by 2016 (from 2007 levels).

Proposed Community Reduction Targets:

- 5% reduction in total community GHG emissions by 2012 from 2007 levels.
- 15% reduction in total community GHG emissions by 2016 from 2007 levels.
- 33% reduction by 2020 from 2007 levels (proposed target to match the Provincial reduction target).

Program Overview

The plan's major features include:

- Definition of 7 initiative areas and energy objectives for each initiative,
- Allocation of permanent funding to ensure energy objectives are being targeted,
- Inclusion of energy considerations within municipal planning processes,
- Municipal action within the Town's facilities to demonstrate leadership in the community, and
- Support for other activities within the community including partnering and in-kind support.

Program planning and execution will be coordinated by the Town. Partnerships will be established with other levels of government as well as utilities and private sector sponsors.

Specific components of the plan will be executed by a number of departments within the town. These are defined within the action areas of the plan.

Program Coordinator

A staff member will be designated as the "Program Coordinator" for energy and GHG management. This person is responsible for working with staff from each department to initiate activities and ensure that the annual work plan is progressing. A sample break-down of responsibilities for the program coordinator and other staff are listed in Table 6.

Table 6: Examples of typical Program Coordinator and Staff Responsibilities in Plan Implementation

Typical Responsibilities of Program Coordinator	Typical Responsibilities of Other Department Staff
Establish annual work plan (in consultation with Environment Commission)	Conduct building audits on municipal facilities
Develop internal awareness programs	Budget and implement identified improvements
Publicize activities to staff through internal communications	Monitor and report on activities
Define data collection requirements and frequency; Collect, store and report on data	Implement fleet reduction activities
Make contact with other partners to promote the plan and find areas for municipal involvement	Implement transit, cycling, and other consistent plans
Apply for funding through various provincial and federal programs to meet the plan objectives	
Promote energy efficiency and awareness in the community	
Act as a resource to the community on energy efficiency	

Management Sponsor

One staff member should be designated as the CEP sponsor and it is proposed to be the City Manager. It is this person's responsibility to ensure that the energy plan is represented at the management and council levels.

7.2 Monitoring and Reporting

A monitoring program will enable the Town to assess progress towards the defined targets. Indicators, also called performance measures, help determine if the actions that have been implemented are having the desired effect and to identify where changes are needed.

The following performance measures are *suggested* for monitoring the progress of this CEP. These are based on the final outcome of energy and GHG emissions:

- Total corporate energy consumption (GJ/year)
- Total corporate GHG emissions (tCO_2e/year)
- Total community energy consumption (GJ/year) (expected to be compiled by the Province)
- Total community GHG emissions (tCO_2e/year) (expected to be compiled by the Province)

Additional indicators can be developed to define the progress towards meeting the plan activities. These are typically more representative of the means to the end and can be informative of the progress made. *Possible* indicators could include:

- Number of buildings built to high energy efficiency, LEED, or BuiltGreen BC standards (buildings/year or square footage/year)
- Number of energy audits conducted in the town on detached dwellings
- Number of trips taken on trolley (once in operation)
- Others as defined through program development

Annual Reporting

It is proposed that brief annual progress reports be prepared by the program coordinator to monitor progress of implementation. The annual report will describe activities implemented in the previous year and define an annual action plan.

Annual reports can also be used to identify areas of change and provide an opportunity to update the plan by adding new actions or modifying existing actions.

Five Year Reporting

It is proposed that the community-wide inventory be updated every five years starting in year 2014. This will include:

- A detailed review of the activities and their success
- An updated energy and GHG baseline
- Recommendation for plan improvement

7.3 Timeline

The timeline in Table 7 outlines a proposed schedule for implementation commencing in fall 2008. The program coordinator is responsible for the reporting and data compilation for the plan; however, the plan itself has responsibilities across many departments. A long-term intent of the plan is to increase the application of energy efficiency practices in all municipal and community activities. To this end, all departments and management would be expected to commit to including energy efficiency considerations in their daily activities.

Table 7: Energy Management Plan Timeline and Responsibilities

	Major Activities	Tasks & Responsibility		
		Program Coordinator	Staff	Management / Council
Q4 2008	- Finalize and approve plan	--	- Review and comment on draft plan	- Approval of Plan
2009	- Define Program coordinator and Management sponsor - Develop a CEP launch strategy (both corporate and community) - Launch plan - Define and begin implementing initial actions	- Seek funding opportunities and partners for initiatives - Develop 2009 work plan	- Define plan representatives in each department - Inform all staff of plan - Managers work with Coordinator to evaluate actions for 2009 - Develop 2009 work plan - Implement actions	- Budget review and approval
2010 and onwards	-Annual energy plan activities -Report to council on activities - Implement actions	- Compile monitored information - Compose annual report - Annual activities	- Managers work with Coordinator to evaluate actions for each year - Develop work plan each year - Implement actions	- Receive annual reports on progress

7.4 Resource Requirements

Personnel

Municipal staff time will be required to implement and administer the plan. This includes:

- The program coordinator role is expected to be an additional part-time staff requirement.
- Other staff time (e.g. management, purchasing, fleet operations, utility services, etc.) will be expected to be provided within existing work pans. This may be equivalent to a part-time equivalent for each of the Town's departments.

Program Disbursements

Disbursement costs will be required to implement some components of the plan. This includes costs for:

- Developing outreach and education materials (websites, brochures, etc.)
- Conducting energy audits and implement identified opportunities
- Implementing fleet management systems or data tracking
- Incremental costs for executing action items within existing systems
- Incentives programs (direct funding to recipient or for purchase and distribution)
- Foregone revenue for charge reduction based incentives

7.5 Financing and Assistance

Long-term funding sources need to be secured in order to implement this plan and maintain momentum. As identified in Action 25, permanent funding to ensure sufficient staff resources and training is recommended.

The Town can also seek funding from other sources such as BC Hydro, the LiveSmart BC program, BC Housing and the Federation of Canadian Municipalities. Table 8 provides a selection of funding opportunities currently available that may be used for implementing climate change and energy-related actions.

Table 8. Selected Funding Opportunities for CEP Implementation

Program	Key Features
CAEE Gold	Up to $50,000 to implement at least one energy efficiency target in the community.
Local*Motion*	Cost-sharing (50/50) between provincial government and local governments for capital projects that make communities greener, healthier and more active and accessible places in which to live.
BC Hydro: Energy Coordinator Funding	BC Hydro has provided partial funding to some municipalities to fund an energy coordinator for the municipal operations. Recently, in a pilot project, BC Hydro has funded an energy coordinator position directed towards community activities in Prince George.
LiveSmart BC	Rebates and incentives to help British Columbians reduce their carbon footprint at home, on the road, and at work.
BC Hydro Power Smart	Rebates and incentives to encourage energy efficiency in new construction and the installation of energy efficient products and appliances in existing facilities.
BC Housing – Housing Endowment Fund	$10 million annually to support housing initiatives that are consistent with the provincial housing strategy and address the needs of households with low to moderate incomes. Projects must have strong partnership contributions from local government, community organizations, private and non-profit sectors, and other government agencies.

Program	Key Features
FCM Green Municipal Fund	Grants and loans available to support capital projects that reduce energy and GHG emissions. Competitive process with RFPs launched annually to fund projects related to brownfield redevelopment, energy, planning, transportation, waste and water.

An additional opportunity that could assist in funding CEP implementation is the Province's recent announcement that it will offset the carbon tax for local governments who have committed to become carbon neutral by 2012. As a signatory to the Climate Action Charter, Ladysmith is eligible to receive a grant equal to 100 per cent of their carbon tax costs. Subject to legislative approval in February 2009, the new Climate Action Revenue Incentive (CARI) will provide a grant to local governments by March 31, 2009. For 2008, the carbon emissions tax municipalities pay will be estimated. For 2009 and future years, the Province will provide grants based on the previous year's actual costs so that local governments can recover the carbon tax, without adding any burden to the property tax. Table 9 provides an estimate of the rebate provided to Ladysmith through the CARI program.

Table 9: Estimated Climate Action Revenue Incentive (CARI) for Ladysmith

Energy Source	2007 Taxable Emissions (tonnes / CO_2e)	Year				
		2008*	2009	2010	2011	2012
Tax ($/tonne CO_2e)		**$10**	**$15**	**$20**	**$25**	**$30**
Natural Gas	136	$700	$2,000	$2,700	$3,400	$4,100
Gasoline	67	$300	$1,000	$1,300	$1,700	$2,000
Diesel	122	$600	$1,800	$2,400	$3,100	$3,700
Total	**325**	**$1,600**	**$4,800**	**$6,400**	**$8,200**	**$9,800**

Source: Province of BC Climate Action Secretariat.
Notes:
1) For 2008, the Climate Action Revenue Incentive is estimated based on a half year (as a result of the program having just been announced).
2) Estimates are based on 2007 taxable emissions. Electricity is not included as the carbon tax is not an explicit component of electricity rates.

Council might consider putting their CARI funds into a 'municipal energy fund' that would provide the seed funding needed for CEP implementation. In future, savings realized through energy efficiency measures could further contribute to the 'municipal energy fund', thus providing a reliable stream of funding to support energy efficiency and GHG emission reductions in the Town of Ladysmith. It is acknowledged that these amounts would not fund a complete climate change program.

APPENDICES

Appendix A: Detailed Energy and GHG Inventories

Appendix B: Corporate Energy and Emissions Spreadsheets

Appendix A: Detailed Energy and GHG Inventories

A-1 Municipal Operations

Results for the municipal operations energy and greenhouse gas inventory for the 2007 year are summarized in Table 3, Figure 5 and Figure 6 in Section 3.1. Key findings include:

- Total energy consumption by *municipal facilities and operations* in 2007 was 2.79 million kWh of electricity, 2,800 GJ of natural gas, and 80,000 L of vehicle fuels for a total energy consumption of 15,700 GJ.
- Solid waste collected from municipal facilities is estimated at 134 tonnes per year.
- Total GHG emissions applicable to the carbon neutrality commitment are estimated at 410 tonnes CO_2e in 2007[21].
- GHG emissions related to corporate waste generation are estimated at 65 tonnes.

Electricity Consumption

Electricity consumption in 2007 was 2.79 million kWh. Frank Jameson Community Centre used a total of 1.0 million kWh, approximately 37% of the Town's total electricity consumption. All other municipal buildings combined consumed a total of 1.2 million kWh.

Natural Gas Consumption

Total natural gas consumption in 2007 was 2,800 GJ in 2007. The Frank Jameson Community Centre is the largest single natural gas user, consuming 1682 GJ. All other municipal buildings combined used a total of 1091 GJ of natural gas.

Fleet

The Town of Ladysmith consumed 28,000 L of gasoline and 51,000 L of diesel in 2007. The fuel usage corresponds to 900 GJ and 2050 GJ of energy from gasoline and diesel, respectively.

Solid Waste

Total estimated tonnage of solid waste generated by the municipal operations is 133 tonnes per year resulting in an estimated 65 tonnes of CO_2e of landfill GHG emissions. The GHG emissions generated from waste disposal are not included in the Town's commitment to become climate neutral through the Climate Action Charter.

[21] These GHG emissions assume an estimated BC Hydro average 'intensity factor' for estimating the amount GHGs produced from electricity consumption. Clarification of the precise intensity values is expected from the province in late 2007.

Greenhouse Gas Emissions

Greenhouse Gas emissions for each source of energy are derived by multiplying the energy consumption by the appropriate emissions factor. For example, the combustion of one GJ of natural gas results in approximately 0.05 tonnes of CO_2e.

For electricity consumption the conversion is more complex. GHG emissions are not created at the point of consumption of electricity, but rather upstream at the place of generation. While most electricity in BC is generated from hydro power, a component of it is generated from fossil fuels (natural gas turbines or coal fired thermal plants).

Emission Factors

Table A - 1 Emission Factors

Source	GHG Emission Factor	Units
Electricity[1]	33	tonne CO_2e / GWh
Natural Gas	0.049	tonne CO_2e / GJ
Gasoline[2]	0.073	tonne CO_2e / GJ
Diesel[2]	0.068	tonne CO_2e / GJ
Solid Waste (SW)	0.484	tonne CO_2e / tonne SW

Notes:

1) Electricity emission factor here is based on BC Hydro's historical electricity emission factor for average BC produced electricity. This does not account for imports and exports. It is expected that the Province will be refining these values as part of their Climate Action Secretariate activities.

2) All emissions factors from Canada's GHG inventory (Aug 2003) Jaques, A. (1992). Canada's Greenhouse Gas Emissions: Estimates for 1990. Environmental Protection, Conservation and Protection, Environment Canada. EPS 5/AP/4, December.

A-2 Community Inventory

The inventoried energy and associated GHG emissions are tabulated in Table A-2 for buildings and solid waste, and Table A-3 for transportation. Province-wide it is expected that waste-generated methane adds another several percent to the total GHG inventory[22].

Key features to note from this information are that:

- Total (inventoried and estimated) energy consumption is about 265,000 GJ for buildings, and 362,000 GJ for transportation.
- The overall energy consumption is about 32% residential, 11% commercial and industrial, and 58% transportation.
- The community disposes of about 3000 tonnes of solid waste per year.

[22] The Province is addressing landfill methane generation through a new set of landfill regulations which will require the capture and utilization of landfill gas at most landfills in the province.

- GHG emissions originate about 5% from solid waste, 15% from buildings and 81% from transportation.
- Electricity is approximately 32% of the community's energy consumption, but only results in about 4% of the community's GHG emissions. This is because of the largely hydro powered electricity which is mostly carbon-free.

Table A - 2: Community Energy and GHG Emissions (2005)

Use	Energy Source	Units of Energy Purchase	Energy (as purchased)	Energy (GJ)	GHG Emission (tonnes CO_2e)	Approximate Retail Value ($)
Residential	Electricity	kWh	39,400,000	141,700	940	$ 2,561,000
	Natural Gas	GJ	56,100	56,100	2870	$ 673,000
Commercial	Electricity	kWh	16,300,000	58,800	390	$ 1,062,000
	Natural Gas	GJ	7,900	7,900	410	$ 95,000
Industrial[2]	Electricity	kWh	n/a	-	-	-
	Natural Gas	GJ	n/a	-	-	-
Solid Waste	-	tonnes	3,000	-	1600	-
Total				**265,000**	**6,210**	**$ 4,391,000**
Total (per capita)				**35.2**	**0.8**	**$ 583**

Source: Ministry of Environment Community Energy and Emissions Inventory (CEEI) Initiative, via the CAEE program.
Notes:
1) Only utility-provided energy is available. Other energy sources such as propane, fuel oil, and wood may be substantial but are not yet estimatable.
2) Industrial energy consumption has been withheld by for reasons of confidentiality.
3) The GHG emissions associated with electricity consumption are estimated from BC Hydro production averages. This does not include the effects of power imports or exports. The electricity GHG values should be considered tentative pending confirmation from the Climate Action Secretariat - expected in the fall of 2008.

Table A - 3: Estimated Community Transportation Energy Consumption and GHG Emissions (2005)

Use	Energy Source	Units of Energy Purchase	Energy (as purchased)	Energy (GJ)	GHG Emission (tonnes CO_2e)	Approximate Retail Value ($)
Passenger and Light Duty Vehicles	Gasoline	L	8,643,000	299,600	21,610	$ 12,100,000
	Diesel	L	448,000	17,300	1,250	$ 627,000
	Propane	L	67,000	1,700	100	$ 73,000
Medium and HDV	Gasoline	L	620,000	21,500	1,550	$ 868,000
	Diesel	L	538,000	20,800	1,500	$ 754,000
	Propane	L	29,000	700	40	$ 32,000
Total	Gasoline	L	9,263,000	321,100	23,160	$ 12,968,000
	Diesel	L	986,000	38,100	2,750	$ 1,381,000
	Propane	L	96,000	2,400	140	$ 105,000
Total				**362,000**	**26,050**	**$ 14,454,000**
Total (per capita)				**48.0**	**3.5**	**$ 1,917**

Source: Ministry of Environment Community Energy and Emissions Inventory (CEEI) Initiative, via the CAEE program.
Note: Transportation numbers are estimated based on vehicle registrations and assumed average travel distances and have not been checked against actual consumption data.

Appendix B: Corporate Energy and Emissions Spreadsheets

Provided in electronic format with final report.