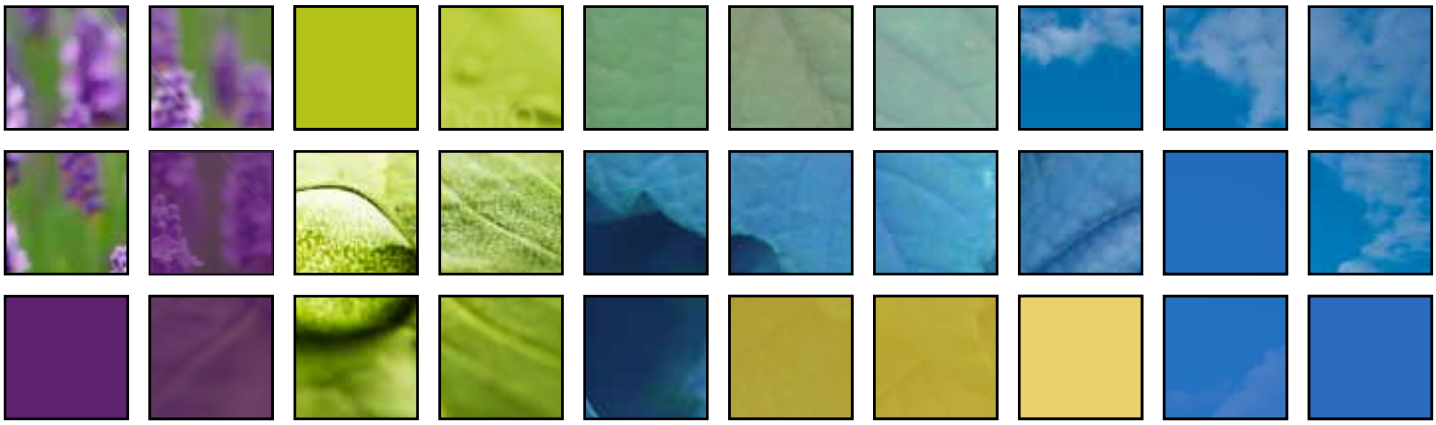
ATTACHMENT B:

City of Pitt Meadows



COMMUNITY ENERGY & GREENHOUSE GAS EMISSIONS PLAN

2011

For the 2007 Inventory Year

HYLA ENVIRONMENTAL SERVICES LTD.

City of Pitt Meadows
The Natural Place

City of Pitt Meadows

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2011

For the 2007 Inventory Year

Prepared for:

City of
Pitt Meadows

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February 2011

(revised June 2011)

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The Natural Place

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Acknowledgement

Staff are gratefully acknowledged for their efforts in the development of this plan.

This study has been produced with the assistance of the Green Municipal Fund, a fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities.

HYLA
ENVIRONMENTAL SERVICES LTD

About Hyla Environmental Services Ltd.

HES Ltd. specializes in developing corporate and community energy and emissions plans for local government and departments within senior levels of government (regional, provincial, and federal). With over 13 years of dedicated experience to emissions management, HES' work extends to corporate and community sustainability plans, including integrated community sustainability plans. HES has developed proprietary software, Energy and Emissions Reporting and Monitoring System™ (EEMRS™), which is used to calculate emissions, develop emissions forecasts, and integrate account-level management to produce accurate, cost effective emissions management strategies. HES is a leader in this field having completed over 105 corporate energy and emissions inventories and 21 emissions management strategies. As well, HES produced community-wide energy and emissions inventories for all local government (189) in British Columbia on behalf of the Province of British Columbia's Ministry of Environment.

Acronyms

CO_2 – Carbon Dioxide

CO_2e– Carbon Dioxide Equivalent

EEMRS™ – Energy and Emissions Monitoring and Reporting System™

GHG – Greenhouse Gas

HES – Hyla Environmental Services Ltd.

VKT – Vehicle Kilometres Travelled

Disclaimer: Notwithstanding financial support from the Government of Canada and the Federation of Canadian Municipalities, the views expressed are the personal views of the author, and the Government of Canada and the Federation of Canadian Municipalities accept no responsibility for them.

Table of Contents

Appendices

List of Tables

List of Charts

List of Figures

List of Maps

Executive Summary

Climate change is a global problem that requires local solutions. Canadian cities have adopted a coordinated response to mitigate and manage greenhouse gas (GHG) emissions by integrating energy and carbon management into the municipal planning process.

The City of Pitt Meadows' 2010 Community Energy and Greenhouse Gas Emissions Plan forms part of this planning process by outlining a comprehensive GHG emissions reduction strategy. Upon adoption by Council and approval by the Partners for Climate Protection (PCP) Secretariat, the City will be recognized as having completed Milestone One, Two, and Three of the community stream of the PCP.

In order to develop a GHG reduction target grounded in the City of Pitt Meadows specific community context, energy use and GHG emissions were calculated for the base year (2007) and estimated for the forecast year (2017). Potential reduction initiatives were identified and the estimated achievable reduction quantities applied to the forecast year, resulting in a pragmatic GHG emissions target.

Inventory Summary

In the 2007 base year, greenhouse gas emissions from the City of Pitt Meadows' community totalled 88,567 tonnes CO_2e.

Forecast Summary

A forecast of GHG emissions for the 2017 target year have been developed using the best data available. Overall GHG emissions are expected to increase by six percent to 93,551 tonnes CO_2e (Table E1). Forecast emission increases have been moderated by the expected implementation of provincial and federal climate change legislation such as a tailpipe emissions standard and carbon neutral governance.

Table E1 - Summary of Community Forecasts

Forecasted Parameter	Base Year	Forecast Year	Percent Increase
	2007	2017	2007 - 2017
Emissions (tonnes CO_2e)	88,567	93,551	6%

[1] 2017 total GHGs does not reflect the potential efficiency gains from implementing a tailpipe standard. Since manufacturers meet targets by a variety of measures, a reliable estimate of fuel consumption is not possible.

Reduction Target Summary

The reduction target for the City's community initiative is based on a ten-year period in accordance with the Federation of Canadian Municipalities' (FCM) PCP Program. With the City's chosen base year of 2007 the target year is 2017, leaving the City a six year (2011-2017) project period over which to implement this plan.

The majority of the community's potential reduction initiatives are achieved in the on-road transportation sector through the implementation of a tailpipe emissions standard and reductions in vehicle use through increased transit use, walking, and cycling. Note that the tailpipe standard is calculated in the forecast of emissions and does not form part of the reduction initiatives calculation.

The majority of achievable reduction initiatives that are the responsibility of the municipality are found in the community buildings sector. These include encouraging energy retrofits for existing building stock, ensuring that new buildings are built to high standards of energy efficiency and encouraging the development of community energy systems.

By implementing the initiatives described in this report, the City of Pitt Meadows would be able to reduce GHG emissions by 13 percent below 2007 levels by 2017. Table E2 provides a summary of the potential reductions in each community sector.

Table E2 - Summary of Estimated Impact of Reduction Initiatives on Community Sectors

Sector		Base Year Emissions (tonnes CO2e)	GHG Projection (tonnes CO2e)	Potential Reduction of GHG Emissions	GHG Emissions After Measures	Percent Reduction of Projected Emissions
		2007	2017	2017	2017	2017
Buildings	Residential	22,783	24,689	1,696	22,993	1%
	Commercial	13,193	14,468	448	14,020	6%
	Industrial	7,089	8,996	1,431	7,565	7%
On-Road Transportation		42,613	42,509	9,765	32,744	-23%
Solid Waste		2,889	2,889	2,889	0	-100%
	TOTAL	**88,567**	**93,551**	**16,229**	**77,322**	**-13%**

Community Reduction Target Statement:

An emission reduction target of 16,229 tonnes CO_2e is recommended for the City of Pitt Meadows. This reduction amount will decrease community emissions 13 percent below 2007 levels by 2017.

1 Introduction

Why a Community Energy Plan (CEP)? The CEP is a community based framework that develops an inventory of current energy consumption and GHG emissions and identifies potential energy and emission reduction actions. By setting benchmarks and goals, the CEP challenges the community to take a leadership role in implementing sustainable growth strategies.

By creating a dialogue with the community during the initial planning stages the CEP encourages stakeholders to reduce their energy consumption and reduce their greenhouse gas (GHG) emissions by identifying conservation opportunities and actionable GHG reduction strategies. Additionally, the active participation of the community serves as an important tool for assessing the viability of the proposed action plan. As the CEP is developed through public consultation and outreach, community responses and behaviour toward proposed measures can be assessed. At what price point will a resident install a smart meter? Will a tax rebate program provide incentives to developers to install solar energy? The development stage of a CEP provides an important opportunity to measure the commitment of the community to the various initiatives proposed.

1.1 Plan Development Process

Hyla Environmental Services Ltd. (HES) was hired to take staff through a planning process which culminated in the development of this document. The development of this plan coincided with a public consultation process designed to gather comments and responses from interested City residents (Figure 1.1). Key staff from the City were interviewed and provided several critical components of plan development as follows:

- providing the detail required to complete the energy and emissions analysis and confirm the base year emissions quantity
- assisting with the forecast of energy consumption, costs for consumption, and emissions
- selecting the final reduction initiatives to be used to calculate the overall program goal (e.g., the reduction quantity)

Figure 1.1 - Community Climate Action Plan consultation process

The City and HES undertook the following public consultation activities:

1. January 2010: A council working session was held to introduce the plan and explain why the plan was being developed by the City. A strategy to derive the target was presented to Council;
2. January 2010: a questionnaire and invitation to an open house for the community plan was sent to all Pitt Meadows residents via direct mail;
3. Feb and March 2010: Staff working groups were conducted to review neighbourhood maps and working draft 1 of the community plan;
4. March 25, 2010: An open house for working draft 1 of the community plan was held at the Family Recreation Centre;
5. June 2010: Second working draft of community plan was presented to staff; and,
6. October 2010: Final Draft Community Plan was presented to staff for presentation to Council in January/February 2011.

1.2 Regional and Local Context

Pitt Meadows is a small, but rapidly growing city bordered by agricultural land and the Fraser and Pitt rivers (Figure 1.2). The city is currently home to about 17,500 residents; however, the population is expected to grow to around 20,000 by the year 2020. Pitt Meadows is in the eastern portion of Metro Vancouver (formerly the Greater Vancouver Regional District) and is often referred to as the "Gateway" to the Fraser Valley.

Residents of Pitt Meadows enjoy living in the community as is shown by the 2006 Ipsos Reid survey, which revealed that 98% of residents felt positively about the quality of life in Pitt Meadows. The natural environment surrounding Pitt Meadows adds to the appeal of the community: from the snow-capped mountains of the Thompson Range to the rich agricultural land to the Fraser and Pitt rivers, Pitt Meadows is surrounded by nature. Agriculture continues to play a central role in Pitt Meadows. It is the City's main economic driver and 86% of Pitt Meadows land base is in the Agricultural Land Reserve (ALR). Cranberries, blueberries and greenhouse crops are commonly found in agricultural lands within Pitt Meadows. Despite its rapid growth, Pitt Meadows has managed to retain a strong element of its rural-charm.

Pitt Meadows also contains a vibrant city centre, with 85% of its population located in the more densely populated Highlands area. Pitt Meadows city centre offers affordable housing in compact, well planned, urban neighbourhoods with access to amenities such as public transportation, retail, education, and health services. The strong community and access to services and greenspace attract a large number of families to Pitt Meadows. Pitt Meadows is linked to neighbouring communities by the newly constructed Golden Ears Bridge and recently expanded Pitt River Bridge. The West Coast Express provides commuters with convenient access to other areas of the Lower Mainland, with a trip to downtown Vancouver taking only 40 minutes.

1.3 Energy, Greenhouse Gas Emissions, and Climate Change

1.3.1 Energy

Energy use in the City of Pitt Meadows is typical of most Canadian communities. Hydroelectric power and natural gas prevail as the primary energy types for buildings and other infrastructure. Hydroelectric power has a low carbon footprint compared to electricity produced by burning fossil fuel and is relatively cheap in comparison to other forms of electric power. In British Columbia, natural gas, when available, is the predominant choice for space heating. A few older homes in Pitt Meadows use other fossil fuels such as fuel oil and propane for space heating, but this number is insignificant according to comments from Terasen Gas Inc.[1] Natural gas is far more energy efficient than electricity when used for space heating; however, in terms of climate change issues, natural gas has a much higher carbon emissions factor per GJ of energy compared to electricity. Natural gas remains the energy source of choice for space heating because it is far less expensive than electric heating. One GJ of natural gas is approximately $13 delivered, whereas 1 GJ(or approximately 277 kWh) of electricity costs approximately $19 . Therefore, low carbon emissions from hydroelectric power in B.C. tends to balance out with the higher carbon emissions from the use of natural gas when used for space heating.

[1] Personal Communication

Figure 1.2 - Aerial photo of the City of Pitt Meadows, British Columbia

1.3.2 Greenhouse Gas Emissions

Greenhouse gases (GHGs) include both natural and human produced gases that act to trap heat within the earth's atmosphere. Common greenhouse gases include Carbon dioxide (CO_2), Methane (CH_4) and Nitrous oxide (N_2O). Carbon dioxide is released in all combustion reactions, such as the burning of gasoline in a car engine. Methane is released during the decomposition of organic matter, substantial sources of methane gas emissions include solid waste in city landfills and decomposing vegetation in flooded reservoirs for a hydroelectric dams. Nitrous oxide is a powerful greenhouse gas that is released during fossil fuel combustion as well as in many commercial and industrial activities.

Different GHGs have differing abilities to trap heat. Nitrous oxide for example, has a warming potential that is 310 times that of carbon dioxide. To simplify the presentation of emissions data, GHG emissions are expressed in a standard unit of equivalent carbon dioxide (CO_2e). One tonne of nitrous oxide and 20 tonnes of CO_2 would together be the equivalent of 330 tonnes of CO_2e. In this report all GHG emissions are reported in units of equivalent carbon dioxide.

1.3.3 Climate Change

While GHGs are part of the earth's natural energy cycle, over the past century human activity has generated GHG concentrations far higher than what is normal. Increasing GHGs causes an augmentation of the naturally occurring greenhouse effect, effectively increasing the amount of heat trapped in the earth's atmosphere. Increasing the amount of heat in the atmosphere disrupts the normal energy cycle, resulting in a cascade of climatic changes that have potentially catastrophic

implications. The sustained changes in the global climate system as a result of human activity is known as anthropogenic climate change. The Intergovernmental Panel on Climate Change (IPCC) has warned of a host of potential and realized ecological changes that are the result of heightened GHG levels including rising sea levels, the melting of the polar ice caps, decreased agricultural yields, the disruption of marine and terrestrial ecosystems, and increasingly erratic weather patterns.

1.4 Why Conserve Energy?

Since it is the consumption of electricity and fossil fuels that is responsible for the majority of GHG emissions, successful climate change mitigation depends upon our ability to reduce energy consumption. Not only should we reduce energy consumption to lessen the effects of greenhouse gases on our planet, we must conserve nonrenewable energy reserves for future generations.

Past reasoning for energy conservation has been primarily concerned with reducing energy costs. This report, however, prioritizes the effect of energy conservation measures on climate change.

Energy conservation can be achieved by behavioural change of both consumers and producers as well as through technological change. Simple behavioural changes include unplugging electronics and appliances when not in use, or setting the thermostat one or two degrees lower. Lowering the temperature by one degree for just eight hours a day can conserve energy and reduce your heating costs by up to 2%[2]. Technological improvements such as switching to renewable energy sources or upgrading existing systems to become more energy efficient can both reduce GHG emissions and provide long-term savings. As energy supplies diminish and become more expensive, consumers will be forced to conserve due to cost escalations alone. Although future energy costs are extremely difficult to predict, it is reasonable to assume that energy conservation could be driven by increases in price for consumption alone.

Well thought out long-term planning can also achieve energy conservation. Smart development strategies that allow communities to grow to manageable limits will minimize overall energy consumption and greenhouse gas production. Strategies that municipal governments can use include planning the spatial arrangement of new developments and requiring energy efficiency in new construction. Other strategies include promoting densification or compaction by implementing compact, safe and diverse community designs; promoting pedestrian, cycling and transit movement; incorporating green building features into new developments; and promoting alternative energy.

There is no silver bullet for climate change mitigation, all of these concepts need to come together if long-term reductions in greenhouse gas emissions are to be achieved.

1.5 International Climate Change Actions and Agreements

In 2007, the United Nations released its most aggressive call to action on climate change with it's **Intergovernmental Panel on Climate Change** (IPCC) *4th Assessment Report - Climate Change 2007*. The report, written by over 2,500 top scientists, concluded that there is "unequivocal" evidence that climate change is real and happening faster than expected. The report calls on the global community to increase their efforts in the areas of climate change adaptation, mitigation and technology.

The global trend toward stricter greenhouse gas emission reduction targets is placing pressure on all levels of government to take measurable steps towards climate change mitigation. Since 1992 the signatories of the United Nations Framework Convention on Climate Change have worked towards meeting the GHG emission reduction targets set at the first Earth Summit in Rio de Janeiro, Brazil. In 2002 the Kyoto Protocol set out suggested targets and options to be achieved on a national level. Canada's target is to reduce its GHG emissions to 17 percent below 2005 levels by 2020.

A key event in climate change agreements was an international gathering of government representatives in Bali, Indonesia in 2007. The goal at this gathering was to determine the global climate change regime after 2012. Delegates called for stricter GHG reduction targets but also called for stricter enforcement measures. The tougher stance on emission reductions echoes recommendations from the G8 summit in Germany held in June 2007. Leaders of the G8 nations introduced more aggressive targets for greenhouse gas emission reductions, agreeing to halve current levels by 2050. At the 2008 summit in Tokyo, G8 leaders acknowledged emerging climate change frameworks must not only guide government bodies but must soon include all major emitters as well.

[2] BC Hydro Power Smart

These tougher international positions on GHG reduction targets and enforcement measures will inevitably affect the amount of detail included in climate change plans produced at the national, provincial and regional levels of government.

1.6 Federal Government Action

The Canadian government has committed to taking action in its most recent climate change plan, setting GHG emission reductions at 17 percent below 2005 levels by 2020, while imposing mandatory reduction targets on industry. In support of efforts to reduce air pollution and greenhouse gas emissions, the Canada EcoTrust for Clean Air and Climate Change was introduced in February 2007. The purpose of the Trust is to co-fund, with the provinces, technology development, energy efficiency, and related projects.

1.7 Provincial Government Action

British Columbia will receive $199.2 million of the $1.5 billion in initial funding from the EcoTrust Fund to put towards its provincial GHG reduction initiatives. The government has legislated a goal of a 33 percent reduction by 2020 and up to 80 percent reduction by 2050. These are some of the toughest emissions standards in North America. Notably, British Columbia is the first Canadian province to adopt California's tough motor vehicle emissions reduction target of 30 percent reduction by 2016.

1.7.1 Climate Action Charter

The province is taking a national leadership role on climate change with the May 2008 introduction of the Climate Action Charter– a provincial initiative signed by the Province, the Union of B.C. Municipalities (UBCM), and local governments. Upon signing, a voluntary commitment is made to measure and report community's greenhouse gas emissions and work to create compact, more energy efficient communities. In addition, a voluntary commitment is made to become carbon neutral in corporate operations by 2012 through conventional reductions (e.g., retrofits) supplemented by purchasing carbon offsets.

The City of Pitt Meadows is one of 179 B.C. municipalities to date to have signed the Charter and, as a result, has pledged to monitor community emissions while working towards carbon neutrality in their own operations. The Climate Action Charter recognizes the need to take action on climate change and reduce greenhouse gas emissions. It also recognizes the important role the Provincial Government and Local Governments can play in affecting change.

1.7.2 Green Communities Amendment Act Bill 27

The Green Communities Amendment Act (Bill 27) came into force on May 29, 2008. It requires official community plans by May 31, 2010 and regional growth strategies by May 31, 2011 to have targets for the reduction of greenhouse gas emissions in the area covered by the plan, and policies and actions of the local government proposed to achieve those targets. These policies and action include objectives to promote energy conservation, water conservation, and the reduction of greenhouse gas emissions.

To fulfil this obligation, the City amended its OCP in May 2010 to include a thirteen percent reduction in GHG emissions by 2017

Bill 27 also provided expanded development permit authority to promote energy and water conservation and the reduction of greenhouse gases, which can be applied to new development sites and the external components. Local governments may also create parking cash-in-lieu programs and use those funds to support alternate transportation. Parking standards may now also be determined by transportation need at the time of development approval. Development cost charges can be waived for small dwelling units and small lot 'green' subdivisions.

1.8 The Starting Point: City of Pitt Meadows Energy Use and GHG Emissions

Pitt Meadows's energy use and emissions is rising as its population increases. For Pitt Meadows to meet the future GHG reduction target proposed herein, this plan must focus on ways in which the City can reduce its overall energy intensity[3],

[3] Energy intensity is a measure of the amount of energy a (state) uses to generate its overall economic output.

and GHG intensity[4] . Put another way, the goal of this plan is to reduce both the community's energy use and the carbon content of the community's energy sources. This plan sets actionable GHG reduction strategies by sector—industrial, commercial, residential, transportation and municipal solid waste and assigns targets accordingly.

1.8.1 Energy Supply and Demand

Energy supply and demand is an important component in community energy planning. BC communities are in an enviable position since the majority of the region's energy is generated from clean hydro power. However, as the region experiences rapid growth, B.C. Hydro faces greater dependence on fossil fuel-based power generation sources. One such plant, Burrard Thermal supplies approximately 950 MW of electricity to the grid.

BC Hydro's goal that all new generation come from renewable energy sources is of particular benefit to Pitt Meadows. An increase in clean energy generation will reduce B.C. Hydro's demand on the Burrard Generating Station. Moreover, by 2016, the B.C. government has mandated that all thermal energy plants in the province become zero emission plants.

1.9 Scope of Community GHG Reductions and Emissions

Many local governments are committed to becoming a Factor-2 community under Natural Resources Canada's Community Energy Plan. Under Factor-2, a municipality commits to a 50% reduction in its reliance on fossil fuels.[5]

Approximately 40% of British Columbia's energy needs are supplied from renewable sources including hydroelectricity and forest biomass.[6] If significant GHG reductions are to be achieved, B.C. must continue implementing reductions in the transportation sector. These include developing alternate fuel technology and encouraging the use of public transit or other low impact modes of transport such as walking and biking. According to the Globe Foundation, based on B.C.'s unrivaled and diverse energy portfolio which also includes large potential for geothermal, solar, wind, biomass and ocean wave and tidal developments the province could be energy self sufficient by 2025 using only conservation measures and renewable energy sources.

1.10 Partners for Climate Protection Milestones

The Partners for Climate Protection (PCP) grew out of the efforts made by the Federation of Canadian Municipalities' and the ICLEI - Local Governments for Sustainability. The PCP is an umbrella initiative that fosters municipal participation in greenhouse gas emission reduction initiatives and sustainability. Its goal is to assist municipalities with their greenhouse gas management initiatives by providing tools and logistical support. The PCP initiative not only focuses on reducing existing greenhouse gas emissions, but also encourages municipalities to influence future greenhouse gas emissions through a variety of sustainable mechanisms such as land use and transportation planning, building codes, and permitting. By participating in the PCP initiative, municipalities receive up-to-date information on global climate change and important information regarding strategies to reduce greenhouse gas emissions, including innovative financing strategies and sample action plans. Currently it includes 176 Canadian municipal and regional governments with BC the most active member of the network with 58 municipalities committed to reducing GHG emissions.

This report is a direct result of the efforts by the City of Pitt Meadows to fulfil requirements as part of the PCP initiative, which consists of five milestones. These milestones are summarized as follows:

1.10.1 Milestone One | Creating a greenhouse gas emissions inventory and forecast

This plan analyses energy use and emissions by sector (e.g., areas for GHG emissions reductions are identified by economic sector—industrial, commercial, residential, transportation and waste), and determines feasible strategies and the resulting reductions targets from each strategy. Before GHG reduction action strategies can be developed, it is necessary to determine the current energy use and emissions of the community—the inventory—against which future GHG reduction progress can be measured.

[4] GHG intensity is a measure of GHG emissions of sources in a state compared to its overall economic output.
[5] http://www.nrcan-rncan.gc.ca/com/index-eng.php
[6] http://www.globe.ca/

1.10.2 Milestone Two | Setting an emissions reduction target

To set performance targets, a base year is first established against which all future emission reductions are measured. A percent reduction target is established over a given time frame. By developing an incremental time line, the plan's progress can be measured and monitored over time based on set benchmarks.

Although a major factor influencing the setting of emissions reduction targets are voluntary and mandated emissions reduction targets established at the federal, provincial and local government levels, local government must develop targets around what they believe they can achieve on their own. Therefore, a visionary target or top down target is not presented. The targets presented within this plan result from a summary of a series of estimated reductions that could be achieved in the sectors covered by the plan.

1.10.3 Milestone Three | Developing an action plan

By developing a list of existing actions and identifying what reductions will be borne by regional policy and senior government, if any, this plan will become the basis for public consultation– the later resulting in a document that has been developed by shared participation throughout the community. In developing the community reduction strategies, key positions and departments responsible for implementation of the proposed strategies will be identified. These activities may be distributed across a number of functions and departments, and community and corporate planning activities.

Actionable emission reduction activities are then identified. Many factors must be taken into consideration when developing viable strategies, including technology life cycles, planned and retired assets, and government mandates, such as renewable energy standards and stricter emissions reductions. The new B.C. motor vehicle emissions standards are an example.

1.10.4 Milestone Four | Implementing the action plan and related activities

Important considerations in implementation of the CEEP are project time lines, costs, return on investment and funding sources for the targeted initiatives. Responsibility for each activity must be allocated to staff, consultants and/or other stakeholders.

1.10.5 Milestone Five | Monitoring progress and reporting results

Ongoing monitoring and performance measurement are critical to the plan's long-term success. Although the ultimate reward for success is the knowledge that local government have done their best to address climate change, a number of minor awards are available to local governments who have successfully implemented sustainability initiatives along the way.

1.11 Energy and Emissions Inventory and Forecast

Methods for PCP Milestone One are described herein. Reporting protocols are referenced and reduction initiatives are briefly discussed. In order to implement an effective strategy to reduce GHG emissions it is necessary to develop an inventory of the emissions.

A review of emissions by sector allows for an analysis of the activity or operation responsible for various emissions. Community emissions by sector include those resulting from residential, commercial and industrial buildings and their operations, transportation within the community and solid waste generated within the community. A review of emissions by source allows an analysis of the origin of various emissions. The origin is attributed to the type of energy consumed to carry out the activity or operation. Major sources of GHG emissions include electricity, natural gas, diesel fuel, and gasoline. GHGs are emitted as these fuels are burned. Methane from the decomposition of waste in landfills is another major source of GHG emissions, but indirectly, unlike the emissions from burning fossil fuels.

The community inventory consists of gross energy values for electricity and natural gas consumed by customers in the residential, commercial, and industrial sectors within the boundary of the City. Community electricity and natural gas consumption data was provided by BC Hydro and Terasen Gas Inc., respectively.

Transportation sector emissions were approximated by estimating the fuel used by vehicles registered to City of Pitt Meadows residents. The alternate option– gross fuel sales within the municipal boundary– is less accurate in reflecting emissions attributed to the City since there is no way of determining the residency of those purchasing fuel within the City boundary or where the fuel was actually consumed.

The method employed to approximate transportation emissions by Hyla Environmental Services' (HES) Energy and Emissions Monitoring and Reporting System (EEMRS™) uses vehicle registration data and average annual vehicle kilometres travelled (VKT) for specific vehicle classes. The origin of the vehicle registration data is the Insurance Corporation of British Columbia while VKT for vehicle classes is provided by the Province of BC for 2007.[7] Individual vehicles are matched with their corresponding fuel consumption rates[8] and a fuel consumption estimate is calculated.

The calculations of CO_2e within EEMRS™ conform with the methods described in the International Panel on Climate Change Greenhouse Gas Inventory Reference Manual (IPCC 2006) and the principles provided in the International Standards Organization (ISO) Draft International Standard for Greenhouse Gases (ISO 2005). Table 1.1 lists all emissions factors. The emissions factor for electricity was provided by BC Hydro.[9] At the time, the emissions factor provided was 22 tonnes CO_2e/GWh (Table 1.1).

Table 1.1 - Emissions Coefficients and Factors

Fuel Type	Units	Emissions Coefficient			Emission Factor
		CO_2	CH_4	N_2O	CO_2e
Electricity	tonnes/GWh				22†
Natural Gas	kg/m3	1.891	0.000037	0.000035	
Gasoline	kg/L	2.289	0.000068-0.0014*	0.00005-0.00016*	
Diesel Fuel	kg/L	2.663	0.000051-0.00012*	0.000082-0.0011*	
Propane	kg/L	1.51	0.00064	0.000028	
Global Warming Potential		1	21	310	

† GHG emissions factor for electricity as reported by BC Hydro at the time of preparation of the report. This factor may have been amended since the initial development of this report.

* assigned according to emissions technology of the vehicle

A detailed summary of the 2007 community energy and emissions inventory is presented in Appendix I.

1.12 Report Structure

The remainder of this plan consists of six sections. Section 2 presents the results of the energy and emissions inventory for the Pitt Meadows community. Section 3 presents the forecasts of energy consumption, costs for consumption, and emissions for the year 2017. Section 4 presents a summary of the reduction initiatives that city staff wish to implement as well as estimates of the potential achievable reductions for each reduction initiative. Section 5 contains an implementation matrix,with suggested actions for broad groups of reduction initiatives. Section 6 provides a summary of the emissions inventory, forecasts and reductions and provides recommendations for future reports.

7 Environment Canada; Province of BC
8 http://www.oee.nrcan.gc.ca
9 http://www.bchydro.com/rx_files/environment

2 Community Energy and Greenhouse Gas Inventory

2.1 Community Inventory Summary

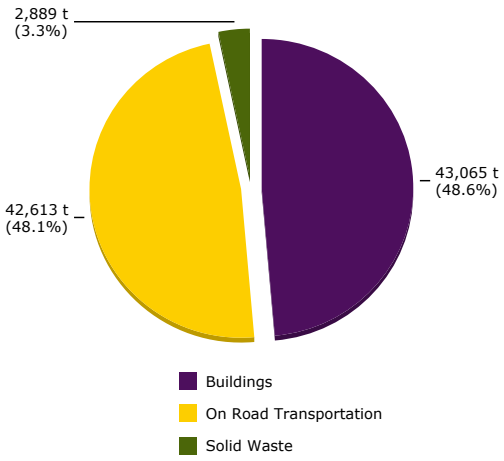
An overview of total energy consumed and emissions produced by the City of Pitt Meadow's community (residents and businesses) is presented below. Energy and emissions data are divided by sector (buildings, on road transportation and solid waste), subsector and emissions source.

In the 2007 base year the community's total greenhouse gas emissions was 88,567 tonnes of CO_2e. (See Appendix I for a detailed community inventory for 2007).

2.2 Community GHG Emissions by Sector

Emissions from the community's on road transportation sector was the second largest source of community emissions, generating 42,613 tonnes of CO_2e in 2007 (48 percent). Community buildings generated 43,065 tonnes of CO_2e (36 percent) whereas methane from the decomposition of solid waste generated 2,889 tonnes of CO_2e (three percent; Table 2.1).

Table 2.1 - Community Energy and Emissions by Sector (2007)



2.3 Consumption by Emissions Source

Although the community generates emissions from numerous sources, only six are part of the scope for the City's inventory: electricity; natural gas, gasoline, diesel fuel, propane and methane produced from solid waste. Data for residential propane purchased at fuel service stations and other retail outlets is not available from suppliers and is otherwise insignificant in terms of overall community emissions.

Natural gas was the largest source of community energy, accounting for 40 percent of energy use in 2007. Electricity and gasoline were the other two major sources of community energy. Gasoline accounted for 28 percent of energy consumption while electricity accounted for 30 percent of energy consumption. Diesel fuel accounted for three percent of energy use and mobile propane less than one percent of total energy use (Table 2.2 & Chart 2.1).

2.4 Emissions by Emissions Source

Two energy sources, gasoline and natural gas, accounted for 88 percent of community emissions. Gasoline combustion from vehicles was one of the single largest source of community emissions, producing 38,688 tonnes of CO_2e (44 percent) in 2007. Natural gas use produced 38,913 tonnes of CO_2e (44 percent). Diesel fuel and solid waste were the other two major sources of community emissions. Diesel fuel use produced 3,846 tonnes of CO_2e (four percent), while emissions associated solid waste accounted for 2,889 tonnes CO_2e (three percent). Electricity use accounted for 4,152 tonnes of CO_2e (five percent) and mobile propane less than one percent of total emissions (Table 2.2 & Chart 2.2).

Table 2.2 - Community Emission Sources (2007)

Energy Type	Total Consumption	Total GJ	Percent Energy	Total Emissions (CO_2e tonnes)	Percent Emissions
Electricity	159,692,247 kWh	574,892	30%	4,152	5%
Natural Gas	770,968 GJ	770,968	40%	38,913	44%
Gasoline	15,457,226 litres	535,747	28%	38,688	44%
Diesel Fuel	1,382,875 litres	53,490	3%	3,846	4%
Mbl Propane	51,753 litres	1,310	0%	79	0%
Solid Waste				2,889	3%
Total			**100%**	**88,567**	**100%**

Chart 2.1 - Energy Consumption by Source

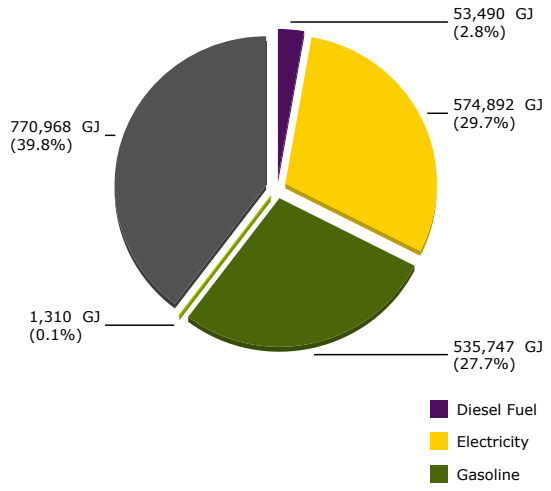
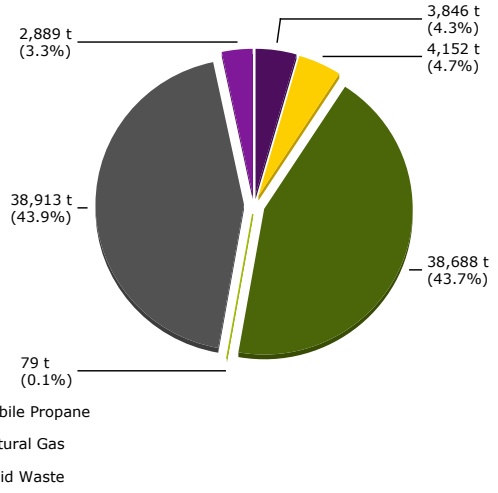


Chart 2.2 - Emissions by Source (tonnes $C0_2e$)



2.5 Community Buildings Energy and Emissions Inventory

2.5.1 Community Buildings Energy Consumption

Residential buildings were the largest consumers of energy in the buildings sector and were responsible for 51 percent of energy consumption followed by commercial buildings (39 percent), and industrial buildings (ten percent; Chart 2.3).

2.5.2 Community Buildings GHG Emissions

Residential buildings were also responsible for the largest amount of community buildings emissions, generating 22,783 tonnes of CO_2e (53 percent). Commercial buildings generated 13,193 tonnes of CO_2e or 31 percent of the buildings sector's emissions. Industrial buildings generated 7,089 tonnes of CO_2e (17 percent; Chart 2.4).

Chart 2.3 - Consumption by Building Subsector

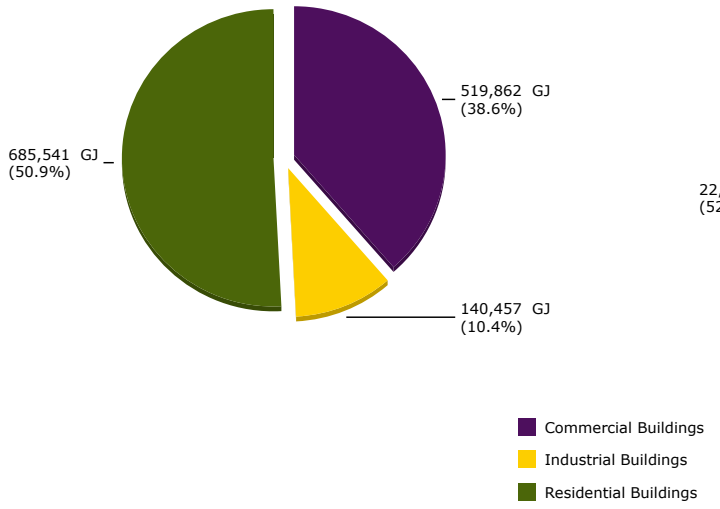
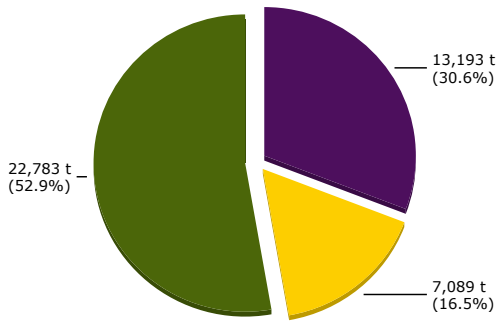


Chart 2.4 - Emissions by Building Subsector



Residential Buildings

In 2007 residential buildings consumed a total of 75,903,693 kWh of electricity and 412,288 GJ of natural gas. The resulting emissions from electricity and natural gas totalled 22,783 tonnes of CO_2e. There were 6,473 residential electricity connections and 4,442 natural gas connections. Residential energy intensity was 11,726 kWh of electricity per connection and 93 GJ of natural gas consumed per connection (Table 2.3).

Table 2.3 - Summary of Community Residential Building Emissions (2007)

Buildings	Consumption By Type						Emissions Total
	Type	Connections	Consumption	Energy/Connection	Energy (GJ)	CO_2e (t)	CO_2e (t)
Residential Buildings	Electricity	6,473	75,903,693 kWh	11,726 kWh/C	273,253	1,973	**22,783**
	Natural Gas	4,442	412,288 GJ	93 GJ/C	412,288	20,809	

Commercial Buildings

The City's commercial buildings generated 13,193 tonnes of CO_2e by consuming 83,788,554 kWh of electricity and 218,223 GJ of natural gas. Electrical energy consumption was 124,315 kWh per connection, while natural gas consumption per connection was 684 GJ (Table 2.4).

Table 2.4 - Summary of Community Commercial Building Emissions (2007)

Buildings	Consumption By Type						Emissions Total
	Type	Connections	Consumption	Energy/Connection	Energy (GJ)	CO_2e (t)	CO_2e (t)
Commercial Buildings	Electricity	674	83,788,554 kWh	124,315 kWh/C	301,639	2,179	**13,193**
	Natural Gas	319	218,223 GJ	684 GJ/C	218,223	11,014	

Industrial Buildings

In 2007 the City of Pitt Meadows's industrial buildings consumed 140,457 GJ of natural gas, resulting in 7,089 tonnes of CO_2e. Average energy intensity was 35,114 GJ of natural gas per connection (Table 2.5). Note: electricity data for industrial operations in the City has been withheld by BC Hydro to protect the privacy of BC Hydro customers.

Table 2.5 - Summary of Community Industrial Building Emissions (2007)

Buildings	Consumption By Type						Emissions Total
	Type	Connections	Consumption		Energy/Connection	Energy (GJ)	CO_2e (t)	CO_2e (t)
Industrial Buildings	Electricity							**7,089**
	Natural Gas	4	140,457	GJ	35,114 GJ/C	140,457	7,089	

2.6 On Road Transportation Energy and Emissions Inventory

The community on road transportation sector includes all motorized vehicles registered within the City's boundaries with ICBC. A condition of the provision of data by ICBC is that vehicles in each vehicle class are referenced as a 'unit'. Vehicle classes have been grouped using gross vehicular weight ratings for individual vehicles.

2.6.1 Fuel Consumption

Light trucks, vans and SUVs accounted for the largest amount of community fuel consumption (48 percent) followed by, commercial vehicles (28 percent), and large passenger cars (17 percent; Table 2.6 & Chart 2.5).

2.6.2 GHG Emissions

Light trucks, vans and SUVs were the largest source of emissions in the community's on road transportation sector, accounting for 48 percent of community emissions. Commercial vehicles were the second largest source of emissions (28 percent) followed by large passenger cars (17 percent; Table 2.6 & Chart 2.6).

Chart 2.5 - Energy Consumption by Vehicle Class

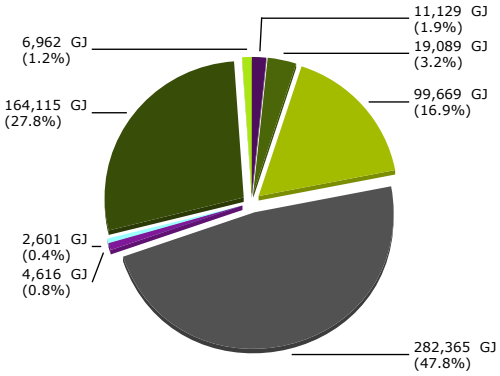
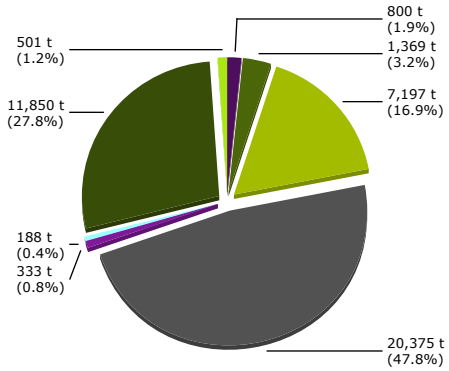


Chart 2.6 - Emissions by Vehicle Class



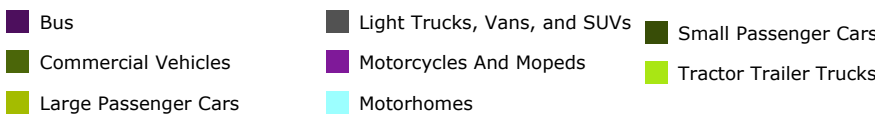


Table 2.6 - Summary of On Road Transportation Emissions (2007)

On Road Transportation	Consumption By Type							Emissions Total
	Type	Units	Consumption		Litres/Unit	Energy (GJ)	CO_2e (t)	CO_2e (t)
Small Passenger Cars	Gasoline	3,477	4,631,901	litres	1,332 L/U	160,542	11,593	**11,850**
	Diesel Fuel		92,380	litres	1,062 L/U	3,573	257	
Large Passenger Cars	Gasoline	1,585	2,811,307	litres	1,774 L/U	97,440	7,036	**7,197**
	Diesel Fuel		57,635	litres	1,801 L/U	2,229	160	
Light Trucks, Vans, And Suvs	Gasoline	3,919	7,608,796	litres	1,942 L/U	263,721	19,044	**20,375**
	Diesel Fuel		460,641	litres	2,038 L/U	17,818	1,281	
	Mobile Propane	16	32,669	litres	2,042 L/U	827	50	
Commercial Vehicles	Gasoline	19	90,258	litres	4,750 L/U	3,128	226	**1,369**
	Diesel Fuel		403,226	litres	4,480 L/U	15,597	1,122	
	Mobile Propane	8	14,365	litres	1,796 L/U	364	22	
Tractor Trailer Trucks	Diesel Fuel		179,999	litres	12,857 L/U	6,962	501	**501**
Motorhomes	Gasoline	66	75,050	litres	1,137 L/U	2,601	188	**188**
Motorcycles And Mopeds	Gasoline	358	133,176	litres	372 L/U	4,616	333	**333**
Bus	Gasoline	9	106,738	litres	11,860 L/U	3,700	267	**800**
	Diesel Fuel		188,994	litres	11,812 L/U	7,310	526	
	Mobile Propane	9	4,719	litres	524 L/U	119	7	
Subtotal	Gasoline	9,433	15,457,226	litres		535,747	38,688	**42,613**
	Diesel Fuel		1,382,875	litres		53,490	3,846	
	Mbl Propane	33	51,753	litres		1,310	79	

2.7 Solid Waste

Community solid waste accounted for about four percent of total community emissions. In 2007 the 7,940 tonnes of solid waste produced by Pitt Meadows residents resulted in 2,889 tonnes of CO_2e (Table 2.7).

Table 2.7 - Summary of Solid Waste Data

Solid Waste	Direct Emissions				Emissions Total
	Type	Estimation Method	Mass (t)	CO_2e (t)	CO_2e (t)
Community Solid Waste	Solid Waste	Methane Commitment	7,940	2,889	**2,889**

2.8 Community Energy Costs

Table 2.8 provides a breakdown of estimated community energy costs. Cost estimates are based on average per unit costs for 2007. The exception is the price for mobile propane which is based on 2010 prices due to a lack of historical data.

Overall direct costs for energy and solid waste disposal amounted to $43,208,316. The largest proportion of energy costs were associated with on road transportation, which accounted for 51 percent of total community energy costs. Residential buildings were responsible for approximately 21 percent of community costs followed by commercial buildings at 14 percent (Table 2.8).

Table 2.8 - Breakdown of Estimated Community Energy Costs

Sector		Energy Type/Unit	Consumption	Per Unit Costs[1]	Total Costs	Percent of Costs	Subtotals
			2007				
Community Buildings	Residential Buildings	Elect	75,903,693 kWh	$0.08	$6,072,295	14%	26%
		Nat Gas	412,288 GJ	$12.75	$5,256,672	12%	
	Commercial Buildings	Elect	83,788,554 kWh	$0.09	$7,540,970	17%	24%
		Nat Gas	218,223 GJ	$12.75	$2,782,343	6%	
	Industrial Buildings	Elect	NA	$0.09	NA	0%	6%
		Nat Gas	140,457 GJ	$19.83	$2,785,262	6%	
On Road Transportation		Gasoline	15,457,226 L	$1.11	$17,157,521	40%	43%
		Diesel	1,382,874 L	$1.07	$1,479,675	3%	
		Other	51,753 L	$0.74	$38,297	<1%	
Solid Waste		Mass	7,940 t	$12.00	$95,280	<1%	<1%
TOTAL				$43,208,316		100%	

[1] Per unit energy costs are estimated annual averages for the year 2007

2.9 Community Inventory Summary

In the 2007 inventory year the City of Pitt Meadows generated 88,567 tonnes of CO_2e. On road transportation and buildings produced approximately the same amount of GHG emissions, with solid waste producing only three percent of Pitt Meadows emissions (Table 2.9).

Table 2.9 - Community Energy Consumption and GHG Emissions Summary

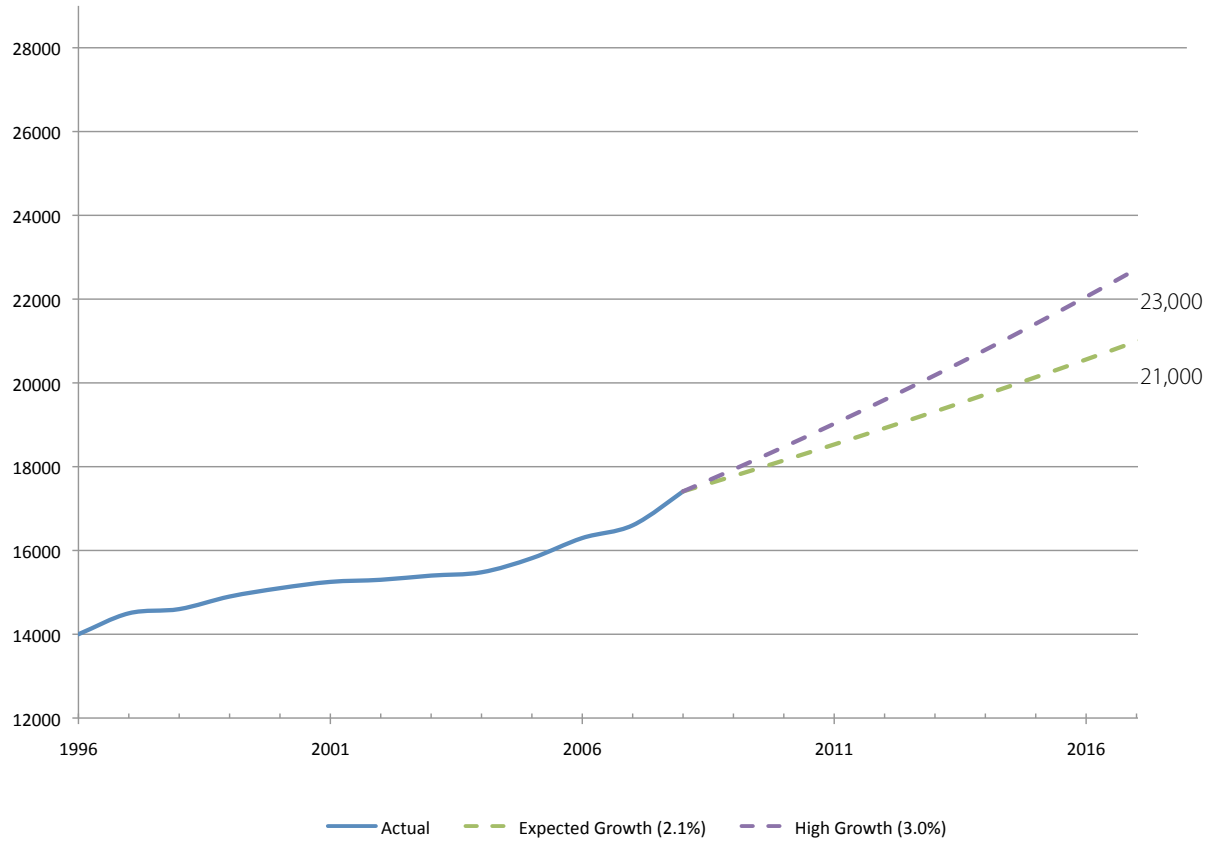
Sector	Energy Type/Unit	Consumption	Energy (GJ)	GHG Emissions (t CO_2e)		Percent Emissions
		2007				
Community Buildings	Elect	159,692,247 kWh	574,892	4,152	43,065	49%
	Nat Gas	770,968 GJ	770,968	38,913		
On Road Transportation	Gasoline	15,457,226 L	535,747	38,688	42,613	48%
	Diesel	1,382,875 L	53,490	3,846		
	Other	5,175 L	1,310	79		
Solid Waste	Mass	7,940 t	NA	2,889	2,889	3%
TOTAL		1,936,407		88,567		100%

3 Community Forecasts

A forecast of community emissions for community buildings, on-road transportation, and solid waste sectors is presented in Section 3. In general, energy and emissions at the community level will increase as the population changes. Chart 3.1 represents the population growth using the two growth scenarios from the City of Pitt Meadows' OCP and based upon 2006 census data[1].

According to the extrapolation presented in Chart 3.1, by 2017 the population of the City of Pitt Meadows will be between ~21,000 and ~23,000. Two growth scenarios, an expected and high growth, for have been developed using estimated growth rates from the City's OCP. An expected growth scenario assumes that the City's population will grow at a rate of 2.1% per annum. The high growth scenario assumes a growth rate of 3.0 percent per annum. Many other factors must be considered if a credible projection is to be developed. These factors are presented along with related assumptions for the projections developed, in the subsections that follow.

Chart 3.1 - Projected Population Growth (1996-2017)



3.1 Forecast of Community Buildings Energy and GHG Emissions

Many factors contribute to the forecast of GHG emissions for community buildings. These factors include the number of units projected, the energy types used for space heating in the projected units (e.g., electric or natural gas space heating), the size and therefore the energy intensity of projected units by energy type, and the emissions factor for electricity that will be used to calculate GHG emissions from electricity in 2017.

[1] Statistics Canada, Census 2006

To simplify, the calculation for the emissions forecast for community buildings is:

Growth in Emissions by Energy Type = Projected Number of Units × Projected Energy per Unit by Energy Type × Projected Emissions Factor

Note: the projected emissions factor only changes for electricity and is otherwise constant for natural gas.

Each of the three operands have been considered in the forecast for community buildings, with the exception of energy intensity, which can only be used for the residential sector because of the inconsistencies in energy intensity for commercial and industrial buildings. A framework and number of assumptions has been provided to support the forecast for each subsector.

Table 3.1 presents the prediction of the number of community building units that is used in the GHG emissions forecast.

3.1.1 Framework and Assumptions

Framework and Assumptions for Forecasts in the Community Buildings Sector:

- an 'Expected Growth' scenario and a 'High Growth' scenario are presented for the Residential Buildings Subsector only;
- the GHG emissions factor for electricity in 2009 is used to calculate GHG emissions for the 2017 forecast. An emissions reduction due to less carbon intensive electricity is included in Section 4 under reduction initiatives that senior government is responsible for;
- consumption data for natural gas is not normalized for weather for 2017, nor is it normalized for any other inventory year presented (e.g., GHG emissions are absolute and normalization would only be undertaken for detailed comparisons of specific consumption accounts);
- growth is significantly different for each of the community buildings subsectors;
- growth is predicted for the forecast year 2017; and,
- energy and GHG emissions Inventories for the years 2005 and 2007 were available to provide guidance for the forecast although the 2005 data is not presented herein.

Assumptions for Forecasts in the Residential Buildings Subsector:

- an 'Expected Growth' scenario and a 'High Growth' scenario are presented;
- the 'Expected Growth' scenario is the City's best estimate of buildings could be developed under existing land use bylaws up to 2017;
- the 'High Growth' scenario is the City's best estimate of buildings that are likely to be developed up to 2017 given changes to the OCP and Zoning Bylaw;
- the ratio of residential units that are heated by electricity to those heated by natural gas has been adjusted from 2008 data. Assume that the predicted number of high rise apartments will use electricity for space heating instead of natural gas. Assume natural gas will be consumed in high rise buildings for common area heating. After a more detailed dataset is obtained in the future from BC Hydro and Terasen Gas Inc., the existing ratios for low rise and high rise apartments could be used for the forecast; and,
- the calculation of the forecasted energy and resulting GHG emissions is based on a projection of the number of units added to the inventory between the base year (2007) and the forecast year (2017).

Assumptions for Forecasts in the Commercial Buildings Subsector:

- the ratio of commercial units that are heated by electricity to those heated by natural gas in 2007 is used to develop the 2017 forecast;
- trends in consumption in the commercial sector have been used as guidance for the forecast;

- a commercial component has been factored into the forecast for commercial buildings, although these new commercial establishments are not necessarily new to the community and may be relocated businesses from within the City;
- large commercial establishments indicate that growth is difficult to predict through turbulent economic times;
- consumption data specific to individual commercial establishments was not available; and,
- forecasts have been developed by choosing an annual increase based on an estimate from observed trends.

Assumptions for Forecasts in the Industrial Buildings Subsector:

- trends in consumption in the industrial subsector do not exist and cannot be used as guidance for the forecast;
- industrial facilities indicate that growth is difficult to predict through turbulent economic times;
- consumption data specific to individual industrial facilities was not available;
- forecasts, if any, are based on discussions with staff of large industrial facilities in the City (see Appendices).

3.1.2 Projection of Units for Community Buildings

The method of projecting the number of units is based on the best estimates of the number of units that will be constructed under the current zoning bylaws and through potential changes to the OCP and zoning bylaws. An 'Expected Growth' scenario and a 'High Growth' scenario are presented in Table 3.1 for the residential buildings subsector. The 'Expected Growth' scenario is based on development that would be allowed under the existing OCP and Land Use Bylaws, whereas the 'High Growth' scenario is based on estimates of what is possible given changes to the OCP that are currently being discussed by the community and Council.

Regardless of allowable growth, population growth is exponential, not linear, and Pitt Meadows may need to accommodate surges of growth that may not coincide with the current OCP. Although there are limitations that will be placed on the amount of allowable growth to 2017 (e.g., allowable development under the forthcoming OCP and related land use bylaws), of the two scenarios presented, the 'Expected Growth' scenario has been used for the 2017 forecast.

Table 3.1 - Expected Growth and High Growth Scenarios for Residential Building Types (2017)

Residential Building Type	Projected Units (2017)	
	Expected Growth	High Growth
Apartments	520	667
Row Housing	160	755
Single Units	221	571
Total Units	**901**	**1,993**

Projections for units in the commercial and industrial sectors are not possible. Instead, an annual increase of 0.5 percent for the commercial sector has been used for the GHG emissions forecast for the commercial buildings subsector. Our assumption includes a commercial component, or mixed use component to most multi-unit developments predicted. Industrial sector units have not been forecasted.

Table 3.2 presents the forecasted energy consumption and related GHG emissions for each of the residential building types predicted in Table 3.1. The subtotal for the residential building types is carried forward into Table 3.3, which presents the forecasts for all community building subsectors (e.g., residential, commercial, and industrial). Under the expected growth scenario, residential buildings emissions will increase by 738 tonnes CO_2e, under the high growth scenario emissions will increase by ~3,100 tonnes CO_2e. Note that the negative values for GHG emissions for electricity in Table 3.2 reflect net zero GHG emissions in 2017 as per provincial policy.

Table 3.2 - Forecast of Community Energy and GHG Emissions Increments for Residential Buildings (2017)

Sector	Energy Type/ Unit	Expected Growth	High Growth	Expected Growth	High Growth
		Energy Consumption		GHG Emissions (CO_2e tonnes)	
		2017			
Apartments	Elect (kWh)	2,888,122	3,705,962	-72	-454
	Nat Gas (GJ)	18,697	23,991	944	7,069
Row Housing	Elect (kWh)	1,548,841	7,304,170	-39	-387
	Nat Gas (GJ)	2,215	10,444	112	2,789
Single Units	Elect (kWh)	2,776,082	7,174,405	-69	-75
	Nat Gas (GJ)	20,428	52,793	1,031	5,796
Subtotal	**Elect (kWh)**	**7,213,045**	**18,184,537**	**-180**	**-916**
	Nat Gas (GJ)	**41,339**	**87,228**	**2,087**	**15,654**
TOTAL				**1,907**	**14,739**

Table 3.3 presents the forecasted energy consumption and related GHG emissions for all community building subsectors combined (e.g., the subtotal for apartments, row housing, and single units in Table 3.2 are represented in the Residential Buildings sector in Table 3.3). Note that the forecast for the commercial buildings sector is not based on the number of projected units, it is based on a 0.5 percent increase per annum. Under the expected growth scenario, buildings emissions will increase by ~1,900 tonnes CO_2e, and under the high growth scenario emissions will increase by ~15,000 tonnes CO_2e.

Table 3.3 - Energy and GHG Emissions Increments for Forecast of Buildings (2017)

Sector	Energy Type/ Unit	Expected Growth Increment	High Growth Increment	Expected Growth Increment	High Growth Increment
		Energy Consumption		GHG Emissions (CO_2e tonnes)	
		2017			
Residential Buildings	Elect (kWh)	7,213,045	18,184,537	-180	-454
	Nat Gas (GJ)	41,339	87,228	2,087	7,069
Commercial Buildings	Elect (kWh)	10,282,541	15,481,568	-257	-387
	Nat Gas (GJ)	30,359	55,276	1,532	2,789
Industrial Buildings	Elect (kWh)	1,009,380	3,028,140	-25	-75
	Nat Gas (GJ)	38,285	114,854	1,932	5,796
Subtotal	**Elect (kWh)**	**18,504,966**	**36,694,245**	**-462**	**-916**
	Nat Gas (GJ)	**109,983**	**310,151**	**5,551**	**15,654**
TOTAL				**5,089**	**14,739**

Table 3.4 presents the base year (2007) GHG emissions, the GHG emission increments for the Expected Growth and High Growth scenarios, and the total GHG emissions forecast.

Table 3.4 - Forecast of GHG Emissions for Buildings (2017)

Sector	Energy Type/Unit	Base Year Emissions	Expected Growth Increment	High Growth Increment	Forecast Expected Growth	Forecast High Growth
		2007	2017			
		GHG Emissions (CO_2e tonnes)				
Residential Buildings	Elect	1,973	-180	-454	1,793	1,519
	Nat Gas	20,809	2,087	7,069	22,896	27,878
Commercial Buildings	Elect	2,179	-257	-387	1,922	1,792
	Nat Gas	11,014	1,532	2,789	12,546	13,803
Industrial Buildings	Elect	-	-25	-75	-25	-75
	Nat Gas	7,089	1,932	5,796	9,021	12,885
Subtotal	**Elect**	**4,152**	**-462**	**-916**	**3,690**	**3,236**
	Nat Gas	**38,912**	**5,551**	**15,654**	**44,463**	**54,566**
TOTAL		**43,064**	**5,089**	**14,739**	**48,153**	**57,803**

The total GHG emissions forecast for the Expected Growth scenario is ~ 48,000 tonnes CO_2e whereas the GHG emissions for the High Growth scenario is ~58,000 tonnes CO_2e. The GHG emissions forecast for the expected growth scenario will be used for the GHG emissions target calculation.

3.2 Forecast of Community On-road Transportation Energy and GHG Emissions

Many factors contribute to the forecast of on-road transportation GHG emissions. These factors include the number of vehicles on-road, the fuel consumption rate of vehicles, and the number of kilometres driven. Community transportation forecasts are therefore difficult to develop since it is difficult to predict the type of vehicles that residents will purchase in the coming years. Further, the fuel consumption rate of vehicles and the number of kilometres driven is also difficult to predict.

To simplify, the calculation for the forecast of community on-road transportation is:

Growth in Emissions = Projected Number of Vehicles per Vehicle Class × Projected Fuel Consumption Rate by Fuel Type × Projected Vehicle Kilometres Driven by Vehicle Class × GHG Emissions Factor.

The forecast for on-road transportation is further complicated by many other external influences that affect each of the factors listed above. The majority of these external influences cannot be predicted but are listed for information as follows:

Number of Vehicles On-road

- insurance costs - high insurance costs can be cost prohibitive and prevent licensed drivers from owning a vehicle. Also, insurance costs may result in existing vehicles taken off the road by an owner;
- vehicle price - the price of new vehicles may affect the number of vehicles on-road;
- availability of capital leases - leasing is a less expensive alternative to purchasing a vehicle and fewer newer vehicles may be purchased in the absence of leasing options; and,
- lease and finance rates for new vehicles - most people cannot afford to pay cash for a vehicle and must rely on lease and financing options.

Fuel Consumption Rate

- regulations introducing fuel consumption standards;
- fuel type - consumption rates differ for gasoline and diesel fuel combustion engines;
- technological change - switch from fuel combustion to electric-gas hybrid to electric;
- temperature - combustion engines operate less efficiently in extreme weather conditions and temperature can alter the shape and inflation of tires which can increase fuel consumption rates;
- fuel price - the price of fuel can affect driver behaviour. High fuel prices may result in slower driving speeds and decreased rates of acceleration, whereas low fuel prices may have the opposite effect; and,
- economy - the financial well-being of a driver may result in behaviours that reduce fuel consumption in order to reduce costs for fuel.

Vehicle Kilometres Travelled

- shifts from auto to non-auto modes of transportation;
- shifts to public transportation;
- changes in the availability, accessibility, and convenience of public transportation;
- economy - the financial well-being of a driver may result in more or less kilometres driven;
- insurance rates - drivers may choose to insure their vehicles under rate classes that limit the number of kilometres driven or limit where the vehicle is driven (e.g., work vs. pleasure only or combinations thereof); and,
- availability of local employment.

3.2.1 Framework and Assumptions for Forecasts in the On-road Transportation Sector

- The Insurance Corporation of British Columbia (ICBC) provides HES with data specific to the City of Pitt Meadows. A condition of the provision of data is that we represent the vehicles in each vehicle class as a 'unit';
- Although vehicle kilometres traveled (VKT) estimates play an important role in predicting GHG emission in the on-road transportation sector, we assume that VKT will not change significantly in the forecast year, the focus for the forecast is a prediction of the count of vehicle types;
- Trends from 2007 to 2008 are not taken into account because these trends are not necessarily representative of the number of vehicles that will be on-road in 2017. Rather, the number of vehicles per dwelling for 2007 has been used for personal vehicles and projected against the number of residential units predicted in Section 3.1;
- It is assumed that personal vehicles per capita does not significantly fluctuate between 2007 and 2017.
- A current year dataset would further assist with our assumptions for the on-road transportation forecast;
- Knowledge of the per capita rate of vehicles in apartments, row houses, and single units would greatly assist with the forecast; and,
- Commercial vehicles, tractor trailer trucks, and motorhomes are not forecast because there are no reliable indicators, including trends, from which to base the forecast.

Unlike the methods used to forecast GHG emissions in community buildings, the forecast for personal vehicles in the on-road transportation sector uses the number of vehicles per dwelling (2.09 units/dwelling) in 2008 and the projected number of dwellings from the 'Expected Growth' scenario to predict the number of vehicles in 2017.

Once the number of vehicles is predicted from the number of units per dwelling for personal vehicles and the predicted number of residential building types, the fuel used per unit in 2007 is used to calculate the fuel used for 2017. Table 3.5 presents the data for 2017 that has been used to calculate the number of additional units in 2017 and the forecast of units and fuel consumption.

Table 3.5 provides a count of vehicles by vehicle type for 2007, the fuel consumed by each vehicle class, the additional units projected for 2017, and the forecast of fuel consumption for 2017. The total number of units forecast for 2017 is 12,800 and the total forecasted volume of fuel is approximately 22 million litres.

Table 3.5 - Forecast of Number of Units and Fuel Consumption for On-road Transportation (2017)

Vehicle Class	Fuel Type	Units	Fuel (Litres)	Litres / Unit	Additional Units	Forecast of Units	Forecast of Consumption (Litres)
		2007			2017		
Small Passenger Cars	Gasoline	3,477	4,631,901	1,332 *	1,122	4,599	6,126,578
	Diesel Fuel	87	92,380	1,062	18	105	111,493
Large Passenger Cars	Gasoline	1,585	2,811,307	1,774	449	2,034	3,607,696
	Diesel Fuel	32	57,635	1,801	6	38	68,442
Light Trucks, Vans, and SUVs	Gasoline	3,919	7,608,796	1,942	1,162	5,081	9,864,836
	Diesel Fuel	226	460,641	2,038	8	234	476,947
	Other	16	32,669	2,042	3	19	38,794
Commercial Vehicles	Gasoline	19	90,258	4,750	N/A	19	90,258
	Diesel Fuel	90	403,226	4,480	N/A	90	403,226
	Other	8	14,365	1,796	N/A	8	14,365
Tractor Trailer Trucks	Diesel Fuel	14	179,999	12,857	N/A	14	179,999
Motorhomes	Gasoline	66	75,050	1,137	27	93	105,752
Motorcycles and Mopeds	Gasoline	358	133,176	372	83	441	164,052
Bus	Gasoline	9	106,738	11,860	N/A	9	106,738
	Diesel Fuel	16	188,994	11,812	N/A	16	188,994
	Other	9	4,719	524			
TOTAL		**9,931**	**16,891,854**		**2,878**	**12,800**	**21,548,171**

Table 3.6 provides the total units, fuel consumption, and GHG emissions for the target calculation. The GHG emissions have been calculated from the forecast amount of fuel consumed. Table 3.8 outlines the forecast of GHG emissions for on-road transportation before legislative requirements are included, while Table 3.8 outlines the forecast with the provincial tailpipe standard included.

Table 3.6 - Forecast of GHGs for On-road Transportation Without Tailpipe Standard Implementation (2017)

Vehicle Class	Fuel Type	Forecast of Units	Forecast of Consumption (litres)	Forecast of GHG Emissions (tonnes CO_2e)
		2017		
Small Passenger Cars	Gasoline	4,599	6,126,578	10,994
	Diesel Fuel	105	111,493	166
Large Passenger Cars	Gasoline	2,034	3,607,696	5,253
	Diesel Fuel	38	68,442	64
Light Trucks, Vans, and SUVs	Gasoline	5,081	9,864,836	22,902
	Diesel Fuel	234	476,947	213
	Mbl Propane	19	38,794	42
Commercial Vehicles	Gasoline	19	90,258	3,789
	Diesel Fuel	90	403,226	3,904
	Mbl Propane	8	14,365	118
Tractor Trailer Trucks	Diesel Fuel	14	179,999	496
Motorhomes	Gasoline	93	105,752	638
Motorcycles and Mopeds	Gasoline	441	164,052	380
Bus	Gasoline	9	106,738	375
	Diesel Fuel	16	188,994	794
TOTAL		**12,800**	**21,548,171**	**48,359**

3.2.2 Provincial Regulations

Tailpipe Emissions Standards

In May 2008, the B.C. government enacted Bill 39, the Greenhouse Gas Reduction (Vehicle Emissions Standards) Act. Bill 39 enables the implementation of a government commitment made in the 2008 Throne Speech to set vehicle GHG emission standards equivalent to those laid out in California's 2004 regulation. Bill 39 will be brought into force by regulation – enacted when (and not before) the equivalent California regulation and standards are implemented. The Ministry of Environment is presently developing the regulation to accompany the new bill.[2] The federal government has also recently outlined a GHG emissions standard; a modification of the Californian standard. If the BC government rescinds its standard in lieu of a federal standard, the projected impact on GHG emissions may change. Table 3.8 lists the emissions limits under the Californian regulation and table 3.9 lists the effect of the standard on GHG emissions.

2 Greenhouse Gas Reduction (Vehicle Emissions Standards Act Policy Intentions Paper for Consultation)

Table 3.7 - Forecast of GHG Emissions for On-road Transportation Before Legislative Requirements (2017)

Model Year	Small Vehicles[1]	Large Vehicles[2]
	Fleet Average Greenhouse Gas Emissions (grams per mile CO_2e)	
2011	267	390
2012	233	631
2013	227	355
2014	222	350
2015	213	341
2016 +	205	332

[1] All Passenger Cars; and Light Duty Trucks 0-3750 lbs

[2] Light Duty Trucks < 3751 Lbs. Loaded Vehicles up to 8500 lbs. Medium Duty Passenger Vehicles

In Table 3.6, a forecast for GHG emissions has been provided based on the number of expected vehicles to 2017. The forecast amount was ~ 48,000 tonnes CO_2e. Table 3.8 shows the effects of the tailpipe standard, thereby reducing the on-road transportation forecast to ~43,000 tonnes CO_2e.

Table 3.8 - Forecast of GHG Emissions for On-road Transportation With Tailpipe Standard (2017)

Vehicle Class	Emissions Standard Non-Compliant Units	Emissions Standard Compliant Units	Emissions Standard Non-Compliant GHGs	Emissions Standard Compliant GHGs	2017 Total Emissions
			CO_2e (t)		
Small Vehicles	3,016	2,116	5,541	4,872	10,412
Large Vehicles	2,964	2,964	12,281	9,857	22,138
Unaffected Vehicles	1,745	0	10,493	0	10,493
TOTAL	**7,720**	**5,080**	**28,315**	**14,728**	**43,043**

California "Pavley II" Tailpipe Emissions Standards

Eventually, senior government in Canada will adopt California's current proposal to implement phase II of the tailpipe emissions standards, which requires even stricter emissions controls on passenger vehicles model year 2017 and later. (Table 3.9). By implementing phase II of the California Tailpipe Standard, GHG emissions would be further reduced by approximately 500 tonnes CO_2e bringing the total forecast for on-road transportation to 42,509 tonnes CO_2e.

Table 3.9 - Reductions from Provincial Government Programs for Transportation

Reduction Initiative	Level of Government	Reduction Quantity GHGs (tonnes CO_2e)
California Pavley II Adoptions (2015)	Provincial Government	534

3.3 Forecast of Community Solid Waste

No growth has been assigned to community solid waste.

3.4 Forecast of Community Greenhouse Gas Emissions

Table 3.10 presents the forecast of emissions by sector and by energy type as well as illustrating the expected percent change between 2007 and 2017.

Table 3.10 - Expected Forecast of Community Emissions (CO_2e tonnes) by Sector and Energy Type

Sector	Emissions CO_2e (t)	Forecast of Emissions (CO_2e tonnes)	Percent Change
	2007	2017	2007-2017
Residential Buildings	22,783	24,689	8%
Commercial Buildings	13,193	14,468	10%
Industrial Buildings	7,089	8,996	27%
Community Transportation	42,613	42,509*	0%
Community Solid Waste	2,889	2,889	0%
Total	**88,567**	**93,551**	**6%**

* The subtotal for Community Transportation represents the total in Table 3.8 minus the total in Table 3.9

3.5 Summary of Community Forecasts

Overall greenhouse gas emissions are forecast to increase by 14 percent. The estimate developed for the on-road transportation sector may be conservative given the ever decreasing fuel consumption rates of vehicles. The forecasts for community energy consumption and emissions are summarized in Table 3.11.

Table 3.11 - Summary of Community Forecasts

Forecasted Parameter	Base Year	Forecast Year	Percent Increase
	2007	2017	2007 - 2017
Emissions (tonnes CO_2e)	88,567	93,551	6%

4 Reduction Initiatives

4.1 Summary of Reduction Initiatives

A best estimate of GHG emissions reductions has been provided for specific reduction initiatives. Some initiatives do not result in a quantitative reduction, or the reduction may be counted within another initiative. Reduction initiatives that fall under the category of 'policy' may not have a direct effect on emissions, but may enable other initiatives. Therefore, if the policy and the corresponding initiative are both described, the estimated GHG reduction will be included with the specific initiative.

It is important to note the GHG reduction amounts are estimates. Any real reductions achieved for these initiatives will depend upon the resources applied by the City of Pitt Meadows, the program's effectiveness, and the degree of uptake by the community.

It is extremely difficult to implement reduction initiatives in existing buildings. It is much easier for a government authority to influence the growth of emissions by developing policies, bylaws, and statements in the Official Community Plan. Ultimately, decisions by Council can profoundly affect the growth of emissions. Influencing community growth in terms of the number, size, and density of new dwellings is an effective, long-term solution to climate change mitigation.

Reduction initiatives that should be adopted and utilized to reduce base year emissions in the City of Pitt Meadows are outlined in 4 broad categories:

- Community Buildings
- Land Use and Urban Design
- Community Transportation
- Solid Waste

The City of Pitt Meadows will need to seek financial assistance to support the majority of the reduction initiatives. Until significant assistance is secured for implementation, the City can gain community support by including reduction initiatives that affect the base year in climate action public education and outreach programs.

Community GHG reductions are difficult to achieve in the absence of legislation, although modest reductions are possible through careful planning and policy implementation.

The opportunities presented for community reductions are very conservative because these initiatives have either modest or no funding resources. Reductions in the on-road transportation sector will rely in part on federal legislation. Many transit improvements are also partially the responsibility of senior governments.

4.2 Community Buildings

4.2.1 Senior Government Policy and Programs

Federal Government

EnerGuide rating in Multiple Listing Service (MLS) Advertising

EnerGuide offers a standardized rating for the energy performance of residential buildings. Because the majority of Canadians claim they would pay extra for an environmentally friendly home, if wide-spread implementation were to occur, this initiative may boost the profile of homes offered for sale if the EnerGuide rating is included in listing (Table 4.1).

Table 4.1 - Reductions from Federal Government Programs for Community Buildings

Reduction Initiative	Level of Government	Reduction Quantity	
		Energy (GJ)	GHGs (tonnes CO_2e)
EnerGuide rating in MLS Advertising	Federal Government	9,049	305

4.2.2 Local Government Policy and Programs

CAEE Existing Buildings Targets

The Community Action on Energy Efficiency (CAEE) provides reduction initiatives for existing and new buildings (Table 4.2). This section describes initiatives that may be applied to existing buildings, ranging from insulation upgrades to solar installations (Figure 4.1). The uptake and success of these initiatives can be influenced by a variety of factors, including building ownership (Map 4.1), building age (Map 4.2), building type (Map 4.3), and the building state of repair (Map 4.4). As a result of this variation, the CAEE existing building reduction initiatives will be more useful for some neighbourhoods (e.g. those with many old buildings requiring repairs) than for other neighbourhoods (e.g. those with predominantly new buildings). Joining the CAEE will require the City to meet the following targets for its existing buildings:

- Reduce energy consumption in 12 percent of existing detached, single-unit and row houses by an average of 17 percent.
- Reduce energy consumption in 16 percent of existing multi-unit residential buildings by an average of 9 percent.
- Reduce energy consumption in 20 percent of existing commercial, institutional and industrial buildings by an average of 14 percent.

Figure 4.1 - Residential Photovoltaics

Photovoltaics, such as these, can provide electricity for homes or businesses. Another type of solar panel uses the sun's energy to heat water (not shown).

Table 4.2 - Reductions from Achieving CAEE Targets for Existing Buildings

Reduction Initiative	Level of Government	Reduction Quantity	
		Energy (GJ)	GHGs (tonnes CO_2e)
CAEE targets for existing single-unit homes	Municipality, With Support	4,878	249
CAEE targets for existing row housing	Municipality, With Support	1,598	82
CAEE targets for existing multi-unit homes	Municipality, With Support	1,579	53
CAEE targets for existing commercial buildings	Municipality, With Support	14,556	369
Total reductions from CAEE existing buildings		**22,611**	**753**

Policies Supporting the Achievement of CAEE Existing Buildings Targets

Building Retrofits: Mechanical and Plumbing System Upgrades

Install more efficient mechanical and plumbing systems in existing buildings, such as water distribution systems, flow-control devices, and ground-source heat pumps. Simple upgrades could reduce water usage, consume less energy, and take advantage of renewable energy sources.

Building Retrofits: Electrical System Upgrades

Promote upgrades to electrical systems in existing buildings, such as converting to natural gas or solar power, installing timing devices, and switching to Energy Star verified bulbs.

Improvements to Management and Operations Practices

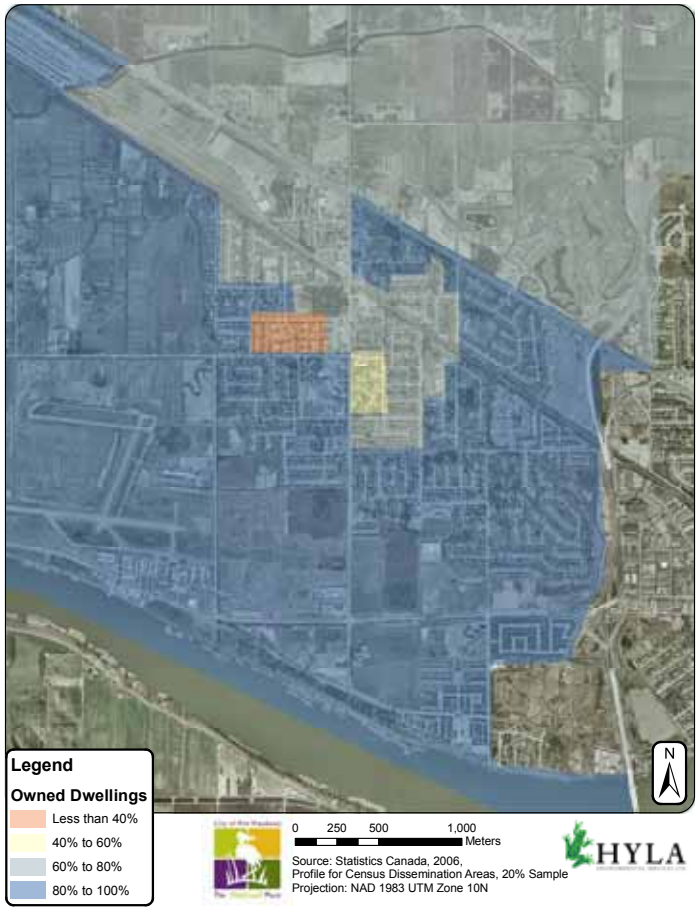
Encourage improvements to the management and operations practices of existing commercial and industrial buildings. For example, establish operating strategies and schedules to ensure equipment only runs when required, at optimum energy saving settings.

Replace Old A/C and Chillers with High Efficiency Models

Substantial gains in efficiency of air conditioning and chiller units has been made and, as a result, energy use can be greatly reduced by replacing older, less efficient A/C and chiller units with new, high efficiency models. Support a goal of having at least 50 homes per year purchase more efficient air conditioners.

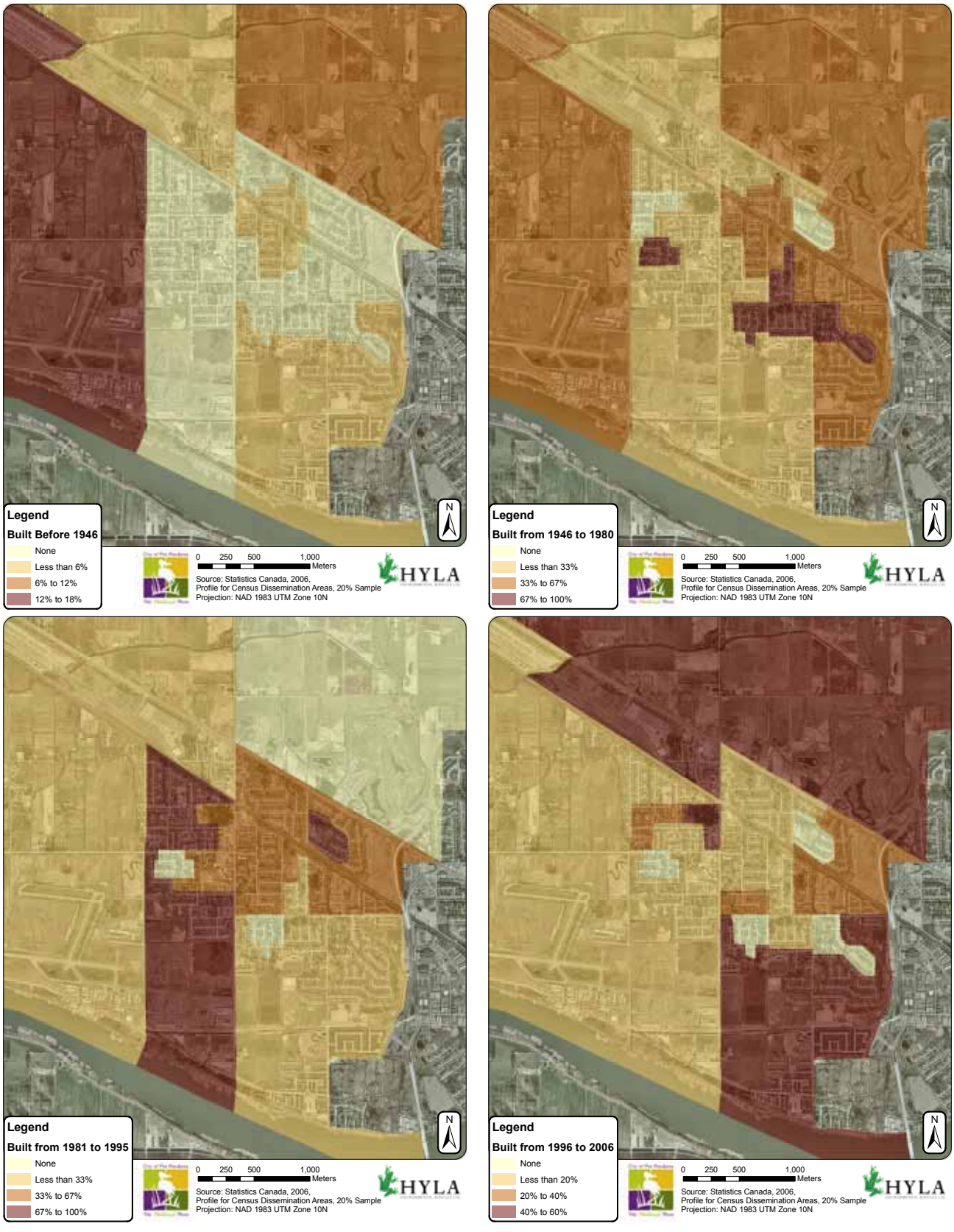
Install High Efficiency Water Heaters

Encourage the installation of high efficiency water heating systems when it becomes time to replace older, less efficient models.



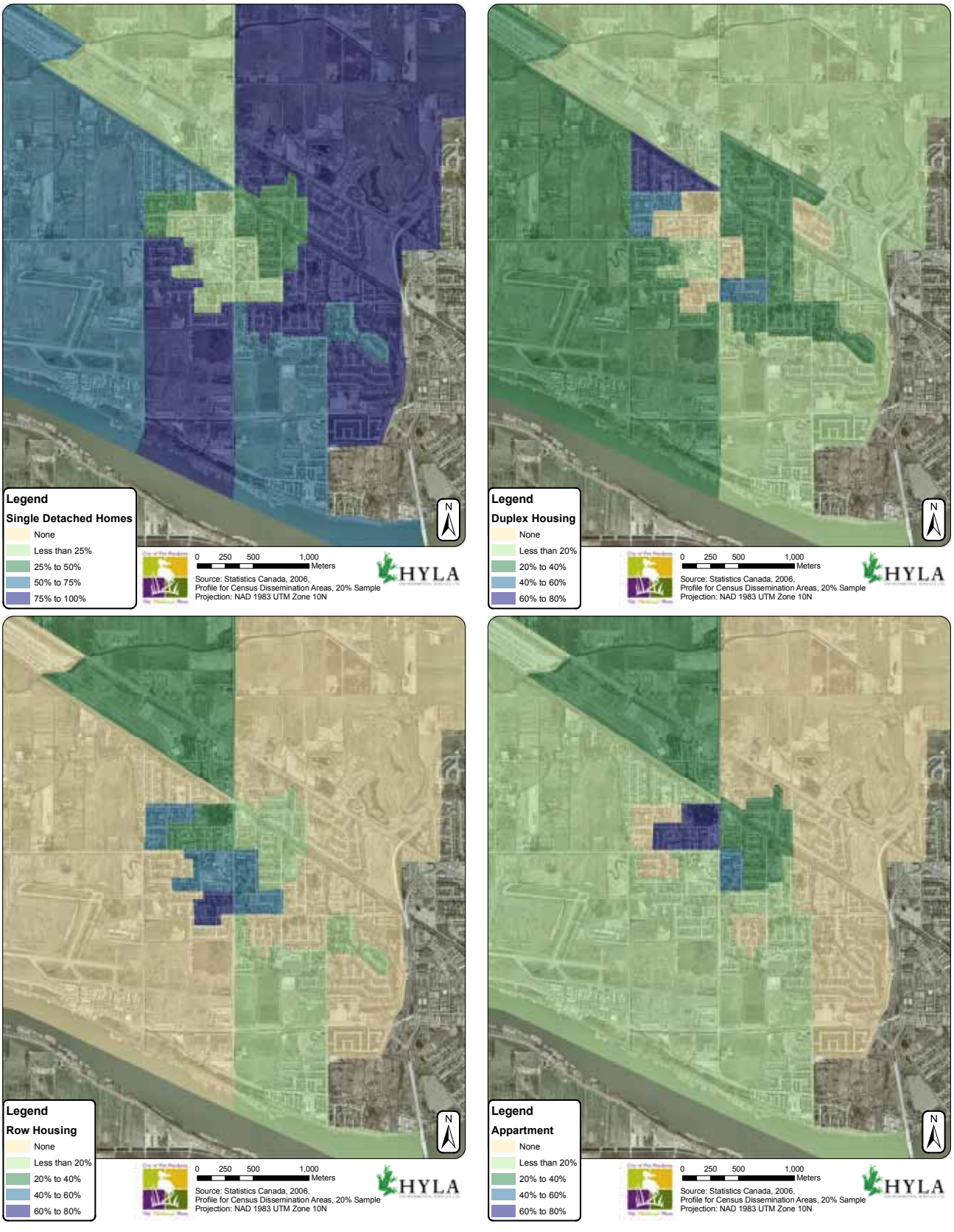
Map 4.1 - Building Ownership

Residents who own (as opposed to rent) the building they reside in are more likely to undertake energy efficiency renovations. This figure shows the percentage of owned buildings in each census dissemination area in the City of Pitt Meadows.



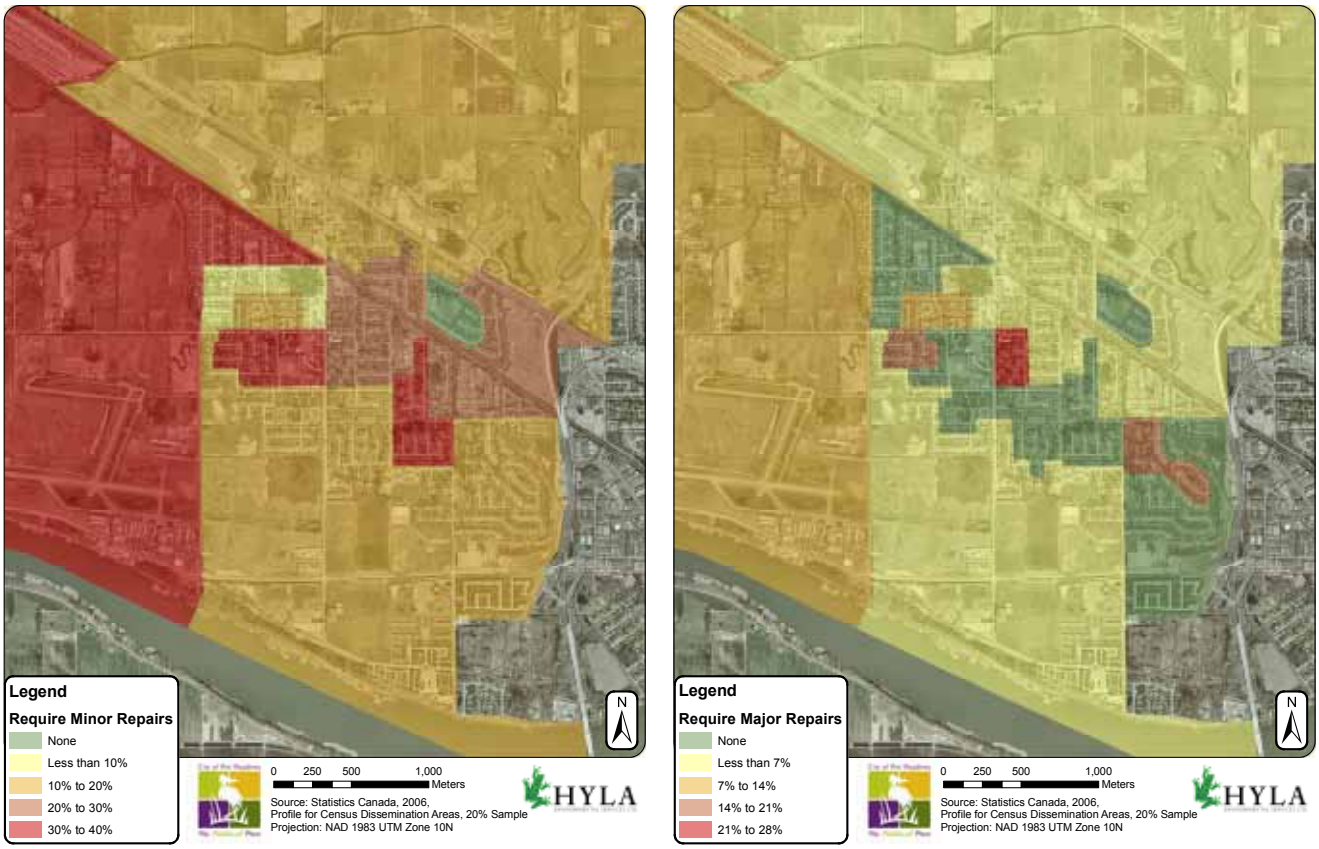
Map 4.2 - Percentage of Buildings in Each Age Category

Building age can influence the effectiveness of initiatives aimed at reducing a neighbourhood's energy use. This figure shows the percentage of buildings built before 1946 (top left), from 1946 to 1980 (top right), from 1981 to 1995 (bottom left), and from 1996 to 2006 (bottom right) in each census dissemination area in the City of Pitt Meadows.



Map 4.3 - Housing Types

There are a wide range of different housing types in the City and each type uses energy differently. Due to this variation, reduction initiatives depend on the type of housing in a neighborhood. This figure shows percentage of each housing including single unit (top left), duplex (top right), row housing (bottom left) and apartments (bottom right) in each census dissemination area.



Map 4.4 - State of Building Repair

The state of building repair can influence the uptake of reduction initiatives. Buildings requiring some repair can be renovated to increase their energy efficiency. Owners of buildings requiring substantial repairs may be less likely to invest in energy efficiency upgrades if they anticipate tearing down their building . The map on the left shows buildings requiring minor repairs and the map on the right shows buildings requiring major repairs.

Install Solar Hot Water Heaters

Encourage the installation of solar hot water systems, especially when renovations are being undertaken. These systems better the environment and can reduce domestic hot water heating bills by 50-80%.

Upgrade Insulation

Encourage people to upgrade the insulation in their homes. Spray Foam is a type of insulation that lowers annual heating bills by protecting against drafts and preventing moisture from entering the walls.

Upgrade Windows

Encourage people to install more energy efficient windows in their homes. Since residential buildings lose 33 percent of their heat through windows, simply upgrading to double paned windows can save residents money on heating bills.

Upgrade Appliances to Energy Star

Encourage residents to upgrade their appliances to those with an Energy Star rating. This helps people distinguish energy efficient products.

Install Low Flow Shower Heads & Faucets

Low flow shower heads and faucets reduce the use of hot water, and thus decrease energy use and GHG emissions. The City should encourage installation of low flow shower heads/faucets.

Encourage Lowering Building Temperature at Night

Lowering building temperature by just a few degrees at night can have a surprisingly large impact on energy use. Digital thermostats automate the process of turning down the thermostat at night (or during hours when no one is using the building). The City should encourage residents to turn down the thermostat at night.

Shorten Showers

Heating water requires large amounts of energy, and produces substantial GHG emissions. Reducing the length of showers can help reduce hot water use and thus decrease GHG emissions. Aim for uptake by 30% of households.

Use Cold Water for Washing Clothes

Often, it is only necessary to use cold water to wash clothes. Not using hot water saves energy and reduces GHG emissions. Aim for uptake by 30% of households.

Use Energy-Saving Setting to Dry Dishes

Producing heat to dry dishes uses a large amount of energy, while air drying requires no additional energy. Energy-saving settings use less or no additional energy to dry dishes. Aim for uptake by 30% of households.

Turn Off Lights When Not in Use

Leaving lights on when no one is in the room wastes energy. Promote energy efficiency by having residents shut of lights when they are not in use. Aim for uptake by 30% of households.

Turn Off Electronics When Not in Use

Depending on the type, electronic equipment can use a lot of energy when in use. Additionally, even when equipment is not in use, but still plugged in, it can use energy. Encourage residents to turn off their TVs, computers, and other equipment when not in use. Additionally, promote energy efficiency by encouraging people to unplug phone chargers and other adapters when not in use. Aim for uptake by 30% of households.

Get Rid of Second Fridge

Fridges, particularly older models, use a lot electricity. The City should encourage households with two fridges to get rid of the older, less efficient model.

Repair Leaks and Drafts

Encourage people to seal cracks in their homes with caulking and weather stripping. Such simple preventative measures reduce the release of CO_2 into the atmosphere and save people money by reducing heat loss.

CAEE New Buildings Targets

The CAEE provides guidelines to increase the energy efficiency of new buildings (Table 4.3). These guidelines outline everything worth considering for new buildings, from construction standards to amenities (e.g. bicycle lockers) to location. If the City joins the CAEE program it must meet the following targets for new buildings:

- Achieve an EnerGuide rating of 80 for 100 percent of new detached, single-unit and row houses by 2017.
- Achieve a 25 percent higher energy performance than the Model National Energy Code for 100 percent of new multi-unit residential buildings by 2017.
- Achieve a 25 percent higher energy performance than the Model National Energy Code for 100 percent of new commercial, institutional and industrial buildings by 2017.

Table 4.3 - Reductions from Achieving CAEE Targets for New Buildings

Reduction Initiative	Level of Government	Reduction Quantity	
		Energy (GJ)	GHGs (tonnes CO_2e)
CAEE targets for new single-unit homes	Municipality, With Support	5,976	223
CAEE targets for new row housing	Municipality, With Support	3,461	129
CAEE targets for new multi-unit homes	Municipality, With Support	12,304	460
CAEE targets for new commercial buildings*	Municipality, With Support	3,020	79
Total reductions from CAEE new buildings		**24,761**	**891**

* The reduction initiatives included in the calculation for commercial buildings are limited to new, more energy efficient lighting and mechanical equipment. Deeper reductions for this subsector are captured in the reductions for district energy systems

Policies Supporting the Achievement of CAEE New Buildings Targets

Energy Efficient Construction

The Energy Efficient Buildings Strategy provides targets for reducing GHGs in Canada. For new buildings, developers should consult an energy efficiency guide. For instance, they could use recyclable materials during construction, and install energy efficient appliances in new buildings.

Electricity and Alternative Energy Division (EAED)

The Electricity and Alternative Energy Division (EAED) was created to help develop an environmentally responsible sector for alternative energy sources. Advise developers to seek potential funding from the EAED.

R-2000 Standard: Adopt R-2000/Power Smart Performance Standards

R-2000 houses offer a number of cost-effective and energy efficient features, from high performance windows to air filtration systems. Promote the R-2000 home program as a building strategy for new homes.

C-2000 Standard: Adopt the C-2000 Building Code for Commercial Buildings

The C-2000 building code aims to reduce energy use through a number of strategies, such as salvaging, recycling, and reusing construction materials. Support C-2000 standards for all new commercial buildings.

Discourage Electric Baseboards

Discourage electric baseboard heating in new buildings. Although their installation is initially cheaper than a forced air system, they expend more energy and grow costly in the long term.

Passive Solar Design

People with passive solar heating in their homes consume less energy without paying extra for construction costs. Support the passive solar design by orienting new buildings strategically, in order to maximize solar energy, and encourage existing buildings to preserve their solar access.

Natural Resource Canada Renewable Energy Deployment Initiative

Take advantage of operating incentives provided by NRCan's initiative program. The program's goal is to promote renewable alternatives to diesel and gasoline, such as biomass, active solar hot water and air-heating systems.

OCP and Local Government By-laws

Increase Density – Intensify

Protect and conserve land by housing more people on less property. Also incorporate transit and pedestrian friendly structures in the design. Apart from high-rises, neighbourhood intensification like secondary suites can also help to accommodate a growing population. Some areas of the City already support substantial density, whereas other areas have very low density (Map 4.5). Intensification does not mean all single family homes should be replaced with high-rises, but that some higher density areas can be incorporated into existing neighbourhoods, allowing these areas to support better transit and non-auto transportation infrastructure.

The City has concentrated substantial density along Harris Road and should continue to increase density along this corridor. Additionally areas around the Pitt Meadows West Coast Express stations are good candidates for high density, given the access to transit and commercial facilities at these locations.

Rapid transit expansion to Pitt Meadows is not expected in the short term; however, long range plans eventually call for an extension of existing rapid transit service to Pitt Meadows. The City should consider where future rapid transit stations may be and ensure high density is not concentrated too far away from these areas.

Community Energy Systems

Community energy systems (CES) can supply energy to groups of buildings cheaply and effectively, with energy savings of up to 70 percent. Encourage new buildings to utilize CES whenever possible (Table 4.4). The high density of mult-unit dwellings along Harris Road is a good area to investigate the potential for CES.

Examine Opportunities for GeoExchange Systems

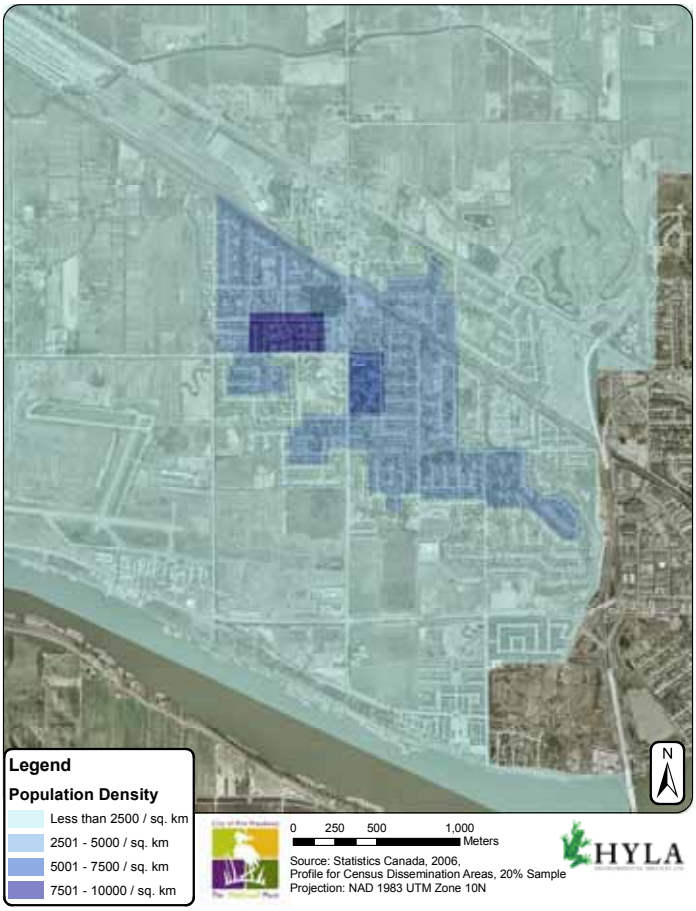
GeoExchange systems utilize energy from underground. Water is either pumped from a well (open systems) or pumped through a network of pipes (closed systems) to capture thermal energy. Examine opportunities for GeoExchange systems and incentives to increase the use of GeoExchange energy.

Waste-Heat Recovery

Waste-heat recovery systems capture and reuse excess heat within industries. Promote these systems by pre-servicing industrial spaces with district heating (see Pre-service for Waste Heat and DES initiative).

Solar Hot Water

Encourage developers to include solar hot water systems in new and existing buildings. These systems improve the environment and can reduce heating bills by 50 to 80 percent. Over their lifetime, solar systems quickly pay for themselves and buffer users from rising energy costs. Solar hot water systems are different from photovoltaic cells, which generate electricity.



Map 4.5 - Population Density

The population density in Pitt Meadows ranges from very low to very high. Encouraging high density along transit corridors helps encourage transit use and decrease private vehicle use.

Table 4.4 - Reductions from OCP and Local Government By-laws for Community Building

Reduction Initiative	Level of Government	Reduction Quantity	
		Energy (GJ)	GHGs (tonnes CO_2e)
Community energy systems in residential buildings	Municipality, With Support	4,744	195
District energy systems in industrial buildings	Municipality, With Support	28,369	1431
Total reductions		**33,113**	**1,626**

Pre-service for Waste Heat and District Energy Systems

Encourage the development of pre-service for waste heat and district energy systems. Pre-service industrial areas for waste-heat recovery by capturing and reusing rejected heat instead of buying more energy. Some excellent waste-heat recovery ideas are provided by the Canadian Industry Program for Energy Conservation.

Provide Rebates on Building Permit Fees for New Energy Efficient Building

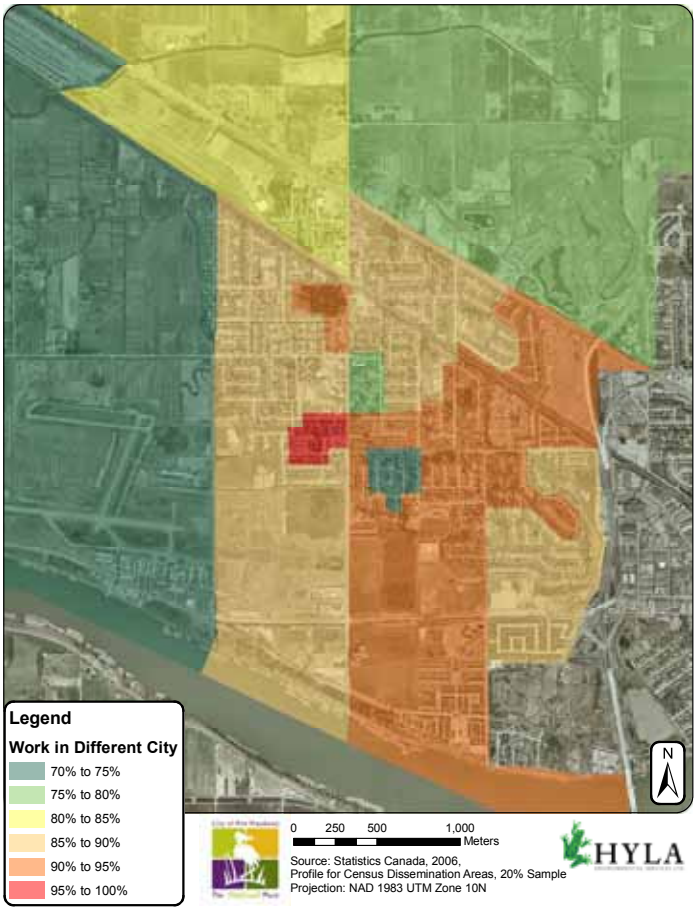
Offer rebates on permit fees to buildings that meet or surpass a certain standard of energy efficiency. Also, establish a minimum requirement for rebates or a sliding scale that offers varying rebates for buildings that meet a "silver" or "gold" standard.

Encourage Mixed-use Buildings

Combining residential and commercial developments creates strong communities where residents can reach services by foot instead of vehicle. Promote mixed-use by citing the many social and environmental benefits of such communities. The Harris Road corridor offers many opportunities for mixed-use buildings as infill developments (e.g. replace a parking lot with a mixed-use building and underground parking lot). Mixed-use buildings create jobs closer to home, which lowers the number of commuters (Map 4.6). Additionally, these support more compact land use. Although Map 4.7 is not directly related to all forms of mixed use, it does illustrate densities in the City that have the affect of lowering overall energy consumption and related GHG emissions.

Smart Growth Checklist

City staff use a Smart Growth Checklist to assess new building applications. The City should continue to use and expand the Smart Growth Checklist, and update it as new technologies and practices as sustainable building are developed. The Smart Growth Checklist should be continually evaluated to ensure it is achieving its goals of increasing the use of non-auto transportation modes and the use of energy efficient building practices, among others.



Map 4.6 - Percentage Residents Working Outside of Pitt Meadows

Creating a good mix of housing and jobs can help decrease the number of people who have to leave the community to go to work, thus reducing VKT.

Maintain Locker/Bike Storage Requirements in New Developments

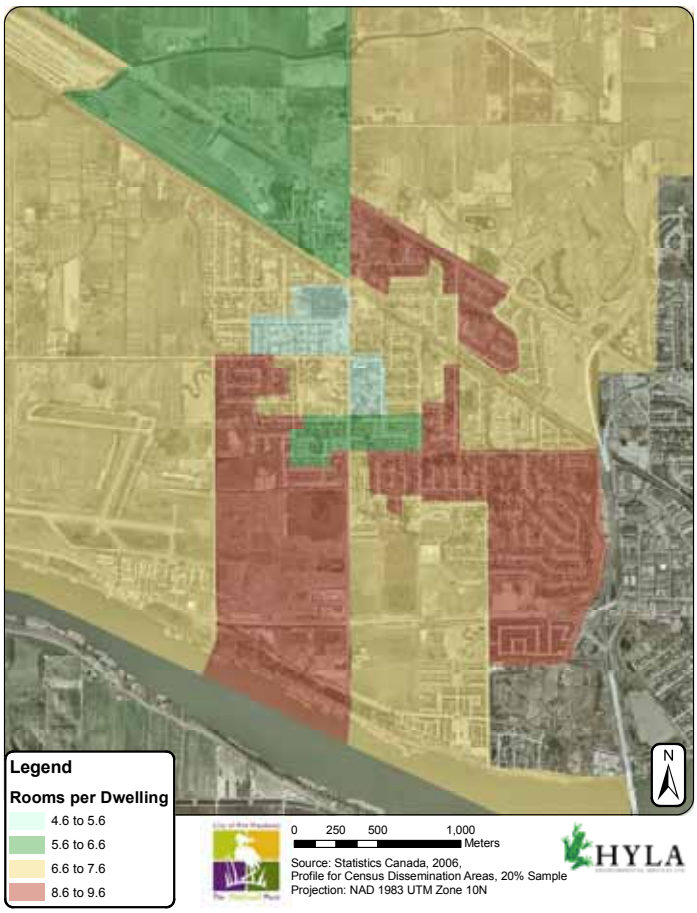
Continue encouraging developers to include facilities (e.g. lockers, showers, and secured storage for bikes) in new buildings, particularly office buildings and other employment centres. These facilities support cyclists and their environmentally friendly method of travel. This initiative is especially important for new developments in areas well served by bike routes. Continually reevaluate requirements to ensure enough bike lockers are provided.

Encourage New Buildings to Meet LEED Standards (or equivalent)

The LEED (Leadership in Energy and Environmental Design) standard encourages sustainable building practices by providing a universal set of design criteria. LEED offers standards for a wide variety of building types and projects, including residential and commercial buildings. New buildings should be encouraged to meet a LEED equivalent standards.

Encourage New Buildings to Meet BuiltGreen Standards

BuiltGreen is an industry initiative that promotes green building standards in British Columbia and Alberta. BuiltGreen currently offers certifications for a variety of residential buildings, including single unit homes, row homes, and apartment towers.



Map 4.7 - Rooms Per Dwelling

The average home size varies among neighbourhoods of the City. Larger homes in residential only areas typically use more energy than units in more compact, mixed use areas.

4.3 Land use and Urban Design

Land use and urban design can have major impacts on community energy use, yet the impacts are very difficult to quantify. While reduction quantities have not been assigned to the land use and urban design initiatives presented here, the importance of these initiatives should not be underestimated. Urban design and land use have long lasting implications. Once roads are and buildings are constructed, it is very expensive to change a city's structure. The land use initiatives provided in this section support and enable the initiatives described in the community buildings and community transportation sections and thus if land use recommendations are not followed, many of the initiatives for community buildings and community transportation will not be successful.

Additionally land use and urban design initiatives are important because municipal governments have a substantial control over land use, and thus are able to make a large impact on energy use, and associated GHG emissions. The land use in Pitt Meadows ranges from a compact urban core, to suburban housing, to rural agricultural areas. The majority of the development on the Harris Road corridor is compact, transit oriented and pedestrian friendly; however, other areas, such as Meadow Town Centre are lower density and automobile dependent.

Future land use planning should take GHG emissions into consideration. Increasing the density of units, providing a mix of commercial and residential units, and ensuring development is built such that transit, cycling, and walking are practice alternatives to private vehicles should be important goals for future land use.

The following initiatives fit together in a style of land use that results in increased energy efficiency and lower GHG emissions. For example, instead of zoning for residential and commercial areas far from each other, and promoting large retail outlets centred around expanses of land that can accommodate large parking lots, new developments should feature a mixture of residential, commercial, and employment areas and be centred along transit routes or planned rapid transit routes, with ample infrastructure for cyclists and pedestrians. The later development style not only reduces energy consumption in buildings, but also for transportation, and thus land use choices will impact both the buildings and transportation sections. It is the ability of good urban design to link neighbourhoods of energy efficient buildings to environmentally friendly transportation options that makes land use initiatives so important.

4.3.1 Senior Government Policy and Programs

Provincial Government

The Agricultural Land Reserve

The Agricultural Land Reserve (ALR) keeps greenfield development to a minimum in agriculturally productive areas. This policy can also help prevent urban sprawl, and often helps lead to higher density development near city centres. A substantial proportion of the land in the City of Pitt Meadows is in the agricultural land reserve.

Regional Government

The Metro Vancouver Regional Growth Strategy

The current regional growth strategy, the Liveable Region Strategic Plan (LRSP), was created in 1996 and has been recently updated. It is recognized under the Growth Strategies Act. The LRSP seeks to protect the natural environment around Metro Vancouver, while allowing for substantial population growth. The four main strategies of the plan are to: protect the green zone, build complete communities, achieve a compact metropolitan region, and increase transportation choice. The City should continue to support a regional growth strategy with an emphasis on sustainability including preserving greenspace and reducing urban sprawl and the use of single occupant vehicles.

4.3.2 Local Government Policy and Programs

Concentrate High Density and Commercial Areas on Major Transit Routes

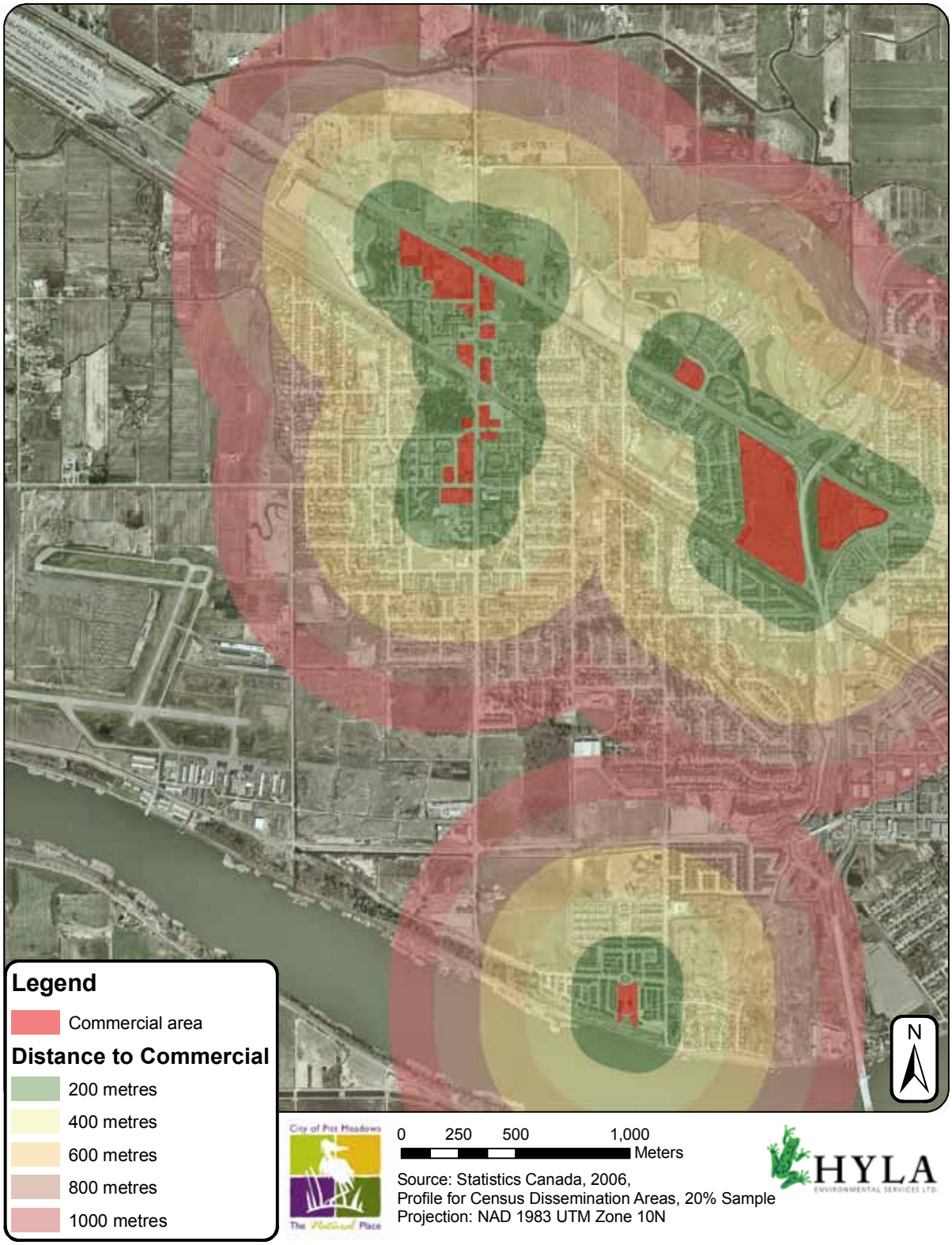
The construction of high density residential areas only decreases the use of private vehicles if developments are built near high frequency transit routes. If high density developments are built in areas that are not well served by transit, it will simply lead to more people driving. Additionally, commercial building should be built along major transit routes, utilizing the principles of transit oriented design. Avoid building large commercial areas in regions poorly served by transit.

The most frequent bus service in Pitt Meadows is provided by the 701 Coquitlam Station/Haney Place, which follows Harris Road and Hammond Road through Pitt Meadows and thus, these roadways are good candidates for higher density development. Currently service provided by community shuttles, such as the C41 in Pitt Meadows, is infrequent, does not run on Sunday, and does not extend into the evening. Additionally C41 runs in only a one-way loop for a substantial portion of its route. Concentrating more density along the C41 route, such as in southern Pitt Meadows, only makes sense if increased density comes with drastically improved transit service.

Decrease Distance to Commercial Locations

Reduce vehicle use and increase non-auto trips by encouraging commercial developments close to populated areas and public transit. Avoid zoning large residential areas without any commercial facilities. In areas that are built-up, consider allowing some commercial space along transit corridors. Aim for a less than a 10 minute walk to a commercial area from all parts of the City, a 10 minute walk to commercial areas will reduce people's dependence on vehicles, traffic congestion, and associated CO_2e emissions. For areas that are already built up, consider zoning some areas for neighbourhood commercial.

Most of the residents of Pitt Meadows are within walking distance of commercial areas (Map 4.8); however, the newer residential developments in the southern part of Pitt Meadows are currently a substantial distance from



Map 4.8 - Distance to Commercial Areas

In order to decrease the use of private vehicles, the walking distance to commercial areas should be as short as practical. The map above shows areas that are within 400 to 1000 metres of a commercial area. Most areas of the City are within walking distance of a commercial area (although the Meadow Town Centre commercial area is automobile oriented, and difficult for pedestrians to access). Note this is a basic analysis using "as the crow files" distance, a more detailed analysis would use actual walking distance.

any commercial area (although if planned community commercial developments are built, this will change). The City should continue to support commercial services including a grocery store, food services, and retail services in southern Pitt Meadows.

In addition to the areas that currently lack commercial facilities, some areas of the City that do feature commercial space are automobile oriented and difficult to access for pedestrians, cyclists, and transit users. Meadow Town Centre in the eastern portion of the City is an example of a commercial area that is not easily accessed by pedestrians and thus residents in the eastern parts of Pitt Meadows are more likely to need a vehicle to access commercial services and, as a result, will contribute to higher GHG emissions than if pedestrian friendly commercial areas where located nearby.

Decrease Distance Between Residential and Employment Areas

Ensure new residences, commercial, and employment are developed within the maximum allowable distance of each other. In built up areas consider adding new uses to large residential only zones before major re-development. It should be possible for residents to access employment and commercial areas without the need for a vehicle.

Ensure that new industrial, commercial, and other employment areas are well served by transit and are accessible to pedestrians and cyclists. For example, work with TransLink to ensure that new employment areas in the south of the City are well served by bus and that necessary connections and safe routes are available for pedestrians and cyclists.

Encourage Mixed Use Neighbourhoods

Fusing residential and commercial sectors into mixed-use developments benefits the community and the environment. Residents in these developments usually access services in their neighbourhood by walking, bussing, or biking, as opposed to driving, because much of what they need is close by. Consequently, mixed-use land improves transit services, lowers traffic congestion, and tightens the sense of community.

The City should continue to support mixed use neighbourhoods in areas such as along Harris Road, where there is good access to public transportation Additionally, the City should ensure that a variety of uses are incorporated into new developments, particularly if development continues to expand in the southern part of the City. Mixed use developments typically feature high density mixed use buildings (with retail and office space on lower floors and residential units on upper floors) along a transit route, with medium and lower density housing located on nearby neighbourhood roads.

Encourage Neighbourhood Commercial

Neighbourhood commercial buildings are typically small scale retail outlets, such as corner stores, or coffee shops. They can be included in multi-unit buildings, with residential units above. Neighbourhood commercial developments are essential for decreasing private vehicle use as they provide a convenient location for residents to run small errands without using a vehicle (Figure 4.2). Neighbourhood commercial buildings can also help enable transit use, by allowing transit users to easily pick up a few items at neighbourhood store on the way home from a bus stop or transit station without the need for a vehicle.

Figure 4.2 - Neighbourhood Commercial
An example of a neighbourhood commercial store in North Vancouver. Encouraging the development of small commercial facilities in areas that aren't in walking distance of commercial facilities can help decrease the number and distance of vehicle trips.

Neighbourhood commercial zoning should be considered in all parts of the City that are not already within a 5 to 10 minute walk of a pedestrian friendly commercial area, particularly in locations near a bus route. For example the southern portion of the City will benefit when community scale commercial developments

are complete, and the eastern portion of the City could benefit from some pedestrian accessible neighbourhood commercial buildings.

Encourage Pedestrian Centred and Transit Oriented Design

Avoid constructing new commercial areas centred on large parking lots. Instead, align commercial buildings along a transit routes, with easy pedestrian access to transit shelters (Figure 4.3). Providing metred on-street parking limits driving, while still providing vehicle access and also provides a buffer between pedestrians and traffic. In residential area, provide traffic calming measures and pedestrian walkways and crosswalks especially in areas around transit stops.

Several buildings along Harris Road in Pitt Meadows serve as a good example of pedestrian oriented design, with convenient access to transit service, wide sidewalks buffered from traffic, and cycling routes nearby. The City should continue to encourage similar types of development, as the appeal of transit oriented design increases drastically as more buildings along a corridor adhere to this pedestrian friendly style of development. When only

Figure 4.3 - Pedestrian Friendly and Non Pedestrian Friendly Development Styles

Example of a pedestrian oriented development (top) and an automobile oriented development (bottom) in Pitt Meadows. Pedestrian friendly developments encourage alternative modes of transportation by fusing residential and commercial units in the same area and featuring infrastructure designed for transit users, cyclists, and pedestrians (note the wide sidewalk, transit shelter, and nearby bike route). Automobile oriented development makes it unpleasant and even dangers for pedestrians, cyclists and transit users to get around, and typically leads to higher automobile use and associated GHG emissions.

a few buildings conform to pedestrian oriented development styles, nearby residents will be less encourage to walk or cycle in the area. The City should continue efforts to make the Harris Road corridor as appealing as possible to pedestrians, cyclists, and transit users through pedestrian centred and transit oriented design.

Areas of the City with highway commercial zoning, such as Meadow Town Centre, are nearly impossible for pedestrians, cyclists and transit users to access. The need to accommodate high traffic volumes on Highway 7 limits the ability to build pedestrian oriented development along the Lougheed corridor; however, opportunities to enhance the connectivity of residential areas to nearby commercial services, such as Meadow Town Centre, and to improve the attractiveness of these areas to non-auto users should be pursued by the City. Increasing the amount of pedestrian oriented and transit centred design in eastern Pitt Meadows is important for reducing auto dependence and associated GHG emissions in this area.

Continue to Integrate Transit Planning and Land Use

Continue to integrate land use planning and transportation planning to ensure that major transit routes service all high density residential and commercial areas and that these areas are built to the specifications of transit oriented design. Take a holistic approach to planning new developments and examine land use patterns under the context of improving transit access and use. If new developments are planned, ensure that transit planners are involved and that these developments complement the transit network, through transit oriented design and traffic management. Ensure that the transit network is flexible enough to effectively support increased density and new land uses. In general, transportation and land use should be planned together, and should not be considered as two independent processes.

As a policy, avoid building new developments in areas poorly served by transit, with the intent of adding transit as an afterthought. It is extremely difficult to retrofit areas to support cost effective transit service if they were built without consideration for transit users.

In areas that already feature high frequency transit service, require all new buildings to feature transit oriented design. The 701 and 791 bus routes are the transit routes that offers some of the best service in Pitt Meadows, and thus is a good candidate for continued higher density residential and commercial development.

4.4 Community Transportation

4.4.1 Senior Government Policy and Programs

Provincial Government

Active Transportation to and from Schools

Support school programs that encourage children to walk or bike to school instead of relying on vehicles. Also examine associated safety and infrastructure issues.

Highway/Bridge Expansion Projects

Senior governments have invested billions of dollars in highway expansion projects in Pitt Meadows and surrounding communities. These projects are intended to increase the size of freeways and roadways and hope to reduce GHG emissions from idling vehicles. GHG reductions from highway expansion are dependent on the number of vehicles using the expanded roadways not being substantially higher than the number using current roadways. In order to prevent increases in single occupancy vehicle use, increasing numbers of commuters must be accommodated through alternative transportation modes, such as transit, cycling, or walking. A reduction amount for the expansion to the Pitt River Bridge, related highway expansion, and to a lesser extent, the Golden Ears Bridge, is estimated in Table 4.5. This information is not referenced and originates from Provincial staff. It is a 'back-of-the-envelope' calculation that HES is uncomfortable including in the calculation.

Table 4.5 - Reductions from Highway/Bridge Expansion Projects

Reduction Initiative	Level of Government	Reduction Quantity GHGs (tonnes CO_2e)
Highway Expansion	Provincial Government	3,900

4.4.2 Local Government Policy and Programs

Decrease Vehicle Fuel Consumption Rate

Improve Vehicle Maintenance

Encourage citizens to undertake regular vehicle maintenance, maintain proper tire pressure, observe speed limits, plan trips to reduce the number of trips, and share rides. Table 4.6 presents the potential GHG emissions reductions possible from improving vehicle maintenance. The reduction estimate is based on potential fleet wide decreases in fuel consumption rate of two percent and has been applied to the fuel consumption of ~10,000 vehicles present in the City in 2007 (note: recent data is not available).

Table 4.6 - Reductions from Improving Vehicle Maintenance

Reduction Initiative	Level of Government	GHG Reductions (t CO_2e)
Improve Vehicle Maintenance	Provincial and Federal Government	800

Increase Replacement Rate of Older Vehicles

Increase the City's compliance with new tailpipe standard by promoting the replacement of older vehicles, with new, more fuel efficient vehicles that conform to the new tailpipe emissions standard. Emissions from transportation can be reduced by promoting the purchase of hybrid or electric vehicles. Table 4.7 presents the potential GHG emissions reductions possible from encouraging greater market uptake of fuel efficient vehicles. This initiative is based on a ten percent increase in tailpipe standard compliant vehicles by 2020.

Table 4.7 - Reductions from Increasing the Replacement Rate of Older Vehicles

Reduction Initiative	Level of Government	GHG Reductions (t CO_2e)
Increase Replacement Rate of Older Vehicles	Shared Responsibility	1,110

Right Sizing Vehicles

The City should promote consumer purchase of the most fuel efficient vehicle to meet transportation needs and set objective to reduce the average fuel consumption rate of vehicles. While vehicle choice is largely driven by market forces the potential GHG reductions from this initiative are substantial. The City should aim for targets of five percent fewer trucks, two percent fewer large cars (assumed to be replaced with seven percent smaller cars - reductions in the number of vehicles included in other initiatives). Table 4.8 presents the potential GHG emissions reductions possible from reducing the number of light trucks, vans, SUVs and large cars in the community vehicle fleet.

Table 4.8 - Reductions from Right Sizing Vehicles

Reduction Initiative	Level of Government	GHG Reductions (t CO_2e)
Right Sizing Vehicles	Shared Responsibility	179

Idle Free Legislation

Idling wastes fuel and produces unnecessary GHG emissions. There is a misconception that it is more efficient to idle a vehicle than to stop and restart a vehicle, which increases the problem of vehicle idling. The City should promote programs to reduce idling, and consider anti-idling by-laws. Table 4.9 presents the potential GHG emissions reductions possible from idle free legislation. The reduction estimate is based on potential fleet wide gains in decreases in the fuel consumption rate of vehicles from reduced idling.

Table 4.9 - Reductions from Idle Free Legislation

Reduction Initiative	Level of Government	GHG Reductions (t CO_2e)
Idle Free Legislation	Municipal Responsibility	260

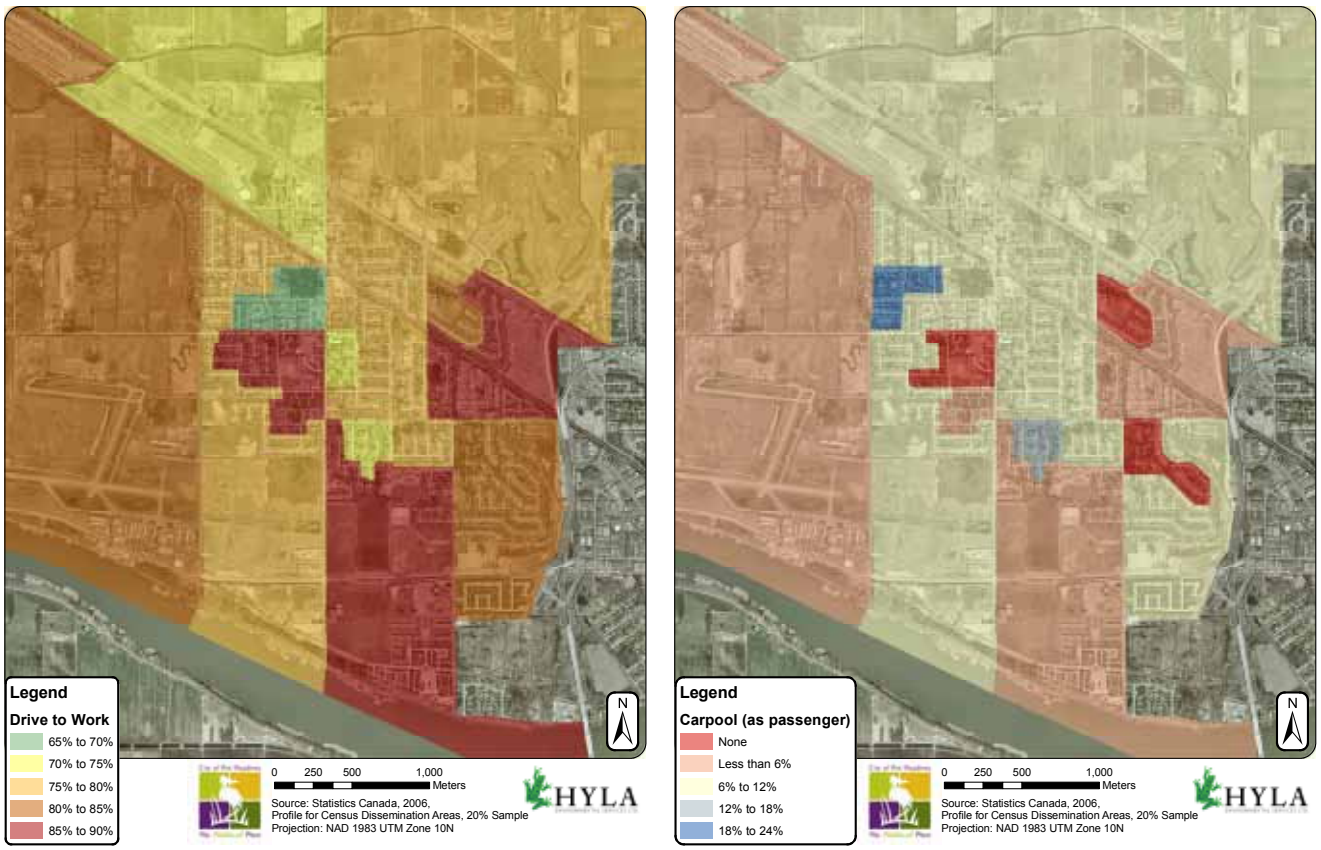
Reduce Vehicle Kilometres Travelled (VKT)

Private automobiles are the single largest source of GHG emissions for the City. Reducing the use of private single occupant vehicles can greatly reduce the greenhouse gas emissions from transportation. This section describes initiatives that can be used to reduce the number of and/or distance of single occupant trips. The use of the private vehicle varies greatly from one area of the City to another (Map 4.9). Initiatives that decrease private vehicle use by increasing the proportion of people who use public transit, cycle, or walk to get to their destination are described in separate sections. This section includes other ways to reduce VKT, such as trip reduction measures including rideshare programs, employer trip reduction programs, car-share co-ops, and distance travelled reductions (Table 4.10).

Table 4.10 - Reductions from Decreasing VKT

Reduction Initiative	Level of Government	Reduction Quantity GHGs (tonnes CO_2e)
3,087	Municipal Government	429

Un-hide the Costs of Parking to Reduce Private Vehicle Use



Map 4.9 - Percentage of People Who Commute to Work in a Private Vehicle (as the driver or passenger)

Single occupant private vehicles are one of the largest sources of greenhouse gas emissions for the City. The map on the left shows the percentage of people who get to work by private vehicle (car, van, or truck) as a driver (with or without carrying passengers). The map on the right shows the percentage of people who get to work in a private vehicle which they are not driving.

Initiatives that make people more aware of their driving habits can reduce private vehicle use and highlight alternative forms of transportation. Consider showing the costs of parking where they are currently hidden. For example, in new residential buildings encourage the sale of parking spaces individually (and not bundled in with the cost of the unit). Additionally, look at other areas where the cost of providing parking is hidden (such as providing free parking on City lots) and instead charge for parking directly.

Develop and Implement a Transportation Demand Management Plan

Develop a Transportation Demand Management Plan to get people thinking about their driving habits, and to encourage them to try alternative transportation methods, like carpooling, biking, or taking transit to work.

Reduce VKT: Shorten Trips

Encourage trip shortening measures by encouraging residents to use services in their area, when possible. This initiative is linked to several land use initiatives (e.g. decreasing the distance between commercial and residential areas). Additionally, the City should consider implementing programs to encourage people in outlying areas to drive to the nearest transit stop and then use transit for the remainder of their journey to help to shorten trips.

Increase the Use of Public Transit

Public transit produces substantially less emissions per capita than single occupant vehicles. Additionally, there are a variety of options being investigated by public transit agencies that reduce emissions from public transit to near zero including electric buses and rapid transit, hybrid buses, and alternative fuel buses. Other benefits from public transportation are a reduction in traffic congestion, better air quality, and the ability of an area to support more compact development.

The level of public transit service in the City varies from region to region, and the percentage of people who use public transit to commute to work also varies substantially by neighbourhood (Map 4.10). The West Coast Express provides high-speed service in peak hours to municipalities west of Pitt Meadows and to Downtown Vancouver. Most areas of Pitt Meadows are within walking distance of a station. TransLink buses provide service to all urban parts of Pitt Meadows, with almost all parts of the City less than 400 metres from a bus stop (Map 4.11). The level of transit service in different areas varies however, with service ranging from the frequent transit network in some parts of the City with service for about 20 hours a day, most of which is at a 15 minute headway, to community shuttle routes, with service about 14 hours of the day (and not at all on Sunday), at about a 30 minute to 60 minute headway. Increased transit service to areas that currently lack adequate service, as well as better connections to neighbouring communities would likely increase the percentage of people who use public transit.

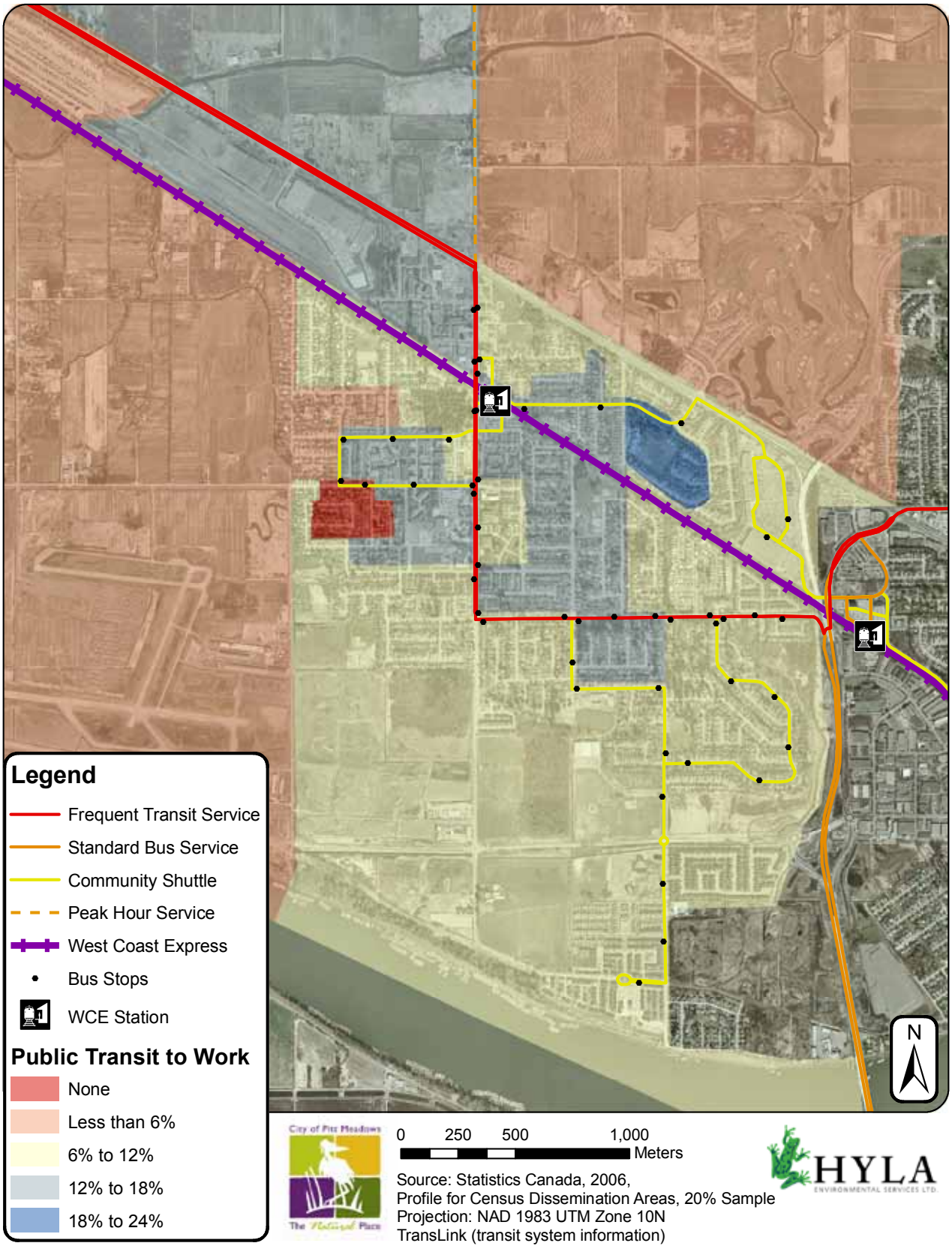
Additionally, increased service on the West Coast Express, including longer hours of service, more frequent peak hour service, and the addition of some trains that run east in the morning and west in the evening would likely encourage more people to use transit. Long-term plans for extending rapid transit to Pitt Meadows will be necessary in order to drastically increase transit ridership.

This section outlines areas where improvements can be made to public transit infrastructure, to increase ridership. According to Statistics Canada, the transit mode share for commuters in Pitt Meadows is about ten percent[1], compared to a 12 percent average for Metro Vancouver. The Provincial Transit Plan provides a goal of increasing transit mode share in Metro Vancouver to 17 percent by the year 2020[2]. To determine reductions from increasing transit ridership, we assume Pitt Meadows will meet the provincial goals by 2017. For this calculation, we assume people who switch to public transit will use their vehicles 70% less (on average, many will no longer require a vehicle), each saving 2.1 tonnes of CO_2 annually.

To meet the ambitious goals of the Provincial Transit Plan, the rapid transit network in Metro Vancouver will have to expand rapidly, along with local bus service, and other public transit infrastructure. Ridership increases in Pitt Meadows will be dependent on the construction of the Evergreen Line to nearby Coquitlam, as well as major increase in West Coast Express service levels, or some other form of rapid transit link to neighbouring municipalities. Additionally, new investment in public transit infrastructure and amenities will help attract more riders.

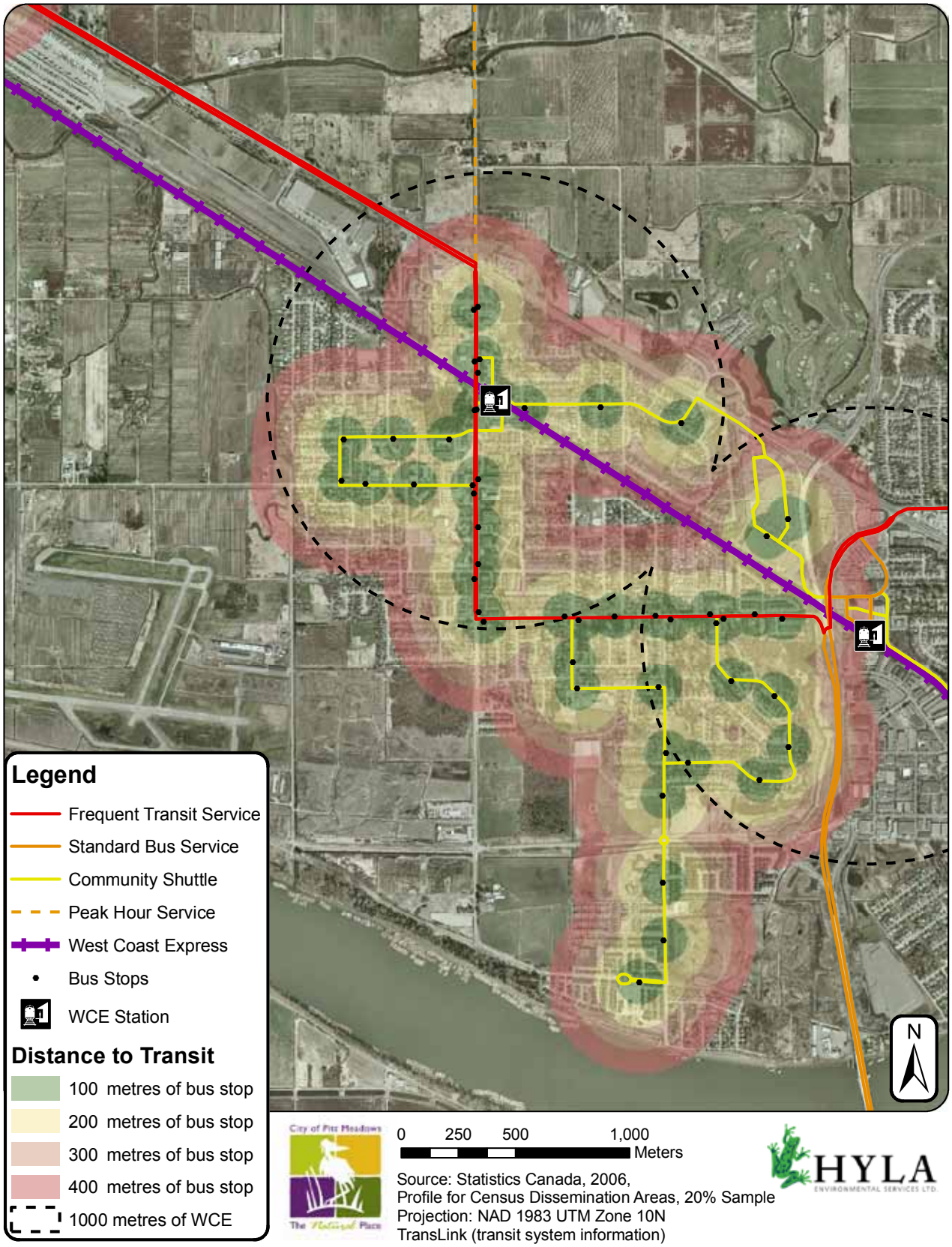
Table 4.11 - Reductions from Increased Transit Ridership

1 Statistics Canada 2006 Community Profiles
2 Provincial Transit Plan, January 2008



Map 4.10 - Percentage of People Who Commute to Work by Public Transit

Public transit produces substantially less emissions per user than private vehicles. The level of public transit service and the associated ridership varies greatly among different parts of the community. This map shows the transit service for an area and the percentage of people who ride public transit to work for each census dissemination area. The lower transit ridership in the southern region of Pitt Meadows accompanies high private automobile usage.



Map 4.11 - Distance to Public Transit

In order to decrease the use of private vehicles, the walking distance to transit should be as little as practical. The map above shows areas that are within 100 to 400 metres of a transit route Overall, most areas of the City are near transit service (although the quality of transit route varies substantially and many sections of the community shuttle route provide one-way service only). Note this is a basic analysis using "as the crow files" distance, a more detailed analysis would use actual walking distance.

Reduction Initiative	Level of Government	Reduction Quantity GHGs (tonnes CO_2e)
Increase Transit Ridership to 17% mode share	Shared	3,087

Increase West Coast Express Ridership

The West Coast Express provides Pitt Meadows residents with fast and reliable rail service during peak periods to municipalities to the west, including Port Coquitlam, Coquitlam, Port Moody, and Vancouver (Figure 4.4). The service was introduced in 1995 and has been incredibly successful, experiencing a doubling of ridership between 1995 and 2009. The number of passengers using the West Coast Express is continuing to increase at a growth rate of about 8% per year. The increased ridership has drastically reduced the costs of operating the service, with the subsidy falling to only $0.02 per passenger km in 2008 from $0.16 in 2001. Continuing investment in the West Coast Express has maintained high reliability (about 98% on time performance) and customer satisfaction (the highest out of any TransLink service).

Despite the success of the West Coast Express, there are growing complaints about the limited hours the train operates at. The West Coast express operates five morning westbound trains and five evening eastbound trains, as well as special event trains. There is no regularly scheduled service on weekends. These limited hours of service and commute-only direction make the West Coast Express unpractical for many who are otherwise be interested in using it. The current service is operated under contract with the Canadian Pacific Railways (CPR) until 2015, so major service changes are unlikely until after that time. The City should work with West Coast Express, TransLink, and senior government to ensure substantial increases in West Coast Express hours of service are brought into effect upon renegotiation of service with CPR. An introduction of all-day and week-end service would likely substantially increase ridership. Rail transit services in other cities, such as Toronto, that began offering only commuter service have been improved to offer 2-way daytime and weekend trips. For example, GO transit in Toronto currently operates two rail lines with 2-way all day service, with plans to expand this service to 8 all day service lines. The ability of the West Coast Express to attract high numbers of people who would otherwise be commuting long distances in personal vehicles make it an important component of Pitt Meadows plan to reduce GHG emissions.

Figure 4.4 - The West Coast Express

Travelling by rail produces substantially less GHG emissions than travelling by personal vehicle. The City should continue to work with senior government and TransLink to increase West Coast Express hours and frequency.

Encourage New Buildings to Feature Public Transit More Prominently

Encourage developers to consider public transit features as part of their building design. For instance, situate the main entrance of a building towards a road with a public transit route, or construct a high quality public transit shelter during the building's development.

Buildings along Harris Road or near the West Coast Express station are good candidates for this initiative and in several cases transit is already easily accessed from buildings on this corridor (see the top image in Figure 4.3 on page 39). Buildings that feature a well constructed transit shelters near their main entrance encourage residents or visitors to use transit, while buildings that are disconnected from transit services near by tend to be difficult for transit users to access.

Public Transportation Shelters

The City should promote the construction of abundant and appealing facilities for pedestrians and transit users. Shelters that are well lit, have adequate space for wheelchairs, level pavement, and easy to understand route information are ideal and encourage transit use for all members of the community.

The City should ensure that all transit stops in commercial areas (for example along Harris Road (Figure 4.5), near Meadow Town Centre, and near new commercial developments planned in the south of Pitt Meadows) have transit shelters that are well maintained, easily accessed, and well lit. Additionally, stops near high density residential buildings, or in locations where people transfer buses (e.g. where the 701 route and C41 routes meet) are important locations for transit shelters. Work with TransLink to provide detailed schedules and route information at these stops.

Public Transport Vouchers

Large companies can offer employees monthly transit passes or a cash allowance intended for transit. One incredibly successful program in Washington reduced the number of daily driving trips by 22,221 in a 3 year period. These programs work best for large companies, but smaller companies could collaborate to develop their own incentives for alternative transportation.

The City should work to ensure employers in Pitt Meadows are aware of the TransLink employer program and consider implementing a public transit voucher program for municipal employees, to reduce GHG emissions and to serve as an example for local business.

Identify Grants for Transit Improvement Projects

Start a fund for transit improvement projects. The City could look into provincial and federal grants in order to fund projects that improve access to public transportation, including bus shelter improvements.

Large transit improvement projects in Pitt Meadows are the responsibility of TransLink and the City should work with TransLink to lobby senior governments for funding for improved transit in the City, including West Coast Express service increases and eventual extension of rapid transit to the City.

Construct Transit Priority Lanes

Investigate opportunities to construct transit priority lanes (or H.O.V.) lanes and other preferential traffic rules (e.g. transit signals at intersections), especially where a transit route is located on a congested roadway. Investigate other ways the City can increase transit priority such as installing "bus bulges" in locations where there is on-street parking and it is difficult for transit buses to pull into traffic.

While traffic on Lougheed highway is a provincial responsibility, the City should look for other areas where transit traffic flow may be improved by transit priority measures. Identify areas, particularly on Harris Road and Hammond Road where transit priority maybe installed to improve transit flow and on-time performance of transit vehicles.

Develop and Maintain a Comprehensive Transit Plan

Work with TransLink, nearby municipalities, and the community to create a City transit plan that will address issues surrounding to public transit for which the City has control. The plan should address ways to make public transit as attractive and reliable as possible for the community.

The City should work with the District of Maple Ridge and TransLink to identify corridors that will be used for long term transit expansion and ensure transit is explicitly incorporated into long range planning. Additionally, continue to work with the community to identify areas where lack of access to transit is a problem, and ensure these concerns are addressed when TransLink is identifying areas for transit improvements.

Figure 4.5 - TransLink bus in Pitt Meadows

TransLink bus on Harris Road. Increasing public transit service can help decrease the use of private vehicles and thus lower GHG emissions.

Support Transit Expansion Projects

Support efforts by senior government to expand regional public transportation networks and lobby for increased transit service in the City. Prioritize public transit improvement projects over road expansion projects and plan to have an increasing proportion of transportation funding used on public transportation projects. Investigate the potential for expanded transit service hours, routes, and frequency.

Aside from potential expansion of West Coast Express service, rapid transit expansions to Pitt Meadows will not likely occur over the time period covered by this report. Delays with extending Metro Vancouver's rapid transit network as far as Coquitlam mean service to Pitt Meadows is a long term goal; however, the City should continue to push for accelerated schedules for rapid transit expansion projects.

Additionally, the City should work with the community and TransLink to investigate potential types of rapid transit that are practical for future use in Pitt Meadows. Transit systems such as SkyTrain are typically only appropriate for large areas of high population densities and thus would be inappropriate for Pitt Meadows and Maple Ridge; however, light rail systems are much cheaper, and are in use in many other regions for linking smaller communities to urban centres. The City should investigate a range of potential transportation systems, and work with TransLink and senior government to ensure rapid transit projects that are practical for lower density and may be extend in to eastern Metro Vancouver communities are evaluated in long range transportation plans.

For the City to meet its transit ridership increases, it is essential that the region stay on track with a major expansion of its rapid transit network. Because a transit system grows exponentially more useful with each expansion, improvements in other areas of the Lower Mainland can help reduce personal vehicle use in Pitt Meadows. For example, the Evergreen line, once complete, will allow Pitt Meadows residents to transfer from the West Coast express, to more easily accessible areas in Burnaby, New Westminster, and Surrey. If regional transit improvements are delayed, Pitt Meadows may not be able to meet targets for GHG reductions from transportation.

Encourage Cycling and Walking

Cycling and walking provide an emissions free transportation option. Some areas of the City have very few people who choose to walk or cycle, while others show higher levels of cycling (Map 4.12). It is important to note that the maps are based on data from the 2006 census, before several improvements to cycling infrastructure were made. The 2011 census will likely show any gains in the proportion of residents choosing to walk or cycle to their destination. Continuing to invest in cycling infrastructure is important as substantial emissions reductions can be achieved if people who previously used auto-modes of transportation walk or cycle for some or all of their trips. Promoting walking and cycling has other benefits, such as improved public health, decreased traffic and air pollution, increased sense of community, and the creation of more livable communities. Improvements to pedestrian and cyclist infrastructure can also improve the access of residents to public transit, thus benefiting even those who are unable to walk or cycle for their entire journey.

Encourage Enhancement of Pedestrian and Cycling facilities

Multi-modal street design includes traffic calming, interconnected streets (Figure 4.6). Additionally, narrow road intersections to reduce the length of crosswalks and encourage active transportation. Traffic calming projects have been successful at reducing vehicle traffic, speed and accidents as well as encouraging active transport in many circumstances. Create a buffer of green-space between pedestrians and roadways to improve walkability and consider building car-free areas into new developments. Street design initiatives involve planners, engineers and community residents.

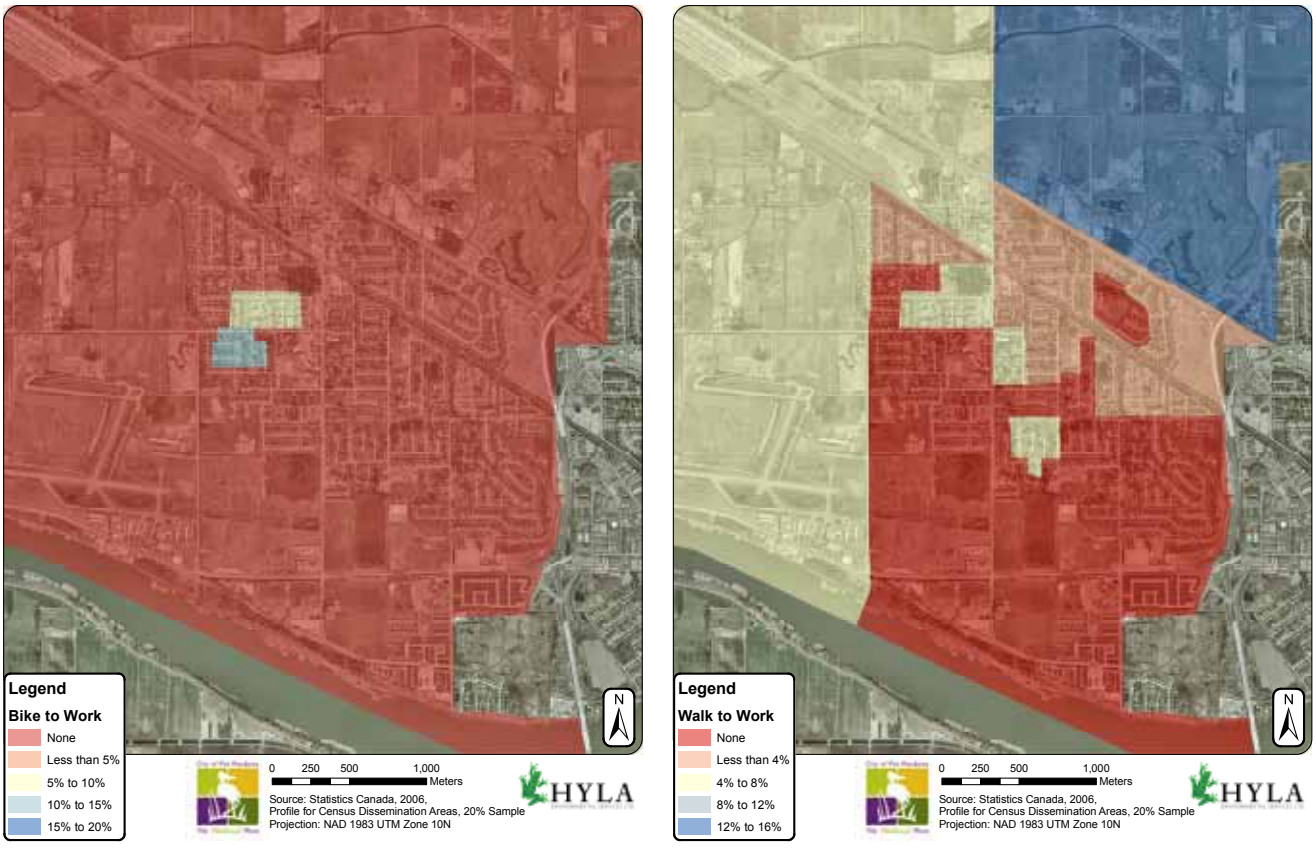
Figure 4.6 - Pedestrian Shortcut in Central Pitt Meadows
Creating "shortcuts" for pedestrians and cyclists can help make it more convenient to walk or cycle. When areas that lack pedestrian pathways or crosswalks are being redeveloped, ensure these facilities are incorporated into new designs.

Road networks with many cul-de-sacs, and winding "no-through" roads that lack pathways for pedestrians and cyclists almost always result in drastically higher personal vehicle use relative to areas with interconnected street networks. The cul-de-sacs preventing access between 117 Ave and Hammond road are some of the many examples of where discontinuities in the road network in Pitt Meadows discourage walking, cycling and transit use. In some cases the distance for pedestrians to walk is ten times what it could be if there was a pedestrian pathway. Not only do breaks in the road network force pedestrians on to long detours, but they also prevent cyclists from using parallel streets as alternative routes to major roadways. For example, there is no parallel route near Hammond Road that cyclists who want to avoid cycling in traffic may use. Traffic calmed roads running parallel to major roads are some of the best ways to attract new people to cycling.

It is incredibly difficult to retrofit existing areas to improve conditions for pedestrians and cyclists; however, there are several ways to gradually add pedestrian and cyclist infrastructure. For example requiring easements for a pedestrian path during new developments, such as when higher density buildings replace single family homes, can help to create corridors that enable the use of neighbourhood streets as bike routes. Additionally, adding crosswalks and curb extensions at major roads can allow for easier movement along neighbourhood streets. On major roadways creating a buffer between the sidewalk and the roadway through on-street parking and a row of street trees can make the route more attractive for pedestrians.

Improve Cycling Infrastructure

Invest in bicycle lanes and signals, optical recognition of bicycles at left turn lanes, and bike racks. Initiatives such as traffic calming and interconnected streets that are useful for pedestrian also improve cycling conditions. Examine opportunities for expanding bike lanes and building more off-street bicycle routes as well as places for expanded bike parking (Figure 4.7).



Map 4.12 - Percentage of People Who Cycle and Walk to Work

Cycling and walking are two of the best ways to get around without using fossil fuels. The map on the left show the percentage of people in each census dissemination area who use a bike as their primary method of getting to work and the map on the right shows the percentage of people who walk to work as their primary method of transportation. Note this data is from the 2006 census. The 2011 census will show the impact of recent improvements to cycling and pedestrian infrastructure.

Bicycle parking facilities exist along Harris Road in several locations and the City should continue to increase the number of bike racks, and install bike lockers in new locations. Ensuring there is a location for cyclists to lock-up their bikes at all major destinations can help to encourage more people to cycle. Additionally, the City should continue its aggressive expansion of cycling projects to continue to draw more people to cycle. Improving safety and ease of access to commercial areas of the City, especially Meadow Town Centre, is an important goal for future cycling projects.

Figure 4.7 - Cycling Infrastructure
Bike rack near Harris Road. Increasing cycling infrastructure such as bike racks, bike lanes, and cyclist activated signals at busy crossings can increase cycling and decrease private vehicle use.

Develop and Maintain a Comprehensive Non-Auto Transportation Plan

Work with the regional district and nearby municipalities to create a plan that focuses on non-auto transportation. The plan should contain maps that outline walking and biking routes to busy city centres, coupled with suggestions on how to make these routes as safe and reliable as possible.

Work with the District of Maple Ridge to ensure it is possible to cycle or walk between destinations in Pitt Meadows and Maple Ridge easily and safely. Identify routes with the goal of making them non-auto transportation corridors and ensure new development and infrastructure projects compliment this goals.

Support Cycling and Pedestrian Projects

Support improvements to cycling and pedestrian infrastructure and lobby for increased funding for non-auto transportation modes. Advocate for cycling and pedestrian components of regional transportation plans.

When projects built through Pitt Meadows by senior governments are being planned, ensure that adequate attention is given to cyclists and pedestrians. Lobby for these projects to contain funding for cycling and pedestrian infrastructure and ensure that new projects do not impede the flow of cyclists or pedestrians.

Identify Grants for Non-auto Transportation Projects

Start a fund for non-auto transportation projects. The City should look into grants for providing cycling infrastructure and for pedestrian improvement projects, such as provincial and federal government grants for new sidewalk and bicycle lane construction.

The City of Pitt Meadows should seek funding through provincial funding for sidewalk construction and federal and provincial economic stimulus funding in order to continue to expand cycling routes, and build new sidewalks in areas where there currently are none.

4.4.3 New Technology

Public Transit

Investigate Transit Priority Technologies

Examine the potential for transit priority technologies at traffic signals on major transit routes. Transit priority signals allow transit vehicles to lengthen a green light or decrease the length of a red light at intersections. Work with TransLink to identify if any areas in Pitt Meadows could benefit from transit priority signals.

Work with TransLink to Implement Real-time Transit Technologies

Real-time transit technologies, such as the NextBus system being tested by TransLink provide transit users with real-time information on when the next bus will arrive through the use of a display located at major transit stops. Investigate the potential for installing such a system at major bus stops within the City. Bus stops along Harris

Road and at Pitt Meadows stations are good candidates for real-time transit technology. Additionally, the City should work with TransLink to improve route information for Pitt Meadows in Google Transit (e.g. add transit routes, not just stops).

Evaluate New Public Transit Types

Trams or streetcars, long popular in European cities, are making a comeback in North America. These systems are growing in popularity due to the much higher ridership they attract relative to buses, their ability to encourage high density, transit oriented development, and their drastically lower cost and installation time compared with other rapid transit types (Figure 4.8). Light Rail Transit (LRT) systems, which are similar in to streetcars, but operate larger vehicles in dedicated right-of-ways, are also growing in popularity.

Vancouver ran a highly successful demonstration streetcar line during the 2010 Olympic games, and has plans for building a downtown street car system. Many other nearby cities, such as Edmonton, Calgary, Seattle, and Portland run LRT systems into nearby suburban communities. The benefit of LRT systems over other technologies, such as SkyTrain, is its drastically lower installation costs mean transit lines can be extended further into suburban communities, and can economically service areas where the population density isn't high enough to support more expensive transit systems.

The City of Pitt Meadows should evaluate different public transit options, and work with TransLink and the provincial government, to identify transit technologies that may be extended to Pitt Meadows in the future. For example, while it is unlikely that a future extension of the planned Evergreen line could reach Pitt Meadows, lower cost transit technologies could potentially be extended as far as Maple Ridge, at a much lower cost per kilometer than SkyTrain.

Figure 4.8 - Modern Transit Technology
Modern light rail technology attracts substantially higher ridership than buses, but is cheaper to install than grade-separated systems, which are only appropriate in high density areas. Different transit technologies should be evaluated for future extensions to Pitt Meadows.

Private Vehicles

Plug-in Electric Vehicles

Once the electric plug-in vehicle is fully developed, greenhouse gas emissions will be greatly reduced. Developers need about 3-5 years before these vehicles will be ready for release into the mainstream market.

4.5 Solid Waste

4.5.1 Senior Government Policy and Programs

Regional Government

Zero Waste Challenge

Metro Vancouver formed the Zero Waste Challenge to develop more environmentally friendly methods of waste disposal. Some program suggestions are more recycling, backyard and food waste composting, and education for all members of the community (Figure 4.9). Although the City will undertake it's own community solid waste pick up programs, it is the downstream GHG emissions that can be reduced more effectively. Through a combination of initiatives, the City's GHG emissions from community waste should be reduced to zero.

Figure 4.9 - The Zero Waste Challenge Logo

Metro Vancouver is responsible for the City's solid waste. The Zero Waste Challenge is a Metro Vancouver initiative that aims to reduce the amount of solid waste and associated GHGs produced in Metro Vancouver.

4.5.2 Local Government Policy and Programs

Waste Disposal Programs

Waste-to-Energy Plant

As the name suggests, Waste-to Energy plants convert municipal waste into an energy supply. Instead of getting dumped into overflowing landfills, waste can be redirected to these plants. The environmental benefits are clear: these plants diminish landfills, preventing the release of methane into the atmosphere. Metro Vancouver plans to build at least 1 facility in the near future as part of their Solid Waste Management Plan.

Waste Reduction Programs

New Waste Collection Policy

The City should adopt a new waste collection policy with the goal of reducing the amount of garbage entering the landfill. Improvements include increasing recycling bin capacity and implementing the collection of kitchen and yard waste. Substantial increases in the solid waste diversion rate are possible in cases where kitchen and yard waste are diverted away from landfills. Additionally, the City should investigate if an increase in solid waste diversion rate can be achieved by implementing single stream recycling.

Construction Waste Reduction Policy

The City should investigate ways in which solid waste from building renovations or new building construction can be reduced. For example, the City should work to implement a recycling plan for construction projects that seeks to recycle would waste that would otherwise be disposed of with other solid waste.

4.6 Community Reductions Summary

4.6.1 Reduction Initiatives

Table 4.12 provides a summary of the quantifiable community reduction initiatives and indicates which level of government is responsible for each initiative. If all reduction initiatives are implemented the City of Pitt Meadows can reduce its 2017 forecast emissions quantity by 16,229 tonnes of CO_2e.

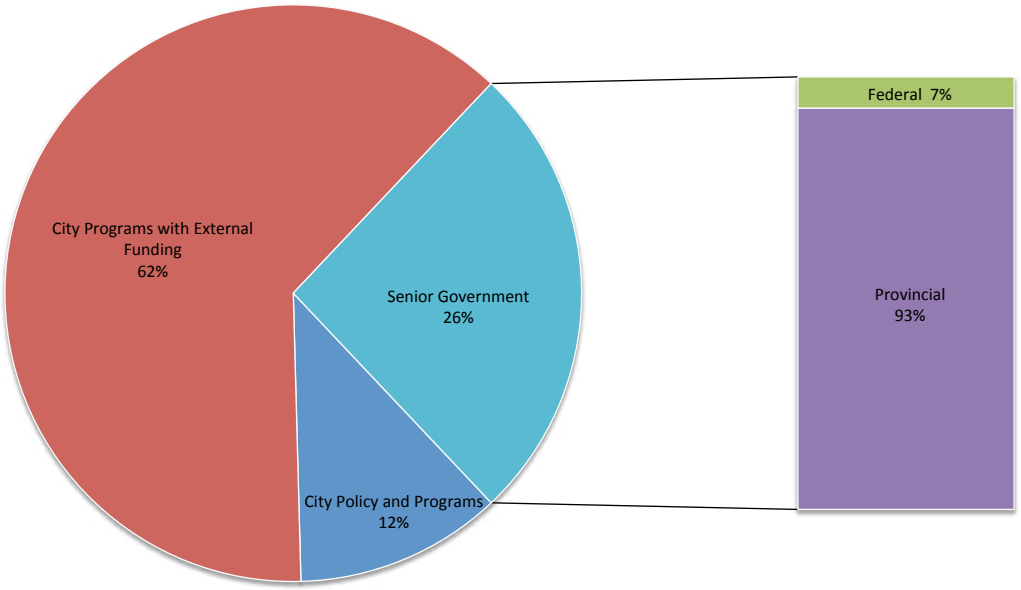
Table 4.12 - Community Reduction Initiatives Summary

Sector	Reduction Initiative	Level of Government	Reduction	
			Energy (GJ)	GHG Emissions (tonnes CO_2e)
Community Buildings	EnerGuide Rating in MLS Advertising	Federal Government	9,049	305
	CAEE Targets - Existing Buildings	Municipal – With Support	22,611	753
	CAEE Targets - New Buildings	Municipal – With Support	24,761	891
	District Energy Systems	Municipal Responsibility	33,113	1,626
	Total Buildings Reductions		**128,035**	**4,438**
On-Road Transportation	Highway/Bridge Expansion Projects	Provincial Government	–	3,900
	Improve Vehicle Maintenance	Shared Responsibility		800
	Increase Replacement Rate of Older Vehicles	Shared Responsibility		1,110
	Right Sizing Vehicles	Shared Responsibility		179
	Idle Free Legislation	Municipal Responsibility		260
	VKT Reduction	Shared Responsibility	–	429
	Increase Transit Ridership	Shared Responsibility	–	3,087
	Total On-Road Transportation Reductions			**9,765**
Community Solid Waste	Zero Waste Challenge	Municipal and Regional Government	–	2,889
	Total Solid Waste Reductions			**2,889**
	TOTAL REDUCTIONS			**16,229**

4.6.2 Share of Responsibility for Reductions

Chart 4.1 provides a breakdown of the reduction quantity for which each level of government is responsible. The largest share of the reductions quantity (62 percent) will require cooperation between the municipality and other levels of governments to reach the target. Note that this figure does not include the legislated reduction initiatives, which were included in the emissions forecast and are entirely the responsibility of senior government. The City of Pitt Meadows is responsible for 12 percent of the proposed reduction quantity, and will depend upon significant resources from senior government for the remaining quantity. Most initiatives will require outside financial assistance (Chart 4.1).

Chart 4.1 - Share of Responsibility



4.6.3 Reduction Target

The reduction target is calculated from the percent difference between the total of emissions in 2017, after all the initiatives have been applied, and the 2007 base year emissions quantity. Table 4.13 provides a breakdown of the community reduction target by sector, and by subsector for community buildings. The overall community reduction target is to reduce emissions by 13 percent below 2007 levels by 2017.

Table 4.13 - Community Reduction Target Summary

Sector		Base Year Emissions (tonnes CO2e)	GHG Projection (tonnes CO2e)	Potential Reduction of GHG Emissions	GHG Emissions After Measures	Percent Reduction of Projected Emissions
		2007	2017	2017	2017	2017
Buildings	Residential	22,783	24,689	1,696	22,993	1%
	Commercial	13,193	14,468	448	14,020	6%
	Industrial	7,089	8,996	1,431	7,565	7%
On-Road Transportation		42,613	42,509	9,765	32,744	-23%
Solid Waste		2,889	2,889	2,889	0	-100%
	TOTAL	**88,567**	**93,551**	**16,229**	**77,322**	**-13%**

5 Implementation, Monitoring & Reporting, and Resources

5.1 Implementation

An implementation matrix is presented below (Table 5.1) with suggested actions for broad groups of reduction initiatives. The page number provided refers to the grouping of reduction initiatives that are summarized in Section 4 and described in more detail in Appendix V.

Table 5.1 - GHG Emissions from Buildings in 2007 and Projected Emissions in 2017

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
Community Buildings – Senior Government Policy and Programs – Federal Government	EnerGuide rating in Multiple Listing Service (MLS) Advertising	The City should encourage EnerGuide ratings in MLS property listings	1	Make public aware of audits and increase priority when funding restored.	Currently, the Federal ecoENERGY Retrofit - Homes program grants have been suspended until further notice. The expectation is that this program will resurface in the future	3	2012 - 2013
Community Buildings – Senior Government Policy and Programs – Provincial Government	Zero Carbon Emissions from Electricity	Support BC Hydro's efforts to move towards zero emissions from electricity	2	Staff query to BC Hydro and keep apprised of developments with Provincial Energy Policy		2	2012
	Carbon Neutral Governance	Support the Provincial Government's plan for Carbon Neutral Governance	3	Staff query to Provincial Climate Action Secretariat and keep apprised of progress		2	2011 ongoing
Community Buildings – Local Government Policy and Programs – CAEE Existing Buildings Targets	Building Retrofits: Mechanical and Plumbing System Upgrades	The City should take steps towards achieving CAEE targets by promoting the following mechanical and plumbing system upgrades for existing community buildings	4	Staff query to Ministry of Energy, Mines and Petroleum Resources regarding CAEE Program and Council report to join if and when program has resources. Staff have an existing application made in 2008 as a starting point.		1 & 2	2010 - 2013
	Building Retrofits: Electrical System Upgrades	The City should take steps towards achieving CAEE targets by promoting the following electrical system upgrades for existing community buildings					

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
continued **Community Buildings – Local Government Policy and Programs – CAEE Existing Buildings Targets**	Improvements to Management and Operations Practices	The City should take steps towards achieving CAEE targets by promoting the following changes to the management and operations practices for existing commercial and industrial buildings.	4	Staff query to Ministry of Energy, Mines and Petroleum Resources regarding CAEE Program and Council report to join if and when program has resources. Staff have an existing application made in 2008 as a starting point.		1 & 2	2010 - 2013
	Upgrade Insulation	The City should take steps towards achieving CAEE targets by encouraging residents to upgrade the insulation materials used in existing community buildings.					
	Upgrade Windows	The City should promote the replacement of old windows to those with an energy star rating in existing residences.					
	Upgrade Appliances to Energy Star	Encourage residents to upgrade their appliances to those with an Energy Star rating. This helps people distinguish energy efficient products from those that are not.					
	Repair Leaks and Drafts	Encourage people to seal up cracks in their homes with caulking and weather stripping.					
Community Buildings – Local Government Policy and Programs – CAEE New Buildings Targets	Energy Efficient Construction	Encourage energy efficient construction. For instance, encourage the use of recyclable materials during construction, and the installation energy efficient appliances in new buildings.	5	Undertake Supporting Programs Eduction (SPE) seminar for staff's outreach to community. Combine with Sustainability Checklist	Designate this seminar as SPE1a Also note that the City has already adopted the Solar Ready Bylaw and is waiting for Building Code adjustments	2	2012 - 2013
	Passive Solar Design	The City should encourage the orientation of new buildings to capitalize on passive solar gain as well as encouraging existing buildings to preserve their solar access.					
	Discourage Electric Baseboards	The City should discourage the installation of electric baseboards in new residential developments.					

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
Community Buildings – Local Government Policy and Programs – CAEE New Buildings Targets	Electricity and Alternative Energy Division (EAED)	The City can achieve CAEE targets by informing developers of potential funding resources from the EAED to use alternative energy sources in new developments	6	Undertake SPE seminar for staff's outreach to community	Designate this seminar as SPE1b Update and Use Smart Growth Checklist Research Required on NRCAN Initiatives	2	2010 - 2012
	R-2000 Standard: Adopt R2000/Power Smart performance standards	The City should encourage developers to review this strategy to support achieving the CAEE targets, including the R-2000 standard for residential buildings.					
	C-2000 Standard: Adopt the C-2000 Building Code for Commercial Buildings	The City should encourage developers to review this strategy to support achieving the CAEE targets, including the C-2000 standard for commercial buildings.					
	Natural Resource Canada Renewable Energy Deployment Initiative	The City should take advantage of operating incentives provided by NRCan's initiative program.					
Community Buildings – Local Government Policy and Programs – OCP and Local Government By-laws	Community Energy Systems	The City should encourage new buildings to utilize community energy systems whenever possible.	7	Have staff work with Fortis BC to determine access available to developers for infrastructure funding partnerships. Add to and use Smart Growth checklist tor these items. Undertake SPE seminar for staff's outreach to community	Designate this seminar as SPE2	1 & 2 (pre-service for Waste Heat 4)	2011-2013
	Examine Opportunities for GeoExchange Systems	The City should investigate when GeoExchange systems are practical for new developments, and require GeoExchange in such developments.					
	Waste-heat Recovery	Promote waste heat recovery systems by pre-servicing industrial spaces with district heating.					
	Solar Hot Water	Encourage developers to include solar hot water systems in new and existing buildings.					
	Pre-service for Waste Heat and District Energy Systems	Encourage the development of pre-service for waste heat and district energy systems in new developments.					

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
Community Buildings – Local Government Policy and Programs – OCP and Local Government By-laws	Density Bonuses/Amenity Bonuses	When considering re-zoning applications the City should provide density bonuses in conjunction with energy efficiency retrofits in town centres and growth concentration areas.	8	Develop a policy or guidance document that describes each initiative for distribution to development community as appropriate. Include within, and expand the Smart Growth Checklist		1	2011
	Encourage Mixed-use Buildings	Encourage the construction of mixed use buildings, especially on major transit routes.					
Community Buildings – Local Government Policy and Programs – OCP and Local Government By-laws	Sustainability Checklist	City staff can use a sustainability checklist to help them assess new building applications. The development must be sustainable with respect to the City's environment, economy, society, and culture.	9	Work to further develop sustainability Smart Growth checklist for Development Permits and Rezoning Applications		1	2011
Community Buildings – Local Government Policy and Programs – OCP and Local Government By-laws	Continue to Require New Development to Have Lockers/Bike Storage/Showers	Utilize the City's sustainability checklist in the approval process for new developments.	10	Incorporate into Smart Growth checklist	These tasks will occur in the normal course of staff's duties	1	2011
	Encourage New Buildings to Meet LEED Standards	LEED provides standards for a wide variety of building types and projects, including standards for residential and commercial buildings. Encourage new buildings to meet these standards					
	Encourage New Buildings to Meet BuiltGreen Standards	BuiltGreen currently offers certifications for a variety of residential buildings, including single unit homes, row homes, and apartment towers. New buildings should be encouraged to meet these standards					
Landuse and Urban Design – Senior Government Policy and Programs	The Metro Vancouver Livable Region Strategic Plan	Continue to support and adhere to the guidelines provided in Metro Vancouver's Livable Region Strategic Plan	11	Staff to stay apprised of MetroVancouver's LRSP	This task will occur in the normal course of staff's duties	2	2011 and ongoing

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
Landuse and Urban Design – Local Government Policy and Programs	Increase Density – Intensify	The City should increase population density to conserve land for future developments and increase future livability.	12	Incorporate into Smart Growth checklist	These tasks will occur in the normal course of staff's duties through planning process and development applications/approvals	mix of 1 and 4	2010 and ongoing
	Concentrate High Density and Commercial Areas on Major Transit Routes	The City should ensure density is concentrated along major transit routes, and encourage high density development on major transit routes, where appropriate.					
	Encourage Pedestrian Centred and Transit Oriented Design	The City should continue to undertake pedestrian enhancement projects, and ensure new developments adhere to the principles of pedestrian oriented design.					
	Decrease Distance Between Commercial, Residential, and Employment Zones	The City should establish maximum allowable distances to commercial areas for all new residential developments. And zone commercial spaces in areas currently outside of this distance.					
	Encourage Mixed Use Neighbourhoods	The City should continue policy mechanisms that encourage mixed use developments.					
	Decrease Distance to Commercial Locations	The City should look at mechanisms, including mixed-use buildings and neighbourhood commercial, to reduce distance to commercial locations.					
	Encourage Neighbourhood Commercial	Encourage the construction of neighbourhood retail buildings in areas that are currently only residential buildings.					
Community Transportation – Senior Government Policy and Programs – Provincial Government	Tailpipe Emissions Standards	Support the tailpipe GHG emissions standards.	13	Support Senior Government programs inlcuidng UBCM resolutions and Undertake SPE seminar for staff's outreach to community	Key are Senior Government programs and Policies and Community Outreach Designate this seminar as SPE3	1	2011 - 2012
	California "Pavley II" Tailpipe Emissions Standards	Support senior government efforts to adopt California's is current proposal to implement phase II tailpipe emissions standards.					
	New Renewable Fuel Regulations Standard	Support implementation of BC provincial Renewable and Low Carbon Fuel Requirements Regulation					

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
Community Transportation – Senior Government Policy and Programs – Provincial Government	Active Transportation to and from Schools	Support school programs that encourage children to walk or bike to school.	14	Work with schools where appropriate	May be opportuntiies for bylaw enforcement	3	2012
Community Transportation – Local Government Policy and Programs – Increase Vehicle Fuel Efficiency	Implement Responsible Automobile Ownership Education Program	Encourage citizens to undertake regular vehicle maintenance, avoid idling, maintain proper tire pressure, observe speed limits, trip planning, and ride sharing.	15	Community Outreach if senior government funding available		3	2012 and beyond
	Right Sizing Vehicles	The City of Pitt Meadows should promote consumer purchase of most fuel efficient vehicle to meet transportation needs.		Community Outreach if senior government funding available			
Community Transportation – Local Government Policy and Programs – Reduce the Use of Single Occupant Private Vehicles	Promote Car Free Days	Support car free days and other initiatives such as corporate bike and walk to work programs, as a way of educating people about alternative transportation.	16	Community Outreach Plan	Focus as a festival option	3	2013
	Co-Operative Auto Networks	The City should promote the use of car sharing networks by designating parking areas and providing incentives to developers.	17	Coordinate with car share providers when the business case is positive for Pitt Meadows	Critical mass to be reached prior to commitments for care share providers	3	2013
	Shared Parking	The City should limit parking availability and promote shared parking in mixed-use areas.	18		Critical mass to be reached	4	2015 or 2016
	Un-hide the Costs of Parking to Reduce Private Vehicle Use	Investigate initiatives that make people more aware of their driving habits in order to reduce private vehicle use and highlight alternative forms of transportation.		Establish parking fees Community wide in high traffic areas	Only reasonable once the state of parking in the City can support the collection of parking fees		
	Develop and Implement a Transportation Demand Management Plan	Develop a Transportation Demand Management Plan to get people thinking about their driving habits, and to encourage them to try alternative transportation methods.	19	Work with Translink	Reliance on Translink and Senior Government Programs and Policies	3	2013

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
Community Transportation – Local Government Policy and Programs – Increase the Use of Public Transit	Develop and Maintain a Comprehensive Transit Plan	Work with TransLink and the community to create a City Transit Plan that will address issues surrounding to public transit for which the City has control.	20	Work with Translink	Reliance on Translink and Senior Governmetn Progams and Policies	4	2013
	Encourage New Buildings to Feature Public Transit More Prominently	Require new buildings to incorporate transit stops and pedestrian routes into their design	21	Work with Translink and Developers		4	2013
	Public Transportation Shelters	The City should promote the construction of abundant and appealing facilities for pedestrians and transit users.		Work with Translink and Developers		4	
	Public Transport Vouchers	Large companies can offer employees monthly transit passes or a cash allowance intended for use on public transit. The City should implement such a program for all staff, and encourage other organizations to do the same.	22	Offer Transit Vouchers	Need to determine employee interest (revisit every three years)	3	2013
	Work with Senior Government to Improve Regional Transit	The City should identify potential regional transit projects, such as light rail, and work with senior governments to ensure these projects are completed.	23	Lobby Efforts	Translink Responsibility	1	2011 and ongoing
	Support Transit Expansion Projects	Support efforts by senior government to expand regional public transportation networks and lobby for increased transit service in the City. Prioritize public transit improvement projects over road expansion projects.		Lobby Efforts and planning in the community	Translink Responsibility	1	2011
	Construct Transit Priority Lanes	Investigate opportunities to construct transit priority lanes (or H.O.V) lanes and other preferential traffic rules for transit vehicles.	24	Lobby Efforts	Translink Responsibility	1	ongoing

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
Community Transportation – Local Government Policy and Programs – Encourage Walking and Cycling	Encourage Enhancement of Pedestrian facilities	Continue to undertake enhancements to pedestrian facilities and investigate the potential for additional traffic calming projects.	25	Ongoing Engineering designs		2	2012 and ongoing
	Improve Cycling Infrastructure	The City should invest in bicycle lanes and signals, optical recognition of bicycles at left turn lanes, as well as new bike racks.	26	Design into new infrastructure	Incorporate into other transportation planning, but requires a budget. Potentially Green Team initiatives.	3	2014
	Develop and Maintain a Comprehensive Non-Auto Transportation Plan	Work with TransLink, Maple Ridge and Port Coquitlam to create a plan that focuses on non-auto transportation.	27	Lobby Efforts	Translink Responsibility	1	2012
	Identify Grants for Non-auto Transportation Projects	Start a fund for non-auto transportation projects. The City should look into grants for providing cycling infrastructure and for pedestrian improvement projects.	28	Research required	Funding issues to be addressed	3	2013
	Support Cycling and Pedestrian Projects	Support improvements to cycling and pedestrian infrastructure and lobby for increased funding for non-auto transportation modes.		Design into new infrastructure and lobby Translink and Senior Government (for funding)		3	2013
Community Transportation – New Technology – Public Transit	Evaluate New Public Transit Types	Examine the potential for new transit types, such as light rail systems, and work with senior governments to implement such systems.	29	Council to work with Translink	Translink Responsibility	1	2016
	Investigate Transit Priority Technologies	Examine the potential for transit priority technologies at traffic signals on major transit routes.		Design into new infrastructure and lobby Translink and Senior Government (for funding)	Translink Responsibility in cooperation with City	4	
	Work with TransLink to Implement Real-time Transit Technologies	Work with TransLink to implement real-time transit technologies on major transit routes within the City.		Design into new infrastructure and lobby Translink and Senior Government (for funding)	Translink Responsibility in cooperation with City	3	
Community Transportation – New Technology – Private Vehicles	Plug-in Electric Vehicles	Monitor developments in the electric vehicle industry, and ensure adequate infrastructure is in place to support electric vehicles.	30	Research and plan for City Infrastructure		2	2011 and ongoing

Reduction Category	Reduction Initiative	Recommendation	Action Item #	Action	Notes	Priority	Year
Solid Waste – Senior Government Policy and Programs – Regional Government	Zero Waste Challenge	Support Metro Vancouver's Zero Waste Challenge.	31	Continue to implement and support programs	Work with Metro Vancouver	1	2011 and ongoing
	Waste-to-Energy Plant	Support Metro Vancouver's plans to build at least 1 facility in the near future as part of their Solid Waste Management Plan.	32	Continue to support programs	Work with Metro Vancouver	2	2011 and ongoing
Solid Waste – Local Government Policy and Programs – Waste Disposal Programs	New Waste Collection Policy	Adopt a new waste collection policy with the goal of reducing the amount of garbage entering the landfill.	33	Staff to stay aprised of MetroVancouver's plan and develop local program	Significant budget impacts	1	2012

5.2 Monitoring and Reporting

The City will make use of the Provincial CEEI data for updates to the community energy and GHG inventory.

While undertaking monitoring, staff should engage a consultant to review growth in the community sectors covered in this plan and advise staff of adjustments that may need to be made to the reduction initiatives described herein, if any. Further, staff should be advised of new initiatives that may become available to the City subsequent to the completion of this plan.

5.3 Resources

5.3.1 Monitoring & Reporting

The community inventory will be received by the City from the Province at no charge to the City.

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6 Summary

7.1 Inventory Summary

The City of Pitt Meadows has calculated its community energy consumption and greenhouse gas emissions for the 2007 base year. Inventory results are shown in Table 7.1. The City's community-wide GHG emissions were 88,567 tonnes CO2e in 2007. The majority of community GHG emissions is shared between the buildings sector and the community transportation sector at approximately 43,000 tonnes in each sector.

Table 7.1 - Community Inventory Summary (2007-2008)

Sector	Energy Type/Unit	Consumption	Energy (GJ)	GHG Emissions ($t CO_2e$)		Percent Emissions
		2007				
Community Buildings	Elect	159,692,247 kWh	574,892	4,152	43,065	49%
	Nat Gas	770,968 GJ	770,968	38,913		
On Road Transportation	Gasoline	15457226 L	535,747	38,688	42,613	48%
	Diesel	1382875 L	53,490	3,846		
	Other	5175 L	1,310	79		
Solid Waste	Mass	7,940 t	NA	2,889	2,889	3%
TOTAL		1,936,407		88,567		100%

7.2 Forecast Summary

By 2017, annual community GHG emissions are predicted to increase by 14 percent, or from ~89,000 to ~101,000 tonnes CO_2e. The largest increase is predicted in the industrial buildings subsector (27 percent). The second largest increase is predicted in the community transportation sector (16 percent).

Table 7.2 - Summary of Community Forecasts

Sector	Emissions CO_2e (t)	Forecast of Emissions (CO_2e tonnes)	Percent Change
	2007	2017	2007-2017
Residential Buildings	22,783	24,689	8%
Commercial Buildings	13,193	14,468	10%
Industrial Buildings	7,089	8,996	27%
Community Transportation	42,613	49,509*	16%
Community Solid Waste	2,889	2,889	0%
Total	**88,567**	**100,551**	**14%**

* The subtotal for Community Transportation represents the total in Table 3.8 minus the total in Table 3.9

7.3 Reduction Target Summary

Preliminary reduction initiatives were identified by city staff and estimates of potential energy savings and GHG reductions were conducted where appropriate. The city's suggested reduction target is developed from the difference in emissions between the 2017 forecast and the estimated GHG emissions in that year after reduction initiatives have been applied.

Table 7.3 - Summary of Estimated Impact of Reduction Initiatives on Community Sectors

Sector		Base Year Emissions (tonnes CO2e)	GHG Projection (tonnes CO2e)	Potential Reduction of GHG Emissions	GHG Emissions After Measures	Percent Reduction of Projected Emissions
		2007	**2017**	**2017**	**2017**	**2017**
Buildings	Residential	22,783	24,689	1,696	22,993	1%
	Commercial	13,193	14,468	448	14,020	6%
	Industrial	7,089	8,996	1,431	7,565	7%
On-Road Transportation		42,613	42,509	9,765	32,744	-23%
Solid Waste		2,889	2,889	2,889	0	-100%
	TOTAL	**88,567**	**93,551**	**16,229**	**77,322**	**-13%**

In order to achieve this target, it is recommended that Council approve the emissions reduction quantity for the community as follows:

Community Reduction Target Statement:

An emission reduction target of 16,229 tonnes CO_2e is recommended for the City of Pitt Meadows. This reduction amount will decrease community emissions 13 percent below 2007 levels by 2017

Glossary of Terms (IPCC 2006)

Carbon dioxide (CO_2): A naturally occurring gas; also a byproduct of burning fossil fuels and biomass, as well as land use changes and other industrial processes. It is the principal anthropogenic greenhouse gas that affects the earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1.

Climate change: A statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

Note that the Framework Convention on Climate Change (UNFCCC), in its Article 1, defines "climate change" as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." The UNFCCC thus makes a distinction between "climate change" attributable to human activities altering the atmospheric composition and "climate variability" attributable to natural causes.

Equivalent CO_2 (CO_2e): The concentration of CO_2 that would cause the same amount of radiative forcing as a given mixture of CO_2 and other greenhouse gases.

GJ (GigaJoules): A Canadian unit of heating value equivalent to 943,213.3 Btu. The standard gas unit in Canada is the gigajoule pursuant to GISB under Order 587-A (1997). A gigajoule (GJ) is a metric term used for measuring energy use. For example, 1 GJ is equal to 277.8 kWh of electricity, 26.9 m^3 of natural gas, 25.9 litres of heating oil. Similar to the energy released when burning a million wooden matches, a gigajoule of gas will cook over 2500 hamburgers, and a gigajoule of electricity will keep a 60-watt bulb continuously lit for six months.

Greenhouse gas: Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. This property of greenhouse gases causes the greenhouse effect. Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Besides CO_2, N_2O, and CH_4, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC): The Kyoto Protocol was adopted at the Third Session of the Conference of the Parties (COP) to the UNFCCC in 1997 in Kyoto, Japan. It contains legally binding commitments in addition to those included in the UNFCCC. Countries included in Annex B of the Protocol (Organisation for Economic Co-operation and Development countries and countries with economies in transition) agreed to reduce their anthropogenic greenhouse gas emissions (CO2, CH4, N2O, HFCs, PFCs, and SF6) by at least 5% below 1990 levels in the commitment period 2008 to 2012. The Kyoto Protocol entered into force on February 16, 2005.

Methane (CH_4): An odorless, colorless, flammable gas, CH_4, the major constituent of natural gas, that is used as a fuel and is an important source of hydrogen and a wide variety of organic compounds.

Nitrous Oxide (N_2O): A powerful greenhouse gas with a global warming potential most recently evaluated at 310. Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.

United Nations Framework Convention on Climate Change (UNFCC): The Convention was adopted on May 9, 1992, in New York and signed at the 1992 Earth Summit in Rio de Janeiro by more than 150 countries and the European Community. Its ultimate objective is the "stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." It contains commitments for all parties. Under the Convention, parties included in Annex I aim to return greenhouse gas emissions not controlled by the Montreal Protocol to 1990 levels by the year 2000. The convention entered into force in March 1994. See: Kyoto Protocol.

Pitt Meadows

Community Energy & Greenhouse Gas Emissions Inventory: 2007

This is Pitt Meadows's 2007 Community Energy and Greenhouse Gas Emissions Inventory

DATA SOURCES:

Residential and Commercial Buildings

Electricity Consumption: BC Hydro Ltd. – consumption and number of accounts
Natural Gas Consumption: Terasen Gas Inc. – consumption and number of accounts

Industrial Buildings

Electricity Consumption: BC Hydro Ltd. – consumption and number of accounts.
Natural Gas Consumption: Terasen Gas Inc. – number of accounts and consumption.

Community Transportation

Activity Data:
Insurance Corporation of British Columbia – licensed vehicles on the road
Natural Resources Canada – Fuel consumption rates for individual vehicles
Province of BC – Vehicle kilometres traveled for the appropriate region of the Province

Community Solid Waste

Solid Waste: per capita disposal rates for municipal solid waste at the regional landfill facility.

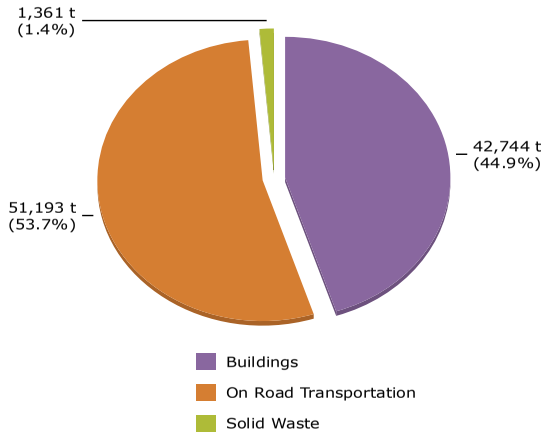
DATA DEFICIENCIES

Fuel oil for space heating for residential and commercial buildings, if any, is deficient. Accessible datasets does not exist for this fuel source and no estimate has been provided by HES.

NOTICE TO THE READER:

Hyla Environmental Services Ltd. (HES) has produced this energy and greenhouse gas emissions inventory based on data provided by the organizations recognized above. HES does not guarantee the accuracy of the data and provides no warranty to the user. The user accepts responsibility for the ultimate use of the data contained within this report.

CO_2e (tonnes) by Sector *



Hyla Environmental Services Ltd.,
#1708 - 400 Capilano Road
Port Moody, BC V3H 0E1
M: 604.469.2910

Pitt Meadows
Community Energy & Greenhouse Gas Emissions Inventory: 2007

Buildings	Consumption By Type						Energy & Emissions Total	
	Type	Connections	Consumption	Energy/Connection	Energy (GJ)	CO_2e (t)	Energy (GJ)	CO_2e (t)
Residential Buildings	Electricity	6,197	68,078,188 kWh	10,986 kWh/C	245,081	1,566	**657,369**	**22,654**
	Natural Gas	4,442	412,288 GJ	93 GJ/C	412,288	21,088		
Commercial Buildings	Electricity	547	41,139,076 kWh	75,209 kWh/C	148,101	946	**366,324**	**12,108**
	Natural Gas	319	218,223 GJ	684 GJ/C	218,223	11,162		
Industrial Buildings	Electricity	155	34,668,543 kWh	223,668 kWh/C	124,807	797	**265,264**	**7,982**
	Natural Gas	4	140,457 GJ	35,114 GJ/C	140,457	7,184		
Subtotal	Electricity	6,899	143,885,808 kWh		517,989	3,309	**1,288,957**	**42,744**
	Natural Gas	4,765	770,968 GJ		770,968	39,435		

On Road Transportation	Consumption By Type						Energy & Emissions Total	
	Type	Units	Consumption	Litres/Unit	Energy (GJ)	CO_2e (t)	Energy (GJ)	CO_2e (t)
Small Passenger Cars	Gasoline	4,858	4,209,109 litres	866 L/U	145,888	10,512	**147,784**	**10,648**
	Diesel Fuel	80	49,038 litres	613 L/U	1,897	136		
Large Passenger Cars	Gasoline	1,942	1,843,372 litres	949 L/U	63,891	4,604	**64,618**	**4,656**
	Diesel Fuel	24	18,782 litres	783 L/U	726	52		
Light Trucks, Vans, And Suvs	Gasoline	5,032	10,094,429 litres	2,006 L/U	349,873	25,210	**353,170**	**25,439**
	Diesel Fuel	35	69,062 litres	1,973 L/U	2,671	192		
	Mobile Propane	12	24,729 litres	2,061 L/U	626	38		
Commercial Vehicles	Gasoline	829	1,523,338 litres	1,838 L/U	52,799	3,804	**109,527**	**7,857**
	Diesel Fuel	427	1,415,725 litres	3,316 L/U	54,760	3,935		
	Mobile Propane	36	77,763 litres	2,160 L/U	1,968	118		
Tractor Trailer Trucks	Diesel Fuel	14	179,999 litres	12,857 L/U	6,962	500	**6,962**	**500**

Hyla Environmental Services Ltd.,
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Port Moody, BC V3H 0E1
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Pitt Meadows

Community Energy & Greenhouse Gas Emissions Inventory: 2007

On Road Transportation continued

Motorhomes	Gasoline	118	233,845	litres	1,982	L/U	8,105	584	**8,105**	**584**
Motorcycles And Mopeds	Gasoline	358	133,176	litres	372	L/U	4,616	333	**4,616**	**333**
Bus	Gasoline	18	150,480	litres	8,360	L/U	5,216	376	**16,355**	**1,176**
	Diesel Fuel	16	288,000	litres	18,000	L/U	11,140	800		
Subtotal	Gasoline	13,155	18,187,749	litres			630,387	45,422	**711,138**	**51,193**
	Diesel Fuel	596	2,020,605	litres			78,157	5,616		
	Mbl Propane	48	102,491	litres			2,594	156		

Solid Waste	Direct Emissions				Emissions Total
	Type	Estimation Method	Mass (t)	CO_2e (t)	CO_2e (t)
Community Solid Waste	Solid Waste	Methane Commitment	3,157	1,361	**1,361**
Subtotal			3,157	1,361	**1,361**

Grand Total	**Activity**	**Consumption**	**Energy**	**CO_2e**	**Energy & Emissions Total**	
					Energy (GJ)	CO_2e (t)
	Electricity	143,885,808 kWh	517,989 GJ	3,309 t		
	Natural Gas	770,968 GJ	770,968 GJ	39,435 t	**2,000,095**	**95,298**
	Gasoline	18,187,749 litres	630,387 GJ	45,422 t		
	Diesel Fuel	2,020,605 litres	78,157 GJ	5,616 t		
	Mbl Propane	102,491 litres	2,594 GJ	156 t		
	Solid Waste			1,361 t		

Appendix II - Community Comparisons

As Figure A1 illustrates, Pitt Meadows has slightly more residents living in single unit homes compared to the B.C. average, and a much higher proportion than the Metro Vancouver average. Some communities further east in the Fraser Valley, such as Mission and Maple Ridge have a higher proportion of single family homes than Pitt Meadows.

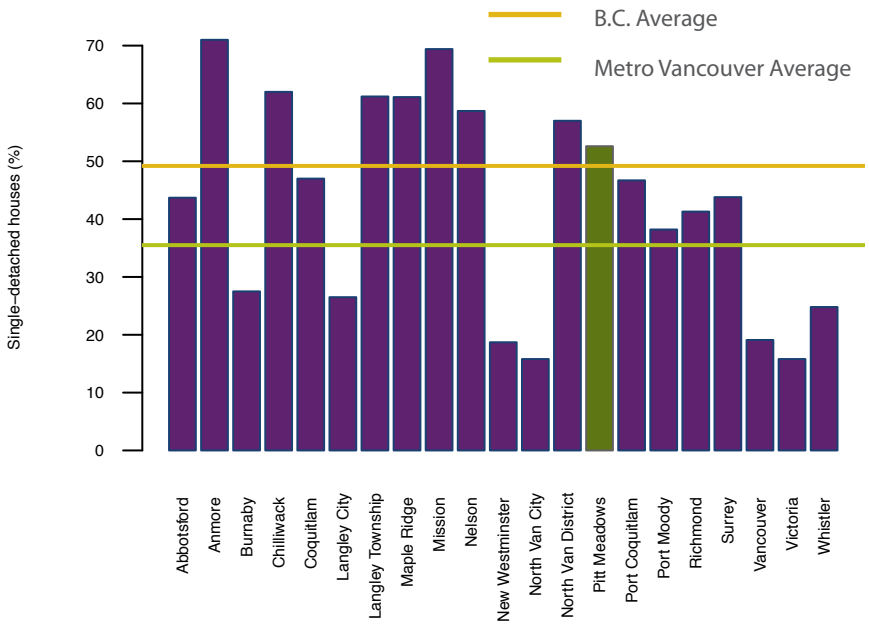


Figure A1 - Single Unit Detached Housing

This graph illustrates the percentage of residents living in single unit detached homes in 2006, for selected municipalities in B.C. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

The percentage of Pitt Meadows residents who live in row housing is higher than both the B.C. and Metro Vancouver averages (Figure A2); however there is considerable variability in the amount of row housing among B.C. communities. Some cities, such as Richmond and Port Moody have more row housing than Pitt Meadows.

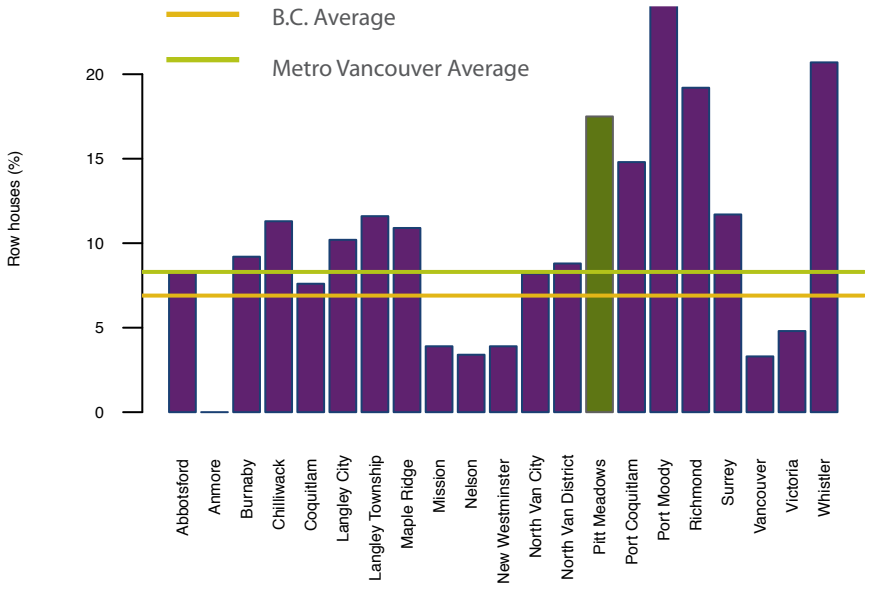


Figure A2 - Row Housing

This graph illustrates the percentage of residents living in row housing in 2006, for selected municipalities. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

A lower percentage of Pitt Meadows residents live in apartments (of less than 5 stories) relative to the provincial and Metro Vancouver average. Some cities, such as the City of North Vancouver and the City of Langley, have a much higher percentage of residents who live in apartments of less than 5 stories compared to Pitt Meadows (Figure A3).

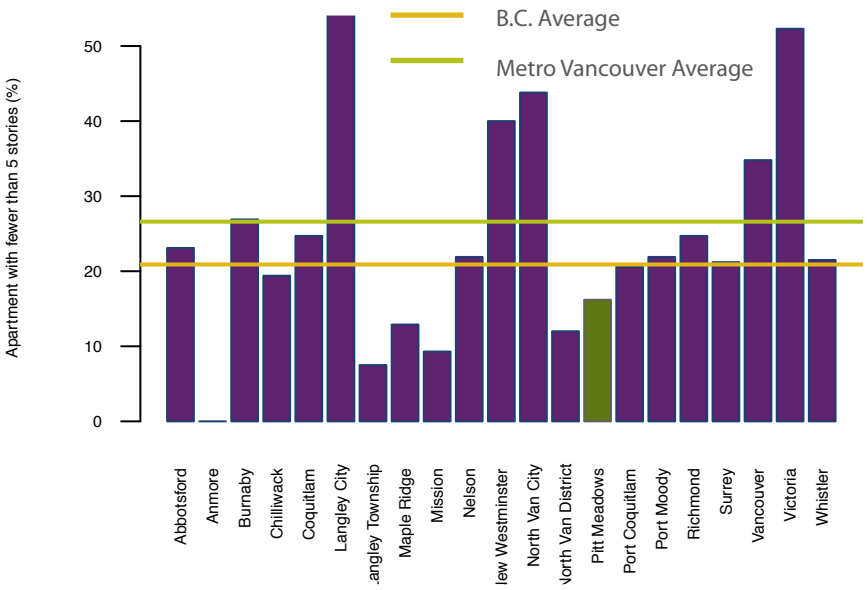


Figure A3 - Apartments with fewer than 5 stories

This graph illustrates the percentage of people living in apartments (with fewer than 5 stories) in 2006, for selected municipalities in B.C. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

Figure A4 illustrates the percentage of residents who live in high rise apartments (5 or more stories). As of the 2006 census, no Pitt Meadows residents reported living in an apartment with 5 or more stories. Higher density developments use less energy than the same number of lo density units due to a smaller average unit size, and shared walls and ceilings in high density developments. In addition high density housing provides the necessary density to support frequent transit service.

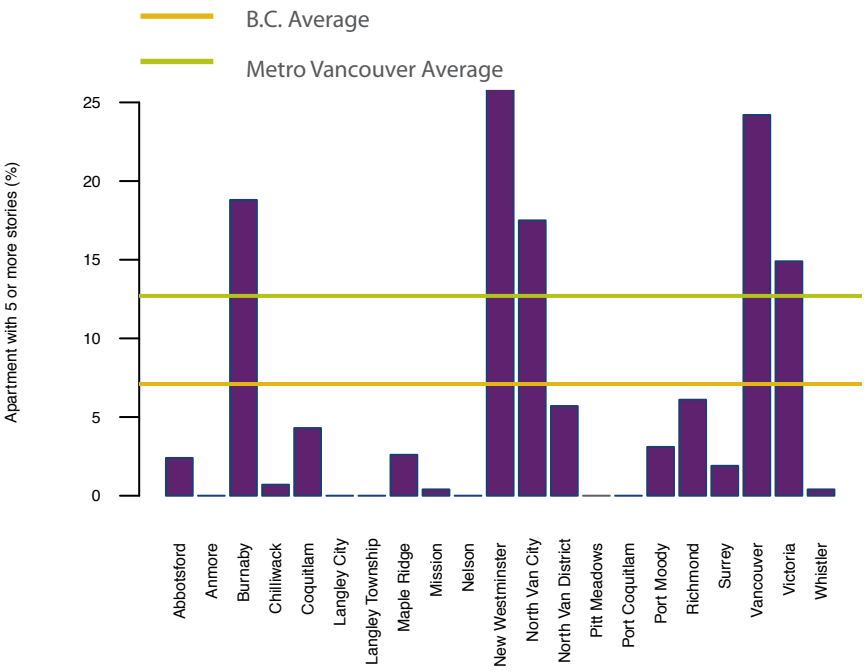


Figure A4 - Apartments with 5 or more stories

This graph illustrates the percentage of people living in apartments (with 5 or more stories) in 2006, for selected municipalities in B.C. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

I Housing Age

Building age is another major factor in a building's energy efficiency. Older buildings were built with fewer (if any) energy efficiency standards compared to the standards and practices for new buildings.

Figure A5 shows the percentage of buildings built before 1986 in selected B.C. municipalities. Pitt Meadows has a substantially smaller percentage of old buildings relative to many other municipalities in B.C. and Metro Vancouver. The high percentage of new buildings in Pitt Meadows suggests that many buildings are relatively energy efficient for their size and type. Since the high number of new buildings is large in Pitt Meadows, there may be less impact from promoting energy efficiency retrofits in Pitt Meadows compared to cities with more older buildings.

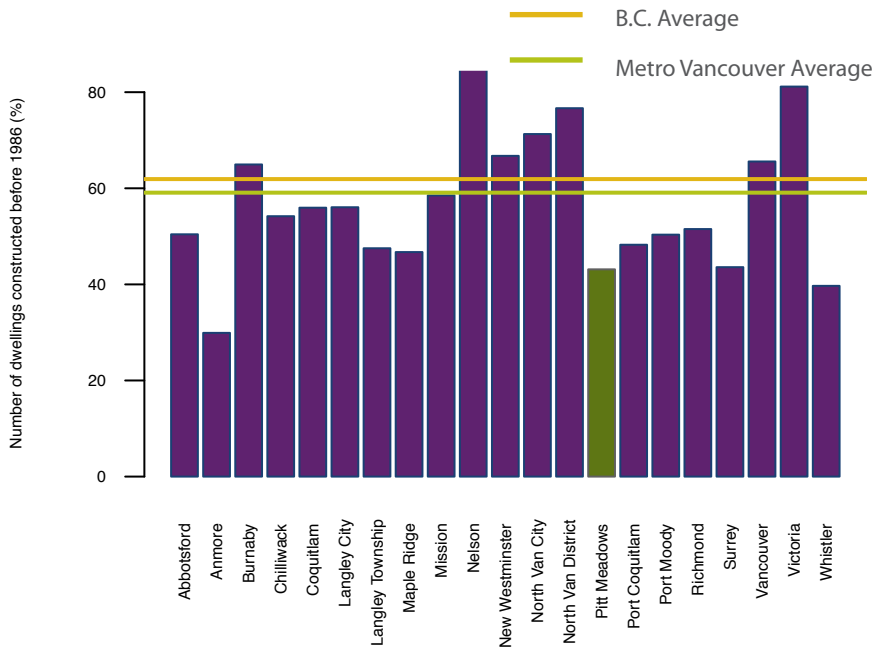


Figure A5 - Buildings Constructed Before 1986

This graph illustrates the percentage of buildings constructed in 1986 (based on buildings numbers in 2006), for selected municipalities in B.C. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

II Owner/Renter Ratio

The percentage of owner occupied buildings in a community can influence the success of programs designed to increase community buildings' energy efficiency. Cities with many residents owning (as opposed to renting) the building they live in may have an easier time convincing residents to undertake energy efficiency upgrades. Typically the building owner pays for renovations, but the building resident receives the benefit of decreased utilities. Figure A6 shows the percentage of buildings occupied by the owner.

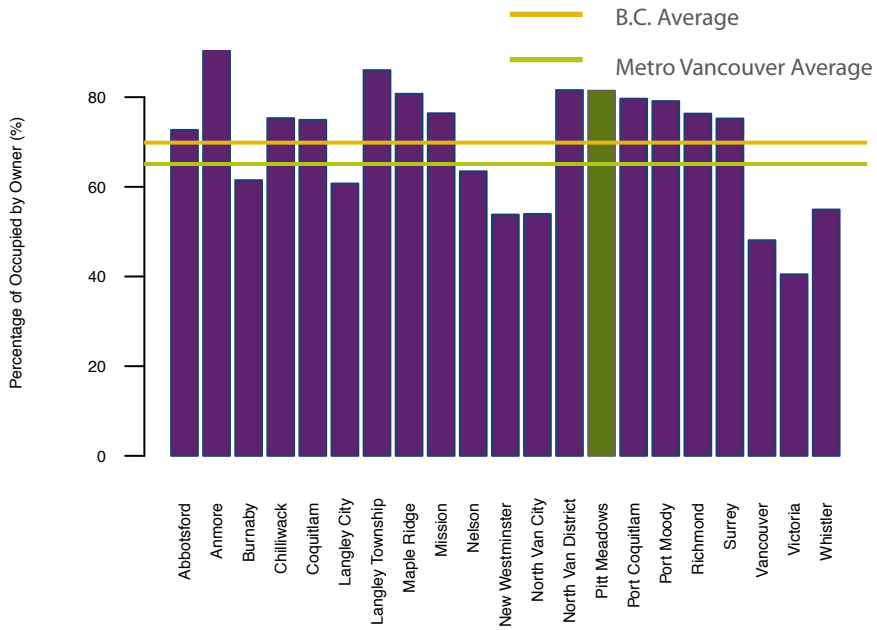


Figure A6 - Buildings Occupied by Owner

This graph illustrates the percentage of buildings occupied by their owner, for selected municipalities in B.C. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

III Transportation Mode Share

Transportation is, on average, the largest source of GHG emissions for B.C. municipalities. Those who commute alone in a vehicle have the highest average emissions (the GHG emissions of those who use transit, walk or cycle are much lower).

As Figure A7 indicates, a high percentage of people in Pitt Meadows commute to work in a private vehicle. While there are many factors influencing the per capita emissions from transportation, the high rate of private automobile usage in Pitt Meadows contributes to high per capita emissions.

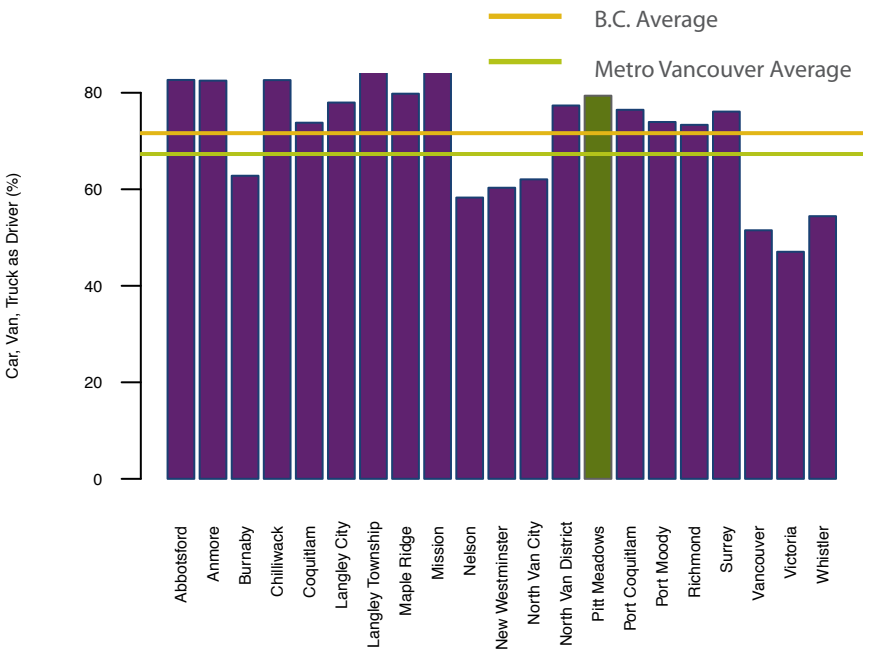


Figure A7 - Private Vehicle to Work

This graph illustrates the percentage of people who drove a private vehicle to work (either with or without passengers) in 2006, for selected municipalities in B.C. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

The high number of people who drive to work in a private vehicle is partly a result of lower than average public transit usage in the City of Pitt Meadows, compared to the Metro Vancouver average (Figure A8). Pitt Meadows has higher public transit ridership relative to several nearby municipalities, but a lower ridership than other communities with West Coast Express service, such as Port Moody, Coquitlam and Port Coquitlam. Increasing the use of public transit will be an essential goal if Pitt Meadows hopes to meet GHG reduction targets.

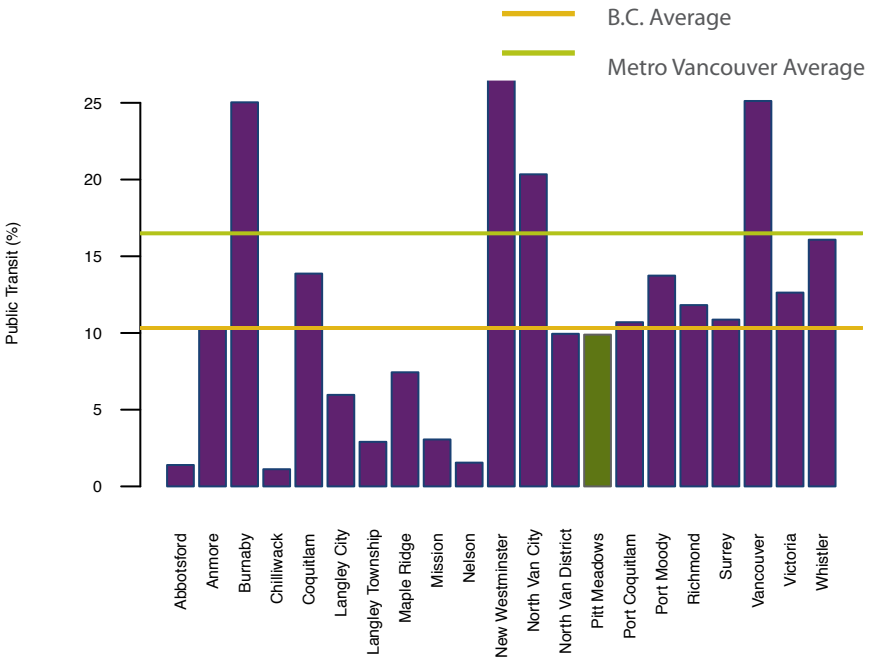


Figure A8 - Public Transit to Work

This graph illustrates the percentage of people who use public transit to get to work in 2006, for selected municipalities in British Columbia. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

Walking and cycling are two of the best ways to get around without using fossil fuels. According to data from 2006, the number who walked or cycled to work in Pitt Meadows was lower than the provincial and Metro Vancouver averages (Figure A9). Data from the 2011 census will help illustrate the success of recent cycling and pedestrian enhancement projects. There is a wide range in the walking and cycling mode share among B.C. communities, with compact walkable cities such as Nelson and Victoria boasting about 30 percent of residents walking or cycling to work, compared to less than five percent in Pitt Meadows. Communities such as the City of North Vancouver, the City of Langley and New Westminster are Metro Vancouver examples of cities with a high mode share for walking and cycling to work.

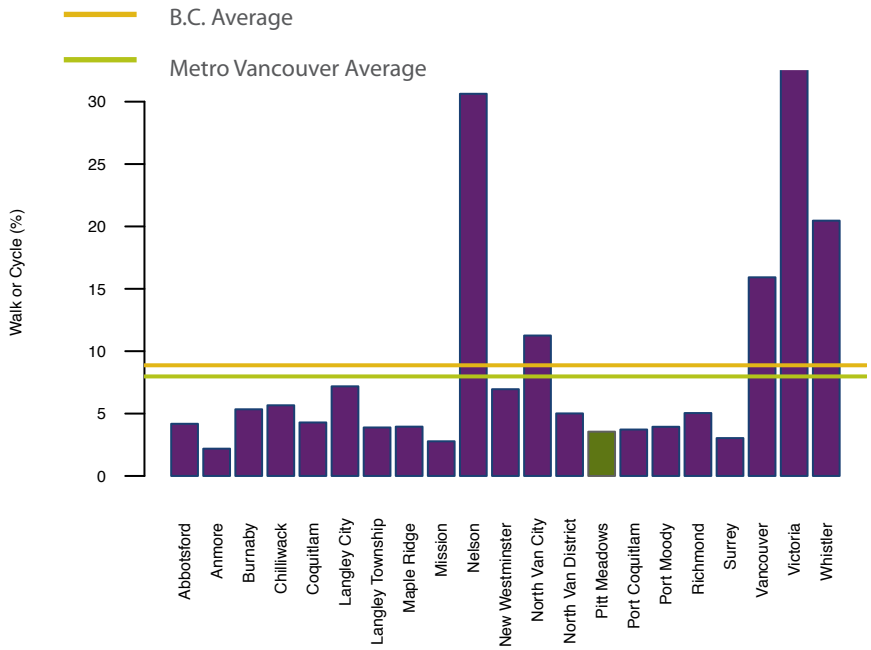


Figure A9 - Walk or Cycle to Work

This graph illustrates the percentage of people who walked or cycled to work in 2006, for selected municipalities in British Columbia. The B.C. average is shown by the blue line, while the orange line shows the Metro Vancouver average. Data provided by Statistics Canada 2006 Community Profiles.

Appendix III - Climate Action Questionnaire

City of Pitt Meadows
Climate Action Open House & Questionnaire

Climate Change is a global issue that can be partially solved at a local level

As fossil fuels are consumed all around us, increasing greenhouse gas (GHG) emissions accumulating in our atmosphere are causing a change to our climate. As a result, all levels of government are taking action, including the City of Pitt Meadows. We are developing a community climate action plan and incorporating greenhouse gas reduction targets into the Official Community Plan.

Here's what you can do to help:

1. Attend the City's Open House

The City would like to hear your ideas on making our community more GHG friendly at an upcoming Open House on:

March 25, 2010 | Family Recreation Centre | 4 to 7 pm

We're encouraging residents to attend the open house to learn more about actions we can take locally. This is your opportunity to tell Council what you think you can do to reduce energy consumption and GHG emissions.

2. Complete the Questionnaire

Online Completion is Encouraged! Go to:

http://www.surveymonkey.com/s/CAPq

Mail or drop off your responses to:

City of Pitt Meadows, 12007 Harris Road
Pitt Meadows, BC V3Y 2B5

What will be presented at the Open House?

Learn about the amount of energy consumed from residential and commercial buildings and the vehicles that we drive. More importantly, we will be presenting options to reduce energy consumption that the City will be detailing in an upcoming report.

There will be a draw for a prize for those who fill out the questionnaire in its entirety

1. Are you answering this survey as a: ☐ *Resident of Pitt Meadows* ☐ *Employee working in Pitt Meadows, residing elsewhere* ☐ *Business owner*

2. If you live in Pitt Meadows, in what municipality do you work? _____

3. If you work in Pitt Meadows, in what municipality do you reside? _____

4. If you own a business in Pitt Meadows, in what municipality do you reside? _____

5. If you drive to work, how far is your residence from your place of work?

☐ *< 15 km away* ☐ *> 15 km away* ☐ *> 50 km away* *My one way commuting distance is* _____ *kilometres*

6. Please rate your level of concern for each of the following:

	Totally Concerned	*Somewhat Concerned*	*Somewhat Unconcerned*	*Not Concerned*
Air quality				
Climate change				
Energy supply				
Motor vehicle pollution				

7. If you have any other environmental concerns/issues/suggestions, please list them below

8. When we consume fossil fuels (i.e., gasoline, natural gas, etc.), we create greenhouse gas emissions. There is a direct link between consumption of fossil fuels and climate change. Energy costs money, so we can reduce the impacts of climate change and save money by reducing energy consumption. Rate the importance of greenhouse gas emissions and costs to you.

	Totally Concerned	*Somewhat Concerned*	*Somewhat Unconcerned*	*Not Concerned*
Costs for energy				
Greenhouse gas emissions				

9. Has the cost for energy changed your behavior in any of the areas listed below?

	Yes	*No*
Home energy efficiency		
Office energy efficiency		
Vehicle driven		
Kilometres driven in vehicle		
Your home location		
Your work location		

10. If you are planning a home renovation, would you like more information about energy efficiency upgrades?

☐ *Yes, I'd like information sent to the email listed at the end of the survey*

11. Community transportation GHG emissions makes up nearly 60% of our emissions, but the calculation is based on an average number of Kilometres that is not specific to the City of Pitt Meadows. Can you help us gather information specific to our community (please note for the following questions your information will not be shared and will only contribute to an average)? *Yes, I'll help!*

12. Tell us about the vehicle you drive and the total number of Kilometres on the odometer

Make (e.g., Honda, Ford)	
Model (e.g., Accord, Taurus)	
Model Year	
Total Kilometres on Odometer	

13. Approximately how many kilometres did the vehicle travel in 2009? _____

14. When you are stopped at a railway crossing do you turn off your vehicle while waiting for the train to pass?

☐ *Yes* ☐ *No*

15. What type of fuel does your vehicle use?

☐ *Diesel fuel* ☐ *Gasoline* ☐ *Propane* ☐ *Natural Gas* ☐ *Hybrid-electric*

16. When you fill your vehicle with fuel, do you fill up inside the City of Pitt Meadow's boundary or outside the City boundary?

☐ *inside* ☐ *outside*

17. Can we send you a link to the draft Climate Action Plan when it's ready? If so, please provide your e-mail address below.

☐ *Yes, I'd like a copy of the draft Climate Action Plan, when it's ready, sent to the email listed at the end of the survey .*

18. If you requested information on energy efficiency or the draft Climate Action Plan, please provide your e-mail address below (please also provide for the prize draw).

My email address is: _____

19. If you would like electronic notifications about the City (e.g., events, news, etc.) sent to the email address provided above, please check here.

☐ *Yes, please send me electronic notifications about City events!*

City of Pitt Meadows
The Natural Place

Thank you for filling out our survey. Please drop off or mail to the City of Pitt Meadows, 12007 Harris Road, Pitt Meadows, BC V3Y 2B5. For more information on Climate Change and Green initiatives, please visit the City's web site at:

www.pittmeadows.bc.ca

Join us for our Earth Day event – Thursday, April 22nd from 1-3 p.m. in Spirit Square.

HYLA
ENVIRONMENTAL SERVICES LTD.
www.hesltd.ca

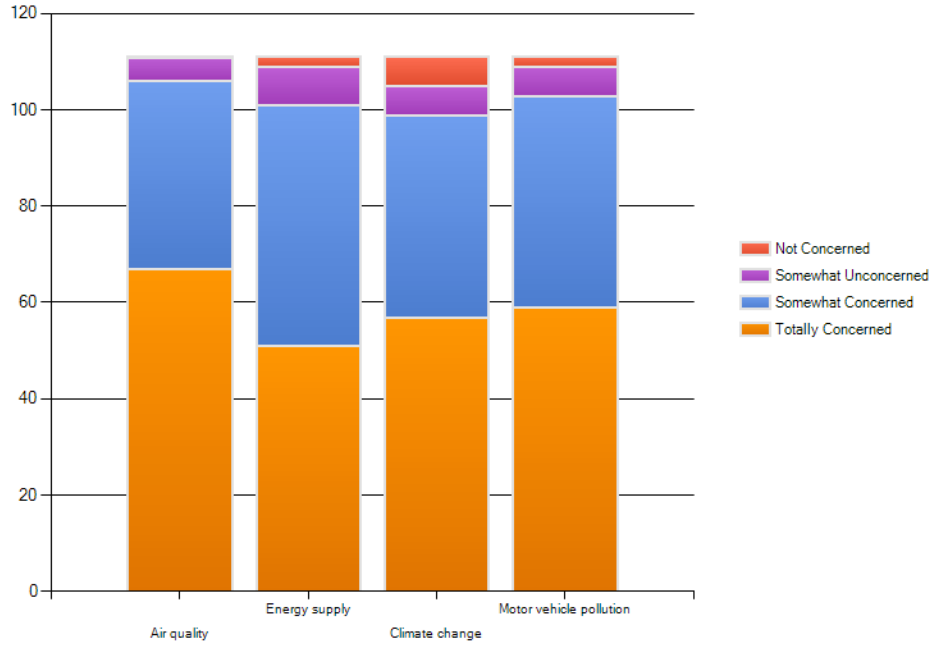
Appendix IV - Climate Action Questionnaire Results

The Climate Action Questionnaire is shown in Appendix III on page 76. The survey was mailed to all Pitt Meadows residents and businesses and was available at the Climate Action Open House on March 25, 2010. There was a total of 124 responses, the majority (96%) of which where from Pitt Meadows residents (few business owners or employees working in Pitt Meadows, but residing elsewhere responded).

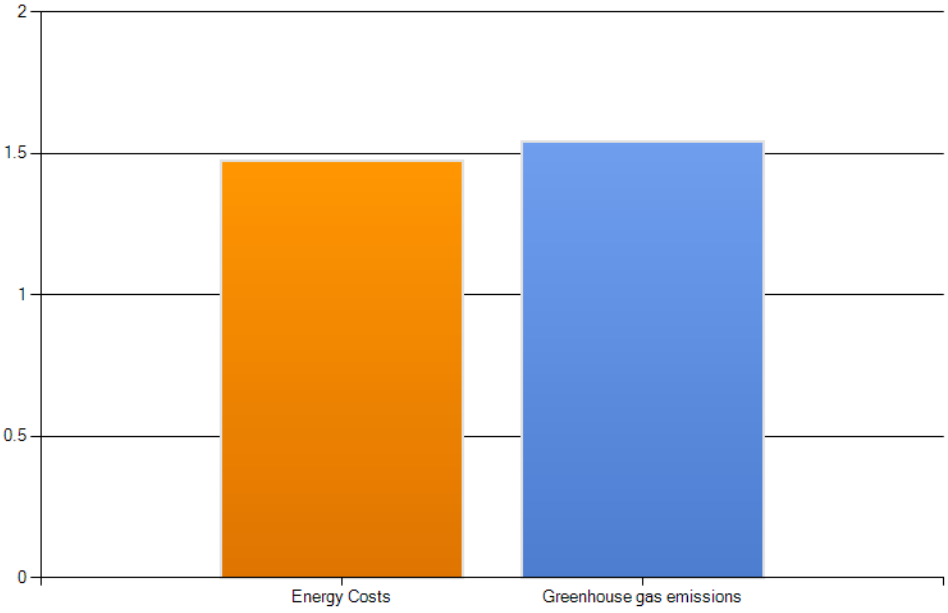
The questionnaire contained questions pertaining to transportation choice and behaviour.as well as questions on a variety of other climate change and environmental issues. A summary of the responses is provided in the following charts. Open ended responses are provided at the end of this appendix.

I Questionnaire Summary Figures

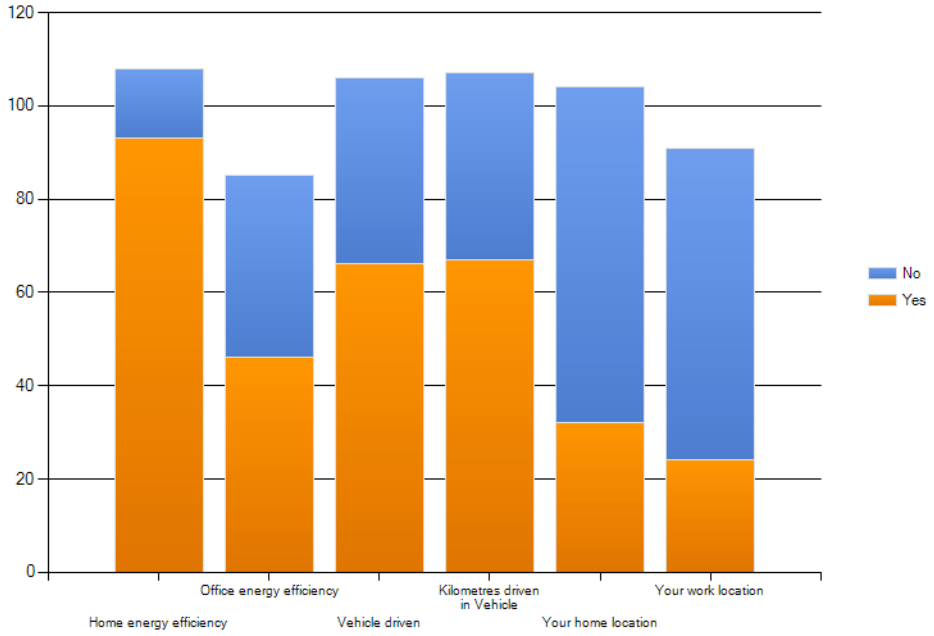
Please rate your level of concern for each of the following environmental issues:



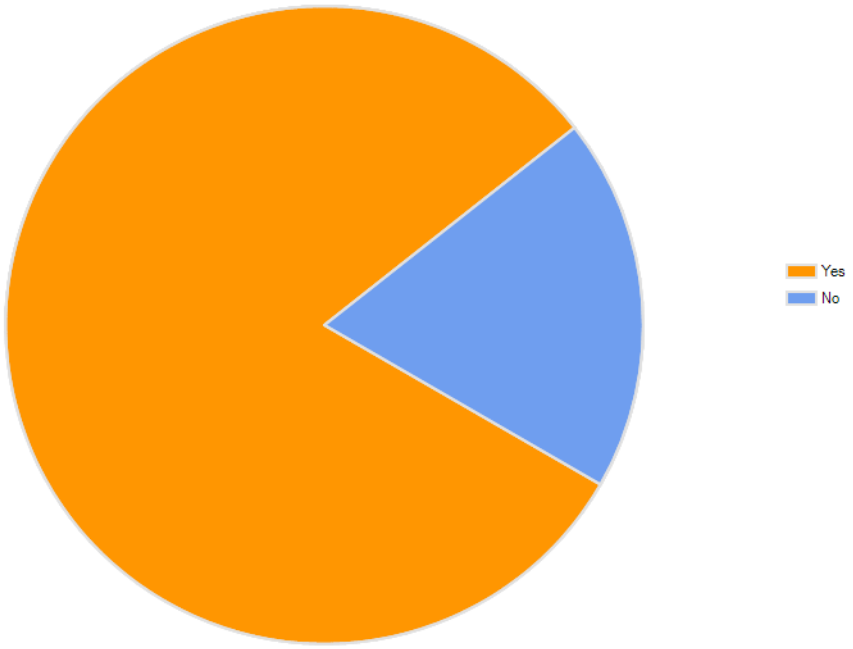
When we consume fossil fuels (i.e., gasoline, natural gas, etc.), we create greenhouse gas emissions. There is a direct link between consumption of fossil fuels and climate change. Energy costs money, so we can reduce the impacts of climate change and save money by reducing energy consumption. Rate the importance of greenhouse gas emissions and costs to you.



Has the cost for energy changed your behavior in any of the areas listed below?



When you are stopped at a railway crossing do you turn off your vehicle while waiting for the train to pass?



II Open-Ended Questionnaire Results

This section contains open-ended responses to the questionnaire. Responses appear unedited.

If you have any other environmental concerns/issues/suggestions, please list them below.

- Rate at which people recycle
- The City of Pitt Meadows needs to increase the level of recycling; including garden waste pick up.
- Noise pollution from cars & motorcycles. Loud vehicles and loud music systems.
- There is a need for residential compost pick-up similar to Vancouver & Port Coquitlam. This would increase Recycling activities and divert compostable waste from the landfill
- Building codes (green building mandates, i.e., green roofs, geothermal energy, residential codes to encorporate green practices); better transit incl. train, local and B-line bus to Skytrain; banning herbicides and pesticides for cosmetic use - limiting/watching their useage in commercial/farm use; light pollution at night through unnecessary illumination and 'bleeding' from lamps & greenhouses (preventable)
- Ocean pollution is my greatest concern
- We need to continue to strive to recycle more. We need to incorporate residential composting. Encourage car pooling and use of public transit. I take a bus whenever I can to work, shop etc.
- It seems odd to me that the only form of transportation being considered in this survey is private automobiles. What about other forms of transportation such as walking, cycling and transit? All these forms also contribute more or less to GHG emissions.
- Local services and accessibility to seniors
- "The stinky air we breath during the application of fertilizer on Pitt Meadows' farms.
- Is that not affecting the air quality of Pitt Meadows and not affecting our health as well?"
- don't agree with the idea of maple ridge putting an industrial park on 203rd street and old dewdney this will pollute and affect our ability to farm in pitt meadows
- fireplace wood burning, gasawnmowers
- Accumulation (in landfill) of compostable garbage. Lack of compost (kitchen waste etc) pick up separate from garbage
- Keeping Pitt Meadows Green
- I am the only one on my street that recycles cans/plastic/paper.(all recyclables) I have bags and bags of recycling and all I see others do is put out a little yellow bag of newspapers. I don't think people are aware of all they can recycle and how to do it. I put mine in blue garbage bags that I thought were meant for recycling, I think that people should be encouraged to NOT use the yellow bags that The City of Pitt Meadows gives out and to fill the big Blue Bags that you can buy at the store. Perhaps people think that's all they are "allowed"?(little yellow bag)
- "solid waste, water usage"
- Throwing cigarette butts out the window, drives me crazy
- Water pollution in Pitt canals due to submerged old barges. Development near Pitt Lake will disturb wildlife.
- "- Percentage of waste per person (as opposed to recycling)
- - Sewage Treatment"
- Something easy for the municipality to deal with - local littering. We need some neighbourhood cleanup days.

- Most climate change paranoia is much ado about nothing.
- "farms illegally piping water in Pitt Meadows
- horrified that companies keep energy continuous to benefit from cheaper rates"
- concerned about the sprays/pesticides that are frequently used on the farms - are there quality control measures adhered to?
- "sewage treatment
- increasing recycling and decreasing landfill waste"
- providing compost kits for residents and additional garden plots
- polluted waterways
- "water consumption/volume of effluent
- implement a low flow/dual flush toilet rebate program
- better public transit options (extend skytrain to Pitt Meadows)"
- deterioration of the oceans
- garbage!
- a Harris Road overpass at CPR tracks would reduce the number of idling vehicles and steaming residents!
- "Conversion of previous farms and free land to housing
- huge areas of pavement decreasing absorption into soil
- loss of greenspace for wildlife
- river pollution
- pumping water from Alouette River"
- "i am encouraging our 162 unit mobile home complex to implement organic gardening and
- do away with harmful pesticides"
- Water supply and quality
- local farming and eating quality foods
- Provide better transit to get into town if you want us to give up cars. West Coast express should run all the time. Fast Buses to centers such as Burnaby and Richmond. Currently transit completely is unworkable from this region to get anywhere without a car.
- the concentration of sun ray levels in the summer
- we have train tracks, station & buses that are not used frequently enough. Too many 1 car drivers - need more car-pooling.
- fish, wildlife, water quality, protecting ALR, sprawl
- Insist on Pedestrian Friendly designed shopping areas/Malls(e.g.Meadowtown is too dangerous to walk from shop to shop, so driving is necessary); Drive-thru businesses(e.g. Tim Hortons)contribute to pollution;Urbanization of Rural areas(e.g. North Corridor-Dewdney Trunk Rd.) Local waterways-abuse of by big agri-business; concern for fish and wildlife habitat; need for rodent control programme(e.g. mice, rats and SQUIRRELS!!!!!

- Food supply, organic eating, cleaning and other household products.
- Worry about the loss of farmlands.
- excessive trash and toxic waste
- noise from lawn mowers, cars, leaf blowers, pressure washers, etc.
- "Increased recycling programs
- more access to locally grown food"
- none
- better tap water = less plastic bottles!
- We think the 9% reduction target for GHG emissions is far too low and that the target should be set the same as the provincial target of a 33% reduction by 2020 and a 80 percent reduction by 2050. We realize meeting these targets would require drastic lifestyle changes but these changes are necessary to prevent significant climate change. These lifestyle changes would include more use of transit, walking and bicycling and would have the added benefit of improving people's health and saving on energy costs. To that end the municipality should lobby for more and better transit and build more separated bicycling paths.
- preservation of farmland - cease development entering the Lougheed corridor
- Water pollution, Reduced numbers of salmon and many other animals
- polluted water supply, lakes, streams, etc
- "Fraser River condition
- Traffic Congestion is a huge problem"
- spraying of blueberries all year long after every rain fall smells. Spurs out 20' into air & the wind blows it to the homes.
- clean rivers, streams, dog droppings in parks d
- water resources
- "The water system.
- The amount of pollutants from the berry fields is very concerning to me.
- The leaching into our waterways is disgusting."
- protecting fish bearing streams, green space and farmland
- suggest light electric vehicle paths & use of same on non-arterials. With 4 golf courses in our tiny residential community, we have the most potential to match similar communities in N. America

About Hyla Environmental Services Ltd.

HES Ltd. specializes in developing corporate and community energy and emissions plans for local government and departments within senior levels of government (regional, provincial, and federal). With over 13 years of dedicated experience to emissions management, HES' work extends to corporate and community sustainability plans, including integrated community sustainability plans. HES has developed proprietary software, Energy and Emissions Reporting and Monitoring System™ (EEMRS™), which is used to calculate emissions, develop emissions forecasts, and integrate account-level management to produce accurate, cost effective emissions management strategies. HES is a leader in this field, having completed over 105 corporate energy and emissions inventories and 21 emissions management strategies. As well, HES produces community-wide energy and emissions inventories for all local governments (189) in British Columbia on behalf of the Province of British Columbia's Ministry of Environment. HES Ltd. is proud to be a founding reporter of The Climate Registry.

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