CITY OF
LANGLEY

2010 COMMUNITY ENERGY AND GHG EMISSIONS PLAN

FOR THE 2007 INVENTORY YEAR

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FOR THE 2007 INVENTORY YEAR

PREPARED FOR:

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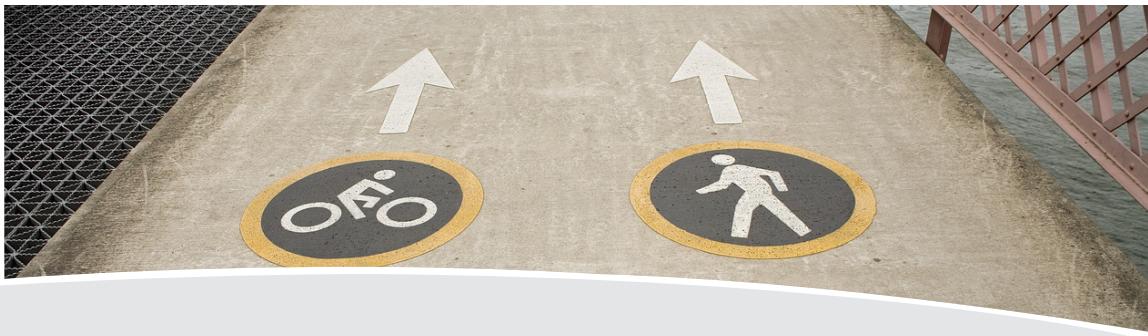

Staff are gratefully acknowledged for their efforts in the development of this plan.

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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.

HYLA
ENVIRONMENTAL SERVICES LTD.

The Climate Registry

ACRONYMS

BAU - Business as Usual
CO_2 – Carbon Dioxide
CO_2e – Carbon Dioxide Equivalent
EEMRS™ – Energy and Emissions Monitoring and Reporting System™
FCM – Federation of Canadian Municipalities
GHG – Greenhouse Gas
HES – Hyla Environmental Services Ltd.
PCP – Partners for Climate Protection
VKT – Vehicle Kilometers Travelled

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Table of Contents

Executive Summary xi

1 Introduction 1

1.1 Energy and Emissions Plan Development 1
1.2 Overall Program Goal: The Reduction Quantity 2
1.3 Climate Change Plan Structure 3
1.4 Greenhouse Gas Emissions, Energy, and Climate Change 3
1.5 Why Conserve Energy 3
1.6 International Climate Change Actions and Agreements 4
1.7 Federal Government Action 4
1.8 Provincial Government Action 4
1.9 Partners for Climate Protection Milestones 5
1.10 Preparing the Inventory and GHG Emissions Reduction Plan 6
1.11 Regional and Local Context 8

2 Community Energy and Greenhouse Gas Inventory 9

2.1 Community Inventory Summary 9
2.2 Community Inventory by Sector 9
2.3 Community Inventory by Emissions Source 10
2.4 Community Buildings Energy and Emissions Inventory 11
2.5 On Road Transportation Energy and Emissions Inventory 13
2.6 Solid Waste 14
2.7 Community Inventory Summary 15

3 Community Forecasts 17

3.1 Forecast Introduction 17
3.2 Forecast of Community Buildings Energy and GHG Emissions 18
3.3 Forecast of Community On Road Transportation Energy and GHG Emissions 22
3.4 Forecast of Community Solid Waste 26
3.5 Summary of Forecast of Community Greenhouse Gas Emissions 27

4 Reduction Initiatives 29

4.1 Summary of Reduction Initiatives 29
4.2 Community Buildings 30
4.3 Land Use and Urban Design 38
4.4 Community Transportation 40
4.5 Solid Waste 49
4.6 Community Reductions Summary 49

5 Implementation, Monitoring & Reporting, and Resources 53

5.1 Implementation 53
5.2 Monitoring and Reporting 55
5.3 Resources 56

6 Summary & Conclusions 57

6.1 Inventory Summary 57
6.2 Forecast Summary 58
6.3 Reduction Target Summary 58

Glossary of Terms (IPCC 2006) 59

Appendix I Detailed GHG Emissions Inventory (2007) 60

Appendix II Detailed Reduction Initiatives 63

Appendix III Public Consultation Materials 93

List of Tables

Table E1 – Forecast Summary xii
Table E2 – Community Reduction Initiatives Summary xiii
Table E3 – Energy and GHG Emissions Plan Target Summary xv
Table 2.1 – Community Energy and Emissions by Sector (2007) 9
Table 2.2 – Community Emission Sources (2007) 10
Table 2.3 – Summary of Community Residential Building Subsector Emissions (2007) 12
Table 2.4 – Summary of Community Commercial Building Subsector Emissions (2007) 12
Table 2.5 – Summary of Community Industrial Building Subsector Emissions (2007) 12
Table 2.6 – Summary of Provincial PSO Subsector Emissions (2007) 12
Table 2.7 – Summary of On Road Transportation Emissions (2007) 14
Table 2.8 – Summary of Solid Waste Data 14
Table 2.9 – Community Energy Consumption and GHG Emissions Summary 15
Table 3.1 – Projected Units for Community Buildings from Observed Trend 19
Table 3.2 – Forecast Net Change Residential Building Units 20
Table 3.3 – Resulting Energy Consumption and GHG Emissions from New Residential Buildings 20
Table 3.4 – Forecast Net Change in Community Buildings' Energy Consumption and GHG Emissions 21
Table 3.5 – Forecast of GHG Emissions for Community Buildings (2017) 21
Table 3.6 – Forecast of Units and Fuel Consumption for On Road Transportation (2007-2017) 24
Table 3.7 – Forecast of GHG Emissions for On Road Transportation (2017) 25
Table 3.8 – Proposed Provincial Tailpipe Standard Implementation 26
Table 3.9 – 2017 On Road Transportation Emissions With Emissions Standard 26
Table 3.10 – Forecast of Community Emissions (CO_2e tonnes) by Sector and Energy Type 27
Table 3.11 – Summary of Community Forecasts 27
Table 4.1 – Reductions from Federal Government Programs for Community Buildings 30
Table 4.2 – Reductions from Achieving CAEE Targets for Existing Buildings 31
Table 4.3 – Reductions from Achieving CAEE Targets for New Buildings 35
Table 4.4 – Reductions from OCP and Local Government By-laws for Community Buildings 38
Table 4.5 – Reductions from Provincial Government Programs for Transportation 41
Table 4.6 – Reductions from Reducing Single Occupant Private Vehicles 41
Table 4.7 – Reductions For Solid Waste 49
Table 4.8 – Community Reduction Initiatives Summary 50
Table 4.9 – Community Reduction Target Summary 51
Table 5.1 – Comparison of GHG Emissions by Sector (2007) 53
Table 5.2 – Summary of Community Forecasts 54
Table 5.3 – Summary of Estimated Impact of Reduction Measures on the Community Sectors 54

List of Figures

Figure E1 – Community GHG Emissions by Sector xii
Figure E2 – Share of Responsibility for Reduction Initiatives xiv
Figure E2 – GHG Emissions Scenarios xv
Figure 1.1 – Community Climate Action Plan Process 1
Figure 1.2 – Aerial photo of the City of Langley 8
Figure 2.1 – Consumption by Sector 10
Figure 2.2 – Emissions by Sector 10
Figure 2.3 – Consumption by Source 11
Figure 2.4 – Emissions by Source 11
Figure 2.5 – Consumption by Building Subsector 11
Figure 2.6 – Emissions by Building Subsector 11
Figure 2.7 – Energy Consumption by Vehicle Class 13
Figure 2.8 – Emissions by Vehicle Class 13
Figure 3.1 – Projected Population Growth (2000-2030) 17
Figure 3.2 – Projected number of Residential Units by 2017 19
Figure 3.3 – GHG Emissions from Buildings in 2007 and Projected Emissions in 2017 22
Figure 3.4 – Projected GHG Emissions from Transportation in 2017 25
Figure 4.4 – State of Building Repair 31
Figure 4.5 – Percentage of Buildings in Each Age Category 32
Figure 4.6 – Housing Types 33
Figure 4.7 – Building Ownership 34
Figure 4.8 – Residential Photovoltaics 34
Figure 4.9 – Average Number of Rooms per Home 36
Figure 4.10 – Percentage Residents Working Outside Langley City 37
Figure 4.11 – Pedestrian Friendly and Non Pedestrian Friendly Development Styles 39
Figure 4.12 – Neighbourhood Commercial 40
Figure 4.13 – Percentage of People Who Commute to Work in a Private Vehicle (as the driver or passenger) 42
Figure 4.14 – TransLink bus at Langley Centre Exchange 43
Figure 4.15 – Percentage of People Who Commute to Work by Public Transit 44
Figure 4.16 – Distance to Public Transit and Commercial Areas 45
Figure 4.17 – Pedestrian Oriented Design 46
Figure 4.18 – Percentage of People Who Cycle and Walk to Work 47
Figure 4.19 – Cycling Infrastructure 47
Figure 4.20 – Modern Transit Technology 48
Figure 4.21 – The Zero Waste Challenge Logo 49
Figure 4.22 – Share of Responsibility 51

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Executive Summary

Climate change is a global problem that requires local solutions. The City of Langley's 2010 Community Energy and GHG Emissions Plan is part of the City's continued efforts to understand the community's carbon footprint and develop a set of realistic measures to reduce greenhouse gas (GHG) emissions.

The Community Energy and GHG Emissions Plan is being developed to meet Provincial Bill 27 requirements[1] and the City's voluntary commitments to:

- Federation of Canadian Municipalities' Partners for Climate Protection[2]; and,
- Provincial Climate Action Charter[3]

The scope of the community inventory for energy and GHG emissions covers:

- Residential Buildings
- Commercial Buildings
- Industrial Buildings
- Community Transportation
- Community Solid Waste

The inventory does not include air, water, and rail in the transportation sector nor agriculture and sequestration from trees.

Though Bill 27 only requires local governments in British Columbia to include GHG reduction targets in Official Community Plans, the City is committed to developing both corporate and community GHG emissions plans. The City also developed a corporate strategy involving sustainability initiatives and a community sustainability framework.

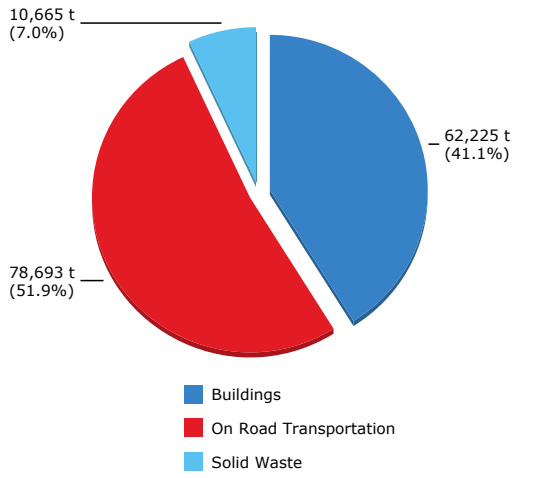
[1] http://www.gov.bc.ca/fortherecord/bill/bi_environment.html?src=/environment/bi_environment.html
[2] http://www.fcm.ca
[3] http://www.cd.gov.bc.ca/ministry/whatsnew/climate_action_charter_update.htm

1.1.1 – Community Energy and Emissions Inventory Summary:

In 2007, the City of Langley generated 151,583 tonnes of CO_2e., with 52 percent caused by community on-road transportation and 41 percent by consumption in community buildings. The remaining seven percent of GHG emissions came from solid waste methane emissions (Figure E1).

Consumption by on-road transportation includes gasoline, diesel fuel, and propane. Community building consumption involves electricity and natural gas, and community solid waste is produced by all residents, businesses, and other operations within City boundaries.

Figure E1 – Community GHG Emissions by Sector



1.1.2 – Community Energy and Emissions Forecast

By 2017, annual community energy consumption is expected to rise 12 percent to ~3,500,000 GJ. Resulting annual GHG emissions should decrease two percent to ~148,000 tonnes CO_2e (Table E1).

This forecast represents the business-as-usual (BAU) scenario and was developed based on allowable projected growth under the City's zoning and Official Community Plan bylaws, legislated GHG reduction initiatives, and Provincial Policy. The BAU scenario is the best estimate of what will occur up to the 2017 forecast year.

The legislated reduction initiatives included in the BAU scenario are as follows:

- net zero GHG emissions from BC Hydro electricity generation by 2016;
- carbon neutral provincial public service organizations by 2010;
- a provincial tailpipe GHG emissions standard; and
- the provincial *Renewable and Low Carbon Fuel Requirements Regulation.*

Table E1 – Forecast Summary

Forecasted Parameter	Base Year	Forecast Year	Percent Increase
	2007	2017	2007-2017
Energy Consumption (GJ)	3,119,464	3,500,461[1]	12%
GHG Emissions (tonnes CO_2e)	151,583	148,251	-2%

[1] The forecast of energy consumption does not reflect potential gains in fuel consumption rates from tailpipe standard implementation.

1.1.3 – GHG Emissions Reduction Initiatives

Table E2 – Community Reduction Initiatives Summary

Sector	Reduction Initiative	Level of Government	Reduction	
			Energy (GJ)	GHG Emissions (tonnes CO_2e)
Community Buildings	Energuide Rating in MLS[1] Advertising	Federal Government	12,407	368
	CAEE[2] Targets - Existing Buildings	Municipal – With Support	46,082	1,315
	CAEE Targets - New Buildings	Municipal – With Support	51,859	1,811
	District Energy Systems	Municipal	51,648	2,642
	Solar Hot Water	Municipal	4,376	152
	Total Buildings Reductions		**153,965**	**6,289**
On Road Transportation	California Pavley II Standard	Provincial Government	–	450
	10% Per Capita VKT Reduction	Shared	–	6,255
	Total On-Road Transportation Reductions			**6,705**
Community Solid Waste	Solid waste diversion rate of 70%	Shared	–	2,133
	Waste-to-Energy Plant	Regional Government	–	5,866
	Total Solid Waste Reductions			**7,999**
	Total Reductions		**153,965**	**20,992**

1 Multiple Listing Service
2 Community Action on Energy and Emissions

Community Buildings | Major Initiatives

EnerGuide rating in Multiple Listing Service (MLS) Advertising

EnerGuide offers a standardized rating for the energy efficiency of buildings. Since a majority of Canadians claim they would pay extra for an environmentally friendly design, boost a house's profile by registering the building's EnerGuide rating on a local realtor's multiple listings service.

CAEE Existing Buildings Targets

The CAEE provides reduction initiatives for both existing and new buildings. This section describes initiatives that may be applied to existing buildings. The number of older buildings in a region varies widely from one area of the City to another. Due to this variation, the CAEE existing building reduction initiatives will be more useful for some neighbourhoods (with many old buildings) than others (with predominantly new buildings).

CAEE New Buildings Targets

The CAEE offers guidelines to increase the energy efficiency of new buildings. These guidelines outline everything that should be considered for new buildings, from construction standards, to amenities (such as bicycle lockers), to location (such as brownfield sites).

Community Energy Systems

Community energy systems (CES) are a cost effective way to supply groups of buildings with energy and secure up to 70 percent in energy savings. Encourage new buildings to utilize CES whenever possible.

Solar Hot Water

Encourage developers to include solar hot water systems in new and existing buildings. These systems better the environment and can reduce heating bills by 50-80 percent.

On-Road Transportation | Major Initiatives

California "Pavley II" Tailpipe Emissions Standards

Encourage senior government to adopt California's current proposal to implement phase II tailpipe emissions standards, which requires stricter emissions controls on passenger vehicles with the model year 2017 and later.

Achieve a 10 Percent Reduction in Per Capita VKT

Work with all levels of government to achieve a 10 percent reduction in vehicle kilometers travelled (VKT) by 2017. This reduction initiative is supported by numerous initiatives, including more efficient land use and increased public transit use. As these initiatives are extremely difficult to estimate, the potential reductions are based on proposals by Metro Vancouver.

Solid Waste | Major Initiatives

Zero Waste Challenge

Metro Vancouver formed the Zero Waste Challenge to develop more environmentally friendly methods of waste disposal. Program suggestions include increased recycling, backyard and food waste composting, and education for all members of the community.

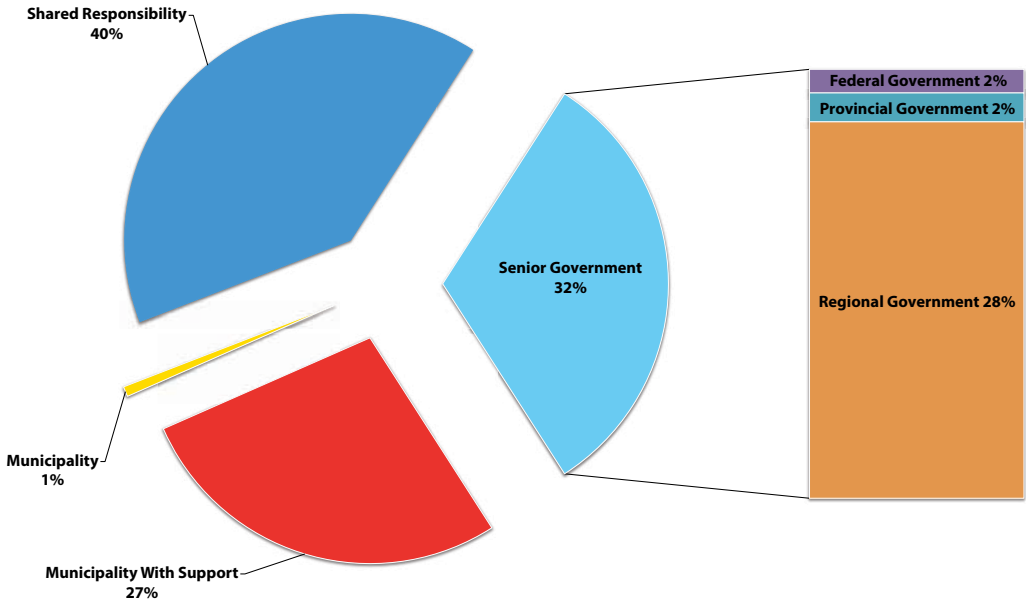
Waste-to-Energy Plant

As the name suggests, Waste-to Energy plants convert municipal waste into an energy supply. Waste can be sent to these plants instead of overflowing landfills. The environmental benefits of these plants are clear: slowing the expansion of landfills reduces the amount of methane released into the atmosphere. Metro Vancouver plans to build at least 1 facility in the near future as part of their Solid Waste Management Plan.

1.1.4 – Share of Responsibility for Reduction Quantity

Figure E2 shows the breakdown of responsibility for the potential reduction quantity. Forty percent of the reduction quantity will require collaboration between the municipality and senior levels of government. Thirty-two percent is the responsibility of senior levels of government. Twenty-eight percent is the responsibility of the municipality, the majority of which will require external funding.

Figure E2 – Share of Responsibility for Reduction Initiatives



1.1.5 – GHG Emissions Reduction Target

In accordance with the FCM PCP Program, the GHG emissions reduction target for the City's community initiatives is based on a 10-year period. The City's base year 2007 and target year 2017, leaves 7 years (2010-2017) to implement this plan. Implementing the initiatives outlined in this report would reduce the City's GHG emissions by **16 percent** below 2007 levels by 2017.

Table E3 provides a summary of the potential reductions in each community sector. Figure E3 provides a visual representation of the difference between the base year, the BAU scenario and the management program results.

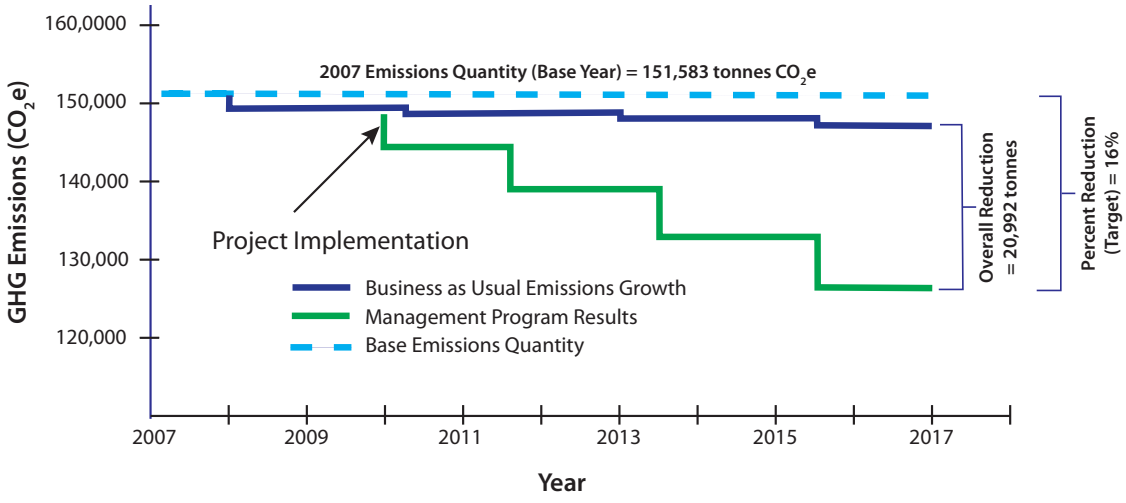
Table E3 – Energy and GHG Emissions Plan Target Summary

Sector		Base Year Emissions	Projected GHG Emissions	Potential GHG Emission Reductions	GHG Emissions After Plan Implementation	Percent Reduction of Projected Emissions [1]
		Tonnes CO_2e				
		2007	2017			
Buildings	Residential	24,205	25,508	4,651	20,857	-14%
	Commercial	32,231	30,813	1,026	29,786	-8%
	Industrial	4,451	3,609	611	2,997	-33%
	PSO[2]	1,336	0	0	0	-100%
On Road Transportation		78,693	77,669	6,705	70,964	-10%
Solid Waste		10,665	10,665	7999	2,666	-75%
TOTAL		151,583	148,251	20,992	127,271	-16%

[1] Please note the 16 percent decrease calculated above represents the potential outcome over the project period (2010-2017) relative to the projected growth in emissions in 2017, which includes the growth of emissions during the project period.

[2] Public Service Organization

Figure E2 – GHG Emissions Scenarios



1.1.6 – Reduction Target Statement:

It is recommended that the City of Langley adopt a GHG emissions reduction target of 16 percent below 2007 levels by 2017. Achieving this target will require a reduction of ~21,000 tonnes CO_2e.

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1 Introduction

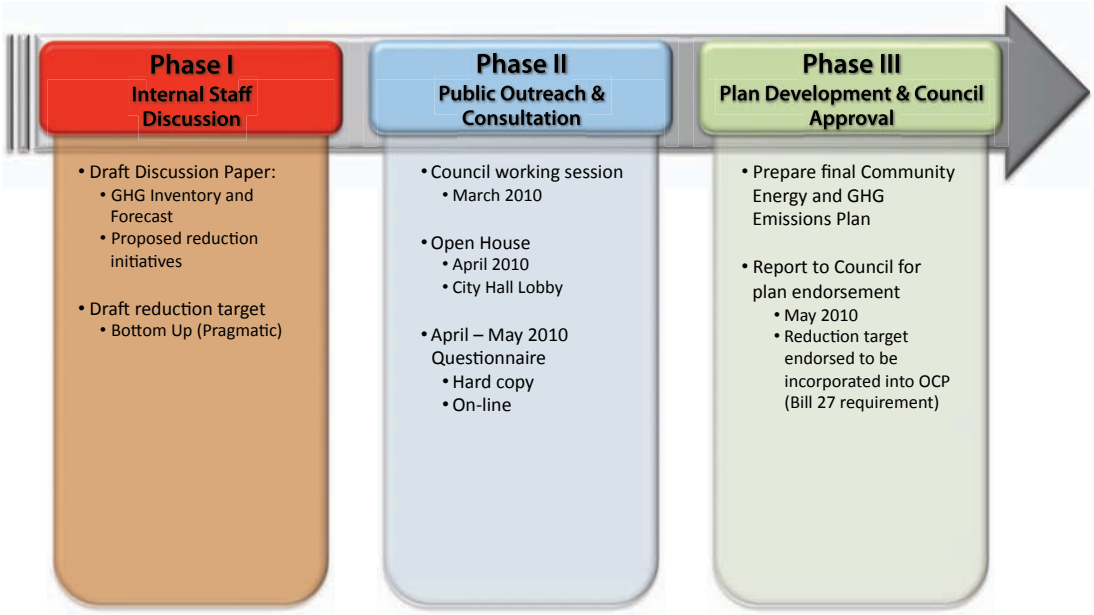
Why a Community Energy and GHG Emissions Plan (CEEP)? The CEEP is a community based framework that develops an inventory of current energy consumption and GHG emissions and identifies potential energy and emission reduction actions. By setting benchmarks and an overall reduction target, the CEEP challenges 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 CEEP encourages stakeholders to identify conservation opportunities to reduce energy consumption and actionable strategies for lowering GHG emissions. Additionally, the community's active participation serves as an important tool for assessing the viability of the proposed action plan. As the CEEP is developed through public consultation and outreach, community responses and behaviour toward the proposed GHG emissions plan can be assessed.

1.1 Energy and Emissions Plan Development

Hyla Environmental Services Ltd. (HES) was hired to take staff through a planning process that culminated in the development of this document. HES' process is illustrated in Figure 1.1.

Figure 1.1 – Community Climate Action Plan Process



As part of the plan development, interviews with key City staff provided critical assistance for the following plan components:

- 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 reduction target.

The development of this plan coincided with a public consultation process designed to gather comments and responses from interested City residents. The City and HES undertook the following public consultation activities:

1. March 31, 2010: A council working session was held to introduce the plan and why the plan was being developed by the City. A draft target was presented to Council as well as the strategy to derive the target;
2. March 31, 2010: The City posts a new sustainability webpage including Community Energy & GHG Emissions Plan section (see http://www.city.langley.bc.ca/sustainability.htm);
3. April 13, 2010: The City invited commission members & community sustainability stakeholders to April 22 Open House (see Appendix III for the invitation);
4. April 16 & 20, 2010: City advertises Open House in Langley Advance (see the Public Service Announcement in Appendix III);
5. April 20, 2010: Draft Plan and survey posted to website (see http://www.city.langley.bc.ca/sustainability.htm);
6. April 20, 2010: Langley Advance article (see "Residents have say in City green plans" in Appendix III); and,
7. April 22, 2010: City holds Open House at City Hall. Fifteen City residents attended.

OCP Bylaw 2817 in response to Green Communities Amendment Act Bill 27

The Green Communities Amendment Act (Bill 27) requires targets for GHG emission reductions be incorporated into Official Community Plans by May 31, 2010. The Act also requires the local government to develop policies and actions to achieve the GHG emission target.

The City's OCP Bylaw 2817, which includes this target, underwent 1st & 2nd Readings on May 10, 2010. To meet the province's requirements as stated in Bill 27, the City will hold a public hearing on May 31, 2010 to amend the OCP according to the GHG emissions reduction target proposed herein.

1.2 Overall Program Goal: The Reduction Quantity

The overall program goal of the City's CEEP is to identify the total potential quantity of GHG emissions reductions and establish a reduction target. This target has been carefully developed through the planning process by quantifying potential reduction initiatives achievable in the project period (2010-2017).

Since community GHG emissions are the result of the combustion of fuel, the use of electrical energy and the decomposition of solid waste, the plan incorporates various types of measures, or reduction initiatives, that reduce energy and emissions through:

- conservation through reduced use.
- technological change.
- switching to less carbon intensive fuel.
- offsetting conventional energy with renewable energy.

1.3 Climate Change Plan Structure

The results of the planning process are presented in 5 sections. Section 1 provides the introduction, community context, and plan methodology. Section 2 presents the results of the community inventory. Section 3 presents a BAU forecast for community energy consumption and emissions for the year 2017. Section 4 presents a summary of the recommended reduction initiatives and reduction estimates for the quantifiable initiatives. Section 5 summarizes the plan's main findings and recommendations.

1.4 Greenhouse Gas Emissions, Energy, and Climate Change

Greenhouse Gas Emissions

GHGs are produced whenever we use energy. A substantial portion of community energy is derived from the combustion of fossil fuels, and when we burn fossil fuels, GHGs are emitted (e.g., carbon dioxide, nitrous oxide, and methane gas). Other significant sources of GHG emissions come from the generation of electricity and from the decomposition of solid waste in landfills.

Climate Change

Greenhouse gases make up part of the atmosphere and contribute to the greenhouse effect, which makes life on earth possible. Without greenhouse gases, the earth's mean temperature would be approximately –19 degrees Centigrade instead of approximately 15 degrees Centigrade.

Additional greenhouse gases generated by human activity trap heat within the earth's atmosphere which unbalances the earth's weather patterns causing our climate to change on a global scale.

Energy

Energy is part of our every day lives and taking it for granted is as easy as turning on a light switch. Nearly every activity we engage in and nearly every product we use on a daily basis either consumes energy directly or required energy in its production.

Energy is used in many ways — to light and heat our homes, to power our vehicles, and to partake in countless daily activities. In British Columbia, 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, whereas natural gas is much more efficient than electricity when used for space heating. In British Columbia, natural gas, where it is locally available, is the primary choice for space heating. Where natural gas is not available, other fossil fuels such as fuel oil and propane are used for space heating.

In terms of climate change issues, natural gas has a much higher carbon emissions factor per GJ of energy compared to electricity generated in B.C. Therefore, low carbon emissions from hydroelectric power in BC tend to balance out with the higher carbon emissions from the natural gas, fuel oil, and propane used for space heating.

1.5 Why Conserve Energy

Since the consumption of fossil fuels results in the production of GHGs, successful climate change mitigation depends upon our ability to reduce energy consumption. Not only should we reduce energy consumption to lessen the effects of GHGs on our planet, we must conserve non-renewable fuel sources for future generations.

Although past reasons to conserve energy have been primarily to reduce energy costs, this report places the emphasis on improving energy conservation in order to mitigate climate change. That being said, as fossil fuel reserves diminish and electricity becomes more expensive, consumers will be forced to conserve due to cost escalations alone. Although extremely difficult to predict, it is reasonable to assume that future energy conservation will be driven, in part, by rising energy costs.

Energy conservation can be achieved by promoting behavioural changes and through technological change. Simple behavioural changes include unplugging electronics and appliances when not in use, or setting the thermostat 1 or 2 degrees lower. In fact, lowering the temperature by 1 degree for just 8 hours a day can conserve

energy and reduce your heating costs by up to 2%[1]. Investing in technological upgrades including renewable energy also has significant benefits for energy conservation and saves money.

Smart long term planning can help achieve energy conservation. Smart development strategies allow communities to grow to manageable limits and minimize their overall energy consumption and GHG production. The addition of renewable energy technologies and implementation of shared heating systems improves community energy conservation even further by sharing heating loads and reducing the reliance on fossil fuels.

Although there is no silver bullet to halt climate change, smart development strategies favour the development of high density communities by implementing compact, safe and diverse design, promoting pedestrian, cycling and transit movement, incorporating green building features, energy efficient construction and promoting alternative energy possibilities. All of these concepts need to come together if long-term reductions in GHG emissions are to be achieved.

1.6 International Climate Change Actions and Agreements

Climate change is a top issue of concern for Canadians. 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, concludes 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 technological solutions.

The global trend toward stricter greenhouse gas emission reduction targets is placing pressure on all levels of government to take measurable steps toward offsetting the negative effects of climate change. Since the signing of the United Nations Framework Convention on Climate Change in 1992, countries have worked toward meeting the GHG emission reduction targets set at the first Earth Summit in Rio de Janeiro, Brazil. The Kyoto Protocol signed in 2002 outlines suggested targets and options to be achieved on a national level.

Since 2007 there has been a global trend toward more aggressive GHG emission reduction targets. A key event was the 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 GHG 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.

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, regional and municipal levels of government.

1.7 Federal Government Action

The Canadian government has committed to taking 'real 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 GHG emissions, the Canada EcoTrust for Clean Air and Climate Change was introduced in February 2007. EcoTrust, together with the provinces, funds technology development, energy efficiency, and related projects.

1.8 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 33 percent reduction by 2020 and a 80 percent reduction by 2050. These are some of the toughest emissions standards in North America. Notably, B.C. is the first Canadian province to adopt California's tough motor vehicle emissions reduction target of 30 percent reduction by 2016.

1 BC Hydro Power Smart

Climate Action Charter

The province is taking a national leadership role on climate change with the May 2008 introduction of the Climate Action Charter (CAC)– a provincial initiative signed by the Province, the Union of BC Municipalities (UBCM), and local governments. Upon signing, a voluntary commitment is made to measure and report community GHG 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 Langley is one of 176 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 CAC recognizes the need to take action on climate change and reduce GHG emissions. It also recognizes the important role the provincial government and local governments can play in affecting climate change.

Green Communities Amendment Act Bill 27

The Green Communities Amendment Act (Bill 27) came into force on May 29, 2008. The Act requires official community plans by May 31, 2010 and regional growth strategies by May 31, 2011 to establish targets for GHG emission reductions in the area covered by the plan. The Act also requires the local government to develop policies and actions to achieve those GHG emission targets as well as objectives for energy and water conservation.

Bill 27 also expanded the authority of development permits to allow municipalities to promote energy and water conservation and the reduction of GHGs in new development sites. Local governments may also create parking cash-in-lieu programs and use those funds to support alternate transportation. Parking standards could also be determined by transportation needs at the time of development approval. Development cost charges can be waived for small dwelling units and small lot 'green' subdivisions.

1.9 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 GHG emission reduction initiatives and sustainability with the goal of assisting municipalities with their GHG management initiatives by providing tools and logistical support. The PCP initiative not only focuses on reducing existing GHG emissions, but also encourages municipalities to influence future GHG emissions through a variety of sustainable mechanisms such as land use and transportation planning, building codes, and development permits. By participating in the PCP initiative, municipalities receive up-to-date information on global climate change and important information regarding strategies to reduce GHG emissions, including innovative financing strategies and sample action plans. Currently it includes 201 Canadian municipal and regional governments. British Columbia is the most active member of the network, with 63 municipalities committed to reducing GHG emissions.

This report is a direct result of the efforts by the City to fulfill requirements as part of the PCP initiative, which consists of 5 milestones. These milestones are summarized as follows:

Milestone One

Creating a greenhouse gas emissions inventory and forecast

The Community Energy and Emissions Plan (CEEP) analyzes 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.

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 the voluntary and mandated emissions reduction targets established by senior government are a major factor influencing the determination of emissions reduction targets, local governments 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.

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, this plan will become the basis for public consultation. 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. Many factors must be taken into consideration when developing viable strategies, including technology lifecycles, planned and retired assets, and government mandates, such as renewable energy standards and stricter emissions reductions.

Milestone Four

Implementing the action plan and related activities

Important considerations in the 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 other stakeholders.

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 governments 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.

1.10 Preparing the Inventory and GHG Emissions Reduction Plan

Methods for PCP Milestone One are described herein and a brief description for PCP Milestone Two is provided. 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.

The emissions analysis is a community wide emissions analysis separated into sectors and sources.

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 Langley 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 Environment Canada for 2002 and the Province of BC for 2007.[1] Individual vehicles are matched with their corresponding fuel efficiencies[2] and a fuel consumption estimate is calculated.

The calculations of CO_2e within EEMRS™ conforms with the methods described in the International Panel on Climate Change Greenhouse Gas Inventory Reference Manual (IPCC 2006), the principles provided in the International Standards Organization (ISO) Draft International Standard for Greenhouse Gases (ISO 2005), and the general guidance within the FCM's guidance document for the preparation of PCP inventories (FCM 2006). Emissions coefficients are found in the IPCC document and emissions factors for electricity are provided by BC Hydro.[3]

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

Emissions Baseline

The community emissions baseline is the total GHG emissions from the community in the base inventory year. This number can be actual data or data that has been backcast from a year where actual data exists. The base year has been established as the year 2007 (the Province of British Columbia's base year). Building emissions for the 2007 community base year is derived from actual consumption data, whereas community transportation emissions are derived from activity data and estimates of vehicle kilometres travelled. Solid waste data has been provided by Metro Vancouver.

Emissions Projection

An emissions projection is developed by forecasting emissions from a year in which real emissions data exists. This may be the base year or the year for which the base year was backcast. The projection must be derived from actual, not estimated, indicator data. The most common indicator data for developing the forecast is population growth estimates provided by a senior government agency. This forecast is also know as the 'business as usual' projection. Where possible, HES forecast emissions on a trend line using actual consumption data for the City for 2007 and 2008. The forecast is a business as usual projection to 2017.

Reporting Protocols and Guidelines

The Federation of Canadian Municipalities provides a protocol document, which guides the development of inventories for the Partners for Climate Protection Program (FCM 2006). By developing common conventions and a standardized approach, protocols make it easier for PCP members to fulfill their commitments to the PCP. As well, the FCM's guidance document for the preparation of PCP inventories (FCM 2006) expands on other protocols and provides more specific context for the preparation of community inventories.

Emissions Reduction Initiatives and Reduction Targets

Community reduction targets are calculated once staff selected the reduction initiatives that they wish to propose for public consultation. The calculation of reductions is conducted on the energy types that are affected by the measure. For example, retrofits to residential buildings are calculated based on the potential reduction of the retrofit on the energy type that the retrofit affects. The total reductions that could be achieved by the City are the sum of the individual estimates of each reduction initiative while accounting for growth in each inventory sector.

1 Environment Canada; Province of BC

2 http://www.oee.nrcan.gc.ca

3 http://www.bchydro.com/rx_files/environment

1.11 Regional and Local Context

The City of Langley is located in the eastern portion of the Greater Vancouver metropolitan area. The City has a much higher population density than other nearby municipalities with 25,000 residents within the City's 10 square kilometre boundary. The population for the Primary and Secondary Trade Area for the City of Langley is over 200,000. This growth and prosperity has earned the City of Langley the title of a Regional City Centre within Metro Vancouver.

The City of Langley contains 6 established residential neighbourhoods, a natural wetland of regional significance, parkland exceeding 300 acres, high density residential development, a revitalized pedestrian oriented downtown, a regional shopping centre and one of the most active industrial and service commercial land bases found in Metro Vancouver.

Figure 1.2 – Aerial photo of the City of Langley

Neighbourhoods are the basic building blocks of communities. Strengthening neighbourhoods builds a stronger community. The quality of life for the City's residents significantly rely on the quality of the neighbourhoods they live in. Based on elementary school catchment areas, the City has identified 6 neighbourhoods: Nicomekl, Douglas, Simonds, Blacklock, Uplands, and Alice Brown.

As part of Metro Vancouver, the City of Langley's growth and development is affected by broader regional trends. The City's housing stock consists of 10,835 dwelling units (June 2006). These units were distributed between 3,093 single-unit dwellings (29 percent) and 7,742 multi-unit dwellings (71.5 percent).

Single-unit housing in the City is generally located in the suburban residential area south of the Nicomekl River. Multi-unit housing, meanwhile, is concentrated in and around the commercial core of the City where further infilling and redevelopment are being encouraged. The growing population of the City of Langley and its trade area has stimulated the ongoing development of the retail and service industries. These commercial businesses are primarily located in Langley's 2 major commercial districts: the Downtown Core and the Willowbrook retail/service node.

The downtown core is the traditional central business district located in the heart of the City. This pedestrian-oriented shopping environment provides a commercial focus for the City and portions of the surrounding Township of Langley and City of Surrey. The City continues to work with the Downtown Langley Merchants' Association to revitalize the downtown core and enhance its appeal to pedestrians and businesses. The downtown core of the City is also intended to be the cultural and social centre for Langley, so both public and private entertainment and recreation/social facilities are encouraged. Residential infilling and densification of the downtown core and surrounding neighbourhoods are also supported to ensure a permanent local population base and to maintain around-the-clock vibrancy in the area.

2 Community Energy and Greenhouse Gas Inventory

An overview of total energy consumed and emissions produced by the City of Langley'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.

2.1 Community Inventory Summary

In the 2007 base year the community's total greenhouse gas emissions was 151,583 tonnes of CO_2e. (See Appendix I for a detailed community inventory for 2007).

2.2 Community Inventory by Sector

2.2.1 – Energy Consumption

In 2007 community buildings accounted for the majority of community energy consumption (2,026,171 GJ; 65 percent). Fuel for on road transportation amassed 35 percent of energy consumption (1,093,294 GJ; Table 2.1 & Figure 2.1).

2.2.2 – Emissions by Sector

The on road transportation sector was the largest source of community emissions, generating 78,693 tonnes of CO_2e in 2007 (52 percent). Community buildings generated 62,225 tonnes of CO_2e (41 percent) whereas methane from the decomposition of community solid waste generated 10,665 tonnes of CO_2e (7 percent; Table 2.1 & Figure 2.2).

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

Sector	Total Energy (GJ)	Total Emissions (CO_2e tonnes)	Percent Energy	Percent Emissions
Buildings	2,026,171	62,225	65%	41%
On Road Transportation	1,093,294	78,693	35%	52%
Solid Waste		10,665	0%	7%
Total	**3,119,465**	**151,583**	**100%**	**100%**

Figure 2.1 – Consumption by Sector

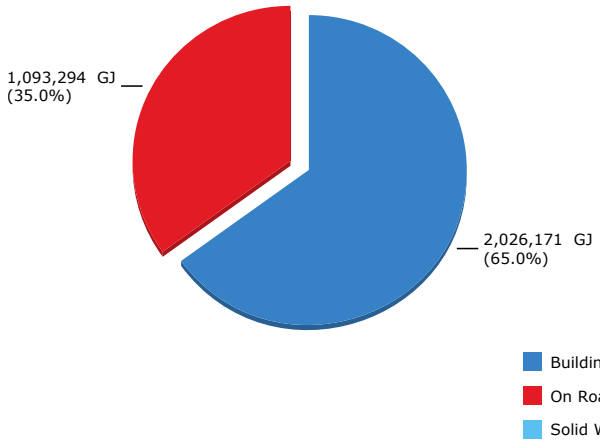
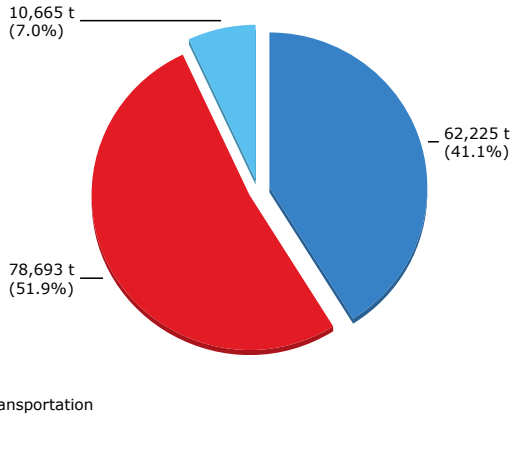


Figure 2.2 – Emissions by Sector



2.3 Community Inventory by Emissions Source

Although the community generates emissions from numerous sources, only 6 were counted in the 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 insignificant in terms of overall community emissions.

2.3.1 – Consumption by Emissions Source

In terms of overall energy content, natural gas used for heating homes was the largest source of community energy, accounting for 35 percent of energy use in 2007. Electricity was the other major source of community energy, responsible for 29 percent of energy consumption, followed by gasoline's 28 percent. Diesel fuel accounted for 7 percent of energy use and mobile propane less than 1 percent (Table 2.2 & Figure 2.3).

2.3.2 – Emissions by Emissions Source

Gasoline and natural gas accounted for 78 percent of community emissions in 2007. Gasoline combustion was the single largest source of community emissions, producing 62,763 tonnes of CO_2e (41 percent), and natural gas use produced 56,606 tonnes of CO_2e (37 percent). Diesel fuel and electricity were also major sources of community emissions in 2007. Diesel fuel use produced 15,730 tonnes of CO_2e (10 percent) while electricity use accounted for 5,619 tonnes of CO_2e (4 percent). Solid waste accounted for 7 percent of emissions and mobile propane less than 1 percent (Table 2.2 & Figure 2.4).

Table 2.2 – Community Emission Sources (2007)

Energy Type	Total Consumption	Total GJ	Percent Energy	Total Emissions (CO_2e tonnes)	Percent Emissions
Electricity	255,415,584 kWh	919,496	29%	5,619	4%
Natural Gas	1,106,674 GJ	1,106,674	35%	56,606	37%
Gasoline	25,131,601 litres	871,061	28%	62,763	41%
Diesel Fuel	5,659,258 litres	218,900	7%	15,730	10%
Mbl Propane	131,685 litres	3,333	0%	200	0%
Solid Waste				10,665	7%
Total			**100%**	**151,583**	**100%**

Figure 2.3 – Consumption by Source

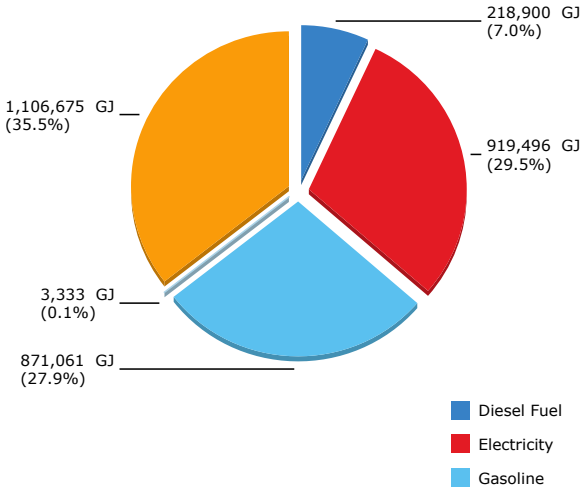
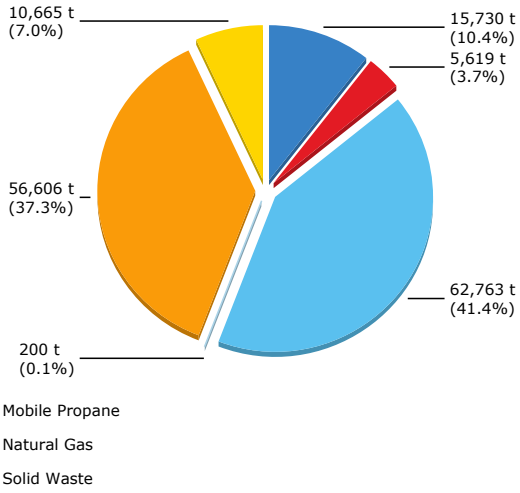


Figure 2.4 – Emissions by Source



2.4 Community Buildings Energy and Emissions Inventory

2.4.1 – Community Buildings Energy Consumption

Commercial buildings were the largest consumers of energy, responsible for 47 percent of energy consumption followed by residential buildings (37 percent) and industrial buildings (14 percent). Provincial public service organizations (PSO's) accounted for 2 percent of energy consumption (Figure 2.5).

2.4.2 – Community Buildings GHG Emissions

Commercial buildings were also responsible for the majority of community buildings emissions, generating 32,231 tonnes of CO_2e (52 percent). Residential buildings generated 24,206 tonnes of CO_2e or 39 percent of the buildings sector's emissions. Industrial buildings generated 4,452 tonnes of CO_2e (7 percent) and provincial PSO's generated 1,336 tonnes of CO_2e (2 percent; Figure 2.6).

Figure 2.5 – Consumption by Building Subsector

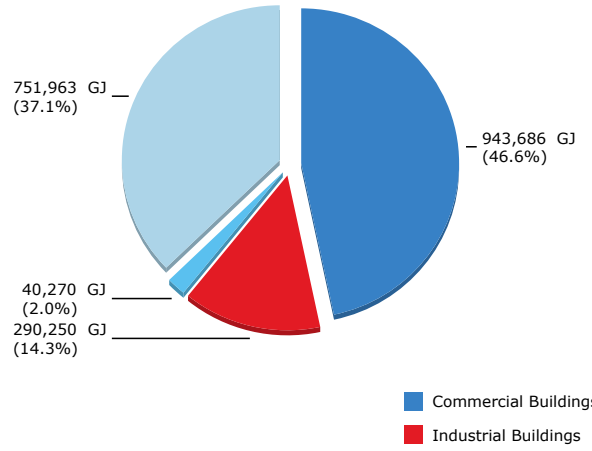
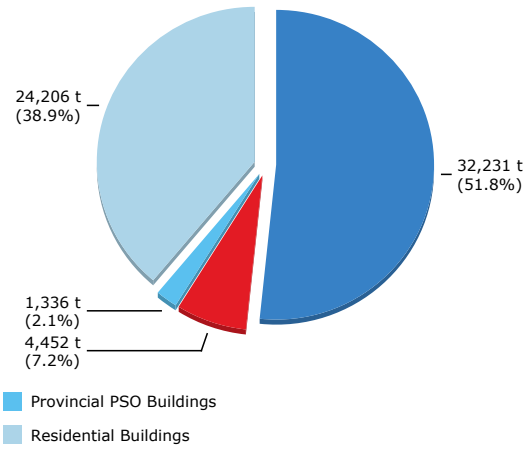


Figure 2.6 – Emissions by Building Subsector



2.4.3 – Residential Buildings

In 2007 residential buildings consumed a total of 87,929,505 kWh of electricity and 435,417 GJ of natural gas. The resulting emissions from electricity and natural gas totalled 24,206 tonnes of CO_2e. There were ~10,700 residential electricity connections and ~4,450 natural gas connections. Residential energy intensity was 8,185 kWh of electricity per connection and 98 GJ of natural gas consumed per connection (Table 2.3).

Table 2.3 – Summary of Community Residential Building Subsector Emissions (2007)

Buildings	Consumption By Type						Emissions Total
	Type	Connections	Consumption	Energy/Connection	Energy (GJ)	CO_2e (t)	CO_2e (t)
Residential Buildings	Electricity	10,743	87,929,505 kWh	8,185 kWh/C	316,546	1,934	**24,206**
	Natural Gas	4,451	435,417 GJ	98 GJ/C	435,417	22,271	

2.4.4 – Commercial Buildings

The City's ~2,000 commercial buildings generated 32,231 tonnes of CO_2e by consuming 98,914,009 kWh of electricity and 587,596 GJ of natural gas. Electrical energy consumption was ~50,000 kWh per connection while natural gas consumption per connection was ~460 GJ (Table 2.4).

Table 2.4 – Summary of Community Commercial Building Subsector Emissions (2007)

Buildings	Consumption By Type						Emissions Total
	Type	Connections	Consumption	Energy/Connection	Energy (GJ)	CO_2e (t)	CO_2e (t)
Commercial Buildings	Electricity	1,976	98,914,009 kWh	50,058 kWh/C	356,090	2,176	**32,231**
	Natural Gas	1,276	587,596 GJ	460 GJ/C	587,596	30,055	

2.4.5 – Industrial Buildings

In 2007 the City of Langley's industrial buildings consumed 64,108,724 kWh of electricity and 59,459 GJ of natural gas, resulting in 4,452 tonnes of CO_2e. Average energy intensity was ~444,500 kWh of electricity per connection and ~4,600 GJ of natural gas per connection (Table 2.5)

Table 2.5 – Summary of Community Industrial Building Subsector Emissions (2007)

Buildings	Consumption By Type						Emissions Total
	Type	Connections	Consumption	Energy/Connection	Energy (GJ)	CO_2e (t)	CO_2e (t)
Industrial Buildings	Electricity	144	64,108,724 kWh	444,494 kWh/C	230,791	1,410	**4,452**
	Natural Gas	13	59,459 GJ	4,574 GJ/C	59,459	3,041	

2.4.6 – Provincial Public Service Organization (PSO) Buildings

Provincial PSOs, including schools, universities and buildings under the operational control of a provincial ministry, generated 1,336 tonnes CO_2e in 2007 by consuming ~4,460,000 kWh of electricity and ~24,000 GJ of natural gas. Energy intensity for these facilities was ~406,000 kWh of electricity per connection and ~3,000 GJ of natural gas per connection (Table 2.6)

Table 2.6 – Summary of Provincial PSO Subsector Emissions (2007)

Buildings	Consumption By Type						Emissions Total
	Type	Connections	Consumption	Energy/Connection	Energy (GJ)	CO_2e (t)	CO_2e (t)
Provincial Pso Buildings	Electricity	11	4,463,346 kWh	405,759 kWh/C	16,068	98	**1,336**
	Natural Gas	8	24,202 GJ	3,025 GJ/C	24,202	1,238	

2.5 On Road Transportation Energy and Emissions Inventory

The community on road transportation sector includes all motorized vehicles registered with the Insurance Corporation of British Columbia, within the City of Langley. One condition of the provision of data is that the vehicles in each class are represented as a 'unit'. Vehicle classes have been grouped using gross vehicle weight ratings for individual vehicles.

2.5.1 – Fuel Consumption

In 2007 light trucks, vans and SUVs accounted for the majority of community fuel consumption (39 percent) followed by commercial vehicles (25 percent), small passenger cars (21 percent) and large passenger cars (10 percent). Buses, motorhomes, motorcycles and mopeds, and tractor trailer trucks altogether accounted for just over 5 percent of energy consumption (Figure 2.7 & Table 2.7).

2.5.2 – GHG Emissions

In 2007 light trucks, vans and SUVs were the largest source of emissions in the community's on road transportation sector, responsible for 39 percent of community emissions. Commercial vehicles were the second largest source of emissions (24 percent) followed by small passenger cars (21 percent) and large passenger cars (ten percent). Buses, motorhomes, tractor trailer trucks, and motorcycles and mopeds accounted for approximately 5 percent of on road transportation emissions (Figure 2.8 & Table 2.7).

Figure 2.7 – Energy Consumption by Vehicle Class

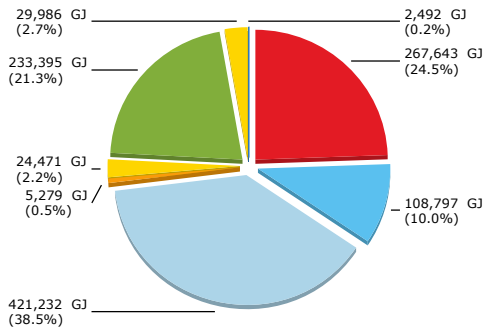
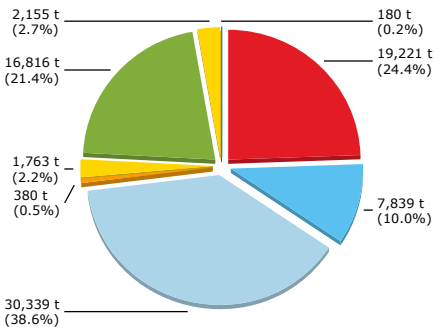


Figure 2.8 – Emissions by Vehicle Class



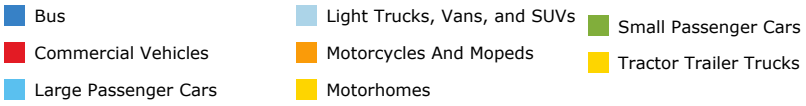


Table 2.7 – Summary of On Road Transportation Emissions (2007)

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	8,445	6,674,280	litres	790 L/U	231,331	16,668	**16,816**
	Diesel Fuel	93	53,360	litres	574 L/U	2,064	148	
Large Passenger Cars	Gasoline	3,032	3,128,106	litres	1,032 L/U	108,420	7,812	**7,839**
	Diesel Fuel	15	9,730	litres	649 L/U	376	27	
Light Trucks, Vans, And Suvs	Gasoline	7,088	12,012,034	litres	1,695 L/U	416,337	29,998	**30,339**
	Diesel Fuel	61	101,038	litres	1,656 L/U	3,908	281	
	Mobile Propane	23	38,969	litres	1,694 L/U	986	59	
Commercial Vehicles	Gasoline	1,473	2,445,129	litres	1,660 L/U	84,748	6,106	**19,221**
	Diesel Fuel	924	4,667,747	litres	5,052 L/U	180,548	12,974	
	Mobile Propane	67	92,717	litres	1,384 L/U	2,347	141	
Tractor Trailer Trucks	Diesel Fuel	55	775,237	litres	14,095 L/U	29,986	2,155	**2,155**
Motorhomes	Gasoline	403	647,847	litres	1,608 L/U	22,454	1,618	**1,763**
	Diesel Fuel	52	52,146	litres	1,003 L/U	2,017	145	
Motorcycles And Mopeds	Gasoline	607	152,302	litres	251 L/U	5,279	380	**380**
Bus	Gasoline	24	71,902	litres	2,996 L/U	2,492	180	**180**
Subtotal	Gasoline	21,072	25,131,601	litres		871,061	62,763	**78,693**
	Diesel Fuel	1,200	5,659,258	litres		218,900	15,730	
	Mbl Propane	90	131,685	litres		3,333	200	

2.6 Solid Waste

Community solid waste accounted for about 7 percent of total community emissions. In 2007 the solid waste produced by Langley residents produced 10,665 tonnes of CO_2e (Table 2.8).

Table 2.8 – Summary of Solid Waste Data

Sector	Mass (t)	Estimation Method	Emissions CO_2e (t)
	2007		
Solid Waste	29,159	Methane Commitment	10,665

2.7 Community Inventory Summary

In the 2007 inventory year the City of Langley used 3,119,464 GJ of energy and generated 151,583 tonnes CO_2e. Community buildings accounted for the greatest amount of energy consumption while on road transportation accounted for the largest share of community GHG emissions (Table 2.9).

Commercial buildings were responsible for the largest share of building sector emissions followed by residential buildings, industrial buildings and provincial PSOs. In the buildings sector, natural gas was the largest source of both energy and GHG emissions.

Light trucks, vans and SUVs were the largest sources of emissions in the on road transportation sector followed by commercial vehicles and small passenger cars. Gasoline was the dominant fuel source in terms of consumption and consequently produced the largest share of emissions among fuel types.

Table 2.9 – Community Energy Consumption and GHG Emissions Summary

Sector		Energy Type/Unit	Consumption	Energy (GJ)	GHG Emissions (Tonnes of CO_2e)	
			2007			
Buildings	Residential Buildings	Elect	87,929,505 kWh	316,546	1,934	24,206
		Nat Gas	435,417 GJ	435,417	22,271	
	Commercial Buildings	Elect	98,914,009 kWh	356,090	2,176	32,231
		Nat Gas	587,596 GJ	587,596	30,055	
	Industrial Buildings	Elect	64,108,724 kWh	230,791	1,410	4,452
		Nat Gas	59,459 GJ	59,459	3,041	
	Provincial PSO's	Elect	4,463,346 kWh	16,068	98	1,336
		Nat Gas	24,202 GJ	24,202	1,238	
	On Road Transportation	Gasoline	25,131,601 L	871,061	62,763	78,693
		Diesel	5,659,258 L	218,900	15,730	
		Propane	131,685 L	3,333	200	
	Solid Waste	Tonnes	29,159 t	NA	10,665	10,665
TOTAL			**3,119,464 GJ**		**151,583 t**	

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3 Community Forecasts

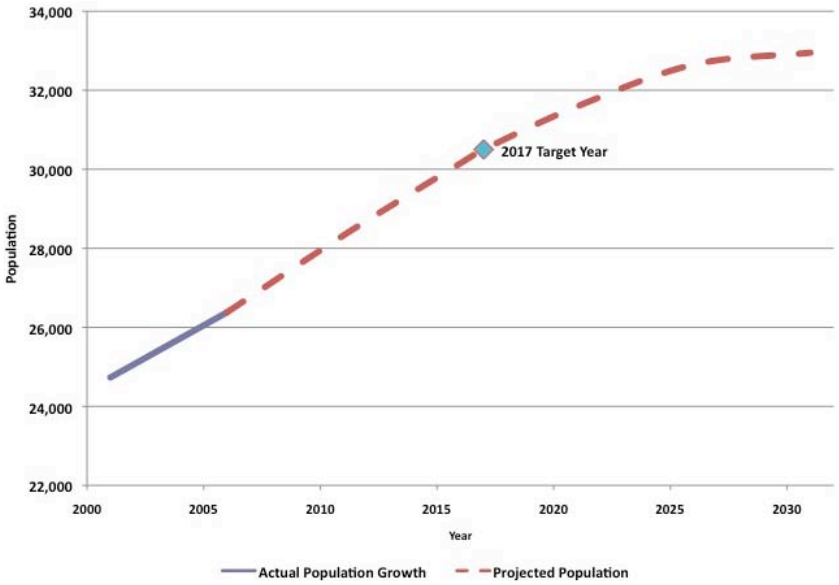
3.1 Forecast Introduction

A forecast of community emissions for the community buildings, on road transportation, and solid waste sectors is presented in the following pages. Community energy consumption and GHG emissions have been modeled for the 2017 target year. The predicted emissions quantity is a business-as-usual (BAU) scenario where only currently legislated GHG reduction initiatives have been included. Developing an emissions forecast is the second step towards developing a GHG emissions reduction target.

In general, free of any policies to limit per capita emissions, energy and emissions at the community level will increase as the City's population increases. In 2006 the City of Langley had an estimated population of 26,360 residents. By the 2017 target year the City's population will grow to an estimated ~30,500 residents. Figure 3.1 shows the projected population increased as detailed in the City's 2005 Official Community Plan (OCP)[1].

Since there is little undeveloped land left within City boundaries, low-density development is not an option for accommodating the expected population increase. The City's OCP requires that population growth is primarily handled through infilling, or densification, of existing residential areas.

Figure 3.1 – Projected Population Growth (2000-2030)



1 City of Langley, Official Community Plan Bylaw, 2005,

3.2 Forecast of Community Buildings Energy and GHG Emissions

Many factors contribute to the forecast of GHG emissions for community buildings. Factors include the number of additional units to be constructed, energy types for space heating new units (e.g., electric or natural gas space heating), size and energy efficiency of projected units, and the GHG emissions factor for electricity in 2017.

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

Growth in Emissions by Energy Type = (Projected Number of Units) × (Projected Energy Intensity by Energy Type) × (Projected Emissions Factor)

Note that the projected emissions factor only changes for electricity and is constant for natural gas. A framework and number of assumptions has been provided to support the building's forecast as a whole and for each subsector.

3.2.1 – Framework and Assumptions

Framework and Assumptions for Forecasts in the Community Buildings Sector:

- A 'Business-as-Usual' (BAU) scenario is presented and is based on trends in energy consumption, data provided by City staff, and senior government legislation affecting GHG emissions.
- The GHG emissions factor for electricity generation in 2017 is based on the assumption that BC Hydro will meet its target to reduce electricity related emissions by 99 percent (for further details on the change in emissions factor see Section 4).
- Consumption data for natural gas is not normalized for weather in 2017.
- Growth is significantly different for each of the community buildings subsectors.
- Growth is predicted for the target year 2017.
- The 2007 energy and GHG emissions inventory was used to provide guidance for the forecast.

Framework and Assumptions for Forecasts in the Residential Buildings Subsector:

- The BAU scenario reflects the City's best estimate of buildings that could be developed under existing land use bylaws up to 2017.
- The ratio of residential units heated by electricity compared to those heated by natural gas was adjusted to reflect current construction trends in Metro Vancouver.
- The calculation of forecasted energy consumption 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).
- The replacement of existing residential units with new units of the same type was not accounted for, because average energy intensity of the current housing stock should remain stable over the project period.

Framework and Methodology for Forecasts in the Commercial Buildings Subsector:

- The 2007 ratio of electricity to natural gas for heating commercial units is used to develop the 2017 forecast.
- Trends in the number of new electrical and natural gas connections and average energy intensity in the commercial sector have been used as guidance for the forecast.
- A commercial component has been factored into the forecast for mixed use residential developments.
- Consumption data specific to individual commercial establishments was not available.
- Forecasts were developed by choosing an annual increase based on an estimate from observed trends.

Framework and Assumptions for Forecasts in the Industrial Buildings Subsector:

- Trends in the number of new industrial connections and electricity consumption in the industrial subsector have been used to guide the forecast.
- Consumption data for individual industrial facilities was not available.

Framework and Assumptions for Forecasts in the Provincial PSO Buildings Subsector:

- The British Columbia provincial government's *Greenhouse Gas Reduction Targets Act* legally requires all public-sector organizations to be carbon-neutral beginning in 2010. Emissions associated with PSO's in the City of Langley's boundary are set to zero for the target year 2017.

3.2.2 – Forecast of Net Changes in Community Buildings Units

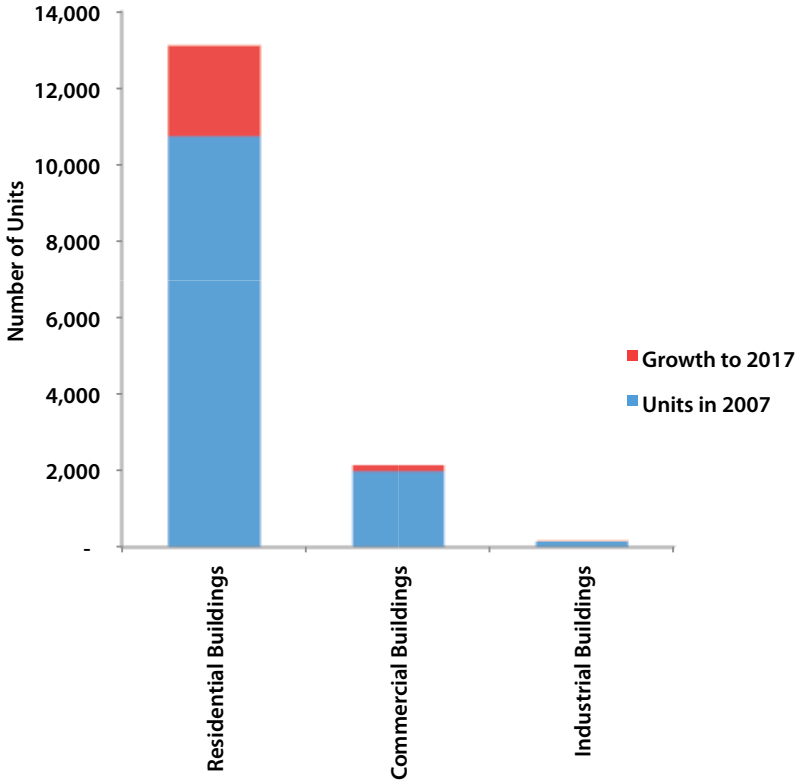
Projections for additional residential units are based on the estimated number of units that could be constructed by 2017 under current zoning bylaws. In accordance with the assumptions listed on the previous page, projections for units in the commercial and industrial sectors are based on data provided by staff and trends in the number of new electrical connections. This assumption includes a commercial or mixed-use component in most of the expected multi-unit developments.

The BAU scenario for expected growth in building units is presented in Table 3.1. Substantial growth of 22 percent is expected in the residential subsector while more a moderate 8 percent growth is expected for both commercial and industrial subsectors.

Table 3.1 – Projected Units for Community Buildings from Observed Trend

Buildings Subsector	Number of Units	Projected Additional Units	Total Units	Percent Growth
	2007	2017		2007-2017
Residential	10,743	+ 2376	13,119	22%
Commercial	1,976	+ 167	2,143	8%
Industrial	144	+ 12	156	8%

Figure 3.2 – Projected number of Residential Units by 2017



3.2.3 – Forecast New Residential Units

Table 3.2 presents the expected residential build out scenario for 2017. This scenario reflects the assumption that the City will continue to densify in order to accommodate growth. The majority of the City's population growth will be accommodated by the construction of approximately 2,320 apartment units. In addition, approximately 238 units of row housing are expected to be developed over the project period. Since the possibility for green-field development is extremely limited in the City of Langley, densification will require the conversion of existing single unit dwellings to multi-unit and row housing. As a result, the total number of single unit dwellings should decrease by approximately 182 units over the project period.

Table 3.2 – Forecast Net Change Residential Building Units

Housing Type	Net Change n Units
	2007 - 2017
Apartments	+2,320
Row Housing	+238
Single Units	-182

3.2.4 – Forecast Net Change in Residential Energy Consumption and GHG Emissions

Table 3.3 presents the expected energy consumption and related GHG emissions resulting from the additional residential units for each housing type. Under the expected growth scenario, resulting total emissions from residential buildings emissions will be ~1,300 tonnes CO_2e. The largest share of the emissions increase is from natural gas consumption in multi-unit developments.

Table 3.3 – Resulting Energy Consumption and GHG Emissions from New Residential Buildings

Housing Type	Energy Type/ Unit	Energy Consumption	GHG Emissions (CO_2e tonnes)
		2017	
Apartments	Elect (kWh)	+13,242,811	-918
	Nat Gas (GJ)	+61,901	3,116
Row Housing	Elect (kWh)	+1,611,546	-325
	Nat Gas (GJ)	+17,275	884
Single Units	Elect (kWh)	-2,148,086	-669
	Nat Gas (GJ)	-15,345	-785
Subtotal	**Elect (kWh)**	**12,706,271**	**-1,912**
	Nat Gas (GJ)	**63,831**	**3,215**
TOTAL			**+1,303**

3.2.5 – Forecast Community Buildings Energy Consumption and GHG Emissions

Table 3.4 exhibits forecasted energy consumption and related GHG emissions for all community building subsectors (e.g., residential, commercial, industrial, and Provincial PSO's). Under the BAU scenario, despite increases in total energy consumption, a net decrease in building sector emissions of approximately 2,300 tonnes CO_2e should occur, due to the anticipated implementation of BC provincial government policy over the project period.

Table 3.4 – Forecast Net Change in Community Buildings' Energy Consumption and GHG Emissions

Sector	Energy Type/Unit	Energy Consumption	GHG Emissions (CO_2e tonnes)
		2017	
Residential Buildings	Elect (kWh)	+12,706,272	-1,912
	Nat Gas (GJ)	+63,831	+3,215
Commercial Buildings	Elect (kWh)	+16,401,372	-2,151
	Nat Gas (GJ)	+14,335	+733
Industrial Buildings	Elect (kWh)	+3,028,140	-1,395
	Nat Gas (GJ)	+10,812	+553
Provincial PSO[1]	Elect (kWh)	0	-98
	Nat Gas (GJ)	0	-1,238
Subtotal	**Elect (kWh)**	**+32,135,784**	**-5,557**
	Nat Gas (GJ)	**+88,978**	**+3,263**
TOTAL			**-2,293**

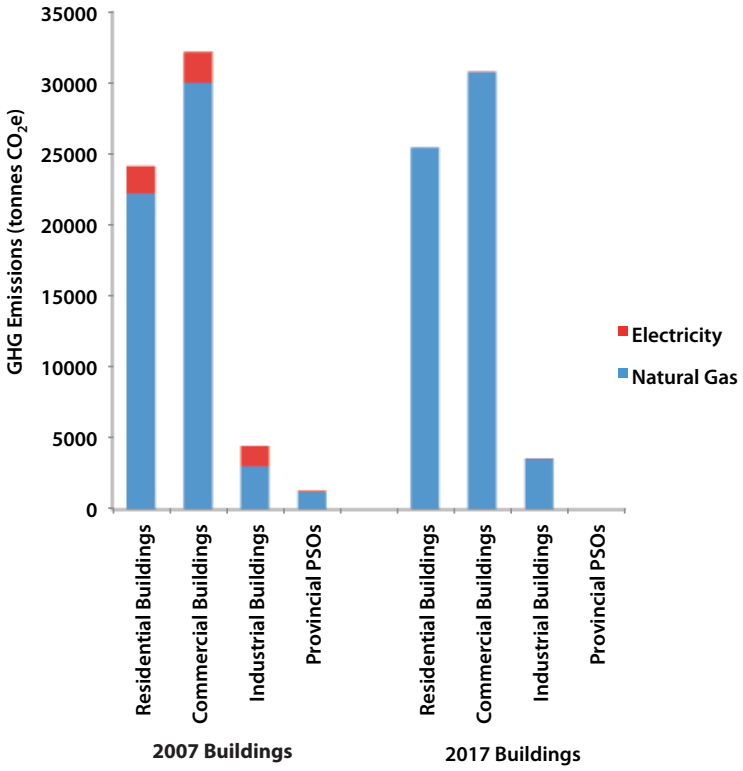
1 Under the B.C. Climate Action Plan all provincial public service organizations must be carbon neutral by 2010.

Table 3.5 presents the base year (2007) GHG emissions, the forecast net change in GHG emissions and the forecast total GHG emissions expected in the target year (2017). Buildings sector emissions are expected to decrease by approximately 2,300 tonnes CO_2e, from 62,225 tonnes CO_2e in the 2007 base year to 59,932 tonnes CO_2e by the 2017 target year.

Table 3.5 – Forecast of GHG Emissions for Community Buildings (2017)

Sector	Energy Type/Unit	Base Year Emissions	Net Change	Forecast Total Emissions
		2007	2017	
		GHG Emissions (CO_2e tonnes)		
Residential Buildings	Elect	1,934	-1,912	22
	Nat Gas	22,271	3,215	25,486
Commercial Buildings	Elect	2,176	-2,151	25
	Nat Gas	30,055	733	30,788
Industrial Buildings	Elect	1,410	-1,395	15
	Nat Gas	3,041	553	3,594
Provincial Public Service Organizations	Elect (kWh)	98	-98	0
	Nat Gas (GJ)	1,238	-1,238	0
Subtotal	**Elect**	**5,619**	**-5,557**	**62**
	Nat Gas	**56,606**	**3,263**	**59,869**
TOTAL		**62,225**	**-2,293**	**59,932**

Figure 3.3 – GHG Emissions from Buildings in 2007 and Projected Emissions in 2017



3.3 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 the road, the fuel consumption rate of vehicles, and the number of kilometres driven. Without knowing which vehicle types residents will purchase in the coming years, it is difficult to develop community transportation forecasts. Fuel consumption rates of vehicles and number of kilometres driven are also hard to estimate.

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

Growth in Emissions =

(Projected # of Vehicles/Vehicle Class) × (Projected FCR by Fuel Type) × (Projected Vehicle Kilometres Driven by Vehicle Class) × (GHG Emissions Factor)

The forecast for on road transportation is further complicated by other external factors that are largely unpredictable:

- The number of vehicles on the road.
- Insurance costs - high insurance costs may discourage vehicle owners from driving and prevent licensed drivers from owning or buying a vehicle.
- Insurance rates - drivers may choose to insure their vehicles under rate classes that limit kilometres driven or permitted usage (e.g., work vs. pleasure only or combinations thereof).
- Vehicle price - the price of new vehicles may affect the number of vehicles on the road.
- Availability of capital leases - leasing is a cheaper alternative to buying a vehicle. Fewer new vehicles may be purchased in the absence of leasing options.

- Lease and finance rates for new vehicles - most residents cannot pay cash for a vehicle and must rely on lease and financing options.
- Fuel Consumption Rate (FCR).
- 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 plug-in.
- Temperature - combustion engines operate less efficiently in extreme weather conditions. Extreme temperatures can also alter the shape and inflation of tires, causing higher fuel consumption.
- 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.
- Economy - a driver may choose to reduce their fuel consumption in order to save money.
- Vehicle Kilometres Travelled (VKT).
- 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.

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 Langley, on the condition that we represent vehicles in each vehicle class as a 'unit'.
- Although 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 forecast focuses on a prediction of the count of vehicle types.
- The number of vehicles per dwelling for 2007 was used for personal vehicles and was projected using the number of residential units predicted in section 3.2.
- It is assumed that personal vehicles per household 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.
- Commercial vehicles, tractor trailer trucks, and buses are not included because there are no reliable indicators (including trends) on which to base the forecast.
- Both the B.C. provincial government and the Canadian federal government have recently adopted or proposed vehicle GHG emission regulations similar to the California *Tailpipe Emissions Standard*. For the purposes of this forecast the emissions limits outlined in the provincial government's proposed policy, the *Greenhouse Gas Reduction (Vehicle Emissions Standards) Act* are assumed.
- The B.C. provincial government's 2008 *Renewable and Low Carbon Fuel Requirements Regulation* requires that all gasoline sold in B.C. to have a provincial average of five percent renewables content by 2010 and diesel fuel a five percent renewables content by 2012. Associated changes to the emission factor for diesel and gasoline have been incorporated into the forecast.

The forecast number of personal vehicles units in the on road transportation sector is based on the projected number of dwellings in 2017 and the average number of vehicles per dwelling in 2007. Subsequently, 2007 fuel consumption per vehicle unit is used to calculate fuel usage for 2017.

3.3.1 – Projection of Units and Fuel Consumption for On Road Transportation

Table 3.6 presents 2007 data used to calculate the number of additional units in 2017 and the forecast of total units and total fuel consumption. The total number of units forecast for 2017 is ~27,000 and the total volume of fuel to be consumed is approximately 36 million litres. The largest expected growth in absolute numbers will occur among gasoline small passenger cars and gasoline light trucks, vans and SUVs.

Table 3.6 – Forecast of Units and Fuel Consumption for On Road Transportation (2007-2017)

Vehicle Class	Fuel Type	Units	Fuel (Litres)	Litres / Unit	Additional Units	Forecast of Units	Forecast of Consumption (Litres)
		2007			2017		
Small Passenger Cars	Gasoline	8,445	6,674,280	790	+1,877	10,322	8,157,870
	Diesel Fuel	93	53,360	574	+21	114	65,221
Large Passenger Cars	Gasoline	3,032	3,128,106	1,032	+674	3,706	3,823,436
	Diesel Fuel	15	9,730	649	+3	18	11,893
Light Trucks, Vans, and SUVs	Gasoline	7,088	12,012,034	1,695	+1,576	8,664	14,682,124
	Diesel Fuel	61	101,038	1,656	+14	75	123,497
	Mbl Propane	23	38,969	1,694	+5	28	47,631
Commercial Vehicles	Gasoline	1,473	2,445,129	1,660	-	1,473	2,445,129
	Diesel Fuel	924	4,667,747	5,052	-	924	4,667,747
	Mbl Propane	67	92,717	1,384	-	67	92,717
Tractor Trailer Trucks	Diesel Fuel	55	775,237	14,095	-	55	775,237
Motorhomes	Gasoline	403	647,847	1,608	+90	493	791,853
	Diesel Fuel	52	52,146	1,003	+12	64	63,737
Motorcycles and Mopeds	Gasoline	607	152,302	251	+135	742	186,156
Bus	Gasoline	24	71902	2,996	-	24	71,902
TOTAL		**22,362**	**30,922,544**		**4,405**	**26,767**	**36,006,151**

3.3.2 – Projection of Emissions for On Road Transportation

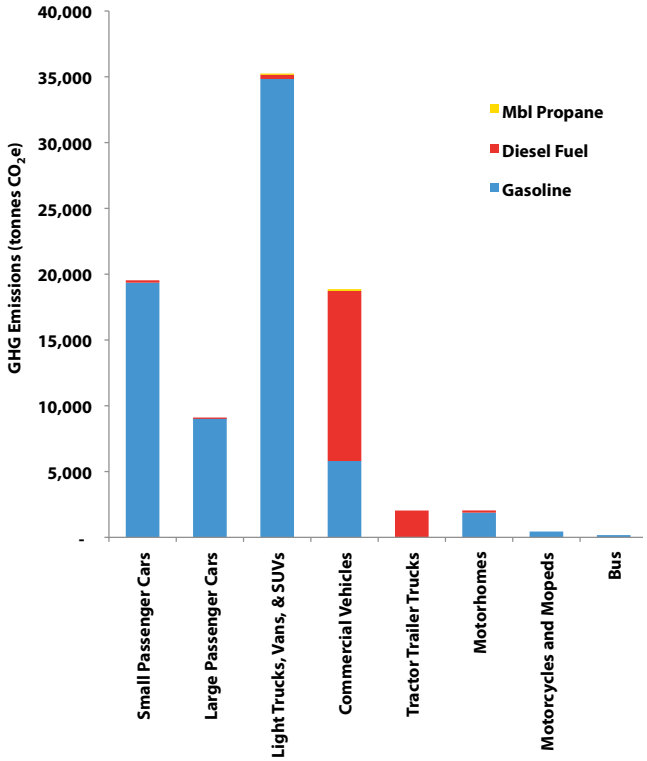
Table 3.3b provides the total units, fuel consumption, and GHG emissions for the target calculation. The GHG emissions have been calculated from the forecast amount of fuel consumed. The emissions quantity in this table includes the impact of the *Renewable and Low Carbon Fuel Requirements Regulation* on gasoline and diesel fuel emissions factors. However it does not include the impact of the implementation of a GHG emissions tailpipe standard (outlined in Table 3.7).

Table 3.7 – Forecast of GHG Emissions for On Road Transportation (2017)

Vehicle Class	Fuel Type [1]	Forecast Total Units	Forecast Fuel Consumption (Litres)	Forecast GHG Emissions (tonnes CO_2e) [2]
		2017		
Small Passenger Cars	Gasoline	10,322	8,157,870	19,354
	Diesel Fuel	114	65,221	181
Large Passenger Cars	Gasoline	3,706	3,823,436	9,072
	Diesel Fuel	18	11,893	33
Light Trucks, Vans, and SUVs	Gasoline	8,664	14,682,124	34,834
	Diesel Fuel	75	123,497	342
	Mbl Propane	28	47,631	72
Commercial Vehicles	Gasoline	1,473	2,445,129	5,801
	Diesel Fuel	924	4,667,747	12,924
	Mbl Propane	67	92,717	141
Tractor Trailer Trucks	Diesel Fuel	55	775,237	2,039
Motorhomes	Gasoline	493	791,853	1,879
	Diesel Fuel	64	63,737	167
Motorcycles and Mopeds	Gasoline	742	186,156	442
Bus	Gasoline	24	71,902	171
TOTAL		**28,784**	**36,006,151**	**87,451**

[1] Emissions factors for gasoline and diesel fuel reflect the provincial Renewable and Low Carbon Fuel Requirements Regulation.
[2] The forecast fuel consumption and GHG emissions does not include the impact of a GHG emissions standard.

Figure 3.4 – Projected GHG Emissions from Transportation in 2017



3.3.3 – Projection of Impact of an Automobile GHG Emissions Standard

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.[1] 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 illustrates the emissions limits under the Californian regulation.

Table 3.8 – Proposed Provincial Tailpipe Standard Implementation

Model Year	Fleet Average Greenhouse Gas Emissions (grams per mile CO_2e)	
	Passenger Vehicles[1]	Light Trucks[2]
2011	267	390
2012	233	361
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

Since a tailpipe emissions standard regulates overall GHG emissions rather than fuel economy it provides an incentive for auto manufacturers to produce vehicles using alternative fuel sources (e.g. electric plug-in vehicles). With so much uncertainty around how manufacturers will meet emissions limits, forecast emissions for the on road transportation sector do not predict future fuel consumption. Taking into account the proposed emissions standard, 2017 emissions for this sector will be approximately 78,000 tonnes of CO_2e (Table 3.9).

Table 3.9 – 2017 On Road Transportation Emissions With Emissions Standard

Vehicle Class	Emissions Standard Non-Compliant Units	Emissions Standard Compliant Units	Emissions Standard Non-Compliant GHGs	Emissions Standard Compliant GHGs	Total Emissions
			CO_2e (t)		
Small Vehicles	3,470	10,690	7,017	17,633	24,651
Large Vehicles	2,358	6,408	9,481	20,169	29,650
Unaffected Vehicles	1,762	–	23,356	–	23,356
TOTAL	**7,590**	**17,098**	**39,854**	**37,802**	**77,656**

3.4 Forecast of Community Solid Waste

The forecast for community solid waste is pending receipt and review of solid waste data collected since the introduction of new waste diversion strategies in the City. For the purpose of establishing total emissions for 2017 and developing a reduction target, emissions from solid waste are assumed to be identical to 2007 emissions.

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

3.5 Summary of Forecast of Community Greenhouse Gas Emissions

Table 3.10 presents the forecast of emissions by sector and the estimated change between 2007 and 2017. Growth in community residential buildings may cause a 5 percent increase in emissions. Emissions from commercial buildings are expected to decrease by 4 percent while industrial building emissions should fall by 19 percent. The moderate growth in residential buildings emissions and the reduction in commercial and industrial buildings emissions are contingent on BC Hydro's target to lower its emissions coefficient by 99 percent by 2016. In addition Provincial PSOs should be carbon neutral by 2017. Emissions from community on-road transportation are expected to decrease by 1 percent as a result of the implementation of renewable fuel regulations and a GHG emissions standard.

Table 3.10 – 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
Buildings	Residential Buildings	24,205	25,508	5%
	Commercial Buildings	32,231	30,813	-4%
	Industrial Buildings	4,451	3,609	-19%
	Provincial PSOs	1,336	-	-100%
Community Transportation		78,693	77,656	-1%
Community Solid Waste		10,665	10,665	0%
Total		**151,583**	**148,251**	**-2%**

Overall energy consumption is expected to increase by 12 percent and overall GHG emissions should decrease by 2 percent. 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
Energy Consumption (GJ)	3,119,464	3,500,461[1]	12%
Emissions (tonnes CO_2e)	151,583	148,251	-2%

1 Forecast energy consumption does not reflect potential gains in fuel efficiency from tailpipe standard implementation.

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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 Langley, 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 Langley are outlined in 4 broad categories:

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

The City of Langley 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 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 efficiency of buildings. Since the majority of Canadians claim they would pay extra for an environmentally friendly design, boost a home's profile by registering the building's EnerGuide rating on a local realtor's multiple listings service.

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	12,407	368

Provincial Government

Zero Carbon Emissions from Electricity

The BC Energy Plan is an initiative for investigating new sources of energy that are both cost effective and environmentally friendly. The main goal is to reduce GHG emissions, with additional benefits including new opportunities for jobs and investments. This reduction initiative is included in the emissions forecast.

Carbon Neutral Governance

The BC Greenhouse Gas Reduction target act legally requires that all provincial public-sector organizations are carbon neutral beginning 2010. This reduction initiative is included in the emissions forecast.

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. This section describes initiatives that may be applied to existing buildings. The number of buildings requiring minor or major repairs varies by City area (Figure 4.1), as does the average building age (Figure 4.2) . As a result of this variation, the CAEE existing building reduction initiatives will be more useful for some neighbourhoods (with many old buildings requiring repairs) than for other neighbourhoods (with predominantly new buildings). Other factors impacting uptake are housing type (Figure 4.3) and building ownership (Figure 4.4) 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.

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	5,113	151
CAEE targets for existing row housing	Municipality, With Support	2,557	76
CAEE targets for existing multi-unit homes	Municipality, With Support	5,414	160
CAEE targets for existing commercial buildings	Municipality, With Support	26,423	842
CAEE targets for existing industrial buildings	Municipality, With Support	6,575	86
Total reductions from CAEE existing buildings		**46,082**	**1,315**

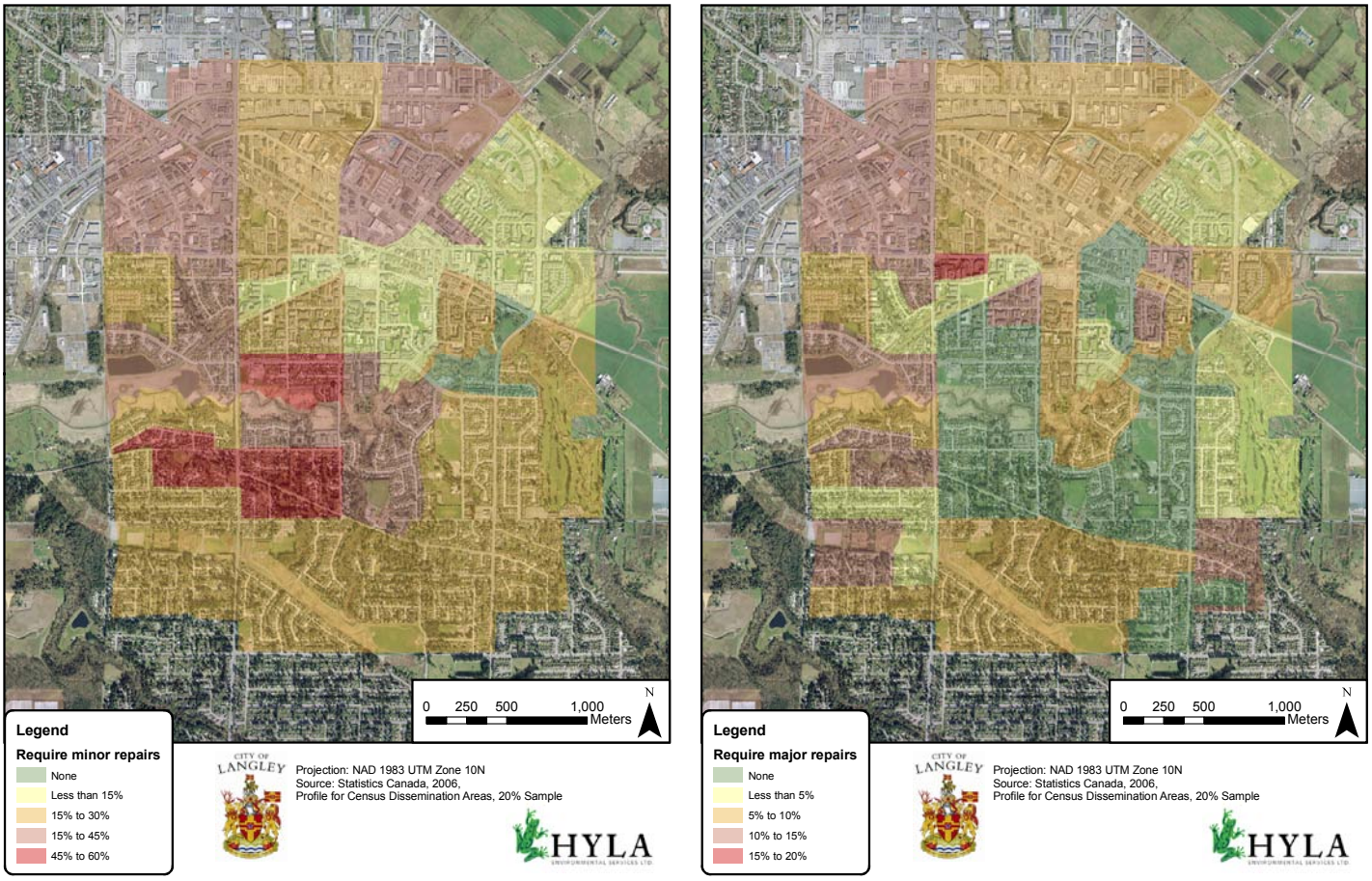

Figure 4.4 – State of Building Repair
The state of building repair can influence the uptake of reduction initiatives. Buildings requiring some repair can be renovated to increase their energy efficiency. Owners of buildings requiring substantial repairs may be less likely to invest in energy efficiency 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.

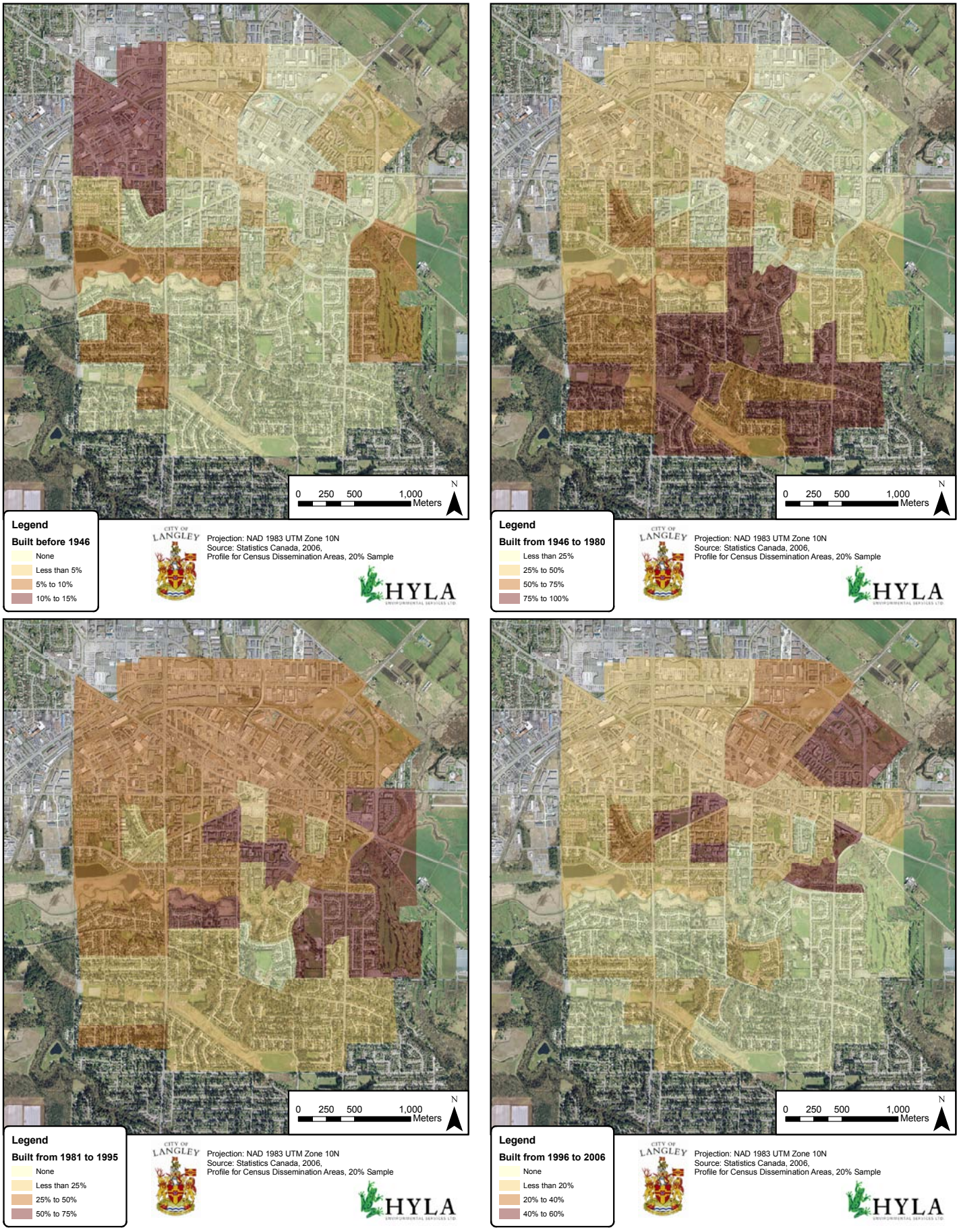

Figure 4.5 – Percentage of Buildings in Each Age Category

Building age can influence the effectiveness of initiatives aimed at reducing a neighborhood'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 Langley.

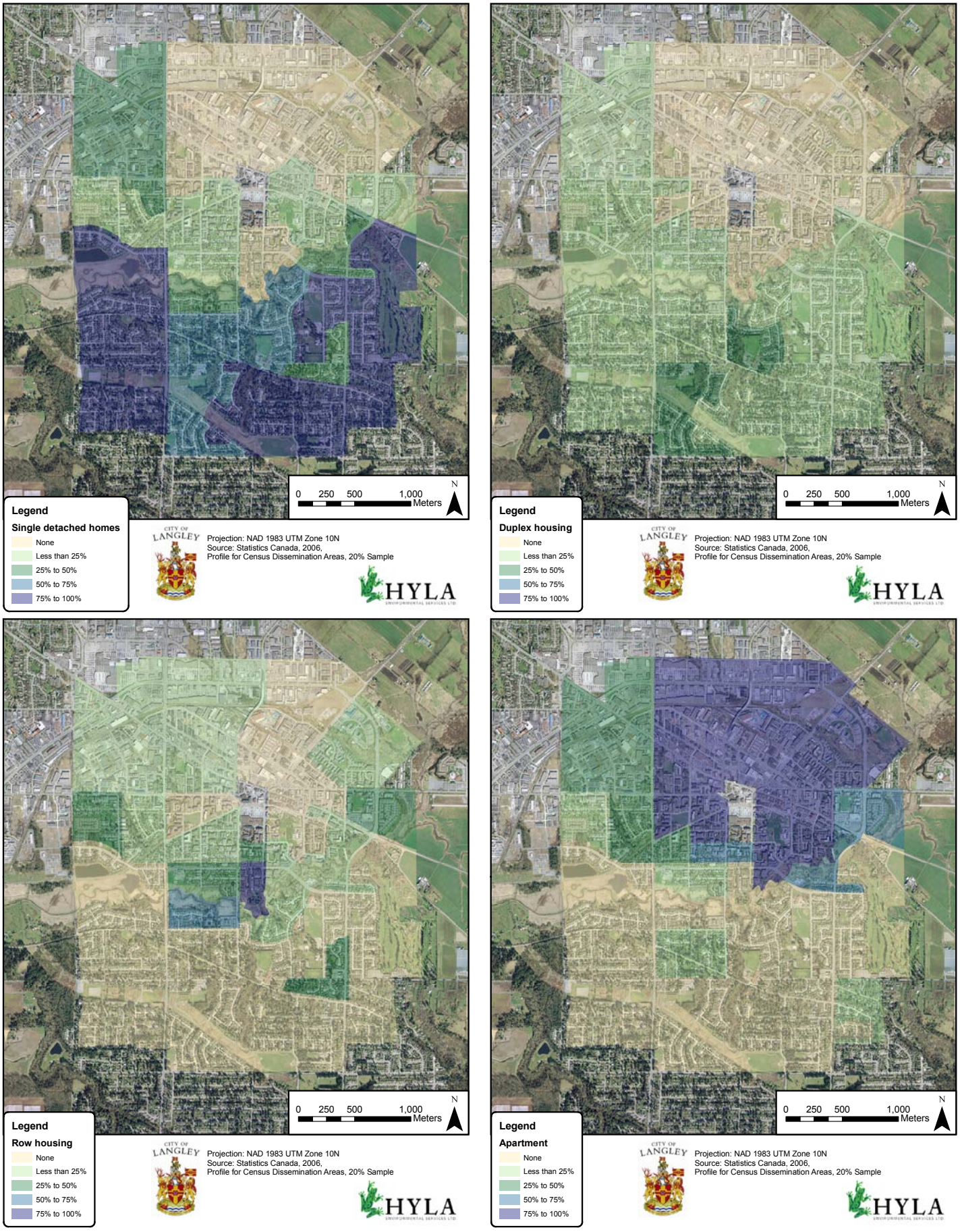

Figure 4.6 – Housing Types

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.

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.

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.

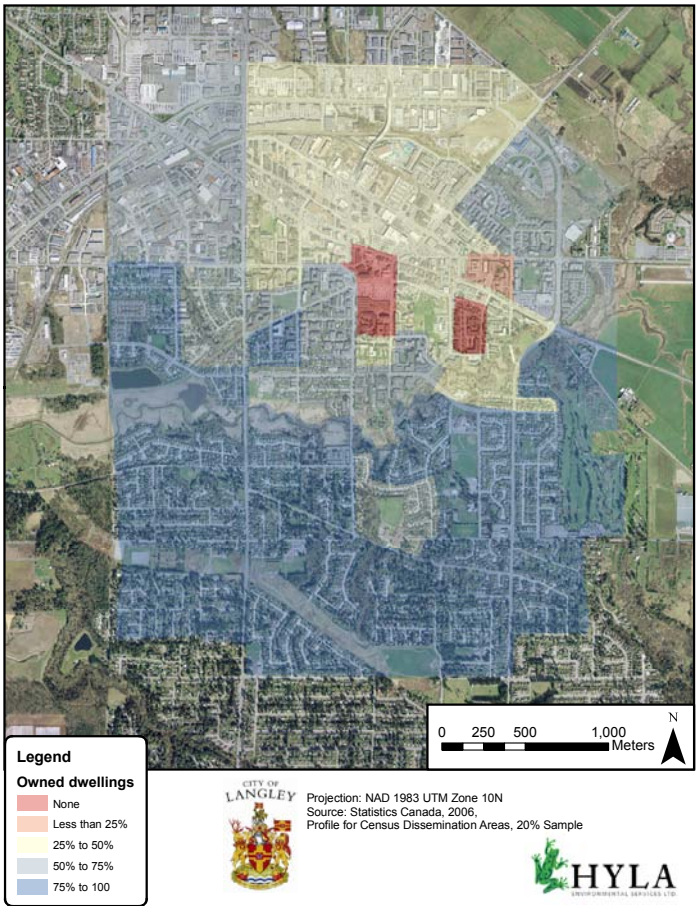

Figure 4.7 – Building Ownership
Residents who own (as opposed to rent) the building they reside in are more likely to undertake energy efficiency renovations. This figures shows the percentage of owned buildings in each census dissemination area in the City of Langley.

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 a lot of 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.

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.

Figure 4.8 – 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).

CAEE New Buildings Targets

The CAEE provides guidelines to increase the energy efficiency of new buildings. These guidelines outline everything worth considering for new buildings, from construction standards to amenities (e.g. bicycle lockers) to location (e.g. Brownfield sites). 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	0	0
CAEE targets for new row housing	Municipality, With Support	5,769	221
CAEE targets for new multi-unit homes	Municipality, With Support	35,127	1,268
CAEE targets for new commercial buildings	Municipality, With Support	5,535	184
CAEE targets for new industrial buildings	Municipality, With Support	5,428	138
Total reductions from CAEE new buildings		**51,859**	**1,811**

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.

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.

Discourage Electric Baseboards

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

Brownfield Developments

Research the potential of Brownfields - vacant land often in prime urban areas - for commercial and residential developments. Well situated in the city, Brownfields can be extremely profitable as long as health or contamination issues are addressed prior to construction.

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

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. Central Langley's high density of mult-unit dwellings is a good area to investigate the potential for CES (Figure 4.3).

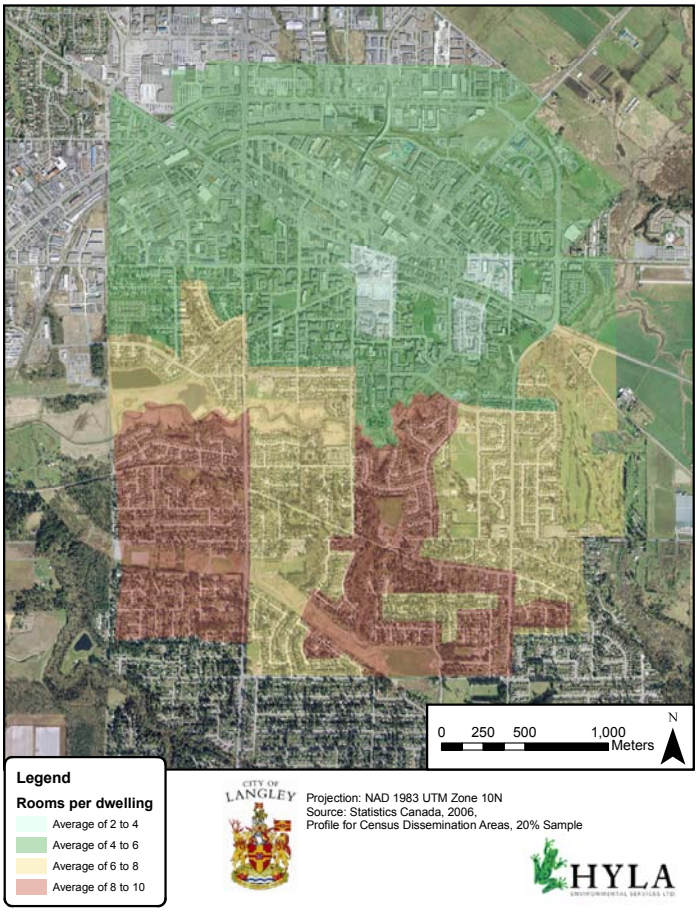

Figure 4.9 – Rooms Per Dwelling
The average home size varies among neighbourhoods of the City. Larger homes typically use more energy and are associated with low population density.

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 (Figure 4.5).

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.

Provide Rebates on Permit Fees for Renovations that meet the EnerGuide Requirements

Offer rebates to renovation permits that meet EnerGuide's standard for energy efficiency. Raise the minimum standard every year.

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. Langley's downtown core 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 (Figure 4.7).

Sustainability Checklist

City staff can use a sustainability checklist to assess new building applications. Developments must meet City standards on the environment, economy, society, and culture.

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

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.

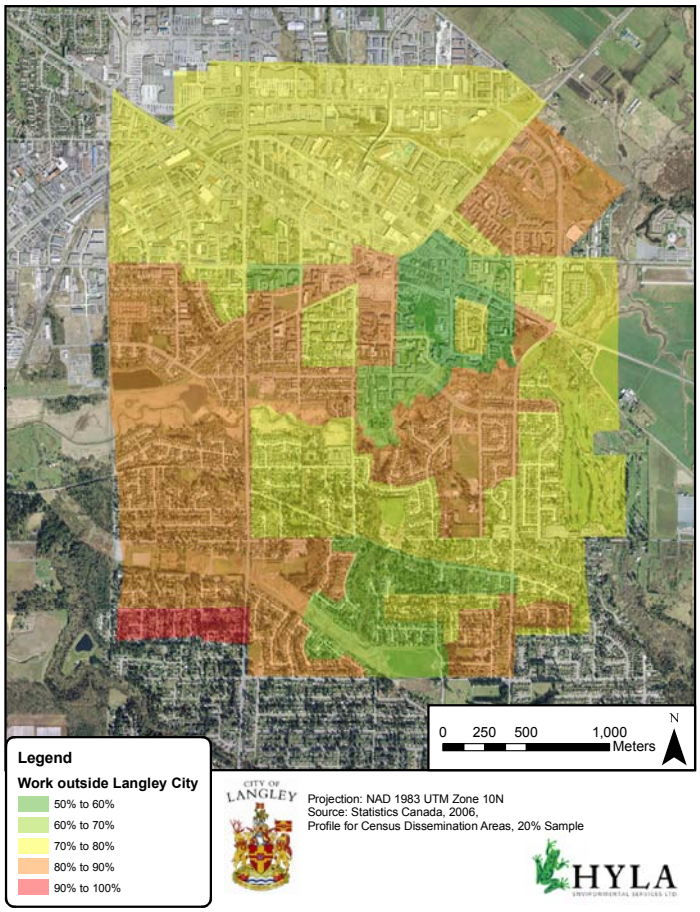

Figure 4.10 – Percentage Residents Working Outside Langley City
Creating a good mix of housing and jobs can help decrease the number of people who have to leave the community to go to work, thus reducing VKT.

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.

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

Reduction Initiative	Level of Government	Reduction Quantity	
		Energy (GJ)	GHGs (tonnes CO_2e)
District energy systems in residential buildings	Municipality, With Support	44,080	2,255
District energy systems in industrial buildings	Municipality, With Support	7,568	387
Solar hot water systems	Municipality	4,376	152
Total reductions		**56,024**	**2,202**

4.3 Land Use and Urban Design

4.3.1 – Senior Government Policy and Programs

Regional Government

The Metro Vancouver Livable Region Strategic Plan

The Liveable Region Strategic Plan (LRSP) was adopted in 1996. Recognized under the Growth Strategies Act, the LRSP protects the natural environment around Metro Vancouver amidst substantial population growth. The plan has 4 main strategies: protect the green zone, build complete communities, achieve a compact metropolitan region, and increase transportation options. Metro Vancouver is currently developing a new Regional Growth Strategy to replace the LRSP.

4.3.2 – Local Government Policy and Programs

Land use decisions can profoundly impact a building's energy consumption and GHG emissions. Buildings and transportation in sprawling developments produce substantially higher GHG emissions than compact, pedestrian friendly developments. The reductions achieved from land use initiatives are incorporated directly into a reduction in VKT (see transportation section), and indirectly in the buildings section - thus there is no reduction in this section. The impact of patterns of land use should not be underestimated; in this area the City can considerably decrease energy use and emissions.

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 multi-unit residential uses, the City is already encouraging neighbourhood intensification by allowing secondary suites in single family zones (i.e. RS1). Another way to intensify existing single family areas is permitting smaller single unit lot sizes, which helps accommodate growing populations while preserving the character of existing neighbourhoods. Intensification does not mean replacing all single family homes with multi-unit buildings. More high density development can be incorporated into existing neighbourhoods, allowing these areas to support better transit and non-auto transportation infrastructure. Much of Langley already contains multi-unit buildings, whereas other are mostly single-unit homes, particularly in the City's southern end.

Concentrate High Density and Commercial Areas on Major Transit Routes

The construction of dense residential areas near high frequency transit routes lowers the need for private vehicles (whereas high density developments built in transit deficient areas produce more commuters). Currently the City is encouraging high density residential and commercial buildings along transit routes converging on the downtown core. Utilizing the principles of transit oriented design (see the next initiative), this strategy provides pedestrians and transit users easy access to facilities.

Figure 4.11 – Pedestrian Friendly and Non Pedestrian Friendly Development Styles
Example of a pedestrian oriented development (top) and an automobile oriented development (bottom). 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.

Encourage Pedestrian Centred and Transit Oriented Design

Avoid constructing new commercial areas centered on large parking lots. Instead, align commercial buildings along transit routes, with easy and direct pedestrian access to transit shelters. Providing parking on-street or at the back of buildings instead of the front de-emphasizes vehicle use. Additionally, on street parking becomes a buffer between pedestrians and traffic. In residential areas provide traffic calming measures such as pedestrian paths and crosswalks (especially in areas around transit stops; Figure 4.8).

Decrease Distance Between Commercial, Residential, and Employment Zones

Ensure new residential, commercial, and employment areas are developed within a maximum allowable distance of each other (preferably walking distance). For built up areas, like the City of Langley, this means adding new uses to areas that are currently single use.

Continue to Support Mixed Use Neighbourhoods in the Downtown Core

Fusing residential and commercial sectors into mixed-use developments benefits the community and the environment. Instead of driving, residents in these developments usually access services in their neighbourhood by walking, biking, or taking transit because commercial and employment areas are close by. Consequently, mixed-use land improves transit services, lowers traffic congestion, and tightens the sense of community. These neighbourhoods feature a range of housing densities, typically higher along major transit routes, with retail establishments at ground level and either residential or office space on upper floors.

Decrease Distance to Commercial Locations

Reduce vehicle use and increase non-auto trips by encouraging commercial developments close to residential areas and public transit. In large areas of residential zoning, look for opportunities that offer commercial space (preferably on a public transit route). Aim for less than 10 minute's walk to a commercial area from all parts of the City (see Figure 4.16 for a map of areas within 1 km (or about a 12 minute walk) of "Downtown Commercial Zoning"). This will reduce a resident's dependence on vehicles, as well as traffic congestion and associated CO_2 emissions. A popular way to introduce commercial uses to lower density neighbourhoods is neighbourhood commercial buildings (see next initiative).

Figure 4.12 – 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.

Consider Neighbourhood Commercial in Appropriate Locations

Neighbourhood commercial developments - typically small scale retail outlets like corner stores or coffee shops - can be incorporated in multi-unit buildings with residential units above. These developments are essential for decreasing private vehicle use, allowing residents to run small errands by foot. Additionally, for transit users neighbourhood commercial outlets are often located on the way home from the bus stop, eliminating the need for an additional trip. These small scale developments offer the convenience of nearby commercial areas without compromising the character of single unit neighbourhoods (Figure 4.12).

4.4 Community Transportation

4.4.1 – Senior Government Policy and Programs

Provincial Government

Tailpipe Emissions Standards

Support the forthcoming provincial and federal proposals for tailpipe GHG emissions standards (see page 26 for more information). Currently both the federal and BC provincial government have proposed GHG emissions standards. The provincial standard has been incorporated into the forecast.

California "Pavley II" Tailpipe Emissions Standards

Support senior government efforts to 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.

New Renewable Fuel Regulations Standard

Implement BC provincial *Renewable and Low Carbon Fuel Requirements Regulation*. This reduction initiative is included in the forecast.

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.

Table 4.5 – 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	450

4.4.2 – Local Government Policy and Programs

Increase Vehicle Fuel Efficiency

Implement Responsible Automobile Ownership Education Program

Encourage responsible driving (e.g. carpools, obeying speed limits, planning efficient routes) and vehicle maintenance (e.g. maintain proper tire pressure).

Right Sizing Vehicles

The City of Langley should promote fuel efficient vehicles and set objectives to raise the average for fuel efficiency.

Reduce the Use of Single Occupant Private Vehicles

Private automobiles are the single largest source of GHG emissions for the City of Langley. To meet reduction targets, measures to reduce private vehicle use are essential. This section describes initiatives to reduce the number of and/or distance of single occupant trips, followed by 2 sections on promoting public transit, cycling, and walking. Private vehicle usage varies greatly by City area (Figure 4.10), as do the number of people who work outside the City (Figure 4.7).

The substantial reduction in emissions from transportation results from the initiatives outlined here and in the following 2 sections. Reduction amounts are not provided for individual initiatives as their success depends on a variety of factors, including uptake by local residents. Additionally, while each initiative helps lower emissions, the largest reductions occur when initiatives are combined. For example, implementing co-operative auto networks, increasing public transit, and decreasing the average walking distance to commercial areas reduces private vehicle usage far more when implemented together than alone.

The City of Langley should collaborate with Metro Vancouver, the provincial government and the federal government to achieve a 10 percent reduction in per capita vehicle kilometers travelled (VKT). This reduction is supported by initiatives that affect land use and urban design, public transit use and non-auto modes, such as walking or biking.

Table 4.6 – Reductions from Reducing Single Occupant Private Vehicles

Reduction Initiative	Level of Government	Reduction Quantity GHGs (tonnes CO_2e)
10 percent reduction in per capita VKT	All	6,225

Promote Car Free Days

To educate people about alternative transportation, support car free days and other initiatives such as corporate bike and walk to work programs. Car free days offer the community the chance to experience less traffic. The one-way section of the Fraser Highway provides a good venue for a possible car-free day.

Co-Operative Auto Networks

Encourage people to join co-operative auto networks. For a small monthly fee members can borrow a range of vehicles, from mini-vans to pick-up trucks, from locations in various parts of town. There are currently no car-sharing companies in the City of Langley.

Shared Parking

To lower the demand for parking spaces, encourage people to drive responsibly by car-pooling, using environmentally friendly vehicles, and sharing parking spaces with commercial vehicles in mixed-use neighbourhoods. Also limit available parking by lowering the minimum requirement to 1 space per unit in all new developments.

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

Initiatives that alert people to their driving habits can reduce private vehicle use and highlight alternative forms of transportation. Consider displaying parking costs where they are hidden. For example, in new residential buildings encourage selling parking spaces individually rather than bundled with the price of the unit. Additionally, charge for parking directly in areas with hidden parking costs (e.g. free parking on City-owned lots) and use the revenue to lower local business tax.

Develop and Implement a Transportation Demand Management Plan

Develop a Transportation Demand Management Plan that incites people to review their driving habits, encouraging alternative transportation methods like walking, biking, or taking transit to work.

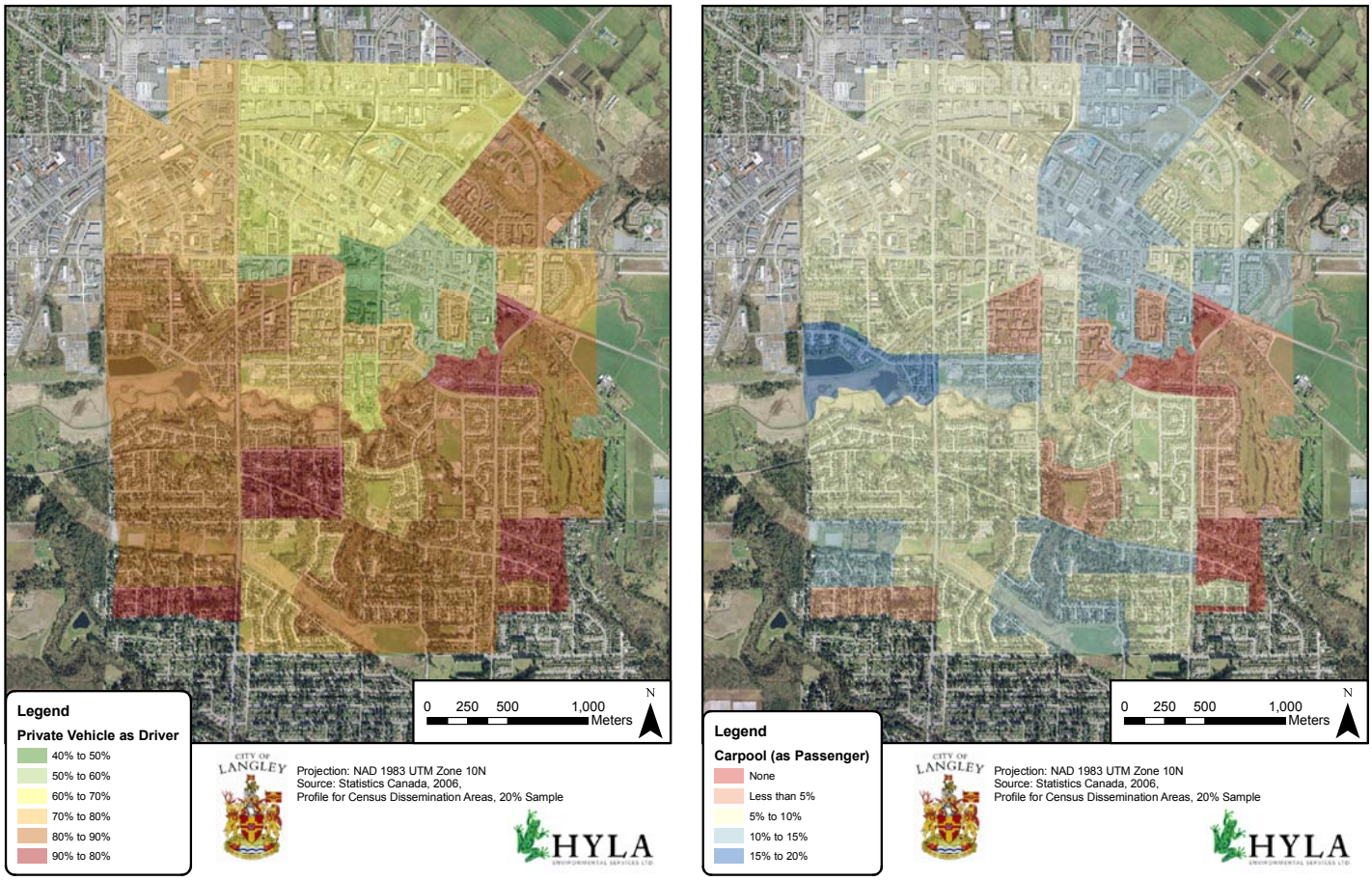

Figure 4.13 – Percentage of People Who Commute to Work in a Private Vehicle (as the driver or passenger)
Single occupant private vehicles are one of the largest sources of greenhouse gas emissions for the City. Decreasing the use of private vehicles can substantially reduce energy use and emissions. 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.

Increase the Use of Public Transit

Public transit produces substantially fewer emissions per capita than single occupant vehicles. Additionally, public transit agencies are investigating a variety of options to all but eliminate public transit emissions, including electric buses, rapid transit, hybrid buses, and alternative fuel buses. Public transit benefits also include reducing traffic congestion, improving air quality, and supporting compact, pedestrian friendly developments.

The level of public transit service in the City, and the number of people who use it, varies from region to region. For example, in some areas near Langley's centre almost 25 percent of residents use public transit to get to work. However in many areas, particularly the southern Langley, few residents ride public transit to work (Figure 4.12). Areas served by the frequent transit network (i.e. service at least every 15 minutes, for a minimum 15 hours a day, 7 days a week, such as the #502 bus in Langley City) have higher transit ridership than areas served only by community shuttles. An interesting exception to this pattern of high transit use along major routes occurs in Langley's downtown core. In this case, transit ridership is low because most people walk or cycle to work. A standard TransLink bus used for the #502 and other major routes, and a community shuttle in southern Langley are shown in Figure 4.11.

Figure 4.14 – TransLink bus at Langley Centre Exchange
A conventional TransLink bus and a community shuttle at Langley Centre Transit Exchange. Increasing public transit service can help decrease the use of private vehicles, thus lowering GHG emissions.

If transit service was provided to areas that lack adequate service (Figure 4.13), and to more neighbouring communities, public transit use would go up. This could also be achieved by extending the frequent transit network further south into residential neighbourhoods, however, higher density in these neighbourhoods would be required to support any service increase. To further increase transit use, ensure transit stops and exchanges are located in all busy areas of the City.

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.

Public Transportation Shelters

The City should promote the construction of appealing facilities to encourage transit use by all members of the community. Well lit shelters with level pavement, adequate space for wheelchairs, and simple route information are ideal.

Public Transport Vouchers

Large companies can offer employees monthly transit passes or a cash allowance to use on public transit. A successful program in Washington, D.C. 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 promoting alternative transportation.

Identify Senior Government Grants for Transit Improvement Projects

Start a fund for transit improvement projects and investigate infrastructure grants from senior governments. For example, identify grants that can fund transit priority measures and upgraded transit shelters.

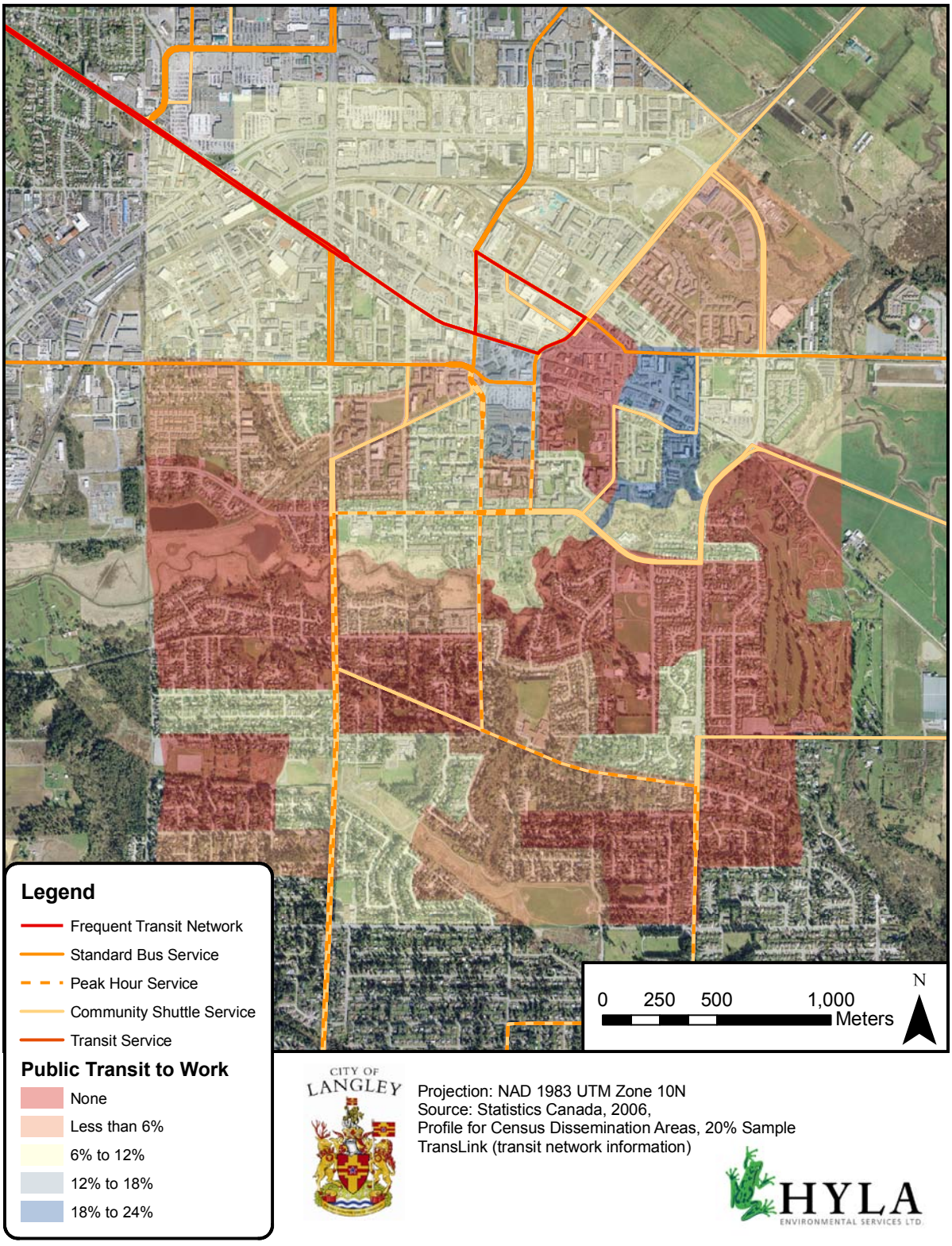

Figure 4.15 – Percentage of People Who Commute to Work by Public Transit
Public transit produces substantially less emissions per user than private vehicles. The level of public transit service and the associated ridership varies greatly among different parts of the community. This map shows the transit 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 Langley accompanies high private automobile usage. The low transit ridership in the downtown core is due to more people walking and cycling.

Work with Senior Governments to Improve Regional Transit

The provincial government is currently researching options for improving transit connections to the Fraser Valley. The City is a partner in TransLink's ongoing Surrey Rapid Transit Alternatives Analysis Study. TransLink is investigating options for extending rapid transit further into Surrey and eventually Langley. Discussions currently involve RapidBus systems and various rail systems. Work with senior levels of government, TransLink, the City of Surrey, and the Township of Langley, on future plans to expand rapid transit service to the City of Langley, on an existing or new route through the City. While a medium term solution, rapid transit can greatly reduce private vehicle use, which is essential for the City to meet reduction targets.

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 transit routes located on congested roadways. Find other ways to increase transit priority, such as installing "bus bulges" where transit buses cannot easily merge into traffic.

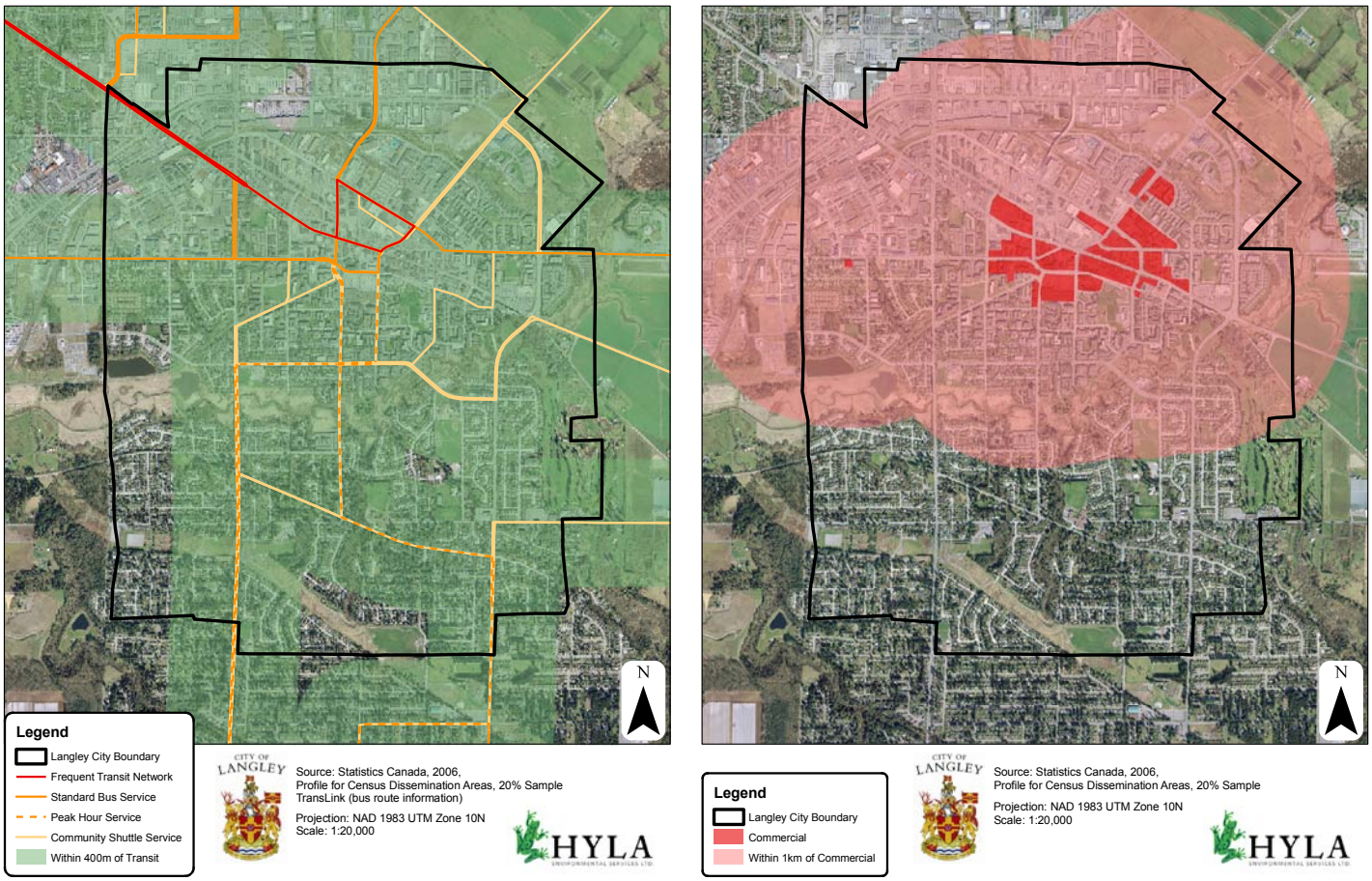

Figure 4.16 – Distance to Public Transit and Commercial Areas

In order to decrease the use of private vehicles, the walking distance to transit and commercial areas should be as little as practical. The maps above show areas that are within 400 metres of a transit route (left) and that are within 1000 metres of a commercial area (right). Overall, most areas of the City are near transit service (although the quality of transit route varies substantially) and within walking distance of a retail commercial area (although some areas are more pedestrian friendly than others). A notable exception is the southern portion of the City, which suffers from poor transit service and lacks any substantial commercial areas within walking distance. Note this is a very basic analysis using "as the crow files" distance. A more involved analysis could determine actual walking distance along streets and would highlight areas where a disconnected road network makes it more difficult for people access transit routes or commercial areas.

Figure 4.17 – Pedestrian Oriented Design
Creating "shortcuts" for pedestrians and cyclists can help make it more convenient to walk or cycle. While many older areas of Langley have small blocks and interconnected streets, newer areas have longer blocks and in some areas lack pedestrian connections. When areas that lack pedestrian pathways or crosswalks are being redeveloped, ensure these facilities are incorporated into new designs.

Develop and Maintain a Comprehensive Transit Plan

Continue to work with TransLink on the South of Fraser Area Transit Plan, which will address public transit issues that are under the City's jurisdiction. The plan should include methods for increasing public transit's reliability and appeal to the community.

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 over road expansion projects, and plan to use more transportation funding on public transit projects. Investigate the potential to extend transit service hours, routes, and frequency. Figure 4.13 illustrates areas of the city that lack access to public transit (for mapping purposes, "transit access" was defined as areas within 400 metres of a transit route, a distance often used by TransLink in planning transit services).

Encourage Cycling and Walking

Cycling and walking are emissions-free transportation. The levels of walking or cycling vary by City region (Figure 4.14). If more drivers converted to walking or cycling, the City could achieve substantial emissions reductions. Other benefits of promoting walking and cycling include improved public health, less traffic and air pollution, and a stronger sense of community. Upgrades to pedestrian and cyclist infrastructure can also improve access to public transit, benefiting those who cannot walk or cycle the whole way. The most effective way to increase the number of pedestrians and cyclists is through land use decisions (see Land Use and Urban Design Section for more information).

Encourage Enhancement of Pedestrian facilities

Many successful examples of pedestrian enhancements can be found in Langley's downtown core, however, other areas of the City often lack these facilities. For example, narrow road intersections shorten the length of crosswalks and encourage active transportation. Multi-modal street designs include traffic calming and interconnected streets (Figure 4.15). Traffic calming has successfully reduced traffic congestion, speeds and accidents. Planners, engineers and community residents can engage in street design initiatives, such as planting trees or cultivating green spaces along sidewalks, or integrating car-free zones in new developments.

Improve Cycling Infrastructure

Improve conditions for cyclists by investing in bicycle lanes, signals, bike racks, and recognizing cyclists at left turn lanes. Examine opportunities for expanding bike lanes and parking, and building off-street bicycle routes (Figure 4.17). Traffic calming and interconnected streets also enhance cycling conditions.

Develop and Maintain a Comprehensive Non-Auto Transportation Plan

Work with TransLink, the Township of Langley, and the City of Surrey to incorporate non-auto transportation into the South of Fraser Area Transit Plan. Alternatively, develop a separate plan that includes non-auto mode transportation but not transit and automobile modes. The plan should contain maps that outline walking and biking routes to busy city centres, coupled with ways to enhance the safety of these routes. Due to the larger distances between municipal centres around Langley (relative to other parts of Metro Vancouver), provide

options for including public transit in a multi-modal transportation network (e.g. work with TransLink to ensure bike lockers are available at major transit exchanges and stops).

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.

Identify Grants for Non-auto Transportation Projects

Start a fund for non-auto transportation projects. The City should consider grants to provide cycling infrastructure and for pedestrian improvement projects, such as upgrading pedestrian crossings and building sidewalks on underdeveloped routes.

Figure 4.19 – Cycling Infrastructure
Bike rack in the city centre. Increasing cycling infrastructure such as bike racks, bike lanes, and cyclist activated signals at busy crossings can increase cycling and decrease private vehicle use.

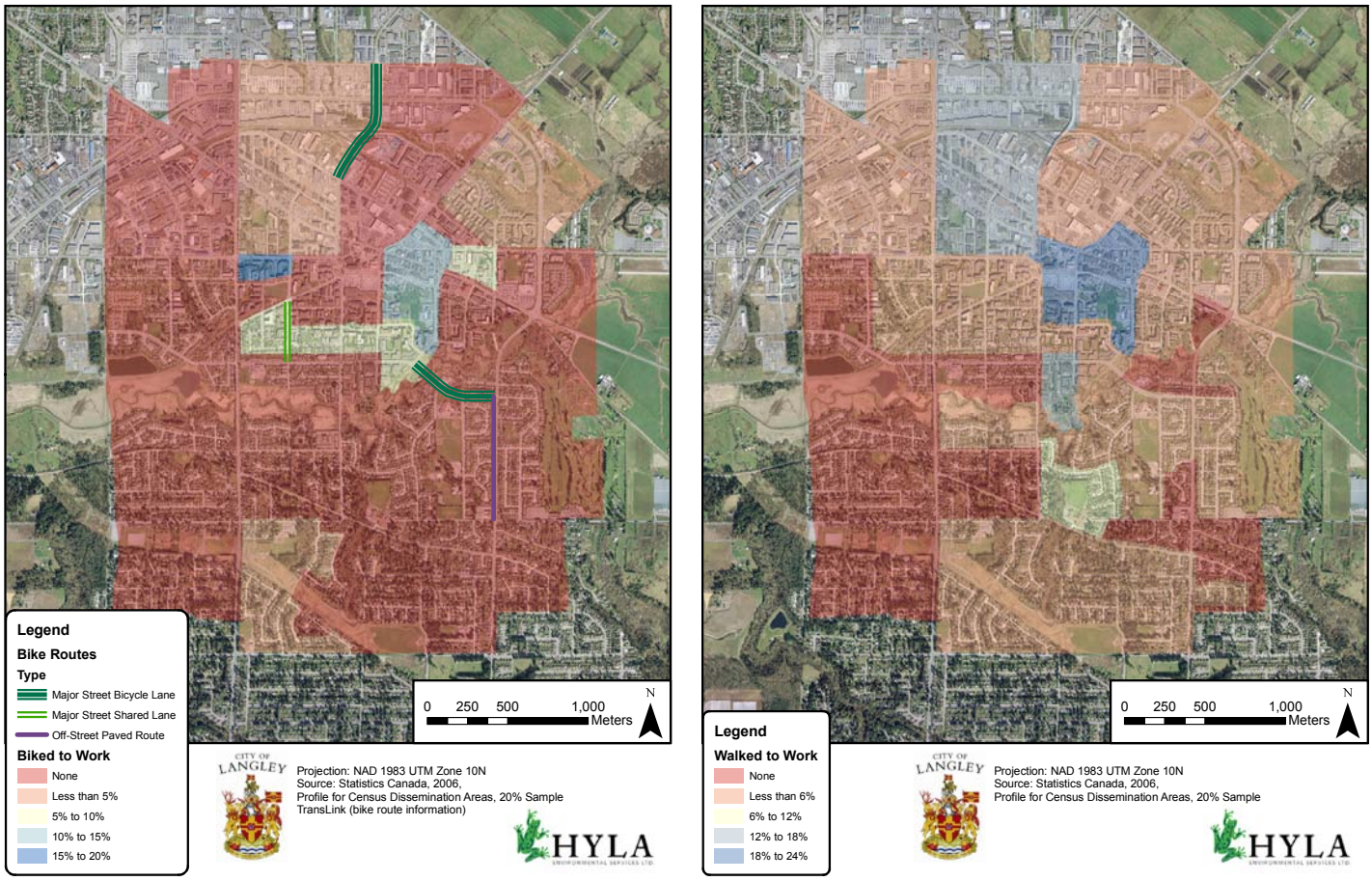

Figure 4.18 – Percentage of People Who Cycle and Walk to Work
Cycling and walking are two of the best ways to get around without using fossil fuels. The map on the left show the percentage of people in each census dissemination area who use a bike as their primary method of getting to work and the map on the right shows the percentage of people who walk to work as their primary method of transportation.

4.4.3 – New Technology

Public Transit

Though all remaining initiatives would be TransLink's responsibility, the City should advocate and coordinate through planning channels like the *South of Fraser Area Transit Plan* and the *Surrey Rapid Transit Alternatives Analysis Study.*

Evaluate New Public Transit Types

A new spin on old technology - modern streetcar systems (at grade light rail transit) are growing more popular in North American cities, surpassing buses in ridership. This is partly because streetcars cost less than other rapid transit types. Vancouver successfully ran a demonstration streetcar line during the 2010 Olympic games using vehicles on-loan from Belgium, where, like many European cities, such systems are commonplace. The Province is currently considering transit expansion to the Fraser Valley through Langley.

Figure 4.20 – Modern Transit Technology
Modern streetcar and light rail technology attracts substantially higher ridership than buses, but is cheaper to install than grade-separated systems such as SkyTrain. Different transit technologies should be evaluated for commuter or community rail through the City of Langley.

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 shorten a red light at intersections. Transit priority technologies are most effective on major transit routes that operate on congested roads. Potential areas in Langley for this system are along Fraser Highway and 200th street. Transit priority measures can also be studied on routes near the Langley Centre transit exchange.

Work with TransLink to Implement Real-time Transit Technologies

Real-time transit technologies, such as the NextBus system being tested by TransLink, tell transit users when the next bus will arrive through a display located at major transit stops. Investigate the potential for installing this system at major bus stops within the City. Bus stops at transit exchanges, such as the Langley Centre transit exchange, are good candidates for real-time transit systems. Also major routes like the #502 could potentially benefit from such a system.

Private Vehicles

Require infrastructure for Plug-in Electric Vehicles

The development of electric plug-in vehicle will greatly reduce GHG emissions. In the near future the City should require infrastructure for plug-in electric vehicles, as developers need lead time before these vehicles are released into the mainstream market (3-5 years).

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. Program suggestions include more recycling, backyard and food waste composting, and education for all members of the community. Achieving this target requires collaboration between the City of Langley and Metro Vancouver.

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 the need for 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 its Solid Waste Management Plan.

4.5.2 – Local Government Policy and Programs

Waste Disposal Programs

New Waste Collection Policy

Adopt a new waste collection policy aimed at reducing the amount of garbage entering landfills. Improvements include increasing recycling bin capacity, supporting single-stream recycling and collecting kitchen and yard waste. This initiative supports the Zero Waste Challenge.

Figure 4.21 – 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 GHG produced in Metro Vancouver.

Table 4.7 – Reductions For Solid Waste

Reduction Initiative	Level of Government	Reduction Quantity GHGs (tonnes CO_2e)
Zero Waste Challenge	Municipal/Regional	2,133
Waste-to-Energy Plant	Regional	5,866
Total Reductions		**7,999**

4.6 Community Reductions Summary

4.6.1 – Reduction Initiatives

Table 4.7 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 Langley can reduce its 2017 forecast emissions quantity by 20,992 tonnes of CO_2e.

Table 4.8 – 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	12,407	368
	CAEE Targets - Existing Buildings	Municipal – With Support	46,082	1,315
	CAEE Targets - New Buildings	Municipal – With Support	51,859	1,811
	District Energy Systems	Municipal	51,648	2,642
	Solar Hot Water	Municipal	4,376	152
	Total Buildings Reductions		**153,965**	**6,289**
On-Road Transportation	California Pavley II Standard	Provincial Government	–	450
	10% Per Capita VKT Reduction	Shared	–	6,255
	Total On-Road Transportation Reductions			**6,705**
Community Solid Waste	Solid waste diversion rate of 70%	Shared	–	2,133
	Waste-to-Energy Plant	Regional Government	–	5,866
	Total Solid Waste Reductions			**7,999**
	TOTAL REDUCTIONS		**153,965**	**20,992**

4.6.2 – Share of Responsibility for Reductions

Figure 4.19 provides a breakdown of the reduction quantity for which each level of government is responsible. The largest share of the reductions quantity (40 percent) will require cooperation between the municipality and other levels of governments to reach the target. Of the 3 levels of senior government, Metro Vancouver is responsible for the largest proportion of the reduction quantity (28 percent) followed by the provincial and federal government (2 percent each). 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 Langley is responsible for 28 percent of the proposed reduction quantity. Most initiatives will require outside financial assistance (Figure 4.19).

4.6.3 – Reduction Target

The reduction target is calculated from the percent difference total of emissions in 2017 after all the initiatives have been applied and the 2007 base year emissions quantity. Table 4.17 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 16 percent below 2007 levels by 2017.

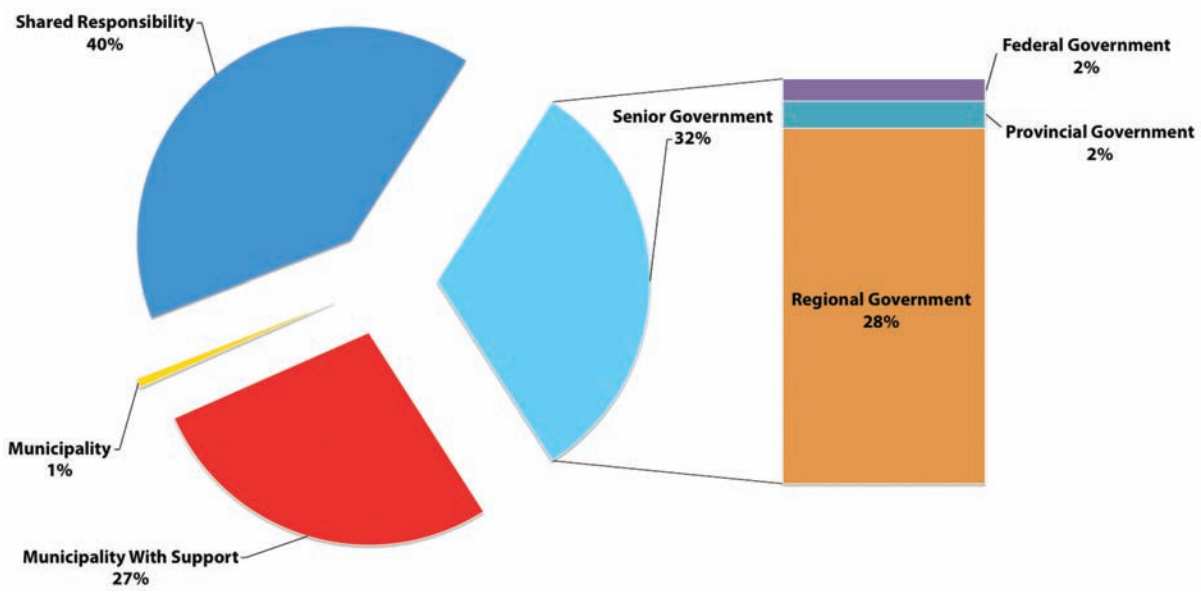

Figure 4.22 – Share of Responsibility
Responsibility for reduction initiatives is divided up between different levels of government.

Table 4.9 – Community Reduction Target Summary

Sector		Base Year Emissions	Projected GHG Emissions	Potential GHG Emission Reductions	GHG Emissions After Plan Implementation	Percent Reduction of Projected Emissions
		Tonnes CO_2e				
		2007	2017			
Buildings	Residential	24,205	25,508	4,651	20,857	**-14%**
	Commercial	32,231	30,813	1,026	29,786	**-8%**
	Industrial	4,451	3,609	611	2,997	**-33%**
	PSO[2]	1,336	0	0	0	**-100%**
On-the-road Transportation		78,693	77,669	6,705	70,964	**-10%**
Solid Waste		10,665	10,665	7999	2,666	**-75%**
TOTAL		**151,583**	**148,251**	**20,992**	**127,271**	**-16%**

[1] It is important to remember that the 16 percent decrease calculated above represents the potential outcome over the project period (2010-2017) relative to the projected growth in emissions in 2017, which includes the growth of emissions during the project period. Note that significant changes will occur in the on-road transportation sector after the project period (2017).
[2] Public Service Organization

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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 II.

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

Reduction Category	Reduction Subcategory	Page	Action	Priority	Resources Required	Year
Community Buildings – Senior Government Policy and Programs – Federal Government	EnerGuide rating in Multiple Listing Service (MLS) Advertising	30	Delay action until federal program restored. Include in staff education	2	N/A	Increase priority when funding restored
Community Buildings – Senior Government Policy and Programs – Provincial Government	Zero Carbon Emissions from Electricity and Carbon Neutral Governance	30	Staff queries	2	Existing staff	2010
Community Buildings – Local Government Policy and Programs – CAEE Existing Buildings Targets	Retrofits of Existing Buildings	30-34	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	Existing staff. CAEE funds to implement as proposed by staff in response to CAEE funding calls	2010
Community Buildings – Local Government Policy and Programs – CAEE New Buildings Targets	Energy Efficient Design for New Buildings	35-36	Undertake Supporting Programs Eduction (SPE) seminar for staff's outreach to community. Combine with Sustainability Checklist	1	Consultant to develop ($1K - $3K)	2010
Community Buildings – Local Government Policy and Programs – CAEE New Buildings Targets	Supporting Programs for Energy Efficient Design for New Buildings	35-36	Undertake SPE seminar for staff's outreach to community	2	Consultant to develop ($1K - $3K)	2011

Reduction Category	Reduction Subcategory	Page	Action	Priority	Resources Required	Year
Community Buildings – Local Government Policy and Programs – OCP and Local Government By-laws	Encourage Energy Efficient Design for New Buildings	36-37	Undertake SPE seminar for staff's outreach to community	1	Consultant to develop	2011
Community Buildings – Local Government Policy and Programs – OCP and Local Government By-laws	Energy Efficient Design for New Buildings	37	Develop a policy or guidance document that describes each initiative for distribution to development community as appropriate	1	Existing Planning Staff	2011
Community Buildings – Local Government Policy and Programs – OCP and Local Government By-laws	Sustainability Checklist	37	Work with consultant to develop sustainability checklist for Development Permits and Rezoning Applications	1	$3K-$5K	2011
Community Buildings – Local Government Policy and Programs – OCP and Local Government By-laws	Energy Efficient Design and Construction for New Buildings	37-38	Incorporate into sustainability checklist	1	Existing Planning Staff	2010
Landuse and Urban Design – Senior Government Policy and Programs	The Metro Vancouver Livable Region Strategic Plan	38	Staff to stay apprised of MetroVancouver's LRSP	2	Existing Planning Staff	2010
Landuse and Urban Design – Local Government Policy and Programs	Landuse and Urban Design	38-40	Incorporate into sustainability checklist	1	Existing Planning Staff	2011
Community Transportation – Senior Government Policy and Programs – Provincial Government	Emissions Standards and other Provincial Programs	40	Undertake SPE seminar for staff's outreach to community	1	Consultant to develop ($2K - $4K) and Sustainability Coordinator	2011
Community Transportation – Local Government Policy and Programs – Increase Vehicle Fuel Efficiency	Increase Vehicle Fuel Efficiency	41	Encourage through eduction and outreach	3	Existing staff	2011
Community Transportation – Local Government Policy and Programs – Reduce the Use of Single Occupant Private Vehicles	Reduce the Use of Single Occupant Private Vehicles	41-42	Targeted measures and TDMP	2	Existing Staff	2010-2011
Community Transportation – Local Government Policy and Programs – Increase the Use of Public Transit	Increase the Use of Public Transit	43-46	Liaison and coordination with senior government	Liaison is first priority. Planning documents at appropriate time	Sustainability Coordinator and/or Existing Planning Staff	ongoing

Reduction Category	Reduction Subcategory	Page	Action	Priority	Resources Required	Year
Community Transportation – Local Government Policy and Programs – Encourage Walking and Cycling	Encourage Walking and Cycling	46-47	Ongoing investments and supporting plans	1	Sustainability Coordinator and/or Existing Planning Staff	ongoing and 2012 for planning documents
Community Transportation – New Technology – Public Transit	New Technology – Public Transit	48	Staff to stay apprised of new opportunities for public transit	1	Sustainability Coordinator and/or Existing Planning Staff	2011
Community Transportation – New Technology – Private Vehicles	Private Vehicles	48	Staff to stay apprised of infrastructure requirements for plug in electric vehicles	2	Sustainability Coordinator and/or Existing Planning Staff	ongoing
Solid Waste – Senior Government Policy and Programs – Regional Government	Solid Waste Policy - Regional Government	49	Staff to stay apprised of Metro Vancouver's plan	1	Sustainability Coordinator and/or Existing Planning Staff	ongoing
Solid Waste – Local Government Policy and Programs – Waste Disposal Programs	Solid Waste Policy - Local Government	49	Develop a Solid Waste Management Plan	1	$50K	2011

5.2 Monitoring and Reporting

The City should engage a qualified consultant to monitor and report community energy and GHG emissions on an annual basis, or every two years depending upon the City's wishes. Currently, there are no protocols regarding monitoring frequency of community GHG emissions, although annual monitoring provides the City with valuable information that may support City policy that affects growth (i.e, zoning applications) and that may strengthen the City's position when lobbying senior government to support infrastructure that reduces community GHG emissions (i.e., transit improvements). Due to time lags with data providers, updated community inventories could be prepared in May or June of a given year for the previous calendar year (e.g., a 2010 inventory would be prepared in May/June of 2011).

While undertaking monitoring, staff should also 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 can be updated inexpensively by qualified consultants. Costs to prepare a community inventory, as per Appendix I, range between $2,000 and $4,000 depending upon the scope of the inventory and the availability of datasets from the data providers. These resource levels include nominal fees for building square footage data used to calculate energy intensity.

5.3.2 – Implementation

If the City wishes to conduct education seminars for staff as per Section 5.1, up to $10,000 may be required for consultants. Efficiencies exist with this initiative if the City holds these seminars with other municipalities.

Many of the reduction initiatives fall under the responsibility of existing staff, which may refer to a sustainability coordinator or planning staff. Existing planning staff cannot undertake all reduction initiatives listed herein and the City should consider creating a position to assist senior staff with implementation of the reduction initiatives listed herein.

6 Summary & Conclusions

6.1 Inventory Summary

In 2007, the buildings sector was responsible for the majority of the community's energy consumption while the on road transportation sector was responsible for the largest share of community GHG emissions. Inventory results for 2007 are shown in Table 5.1.

Table 6.1 – Comparison of GHG Emissions by Sector (2007)

Sector		Energy Type/Unit	Consumption	Energy (GJ)	CO_2e (t)	Total CO_2e (t)
			2007			
Buildings	Residential Buildings	Elect	87,929,505 kWh	316,546	1,934	24,206
		Nat Gas	435,417 GJ	435,417	22,271	
	Commercial Buildings	Elect	98,914,009 kWh	356,090	2,176	32,231
		Nat Gas	587,596 GJ	587,596	30,055	
	Industrial Buildings	Elect	64,108,724 kWh	230,791	1,410	4,452
		Nat Gas	59,459 GJ	59,459	3,041	
	Provincial PSO's	Elect	4,463,346 kWh	16,068	98	1,336
		Nat Gas	24,202 GJ	24,202	1,238	
	On Road Transportation	Gasoline	25,131,601 L	871,061	62,763	78,693
		Diesel	5,659,258 L	218,900	15,730	
		Propane	131,685 L	3,333	200	
	Solid Waste	Tonnes	29,159 t	NA	10,665	10,665
TOTAL			3,119,464 GJ		151,583 t	

Overall the City of Langley community generated 151,583 tonnes of CO_2e in greenhouse gas emissions in the 2007 base year.

6.2 Forecast Summary

A business-as-usual (BAU) scenario of energy consumption and GHG emissions was developed based on potential growth under existing bylaws and legislated GHG reduction initiatives. By 2017, annual community energy consumption is predicted to increase by 12 percent to ~3,500,000 GJ. Resulting annual GHG emissions are predicted to decrease by two percent to ~148,000 tonnes CO_2e by 2017 (Table 5.2).

Table 6.2 – Summary of Community Forecasts

Forecasted Parameter	Base Year	Forecast Year	Percent Increase
	2007	2017	2007 - 2017
Energy Consumption (GJ)	3,119,464	3,500,461[1]	12%
Emissions (tonnes CO_2e)	151,583	148,251	-2%

1 Forecast energy consumption does not reflect potential gains in fuel efficiency from tailpipe standard implementation.

In a business as usual scenario, overall greenhouse gas emissions are expected to decrease by two percent between 2007 and 2017.

6.3 Reduction Target Summary

There are many opportunities for new GHG reductions within the City of Langley's community sectors. By implementing the initiatives described in Section 4 the City of Langley would be able to reduce GHG emissions by **16 percent**. Table 5.3 provides a summary of the potential reductions in each community sector.

Table 6.3 – Summary of Estimated Impact of Reduction Measures on the Community Sectors

Sector		Base Year Emissions	Projected GHG Emissions	Potential GHG Emission Reductions	GHG Emissions After Plan Implementation	Percent Reduction of Projected Emissions
		Tonnes CO_2e				
		2007	2017			
Buildings	Residential	24,205	25,508	4,651	20,857	**-14%**
	Commercial	32,231	30,813	1,026	29,786	**-8%**
	Industrial	4,451	3,609	611	2,997	**-33%**
	PSO[2]	1,336	0	0	0	**-100%**
On-the-road Transportation		78,693	77,669	6,705	70,964	**-10%**
Solid Waste		10,665	10,665	7999	2,666	**-75%**
TOTAL		**151,583**	**148,251**	**20,992**	**127,271**	**-16%**

[1] It is important to remember that the 16 percent decrease calculated above represents the potential outcome over the project period (2010-2017) relative to the projected growth in emissions in 2017, which includes the growth of emissions during the project period.

[2] Public Service Organization

Reduction Target Statement:

The City of Langley can reduce annual emissions by 20,992 tonnes CO_2e from the 2017 emissions forecast, resulting in a 16 percent reduction below 2007 emissions levels.

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 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.

Langley City

Community Energy & Greenhouse Gas Emissions Inventory: 2007

This is Langley City'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. – consumption and number of accounts

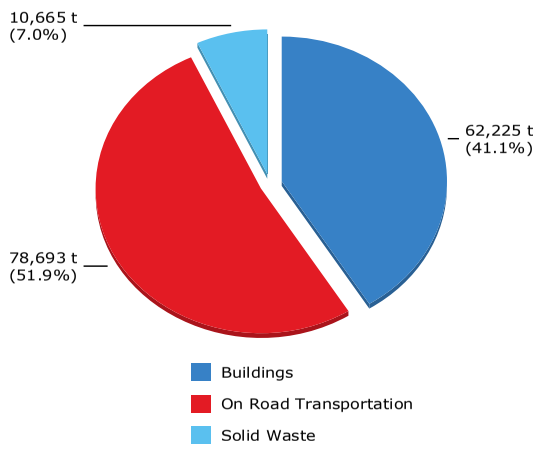
Community Transportation
Activity Data:
Insurance Corporation of British Columbia – licensed vehicles on the road
Natural Resources Canada – Fuel consumption rates for individual vehicles
Province of BC – Vehicle kilometres traveled for the appropriate region of the Province

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 do 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 *



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Langley City
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	10,743	87,929,505	kWh	8,185	kWh/C	316,546	1,934	**751,963**	**24,206**
	Natural Gas	4,451	435,417	GJ	98	GJ/C	435,417	22,271		
Commercial Buildings	Electricity	1,976	98,914,009	kWh	50,058	kWh/C	356,090	2,176	**943,686**	**32,231**
	Natural Gas	1,276	587,596	GJ	460	GJ/C	587,596	30,055		
Industrial Buildings	Electricity	144	64,108,724	kWh	444,494	kWh/C	230,791	1,410	**290,250**	**4,452**
	Natural Gas	13	59,459	GJ	4,574	GJ/C	59,459	3,041		
Provincial Pso Buildings	Electricity	11	4,463,346	kWh	405,759	kWh/C	16,068	98	**40,270**	**1,336**
	Natural Gas	8	24,202	GJ	3,025	GJ/C	24,202	1,238		
Subtotal	Electricity	12,874	255,415,584	kWh			919,496	5,619	**2,026,170**	**62,225**
	Natural Gas	5,748	1,106,674	GJ			1,106,674	56,606		

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	8,445	6,674,280	litres	790	L/U	231,331	16,668	**233,395**	**16,816**
	Diesel Fuel	93	53,360	litres	574	L/U	2,064	148		
Large Passenger Cars	Gasoline	3,032	3,128,106	litres	1,032	L/U	108,420	7,812	**108,797**	**7,839**
	Diesel Fuel	15	9,730	litres	649	L/U	376	27		
Light Trucks, Vans, And Suvs	Gasoline	7,088	12,012,034	litres	1,695	L/U	416,337	29,998	**421,232**	**30,339**
	Diesel Fuel	61	101,038	litres	1,656	L/U	3,908	281		
	Mobile Propane	23	38,969	litres	1,694	L/U	986	59		
Commercial Vehicles	Gasoline	1,473	2,445,129	litres	1,660	L/U	84,748	6,106	**267,643**	**19,221**
	Diesel Fuel	924	4,667,747	litres	5,052	L/U	180,548	12,974		
	Mobile Propane	67	92,717	litres	1,384	L/U	2,347	141		
Tractor Trailer Trucks	Diesel Fuel	55	775,237	litres	14,095	L/U	29,986	2,155	**29,986**	**2,155**

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Langley City

Community Energy & Greenhouse Gas Emissions Inventory: 2007

On Road Transportation continued

Motorhomes	Gasoline	403	647,847	litres	1,608	L/U	22,454	1,618	**24,471**	**1,763**
	Diesel Fuel	52	52,146	litres	1,003	L/U	2,017	145		
Motorcycles And Mopeds	Gasoline	607	152,302	litres	251	L/U	5,279	380	**5,279**	**380**
Bus	Gasoline	24	71,902	litres	2,996	L/U	2,492	180	**2,492**	**180**
Subtotal	Gasoline	21,072	25,131,601	litres			871,061	62,763	**1,093,294**	**78,693**
	Diesel Fuel	1,200	5,659,258	litres			218,900	15,730		
	Mbl Propane	90	131,685	litres			3,333	200		

Solid Waste	Direct Emissions				Emissions Total
	Type	Estimation Method	Mass (t)	CO_2e (t)	CO_2e (t)
Community Solid Waste	Solid Waste	Methane Commitment	29,159	10,665	**10,665**
Subtotal			29,159	10,665	**10,665**

Grand Total	**Activity**	**Consumption**	**Energy**	**CO_2e**	**Energy & Emissions Total**	
					Energy (GJ)	CO_2e (t)
	Electricity	255,415,584 kWh	919,496 GJ	5,619 t		
	Natural Gas	1,106,674 GJ	1,106,674 GJ	56,606 t		
	Gasoline	25,131,601 litres	871,061 GJ	62,763 t	**3,119,464**	**151,583**
	Diesel Fuel	5,659,258 litres	218,900 GJ	15,730 t		
	Mbl Propane	131,685 litres	3,333 GJ	200 t		
	Solid Waste			10,665 t		

APPENDIX II DETAILED REDUCTION INITIATIVES

This section contains detailed information and sources for additional information for each of the reduction initiatives discussed in section 4.

II-I Reduction Initiatives Index

Community Buildings

Brownfield Developments p.67

Building Retrofits: Electrical System Upgrades p.62

Building Retrofits: Mechanical and Plumbing System Upgrades p.62

C-2000 Standard: Adopt the C-2000 Building Code for Commercial Buildings p.66

CAEE Existing Buildings Targets Summary p.64

CAEE New Buildings Summary p.67

Carbon Neutral Governance p.61

Community Energy Systems p.68

Density Bonuses/Amenity Bonuses p.71

Discourage Electric Baseboards p.67

Electricity and Alternative Energy Division (EAED) p.65

Encourage Mixed-use Buildings p.71

Encourage New Buildings to Meet BuiltGreen Standards p.72

Encourage New Buildings to Meet LEED Standards p.72

EnerGuide rating in Multiple Listing Service (MLS) Advertising p.60

Energy Efficient Construction p.64

Examine Opportunities for GeoExchange Systems p.68

Improvements to Management and Operations Practices p.62

Natural Resource Canada Renewable Energy Deployment Initiative p.67

New Development lockers/bike storage p.71

Passive Solar Design p.66

Pre-service for Waste Heat and District Energy Systems p.70

Provide Rebates on Building Permit Fees for New Energy Efficient Building p.70

Provide Rebates on Renovation Permit Fees for renovations that meet the EnerGuide Requirements p.70

R-2000 Standard: Adopt R2000/ Power Smart performance standards p.65

Repair Leaks and Drafts p.64

Solar Hot Water p.70

Sustainability Checklist p.71

Upgrade Appliances to Energy Star p.63

Upgrade Insulation p.63

Upgrade Windows p.63

Waste-heat Recovery p.69

Zero Carbon Emissions from Electricity p.61

Land use and Urban Design

Concentrate High Density and Commercial Areas on Major Transit Routes p.73

Decrease Distance to Commercial Locations p.75

Distance Relationship Between Commercial, Residential, and Employ-

ment Zones p.74

Encourage Mixed Use Neighbourhoods p.75

Encourage Neighbourhood Commercial p.75

Encourage Pedestrian Centred and Transit Oriented Design p.74

Increase Density – Intensify p.73

The Metro Vancouver Livable Region Strategic Plan p.72

Community Transportation

Active Transportation to and from Schools p.78

California "Pavley II" Tailpipe Emissions Standards p.77

Construct Transit Priority Lanes p.82

Co-Operative Auto Networks p.79

Develop and Implement a Transportation Demand Management Plan p.80

Develop and Maintain a Comprehensive Non-Auto Transportation Plan p.83

Develop and Maintain a Comprehensive Transit Plan p.82

Encourage Enhancement of Pedestrian facilities p.82

Encourage New Buildings to Feature Public Transit More Prominently p.80

Identify Grants for Non-auto Transportation Projects p.84

Identify Grants for Transit Improvement Projects p.81

Improve Cycling Infrastructure p.83

New Renewable Fuel Regulations Standard p.78

Plug-in Electric Vehicles p.85

Promote Car Free Days p.78

Public Transportation Shelters p.80

Public Transport Vouchers p.81

Reducing VKT p.80

Shared Parking p.79

Support Cycling and Pedestrian Projects p.84

Support Transit Expansion Projects p.82

Tailpipe Emissions Standards p.77

Un-hide the Costs of Parking to Reduce Private Vehicle Use p.79

Work with Senior Governments to Improve Regional Transit p.81

Work with TransLink to Implement Real- time Transit Technologies p.85

II-V Solid Waste

Waste Reduction Programs p.

Waste-to-Energy Plant p.86

Zero Waste Challenge p.86

II-II Community Buildings

6.3.3 – Senior Government Policy and Programs

Federal Government

EnerGuide rating in Multiple Listing Service (MLS) Advertising

EnerGuide offers a standardized rating for the energy efficiency of buildings. Since the majority of Canadians claim they would pay extra for an environmentally friendly design, boost a home's profile by registering the building's EnerGuide rating on a local realtor's multiple listings service.

EnerGuide is a service of the Natural Resources Canada Office of Energy Efficiency, applying to the energy efficiency and consumption of old and new houses. EnerGuide provides a standardized measure of a building's energy efficiency, so that consumers can compare the amount of energy consumed in their house with other houses. Homes are rated on a scale of 0 to 100, with 0 indicating extremely high energy consumption and 100 representing high energy efficiency, with no purchased energy.

Canadians are concerned about the energy efficiency of their home. According to a recent survey, 63% of Canadians would pay more for an environmentally friendly home, while 72% consider energy efficiency an important quality in the next house they purchase. One way to improve the energy efficiency profile of a house is to register the house's EnerGuide rating on the multiple listings service (MLS), offered by local realtors.

Prominently featuring EnerGuide ratings would promote energy efficiency in the development of future buildings. Improving the EnerGuide rating of a house can be highly beneficial: results from a BC government analysis indicated that a 5% increase in a home's EnerGuide rating can reduce energy consumption by 29%.

To identify key areas for improving energy efficiency, Natural Resources Canada employs computer software models to analyze the data, targeting the most cost-effective measures for lowering energy consumption. Natural Resources Canada has partnered with Canada's residential construction industry to apply these measures to energy-efficient building practices and technologies.

Typical Energy Efficiency Ratings

Type of House	*Rating*
New house constructed to building code standards	65-72
New house with some energy-efficiency improvements	73-79
New energy-efficient house	80-90
House requiring little or no purchased energy	91-100

Zero Carbon Emissions from Electricity

The BC Energy Plan is an initiative for investigating new sources of energy that are both cost effective and environmentally friendly. The main goal is to reduce GHG emissions, with additional benefits including new opportunities for jobs and investments. This reduction initiative is included in the emissions forecast.

The plan has many strategies to meet greenhouse gas reduction targets:

- Maintain zero net greenhouse gas emissions in all new electricity projects. For coal-fired power plants, zero greenhouse gas emissions will be required.
- Reduce net greenhouse gas emissions to zero in all existing thermal generation power plants by 2016.
- Do not use nuclear energy to generate electricity.
- Maintain 90 percent of all electricity generated from clean and renewable sources.
- Put energy efficient buildings into practice by 2010.
- Aim for 50 percent of BC Hydro's incremental resource needs from conservation measures by 2020.

Implementing the strategies above should lead to zero new net greenhouse gas emissions from both electricity produced from burning fossil fuels and new power generating projects. These changes should will result in a 99% decrease in CO_2e emissions from electricity generation by 2017 (according to 2007 BC Hydro figures).

Carbon Neutral Governance

The BC Greenhouse Gas Reduction target act legally requires that all provincial public-sector organizations are carbon neutral beginning 2010. This reduction initiative is included in the emissions forecast.

The B.C. government is setting an example and working to ensure that its operations are carbon neutral for 2010 and every year thereafter. This commitment – enshrined in legislation – is the first of its kind in North America. It applies to all provincial public sector operations, including government ministries and agencies, schools, colleges, universities, health authorities and Crown corporations.

Public sector emissions come from buildings, fleet, procurement and travel (core government only). By providing public sector employees with tangible changes they can make, we will significantly reduce the greenhouse gas (GHG) emissions produced by the public sector, conserve energy, decrease costs and demonstrate a successful approach to addressing climate change.

As part of this commitment, everyone who works for the Province will be required to:

- Measure their greenhouse gas emissions;
- Reduce these emissions as much as possible;
- Offset the remaining emissions by investing in projects that reduce greenhouse gas emissions, so the net effect of government activities is carbon neutral; and
- Report out publicly on plans and actions to reduce emissions.

For more information on this initiative, please visit the following:

- LiveSmart BC (http://www.livesmartbc.ca/government/neutral.html)

6.3.4 – Local Government Policy and Programs

HES uses its unique Energy and Emissions Monitoring and Reporting System™ (EEMRS™) to calculate reduction estimates for buildings that can result from local government policy and programs. EEMRS™ applies reduction initiatives to an energy amount in the appropriate sector, yielding the reductions in energy consumption and resulting greenhouse gas emissions.

CAEE Existing Buildings

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.

Promote upgrades to the following mechanical and plumbing systems in existing buildings:

- Replace constant speed motors, which waste energy, with more efficient variable speed motors such as pumps and fans; upgrade boilers to high efficiency heating systems; upgrade outdated cooling systems with new, more efficient systems; utilize variable volume air and water distribution systems, which consume less energy than constant volume configurations.
- Reduce water usage by installing flow-control and low-flow devices; consider digital control systems to monitor and control the operation of all systems.
- Utilize renewable energy sources using technologies such as ground-source heat pumps and, solar pool heaters and solar walls.

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.

Encourage the following upgrades to electrical systems in existing buildings:

- Replace conventional bulbs with Energy Star verified bulbs, which use 75% less energy and produce 75% less heat than incandescent bulbs; (Canada intends on banning the sale of inefficient incandescent light bulbs by 2012).
- Convert lighting systems to high-efficiency technology, like T8 lighting with reflectors or pulse charge high intensity discharge lighting.
- Dim a bulb by 25% to consume 20% less energy.
- Install digital lighting control systems.
- Install motion sensors or a timing device to ensure equipment is off when not in use.
- Convert electric heating to natural gas or solar power.
- Install power factor correction capacitors to reduce utility charges.

For more information on this initiative, please visit the following website:

- BC Hydro's Power Smart Program (www.bchydro.com/powersmart)

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.

Encourage the following improvements to the management and operation of existing industrial and commercial buildings:

- Ensure operating strategies and schedules only run equipment when required, set at optimum setting for conserving energy.
- Purchase and maintain high-efficiency equipment.
- Implement performance monitoring and reporting programs to ensure the project performs as expected.
- Explore fixed rate energy prices to ensure retrofit savings and avoid fluctuating energy prices.
- Train staff to be energy-conscious.

For more information on this initiative, please visit the following:

- Federal Buildings Initiative developed and implemented by Natural Resources Canada
- BC Hydro's Power Smart Program (www.bchydro.com/powersmart)

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.

Upgrading a home's insulation can save homeowners money by reducing energy consumption and heat loss. For example, good quality floor insulation in the attic can save homeowners up to 30% on their annual heating bills. One increasingly popular type of insulation is Spray Foam, which not only defends against drafts, but also prevents moisture from entering the walls. Spray Foam has an excellent insulating capacity, with an R-value of up to 6.5 per inch.

For more information on this initiative, please visit the following:

- BC Hydro (www.bchydro.com)
- Natural Resources Canada (www.nrcan-rncan.gc.ca)
- Green Design Build (www.greendesignbuild.net)

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 a lot of money on heating bills.

Almost 33% of all heat loss in residential buildings occurs through windows. New technologies can reduce heat loss by over 20% and lead to considerable savings. Changes include upgrading from single to double pained windows and converting to low E and argon windows with an energy star rating.

All new windows (except those with solid wood frames) are now checked to meet the BC Energy Efficiency Act. To indicate energy efficiency new windows must have a permanent label with a registered trademark or certification.

For more information on this initiative, please visit the following:

- BC Hydro (www.bchydro.com)
- Natural Resources Canada (www.nrcan-rncan.gc.ca)
- Green Design Build (www.greendesignbuild.net)

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.

Building rating systems usually focus on large equipment (e.g. furnaces or cooling systems), while omitting smaller appliances and equipment. Rating systems like EnergyStar can be used to develop policies on energy efficiency. EnergyStar is an international symbol, used in Canada and elsewhere, that allows consumers to identify products that conform to higher levels of energy efficiency.

For more information on this initiative, please visit the following:

- BC Hydro (www.bchydro.com)
- BC Climate Exchange (www.bcclimateexchange.ca/pdfs/EnergyEfficiencyOnlineGuide2009.pdf)
- Green Design Build (www.greendesignbuild.net)

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..

Sealing cracks and gaps with caulking and weather stripping is a cost-effective way to reduce heat loss and uncomfortable drafts. Leaks are responsible for 20% of the heat loss in many homes, and a simple caulking seal can lower heat loss by 5 to 10%. Small preventative measures to leaks and ventilation systems could also benefit the environment: A 5% reduction of heat loss in approximately 10,000 BC households could prevent 1,000 tonnes of CO_2 from being released into the atmosphere annually.

CAEE Existing Buildings Targets Summary

- 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.

To meet CAEE targets the City should endorse bylaws and policies that either promote or require a building's energy efficiency to match CAEE targets. The City should also develop outreach programs to reduce energy consumption in new and existing buildings.

CAEE New Buildings

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.

The Energy Efficient Buildings Strategy, produced in May 2008 by the Ministry of Energy Mines and Petroleum Resources (MEMPR), outlines the most aggressive energy efficiency targets in Canada. The document states that in B.C. we "know how to build smarter, faster and smaller. We can reduce energy consumption, improve air quality and make our landscapes and buildings healthy places to live, work and learn. We are building for tomorrow, today." MEMPR goes on to review the major causes and effects of climate change. MEMPR identifies sources of funding for those who improve the resource efficiency within a building.

Pre-existing bylaws and policies provide a framework for designing energy efficient buildings. To save on resources, use recyclable materials such as drywall, roofing, concrete and carpet during construction. Other ways to save energy include increasing the density of the building, and installing energy efficient appliances and air control systems. An energy efficiency guide can be provided for new developments.

The Energy Efficient Buildings Strategy includes an action plan with several targets aimed at achieving the following emissions reductions by 2020:

- Achieve a 33% reduction in greenhouse gas emissions for the building sector when combined with the BC Energy Plan commitments for clean and renewable energy and electricity self-sufficiency.
- Achieve net energy savings of approximately $3.4 billion above capital costs of over 12 years.
- Attain annual electricity savings equivalent to the consumption of 800,000 homes.
- Attain annual fuel savings equivalent to the demand of 570,000 homes.
- Use energy efficiency and conservation strategies to reduce greenhouse gas emissions by 1.8 million tonnes per year in 2020.
- Create approximately 130,000 new job opportunities over 12 years (excluding the re-spending of funds saved through energy efficiency methods).

This strategy offers a variety of sources for funding. Additionally, the City can use information in this strategy to collaborate with other local municipalities in developing bylaws for energy efficient construction.

For more information on this initiative, please visit the following:

- BC Energy Plan (www.energyplan.gov.bc.ca/bcep/default.aspx?hash=4)

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.

The Electricity and Alternative Energy Division (EAED) of MEMPR was formed to help build a competitive, efficient, reliable, and environmentally responsible sector for electricity and alternative energy. The City should inform developers of potential funding resources available through EAED.

MEMPR targeted 4 broad energy sectors:

- Alternative Energy – Advancing policies and programs for energy efficiency including on a community basis, and aiding in the evaluation, development and deployment of leading edge clean energy technologies.
- Bioenergy and Renewable Energy – Developing and implementing strategic policies related to renewable fuels, bioenergy, wind, solar, ocean, and geothermal energy.
- Electricity Policy – Developing and maintaining electricity related policies, legislation, regulations and programs.
- Independent Power Producer Policy and Operations – Developing and maintaining the operational policies for Provincial Crown land tenures, and procedures for independent power producer (IPP) projects.

The EAED is also responsible for managing the Innovative Clean Energy (ICE) Fund. The ICE supports the development of clean power and energy efficiency technologies in the electricity, transportation, alternative energy, and oil and gas sectors.

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.

The R-2000 home program is an initiative of the Natural Resources Canada Office of Energy Efficiency promoting building practices and technologies that are cost-effective and energy-efficient. Natural Resources Canada promotes typical features of R-2000 homes:

- Sorted lumber cut wastes to maximize reuse on site.
- Airtight (draft free) buildings and airtight drywall.
- High performance windows that meet energy rating requirements based on local climates.
- Water-conserving fixtures, such as toilets, faucets, and showers.
- Properly sized heating and cooling appliances (CSA F280).
- Pleated bag air filtration system to remove dust, danders and pollen.
- A blower door test conducted on every R-2000 home to verify air-tight construction.
- Built for active lifestyle, active commuting, and low carbon-based fuel consumption.
- Insulated concrete of high performance and low waste to construct walls.
- More day lighting: passive solar gain for winter and free cooling for summer.

The R-2000 home can use these building strategies to reduce greenhouse gasses, cutting average home emissions (5 tonnes of CO_2e) by 30%. To help establish a market for sustainable building materials, use recyclable products (e.g. drywall, roofing, concrete, and carpeting).

Since reduction estimates are covered under the CAEE program targets, they are not provided for this program.

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.

The C-2000 structure outlines energy efficiency guidelines for commercial buildings. The goal for the C-2000 code is to use 50% less energy than a similar building designed in accordance with the Model National Energy Code (MNECB). Natural Resources Canada provides the following goals for a C-2000 building:

- Achieve a gold rating from the LEED™ Green Building Rating System™.
- Achieve C-2000 Program for Advanced Commercial Buildings criteria and CBIP compliance.
- Use materials that are manufactured without CFCs and HCFCs.

- Use equipment that does not use ozone-depleting substances.
- Ensure that all new materials have no VOC targets.
- Ensure that half of all new materials consist of 20% post-consumer or 40% post-industrial recycled content.
- Use a construction and demolition waste management plan for re-use and recycling in an effort to achieve zero waste.
- Maximize use of salvaged products, to save on materials.
- Ensure a minimum of 80% of all material is sourced from within 500 km of construction site.
- Use a renewable energy source for a minimum 10% of energy requirements.
- Re-use at least 75% of the existing structure and shell of the building.
- Integrate native and drought-tolerant trees and plantings whenever possible.
- Develop a water conservation plan.
- Use high reflective surface finishes for roof and parking lot construction.
- Ensure the lighting load is at 22 W/m2 or less.

Since reduction estimates are covered under the CAEE program targets, they have not been provided for this program.

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.

Passive solar homes require less energy because they capitalize on a building's location. This design maximizes or minimizes the amount of sunlight entering the building in order to lower winter heating and summer cooling costs. Landscaping also plays a role. Deciduous trees and bushes planted along the south side of the building function like shutters: their foliage blocks light in the summer, while in the winter bare branches let light in.

Though many existing buildings can use passive solar heating, new structures benefit even more because decisions like orientation, wall densities, and window fixture size can all be chosen to maximize solar gains without raising the price of construction.

Discourage Electric Baseboards

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

With their lower construction costs, electric baseboard heating are often installed in new buildings instead of traditional forced air furnace systems, even though long term operating costs for baseboard heating far exceed those for natural gas. Because of their high long term costs, developers should be discouraged from installing electric baseboard heating in new buildings, and instead consider more economical alternatives, such as air ducts for central forced-air systems, or hydronic systems. A forced air system has the benefit of being adaptable to other forms of energy that may become available (e.g. geothermal) whereas electric baseboards are difficult to modify, and are less adaptable to new heating technologies.

This initiative applies to converting homes with existing electric baseboard heating, though since most of those buildings cannot accommodate conversion, the reduction amount is minimal.

Brownfield Developments

Research the potential of Brownfields - vacant land often in prime urban areas - for commercial and residential developments. Well situated in the city, Brownfields can be extremely profitable as long as health or contamination issues are addressed prior to construction.

According to Canada's National Round Table on the Environment and the Economy (NRTEE), Brownfields are vacant, derelict or under-utilized commercial and industrial land. Though real or alleged past activities "contaminated" the property, there is still redevelopment potential.

Brownfields commonly exist in former railway yards, riverbanks, old industrial waterfronts, deserted service stations, decommissioned refineries, former dry cleaners or other commercial properties. Often prime real estate, Brownfields are within walking distance of community centres, transportation services and other established resources.

Any contamination on Brownfield land must be removed before redevelopment begins. Otherwise, toxic materials can pose risks to humans. Toxins also hurt the environment, but decontaminating Brownfield land improves the quality of surrounding air, water and soil. Even with the expense of decontamination, developments on Brownfield land are often extremely lucrative, because they are situated in prime urban areas.

A reduction estimate is not provided for this initiative.

For more information on this initiative, please visit the following:

- Ontario Ministry of the Environment (www.ene.gov.on.ca)
- Canadian Brownfields Network (www.canadianbrownfieldsnetwork.ca)
- BC Ministry of Environment (www.gov.bc.ca/env)

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.

The NRCan Biofuels program focuses on renewable alternatives to gasoline and diesel fuel. As much as $1.9 billion will be invested into ecoENERGY for the Biofuels program. This investment is anticipated to stretch over the next 7 years, until March 31, 2017. This program provides operating incentives for facilities producing renewable alternatives to diesel and gasoline. For recipients in Canada, incentives are available for up to 7 consecutive years.

CAEE New Buildings Summary

Meet CAEE program targets for new buildings by 2010. These targets involve high EnerGuide ratings, and high energy performances for residential, commercial, institutional and industrial developments.

Achieve CAEE program targets for new buildings:

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

Another way to reduce energy consumption in new and existing buildings is to introduce community outreach and education programs. These programs require sources of additional funding in order to contribute to the City's CAEE targets. The City should consider policies and bylaws that either promote or require energy efficiency, meet

6.3.5 – OCP and Local Government By-laws

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. Central Langley's high density of multi-unit dwellings is a good area to investigate the potential for CES .

Community Energy Systems (CES) are a cost effective, energy efficient method of heating and cooling a cluster of buildings. The construction of these programs is supported by the CES program, which recognizes and develops

opportunities for combined heat and power (co-generation), district heating and cooling, thermal storage, waste heat recovery, and local sources of renewable energy (particularly biomass). The program is accessible through Natural Resources Canada.

Clients use the program to:

- Develop community energy plans.
- Conduct feasibility studies.
- Design district heating and cooling systems.
- Assist with project management.
- Conduct trouble-shooting that requires specialized expertise;
- Develop system-design software.
- Develop innovative enhancements to new and existing equipment.
- Develop new district cooling technologies.
- Write technical and promotional manuals.
- Help link system suppliers with potential adopters.

To support CES Municipalities can encourage zoning and rezoning applications to district energy systems. The municipality could also establish a private utility, supplying renewable energy on-site to new developments, and leasing access to the source.

It is very difficult to estimate energy and GHG emissions reductions for this reduction initiative. Energy savings of 40-70% for space heating could be achievable, according to best practices.

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.

GeoExchange systems are not the same as Geothermal systems. Geothermal systems take advantage of heat deep under the earth's surface, and require deep wells. GeoExchange utilizes free energy in the ground and uses a network of pipes near the earths surface, or a well in order to extract this heat. Look for opportunities to increase the use of GeoExchange and promote the installation of such systems where appropriate. The Canadian GeoExchange Coalition (CGC) provides information on GeoExchange, Geothermal Energy and maintains a list of coalition members.

For more information on this initiative, please visit the following:

- Canadian GeoExchange Coalition (www.geo-exchange.ca)

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).

Waste-heat recovery captures and reuses excess heat in industrial areas. The City can showcase these systems for future use by pre-servicing industrial areas for waste-heat recovery.

The Canadian Industry Program for Energy Conservation provides ideas for waste-heat recovery:

- Identify and eliminate as many sources of waste heat as possible.
- Reduce the temperature of the remaining waste heat.
- Inspect and maintain equipment to minimize the production of waste heat.

- Capture waste heat from clean waste streams that usually go up into the atmosphere or down drains, and pipe the waste stream to places it can be used.
- Use waste-process water as a heat source for a heat pump.
- Use the heat of the plant effluent in a wastewater treatment plant as a heat source for a heat pump.
- Re-use hot exhaust air for drying.
- Install automatic controls.
- Re-use heat from cooling hydraulic oil within molding machines and injection molds. (This also reduces the electrical load on the production process).
- Install waste-heat reclamation equipment (e.g. replace a cooling tower circulation loop with a shell-and-tube heat exchanger).
- Upgrade or replace outdated waste-heat reclamation equipment.
- Combine a flue gas heat recovery unit with a heat pump.
- Use an absorption heat transformer, which reclaims waste heat by using a solution of lithium bromide.
- Use a low-grade chiller, which can convert low-grade heat to spare cooling.
- Integrate a compact heat exchanger with other processes.
- In a large computer centre, capture generated heat by using thermal storage.
- Recover heat generated through refrigeration and upgrade the heat by using a heat pump.
- Consider converting high-temperature flue gas heat (e.g. from metallurgical furnaces) into superheated steam for electric power generation.

District Heating Systems generate heat in a centralized location for residential and commercial developments. They effectively reduce energy use, providing energy to heat water and buildings. District heating plants are more efficient and less polluting than localized boilers. The most common sources are plant burning fossil fuels, which involve a heat engine or power station to produce electricity and heat simultaneously, or a plant that utilizes biomass. Heat-only boiler stations and central solar heating are also viable options.

District Heating Systems employ water or steam to distribute heat through a network of insulated underground pipes until it reaches the consumer. Heat exchangers connect the network to the building's central heating. Water or steam in the district heating system does not mix with water in the consumer's central heating system.

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.

Over their lifetime, solar hot water systems pay for themselves and also help protect home or business owners from increasing energy costs. Efficient solar water heating panels can be uses for space heating and to heat water for in-building uses. When solar energy is used for space and water heating, it reduces the need to use fossil fuels for these tasks and thus reduces the release of GHGs into the atmosphere.

Solar water heating systems save energy by utilizing sunlight to heat water. Two types of solar water heating systems are active, which circulate water with pumps, and passive, which do not. Both systems require solar collectors and one or two well-insulated storage tanks. In one-tank systems the water is heated directly in a storage tank whereas in two-tank systems the water is preheated by solar collectors before storage in a conventional boiler. These systems can save owners 50-80% on their heating bills.

SolarBC provides information on solar hot water installations and incentives and cost benefits of installing such a system. They also provide lists of B.C. Solar Communities and registered installers of solar hot water systems.

For more information on this initiative, please visit the following:

- BC Hydro (www.bchydro.com)
- SolarBC (www.solarbc.ca)
- US Department of Energy (www.energysavers.gov)

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.

If plans are produced for energy efficient buildings the City should consider providing a rebate on building permit fees. Over a building's lifetime, energy efficient designs consume much less energy compared to standard building designs. To encourage construction of these buildings, give developers a rebate on the fees they pay for building permits.

Minimum requirements for fee rebates can be established from standards discussed in the previous section. Another option is a sliding rebate scale, with partial rebates for buildings that meet the LEED silver specifications, and full rebates for buildings that meet the LEED gold standard.

Provide Rebates on Renovation Permit Fees for renovations that meet the EnerGuide Requirements

Offer rebates to renovation permits that meet EnerGuide's standard for energy efficiency. Raise the minimum standard every year.

The City should also consider rebates for renovation permits, provided the renovation meets predefined standards. The EnerGuide requirements offer a good standard measure of a renovation's energy savings. EnerGuide audits are conducted before renovations, providing homeowners with valuable information about energy saving renovations that could suit their home.

The fee rebate could vary by each renovation's energy savings, or consist of a flat rate, dependent on a minimum energy saving requirement. To keep raising the standard of energy efficiency required by renovations, the minimum to receive a rebate should grow over time.

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. Langley's downtown core 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.

Mixed-land use developments combine residential space with other components such as retail, medical, community centres, education, entertainment, government services, and offices.

Smart Growth BC advocates mixed-land use. They assert that buildings containing both residential units and businesses produce vibrant communities of social and economical diversity. The environment benefits too - while people in sprawling neighbourhoods spend hours driving from place to place, residents in mixed-use buildings can shop and work close to home without relying on vehicles.

According to a recent report by Seattle-based Sightline Institute, the only cities within Metro Vancouver that received passing grades for implementing Smart Growth techniques, such as mixed use buildings, were the

City of Vancouver and the City of North Vancouver, two cities with no other way to accommodate their rising populations.

Sustainability Checklist

City staff can use a sustainability checklist to assess new building applications. Developments must meet City standards on the environment, economy, society, and culture.

Developers and their consultants designed a sustainability checklist to outline sustainability requirements for future projects. City staff can refer to the checklist when assessing building applications to help them evaluate sustainability criteria on a project-by-project basis. Applicants outline how their development meets a four-pillar model of sustainability: environmental, economic, social and cultural goals.

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.

Land use Bylaws within the City of Vancouver require that some new developments provide parking and shower facilities for cyclists. Since these facilities - showers, change rooms, lockers, and secure storage space for bikes - support this environmentally friendly mode of travel, the City should enact similar bylaws.

Vancouver's Parking bylaw (No. 6059, Section 6) requires short-term and long-term bicycle parking spaces in several areas:

- Residential units including seniors' housing.
- Health, educational and religious institutions.
- Cultural, recreational and sports facilities.
- Commercial developments (e.g. office, service, retail, industrial).

Vancouver's Parking Bylaw defines the characteristics of a suitable cyclist parking space (e.g. location, size, security and access features). Long-term spaces must be located in a separate room or a chain-link compound, and for non-residential users these long-term spaces must come with a minimum number of lockers. In a similar fashion, Vancouver's Building By-law (No. 6134) requires that non-residential developments include long-term bicycle parking spaces, along with a minimum number of washroom facilities.

Descriptions of sample Bylaws adaptable for use in the City are available in the Development Guidelines to Support Sustainable Transportation, provided by Transport Canada.

Encourage New Buildings to Meet LEED Standards

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.

The LEED program in Canada is run through the Canada Green Building Council, which has the goal of accelerating the move towards green buildings and communities in Canada. LEED is a third-party certification program and the LEED certification requires internationally accepted green building standards. The five key areas that LEED focuses on are:

- Sustainable site development
- Water Usage Efficiency
- Energy Efficiency
- Building Materials
- Indoor Environmental Quality

For more information on this initiative, please visit the following:

- Canada Green Building Council (www.cagbc.org/leed/what/index.php)

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.

BuiltGreen strives to reduce the impact the buildings we live in have on the environment. It is an industry sponsored initiative that currently provides a set of standards for British Columbia and Alberta. The BuiltGreen checklist incorporates building operation systems and materials, exterior and interior building finishes, indoor air quality and ventilation, water and waste management and business practices. The BuiltGreen program has seen great success and has enrolled 13514 homes to date.

For more information on this initiative, please visit the following:

- BuiltGreen Canada (www.builtgreencanada.ca)

II-III Land use and Urban Design

6.3.6 – Senior Government Policy and Programs

Regional Government

The Metro Vancouver Livable Region Strategic Plan

The Liveable Region Strategic Plan (LRSP) was adopted in 1996. Recognized under the Growth Strategies Act, the LRSP protects the natural environment around Metro Vancouver amidst substantial population growth. The plan has 4 main strategies: protect the green zone, build complete communities, achieve a compact metropolitan region, and increase transportation options. Metro Vancouver is currently developing a new Regional Growth Strategy to replace the LRSP.

The Livable Region Strategic Plan (LRSP) is a widely respected regional growth strategy with the goal of maintaining the high level of livability enjoyed in Metro Vancouver. The strategy was created as a way of managing the high level of growth expected in the Greater Vancouver region. The LRSP provides a framework for the planning processes undertaken by municipal governments in all member municipalities. The strategy aims to protect thenatural environment, through restricting greenfield development and providing transportation alternatives to the private vehicle

For more information on this initiative, please visit the following:

- Metro Vancouver (www.metrovancouver.org/planning/development/strategy/Pages/default.aspx)

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 multi-unit residential uses, the City is already encouraging neighbourhood intensification by allowing secondary suites in single family zones (i.e. RS1). Another way to intensify existing single family areas is permitting smaller single unit lot sizes, which helps accommodate growing populations while preserving the character of existing neighbourhoods. Intensification does not mean replacing all single family homes with multi-unit buildings. More high density development can be incorporated into existing neighbourhoods, allowing these areas to support better transit and non-auto transportation infrastructure. Much of Langley already contains multi-unit buildings, whereas other are mostly single-unit homes, particularly in the City's southern end.

Housing more people on less land alleviates the pressure to build on agriculturally productive land. This concept, often called eco-density, supports suitable densification in order to address climate change and reduce the ecological footprint of development. To avoid sprawling development, build within the urban containment boundary using mixed-use, transit and pedestrian friendly development styles, involving initiatives like energy aware landscaping, and passive solar heating. Apart from the environmental benefits of eco-density, the heating and cooling of such developments is efficiently controlled by district energy systems. Additionally, automobile

emissions are reduced in higher density areas, as residents can easily walk, cycle or use public transit to access local services.

Intensification doesn't only signify high-rises. Neighbourhood intensification is another valuable way to accommodate community growth, especially in single-family detached residential neighbourhoods. Permitting more secondary suites is one way to provide a wider range of housing options. Another way is to allow smaller single-family lots. During public education and outreach sessions, the City could ask the following questions about neighbourhood intensification:

- Should there be a requirement to rough-in a secondary suite, where appropriate, in new constructions?
- Should smaller single-family lots be allowed?

For more information on this initiative, please visit the following:

- Vancouver Eco-density (www.vancouver-ecodensity.ca)
- Smart Growth BC (smartgrowth.bc.ca)

Concentrate High Density and Commercial Areas on Major Transit Routes

The construction of dense residential areas near high frequency transit routes lowers the need for private vehicles (whereas high density developments built in transit deficient areas produce more commuters). Currently the City is encouraging high density residential and commercial buildings along transit routes converging on the downtown core. Utilizing the principles of transit oriented design (see the next initiative), this strategy provides pedestrians and transit users easy access to facilities.

Encouraging high density residential and commercial development along has been shown to decrease vehicle kilometres travelled and thus decrease greenhouse gas emissions from transportation. This is because having a large number of people near transit routes increases transit use, which can allow for higher frequency transit service eventually drawing even more riders. If commercial development is built along transit routes, residents will be able to use to run errands more easily without using a private vehicle.

An added benefit of locating commercial areas along transit routes is it gives transit users the ability to run errands on the way to or from a transit stop, thus reducing the need for a private vehicle. For example, if a resident who uses transit to commute to work is able to visit a commercial area located near a transit stop, it eliminates the need for this person to make another trip, potentially in a single occupant vehicle, to run errands.

Many older areas of Metro Vancouver, which developed around streetcar lines, benefit from already having this pattern of land use: apartments and retail outlets are located along major roadways that feature transit service, while single unit homes are located on nearby neighbourhood streets. Newer neighbourhoods, however, often feature commercial developments all on one location, not distributed through residential areas along transit routes. Changing the land use of an existing area is extremely difficult, but some relatively minor changes can help decrease the number of private vehicle trips in these areas. For example, when a area located on a transit route in a residential area is under review for redevelopment, the City should consider allowing some commercial space to be included provided it is developed under the principles of pedestrian and transit oriented design (see next initiative).

For more information on this initiative, please visit the following:

- Smart Growth BC (smartgrowth.bc.ca)

Encourage Pedestrian Centred and Transit Oriented Design

Avoid constructing new commercial areas centered on large parking lots. Instead, align commercial buildings along transit routes, with easy and direct pedestrian access to transit shelters. Providing parking on-street or at the back of buildings instead of the front de-emphasizes vehicle use. Additionally, on street parking becomes a buffer between pedestrians and traffic. In residential areas provide traffic calming measures such as pedestrian paths and crosswalks (especially in areas around transit stops).

The type of development in an area has a major influence on the proportion of people who walk, take transit or drive and therefore development style influences greenhouse gas emissions produced from transportation. Not surprisingly, areas that contain large amounts of parking, but which lack pedestrian and transit infrastructure have much higher numbers of people driving to them than areas which contain less parking, but have buildings and infrastructure designed to support pedestrians, cyclists, and transit users. The substantially higher greenhouse gas emissions produced in auto-centred areas relative to pedestrian centred areas illustrates the importance of decreasing vehicle use.

There are a variety of ways to promote walking, cycling, or taking transit to a destination. For example, when a building is situated with its main entrance way onto a sidewalk with infrastructure for transit users and cyclists located nearby, the prominence of non-auto transportation is increased; however, if the parking area is located nearest to a building entrance, more people will be encouraged to drive.

For more information on this initiative, please visit the following:

- Smart Growth BC (smartgrowth.bc.ca)

Decrease Distance Between Commercial, Residential, and Employment Zones

Ensure new residential, commercial, and employment areas are developed within a maximum allowable distance of each other (preferably walking distance). For built up areas, like the City of Langley, this means adding new uses to areas that are currently single use.

The City should establish a maximum allowable distance for new residential developments can be from commercial areas. From the maximum distance residents should be able to access commercial areas without a vehicle. For example, mixed neighbourhoods use fewer fossil fuels because community members are able to access many services by walking, cycling, or public transit. These neighbourhoods are extremely liveable since residents without vehicles can still access commercial services easily. For areas that are already built up, this can mean placing restrictions on increases in density for areas too far from commercial centres unless some commercial facilities are provided as part of the new development.

For more information on this initiative, please visit the following:

- Smart Growth BC (smartgrowth.bc.ca)

Continue to Support Mixed Use Neighbourhoods in the Downtown Core

Fusing residential and commercial sectors into mixed-use developments benefits the community and the environment. Instead of driving, residents in these developments usually access services in their neighbourhood by walking, biking, or taking transit because commercial and employment areas are close by. Consequently, mixed-use land improves transit services, lowers traffic congestion, and tightens the sense of community. These neighbourhoods feature a range of housing densities, typically higher along major transit routes, with retail establishments at ground level and either residential or office space on upper floors.

Combining residential and commercial sectors in the same developments can benefit the City and the environment. Mixed-use developments tend to be higher in density, and as a consequence quite pedestrian friendly. Since many services are within walking distance, residents do not rely as much on vehicles in their daily lives, which leads to less demand for parking, better transit services, and a reliable core of customers guaranteed for local businesses (e.g. grocery stores).

Areas that are already mostly built-up can still take advantage of this initiative. For example, areas that are currently single use, such as strip-mall commercial area, can be gradually replaced with mixed-use centres containing a mix of retail, service, institutional, business and residential uses.

For more information on this initiative, please visit the following:

- Smart Growth BC (smartgrowth.bc.ca)

Decrease Distance to Commercial Locations

Reduce vehicle use and increase non-auto trips by encouraging commercial developments close to residential areas and public transit. In large areas of residential zoning, look for opportunities that offer commercial space (preferably on a public transit route). Aim for less than 10 minute's walk to a commercial area from all parts of the City. This will reduce a resident's dependence on vehicles, as well as traffic congestion and associated CO_2 emissions. A popular way to introduce commercial uses to lower density neighbourhoods is neighbourhood commercial buildings (see next initiative).

Support the development of communities that are not automobile dependent in order to lower emissions and traffic congestion. Provide easy access to public transit for work, recreation and school, by building commercial centres close to transit nodes and residential neighbourhoods. Similarly, situate pedestrian friendly commercial developments close to population centres, and prevent retailers from establishing on local government boundaries to avoid zoning bylaws.

A decrease in driving distance to commercial locations can be achieved either through zoning new commercial regions, preferably along major transit routes, and through promoting neighbourhood commercial buildings (i.e. corner stores; discussed in the next initiative). It is most effective to ensure a minimum distance to commercial centres is achieved when an area is first developed; however, it is still possible to in-fill residential areas with some commercial zones. A common way this type of in-fill can be achieved is by utilizing the principles of mixed-use development (discussed above) to allow for retail on the ground level of new residential buildings.

Note: This initiative is linked to City densification policy.

For more information on this initiative, please visit the following:

- Smart Growth BC (smartgrowth.bc.ca)

Consider Neighbourhood Commercial in Appropriate Locations

Neighbourhood commercial developments - typically small scale retail outlets like corner stores or coffee shops - can be incorporated in multi-unit buildings with residential units above. These developments are essential for decreasing private vehicle use, allowing residents to run small errands by foot. Additionally, for transit users neighbourhood commercial outlets are often located on the way home from the bus stop, eliminating the need for an additional trip. These small scale developments offer the convenience of nearby commercial areas without compromising the character of single unit neighbourhoods.

Neighbourhood commercial buildings, such as corner stores, used to be commonplace in almost every residential area, especially those not within walking distance of an established town centre. The prevalence of corner stores and other neighborhood commercial buildings has decreased with increasing automobile usage and many new residential areas lack residential commercial buildings completely. In many cases, gas station convenience stores have replaced corner stores. Gas station convenience stores are often located in areas that are not easily accessed by pedestrians or cyclists and thus tend to serve only automobile users and do not help reduce auto trips. Allowing for existing corner stores to also have a café component is a good way to help these smaller neighbourhood facilities compete with large grocery stores and gas station convenience stores.

Increasing the number of neighbourhood commercial buildings that are easily accessed by pedestrians and cyclists can help reduce VKT as residents will be able to utilize these neighbourhood facilities easily without using a car. Neighbourhood commercial facilities are often most effective when located near transit routes, bike routes, or areas with heavy pedestrian traffic, such as parks.

II-IV Community Transportation

There are 5 broad categories which the City can focus on to reduce greenhouse gas emissions in the transportation sector:

- Local Improvements – Improve transportation infrastructure to reduce the distance vehicles travel. This would significantly reduce greenhouse gas emissions.
- Sustainable Transportation – Reduce vehicle use in favour of sustainable transportation such as cycling, walking, public transit. As a reduction measure, sustainable transportation relies on behavioural changes,

and individuals must recognize the associated health, social and financial benefits. Incentives from employers, schools and government would also support these efforts.

- Infrastructure – Support the implementation of government policies and regulations that will improve the quality of neighbourhoods for pedestrians, residents and businesses.
- Energy Efficient Transportation – Re-evaluate vehicle type, vehicle use and vehicle operation. Residents and businesses must also take on fuel-efficient driving and maintenance habits including trip reductions through route planning.
- Technological Change – The price and security of fuel and fuel supply are causing rapid technological change in the automotive industry. The a significant reduction in GHG emissions in the transportation sector may be the plug-in hybrid electric vehicle (PHEV), followed quickly by the electric plug in vehicle (EPV).

These general categories have been taken into consideration when determining reduction initiatives. The reduction initiatives are categorized by the level of government responsible for them and the type of transportation they affect.

6.3.7 – Senior Government Policy and Programs

Changes in the type of local transit infrastructure being built can cause a substantial decrease in fuel use and associated greenhouse gas emissions. Increasing the proportion of people who use public transit, cycle or walk to get to their destinations has a dramatic effect on emissions.

Provincial Government

Tailpipe Emissions Standards

Support the forthcoming provincial and federal proposals for tailpipe GHG emissions standards (see page 26 for more information). Currently both the federal and BC provincial government have proposed GHG emissions standards. The provincial standard has been incorporated into the forecast.

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 greenhouse gas (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.[1] The federal government has also recently outlined a GHG emissions standard that is 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. Taking into account the proposed emissions standard 2017 emissions for the on-road transportation sector will be approximately 78,000 tonnes of CO_2e.

Proposed Provincial Tailpipe Standard Implementation

Model Year	Fleet Average Greenhouse Gas Emissions (grams per mile CO_2e)	
	Passenger Vehicles[1]	Light Trucks[2]
2011	267	390
2012	233	361
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

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

California "Pavley II" Tailpipe Emissions Standards

Support senior government efforts to 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.

California's is current proposal to implement phase II tailpipe emissions standards that would require even stricter emissions controls on passenger vehicles model year 2017 and later. These stricter emissions standards would rely heavily on the adoption of electric plug-in vehicle technology. Since the community target year is 2017, this initiative will have a small effect on the overall reduction quantity

Proposed "Pavley II" Emissions Standard

Model Year	Fleet Average Greenhouse Gas Emissions (grams per mile CO_2e)	
	Passenger Vehicles[1]	Light Trucks[2]
2017	195	310
2018	185	285
2019	180	270
2020	175	265

New Renewable Fuel Regulations Standard

Implement BC provincial Renewable and Low Carbon Fuel Requirements Regulation. This reduction initiative is included in the forecast.

The Renewable and Low Carbon Fuel Requirements Regulation (RLCFRR) will reduce British Columbia's reliance on non-renewable fuels, help reduce the environmental impact of transportation fuels and contribute to a new, low-carbon economy.

The RLCFRR provides a regulatory framework that enables the Province to set benchmarks for the amount of renewable fuel in B.C.'s transportation fuel blends, reduce the carbon intensity of transportation fuels and meet its commitment to adopt a low-carbon fuel standard. This legislation further supports British Columbia's goal to lower provincial greenhouse gas (GHG) emissions by 33 percent by 2020.

The RLCFRR will help diversify B.C.'s transportation fuel supply, decrease GHG emissions and establish a market for low-carbon fuels by:

- Encouraging suppliers to determine how best to meet the requirements in accordance with consumer demand and market forces;
- Reducing reliance on non-renewable fuels; and
- Enabling requirements that encourage emerging cleaner fuel technologies.

The RLCFRR will reduce the carbon intensity of transportation fuels through two major requirements:

- the Renewable Fuel Requirement (5 percent renewable content in gasoline beginning in 2010 and 3 percent renewable content in diesel in 2010, 4 percent in 2011, and 5 percent for 2012 onward); and
- the Low Carbon Fuel Requirement (10 percent reduction in carbon intensity by 2020).

For more information on this initiative, please visit the following:

- Ministry of Energy, Mines and Petroleum Resources (www.empr.gov.bc.ca)

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.

Replace driving with active transportation to better the environment and community. Decreased vehicle use leads to fewer greenhouse gas emissions and cleaner air, as well as financial savings on gas. But perhaps even more importantly, children who walk or bike to school get some exercise, become healthier, and generally feel more energized.

Successful initiatives require collaboration with stakeholders in the community, and must address the barriers affecting transportation choice, such as a lack of pedestrian infrastructure near schools.

This reduction initiative can also be categorized as behavioural change. It is listed as a stand-alone initiative because the target audiences are public and private schools throughout the community.

6.3.8 – Local Government Policy and Programs

Increase Vehicle Fuel Efficiency

Implement Responsible Automobile Ownership Education Program

Encourage responsible driving (e.g. carpools, obeying speed limits, planning efficient routes) and vehicle maintenance (e.g. maintain proper tire pressure).

Right Sizing Vehicles

The City of Langley should promote fuel efficient vehicles and set objectives to raise the average for fuel efficiency.

Reduce the Use of Single Occupant Private Vehicles

There are several ways to reduce the distance vehicles travel. For example, promote carpooling networks and car-share cooperatives, and set goals to reduce the volume of fuel sales.

- Encourage trip reduction measures such as vanpool and rideshare programs, employer trip reduction programs, car-share cooperatives, and distance travelled reductions.
- Set goals to reduce per capita vehicle kilometers travelled (VKT) by 10% by the 2017 target year.
- Reduce VKT by vehicle type (e.g. heavy trucks, light trucks, multi-passenger vehicles, single-passenger vehicles, etc.).
- Calculate VKT reductions by vehicle type to prevent higher VKT for heavily polluting vehicles.
- Reduce total fuel volume sales throughout community (policy or global objective only implemented if appropriately tracked).
- Reduce distances travelled through mandatory or voluntary measures (e.g. online carpool networks) among employers, cities and regional districts.

Promote Car Free Days

To educate people about alternative transportation, support car free days and other initiatives such as corporate bike and walk to work programs. Car free days offer the community the chance to experience less traffic. The one-way section of the Fraser Highway provides a good venue for a possible car-free day.

The purpose of car free days is to educate residents on the benefits of alternative forms of transportation, such as taking transit, walking or cycling. These events prompt residents to consider more sustainable transport options while drawing attention to facilities that need improvements and/or maintenance (e.g. public transit). Walk or bike to work campaigns have succeeded across Canada, but in order to keep people engaged in these events, long-term incentives are necessary.

Co-Operative Auto Networks

Encourage people to join co-operative auto networks. For a small monthly fee members can borrow a range of vehicles, from mini-vans to pick-up trucks, from locations in various parts of town. There are currently no car-sharing companies in the City of Langley.

Individuals who join co-operative auto networks, are car co-ops, pay a small monthly fee to have shared access to automobiles. Members borrow vehicles that are located in accessible places around the City, and pay by the hour or kilometre, depending on the auto network. Members can choose from a large selection of vehicles depending on the task. Car co-ops typically use fuel-efficient, well-maintained vehicles ranging from SmartCars to mini-vans and pick-up trucks. Members of car co-ops generally spend less on transportation, since they also frequently use alternative forms like cycling or transit. Enrolment for one auto network, Zipcar, has tripled from 2006, with 66% of their members intending to either sell their personal vehicle or not buy one at all. Of these new registrants, 40% have joined as a direct result of rising fuel prices.

Note: This initiative is linked to CAEE new buildings policy.

Shared Parking

To lower the demand for parking spaces, encourage people to drive responsibly by car-pooling, using environmentally friendly vehicles, and sharing parking spaces with commercial vehicles in mixed-use neighbourhoods. Also limit available parking by lowering the minimum requirement to 1 space per unit in all new developments.

Limit parking availability and promote shared parking in mixed-use areas. Shared parking lowers the demand for parking spaces. These arrangements often work because the same parking spot can be used by a resident's vehicle at night and a commercial vehicle during the day.

Offer incentives for responsible vehicle users, such as discounts for car-poolers or environmentally friendly vehicles (e.g. vehicles that do not use fossil fuels, or vehicles meeting strict standards for emissions reductions).

Limit parking availability by lowering the minimum parking requirement to one space per unit in all new developments. Furthermore, to ensure communities are pedestrian friendly, reduce the minimum parking required by zoning regulations. On street parallel parking can both minimize parking requirements and function as a protective barrier between pedestrians and traffic. On street parking areas could also give priority to car-poolers and/or fuel-efficient vehicles.

Note: This initiative is linked to CAEE new buildings policy.

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

Initiatives that alert people to their driving habits can reduce private vehicle use and highlight alternative forms of transportation. Consider displaying parking costs where they are hidden. For example, in new residential buildings encourage selling parking spaces individually rather than bundled with the price of the unit. Additionally, charge for parking directly in areas with hidden parking costs (e.g. free parking on City-owned lots) and use the revenue to lower local business tax.

There are a number of ways to reduce vehicle use. Ensure that vehicle owners pay the full costs of services used. Limiting the amount of parking available and charging for public parking will ensure taxpayers are not subsidizing vehicle owners by offering free parking on municipal land, and may also encourage vehicle owners to use other forms of transportation. Parking revenues can be reinvested into alternative transportation infrastructure.

Additionally, taxation rates can vary according to vehicle ownership. For example, households with below average vehicle ownership and businesses with fewer employees commuting by S.O.V. could have a lower tax rate than households and businesses with above average usage. To reflect the extra traffic generated, businesses with more parking than the City requires could pay higher taxes. Such businesses could pass on this fee to vehicle users via paid parking. Implementing these cost incentives would likely cause people to consider alternative transportation methods.

The City can lobby the province to include variable "pay-as-you-drive" insurance rates, where motorists pay for insurance based on how much they use their vehicle, providing an incentive to avoid vehicle use, when practical.

Develop and Implement a Transportation Demand Management Plan

Develop a Transportation Demand Management Plan that incites people to review their driving habits, encouraging alternative transportation methods like walking, biking, or taking transit to work.

The Transportation Demand Management Plan contains incentives for alternative forms of transportation. One way to implement the plan is by offering free transit passes for a month to various residents or to employees of different companies. The City should also support events like "bike to work month" and sponsor community events that promote sustainable transportation (e.g. free bicycle maintenance programs). Another way to encourage alternative transportation is to generate materials about cycling and public transit routes, and hand them out to the employees of local businesses.

Increase the Use of Public Transit

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.

Encourage new buildings to feature public transit and pedestrian areas more prominently when issuing building permits. Many buildings currently have their main entrance onto a parking area, with the nearest transit stop a long distance away and difficult to access. This design can make it difficult to use public transit, particularly for those with mobility difficulties. Access to a public transportation should be a consideration for all new buildings. In addition to improving access to transit stops, new buildings should include an entrance that opens on to a city sidewalk and has bicycle parking nearby, instead of providing the main entrance on to a vehicle parking lot.

Public Transportation Shelters

The City should promote the construction of appealing facilities to encourage transit use by all members of the community. Well lit shelters with level pavement, adequate space for wheelchairs, and simple route information are ideal.

A deterrent for taking public transit for many people is waiting for the bus in poor weather conditions. Well built public transit shelters can go a long way to making it more pleasant to wait for the bus in poor weather conditions. Shelters should be well lit and protect transit users from the weather. It is also important to ensure transit shelters are easily accessible to people with mobility difficulties. The City should work with TransLink to ensure that route and schedule information is available at all transit shelters and continue to improve public transit shelters. The City should concentrate on ensuring all major routes, especially those that serve commercial areas, have public transit shelters, the next priority should be building transit shelters in residential neighbourhoods. The construction of transit shelters is an initiative that gives the City considerable ability to improve the attractiveness of public transit to residents.

Public Transport Vouchers

Large companies can offer employees monthly transit passes or a cash allowance to use on public transit. A successful program in Washington, D.C. 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 promoting alternative transportation.

Companies can reduce vehicle usage by offering their employees subsidized parking, a cash allowance intended for transit, or by simply handing out monthly transit passes. These are tax-deductible business expenses. A similar program in Washington D.C. enjoyed substantial success, when in 1993 they started giving private and public sector employees discounted transit passes. Eventually all federal agencies were required to give vouchers to employees, and today a total of 138 large private sector firms (with a minimum 100 employees each) participate in the program. Over a 3 year period this program resulted in an estimated 27,221 fewer daily vehicle trips, the equivalent of over 675,000 kilometres. Thanks to this program 4,600 tonnes CO_2e are prevented from entering the atmosphere every year.

Though these kinds of initiatives work for large companies, they are more difficult for smaller organizations to implement. For example, discounted transit passes are only available for medium or large companies. No such

incentive exists for smaller companies. However, a Transport Management Association (TMA) could bring several smaller organizations together to develop alternative transportation incentives. Also, when developing transit plans for a region, TMAs could be a valuable contact for regional transportation authorities.

Note: Though reduction amounts from this initiative are small when considered for municipal employees only; however, the City could lead by example, with greater reductions possible if more companies follow suit.

Identify Senior Government Grants for Transit Improvement Projects

Start a fund for transit improvement projects and investigate infrastructure grants from senior governments. For example, identify grants that can fund transit priority measures and upgraded transit shelters.

The City should consider starting a fund in order to finance alternative transportation projects. (Legislation allowing such a fund is in Bill 27). First, the City must determine what types of large transportation projects would be eligible for funding, for example working with the province and TransLink to construct light rail transit systems or continue with public transit expansion. As many of these projects would be otherwise unaffordable, the City should lobby for federal and provincial grants to help with funding.

The City could allow developers to build fewer parking spaces, and in exchange contribute financially to a fund for public transit infrastructure. A minimum contribution sum should first be established.

Work with Senior Governments to Improve Regional Transit

The provincial government is currently researching options for improving transit connections to the Fraser Valley. The City is a partner in TransLink's ongoing Surrey Rapid Transit Alternatives Analysis Study. TransLink is investigating options for extending rapid transit further into Surrey and eventually Langley. Discussions currently involve RapidBus systems and various rail systems. Work with senior levels of government, TransLink, and the Township of Langley, on future plans to expand rapid transit service to the City of Langley, on an existing or new route through the City. While a medium term solution, rapid transit can greatly reduce private vehicle use, which is essential for the City to meet reduction targets.

Regional transportation is the responsibility of senior governments; however, the City has a role to play in lobbying for better regional transit connections and supporting senior governments in improving regional transit connections. Rapid transit in B.C. is currently confined to Vancouver and its inner suburbs, however, the province intends to dramatically increase public transit use through better service and rapid transit expansion.

The City should continue to identify areas where rapid or regional transit could be improved and work with senior governments to expand or introduce service in these areas. Both RapidBus and light rail systems are candidates for regional transportation. Rail systems can be more expensive, but also attract a much higher ridership than bus systems. Identifying opportunities to improve regional transportation is important, as local transit improvements become more effective when combined with regional transit improvements.

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 transit routes located on congested roadways. Find other ways to increase transit priority, such as installing "bus bulges" where transit buses cannot easily merge into traffic.

One way to make public transit more attractive is to make it competitive with private vehicles in terms of travel time. Transit priority measures separate transit vehicles from traffic or give transit vehicles priority at traffic signals. When transit vehicles are not forced to sit in traffic their on-time performance is also improved, attracting additional riders. The City needs to work with TransLink to identify what transit priority measures, if any, should be introduced. Creating "bus bulges" at stops where buses have difficulty pulling into traffic can improve travel times as well as provide space for transit infrastructure, such as expanded bus shelters (as discussed in the " Public Transportation Shelters" section). H.O.V. lanes, transit priority signals, and bus bulges are already in use in many municipalities around Metro Vancouver.

Develop and Maintain a Comprehensive Transit Plan

Continue to work with TransLink on the South of Fraser Area Transit Plan, which will address public transit issues that are under the City's jurisdiction. The plan should include methods for increasing public transit's reliability and appeal to the community.

Collaborate with TransLink and the community to develop a comprehensive plan for a complete transit network. This plan should identify transit routes and then ensure that city infrastructure nearby (such as traffic signals, crosswalks, and transit shelters) makes public transit as a reliable and safe option as possible. This means ensuring transit stops can be safety accessed from all areas they are intended to serve, such as adjacent commercial shopping centres. For example, transit stops should always have sidewalk access and should be located near crosswalks or pedestrian signals.

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 over road expansion projects, and plan to use more transportation funding on public transit projects. Investigate the potential to extend transit service hours, routes, and frequency. Figure 4.13 illustrates areas of the city that lack access to public transit (for mapping purposes, "transit access" was defined as areas within 400 metres of a transit route, a distance often used by TransLink in planning transit services).

Many of the transit initiatives discussed in this section require working with senior governments and TransLink. While there is a substantial number of initiatives the City can undertake without help from senior governments, it is essential that the City continue to support transit improvement projects undertaken by the provincial government and TransLink. The City should take an active role and request transportation funding destined to be spent within its borders goes to transit, cycling and pedestrian infrastructure improvement ahead of road expansion projects. The ability of a project to reduce VKT should become an increasingly important consideration for future transportation investments.

Encourage Walking and Cycling

Encourage Enhancement of Pedestrian facilities

Many successful examples of pedestrian enhancements can be found in Langley's downtown core, however, other areas of the City often lack these facilities. For example, narrow road intersections shorten the length of crosswalks and encourage active transportation. Multi-modal street designs include traffic calming and interconnected streets. Traffic calming has successfully reduced traffic congestion, speeds and accidents. Planners, engineers and community residents can engage in street design initiatives, such as planting trees or cultivating green spaces along sidewalks, or integrating car-free zones in new developments.

Street layout has a big effect on the number of people walking and cycling and thus average VKT. Areas with many curved or cul-de-sac streets are typically associated with much higher automobile usage than areas with a continuous street network composed of small blocks. Obviously there are limited opportunities to modify existing street networks in areas that have already been built up; however, there are a variety of ways to enhance road infrastructure to help encourage more cycling and walking.

The City should identify areas where connecting pathways for cyclists and pedestrians can be built. Additionally, building crosswalks or pedestrian signals in locations where a major roadway cuts through what could otherwise be a good cycling or walking route can help create a better cycling and walking network. When large areas are being redeveloped, locations where pathways can be built should be identified. The City should work with the local community to identify areas where pedestrian and cyclist flow can be improved.

Traffic calming measures such as curb extensions, traffic circles, and raised crosswalks can make it safer to be a pedestrian or cyclist. The City should continue to identify areas where traffic calming can help improve routes for cyclists and pedestrians.

For more information on this initiative, please visit the following:

- BC LocalMotion (www.localmotion.gov.bc.ca)
- Smart Growth BC (www.smartgrowth.bc.ca)

Improve Cycling Infrastructure

Improve conditions for cyclists by investing in bicycle lanes, signals, bike racks, and recognizing cyclists at left turn lanes. Examine opportunities for expanding bike lanes and parking, and building off-street bicycle routes. Traffic calming and interconnected streets also enhance cycling conditions.

Cycling is one of the best ways to get around without producing GHG emissions. The City should continue to invest in infrastructure to support cyclists. Building bike lanes, including bicycle turning lanes and "bike boxes" for left turns, are good ways to encourage more people to bike to their destination. Building off-street bicycle routes helps attract cyclists who are uncomfortable riding in busy traffic. The City should also consider how other infrastructure projects affect cyclists and should avoid building projects (such as vehicle turning lanes) in such a way that they make it more difficult or dangerous to cycle.

Bicycle parking is essential to attract people to cycle for trips they would otherwise use a vehicle to take. Bicycle lockers are safe locations for cyclists to store their bike for long periods. On-street locations for cyclists to lock-up their bikes should be provided in high visibility locations to help reduce bicycle theft. It is important to note that there is a wide variety of factors that make it easy or difficult to cycle. These factors include the availability of bicycle parking, the number and connectivity of safe cycling routes, and the degree of traffic calming in the area. If only some of these factors are addressed, or if cycling infrastructure is missing along parts of a route, the City will fail to attract a substantial number of cyclists.

For more information on this initiative, please visit the following:

- BC LocalMotion (www.localmotion.gov.bc.ca)

Develop and Maintain a Comprehensive Non-Auto Transportation Plan

Work with TransLink, the Township of Langley, and the City of Surrey to incorporate non-auto transportation into the South of Fraser Area Transit Plan. Alternatively, develop a separate plan that includes non-auto mode transportation but not transit and automobile modes. The plan should contain maps that outline walking and biking routes to busy city centres, coupled with ways to enhance the safety of these routes. Due to the larger distances between municipal centres around Langley (relative to other parts of Metro Vancouver), provide options for including public transit in a multi-modal transportation network (e.g. work with TransLink to ensure bike lockers are available at major transit exchanges and stops).

Collaborate with Metro Vancouver, TransLink and neighbouring municipalities to develop a comprehensive plan for multi-modal transportation. This plan should illustrate safe routes for pedestrians and cyclists to commercial and employment centres. A "safe" route may require bike racks, signal crossings at busy intersections, and dividers to separate pedestrian, cyclist, and automobile traffic.

This plan should also ensure that the City continues to work with neighbouring municipalities to provide continuous routes for non-auto transportation users, particularly cyclists. Specifically, this means ensuring bike routes and sidewalks do not end when the reach a municipal boundary.

For more information on this initiative, please visit the following:

- BC LocalMotion (www.localmotion.gov.bc.ca)
- Smart Growth BC (www.smartgrowth.bc.ca)

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.

Support TransLink and the provincial government in their effort to build more cycling and pedestrian infrastructure. TransLink recently completed the Central Valley Greenway from New Westminster, through Burnaby to Vancouver. The City should support TransLink in building a regional cycling network.

The City should also lobby senior governments for increased funding for regional non-auto transportation projects. Additionally, the City should continue to seek grants to improve its own cycling network and construct sidewalks on routes where there currently are none.

Identify Grants for Non-auto Transportation Projects

Start a fund for non-auto transportation projects. The City should consider grants to provide cycling infrastructure and for pedestrian improvement projects, such as upgrading pedestrian crossings and building sidewalks on underdeveloped routes.

The City should consider starting a fund in order to finance alternative transportation projects. (Legislation allowing such a fund is in Bill 27). First the City must determine what types of large transportation projects would be eligible for funding, for example traffic-separated bikeways, pedestrian pathways, sidewalks etc. As many of these projects would be otherwise unaffordable, the City should lobby for federal and provincial grants to help with funding.

The City could allow developers to build fewer parking spaces, and in exchange contribute financially to a fund for non-auto transportation. A minimum contribution sum should first be established.

For more information on this initiative, please visit the following:

- BC LocalMotion (www.localmotion.gov.bc.ca)

6.3.9 – New Technology

Public Transit

Evaluate New Public Transit Types

A new spin on old technology - modern streetcar systems (at grade light rail transit) are growing more popular in North American cities, surpassing buses in ridership. This is partly because streetcars cost less than other rapid transit types. Vancouver successfully ran a demonstration streetcar line during the 2010 Olympic games using vehicles on-loan from Belgium, where, like many European cities, such systems are commonplace. The Province is currently considering transit expansion to the Fraser Valley through Langley.

Rail-based public transit was once very common in Vancouver and the Fraser Valley, including streetcar systems, the interurban electric railway, and passenger trains. Modern streetcar systems and commuter rail are being expanded or re-introduced in many North American cities. For example the City of Portland has recently begun rebuilding its streetcar and expanding light rail service with great success. The City of Vancouver's demonstration line during the 2010 Olympic Winter Games also experienced higher than expected ridership.

An extension of any rail-based system to the City would be primarily an initiative of TransLink and the provincial government. Both TransLink and the provincial government are currently studying options for expanding transit in the South of Fraser Region. The City should investigate how different transit technologies would be implemented within its borders and monitor progress on extending rapid transit further into the Fraser Valley. The City should support transit technologies that are able to draw high ridership numbers in order to reduce GHG emissions from transportation.

For more information on this initiative, please visit the following:

- Vancouver Streetcar (vancouver.ca/ENGSVCS/transport/streetcar/index.htm)

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 shorten a red light at intersections. Transit priority technologies are most effective on major transit routes that operate on congested roads. Potential areas in Langley for this system are along Fraser Highway and 200th street. Transit priority measures can also be studied on routes near the Langley Centre transit exchange.

Work with TransLink to Implement Real- time Transit Technologies

Real-time transit technologies, such as the NextBus system being tested by TransLink, tell transit users when the next bus will arrive through a display located at major transit stops. Investigate the potential for installing this system at major bus stops within the City. Bus stops at transit exchanges, such as the Langley Centre transit exchange, are good candidates for real-time transit systems. Also major routes like the #502 could potentially benefit from such a system.

Real-time transit information systems are an increasingly popular new technology that enables transit users to get up to date information about when their bus will arrive using information provided by GPS systems already installed in many buses. TransLink is working on implementing such a system in Metro Vancouver, and experimented with testing this service, known as NextBus, along Main Street in Vancouver. The City should monitor the results of pilot projects for real-time transit information systems, and work with TransLink to implement such systems on major routes if the technology proves appropriate.

Private Vehicles

Require infrastructure for Plug-in Electric Vehicles

The development of electric plug-in vehicle will greatly reduce GHG emissions. In the near future the City should require infrastructure for plug-in electric vehicles, as developers need lead time before these vehicles are released into the mainstream market (3-5 years).

Two major factors that push for technological change in the automotive industry are escalating fuel costs and ongoing uncertainty over the security of global fuel supplies. The greatest reduction in greenhouse gas emissions from personal vehicles will almost certainly come from replacing fossil fuel powered vehicles with electric vehicles. The plug-in hybrid vehicle (PHEV) will be introduced first, followed by the electric plug-in vehicle (EPV).

In the transportation sector, the electric plug-in vehicle will be responsible for massively reducing greenhouse gas emissions. Although electric vehicle technology is developing rapidly, it will still be 3-5 years before these vehicles are introduced to the mainstream market.

The influence of plug-in vehicles was excluded from the City's target calculation, as the target is 2017, and the release of electric vehicles is uncertain. However predictions on the anticipated emission reductions for this new technology are provided.

II-V Solid Waste

6.3.10 – 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. Program suggestions include more recycling, backyard and food waste composting, and education for all members of the community. Achieving this target requires collaboration between the City of Langley and Metro Vancouver.

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.

Though Metro Vancouver is mainly in charge of the City's solid waste initiatives, the City can help by making solid waste collection more efficient, and supporting region-wide education programs.

Today Metro Vancouver redirects about 50% of waste from landfills into recycling programs, but initiatives like the Zero Waste Challenge are expected to raise that percentage.

The Zero Waste Challenge involves the following programs:

- Residential recycling
- Backyard composting
- Yard waste collection and drop off
- Disposal bans
- Extended Producer Responsibility (EPR)

- Food waste composting
- Recycling pilot projects
- Education
- Concrete, asphalt and gypsum recycling

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 the need for 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 its Solid Waste Management Plan.

Waste-to-Energy plants divert municipal waste away from landfills, which prevents the release of methane into the atmosphere. These plants also lower transportation emissions, as the waste travels a shorter distance to waste-to-energy facilities than to landfills. Metro Vancouver intends to build at least one waste-to-energy facility before long, and once their Solid Waste Management Plan is published more information on future facilities will be available.

Metro Vancouver supplies all member municipalities with greenhouse gas estimates from solid waste. Metro Vancouver's Zero Waste challenge does not include quantified reduction initiatives, but a 70% diversion rate would mean significant reductions from the base year quantity.

For more information on this initiative, please visit the following:

- Metro Vancouver (www.metrovancouver.org)
- Natural Resources Canada (www.nrcan-rncan.gc.ca)

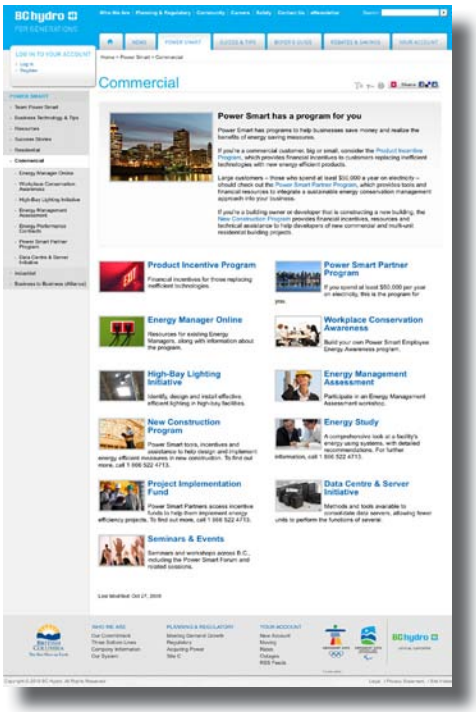
6.3.11 – Local Government Policy and Programs

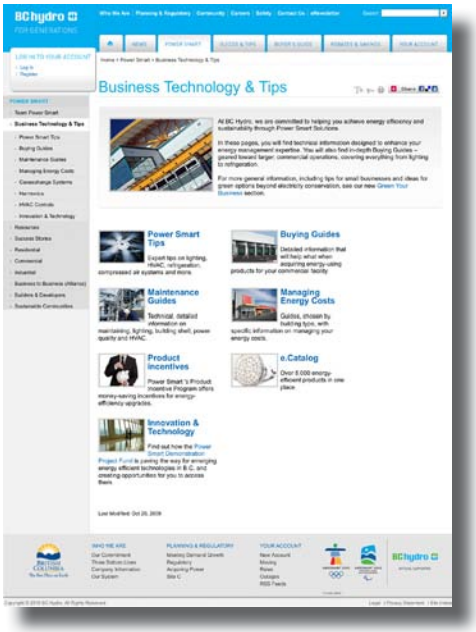
New Waste Collection Policy

Adopt a new waste collection policy aimed at reducing the amount of garbage entering landfills. Improvements include increasing recycling bin capacity, supporting single-stream recycling and collecting kitchen and yard waste. This initiative supports the Zero Waste Challenge.

Waste sent to landfills produces GHG emissions when breaks down (through the release of methane) and thus reducing the amount of waste sent to landfills helps reduce GHG emissions. The City can support programs that help reduce the amount of waste sent to landfills by increasing the recycling bin capacity for curb side pickup, and investigating the potential to implement collection of kitchen waste with yard waste

BC Hydro's Website Provides Businesses with Tips on How to Save Power





All tips provided by BC Hydro, see www.bchydro.com for more information and PowerSmart awareness materials

From http://www.bchydro.com/powersmart/commercial.html

A Few of BC Hydro's Tips For Saving Energy:

Turn off Monitors

- Turning off one monitor saves 500 kWh/year.
- 1000 monitors turned off saves enough electricity to light about 280 homes each year.

Turn off Photocopiers

- Turning off one photocopier saves 1,294 kWh/year.
- 1000 photocopiers turned off saves enough electricity to light about 720 homes each year.

Turn off chargers

- Turning off five chargers when not in use saves 54 kWh/year.
- If 5,000 households turned off their chargers, the energy saved could provide lighting to about 150 homes each year.

BC Hydro Suggests 6 Steps to Reducing Energy Use in Your Business:

Step 1 – Establish a clear vision

Step 2 – Create the team

Step 3 – Know your workplace

Step 4 – Develop your communications plan

Step 5 – Implement your plan

Step 6 – Recognize and reward

Terasen Gas Suggests Ways for Businesses to Reduce Their Energy Costs

All tips from www.terasen.com. Visit Terasen's website for a more comprehensive list of energy saving tips

From http://www.terasengas.com/Business/SavingEnergy/EnergySavingTips

Energy Saving Tips from Terasen:

Building Upgrades

- Check insulation levels when refurbishing and upgrade to current standards where possible.
- Draft-proof windows and doors with weather-stripping.
- Install double-glazed windows.

Water Heating

- Make sure tank-type heaters are part of your annual maintenance schedule.
- Think about changing tank-type heaters to boiler/storage tank combinations for major cost and energy savings
- Insulate all hot water pipes in the boiler room and any running through unheated areas such as parkades. Make sure that valves and flanges are insulated.

Visit Terasen's Website at www.terasen.com/Business and click on 'Saving Energy' to learn about their Energy Assessment Program

APPENDIX III PUBLIC CONSULTATION MATERIALS

Open House

Community Energy & Greenhouse Gas Emissions Plan

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

The City of Langley is committed to addressing issues of climate change by implementing policies and programs on sustainable community development, energy efficiency and conservation, and reducing greenhouse gas (GHG) emissions.

The City would like to hear your ideas on making our community more energy efficient at an upcoming open house. We're encouraging residents to attend the open house to learn more about actions we can take locally. This is your opportunity to comment on the City's strategy to reduce energy consumption and GHG emissions.

What will be presented at the Open House?

- Current energy usage and GHG emissions in the City of Langley.
- The forecast for future energy use and GHG emissions expected over the next several years.
- Potential ways that the community of Langley can reduce its GHG emissions.
- A questionnaire related to the City's Plan will also be presented. The survey can also be found at:

  www.city.langley.bc.ca/sustainability.htm

Date: Thursday, April 22, 2010

Time: 3:00 p.m. - 8:00 p.m.

Place: Langley City Hall Lobby

20399 Douglas Crescent

CITY OF LANGLEY

HYLA ENVIRONMENTAL SERVICES LTD.

City of Langley – Community Energy and GHG Emissions Plan Questionnaire

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

The City of Langley is committed to addressing issues of climate change by implementing policies and programs on sustainable community development, energy conservation, and reducing greenhouse gas (GHG) emissions. Since it is the consumption of fossil fuels results in the production of greenhouse gases, successful climate change mitigation depends upon our ability to reduce energy consumption.

Here's what you can do to help:

1. Attend the City's Open House

The City would like to hear your ideas on how to make our community more energy efficient at an upcoming open house on:

Thursday, April 22, 2010 (3 to 8 p.m.) at Langley City Hall

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 how you think Langley can reduce energy consumption and GHG emissions.

2. Complete the Questionnaire

Online Completion is Encouraged! Go to:

www.surveymonkey.com/s/langleycityclimatesurvey

Drop off or mail your responses to:

Langley City Hall

20399 Douglas Crescent,

Langley, BC V3A 4B3

What will be presented at the Open House?

An inventory detailing the amount of energy consumed from residential buildings, commercial buildings, and vehicles in the City of Langley will be presented. In addition, options on how to reduce energy consumption in the City will be on display as well as detailed in an upcoming report.

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

1. **I am answering this survey as:**

☐ A City of Langley resident.
Please indicate the municipality where you are employed: _____

☐ A resident of another municipality that is employed within the City of Langley.
Please indicate the municipality where you reside: _____

☐ A City of Langley business owner residing in a municipality other than the City of Langley.
Please indicate the municipality where you reside: _____

2. **Please indicate your level of concern for each of the following environmental issues:**

	Very Concerned	Somewhat Concerned	Not Very Concerned	Not Concerned At All
Air Quality	☐	☐	☐	☐
Biodiversity	☐	☐	☐	☐
Climate Change	☐	☐	☐	☐
Energy supply/cost	☐	☐	☐	☐
Motor vehicle pollution	☐	☐	☐	☐

3. **Please rank your level of concern for each of the following environmental issues in terms of priority (1 = highest, 5 = lowest)**

Air Quality _____
Biodiversity _____
Climate Change _____
Energy supply/cost _____
Motor vehicle pollution _____

4. **Have increasing energy costs (i.e. gasoline, natural gas, and electricity) changed your behaviour in any of the areas listed below?**

	Yes	No		Yes	No
Home energy efficiency	☐	☐	Your home location	☐	☐
Office energy efficiency	☐	☐	Your office location	☐	☐
Vehicle Driven	☐	☐	Commuting options	☐	☐
Kilometres driven in vehicle	☐	☐			

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

Community transportation GHG emissions makes up nearly 60% of our emissions, but the calculations are based on an average number of kilometres that is not specific to the City of Langley. 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)? If you prefer not to help, please skip to question 13.

6. What is your primary mode of transportation to work?

☐ Personal vehicle ☐ Bicycle ☐ Ride-share or carpooling program

☐ Public transit ☐ Walking

7. What is your one-way commuting distance to work (in kilometres)?

Commuting distance: _____ km ☐ I don't commute to work

8. How many vehicles are insured for your household? *(If you don't have a vehicle, check zero and skip to question 13)*

☐ Zero ☐ One ☐ Two ☐ Three ☐ Four or more

9. Tell us about the primary vehicle you drive.

Make (e.g., Honda, Ford) _____
Model (e.g., Accord, Taurus) _____
Model Year _____

10. Tell us how far you've travelled in your primary vehicle.

Approximately how many kilometres did the vehicle travel in 2009? _____ km
What is the total kilometres travelled reading on the odometer? _____ km

11. What type of fuel does your primary vehicle use?

☐ Diesel fuel ☐ Gasoline (electric hybrid) ☐ Natural gas

☐ Gasoline ☐ Propane ☐ Other: _____

12. When you fill your vehicle with fuel, do you primarily fill up inside the City of Langley's boundary or outside the City's boundary?

☐ Primarily within the City of Langley ☐ Primarily outside the City of Langley

13. Are you interested in receiving further information about energy efficiency upgrades, the City's Climate Action Plan and/or City events? If so, please indicate your interests and provide your e-mail address below.

☐ Energy efficiency upgrades ☐ Climate Action Plan (when ready) ☐ City events and news

E-mail address: _____

Public Service Announcement

For Immediate Release: April 13, 2010

CITY OF LANGLEY HOSTS COMMUNITY ENERGY AND GREENHOUSE GAS EMISSIONS PLAN OPEN HOUSE

The City of Langley, along with its consultant, Hyla Environmental Services Ltd., is pleased to host a Community Energy and Greenhouse Gas (GHG) Emissions Plan Public Open House in the City Hall foyer, 20399 Douglas Crescent, on Thursday, April 22, 2010 from 3:00 p.m. to 8:00 p.m. This open house, scheduled to coincide with "Earth Day", will provide an opportunity for the public to learn about and comment on the City's plans for reducing community energy use and addressing climate change.

A discussion paper and on-line questionnaire relating to the proposed Community Energy and GHG Emissions Plan will be available on the City's website. The Community Energy and GHG Emissions Plan will identify a target for reduced greenhouse gas emissions to be incorporated into the City's Official Community Plan as required by Bill 27, the *Local Government (Green Communities) Statutes Amendment Act*. The Community Energy and GHG Emissions Plan is scheduled for completion in May 2010.

The City of Langley is a member of the Federation of Canadian Municipalities' Partners for Climate Protection program and a signatory of the B.C. Climate Action Charter. For further information on climate action planning and other sustainability initiatives, please visit the City's website at: http://www.city.langley.bc.ca/sustainability.htm.

Contact:
Roy M. Beddow, MCIP
Deputy Director of Development Services &
Economic Development
City of Langley
Tel 604-514-2817
Email rbeddow@langleycity.ca
www.city.langley.bc.ca

Local government

Residents have a say in City green plans

What are you willing to do to relieve gas?

by Heather Colpitts
hcolpitts@langleyadvance.com

Langley City is planning an open house to coincide with Earth Day on a topic near and dear to the planet.

The Community Energy and Greenhouse Gas (GHG) Emissions Plan public open house is 3-8 p.m. on Thursday, April 22 at City hall at Douglas Crescent and 204th Street.

People will have a chance to comment on the City's plans for reducing energy use and addressing climate change.

A discussion paper and online questionnaire about the proposed Community Energy and GHG Emissions Plan will be available through the website www.city.langley.bc.ca under the sustainability link.

As a member of the Federation of Canadian Municipalities' Partners for Climate Protection program and a signatory of the B.C. Climate Action Charter, Langley City has committed to taking steps to reduce its impact.

Through the climate action charter, the City has committed to becoming carbon neutral with a goal set for 2012.

Thursday's forum is all part of the push towards sustainability that the City has undertaken.

The City is developing plans to reduce its energy consumption, as well as reducing the greenhouse gases it creates.

Current energy usage and what the municipality expects to need in the coming years will be presented during the forum. There will also be discussions on how to reduce GHGs and a questionnaire, which the City will put online as well.

Part of that is gathering community input on the plan, which will be completed in May.

The Official Community Plan will subsequently be amended to include things like the greenhouse gas emission reduction targets the City plans to adopt.

April 16th Advertisement

COMMUNITY ENERGY & GREENHOUSE GAS EMISSIONS PLAN OPEN HOUSE – APRIL 22, 2010

HAVE YOUR SAY IN CLIMATE ACTION PLANNING

THE EVENT

The City of Langley is hosting a public open house concerning a proposed Community Energy & Greenhouse Gas Emissions Plan in the City Hall lobby from 3:00 p.m. to 8:00 p.m. on Thursday, April 22, 2010 ("Earth Day"). The public is invited to attend this event to learn about and comment on the City's plans for reducing community energy use and addressing climate change.

THE PLAN

The Community Energy & Greenhouse Gas Emissions Plan will identify a target for reduced greenhouse gas emissions to be incorporated in the Official Community Plan as required by Bill 27, the *Local Government (Green Communities) Statutes Amendment Act.* The Community Energy & GHG Emissions Plan is scheduled for completion in May 2010.

THE SURVEY

A survey on the Community Energy & Greenhouse Gas Emissions Plan will be available to the public at the open house and on the City's website at: http://www.city.langley.bc.ca/sustainability.htm

FOR FURTHER INFORMATION, PLEASE CONTACT:

Roy M. Beddow, MCIP
Deputy Director of Development Services & Economic Development
Tel: 604-514-2817
E-mail: rbeddow@langleycity.ca • Web: http://www.city.langley.bc.ca

CITY OF LANGLEY

04165992

April 20th Advertisement

COMMUNITY ENERGY & GREENHOUSE GAS EMISSIONS PLAN OPEN HOUSE – APRIL 22, 2010

HAVE YOUR SAY IN CLIMATE ACTION PLANNING

THE EVENT

The City of Langley is hosting a public open house concerning a proposed Community Energy & Greenhouse Gas Emissions Plan in the City Hall lobby from 3:00 p.m. to 8:00 p.m. on Thursday, April 22, 2010 ("Earth Day"). The public is invited to attend this event to learn about and comment on the City's plans for reducing community energy use and addressing climate change.

THE PLAN

The Community Energy & Greenhouse Gas Emissions Plan will identify a target for reduced greenhouse gas emissions to be incorporated in the Official Community Plan as required by Bill 27, the *Local Government (Green Communities) Statutes Amendment Act.* The Community Energy & GHG Emissions Plan is scheduled for completion in May 2010.

THE SURVEY

A survey on the Community Energy & Greenhouse Gas Emissions Plan will be available to the public at the open house and on the City's website at: http://www.city.langley.bc.ca/sustainability.htm

FOR FURTHER INFORMATION, PLEASE CONTACT:

THE PLACE TO BE

Roy M. Beddow, MCIP
Deputy Director of Development Services & Economic Development
Tel: 604-514-2817
E-mail: rbeddow@langleycity.ca • Web: http://www.city.langley.bc.ca

CITY OF LANGLEY

04165992