

City of North Vancouver

Greenhouse Gas

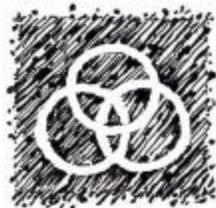
Local Action Plan



Revised Draft Final Report

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Disclaimer

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Contents

Abbreviations.....	v
Summary.....	1
Introduction.....	4
Background.....	4
Objectives of GHG Local Action Plan.....	5
Methodology.....	5
Report Structure.....	6
Phase One: Situation Analysis and Local Context.....	7
Summary and Implications for Program Design.....	15
Phase Two: GHG Emissions Profile and Forecast.....	16
Introduction.....	16
GHG Emissions Profile.....	16
GHG Emissions Forecast.....	18
GHG Emissions profile for 2004.....	19
GHG Reduction Target.....	20
Summary and Implications for Program Design.....	20
Phase Three: GHG Management Framework.....	22
Roles and Responsibilities.....	22
Goals, Objectives, and Indicators.....	23
Ongoing Initiatives in the City of North Vancouver.....	26
Public Consultation Feedback.....	27
Summary and Implications for Program Design.....	27
Phase Four: Program Implementation Plan.....	29
Program Description.....	29
Program Overview.....	29
Rationale.....	33
Expected Results.....	33
Performance Measurement Framework.....	34
Program Impact.....	37
Reporting Requirements.....	40
Program Implementation Strategy.....	40
Program Delivery.....	42
Next Steps.....	46
Appendix 1: Corporate Facility Emissions Baseline, 1995.....	47

List of Tables

Table 1: Population Characteristics of the City of North Vancouver.....	10
Table 2: Mode Split for Trip to Work.....	10
Table 3: 2001 Residential Dwellings.....	12
Table 4: Floor Area by Commercial Building Segment.....	14
Table 5: GHG Emission Factors.....	17
Table 6: CNV Corporate GHG Emissions, 1995 [Tonnes].....	17
Table 7: Community GHG Emissions in 1995.....	18
Table 8: CNV Corporate GHG Emissions, 1995 Baseline and Business as Usual 2010 [Tonnes].....	19
Table 9: Community GHG Emissions, 1995 Baseline and Business as Usual [Tonnes].....	19
Table 10: Energy Objectives and Proposed Community and Corporate Targets.....	24
Table 11: Ongoing CNV sponsored GHG Emission Reduction Measures.....	26
Table 12: Corporate LAP Initiatives.....	30
Table 13: Community Wide LAP Initiatives.....	31
Table 14: LAP Impacts.....	35
Table 15: Impact of Harry Jerome Development Options on Corporate Emissions.....	37
Table 16: Alternative Emission Reduction Targets.....	39
Table 17: Impacts of Alternative GHG Targets.....	40
Table 18: Programs Available to Manage Corporate Emissions.....	41
Table 19: Programs Available to Manage Community Emissions.....	42
Table 20: Community Target Options and Resource Requirements.....	43
Table 21: CNV Climate Change Action Plan Resource Allocations (\$000).....	44

List of Figures

Figure 1: Conceptual Vision of Greenways and Streams in the CNV.....	8
Figure 2: City of North Vancouver's Location in the Greater Vancouver Regional District.....	8
Figure 3: CNV Site Map.....	9
Figure 4: Mobile Per Capita Emissions in the GVRD.....	11
Figure 5: Average Electricity Use for Electrically Heated Homes in the Lower Mainland [KWh/yr] (Per Unit).....	13
Figure 6: Energy Use Intensity by Building Segment for Existing and New Buildings.....	14
Figure 7: CNV Corporate Energy Consumption by Fuel and Segment, 1995 [GJ].....	16
Figure 8: Community Energy Use by Segment and Energy Source, 1995 [GJ].....	18
Figure 9: Climate Change Program Results Framework.....	34

Abbreviations

BCBC	BC Building Code
CBIP	Commercial Building Incentive Program
CEP	Community Energy Plan
CES	Community Energy Systems
CO ₂	Carbon Dioxide
CNV	City of North Vancouver
DSM	Demand Side Management
EGH	Energide for Houses
ERM	Emission Reduction Measures
FCM	Federation of Canadian Municipalities
GHG	Greenhouse Gas
GJ	Gigajoules
GVRD	Greater Vancouver Regional District
HVAC	Heating Ventilation and Air Conditioning
LAP	Local Action Plan (for Greenhouse Gas Emission Reduction)
LEED	Leadership in Energy and Environmental Design
MNECB	Model National Energy Code for Buildings
OCP	Official Community Plan
PCP	Partners for Climate Protection Program
SFD	Single Family Dwelling
SOV	Single Occupancy Vehicle
tCO ₂ e	Tonnes Carbon Dioxide Equivalent
TDM	Transportation Demand Management
VKT	Vehicle Kilometres Travelled

Summary

Introduction

The City of North Vancouver (CNV) is committed to being leaders in environmental stewardship and community sustainability. This Local Action Plan (LAP) was initiated to identify opportunities to move the CNV closer to its sustainability goals through energy and greenhouse gas management, in accordance with Milestone 3 of the Partners for Climate Protection program.

GHG Emissions Profile and Forecast

A baseline of 1995 was established for calculating emissions. Current corporate and community greenhouse gas emissions are estimated to be 2,454 tonnes per year and 190,190 tonnes per year, respectively. The City has set an interim target of a 20% corporate emissions reduction and a 6% community-wide emissions reduction by 2010. If emissions continue to grow at the current rate, corporate emissions are forecast to be 2,724 in 2010, which is 39% above the PCP corporate target. Community emissions are forecast to be 231,800 tonnes/year in 2010, which is 30% above the PCP community target. Community emissions sources are primarily residential buildings, commercial buildings and light duty vehicles.

GHG Management Framework

The City of North Vancouver has established a range of energy objectives as part of its Official Community Plan. A set of indicators and targets are proposed for monitoring implementation of the LAP that is consistent with the management framework of the OCP.

Proposed Initiatives

The Local Action Plan focuses on cost-effective actions to reduce GHG emissions that provide significant environmental, economic and social benefits. Implementation of the corporate GHG program will reduce emissions by 20% corresponding to 810 tonnes per year in 2010, relative to the business as usual scenario. Areas of program focus include:

- CNV Corporate building retrofits,
- New building design guidelines,
- Fuel switching for light and heavy duty vehicles,
- Driver training and enhanced vehicle maintenance program, and
- Environmental Procurement Policy.

Community-wide program activities will focus efforts to play a catalytic role in bringing together potential projects and proponents with available resources, both within the program itself and from the numerous potential external sources. Areas of program focus include:

- Residential building retrofits through enhanced marketing of the Energuide for Houses Program,
- Land use planning that supports the principles of Smart Growth,
- Commercial building retrofits through facilitation of Energy Innovators Financing,
- Support for the Community Energy Systems in areas where it is available,
- Green building design guidelines for new residential and commercial buildings,
- Transportation demand management, and
- Public engagement and outreach

The City has established a challenging interim target in the face of sustained community growth. In reality, it is not likely the City can achieve the interim target of 6% reduction without access to considerable funding and without imposing significant financial impacts on residents and businesses. Therefore, it is recommended the City consider amending the interim community emissions target to ensure it is challenging yet achievable. Alternative emission reduction targets are summarised in Table S1.

To be consistent with Canada's One Tonne Challenge, proposed targets are presented on a per capita basis. Option 2 is recommended, as it requires a sustained commitment on the part of the community without requiring significant additional expenditures by the City, residents or businesses. Resource requirements for program implementation depend on the community target adopted and are summarised in Table S1.

Table S1: Community Target Options and Resource Requirements

Target	Resource Requirements
Interim Target: Community-wide per capita GHG emission reduction of 34% below the 1995 levels by 2010	Additional management, technical, communications and outreach resources required. Funds for program roll-out also required.
Option 1: Community-wide per capita GHG emission reduction of 34 % below the 1995 baseline by 2015	Additional technical, communications and outreach resources required.
Option 2 (Recommended) Community-wide per capita GHG emission reduction of 20% below the 2010 forecast	Staffing for communications and outreach activities required.
Option 3: Community-wide per capita GHG emission reduction of 15 % relative to 1995 only for those areas where the City has direct control	No additional staffing required.

Program Resources

Corporate emissions reductions will be achieved utilising existing capital and operating budgets and staffing. Where additional capital expenditures are required for specific initiatives, they will be offset through lower operating costs as a means to minimise life-cycle costs.

Staffing and resource requirements for the community program depend on the emissions target chosen, as summarised in Table S1. The budget to achieve the recommended community target (Option 2, 20% per capita below 2010 forecast) is estimated at \$195,000 between 2005 and 2008. Several external funding sources are available to the City to offset a portion or all of the program costs, including BC Hydro, Green Municipal Funds, Opportunities Envelope funding or Infrastructure Canada programs. In order to access these funding sources, however, the City needs to endorse this Local Action Plan.

Next Steps

A sequence of activities is required to move from planning to action. Once council has endorsed this plan, staff will need to develop detailed work-plans. Critical steps are identified below.

- There are limitations to the analysis completed to develop the baseline and forecast data. While this should not limit efforts to manage GHG emissions in the City, the data requires updating. It is recommended this occur in conjunction with program monitoring requirements.
- Corporate emission reductions activities have commenced, and progress is ongoing. Monitoring activities and communicating success stories is recommended.
- A key opportunity for corporate emission reduction relates to building energy efficiency improvements. It is recommended that staff proceed with a detailed work-plan for

completing this work.

- Achieving the interim community emissions reduction target will be a substantial challenge. It is recommended the City review its emission reduction target and resources available to implement the program.
- Of the alternative community wide emissions targets proposed, a 20% per capita¹ emissions reduction is recommended, as it requires a sustained commitment on the part of the community without requiring significant additional expenditures by the City or imposing financial burden on the community.
- Community progress is limited to date. Engagement by businesses and residents on this issue a crucial next step. Therefore, it is recommended that key audiences and messages be developed. Support for additional resources to provide the engagement and outreach functions is recommended. Simultaneously, funding sources such as the Opportunity Envelope can be accessed. Finally, program partnership arrangements need to be initiated with delivery agents such as the North Shore Recycling Program, Natural Resources Canada and BEST.
- A range of program partners exists, such as Green Buildings BC, the Energuide for Houses program, and Better Environmentally Sound Transportation. It is recommended the CNV work with these existing programs to implement the LAP.

¹ This corresponds to a 6% absolute reduction relative to 2010 business as usual estimates.

Introduction

The City of North Vancouver (CNV) is committed to being leaders in environmental stewardship and community sustainability. This Local Action Plan (LAP) was initiated to identify opportunities to move the CNV closer to its sustainability goals through energy and greenhouse gas management, in accordance with Milestone 3 of the Partners for Climate Protection program.

Background

Climate Change and Greenhouse Gas Emissions

Human activities such as the burning of fossil fuels and the removal of carbon sinks (e.g., forests), are resulting in increased concentrations of greenhouse gases in the atmosphere, thus contributing to global climate change.

Climate change is a global issue requiring local action. In Canada, municipal governments are doing their part by voluntarily joining the Federation of Canadian Municipalities Partners for Climate Protection (PCP) Program. This is a group of municipal and regional governments that are working together to reduce local GHG emissions.

The link between energy and greenhouse gas (GHG) management is straightforward. The burning of fossil fuels is resulting in increased concentrations of GHG in the atmosphere contributing to global climate change. In the City of North Vancouver, 98% of the GHG emissions are produced by consumption of fossil fuels. Other sources of GHG emissions in CNV include solid waste disposal and industrial activity. Therefore, the focus of this plan is on implementing opportunities to use energy more efficiently, as well as reducing the carbon intensity of fuels consumed in the City.

Partners for Climate Protection

Over 120 municipalities from across Canada have joined the Federation of Canadian Municipalities (FCM) Partners for Climate Protection Program (PCP) to address the issue of climate change. The PCP program consists of five milestones:

1. **Conduct a baseline emission analysis** for municipal operations and the community.
2. **Establish GHG reduction targets** for both municipal operations and the community.
3. **Develop a local action plan** outlining action items to reduce energy use and greenhouse gas emissions from municipal operations and throughout the community.
4. **Establish a program to implement adopted action items** that will reduce GHG emissions.
5. **Continue to monitor, verify, and report** GHG reduction achievements and amend the action plan accordingly to reflect new strategies.

The City of North Vancouver joined the Partners for Climate Protection Program in October 1997. A GHG emissions baseline was completed in March 2001, in accordance with Milestone 1. In July 2002, the CNV established a GHG reduction target. Specifically:

THAT Council adopt in principle the recommended FCM PCP program Milestone 2 reduction targets of 20% for municipal emissions and 6% for community emissions as an interim measure. These targets will be reviewed in coordination with the development of a greenhouse gas reduction action plan (Milestone 3) to ensure the targets are realistic for the City of North Vancouver.

City of North Vancouver Report File # 1180-39, July 17, 2002

CNV has established 1995 as the baseline year for calculation of the reduction target, and the year 2010 as the target date for the emissions reduction.

Currently in British Columbia, 39 municipalities have joined the PCP program. Of those 39, only four municipalities (The City of North Vancouver, the City of Vancouver, Langley and Prince George) are developing a local action plan in accordance with milestone 3. The Resort Municipality of Whistler is the only municipality in BC that has achieved milestone 4.

Objectives of GHG Local Action Plan

Implementation of this plan will enable the CNV to better manage impacts of urban development related to energy, greenhouse gases and air quality, while at the same time achieving broader community objectives related to affordable housing, transportation management, job creation, and local economic development. As such, the objectives of this report are to:

1. Review the emissions inventory to identify areas of challenge and opportunity,
2. Review the City's various programs, plans, policies, and by-laws that relate to energy management,
3. Identify potential policies and programs to achieve GHG emissions reductions, in accordance with Milestone 3 of the Partners for Climate Protection (PCP) Program, and
4. Develop a plan for reducing emissions.

Methodology

Analysis completed was conducted in four phases. Phase One of the assignment included a situation analysis based on a review of relevant documentation to better understand the current emission profile in the City. Specific information reviewed includes:

- PCP Milestone 2 reports,
- The 2002 Official Community Plan,
- Demographic and housing projections,
- Solid waste management plans, and
- Transportation plans.

In Phase Two of the assignment, a GHG emissions baseline and forecast were developed for corporate and community wide greenhouse gas emissions. This information was assembled to define a business as usual scenario of emissions in the City in 2010, in the absence of policies and programs. In addition, the analysis provides information on primary source segments in order to focus analysis on those opportunities with the most significant impact.

Phase Three of the assignment was used to identify options for managing emissions, and to obtain input and feedback on opportunities to manage GHG emissions. To complete this phase, the goals, and objectives articulated in the Official Community Plan were reviewed. Those objectives relevant to managing GHG emissions were analysed and a series of indicators and targets were developed and consolidated into a GHG management framework.

In addition to developing a GHG management framework, a series of workshops and interviews were completed. Workshops were conducted with CNV staff, businesses, institutions, and the general public. The goals for those meetings were to:

- Present information on GHG emissions in the City of North Vancouver,
- Convey an understanding of the City's objectives and current capacity with respect to energy management,
- Identify potential synergies between energy and GHG management with existing efforts, and
- Brainstorm potential actions for consideration by the City of North Vancouver to manage greenhouse gas emissions.

Phase Four of the assignment focused on developing an implementation plan to manage GHG emissions, based on the management framework defined and feedback obtained through the consultation process.

Report Structure

The remainder of this report is divided into the following study areas.

- Phase One: Situation Analysis and Local Context,
- Phase Two: GHG Emissions Profile and Forecast,
- Phase Three: GHG Management Framework, and
- Phase Four: GHG Program Implementation Plan.

Phase One: Situation Analysis and Local Context

An array of factors contributes to how a community consumes energy and produces GHG emissions. This section provides an overview of these factors, including:

- Community Vision,
- Location and Geography,
- Population,
- Transportation,
- Residential Buildings,
- Commercial Buildings, and
- Industry.



Community Vision

The City of North Vancouver has expressed a strong commitment to sustainability. The Official Community Plan (OCP) articulates a clear vision and a set of goals that establishes the City as a leader in management of energy and greenhouse gas emissions. The OCP encompasses the sentiments of the Livable Region Strategic Plan to:

1. Protect Green Zones,
2. Build Complete Communities,
3. Achieve Compact Metropolitan Region, and
4. Increase Transportation Choice.

Further, the City has embodied the principles of Smart Growth BC, particularly related to encouraging mixed-use development and focusing growth in development concentration areas. In addition to enhancing the livability and affordability of the City, there are significant environmental benefits (particularly energy) to development that follow from these principles.

Location and Geography

North Vancouver is bordered by the District of North Vancouver to the north, east and west, and by Burrard Inlet to the south. This constrains the potential for expansion of the community to redevelopment of existing properties. The City's location within the greater Vancouver Regional District is shown in Figure 2. A map of the City is presented in Figure 3.

As development proceeds, both residential and commercial intensification will occur. Examples of this land use intensification include the lower Lonsdale development area, where approximately 2,000 new residential units are being constructed on land, which was previously used for parking, and heavy industrial uses. The development that is occurring should be applauded as it follows many of the principles of Smart Growth BC. However, from the perspective of reducing GHG emissions, continued growth in the community will result in an increase in energy use and associated GHG emissions in the City.

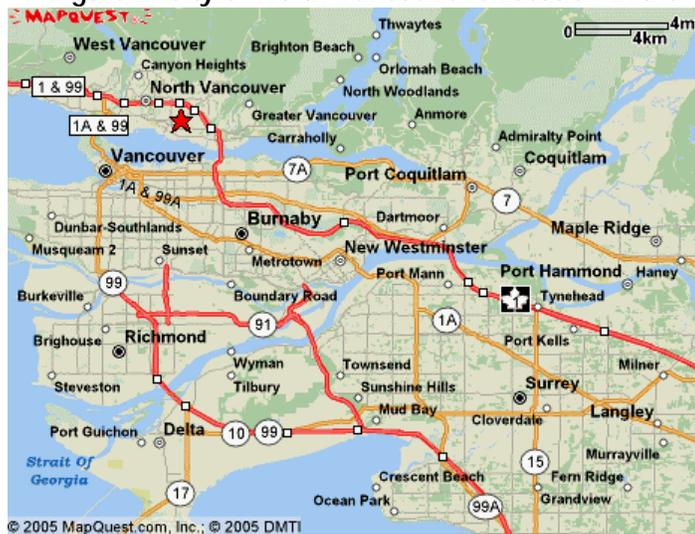
As a relatively small municipality located within a larger region, the City of North Vancouver is a town centre, providing housing and services, while supporting broader regional goals articulated in the Livable Region Strategic Plan. Due to its proximity, the CNV provides easy access to employment opportunities in downtown Vancouver, as well as recreational opportunities in the mountains of the North Shore. As a result, energy consumption is largely attributable to transportation and buildings related services.

Figure 1: Conceptual Vision of Greenways and Streams in the CNV²



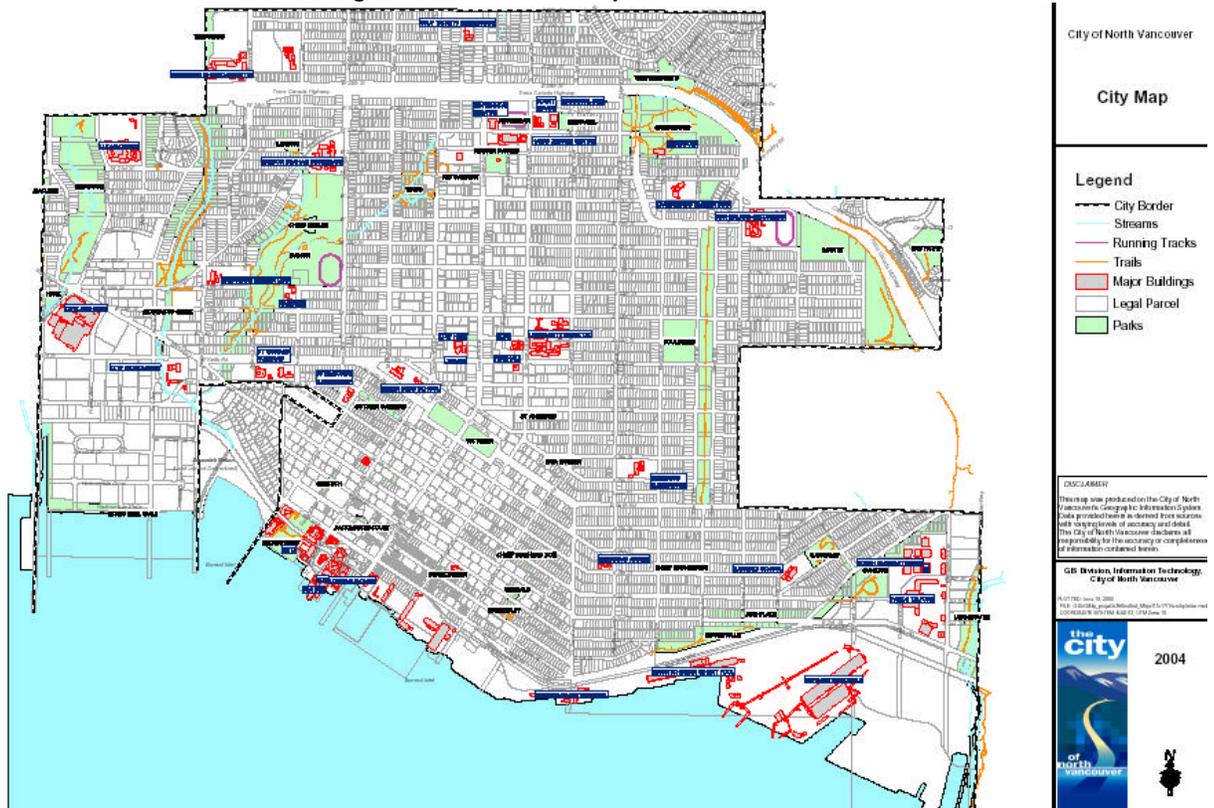
The City is centred around two neighbourhoods including Lower and Central Lonsdale. The Lower Lonsdale Town Centre is located around the mixed-use shopping and office complex called Lonsdale Quay, on Burrard Inlet. This area is undergoing rapid redevelopment. The Central Lonsdale Town Centre is located up the hill and runs along Lonsdale Avenue between 13th and 17th Streets. Having well defined town centres facilitates accessibility and provides options for a range of non-motorized transportation alternatives, resulting in enhanced opportunities for reducing transportation energy use.

Figure 2: City of North Vancouver's Location in the Greater Vancouver Regional District



² Ref. CitiesPlus

Figure 3: CNV Site Map



Population

Table 1 summarises key population statistics for the City of North Vancouver. The population in the City is estimated at 48,136. Population is a key determinant in energy use due to provision of dwelling units, as well as business, institutional and transportation services. With a relatively small area of approximately 12 square kilometres, and a population of over 48,000, the City of North Vancouver is the second most densely populated municipality in the GVRD (next to the City of Vancouver) at 75.8 people per hectare. This has a significant impact on energy use as it provides a population base to support public transit. Second, much of the multi-unit residential development is located within the two town centres, so that walking and cycling are practical alternatives to cars.

Population growth rate in North Vancouver is currently estimated at 6.8% between 1996 and 2001. Sustained population growth makes it challenging to achieve absolute reductions in GHG emissions, as reductions in emissions are frequently outpaced by increases in the number of people consuming energy.



Table 1: Population Characteristics of the City of North Vancouver³

Population	48,136
Estimated five year Population Growth Rate, 1996 – 2001	6.8%
Estimated Population capacity	62,000 ⁴
Population Density [Persons/hectare]	75.8 ⁵
CNV Residents Employed within CNV	22.1%
Employment population	23,330

In addition to the residential population, the City of North Vancouver also has a significant employee population of over 23,330. Significant employers include

- Lions Gate Hospital,
- The Insurance Corporation of BC corporate office,
- The City of North Vancouver, and
- Honeywell-Measurex Devron.

Identification of major employment locations is significant. First, these organisations typically have large facilities that might be able to take a leadership role in support of alternative transportation programs, energy efficient building design, the district energy system expansion, or green procurement. In addition, the major employers provide a basis for understanding trends in employment in the CNV and how that might change and impact energy use over time. Finally, the major employers make it possible to consider programs such as Translink’s Employer Pass Program to encourage a reduction in work related Single Occupant vehicle (SOV) use.

Transportation

There is a strong relationship between land use and energy consumption from mobile sources. Increased mixed-use of development generally results in lower use of SOV and increased use of alternative modes, including cycling, walking and public transit. Similarly, increased density of residential and commercial development will result in increased ridership of public transit, resulting in reduced energy consumption from light duty vehicles.



Table 2 summarizes mode split for trips to work by residents of the City of North Vancouver. As can be seen, 60% of trips are drivers in single occupant vehicles. This compares to 55% by Vancouver residents and over 77% by residents of the District of North Vancouver. The relatively high use of public transport in the CNV is facilitated by provision of frequent bus and seabus services.

Table 2: Mode Split for Trip to Work⁶

Location	Driver	Passenger	Public Transit	Walk	Other
CNV	60%	7.3%	19.8%	9.4%	2.7%
Vancouver	55%	6.1%	23.7%	10.7%	4.5%
DNV	77.3%	6.5%	10.9%	3.4%	1.9%

³ Ref. <http://www.bcstats.gov.bc.ca/data/pop/pop/mun/Mun9603a.htm>

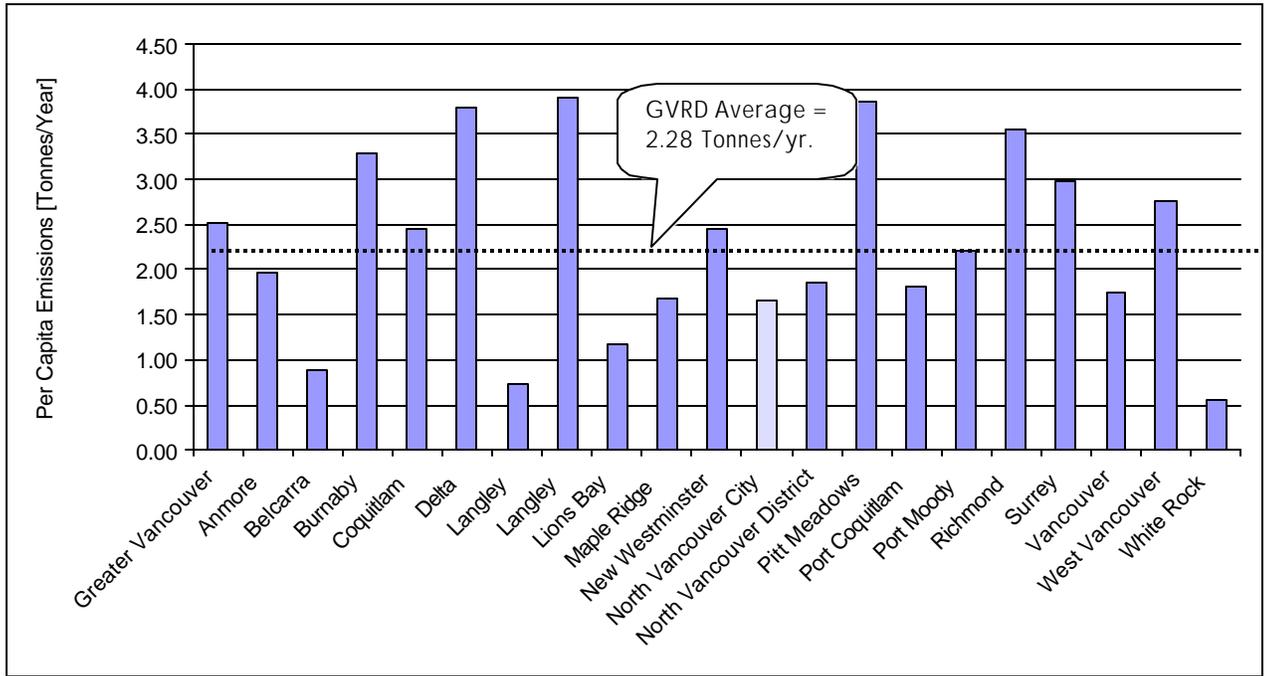
⁴ Ref. Personal Communication, Paul Penner, CNV

⁵ ref <http://www.smartgrowth.bc.ca/downloads/SprawlReport.pdf>, Pg 16.

⁶ ref <http://www.smartgrowth.bc.ca/downloads/SprawlReport.pdf>, Pg 19.

GHG emissions from mobile sources are summarized in Figure 4 on a per capita basis for the GVRD. On average, emissions from mobile sources in the GVRD are 2.3 tonnes per person per year. As can be seen, the City of North Vancouver is well below that, at 1.7 tonnes per person per year. These emissions are low relative to comparable municipalities in the region, so achieving further significant reductions in this sector may be challenging.

Figure 4: Mobile Per Capita Emissions in the GVRD



Residential Building Stock

The residential building stock is made up of a range of housing types, as summarised in Table 3. As can be seen, there are an estimated 20,705 dwelling units in the City of North Vancouver. Owner-occupied dwellings account for only 48%⁷ of the building stock. This has significant impacts on building retrofit opportunities for existing buildings, as tenants usually are not willing to invest in energy efficiency since someone else owns the building. Further, the owner is not willing to invest in energy efficiency since the tenant gets the rewards of lower energy bills. A final issue related to rental units is that these form a significant portion of the affordable housing units in the City of North Vancouver. Encouraging energy efficiency upgrades in that portion of the stock could have a regressive impact.



⁷ Ref <http://www.gvrd.bc.ca/publications/file.asp?ID=503>, Pg. 3.

Table 3: 2001 Residential Dwellings⁸

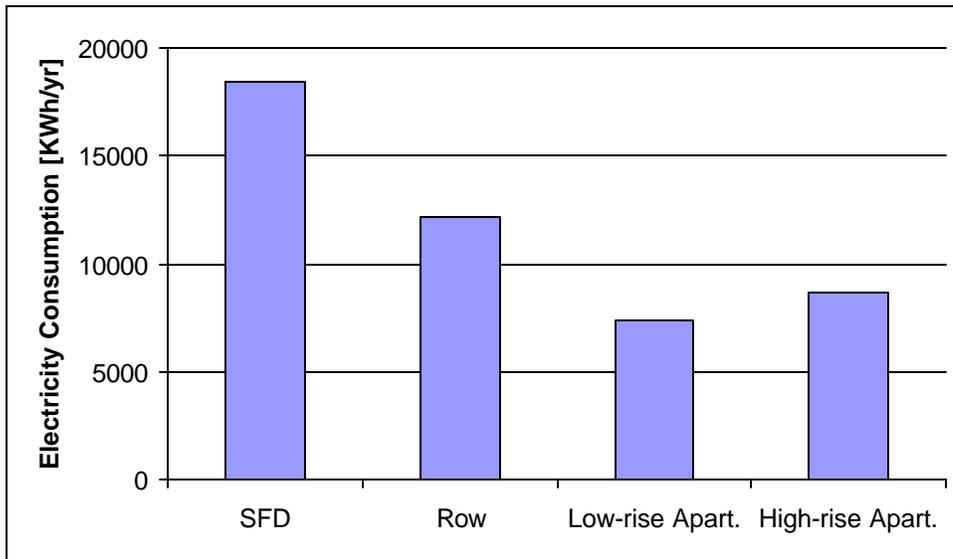
	Units in 2001	Percent Change 1996 2001
Single Family Detached	4,105	5.6%
Semi-detached	820	
Suites/Detached Duplexes	1,775	62.9%
Row	1,780	
Other Detached	15	
Mobile	25	
Low-rise apartment	3,110	32.5%
High-rise Apartment	9,080	
Total	20,705	

59% of dwelling units are in the form of low-rise and high-rise apartments. In general, attached housing is significantly more energy efficient than detached housing. Figure 5 illustrates the relationship between energy use and detachment style of newly constructed electrically heated homes in the lower mainland. As can be seen, row detachments use 34% less electricity per unit than detached dwellings. Similarly, low-rise and high-rise apartment units consume less than half the electricity of a single family detached unit. As noted in Table 3, the majority of new development in the City is row and apartment detachments. Redevelopment of existing single family lots into row and apartment style housing will have a significant impact on reducing energy consumption in new development in the City (on a per unit basis). It must be recognised, however, that much of the growth is occurring in the lower Lonsdale area, where land is being redeveloped from parking space to residential land. Therefore, overall energy and greenhouse gas emissions from residential buildings are likely to increase in the City over the planning horizon of this study.

Another important factor in energy use in buildings is vintage. Based on a review of the BC Assessment Authority database, approximately 53% of the single family dwelling stock in the CNV was constructed before 1960. Typical life-spans of these dwellings are 40 to 60 years, therefore extensive redevelopment of these properties over the next 20 years can be expected. A further 25% of the single-family stock was constructed between 1960 and 1980. Many of these dwellings likely have older and less efficient furnaces and single glazed aluminium windows. Remediation of these units with energy efficient products can have a significant impact on community energy use. However, as noted above, there may be challenges to achieving reductions due to the large portion of rental units.

⁸ Ref: <http://www.gvrd.bc.ca/publications/file.asp?ID=503>, Pg 7

Figure 5: Average Electricity Use for Electrically Heated Homes in the Lower Mainland [KWh/yr]⁹ (Per Unit)



While there is significant opportunity to improve the energy performance of new buildings, it is important to recognise that much of the building stock that will exist in the PCP target year (2010) has already been constructed. Further, the City has limited ability to influence the pace or level of energy efficiency remediation that occurs in the existing stock.

Commercial and Institutional Building Stock

The commercial and institutional building stock comprises a range of private businesses, civic, and institutional segments. The commercial/institutional building stock is summarised in Table 4¹⁰. As can be seen, there is an estimated 7.5 million square feet of commercial and institutional floor space in the CNV.

The energy performance of new and existing electrically-heated commercial buildings is summarised in Figure 6. As noted for the residential buildings, the City has limited ability to influence the energy performance of new or existing commercial and institutional facilities. The BC Building Code does not address the energy performance of new commercial buildings. Based on a review of the BC Assessment Authority database, approximately 52% of the commercial and institutional building stock was constructed between 1970 and 1985. These buildings likely have inefficient HVAC and lighting systems, little or no control devices, and no thermal insulation in the envelope. Remediation of these buildings with energy-efficient products could have a significant impact on community energy use. However, the CNV has limited ability to influence the energy performance of the existing stock.



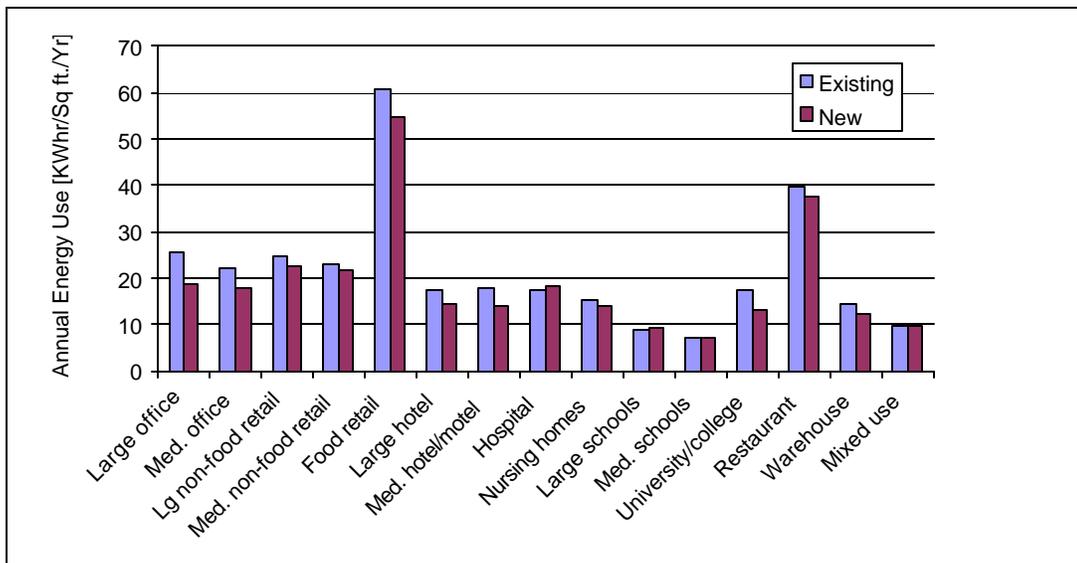
⁹ Ref. BC Hydro Conservation Potential Review, Residential Analysis, Pg 28.

¹⁰ While the BC Assessment authority provides the most comprehensive data set for buildings in BC, there have been issues with data quality. Therefore, this data should be used with caution.

Table 4: Floor Area by Commercial Building Segment¹¹

Building Segment	Floor Area [Sq. Ft]
Large office	927,847
Med. Office	1,309,573
Large non-food retail	242,982
Med. Non-food retail	979,426
Food retail	97,848
Med. Hotel/motel	20,000
Hospital	15,536
Nursing homes	7,665
Large schools	651,441
Med. Schools	186,237
University/college	140,460
Restaurant	101,194
Warehouse	1,213,128
Mixed use	1,584,642
Total	7,477,979

Figure 6: Energy Use Intensity by Building Segment for Existing and New Buildings.¹²



Industry

In many Canadian cities, industrial activity is a major economic base, energy consumer and also a source of waste heat for district heating systems. There is limited industrial activity in the City of North Vancouver, despite a range of heavy industrial activities such as the Wheat Pool and the shipyards. In addition, there is light industrial activity such as furniture manufacturing in the Lower Lonsdale area. These activities are relatively modest and reflect the changing economic base of the City of North Vancouver towards service businesses.

¹¹ Ref. BC Assessment Authority, 2002.

¹² These energy use intensity estimates are for electrically heated buildings. Ref CPR, Pg 25, 2003.

Summary and Implications for Program Design

Based on the preceding information, major issues and their implications for designing a Local Action Plan for the City of North Vancouver are summarised below.

- The City's strong commitment to sustainable development is captured in the Official Community Plan. Achieving the targets of the LAP through implementation of programs developed for broader community goals and objectives articulated in the OCP provide a robust framework for program implementation.
- The fixed landmass of the City provides a means to ensure that growth occurs in accordance with the principles of "Smart Growth BC". While this reduces the impact of development, the population of the City continues to grow. In particular re-development in the Lower Lonsdale area is occurring in an area that previously generated few emissions (such as parking lots). As a result, ongoing development is increasing total GHG emissions in the City.
- Due to its excellent public transit system, the City of North Vancouver has one of the lowest GHG emissions from transportation of any municipality in the GVRD (on a per capita basis). While this enhances the liveability of the City, it makes additional reductions from transportation difficult to achieve. Coupled to this, the City has little direct control over major transportation decisions in the City, as the BC Ministry of Transportation and Highways, and Translink are the primary decision makers.
- A large portion of the residential building stock includes older wood frame apartment buildings. There is a significant opportunity to retrofit these buildings. However, in developing a program to reduce energy from these buildings, it is essential to ensure that affordability of rental units is not compromised.
- Based on the analysis of commercial floor space, the most significant opportunities for reducing emissions in the commercial building sector include office buildings, mixed use and retail. A range of programs exist to target energy efficiency in these segments, such as the Energy Innovators Initiative from Natural Resources Canada, and the Powersmart Improvement Program from BC Hydro. However, due to the high incidence of lease tenure arrangements in these segments, uptake in energy efficiency has historically been quite low. The challenge for implementing the LAP in the City of North Vancouver will be to create opportunities that will motivate businesses to participate.

Phase Two: GHG Emissions Profile and Forecast

Introduction

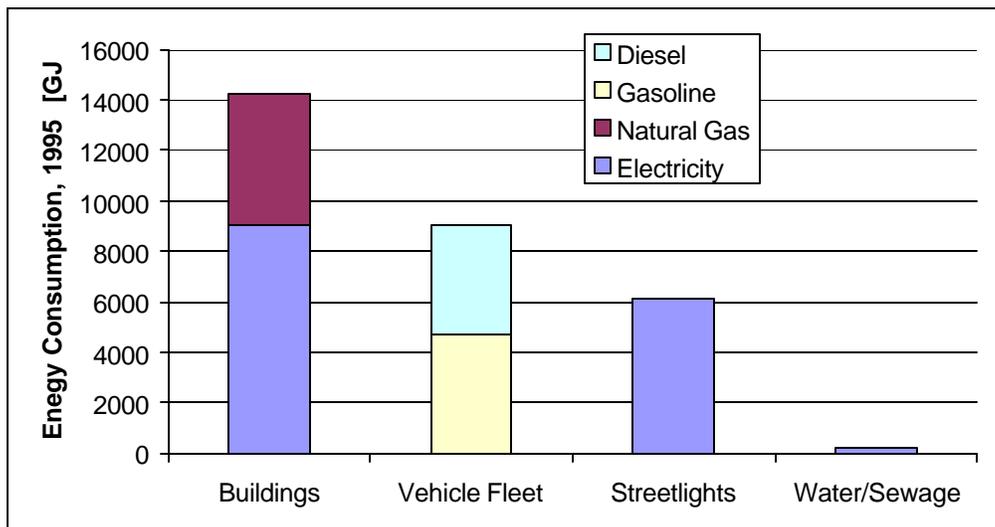
This section provides a review and summary of current and forecast GHG emissions in the City of North Vancouver. A GHG emissions baseline was completed for the City of North Vancouver in 2002¹³ with a baseline defined as 1995.

GHG Emissions Profile

Corporate Emissions Profile

In the course of providing services to residents and businesses, the CNV consumes energy through the construction, management and delivery of municipal services and operation of facilities. For example, the CNV owns and operates a number of buildings including the Harry Jerome Recreation Centre, the public works facilities City Hall, the library, and a fleet of vehicles. Figure 7 provides a breakdown for CNV corporate energy use by segment. As can be seen, buildings are the largest corporate energy users, followed by the mobile fleet.

Figure 7: CNV Corporate Energy Consumption by Fuel and Segment, 1995 [GJ]



Greenhouse gas emissions are calculated from energy consumption by fuel type using the emission factors summarised in Table 5

¹³ Ref Hyla Environmental GHG Baseline Report

Table 5: GHG Emission Factors

Energy Source	Emission Factor [Tonnes GHG/GJ]
Electricity	0.017
Natural Gas	0.049
Fuel Oil	0.073
Gasoline	0.071
Diesel	0.072

Combining energy consumption and the emission factors noted above, Table 6 summarises CNV corporate GHG emissions. As can be seen, corporate emissions in 1995 are estimated at 2,454 tonnes, with buildings and the vehicle fleet making up 88% of the corporate emissions.

Table 6: CNV Corporate GHG Emissions, 1995 [Tonnes]

Segment	Tonnes	Breakdown [%]
Buildings	1,530	62%
Vehicle Fleet	625	25%
Streetlights	65	3%
Water/Sewage	3	0%
Waste	230	9%
Other	0	0%
Total	2,454	100%

In terms of corporate GHG emissions, the baseline data clearly identifies building retrofit activity as a key opportunity. In addition, reducing emissions from CNV mobile fleet also offers a significant opportunity. Program options for managing emissions from these sources are discussed in subsequent sections of the report.

Community Emissions Profile

The consumption of energy in the municipality is shaped by land-use practices, transportation systems, the energy efficiency of building stock, and the source of energy (i.e., the systems and fuel used to generate electricity). The CNV influences these activities through land-use designations, bylaws, energy use standards in building codes, development charges, zoning requirements, relationships with local utilities and communication with local businesses and residents.

Figure 6 provides a breakdown for CNV community energy use by segment and fuel. As can be seen, residential buildings are the largest energy users, followed by commercial buildings and light duty vehicles.

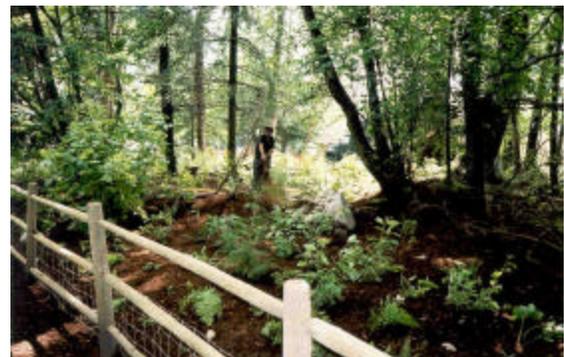


Figure 8: Community Energy Use by Segment and Energy Source, 1995 [GJ]

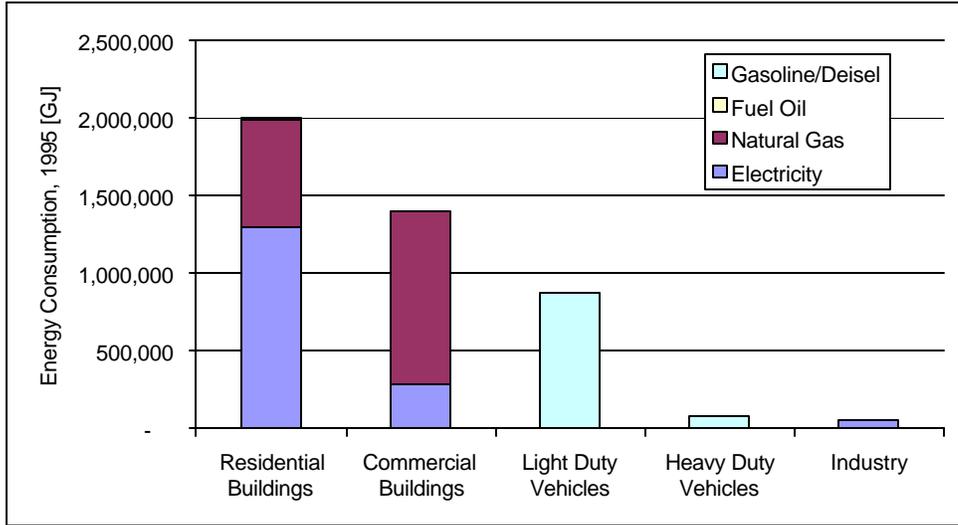


Table 7 summarises CNV community GHG emissions. As can be seen, community emissions in 1995 are estimated at over 190,000 tonnes, with emissions roughly equally split among residential buildings, commercial buildings and light duty vehicles.

Table 7: Community GHG Emissions in 1995

Segment	Tonnes	[%]
Residential Buildings	57,480	30%
Commercial Buildings	60,046	32%
Solid Waste	2,283	1%
Light Duty Vehicles	62,672	33%
Heavy Duty Vehicles	6,224	3%
Industry	1,485	1%
Total	190,190	100%

GHG Emissions Forecast

Corporate Emissions Forecast

Assuming current growth projections, corporate GHG Emissions are forecast to increase from 2,454 Tonnes per year in 1995 to 2,724 Tonnes per year in 2010, corresponding to an 11% increase. The breakdown for emissions by source is summarised in Table 10¹⁴. Increased emissions are largely attributable to an increase in building stock. A slight increase in electricity use from street lighting and sewer facilities is also projected. A detailed description of GHG emissions by facility is included in Appendix 1.



¹⁴ Ref. Hyla Environmental GHG Baseline Report

Table 8: CNV Corporate GHG Emissions, 1995 Baseline and Business as Usual 2010 [Tonnes]

Segment	1995 [Tonnes]	2010 [Tonnes]
Buildings	1,530	1,758
Vehicle Fleet	625	625
Streetlights	65	106
Water/Sewage	3	6
Waste	230	230
Other	0	0
Total	2,454	2,724

Community Emissions Forecast

Assuming current growth projections, community GHG emissions are forecast to grow from 190,190 Tonnes per year in 1995 to 231,880 Tonnes per year in 2010. A breakdown of emissions by segment is summarised in Table 9¹⁵. Forecast GHG Emissions have been calculated as part of Milestone 1 analysis. That analysis assumes a population increase of 13% between 1995 and 2010 (representing a 0.9% population growth rate), and that community energy use is directly related to population. It should be noted this is a simplification. As noted previously, development in the CNV is shifting away from single-family homes towards row and apartment buildings. As the population increases, the growth is centred in proximity to the Lonsdale corridor, reducing single occupancy vehicle need for provision of basic services. Therefore developing an emissions forecast solely on the basis of population growth will likely over-estimate growth in GHG emissions. However, population growth has actually been faster than the 0.9% estimate used in the analysis. As part of future monitoring in milestone four and five, additional analysis of the CNV forecast is recommended. This can be accomplished by obtaining electricity and, natural gas sales data from the utilities for buildings and the GVRD Air Quality Management Plan forecasts for mobile sources.

Table 9: Community GHG Emissions, 1995 Baseline and Business as Usual [Tonnes]

Segment	1995 (Tonnes)	2010 (Tonnes) ¹⁶
Residential Buildings	57,480	64,819
Commercial Buildings	60,046	86,404
Solid Waste	2,283	2,316
Light Duty Vehicles	62,672	77,848
Heavy Duty Vehicles	6,224	
Industry	1,485	494
Total	190,190	231,880

Based on the population data in Table 1 and the GHG data in Table 9 per capita emissions are expected to decrease by 11% between 1995 and 2010. This is partially due to the fact that new buildings and transportation systems are more energy efficient than existing stock. However, it also reflects limitations and simplifications made in the original forecasts.

GHG Emissions profile for 2004

A comprehensive update of GHG emissions for 2004 was not completed. The original baseline and forecast estimates are derived from GVRD air quality management forecasts and back-casts, which

¹⁵ Ref Hyla Environmental GHG Baseline Report.

¹⁶ Heavy Duty Vehicle emissions were not broken out in the analysis provided.

are updated on a five-year basis. However, the most recent version of the Emissions Inventory Forecast/Backcast does not disaggregate emissions data by municipality. As noted previously, it is recommended the City of North Vancouver work with Terasen, BC Hydro and the GVRD to update the emissions profile on a four to five year basis.

GHG Reduction Target

Corporate GHG Emission Reduction Target

The City of North Vancouver has adopted for the interim, the recommended corporate target of a 20% reduction in GHG emissions within ten years of joining the PCP program. Specifically, the City of North Vancouver has committed to a corporate GHG emissions target of 1,963 tonnes per year by 2010. As noted above however, emissions are forecast to increase to 2,724 Tonnes per year, corresponding to emissions 39% in excess of the target.

Community GHG Emission Reduction Target

The City of North Vancouver has adopted for the interim, the recommended community target of a 6% reduction in GHG emissions within ten years of joining the PCP program. Specifically, the City of North Vancouver has committed to a community GHG emissions target of 178,800 tonnes per year by 2010. As noted above, forecast emissions are estimated at 231,880 tonnes per year, which exceeds the target by 30%. On a per capita basis, emissions are forecast to decrease by 15% by 2010, relative to 1995. This is due to the low population growth estimate used in developing the forecast.

Summary and Implications for Program Design

Based on this analysis, the primary sources of GHG emissions in the City of North Vancouver include buildings and transportation. In particular:

- Building represent 62% and vehicles represent 25% of corporate emissions. Therefore, focusing corporate emission reduction strategies on buildings and fleet vehicles will have the greatest impact. Fortunately City staff is active at reviewing energy use in both these areas and are developing options for improved management of energy use in buildings and the mobile fleet.
- Community wide, buildings represent 62% of GHG emission in the City of North Vancouver, while light duty vehicles contribute a further 33%. A range of programs exist targeting residential and commercial building segments. Many of these programs include information, education and financial incentives. The challenge is in getting residents and businesses to participate in the existing programs. This is a key challenge and a significant opportunity for CNV activities.

Corporate emissions are forecast to exceed the PCP target by 39% in 2010. Achieving the emission reduction target will be challenging. However, many examples exist of opportunities for significant emission reductions. For example:

- Use of bio-diesel is currently being piloted in CNV fleet and will reduce emissions from diesel vehicles by approximately 15%,
- Construction of new civic buildings in accordance with LEED Silver typically reduce energy consumption by 30%, and
- Energy retrofits of existing buildings can achieve significant savings. For example, School District 44 recently completed energy retrofits in its facilities with energy savings of 35%.

GHG emissions from community wide sources are forecast to increase to 232,000 tonnes in 2010 and exceed the PCP target by 30%. Achieving the target is a substantial undertaking. As such, the

City may wish to consider reviewing its interim community emission reduction target to reflect something that is both challenging yet achievable. In the City of Vancouver, for example, the date for compliance with their PCP target has been extended. In the Town of Canmore, Council has chosen to adopt a per capita target to reflect the impact of rapid growth on energy use in that community. Alternately, the City may choose to aggressively engage the community in this issue. For example, if all residents in the City of North Vancouver participated in Canada's One Tonne Challenge, the City would achieve its emission reduction target of 6%. Therefore, prior to finalising Community program targets, it is recommended the City confirm its community wide target.

Phase Three: GHG Management Framework

Roles and Responsibilities

Understanding the spheres of influence and control related to management of GHG emissions is key to developing policy that achieves the expected outcomes. Corporate GHG emissions are within the direct control of the CNV. Management of GHG emissions is a shared responsibility. Engineering, Parks and Environment is responsible for this Local Action Plan. However, Community Development has responsibility for planning activities, while Finance is responsible for purchasing decisions and the management of corporate facilities.



While the City has the ability to shape the type of residential development that is built, it has limited ability to manage the energy performance of new or existing buildings. New residential buildings constructed in the City of North Vancouver must meet the requirements of the BC Building Code (BCBC). Energy efficiency requirements are defined in the BCBC for small residential buildings, however, no energy efficiency requirements exist for Part 3 (non residential) buildings. Municipalities in BC do not have the authority to enact energy efficiency requirements more stringent than defined in the BC Building Code. Finally, no requirements exist for the energy performance of existing buildings.

In terms of transportation, the City has authority over parking management and a range of transportation demand management options, such as anti-idling bylaws. As noted previously, increased density and mixed use development also contribute to reducing energy use and GHG emissions from light duty vehicles. It should be noted that transportation management is largely a regional issue. Transport 2021 is the principle strategic document for regional level transportation planning, and it sets an effective target of a 17% reduction in GHG emissions through a range of measures including:

- Transportation demand management, including parking pricing, additional fuel tax and bridge tolling,
- Land use management through comprehensive implementation of the Livable Region Strategic Plan, and
- Transportation supply, including significant increases to the bus fleet as well as strategic road investments.

To date, limited progress has been made on the more controversial aspects of the plan, including parking pricing, fuel taxes and bridge tolling. In the absence of these funding sources and policy instruments, the ability of the CNV to impact travel behaviour is limited.

Goals, Objectives, and Indicators

The City of North Vancouver has included an energy goal and a number of energy objectives in its Official Community Plan (OCP). This is a bold and visionary approach, and the City should be commended for its integration of sustainability into the OCP.

Moving from the Community Vision through goals into objectives and finally to implementation, the OCP provides a conceptual framework for managing efforts to reduce GHG emissions. The community vision articulated in the OCP is:

To be a vibrant, diverse and highly livable community that strives to balance the social, economic and environmental needs of our community.

Recognising the close relationship between sustainability and energy use, the CNV has included an energy objective in the OCP. As noted,

Closely linked to the City's vision for a more sustainable and environmentally responsible community is how energy use is managed. How energy is consumed has significant consequences for the environment and for quality of life. Although energy issues have traditionally been managed at the provincial level, the City of North Vancouver has an opportunity to participate at the local level to reduce the negative impacts of energy usage.

As such, the CNV has included an energy goal and a number of energy objectives in its OCP. The energy goal is:

To encourage meeting the present and future energy service needs of the community in a manner that is efficient and cost-effective; that is environmentally responsible (locally, regionally, and globally); and that fosters local economic development.

Energy objectives articulated in the OCP are summarised in Table 10. As can be seen, a range of energy supply and demand issues are dealt with. The City is currently developing an implementation plan for aspects of the OCP. As such, a range of proposed indicators and targets are included for consideration addressing energy objectives for community and corporate activities. Finally, the City departments responsible for implementation of the programs to achieve the objectives are provided.

The targets proposed in Table 10 are cost effective. For example, constructing civic buildings to LEED silver generally results in an increase in capital costs of 1% to 1.5%. However, the reduced operating costs generally result in a payback of three to five years for green buildings.

Table 10: Energy Objectives and Proposed Community and Corporate Targets

CNV Objective¹⁷	Proposed Indicator	Proposed Corporate Target	Proposed Corporate Initiative	Proposed Community Target	Proposed Community Initiative	Department Responsible
To promote energy efficient building design and practices for all development projects and City-owned buildings.	EGH Rating of new Part 9 Buildings LEED Points related to energy for Part 3 buildings	All new CNV buildings constructed to LEED Silver standard, with a minimum 30% reduction in energy use relative to MNECB	Council Directive	All new residential buildings constructed to <i>Energuide for Houses</i> rating 80. All new commercial and institutional buildings constructed to LEED Silver standard, with CBIP compliance.	Support for Energuide for new Houses Program Green Building Incentive Program	Finance Community Development
To implement Community Energy Systems as a means of providing heat energy for applications such as space heating and domestic hot water provided that it is demonstrated to be economically and technically feasible, and meets the City's sustainability goals and objectives.	% of development using hydronic heating Fuel share in CES Zone (%) Use of Hythane as feedstock in CES	Connect all CNV buildings within 1km buffer zone of CES.	Connect Municipal Buildings to CES	100% of new commercial and multi-unit residential development is retrofit ready Capture 100% of all new development within 1 km buffer zone of CES Use 10% hydrogen as feedstock	Expand CES	Engineering, Parks and Environment, Community Development, and Finance
To collaborate with partners and agencies in the transportation and development fields to jointly achieve energy conservation	Morning peak mode share (%)	25% SOV driver mode share	Go Green Program	50% SOV driver mode share	Go Green Program	Engineering, Parks and Environment
To reduce greenhouse gas emissions by measures such as transportation alternatives to the automobile, including increased transit, and a network of walking and cycling paths	GHG emissions from community and corporate activities (Tonnes)	Achieve 20% reduction in corporate GHG Emissions by 2010 relative to 1995 levels	GHG LAP	Achieve 6% reduction in community GHG Emissions by 2015 relative to 1995 levels	GHG LAP	Engineering, Parks and Environment
To encourage the planning, design and construction of energy efficient	% of development within growth concentration area.	100%	Smart Growth BC Planning	100%	Smart Growth BC Planning	Community Development

¹⁷ Ref: CNV Official Community Plan, Pg 40, 2002.

CNV Objective¹⁷	Proposed Indicator	Proposed Corporate Target	Proposed Corporate Initiative	Proposed Community Target	Proposed Community Initiative	Department Responsible
neighbourhoods and buildings to minimize green house gas emissions.	% of redevelopment that includes mixed use zoning	100%		100%		
To minimize the use of non-renewable energy by increasing the use of clean and efficient renewable energy supply systems	GHG Intensity of electricity	Purchase 5% certified green power by 2007 Purchase of 20% bio-diesel and ethanol blend gasoline for mobile fleet	Council Directive	Purchase 10% certified green power by 2010 Purchase of 20% bio-diesel and ethanol blend gasoline for mobile fleet	Green Power Procurement	Finance
To encourage optimization of energy utilized during the full life-cycle use of public and private assets, i.e. for the production, transportation and assembly of materials, for the lifetime operation and maintenance of the asset, and for the retirement, re-use and replacement of the asset	Energy savings in 2010 [GJ]	Conduct an energy audit of all CNV facilities by 2006. Conduct recommended energy retrofits portfolio payback of less than ten years by 2010	Council Directive	Achieve 50% penetration of Energuide audits in detached housing by 2015 Achieve 10% penetration of energy innovators program in commercial sector by 2015	Clean Air Initiative	Finance Community Development

Ongoing Initiatives in the City of North Vancouver

A review of the emissions inventory provides a basis for targeting programs and policies to effectively reduce greenhouse gas emissions in the City. Primary sources of corporate emissions include facilities and the vehicle fleet. Primary sources of community GHG emissions include residential buildings, commercial buildings and light duty vehicles. It is important to understand that emissions in 2010 are largely attributable to buildings that have already been constructed. Therefore, in order to significantly reduce emissions from the building stock, programs that focus on the retrofit of the existing stock are recommended. Examples of these programs include the *Energuide for Houses* program for residential buildings and the *Energy Innovators* Initiative for commercial and institutional buildings. Recent discussions between municipalities and building retrofit contractors has identified a mutual interest in developing a “clean air network” to increase residential building retrofit activity. Abbotsford and the City of Vancouver have expressed strong support for piloting such an initiative¹⁸.

A summary of ongoing initiatives in the City is summarised in Table 11. As can be seen, a range of activities are ongoing in the City dealing with both corporate and community GHG emissions. However, there are “gaps” in significant areas. In particular, additional opportunities exist to manage emissions from transportation, commercial buildings and residential buildings.

Table 11: Ongoing CNV sponsored GHG Emission Reduction Measures

Source	Issue	Current CNV activities
Corporate GHG Emissions	Corporate facilities	<ul style="list-style-type: none"> • 10 year capital plan
	Corporate Fleet	<ul style="list-style-type: none"> • Fleet management • Bio-diesel purchase (proposed) • Right Sizing vehicles • Hybrid Vehicles
	Corporate Operations	<ul style="list-style-type: none"> • Lighting Master Plan • Tree Planting
Community GHG Emissions	Transportation	<ul style="list-style-type: none"> • Parking management • Promoting alternative modes of transportation • Paid parking lots • Bicycle program • LED traffic lights
	Land Use Planning	<ul style="list-style-type: none"> • Incorporation of Smart Growth BC principles in OCP • Density bonusing
	Residential Buildings	<ul style="list-style-type: none"> • Sustainable building guidelines
	Commercial Buildings	<ul style="list-style-type: none"> • Sustainable building guidelines
	Energy Systems	<ul style="list-style-type: none"> • Feasibility study to expand Lonsdale Energy Corp
	Solid Waste	<ul style="list-style-type: none"> • North Shore Recycling Program
Community Engagement	<ul style="list-style-type: none"> • None 	

¹⁸ Ref. Personal Communication, Jeff Murdock, Building Insight Technologies.

Public Consultation Feedback

A series of workshops were completed as part of developing the Local Action Plan to obtain input and feedback from stakeholders on preferred options for managing greenhouse gas emission in the Community. Workshops were conducted with staff, business groups and the general public. Insights provided by CNV staff include observations that:

- Building retrofits are key segment,
- The City has already done a lot to Manage GHG emissions relative to the 1995 baseline, and
- There is a significant opportunity to improve co-ordination among the North Vancouver Recreation Commission, the City and the District

Insights from the public and business workshops include that:

- The CNV needs to demonstrate leadership,
- The City needs to be a source for reliable information on energy saving opportunities, and
- The OCP provides an important means to implement and monitor the Local Action Plan.

It should be noted that participation in the business and public workshops was limited, reflecting the moderate priority this issue has among many businesses and residents. Developing a program that has a widespread participation rate will be a significant challenge. An effective engagement strategy is required which targets and motivates key decision makers into action.

Summary and Implications for Program Design

The preceding review of factors affecting the design of an LAP is by no means exhaustive; nonetheless, several important observations are particularly relevant to proposed program design that is presented in the following sections. They are:

- The City has developed a management structure through its Official Community Plan that facilitates integration of GHG management into ongoing implementation of the OCP.
- There are a number of ongoing initiatives related to reducing both corporate and community GHG emissions. These programs vary in terms of target segment or host organization. These programs also provide an excellent opportunity to leverage resources allocated to this initiative. In particular, the corporate ten-year capital plan for facilities provides an opportunity to focus on energy retrofits of existing City owned and operated buildings. Similarly, the City is implementing a range of emission reduction measures for vehicles, including a bio-diesel program, right sizing vehicles and purchasing hybrid vehicles for its corporate fleet that will have a significant impact on mobile emissions.
- At this point in time there is no focal point for the co-ordination, implementation or promotion of energy efficiency and greenhouse gas emissions management in the City. A significant program challenge is to bring together potential proponents, projects and financial resources to provide increased levels of energy efficiency investment within the City.
- The level of participation in workshops was low, suggesting moderate level of interest in this issue by businesses and residents. Key to



the success of the Local Action Plan will be an engagement strategy that identifies and targets the key decision makers, and provides effective messages to build commitments and enhances motivation to act.

Phase Four: Program Implementation Plan

This section provides an implementation plan for the LAP, together with a summary of its objectives rationale and program components. The expected results from the program are presented within a preliminary performance measurement framework.

Program Description

Program Name:

City of North Vancouver GHG Local Action Plan

Objectives:

The City of North Vancouver has established two objectives for this program:

1. To reduce corporate greenhouse gas emissions by 20% in 2010, relative to a 1995 baseline, and
2. To reduce community-wide greenhouse gas emissions by 6% in 2010, relative to a 1995 baseline.

Program Overview

It is recommended the LAP be organised into two components, including a corporate program and a community-wide initiative. The program will focus primarily on energy efficiency and fuel switching activities for buildings and vehicles with separate programs for corporate and community segments.

Corporate Climate Change Program

The corporate GHG management plan will work with staff to reduce energy and greenhouse gas emissions from in-house activities, with a primary focus on buildings and fleet. The program will work to strengthen and expand ongoing activities at the City. Areas of program focus include:

- CNV Corporate building retrofits,
- New building design guidelines,
- Fuel switching for light and heavy duty vehicles,
- Driver training and enhanced vehicle maintenance program, and
- Environmental Procurement Policy.

A description of these initiatives is presented in Table 12.

Table 12: Corporate LAP Initiatives

Program	Description	Department Responsible
CNV Corporate building retrofits	<p>This initiative includes energy efficiency retrofits of existing corporate owned and managed facilities in the City of North Vancouver. A number of buildings exist where energy efficiency opportunities exist, for example, the works yard, and City Hall. Potential retrofits may cover</p> <ul style="list-style-type: none"> • Building envelope, including glazing, insulation and air tightness, • Lighting systems, • Heating ventilation and air conditioning equipment, • Operating schedules, and • Domestic hot water systems. <p>The City may choose to complete these retrofits by managing the work in house or by hiring an energy retrofit contractor. It is not possible to define the level of energy savings achieved from this effort, however, operating savings of 25% to 35% are realistic for direct managed buildings. For indirect managed facilities such as the buildings operated by the North Vancouver Recreation Commission, a 10% improvement in energy performance is assumed.</p>	Finance
New building design guidelines	<p>This initiative ensures that all new corporate facilities constructed in the City are energy efficient and environmentally responsible. A number of municipalities (including the City of Vancouver and the Resort Municipality of Whistler) have adopted the LEED Silver standard as the minimum performance standard for new civic projects. Constructing to LEED may cost an additional 1% to 2% for typical civic projects, with payback periods ranging from three to seven years. In general, LEED silver projects achieve energy savings of 30% to 40%.</p>	Finance
Fuel switching for light and heavy duty vehicles	<p>The City is currently negotiating a contract to purchase bio-diesel in association with diesel purchase pool members. Substituting bio-diesel will reduce GHG emissions from diesel vehicles by approximately 15%. Depending on the success of this program, the initiative may be expanded to include an ethanol gas blend for gasoline-fuelled vehicles. In the longer term it is hoped the success of the bio-diesel initiative may be used to highlight benefits to other major diesel consumers in the CNV, such as Translink.</p> <p>In addition to the bio-diesel initiative, the City is reviewing operator requirements and "right-sizing" vehicles, resulting in a 10% to 15% improvement in mileage on affected vehicles. Finally, the City plans to purchase hybrid vehicles to replace existing fleet light duty vehicles. Depending on the vehicle chosen, energy savings of 25% are achievable.</p>	Engineering, Parks and Environment
Driver training and enhanced vehicle maintenance program	<p>This initiative will utilise existing programs such as the Feet-smart program from Natural Resources Canada, and the Canada Fleet Challenge from the BC Climate Exchange to provide driver training for fleet vehicles. Typical savings of 10% may be achieved through driver training.</p>	Engineering, Parks and Environment
Energy Efficient Procurement Policy	<p>A range of products and services exist with reduced environmental impact in general and energy consumption in particular. This</p>	Finance

Program	Description	Department Responsible
	initiative is intended to review the procurement policy for CNV operations in an effort to reduce the energy consumption of products and services. For example, energy star compliant office equipment reduces energy consumption by 25% compared to standard devices. Similarly, Novex Courier (available throughout the Lower Mainland) has recently committed to replace all its fleet with hybrid vehicles. Finally, there is a range of opportunities for the procurement of green power.	

Community Wide Program

Short-term (Less than five year time horizon) community-wide program activities will focus efforts to play a catalytic role in bringing together potential projects and proponents with available resources (including information and financial resources), both within the program itself and from the numerous potential external sources. Consequently, leveraging of resources for the implementation of the LAP projects in the City of North Vancouver is an important activity for the program. Once projects are identified and underway, communication of the results to other potential replicators within the City will also be a key area of activity. Areas of program focus include:

- Residential building retrofits through enhanced marketing of the Energuide for Houses Program,
- Land use planning that supports the principles of Smart Growth BC
- Commercial building retrofits through facilitation of Energy Innovators Financing,
- Support for the Community Energy Systems in areas where it is available
- Green building design guidelines for residential and commercial buildings,
- Transportation demand management, and
- Public engagement and outreach

A description of these initiatives is presented in Table 13

Table 13: Community Wide LAP Initiatives

Program	Description	Department Responsible
Residential building retrofits through enhanced marketing of the Energuide for Houses Program	This initiative utilises the Energuide for Houses initiative to encourage energy retrofits in detached houses. CNV staff have recently participated with other Lower Mainland municipalities to develop a “Clean Air Network” where municipalities work with retrofit contractors and Energuide delivery agents to increase participation of households in accessing federal grants for energy retrofits.	Finance Community Development
Land use planning that supports the principles of Smart Growth BC	This initiative is intended to ensure that growth in the City occurs in a manner that is consistent with the principles of Smart Growth BC, and articulated in the OCP. This initiative monitors the indicators and targets defined for land use planning to ensure density and access to services throughout the municipality.	Community Development
Commercial building retrofits through facilitation of Energy Innovators Financing	A number of programs exist to encourage commercial building owners and tenants to complete energy efficient retrofits. This effort seeks to reduce the transaction costs of accessing loan and grant funding. In this initiative, the CNV will act as a broker to obtain loans and grants from BC Hydro, Terasen Gas, and Natural Resources Canada to	Finance Community Development

Program	Description	Department Responsible
	those firms interested in energy efficient buildings. Both Terasen and BC Hydro offer free energy audit services to business clients. Utilising that information, the CNV could access federal incentive funding on behalf of the building owner. Similar efforts are currently being considered by the GVRD, and Clean Nova Scotia recently launched a version of this program.	
Support for the Community Energy Systems in areas where it is available	<p>The City of North Vancouver has shown considerable leadership in development of the Lower Lonsdale community energy system. This initiative focuses on expansion of the energy system to Central Lonsdale, to ensure that new development around City hall utilises hydronic heat.</p> <p>In the longer term, this initiative will focus on alternative fuel energy systems such as ground source heat pumps, hydrogen or digester gas.</p>	Engineering, Parks and Environment, Community Development, and Finance
Expand Green building design guidelines for residential and commercial buildings	Green building guidelines are widely available and provide a range of strategies for reducing energy, water and materials in new construction. These guidelines are intended to provide developers with design strategies that complement the goals and objectives in the Official Community Plan. For example, the City of North Vancouver has developed a set of Sustainable design guidelines. Where developers demonstrate compliance with the guidelines, density bonuses may be granted.	Community Development, and Finance
Transportation demand management	<p>Managing transportation demand includes a range of activities including parking supply and pricing, provision of resources for car/van pool, street calming etc. In the short term, this initiative will focus on major employers in the CNV to encourage the adoption of the Go Green program from BEST. In addition, it is recommended that parking pricing policy be reviewed to provide a source of funding for addition TDM activities and to encourage non-SOV modes within the community centres. Similar initiatives such as Whistler and Kelowna result in travel demand reductions of between 10% and 20%.</p> <p>In the longer term, this initiative is intended to work with GVRD member municipalities to fully implement the policies and programs defined in Transport 2021.</p>	Engineering, Parks and Environment
Public engagement and outreach	Engaging businesses and residents in the LAP is a key activity area. This initiative Identifies target audiences and key messages to ensure widespread commitment to reduced energy use and environmental impact. Similar activities are ongoing in the City of Vancouver, and may be used as a basis for developing a public outreach and education plan for the LAP. Additional resources include the One Tonne Challenge web site available from the Government of Canada and the OCP monitoring plan currently under development. Initial discussions with North Shore Recycling identified options for expanding the activities of that organisation to include energy and climate change.	Corporate Services with support of relevant Departments North Shore Recycling

In the longer term (greater than five year time horizon), program resources will work with senior levels of government to encourage:

- Full implementation of the GVRD Livable Region Strategic Plan and Transport 2021 through-out the region, and
- Increased stringency of energy performance requirements of new construction, consistent with the Provincial targets established as part of the Review of Energy Performance of Buildings in BC (REPBC).

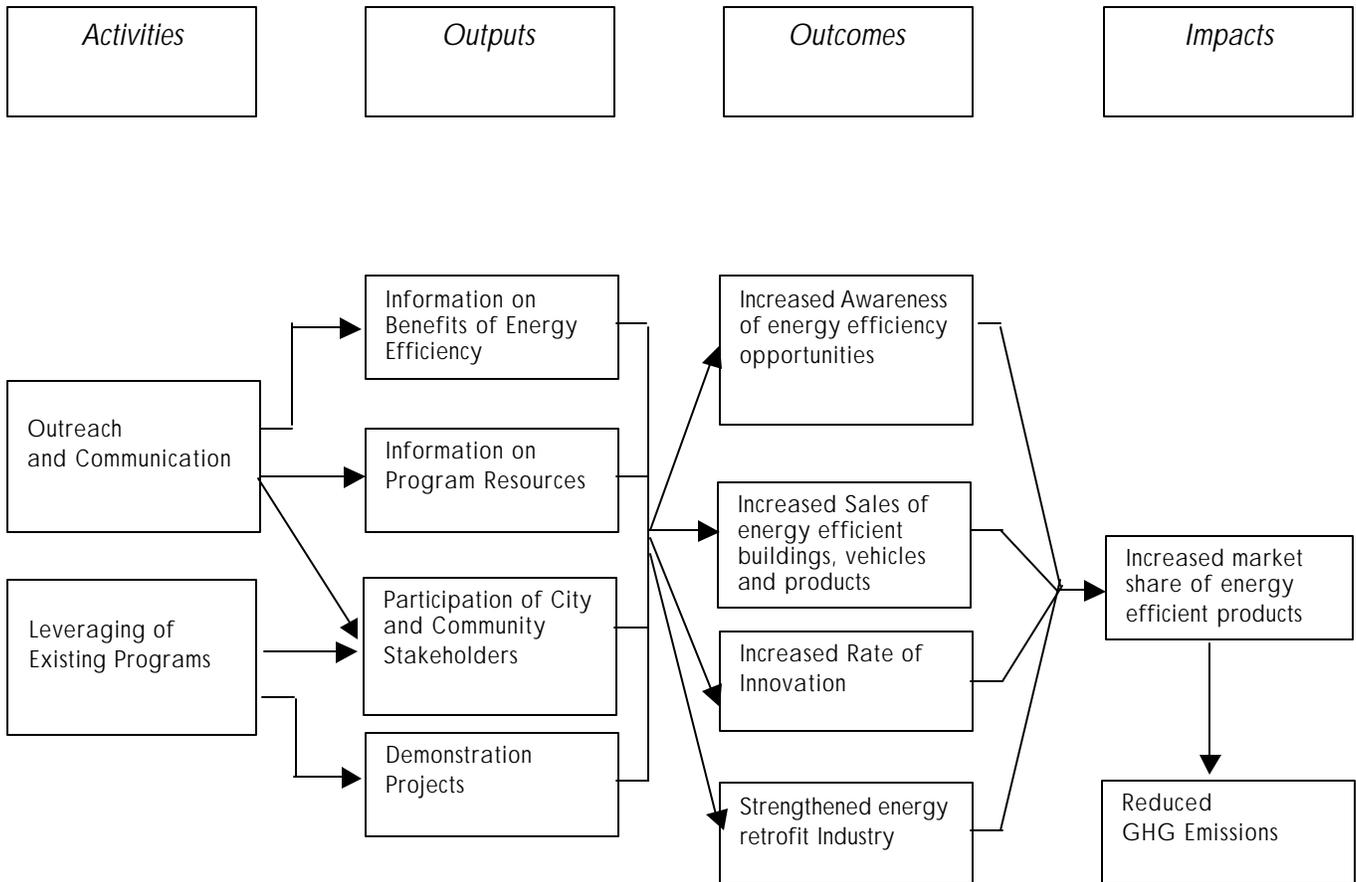
Rationale

The LAP focuses on cost-effective actions to reduce GHG emissions that provide significant environmental, economic and social benefits. As such, the program is designed to achieve specific and measurable progress relative to the goals and objectives defined in the City's Official Community Plan and the Partners for Climate Protection Program in areas of land use, transportation, buildings and environment.

Expected Results

Experience with other LAP programs has demonstrated that communities, in collaboration with senior government, utility and industry stakeholders, can positively influence the rate of energy efficiency investment. Thus, this program has been designed to contribute to reduce fuel consumption and GHG emissions, through the results chain shown below in Figure 9.

Figure 9: Climate Change Program Results Framework



Performance Measurement Framework

The performance measurement framework is designed to reflect the expected results identified above. Indicators and targets have been developed in Previous sections of the Report and are presented in Table 14. These indicators will need to be reviewed once the emissions target is finalised and as the program gains implementation experience. In particular, the community wide targets were developed, assuming an emission reduction target of 6%.

Table 14: LAP Impacts

Proposed Corporate Initiative	Proposed Corporate Target	Corporate GHG Impact [Tonnes]	Proposed Community Initiative	Proposed Community Target	Community GHG Impact [Tonnes]
Council Directive	All new CNV buildings constructed to LEED Silver standard, with a 50% reduction in energy use relative to MNECB	New buildings will include parcel 9 and block 62 developments. An emissions reduction of 70 Tonnes/yr is achieved	Support for Energuide for new Houses Program Green Building Incentive Program	All new residential buildings constructed to <i>Energuide for Houses</i> rating 80. All new commercial and institutional buildings constructed to LEED Silver standard, with CBIP compliance.	740 9,300
Connect Municipal Buildings to CES	Connect all CNV buildings within 1km buffer zone of CES.	Further analysis required	Expand CES	100% of new commercial and multi-unit residential development is retrofit ready Capture 100% of all new development within 1 km buffer zone of CES Use 10% hydrogen as feedstock	Enabling 3,700 Further Analysis Required
Go Green Program	25% SOV driver mode share	Further analysis required	Go Green Program	50% SOV driver mode share	1,500
Smart Growth BC Planning	N/A	Further Analysis Required	Smart Growth BC Planning Initiative	100% 100%	Further Analysis Required
Council Directive	Purchase 10% certified green power by 2010 Purchase of 20% bio-diesel and ethanol blend gasoline for mobile	160 125	Green Power Procurement	Purchase 10% certified green power by 2010 Purchase of 20% bio-diesel and ethanol blend gasoline for mobile	16,000 15,000

Proposed Corporate Initiative	Proposed Corporate Target	Corporate GHG Impact [Tonnes]	Proposed Community Initiative	Proposed Community Target	Community GHG Impact [Tonnes]
	fleet			sources	
Council Directive	Conduct an energy audit of all CNV facilities by 2006. Conduct recommended energy retrofits portfolio payback of less than ten years by 2010	A 35% emissions reduction is assumed for direct managed facilities and 10% emissions reduction is assumed for indirect managed facilities (such as the NVRC facilities). A reduction of 340 Tonnes/yr is achieved.	Clean Air Initiative	Achieve 50% penetration of Energuide audits in detached housing by 2015 Achieve 50% penetration of energy innovators program in commercial sector by 2015	3,300 4,000
GHG LAP	Achieve 20% reduction in corporate GHG Emissions by 2010 relative to 1995 levels	Aggregate impact of 810 Tonnes/yr in 2010	GHG LAP	Achieve 6% reduction in community GHG Emissions by 2015 relative to 1995 levels	Aggregate impact of 53,500 tonnes/yr in 2010

Program Impact

Corporate Program Impact

Table 14 summarises the impact of the proposed corporate measures. As can be seen, implementation of the corporate GHG program will reduce emissions by 810 tonnes per year in 2010, relative to the business as usual scenario. Assuming full implementation of the programs outlined above, the City will achieve its emission reduction target of 20% relative to the 1995 baseline. As note previously, this is a challenging target, however, the initiatives identified above are cost effective.

The analysis completed above includes the addition of the John Braithwaite Community Centre, as well as the proposed development for Parcel 9 and Block 62. It is assumed that the Parcel 9 development will include 5,200 square meters of development, of which the City will manage 2,000 square meters. For the Block 62 development, it is assumed the existing library will be retrofitted and re-used for other civic purposes, and a new library building will be constructed with a floor area of 3,200 square meters¹⁹. The analysis assumes the Harry Jerome Centre is remediated (rather than replaced). Discussions with City Staff confirm that analysis for the potential retrofit of Harry Jerome is ongoing²⁰.

A range of options are under consideration for the future of the Harry Jerome Centre. Options under consideration and the impact on corporate GHG emissions are summarised in Table 15. For example, should the City decide to retain the existing Harry Jerome centre and build another recreation facility (assumed to be 1.5 time the size of the existing facility and 25% more energy efficient), corporate emissions would increase by 542 tonnes per year. As can be seen, the City will achieve its corporate emissions target under all options except for the option to retain the existing facility and build another facility.

Table 15: Impact of Harry Jerome Development Options on Corporate Emissions

Option	GHG Impact of Harry Jerome Option [Tonnes/year]	Corporate GHG Emissions in 2010 [Tonnes/year]
Retain the existing Harry Jerome Centre with no retrofit	482	1,903
Retain the existing Harry Jerome Centre with a 10% reduction in energy use retrofit	434	1,896
Demolish the existing Harry Jerome Centre and build a new facility that is 1.5 time the size of the existing facility and 25% more energy efficient	542	1,963
Retain the existing Harry Jerome Centre and build a new facility that is 1.5 time the size of the existing facility and 25% more energy efficient	1,384	2,805

¹⁹ Ref. Personal Communication, Collin Greer

²⁰ Ref Personal communication, Glenn Stainton

Community Program Impact

The community targets shown in Table 14 assume full implementation of a community wide program resulting in a GHG emissions reduction by 53,500 tonnes per year in 2010, in accordance with the interim target established by the City. As a result, emissions will be reduced from 231,880 tonnes per year in the business as usual scenario to 178,400 tonnes per year. On a per capita basis, a 34% emissions reduction will be achieved.

As noted previously, the City has established a challenging interim target in the face of sustained development. To succeed in achieving the interim target, the City would require very high participation rates by businesses and residents in all aspects of the initiative. In reality, it is not likely the City could achieve this level of emissions reduction without access to considerable funding and without imposing substantial financial burdens on residents and businesses. Therefore, it is recommended the City consider amending the interim community target to ensure it is both challenging yet achievable. Further, it is recommended the City consider a per capita emissions reduction target (rather than an absolute target) to reflect the impact of population growth on GHG emissions. Presenting the target on a per capita basis will also be consistent with The Government of Canada One Tonne Challenge program, resulting in consistent messaging to consumers. Alternative emission reduction targets are summarised in Table 16. Table 17 summarises the impact of the alternative emissions reduction, compared to the 1995 baseline. Option 2, corresponding to a 20% per capita emissions reduction, is recommended, as it requires a sustained commitment on the part of the community without requiring significant additional expenditures by the City or imposing financial burden on the community.

Table 16: Alternative Emission Reduction Targets

Target Option	Description and Impact	Rationale
<p>Interim Target</p> <p>A community-wide GHG emission reduction target of 6% below the 1995 baseline by 2010. On per capita basis, this corresponds to a 34% emissions reduction</p>	<p>This target is recommended by the Partners for Climate Protection Program</p>	<p>The PCP interim target is consistent with Canada's Kyoto commitment</p>
<p>Option 1:</p> <p>Community-wide per capita GHG emission reduction of 34 % below the 1995 baseline by 2015</p>	<p>This option extends the compliance period for achieving the City's emission reduction target. This corresponds to an emissions target of 178,800 tonnes per year by 2015, extending the period for the CNV to achieve its target by five years.</p>	<p>Within the extended compliance timeframe, it is expected the Province will enact more stringent requirements for energy efficiency of buildings, and the Federal government will update and expand the fuel economy requirements for new vehicles.</p> <p>While this target is quite challenging, it provides the CNV additional time to achieve its original emissions reduction. To achieve this target, the City will require additional staff resources to implement programs.</p>
<p>Option 2 (Recommended)</p> <p>Community-wide per capita GHG emission reduction of 20% below the 2010 forecast</p>	<p>This option changes the baseline date from 1995 to 2010 and corresponds to an emissions target of 218,000 tonnes per year compared to the 231,880 tonnes per year under current growth projections. On a per capita basis, this corresponds to a per capital emission reduction of 17%.</p>	<p>This target results in absolute emissions reductions, while accounting for sustained population growth in the City.</p> <p>To achieve this target, the City will require additional staff resources to implement programs, however, much of the LAP implementation can be implemented utilising existing staff.</p> <p>This target is recommended as being challenging yet achievable</p>
<p>Option 3:</p> <p>Community-wide per capita GHG emission reduction of 15 % relative to 1995 only for those areas where the City has direct control.</p>	<p>This corresponds to an emissions target of 231,740 tonnes per year compared to the 231,880 tonnes per year under the business as usual scenario.</p>	<p>This option would focus on emission reductions from solid waste management, plus limited programming related to building energy efficiency and transportation management. The major responsibility for achieving emission reductions from buildings and transportation is transferred to the GVRD, the Province and the Federal Government.</p> <p>This target is the least challenging, and requires no additional staff resources to achieve.</p>

Table 17: Impacts of Alternative GHG Targets.

Milestone	GHG Emissions	Per capita GHG Emissions	% GHG Reduction relative to 1995
1995 Base Year	190,190	4.4	
2010 BAU	231,881	3.7	15%
2010 PCP Interim Target	178,779	2.9	34%
Option 1	178,779	2.9	34%
Option 2	217,968	3.5	20%
Option 3	231,740	3.7	15%

Reporting Requirements

Measuring the success of the program will require information on the results achieved relative to the expected outcomes described in the previous section. It is expected that, on a program level, this will consist of annual reports that describe annual energy consumption and GHG emissions reductions, production and technical performance relative to expectations. Annual reporting is recommended due to the tight timelines to achieve the interim targets. This program-level reporting will be greatly facilitated by submission of periodic reports from program participants. These project-level reports could satisfy one or more of the following:

Minimum reporting requirements (Level I)

- Progress on implementation of the project, in terms of a description of the implementation status of each emission reduction measure,
- Actual performance in comparison with expectations, for example the GHG emissions reduced compared to the target reduction defined in Table 14, and
- Total GHG reductions [Tonnes]

Additional reporting requirements (Level II)

- Qualitative assessment of project visibility and potential for replication (are people aware of the project, and has it spawned other projects?)
- Qualitative assessment of project secondary benefits (social and environmental impacts)

Program Implementation Strategy

This section identifies and discusses the proposed program implementation strategy for meeting the objectives outlined in the previous sections. Since the ultimate success of the program will be judged on the achievement of its results (outputs, outcomes and impacts), the design should reflect a judgement of what features are most likely to contribute positively to those results. This involves the application of criteria of practicality, affordability, effectiveness and efficiency.

The following aspects of the program design are examined:



- Target sectors and potential partners,
- Program delivery, and
- Resource requirements.

Each is further discussed below.

Target Sectors and Potential Partners

The primary sectors to be addressed in this program include:

- Residential buildings,
- Commercial and institutional buildings,
- Light duty vehicles, and
- Heavy-duty vehicles.

There are a number of programs currently offered by agencies outside the CNV that can be used to target these segments. A summary of available programs is summarised in Table 18 for corporate emissions and Table 19 for community emissions. It is recommended the City utilise these existing programs to deliver GHG savings in the community. Implementation of the LAP using these existing initiatives will reduce the cost of program design and allow the City to focus its efforts on areas where it can have the greatest impact, including engaging the public and businesses. A second potential role for the City is to act as a facilitator of the programs identified below to residents and businesses located in the City of North Vancouver. In that capacity, the City could assist in accessing technical resources, or assist with applications for program participants in order to reduce the uncertainty and transaction costs of program participation. A description of the resource requirements for these roles is presented below. Initial discussions with the North Shore Recycling Program confirm their willingness to participate in implementation of the LAP, providing a range of engagement and outreach activities that are extensions to the work they are already doing.

Table 18: Programs Available to Manage Corporate Emissions

	Region/Province	Federal	Utility
Corporate facilities	Better Buildings Partnership	Energy Innovators	Powersmart PIP
		REDI	Commercial Boiler Upgrade
	Green Buildings BC	Green Municipal Funds	
		CBIP	
Corporate Fleet	Bio-diesel purchase pool	Canada Fleet Challenge	
Corporate Operations			Powersmart

Table 19: Programs Available to Manage Community Emissions

	NGO	Region	Province	Federal	Utility
Transportation	BEST Canada Fleet Challenge	Transport 2021		Green Municipal Funds	
Land Use Planning	Smart-growth BC	LRSP			
Residential Buildings		BC Building Code Update	PST exemptions	Energide for Houses	Powersmart High Efficiency Furnace Rebate
Commercial Buildings			Green Buildings BC	Energy Innovators REDI Green Municipal Funds CBIP	Powersmart PIP Commercial Boiler Upgrade
Energy Systems				Green Municipal Funds	
Solid Waste	North Shore Recycling				
Community Engagement	North Shore Recycling			One Tonne Challenge Opportunity Envelope	

Program Delivery

To deliver the corporate program, it is anticipated that council will direct the relevant staff to develop departmental business plans. These plans will identify activities, resource requirements and timelines for implementation.

The City will be responsible for the delivery of the community portion of the Local Action Plan, with Engineering, Parks and Environment managing the initiative, with support of the relevant departments identified in Table 10. It is anticipated the program will be delivered in cooperation with another agency, such as the North Shore Recycling Program, which provide engagement and outreach activities. In addition, it is expected that a technical resource person will be required to provide review and on-going technical advice related to the design, operation and monitoring of the programs. This has been the case in Whistler, where an energy efficiency co-ordinator is being funded by BC Hydro. The CNV will be responsible for the program's overall design, ongoing

management, marketing, funds disbursements, monitoring and data collection, outcome tracking and technology transfer.

The LAP will be rolled out in 2005 with activities designed to secure funding utilising existing in-house staff. In addition, work will focus on activities to finalize the initiative's operating guidelines

In 2006 and dependent on external funding, additional resources will be hired to develop and administer program activities; market the initiative to appropriate target organizations; and, implement the first round of projects.

By 2007, it is expected that an initial core of projects will be in place; the focus in this third year will be on achieving an escalated number of programs, ensuring the acquisition of performance monitoring data for each initiative and the implementation of related technology transfer and communications activities.

By 2008, the LAP will be in full operation and activities are expected to be divided between on-going development and monitoring of projects and the promotion and technology transfer activities required to achieve replication targets. Depending on program success and funding resources, the program will either be required to ramp up its activities or to define a suitable exit strategy.

Resource Requirements

Corporate emissions reductions will be achieved utilising existing operating budgets and staffing. Where additional capital expenditures are required for specific initiatives, they will be offset through lower operating costs.

The community program will require a core team that consists of a program manager, a buildings technical expert and a transportation demand management co-ordinator. Staffing and resource requirements for the community program depend on the emissions target chosen, as summarised in Table 20.

Table 20: Community Target Options and Resource Requirements

Target	Resource Requirements
Interim Target: Community-wide per capita GHG emission reduction of 34% below the 1995 levels by 2010	Additional management, technical, communications and outreach resources required. Funds for program roll-out also required.
Option 1: Community-wide per capita GHG emission reduction of 34 % below the 1995 baseline by 2015	Additional technical, communications and outreach resources required.
Option 2 (Recommended) Community-wide per capita GHG emission reduction of 20% below the 2010 forecast	Staffing for public outreach liaison required.
Option 3: Community-wide per capita GHG emission reduction of 15 % relative to 1995 only for those areas where the City has direct control	No additional staffing required.

Should the City commit to the interim community target (6% below 1995 emissions by 2010 and corresponding a 35% per capita reduction), additional staffing will be required to form the core team. Program budgeting will also be required to provide incentives and to develop information and education activities. Should the City consider the alternative targets proposed in Table 16, in-house staffing and existing budgets will be used for the core team, with additional specialty support provided for outreach activities, and depending on access to climate change funds.

The required budget for the recommended target (Option 2, 20% per capita below 2010 forecast) is shown in Table 21. As can be seen, the budget to achieve a 20% per capita emissions reduction is

estimated at \$195,000. As discussed below, several external funding sources are available to the City to offset a portion or all of the program costs. In order to access those funding sources, however, the City needs to endorse this Local Action Plan.

As noted above, existing CNV staff will form the core team. The Engagement and Outreach co-ordinator and the Communications and Promotion resources will work with the North Shore Recycling Program²¹ and CNV communication staff to motivate and reinforce program uptake. It should be highlighted that getting participation of businesses and residents is key to the success of this initiative. Therefore, support for additional resources to provide the engagement and outreach functions is recommended. The O & M funds shown in Table 21 will be used to purchase specialized expertise to assist with marketing, monitoring and promotion, and will depend on access to external funding sources.

Should the City choose the alternative target option 1 (34% per capita reduction below 1995 levels by 2015), additional technical support and program budgets will be required beyond the funding shown in Table 21 to roll out program activities. Should the City choose target option 3 (15% per capita below 1995 levels for direct controlled emissions), no additional resources or budget will be required.

Table 21: CNV Climate Change Action Plan Resource Allocations (\$000)

Category	Fiscal Year				Total
	2005	2006	2007	2008	
Program Management	Existing Staff				0
Building Energy Efficiency Co-ordinator	Existing Staff				0
Transportation Demand Management Co-ordinator	Existing Staff				0
Engagement and Outreach liaison (Subject to External Funding)	\$0	\$35	\$35	\$35	\$105
Communications and Promotion liaison (Subject to External Funding)	\$0	\$30	\$30	\$30	\$90
O & M	Subject to External Funding				
Grand Total	\$0	\$65	\$65	\$65	\$195

Funding Sources

To support program efforts, it is recommended the City apply for funding from federal and provincial organisations. It is expected that these funding sources will partially or completely cover program costs. A range of funding options exist to support implementation of the LAP, including:

- Access funds from BC Hydro to hire a community energy co-ordinator as was recently done in Whistler,

²¹ The North Shore Recycling Program has already expressed support for this proposal.

-
- Obtain Green Municipal Funds, Opportunities Envelope funding or Infrastructure Canada programs, and
 - Work with the other northshore municipalities to co-fund a shared resource.

Next Steps

A sequence of activities is required to move from planning to action. Once council has endorsed this plan, staff will need to develop detailed work-plans. Critical steps are identified below.

- There are limitations to the analysis completed to develop the baseline and forecast data. While this should not limit efforts to manage GHG emissions in the City, the data requires updating. It is recommended this occur in conjunction with program monitoring requirements.
- Corporate emission reductions activities have commenced, and progress is ongoing. Monitoring activities and communicating success stories is recommended.
- A key opportunity for corporate emission reduction relates to building energy efficiency improvements. It is recommended that staff proceed with a detailed work-plan for completing this work.
- Achieving the interim community emissions reduction target will be a substantial challenge. It is recommended the City review its emission reduction target and resources available to implement the program.
- Of the alternative community wide emissions targets proposed, a 20% per capita is recommended, as it requires a sustained commitment on the part of the community without requiring significant additional expenditures by the City or imposing financial burden on the community.
- Community progress is limited to date. Engagement by businesses and residents on this issue a crucial next step. Therefore, it is recommended that key audiences and messages be developed. Support for additional resources to provide the engagement and outreach functions is recommended. Simultaneously, funding sources such as the Opportunity Envelope can be accessed. Finally, program partnership arrangements need to be initiated with delivery agents such as the North Shore Recycling Program, Natural Resources Canada and BEST.
- A range of program partners exist, such as Green Buildings BC, the Energuide for Houses program, and Better Environmentally Sound Transportation. It is recommended the CNV work with these existing programs to implement the LAP.

Appendix 1: Corporate Facility Emissions Baseline, 1995

Location	GHG Emissions [Tonnes]
NS Museum Warehouse	33
Ottawa Garden Park	<1
Overhead Walkway	1
PGE Station Museum	1
Plaza @ West Esplanade Park	3
Tempe Heights Park	<1
City Hall	272
Centennial Theatre	85
Hammersly House (Now Sold)	50
North Shore Museum	3
City Works Yard	92
Annex (rental Property)	41
Community Policing Station	1
Fire Hall	85
Lonsdale Quay	6
RCMP building	97
Miscellaneous Hydro Accounts	1
Miscellaneous Hydro Accounts	38
Waterfront Park	3
Derek Inman Park	2
Grande Boulevard Park	4
Hamilton Park	<1
Kinsman Park	1
Lonsdale Recreation Centre	497
Loutet Park	21
Mahon Park	47
McDougall Rec Centre	51
Memorial Gym	95
Total	1530