

The City of North Vancouver's

Corporate and Community Update for Greenhouse Gas Emissions Reduction and Monitoring

FCM/ICLEI Partners for Climate Protection Program
"Milestone 5"

December 13, 2010



www.cnv.org

The City of North Vancouver's

**Corporate and Community Update for
Greenhouse Gas Emissions Reduction and Monitoring:**

**FCM/ICLEI Partners for Climate Protection Program
"Milestone 5"**

December 13, 2010

Table of Contents

1.0 Introduction and Summary	4
1.1 Background	4
1.2 Summary of GHG Emissions and Progress towards Reduction Targets	4
PART 1: CORPORATE UPDATE	6
2.0 Corporate GHG Reduction Measures and Actions	6
2.1 Summary of LAP Corporate GHG Reduction Measures	8
2.2 Summary of Additional Corporate GHG Reduction Measures	9
2.3 Evaluation of Cost Savings and GHG Reduction Impact	10
3.0 Corporate Inventory, Monitoring and Reporting	10
3.1 GHG Emissions Inventory Methodology	10
3.2 Monitoring and Reporting Strategy	11
4.0 Corporate GHG Emissions Profile	12
4.1 Overview of GHG Emissions Inventory and Targets	12
4.2 Summary of Progress towards LAP Reduction Targets	14
4.3 Reassessment of Reduction Targets	14
PART 2: COMMUNITY UPDATE	16
5.0 Community GHG Reduction Measures and Actions	16
5.1 Summary of LAP Community GHG Reduction Measures	17

5.2 Summary of Additional Community GHG Reduction Measures.....	18
6.0 Community Inventory, Monitoring and Reporting.....	19
6.1 GHG Emissions Inventory Methodology	19
6.2 Monitoring and Reporting Strategy	19
7.0 Community GHG Emissions Profile.....	20
7.1 Overview of GHG Emissions Inventory and Targets	20
7.2 Summary of Progress towards LAP Reduction Targets.....	21
7.3 Reassessment of Community Reduction Targets	22
PART 3: REPORTING TO STAKEHOLDERS.....	23
8.0 External Monitoring and Reporting.....	23
8.1 PCP Emissions Reduction Measures Report.....	23
8.2 Provincial Community Energy and Emissions Inventory (CEEI).....	23
9.0 Participation and Engagement	23
9.1 Internal Participation and Engagement.....	23
9.2 Stakeholder Consultation	24
9.3 Community Outreach	24
9.4 External Task Forces	25
10.0 Next Steps	25
10.1 Future Initiatives for Energy and Emissions Reduction.....	25
10.2 Data Needs	26
10.3 Summary	26
11.0 Appendices	27
Appendix 1: Emission Factors.....	27
Appendix 2: Summary of Corporate and Community Inventories by Sector and Fuel Type.....	28
Appendix 3: Detailed Technical Documents	30

1.0 Introduction and Summary

1.1 Background

The Partners for Climate Protection (PCP) is a network of over 200 Canadian municipalities that have committed to reducing greenhouse gas (GHG) emissions. PCP is a joint initiative between the Federation of Canadian Municipalities (FCM) and the International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Protection network.

The PCP Program consists of a **five milestone framework** for reducing GHG emissions:

- 1) Creating a GHG emissions inventory and forecast;
- 2) Setting an emissions reductions target;
- 3) Developing a local action plan;
- 4) Implementing the local action plan or a set of activities; and
- 5) Monitoring progress and reporting results.

Since becoming a member of the PCP Program in 1997, the City of North Vancouver has made significant progress through the five milestone framework. Through participation in the Local and Regional Working Group on Climate Change, a GHG emissions baseline for the year 1995 was completed in 2001, in accordance with Milestone 1. In July 2002, Council endorsed the City's preliminary Milestone 2 reduction targets of 20% below the baseline for corporate emissions and 6% below the baseline for community emissions, based on the recommended PCP Program targets. The City moved forward with the development of a GHG reduction action plan and in March 2005, Council endorsed the GHG Local Action Plan (LAP), making the City the second municipality in BC and first in Metro Vancouver to achieve Milestone 3. The LAP outlines cost-effective actions to reduce GHG emissions at both the corporate and community levels. The following targets were adopted in the Plan:

- **Corporate:** By 2010, a decrease of 20% below the 1995 baseline.
- **Community:** By 2010, a decrease of 6% per capita below the predicted 2010 forecast.

Since adoption of the LAP, the City has implemented a number of actions at both the corporate and community level, and has initiated annual target setting, monitoring and review processes. As a result of implementing the measures and actions outlined in the LAP, and by demonstrating stakeholder involvement and Council commitment, the City was awarded Milestone 4 in October 2005, becoming the second municipality in BC and sixth in Canada to have reached that level.

The City is now poised to reach the final Milestone 5, becoming one of only a few municipalities nation-wide to do so. Achieving Milestone 5 involves monitoring and updating the GHG emissions inventory, quantifying the GHG reduction impact of each reduction measure in the action plan, and reporting on stakeholder involvement and overall progress. This process has provided the City with the opportunity to measure the effectiveness of its LAP, as well as highlight achievements, assess key opportunities and challenges, and provide direction for future actions.

1.2 Summary of GHG Emissions and Progress towards Reduction Targets

Corporate emissions are those that a municipality creates through its activities, and those that it has control over, such as municipal building operations, recreation centres, vehicle fleets, and utility services. Based on the City of North Vancouver's updated corporate GHG emissions inventory, total emissions in 2009 were 2,546 tonnes of carbon dioxide equivalent (CO₂e). Emissions had increased gradually from the 1995 baseline until 2008 by a total of 8% (203 tonnes CO₂e). In 2009,

due to the achievement of a number of significant reduction actions, the City's emissions began to decrease and the City saw an overall annual reduction of 4% (110 tonnes CO₂e) from 2008 levels. This is a substantial achievement given an 8% increase in building square footage in 2009. Although the City has not yet reached the reduction target of 20% below the 1995 baseline, which is 1,963 tonnes by 2010, the 4% reduction in emissions in 2009 indicates that great progress is being made in reducing and managing energy and GHG emissions since implementation of the LAP in 2005.

Community emissions are those occurring by residents and businesses in the community, which a municipality cannot directly control, but may be able to influence through planning and program activities. Results of the City of North Vancouver's 2007 Community Energy and Emissions Inventory (CEEI), completed in 2009, indicate that total community GHG emissions in 2007 were 225,763 tonnes CO₂e. These results indicate the City is making progress towards reaching its 2010 reduction target of 217,968 tonnes of CO₂e. Data limitations and methodological differences among inventory years however, make it difficult to accurately determine community emission reductions for the City. Since the Local Action Plan was adopted in 2005, numerous actions have been implemented and significant progress has been made towards reducing community emissions in the City.

PART 1: CORPORATE UPDATE

2.0 Corporate GHG Reduction Measures and Actions

In support of the targets adopted in the LAP, and consistent with the vision of a sustainable community, the City has been very active in implementing numerous actions at both the corporate and community levels to reduce GHG emissions. The City has made every effort to track the specific measures identified in the LAP and to compile a complete, accurate and consistent quantification of emissions, as per the intent of the PCP initiative. Where adequate data could be obtained, indicators were developed and calculations¹ were performed to estimate total CO₂e reductions of each action, following PCP guidelines.

Quantification of specific resource savings, implementation costs, annual cost savings, and GHG reductions for each corporate GHG reduction measure are summarized below (Table 1).

Table 1: Corporate GHG Reduction Measures

	Measure Name	Year Implemented	Sector	Total Implementation Cost	Annual Cost Savings	Annual Resource Savings	Emissions Reduction Impact (t CO ₂ e)
Local Action Plan Measures	Corporate Building Retrofits	2008	Buildings	\$133,000	\$13,000	243,992 kWh	5
	New Civic Building Design Guidelines	2008	Buildings	\$1,811,675*	\$60,000	150,570 kWh and 602 GJ	34
	Conversion to Hybrid Vehicles	2006	Vehicle Fleet	\$10,268*	\$1,800	2,275 litres gasoline (average / year)	5
	Addition of Electric Bikes	2009	Vehicle Fleet	\$1,895	\$80	89 litres gasoline	0.2
	Addition of Electric Forklifts	2010	Vehicle Fleet	\$35,866	\$2,000	3,345 litres propane	5
	Fuel Switching for Light and Heavy Duty Vehicles	2007	Vehicle Fleet	\$0	\$0	158,800 litres diesel replaced with B5 biodiesel (average / year)	22

¹The calculations involved multiplying energy and/or emissions savings by an appropriate emission factor to convert energy usage, fuel reduction or waste diversion into the associated CO₂e equivalent. It is important to note that these calculations were often made under various assumptions due to data limitations, and should therefore be considered as an estimation of the potential reductions of specific measures.

* Incremental cost assumed at 5% for higher efficiency buildings and fleet vehicles.

Additional Measures	Addition of Zero Emissions Vehicle	2009	Vehicle Fleet	\$28,470	\$400	500 litres diesel	1
	Energy Efficient Procurement Policy	2008	Buildings, Vehicle Fleet, Waste	\$0	\$0	n/a	n/a
	Tree Planting and Natural Area Restoration	Ongoing	Land Use	n/a	n/a	1,033 trees planted (average / year) ²	9
	LEC Expansion City wide (including installation of solar hot water panels on Library)	2008	Buildings	\$30,000	\$6,600	656 GJ of total energy saved / m ² of buildings connected	33
	Plaza Fountain Conversion to Cooling Tower	2008	Buildings	\$25,000	n/a	n/a	n/a
	Boiler Replacement at Yard	2010	Buildings	\$65,000	n/a	n/a	n/a
	Turn it Off Challenge	2007 (3 month program)	Buildings	\$0	\$6,000	87,669 kWh	2
	Fuel Tank Vapour Recovery Units	2008	Vehicle Fleet	\$2,796	\$200	232 litres gasoline	1
	Electric Olympia Ice Machine	2008	Vehicle Fleet (Recreation)	\$174,033	\$3,010	5,034 litres propane	8
	Hydrogen Truck Pilot	2009	Vehicle Fleet	n/a	n/a	n/a	n/a
	Driver Training and Enhanced Vehicle Maintenance Program	Ongoing	Vehicle Fleet	n/a	n/a	n/a	n/a
	Transit Pass Reimbursement	1998	Transportation	\$4,494 (average / year)	\$0	31,711 kms total annual average savings	9
	Compressed Work Week	2002	Transportation	\$0	\$0	23,664 kms total annual average savings	7

² This calculation is based on the assumption that planting and maintaining 110 trees sequesters 1 tonne of CO₂e, sourced from the CNV Council Report: PCP Program Update, January 23, 2007.

Staff Bicycle Payroll Deduction Plan	2008	Transportation	\$0	\$0	11,072 kms total annual average savings	3
Staff Business Travel Offset Fund	2009	Transportation	\$30,000	\$0	n/a	n/a
Lunch Room Composting Pilot	2009	Corporate Waste	\$0	\$100	1 tonne waste diverted	1
Trenchless Technology	2009	Corporate Waste	n/a	\$44,000	1,050 tonnes waste diverted	33 ³
Bottled Water Policy	2009	Corporate Waste	\$0	\$1,500	Approx. 2,500 bottles saved / year	n/a
Paper Reduction and Printing Initiatives	2009	Corporate Waste	n/a	n/a	n/a	n/a
Product Reuse and Recycling Initiatives	Ongoing	Corporate Waste	n/a	n/a	n/a	n/a
On-site Composting (Parks Dept.)	2009	Corporate Waste	n/a	n/a	n/a	n/a

2.1 Summary of LAP Corporate GHG Reduction Measures

Buildings

- *Corporate Building Retrofits:* Detailed energy audits were performed on four main City-owned and managed facilities (City Hall, Fire Hall, Gerry Brewer Building, and Operation Works Yard) and retrofit projects were identified. A lighting system upgrade for all core facilities was completed in 2009, in which 3851 lights were replaced.
- *Civic Building Design Guidelines:* The City adopted a Civic Building Policy requiring that all new corporate facilities constructed are energy efficient and environmentally responsible. In 2008 the new Library was constructed according to LEED Silver standards.
- *Energy Efficient Procurement Policy:* The City adopted a sustainable purchasing policy that includes energy efficiency as evaluation criteria, in an effort to reduce the energy consumption of products and services. CNV was a member (2006-08) of B.C. Hydro's green power certificate program, purchasing 10% of its building power from green sources.

Fleet

- *Conversion to Hybrid Vehicles:* The City purchased more efficient hybrid vehicles to replace existing fleet light duty vehicles.

³ The amount of CO₂e saved was calculated based on waste and fuel reductions achieved through the use of trenchless technology compared to an open trench project.

- *Addition of Electric Bicycles:* The City purchased two electric bikes with 350-watt motors and 36-volt lithium polymer batteries, for staff use on short-haul trips up to 10 kilometres. The City's Parks Foreman, who previously drove a van, now largely uses an electric bicycle to visit sites.
- *Addition of Electric Forklifts:* Starting in 2010, the City's propane forklifts are being replaced with electric forklifts.
- *Fuel Switching for Light and Heavy Duty Vehicles:* 5% biodiesel (B5) is being used for all diesel fleet vehicles.
- *Addition of Zero Emissions Vehicle:* The City purchased a plug-in electric Neighbourhood Zero Emission Vehicle, a small-scale dump truck that is used as part of the cemetery operations.

Landscape

- *Tree Planting and Natural Area Restoration:* Each year trees are planted on City lands through park improvement projects, habitat enhancement projects, and as off-site amenities associated with new developments. On average, planting and maintaining 110 trees sequesters 1 tonne of CO₂e, helping to purify the air.

2.2 Summary of Additional Corporate GHG Reduction Measures

Building on the measures outlined in the 2005 Local Action Plan, the City has implemented numerous additional actions and initiatives that have achieved considerable energy and emissions reductions.

Buildings

- Expansion of the Lonsdale Energy Corporation (LEC) district energy heating system City wide, including City Hall and the Library, optimizes heating efficiency through a network of well-insulated pipes. The Library features the largest solar hot water panel array in BC, which generates renewable energy for LEC.
- The City plaza fountain functions as a cooling tower for the Library air conditioning and heating system.
- The stand-alone boiler at the City Operations Yard has been replaced with a higher-efficiency model.
- Participation in the 2007 Turn it Off Challenge, where City residents were encouraged to join City staff in becoming as energy efficient as possible for 30 days, garnered the City second place honours in the category of 15,000 to 50,000 residents.

Vehicle Fleet

- The installation of fuel tank vapour recovery units at the operations yard captures and recovers valuable gas streams that may otherwise be a significant environmental pollutant.
- The propane Zamboni at Harry Jerome recreation centre has been replaced with an electric Olympia ice machine.
- A hydrogen-powered light truck was piloted; however, the City has determined the vehicle is not fit for purpose due to space, technology and feasibility constraints.
- Participation in the Enhanced Vehicle Maintenance Program (E3 Fleet Accreditation) is in progress, utilizing existing programs such as the Fleet-smart program from Natural Resources Canada, and the Canada Fleet Challenge from the BC Climate Exchange.

Corporate Waste

- The City's use of trenchless technology in sewer renewal eliminates the need for a full-length excavation, thus reducing the amount of waste to be disposed of and new paving required.
- A lunch room composting pilot program was initiated by the Green Team.

- Bottled water has been phased out at City facilities, including City Hall, Library, Fire Hall, Waterfront Office, Operations Centre, and Gerry Brewer RCMP building.
- Conversions to paperless systems (e.g. electronic applicant tracking system and paperless billing for BC Hydro and Terasen accounts) help minimize paper use. Most printers also print double-sided by default, and scanning has been enabled on many machines, enabling staff to share electronic versions of documents rather than making photocopies.
- Product reuse and recycling initiatives help divert waste, including: all wood waste is collected and sent for recycling; used waste oil from the garage is returned for recycling; PVC waste ends are returned and manufactured into new PVC pipe; and sweeper brush heads are returned to supplier for reuse.
- On-site composting and mulching techniques are being used by parks staff to avoid vehicle trips to the transfer station.

Transportation

While employee commuting is not included in the corporate GHG emissions inventory, the City has implemented a number of transportation demand management programs for employees, including:

- The provision of a partial employee reimbursement program for Translink Transit Passes.
- Participation in a compressed work week schedule.
- Encouraging cycling to work through the provision of a staff bicycle payroll deduction plan, as well as bike racks and lockers provided at City Hall and the Operations Yard.
- The provision of \$30,000 to fund non-formal staff business travel offsets.

2.3 Evaluation of Cost Savings and GHG Reduction Impact

The implementation of trenchless technology for sewer maintenance had the highest cost savings of \$44,000 and a substantial emissions reduction of 33 tonnes CO₂e. In the buildings sector, LEC expansion to central Lonsdale resulted in the most substantial emissions reduction of 33 tonnes CO₂e, and had the highest cost savings of \$6,600 relative to implementation costs. Developing the new Library according to LEED Silver standards resulted in the highest CO₂e reduction of 260 tonnes CO₂e, but had the lowest cost savings of \$16,000 relative to the high implementation cost of construction.

3.0 Corporate Inventory, Monitoring and Reporting

The City's 1995 emissions inventory baseline, completed by Hyla Environmental, was comprised of analyses of the emissions generated by corporate operations and those associated with the community as a whole. The City retained Sheltair (now Stantec) to perform an update to the 1995 corporate and community inventory baseline in 2006. In the update, an attempt was made to provide a comparison of 1995, 1999 and 2006 data, but complete information on the methodology and data sources for 1995 and 1999 was unavailable. Due to these data limitations and differences in methodologies, comparisons to previous corporate and community emission inventories must be made with caution. For the purposes of the City's Milestone 5 submission, the corporate and community baseline data used will be the 1995 baseline, which informed the development of the LAP and the emission reduction targets.

3.1 GHG Emissions Inventory Methodology

In 2008, a new GHG accounting system was developed by Enerficiency Consulting for the City. This system allowed 2005-07 data to be added, as well as subsequent years. For the corporate

buildings emission profile, a list of addresses was compiled from utility accounts being billed to the City of North Vancouver. Electricity data was obtained directly from BC Hydro for City-owned facilities, recreation facilities within the City (with authorization by the North Vancouver Recreation Commission (NVRec)), and for Presentation House and North Shore Neighbourhood House (with authorization by each respective society). In the case of Centennial Theatre, electricity is supplied through Harry Jerome Recreation Centre, but consumption was provided by NVRec. Where there were discrepancies or omissions between new data received from BC Hydro and Terasen Gas and the 2006 update, the new data was used. Consumption was normalized for 365 days except where a building was not occupied for the full year.

Natural gas data was obtained directly from Terasen Gas for City facilities, recreation facilities within the City (with authorization by NVRec), and for Presentation House and North Shore Neighbourhood House (with authorization by each respective society). District heating energy consumption data was provided by the NVRec for the John Braithwaite Community Centre. Natural gas consumption for the new Library was provided by Lonsdale Energy Corporation, which was converted to district heating energy assuming 90% efficiency.

Vehicle fuel (gasoline and diesel) consumption was provided by the City's Public Works Manager, by individual vehicle. Use of 5% biodiesel is accounted for in 2008, and for half of 2007. Solid waste volumes were obtained from the City Operations Yard for all years. Solid waste from other facilities was calculated as part of the 2006 inventory update, based on bin sizes and pickup frequency. However, as pickup frequency remains the same in the City regardless of the amount of waste in the bins, this methodology does not accurately represent actual waste amount, making it challenging to detect changes in the quantity of waste being disposed of. As such, these values were assumed to have not changed and the same values were used for 2007-2009.

3.2 Monitoring and Reporting Strategy

Internal monitoring and reporting mechanisms have been implemented in the City to track corporate inventories and actions, to determine whether reduction measures are producing anticipated results, and to assess whether emissions reduction targets are being met. The City provides annual information reports to Council summarizing corporate GHG inventory results and progress towards reduction targets. In addition, project-specific reports are submitted periodically by program participants. Minimum reporting requirements include progress on implementation of projects and status of emission reduction measures, performance in comparison with expectations or reduction targets, and total GHG reductions.

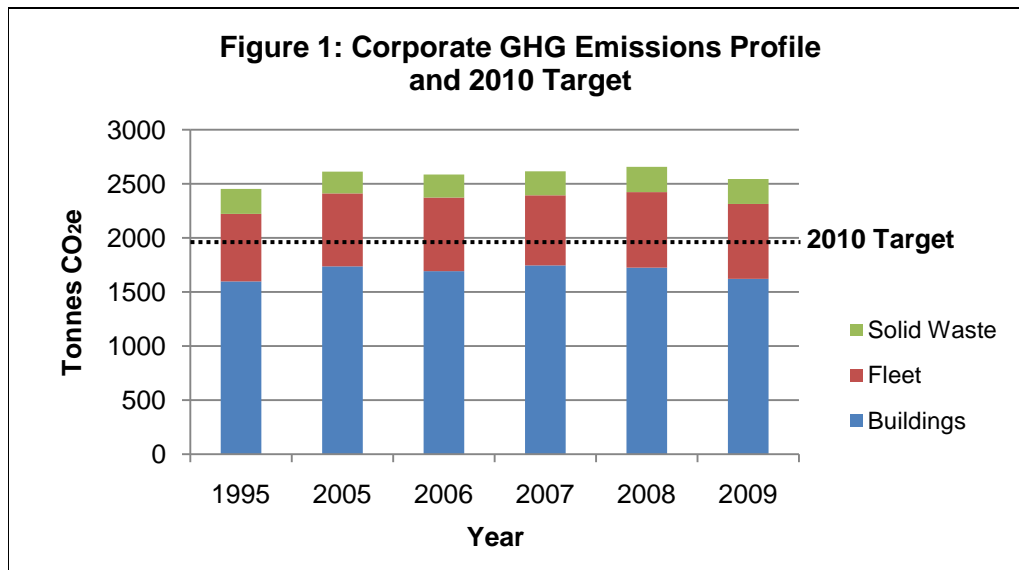
The City's Corporate Energy and Greenhouse Gas Management Team, formed in January 2009, meets quarterly and is responsible for compiling data for the City's corporate energy and GHG emissions inventory, and reporting on reduction actions in each department. The team has representation from facilities, parks, transportation, recreation, public works, and finance. The data is managed by the City's Manager, Accounting Services. The data collected provides the City with the information needed to evaluate the effectiveness and significance of reduction actions, as well as highlight achievements, assess key opportunities and challenges, and provide direction for future actions. These monitoring and reporting processes will continue to be adapted to ensure targets being met and to ensure best practices are achieved for the City.

The City has also recently implemented a requirement for all City departments to report qualitatively on GHG implications for each project in the Capital Budget Project Plan. This requires every department to identify potential sources of GHG emissions for each project along with any reduction

opportunities and GHG reduction benefits that could result from the project. Where information is readily available for buildings and fleet, these departments are required to provide quantitative data on energy use and GHG emissions.

4.0 Corporate GHG Emissions Profile

4.1 Overview of GHG Emissions Inventory and Targets



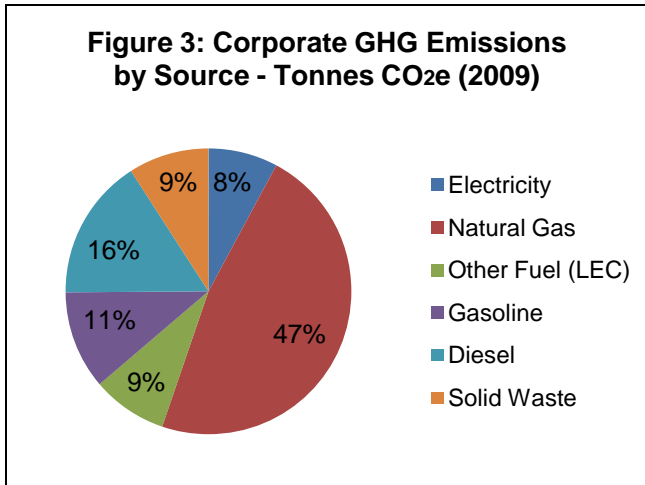
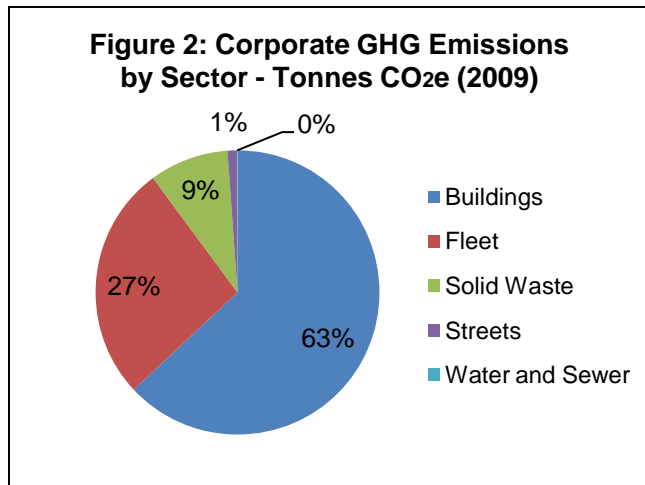
The City's corporate GHG emissions have gradually increased since the 1995 baseline year until 2008. In 2009, despite growth in fleet and facilities to provide services, the City's corporate emissions began to decrease and the City saw the greatest overall annual reduction of 4% (110 tonnes) from 2008 levels (Figure 1). The City's 2009 emissions totaled 2,546 tonnes, equivalent to approximately 442 passenger vehicles or 5,371 barrels of oil. This accomplishment can be attributed predominately to a significant decrease in building emissions. As an example, the new City Library, at 36,000 square feet (approximately three times the size of the previous library) represented alone an increase of 8% in square footage to the City's existing facilities, and yet building emissions decreased. While the City has not reached its reduction target of 20% below the 1995 baseline (1,963 tonnes), the 4% reduction in corporate emissions in 2009 is a significant achievement, one that has been facilitated by the actions outlined in the 2005 LAP.

In the buildings sector, emissions peaked at 1,747 tonnes in 2007, followed by a decrease of 21 tonnes (1%) in 2008 and an additional considerable decrease of 103 tonnes (6%) to 1,623 tonnes in 2009. This decrease is due to a reduction in energy use demand through improved system optimization and scheduling, as well as a comprehensive lighting retrofit, boiler efficiency upgrades, and an increased number of buildings connected to the City's LEC district heating system and developed under the new civic building design guidelines.

Corporate fleet emissions remained fairly steady over the 2005 to 2007 period, peaking at 698 tonnes in 2008. The increase in emissions of 52 tonnes (8%) in 2007 from 2008 is likely due to the fact that the region received a substantial amount of snowfall in 2008-09, requiring increased fleet activity for snow removal. This illustrates that fleet emissions are dependent on and reflective of

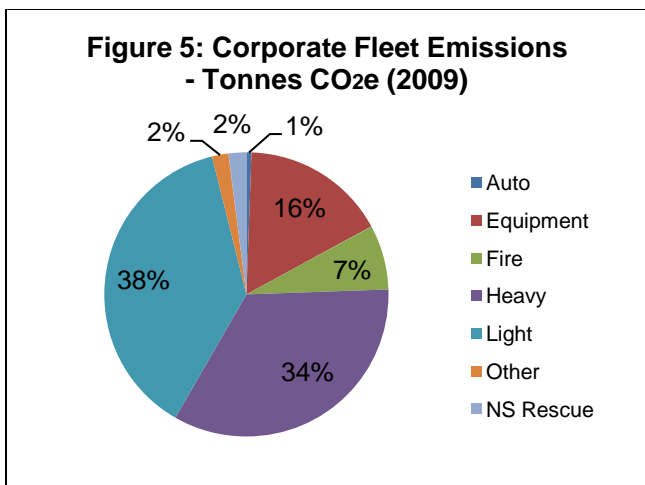
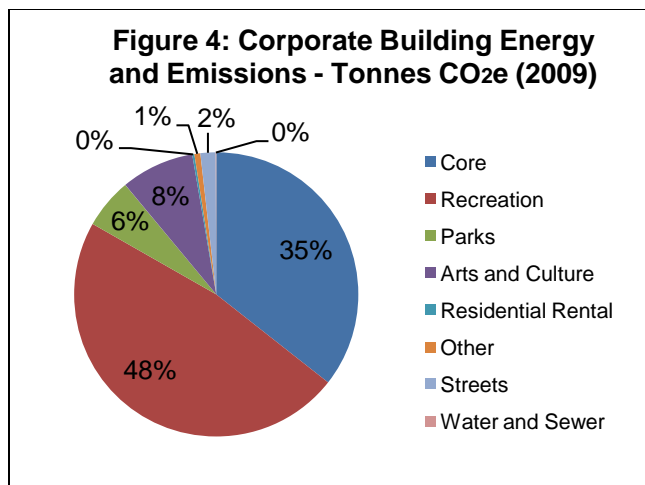
external weather conditions, and can therefore show an increase despite actions taken by the City to decrease emissions such as technology upgrades. In 2009, fleet emissions decreased by 7 tonnes (1%), which is a significant achievement despite an average annual 2% growth in the City's fleet.

In the solid waste sector, while it appears emissions have remained quite stable over the 1995-2009 period, it is difficult to detect any change in emissions due to methodology limitations. Reducing emissions through increased waste diversion represents an area of opportunity for the City.



In 2009, the greatest contributor to the City's corporate emissions was from the buildings sector, at 64% (1,623 tonnes), followed by fleet at 27% (691 tonnes), and solid waste at 9% (232 tonnes). Water, sewer and streetlights make up the remaining 1% (29 tonnes) of the corporate emissions profile (Figure 2).

The major source of the City's corporate emissions in 2009 was the use of natural gas for heating buildings, at 47% (1,207 tonnes), including 9% (217 tonnes) for LEC district heating. Fleet use of diesel and gasoline consumption also contribute a significant amount to the emissions profile at 16% (408 tonnes) and 11% (283 tonnes) respectively. Electricity contributed only 8% (200 tonnes) of emissions, as it largely comes from hydroelectric renewable sources in BC. Emissions from solid waste make up the remaining 9% (232 tonnes) of the City's corporate emissions profile (Figure 3).



Recreation facilities in the City comprise 48% (773 tonnes) of building-related energy consumption and GHG emissions, followed by core City buildings (City Hall, Library, Fire Hall, RCMP Building and Operations Yard) at 35% (578 tonnes). A number of smaller community and park buildings make up the remaining 17% (272 tonnes) of energy use and emissions (Figure 4).

In the vehicle fleet sector, light and heavy trucks make up the majority of emissions at 38% (261 tonnes) and 34% (234 tonnes) respectively. Equipment contributes 16% (114 tonnes) of emissions, followed by fire at 7% (51 tonnes). Automobiles, North Shore Rescue and other vehicles make up the remaining 5% (31 tonnes) of emissions (Figure 5).

4.2 Summary of Progress towards LAP Reduction Targets

Table 2: Corporate Progress towards Reduction Targets

Sector	Baseline tonnes CO ₂ e (1995)	LAP Adoption tonnes CO ₂ e (2005)	Current tonnes CO ₂ e (2009)	Percent Change (2005 to 2009)	Percent Change (2008 to 2009)	Growth Indicators (2005-2009)
Buildings	1,598	1,738	1,623	0%	- 6%	Number of buildings increased by 5%
Fleet	625	673	691	+ 2%	- 1%	Fleet size increased by 7%
Solid Waste	230	202	232	N/A*	N/A*	
TOTAL	2,453	2,613	2,546	+ 2%	- 4%	

*Note: due to estimation method used for solid waste year to year comparisons are not possible. The reporting system is currently being updated so that year to year changes can be detected.

Measuring the success of the 2005 LAP requires information on results achieved relative to expected outcomes. Based on the City's updated corporate GHG emissions inventory for 2009, emissions have increased by a total of 2% (44 tonnes) over the period of 1995 to 2009. Although the City did not meet the reduction target of 20% below the 1995 baseline, which is 1,963 tonnes by 2010, the 4% reduction in emissions achieved in 2009 over 2008 levels indicates that progress is being made in reducing and managing energy and GHG emissions since implementation of the LAP in 2005 (Table 2).

4.3 Reassessment of Reduction Targets

The City is currently in the process of updating the corporate component of the 2005 LAP and reassessing the 2010 emission reduction targets. The Corporate Climate Action Plan update will address three main issues: (1) staff engagement and demonstrating corporate leadership, (2) identifying further reduction opportunities and targets, and (3) developing a policy for carbon offset purchase in advance of 2012 Climate Action Charter municipal operations carbon neutrality requirements.

PART 2: COMMUNITY UPDATE

5.0 Community GHG Reduction Measures and Actions

Quantification of specific resource savings, implementation costs, annual cost savings, and GHG reductions for each community GHG reduction measure are summarized below (Table 3).

Table 3: Community GHG Reduction Measures

	Measure Name	Year Implemented	Sector	Total Implementation Cost	Annual Cost Savings	Annual Resource Savings	Emissions Reduction Impact (t CO ₂ e)
Local Action Plan Measures	Residential Building Retrofits	2008	Buildings	\$12,000	n/a	3.9 tonnes CO ₂ e saved / retrofit	612
	Land Use Planning that Supports Smart Growth	2002	Buildings	n/a	n/a	n/a	n/a
	LEC District Energy Heating System Expansion	2003	Buildings	\$30,000	\$47,000	13,934 GJ of total energy saved / m ² of buildings connected	711
	Sustainable Development Guidelines for Buildings	2002	Buildings	n/a	n/a	544,050 kWh and 2,176 GJ total energy saved / m ² of LEED certified buildings	123
	Transportation Demand Management	Updated in 2006	Transportation	Approximately \$70,000	n/a	1,560m of bike lanes added in 2008-09	n/a
	Anti-Idling Bylaw	2005	Transportation	\$4,000	n/a	n/a	n/a
	Multi-Family Recycling	Ongoing	Waste	n/a	n/a	1,786 tonnes of waste diverted (average / year)	864
	Single-Family Recycling	Ongoing	Waste	n/a	n/a	1,791 tonnes of waste diverted (average / year)	867
	Recycling Drop-Off Depot	Ongoing	Waste	n/a	n/a	440 tonnes of waste diverted (average / year)	213
	Backyard Composting	Ongoing	Waste	n/a	n/a	34 tonnes of waste diverted (average / year)	16

	Yard Trimming Collection	Ongoing	Waste	n/a	n/a	1,360 tonnes of waste diverted (average / year)	658
	North Shore Recycling Solid Waste Diversion Programs	Ongoing	Waste	n/a	n/a	n/a	n/a
	Climate Change Showdown	2008	Outreach	\$4,000	n/a	452 students involved (average / year)	210 ⁴
	Parks and Environment Grants	Ongoing	Outreach	\$26,500	\$0	4 organizations involved (average / year)	n/a
	Sustainable Transportation Grants	Ongoing	Outreach	\$4,300	\$0	2 organizations involved (average / year)	n/a
Additional Measures	Zero Emissions Vehicle Bylaw	2009	Transportation	n/a	\$400	n/a	n/a
	Bike to Work Week	2008	Transportation	\$0	\$0	16,691 kms saved (average / year)	4
	Urban Agriculture and Community Gardens	2004	Land Use	\$200,000	n/a	2,700 m ² of community garden space added	n/a

5.1 Summary of LAP Community GHG Reduction Measures

Buildings

- *Residential Building Retrofits:* The City implemented a dedicated outreach program in partnership with the City of Vancouver Sustainability Office to promote the LiveSmart BC efficiency incentive program, which encourages home energy retrofits in detached and semi-detached houses through outreach, and by promoting senior government and utility grant opportunities to homeowners.
- *Land Use Planning that Supports Smart Growth:* The City's 2002 Official Community Plan (OCP) is based on Smart Growth BC principles.
- *LEC District Energy Heating System:* The City's award winning LEC district heating system continues to expand as new residential buildings are constructed.
- *Sustainable Development Guidelines for Residential and Commercial Buildings:* Sustainable Development Guidelines based loosely on the LEED criteria were developed, providing

⁴ The amount of CO₂e saved is based on results from the student lead initiatives to reduce emissions through the Climate Change Showdown program.

developers with social, economic, and environmental considerations for the planning and implementation of new developments.

Transportation

- *Transportation Demand Management*: The City's comprehensive multi-modal Transportation Plan places an emphasis on enhancing pedestrian routes, greenways and bike corridors, and improving accessibility to transit. The Plan serves as a road map over the next 20 years and beyond.
- *Anti-Idling Bylaw*: The City's Street and Traffic Bylaw was amended to limit the amount of time drivers may allow their vehicle engines to idle while stationary.

Waste

- *Single-Family and Multi-Family Recycling, Recycling Drop-Off Depot and Backyard Composting*: Services, facilities and outreach programs are provided to City residents by the North Shore Recycling Program.
- *Yard Trimming Collection*: Services are provided by the City of North Vancouver.

Outreach

- *Climate Change Showdown*: In partnership with the BC Sustainable Energy Association, the City delivers the Climate Change Showdown, an educational contest for students to reduce energy and emissions.
- *Parks & Environment Grant Program*: \$30,000 is awarded annually to support small-scale, community-based parks and environmental initiatives, such as bike valet programs.
- *Sustainable Transportation Grants*: \$4,300 is awarded annually to community-based sustainable transportation organizations, such as local cycling groups.
- *Climate Smart*: The City has partnered with the North Vancouver Chamber of Commerce to offer Climate Smart, a program offering tools, training and technical support for businesses to reduce their GHG emissions and improve their financial bottom line.

5.2 Summary of Additional Community GHG Reduction Measures

Buildings

- The City is the first municipality in British Columbia with a density bonussing bylaw that ensures that higher energy efficiency standards (ASHRAE 90.1 2007 for institutional, commercial, industrial and large residential buildings; EnerGuide 80 for all smaller residential buildings) are secured for almost 100% of all new homes and buildings constructed in the City.

Transportation

- Adoption of a Zero Emission Vehicle Bylaw that allows electric vehicles on some City roads.
- Participation in Bike to Work Week, encouraging bicycle commuting and therefore reduced GHG emissions.

Land Use

- The City added a second community garden near Queen Mary School to its existing garden at 2nd and St Georges, enabling residents living in higher density neighbourhoods to grow food locally. In 2009, the City also began a five year urban agriculture pilot project in partnership with the UBC Greenskins Lab.

6.0 Community Inventory, Monitoring and Reporting

6.1 GHG Emissions Inventory Methodology

Data for the City's current community GHG inventory has been obtained from the *Community Energy and Greenhouse Gas Emissions (CEEI) Inventory Report* completed by the Province for the year 2007. The CEEI Report was released in 2009 and provides total community energy and emissions estimates for each municipality in BC for the year 2007 in the transportation, buildings and solid waste sectors. The 2009 CEEI Report informed the update to the community section of the LAP and development of the City's recently adopted Community Energy and Emissions Plan (CEEP). In May 2010, an updated version of the 2009 CEEI Report was released. The methodology varied slightly in the updated report, particularly the exclusion of large industrial buildings, which accounts for the reassessment of GHG emissions from 225,000 tonnes CO₂e (2009) to 214,000 tonnes CO₂e (2010). As the 2009 CEEI Report was used to develop the City's CEEP, for the purposes of continuity, the data from the 2009 CEEI Report will be used for the City's Milestone 5 submission.

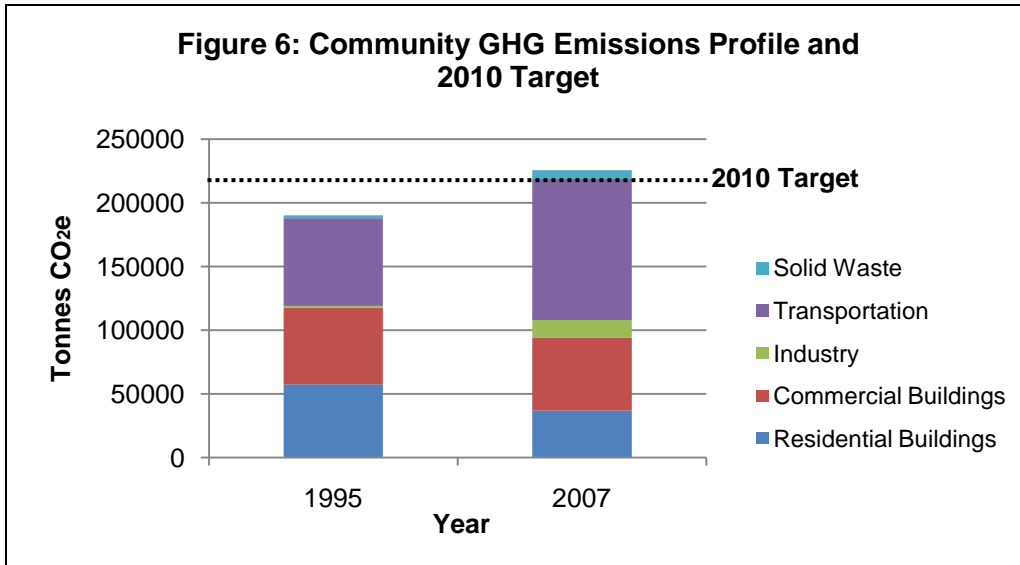
Differences in the methodology for compiling community data for the 1995 baseline, the 2006 update mentioned in Section 3.0, and the 2009 CEEI Report make comparisons between inventories challenging. For example, the port lands along the south shore of the City were excluded in the 1995 baseline but included in the 2009 CEEI Report, resulting in an apparent increase in industrial emission values between 1995 and 2007. In addition, without detailed analysis of the productivity and type of industry in the City and knowledge of industry standards, it is difficult to determine the relative efficiency of the City's industrial facilities. Due to these limitations, it is difficult to accurately discern trends in community energy and emissions reductions. Improved access to data and standardized methodologies will improve the ability of the City to detect changes in community energy and emissions over time.

6.2 Monitoring and Reporting Strategy

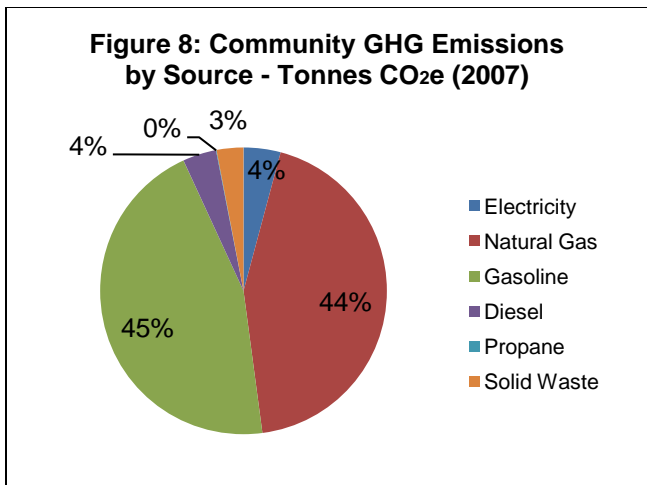
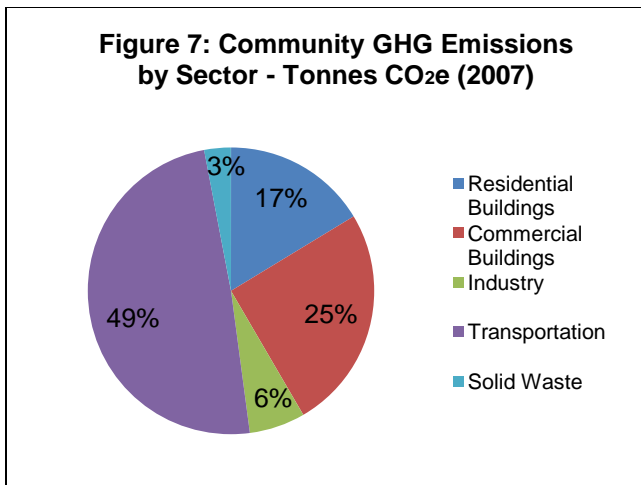
The City has hired a Community Energy Manager to focus on the implementation and monitoring strategy for the CEEP. While data availability makes monitoring far more challenging at the community level, the City is currently developing a monitoring strategy which will take advantage of all available information. The Ministry of Environment has indicated that future CEEI reports will be made available for municipalities every two years, beginning in 2011 (for the 2010 inventory). This will enable the City to conduct more accurate comparisons of community emissions in future years, and will be a useful monitoring tool.

7.0 Community GHG Emissions Profile

7.1 Overview of GHG Emissions Inventory and Targets

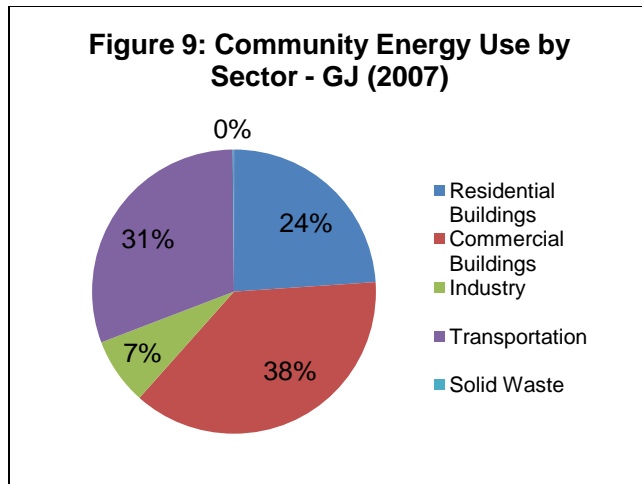


In 2007 the City’s community GHG emissions were 225,763 tonnes of CO₂e (5 tonnes per capita and 3 tonnes per combined residents and jobs) (Figure 6). Due to scope and methodological differences among inventory years as discussed previously, it is difficult to accurately discern trends in community energy use and emissions for the City. The perceived increase in 2007 could possibly be attributed to the inclusion of port lands in the 2007 inventory, which were excluded in the 1995 baseline. While it seems that the City has not reached its reduction target of 217,968 tonnes, data limitations obscure verification of this fact.



In 2007, community emissions were closely divided between transportation which makes up 49% (110,871 tonnes) and buildings, which contribute 48% (108,105 tonnes) (Figure 7). Within the buildings sector, residential buildings make up 17% (36,854 tonnes) of total emissions, commercial buildings contribute 25% (57,073 tonnes), and industry contributes 6% (14,178 tonnes). The remaining 3% (6,788 tonnes) of the community emissions profile is attributed to solid waste.

The major sources of the City’s community emissions are again closely divided between gasoline at 45% (102,152 tonnes), and natural gas for heating buildings, which constitutes 44% (98,670 tonnes) (Figure 8). Electricity and diesel both make up approximately 4% of emissions (9,435 tonnes and 8,551 tonnes respectively), while propane contributes >1% at 167 tonnes. Emissions from solid waste make up the remaining 3% (6,788 tonnes).

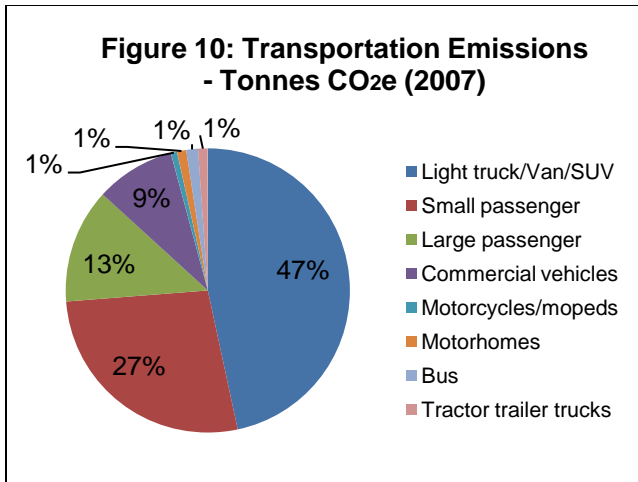


Buildings consume the majority of the City’s community energy at 69% or 3,472,876 GJ (38% for commercial buildings, 24% for residential buildings, and 7% for industry) (Figure 9). Energy use for transportation accounts for the balance at 31% (1,593,527 GJ). These results indicate substantial opportunities for the City to reduce energy use in buildings and in transportation, which are also the largest sources of community emissions.

7.2 Summary of Progress towards LAP Reduction Targets

Due to scope and methodological differences among inventory years as previously discussed, it is impossible to accurately assess community emission reductions for the City. However, progress is being made in reducing emissions in the community building sector due to the implementation of numerous reduction actions including the LiveSmart BC home retrofit program and Climate Smart program for businesses, an increased number of buildings connecting to the City’s LEC district heating system, and an increased number of buildings being developed according to sustainable building guidelines. These actions are significant towards achieving community emissions reductions given that the City’s population is growing at a rate of 5.7%.

With regard to transportation, because of its dense development pattern and the concentration of jobs in a central business district with good transit connections, the percentage of transportation emissions in the City is lower than is typical for municipalities in BC, but is still a significant contributing factor to community emissions. The 2010 CEEI Report states that single occupancy vehicle commuting in the City has increased slightly from 61% in 1996 to 62% in 2006, while walking, biking, and use of transit have remained relatively stable (2006 Census of Canada). This warrants attention for future efforts towards reducing community transportation emissions, particularly with regards to single occupancy vehicle use.



While the City already provides numerous waste diversion opportunities, solid waste is also an important area to focus emission reduction efforts and increase waste diversions actions given the increasing population.

7.3 Reassessment of Community Reduction Targets

The City recently completed an update to the community component of the 2005 LAP, and in April 2010, Council endorsed the new Community Energy and Emissions Plan (CEEP) in principle. The CEEP provided analysis to support the OCP Amendment necessary for the City to comply with the new Provincial Bill 27 requirements to include community GHG reduction targets, policies and actions in official community plans. The CEEP identifies the most innovative and effective strategies and actions for maximum community GHG reductions in the following sub-sectors: land use planning, buildings, transportation, energy supply, waste, and ecosystems.

Taking into consideration the analysis and stakeholder engagement that took place in the development of the CEEP, and in recognition that there is much uncertainty regarding the future of technology, energy prices, the implementation of senior government policies and actions, and other important factors that will drive emission trends, the City adopted new community-wide targets for GHG reduction along with key supporting sector-based targets over the course of the next decade:

- **15%** reduction in GHG emissions below 2007 levels by the year 2020
- **50%** reduction by 2050

These targets represent an ambitious but realistic goal, and are even more compelling when one considers that the City is already a relatively lean carbon community with low per capita emissions, and thus has fewer opportunities for reduction. To meet the reduction targets, the City requires an 112,882 tonne decrease in total community energy and GHG emissions by 2050. A Low Carbon Energy and Emissions Path centered around policies and actions was developed as part of the CEEP, encompassing the emissions reduction strategies presented in the Plan to achieve the adopted targets. The Plan also lays the foundation for energy and climate considerations in the forthcoming overall update to the City's Official Community Plan.

PART 3: REPORTING TO STAKEHOLDERS

8.0 External Monitoring and Reporting

8.1 PCP Emissions Reduction Measures Report

As a member of PCP and a local leader in sustainability initiatives, the City will continue to report on its corporate and community emissions to the FCM PCP Program's annual Emissions Reduction Measures Report, to demonstrate its continued commitment to energy and emissions reduction strategies. The City recognizes that by analyzing the impacts of specific actions and reporting progress to the PCP, municipalities can build support at the local level and help PCP to demonstrate the cumulative impact of the program at a national level.

The City has also committed, through the BC Climate Action Charter as of 2012, to report on its corporate emissions to the Province of British Columbia.

8.2 Provincial Community Energy and Emissions Inventory (CEEI)

The accuracy and detail of the CEEI Reports will continue to be reviewed and improved as part of the Province's commitment to adaptive management and continuous improvement (CEEI Technical Guidance Document, 2010). As refinement of the methodologies and data input continues, baseline inventories will also be updated to reflect the progressing assessment practices (CEEI Technical Guidance Document, 2010).

9.0 Participation and Engagement

9.1 Internal Participation and Engagement

Council has taken a proactive role since the City first joined the PCP Program in 1997. Since that time, Council has endorsed each of the City's Milestone submissions, and has been kept up to date on civic GHG initiatives through regular progress reports.

The City is also fortunate to have dedicated staff with a high degree of engagement and commitment to climate action. The City is currently in the process of developing a corporate climate action engagement strategy to communicate the results of the GHG emissions inventory and reduction action progress with staff and gain momentum and support for future initiatives.

City employees have also been very active in establishing various working groups to support the implementation of corporate and community energy and emissions reduction measures, including the Corporate Energy and Greenhouse Gas Management Team, Climate Action Task Force, CEEP Implementation Team, and Energy Efficient Buildings Working Group:

Corporate Energy Management Team:

The Corporate Energy Management Team is comprised of staff responsible for corporate energy management within their departments. Representatives from facilities, parks, transportation, recreation, public works, and finance meet quarterly to identify operational measures and capital improvements to achieve energy savings and GHG reductions. These efforts focus on opportunities in City-owned buildings, recreation centres, vehicle fleet, parks, and street lights/traffic signals. In

December 2009 the team implemented the City's first annual corporate energy and GHG emissions inventory and reporting system, as presented in Section 3.0 of this report.

Climate Action Task Force:

A cross-departmental Climate Action Task Force was formed in March 2009 and played a key role in providing high level coordination of climate action initiatives in the City, and oversaw the development of the CEEP. The task force had representation from the City Manager's Department, Finance, Community Development, and Engineering, Parks and Environment, and worked to position the City as a leader in climate action within both corporate operations and as a community.

CEEP Implementation Team:

The City has formed a cross-cutting team of dedicated staff, who will focus on developing the Implementation Strategy for the CEEP, through which aggressive actions will be implemented to realize the identified targets and objectives, resulting in significant and positive change in the community. Future decisions by the City will be viewed through the lens of the Plan and associated targets, policies and actions incorporated into the City's Official Community Plan.

Energy Efficient Buildings Working Group:

Formed in September 2009, the Energy Efficient Buildings Working Group gathers technical expertise, inter-departmental staff, and community and industry representation to focus on the investigation of regulatory and incentive options to improve the energy efficiency of buildings. The working group has outlined immediate, intermediate and long-term strategies for Council's consideration to improve energy performance in new and existing buildings.

9.2 Stakeholder Consultation

As part of the development of the City's LAP in 2005, a series of stakeholder workshops were conducted with City staff, residents, and businesses. The purpose of the workshops were to provide information on the City's GHG emissions profile and a preliminary overview of GHG reduction opportunities, and to seek feedback on other reduction opportunities, barriers to participation, and means in which the City could assist the community in reducing their GHG emissions.

Numerous public engagement opportunities were also integrated in the process of developing the CEEP in 2009-10. Staff and HBLanarc Consultants hosted the following public consultation events:

- Workshops with Council and City Advisory Committee consultations (15 people involved)
- Two intensive stakeholder workshops with community and business representatives (42 people attended)
- Two public open houses (32 people attended)
- One public hearing for the OCP Bylaw Amendment

The City also maintains a comprehensive, high traffic website where content on climate action and sustainability progress and opportunities have been uploaded to foster interest and action.

9.3 Community Outreach

The City has a dedicated energy and emissions reduction outreach program and recognizes the significant impact that encouraging energy conservation can have on a community. Specific outreach actions the City has implemented include: 1) LiveSmart BC home retrofit program, 2) Climate Change showdown, 3) Climate Smart program in partnership with the Districts of North and West Vancouver, Metro Vancouver, and the North and West Vancouver Chambers of Commerce.

The Green City Living Film and Speaker Series is also hosted by the City on the third Tuesday of each month from May to November. Each evening is hosted by a different member of Council, and features exciting new films and presentations from local experts on sustainability and climate action topics. The community is also kept up to date on City initiatives through the City's ongoing public information program. Through these actions the City and community are among the national leaders in energy and emissions reduction and sustainability.

9.4 External Task Forces

City staff are members of external groups such as the Regional Engineers Advisory Committee and Climate Protection Sub-Committee, the Metro Vancouver Technical Advisory Committee and the Regional Clean Air Communication Team.

10.0 Next Steps

10.1 Future Initiatives for Energy and Emissions Reduction

The City is committed to continue to seek out new opportunities and strategies to reduce energy and GHG emissions at a corporate level and in the community. The following initiatives are currently in progress:

Corporate Initiatives

- Implementing an automated DDC Building Control System, allowing for enhanced monitoring, metering and scheduling of energy use in core buildings. This initiative includes system optimization changes at core facilities, such as reduced fan operation and lighting controls.
- Considering a pilot program to retrofit street lights with higher efficiency LEDs.

Community Initiatives

- Encouraging higher efficiency standards for new and existing buildings, and increasing sustainable transportation modes through implementation of the innovative Transportation Plan.
- Developing a draft construction waste bylaw to reduce the amount of waste (embodied energy, etc.) created by construction.
- Guided by Metro Vancouver's Integrated Solid Waste and Resource Management Plan, the City will be increasing opportunities for food waste diversion in single- and multi-family homes, and reducing litter in streets, parks and public spaces.

The City is also committed to providing ongoing training and education opportunities for employees, to ensure they are able to meet the challenges that may arise with new operational processes or products associated with reduction initiatives. This includes the driver training and enhanced vehicle maintenance program, and electric bicycle training sessions for employees. Additional actions such as Bike to Work Week, and encouraging environmentally friendly paper reduction initiatives also help to educate, facilitate and motivate employees to make sustainable choices both at work and in the community. As previously mentioned, a component of the Corporate Climate Action Plan update includes a staff engagement strategy to ensure effective communication of best practices and corporate leadership is in place.

The City will continue to seek out effective partnerships with other municipalities and organizations both regionally and nationally. For example, the City has enjoyed a record of success in residential

solid waste diversion through the work by the North Shore Recycling Program, in partnership with the Districts of North Vancouver and West Vancouver. Recent education efforts have increased composting of organics in single-family residences and diversion of recyclables in multi-family residences, and the City is committed to facilitating and encouraging additional outreach opportunities. The City has also joined other Metro Vancouver municipalities in the regional Zero Waste Challenge, targeting a 70% diversion rate for waste by 2015, and is working to partner with available programs that address the larger issues of global climate change, such as Climate Smart and Better Environmentally Sound Transportation (BEST).

Continued engagement with the community on issues of energy and emissions reduction is a cornerstone of the City's commitment to sustainability, and the City is committed to maintaining and enhancing public outreach and participation opportunities. For example, the City has conducted a baseline telephone survey of attitudes and behaviour among City residents with regard to energy use and building upgrades, which will help inform the implementation strategy for the CEEP.

10.2 Data Needs

Throughout the process of monitoring and reporting on energy and emissions, additional data needs have been identified which would enable the City to develop a more comprehensive and effective inventory and monitoring system. These include:

- Community natural gas consumption data from Terasen Gas.
- Corporate and community solid waste data by amount/weight and sector (multi-family, commercial, etc).
- Non-recreational bicycle path user data to quantify reductions in single occupancy vehicle use.
- Updated tree stock and canopy cover inventory to track carbon sequestration functions of the urban forest.

As previously mentioned, the 1995 baseline inventory was intrinsic to the development of the City's LAP, however the review of this early effort has illustrated substantial evolution of reporting practices over the past several years. The City recognizes that in order to accurately monitor progress, it is important that the analysis conducted each year is comparable through the use of consistent methods and sources of data.

10.3 Summary

The City of North Vancouver has made considerable progress in planning and implementing policies and actions to reduce corporate and community GHG emissions, as well as monitoring and reporting on these actions and progress. The City recognizes that significant barriers often exist with regards to energy and emissions reduction at both the corporate and community level, such as financial implications and feasibility of implementing reduction actions. For example, though a building may be close enough to connect to the LEC district heating system, it may not be economically feasible to do so. While these barriers exist, the City is dedicated to address and adapt to these challenges with a goal of continuous improvement.

Continued success will require the sustained commitment of all City staff and departments, and increased commitment of the community-at-large. Moving forward with annual reporting, setting interim targets, and monitoring energy and GHG emissions reduction measures will ensure that the City remains on track.

11.0 Appendices

Appendix 1: Emission Factors

Fuel Type	Emission Factor (tonnes CO ₂ e per unit)	Source
Electricity	0.000022 tonnes/kWh	Greenhouse Gas Emission Assessment Guide For British Columbia Local Governments, Community Energy Association and the Ministry of Community Services, February 20 2008.
Natural Gas	0.051 tonnes/GJ	
Gasoline	0.00241 tonnes/Litre	
Diesel	0.0028 tonnes/Litre	
Biodiesel	0.002658 tonnes/Litre	
Solid Waste	0.484 tonnes/Tonne	Canada's GHG Inventory, Jaques, A. (1992), Canada's Greenhouse Gas Emissions: Estimates for 1990, Environmental Protection, Conservation and Protection, Environment Canada, August 2003.

Appendix 2: Summary of Corporate and Community Inventories by Sector and Fuel Type

CNV Corporate Energy and GHG Emissions Inventory by Sector and Fuel Type (2005 and 2009)

	2005			2009		
Source	Consumption	GJ	CO ₂ e	Consumption	GJ	CO ₂ e
Electricity	9,046,237 kWh	32,566	217	9,072,615 kWh	32,661	200
Natural Gas	28,399 GJ	28,399	1,448	23,667 GJ	23,667	1,207
Other fuel	1,281 GJ	1,281	73	3,815 GJ	3,815	217
Gasoline	116,551 litres	4,079	284	116,473 litres	4,077	283
Diesel	142,285 litres	5,450	389	157,104 litres	6,017	408
Solid Waste	417 tonnes	-	202	478 tonnes	-	232
TOTAL	9,335,170	71,776	2,613	9,374,152	70,236	2,546

*Data has been obtained from the City's corporate GHG inventory dated December 8, 2010. The inventory was developed by *Enerficiency Consulting*.

CNV Community Energy and Emissions Inventory (CEEI) by Sector and Fuel Type (2007)

	2007		
Source	Consumption	GJ	CO ₂ e
Electricity			
Residential	151,826,924 kWh	546,577	3,340
Commercial	243,761,270 kWh	877,541	5,363
Industrial	33,251,477 kWh	119,705	732
<i>Subtotal</i>	428,839,671 kWh	1,543,823	9,435
Natural Gas			
Residential	655,213 GJ	655,213	33,514
Commercial	1,010,968 GJ	1,010,968	51,710
Industrial	262,872 GJ	262,872	13,446
<i>Subtotal</i>	1,929,053 GJ	1,929,053	98,670
Gasoline	40,903,958 litres	1,417,731	102,152
Diesel	3,076,672 litres	119,006	8,551
Propane	110,247 litres	2,790	168
<i>Subtotal</i>	44,090,877 litres	1,539,527	110,871
Solid Waste	- -	-	6,788
TOTAL	474,859,601	5,012,403	225,763

*Data for the City's community GHG inventory has been obtained from the first *Community Energy and Greenhouse Gas Emissions (CEEI) Inventory Report* completed by the Province for the year 2007. The CEEI Report was released in 2009.

Appendix 3: Detailed Technical Documents

- **Corporate Energy and Greenhouse Gas Emissions Inventory (2005-2009)**
- **Community Energy and Greenhouse Gas Emissions (CEEI) Inventory Report (2007)**
- **2005 Greenhouse Gas Local Action Plan**

City of North Vancouver - Corporate Energy and GHG Emissions Inventory

Year: 2009

	Consumption		GJ	\$	CO2e
Electricity	9,072,615 kWh		32,661	\$ 635,083	200
Natural gas	23,667 GJ		23,667	\$ 241,402	1,207
Other fuel	3,815 GJ		3,815	\$ 48,038	217
Gasoline	116,473 Litres		4,077	\$ 107,155	283
Diesel	157,104 Litres		6,017	\$ 139,822	408
Solid Waste	478 Tonnes			\$ 68,891	232
			70,236	\$ 1,240,391	2,546

Buildings Breakdown

	GJ	CO2e
Core	23,059	578
Recreation	24,453	773
Parks	3,929	93
Arts & Culture	3,202	135
Residential rental	78	4
Other	590	11
Streets	4,587	28
Water & sewer	245	1
	60,143	1,623

Fleet Breakdown

	GJ	CO2e
Auto	59	4
Equipment	1,682	114
Fire	744	51
Heavy	3,455	234
Light	3,763	261
Other	194	13
NS Rescue	196	14
	10,094	691

Annual Results - CO2e

	2005	2006	2007	2008	2009	2010	Target	1995
Buildings	1,738	1,694	1,747	1,726	1,623		1,279	1598
Fleet	673	679	646	698	691		500	625
Solid Waste	202	213	223	232	232		184	230
Total	2,613	2,586	2,616	2,655	2,546	-	1,963	2453
Change over prior year	160	(27)	30	40	(109)			TOTAL 1995-2009 4.1%
Change %	6.5%	-1.0%	1.1%	1.5%	-4.1%			TOTAL 2005-2009 -2.5%

Anexo 4 - OBRAS		Código de Obra		Código de Proyecto		Código de Fase		Código de Estado		Código de Tipo		Código de Materiales		Código de Medidas		Código de Unidades		Código de Valores		Código de Precios		Código de Costos		Código de Beneficios		Código de Impuestos		Código de Retenciones		Código de Otros		Código de Totales	
Orden	Descripción	Unidad	Cantidad	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	Valor	
1	

North Vancouver City

Community Energy & Greenhouse Gas Emissions Inventory: 2007

This is your local government's draft 2007 Community Energy and Greenhouse Gas Emissions Inventory (CEEI). From March 10th to April 15th 2009, the Province and partners are asking for your review and feedback - <http://www.toolkit.bc.ca/ceei> - on the content, clarity and usefulness of your community's draft 2007 CEEI Report.

What is a CEEI Report?

CEEI Reports are a result of a multi-agency effort to provide a province-wide solution to assist local governments in BC to track and report annual community-wide energy consumption and greenhouse gas (GHG) emissions. For 2007, the CEEI Reports provide high-level energy and GHG emission estimates in three primary sectors – on-road transportation, buildings and solid waste. As additional information, estimates on land-use change emissions from deforestation are provided at the regional district level. CEEI Reports are one of the many resources available through the Climate Action Toolkit (<http://www.toolkit.bc.ca>), a web-based service provided through the ongoing collaboration between UBCM and the Province.

Why does my local government need a CEEI Report?

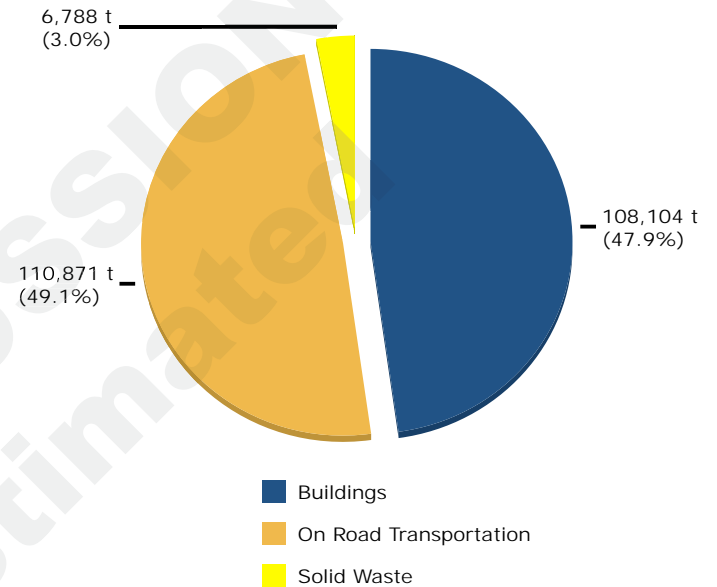
An energy and GHG emissions inventory can be a valuable tool that helps local governments plan and implement GHG and energy management strategies, while at the same time strengthening broader sustainability planning at the local level. CEEI reports have two primary purposes – to fulfill local governments' Climate Action Charter commitment to measure and report their community's GHG emissions profile, and to establish a base year inventory for local governments to consider as they develop targets, policies, and actions related to the Province's new Green Communities Legislation (Bill 27). As an additional benefit, CEEI Reports support BC local government members of the Federation of Canadian Municipalities' Partners for Climate Protection program to achieve Milestone One of the community stream – a community GHG emissions inventory.

A first in North America!

CEEI is a first in North America, and a first step for BC communities. The 2007 CEEI Reports are based on best available province-wide data. The accuracy and detail of CEEI reports will continue to improve to meet increasing local and provincial government information needs. For example, the CEEI working group is presently pursuing ways to refine community boundary accuracy for a number of BC's smaller communities. Also, local governments may wish to provide additional information to the CEEI and/or enhance their CEEI report (in sectors and/or detail) where interest, capacity and local information sources permit (e.g., provide the CEEI with accurate community-specific solid waste data). For future reports, the CEEI working group will be considering the inclusion of additional components to GHG inventories as advised by emerging international protocols, the information needs of local governments, and the Province's forthcoming Green Communities Incentive Program.

Hyla Environmental Services Ltd. (HES) is providing 2007 CEEI Reports using its Energy and Emissions Monitoring and Reporting System™. HES is also developing a 2007 CEEI Technical Methods and Guidance document, presently scheduled to be available in late March 2009.

CO₂e (tonnes) by Sector *



* In some CEEI Reports, inaccuracy in solid waste data and/or where electricity and natural gas consumption data for buildings has been withheld for confidentiality purposes, the relative percentages of GHGs in each sector as illustrated above may appear disproportionate. For this reason, care should be taken in interpreting these reports, particularly where comparisons with other local government may be of interest.

Please refer to the CEEI User Guide for overviews of each sector (<http://www.env.gov.bc.ca/epd/climate/ceei/pdf/ceei-user-guide.pdf>). For answers to Frequently Asked Questions go to <http://www.env.gov.bc.ca/epd/climate/ceei/pdf/ceei-faq.pdf>. To explore 'taking action community wide', go to <http://www.toolkit.bc.ca/taking-action/community-wide>. For more information, please contact the Ministry of Environment at CEEIRPT@gov.bc.ca.

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

North Vancouver City

Community Energy & Greenhouse Gas Emissions Inventory: 2007

BUILDINGS	Consumption By Type							Energy & Emissions Total	
	Type	Connections	Consumption	Energy/Connection	Energy (GJ)	CO ₂ e (t)	Energy (GJ)	CO ₂ e (t)	
RESIDENTIAL BUILDINGS	FUELV	00000	0000000000	N	00000 N	00000000	00000	0000000000	000000
	1 DWUD DV	00000	00000000		00	00000000	000000		
COMMERCIAL BUILDINGS	FUELV	00000	0000000000	N	0000000 N	00000000	00000	0000000000	000000
	1 DWUD DV	00000	0000000000		000	0000000000	000000		
INDUSTRIAL BUILDINGS	FUELV	000	0000000000	N	00000000 N	00000000	000	00000000	000000
	1 DWUD DV	00	00000000		000000	00000000	000000		
SUBTOTAL	FUELV	000000	0000000000	N	0000000000	0000000000	000000	0000000000	00000000
	1 DWUD DV	00000	0000000000		0000000000	0000000000	000000		

ON ROAD TRANSPORTATION	Consumption By Type						Energy & Emissions Total		
	Type	Units	Consumption	Litres/Unit	Energy (GJ)	CO ₂ e (t)	Energy (GJ)	CO ₂ e (t)	
SMALL PASSENGER CARS	DV L	000000	0000000000	000 V	000 / 08	00000000	000000	00000000	000000
	L V 0	000	00000000	000 V	000 / 08	000000	000		
LARGE PASSENGER CARS	DV L	00000	0000000000	000 V	0000 / 08	00000000	000000	00000000	000000
	L V 0	00	00000000	000 V	000 / 08	000000	000		
LIGHT TRUCKS, VANS, AND SUVs	DV L	000000	0000000000	000 V	0000 / 08	00000000	000000	00000000	000000
	L V 0	000	00000000	000 V	0000 / 08	000000	000		
	0 EL 03USD	00	00000000	000 V	0000 / 08	000000	000		
COMMERCIAL VEHICLES	DV L	00000	0000000000	000 V	0000 / 08	00000000	000000	00000000	000000
	L V 0	000	0000000000	000 V	0000 / 08	00000000	000000		

North Vancouver City

Community Energy & Greenhouse Gas Emissions Inventory: 2007

ON ROAD TRANSPORTATION CONTINUED

	0 E L 3 USD								
TRACTOR TRAILER TRUCKS	L V □	□□	□□□□□□	LW V	□□□□□	/ B	□□□	□□	□□□□□ □□□□□
MOTORHOMES	DV L	□□□	□□□□□□	LW V	□□□□□	/ B	□□□□□	□□□□□	□□□□□ □□□□□
	L V □	□□	□□□□□	LW V	□□□□□	/ B	□□□	□□	
MOTORCYCLES AND MOPEDS	DV L	□□□	□□□□□□	LW V	□□□	/ B	□□□□□	□□□	□□□□□ □□□
BUS	DV L	□□	□□□□□□	LW V	□□□□□	/ B	□□□□□	□□□	□□□□□ □□□□□
	L V □	□□	□□□□□□	LW V	□□□□□	/ B	□□□□□	□□□□□	
SUBTOTAL	DV L	□□□□□	□□□□□□□□	LW V	□□□□□□□		□□□□□□□	□□□□□□□	□□□□□□□ □□□□□□□
	L V	□□□	□□□□□□□	LW V	□□□□□□□		□□□□□□□	□□□□□	
	0 E 3 USD	□□	□□□□□□	LW V	□□□□□		□□□□□	□□□	

SOLID WASTE	Direct Emissions				Emissions Total	
	Type	Estimation Method	Mass (t)	CO ₂ e (t)		CO ₂ e (t)
COMMUNITY SOLID WASTE	6 LG □ DW	DW □ P P LW V		□□□□		□□□□
SUBTOTAL				□□□□		□□□□

D G □ DC	& S	& 2 □	□ □	□ □ DC
F W F W	□□□□□□□□ N	□□□□□□□	□□□□□□□	Energy (GJ)
1 DW D DV	□□□□□□□	□□□□□□□	□□□□□□□	CO ₂ e (t)
DV L	□□□□□□□ LW V	□□□□□□□	□□□□□□□	□□□□□□□ □□□□□□□
L V	□□□□□□□ LW V	□□□□□□□	□□□□□□□	
0 E 3 USD	□□□□□□ LW V	□□□□□	□□□□□	
6 LG □ DW			□□□□□	

City of North Vancouver

Greenhouse Gas

Local Action Plan



Final Report

Submitted by:

Innes Hood



The Sheltair Group

2 - 3661 West 4th Avenue
Vancouver BC Canada V6R 1P2
t: 604-732-9106 f: 604-732-9238
www.sheltair.com

February 2005

Disclaimer

This Study has been produced with the assistance of the Green Municipal Enabling Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the points of view expressed are those of the authors and in no way incur the liability of the Federation of Canadian Municipalities nor the Government of Canada.

Copyright © 2005, City of North Vancouver

All rights reserved. No part of this publication may be reproduced, recorded or transmitted in any form or by any means, electronic, mechanical, photographic, sound, magnetic or other, without advance written notice from the owner.

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

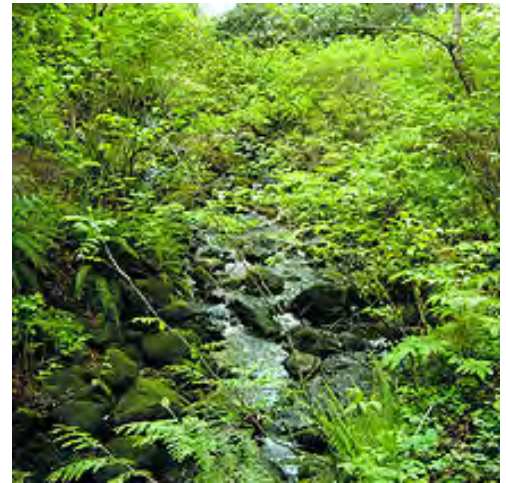
The remainder of this report is divided into the following study areas.

- 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.

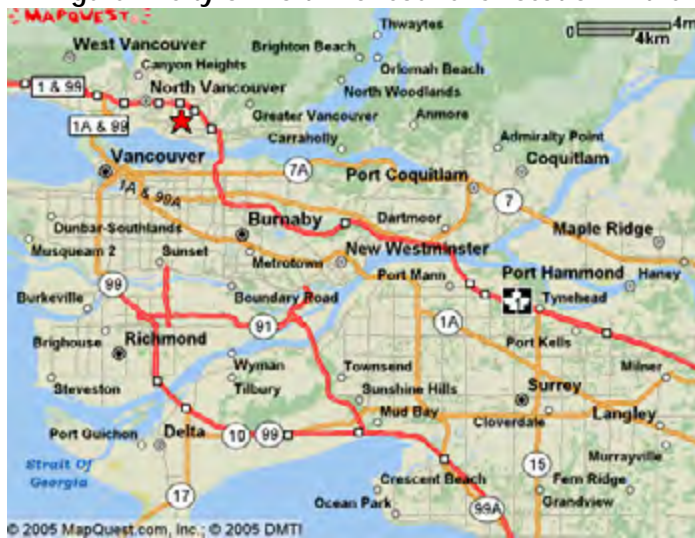
As a relatively small municipality located within a larger region, the City of North Vancouver is a town centre, providing housing and services, while supporting broader regional goals articulated in the Livable Region Strategic Plan. Due to its proximity, the CNV provides easy access to employment opportunities 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>

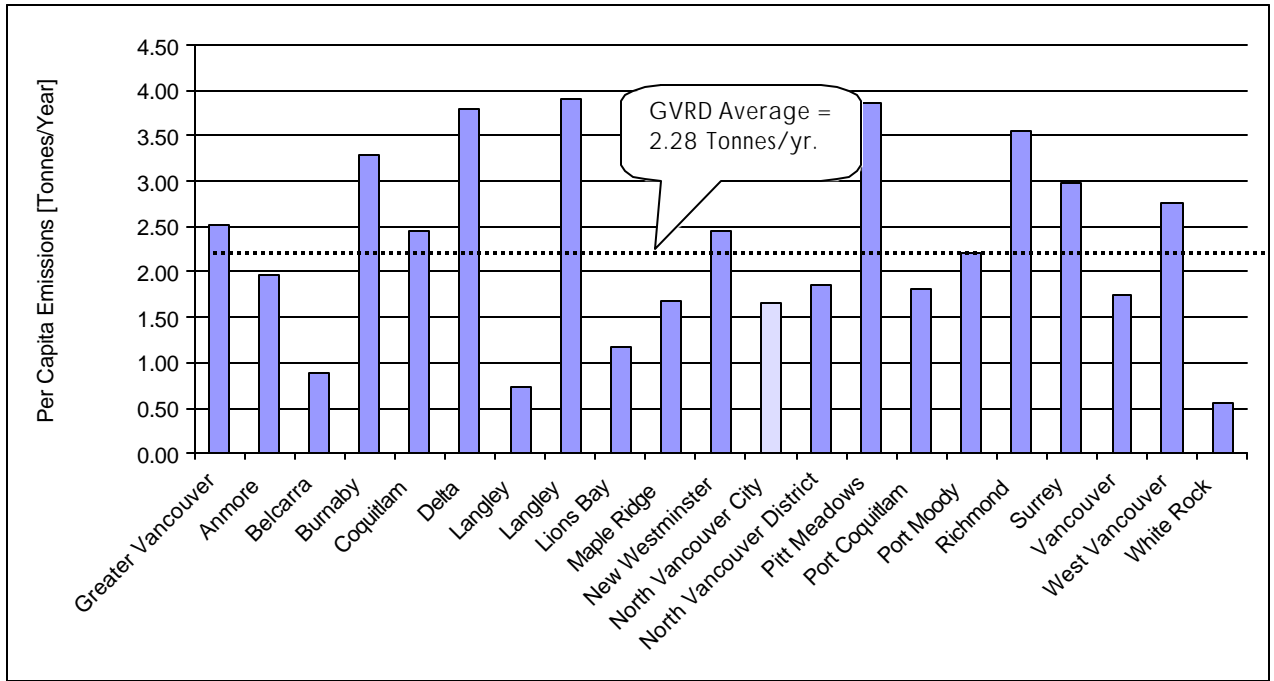
⁴ Ref. Personal Communication, Paul Penner, CNV

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

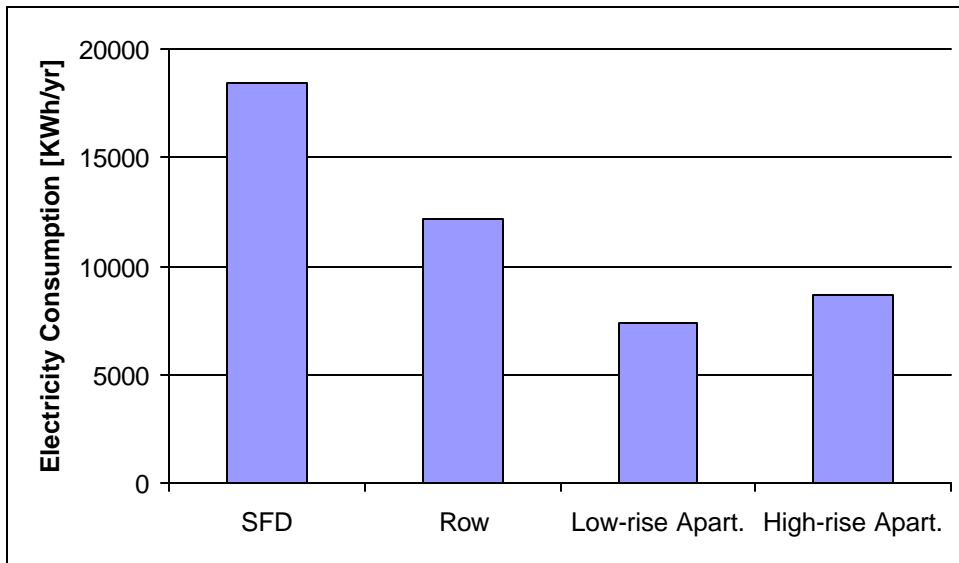
	Units in 2001	Percent Change 1996 2001
Single Family Detached	4,105	5.6%
Semi-detached	820	
Suites/Detached Duplexes	1,775	62.9%
Row	1,780	
Other Detached	15	
Mobile	25	
Low-rise apartment	3,110	32.5%
High-rise Apartment	9,080	
Total	20,705	

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.



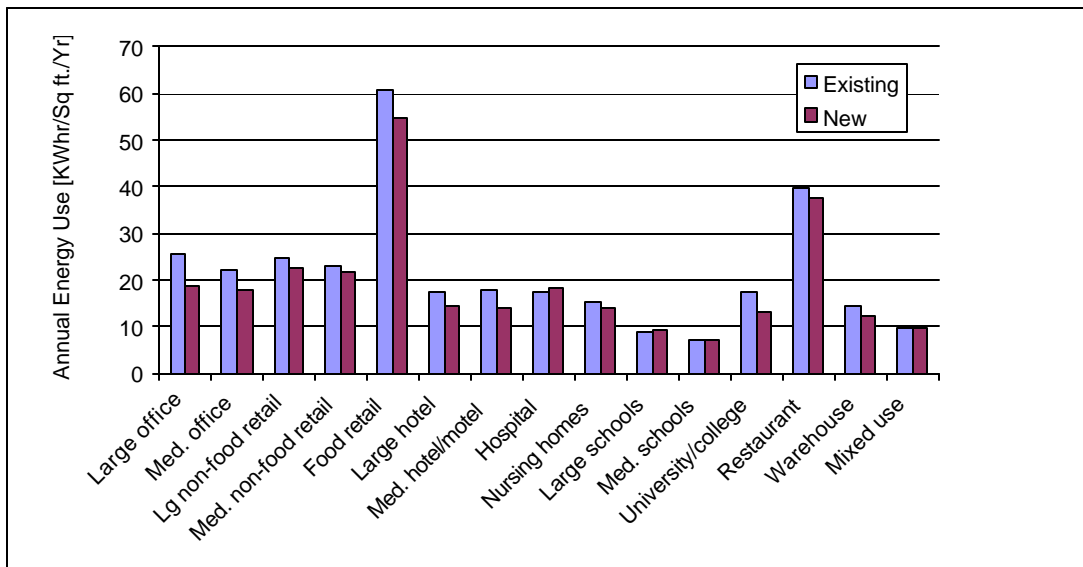
⁹ Ref. BC Hydro Conservation Potential Review, Residential Analysis, Pg 28.

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

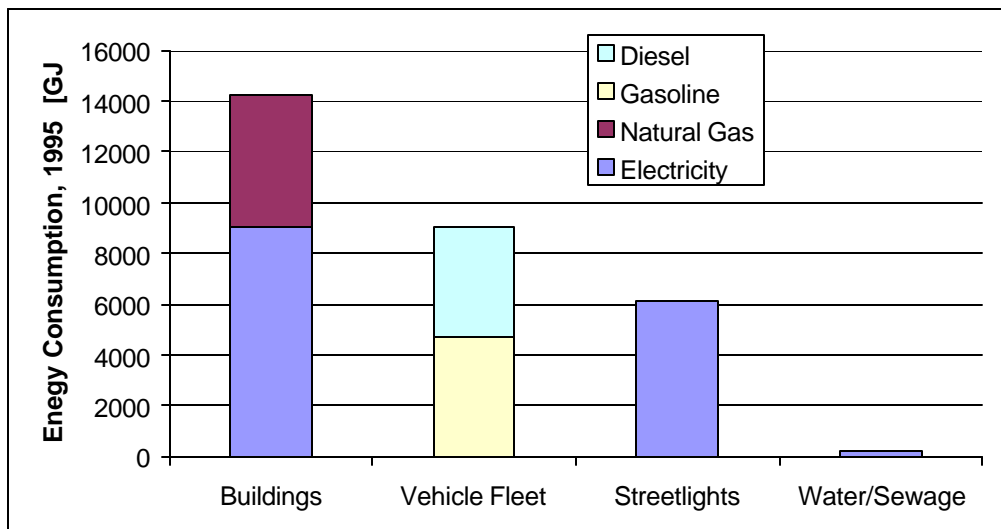
This section provides a review and summary of current and forecast GHG emissions in the City of North Vancouver. A GHG emissions baseline was completed for the City of North Vancouver in 2002¹³ with a baseline defined as 1995.

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]

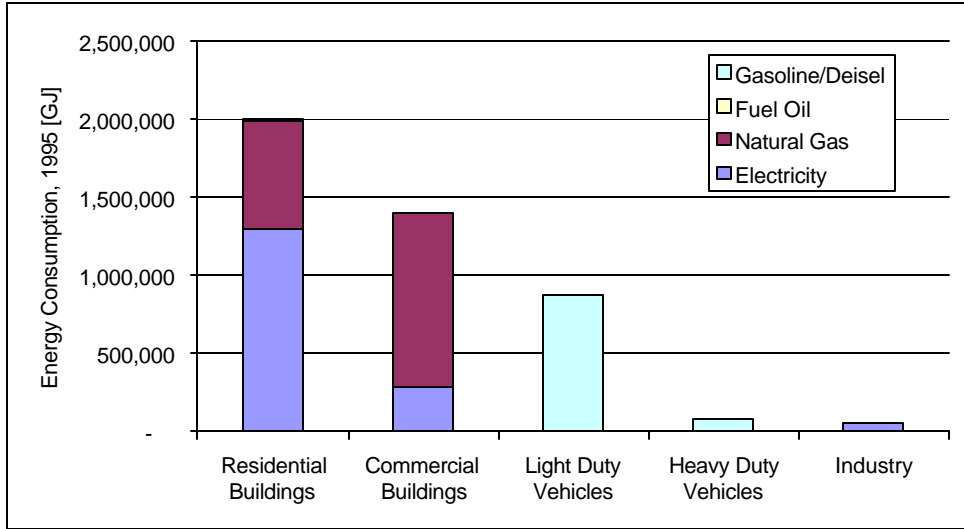


Table 7 summarises CNV community GHG emissions. As can be seen, community emissions in 1995 are estimated at over 190,000 tonnes, with emissions roughly equally split among residential buildings, commercial buildings and light duty vehicles.

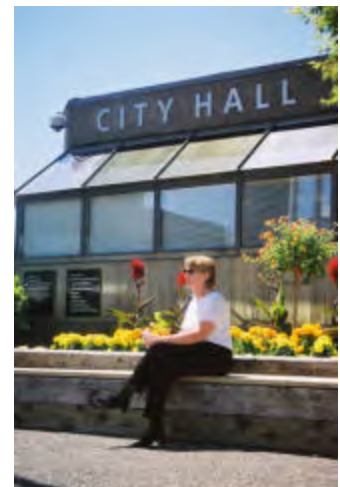
Table 7: Community GHG Emissions in 1995

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).

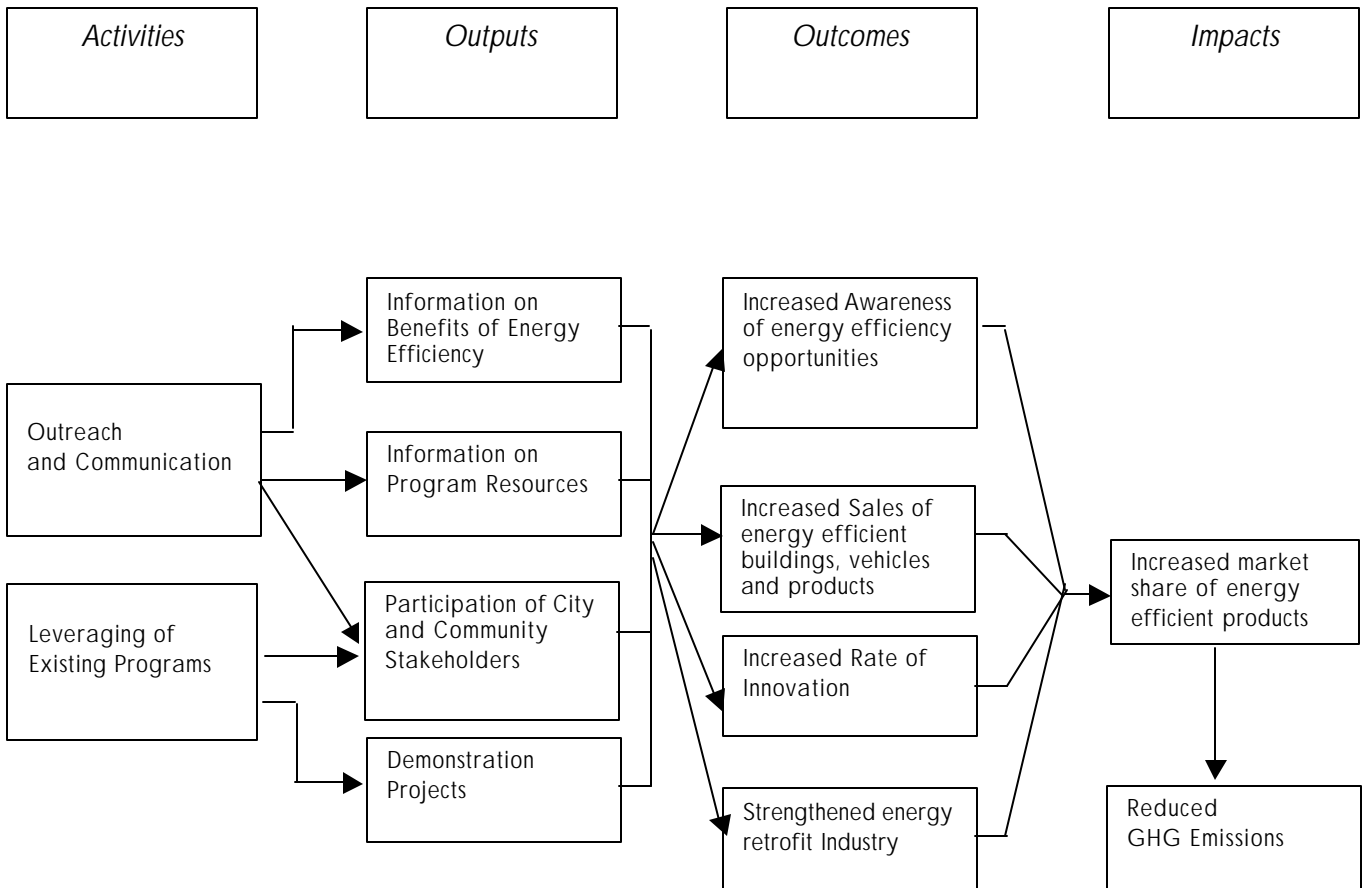
Rationale

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	<p>Conduct an energy audit of all CNV facilities by 2006.</p> <p>Conduct recommended energy retrofits portfolio payback of less than ten years by 2010</p>	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	<p>Achieve 50% penetration of Energuide audits in detached housing by 2015</p> <p>Achieve 50% penetration of energy innovators program in commercial sector by 2015</p>	<p>3,300</p> <p>4,000</p>
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