The Cool Vancouver Task Force's

Draft Community Climate Change Action Plan

DRAFT

April 28, 2004

Executive Summary

Climate change is an issue that Vancouver is taking seriously and has shown significant leadership in addressing.

In March 2003 The City of Vancouver Council created the Cool Vancouver Task Force, a collection of knowledgeable individuals with a diversity of expertise representing a wide range of stakeholder groups, and asked it to work with staff to develop a Climate Change Action Plan (CCAP), both for the City as a corporation and for the City as an overall community. The Corporate CCAP, aiming to reduce corporate greenhouse gas emissions to 20% below 1990 levels by 2010 was adopted in December 2003.

This document is the Draft Community Climate Change Plan for Vancouver as prepared by the Cool Vancouver Task Force and City staff.

This Draft Action Plan is intended to provide the City with a launching point for broad stakeholder and community input by framing the challenge and the priority opportunities towards meeting Vancouver's share of the federal 6% reduction target for greenhouse gas (GHG) emissions below 1990 levels by 2012. Once the City has the benefit of accessing and understanding the perspectives of the broader community, it will integrate their ideas, resources, and concerns into a Final Action Plan that lays out how the City will both lead and support broader climate change initiatives.

Emissions Reduction Target

The Cool Vancouver Task Force recognised the importance of setting a target that would challenge the entire community to make real emissions reductions. At the same time, the target had to be one that could be achieved through concerted and coordinated efforts. The Cool Vancouver Task Force has endorsed a "fair share of the Federal Target" based on the fact that Vancouver is growing disproportionately fast compared to the national average and the federal Kyoto target was not allocated regionally but rather conceived of as a national challenge.

By combining the estimated national population increase of 21% from 1990 to 2012 with a 6% absolute GHG reduction target means that all Canadians must reduce their GHG emissions by 27% compared to 1990 levels by 2012. For Vancouver, this "fair share of Canada's 6% reduction target" would translate to a 409,000 tonne reduction in annual GHG emissions from the 2012 business-as-usual emissions forecast. A 2012 target date was adopted as it was identified as the minimum time frame that would make reductions of this magnitude possible given the time required for programs to be developed, resources to be located, and implementation to begin having an effect on emissions.

An interim target for the 2010 Olympics is to return to 1990 emissions levels even though the population is expected to grow by nearly 30% over this time frame.

The CVTF and City are both aware that the 6% reduction target established in relation to the Kyoto protocol is only the first step towards addressing the challenge of climate change. This City will begin exploring the setting of a longer term and much more substantial emissions reduction target concurrent with the community consultation process for the Draft Plan.

Ultimately, reducing Vancouver's GHG emissions will require action by all citizens (private and corporate). While this Draft Plan identifies the most important actions that all citizens can take immediately to reduce their personal GHG emissions, the bulk of this Plan focuses on initiatives that

the City and other large institutional players can undertake to make the individual and corporate actions easier.

Actions for Individuals

The actions individuals can undertake to reduce emissions immediately include:

- Have a government certified home energy audit (Energuide evaluation) completed to identify opportunities to improve home energy efficiency and to gain an awareness of Federal Grants currently available;
- Make small energy improvements to your home such as installing a programmable thermostat and low flow shower heads;
- Incorporate energy efficiency when undertaking a major renovation or appliance replacement;
- Choose the most fuel efficient vehicle that will meet your needs;
- Operate your vehicle efficiently by ensuring proper tire inflation, accelerating and braking gradually, and by turning your vehicle off when waiting;
- Reduce the use of your car by walking, cycling, or taking transit whenever it is feasible; and
- Others as outlined in the personal action section of this draft Plan.

Priority Areas for Institutional Action on Policy and Programs

The City of Vancouver has a long history of action and policy direction that supports the reduction of greenhouse gas emissions. Most importantly, Vancouver's focus on creating higher density, mixed-use communities have resulted in a city that supports walking, cycling and transit usage while at the same time have shifted our residential building stock towards homes that are more energy efficient.

Continuation of these approaches as well as others that result in a gradual improvement are fundamental to Vancouver's continued success in limiting its contribution to climate change but are not in themselves sufficient to meet the relatively short-term reduction target. Because of the time frame required for the natural replacement cycle of the existing building, appliance, or vehicle stocks some new initiatives for short term change are required.

This plan identifies six key "new or renewed" initiatives that are targeted to result in 229,000 tonnes (t) of emission reductions below our 2012 "business as usual" GHG emissions forecast. This is over 50% of the total reduction required to meet our target. These six key initiatives for new or renewed action that will require immediate City leadership and broad community support include:

1) *Home renovations for energy efficiency* (38,000t reduction in annual GHG emissions)
2) *Energy efficiency retrofits for institutional facilities* (27,000t)
3) *Energy efficiency retrofits for large commercial buildings* (14,000t)
4) *Biodiesel fuel blends* (24,000t)
5) *Efficient driver training and anti-idling* (35,000t)
6) *Transportation alternatives* (91,000t)

The Task Force recognizes that implementing these initiatives will require a central coordinating body and financial resources. One of the purposes for the consultation process around this Draft Plan is to identify the staffing needs of this central organizing body *–a Community Energy and Emissions Group* (likely to be part of the City's Sustainability Support Group at least initially) and to develop a *resourcing strategy* that takes advantage of existing funding sources as well as identifies new approaches to funding innovative initiatives.

Additional Areas for Institutional Action

Three additional initiatives where the City has an important role to play in meeting the 2012 target but are already part of existing work programs include:

- Improved *energy efficiency standards for new construction* (ASHRAE and move to CBIP) = 12,000t
- *Non-market housing retrofits* = 12,000t
- Continuation of *landfill gas recovery and cogeneration*

In addition, it is important to recognize that over one quarter of our targeted emission reductions (135,000t) depend on Federal implementation of their own plans for improved vehicle fuel efficiency standards. The City needs to gain a better understanding of the Federal plans for implementation in order to understand if there is a local role in ensuring these reductions are realized.

The remaining 20,000t of targeted reductions to meet our target arise from the expanded use of ethanol-blended fuels, an assumption of improved industrial efficiency, employee energy awareness, and small commercial retrofits.

In addition to these actions towards meeting its short term goals, the city also needs to develop a better understanding of the opportunities for implementing *community energy systems* while also developing a *Climate Change Adaptation Strategy* to minimize the negative impacts that might arise due to the inevitable changes that our climate will undergo before GHG emissions can be stabilized.

Table of Contents

Executive Summary 2

Table of Contents 5

1.0 Introduction 8
- 1.1 Cool Vancouver's Draft Climate Change Plan
- 1.2 Climate Change
- 1.3 Kyoto Protocol: The First Step 9
- 1.4 The Corporate Climate Change Action Plan: Walking the Talk
- 1.5 Overview of the Local Context

2.0 Framing the Challenge and Focusing the Discussion 11
- 2.1 Vancouver's GHG Emissions Reduction Target
- 2.2 Importance of Building Community Support 12
- 2.3 Grouping and Classifying Emissions Reduction Measures

3.0 Actions for Individuals 14

Buildings Overview 16

4.0 Residential Building Retrofits 18
- 4.1 Housing Retrofits
  - 4.1.1 Energuide for Houses 19
  - 4.1.2 Do-It-Yourself Approach
  - 4.1.3 "One Stop, No Money Down" Approach 20
  - 4.1.4 Role for Renovation Contractors
  - 4.1.5 Corporate Climate Change Challenge 21
- 4.2 Non-Market Housing Retrofits

5.0 Commercial Building Retrofits 22
- 5.1 Medium and Large Commercial Building Retrofits
- 5.2 Tenant/Staff Energy Awareness 23
- 5.3 Institutional Building Retrofits
- 5.4 Small Commercial Retrofits 25

6.0 New Building and Appliance Energy Standards 26
- 6.1 Energy Efficiency of Appliances
- 6.2 Energy Utilization By-law
- 6.3 Energy-Efficient New Construction 27
- 6.4 Energuide 80 for New Detached Housing 28

Transportation Overview 29
7.0 Transportation Alternatives 31
7.1 Smart Growth – Vancouver's Success Story 32
7.2 Transit Service and Pricing
7.3 Walking and Cycling Infrastructure 33
7.4 Individualized Marketing of Transportation Alternatives 34
7.5 Cleaner Commuting Options 35
7.5.1 Existing Commuter Options Programs
7.5.2 Carpools
7.5.3 Transportation Management Associations
7.5.4 Universal-Pass Programs
7.6 Clean Trips to School 37
7.7 Car-Sharing 38
7.8 Travel Pricing Strategies 39
7.8.1 Distance-Based Insurance
7.8.2 Fuel or Carbon Tax

8.0 Fuel and Vehicle Efficiency 41
8.1 Renewable Fuel Blends
8.1.1 Biodiesel Blends
8.1.2 Ethanol-blended Fuels
8.1.3 Other Alternative Fuels
8.2 Efficient Vehicle Operation 43
8.2.1 Driver Training
8.2.2 Anti-Idling By-law
8.3 Efficient Vehicles 44
8.3.1 Federal Fuel Efficiency Standards
8.3.2 More Efficient Vehicles

9.0 Solid Waste Reduction 46
9.1 Material Bans from Disposal
9.2 Beneficial Use of Landfill Gas
9.3 Waste Reduction Initiatives 47

10.0 Community Energy Systems 48

11.0 Additional Considerations 49
11.1 Sequestration
11.2 Climate Change Adaptations
11.3 Emissions Reduction Measurement and Monitoring
11.4 Emissions Trading 50
11.5 Industry Outreach

12.0 Looking Ahead to Implementation 51
12.1 Organizational Development
12.2 Resourcing 52
12.3 Integrated Marketing and Recognition Program 53

List of Acronyms 54

Appendix A1 – Background i
Appendix A2 – Community GHG Emissions Profile Methodology vi

Appendix B – Consultation Plan xiv

1.0 Introduction

1.1 Cool Vancouver's Draft Community Climate Change Action Plan (CCAP)

The City of Vancouver is committed to becoming more sustainable and recognizes that addressing climate change and energy use are fundamental to this objective. This Draft Community Climate Change Action Plan (CCAP) focuses on reducing greenhouse gas (GHG) emissions but recognizes that these efforts must support broader issues of sustainability. With the 2010 Olympics coinciding with the central target date for meeting federal Kyoto commitments for reducing GHG emissions, the world's attention will be upon Vancouver and the region, looking to benefit from our examples and commitment in addressing climate change.

This Draft Plan was prepared by the Cool Vancouver Task Force (CVTF), a collection of knowledgeable individuals with a diversity of expertise representing a wide range of stakeholder groups (see Appendix A1: Background for more details on the Cool Vancouver Task Force).

Most of the activities that will result in reductions in the Vancouver's GHG emissions are beyond the direct control of the City. Ultimately, reducing Vancouver's GHG emissions will require action by all citizens (private and corporate). The role of the City and other institutions is to promote and enable those actions by private citizens and corporations that will result in GHG emission reductions. While this Draft Plan identifies the most important actions that all citizens can take immediately to reduce their personal GHG emissions, the bulk of this Plan focuses on initiatives that the City and other large institutional players can undertake to make the individual and corporate actions easier.

This Draft Community CCAP is intended to provide the City with a launching point for broad community and stakeholder input by framing the challenge and the priority opportunities towards meeting or exceeding the City's proposed GHG emissions reduction target of 6% below 1990 levels (our share of the federal Kyoto commitment). Once the City has the benefit of accessing and understanding the perspectives of the broader community, it will integrate their ideas, resources, and concerns into a Final Action Plan that lays out how the City will both lead and support broader climate change initiatives.

This Draft Plan is the result of significant effort on the part of the Cool Vancouver Task Force, City staff and consultants but is not finished – it now requires a widespread discussion with the public and many stakeholders to refine it and chart the path forward.

1.2 Climate Change

Climate change is viewed by many experts as the most significant global environmental challenge facing our planet. The emission of greenhouse gases, largely resulting from the burning of fossil fuels, is upsetting the natural balance of carbon in the atmosphere, resulting in overall global warming and regionally specific climate changes. While the connection between the use of natural gas to heat our homes or gasoline to power our cars is obvious, what many people don't recognise is that since 1995 BC reached its demand capacity for hydro generated electricity. Since then, new demand has increasingly been met by natural gas powered generation stations and as we move forward this trend is likely to continue; this trend is resulting in increased GHG emissions from electricity usage.

The impacts of the climate changes are regionally specific but for Vancouver they are likely to include summer droughts, winter flooding, increased frequency of extreme weather events, and species extinction mainly resulting from habitat changes. (See *Appendix A1: Background* for more details on Climate Change).

1.3 Kyoto Protocol: The First Step

In 1997, the Kyoto Protocol was established as the first global step to address the challenges of climate change and established an overall target for GHG emissions reductions for developed countries of 5.2% below 1990 levels for 2008 – 2012.

In 1998, Vancouver joined the Partners for Climate Protection (PCP), an initiative for Canadian municipalities to reduce their GHG emissions. In 2003, City Council approved a working target to reduce community GHG emissions by 6% from 1990 levels by 2010. Following strategic analysis, the target this plan is working toward is a 6% reduction by 2012 (based on an estimation of projected national per person emissions) as a challenging but achievable target if the whole Vancouver community commits energy and resources to achieving this goal. It is important to note that these are all preliminary steps to address climate change and further reductions will be required beyond 2012 if we hope to limit climate change and its resultant impacts.

This Draft Plan frames the challenge that Vancouver faces in taking this first step and sets the stage for consultations to inform how to address this challenge. While longer-term GHG reduction targets have not yet been established, we know that realistically reducing GHG emissions in a meaningful way beyond 2012 requires additional immediate action. This Draft Plan also lays the foundation for discussions on the essential immediate actions that will not contribute significantly to meeting the 2012 target but are required for deeper, longer-term GHG reductions.

1.4 The City of Vancouver's Corporate Climate Change Action Plan: Walking the Talk

In December 2003, the City approved its Corporate Climate Change Action Plan for its own civic facilities, buildings, fleets and activities and is already actively implementing it. The Corporate Plan's target for reduction is 20% below 1990 levels, by 2010 – a target that far exceeds the Kyoto target (6% reduction) and thereby demonstrates the City's commitment to leadership on climate change. Two important components of the Corporate Plan are that the actions required to make these significant reductions are largely expected to pay for themselves and that many of the initiatives have been designed so as to be replicable by individuals and corporate citizens alike.

1.5 Overview of the Local Context

Vancouver is a city of nearly 600,000 citizens at the heart of a metropolitan region of nearly 2.1 million people. Located on the Canada's south-western Pacific coast, Vancouver enjoys a relatively moderate climate. Primarily because of its climate and attractive location it is an appealing destination for both immigration and national migration; Vancouver is expecting that its population will increase nearly 30% from 1990 levels by 2012.

While Vancouver's growth exceeds the national projections for the same period, it is slower than the rest of the metropolitan area, partially due to the high cost of housing. Because it is constricted from horizontal growth by water and other municipalities, the City has been densifying and pursuing the development of walkable, mixed-use communities for some time.

By all accounts, Vancouver is already performing exceptionally with regard to per capita emissions. A combination of the city's climate, planning and growth patterns have resulted in per capita GHG emissions of 5.7 tonnes, a fraction of the per capita emissions of the other major Canadian cities. Per capita automobile usage is less and transit usage is greater than the rest of the region. In addition, much of the new growth is being accommodated in new higher density building forms that are inherently more energy efficient than detached housing.

In terms of GHG emissions reductions, this is both a blessing and a challenge. Combined with the fact that most of our electricity comes from inexpensive hydro sources, low energy use and costs make the economics of energy efficiency retrofits and new construction less attractive than in other parts of the country. In addition, the fact that major transit and transportation planning is handled regionally combined with the compact nature of our city and its role as the centre of the metropolitan region, has resulted in a situation where local demand for transportation alternatives often surpasses supply capacity.

2.0 Framing the Challenge and Focusing the Discussion

2.1 Vancouver's GHG Emissions Reduction Target

The Cool Vancouver Task Force recognised the importance of setting a target that would challenge the entire community to make real emissions reductions. At the same time, the target had to be one that could be achieved through concerted and coordinated efforts. The Cool Vancouver Task Force has endorsed a "fair share of the Federal Target" based on the fact that Vancouver is growing disproportionately fast compared to the national average and the federal Kyoto target was not allocated regionally but rather conceived of as a national challenge.

By combining the estimated national population increase of 21% from 1990 to 2012 with a 6% absolute GHG reduction target means that all Canadians must reduce their GHG emissions by 27% compared to 1990 levels by 2012. For Vancouver, this "fair share of Canada's 6% reduction target" would translate to a 409,000 tonne reduction in annual GHG emissions from the 2012 business-as-usual emissions forecast. A 2012 target date was adopted as it was identified as the minimum time frame that would make reductions of this magnitude possible given the time required for programs to be developed, resources to be located, and implementation to begin having an effect on emissions.

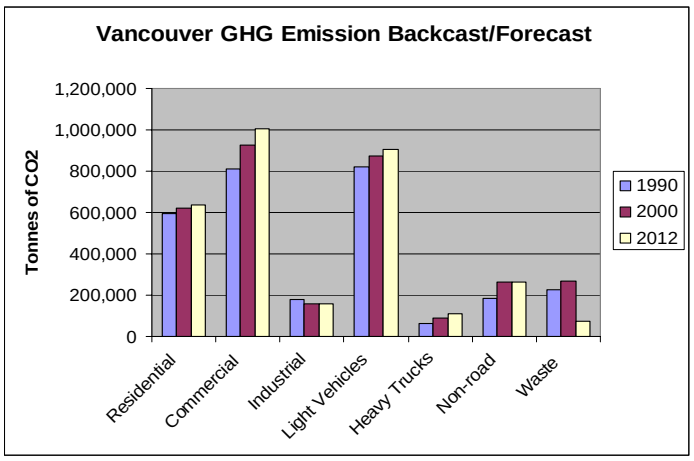
An interim target for the 2010 Olympics is to return to 1990 emissions levels even though the population is expected to grow by nearly 30% over this time frame.

The CVTF and City are both aware that the 6% reduction target established in relation to the Kyoto protocol is only the first step towards addressing the challenge of climate change. This City will begin exploring the setting of a longer term and much more substantial emissions reduction target concurrent with the community consultation process for the Draft Plan.

Role of the Emissions Backcast and Forecast

Vancouver's GHG emissions backcast and forecast provides the foundation for understanding the challenge in meeting its reduction target and establishing priority areas for focused initiatives.[1] A detailed discussion of the methodology, data sources, and assumptions inherent in this backcast and forecast is presented in *Appendix A2: Vancouver Community Greenhouse Gas Emissions Profiles Methodology.*

[1] It is important that the reader does not confuse greenhouse gas emissions with "common air contaminant" emissions. In this report, unless specified otherwise, emissions refers to greenhouse gas emissions (GHG's).



In order to quantify the total emissions reductions required to meet the 6% reduction target consider:

1990 GHG emissions = 2.9 million tonnes
2012 Targeted Total GHG Emissions = 2.75 million tonnes (Vancouver's share of 6% below 1990)
2012 Business-as-usual forecasted GHG emissions = 3.16 million tonnes

*Meeting our share of a 6% emissions reduction target (adjusted for disproportionate population growth) means that we must reduce our forecasted GHG emissions by **409,000 tonnes** between now and 2012.*[2]

One of the primary purposes of this Draft Plan is to identify those areas where we believe the largest emissions reductions can reasonably occur so as to focus the consultation discussion on those areas and developing a plan of how to make the required changes.

Upon examining the above graph, it is clearly evident that emissions reductions must focus primarily on:

- residential energy use
- commercial building energy use
- reducing emissions from light vehicles such as passenger cars, mini-vans, sport utility vehicles (SUVs), and light trucks.

A closer look reveals that the magnitude of forecasted GHG emissions growth for buildings in the next five years is relatively small compared to the existing baseline and that in order to meet the 2012 reduction target we will have to retrofit a significant amount of our residential and commercial building stock.

2.2 Importance of Building Community and Partner Support to Meet the Target

Reducing Vancouver's GHG emissions by 409,000 tonnes per year will not be possible without significant community and partner support. The City has limited jurisdiction over many things that have significant impact on community emissions such as individual transportation choices, transit infrastructure, vehicle/appliance efficiency standards and purchasing decisions, etc. It also has limited financial and staff resources to apply to any single challenge.

[2] Incorporated into the 2012 Business-As-Usual forecast is a 150,000 tonne *reduction* in annual CO_2 equivalent emissions relative to 1990 from the Vancouver landfill resulting from the award winning landfill gas recovery and cogeneration project implemented in 2002.

Despite these challenges, the City believes that its residents, businesses, non-profit organizations, utilities, and the other levels of government (Regional, Provincial, and Federal) are concerned about climate change. Together with the City, these partners do have the control and resources to make the required changes in a cost-effective and socially responsible manner. The City's challenge will be to build support through education and partnerships, identify and remove barriers to positive change, and enable access by local citizens and stakeholders to the resources that are available.

In this Draft Community CCAP (or Draft Plan), *preliminary* attempts to quantify the *potential* annual emissions reductions of the emissions reduction measures indicate that the target is attainable.

2.3 Classifying Emissions Reduction Measures

The remainder of this report focuses on a wide variety of emissions reduction measures that appear to be viable or are worth further investigation. To assist the reader in understanding these measures and the role they play in the overall plan, these measures have been *classified* using the following criteria:

- GHG reduction or public awareness potential
- Amount of existing resources or commitment
- Magnitude of barriers and uncertainty
- Cost-effective
- Complementary to other City objectives
- Part of an existing work program or requiring new action

From the point of view of City management, the classifications used here are:

- ***Priority Measure for Immediate Institutional Action*** – these measures could reasonably be expected to result in significant emissions reductions in a cost-effective manner if additional resources (such as funding or staff time) were committed
- ***Additional Measure for Institutional Action*** – these measures are important but already part of a City or other institution's work plan
- ***Additional Measure for Further Exploration*** – these measures could result in GHG emission reductions but are not a top priority as they are not anticipated to result in significant emissions reductions

3.0 Actions for Individuals

This Draft Community Climate Change Action Plan is primarily focused on creating policy and programs that support behaviour changes by individuals and businesses, however individuals do not need to wait before starting to reduce their own GHG emissions. Ultimately, reducing Vancouver's GHG emissions will require commitment and action by all citizens (private and corporate).

This section provides information on what Vancouverites can do as individuals to make personal choices that reduce emissions. Every day, we make lifestyle choices including where we live, how we heat our homes, what and how much we buy, how we travel amongst others that significantly impact emissions, our quality of life, our community and the things we value.

It is important to acknowledge that the issues of climate change are a relatively new consideration for our lives. Furthermore, the economy is not currently structured to fully support energy efficiency and reduced emissions in daily life. As such, some of these actions can cost more initially but offer long term savings opportunities and additional benefits such as increased health.

The following is a list of actions we each can take to reduce emissions in our daily life:

Around the Home:

- Adopt the "one-tonne" per person reduction challenge and educate yourself on how to achieve that reduction;
- Have a government certified home energy audit (Energuide evaluation) completed to identify opportunities to improve home energy efficiency and to gain an awareness of Federal Grants currently available;
- Install a programmable thermostat or turn down the temperature in your home a few degrees and decrease it to a minimum when away;
- Incorporate energy efficiency when undertaking a major renovation or appliance replacement;
- Shut lights off when not needed and possibly install light sensors to automatically turn lights off;
- Hang washed clothes to dry when possible instead of using a clothes dryer;
- Compost food and green waste in a backyard or worm composter;
- Grow your own fruit or vegetables where you can;
- Limit the use of gasoline-powered lawn & garden equipment and use electric or non-motorized lawn mowers where possible;
- Choose sustainable energy options for your home including low-impact renewable energy and energy efficiency technologies;
- Apply to access energy efficient programs offered by utility companies, such as BC Hydro's Power Smart program;
- Insulate and draft-proof your home;
- Use a water-saving showerhead to save up to 15% of your home's hot water use;
- Switch to compact fluorescent lighting where possible as it uses 75% less energy than traditional lamps, last about eight times longer and produces the same amount of light;
- Chose energy-efficient appliances such as those bearing the Energy Star label;
- Turn off your computer when you aren't using it; and
- Identify a "family champion" to promote GHG emission reductions and provide a viable rewards program to that person to keep their initiative up.

Food :

- Purchase locally grown and/or organic produce when possible;
- Walk, cycle or take transit to purchase food; and
- Reduce the packaging and "bags" associated with your food and shopping habits.

Transportation:

- Choose to live, shop and recreate close to where you work or go to school;
- Identify opportunities to eliminate or combine car trips;
- Explore opportunities to carpool some days to work and investigate opportunities to participate in a auto-coop and reduce the need for car ownership;
- Look for opportunities to walk, in-line skate or bicycle to your destination;
- Take transit whenever possible;
- Choose the most fuel efficient vehicle that will meet your needs; and
- Operate your vehicle efficiently by ensuring proper tire inflation, accelerating and braking gradually, and by turning your vehicle off when waiting.

Work:

- Research your company's policies on environmental practices and climate change;
- Raise awareness of climate change issues in your company through providing information or starting an environmental or sustainability committee;
- Celebrate environmentally friendly practices and the people behind them in your workplace;
- Eliminate unnecessary energy waste where it is within your control such as turning your lights and computer monitor off when not in use
- Develop climate-friendly business policies in projects and work teams within your control or influence (see the next section);
- Encourage your employer to provide facilities and services that support alternate transportation modes such as dedicated car-pool parking, bicycle lockers, shower facilities, etc.

Play

- Choose recreation activities that are close to where you live and do not use a significant amount of energy.

The rest of the Draft Community CCAP's proposed measures more fully explore what institutions can do to support the above actions we each can take, including supporting more energy efficient buildings, providing and encouraging alternatives to the vehicle for transportation, and others.

Buildings Overview

The natural gas and electricity used for space heating, hot water, lighting, and "plug-in" equipment and appliances in residential and commercial buildings account for over half of Vancouver's GHG emissions. The connection between burning natural gas and greenhouse gas emissions is obvious but what many people are not aware of is that since the mid-1990's BC reached its hydro generated electricity capacity and since then we have grown increasingly dependant on natural gas fired generators for our electricity needs. This shift means that electricity use in our Province has a rapidly increasing GHG impact.

In the long run, the most cost-effective approach to making buildings more energy efficient is to simply build new buildings to be more energy efficient. This Plan propose a key policy tool to do so – increased energy standards for new buildings. However, even with a significant growth rate, the total number of existing buildings far outnumbers new buildings that will be built by 2012. Therefore, because this Plan is focused on achieving emissions reductions in the short term (2012) as well as the long run, much of the building-related initiatives focus on retrofitting existing buildings for increased energy efficiency.

Buildings are classified as "existing (for retrofits)" or "new" buildings and then according to 3 categories:

- Residential (market / non-market);
- Commercial (large / small); and
- Institutional.

In summary, the plan calls for the following with respect to buildings:

Strategy	***Description***	***Targeted emissions reduction***	***Implementation***
Market Housing Retrofits	Promote community awareness/access to existing resources and develop new tools to maximize home energy improvements and retrofits.	Targeted Reduction: 38,000 t	35% of detached/semi-detached housing improves energy efficiency 25%
Non-Market Housing Retrofits	Development and implementation of a strategy to increase the energy efficiency of non-market units in Vancouver	Targeted Reduction: 12,000 t	90% of non-market housing stock improves energy efficiency 25%
Medium and Large Commercial Building Retrofits	Collaborative work between the City, utilities, other levels of government, and building owners/operators to develop tools and incentives to to achieve deeper market penetration of energy efficiency programs in medium and large office buildings, hotels, warehouses, and non-food retail.	Targeted Reduction: 14,000t	25% of medium and large commercial buildings improve energy efficiency by 15%
Tenant/Staff Energy Awareness	Development and promotion of an energy awareness program with messaging potentially incorporated into the proposed Integrated Marketing Program	Targeted Reduction: 5,000t	25% of employers implement energy awareness programs that improve efficiency by 2%.

Institutional Building Retrofits	Collaboration between the City and major institutions such as the Health Board, School Board, Community Colleges, and other levels of Government to share information on the benefits and challenges of energy efficiency retrofits and to build commitment to getting their house-in-order.	Targeted Reduction: 27,000t	75% of institutional buildings improve energy efficiency by 15%
Small Commercial Building Retrofits	Collaboration with BC Hydro, Terasen, senior governments, BIAs and other stakeholders to promote retrofits for small businesses ("Mom and Pop's") throughout the city, starting with lighting retrofits and promoting other energy efficiency measures where appropriate.	Targeted Reduction: 5,000t	15% of small commercial buildings improve energy efficiency by 10%
Update the City's Energy Utilization By-law	Upgrade of the energy efficiency requirements of the City's Energy Utilization By-law to current standards as a key first step in improving the energy efficiency of new buildings.	Targeted Reduction: 7,000t by 2012 with significant continuing benefits beyond then.	Compliance with ASHRAE 90.1 (2001) by 2006.
Energy Efficient New Construction	Development of programs to ensure new commercial and multi-family buildings meet the requirements of the Commercial Building Incentive Program (CBIP) which exceeds ASHRAE 90.1 (2001)) by 10% to 15%.	Targeted Reduction: 4,000t by 2012 with significant continuing benefits beyond then.	All new commercial and multi-family residential buildings will meet CBIP standards by 2010
Regulate the Energy Efficiency of Appliances	Advocacy to the Province and Federal Governments to increase the minimum efficiency of common appliances in buildings.	Targeted Reduction: To be determined	To be determined
Energuide 80 for New Detached Housing	Advocacy and support for the Province and Natural Resources Canada in their work to improve energy efficiency of new detached and semi-detached homes to at least an Energuide 80 rating.	Targeted Reduction: To be determined	To be determined

4.0 Residential Building Retrofits

The natural gas we use to heat our homes and water as well as the electricity that is increasingly generated at natural gas fired generating stations result in significant GHG emissions. Energy use in residential buildings is currently responsible for over one fifth of the total GHG emissions in Vancouver.

The approach advocated in this Draft Plan for market housing is to promote simple improvements that every homeowner can implement themselves while encouraging those homeowners that are considering a home renovation or new appliance to make energy efficiency a top consideration in their final decision. The City and other partners must make it easy for homeowners to undertake energy efficiency improvements by increasing their awareness of programs and funding available to assist them.

The City of Vancouver has committed to retrofitting all of its non-market housing by 2010. The City will work with BC Housing to develop the business case to justify similar improvements in the significant amount of non-market housing it is responsible for (either directly or in paying the operating costs).

4.1 Market Housing Retrofits

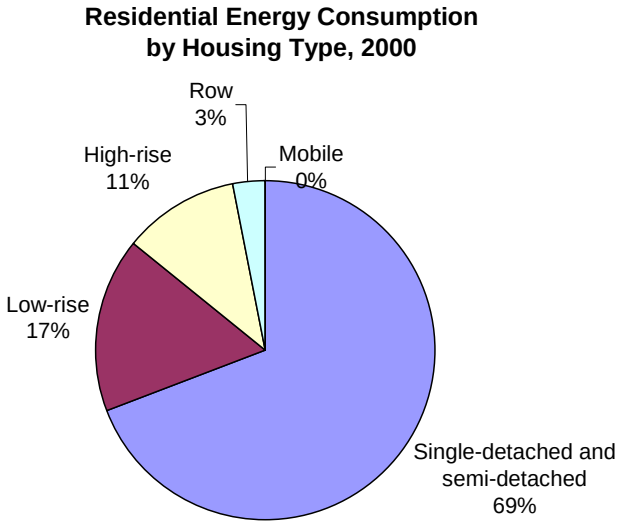
Promote community awareness/access to existing resources and develop new tools to maximize home energy improvements and retrofits.

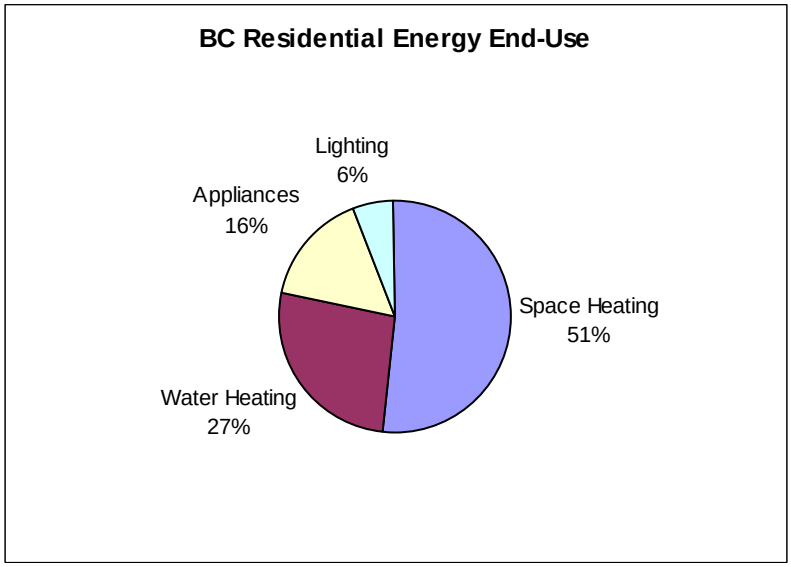
Priority Measure for Immediate Institutional Action

Targeted Reduction: 38,000 t

Assumptions: 35% of detached/semi-detached housing improves energy efficiency by 25%

The following two graphs show typical energy consumption by housing type and the typical end-use of energy consumed. When combined with the magnitude of residential emissions, what these graphs reveal is that energy retrofits focusing primarily on space and water heating in detached housing is the single most important emissions reduction measure that the City can actively pursue.





The roles the City will likely need to play are to:

- Create community wide awareness and commitment to improving the energy efficiency of their home
- Maximize the access of homeowners to the many tools and resources that already exist
- Recruit the participation of the home renovation industry in promoting energy efficiency and related opportunities

4.1.1 Energuide for Houses

The City should promote the Energuide for Houses program through the building permit process, Integrated Marketing, supporting the Provincial initiative described below by engaging the BC Realtors Association, and developing additional complementary tools

The core existing resource promoting home energy retrofits is the Federal Government's *Energuide for Houses* Program that certifies inspectors and offsets the cost of home energy audits. For homeowners who demonstrate that they have improved the efficiency of their home, this program also offers significant rebate money.

To increase access to this resource and to attempt to incorporate energy efficiency as a consideration in home purchases, the Province is exploring ways to require Energuide evaluations for all housing sales. Creating energy awareness upon possession of a home increases homeowner awareness of efficiency opportunities when doing any subsequent renovations.

4.1.2 Do-It-Yourself Approach

The City should promote a homeowner do-it-yourself approach to energy improvements through Integrated Marketing, by engaging local hardware stores to do promotions and demonstrations, and through the proposed Corporate Climate Change Challenge.

Many homeowners will not be attracted to undertaking major home renovations just to improve energy. These homeowners should be made aware of the numerous, low

cost, easy to implement, high impact measures that they could implement themselves with limited or no outside instruction. These include:

- installing and using a programmable thermostat(s);
- weather sealing;
- installing quality low flow shower heads
- installing compact fluorescent lights and light-emitting diode (LED) Christmas lights.

These improvements typically cost less than $300 per home and can result in energy savings of around 20% for many homes, paying for themselves in under a year.

4.1.3 "One Stop, No Money Down" Approach

The City should support, where appropriate, the work of credible organizations and companies that make home energy retrofits simple, with no or only limited financial impact to the homeowner.

Homeworks, formerly a subsidiary of Terasen Gas, is an innovator in this area. They offer a "*One Stop, No Money Down*" option to address many of the barriers that homeowners have when considering retrofits. Their service includes:

- A free audit to qualitatively identify the best energy retrofit opportunities;
- Identify and apply for any rebate or funding programs the homeowner could qualify for including a Energuide Evaluation and rebate;
- Arrange for a retrofit by a Terasen-certified retrofit contractor;
- Arrange for financing of the retrofits with monthly payments coordinated with anticipated energy cost savings; and
- Quality control of work completed.

4.1.4 Role for Renovation Contractors

The City should work with stakeholders to develop and implement a program to educate and possibly provide recognizable branding for home renovation contractors and suppliers on the opportunities for energy efficiency improvements that complement their core business.

While many homeowners may not want to spend large sums of money improving the energy efficiency of their home, they might be receptive to spending the small incremental cost of doing a renovation planned for other reasons in an energy efficient fashion. Windows, water heaters, furnaces all get replaced eventually. For instance, people periodically excavate around their foundation to install drain tile creating a great opportunity to install rigid external basement insulation.

One mechanism to make homeowners aware of incremental opportunities for energy efficiency improvements would be to develop a program to educate and gain the commitment of home renovation contractors and suppliers to identify energy efficiency opportunities directly or indirectly relating to their core business. This might involve some form of "branding" that indicates to homeowners that the contractor or supplier they have hired is aware of the energy efficiency opportunities of the work they are performing and will present the homeowner with the options (including funding and operational cost savings).

4.1.5 Corporate Climate Change Challenge

The City should work with key corporate stakeholders to develop and implement a "Corporate Climate Change (C3) Challenge" where these organizations undertake a friendly competition to achieve the highest level of employee home retrofits and thereby use their own employees to launch home energy awareness into the community while building contractor capacity.

The City can use its access to a significant segment of the population as a catalyst for awareness and change. By providing staff with well-designed information on home energy retrofit options and by hosting "brown bag" lunch sessions, the City could begin to raise broader community awareness and engagement. By doing so in a cooperative/competitive fashion with other large stakeholders such as the GVRD, BC Hydro, Terasen, and VanCity through a Corporate Climate Change Challenge, there is a great opportunity to engage tens of thousands of homeowners.

The City could work with these social/environmental stakeholders to pilot a Corporate Climate Change Challenge. By limiting involvement initially, these partners could get a better understanding of the messaging and barriers while simultaneously building contractor capacity to respond to the rapid market growth. After the pilot is complete, materials/format is revised, and barriers have been addressed, other large corporations, institutions, and municipalities could be engaged in the Challenge in subsequent years.

Home energy retrofits are a key opportunity to significantly reduce GHG emissions in Vancouver to meet the 2012 target. Energuide for Houses, the Do-it-yourself approach, the One-Stop approach, Energy Awareness for all retrofits, and the Corporate Climate Change Challenge create five opportunities to advance home energy retrofits by providing a variety of tools and resources to overcome potential barriers. The City should work with potential partners to further explore and develop these opportunities, potentially piloting some during the consultation process.

4.2 Non-Market Housing Retrofits

The City should support BC Housing efforts to develop and implement a strategy to increase the energy efficiency of non-market units in Vancouver by providing political and research support, co-sponsoring funding applications, and bringing other stakeholder such as the BC Non-Profit Housing Association to the table.

Additional Measures for Institutional Action

Targeted Reduction: 12,000 t

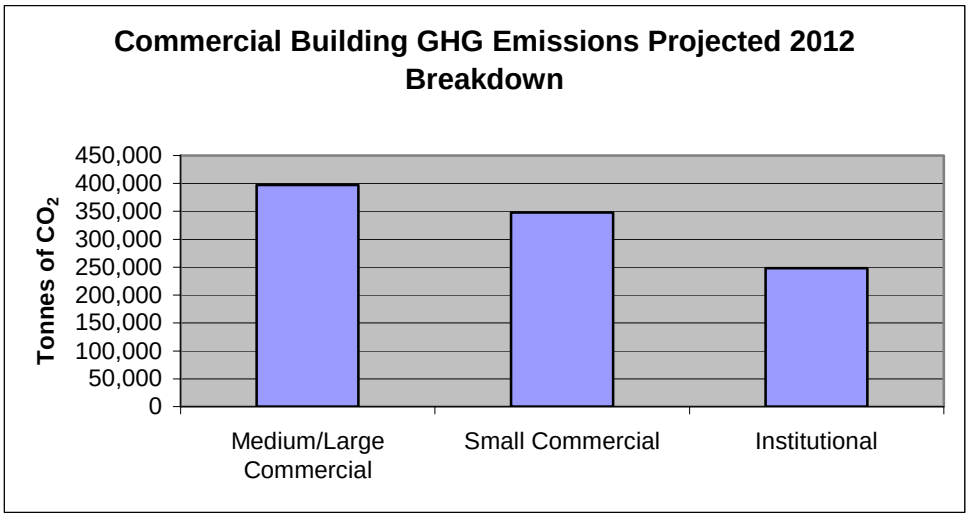
Assumptions: 90% of non-market housing stock improves energy efficiency by 25%

There are approximately 21,000 non-market housing units in Vancouver comprising nearly 9% of the total stock. BC Housing and non-market housing groups own and operate the majority of the units while the City itself is responsible for the remainder. The City has committed to improving the energy performance of its own facilities (including non-market housing) in its Corporate Climate Change Action Plan (CCAP).

BC Housing is presently developing the business case to retrofit those units that it owns and operates with an aim to expand the program to the non-market housing group controlled units. Even though they do not own or operate these housing group controlled units, they are largely responsible for funding their operations and therefore could realize long-term savings by supporting retrofits.

5.0 Commercial Building Retrofits

Commercial buildings (offices, retail, warehouses, and institutional) are the single largest source of GHG emissions in Vancouver. Improving the energy efficiency of the existing building stock is one of the five central strategies in this plan and will be essential in order to meet the 2012 reduction target of 6%. The wide variety in scales and ownership structures requires three approaches to address the challenges of developing and implementing a GHG reduction strategy for commercial buildings.



5.1 Medium and Large Commercial Building Retrofits

The City should work with utilities, other levels of government, and building owners/operators to develop tools and incentives to complement recent changes in financial and market conditions to achieve deeper market penetration of energy efficiency programs in medium and large office buildings, hotels, warehouses, and non-food retail

Priority Measure for Immediate Institutional Action

Targeted Reduction: 14,000t

Assumptions: 25% of medium and large commercial buildings improve energy efficiency by 15%

The uptake of Federal, Provincial, and Regional energy efficiency programs in Vancouver has been historically limited by the long payback periods resulting from low energy costs and a mild climate. Recent changes include:

- BC Hydro's renewed commitment to and structuring of PowerSmart;
- The Federal Government's commitment to Kyoto and provision of some resources in this area;
- Volatility and increases in natural gas prices and recently announced increases in electricity rates;
- The City's ability to provide positive publicity and support for building owners and operators that make socially positive improvements; and
- The Growing desire by many large building owners, operators, and major tenants to support environmental initiatives
- The introduction of the Building Owners and Managers Association's (BOMA's) GO GREEN program provides a good foundation for encouraging energy awareness and retrofits.

Many previous programs have attempted to encourage building owners and operators to undertake comprehensive renovations that are not consistent with their annual budgeting processes. The GVRD's Customer Needs Assessment indicated that programs that encouraged a step-wise approach that was harmonized with individual buildings' maintenance and replacement schedules would be much more effective in realizing change. One disadvantage to this approach is that each improvement would likely be justified on a stand-alone basis which could result in only the most economically viable improvements to be undertaken thereby limiting the total energy savings. An additional challenge is that in order to undertake energy retrofits, owners/operators would require a credible energy and maintenance audit to understand the opportunities – they may not be willing to pay for an audit but experience has shown that free audits are not necessarily valued and seldom translate into action.

The GVRD work also suggests that promoting market competitiveness and not just reduced operating costs might be a more effective approach to promoting energy retrofits. Demonstrating the link between energy improvements, building quality, and improved worker productivity may lead to increased interest from building owners and operators as they seek a competitive advantage in attempting to attract and maintain tenants, in the context of increasing interest in green buildings in the business community

There is a common misconception that split incentives or triple-net leases are a major impediment to energy efficiency improvements in commercial buildings. While the majority of medium and large commercial buildings are not owner occupied, contemporary lease structures usually enable building owners/operators to recover the costs of improvements that can be shown to reduce operating costs. Once the costs of improvements have been recovered, the reduced operating costs improve the market competitiveness of the leased space.

One of the most cost-effective approaches to improving the energy efficiency of existing commercial (and even large multi-family residential) buildings is to ensure that the existing systems are maintained and operated properly. One of the most common findings arising from professional energy audits is that the building control system is not programmed to maximize energy performance while maintaining functionality. In addition, it is not uncommon to miss or neglect the regular maintenance of HVAC equipment resulting in inefficient operation.

To promote improved energy efficiency of building operations and maintenance the simplest approach may be to champion the development of a Building Operator Training and Certification program to establish standards and educate building operators on ways to increase the energy efficiency of their buildings. The Provincial Ministry of Energy and Mines is currently exploring the opportunities and challenges of an Operator Training and Certification program. As part of the consultation work around this Draft Plan, the City should explore ways to support the Provincial efforts and promote the uptake of such training. As with the other potential elements of a strategy to increase commercial building retrofits, the best approach *may* be to try and incorporate operator training into BOMA's existing GO GREEN program.

5.2 Tenant/Staff Energy Awareness

The City should engage Hydro and large employers to develop and promote a universal energy awareness program with messaging potentially incorporated into the proposed Integrated Marketing Program

Additional Measure for Further Exploration

Targeted Reduction: 5,000t

Assumptions: 25% of employers implement energy awareness programs that improve efficiency by 2%.

While retrofit programs take both time and money to implement, some organizations have realized cost-effective energy savings of 2-5% by simply increasing staff awareness of efficient energy behaviours. It is important that any programs to promote energy efficient behaviours focus on reducing unnecessary waste and that they are clearly not suggesting that employees "freeze in the dark". Some common elements of these programs include:

- Encouraging staff to turn off lights when leaving common spaces (meeting rooms, etc)
- Encouraging staff to turn off lights at the end of the work day, in their own office as well as un-occupied surrounding spaces
- Encouraging/mandating staff to enable computer screen power saver modes; screen savers do not reduce computer energy consumption
- Providing and supporting the use of task lighting and sun shading
- Developing as localized as possible form of energy consumption reporting
- Programs should communicate to all staff but should also take advantage of any teams uniquely positioned to make these changes happen such as IT, security, and cleaning staff.

The City of Vancouver will be working to develop and implement such a program as part of its own Corporate Climate Change Plan.

Another opportunity to promote general energy awareness might be to periodically run a Black-out Campaign in areas with large concentrations of commercial office buildings. Such a campaign might have awards/recognition for those buildings that are largely "blacked out" at night (allowing for minimum baseline levels of safety lighting). One particular challenge to address would be after-hours lighting in retail spaces to discourage vandalism and theft. Before committing resources to this as a promotional tool, a better understanding of the energy behaviours in these areas would be required.

5.3 Institutional Building Retrofits

The City could engage other major institutions such as the Health Board, School Board, Community Colleges, and other levels of Government to share information on the benefits and challenges of energy efficiency retrofits and to build commitment to getting their house-in-order.

Priority Measure for Immediate Institutional Action

Targeted Reduction: 27,000t

Assumptions: 75% of institutional buildings improve energy efficiency by 15%

Institutional buildings make up 25% of the commercial building stock and their long-term owner occupied nature make "house-in order" retrofits a great opportunity for GHG emissions reductions. Their large scale makes it easier for them to realize funding support from BC Hydro's PowerSmart program. This institutional building stock includes government buildings, colleges, schools, hospitals, other care facilities, and churches. While Vancouver schools have nearly reached their best efficiency potential, we believe that all these other institutions have real savings potential.

In its Corporate Climate Change Action Plan, the City of Vancouver has committed to improving the energy efficiency of its existing building stock by 20% before 2010. The plan is to engage an Energy Service Company (ESCO) to provide a turnkey audit, design, and retrofit service on roughly five million square feet of City owned and occupied facilities. While the detailed financial implications will arise out of the audits, it is expected that these retrofits can be achieved in a cost-effective manner based on the experience of other large public institutions that have engaged in a similar process.

In its Action Plan for Energy Efficiency and Greenhouse Gas Reduction (January, 2004), the British Columbia Building Corporation has indicated that they intend to improve the energy efficiency of the provincial building stock by 12% by 2007.

5.4 Small Commercial Building Retrofits

The City should work with BC Hydro, Terasen, senior governments, BIAs and other stakeholders to promote retrofits for small businesses ("Mom and Pop's") throughout the city, starting with lighting retrofits and promoting other energy efficiency measures where appropriate.

Additional Measure for Further Exploration

Targeted Reduction: 5,000t

Assumptions: 15% of small commercial buildings improve energy efficiency by 10%

The small business sector is a difficult one to reach, due to the patterns of ownership, management and tenancy of the buildings in which small "mom and pop" businesses typically reside. There are many barriers to reaching this group, including availability, ethnicity and language[3], slim margins, short-term leases and others.

BC Hydro recently completed a program plan, for future implementation, that noted that 5,000 kWh of energy could be saved, including one Megawatt of peak load, by retrofitting the lighting of 1,000 small businesses in Vancouver. Many examples exist for programs like this, including Toronto's Cool Shops program as well as others in San Francisco, Berkeley, Santa Cruz, and the City of Davis, in California.

With approximately 40,000 small businesses that would fall into this category in the GVRD, a program like this would bring many benefits.

A successful program would include:

- A comprehensive "turnkey" service;
- Community-based delivery approaches;
- Education and multicultural outreach;
- Demonstrations;
- Pre-qualified contractors;
- Incentives;
- Quality assurance; and
- Monitoring and verification.

As a minimum, the City should promote the inclusion of new lease language, similar to that used with larger professionally managed commercial buildings, that enables building owners to recover the cost of energy efficiency improvements from tenants.

[3] West Coast Environmental Law's MultiCultural Environmental Citizen program might be useful in addressing language and cultural barriers.

6.0 New Building and Appliance Energy Standards

The limited amount of time remaining before 2012 and the relatively small amount of growth relative to the existing building stock means that improved energy efficiencies for appliances and buildings will not have a significant impact in meeting the 6% reduction target. Despite this limitation, implementing these strategies immediately or in the short-term is essential for longer-term GHG emissions reductions. An intelligent and ongoing approach to new efficiency standards is one of the most cost and time effective long-term strategies available to governments to make meaningful changes.

6.1 Energy Efficiency of Appliances

The City should support efforts by the Province and Federal Governments to increase the minimum efficiency of common appliances in buildings.

Additional Measure for Institutional Action

Targeted Reduction: To be determined

Assumptions: To be determined

One potentially powerful and cost-effective approach to improving the energy efficiency of buildings is to increase the required efficiency of appliances and energy devices within the building. Through the BC Energy Efficiency Act, the Province has the ability to mandate efficiency standards for specific new appliances and energy devices including things such as fridges and washing machines, boilers, hot water heaters, furnaces, decorative fireplaces and even windows.

Establishing efficiency standards for new appliances limits the energy impacts of building stock growth *if it were done very soon*. In addition, because most of these devices typically have an average life expectancy of 10 to 15 years, establishing higher standards for new devices means that existing inefficient appliances will be phased out over time (starting with the oldest, least efficient ones). Another advantage of this supply side approach is that it avoids the need for retrofit compliance inspections.

The Province is currently reviewing the BC Energy Efficiency Act and is considering requiring new standards on a broad range of devices. *As part of the City's Community Plan, they should advocate for higher Provincial standards to take effect as soon as possible*. This is a cost-effective way of reducing GHG emissions without putting any single municipality at a competitive disadvantage. A strong regulation avoids lost Provincial revenue that might otherwise be sought for PST exemptions on efficient appliances.

6.2 Energy Utilization By-law

The City should upgrade the energy efficiency requirements of the City's Energy Utilization By-law to current standards as a key first step in improving the energy efficiency of new buildings.

Additional Measure for Institutional Action

Targeted Reduction: 7,000t by 2012 with significant continuing benefits beyond then.

Assumptions: Compliance with ASHRAE 90.1 (2001) by 2006.

In 1991 Vancouver approved amendments to the Building By-law that required adherence to the 1989 edition of the ASHRAE 90.1 standard for energy use with a relaxation in lighting efficiency requirements. Not only is this outdated standard no longer available but it does not reflect the evolution of building techniques and technologies that enable greater energy performance.

Updating the Energy Utilization By-law to reference current standards is an important first step towards reducing GHG emissions by 2012 and is fundamental to addressing climate change in the longer-term. As the efficacy of new building standards in affecting short-term (2012) goals is directly related to the speed with which they are enacted, it is recommended that the City move quickly on

updating its Energy Utilization By-law. Staff are already in discussion with the design and development communities on reviewing this ASHRAE update and will be ready to report back to Council soon with a proposed update to the Vancouver Building By-Law (VBBL) and an implementation plan.

It is estimated that applying current standards would improve the efficiency of new Part 3 buildings (commercial and mid-high rise residential) by 10% to 15%.

Energy upgrade requirements during renovations – The City should consider requiring as part of issuance of a building renovation permit that any systems/component impacted directly by the planned improvement be brought up to current energy efficiency standards.

6.3 Energy Efficient New Construction

The City should encourage new commercial and multi-family buildings to meet the requirements of the Commercial Building Incentive Program (CBIP) which exceeds ASHRAE 90.1 (2001)) by 10% to 15%.
Additional Measure for Institutional Action
Targeted Reduction: 4,000t
Assumptions: All new commercial and multi-family residential buildings will meet CBIP standards by 2010

While the short-term impacts of new building energy efficiency are limited, increasing the efficiency of new commercial and multifamily buildings is key to cost-effective and meaningful long-term GHG reductions in Vancouver. Commercial building GHG emissions are growing faster than any other sector other than heavy-duty vehicles and most of the population growth in Vancouver will be accommodated in multifamily residential buildings. Updating the VBBL to reference ASHRAE 90.1 (2001), as per the previous section, is a significant first step, improving energy efficiency by 10% to 15%.

Developing policy for high performance or green buildings is a growing priority in Vancouver. Many developers are beginning to pursue new technologies and are looking to staff for answers and directions. Throughout 2003, City of Vancouver staff have worked toward the creation of a green buildings program that will address the questions around green buildings in an attempt to develop and/or promote a green building strategy that is applicable to the entire city. A priority for the City's soon to be launched Green Building Program will be to engage building developers (especially those few who have attempted to build energy efficient buildings) and other stakeholders to identify barriers to implementing energy efficiency in these buildings and to determine opportunities to effect the desired changes.

Partnering with the initial developers that incorporate leading-edge energy efficiency strategies to meet CBIP[4] requirements will provide the City with a better understanding of the challenges and opportunities that this approach entails. This understanding will be used to inform zoning density schedules and possibly other incentives to encourage the desired changes. As the desired approaches and technologies become more standard practice, the City will look at regulating them beyond South East False Creek (SEFC) as required elements of building design and construction city-wide.

If temporary incentives are required to encourage the transition, the City views an Atmospheric Fund or expedited approval process (with staff to support) as preferable to height or density bonusing.

[4] While the Commercial Building Incentive Program is currently cumbersome for use in the design of multifamily buildings, revisions expected before 2005 should make it a much more useful tool.

Height and density bonuses outside of the carefully developed zoning schedules have the capacity to drastically impact the urban design standards/goals established for multi-family residential communities, potentially impacting livability, view corridors, shadowing, and public realm. Development Cost Levies are not used to fund energy infrastructure.

6.4 Energuide 80 for New Detached and Semi-Detached Housing

The City should support the Province and Natural Resources Canada in their work to improve energy efficiency of new detached and semi-detached homes to at least an Energuide 80 rating.

Additional Measure for Institutional Action

Targeted Reduction: N/A

Assumptions: N/A

Improving the energy efficiency of these homes is a priority for both the Province and Natural Resources Canada; by 2010 they intend to have all new detached and semi-detached housing built to score at least Energuide 80. While Vancouver should support their lead in this area, it is not a priority measure as the amount of new detached housing construction is relatively small.

While the technology to make this change is not complicated, trades have indicated that they need time to become familiar with improved construction techniques and materials. The Province is considering mandatory Energuide labelling on all new homes to raise awareness of energy performance issues amongst both trades and consumers.

As the four strategies above indicate, improving the energy efficiency of new appliances and construction is fundamental to long-term GHG emissions reduction. Government has much greater influence/control over the efficiency of new buildings and appliances than they do over retrofits and building it efficient in the first place is a much more cost-effective approach. All of the above four strategies are already part of existing work programs.

Transportation Overview

Vehicles such as passenger cars, light trucks, and sport utilities (referred to collectively as light duty vehicles) and heavy duty trucks account for over one third of Vancouver's GHG emissions. This plan describes two general approaches to reducing the GHG emissions that result from our use of light and heavy duty vehicles.

The first approach, which is embodied in the City's transportation plans and the region's Transport 2021 plan, is to encourage and support the use of alternatives to the single occupant vehicle. This Draft Community CCAP builds on the directions established in these existing plans by providing greater specifics (that include new tools that were not available when the existing plans were written) while at the same time identifying the need expedite some elements of their implementation in order to help reduce GHG emissions to meet the 2012 target. This will require the city to take a leadership role in ensuring viable and attractive transportation alternatives are available as well as promoting these alternatives.

The second approach recognizes that automobiles will continue to be the dominant travel mode for many trips. Reducing greenhouse gas emissions will also require a significant shift towards more efficient fuels and vehicles. Utilizing new fuel and vehicle technologies and reducing wasteful habits, such as unnecessary idling are new approaches for the City to become actively involved in but will be key in reducing GHG emissions to meet our targets.

Strategy	***Description***	***Targeted emissions reduction***	***Implementation***
Biodiesel blends	Use the purchasing power of Municipal fleets to support the development of local biodiesel production and work with producers and other level of government to make this alternative fuel cost neutral.	Targeted Reduction: 24,000 t	85% of diesel fuel sales for heavy duty and non-road equipment are a 20% biodiesel blend
Ethanol-blended gasoline	Research the environmental and operational implications of ethanol-blended fuels and seek way to promote increased use.	Targeted Reduction: 5,000 t	15% of gasoline fuel sales are a 10% ethanol blend
Efficient Vehicle Operation	Promote fuel efficient driver training programs and establish an anti-idling by-law to reduce unnecessary fuel consumption.	Targeted Reduction: 35,000t	15% of all light vehicle drivers and 30% of all heavy duty vehicle drivers improve the efficiency of their vehicle operation by 10%. All drivers reduce unnecessary idling by 4 minutes/day.
Efficient Vehicles	Research and advocate for timely implementation of increased federal fuel efficiency standards and seek ways to promote the purchase of the most efficient vehicle that meets a purchasers' needs.	Targeted Reduction: 135,000t	To be determined
Transportation Alternatives	Develop a package of initiatives that increases the provision of viable transportation alternatives while simultaneously encouraging the use of these alternatives. • Work with TransLink to provide	Targeted Reduction: 91,000t	Reduce light duty vehicle usage by Vancouver residents by 10% from projected 2012 levels

	improved transit service • Increase walking and cycling infrastructure • Expand individualized marketing of transportation alternatives • Promote clean commuting options • Support clean trips to school • Expand participation in car-sharing • Explore transportation pricing strategies		

7.0 Transportation Alternatives

Priority Measure for Immediate Institutional Action

Aggregate Targeted Reduction from Supporting Transportation Alternatives: 91,000t

Assumptions: That a bundle of measures to provide transportation alternatives and encourage their use can reduce light vehicle fuel consumption by 10% from the projected 2012 business as usual total.

Vancouver-based light-duty vehicles (passenger cars, light trucks, mini-vans, SUVs, etc) are expected to emit over 900,000t of greenhouse gases by 2012 (over ¼ of all community GHG emissions). Reducing the amount of motor vehicle use, especially by single-occupant vehicles, is essential to meeting the 6% GHG emissions reduction target. In addition, promoting transportation alternatives supports other sustainability objectives, such as reducing other types air pollution, reducing collisions, improving community livability, improving health (through promoting increased physical activity and air quality), and improving goods movement.

Promoting transportation alternative initiatives, also referred to as Transportation Demand Management (TDM), consist of measures to:

- Reduce the need for automobile travel (*"Smart Growth");*
- Provide alternatives to automobile travel, especially targeting a reduction in single-occupant-vehicle (SOV) trips;
- Promote the use of alternative forms of transportation ;
- Adjust the cost of travel so as to promote the use of alternatives while simultaneously generating additional revenue to support alternatives.

Measures that promote and support transportation alternatives are significantly more effective when implemented as part of a comprehensive bundle of measures addressing all four of these categories. For example, promoting alternatives without first or concurrently building alternative capacity would not be an effective approach. As a result, it is difficult to quantify the potential impacts of isolated transportation alternative measures. This plan proposes that promoting transportation alternatives could collectively reduce GHG emissions by 10% from the "business-as-usual" forecast for 2012. Reducing the vehicle-kilometres-traveled by Vancouver-registered vehicles by 10% within five years is an ambitious target compared to other transportation plans.[5] While this will clearly be a challenge, two reasons for optimism are that a significant latent demand for alternative travel modes already exists in Vancouver and its "smart growth" pattern of development where most new population growth has and is expected to be accommodated near employment, recreation, and services.

While some of these measures can be initiated independently in Vancouver, the promotion and support of transportation alternatives is truly a regional concern and the ability to implement many of these measures lies with either TransLink or the GVRD. The success of Vancouver's Community Climate Change Plan will depend on how effectively we can work together with our regional partners to effectively reduce traffic.

The following eight subsections describe transportation alternative measures that are either essential or look promising as approaches to reducing Vancouver's GHG emissions.

[5] For example, the current regional transportation plan, Transport 2021, estimated that if all of its demand management measures were implemented (including regional tolling), there would be a 10% reduction in the number of peak hour vehicle trips in 2021 compared to the base case. In another example, Portland Oregon's Transportation Systems Plan notes a target of 10% reduction in vehicle-miles-traveled per capita over a 20-year period. To review the feasibility of this target, and help focus where resources will need to be applied, the City has requested that TransLink provide a review of the City's emissions forecasts and target, using their regional emissions model.

7.1 Continued "Smart Growth"

Building compact, complete communities has been central to the relatively slow growth in GHG emissions from transportation (relative to population increase and other municipalities in the region). The City should continue with its efforts in this regard, especially their work around rapid transit stations.

Additional Measure for Institutional Action

A key strategy for managing transportation related emissions is land use which plans for higher density, mixed use, walkable communities. This action is almost entirely within the control of individual municipalities. In Vancouver, emissions from Light-Duty Vehicles increased less than 6%, despite a population increase of 18% from 1990 to 2000, and a shift towards less fuel efficient vehicles. AirCare and ICBC data indicates that while the total number of Vancouver insured vehicles increased, the distance traveled per vehicle and the total distance traveled by all vehicles actually decreased. This finding is consistent with the results of TransLink's 1999 Trip Diary Study that indicated that automobile trips originating in Vancouver decreased slightly, in terms of both mode share and the total number of trips (over 24 hours). To understand this result, it is important to consider the nature of development in Vancouver. Much of Vancouver's population growth in the 1990s was accommodated in the downtown peninsula and other mid-high density nodes where it easy to access employment, recreation, and retail on foot, by bike and using transit.

The impact of land use on emissions is a long-term perspective. This plan assumes that existing and past land use initiatives, will continue to contribute similar benefits for Light-Duty Vehicles, between now and 2012. Although further refinements to land use within the city and region may have a strong influence on reducing GHGs, these impacts will not likely be significant until after 2012.

7.2 Transit Service and Pricing

The City should work with TransLink to increase bus service on high demand routes. Achieving this will likely require additional service as well as giving buses higher road priority through street and signaling design.

Additional Measure for Institutional Action

Improving transit service and ensuring that it is effectively priced are key initiatives in both the City and regional transportation plans. Improvements can include increasing transit speed, frequency, user information and vehicle comfort, and encouraging innovative services. This plan will require a renewed focus on transit over the next 6 years to address existing service needs and provide for future service increases generated by new demand management initiatives (e.g. U-pass expansion, school and commuter trip reduction programs, etc.). Ensuring that the 5-year Vancouver Area Transit Plan currently being developed is responsive to these needs is fundamental to the success of this plan.

In Vancouver there is significant latent demand for peak hour transit service and the success of many of the other initiatives described in this plan are dependant upon there being a viable transportation alternative available. TransLink, through their Three-Year Plan and Ten-Year Outlook, propose to significantly improve transit service in the region. Vancouver's Transit Area Plan (preparation to start in early 2004 and be completed by early 2005) will clarify what new services will be allocated to Vancouver. In addition, TransLink's Showcase pilot for Main Street, to understand how to effectively provide transit priority without negatively impacting business along the route, could provide extremely valuable information on ways to improve transit service.

The City has proposed implementing a Downtown Streetcar Network to link a number of activity centres in the downtown area, such as residential employment, tourist and shopping areas that have expanded beyond reasonable walking limits. To provide a seamless transportation network, the

Streetcar would be integrated into other transit services, such as the Coast Mountain Bus Co., Seabus, SkyTrain, West Coast Express, the future RAV line, and possibly the private ferry operators in False Creek. Providing the Downtown Streetcar will be an important cornerstone in providing transit service to Southeast False Creek (SEFC), the City's sustainable community, as well as North False Creek and the False Creek Flats.

In addition to improving service, transit ridership could be increased through transit fare reductions or discounts. TransLink's Three-Year Plan and Ten-Year Outlook include increasing general fares by the rate of inflation, while expanding less expensive U-passes for post-secondary institutions, encouraging the Provincial Government to continue discounted passes for seniors, and carrying out a Fare System and Policy Review when "Smart Cards" are introduced towards the end of the Outlook period.

In the short-term, commuter trip reductions must largely focus on areas where there is excess transit capacity (i.e. reverse commute direction, Millennium SkyTrain stations, etc.), carpools, walking, and cycling. The City will work with TransLink to identify areas where there is excess capacity.

Priority actions that the City can undertake to facilitate increased transit service include:

- Requesting that TransLink determine the increase in transit service required to support, in conjunction with other measures, a 10% reduction in SOV trips by Vancouver residents by 2012;
- Working with TransLink to expedite the Main Street Showcase Project so as to highlight the opportunities for enhancing transit road priority in time to inform the Vancouver Transit Area Plan and the final version of this Climate Change Action Plan;
- Developing a Transit Priority Plan as part of the Transit Area Plan, to identify further signal priority projects, queue jumpers bus lanes, and other priority measures that could be implemented over the next five years; and
- Requesting that TransLink expedite their Fare System and Policy Review in order to examine how fares could be structured to optimize ridership and GHG reductions.

Similarly, when TransLink updates their Long-Range Strategic Transportation Plan in 2004, GHG reduction measures should be included, and progress on actual emissions reductions reported on a regular basis.

7.3 Walking and Cycling Infrastructure

The City should expedite the completion of the City's greenway, bikeway, and pedestrian networks to increase the number of "short trips" taken by walking and cycling. Achieving this may depend in part upon increased flexibility in spending of TransLink Minor Capital Cost Sharing funding.
Additional Measure for Institutional Action

Shifting automobile trips to walking and cycling can have a significant impact on GHG emissions. This is especially true for short trips (less than 5km) where walking and cycling are most viable. Until transit capacity increases to meet current and potentially expanded demand, improving the infrastructure capacity and promoting the use of other alternatives provides one of the best opportunities to reduce Vancouver's reliance on private automobiles to meet our transportation demands.

As part of the implementation of its existing transportation plans, the City continues to expand its walking and cycling facilities. In general, there is significant capacity in the existing networks for these modes to accommodate increased use. However, there are still some areas lacking needed facilities. Accordingly, over the next 6 years infrastructure improvements will need to be expedited. Although

funding from the new city-wide Development Cost Levy will help, significantly increased contributions from the region or other levels of government will also be needed. A current priority action to support walking and cycling infrastructure is to obtain increased flexibility to spend TransLink Minor Capital cost-sharing funding on bicycle and pedestrian improvements. Vancouver currently has about $5 million in unallocated Minor Capital funding that it could have spent on walking and cycling infrastructure if TransLink would permit increased spending flexibility.

7.4 Individualized Marketing of Transportation Alternatives

The City should work with TransLink to expedite the planned pilot project in individualized marketing targeted for later 2004 in Kitsilano.

Priority Measure for Immediate Institutional Action

The GVRD/TransLink's Showcase Project that recently received almost $9 million of Transport Canada funding includes a widespread pilot of TravelSmart in the region. Kitsilano is one of six pilot neighbourhoods to demonstrate the efficacy of individualized marketing; a new, but proven initiative that helps interested residents shift to alternative modes. This initiative is not specifically referenced in City or regional transportation plans, since it was not sufficiently developed and tested at the time these plans were created.

Unlike conventional advertising or promotional efforts, individualized marketing identifies individuals or households that are interested in using transportation alternatives and then provides them with customized information and support. By customizing the information to the user, the program can enable them to take advantage of existing alternatives making immediate modal shifts without having to wait for costly (and lengthy) service improvements.

This program of individualized marketing called TravelSmart was developed in Munich and has subsequently been piloted in Perth with impressive results. The first phase of a pilot program in Portland, Oregon is just about complete.

In Australia, the TravelSmart program was implemented with 15,000 households with the following results:

- 21% increase in transit
- 91% increase in cycling
- 16% increase in walking
- 14% decrease in car vehicle-kilometres-traveled

Not only was TravelSmart successful in making significant modal shifts, these results were lasting according to a follow-up study two years later. The cost/benefit analysis showed strong program returns in avoided costs and there were also unquantified indications that the program had additional health benefits.

Other programs could also be considered, such as Seattle's "One-Less-Car" initiative. Under this program, families are offered financial incentives and information to help them reduce automobile use, try other transportation options, and re-think the way they use their cars. The demonstrations help inform, educate and encourage other Seattle families to save money and make their communities more liveable.

7.5 Cleaner Commuting Options

In Vancouver, almost 300,000 single occupant automobile trips are made for commuting purposes per day.[6] The workday commute has been identified as having high potential for mode shift because for many individuals, the trip destination and arrival and departure times do not vary. The routine nature of this trip makes it easier for people to make arrangements that do not require the flexibility of a single occupant vehicle. In addition, programs to provide and promote cleaner commuter options can be delivered in cooperation with employers (or post-secondary institutions in the case of students) to customize the tools and messaging to specific needs and provide more direct communication with employees than non-targeted programs.

Increasing car-pooling and other commuter and post-secondary trip options to driving alone are supported in Vancouver's transportation plans and a key component of the region's Transport 2021 plan. Although the City and regional plans both call for car-pooling to increase, this mode has decreased in recent years. Increased efforts are needed over the next 6 years to reverse this trend, as well as expand the highly successful U-pass concept introduced by TransLink in 2003.

7.5.1 Existing Commuter Options Programs

The City should seek and pursue opportunities to promote existing commuter options programs.

Priority Measure for Immediate Institutional Action

TransLink, through Better Environmentally Sound Transportation (BEST), currently provides employee commuter options programs to medium and large major employers. Through the Go Green Choices and OnBoard programs, BEST provides tailored assistance in the development, design, implementation and maintenance of workplace commuter options programs. This includes training, informational and marketing materials, workshops, etc.

The City could leverage these existing resources by identifying opportunities to increase employer and post-secondary school participation in these programs. One such opportunity might be to work with the Building Owners and Managers Association to see if participation in these programs might be one of the criteria for their own GO GREEN workplace program (that currently focuses mainly on building energy efficiency). Regardless of the avenue pursued, particular attention should be paid to those areas of the city with underutilized sustainable transportation infrastructure.

In the USA some states like California and Washington have made commuting options programs mandatory for companies with more than 100 employees. While the City can not compel businesses to participate in the commuter Go Green Choices program, the City could recommend or promote these services to companies over a certain size as these companies are processed through regular City business channels (i.e., City taxes or business licenses). At a minimum, the City could promote Go Green Choices on the City's website under business resources and information.

7.5.2 Use of Carpools

The City should work with regional partners such as TransLink, Jack Bell Rideshare, the Cooperative Auto Network, and BEST to explore the efficacy of existing car pooling programs and possibly pilot new programs to increase carpooling in Vancouver.

Additional Measure for Further Exploration

[6] Trips to and from post-secondary institutions are included in the definition of commuting trips.

A significant number of employees live or work in locations that are not well-served by transit or where walking and cycling are not attractive options because of distance or insufficient facilities. Accordingly, shifting some commuters who currently use single occupant vehicles (SOVs) to carpooling programs should be further explored as a measure to reduce green house gas emissions. Given the limited success of existing programs and strategies, the City must explore the successes and barriers so as to better understand the viability of this approach and the best way to support and expand it.

One possible option that the City should consider is a pilot project that would use postal-code searches to identify potential carpool matches amongst employees clustered in the Central Business District. This approach has proved to be effective at City of Vancouver staff nodes such as City Hall. One of the first steps of in such a pilot would be to secure the voluntary cooperation of a sufficient number of employers within the Central Business District to create a large enough database to enable matches to be made.

Carpooling is a TDM measure that also requires incentives such as priority parking measures. The City should work with parking providers to develop and implement (or expand) car-pool priority parking, especially at employment nodes such as the Central Business District. These efforts may also be supported through Transportation Management Associations (see below) and existing commuter option programs.

7.5.3 Transportation Management Associations *(TMAs)*

The City should work with stakeholders to develop and promote TMAs in the city as a means to increase the effectiveness of initiatives promoting transportation options.

Additional Measure for Further Exploration

One important component that may be required for effective, widespread commuter trip reductions might be Transportation Management Associations. These are private, non-profit, member-controlled organizations that work together to address local transportation issues. They are usually clustered around a commercial or employment node (such as a large institution). Working cooperatively, members can share resources (such as off-street parking or bicycle facilities), offer services such as discounted transit passes, have a greater pool of people to draw upon for carpool matches, and have a unified voice when advocating for improvements such as increased transit service or improved pedestrian access.

Additional benefits to the City could include more effective transportation demand management program delivery, and a simplified relationship in dealing with a coordinated, unified voice on local transportation issues.

The challenge to be addressed in determining the role of TMAs in Vancouver is how to provide the financial resources required for a TMA to be successful and how to generate interest amongst local businesses to be engaged in the TMA. Without resources a TMA cannot address transportation issues in a meaningful way. Further, without visible improvements, members may not be willing to pay to support the organization. One option may be to seek Federal funding to support the establishment of TMAs in Vancouver through a pilot project. Another might be to explore cost-sharing opportunities with TransLink to expand TMAs and other measures that help to reduce or limit traffic.

Other North American cities have established redevelopment zones where TMAs are required by law to create operational TDM programs, particularly in areas with low transit use.

7.5.4 Universal-Pass Programs

The City should work with stakeholders to explore additional opportunities for Universal Pass Programs. This might include school focused programs, employment node centered programs, or even programs for major new residential developments (such as within SEFC).
Additional Measure for Further Exploration

The provision of a universally accessible, significantly discounted transit pass has been demonstrated as being very effective in encouraging the use of transit and boosting rates of ridership. The introduction of U-Pass at UBC and SFU in the fall of 2003 has been very successful, especially at UBC where transit ridership increased 53% over 2002 levels. The UBC and SFU programs are also significant in that a large number of students are being introduced to a transit system at a point in time when many are considering a first vehicle purchase.

A central challenge of offering universal passes is on the supply side of the equation –ensuring that there are buses available to transport willing commuters. Other jurisdictions across North America have seen success in offering universal passes to large or strategically located organizations to encourage more commuter trips by transit. Discounted universal passes require both capacity within the transit system to carry those passengers and funding to offset the revenue "losses". Both UBC and SFU have contributed to the program start-up costs and subsidize the pass costs. As such, the opportunities for additional U-Pass programs within Vancouver will require a cooperative analysis of areas of "opportunity" and how costs can be managed.

7.6 Clean Trips to School

The City should work with grade schools, parent advisory committees, block parent groups, neighbourhood associations, ICBC, and BEST to identify opportunities to support and promote existing cleaner transportation choice to school programs.
Priority Measure for Immediate Institutional Action

Studies have shown that up to 8% of automobile trips for Vancouver families over a 24-hour period are "grade-school related." Given the close proximity that most families in Vancouver live in relation to their children's school, reducing these trips offers a promising opportunity to reduce GHG emissions. In the context of this plan, these reductions are important. For the families, schools, and neighbourhoods where changes may be supported, the more significant benefits could be demonstrable improvements to neighbourhood traffic safety and children's health (through increased exercise and improved air quality).

Currently, the Insurance Corporation of British Columbia sponsors the Way-to-Go school program, which is targeted towards elementary school children and their parents. Way-to-Go encourages improved safety, reduced environmental impacts and improved physical fitness. This is done by increasing awareness and opportunities for walking, cycling, transit and ride-sharing. The main service offered is a Resource Kit for schools and individuals. Included in this package is background information on traffic safety and transportation alternatives, a process manual, ideas from similar programs, community resources and contacts, and related forms.

Better Environmentally Sound Transportation (BEST) has also provided a program called Off Ramp, for secondary school students. This is an award-winning student-led program to change attitudes and circumstances (particularly at a time when life habits are being formed and driver licensing is

pending), so that secondary students increasingly walk, cycle, take transit, board, blade and carpool to school.

While an initial consultation with current program providers will inform the direction of the City's role, it is initially envisioned that the City could contribute to the efficacy and uptake of existing programs by advocating for program expansion, undertaking research to barriers, enhancing mechanisms for schools/communities to improve street safety, and by co-sponsoring messaging through print materials, curricula development, school plays, etc.

7.7 Car-Sharing

The City should work with local car-sharing organizations to identify opportunities for expansion of auto-coops and other similar programs, and to monitor the impacts that membership has on overall automobile usage. In particular, the City should work with TransLink to review opportunities for integrating car-sharing with transit and ensure that car-sharing options are included in the Kitsilano TravelSmart pilot project.

Priority Measure for Immediate Institutional Action

Car-sharing (or car coops) provides individuals with easy access to a car to complement and encourage other transportation alternatives. By providing access to a car at a low hourly rate that includes gas, insurance, and maintenance, it enables individuals or households to get by with fewer privately owned vehicles, especially where there is good access to shops, services, and transit. Research has shown that a single car-coop vehicle typically displaces seven to ten privately owned automobiles (www.zipcar.com/green-benefits/). This reduces the amount of private or public space required for parking, further enabling compact and complete communities.

More significantly, because a user must pay the full cost of using a car each time they drive, members are more likely to use a car only when no other alternatives make sense. Car-sharing has been shown to reduce individual automobile usage by as much as 50% thereby reducing GHG emissions and traffic congestion (*www.zipcar.com/green-benefits/*). A University of California study of San Francisco's program, two years after its implementation in 2001, estimated that annual GHG emissions from car-sharing members decreased by 125 kg, while emissions from non-members increased by 41 kg per year.[7]

To better understand the significance that car-sharing might have in the City's final Community Climate Change Action Plan, it will be important to understand how a municipality can foster the rapid expansion of car-sharing membership. In addition, local monitoring of how car-sharing participation impacts automobile usage would be helpful in balancing the costs and benefits of support.

In Greater Vancouver, car-sharing services have been provided by the Co-operative Auto Network (CAN) since 1997. Based on year 2000 data, CAN members emitted significantly fewer GHG emissions than average drivers in the region. The City has assisted CAN with finding parking spaces for their vehicles and is supporting inclusion of car-sharing in the sustainable development of Southeast False Creek. TransLink is also partnering with CAN on a one-year pilot Commuter Car-Share Program in which car-share vehicles will be located at SkyTrain stations during weekdays. Fees charged to participants will also include a monthly transit pass. TransLink's TravelSmart pilot project, which will provide personalized marketing for non-auto alternatives, is another opportunity to promote the growth of car-sharing.

[7] Impact on automobile usage and emissions can vary significantly depending on the way car-sharing organizations are set up and the transportation system and land use characteristics of the area in which they are located.

The promotion of car sharing is consistent with the directions established in existing City transportation plans but is not specifically referenced as it is a relatively new alternative in North America.

7.8 Travel Pricing Strategies

The City should work with TransLink, the Greater Vancouver Regional District (GVRD), and the Province for the timely development and implementation of travel pricing strategies, in particular increased gas taxes and distance-based insurance. Research has indicated that travel pricing is a very effective tool in changing mode choice and in generating revenue to fund alternatives.
Additional Measure for Further Exploration

One of the most sustainable and potentially significant approaches to promoting mode shifts to greener alternatives is in getting the price signals right. In addition to convenience, pricing is the other primary determinant of transportation choice for most people. Having drivers pay costs for each trip taken helps raise their awareness of the real cost of travel and encourages them to consider alternatives or reduce the amount of travel they undertake. Revenues generated through pricing strategies can be used to provide additional services for alternative modes.

Pricing strategies that lead to a more effective transportation system are supported in Vancouver's transportation plans and are a fundamental component of the region's Transport 2021 plan. Despite their importance, progress in implementing pricing strategies has fallen behind schedule. Since pricing can be an effective deterrent to unnecessary single occupant vehicle use, two additional options that could be explored further are suggested in this Draft Community CCAP.

7.8.1 Distance-Based Vehicle Insurance

The City, in partnership with the GVRD, TransLink and the UBCM should lobby the Provincial Government and the Insurance Corporation of British Columbia (ICBC) to consider a pilot program for implementing distance-based insurance in Vancouver or a Vancouver sub-area.

Currently, car insurance in British Columbia is a fixed cost. Distance-based insurance would allow motorists to pay by the amount of distance they actually travel. This helps reduce emissions by providing motorists with an incentive to drive less. Research has clearly indicated that per-use travel pricing is an effective means to decrease trip frequency and distance.

7.8.2 Regional Fuel or Carbon Tax

One final pricing strategy to reduce traffic and generate revenue to fund alternatives would be to further increase fuel taxes. Any additional taxes on vehicular fuel would need to be balanced against the ability of consumers to purchase fuel elsewhere, thereby reducing the effectiveness of such cost increases.

As an alternative to a fuel tax, this Draft Climate Change Action Plan presents the opportunity to engage discussions into developing a more widely reaching Carbon Tax that could be applied to any fossil fuel including gasoline, diesel, and natural gas. A carbon tax has proven very effective in reducing GHG emissions in the United Kingdom.

The City should initiate discussions with the GVRD into the viability of developing a carbon taxation strategy for the region to utilize the GVRD's air quality jurisdiction to[8]:

- create financial incentives to reduce traffic;
- improve the economics of energy efficient new and retrofitted buildings; and to
- provide key funding for energy conservation and transportation demand management initiatives.

In addition, Vancouver could conduct research into the potential public reaction to the idea of carbon taxing as either a new tax or possibly just a tax shift.

Two additional pricing strategies that are noteworthy but are not being recommended as critical GHG emissions reduction strategies are parking pricing/supply and road tolling.

The City is exploring and implementing parking approaches that encourage transportation alternatives and efficient land use for new developments, including through the City's Transportation Plans, and parking reviews. In addition, TransLink is currently working to develop a regional parking strategy that includes a parking stall tax. This work is important for many reasons, however, because this extra tax would likely be invisible to consumers and not significant relative to most of the parking charges in Vancouver currently, it is unlikely to alter Vancouverites' travel patterns except indirectly by providing revenue to support alternatives. This Draft Community CCAP is not intended to replace current parking policy discussions and initiatives. Rather it is intended to further encourage currently occurring discussions around all options for parking policy that will reduce unnecessary vehicle use and support alternatives to the automobile.

The second additional pricing strategy noted but not critical to Vancouver GHG emissions reductions in the short-term is road tolling. Tolling of major road and highway bridges, where they cross municipal boundaries, is part of the region's current long-range transportation plan (Transport 2021), and supported in the Vancouver Transportation Plan (1997). Transport 2021 recognized tolling as being critical for minimizing future traffic growth, as well as providing a source of revenue for transportation services. While the City supports tolling as a regional traffic reduction and congestion control strategy, it is not seen as playing a key role in reducing Vancouver's short-term GHG emissions because of uncertainty in it implementation date and the fact that tolling implemented at municipal boundary bridges is not expected to significantly reduce Vancouver-based vehicle travel. Road tolling may become a very important long-range GHG emissions reduction strategy for the Region.

[8] Preliminary legal opinions have indicated that GHG's can be considered air contaminants and therefore are within the GVRD's mandate to regulate.

8.0 Fuel and Vehicle Efficiency

City transportation plans and the region's Transport 2021 plan support reduced emissions from transportation. Their main focus though is encouraging more effective use of alternatives to single occupant passenger vehicles. Although increased use of alternatives will also be a key to the successful implementation this action plan, these initiatives alone will not be enough to reach this action plan's emission reduction targets. Since automobiles will continue to be the dominant mode for many trips, reducing greenhouse gas emissions will also require a significant shift towards more efficient fuels and vehicles. Utilizing new fuel and vehicle technologies and reducing wasteful habits, such as unnecessary idling, are key supplements to the initiatives in existing transportation plans.

Mobile sources such as cars, trucks, and heavy-duty construction equipment are expected to account for over 1.1 million tonnes of GHG emissions (over 35% of all Vancouver emissions) by 2010. While this plan includes efforts to reduce the amount vehicular usage by promoting transportation alternatives, reducing the GHG impacts of vehicles and the fuels they use will also be essential to meeting the 2010 target. This can be achieved by:

- increasing the use of renewable fuel blends;
- by encouraging more fuel efficient driver habits; and
- by promoting/supporting more fuel efficient vehicles.

8.1 Renewable Fuel Blends

Using renewable, plant and animal-based vehicles fuels can result in reduced net GHG emissions. Renewable vehicle fuels such as ethanol can be produced from plant crops like canola and soybeans. Similarly biodiesel can be produced from renewable sources such as plant or animal fats. While burning these fuels can sometimes result in GHG emissions reductions at the tail pipe, an additional advantage is that the carbon dioxide emitted is recaptured when new crops are grown to produce more fuel (assuming the crops are grown and harvested in an environmentally effective way). Because the emissions do not remain in the atmosphere, the net effect is a reduced level of GHG per litre of fuel burned.[9]

8.1.1 Biodiesel Blends

The City should continue to pursue biodiesel blends for its municipal fleet and work to identify and support other opportunities for a regional market transformation in diesel fuel.
Priority Measure for Immediate Institutional Action
Targeted Reduction: 24,000t
Assumptions: 85% of diesel fuel sales (for all diesel vehicles and heavy construction equipment) will be a 20% biodiesel blend by 2012.

Biodiesel-blended fuels are rapidly gaining market acceptance amongst fleet managers as a viable way to reduce GHG emissions. Similar to ethanol-blended fuels for gasoline engines, biodiesel is produced from a renewable source such as animal and plant-based fats and oils. Current diesel engines can run on a 20% biodiesel blend (B20) without any modification resulting in approximately a 12% reduction in GHG emissions (varies depending on the feed stock).

[9] The GHG reduction of renewable fuel blends is not 1:1, that is 10% ethanol does not reduce net emissions by 10% because of the extra energy it takes to produce the ethanol when compared to fossil fuels.

The City of Vancouver and other municipal fleet managers are currently running a demonstration project to prove the operational viability of B20 blends in their heavy-duty vehicles. If this fuel blend works as expected, the plan is to have municipal fleets in the region switch to biodiesel by mid-2005. The intention is to leverage fleet purchase volumes and proposed Provincial tax exemptions to create a cost neutral (or close to cost neutral) supply of B20-blended diesel by encouraging local production.

If biodiesel blends can be produced in sufficient volumes at costs close to that of pure fossil fuel-based diesel, it may be possible to transform the entire regional diesel market.

While biodiesel can be made from many different types of "oils", the preferred feedstock is waste "grease" and other pre-used oils.

8.1.2 Ethanol-Blended Fuels

The City should continue to explore the implications of ethanol-blended fuels for its corporate fleet and work with the Federal Government and industry partners to explore the opportunities and barriers to wide-spread market penetration of ethanol-blended fuels in the region.

Additional Measure for Further Exploration

Targeted Reduction: 5,000t

Assumptions: 15% of gas sales in the region will be a 10% ethanol blend.

All light-duty vehicles (passenger cars, SUVs, and light trucks) manufactured since 1979 can use fuels with up to 10% ethanol (E10 blend) without any modification required. Mohawk service stations have been selling E10-blended fuel as their premium, high-octane fuel for years. E10 fuel blends result in approximately 3.5% less net GHG emissions than pure gasoline. The Federal Climate Change Action Plan has a target of 35 percent of Canadian gasoline containing 10% ethanol by 2010. The Government of Canada recently announced the first steps in its Ethanol Expansion Program. This has involved selecting companies to construct new fuel ethanol facilities, including one in British Columbia (Okanagan Biofuels Inc., Kelowna).

In addition, some vehicles that have been produced over the last five years are available with a flex fuel option, meaning they can run on higher percentage blends of ethanol such as E85 (85% ethanol) with much greater GHG emissions reductions.[10] The Federal Government is increasingly specifying flex fuel vehicles for its own fleet.

A better understanding of the science and opportunities of higher percentage ethanol-blended fuels is required to inform the final version of this plan. Some issues that will need to be resolved are:

- What are the operational implications of running ethanol-blended fuels?
- In addition to Provincial tax exemptions, what would be required to make ethanol-blended fuels close to cost neutral compared to standard gasoline?
- Could higher percentage blends like E85 be made attractive to consumers who are environmental leaders and what would the cost and availability of the fuel need to be to be successful?

[10] The flex fuel vehicle FFV option is available as an option on vehicles such as the Chrysler, Dodge, and Plymouth minivans; Ford Taurus, Rangers, and Explorers; General Motors S-10 pickups and SUV's; Mercury Sables; Mazda pickups, etc.

8.1.3 Other Alternative Fuels

The City should continue to explore the opportunities offered by other vehicle fuels such as natural gas, hydrogen, and electricity and identify practical ways in which to support them.

Additional Measure for Further Exploration

Fuel cell powered vehicles are operated using hydrogen produced from natural gas or electrolysis as a fuel. Although they are frequently referred to as "zero emission" vehicles, the source and production method of hydrogen can result in a range of real emissions. The City is currently participating in a trial demonstration of fuel cell cars. Although these vehicles are not expected to be market ready by 2010, some fleet vehicles may be. Fuel Cells Canada is currently coordinating a "hydrogen highway" initiative that proposes installing hydrogen fueling stations in and around Vancouver as well as a hydrogen powered bus fleet for the 2010 Olympics.

Hybrid electric vehicles use a combination of a conventional fossil fuel powered engine and an electric motor that uses regenerative braking to help charge the vehicles batteries. Commercially available hybrid electric passenger vehicles reduce fossil fuel consumption by 20% – 40%. There may be a role for the City in promoting greater market uptake of these vehicles despite their higher purchase price.

8.2 Efficient Vehicle Operation

8.2.1 Driver Training

The City should continue to develop its heavy-duty efficient driver training program and then work with partners to promote this program with fleet operators in the city. At the same time, the City should work with stakeholders such as National Resources Canada, the BCAA, and others to promote in inclusion of fuel-efficiency training in all driver training programs throughout the city.

Priority Measure for Immediate Institutional Action

Targeted Reduction: 17,000t

Assumptions: 15% of light vehicle drivers and 30% of heavy-duty truck drivers improve driving efficiency by 10%

How a vehicle is driven can greatly impact its fuel efficiency. Research and pilot tests have indicated that driver training focused on fuel efficiency awareness complements safe driving habits while reducing fuel consumption between 15% and 40%.

Heavy-Duty Vehicle Driver Training – As part of its Corporate Climate Change Plan the City is developing and piloting an heavy-duty vehicle efficient driver training program. If this pilot can successfully demonstrate that the training costs are recovered in reduced fuel costs, this should be a relatively easy program to promote amongst other fleet operators and heavy-duty driver training schools in the city. The City will work with the GVRD, TransLink, the BC Trucking Association, and representatives of the private heavy-duty vehicle fleets to determine the best way to maximize uptake of the program.

The City of Edmonton recently updated its heavy-duty driver training program to include a revised fuel efficiency course. When drivers who had received this training were re-tested months after the course they drove 15% more efficiently than before the training.

Light-Duty Vehicle Driver Training and Awareness - Aggressive driving habits involving hard acceleration and braking have been shown to only marginally decrease travel times (less than 5%) but increase fuel consumption by nearly 40%. Driving habits such as accelerating

smoothly combined with watching the road ahead and anticipating conditions to enable gradual braking not only save fuel but are core to safe driving as well.

Natural Resources Canada's Office of Energy Efficiency (OEE) runs the AutoSmart Driving Program to educate drivers on how to drive safe and efficiently. One of their best tools is an information package and materials for driver training schools to incorporate into their programs. www.oee.nrcan.gc.ca/vehicles/home.cfm

The City should work with the OEE, BCAA, and driver trainer associations to understand what initiatives they have undertaken to promote efficient driving habits and to understand how the City could complement their efforts. Additionally, the Provincial Government and ICBC could be approached with regards to their support for making efficient driving habits one of the qualifications for driver testing and licensing.

Correct Tire Inflation – A study by the Federal Government and the Rubber Association of Canada has indicated that driving with one tire under-inflated by 20% results in the consumption of two additional weeks worth of fuel per year. About one quarter of vehicles were estimated to have sub-optimal fuel economy resulting from under inflated tires. Increased awareness of this issue could be combined with other driver awareness and training initiatives.

8.2.2 Anti-Idling By-law

The City should work with stakeholders to promote idling awareness in the community and to develop a specific anti-idling by-law that respects operational concerns.
Priority Measure for Immediate Institutional Action
Targeted Reduction: 18,000t
Assumptions: Office of Energy Efficiency estimate of impact of reducing unnecessary idling by 4 minutes per day.

In addition to better driving habits, reducing unnecessary idling can also be a cost-effective way to reduce GHG emissions. The OEE research indicates that if an engine is going to be left idling for more than ten seconds, it is best to turn it off. One opportunity to reduce idling and increase awareness may be to create an anti-idling by-law that prohibits unnecessary idling where it is common such as in school zones, on construction sites, and for taxis, tour busses, and transit busses awaiting passengers.

During the public consultation, the City should work with both stakeholders that may be impacted by an anti-idling by-law as well as other organizations that are presently piloting or supporting anti-idling programs such as Natural Resources Canada's OEE (www.oee.nrcan.gc.ca/idling/home.cfm), Better Environmentally Sound Transportation (BEST) and the GVRD. These organizations are developing knowledge of the challenges and opportunities of an anti-idling by-laws and awareness programs and have existing resources that the City may be able to leverage in this emissions reduction measure.

8.3 Efficient Vehicles

8.3.1 Federal Fuel Efficiency Standards

The City should work with senior governments to advocate for timely increases in fuel efficiency standards, consistent with the Federal Government plan.
Additional Measure for Institutional Action
Targeted Reduction: 135,000t

Assumptions: Reduction based on prorating the Federal Target for 2010 to Vancouver's relative population and extending impact to 2012

Fuel efficiency standards for new vehicles sold in Canada are established by the Federal Government. The Federal Climate Change Action Plan projects significant GHG reductions by 2010 through negotiations with the automobile industry and the United States. While their plan does not detail how they intend to realize these savings, they alone account for over one fifth of the total reductions required for Vancouver to meet its 6% reduction target.

Because the majority of the vehicle stock turns over relatively quickly (approximately every ten years), fuel efficiency standards can be a very cost-effective way to realize significant GHG reductions. In the 1980s we saw significant improvements in vehicle fuel efficiencies but in the 1990s technical innovation focused almost exclusively on improving engine power and performance.

For new standards to impact emissions in any measurable way by 2010, they must come into effect soon. The City needs a better understanding of the Federal plans for fuel efficiency standards and must work to communicate the fundamental importance that improved standards play in realizing GHG reductions in Canada's cities.

8.3.2 More Efficient Vehicles

The City should explore the viability of promoting the purchase of more fuel-efficient vehicles by Vancouver residents and businesses.

Additional Measure for Further Exploration

Targeted Reduction: To be determined
Assumptions: To be determined

AirCare data indicates that the total distance traveled by all Vancouver-based light-duty vehicles (gross vehicle weight of 5,000 kg or less) actually decreased from 1990 to 2000 despite overall increases in population and the number of vehicles owned. Despite this trend, GHG emissions increased as consumer preference shifted towards heavier, less efficient vehicles like light trucks and SUVs. If the average vehicle weight had remained the same, GHG emissions from light-duty vehicles would have actually decreased.

It is unclear whether or not the City could effectively promote fuel efficiency considerations in vehicle purchasing decisions. While there are many private and public benefits (lower capital cost, lower operating cost, improved air quality, decreased GHG emissions, etc), vehicle manufacturers have very significant marketing budgets and light trucks/SUVs offer greater profit margins than smaller, more efficient vehicles. The best opportunity may lie within promoting the better efficiencies within the consumers' desired vehicle class.

A better understanding of citizens' receptivity to this messaging would be required before significant resources were invested in incorporating it into the integrated messaging program that is likely to arise from this plan (see Section 3.3).

Regardless of marketing receptivity, the City should explore independent and cost-effective promotional measures within its power such as limited duration free parking campaign for "green" vehicles, creating smaller (and therefore more affordable) parking spaces for ultra-small vehicles, or reviewing if there is a role for the City in helping to promote the Region's "Scrap-It Program" which provides incentives for vehicle owners to take older, inefficient vehicles off the road.

9.0 Solid Waste Reduction

The solid waste GHG emissions in Vancouver's GHG profile are largely caused by the decomposition of organic materials such as food scraps, yard waste, and paper at landfills. Vancouver and the GVRD have been successful in greatly limiting and even reducing these emissions through programs such as recycling (especially paper) and landfill gas recovery and cogeneration. In 2000, an estimated 267,000 tonnes of GHGs were emitted from the disposal of Vancouver waste but by 2003, the Vancouver Landfill gas recovery and cogeneration project reduced these emissions by approximately 200,000 tonnes per year. Despite this remarkable success, further opportunities exist to increase the efficacy of these approaches and are described below.

In addition to these direct emissions, there are a number of additional GHG emissions relating to solid waste that are measured under different categories and even different jurisdictions (i.e., not in Vancouver). Going one step back from the landfill, the collection and handling of solid waste results in GHG emissions from garbage trucks. These are measured under the Heavy-Duty Vehicle category. Going back another step, the products we consume (food, clothes, cars, etc.) all require energy to produce and transport to our city and homes. This "embodied" energy and its related GHG emissions are significant but largely invisible to Vancouver's GHG profile because most of these goods are produced outside of the city and the majority of the transportation is international or interprovincial trucking, rail, and marine.

In general, the priorities for action to reduce GHGs from these indirect solid waste emissions follow the well known hierarchy of *Reduce, Reuse, Recycle and Residuals Management.* While much of this outside the scope of this plan, some additional actions to complement existing programs are described in Section 9.3 below.

9.1 Material Bans from Disposal

To further reduce GHG emissions from landfills, The City should work with the GVRD to increase awareness and enforcement of the paper ban at all waste handling facilities in the GVRD.

Because paper products consist of organic material, decomposition of paper in the landfill contributes to methane production, a powerful GHG. A significant amount of paper continues to be landfilled in spite of the existing ban and an extensive recycling network that provides an alternate disposal means. The City should request that the GVRD strengthen enforcement of the existing paper ban at all waste handling facilities.

9.2 Beneficial Use of Landfill Gas

The City should continue to expand its landfill gas collection system when practical as the landfill develops and continue to search out new ways to maximize energy recovery and GHG reductions from landfill gas.

The Vancouver landfill currently collects landfill gas from all areas of the landfill where it is practical to do so. The landfill gas is beneficially utilized as fuel to generate electricity as well as heat a nearby greenhouse. In 2003, beneficial use of landfill gas at the Vancouver landfill reduced GHG emissions by approximately 200,000 tonnes per year due to the destruction of methane. There are further emissions reductions when one considers that the electricity generated is "green" and that less natural gas is used by the greenhouse for its operations.

9.3 Waste Reduction Initiatives

The City should increase consumer awareness of the link between GHG emissions and packaging, recycling etc. as well as advocate with the Provincial Government for expansion of their Product Stewardship initiative.

In order to reduce the significant indirect GHG emissions relating to waste that do not show up on Vancouver's emissions profile, the City should support existing programs that encourage reduction, reuse and recycling.

One action that the City could take would be to increase public awareness of the link between waste and GHG emissions as part of the City's overall waste reduction education. Promoting energy savings and GHG reductions as another reason to avoid excess packaging and avoid non-reusable products helps to strengthen this messaging.

In addition, The City should advocate for the Provincial Government to continue to expand Product Stewardship initiatives. Product Stewardship places the responsibility for managing packaging, from creation through recycling, onto the industry that creates it. The Province should be encouraged to act on its plans to add milk containers to the existing beverage container program and to add electronic products to the Stewardship program.

10.0 Community Energy Systems

The City should commission a summary of existing research into the opportunities for community energy systems and use this study to prioritize additional required research, focus the consultation process, and identify promising pilot projects. In addition, the City should pursue immediate opportunities for community energy systems in conjunction with the expansion of Vancouver General Hospital's heat plant and in South East False Creek.

There are significant opportunities to improve energy efficiency, apply "waste" energy to useful purposes, and to generate green power by examining energy sources, uses, and needs at a community scale. Community energy systems are those systems that use district heating and cooling, combined heat and power (cogeneration), distributed generation, waste heat recovery, thermal storage, and local sources of renewable energy (such as biomass, micro-hydro, wind, solar etc). One significant example is the City's own landfill gas recovery and cogeneration project where the methane gas emitted from the local landfill is captured and used to heat and provide electricity to nearby greenhouses. Community energy systems both reduce the consumption of non-renewable, greenhouse gas emitting energy as well as provide increased energy supply robustness.

Our energy systems have historically been designed and implemented at either an individual building scale or at a much larger regional, provincial, or even international scale. Developing an understanding and infrastructure (physical, commercial, legal) of community scaled energy systems will take some time. As such, it is not expected that community energy systems will contribute to significant GHG reductions between now and 2012. Despite this challenge, it is expected that community energy systems will play a critical role in the long-term reduction of GHG emissions and it is important that we begin developing an understanding of the opportunities and challenges for implementation immediately.

As a first step towards understanding and developing community energy systems in Vancouver, the City should commission a study of international best practices and a synopsis of the relevant local research that has already been conducted (such as SFU studies on the feasibility of combined heat and power in the GVRD).

This study could be used to:

- focus the consultation process with local utilities, academics, and commercial expertise;
- prioritize required additional research; and
- identify the most promising pilot projects for early implementation

Some specific initiatives that should be pursued immediately include:

- Working with Vancouver General Hospital to determine the feasibility of increasing the scale of their planned central heat plant expansion so that it could provide heat to other non-hospital related users nearby in both the short and long terms;
- Identifying the specific opportunities for community energy systems for the development of South East False Creek (including considerations of a central heating system like that used at UBC or downtown Vancouver, determining the viability of sewage source heat pumps, etc)
- Review the efficiency of the present downtown district heating system
- Pursue opportunities for waste heat recovery at Molson's Brewery

Even if the pursuit of these specific opportunities does not result directly in the development of community energy systems it would be useful in identifying those areas where further research or study is required.

11.0 Additional Considerations

11.1 Sequestration

Carbon sequestration refers to activities that reduce the amount of carbon dioxide contributing to the greenhouse effect by capturing it from the atmosphere. Most carbon sequestration discussions revolve around the amount of carbon sequestered by trees in their process of photosynthesis and growth.

While sequestration is a controversial topic for climate change discussions at the national and international level, it has limited applicability to Vancouver. It is expected that the direct climate change benefits from sequestered carbon is expected to be less than 1,000 tonnes per year for the City's existing ambitious tree planting campaign that includes a net increase of up to 5,400 trees in any year.

The City should continue to track and document the net changes in the amount of trees planted and removed annually in Vancouver. Despite their limited applicability to climate change planning, there are numerous and significant additional benefits of urban trees.

11.2 Climate Change Adaptations

Climate Change plans must look at two things:

- How to reduce GHG emissions to mitigate climate change; and
- How to prepare for the expected impacts of climate change that cannot be avoided.

This Draft Community CCAP is if focussed on reducing GHG emissions through changes in policy, programs and behaviour within the city. However, Vancouver will likely experience a range of impacts from climate change that has already occurred or will occur before the global climate change process can be slowed and stabilized.

The City should study the projected changes to Vancouver's climate and develop an Adaptation Strategy that identifies priority infrastructure adaptations that may require initiation in the short term in order to prepare for those changes. This might include planning for:

- Increased extreme weather events and the reliability of essential services;
- Longer, drier summers and wetter winters with reduced snow pack;
- Increases in instances in Vancouver of diseases from warmer climates;
- Increases in sea level; and
- Others

In the development of an adaptation strategy, opportunities to integrate it with existing health, health, infrastructure, and emergency plans must be pursued, including Police, Fire, the Health Authority, E-Comm and others.

11.3 Emissions Reduction Measurement and Monitoring

The methodology for determining Vancouver's emissions profile described in Appendix 2 establishes the *general* approach for continuing to monitor our progress towards meeting our overall reduction target. The approach to light-duty vehicle emissions currently relies upon AirCare tested vehicle mileage data. This is not expected to be a useful data source in the future because AirCare's mandate is scheduled to expire in 2006 and even if this mandate is renewed, their intent is to increase the testing frequency from two to three years.

In order to establish a base emissions profile for any given year in the future using our current approach, it will be necessary to work with ICBC to begin to collect vehicle mileage upon registration renewal and be willing to share this data on a geographical basis.

While the emissions profile approach provides a useful general tool, it will be necessary to develop specific measurement approaches for individual initiatives. This will not be an insignificant undertaking but initiative specific measures are required for two reasons:

1. Direct and robust measurement and documentation of the efficacy of specific initiatives will be required for emissions trading;
2. This general approach will not reflect the impact of a number of promising and important initiatives. For example, an effective anti-idling campaign in Vancouver will reduce fuel consumed in Vancouver but the regional fuel consumption that is used may increase. Because a reduction in idling will not change recorded mileage, our general measure will ignore the impact of this initiative.

11.4 Emissions Trading

The City must develop an improved understanding of emission reduction trading and its inherent protocols. Emissions trading may offer opportunities to finance emission reduction initiatives. Even if the City does not choose to trade any emissions, documenting the ongoing efficacy of specific emissions reduction measures in a way that is likely to satisfy the requirements of emissions trading is recommended in order to leave this potentially significant option available on an ongoing basis.

11.5 Industry Outreach

While this Draft Plan targets an absolute reduction in industrial emissions of 6% from 2000 levels, there has been insufficient time to develop an understanding of changes in industrial emissions since 2000 and looking forward to 2012 and beyond.

Even though local industry is largely outside the jurisdictional authority of the City, the Draft Plan consultation process should include industrial stakeholders so as to develop a better understanding of their recent and projected changes in emissions levels. By working with these stakeholders, the City may be able to provide encouragement or even support for emissions reductions. If industry is already actively engaged in pursuing energy efficiency improvements, the Plan should reflect the positive contributions that our local industries are providing towards meeting our greenhouse gas reduction targets.

12.0 Looking Ahead to Implementation

In the preparation of this Draft Plan for community and stakeholder consultation, the City and Cool Vancouver Task Force identified a number of elements that a final Community Climate Change Action Plan (CCAP) was sure to require to enable its translation from planning to implementation. A number of these elements are described here as they are expected to apply to many, if not all of the emissions reduction measures described in the remainder of this Draft Plan.

12.1 Organizational Development

One of the most important aspects of developing and implementing an "action plan" is to identify "who" will lead, manage or coordinate the implementation of the plan. The scope of the Community CCAP will require a robust "organizational" dimension to be effective.

Current organizational elements of this plan and its development process include:

- *The Cool Vancouver Task Force* (CVTF)
- *The City's Sustainability Group* **-** The Sustainability Group is a staff team within the City of Vancouver that has worked with the Task Force to develop the CCAPs. This group is coordinating the work occurring in many City departments around sustainability projects, most particularly around energy and climate change issues.
- *Others* - There are many groups who have been and will continue to be involved from every sector and stakeholder group associated with this plan. Many are represented on the CVTF and others will be associated with the implementation of any particular "Action" or issue connected to the Community CCAP.

The CVTF has highlighted the importance of establishing a robust "organizational" foundation for completing the development and coordinating the implementation of the Community CCAP. While there are many stakeholders who will be responsible and take the lead on specific aspects of the overall Community CCAP, there would be great value in establishing a central coordinating group. Initially, it is envisioned that this role would be fulfilled by an expanded City of Vancouver Sustainability Support Group but depending on funding sources and the feedback received during the consultation around this plan, it may be most effective to create an arms length entity.

This "coordinating group" is envisioned as having several staff with a range of responsibilities including:

- Coordinating the implementation of the Community CCAP amongst all the stakeholders;
- Overseeing the monitoring and reporting functions associated with the plan;
- Advising City Council, the City Manager's Office, the City's Sustainability Group, City staff in all departments, and the community in general on energy and emissions issues;
- Working closely with City staff from all departments on a wide range of City programs and projects to integrate energy and emissions considerations into their work;
- Managing a potential endowment that supports the "Office's" operations and funding for community energy and emissions-related projects;
- Finding funding from many agencies (senior government in particular) and foundations to support energy and emissions-related projects;
- Spearheading communications and education initiatives throughout the community and stakeholder on energy and emissions issues;
- Representing the City on inter-governmental discussions around energy and emissions issues as appropriate;
- Building partnerships and leveraging resources and program funding in support of the implementation of the Community CCAP; and
- Others as the "Office" evolves over time.

It is likely that in the process of coordinating the implementation of the Community CCAP, that additional "groups" or committees may be formed to oversee or advise particular programs or projects. It is not clear yet what advisory groups might be valuable, beyond that proposed below for the ongoing role of the current Task Force, however it is expected that the first insights into this opportunity will come during the consultation process on the Draft Community CCAP.

Partnerships
There are many stakeholders with whom the "coordinating group" should consider developing partnerships. Through these partnerships, the Community CCAP can be most effectively implemented and ongoing progress on energy and emissions issues maintained. The following outlines some considerations for partnerships:

- Energy and Emissions Advisory Group – *an evolution of the CVTF once the Plan is complete*
- Utilities and Independent Power Producers (IPPs)
- Academic Institutions
- Senior Governments
- Development industry
- Non-governmental organizations (NGOs)

Resources
The "coordinating group" would need sufficient funding to keep a core of staff to coordinate the implementation of the Community CCAP. This core group could also work to acquire more funding to support additional project-oriented staff. The group would also require project funding to support the projects for which it is responsible.

The section of this Draft Community CCAP on "Resourcing" (below) outlines a range of opportunities in this regard. Further to this issue, there are several sources to consider for funding this group:
- Annual operating budget from the City;
- Contributions from other agencies – utilities, senior governments, foundations and others;
- An endowment which provides a steady stream of revenue; and
- Others

Toronto has funded the "Toronto Atmospheric Fund (TAF)" and its associated Better Buildings Partnership through the establishment of an endowment. The endowment was created through the sale of a piece of public land for over $20 million. This money has been invested and its revenues channeled into both funding the TAF and into providing both grants and a revolving "loan fund" that provides loans for energy upgrades, where the savings in energy costs are negotiated into the payback plan on the loans.

Next Steps
During the consultation process for this Draft Community CCAP a clearer vision of how to set up, structure, fund and give direction to a coordinating group to oversee the implementation of the Community CCAP will emerge.

12.2 Resourcing

Implementing the final Community CCAP will require action in many areas, most of them requiring some form of resources. As the resource needs become clearer during the consultation phase of the Action Plan development, a strategy to access those resources will be concurrently developed. It is expected that one key to successful implementation of the Final Plan that emerges will be to enable individuals, stakeholders, and businesses to take the lead on implementing many of the measures. A

coordinated strategy will permit the most strategic and leveraged approach to funding to achieve the greatest level of implementation of the Action Plan.

A range of *types* of funding can be identified, including:

- Grants or donations (whole or matching funds) from various individuals, agencies, foundations and government programs;
- Operating or program / project budgets from various organizations (including the City, utilities, and corporations);
- Subsidies for various energy efficient products or services;
- Low interest loans (such as the Federation of Canadian Municipalities' GMIF funds) or revolving funds driven by savings found in increased efficiencies;
- Regular market-based financing options;
- Changes in tax policy (tax shifting); and
- Others.

A range of *sources* for funding, staffing, partnerships or other resources can be identified including:

- Federal Government departments and programs;
- Provincial Government Ministries;
- BC utilities including BC Hydro and Terasen;
- Foundations and other funding agencies;
- Business and industry;
- NGOs;
- Universities;
- Personal volunteer time;
- City of Vancouver staff and resources; and
- Others.

A financing plan drawn from the above opportunities and others needs to be developed around each major program or initiative in this Action Plan.

12.3 Integrated Marketing and Recognition Program

Many opportunities and programs to make cost-effective, easy to implement changes that would result in GHG emissions already exist. One of the key roles that the City could play in meeting its 6% community GHG emissions reduction target is expected to be to build public commitment to taking personal or corporate action to make reductions and make it as easy as possible for them to access existing and emergent resources. It is envisioned that this program would consist of four components:

- Integrated Marketing Campaign –an advertising campaign targeted at individuals for home energy efficiency, fuel and vehicle efficiency, and transportation alternatives[11]
- Corporate Branding – a program that brings recognition to those businesses that undertake GHG emissions reduction initiatives or provide certified services to help others do so
- Information Portal – a website and possible phone support line connecting general public as well as business sectors to the information and resources available to make changes easily
- Youth Awareness Program – educate children on climate change and actions their family can take to reduce GHG emissions

[11] Developing the campaign could potentially build upon the Federal 1-Tonne Challenge and/or California's very successful Flex Your Power Campaign that had a 67% awareness after one year and achieved a 20% reduction in 1/3 of homes and businesses.

List of Acronyms

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
B20	20% biodiesel-blended diesel fuel
BCAA	British Columbia Automobile Association
BCBC	British Columbia Building Corporation
BEST	Better Environmentally Sound Transportation
BIA	Business Improvement Association
BOMA	Building Owners and Managers Association
C3	Corporate Climate Change (as in the “C3 Challenge”)
CAN	Cooperative Auto Network
CBIP	Commercial Building Incentive Program
CCP	Cities for Climate Protection
CCAP	Climate Change Action Plan
CEEO	Community Energy Efficiency Office
COV	City of Vancouver
CVTF	Cool Vancouver Task Force
E10	10% ethanol-blended gasoline
EPC	Energy Performance Contract
FCM	Federation of Canadian Municipalities
GHG	greenhouse gas
GMEF	Green Municipal Enabling Fund
GMIF	Green Municipal Investment Fund
GVRD	Greater Vancouver Regional District
ICBC	Insurance Corporation of British Columbia
ICLEI	International Council for Local Environmental Initiatives
IPP	independent power producer
LED	light emitting diode
LEED	Leadership in Energy and Environmental Design
NGO	non-governmental organization
NRCan	Natural Resources Canada
OEE	Natural Resources Canada’s Office of Energy Efficiency
PAC	Parent Advisory Committee
PCP	Partners for Climate Protection
PST	Provincial Sales Tax
SEFC	South East False Creek
SFU	Simon Fraser University
SOV	single occupant vehicle
SUV	sport utility vehicle
TAF	Toronto Atmospheric Fund
TDM	transportation demand management
TMA	Transportation Management Association
U-Pass	Universal-Pass
UBC	University of British Columbia
UEL	University Endowment Lands
VBBL	Vancouver Building By-law

Symbols: eCO_2 = carbon dioxide equivalent; kg = kilogram; km = kilometre; t = tonne

APPENDIX A1:
Background to the Draft Community Climate Change Action Plan

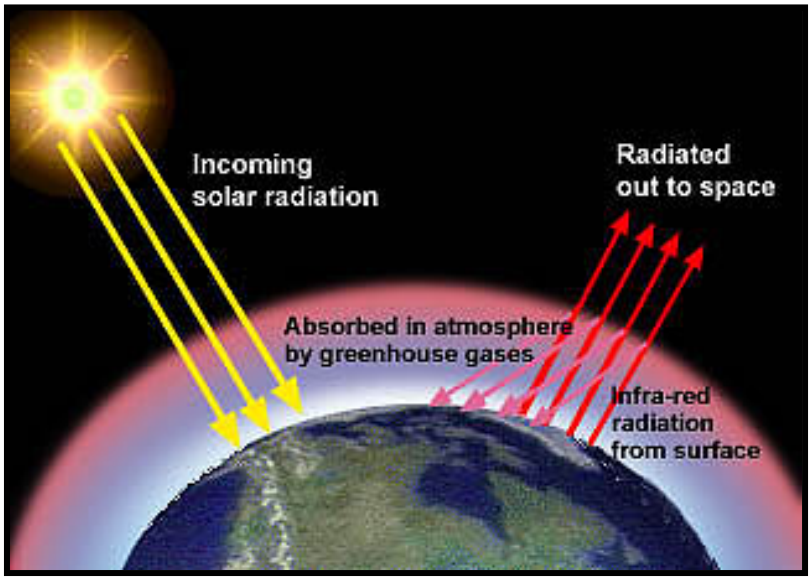
The Cool Vancouver Task Force

This Draft Community Climate Change Action Plan was developed in cooperation with the Cool Vancouver Task Force (CVTF). This collection of knowledgeable individuals from a wide range of stakeholder groups in the City of Vancouver and the Region was created through a March 25, 2003 Council motion and was co-chaired by City Councilor David Cadman and the City's General Manager of Engineering Services. The City wanted its plan to be informed by the interests and knowledge of a wide diversity of stakeholders including:

Organization	Representative(s)
• Environmental Youth Alliance (EYA)	Katrina Ao Karun Koernig
• Society Promoting Environmental Conservation (SPEC)	Ivan Bulic Jim Hamm
• BC Ministry of Water, Land, & Air Protection	Brian J. Clark
• Science World	Kevin Kearns Roda Klein Brian Tisdall
• Vancouver Coastal Health Authority	Nick Losito
• Terasen Gas	Sharon McCarthy
• Building Owner and Managers Association (BOMA) of BC	Andy Molloy Paul La Branche
• Vancouver Board of Trade	Dave Park
• BC Hydro	Bruce Sampson Ted Ferguson Victoria Smith
• Vancouver Economic Development Commission	Linda Thorstad
• SFU School of Resources & Environmental Management	Bryn Sadownik Kevin Washbrook
• Environment Canada	Wendy Avis Brian O'Donnell Athana Mentzelopoulos
• David Suzuki Foundation	Alex Boston Jose Etcheverry
• Vancouver City Planning Commission	Robert Buller Lilian Chau Tom Pryce-Digby
• Urban Development Institute (UDI)	Maureen Enser

• GVRD	Nancy Knight Jennie Moore
• Tides Canada Foundation	Michael Magee
• Vancouver School Board	Doug McClary Kevin Millsip (Trustee)
• UBC Sustainable Development Research Institute (SDRI)	John Robinson
• TransLink	Clive Rock Tamim Raad
• Better Environmentally Sound Transportation (BEST)	Ray Straatsma Marion Town
• Sinclair Environmental Solutions	Scott Sinclair
• Molson Canada	Jeff Gaulin

Climate Change and Greenhouse Gases



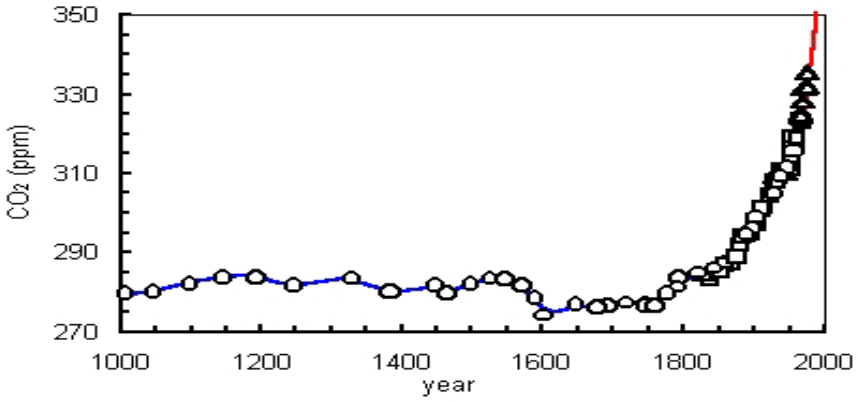
Climate Change is an expression used to generally describe observed and expected changes to the Earth's climate resulting from man's impact on a natural phenomenon called the greenhouse effect. The greenhouse effect occurs when gases in Earth's atmosphere, (primarily carbon dioxide but also including other gases such as methane, nitrous oxide, and hydrofluorocarbons) trap solar energy from the sun close to Earth.

While these greenhouse gases (GHGs) naturally cycle between the planet and its atmosphere, human activities that increase the emission of these gases into the atmosphere can change the natural balance and result in climate change[1]. The primary human activity that emits greenhouse gases is the burning of fossil fuels; in automobiles, to generate electricity, to heat our homes and business, to power industrial machines, etc. In addition, the garbage we produce also emits greenhouse gases as it breaks down in our landfills.

[1] An example of this natural cycle is the absorption of carbon dioxide by plants. Plants incorporate the carbon from carbon dioxide into their structure and release the oxygen into the atmosphere. When a plant dies, the carbon trapped in its body combines with gases in the atmosphere to release greenhouse gases.

Globally, human activities add nearly 30 billion tonnes of carbon to the atmosphere each year. In 1997, Canada's greenhouse gas emissions were 682 million tonnes, a 13 per cent increase over 1990. If no serious action is taken, current forecasts are that Canada's GHG emissions could be 25 per cent above 1990 levels by 2010.

Ice core samples demonstrate the increase in CO_2 in the atmosphere over many hundreds of years.



Ice core data showing CO_2 levels this millennium[2]

Greenhouse gases vary in their impact in trapping solar radiation. For example, one tonne of methane has approximately 21 times the global warming potential of the same amount of carbon dioxide. For ease of comparison and to create a standard of measurement, GHGs are equated and expressed in tonnes of carbon dioxide equivalents (t eCO_2).

While there is some uncertainty around the science of climate change, the majority of world scientists agree that the climate is warming with potentially disastrous effects and that the primary cause of that warming is human activity.

The Impacts of Climate Change

A change in the world's climate of the magnitude predicted by scientists would have significant consequences for people, economies and the environment across the planet. It is impossible to predict exactly what the impacts of climate change will be to Vancouver, but scientists have identified some of the implications that Vancouver can probably expect to face, including:

- Floods from increased storm intensity, wetter winters, and rising sea levels;
- Disruptions to our water supply during longer drier summers;
- Increased number and intensity of extreme weather events such as rainstorms in the winter and summer droughts;
- New diseases resulting from increased average temperature (globally, tropical diseases have already begun moving northward);
- Increased respiratory problems due to increased temperatures and smog effects;

[2] Taken from the CSIRO site (http://www.ems.psu.edu/~radovic/COxTask3A.html#Carbon%20Dioxide%20Trends%20over)

- Indigenous plants and animals may be challenged for their ecological niches by foreign species from warmer climates;
- Environmental refugees from other nations that either will lack the resources to deal with climate changes or are expecting more drastic impacts

Globally, climate change impacts will likely include a rise in sea-level that would threaten millions of people, and the melting of up to half the ice in the world's mountain glaciers. In Canada, projected impacts include a large reduction in the areas covered by boreal forest and tundra, major changes to the levels and flow-rates of rivers and lakes, and the spread of semi-desert conditions over part of the southern Prairies.

The considerations for preparing for and responding to these challenges will be begin to be addressed in the Community Climate Change Action Plan expected to be completed in 2004.

Kyoto Protocol

In 1992, a global approach to address the challenge of climate change was launched with more than 155 countries, including Canada, signing the United Nations Framework Convention on Climate Change (UNFCCC). Since 1992, a number of United Nations conferences have taken place. The goals of the agreements were to limit greenhouse gas emissions and protect carbon sinks and reservoirs.

In 1997, the Kyoto Protocol was established to create a future of lower GHG emissions, better energy efficiency, sustainable growth, and cleaner air, leading to an overall cleaner, healthier environment. The Protocol created various targets, for industrialized countries that ratify the agreement, to reduce overall GHG emissions by a global average of 5.2 percent below 1990 levels in the commitment period of 2008 to 2012.

The Protocol will come into effect 90 days after at least 55 Parties to the Convention, which account for at least 55% of the total carbon dioxide emissions for 1990 from industrialized nations, have ratified, accepted, approved or acceded to the Protocol. The 55% requirement will be satisfied for the Protocol's entry into force when Russia ratifies the Protocol. The United States has indicated that it will not ratify the Protocol.

The Partners for Climate Protection (PCP) Process

The City joined the PCP program at its inception in late 1998. PCP is a national program coordinated by the Federation of Canadian Municipalities (FCM) that brings Canadian municipal governments together to reduce the local production of GHG emissions and improve the quality of life. The PCP works in conjunction with ICLEI to establish norms for measuring and reporting GHG emissions and reductions.

As a participating member of the PCP, the City has been implementing various measures to reduce GHG emissions and ultimately, to contribute to the Government of Canada's international commitment to reduce GHG emissions globally. The PCP process describes five key steps in addressing climate change:

1) Take emissions inventory and forecast future emissions
2) Set a reduction target

3) Develop a local action plan
4) Implement the plan
5) Measure progress: monitor, verify & report reductions

The process leading up to this Draft Community CCAP has taken the City through the first three of five steps in the PCP process.

Appendix A2:
Vancouver Community Greenhouse Gas Emissions Profiles Methodology

A. SUMMARY

Vancouver Greenhouse Gas Emissions (Annual Tonnes of CO_2)

	1990	2000	2012
Residential Buildings	597,000	621,000	636,000
Commercial Buildings	808,000	925,000	1,007,000
Industrial Facilities	179,000	160,000	160,000
Light-Duty Vehicles	822,000	873,000	907,000
Heavy-Duty Trucks	64,000	89,000	109,000
Non-Road Mobile Equipment	183,000	262,000	262,000
Waste	225,000	268,000	75,000
TOTAL	**2,878,000**	**3,198,000**	**3,156,000**

The Vancouver greenhouse gas (GHG) emissions profiles consist of seven main categories of emissions, each including a backcast to 1990, a 2000 emissions profile, and a "business-as-usual" forecast to 2010. Because 1990 is the target reference year, it was important to develop an accurate backcast and to document what was included or excluded from the data. The 2000 emissions profile provided us a relatively "current" picture of where we are at and established a foundation for the 2012 forecast.

Readers will observe that important emissions sources such as marine, air traffic, and rail freight transportation are not included in the Vancouver municipal community profile. This exclusion is consistent with national and international protocols for determining municipal emissions profiles; these sources are largely outside of the regulatory jurisdiction of local governmental bodies.

In addition, note that this report discusses GHG emissions (carbon dioxide or CO_2 or CO_2 equivalent). Many references to emissions outside of specific climate change discussions actually refer to the numerous common air contaminants that make up smog and air pollution. For example, a vehicle's GHG emissions are a function of fuel economy and are not impacted by "emissions control" equipment which is designed to reduce common air contaminants.

Buildings: The emissions profiles for the three building categories (residential, commercial, industrial) were largely based upon data originating from the local utilities and the GVRD for natural gas, electricity, and fuel oil sales to buildings or facilities located within Vancouver. Details of data sources and assumptions are listed in the section "Data Sources for Buildings" to follow.

The ***business-as-usual forecast*** for residential and commercial buildings was based upon:

- the growth in GHG emissions from 1990 to 2000 relative to population growth during the same period (18%); and
- the emissions in 2000 and the projected population growth for Vancouver between 2000 and 2010 (9.1% from BC Stats PEOPLE 28 forecast)
- ***It is important to note that the emissions reduction target and timeframe changed at the last moment in preparing this plan. As a result, the emissions forecasts***

method described is to 2010; simple linear extrapolation was used to modify them to 2012.

For example, residential emissions in Vancouver increased 4% between 1990 and 2000 while the population increased 18%. The relative increase in emissions was 0.22 (4/18) of the population growth (which is not surprising as most growth was accommodated in considerably more efficient, higher density building forms). If we apply this same relative growth to population forecasts (0.22 x 9.1% = 2.0%), the business-as-usual forecast increase for residential GHG emissions from 2000 to 2010 is 2%. (1.02 x 621,000 t in 2000 = 633,000 tonnes in 2010). The projected change over ten years was extrapolated to twelve years (633,000 – 621,000) x 12/10 = 636,000t).

In the absence of a detailed study about industry in Vancouver, it was assumed that industrial emissions would remain the same in 2012 as they were in 2000.

Carbon Intensity of Electricity: While the conversion factors for translating natural gas and fuel oil into CO_2 emissions is relatively constant, the conversion factor for electricity varies depending on the relative annual blend of generation sources (largely hydro or natural gas generation in BC). For the 1990 and 2000 emissions profiles, a five year average conversion factor (referred to as the carbon intensity of electricity or the "electricity coefficient") has been used so that annual fluctuations in water supply do not skew the emissions profile.

Light-Duty Vehicles (LDVs): The emissions profiles for light-duty vehicles (cars, light trucks, minivans, sport utility vehicles, etc) are based upon Vancouver's share of regional fuel sales. Vancouver's share was determined based on the ratio of AirCare reported mileage of vehicles registered in Vancouver to the total mileage of all AirCare eligible vehicles registered in the region.

This approach, which as been discussed with and is supported by the GVRD, provides a GHG emissions profile that is grounded in physical reality (fuel sales) and reflects the impact of those actions and policies that a municipality can directly control or influence. For the purposes of climate change planning, it provides a measurement and feedback mechanism that reflects the success of planning compact, mixed use communities and supporting transportation alternatives such as transit, walking, and cycling. The City recognises that dealing with related issues such as traffic congestion requires a regional approach and measurement tool.

The business-as-usual forecast for light-duty vehicles used the same approach as described above for residential and commercial buildings; the historical growth in light vehicle emissions relative to population increases is used to project ahead to 2010 from 2000 and then simple extrapolation was used to project from 2010 to 2012.

Heavy-Duty Vehicles (HDVs): The emissions profiles and forecast for heavy-duty vehicles were based on Vancouver values (diesel portion only) derived from methodology in the 2003 GVRD report "2000 Emission Inventory of the Canadian Portion of the Lower Fraser Valley Airshed". A Vancouver specific measure was not developed because mileage data for HDVs was not readily available and HDV traffic does not reflect city specific approaches to planning and supporting transportation alternatives.

Waste: Organic waste such as food, yard trimmings, and paper produces methane when it decomposes. Methane has approximately 21 times the greenhouse effect compared to carbon

dioxide. In 2002, the City implemented an award winning landfill gas recovery and cogeneration system that significantly reduced greenhouse gas emissions relating to waste.

B. INTRODUCTION

Taking inventory of the City of Vancouver's emissions and forecasting future emissions is the first step in the Partners for Climate Protection's (PCP) Five Milestone Process. Community emissions profiling was necessary to determine the greenhouse gas (GHG) emissions target in relation to the Kyoto Protocol and for future comparisons and monitoring towards meeting the target.

Cooperation with various members of the GVRD, TransLink's AirCare Division, and the utility companies was necessary to establish the GHG emissions inventory. The International Council for Local Environmental Initiatives (ICLEI) / Cities for Climate Protection (CCP) Protocol / Guidelines for Reporting, which was adopted by the Partners for Climate Protection (PCP), was used as a guideline for establishing the emissions inventories. Carbon dioxide (CO_2) was the only GHG required to be inventoried, except for the Waste Sector, which was based on equivalent CO_2 emissions from methane production.

A variety of sources were contacted for data and validation of figures. Different analyses and calculations were performed to determine Vancouver's Community GHG emissions for 1990 and 2000. Where possible, the figures were compared with other sources, like the GVRD, and the change from each category was compared with other indicators such as population growth both in Vancouver and the GVRD and the change in commercial and industrial floor space. The final figures established seem to be the most reasonable and repeatable for future emissions inventory work.

In general, sources did not have specific documentation and/or analyses especially designed to calculate and track GHG emissions for individual municipalities. The 1990 GHG emissions were more complicated to determine and derive than the 2000 GHG emissions, as much of the 1990 data was unavailable, not readily retrieved and/or were documented in ways that were not comparable with newer data. The backcasting methods and assumptions are summarized briefly in this appendix.

The following summarizes the data sources and methodology for the four main sectors of the City of Vancouver's Community GHG Emissions Inventory: C. Buildings, D. Transportation, E. Waste and F. "Other" (Non-Road Mobile Equipment).

C. DATA SOURCES FOR BUILDINGS

The buildings sector is separated into three categories: Residential, Commercial and Industrial.

Emissions figures from the use of natural gas and fuel oil excluded UBC and the University Endowment Lands (UEL). Emissions from electricity consumption excluded UBC, but included the rest of UEL; however, this is a very small amount compared to the rest of Vancouver's consumption, so it was not factored out.

2000

Sources & Comments for All Categories: Residential, Industrial & Commercial

Electricity:
Source: BC Hydro
Consumption was converted into equivalent CO_2 emissions based on a five year average of the most recent electricity coefficients obtained from BC Hydro: (1998 and 1999 figures from Ted Ferguson on March 3, 2004) and 2000, 2001 and 2002 figures from p.14 of the "*BC Hydro Greenhouse Gas Report 2003*" (http://www.bchydro.com/rx_files/environment/environment9777.pdf)
A five year average of the electricity coefficient was used to reduce the effects of possible large annual fluctuations of the coefficient on the emissions calculations.

Natural Gas:
Source: Terasen
GVRD's conversion factors were used to calculate the CO_2 emissions based on fuel consumption.

Fuel Oil:
Source: GVRD

Specific Information for Each Category

Residential
Residential fuel oil consumption was based on total regional consumption prorated by GVRD's adjusted percentage population of Vancouver versus the GVRD in 2000.

Commercial
Commercial electricity consumption included trolley buses, Coast Mountain, SkyTrain & related offices and facilities, such as transit rectifier stations and SkyTrain stations.

Natural gas consumption included interruptible sales / transported and excluded "double-counted" sales already included in the industrial category (as determined by Terasen). For 1990, these inclusion criteria for electricity and natural gas were assumed to be the same.

Fuel oil consumption was based on total regional use prorated by the commercial floor space of Vancouver versus the GVRD in 2000.

Industrial
Industrial fuel oil consumption was based on volumes reported from the survey of only GVRD's permitted point sources in 2000. Since fuel oil emissions are such a small part of the total emissions inventory, no adjustment factor was estimated or added to account for non-permitted sources.

1990

Sources & Comments for All Categories: Residential, Industrial & Commercial

Electricity:
Source: BC Hydro
Consumption was converted into equivalent CO_2 emissions based on a five year average from 1998 to 1993 (base year figure obtained from the "*BC Hydro Greenhouse Gas Report 2003*")
A five year average of the electricity coefficient was used to reduce the effects of possible large annual fluctuations of the coefficient on the emissions calculations.

Natural Gas:
Source: GVRD report (Residential & Commercial) & permitted point source backcasted and adjusted (Industrial)
GVRD's conversion factors were used to calculate the CO_2 emissions based on fuel consumption.

Fuel Oil:
Source: GVRD

Specific Information for Each Category (or Categories)

Residential & Commercial
As Terasen did not keep historical records back to 1990, Residential and Commercial natural gas figures for 1990 were obtained from the GVRD through their 1993 report by B.H. Levelton & Associates and Western Research: "*1990 Air Emissions Inventory for the Lower Fraser Valley: Area Sources*". The natural gas consumption figures of the report were converted to CO_2 emissions using GVRD's conversion factors.

Note: According to the GVRD, BC Gas account areas did not strictly follow municipal boundaries, so gas volumes for specified municipal areas may not be entirely accurate. However, the figures from the 1993 report are more in line with other indicators, such as trends of available data, as compared with other disaggregation methods from regional totals.

Both Residential and Commercial fuel oil consumption were based on GVRD's 1995 adjusted Vancouver percentage population compared with the GVRD.

Commercial
For Commercial electricity consumption, BC Hydro's records combined the Commercial & Industrial Categories into "Small Commercial / Industrial" & "Large Commercial / Industrial", therefore the approximate percentage split was projected back to 1990 using actual, available 1995 to 2002 data. Figures included BC Hydro's subcategories: "Irrigation Consumption", "Street Lighting" and "BC Hydro Own Use". Figures also included transit and related facilities (details in the 2000 Commercial Section).

Industrial
For Industrial electricity consumption, details are in the Commercial Section: A trend line of proportions was plotted from actual, available Hydro data to approximate the Commercial / Industrial split. Figures included BC Hydro's subcategory: "Transmission Consumption".

For Industrial natural gas and fuel oil consumption, only GVRD's Permitted Point Sources' combined natural gas and fuel oil CO_2 emissions were available. Therefore, the same fuel split as year 2000, which was based on actual CO_2 emissions data, was used to determine the approximate 1990 natural gas consumption and fuel oil consumption separately. Since fuel oil emissions are such a small part of the total emissions inventory, no adjustment factor was estimated or added to account for the non-permitted sources.

However the non-permitted sources' natural gas consumption was a substantial portion in relation to the permitted sources. To account for the large portion of emissions not in GVRD's Point Source figures, the percentage difference between a) Terasen's 2000 Industrial natural gas consumption (which includes all industrial sources, permitted and non-permitted) and b) GVRD's 2000 Permitted Point Source natural gas consumption (which only includes GVRD-permitted sources) was added to GVRD's 1990 Point Sources natural gas consumption total. The adjustment resulted in a decrease in emissions from 1990 to 2000, which is more in line with the approximate, actual industrial floor space decrease during the same period, than the significant increase that would have occurred without the adjustment.

D. DATA SOURCES FOR TRANSPORTATION

The Transportation Sector was split into two categories: Light-Duty Vehicles (which weigh 5,000kg or less) and Heavy-Duty Vehicles (which weigh over 5,000kg). This split was necessary because AirCare data (along with ICBC and regional fuel sales data) was used for the Light-Duty Vehicle analysis, but AirCare only tests vehicles that weigh 5,000 kg or less.

Because most Light-Duty Vehicles (LDVs) consume gasoline, only gasoline consumption was used in the analysis of LDVs. All other fuels, including diesel were not included because the total use in the LDV category is insignificant. Similarly, most Heavy-Duty Vehicles (HDVs) consume diesel, so all other fuels were not included (more details in the Heavy-Duty Section). The gasoline and diesel used in the Transportation Sector are clear fuels, which would have very little overlap of fuel consumption with the Other Sector, which included mostly marked fuels (more information in Section D. "Other").

The LDV analysis was based on determining Vancouver's proportion of regional (GVRD) gasoline consumption, which is directly related to Vancouver's CO_2 emissions. Vancouver's proportion was based on the gasoline consumption of Vancouver-registered vehicles compared to GVRD-registered vehicles. Tracking Vancouver's proportion of emissions helps to reflect changes made to reduce vehicle emissions by vehicles that have an insured address in Vancouver.

The HDV analysis was based on GVRD emissions modelling, because AirCare data was not available for HDVs.

Light-Duty Vehicles (LDVs)

The following are steps taken to analyze the LDV emissions:

1) The regional GVRD gasoline sales were determined from the gasoline fuel tax proceeds of the Greater Vancouver Transportation Tax (GVTT) Area) for 1990 and 2000. Source: BC Consumer Taxation Branch via Translink for the total regional gasoline sales

Note: 1990 figures did not include Maple Ridge & Pitt Meadows (and were not available separately), so an adjustment factor was added (based on population and approximate proportion of registered vehicles).

2) The boundaries of Vancouver and the GVRD were defined by the first three digits of the postal code (Forward Sortation Area (FSA)).
Source: Canada Post for Vancouver's FSAs & GVRD for the database of all postal codes and confirmation of GVRD's FSAs.

3) Vancouver's portion of the total GVRD regional gasoline sales for 1990 and 2000 was determined by analyzing mileage (odometer readings) for different vehicle types from AirCare data, total insured vehicle counts from ICBC, and fuel efficiency estimates for different vehicle types from the GVRD. Since AirCare data was not available for 1990, Vancouver's 1990 portion had to be estimated using a combination of the earliest few years of AirCare data available and 1990 ICBC vehicle counts (adjusted to include Maple Ridge and Pitt Meadows).

4) Vancouver's total 1990 and 2000 proportion of gasoline consumed was compared with the total 1990 and 2000 regional gasoline sales to determine Vancouver's total 1990 and 2000 gasoline consumed.

   Note: The benefit of using the gasoline consumption proportion of Vancouver compared to the GVRD to distribute the total GVRD gasoline sales is that any uncertainties in data analysis should be shared (and relatively proportional) between both study area groups.

5) Vancouver's equivalent CO_2 emissions for 1990 and 2000 were calculated from the total amount of gasoline consumed respectively
Source: NRCan for the gasoline to CO_2 emissions conversion factor

Note: There is a small overlap with non-road mobile lawn and garden equipment which use gasoline, but this would be a small percentage and it is assumed that the proportion would be relatively consistent across the region, and thus taking proportions would factor out most, if not all of the error, thus making it negligible in the emissions profiling (more details are listed in Section D. "Other")

Heavy-Duty Vehicles (HDVs)

The HDV part of the Transportation Sector basically included emissions from vehicles that weigh over 5,000 kg. The emissions were calculated with GVRD's modelling (GVRD's 2003 report: "*2000 Emission Inventory for the Canadian Portion of the Lower Fraser Valley Airshed: Detailed Listing of Results and Methodology*" http://www.gvrd.bc.ca/publications/file.asp?ID=684 has more details).

Only the diesel portion was included in the emissions, because the majority of vehicles weighing over 5,000 kg are diesel-powered and similarly, the majority of vehicles 5,000 kg or less are gasoline-powered. All gasoline consumption was distributed in the Light-Duty vehicle analysis. While not perfect, gasoline use in the Heavy-Duty category is comparatively small. The impact of the error is reduced further if one accepts that the proportional difference of this category between the municipalities is also small.

E. DATA SOURCES FOR WASTE

The Waste Sector GHG emissions profile is based on:

- methane produced at landfills converted to equivalent CO_2 emissions; and
- emissions from the Burnaby Incinerator as reported by the GVRD.

2000

The "waste in place" method was used to establish the 2000 emissions for the Waste Sector. Totals were prorated by Vancouver's percentage of waste in place for each landfill site: Vancouver Landfill, Port Mann Landfill = 0 (closed around the mid 1990's), Cache Creek Landfill, and GVRD information for Waste to Energy (WTE) Facility (Burnaby Incinerator).

1990

1990 emissions were based on "waste in place" at the Vancouver Landfill. It was assumed that all Vancouver waste went to the Vancouver Landfill (via the Vancouver South Transfer Station (VSTS)), so Port Mann Landfill, Cache Creek Landfill, Burnaby Incinerator were all assumed to be zero, as no values were tracked for 1990.

F. DATA SOURCES FOR "OTHER" (NON-ROAD MOBILE EQUIPMENT)

The "Other" Sector consists of what the GVRD has classified as "non-road mobile equipment", which includes industrial, construction, lawn/garden, and agricultural equipment etc. Marked fuels are the predominant fuel consumed in this category, so there is little overlap with the clear fuels that were analyzed in the Transportation Sector. Note that for some lawn and garden equipment ("lawn care equipment"*), gasoline consumption (clear fuel) in this sector was double-counted with the Light-Duty vehicle analysis, and diesel consumption (clear fuel) with GVRD's Heavy-Duty vehicle analysis; however, the amount is small ("*estimated to be not greater than 1% for onroad gasoline and 2% for onroad diesel*" (Source: page C-14 of GVRD's "*2000 Emission Inventory for the Canadian Portion of the Lower Fraser Valley Airshed: Detailed Listing of Results and Methodology*")) and assumed relatively consistent across the region. The double-counting is thus considered negligible, especially since Vancouver/GVRD proportions were used in the gasoline consumption analysis in the Transportation Sector.

* Note: the ICLEI/CCP Protocol does not require lawn care equipment to be reported, but since it is such a small amount of the total inventory and the GVRD's figures included lawn care equipment, they were included in the "Other" category of Vancouver's GHG emissions profiles.

Source: GVRD for disaggregation of figures for Vancouver's portion of "Other" emissions for both 1990 and 2000.

Community Climate Change Action Plan
Consultation and Communications Plan

Introduction

A number of priority areas have been identified where action is required to reduce GHG emissions in the City. Before rolling out these initiatives, the City wants to take the draft plan to the community for feedback, input, buy-in and commitment. The City also needs to begin a communications and education process to get people from all sectors of the community thinking about how and where they can make changes required to reach GHG reductions targets.

This consultation plan foresees two parallel streams of activity, working concurrently: stakeholder consultation, and public education, information and engagement. This approach sets the stage for ongoing social marketing and communications that the City would need to engage in over time if it is to reach the six per cent reduction target.

Overall Goals:

- Inform stakeholders and the public of the City's green house gas reduction initiative
- Encourage action to reduce GHG emissions in both the public and stakeholders
- Gain more detailed feedback from the public and stakeholders on the proposed emissions reduction strategies
- Work with stakeholders and the public to add more implementation detail to the Draft Action Plan.

Project Initiation
Upon project commencement

- Meet with the client to be briefed on the desired outcomes;
- Gain a clear understanding of the process;
- Prepare work plans (including work to date).

Program Launch
May 31 commencing and throughout project

- ***Develop branding for the project and produce a visual identity for it.***

- ***Develop key messages and positioning that will drive action, what is being asked of people, what the City is doing at a corporate level, how people can get involved.***

- ***Host a launch event with special speakers to attract attention***

- ***Prepare speaking notes for the Mayor and Council as needed***

- ***Prepare a Question and Answer document for Council***

- ***Ongoing proactive media relations that positions the City of Vancouver as a leader***
  - Securing earned media coverage about the GHG issue will be a crucial step in the public education process. The City does not have sufficient budget to advertise GHG reductions into the hearts and minds of residents. The Vancouver Sun will be invited to become a partner in this initiative and run weekly features on the issues.

- ***Prepare a web site*** *(unique site or part of existing City site)* ***with information for the public on how they can get involved and what they can do to make a difference*** *(10 first steps)*

Phase One:
Public Education, Information and Engagement, and Stakeholder Consultation
June 1 to October 31, 2004

Education
Engaging the public in a process to identify actions they can take in the short-term to reduce GHG emissions is the focus of a communications/consultation strategy for residents, businesses, community associations and the multicultural community.

- ***Engage existing City networks to recruit and identify participants.***
  - The City has a long and effective tradition of working with residents and neighbourhoods on a range of planning and community issues. Work with the City's project team to collect names of engaged citizens who have taken part in other planning programs (CityPlan) and who could be enrolled early and influence others.

- ***Create educational materials for the public so their participation in consultation can be meaningful.***
  - There is still work to be done to educate the community about the issues of GHGs and its impacts. It is important to recognize that the majority of the public are unlikely to have comprehensive climate change awareness and that materials will have to be suitable for their understanding. Specific communications vehicles include: a four page newspaper insert that would run in the city-wide version of the Vancouver Courier. Extra copies will be "overprinted" for use at workshops. Display boards and a PowerPoint presentation will be developed to sue at workshops and public events.

Stakeholder Consultation
A series of small Roundtable discussion groups comprised of stakeholders from specific industries or areas of interest will be conducted. The purpose of stakeholder consultation will be to present the proposed measures from the draft action plan to engage sector

leaders in discussions designed to determine what opportunities they see to reduce GHG emissions, what they are willing to commit to, and identify barriers they may see to achieving reductions.

- ***Meet with City staff to fully understand the background and rationale for each initiative identified in the draft plan.***

- ***Take background material from the draft plan and prepare a foundational PowerPoint presentation for widespread use in introducing the project*.**
  - The presentation will address the who, what, why, when, where and how of the consultation process and what is expected from stakeholders. This is expected to take place during the month of June

- ***Customize the presentation for each Roundtable consultation group.***

- ***Work with facilitation team to develop an agenda and approach for each of the Roundtable discussions.***

- ***Facilitate Roundtables meeting with each stakeholder group at least twice***
  - The first meeting would be to review draft initiatives and identify additional ideas; and the second to determine buy-in and get commitment. The first Roundtable meeting is expected to be held in July with the follow-up meeting in late September.

- ***Conduct a minimum of 4 Roundtables with / on the topics of:***
  - Building Owners and Managers;
  - Renovation Contractors;
  - School Trip reductions; and
  - Institutional Retrofits.

- ***Prepare a report on each of the Roundtable discussions.***

Phase Two

Education

- ***Use existing communications channels to disseminate public education materials***
  - This could include GVRD, greater.vancouver TV, The Buzzer and more to communicate GHG issues. There is already excellent work being done in the community on this issue and the consultation will tap into existing communications channels wherever possible.

- ***Children's program.***
  - As part of the project web site, a special section for children should be created. Community partners will be sought to co-sponsor an essay writing contest that could be run through the web site. The children's section could also feature activities and ideas kids could use to influence decision-makers in their homes.

- ***Hold a minimum of five Cool Vancouver Action Workshops for the public to gather input and direction***
  - The workshops would be a combination of education and consultation and would be focused on particular neighborhoods, youth, and multicultural groups. These workshops would gather people's input on directions identified in the Action Plan.

Stakeholder Consultation

- ***Hold additional Roundtable discussions as required and resources permit.***

Overall Consultation Budget

The consultation has been structured to work for both a $75,000 budget (Phase One) and a $150,000 budget (Phase Two). This structure has been used as the City currently has a $75,000 budget but may receive additional funds from FCM's Green Municipal Funds, whereupon Phase Two activities could be undertaken.

Phase One

Project Initiation	$5,000
Project launch and beyond	budget to be determined
Phase One: Public Education, Information and Engagement, and Stakeholder Consultation	$70,000
Phase Two: Public Education, Information and Engagement, and Stakeholder Consultation	$60,000
Project Management Phase One	$7,000
Project Management Phase Two	$7,000
Total	**$149,000**

- Additional Roundtables (2 sessions each) @ $8,000
- Additional Cool Vancouver Action Workshops @ $7500