A Discussion Paper on Greenhouse Gas Reduction Planning for the City of Vancouver

by the

Cool Vancouver Task Force

June 2003

"The 21st Century presents the City of Vancouver with a challenge for each of us. We need to envision and adopt new ways of building and managing our city that respect the planet's atmosphere while continuing to enhance our community's quality of life.

We all share the same environment and thus, this challenge will require creativity, commitment and an attitude of collaboration between government, business and the community. By working together, we can claim previously unknown benefits, and celebrate our accomplishments as we build a sustainable city for ourselves and our children."

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Executive Summary

This document is a discussion paper on greenhouse gas (GHG) reduction planning for the City of Vancouver and was the joint creation of the Cool Vancouver Task Force and City staff. The Cool Vancouver Task Force (CVTF) is a group of knowledgeable individuals from a wide range of stakeholder groups in the City of Vancouver and the Region that City Council invited to participate in a series of meetings to provide advice and guidance on the development of the components of a GHG Reduction Action Plan for the City.

It is one of many initiatives the City currently is undertaking in its commitment to becoming more sustainable. The Action Plan is intended to provide further leadership and co-ordination of GHG reduction initiatives in the City on both corporate and community issues.

This discussion paper explores issues of climate change, how Vancouver has approached climate change to date, the City's current emissions profile and proposed reduction targets. Neither this discussion paper nor the Action Plan that will ultimately be developed is intended to supersede any existing Council policies, programs or regulations, however they are intended to help give a cohesive structure to the City's initiatives that address climate change. Furthermore, the process of creating the paper is intended to spur on exploration of possible innovations within the City and the consideration of additional initiatives to promote reductions in GHG emissions in the City.

Climate Change is the warming of the planet's climate primarily due to an increase in 6 particular greenhouse gases in the atmosphere whose current concentrations are the result of human activity, in particular the burning of fossil fuels. These gases trap the sun's rays and increase the warming of the atmosphere. Canada ratified the Kyoto Protocol, an international agreement on reducing climate change amongst many countries. Vancouver is showing leadership in being proactive in responding to the challenges climate change offer through the creation of this plan.

The City intends to take a "strategic" approach to GHG reduction. The scope of issues and potential initiatives that are encompassed by GHG reduction planning is significant and the City must prioritize its activity.

The City's strategy for GHG reduction includes the following goals:

- To increase the understanding and commitment in with all stakeholders in the City (community and corporate) regarding climate change, its implications to Vancouver and the options we have to reduce emissions while increasing the City's prosperity.
- To integrate emissions reduction goals into all relevant aspects of City business.
- To create a streamlined and coordinated Action Plan that harmonizes effort and resources toward achieving real reductions in emissions in both the short and longer term.

- To develop strong partnerships with industry and other levels of government to harness resources to implement innovative programs and projects.
- To develop tools that assist community and corporate initiatives in Vancouver in emissions reduction initiatives.
- To position the GHG reduction program as a cornerstone in the City's overall approach to sustainability.
- To identify economic development opportunities that exists in the reduction of GHG emissions.

Vancouver is addressing its emissions by conceptually separating its organizational "corporate" emissions from community emissions. This discussion paper outlines suggestions for reducing emissions in both the corporate and community dimensions and discusses the City's role in encouraging both, built around a framework of types of action the City can take including:

- Research
- Educate, consult and communicate
- Act (demonstrate leadership)
- Advocate
- Partner
- Regulate
- Monitor and measure

This discussion paper outlines a wide range of initiatives that stakeholders and the City could pursue to reduce emissions in a range of areas, including:

- Personal lifestyle issues;
- Business sectors;
- City Development;
- Transportation;
- Infrastructure; and
- Municipal Management.

In addition to a wide range of options to consider to reduce GHG emissions, this discussion paper also briefly explores the likely unavoidable impacts of climate change that has and is occurring and adaptation strategies the City could consider to address them.

This discussion paper offers some general observations on consultation and implementation of the final Action Plan, noting that many of those issues are yet to be considered in further discussion with the Task Force and the public.

This discussion paper will be presented to City Council in mid June 2003 and is expected to go out for wider discussion in the fall of 2003.

Many direct and indirect benefits await the City in pursuit of reduced emissions and this discussion paper is a step forward in identifying the full range of those opportunities.

1.0 Introduction

This document is a discussion paper outlining a wide range of issues and options for the City of Vancouver to consider in its development of a Greenhouse Gas (GHG) Reduction Action Plan. It was created in the spring of 2003 by the City on the direction of City Council and under the guidance of the Cool Vancouver Task Force on climate change.

Why complete an Action Plan?
The City of Vancouver is committed to becoming more sustainable and has been addressing the particular issues of climate change since the late 1980s. The Action Plan that will ultimately be developed is intended to provide further leadership and coordination of GHG reduction initiatives in the City on both corporate and community issues.

What is in the Discussion Paper?
This discussion paper outlines the issues of climate change and how Vancouver has approached climate change to date. It outlines Vancouver's current emissions profile and discusses proposed reduction targets. It then outlines principles, issues, criteria and options for consideration around how the City could reduce its emissions. It also explores briefly, issues of adaptation to climate change impacts. Finally it outlines a work plan, consultation plan and proposed schedule for finalizing the Action Plan in later 2003.

What will the status be of the Action Plan?
This Action Plan will not ultimately supersede any existing Council policies, programs or regulations, however it will help give a cohesive structure to the City's initiatives that address climate change. Furthermore, the process of creating both the discussion paper and the Plan is intended to spur on innovation within the City and the consideration of additional initiatives to promote reductions in GHG emissions in the City.

2.0 Overview of Cool Vancouver Task Force

What is the Cool Vancouver Task Force?

The Cool Vancouver Task Force (CVTF) is a group of knowledgeable individuals from a wide range of stakeholder groups in the City of Vancouver and the Region that City Council invited to participate in a series of meetings to provide advice and guidance on the development of a list of the components of a GHG Reduction Action Plan for the City. This discussion paper serves as an exploration of issues and options relevant to that list.

How was the Task Force created?

City Council created the Cool Vancouver Task Force through a motion at the March 25th, 2003 Council meeting.

A. *THAT, in order to provide a leadership role in reducing Greenhouse Gas emissions, Council adopt a Greenhouse Gas Emissions Reduction Target for the City (organization) of 20% below 1990 levels by 2010 as an interim measure. This target will need to be reviewed in coordination with the finalized emissions inventory and the development of a Greenhouse Gas Emissions Reduction Action Plan to ensure that the target is realistic for the City of Vancouver.*

B. *THAT, subject to any emissions reduction target adopted by Council, staff develop a Greenhouse Gas Emissions Reduction Action Plan for the City (organization) that is consistent with the City's Definition and Principles of Sustainability and the objectives of the Kyoto Accord.*

C. *THAT Council refer this report to a Cool Vancouver Task Force, comprised of Councillors Roberts, Cadman and Bass; a representative each from the Vancouver School Board and the Vancouver Park Board; representatives of the David Suzuki Foundation, SPEC and the UBC Sustainable Development research Institute; a representative from TransLink, BC Hydro, and the building industry; Mark Roseland; a GVRD representative from the Sustainable Region Initiative; the Director of Environmental Health of the Vancouver Coastal Health Authority; a representative of the City's Corporate Management Team; with Councillor Cadman and the General Manager of Engineering Services as Co-chairs.*

D. *THAT the Cool Vancouver Task Force:*

   (i) report back by June 24, 2003 on the components needed to build a comprehensive city-wide program to reduce greenhouse gas emissions, including measures modeled on initiatives like the Toronto Atmospheric Fund;

   (ii) report back with suggestions for a Community Greenhouse Gas Emissions Inventory and suggestions on what role the City can provide to help reduce community greenhouse gas emissions; and

   (iii) seek assistance from regional and senior governments and the Federation of Canadian Municipalities to assist in the development of an Action Plan, to meet any emissions reduction target(s) adopted by Council, and to report back on community emissions.

How did the Action planning process proceed?
The first meeting of the Task Force was convened on April 15th, 2003. The process was agreed to include two subsequent meetings of the Task Force prior to reporting to Council, including a meeting on May 7th and one on June 2nd.

City staff gathered suggestions and input form the Task force, and completed additional research into the issues of GHG reduction and examples of Action Plans from other cities. Staff created a draft of this discussion paper and the Task Force reviewed it and offered additional advice and guidance.

Who is on the Task Force?
Council selected the members of the Task Force and a few additional stakeholders were included after the first meeting at the suggestion of other Task Force members. The membership was not intended to include every stakeholder involved in GHG reduction issues, but rather to assist in getting a broad spectrum of input prior to the full stakeholder consultation process that is intended for the fall of 2003.

The membership of the Task Force included (in no particular order):

Katrina Ao **Environmental Youth Alliance**	Wendy Avis - *Pacific & Yukon Region* **Environment Canada**
Fred Bass, - *City Councillor* **City of Vancouver**	Alex Boston **David Suzuki Foundation**
Ivan Bulic - *Coordinator* **SPEC**	Robert Buller - *Commission Manager* **Vancouver Planning Commission**
David Cadman - *City Councillor* **City of Vancouver**	Lilian Chau **Vancouver City Planning Commission**
Brian J. Clark - *Regional Manager, Environmental Stewardship* **Ministry of Water, Land & Air Protection**	Maureen Enser - *Executive Director* **Urban Development Institute**
Dermot Foley **David Suzuki Foundation**	Jim Hamm - *Director* **SPEC**
Mark Holland – *Manager, Sustainability Support Group* ***City of Vancouver***	Kevin Kearns – *Director of Exhibits* **Science World**
Nancy Knight - *Division Manager, Demand Side Management* **GVRD**	Kevin Kwok – *Manager, Environmental Services* **City of Vancouver**
Nick Losito – *Director Environmental Health* **Vancouver Coastal Health Authority**	Michael Magee **Tides Canada Foundation**
Sharon McCarthy - *Environmental Health & Safety* **BC Gas**	Doug McClary - *Manager of Maintenance & Construction* **Vancouver School Board**

Athana Mentzelopoulos - *RD, Environmental Protection Branch Pacific & Yukon Region* **Environment Canada**	Kevin Millsip - *School Trustee* **Vancouver School Board**
Andy Molloy **BOMA**	Susan Mundick - *General Manager* **Vancouver Park Board**
Dave Park **Vancouver Board of Trade**	Lyndsay Poaps - *Commissioner* **Vancouver Park Board**
Tamim Raad **TransLink Strategic Planning**	Anne Roberts - *City Councillor* **City of Vancouver**
John Robinson - *Sustainable Development Research Institute* **UBC**	Clive Rock - *Director of Strategic Planning* **TransLink**
Dave Rudberg – *General Manager of Engineering Services* **City of Vancouver**	Bryn Sadownik - *School of Resources & Environmental Management* **Simon Fraser University**
Bruce Sampson - *Vice-President, Sustainability* **BC Hydro**	Catherine Sinasac – *Planner* **City of Vancouver**
Ian Smith – *Planner* **City of Vancouver**	Ray Straatsma – *Director of Communications* **B.E.S.T.**
Brian Tisdall – *President & CEO* **Science World**	Linda Thorstad – *Executive Director* **Vancouver Economic Development Commission**
Julianna Torjek **City of Vancouver Civic Youth Strategy**	Marion Town - *Executive Director* **B.E.S.T.**
Kevin Van Vliet – *Engineer* **City of Vancouver**	Brian Davies – Engineer **City of Vancouver**
Elizabeth Seto – Engineer **City of Vancouver**	Brain Tysdall **Science World**

3.0 Climate Change – an overview of the issues

Introduction

The issue of the greenhouse effect due to the emission of various substances into the atmosphere is the central scientific issue in climate change. This section reviews the science and perspectives on the science of climate change, and the international Kyoto Protocol agreement that was recently ratified by Canada and many other nations as an approach to changing it.

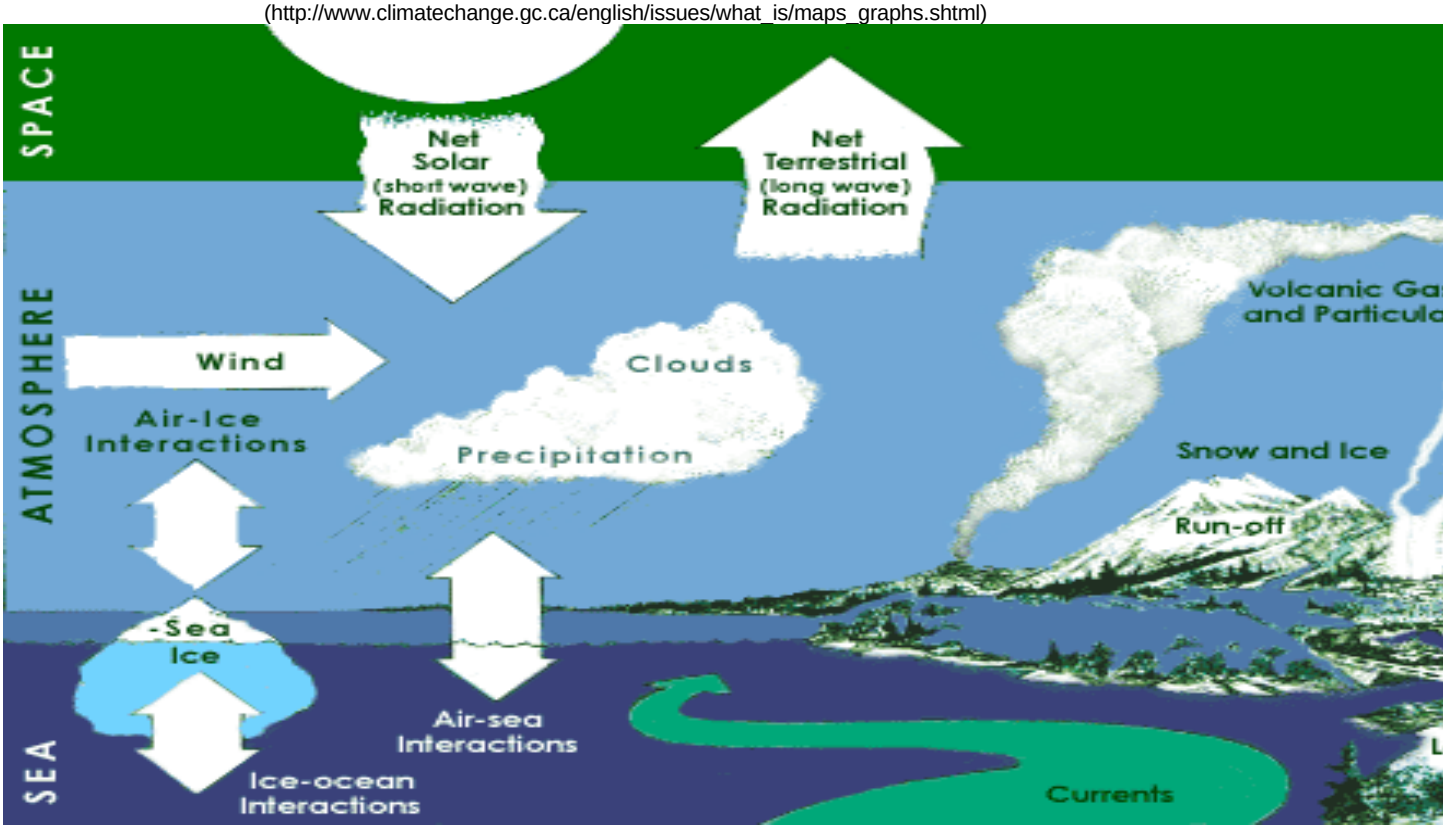
The following descriptions of the scientific predictions of warming tends, causes and effects have been drawn largely from federal information sources on climate change.

THE GREENHOUSE EFFECT

Understanding the global climate system is the first step towards understanding climate change and its impacts. Finding solutions then depends on identifying the key greenhouse gases, where they come from, and what happens to them after they have been emitted.

Major elements of the climate system

(http://www.climatechange.gc.ca/english/issues/what_is/maps_graphs.shtml)



Greenhouse Gases

A greenhouse gas (GHG) is a gas in the earth's atmosphere that contributes to the "greenhouse effect", the phenomenon of absorbing the sun's energy but partially blocking outgoing radiated heat. The natural greenhouse effect is vital to life as we know it.

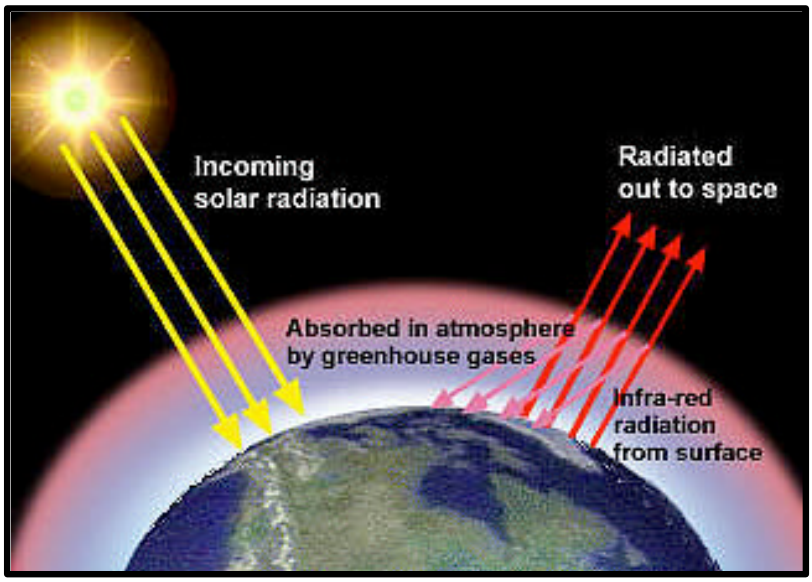


Diagram of the Greenhouse Effect

The intensifying of the natural greenhouse effect has been attributed directly or indirectly to human activity that generates levels of GHGs beyond natural levels. This enhanced greenhouse effect is believed to cause changes in global climate and, consequently, ecosystems.

There are a number of naturally occurring and man-made GHGs. The six gases (or families of gases) targeted for reduction in the Kyoto Protocol are:

- Carbon dioxide;
- Methane;
- Nitrous oxide;
- Hydrofluorocarbons;
- Perfuorocarbons; and
- Sulphur hexafluoride.

CO2eq

These GHGs have varying levels of global warming potential. For example, methane has approximately 21 times the global warming potential of carbon dioxide. For ease of comparison and to create a standard of measurement, the GHGs are equated and expressed in carbon dioxide equivalents (CO_2 eq).

The target reduction figures under the Kyoto Protocol and all discussion in this document refer to GHGs in CO_2 eq. These GHG emissions are distinct from the common air pollutants or ozone depleting substances that are addressed in other initiatives or protocols and are not part of this report. However, most GHG reduction initiatives contribute equally to reducing the common air contaminants (e.g., carbon monoxide, nitrogen oxides, volatile organics, ozone etc.)

The Science

"The average global temperature has been rising sharply in the past century. Scientists largely agree that the primary cause is human activity contributing to the greenhouse effect by emitting greenhouse gases (GHGs) that trap energy and warm the atmosphere. Most of the emissions come from burning fossil fuels such as coal, oil and gasoline. Scientists predict that if decisive action is not taken very soon to stabilize the amounts of GHGs in the atmosphere, then further dramatic warming will take place over the coming century. The projected rise in temperature is expected to occur faster than at any other period over the last 10,000 years".[1] *The Science and Impacts of Climate Change (http://www.climatechangesolutions.com/english/science/)*

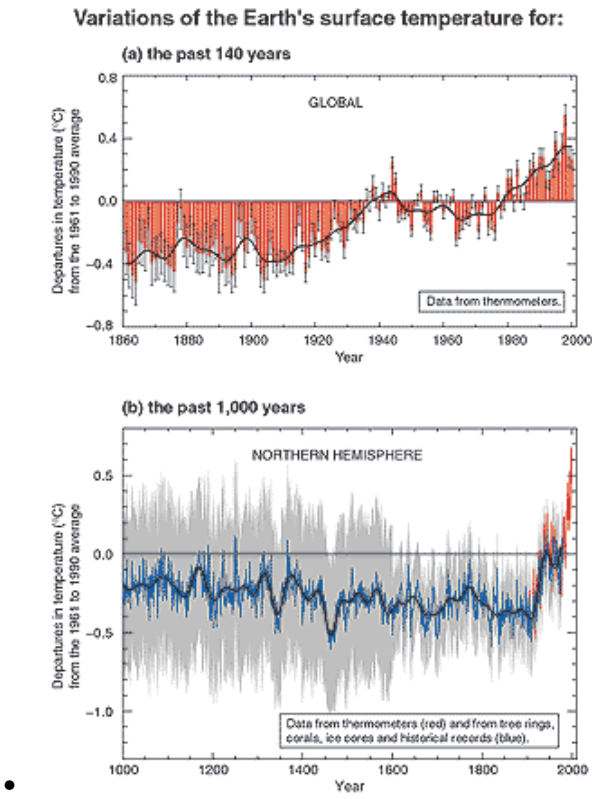
There is some uncertainty around the science of climate change, however the majority of world scientists agree that the climate is warming and that the primary cause of that warming is human activity.

The Intergovernmental Panel on Climate Change (IPCC) notes the following: *(http://www.grida.no/climate/ipcc_tar/vol4/english/075.htm)*

- *The global average surface temperature (the average of near surface air temperature over land, and sea surface temperature) has increased since 1861. Over the 20th century the increase has been 0.6 ± 0.2°C. This value is about 0.15°C larger than that estimated by the SAR for the period up to 1994, owing to the relatively high temperatures of the additional years (1995 to 2000) and improved methods of processing the data. These numbers take into account various adjustments, including urban heat island effects. The record shows a great deal of variability; for example, most of the warming occurred during the 20th century, during two periods, 1910 to 1945 and 1976 to 2000.*

- *Globally, it is very likely[7] that the 1990s was the warmest decade and 1998 the warmest year in the instrumental record, since 1861.*

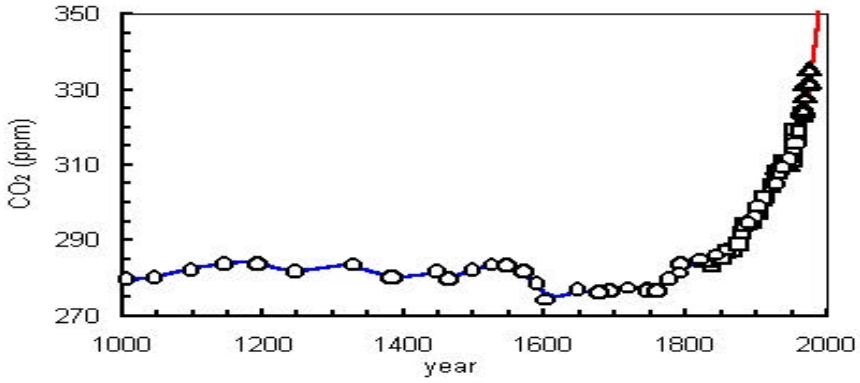
- *New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the 20th century is likely[7] to have been the largest of any century during the past 1,000 years. It is also likely[7] that, in the Northern Hemisphere, the 1990s was the warmest decade and 1998 the warmest year. Because less data are available, less is known about annual averages prior to 1,000 years before present and for conditions prevailing in most of the Southern Hemisphere prior to 1861*



The Role of Carbon Dioxide

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 CO2 in the atmosphere over many hundreds of years.



Ice core data showing CO_2 levels over this millennium.

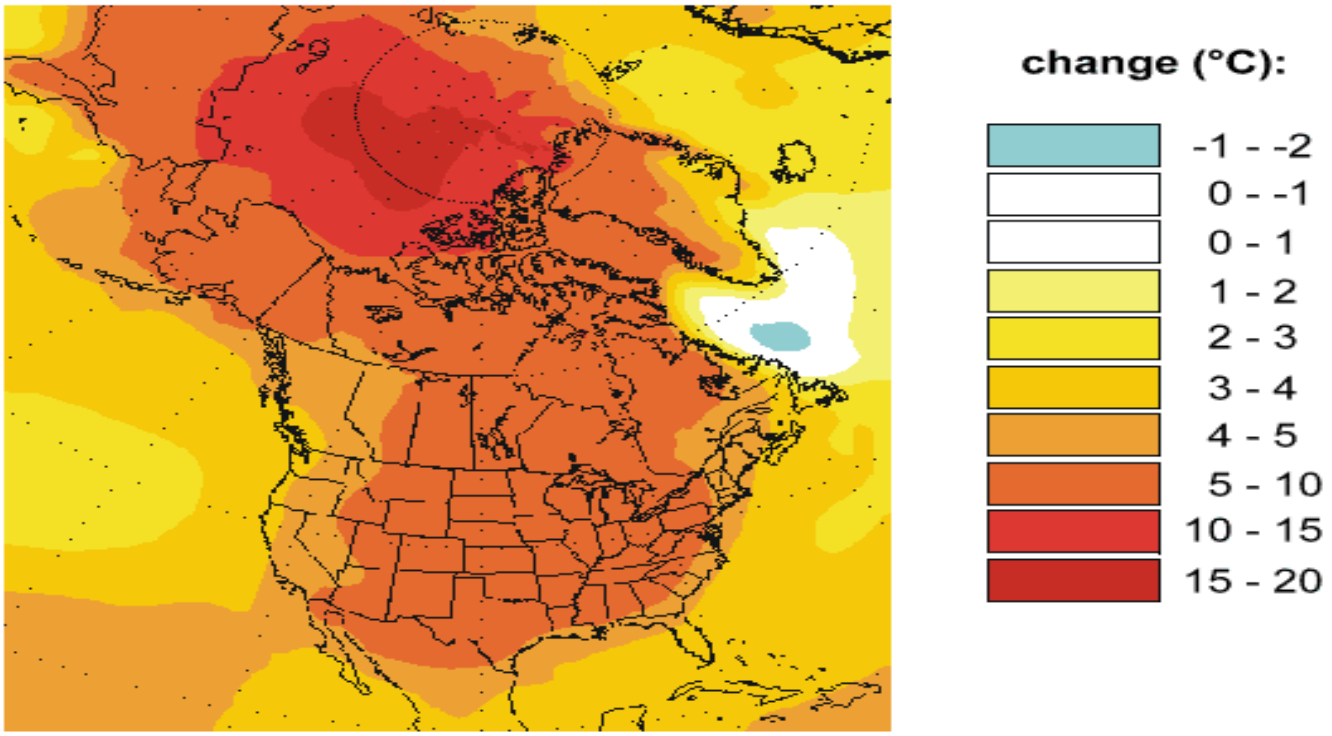
Taken from the CSIRO site
(http://www.ems.psu.edu/~radovic/COxTask3A.html#Carbon%20Dioxide%20Trends%20over)

Trends

The IPCC have developed a model that predicts future increases in temperature if the current trends continue. This model is dependent on a number of assumptions concerning population and economic growth, technological changes, energy availability and fuel use during the period 1990-2100.

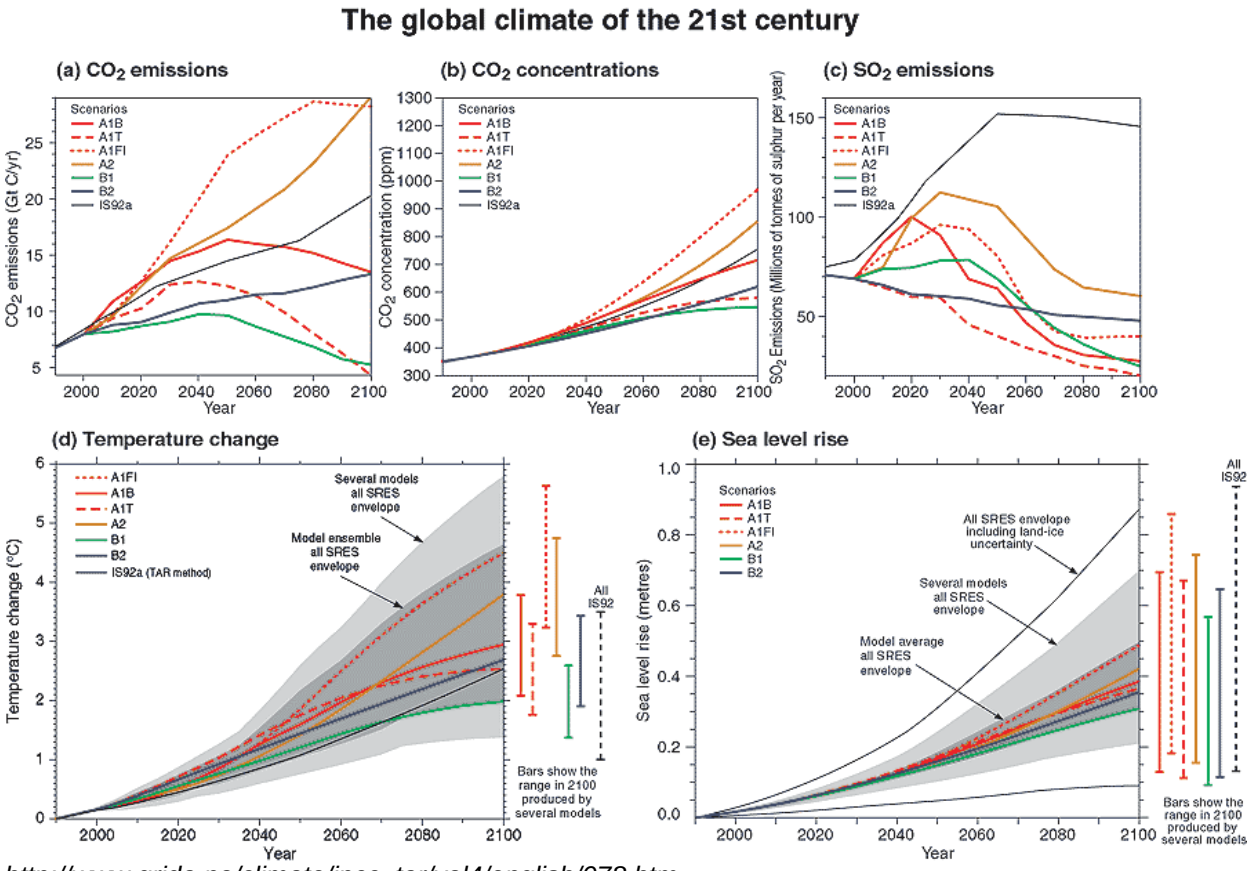
The model showed the results for three scenarios using different "climate sensitivities", a low, medium and high value. Global mean temperature is predicted to rise between 1.4°C and 5.8°C over the next century. Warming will be greater in northern areas.

Projected Average Temperature Changes in North America and the Arctic Between 1975-95 and 2080-2100
using the Canadian climate model CGCM1



Environment Canada (1999), *The Science of Climate Change* p.28. Available at http://www1.tor.ec.gc.ca/apac/climate/ccsci_e.cfm.

The predictions for climate change in the future is synonymous with increases in carbon dioxide in the atmosphere as noted in the following figure. The following figure describes predicted trends depending on various optimistic or pessimistic modeled scenarios.



http://www.grida.no/climate/ipcc_tar/vol4/english/078.htm

Impacts

A change in the world's climate of the magnitude predicted would have significant consequences for people, economies and the environment across the planet. The consequences 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.

Climate change would also likely affect weather extremes along with average temperature. Many projections of the world's future climate show more intense rainfalls or snow storms, which are likely to lead to more severe river flooding. Between the 1960s and the 1990s, the number of significant natural catastrophes such as floods and storms rose three-fold, and the associated economic losses rose by a factor of nine, even after adjusting for inflation. Although it is difficult to link this recent trend to climate change, it provides an important warning of how future changes may affect us.

Climate change is also expected to have wide-ranging and mostly harmful impacts on human health, with significant loss of life. In fact, GHG emissions are already linked to direct health impacts. This is because the largest source of emissions, the burning of fossil fuels, is also a major source of air pollutants such as toxic metals and smog.

Predicted (possibly inevitable) impacts of climate change on Vancouver

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.

- ***Flooding*** — Flooding is expected to increase due to increased storm intensity, wetter winters and ocean level rise.

- ***Ocean level rise*** — The ocean is predicted to rise between several inches and a meter over the next 100 years depending on what climate model is used. This rise may impact Vancouver's waterfront, marinas, port, seawall and properties, particularly when considered in conjunction with an increase in storm intensity.

- ***Changes in water supply*** — The GVRD predicts a reduction in the snow pack on the Northshore mountains over the next several decades due to climate change. This may have impacts on the quality and quantity of Vancouver's water supply, including increased winter runoff in the rivers and streams, increased landslides into the reservoirs, a reduction in water available in late summer, and others.

- ***Increase in number and intensity of storms*** — Vancouver can expect to face an increase in both the number and intensity of storms. These may bring damage to public and private property from wind and flooding.

- ***Longer hotter summers*** — Scientists predict our summers will be longer and hotter than in the past. This will result in increased demand on our water supply and an increase in the risk of fires. It may also increase health problems.

- ***Shorter wetter winters*** — Vancouver's winters are predicted to be shorter (in terms of average temperature), but to be more intense in terms of temperature fluctuations and rainfall. This may result in increased flooding and erosion.

- ***Diseases*** — An increase in average temperature may permit certain

diseases more common in the south to migrate north to Vancouver. The fear of West Nile Virus in the summer of 2003 is an example.

- ***Health care issues*** — The increase in temperature, diseases and storms is expected to increase health care issues, including diseases, respiratory problems, stress and others.

- ***Hydro-electricity fluctuation in supply and price*** — The change in precipitation (less in summer, more in winter and less predictability overall) will affect the flows in BC rivers that may impact the reliability of some hydro-electricity rates.

- ***Land and aquatic species changes*** — The change in temperature and precipitation patterns over time may result in changes in species on both land and in water. Foreign species from warmer climates may challenge existing species in some cases for their ecological niches, creating local scarcities.

- ***Agricultural production changes*** — The increase in overall temperature and changes in precipitation may impact agricultural sectors permitting increased production in some areas or crops and a reduction in others.

- ***Impacts on the economy*** — The Vancouver economy may face changes due to climate change impacts including changes in the forestry and fishing sectors, changes in tourism, insurance and others.

- ***Environmental refugees*** — Many from other countries and areas of the world will face catastrophic impacts from changes in the climate and it is likely that Canada and Vancouver will be drawn into assisting these groups, via financial support and receiving immigration.

The considerations for preparing for and responding to these challenges are discussed briefly in a later chapter on “adaptation strategies.”

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 Annex 1 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 the Annex I Countries, have ratified, accepted, approved or acceded to the Protocol. Currently, 109 countries have ratified, accepted, approved, or acceded to the Protocol with approximately 44% of 1990 emissions. 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 Canadian Context

Senior Canadian governments have co-operated to determine how Canada can meet its Kyoto commitments, and municipal governments are key partners. (FCM and the Municipal Response. - http://www.fcm.ca/scep/support/PCP/pcp_cc_municipal_response.htm)

On October 16-17, 2000, in a meeting in Quebec City of Environment and Energy Ministers from all provinces and territories, all provinces except Ontario agreed on the National Implementation Strategy and the First National Business Plan on Climate Change.

This plan calls for:

- increased use of ethanol;
- infrastructure for fuel cell vehicles;
- pilot projects and cost-sharing agreements in strategic areas;
- assessing impacts and adaptation needs; and
- policy options such as domestic emissions trading.

In order to increase Canadians' understanding of climate change, information "hubs" were recommended and many have been implemented. Partners can work together on public education and outreach activities through these hubs.

The approach taken by senior governments has many impacts on local governments, in a manner that will be somewhat unique to each one, depending on its particular characteristics. Consequently, each local government is approaching climate change in a slightly different manner.

Possible Impacts of Federal Ratification on the City of Vancouver

As part of the national strategy, the Federal Government currently does not have specific GHG reduction requirements for municipalities. Any GHG emissions reductions or reduction targets and credit trading are voluntary, and will contribute to the Government of Canada's GHG Emissions Reduction Target of 6% below 1990 levels by the commitment period of 2008 to 2012.

Since, under current directions, Canada's greenhouse gas emissions could be 25 per cent above 1990 levels by 2010, then the 6% reduction below 1990 levels could actually mean about a 30% reduction from current directions.

As a result of the Federal Government's commitment to the Kyoto Protocol, there may be increased Federal interest in providing assistance to reduce GHG emissions and increase climate-friendly infrastructure. On February 18, 2003, the Federal Government announced the new Federal Budget. Budget measures include $3 billion for the environment, of which $2 billion will be directed to help implement the Kyoto Protocol. The details have not been established; however, accessing these possible resources should be reflected in any local Greenhouse Gas Emissions Reduction Action Plan.

The next chapter explores in more detail the policy context of international to local governmental policy and initiatives on climate change.

4.0 The Policy Context

Introduction
Many levels of government are addressing climate change. These initiatives form a policy context for the City's work on GHG reduction. Four levels of governmental policy can be identified.

International Policy
As climate change is fundamentally a global issue, a range of international initiatives exists to address climate change. Three of the more notable are described below.

The United Nations Framework Convention on Climate Change (UNFCCC)
The first notable international initiative is the UNFCCC where work has focused around the development, negotiation and promotion of the Kyoto Protocol, as discussed earlier. The work is supported by a Secretariat that coordinates the international work on climate change around this agreement. http://unfccc.int/

Intergovernmental Panel on Climate Change (IPCC)
The IPCC was formed through a collaboration of the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988. The IPCC's role is "to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation." The IPCC does not do original research but rather assesses issues through peer reviewed and published scientific/technical literature. It publishes its findings for wider use and consideration. http://www.ipcc.ch/

International Council of Local Environmental Initiatives (ICLEI)
ICLEI is a group formed by the United Nations as an international association of local governments working together to implement sustainable development. Currently ICLEI has more than 430 cities, towns, counties, and their associations from around the world as full Members of the Council, with hundreds of additional local governments participating in specific ICLEI campaigns and projects. http://www.iclei.org/

Federal Policy
The Canadian federal government has ratified the Kyoto Protocol and commenced a range of initiatives to support GHG reductions. It has developed a "Climate Change Plan for Canada" amongst other initiatives (http://www.climatechange.gc.ca/plan_for_canada/plan/index.html). Accompanying the Climate Change Plan is a National Business Plan for Climate Change as well as a National Implementation Strategy.

Many federal government departments have initiatives to address climate change, including Environment Canada, NRCAN, Fisheries and Oceans Canada, Health

Canada, Transport Canada and many others. A summary of their initiatives can be found at: http://www.climatechange.gc.ca/english/actions/what_are/federal_links.shtml

The federal government has commenced investing in projects to reduce GHG emissions, and on November 26, 2001, the Government of Canada announced the details of $425.15 million in concrete initiatives that will help reduce Canada's greenhouse gas (GHG) emissions.

Federation of Canadian Municipalities (FCM)

The Federation of Canadian Municipalities (FCM) administers two federal funds *(Green Municipal Enabling Fund & Green Municipal Investment Fund)* to support municipal actions to make the country more sustainable and reduce emissions. The City of Vancouver has accessed these funds on a number of occasions to support its initiatives, including studies on the Southeast False Creek project.

Provincial Policy

The BC provincial government has a number of Ministries dealing with a range of initiatives to address climate change, including the Ministry of Water, Land and Air Protection, Ministry of Forests and the Ministry of Energy and Mines, amongst others. More information on these can be found at: http://wlapwww.gov.bc.ca/air/climate/#2

The range of policy initiatives includes education campaigns, technical reports on the extent and impacts of climate change in BC, business planning for response to climate change and most recently, a "Report of the BC Climate Change Economic Impacts Panel."

The province recently approved an Energy Policy that highlights the exploration for fossil fuel reserves on and off shore as a priority. This policy may place challenges in the face of initiatives to achieve real GHG reductions in the province.

Regional Policy

The Greater Vancouver Regional District (GVRD) also has a wide range of initiatives underway to support GHG reductions. First and foremost is their regional land use planning processes and the resulting plans, including the Livable Region Strategic Plan and more recently, the Sustainable Region Initiative.

The GVRD's DSM Group has many initiatives underway with business, local governments and community groups to support GHG reductions. Additional information can be found at: http://www.gvrd.bc.ca/services/air/change/change.html

Other Cities

A number of other cities are pursuing GHG reduction plans and initiatives in Canada. Most notable are Toronto, Edmonton and Ottawa, amongst others. Each has

developed a range of initiatives. Toronto has established the Toronto Atmospheric Fund (TAF) that manages a grant program to the City and other organizations for GHG reduction initiatives, based on a several million-dollar endowment. Edmonton has been working on a GHG reduction plan for several years and is in the final stages of planning and commencing implementation.

Many Canadian Cities have commenced the process of addressing GHG reductions through a program known as the Partners for Climate Protection administered through the Federation of Canadian Municipalities. Vancouver is member of this program, along with over one hundred other Canadian municipalities.

ICLEI (noted above) has been instrumental in promoting GHG reduction planning and is working with many hundred municipalities around the world on climate change issues.

Conclusion

The City of Vancouver's initiative to develop a GHG Reduction Plan is proceeding in the context of a wide range of policy and programs to support it from all levels of government.

Many of the senior government initiatives and plans directly involve local government or initiatives that will impact local jurisdictions and as such, the development of a strategic action plan is a wise course of action for Vancouver.

5.0 Vancouver's Approach to Climate Change

Introduction
This section explores Vancouver's approach to climate change issues including perspectives, past initiatives and directions for the future.

The City of Vancouver has been proactive in addressing climate change issues for nearly 2 decades. It demonstrated leadership many decades ago in reducing highway infrastructure planned for downtown, bringing housing back to the downtown, and increasing pedestrian amenity around the City. It took a strong position on not increasing road infrastructure and shifting transportation focus to transit and non-automobile modes.

Overall, Vancouver has taken a position of both responsibility and leadership in addressing climate change, however the 21st century has posed new challenges and renewed the call for determination and creativity in addressing these issues within the City's jurisdiction.

Figure: Vancouver in the Greater Vancouver Region

COUNCIL POLICY

The City of Vancouver Council's policy dates back over a decade specifically on climate change:

> *On October 16, 1990, Council approved in principle Clouds of Change Recommendation #1 to reduce carbon dioxide emissions by 20% as part of the actions to address global climate change issues, subject to future reports on costs and trade-offs involved in achieving the objectives and targets.*
>
> *In 1995, Vancouver joined the Federation of Canadian Municipalities' "20% Club", which became the Partners for Climate Protection Program in 1998.*
>
> *On April 23, 2002, Council adopted a Definition and Principles of Sustainability to guide, prioritize, and improve the sustainability of City actions and operations.*
>
> *On May 2, 2002, Council unanimously carried the motion, proposed by the Federation of Canadian Municipalities, to support the Canadian Government's ratification of the Kyoto Protocol.*

History of the City's GHG initiatives

While the City has used its policy and regulatory powers on many occasions and in many initiatives to encourage what we now call more sustainable urban development patterns, the following history of the City's initiatives focuses on its own operations.

The Clouds of Change

In 1990 Council approved a report known as *the Clouds of Change Report*. This document had been prepared by a task force on climate change. It offered 34 recommendations of which most have been implemented in subsequent years.

The work of the Cool Vancouver Task Force, and the City's efforts to develop a comprehensive Action Plan to reduce GHG emissions is building on the foundation laid by the Clouds of Change report. The Action Plan will ultimately take additional steps and address a range of issues at a higher level of detail.

PCP Process

The City joined the PCP program (Partners for Climate Protection) at its inception in late 1998. PCP is a national program that brings Canadian municipal governments together to reduce the local production of GHG emissions and improve the quality of life. 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.

PCP Milestones and progress to date include:

1) ***Take emissions inventory and forecast future emissions***

   Status: To report back with a community-wide inventory (through the Task Force)

2) ***Set a reduction target***

Status: To be determined by the Task Force.
Note: on March 25, 2003, Council approved a 20% reduction from 1990 levels by 2010 for the City (organization) as an interim measure, subject to a review of the finalized emissions inventory and development of a Greenhouse Gas Emissions Reduction Action Plan to ensure that the target is realistic for the City of Vancouver.

3) Develop a local action plan

Status: Draft components of an Action Plan to be developed by the Task Force - to be considered, within a sustainability framework, after Milestone 2 has been completed.

4) Implement the plan

Status: To act on after Milestone 3 has been completed and adopted by Council; Note: numerous actions have already been completed to reduce emissions to date both community-wide and organizationally.

5) Measure progress: monitor, verify & report reductions

Status: Yet to complete.

Overall Strategy and Initiatives

The strategy the City has taken around reducing GHG emissions is to reduce energy use through more efficient operations or a change in the way things are done, so that overall emissions are reduced. These initiatives work towards achieving PCP's Milestone 4, and many have been implemented successfully to reduce emissions earlier and prior to developing a PCP action plan as mentioned in Milestone 3 above. A brief description of each source category, with future plans if available, follows.

a) City Buildings

Since 1989, the Corporate Services Group has been working extensively with BC Hydro on the re-initiated and cost-sharing Power Smart Program to reduce electrical energy use in Civic Facilities. Initiatives include energy efficient light-emitting diode (LED) exit signs, energy audits, lighting upgrades, Energy Performance Contracts, and the green building rating system, which will be a major component for increased energy efficiency.

b) City Fleet

Vehicle downsizing (where appropriate) is one of the several areas where the City has significantly reduced emissions. As a result of cleaner emissions standards and improved equipment technology over the last 15 years, current production vehicles are significantly cleaner and more fuel-efficient than units purchased in the 1990s. To explore future additional emissions and efficiency improvements, the City is currently conducting trials with emerging technologies such as alternative fuels, electric cars, and hybrid-electric vehicles, and is investigating near-term technologies such as fuel cells.

c) Street and Traffic Lighting

In 1991-95 27,000 street lighting fixtures were converted from incandescent and mercury vapour to high-pressure sodium under the BC Hydro PowerSmart program, saving 12.2 million kilowatt hours of energy and $700,000 every year.

In 2002, the City began a Power Smart Program project to convert the City's 670 traffic signals to LEDs, which consume 80 to 90% less energy and can last seven to ten times longer than conventional light bulbs, potentially saving $250,000 annually, once implemented. Once the technology has been advanced, perhaps in the next five years, the City's goal is to switch to LEDs for street lighting, resulting in substantial additional energy and cost savings and greater reliability.

d) Corporate Waste Disposal

Greenhouse Gas emissions are reduced through waste reduction, reuse, recycling, and more efficient use of energy in recycling and other waste disposal-related processes. Results include decreased energy consumption and landfilling of materials.

e) Vancouver Landfill

In 1991, the City installed a landfill gas collection and flaring system at the Vancouver Landfill to reduce GHG emissions and control odour. Landfill gas is a product of "anaerobic decomposition" of organic wastes deposited in landfills. It is comprised of approximately 50% CO2 and 50% methane. The latter is a potent GHG with 21 times the warming potential of CO2. In 1999, Council approved expansion to cover areas of the Landfill that received waste from 1990 to 1998 and pursue landfill gas beneficial use. By 2001, the expanded landfill gas control system was fully operational, and Council approved an additional expansion for 2003 to cover the area filled since 1998, which will further reduce GHG emissions. Within 2004, the City will be selling landfill gas for use in a cogeneration system to produce electricity and to heat neighbouring greenhouses.

The City, who has significant control over the gas collection and flaring system, has been successful in substantially reducing emissions (e.g., 200,000 tonnes of eCO_2 emissions were reduced in 2002). *Note: PCP and international protocols consider municipal landfill emissions as "community" (not "corporate") emissions.*

Vancouver Landfill Greenhouse Gas Emissions Inventory (Community)

Equivalent Carbon Dioxide (eCO_2) in Tonnes (Approximate)		
1990	**2002**	**2003** (est.)
276,000	170,000*	70,000

** In absence of any reduction measures, the 2002 figure would have been approximately 370,000 Tonnes*

Sustainability Policy

In the mid 1990s, the concept of "sustainable urban development" began to emerge in discussions and policy directions in the City. The City targeted the development area in Southeast False Creek (SEFC) to become a "model sustainable community" and as

staff began working under this directive, the understanding of the importance of becoming more sustainable emerged.

Following several years of work on a wide variety of sustainability initiatives, in April 2002, the City adopted a formal position, definition and principles on sustainability, as detailed below.

Definition of a Sustainable Vancouver

A sustainable Vancouver is a community that meets the needs of the present without compromising the ability of future generations to meet their own needs.

It is a place where people live, work and prosper in a vibrant community of communities. In such a community, sustainability is achieved through community participation and the reconciliation of short and long term economic, social and ecological well-being.

Sustainability is a direction rather than a destination. A sustainable city is one that protects and enhances the immediate and long-term well being of a city and its citizens, while providing the highest quality of life possible.

Sustainability requires integrated decision-making that takes into account economic, ecological, and social impacts as a whole.

City Principles of Sustainability

1. *Today's decisions must not compromise the choices of our children and future generations;*
2. *We are all accountable for our individual and collective actions;*
3. *Resources must be used fairly and efficiently without compromising the sustainability of one community for another*
4. *Using renewable resources is encouraged and supported, while the use of non-renewable resources should be minimized;*
5. *A community should provide a safe, healthy, and viable setting for human interaction, education, employment, recreation, and cultural development;*
6. *A sustainable Vancouver contributes to, and provides leadership towards, regional, provincial, national and global sustainability;*
7. *The Vancouver economy should move from its dependence on non-renewable carbon based fuels, particularly for transportation, which are likely to fluctuate dramatically in price and supply*
8. *A community should provide a safe, healthy, and viable setting for human interaction, education, employment, recreation, and cultural development;*
9. *A sustainable Vancouver contributes to, and provides leadership towards, regional, provincial, national and global sustainability;*
10. *The Vancouver economy should move from its dependence on non-renewable carbon based fuels, particularly for transportation, which are likely to fluctuate dramatically in price and supply*

A Sustainability Perspective

The City is proceeding with the development of a GHG Reduction Action Plan with awareness that this process is part of a larger perspective and position on increasing the overall sustainability of the City. The City is pursuing a wide range of initiatives that address sustainability, including developing a comprehensive strategic action plan on

sustainability for the City as a corporation. The GHG Action Plan is seen as a key step in the process of making the City more sustainable.

6.0 Vancouver's Emission Profile

Introduction
This section outlines the profile of Vancouver's emissions and is intended to explain where Vancouver's emissions are coming from to provide context and to assist in identifying where priority initiatives to reduce GHG emissions may be most effective.

Measurement Challenges
The following discussion is based largely on the data the City has gathered on its GHG emissions as part of its work on the PCP process (Partners for Climate Protection) under advisement from FCM (Federation of Canadian Municipalities) and with the assistance of the Greater Vancouver Regional District (GVRD), BC Hydro, Terasen and Air Care for data.

Transportation is one of the largest sources of emissions in the region. The question of how transportation emissions are measured and allocated to the various municipalities remains a work in progress. It is anticipated that fuel sales (gasoline, diesel, propane) within the GVRD will be distributed by vehicle kilometers traveled (vkmt) data obtained from Air Care and other transportation modeling. Completion of the community emissions profile for Vancouver for 1995 and 2000 is anticipated by approximately autumn of 2003.

The Carbon-Intensity of Electricity
The consumption of electricity in itself does not result in GHG or equivalent carbon dioxide (CO_2 eq) emissions; however, if fossil fuels are used to generate that electricity, then the consumption of those fuels does result in CO_2 eq emissions. The CO_2 eq emissions per unit of electrical energy or "carbon-intensity" is an important factor that affects the results of the inventory. There are many sources of electricity delivering power to the grid. In the past, hydroelectric dams throughout the province, which have almost no GHG emissions associated with generation, have supplied most of BC's electricity. However, in certain years when the water supply was low and hydroelectric capacity was exceeded, more fossil fuel-based generation (natural gas or coal fired turbines) was needed, resulting in increased GHG emissions.

Figure: The emissions associated with lighting City Hall change depending on the carbon-intensity of the source of electricity.

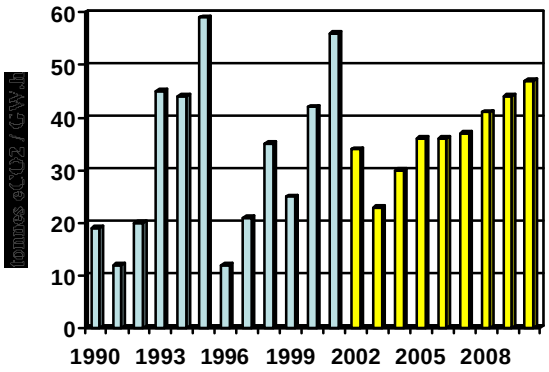


Figure: Actual and Forecast Greenhouse Gases from Electricity (source: BC Hydro)

In this context, it is to be noted that the "carbon-intensity" of our electricity is expected to increase, thereby increasing the emissions associated with electricity use. The City's GHG emissions inventory is highly reliant on the "carbon-intensity" of the power supplied from BC Hydro.

Corporate and Community Emissions

This section explores the profiles of the City's "corporate" emissions that are associated with the City's own municipal operations as an organizational entity. A profile of Vancouver's "community" emissions then follows, which outlines our emissions as a "geographical" entity.

Corporate Emissions

The City's corporate emissions are measured in four categories as shown in the following figure:

Sector	Percentage of Total Emissions
Fleet	47%
Buildings	41%
Waste (organization)	9%
Street / Traffic Lighting	3%

Figure: 1999 "Corporate" Emissions By Organizational Sector

The overall total corporate emissions were approximately 30,000 tonnes in 1999.

Community Emissions

The following explores a number of areas of emissions for Vancouver as a geographical city, including emissions from residents and businesses. The ballpark estimate of the overall total community emissions for 1995 is almost three million tonnes (or megatonnes). The City's corporate emissions inventory is approximately one percent of that total.

The following figure shows the primary fuel sources for our city's emissions, including the observation that the largest amount of our emissions comes from natural gas (for heating) with automobile fuel as a close second. Emissions associated with our waste management system are third and emissions from electricity generation are fourth; however, electricity could easily become third if the carbon-intensity were to increase.

Fuel Type	Percentage of Total Emissions
Natural Gas	40%
Mobile Fuel (Unrefined Data)	32%
Waste	12%
Electricity	10%
Other (Point Sources)	5%
Fuel Oil	1%

Figure: 1995 Community Emissions By Fuel Type (Approximate)

Reductions in Waste Management Emissions

PCP and international protocols consider municipal landfill emissions as community, not corporate, emissions. As the operator of the landfill, the City has been successful in implementing innovative initiatives in harvesting methane to significantly reduce the community emissions (e.g., 200,000 tonnes of eCO_2 emissions were reduced in 2002, as shown in the following figure).

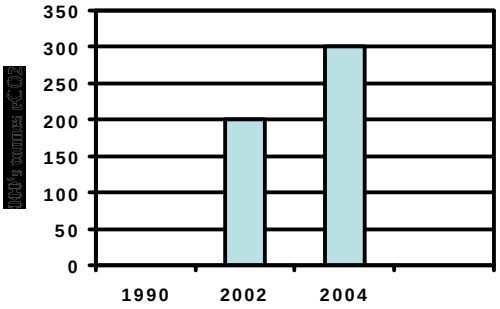


Figure: Actual and Forecast Annual Emission Reductions at the Vancouver Landfill

Options for Consideration

The Cool Vancouver Task Force offered some recommendations regarding measuring emissions and the City's emissions profile, including:

- The City should be clear on its emissions, both corporate and community, because we need the data to demonstrate the success from changes and initiatives to reduce emissions. (It is important to measure and track progress.)
- The City needs to be clear on the differences between the City's emissions versus regional and other emissions particularly regarding transportation emissions.

- The City should work with the GVRD to develop a consistent (and repeatable) methodology for measuring emissions across the region. This is also important for any future credit trading activity that may occur, and as a comparison of relative progress with other municipalities in the region.
- The City should consider how it would address emitters that are outside its jurisdiction such as the Port and the airport.
- The City should explore the measurement of electrical energy consumption separate from GHG emissions to determine what portion of emissions are due to an increase in the carbon-intensity of energy and what is based on other changes, such as in behaviour.
- The City should consider addressing emissions from its employees' commuting activities as a leadership measure.
- The City should consider the costs of not addressing climate change and the costs of adaptation strategies as potential "avoided costs" associated with its GHG reduction initiatives.

7.0 Emissions Reduction Targets & Monitoring

Introduction
This section addresses possible targets for emissions reduction and the importance of monitoring systems.

As noted earlier, City Council approved a voluntary target of 20% reduction in the City's corporate emissions of the six "Kyoto gases" by 2010. However, Staff and Council are still considering what an appropriate target for reduction in community emissions would be.

Targets
The targets adopted in the Kyoto Protocol agreement are intended to be binding and provide for various forms of enforcement, including possible trade sanctions against countries that do not meet their targets. The targets local governments adopt for their corporate and community emissions are important. Local governments and communities will play an important role in reducing emissions to meet the federal government's commitment as many of the sources of emissions are directly or indirectly impacted by local government policies and programs.

That being said, the targets Vancouver adopts are voluntary and it is not expected that any party would take any action against the City if the targets are not met.

Beyond Kyoto
Canada has committed to a 6% reduction below 1990 levels by 2010 and the measurement of emissions will take place between 2008 and 2012 to get an accurate average.

However, most scientists and some government agencies around the world acknowledge that a 6% reduction is insufficient to curb climate change. Many are calling for reductions in the order of 50% from 1990 levels by 2030, including the UK Government and the David Suzuki Foundation amongst others. In addition, Kyoto only focuses on six gases, and there are others of concern as well.

Some cities have taken up this challenge. For instance, Edmonton's GHG Reduction Plan calls for a three stage target program, including a 6% reduction (from 1990 levels) by 2010, a 20% reduction by 2030 and no net GHG emissions from energy production by 2050.

In this context, this Action Plan can be seen as a step in the right direction with a recognition that additional steps may be required to continue to reduce the City's emissions, particularly in the face of a steadily growing population.

Options for Consideration

The Task Force offered the following general options for consideration by the City on the issue of targets and reductions:

- The City should work with the utilities to develop accurate forecasting models;
- The City should be clear on where each of the GHG gases are coming from to better target reduction initiatives;
- The City should develop both short and long term strategies to reduce emissions to identify easy wins in the short term and set the stage for longer term structural changes to support reliable and sustainable reductions;
- The City should consider additional gases beyond those identified in the Kyoto Protocol;
- The City should estimate the potential for "sinks" in the community;
- The City should establish a policy or strategy around accessing offsets as part of its plan;
- The City should consider and analyse the impacts of the provincial energy policy on its emissions and initiatives; and
- The costs of various initiatives should be clearly identified along with who benefits and who pays.

The Task Force suggested further observations and options for consideration on the issue of ***"community emissions":***

- The City should define clearly what it means by "community" for purposes of measuring emissions;
- The City needs to be clear on what the implications are of any community target for reductions before discussing these targets with the public, so they can make informed choices;
- Choosing a target for reduction is a good idea as it will stimulate focused collective action - ***a 6% reduction in community emissions by 2010*** should be a minimum target;
- The City should pursue partnerships with other levels of government to assist it in meeting its target;
- The City should make both community and corporate emissions measurement as comparable as possible;
- The City should explore the experience of the Toronto Atmospheric Fund for advice;
- The City should develop a social change strategy to support its reduction plan, including possibly using City employees as a target focus group to explore what they would do or support in terms of changes in behaviour – make the City a pilot project for the community. Cost savings and other benefits from GHG reduction initiatives should be highlighted in this process. The City should endeavour to inspire Vancouverites to reduce emissions through education and communication;
- The City should expand the discussion on GHG targets to include the broader issue of "sustainability targets";

- There are information resources available to the City for this process, such as the Cities Plus submission on the 100 yr plan for a sustainable region;
- The City should consider a range of incentives for the private sector to assist them in reducing emissions;
- The City should work with the School Board and non-profit organizations to provide education to youth on how to lower GHG emissions;
- Can the City use its position on TransLink to address transportation challenges in reducing emissions?; and
- The City should provide a resource to its residents for calculating their household GHG emissions.

The Task Force offered additional options for consideration regarding ***corporate emission reductions:***

- The City should focus on reducing emissions in its facilities and buildings, fleets and operations.
- The City should begin to utilize full cost accounting measures to incorporate GHG issues into its municipal management;
- The City should challenge other cities, corporations or professional groups to a competition to reduce emissions, similar to the competitions associated with United Way funding drives; and
- Public buildings and operations should be an example of GHG reduction opportunities.

Measurement, Indicators and Monitoring

In order for the City to effectively manage itself to reduce GHG emissions, it must have an effective measurement and monitoring system in place, to track GHG emissions and related issues. Measurement always brings up the question of indicators.

The Task Force offered the following observations and options for consideration on this issue:

- Reporting should be undertaken to track progress and emissions should be tracked on a per capita basis as well as on a city or regional basis to give clarity to the increases caused by population growth;
- The City should consider focusing its measurement on sustainability issues and utilize existing sustainability indicator sets, such as those developed by FRBC, the Pembina Institute, FCM and the Progress Board;

- The City should support initiatives to develop a common set of national indicators for comparison;
- The City should look to measure and manage for “co-benefits” in its GHG initiatives, particularly those that have local economic development benefits;
- The City should investigate survey data on attitudes to changing behaviour to support GHG reductions to gauge Vancouverites’ willingness to change;
- The City should investigate using Life-Cycle Value Analysis in its assessment of fiscal issues around GHG reduction initiatives;
- The City should establish a regular reporting process on GHG emissions (yearly or bi-yearly on many issues) and get the community, schools and corporations involved in the process, and focus on reporting on:
    - GHG reductions;
    - Dollars saved by the City annually due to its initiatives; and
    - Cheapest measures that provide most savings;
- Energy and emissions should be tracked by end use, fuel type and sector; and
- The City should pursue the use of models to explore scenarios for predicting impacts of GHG emission reduction activities.

8.0 Goals and Principles for GHG Reduction Planning

Status of the Action Plan

The GHG Reduction Action Plan to be finalized after consultation is not intended to *supersede* existing Council policies, programs or regulations. However, the Plan is intended to help give a cohesive structure to the City's initiatives that address climate change. Furthermore, the process of creating the Plan is intended to spur on innovation within the City.

The Clouds of Change report in the early 1990s became a reference document for many City initiatives and policy discussions. It is intended that this discussion paper and the Action Plan ultimately developed be both a stimulus for specific programs and initiatives as well as a reference document.

Strategic Goals

The City intends to take a "strategic" approach to GHG reduction. The scope of issues and potential initiatives that are encompassed by GHG reduction planning is significant and the City must prioritize its activity.

The City's strategy for GHG reduction includes the following goals:

- To increase the understanding and commitment with all stakeholders in the City (community and corporate) regarding climate change, its implications to Vancouver and the options we have to reduce emissions while increasing the City's prosperity.
- To integrate emissions reduction goals into all relevant aspects of City business.
- To create a streamlined and coordinated Action Plan that harmonizes effort and resources toward achieving real reductions in emissions in both the short and longer term.
- To develop strong partnerships with industry and other levels of government to harness resources to implement innovative programs and projects.
- To develop tools that assist community and corporate initiatives in Vancouver in emissions reduction initiatives.
- To position the GHG reduction program as a cornerstone in the City's overall approach to sustainability.
- To identify economic development opportunities that exist in the reduction of GHG emissions.

Principles

The following principles define "perspectives" to be applied to all planning and actions regarding emissions reduction in the City.

Sustainability The ultimate goal of the GHG Action Plan is to increase the overall sustainability of the city, region and the planet. In this context the perspectives of sustainability, including environmental, social and economic considerations, should be integrated into all actions undertaken to reduce emissions.

Multiple Objectives, Multiple Benefits Initiatives or programs undertaken to address GHG reductions should be structured around multiple objectives, with an aim to receive multiple benefits from their implementation.

Shared Responsibility All Vancouverites share responsibility for the preservation of the environment for present and future generations. The City can play a number of roles, including leadership in its corporate activities, but it is Vancouver's residents, business operators and visitors who must take action to assist in reducing emissions.

Jurisdictional Priority While some aspects of climate change issues are outside the city's jurisdiction, the City can do many things within its jurisdiction. While it should focus on those areas and initiatives that fall within its jurisdiction, particularly regarding regulatory approaches, it should also advocate and lobby senior governments to address climate change issues.

Partnerships Recognizing the two prior principles of shared responsibility and jurisdictional limits, partnerships will be sought wherever possible to assist in the implementation of the Action Plan. Climate change issues span all jurisdictional and administrative boundaries. Effective management of these issues therefore requires joint, collaborative actions on the part of all parties, including all levels of government and business.

Empowerment The City will consider possible changes to its own policies, regulations and relationships to empower other stakeholders to make progress on emission reductions in our community, in a spirit of creative tradeoffs and overall performance optimization.

Flexibility and continual Improvement	We acknowledge that we can only move so far with this first step, but we are committed to continually improving our emissions performance through better management, more efficient technology and adaptive systems that easily permit changes to increase performance over time.
Participatory Decision-making	Decision making processes should be as open as possible regarding climate change issues or initiatives, particularly including in a respectful manner, stakeholders who may be impacted by either climate change or by various initiatives to address it.
Leadership	The City will demonstrate leadership on GHG reduction initiatives within its own corporate activities and employees.
Monitor and Report	The City will commit to establishing cost-effective monitoring systems for GHG emissions in the City and report progress and issues to the City's residents and businesses.
Assessment	The City will assess the costs and benefits of possible initiatives on a short and long term timeline.
Affordability and Cost-effectiveness	The City will assess the affordability of initiatives with respect to their relative cost-effectiveness in achieving their goals relative to other options and the overall economic impacts and who pays and benefits. In this context, the City will also address the wider objectives that various initiatives may address besides GHG reductions that may make an initiative desirable for reasons besides GHG reductions.

City's role in GHG reduction process

The City has a range of roles or actions it can take. Which role it needs to take will depend on the issue and the primary stakeholders the City needs to work with to address the issue.

The following framework describes the primary roles the City can take on emissions reductions issues or initiatives:

- Research and evaluate
- Educate, consult and communicate
- Act (demonstrate leadership)
- Advocate
- Partner
- Regulate
- Monitor and measure

Each of the above actions may have unique processes, stakeholder involvement and documents or projects associated with it, depending on the issue the City is addressing. The City's approach is to be proactive on all issues, and to share the responsibility with all stakeholders for the creation and implementation of the Action Plan and its elements.

9.0 Stakeholder sectors

Introduction
The following list describes a preliminary list of sectors whose actions, interests or jurisdictions may impact the City of Vancouver's initiatives in emissions reduction. This list does not mean that any or each will be involved directly in this project, rather it serves as a reference point for the creation and implementation of the Action Plan to note possible stakeholders that might be involved.

Stakeholders

- ***Government – federal, provincial and regional***
  - Environmental protection
  - Development regulation
  - Industry regulation
  - Transportation regulation
  - Climate change initiatives
  - Others

- **Community**
  - Neighbourhoods
  - Children and Youth
  - First Nations
  - Public

- ***Non-profit & interest groups***
  - Environmental
  - Social
  - Economic
  - Others

- ***Institutional sector***
  - Education
  - Health care
  - Others

- ***Transportation sector***
  - Many in this sector

- ***Business and industry in many sectors, particularly including:***
  - Small businesses (many types)
  - Hospitality industry
  - Development and building management industry
  - Insurance industry
  - Waste management industry
  - Energy industry

10.0 Issues and Options for Consideration

Introduction
The following sections explore issues and options for GHG reduction initiatives in a wide range of areas. Options for action in each area are offered for consideration.

In general, a range of directions for action that have an impact on GHG emissions are referenced directly or indirectly in many of these sections, including:

- Increasing energy efficiency and switching to lower emission sources of energy;
- Reducing the consumption of water and the production of liquid waste;
- Reducing the production of solid waste;
- Increasing the vegetation in the City;
- Reducing the need and use of vehicles for transportation;
- Developing in accordance with sustainable development principles; and
- Generally managing our lives, homes and businesses in accordance with GHG reduction goals.

The Framework
Where appropriate corporate issues are noted separately from community issues. In some cases, recommendations on possible roles for the City in supporting GHG reductions are noted separately as well.

For most every area of possible GHG reductions explored, the sections introduce the issue and discuss:

- Trends;
- Key Issues ;
- Goals for GHG reductions;
- Current City directions; and
- Options for consideration.

The options for consideration revolve around the framework of action the Task Force identified for the city, including:

- Research and evaluate;
- Educate;
- Act (leadership);
- Advocate;
- Partner;
- Regulate; and
- Monitor and measure.

10.1 Personal lifestyle choices

Introduction
This section provides information on what Vancouverites can do as citizens, residents and visitors to make personal choices that reduce GHG 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 our emissions, our quality of life, our community and the things we value.

Many organizations have recognized the importance of personal choices and have developed recommendations for individuals to consider regarding the emissions associated with their daily lives. The City, GVRD, TransLink, corporations such as BC Hydro, Terasen (formerly BC Gas), foundations, societies, NGO's etc. have existing programs that offer opportunities for people, both individually and collectively, to choose more sustainable lifestyles.

Community outreach programs, such as City Plans Visioning, contribute to more sustainable communities through the establishment of partnerships with the City, its communities and other corporations etc. The programs encourage people to get involved in planning the future of their city with community-building exercises that foster neighbourhood pride and contribute to a more sustainable and viable City.

Trends
A range of trends can be identified regarding personal choices and GHG emissions:

- Alternative forms of transportation are on the rise including a wide range of small electric powered vehicles and others on one hand and more people continue to purchase SUVs on the other;
- Housing in the downtown of Vancouver costs a premium because of the high quality of life;
- There is a growing movement to energy efficient home design, finishing and appliances;
- Ecotourism is increasing in popularity;
- Many companies are beginning to offer more environmentally friendly product choices and recycling opportunities;
- The information resources available for people to access on more sustainable lifestyles continues to grow; and
- McDonalds now offers a "veggie burger!

Issues
Several issues of importance to consider when exploring personal lifestyle choices to support GHG Reductions include:

- How we decorate, remodel, clean and maintain our homes and gardens;
- What we choose to eat;
- What modes of transportation we chose;

- What kind of vehicle we choose to own and how often we use it;
- Where we choose to go to for recreation and what types of recreation we choose to participate in;
- How we manage our waste and how much we recycle and compost;
- How we use water;
- How we educate ourselves and our families on environmental and climate change issues; and
- Others

Goals

A number of goals can be identified that focus perspective regarding personal choices and GHG emission reductions, including:

- To manage all aspects of our homes with an eye to minimizing emissions directly or indirectly associated with our choices;
- To reduce the use of our personal vehicles in our daily lives and to choose to own fuel efficient vehicles;
- To make choices in our daily life of working and playing that support GHG reductions;
- To be responsible in our use of resources and management of waste; and
- To keep ourselves educated regarding climate change issues and what we can do to live a lower-impact lifestyle.

Current City Directions

The City has a range of initiatives and projects that support Vancouverites making choices that reduce emissions, including:

- Highlighting environmentally friendly projects in the Lower Mainland through media coverage with Greater Vancouver TV.com;
- March for the Environment and Clean Air Day events;
- Participating in TransLink's "On-Board" Initiative;
- Educational resources for use in Schools, at Home, at Work;
- *A to Z of H2O* and *ReThink* - Two elementary school theatre presentations;
- Rain Barrel Program;
- Waterwise Gardening Practices;

- Demonstration Gardens;
- Public Service Announcements at local theatres; and
- Others

Options for Consideration

The following outlines a wide range of personal choices Vancouverites can consider to reduce the GHG emissions associated with their daily lives:

Around the Home:

- Adopt the “one-tonne” per person reduction challenge and educate yourself on how to achieve that reduction;
- Turn down the temperature in your home a few degrees and decrease it to a minimum when away;
- 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;
- Plant native or drought-resistant plants in your garden;
- Use organic-based fertilizers for indoor and outdoor plants;
- Use biological methods for control of harmful insects and weeds;
- Use rain barrels to collect water to use for irrigating;
- Use water wisely when irrigating lawns, landscape areas and vegetable gardens;
- Limit the use of gasoline-powered lawn & garden equipment and use electric or non-motorized lawn mowers where possible;
- Allow the lawn to go dormant during the extremely dry season;
- 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 produced, organically produced food;
- 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 close to where you work, shop and recreate;
- 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; and
- Take transit whenever possible.

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; and
- Develop climate-friendly business policies in projects and work teams within your control or influence (see the next section).

Play

- Choose recreation activities that are close to where you live and do not involve the emission of a significant amount of emissions.

The City's Role

The City's role is to provide education, resources, measures and means that will help individuals reach everyday targets that reduce the GHG emissions in the city. The City should demonstrate by example as well as draw from other sources which recommend and encourage individuals to be wise consumers and proactive in reducing overall demands on energy. The City can pursue a range of activities to promote actions that reduce GHG emissions in Vancouverites' lives, including:

- Provide an interesting, user-friendly resource document on how to live a climate-friendly or more sustainable lifestyle through a range of communications media, including the City's website;
- Develop a tool for residents to use to estimate their GHG emissions and monitor them;
- Partner with TransLink to provide shuttle services to special events such as the Vancouver Landfill Open House: Come and See Where Your Garbage Goes, in Delta;
- Use the City's parks, open spaces and boulevards as demonstration areas for climate-friendly home garden management, including the use of native plant and water-wise landscaping methods, biological methods for storm water collection, dispersion and reuse, growing your own produce etc… and provide appropriate interpretation material associated with it;

- Promote types of recreation and related infrastructure/facilities that consume little energy, have less environmental impact and contribute to keeping fit;
- Raise awareness on energy issues in the community and build knowledge and skills around managing energy;
- Communicate to Vancouverites on a regular and accessible basis our GHG emissions performance;
- Develop partnerships with the Community and other Corporations which support energy educational programs in our schools, such as BC Hydro's kindergarten to Grade 12 Energy Modules which give young people the knowledge and tools to make informed decisions about energy, and related issues such as conservation, the environment and safety;
- Build on existing educational and partnerships between the City, Community, and VSB etc with programs such as, Individual Actions on Climate Change poster contest (the display is located in sub-ground hallway, City Hall).
- Develop a family-oriented GHG reduction implementation package including "things to stick on the fridge" as reminders of the need to reduce emissions;
- Support the development and distribution of good energy and climate change educational modules in the City's schools;
- Support neighbourhood scale, community-driven initiatives to address climate change;
- Investigate the effectiveness and feasibility of requiring energy upgrades in homes whenever they are sold;
- Use its own corporate facilities and practices to model a more environmentally-friendly approach to corporate activity, possibly including initiatives to:
    - Provide washable containers and cutlery for food purchased in the cafeteria;
    - Apply deposits as an incentive to return containers;
    - Use washable cutlery and servings dishes when using catering for meetings;
    - Design the cafeteria menu featuring locally-grown, seasonal produce;
    - Promote employees taking transit whenever possible to locally accessible off-site meetings;
    - Install dispensing units in restrooms that eliminate excess use and supply recycled and unbleached cotton paper products;
    - Install water-wise plumbing fixtures in the restrooms;
    - Develop a 'Foliage for Clean Air' office program;
    - Use City Hall foyers and the campus as demonstration areas for more sustainable methods;
    - Build-in biological filtration methods in existing and new public facilities; and
    - Ensure photocopiers and printers are set-up to make 2-sided copies automatically.

10.2 Business and Industry

Introduction
This section explores the role of business and industry in reducing emissions in Vancouver and how the City can work with business to achieve better GHG performance.

Business and industry is responsible for a significant amount of direct emissions in the City. The amount of emissions associated with the production and sale of goods and services largely determine the "embodied" emissions associated with the daily lives of the residents of Vancouver.

The City has a range of options in addressing the GHG issues of business and industry. In some cases, it is valuable to use regulation to "level the playing field" and simply require all businesses to meet a certain standard. However, in many cases, it is more effective for the City to work with business and industry with education, partnership, and other approaches to facilitate change in the absence of regulation. This approach can be more cost effective in some cases and permits more flexibility and creativity on the part of business. Furthermore, many industry groups are pursuing climate change initiatives on their own in a manner that suits the unique characteristics of their industry.

Industry and businesses across all sectors are considered in this section, however no detail is offered regarding specifics for different sectors. Sectors of particular interest include:

- Small businesses (many types);
- Hospitality industry;
- Development industry;
- Building management industry;
- Waste management industry;
- Energy industry;
- Institutional sector; and
- Environmental or eco-businesses.

Trends
A number of trends are emerging in the business sector regarding climate change:

- Technology is developing in many areas to increase efficiencies and reduce emissions;
- The "eco-business" sector is growing as demand for "greener" technologies grows;
- Many industry groups are developing their own sustainability and GHG reduction strategies – often in response to the recognition that customers are increasingly demanding better environmental practices;
- There is a growing desire to reduce GHG emissions in the small business sector;

- Triple Bottom Line accounting practices are emerging in many companies as a way of addressing the larger issues of sustainability (environmental, social and economic) for a company; and
- A movement known as Eco-Industrial Networking (EIN) is growing where businesses work with each other and the community to increase environmental and economic performance by sharing resources and waste streams and other business resources.

The *Kyoto Protocol* will have a range of impacts on Canadian businesses, including those in Vancouver. It is unclear as of yet exactly what those impacts will be, and many have less to do with the challenge of reducing emissions and more to do with how the federal government may respond and how other countries may respond (i.e.: trade sanctions) if Canada does not meet its commitments. The solutions to many of the challenges the Kyoto protocol poses lie in action taken at the local level, in both governments and business.

Figure: Older polluting industry around False Creek

Issues

The issues with respect to business practices include the primary issues that emerge when pursuing GHG reductions including:

- GHG recovery/reuse;
- Energy efficiency;
- Clean energy generation;
- Waste reduction; and
- Development of GHG sinks.

Goals

The following goals can focus partnerships and initiatives with business on GHG reduction:

- To increase internal expertise in the business community on GHG issues;
- To increase environmental and economic performance simultaneously through creativity and co-benefit oriented initiatives;
- To improve energy efficiencies of equipment and facilities through more efficient practices, better technology, fuel-switching and long term strategic planning;
- To create a program of city-industry partnerships to increase mutual support; and

- To support eco-businesses who promote the reduction of GHG emission establishing operations in Vancouver.
- To develop a corporate culture that supports “greener” business practices, including reducing emissions;
- To address include environmental issues such as GHG emissions in how companies do accounting and make financial decisions; and
- To address environmental responsibility and innovative practices in business strategic positioning and marketing.

Options for Consideration

The following proposes various options for consideration in how GHG emissions could be addressed with businesses in the city. They include actions that both industry or business should take as well as those the City should take to support the greening of business activities:

Green Management and Facilities

- Business and industry should identify and adopt energy efficient practices in all aspects of the company ;
- Businesses should encourage and recognize environmental stewardship and employee awareness programs on GHG issues in all industry sectors;
- Work with unions where applicable to develop employer-employee programs that support more sustainable practices;
- Businesses should adopt energy and resource conservation standards for new facilities and for expansion or retrofit of existing facilities; and
- Industry and business should use high volume fly ash, such as EcoSmart concrete in corporate facilities and projects where possible;

Energy

- Alternative and renewable energy supplies should be developed in industrial and commercial sites and businesses (such as geothermal, solar, others);
- Businesses should switch to fuels with fewer GHG emissions for their operations, equipment and fleets;
- Industry should develop or support offsets and carbon sinks strategies as part of their business;
- BC Hydro should expand its green power program and continue to encourage businesses in the city to buy “green” power certificates;

Transportation

- Businesses should develop commuter-reduction plans and promote transportation demand management initiatives such as carpooling;
- Fleet smart programs should be developed for corporate fleets with consideration to the use of low-emission, super low emission and clean technology vehicles such as hybrids or biodiesel, natural gas, fuel cell and electric powered engines, etc;

Partnerships

- Businesses should investigate the opportunities for the development of "eco-industrial networks" (EIN) in the commercial and industrial areas in which they operate (see brief description above);
- Industry and business organizations should work together to develop business-oriented resources on cost-effective ways to reduce emissions and integrate sustainability values into their business operations and corporate culture;
- The Vancouver Economic Development Commission should encourage companies that specialize in low GHG products and services to locate in Vancouver;

City Role

The City can play various roles with industry and business in addressing GHG emission reductions, including those noted above. It is important that the City work "with" industry in a coordinated and efficient manner to find the best solutions. As such, the City could consider the creation of *a roundtable process with Vancouver's business community to develop a strategy* to increase the environmental and overall sustainability performance of Vancouver businesses. Elements to address could include:

- Developing a data base of "greener" business practices and programs in a wide range of industry and business sectors in North America and Europe;
- The City should promote eco-businesses where it can;
- Recognition and support for more sustainable business practices and programs currently being promoted in Vancouver by various industry groups *(i.e.: BOMA's programs);*
- The development of non-regulatory approaches where the City can encourage greener business practices in Vancouver while still maintaining flexibility for maximum efficiency in the participating businesses;
- A review of Vancouver's approach to regulations, fees, fines and taxes that apply to businesses to identify ways to use these tools most effectively to increase environmental and GHG emission performance;
- Address regional land use linkages with the GVRD and others regarding business location and practice;
- Initiating a discussion with the GVRD and green business groups on developing and disseminating resources for greener business practices throughout the region;
- Development of a monitoring system for businesses and GHG emissions in the City;
- The City should work with NGOs such as the Environmental Youth Alliance to support to educate and work with small businesses to achieve GHG reductions (see EYA's Green Workplace Program (www.eya.ca/gwp/index.html);
- Key city officials should consider meeting with the editorial boards of local media to discuss GHG issues and how the local media can assist in the raising of awareness of the issue in their programs and news;
- The City should consider elements of tax shifting to provide incentives for green business practices;

- Discussion with the GVRD on initiatives to support the trading of carbon credits to the benefit of Vancouver's businesses; and
- A program to increase the profile of businesses that are pursuing green business practices in the city.

10.3 City Development

Introduction
This section explores GHG reduction issues and opportunities that may exist around "how" the City manages planning and development, including planning processes, land use, buildings, open space and maintenance.

Land Use
How a city is organized with respect to land use has a significant impact on GHG emissions, primarily through its impact on how much we have to travel to meet our daily needs of living, working, shopping, recreating and attending school. The farther land uses are separated the more we have to travel and therefore, the more GHGs we emit.

Complete communities that offer opportunities to live, work, shop, play and learn within a convenient, walking, cycling or transit distance are more liveable and more energy efficient and therefore, have fewer GHG emissions associated with them.

Buildings
As Vancouver has been growing in population at a steady rate, many new buildings are built each year in the city. A building lasts typically for between 50-100 years –longer with appropriate maintenance. As such, the relative efficiency of a building will determine the amount of energy (and thereby GHG emissions) associated with its operation and the quality of life of its inhabitants for many decades. Recognizing that many credible agencies are calling for significant reductions in GHG emissions (beyond the 6% reduction by 2010 called for in the Kyoto agreement) over the next several decades, it is important to aggressively pursue emission reduction initiatives associated with buildings in the city.

The regulation of building design is done primarily through Vancouver's Building Code, as well as through other design guidelines such as those associated with Official Development Plans and zoning (setbacks, orientation, general building envelope), Heritage preservation; and others. Implementing GHG oriented design directions would need to be done primarily through the integration of new guidelines into these existing regulatory systems and documents.

Addressing GHG issues in existing buildings is of key importance in reducing the emissions associated with buildings over the next several decades – we cannot rely simply on making "new" buildings more efficient to meet our reduction targets. GHG emissions issues are linked to both operations / management of existing buildings and to retrofits of part or all of a building to make it more energy efficient and achieve better indoor air quality.

Trends

A number of trends are visible in development planning regarding emissions:

- Sustainability considerations are now being discussed in most larger development projects in the City;
- There has been a growth in cost-effective computer modelling programs for projecting emissions performance of various building and site design options;
- The US Green Building Council's (USGBC) LEED™ *(Leadership in Energy and Environmental Design)* program is becoming popular in North America for registering "greener" buildings and LEED™ requires various energy and emissions initiatives to receive certification;
- The Smartgrowth and New Urbanism movements across North America are effectively advocating for sprawl reduction, the development of mixed use complete communities and the creation of liveable, higher density, urban neighbourhoods – Vancouver has been working on these issues for many decades although these two movements have made such policies popular recently;
- The interest in district heating systems that share heating sources and/or move excess heat from commercial uses to nearby residential areas;
- Auto-oriented "big box" retail is often developed on the edges of communities, however many are also now locating in downtown settings;
- A slowly increasing interest in redeveloping areas around shopping centres into higher density housing (i.e.: Coquitlam town centre);
- The significant growth of information available on "green development guidelines" throughout North America;
- The steady growth in governmental financial incentives and support for innovative and energy efficient projects and buildings;
- The Building and Managers Association (BOMA) has recently been working a green building management strategy for its members.
- A growing range of new companies are emerging who will provide energy efficiency upgrades at no cost provided they are paid through the energy savings of the buildings they upgrade (ESCos – or Energy Service Providers);

Goals

Several goals can be identified to focus work on integrating GHG considerations into development planning and assessment processes, including:

- To integrate GHG emissions considerations into the City's development planning and approvals processes;
- To avoid adding significant cost or demands on current planning and approvals processes.

- To identify the value of using computer modelling programs in development planning or assessment;
- To ensure the city's neighbourhoods continue to develop in the most complete manner possible, offering a diversity of housing within walking and cycling distances of jobs, shopping, schools and recreation opportunities;
- To increase the awareness of GHG issues in neighbourhood and development planning processes;
- To address ways to layout a development to support a highly liveable and fully accessible built environment that facilitates reduced GHG emissions;
- To address GHG sinks in a development through preserving and enhancing the vegetative cover and urban forest;
- To structure the development program to address the land uses needed to have an energy-efficient development;
- To consider landscape and buildings as one "holistic" system that needs to address GHG emission reductions;
- To divert existing structures and other materials from the landfill where redevelopment is occurring;
- To increase the awareness of the GHG issues and the capacity in the development and design industry to address these issues in building design;
- To establish a basic regulatory system that supports green buildings with lower GHG emissions;
- To develop incentives and programs (including through partnering) for greener development in the city, including addressing possible added costs or risk for green building design;
- To provide resources to the development industry and staff on green design;
- To develop strategies to encourage the systematic retrofit of all types of existing buildings in the City over time to achieve higher levels of performance;
- To develop a range of incentives to encourage management and retrofitting initiatives to increase efficiency;
- To develop resources and information to support programs to increase energy efficiency in existing buildings; and
- To establish an efficient monitoring system on building performance.

Current City Directions

The City has several initiatives directly or indirectly addressing GHG emissions in its development planning at this time:

- Implementation of the CityPlan process where every neighbourhood in the City is being planned in accordance with mixed-use principles in close consultation with the residents of the neighbourhood;
- Implementation of the Central Area Plan through developing housing and neighbourhoods around the central business district;
- The development of live/work zoning;
- Heritage preservation guidelines;
- The City has developed a sustainability policy statement for its Southeast False Creek (SEFC) development that expressly addresses energy and air quality;

- The SEFC project has included extensive studies into how to make development and building design more sustainable;
- Building waste diversion programs;
- Street tree guidelines;
- Greenways program;
- The City has an energy bylaw that sets energy efficiency standards that all development applications must meet;
- An initiatives with the BC LEED™ Committee to create a version of the LEED™ green building rating system especially applicable to the BC and Vancouver context, including integrating this system into the approvals for the Southeast False Creek development;
- Many of the City's new facilities are green (Works Yard building, Mt Pleasant Community Centre, others);

Figure: The City's new LEED Silver rated City Works Yard building

- Partnering with BC Hydro's Power Smart program to address lighting, energy audits, LED exit signs and control tune-ups at City facilities;
- Completing Energy Performance Pilot Projects at City Hall and Library Square; and
- An energy accounting system that monitors energy use in major civic facilities.

Options for consideration

The following proposes various options for consideration in how GHG emissions could be integrated into the City's ***development planning processes***:

- Continue to implement the PCP (Partners for Climate Protection) process;
- Identify Council policy that needs to be established to support the consideration of emissions in development planning;
- Develop of a city-wide Community Energy Plan (CEP) to formally coordinate a comprehensive approach to energy efficiency across all areas and dimensions of the city;
- Review the Vancouver energy bylaw for its effectiveness and consideration of possible changes;
- Work with the development industry and professional organizations to identify the most cost-effective approach to integrating GHG emission considerations into the planning, design and approvals process;

- Partner with other groups (GVRD, UBCM, FCM, others) to investigate computer models available for modelling GHG emissions performance of buildings and sites with respect to their applicability, cost, reliability and user-friendliness;
- Develop educational resources for the development industry on how to reduce GHG emissions in development and building design;
- Continue initiatives to develop the BC LEED™ building rating system and integrate it into City approvals processes;
- Encourage senior governments to address GHG emissions in their building codes and standards;
- Support the continued existence of the Vancouver Building Code to ensure Vancouver retains control of the standards of buildings built in the city and investigate how best to incorporate GHG considerations into its standards;
- Coordinate and integrate land-use planning and approvals to transit goals and GHG targets – for instance, parking standards should be different where areas are well served by transit and neighbourhoods are walkable;
- Develop increased professional capacity within the City's Departments in GHG emissions issues; and
- Encourage each Department to identify how they can refine their requirements and policies to support the reduction of GHG emissions in projects they deal with.

Options for consideration in how GHG emissions could be integrated into the City's ***land use planning*** include:

- Continue to implement the CityPlan neighbourhood visioning processes and include energy and GHG emission reductions as a topic for discussion and a consideration for shaping neighbourhood development;
- Continue to implement the Central Area Plan to develop complete neighbourhoods with a range of housing in the downtown;
- Integrate energy into the update of any City wide plans, the Central Area Plan and major projects policy statements and Official Development Plans;
- Identify the precinct around Science World, including SEFC, False Creek Flats and the Finning Site as a whole and classify it as ***a model "sustainable precinct"*** for the city;
- Address the possibility of increasing the mix of uses in Vancouver's large single family areas;
- Continue to refine live/work housing zoning and guidelines.
- Retain industrial land uses throughout the city to preserve a range of jobs relatively close to housing; and
- Incorporate energy considerations into the terms of reference of appropriate committees and commissions such as the Urban Design Panel;
- Identify clusters of medium and high-density buildings whose demand is sufficient to support a community energy system; and
- Incorporate development bylaws that require the installation of energy system equipment when rezoning for high-density areas, e.g. district heating zoning, distributed energy systems.

Options for consideration in how GHG emissions could be integrated into ***urban design*** include:

- Develop a list of GHG reduction-oriented guidelines on urban and site design for staff and the development industry;
- Continue to support and implement the heritage preservation program, however, integrate building efficiency objectives into heritage modification allowances wherever possible to both preserve older buildings and make them more energy efficient;
- Pursue the potential of utilizing three key city sites (SEFC, Science World False Creek Flats) as a connected model or template for implementing a wide range of Cool Vancouver Task Force options for GHG reductions;
- Work with the Park Board to assess current urban forest policies and initiatives to ensure a coordinated approach to optimizing forest and vegetative cover in the city, and identify gaps and initiatives to address the gaps as needed; and
- Consider building energy efficiency when assessing landscape plans for new development (location of trees and other landscape elements can impact how much energy buildings consume).

Options to consider for how GHG emissions could be integrated into ***building design*** Include:

- Continue to move forward on the LEED™ BC initiative and consider how its recommendations could be integrated into the City's current building design guidelines and bylaws;
- Plan to review the policies and building design innovations emerging in the SEFC project and to consider how to promote similar innovations in development across the city in the future;
- Investigate the feasibility of more efficient approvals for green building design, including possibly a faster approvals process (green door) as well as a sliding-scale building permit fee structure to privilege green buildings;
- Develop educational resources for smaller developers and architects to support the development of more energy efficient single family homes;
- Work with the development industry to develop basic green design guidelines for all building types, including multi-family residential, commercial, institutional and industrial;
- Continue to pursue green buildings in all of the City's facilities;
- Coordinate within the City the policy and regulatory approach to building design and approvals;
- Develop "equivalencies" for green design directions to replace "code" requirements where possible;
- Reduce parking requirements where possible;
- Specify high volume fly ash concrete in municipal works projects;
- Promote green roofs;
- Establish a strong Council policy on the promotion of green and energy efficient buildings;

- Consider all new buildings as potential "net contributors" to the energy grid and ecosystem; and
- Link BC Hydro Power Smart and/or EnerGuide information packages to building permits.

Options to consider in how GHG emissions could be integrated into ***building operations and retrofits*** include:

- Support BOMA's "Go Green" initiative;
- Partner with BC Hydro and other utilities to promote increased efficiency in building operations and retrofits;
- Consider the development of a fund to provide incentives and various forms of funding or support for building retrofits;
- Develop educational material for presentation in schools and other venues to educate children;
- Partner with the GVRD and the utilities to develop information resources on more efficient systems for retrofitting older homes and buildings;
- Research applicable programs available from senior governments and ensure this information is widely available in the city;
- Advocate the establishment of additional programs as needed;
- Use Life-cycle Costing procedures when assessing the feasibility of energy savings or emission reduction measures and retrofits;
- Develop a strategy to retrofit the City's own facilities and buildings to increase efficiency and reduce emissions;
- Develop a strategy to "green" the operations of City buildings and facilities (including park facilities such as pools, etc…) and establish partnerships where possible to support and disseminate information from such an initiative; and
- Provide incentives to convert under-used parking facilities to car-pool parking, bike parking, auto-coop parking or other appropriate uses.

10.4 Open Space

Introduction
This section examines opportunities in open space design and management to reduce GHG emissions.

The open space areas of the city, including parks, plazas, landscapes and other similar areas are important for both liveability and GHG emissions amongst other things. A sufficient quantity of good quality open space is important in the city to facilitate a full and good quality of life for residents, particularly when considered in the context of other GHG emission reduction directions such as higher density mixed use neighbourhoods.

Open space design can have many direct and indirect GHG emission reduction benefits including increasing building efficiencies (shade), capturing carbon through trees and vegetation (carbon sequestration), facilitating a pleasurable walking or cycling environment; and others. The GHG emissions considerations also extend to the maintenance of the urban open space.

It is important to note that while trees can sequester carbon, capture air particulate and counteract the urban heat island amongst other benefits, urban trees can only contribute so much toward meeting our GHG targets and initiatives to reduce emissions will be more effective overall than relying on the urban forest to sequester carbon emissions.

Trends
Trends that are worth noting on this issue include:

- An increase in interest in planting trees in cities across North America;
- An increase in concern with some motorized landscape maintenance equipment such as leaf blowers;
- An increase in composting programs for landscape waste;
- Higher density living often characterized by very limited amounts of private open space, resulting in much more reliance on public open space and parks than traditional ground oriented housing;
- Greater interest in personal non motorized outdoor fitness activities such as walking, cycling, running etc;
- Greater interest in observing natural environments (real remnants or newly established) in a city context, including activities such as bird watching;
- An increase in technological efficiencies for outdoor lighting; and
- Others.

Goals
A few goals to focus effort in this area include:

- To optimize the number of trees planted in Vancouver;

- To increase the energy-efficiency of outdoor lighting in public open space in the city;
- To increase the energy efficiency and reduce emissions associated with all equipment and vehicles used in the maintenance of public open space in the City;
- To manage the landscape waste stream from public open space in the City so as to minimize emissions; and
- To consider the energy efficiency of buildings in the design and development of open space where applicable.

Current City Directions

The City has a number of current initiatives and programs that support GHG reductions in urban open spaces including:

- The Park Board has a tree planting policy that supports the planting of many hundreds of trees every year;
- The City has a Tree Bylaw that restricts the cutting of trees on private property;
- The City has a waste management plan that addresses landscape waste, including significant waste stream separation and composting facilities; and
- Others.

Options for Consideration

The following proposes various options for consideration in how GHG emissions could be integrated into open space design and management:

- Continue to support the protection of existing trees on private land and on development sites;
- Develop a strategy to acquire more green space in the city, especially in high density neighbourhoods or neighbourhoods with less than their fair share of park space;
- Develop a strategy to reduce emissions in public open space management equipment in conjunction with the Park Board, School Board and Engineering Department;
- Create partnerships with NGOs, such as Evergreen, and other agencies that support the planting and maintenance of trees in urban settings to increase the rate of tree planting and growth in the city;
- Promote the planting of trees to strategically shade buildings to increase their performance;
- Develop a communications strategy to promote the appropriate planting and care of urban trees and understanding of their role in reducing GHG emissions;
- Develop a strategy to increase the energy efficiency and alternative approaches to the lighting of public open space in the City, with due consideration to safety and other concerns;
- Retrofit outdoor and traffic lights with LED technology;
- Implement naturescaping and improve biodiversity of landscaping on municipal sites including buildings and grounds surrounding municipal buildings, parking lots, and right of ways; and

- Use bio-oil in power tools, two stroke engines and hydraulic systems.

10.5 Food and Agriculture

Introduction
This section addresses the issue of urban agriculture and the food supply for the city and the associated GHG emissions considerations.

The flow of "food" in the City can be seen in the same way as we see water, materials or energy as "flows" in the city that can be managed so as to reduce GHG emissions. Currently, most of our food is produced, manufactured and packaged outside the region and transported to stores in the city. This approach achieves certain economies of scale but can also offer a range of challenges, from increased GHG emissions per kg of food, increased dependence on fossil fuels, reduced local agricultural economic opportunities, expensive transportation infrastructure, mono-culture factory farms that damage the environment, and others.

The management of food has not typically been an urban governance or planning issue, however under the framework of sustainability as well as with consideration to the important role it can play in the city's economy and cultural life, increasingly cities are addressing the issue of food.

Trends
Trends that are worth noting on this issue include:

- A significant movement supporting locally grown organic food is emerging across North America;
- Farmer's markets are increasing in popularity in cities;
- Community garden programs are emerging in cities across North America;
- Gardening (both ornamental and for food) has emerged as one of North American's favourite pastimes (gardening books are some of the high selling types of books today);
- Urban living in higher density neighbourhoods is increasing in popularity and these neighbourhoods offer limited opportunities for gardening; and
- Others.

Goals
A few goals to focus effort in this area include:

- Increase the physical capacity of Vancouver's neighbourhoods to support the growing of food and work to increase the amount of food grown in the city;
- Promote understanding in Vancouver residents of where their food comes from and how it is produced and encourage selection of food produced with ethical and environmentally sustainable business practices.
- Encourage Vancouverites to purchase food that is produced locally with organic farming methods;
- Increase the capacity of the City to offer food growing opportunities to local Vancouver residents in need of increased food security;

- Integrate organic waste management operations with urban agriculture practices (composting); and
- Increase the technical capacity, skills and knowledge of all stakeholders relating to innovative urban agricultural systems.

Current City Directions

The City has a number of current initiatives and programs that support GHG reductions in the city's food supply including:

- Community gardens in many parks throughout the city, managed in conjunction with the Park Board;
- SEFC urban agriculture strategy developed a wide range of recommendations for more sustainable management of our food and associated opportunities;
- Support for farmer's markets; and
- Others.

Options for Consideration

The following proposes various options for consideration around how GHG emissions could be addressed in our management of the city's food supply. Many of these recommendations were taken from the Southeast False Creek Urban Agriculture Strategy the City developed for its model sustainable urban community project. Options for consideration include:

Policy

- Participate in the upcoming Food Policy initiative in Vancouver to assist in developing a sustainable food policy framework for the city;
- Provide a clear Council approved policy statement regarding urban agriculture and the City's food supply so that all stakeholders are clear about the city's level of commitment to sustainable food activity;
- Review regulations and bylaws that currently restrict urban agriculture and negotiate changes or flexibility in interpretation;
- Draft a package of incentives, including density bonusing/additional FSR, DCL/CAC reductions, taxation credits to encourage private developers to include urban agriculture opportunities in their designs;
- Develop management policies for Farmers Markets to settle outstanding issues regarding their land use classification and encourage their growth and prosperity as appropriate;
- Create new regulations, bylaws and design guidelines that require or encourage those urban agriculture practices (or opportunities) deemed appropriate for the City;

Planning and Design

- Incorporate urban agriculture into the site planning and design process for new residential and commercial buildings/projects where appropriate;
- Promote green roofs capable of supporting food production in buildings where possible;

- Continue to create public community gardens in Vancouver's parks, public open space (including some boulevards in street rights-of-way) and school grounds where appropriate;
- Use public buildings and land for demonstration projects of innovative food production and management, possibly including small-scale commercial greenhouses, an eco-industrial food complex, an aquaculture/biponics project, and a commercial rooftop garden;
- Explore economic development opportunities associated sustainable food production and management in the city, possibly including the establishment of small companies or other organizations that can effectively and appropriately use interior spaces of buildings, parkades or rooftops to grow food for profit through a variety of means, including aquaculture, bioponics or through other agricultural technology;
- Investigate the opportunities for developing the podiums and rooftops of buildings (especially concrete buildings) in such a way as to support greenhouses and/or rooftop gardens capable of supporting the growing of food;

Education

- Partner with NGOs to develop training modules for staff, designers and urban gardeners;
- Encourage composting practices;
- Develop information resources that provide information to strata councils and other building groups or companies to encourage the growing of food on their properties;
- Work with the School Board to identify opportunities to encourage school curricula to explore issues surrounding production of locally produced organic food;
- Encourage donations of some food produced in community gardens to Food Banks or other organizations and/or to emergency food relief;
- Provide space and training for low income residents in how to access and maintain public community gardens;
- Encourage a City-wide attitude that celebrates local food, agriculture, organic production and biodiversity so that urban agriculture becomes an acceptable part of Vancouver's urban environment;

Partnering

- Promote the greening of school grounds in Vancouver's school grounds to increase the integration of understandings of food into our children's education;
- Work with the Park Board to establish accountable local organizations to manage public community gardens where needed, to ensure they are developed and maintained in a fashion appropriate to a highly used public space;
- Develop information resources and guidelines for the Parks Board, City staff and building owners and managers to use when designing or managing landscape areas to support the use of edible landscaping principles;
- Encourage companies in Vancouver to establish eco-industrial network (EIN) relationships and look for opportunities to use food production to address the

supply of materials or management of waste flows (i.e. compost organic wastes from one company and use the resulting soil to grow flowers for the tables of a nearby restaurant);

- Encourage local grocery stores to consider selling locally grown produce; and
- Continue to promote the use of composting facilities in private backyards.

10.6 Waterways

Introduction

This section briefly explores the GHG emissions issues associated with Vancouver's waterways.

The City is wrapped with waterways, particularly including Burrard Inlet, English Bay, False Creek, and the Fraser River. The city and its residents have many interactions with these waterways in ways that can impact GHG emissions.

Goals

The goals for a GHG Action Plan with respect to waterways include:

- To integrate the waterways and their edges into an overall strategy to encourage non-automobile forms of movement; and
- To work to reduce emissions and pollutants associated with boating and shipping.

Figure: Port of Vancouver Terminal in Burrard Inlet

Current City Directions

The City has developed the waterfront around its water bodies into some of the most treasured and used public open space in the region.

The City is also exploring both ways to integrate the False Creek Ferry service into the transit system, and ways to reduce emissions associated with shipping.

Options for Consideration

Options for consideration include:

- Continue to implement the waterfront walkway development around Vancouver's waterfront in a manner that permits a wide range of travel modes, and develop policy on progressive foreshore development in consultation with the Park Board;
- Enter into discussions with TransLink and the False Creek Ferry company to integrate its service into the transit system;
- Work with the Port and other agencies to find ways to reduce emissions associated with shipping and the Port; and
- Work with local boating clubs and marinas to reduce emissions associated with recreational boating.

10.7 Transportation

Introduction
This section explores opportunities for GHG reduction initiatives in the City around transportation issues.

Innovative, energy-efficient and sustainable transportation is fundamental in the pursuit of GHG emissions reductions. How we commute and transport goods, in and out of and within the city contributes a significant percentage of the City's GHG emissions.

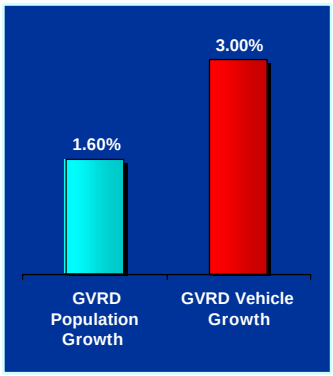
Transportation directions were identified in the Council-approved City of Vancouver Transportation Plan in 1997, including goals of reducing emissions, providing transportation choices and enhancing the liveability of the City. Since 1997, the city has implemented a number of projects that support the Directions, Major Initiatives and Key Elements of the plan. Most recently, the City has also approved a downtown transportation plan that responds to the increasing trend to walking and cycling within the downtown and identifies the need to provide better service in the future.

Locally, vehicles are the largest single source of air pollution in the Lower Mainland; within the Province, the largest source (40%) of emissions is transportation related and nationally transportation accounts for about 25% of Canada's GHG emissions - all of which are major contributors to smog in our urban areas.

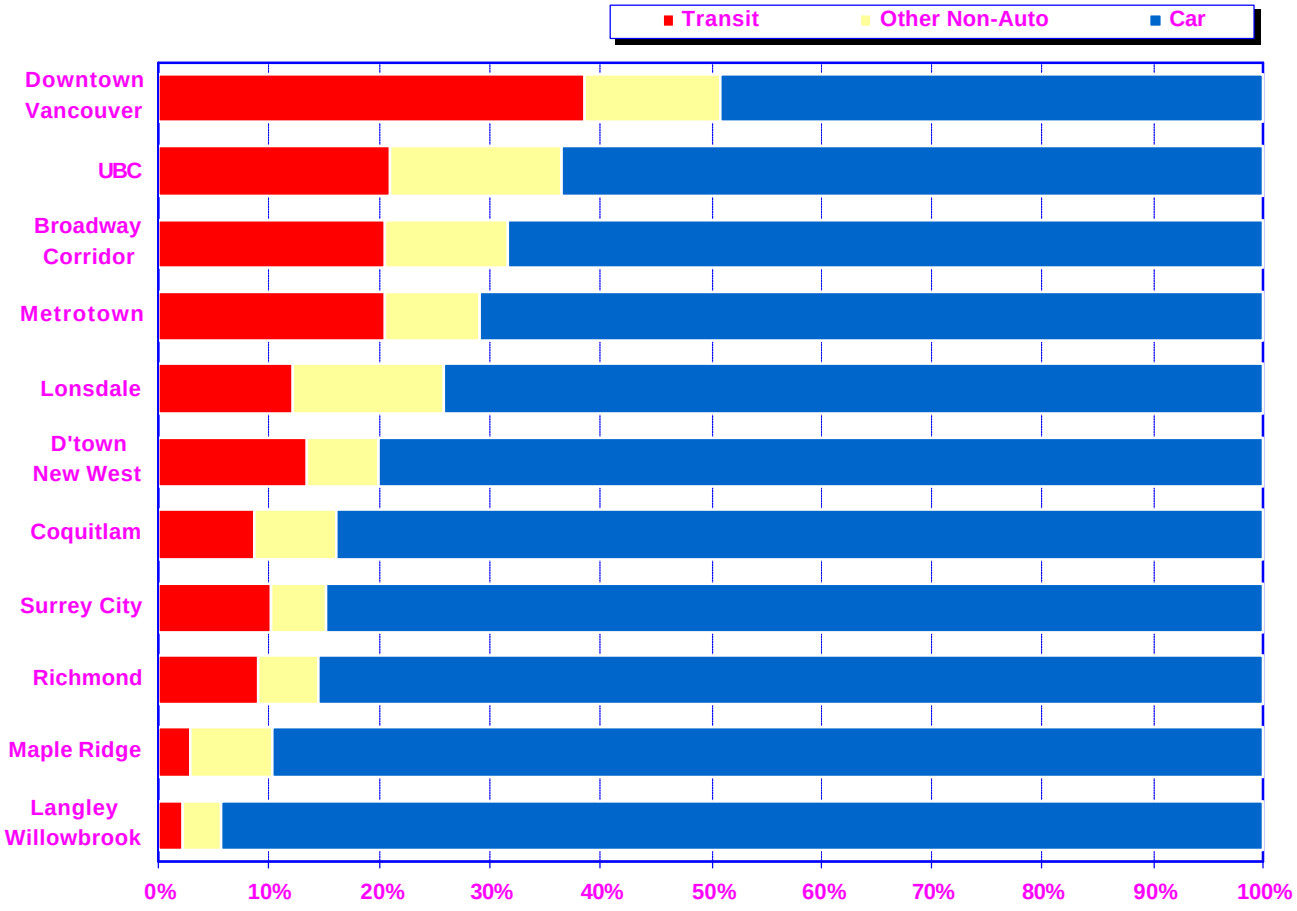
Trends
A number of trends are visible in this area, including:

- An increasing direction in city policy toward supporting bicycles, pedestrians, and transit;
- A continued growth in use of inefficient vehicles such as SUVs;
- A growth in alternative vehicle fuels and motors (hybrids);
- An increase in use of non-motorized transport such as inline skates, skateboards and others;
- The challenges of locating jobs in regional town centres;
- The success of some land use / transportation policies in the region;
- Walking and biking are up by over 11% in the downtown between 1994-1999, such that by 1999, more people walked and biked downtown than drove;
- The disproportionate increase in vehicle ownership in the region compared to population growth; and
- Increasing challenges in funding transit systems.

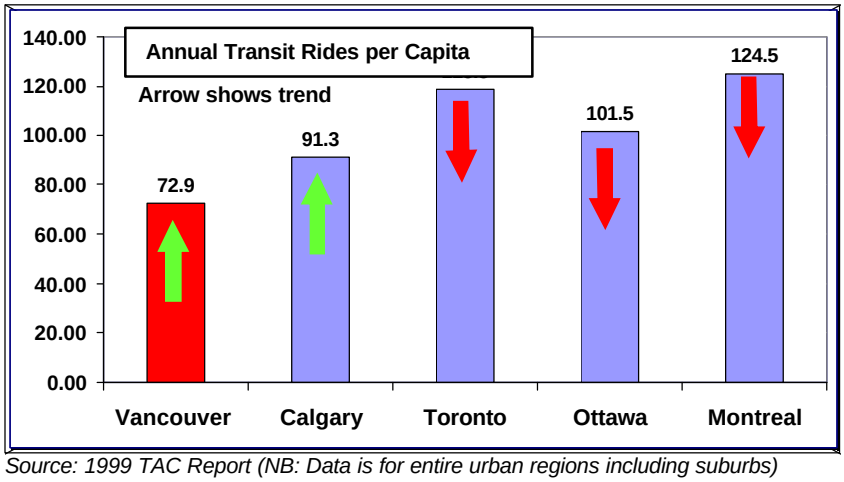
Traffic in the GVRD is growing at twice the rate of population growth and the GVRD has the highest per capita car ownership in Canada. Approximately 30,000 cars are being added to the region's roads every year.



Regional statistics show the relationship between density and transportation modes used for commuting.



National statistics demonstrate a growing trend in transit ridership in Vancouver.



Source: 1999 TAC Report (NB: Data is for entire urban regions including suburbs)

Goals

A Transportation system for Vancouver that supports GHG reductions could include the following goals:

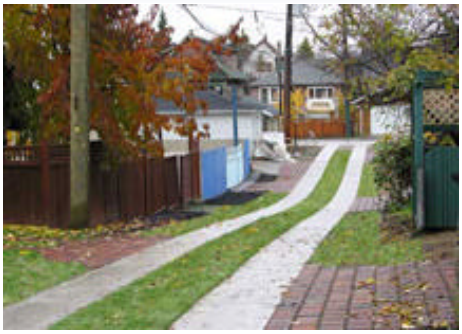
- Implementing the Key Elements of The Transportation Plan;
  - Sharing the Road Network;
  - Allocating more road space to transit;
  - Improving truck access;
  - Allocating space for cyclists;
  - Improving pedestrian comfort and safety;
- Calming traffic in neighbourhoods;
- Implementing the Downtown Transportation Plan;
- Reviewing the transportation targets;
- Establishing implementation priorities;
- Finding additional funding sources for transportation;
- Improving transit;
- Supporting innovative transportation options such as car sharing and transit pass programs;
- Balancing the sometimes competing objectives of impacts to neighborhoods while maintaining and enhancing local and regional transportation objectives (i.e., Central Area Plan, CityPlan; Liveable Regional Strategic Plan; Regional Transportation Plan).

Current City Practices

The City has many initiatives around a more environmentally friendly transportation system, including:

- Trials are being undertaken with emerging technologies such as alternative fuels, electric cars, and hybrid-electric vehicles in the City fleet;
- City fleet vehicle downsizing overall (where appropriate);
- A significant bicycle program, including development guidelines, a greenways program, a Bicycle Advisory Committee and others;

- Strong urban design guidelines to favour the pedestrian;
- An innovative “Country Lane” project to create low-impact lanes;
- Developing a sustainable transportation network and establishing sustainability transportation practices in the redevelopment of SEFC;
- Minimizing the expansion of the City’s street network except as part of redevelopment or for safety reasons;
- Increasing transit priority and amenities such as bus bulges;
- Facilitating the development of rapid transit in the city;
- Pursuing the development of the downtown streetcar system;
- A leading new street design pilot project to naturalize streets and manage water more efficiently; and
- Many others



Options for Consideration

The following options can be considered to continue to reduce GHG emissions in the City:

Plans and policy

- Continue to develop Vancouver Transportation Plan’s Major Initiatives to implement policies which focus on transportation and transportation choices as a means to a better community and corporate city;
- Develop a social marking strategy to accelerate the implementation and acceptance of the Transportation Plan;
- Continue to support and implement the City’s land use plans, Central Area Plan and community vision plans (CityPlan);
- Continue to support the Sustainable Region Initiative and Liveable Region Strategic Plan to focus development in transit-oriented neighbourhood centres;

- Adopt a policy on how the City will spend federal transportation monies including a priority on transit and cycling;
- Review current City spending priorities to consider how to ensure they are in line with the City's GHG reduction goals;
- Place a high priority on support for transit and remove incentives which favour the use of the car where practical alternatives exist;
- Develop community (including health and educational institutions etc.) and corporate partnerships and incentives that foster alternative transportation habits, including Car Co-ops, Auto-Share programs, Hybrid vehicles, Electric vehicles, Bike-Share programs and others.
- Accelerate the development of bicycle paths and lanes throughout the city;
- Pursue anti-idling campaigns and bylaws for the City, in conjunction with the GVRD and explore funding opportunities from NRCAN;
- Re-instate ACOR (mobile air emissions monitoring system Air Care on the Road) to catch heavy mobile pollution emitters;
- Advocate to senior governments to increase incentives and support for cities shifting fleets to hybrids, and to set standards for increasing fuel efficiency by 25-40% as soon as possible;
- Pursue programs to optimize freight and courier systems within the city;
- Continue to promote telecommuting programs;

City Practices

- Demonstrate leadership through corporate (City) programs and projects to utilize appropriate vehicle, engine and fuel technologies (e.g. downsizing engines, hybrid engines, lower emission fuels, etc.);
- Develop a transit demand management strategy for City employees to demonstrate leadership;
- Initiate an Employer Pass Program to purchase employee transit passes directly from TransLink at a 15% discount of the retail price;
- Purchase reformulated engine oil (i.e. recycled or reprocessed oil), ethanol and biodiesel for corporate vehicles;
- Review and revise as appropriate the mandate and objectives of key City programs and departments (e.g. property endowment fund, parking corporation) to ensure consistency with GHG reduction objectives and/or to support their achievement;
- Change the City's corporate fleet to hybrids or lower emission vehicles;
- Establish some challenging corporate targets for City employees for trip reduction;

Parking

- Investigate the possibility of restricting the use of land in the Central Area for "parking-only" uses;
- Promote parking relaxations in exchange for auto-coops or transit passes in new downtown buildings;
- Reduce commercial parking standards where good transit access is provided, e.g. minimum 15-minute peak time bus service;
- Reduce minimum parking requirements adjacent rapid transit stops;

- Work with co-operative auto networks to identify and designate specific on-street reserved parking spots at various locations;
- Work with TransLink to initiate a regional parking policy, addressing TDM and revenues;

Education and partnerships

- Consider granting relaxation on parking requirements in lieu of designated car-sharing stalls;
- Work with School boards, schools and neighbourhoods to promote walking and cycling implement trip reduction programs;
- Continue to work with schools, neighbourhoods, business improvement areas, NGOs and business associations to implement traffic calming, street reclaiming initiatives that reduce vehicle traffic volumes and speeds, re-allocation of road space, and more attractive street environments;
- Continue to work with stakeholders to ensure safe and effective goods movement systems within the city;
- Pursue initiatives to encourage youth to chose non-automobile modes such as bicycles and transit;
- Explore opportunities to extend the U-Pass system into schools;

Funding and incentives

- Develop a "funding strategy" to ensure the plan's recommendations can be given effect;
- Create an ongoing fund to pilot innovative GHG reduction initiatives not typically considered as part of routine City business;
- Request that the provincial government re-instate funding of the Cycling Network program;
- Consider directing some city parking revenues into transit and cycling and pedestrian system improvements;
- Consider implementing road and congestion tolls for access to the downtown, possibly similar to that implemented in London, England; and
- Explore opportunities for provincial funding and programs for school-oriented initiatives.

10.8 Water and Liquid Waste Systems

Introduction
Greenhouse Gas reductions can be achieved through addressing how the water is supplied and wastewater managed in the City and the Region.

There are two key elements of GHG reduction to consider with water and liquid waste management:

- The direct linkage between water and liquid waste management systems and the emissions from these systems such as CO2 and methane from treatment plants; and
- Indirect linkage between water and liquid waste management through the energy used in these systems.

The Vancouver water system is a hybrid of City and GVRD owned facilities. The City itself does not own any water supply pump stations or re-chlorination stations and therefore the City's power requirements are essentially zero. The GVRD however, does have power uses for the supply reservoirs (Capilano, Seymour and Coquitlam), for the outlying reservoirs (such as Queen Elizabeth and Kersland), for the pump stations, and the re-chlorination stations.

The City does own a few sewer-pumping stations, but as with the water supply system, the vast majority of the sewer system elements that consume energy are owned and operated by the GVRD.

Since the GVRD has jurisdiction over the water supply and treatment systems for the City, initiatives to curb GHG emissions for the City need to be jointly developed and implemented with the GVRD.

Trends
As the population in the City grows, the consumption of water and production of liquid waste is correspondingly growing. As a general rule, the more water and liquid waste the City is required to deal with, the greater the energy consumption and GHG emissions there will be associated with the City on this issue. In this context, demand side management (DSM) measures to reduce water consumption and waste production become important as a means of counteracting the trend of increasing emissions directly related to population growth.

The second approach to reducing GHG emissions in these systems is to increase their efficiency. The GVRD has been working to increase the efficiency of the water supply and wastewater treatment systems in the region, and the City has supported these initiatives, through their own initiatives and through the regional Water and Liquid Waste Management Planning processes.

Figure: surface runoff management system

Issues

There are four main energy consumption and emissions components associated with the water and liquid waste systems in the City

- ***Water pumping*** - the energy used supplying water to and within the City for various purposes, including:
  - General potable water supply to homes, institutions, businesses and parks;
  - Flushing of pipes;
  - Flushing of streets (street sweeping has replaced this practice in most areas of the city);
  - Fire suppression (hydrants); and
  - Others
- ***Water treatment*** – the energy used in the treatment of the water from the North shore reservoirs to ensure it meets potable standards.
- ***Sewage pumping*** – the energy used pumping sewage from the City into the regional system
- ***Sewage treatment*** – the energy used and emissions associated with the treatment of sewage in the regional facilities.

Goals

The goals for the water and liquid waste management systems with respect to GHG emissions reduction include:

- ***Water***
  - To reduce the demand for potable water within the City, in order to save energy and emissions associated with pumping and treating.
  - To increase the water management system's efficiency including equipment efficiency.
- ***Storm Water***
  - To reduce storm water in the sewer system to reduce the pumping requirements for storm water.
- ***Wastewater***
  - To reduce the amount of wastewater produced in homes, business and institutions, to reduce pumping requirements.
  - To increase the efficiency and integrity of the sewer management system, particularly through addressing groundwater inflow and infiltration into the system.

Current City Practices

The City has a number of initiatives that address the reduction of water demand, waste water production and storm water pumping, including:

- ***Combined Sewer Separation***
  - The City of Vancouver is undertaking to separate its storm water management lines from its sewer lines, to reduce the amount of water it sends to the GVRD's wastewater treatment plants.
- ***Stormwater Management Initiatives***
  - Reducing the amount of water entering the City's sewer system, helps to lower wastewater treatment costs, combined sewer overflows and flooding potential, as well as, to delay costly infrastructure upgrades. The City therefore implemented bylaw changes for single family (RS-1) zones in 1999 that limited impervious areas of a lot to 65%, in order to permit a third of the lot to absorb runoff;
  - The City has installed perforated street drains and catch basins to permit increased water infiltration and reduce runoff;
  - The City's "Country Lane" project has redesigned several lanes in the city as a pilot project, reducing their paved area and installing permeable paving systems throughout.
- ***Water Conservation Program***
  - The City of Vancouver has initiated a program that promotes water conservation through public education. The aim of these initiatives is to educate residents about the principles and practices of water conservation, and how to minimize waste. The conservation program has introduced initiatives such as:
    - Rain Barrel Program
    - Waterwise Gardening Practices
    - Demonstration Gardens
    - Industrial Water Conservation Programs
    - A to Z of H2O - An elementary school theatre presentation
    - Public Service Announcements at local theatres

Options and Initiatives for Consideration

The following outlines potential options for addressing GHG emission reductions in the water and wastewater management system.

- ***General***
  - Work with the GVRD to increase energy efficiency where possible in the context of the regional sustainable region initiative and regional water and liquid waste management plans;
  - Work with industry and business to encourage energy efficient and low emission water and liquid waste management systems;

- ***Water***

- Continue to promote water conservation in all areas of the City *(residential, commercial, industrial, institutional, parks management, others)* to reduce consumption of potable water and production of liquid waste, and to reduce the energy required for management of the flows;
- Work with the GVRD to identify ways of increasing the efficiency and long term integrity of the City's components of the water supply system;
- Consider regulatory initiatives to reduce water consumption in buildings and development (see buildings section);
- Continue to investigate demand side management initiatives, from a triple bottom line accounting framework, such as:
    - Exploring the effectiveness and feasibility of water metering for all households;
    - Providing incentives to residential and commercial owners and tenants to replace existing plumbing fixtures with more efficient ones;
    - Pursuing opportunities to generate power from high pressure gravity feed pipes;
    - Providing incentives and education to promote the purchase of efficient front-loading clothes washers;

- ***Storm Water***
    - Develop, test and implement a wide range of initiatives to reduce the flow of storm water runoff into the sewer system, including increasing permeability, green roofs and downspout disconnections.
    - Consider alternative engineering standards for runoff management in new development that encourages percolation of runoff where appropriate;

- ***Wastewater***
    - Explore opportunities to permit the development of water recycling systems that re-use various types of grey water in place of potable water where appropriate;
    - Explore options to install heat-recovery systems in the wastewater systems where appropriate;
    - Work with the Health Board and other agencies to develop and permit opportunities for waterless sewage management systems such as waterless urinals and composting toilets;
    - Work with the GVRD to implement programs to reduce inflow and infiltration within the City's jurisdiction to optimize the integrity of the sewer system; and
    - Use high efficiency motors and variable speed pumps for fan motors, water and wastewater pumping stations in the City's pumping systems.

10.9 Energy Systems

Introduction
Energy is central to the challenge of reducing GHG emissions. Emissions can be produced during the creation or extraction of energy and fuels, their transmission and distribution, and ultimately consumption. We use energy for most of our business and personal activities and as such, finding ways to reduce GHG emissions in energy use is a key way of reducing emissions.

Trends
Trend analysis has shown that energy use per capita is increasing and correspondingly GHG emissions. Many argue that it is possible to increase our quality of life while reducing our consumption of energy, and that either way, if we pursue cleaner and renewable forms of energy and appropriate technology, we can reduce our GHG emissions even if energy consumption rises.

At this time most energy use in the City of Vancouver is linked to the electricity grid and natural gas pipeline system, or to the extensive supply infrastructure for fossil fuels (gasoline, propane, etc…). Analysis by most energy associations and organizations indicates sufficient supply of fossil fuels at current consumption rates for the next few decades, but many predict the movement toward renewable sources by the end of the 21st century in most sectors.

However, by the time the energy sector significantly transitions to renewables, we may have consumed a significant amount of fossil fuels and deposited significant emissions into the atmosphere. Thus, it is important to commence energy savings, efficiency and source changes in the near future to reduce the overall rate and amount of emissions the City emits.

Issues
Some of the key issues to consider when addressing the energy dimension of GHG emissions include:

- What is the source of the energy we are using – hydro, gas or coal powered generators, geothermal, wind, solar, others?
- How are we transmitting the energy – transmission wires, trucks, pipelines, etc…?
- How efficient is our transmission and distribution system?
- How efficient is our equipment and appliances?
- Others

Goals
An energy system for Vancouver that supports GHG reductions could include the following goals:

- To significantly reduce and ultimately eliminate dependence on fossil fuels and replace non-renewable energy sources with "renewable" ones – (see Council's 10th principle of sustainability that suggests the reduction of reliance on fossil fuels).
- To increase the City's energy self-reliance by increasing the local supply of renewable energy within the City's jurisdiction, possibly including geothermal, solar and other sources.
- To ensure the transmission and distribution lines and pipes in the City where applicable are highly efficient.
- To promote the use of highly energy efficient technology and equipment in the city.
- To strongly promote energy-efficient lifestyles and business practices within its jurisdiction.
- To maximize partnership opportunities to promote energy efficiency and renewable energy systems.

Current City Practices

The City of Vancouver has been supporting increased energy efficiency measures for a number of decades. Some of the relevant initiatives and policies include:

- *The City's Energy Use Bylaw* – requiring a basic level of energy efficiency in development as a condition of development;
- *The Landfill Gas Harvesting Project;*
- *Geothermal heating systems in City facilities* – New Works Yard bldg; Mole Hill; others;
- *Energy Manager position* – for School Board facilities and for City facilities since 1983; and
- *Others*

Options and initiatives for consideration

There a wide range of energy-related options to consider to reduce GHG emissions, including the preliminary list provided below.

- ***Alternative Energy Supply***
  - Develop information on a range of alternative energy (heating, cooling, electricity & fuels) that could support City activities and explore basic issues around their feasibility and applicability in the Vancouver context;

- Identify barriers to the implementation of renewable energy supply within the City's boundaries and work with stakeholders to remove these barriers;
- Work with industry, the utilities and other stakeholders to develop and monitor alternative and renewable energy pilot projects in the City;
- Explore opportunities to have small scale renewable energy sources developed to supply decentralized small scale demands (i.e.: parking meters, public clocks, others) throughout the City;
- Explore the issues and propose a "target" for the percentage of renewable energy the City will have online by 2010;
- Develop programs and incentives for homeowners to install alternative energy systems where appropriate;
- Develop an energy recovery strategy for the city;
- Explore opportunities for a tidal energy system around Vancouver;
- Partner with Hydro to develop a net metering program for City facilities;

- ***Transmission, Distribution and Supply Management Systems***
  - Work with stakeholders to examine the feasibility of installing or expanding district heating and cooling systems of various types in the City;
  - Partner with the utilities and other stakeholders to develop and implement DSM measures for energy consumption;
  - Pursue cogeneration systems where appropriate;
  - Hydronic heating systems should be considered a priority for building energy systems;
  - Explore opportunities to capture waste heat from the sewer system;

- ***Equipment and Technology***
  - Develop a strategy to promote the purchase and use of highly energy efficient equipment, appliances and technology (such as those with Energy Star rating) in City operations and in the community as a whole;
  - Work with industry and business to promote increased energy efficiency in operations and equipment;
  - Work with the GVRD and the utilities to create a user-friendly access point to initiatives and incentives that support the retrofit and installation of energy-efficient equipment;
  - Implement initiatives to increase energy efficiency in the City's streetlights;
  - Adapt municipal infrastructure replacement programs to incorporate energy efficiency changes such as the introduction of waste heat exchange infrastructure, e.g. twin piping for district energy systems, micro-hydro installation, e.g. turbines in gravity fed water distribution pipes, dual speed pumps at water pumping stations, etc;

- ***General Energy Efficiency Practices***
  - Develop a communications strategy to promote energy efficiency in the city and partner with utilities and other agencies to implement the strategy;

- Coordinate the development of educational initiatives with various stakeholder groups and the public to encourage energy efficiency in their operations, facilities and equipment;
- Encourage the development of Eco-industrial Networks within the commercial and industrial sectors of the City to increase energy efficiency, profitability, economic development and environmental performance;
- Work with a broad range of stakeholders to implement a massive building retrofit program;

- ***City's Corporate Practices***
  - Complete a Community Energy Plan for the City to integrate more sustainable energy measures with the City's broader social, environmental and economic objectives and opportunities;
  - Consider purchasing "green power certificates" for part of the City's energy supply;
  - Increase energy consumption monitoring initiatives throughout the City, especially for the City's corporate practices;
  - Develop and implement a program to educate City staff on energy and GHG issues and encourage both practices that increase energy efficiency, and ideas for alternative energy systems or other GHG reduction possibilities;
  - Implement a program to increase energy efficiency in City buildings and facilities and possibly harvest alternatives sources of energy on the building site (integrated PVC; geothermal; others) - (See "Buildings" section of this report);
  - Continue current streetlight retrofitting programs and broaden this program as technology improves;
  - Address the energy efficiency of the City's fleets;
  - Establish a green procurement policy for all municipal equipment that includes green energy and energy efficiency considerations;

- **Partnerships**
  - Explore energy efficiency programs with BC Hydro, BC Gas and Independent Power Producers; and
  - Explore opportunities to partner with Molson to capture waste heat from their Burrard St brewery facility.

10.10 Solid Waste Management Systems

Introduction
Solid waste is an important aspect of GHG reduction as it is connected to emissions in several ways:

- ***Transportation of waste***
  - Managing solid waste requires extensive use of energy and thereby the creation of emissions through the transportation of recyclables and waste to market or final disposal facilities
- ***Methane in landfills***
  - The decomposition process in landfills creates methane, which, if not captured, is released into the atmosphere as a GHG.
- ***Energy-efficient recycled products***
  - Re-using or refurbishing materials and products or recycling waste into the manufacture of new products can be more energy efficient than creating new products from virgin materials.
- ***Embodied emissions***
  - Since all products require energy to produce, package and transport, preventing the production of waste in the first place reduces the need for the consumption of energy and emission of GHGs at all stages in a manufacture and distribution process.

The City is responsible for garbage and yard trimmings collection and processing or disposal from smaller residential properties (single family, duplex, row houses, etc.) as well as recycling collection from all residential properties. This mandate includes waste reduction and education programs. The City operates the Vancouver South Transfer Station and Vancouver Landfill, which includes a significant composting facility. Street cleaning and public litter receptacles are also within the City's Solid Waste mandate.

The City manages waste in accordance with the GVRD's Solid Waste Management Plan (1995).

Trends
Vancouver residents have been successful in reducing their waste generation significantly since 1990. The amount of garbage that the city collects for disposal dropped from 92,000 tonnes in 1990 to 58,000 tonnes in 2001.

Goals
The goals for solid waste management with respect to GHG reduction include:

- To increase overall awareness of solid waste management and GHG issues;
- To reduce the generation of solid waste in business, institutions, residences and parks management;
- To recover materials from the waste stream for re-use, recycling or re-manufacture into other products;

- To encourage the purchase and use of previously-used materials or materials with recycled content;
- To encourage increased efficiencies and reduced emissions in the equipment used in managing waste; and
- To reduce methane release associated with the City's landfill operations.

Current City Practices

The City has a number of progressive initiatives and programs that support the reduction of GHG emissions during the management of solid waste, including:

- *Single and multi-family Blue Box recycling programs*
- *Recycling transfer stations (including battery, mattress, tires, scrap metal, and appliance recycling)*
- *Residential yard waste recovery program –*
- *Composting facility*
- *Backyard composter program*
- *Worm composter distribution program*
- *Composting hotline*
- *Demonstration garden*
- *Recycling / Garbage hotline*
- *Litter cleanup volunteer programs (Keep Vancouver Spectacular)*
- *Education initiatives (such as the school plays)*
- *Landfill methane recovery and beneficial use project.*

Options and initiatives for consideration

The City has shown leadership in waste management and additional considerations might include:

- Continue to improve and expand the City's waste prevention and recovery practices;
- Encourage procurement policies in the City and the community to use materials with recycled content;
- Promote the purchase of equipment that is resource efficient *(such as duplexing printers and photocopiers);*
- Conduct ongoing awareness and education campaigns to reduce waste;

- Work with businesses and industry to increase product and packaging stewardship programs and to reduce the use of non-recyclable products and packaging;
- Encourage “deconstruction” in place of “demolition” practices in the city;
- Expand the City’s asphalt and other street material recycling practices where possible;
- Consider the implementation of robust waste reduction practices for City employees similar to initiatives in the federal government;
- Explore the implementation of a commercial food-waste collection program;
- Investigate opportunities for the use of recycling spent cooking oils in the city fleets as a substitute for bio-diesel to reduce emissions and waste, possibly including a partnership with EYA’s biodiesel project;
- Explore opportunities for pilot projects of residential food-waste collection in apartments and suites, acknowledging the differences between owners and renters;
- Promote the re-use and recovery of electronic devices;
- Develop a program to promote eco-industrial networks throughout the city; and
- Identify economic opportunities in waste reduction for the City, including a “design for environment” centre.

10.11 Municipal Management

Introduction
This section addresses the issue of how the City of Vancouver manages itself as a "corporate entity," with respect to climate change issues.

Quite apart from its central role as a local government, the City of Vancouver is an organization of significant size with significant land holdings, facilities, vehicle fleets and numbers of employees. Not only does this fact suggest that the City should explore ways to reduce its "corporate" emissions, but it also points to the opportunity for the City to demonstrate "leadership" for other organizations and corporations, and thereby assist it in meeting its larger community reduction targets.

The City has adopted a target of a 20% reduction in "corporate" emissions (below 1990 levels) by 2010, as part of its Partners for Climate Protection emissions management process. This discussion paper explores some of the initiatives the City could consider in its strategy to meet that target.

Trends
A number of trends in this area are worth highlighting:

- Green business management principles, strategies and practices are being developed in many businesses and organizations (including BP, Royal Dutch Shell, DuPont, Ford, Daimler/Chrysler, Texaco, GM, BC Hydro and TransAlta amongst others).
- Many green management organizations have emerged that offer extensive advice and expertise in these areas, including Canadian Business for Social Responsibility and others.
- Corporate management strategies based on the comprehensive structure of sustainability are being increasingly recognized as the new "bar" for corporate strategy.
- Governments at all levels are working to improve the "green" performance of all aspects of their operations from the Canadian federal government, to the US Navy and more.

Issues
A number of issues are important to highlight on this topic, including:

- Organizational structure and departmental mandates, resources, capacity and priorities;
- Corporate procedures for dealing with activities that may have GHG impacts;
- Partnership building with other agencies;
- Management policies on a wide range of issues including:
    - Communications and consultation with employees and stakeholders;
    - Monitoring, analysis and reporting (indicators) of corporate performance;
    - Finance and accounting (taxes, fees, incentives, investment, etc…);

    - Procurement practices;
    - Corporate waste management; and
    - Employee travel;
- City buildings and facilities; and
- Service provision:
    - Police;
    - Fire;
    - Libraries; and
    - Others.

Goals

A few goals to focus effort in this area include:

- To develop and implement corporate procedures and policies that result in reductions in GHG emissions associated with the City's own corporate activity;
- To manage the City's facilities and vehicle fleets for increased efficiency and emission reductions; and
- To raise awareness, expertise and a corporate culture of leadership and innovation in reducing the City's corporate emissions.

Current City Directions

The City has a number of current initiatives and programs that support GHG reductions in its corporate activities including:

- The establishment of a "Special Office of the Environment" to oversee environmental performance issues;
- The establishment of a Sustainability Staff group (Steering Committee, Support Group, and Staff Group) in the City to coordinate sustainability initiatives and complete a sustainability plan for the City;
- Staff working on climate change, energy efficiency, greener buildings, and a host of other innovative projects;
- The leasing of several electric vehicles and considerations for smaller vehicles overall for the City fleet;
- The "greening" of a number of new corporate facilities (community centre, City Works Yard building, others); and
- Others.

Options for Consideration

The following proposes various options for consideration around how GHG emissions could be addressed in the City's corporate activities:

- ***Corporate policy***
  - Formally establish a corporate commitment to "green" or low emissions policies, procedures and practices throughout the City corporation, and integrate this work into a larger "sustainability " strategy for the City;
  - Establish a GHG reduction strategy for City departments to implement in their own areas of jurisdiction, in consultation with the staff of each department;
  - Adopt a formal policy of favouring or requiring environmentally responsible business practices from all companies whom the City hires, and develop resources for businesses and staff to use in evaluating performance in suppliers (goods and services) corporate practices;
  - Develop a corporate accounting system that addresses environmental performance including emissions, such as a Triple Bottom Line approach;

- ***Education***
  - Develop and deliver a corporate education strategy to increase understanding and capacity to deal with GHG issues in the City;
  - Develop programs to encourage personal choices in City employees that reduce emissions, both at work and at home;
  - Develop resources for employees to support greener practices in their activities (such as how to "green" a public meeting, etc…);

- ***Procurement***
  - Develop a "greener" procurement strategy for the City to support the purchase of energy and resource efficient equipment, recycled products, service providers that have responsible business policies on climate change (courier etc…), and others;
  - Address GHG emissions in City staff travel, including a policy on staying in "green" hotels;
  - Investigate the purchase of green power certificates for some of the City's corporate energy demand;

- ***Transportation and fleets***
  - Develop an initiative to increase the use of bicycles and other low emissions transportation modes when staff are on City business (i.e.: Police on bicycles);
  - Continue to promote cycling (and use of other similar modes), car pooling and transit use amongst employees and develop a strategy to decrease private vehicle use over time;
  - Continue to increase the efficiency of the City's fleet;
  - Explore opportunities to use bio-fuels in the City fleet;

- ***Facilities***
    - Adopt a policy of high levels of green performance (such as LEED silver) for all new City facilities;
    - Develop a city building retrofit strategy to increase the efficiency of existing City buildings over time, including addressing energy, water, waste, ozone depleting substances, material selection, system maintenance, indoor air quality and communications with managers and employees on building issues;
    - Develop a strategy to reduce emissions associated with the maintenance of landscapes around City facilities;
    - Consider the development of additional green “pilot projects” with City facilities;
    - Develop and implement a “green” cleaning policy for the maintenance of City facilities with respect to the practices and products used by cleaners and other maintenance staff;
    - Consider metering City facilities for water and energy consumption;

- ***Waste***
    - Develop a strategy to reduce solid waste from City buildings and operations, including organics (see federal government example); and
    - Promote movement toward “paperless” operations in all departments.

11.0 Evaluation Criteria

Introduction
The development of this Action Plan entails research, consultation and the development of many ideas. As the City must balance many priorities on limited budgets, it is important to develop criteria to use when assessing the relative importance of various options to ensure maximum effectiveness.

Criteria:
The following criteria are proposed to use in evaluating various action items in the Action Plan to establish priorities.

- ***GHG reductions*** The initiative should result in real GHG reductions.
- ***Affordable*** Initiatives should be affordable and cost-effective.
- ***Early wins*** Priorities for action should focus on low-hanging fruit first to achieve early gains and build momentum.
- ***Significant impact*** Focus should be on areas with high emissions that have a high probability of seeing reductions from proposed initiatives.
- ***Appropriate jurisdiction*** Focus should be on initiatives addressing areas that are within City's jurisdiction and reasonable influence.
- ***Partnerships*** Projects should be structured to increase partnerships and leverage of resources.
- ***Increases liveability*** GHG reduction initiatives should maintain or enhance liveability and the quality of life in the city.
- ***Can be phased*** Initiatives, especially larger ones, should be structured in such a way that they can be implemented in stages.
- ***Measurable*** Initiatives performance should be measurable and structured so they can be easily monitored.
- ***Supports other initiatives*** Focus should be on directions that support regional, provincial and federal initiatives in emissions reduction that benefit the City.
- ***Local economic benefit*** Initiatives should be chosen than increase local economic opportunity and activity.
- ***Adaptability*** Any technology pursued for GHG reductions should be

adaptable to be able to respond to changes in the future, and should be designed to increase the flexibility of existing infrastructure or technology.

12.0 Adaptation Strategies for Vancouver

Introduction
This section outlines perspectives and considerations for the City of Vancouver on adaptations and management of some of the inevitable impacts of climate change.

Why is adaptation important?
We know that industrialized countries have been emitting significant amounts of greenhouse gasses for some time and that the climate has been changing steadily in the past century. While this report has focused on the priority of slowing and eliminating our emissions of GHGs, it is important to recognize that the climate has been and is still changing and that while our efforts to reduce emissions are intended to slow that change, they will not enable us to avoid it altogether.

A discussion about adapting to the impacts of climate change in no way reduces the importance of eliminating GHG emissions. Rather it is a pragmatic response to recognizing climate change has occurred and continues to occur and we must prepare ourselves for it, while we work to reduce emissions and therefore the rate of climate change. A combination of GHG emission reduction initiatives and adaptation strategies will best prepare Vancouver for the future.

Figure: How will climate change impact Vancouver and its waterfront?

Sources of impacts
In order to understand what some of the impacts of climate change might be, it is important to distinguish between ambient energy and temperature. Calling climate change “global warming” is somewhat of a misnomer. Temperature is only one way to measure “ambient energy.” Warm water or air has more energy in it, and we measure that energy as a change in temperature. From the point of view of the planet, global warming actually means an increase in the ambient energy embodied in its atmosphere, oceans and landmasses. When we consider climate change as an increase in ambient energy and not just temperature, we can see how many of the predicted impacts of climate change occur. For instance, one of the impacts of climate change has been an

increase in the average height of ocean waves – an observation that makes more sense when ambient energy is considered, than if simple temperature change is measured.

In summary, the possible impacts of climate change noted in an earlier chapter in this discussion paper include:

- Flooding;
- Ocean level rise;
- Changes in water supply;
- Increase in number and intensity of storms;
- Longer hotter summers;
- Shorter wetter winters;
- Diseases;
- Health care issues;
- Hydro-electricity fluctuation in supply and price;
- Land and aquatic species changes;
- Agricultural production changes;
- Impacts on the economy; and
- Environmental refugees.

Options for consideration on adaptation strategies

The following options can be considered by the City on how it can prepare to adapt to impacts of climate change:

- Convene a Task Force as part of the consultation process on the GHG Action Plan, to advise the City on a strategy for adapting to climate change impacts, in conjunction with existing emergency and security organizations such as Police, Fire Departments, Health Board and others.
- Develop information resources for the public and businesses in Vancouver on how they can prepare for the impacts of climate change;
- Evaluate City policies and regulations with respect to their support for increased resilience to climate change impacts;
- Develop energy efficiency and reliability strategies with BC Hydro and other utilities;
- Develop a robust water management strategy to minimize the water used in the City over time, including use controls, appliance guidelines and others;
- Partner with other governments and agencies to assist in preparing for facing impacts of climate change; and
- Monitor impacts on the City where impacts are predicted around climate change to assist in tracking change and informing management and response planning.

13.0 Implementation Process

Introduction
This section outlines perspectives on the implementation of the GHG Reduction Action Plan when it is ultimately developed.

Aspects of the Plan's Recommendations
There are several dimensions to consider:

- ***General new perspectives*** — Some of the options for consideration in this paper are "conceptual" in nature. The City and other stakeholders can simply begin to integrate these perspectives into their daily work prior to the development of a formal Action Plan.

  The provision of resources, special presentations or workshops on these issues would be valuable to assist in integrating the new information and perspectives into daily work and projects.

- ***New issues and approaches to integrate into existing activities*** — GHG considerations are not integrated into all City projects or those of other stakeholders in the community at this time. Some of the recommended actions in this paper suggest that we do things differently, however they may not be "new" projects as such.

  Like the above description of new perspectives, these new ways of doing the things we already do, can probably be implemented relatively easily, with a little preparation and learning.

- ***New projects or initiatives*** — Some of the recommendations in this paper suggest entirely "new" activities or initiatives. These need to be considered in the context of existing priorities, resources and expertise.

Assistance
A number of sources of financial assistance are available to the City for GHG reduction planning and initiatives. The City will pursue many of these sources as part of the planning and implementation process.

Responsibility

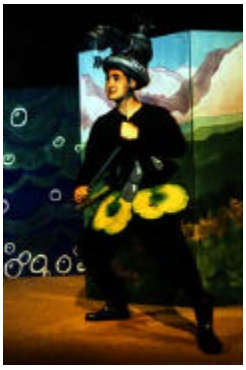
This discussion paper highlights the point that reducing GHG emissions is a shared responsibility amongst the City and all Vancouverites.

Following consultation and final refinements, it is expected that a GHG Reduction Action Plan will be created and adopted by Council and implementation will commence. A comprehensive implementation plan will be prepared at that time, with due consideration to the priorities uncovered through the consultation process.

14.0 Consultation and Communication Strategy

Introduction
The section addresses the scope and importance of consultation and communication in developing and implementing the GHG Reduction Action Plan.

As described in the earlier section, there are many stakeholders related to GHG reduction initiatives. The City should be both broad reaching and efficient in its consultation with stakeholders on this Action Plan.



Issues
There are a number of issues worth highlighting regarding consultation and communications when developing the Action Plan.

- ***A made-in-Vancouver approach*** — The most effective approach to developing the GHG Action Plan is to build it around the unique aspects of the Vancouver stakeholder group and their issues, strengths and opportunities.

- ***Integration*** — The City has many communications and consultation resources with many projects underway on many topics. The consultation and communications around GHG issues should be integrated into the City's current projects to both be fiscally efficient and to embed GHG issues in all aspects of the City business.

- ***Education*** — GHG issues are new to many and we are all learning what they "mean" to our lives, businesses and activities. The City should put a high priority on education initiatives around GHG reduction issues to explain clearly what the issues are, why they are important to Vancouverites, and what we can do about them.

- ***Transitional steps*** Recognizing that many of the sources of GHG emissions are part of our daily lives, it will take some time to change. Consultation and communication should outline a sequence of steps to emphasize how we can move forward to make small gains immediately.

- ***Jurisdiction*** Communication and consultation processes should clearly identify the issues of "jurisdiction" over areas of GHG emissions and focus its priority on areas where the City has jurisdiction. It should also consider focusing communication and consultation initiatives on senior governments and agencies that have jurisdiction over key issues such as energy pricing and environmental regulations.

- ***Partnerships*** The City should partner with other organizations promoting GHG reduction to leverage resources. In particular it should work with companies and organizations to reach their stakeholders, such as employees and others.

Recommendations from the Task Force

- Consultation process should be a two-way dialogue that is open to community-driven perspectives;
- The City should develop a excellent website resource on this topic;
- Workshop formats where participants can have time to learn would be valuable;
- The City should partner with some major media outlets to have public learning and discussion of this topic;
- The City should pursue a "celebration" of successes and "friendly competition" model of encouragement;
- The City should educate participants in the process on the risks of not making changes to reduce GHG emissions;
- The City should develop an inventory of organizations, educational bodies and businesses concerned with GHG reduction;
- The City should track population-level behavioural change over time regarding GHG emissions;
- The City should focus education on areas where many people frequent to get the message out; and
- Maybe the City should do a "workbook" approach to educate participants and help them make informed choices.

15.0 Conclusion

This discussion paper on greenhouse gas reduction planning for the City of Vancouver was the joint creation of the Cool Vancouver Task Force and City staff. It is one of many initiatives the City currently is undertaking in its commitment to becoming more sustainable. The discussion paper is intended to provide further information and options on GHG reduction opportunities in the City on both corporate and community issues.

The paper outlined the issues of climate change and how Vancouver has approached climate change to date. It discussed Vancouver's current emissions profile and discusses proposed reduction targets. It then outlined principles, issues, criteria and options for consideration around how the City could reduce its emissions. It also explored briefly issues of adaptation to climate change impacts.

This discussion paper is intended to outline the full scope of issues and opportunities and help give a cohesive framework to the City's considerations in addressing climate change. Furthermore, the process of creating the discussion paper, and ultimately the Action Plan is intended to spur on innovation within the City to promote reductions in GHG emissions.

Appendices

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