



SUSTAINABILITY

# THE CLIMATE-FRIENDLY CITY

A Corporate Climate Change Action Plan  
for the  
City of Vancouver

2004





## MAYOR

### Larry W. Campbell

The City of Vancouver is taking a bold step forward with the adoption of this Corporate Climate Change Action Plan. We all share the planet's atmosphere and impacts from greenhouse gas emissions affect everyone, and therefore, we must all take responsibility for addressing climate change. This action plan demonstrates the City of Vancouver's commitment to leadership in addressing its own emissions, and in being environmentally, socially and economically responsible.

## The Climate-Friendly City

*The City of Vancouver recognizes the importance of building a city that works not only for today but also for the future, and is committed to becoming more sustainable in all of its operations. By definition, a sustainable city is one that protects and enhances its immediate and long-term well-being.*

*That's why Vancouver has taken a position of responsibility and leadership in addressing climate change, dating back to the 1980s. However, the 21st century poses new challenges and has renewed the call for determination and creativity in addressing these issues within its jurisdiction.*

*Vancouver City Council has approved a corporate greenhouse gas reduction target of 20 per cent below 1990 emission levels by 2010. To achieve this goal, the City has adopted a greenhouse gas action plan, which addresses emissions resulting from areas such as energy use in civic facilities, fleet operations and landfill emissions associated with the waste generated by City operations.*

*A community climate change action plan, expected later in 2004, will compliment the corporate action plan.*

## COUNCILLOR

### David Cadman

I believe that climate change is one of the most important issues facing cities today. The City's Cool Vancouver Task Force, with representatives from all sectors, has provided excellent guidance in the creation of this Corporate Climate Change Action Plan. I am proud that this plan has charted a path for the City to reduce emissions from its own facilities, fleets and operations by 20 per cent below 1990 levels by 2010. I also believe that the significance of this action plan goes far beyond the specifics of this organization.

I believe that with this Corporate Climate Change Action Plan, the City of Vancouver is setting an example that the rest of us in the community can follow. The steps outlined in this document demonstrate how organizations and we as individuals alike can create a culture of energy efficiency in our workplace by educating ourselves, taking responsibility for things we can do, reviewing the choices we make, and then making better choices that are more respectful of our environment.

Can we do it? Yes! And I believe that by undertaking this task, we will make both our city and our world a better place.



## **Cool Vancouver Task Force**

The action plan was developed in cooperation with the Cool Vancouver Task Force, which was co-chaired by City Councilor David Cadman and Dave Rudberg, General Manager of Engineering Services. The task force represents a wide range of stakeholder groups from across the Vancouver region, including:

The Environmental Youth Alliance

Society Promoting Environmental Conservation

BC Ministry of Water, Land, & Air Protection

Science World

Vancouver Coastal Health Authority  
Terasen Gas

Building Owners and Managers Association

Vancouver Board of Trade

BC Hydro

Vancouver Economic Development Commission

SFU School of Resources & Environmental Management

Environment Canada

David Suzuki Foundation

Vancouver Planning Commission

Urban Development Institute

Greater Vancouver Regional District

Tides Canada Foundation

Vancouver School Board

Vancouver Park Board

TransLink

Better Environmentally Sound Transportation

UBC Sustainable Development Research Institute

Molson Canada

City of Vancouver (Council and Staff)

# Corporate Climate Change Action Plan for the City of Vancouver

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# INTRODUCTION & BACKGROUND

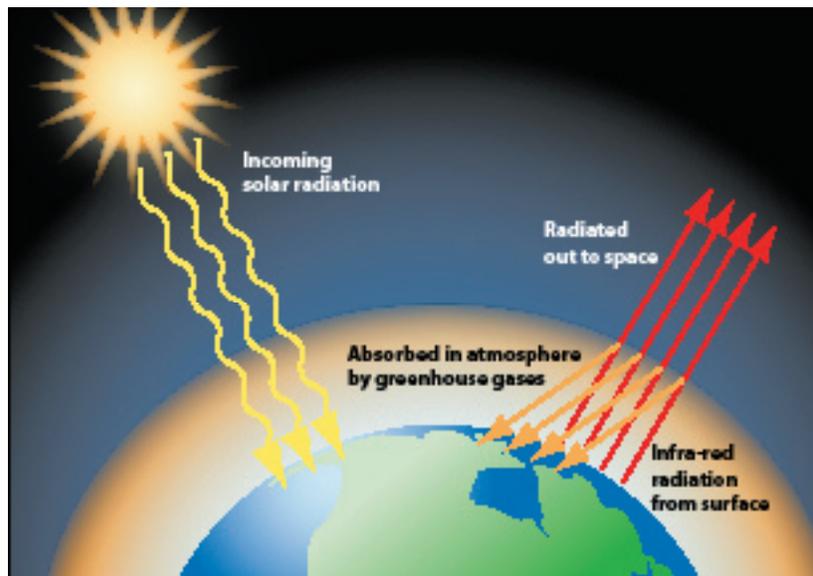
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## What Is Climate Change?

Climate change describes observed and anticipated changes to our planet resulting from human impact because of a phenomenon known as the greenhouse effect. This occurs when gases in earth's atmosphere, (primarily carbon dioxide but also including other gases such as methane) trap solar energy from the sun close to earth.

The primary human activity that emits greenhouse gases is the burning of fossil fuels - whether it's from automobiles or generating electricity to heat our homes and businesses. The garbage we produce also emits greenhouse gases as it decomposes in our landfills.

In all, 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 emissions could be 25 per cent above 1990 levels by 2010.



## The Impacts of Climate Change

The majority of world scientists agree that the climate is warming with potentially disastrous effects for people, economies and the environment. 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 expect to face, such as:

- Flooding from increased storm intensity, wetter winters, and rising sea levels.
- Disruptions to our water supply during longer drier summers.
- Increased number and intensity of extreme weather events such as rainstorms in the winter and summer droughts.
- New diseases resulting from increased average temperature (globally, tropical diseases have already begun moving northward).
- Increasing respiratory problems due to increased temperatures and smog effects.
- Indigenous plants and animals may be challenged for their ecological niches by foreign species from warmer climates.
- Environmental refugees from other nations that either will lack the resources to deal with climate changes or are expecting more drastic impacts.

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## **National and International Context**

### **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.

In 1997, the Kyoto Protocol was established to create a future of lower emissions, better energy efficiency, sustainable growth and cleaner air. The protocol established various targets for industrialized countries to reduce overall greenhouse gas emissions by a global average of 5.2 per cent 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 per cent of the total carbon dioxide emissions for 1990 from industrialized nations, have ratified it.

### **Partners for Climate Protection**

The Partners for Climate Protection program is a Federation of Canadian Municipalities initiative that brings Canadian municipal governments together to reduce the local production of greenhouse gas emissions.

Vancouver joined the Partners for Climate Protection in 1998 and has been implementing various measures to reduce greenhouse gas emissions and contributing to Canada's international commitment to reduce greenhouse gas emissions. The program outlines five key steps in addressing climate change:

- 1) Take emissions inventory and forecast future emissions
- 2) Set a reduction target
- 3) Develop a local action plan
- 4) Implement the plan
- 5) Measure progress: monitor, verify & report reductions

Vancouver is at step three of the process, with its corporate climate change action plan and the upcoming community action plan.

## **Role of the Corporate Climate Change Action Plan**

The corporate action plan contains several measures to reduce the greenhouse gas emissions resulting from City of Vancouver operations, while recognizing Vancouver's role as a service provider. The plan is limited to those measures that are financially viable and do not prevent the City from providing essential services, without compromising other programs or requiring increased taxation.

The plan also recognizes that the City's responsibility goes beyond just providing services -- it must also set an example and demonstrate leadership to the community.

While corporate greenhouse gas emissions account for only about one per cent of the emissions within Vancouver, the plan will play a key role in the formulation of the community action plan.

Not only does it clearly signal that Vancouver is committed to addressing climate change issues, it also provides a number of very realistic and repeatable examples of how individuals and organizations can act independently to reduce greenhouse gas emissions.

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## Corporate Emissions Inventory

In 1999, just over half of Vancouver's corporate greenhouse gas emissions were from energy use in civic facilities; just over 35 per cent were from fleet operations; and almost 10 per cent were landfill emissions associated with the waste generated by City operations.

Total corporate greenhouse gas emissions actually decreased six per cent from 1990 to 1999. This indicates that despite a rapidly growing population and the increasing greenhouse gas emissions associated with the production of electricity, it is possible to reduce total greenhouse gas emissions. (See Appendix for more details about Vancouver's corporate emissions profile.)

## Greenhouse Gas Emission Reduction Measures

The City of Vancouver and the Cool Vancouver Task Force have identified a number of emission reduction actions that address climate change cost-effectively. While most of these initiatives offer real opportunities to lower emissions, some of them are dependant on further research and development. Others do not significantly reduce corporate emissions but demonstrate leadership to other organizations and the public.

The thirteen emission reduction measures described in this plan fall into five main categories:

### Civic Facilities

- Energy performance contract
- Energy efficient purchasing policy
- Supporting alternative energy
- Green design for new and replacement civic facilities

### Corporate Fleet

- Vehicle right-sizing
- Shift to diesel vehicles
- Shift to biodiesel fuel
- Driver training program
- Fleet demand management
- Other technologies and fuels for consideration

### Street/Park Lighting and Traffic Control Signals

- Track and implement technological improvements

### Corporate Waste Reduction and Landfill Gas Recovery

- Expand waste reduction and landfill gas recovery programs

### Corporate Demand-Side Management

- Develop programs for staff energy use and commuting
- Examine the efficiency and cost-saving effect to the environment of the compressed work week

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## Civic Facilities

The City of Vancouver owns or occupies facilities ranging from City Hall and other offices, police and fire stations, community and recreation centres, to land holdings for investment and planning purposes.

Roughly half of the City's corporate greenhouse gas emissions are due to energy use in its facilities. The facilities that the City both owns and occupies offer great opportunities to invest in energy efficient capital improvements that will pay for themselves within a short period while significantly reducing our greenhouse gas emissions.

There are two categories of civic facilities included in Vancouver's emissions profile:

- City of Vancouver owned and occupied;
- City of Vancouver occupied but not owned.



City of Vancouver



Buildings that the City owns but does not occupy are not included in the corporate emission profile because these represent a small percentage of the energy consumed by the corporate stock and because the City does not have access to the utility information of its tenants.

## Energy Performance Contract

One of the most effective ways to reduce greenhouse gas emissions from existing civic facilities is to improve the energy efficiency of the buildings themselves through measures such as improved controls, more efficient lighting and heating/cooling equipment, and improvements to the building envelope such as its insulation and windows.

The Cool Vancouver Task Force recommends that the City of Vancouver pursue an energy performance contract, in which an energy service company undertakes a turnkey retrofit project and in turn receives compensation from the energy savings.

Numerous Canadian municipalities and other organizations have entered into energy performance contracts, including Toronto, Calgary, Burnaby and the University of British Columbia. In the experience of other large organizations, an average 20 per cent reduction in energy consumption from retrofitted buildings is economically viable.

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### **Interdepartmental Energy Committee**

To ensure that departmental and employee needs are satisfied in the retrofit process, it is important to form a multi-stakeholder committee early on to understand these needs and to incorporate them into the terms of the energy performance contract.

Identifying and addressing potential conflicts between energy efficiency measures and the smooth functioning of a given facility would not only require the feedback of staff but also a study of other organizations with similar facilities and their experience with energy retrofits.

A committee of this nature can provide a valuable communication tool to the individual departments and facilities. Not only does this help keep employees informed of the changes in their working environment, it also illustrates how individual behaviors can positively impact the environment through energy savings.

### **Savings sharing fund**

As a tool to help increase staff awareness and support of energy efficiency, some organizations have created an internal accounting process to track capital expenditures for energy related projects, account for the savings from the retrofits, and allocate a portion of the savings beyond those estimated in the energy performance contract to a savings sharing fund. Facilities involved in the retrofit program can apply to the fund to finance discretionary projects or to undertake further sustainability initiatives.

In large organizations, managers at the facility level are often not aware of costs associated with utility use because the bills are paid through a central accounting or facility management department. By creating a revolving fund, individual managers are more likely to become involved in the management of the project and can encourage building occupants, staff and users to manage resources more effectively.

### **The City as a responsible landlord and tenant**

An energy performance contract is only recommended for City-owned and occupied facilities where the City is responsible for capital upgrades and also receives the benefits of reduced operating costs. This does not mean that Vancouver should ignore its role as a landlord and as a tenant.

For buildings that the City owns but does not occupy or pay for the utilities, revised or renewed lease arrangements could be explored that would enable Vancouver to recover the costs of energy efficient improvements. This is only applicable to those buildings that the City expects to own for a period long enough for energy savings to repay the capital improvements.

For buildings or space that Vancouver leases from other owners, it should explore lease revisions that would enable the owners to recover their investment in energy efficiency upgrades. The City should also review the energy efficiency of its leased spaces and consider finding new leased space or buying additional space if the owners of the space cannot be encouraged to conduct energy efficiency upgrades.



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## ***ACTIONS***

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- 1** That City Council approves the creation of an Energy Projects Coordinator position.
  - 2** The Energy Projects Coordinator’s initial mandate should be to help explore the issues and opportunities around an energy performance contract.
  - 3** The Energy Projects Coordinator should be directed to assist in the formation of an Interdepartmental Energy Committee to ensure the energy performance contract incorporates departmental and facility specific needs.
  - 4** That the Energy Projects Coordinator, in consultation with Finance and Accounting, should help to determine the opportunities and feasibility of establishing a savings sharing fund (or similar communication/incentive tool) to support the energy performance contract.
  - 5** That the Real Estate department and Vancouver Park Board are directed to review existing lease agreements and where appropriate explore, in consultation with Legal Services, revised lease structures to enable it to retrofit its own leased buildings and to encourage energy retrofits in those buildings that it leases space.
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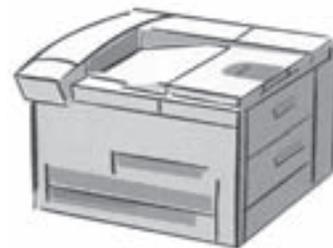
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## Energy Efficient Purchasing Policy

One of the fastest growing sources of increased electricity consumption in office buildings is from “plug loads,” which is the energy consumed by equipment and appliances that are plugged into electrical outlets such as computers, copiers and fridges.

BC Hydro studied electricity use in its service region and determined that energy efficient office equipment offers the most cost effective opportunity to reduce electrical consumption in commercial and office settings. BC Hydro believes that most energy efficient office equipment has no incremental capital costs and could save an average of 25 per cent on operating costs. The net impacts of using energy efficient equipment in office buildings was estimated at a three per cent overall reduction in electricity consumption.

For Vancouver, this would result in approximately a one per cent reduction in total energy consumption from corporate facilities, or about \$50,000 saved annually. This would be equivalent to a 250 tonne reduction relative to 1990 by 2010 after accounting for corporate growth. An energy efficient purchasing policy could become a component of an integrated sustainable purchasing policy that could address sourcing, recycled/renewable content and the disposal options for used products.



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## **ACTION**

- 1** The Purchasing Department, in consultation with the Sustainability Support Group and with Legal Services, should report back on the opportunities and implications of establishing an energy efficient purchasing policy by September 2004. In the meantime, Energy Star rated equipment should be purchased where applicable.
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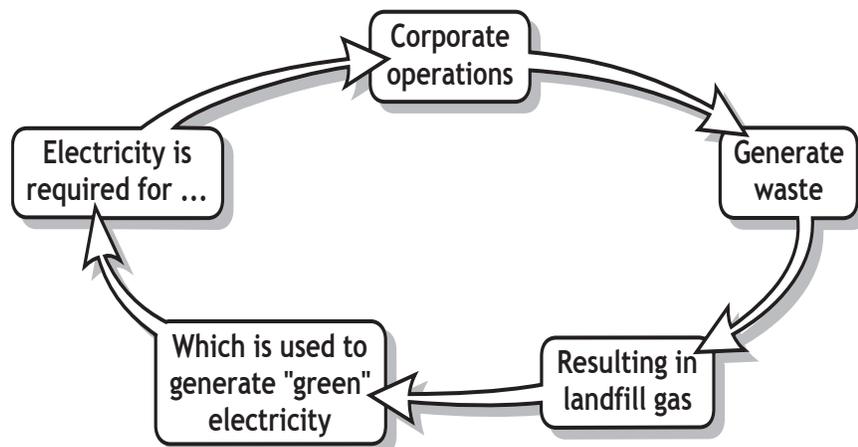
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## Supporting Alternative Energy

While many of the best opportunities for reducing greenhouse gas emissions from civic facilities rests in cutting the energy used by those facilities, Vancouver can demonstrate a more holistic approach by actively pursuing and supporting the development of alternative sources of energy for use in its facilities.

Vancouver's landfill gas recovery and cogeneration initiative is one example of the development of alternative energy sources. Until more are developed, Vancouver can demonstrate immediate action in this area by purchasing a portion of the energy it uses from certified "green" power producers, such as BC Hydro's Green Power Purchase program.

Some of the revenue generated through this operation could be used to cover the cost of the Green Power Purchase certificates. The Cool Vancouver Task Force recognizes that purchasing Green Power Certificates at a 33 per cent cost premium is only a temporary measure for the City to demonstrate its commitment to immediate action. The community action plan will address how Vancouver can encourage and support the development of alternative community energy systems.



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## ACTIONS

- 1** That the proposed Energy Projects Coordinator's mandate includes the requirement to assist in reporting back on the feasibility of generating additional "green" energy at civic facilities.
  - 2** That Vancouver should advocate for the more aggressive implementation and broader accessibility of alternative energy with the GVRD, BC Hydro and the Province of BC.
  - 3** That, as an immediate but interim measure, the City of Vancouver annually purchases Green Power Certificates equivalent to a percentage of the annual electricity used at City Hall. Certificates representing 10 per cent of the electricity used in City Hall could be funded from the City's share of the landfill gas revenues.
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## Green Design for New and Replacement Civic Buildings

While reducing energy consumption in existing facilities is the key to meeting the 20 per cent reduction target by 2010, Vancouver can act now to minimize the impacts of future growth on its greenhouse gas emissions. One key opportunity is requiring that all new and replacement civic buildings greater than 500 square meters be designed to meet the equivalent of a minimum LEED Silver standard.

LEED (Leadership in Energy and Environmental Design) is a "green" building rating system that allocates points for a range of environmental design features. Requiring that new or replacement civic facilities are designed to meet the equivalent of a minimum LEED standard ensures that they incorporate a broad spectrum of sustainable building considerations.

While LEED standards will not likely be available for residential buildings until 2008, City constructed and operated residential buildings built before 2008 should be designed to be at least 20 per cent more energy efficient than standard practice.

This report assumes that the civic facility stock will increase by 12.6 per cent between 1999 and 2010 to keep pace with projected increases in population. Building new and replacement facilities at least 20 per cent more efficiently than in 1999 reduces the energy impacts of this growth to a 10 per cent increase. Realistically, this is a high growth estimate because many of the new facilities that are planned are actually replacing older, inefficient ones.



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## ACTIONS

- 1 That City Council approve the recommendation to adopt green design standards equivalent to that of a minimum LEED Silver rating for all non-residential new and replacement civic buildings over 500 square meters.**
  - 2 That facility design teams should be encouraged and supported in pursuing a higher LEED score when good opportunities are available to do so.**
  - 3 That the City's planning department should report back on the energy implications of LEED and how to modify this requirement to ensure that buildings are at least 20 per cent more efficient than is currently standard.**
  - 4 That the LEED rating system for residential buildings be evaluated when it becomes available.**
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## Corporate Fleet

The City of Vancouver's fleet consists of approximately 2,000 cars, trucks, and heavy equipment units. Greenhouse gas emissions from the fleet have decreased 11 per cent since 1990 as a result of technological innovation and vehicle downsizing. These approaches, in conjunction with the development of viable new fuel compositions are expected to provide significant opportunities to further reduce both greenhouse gas and common air contaminant emissions from the City's fleet.

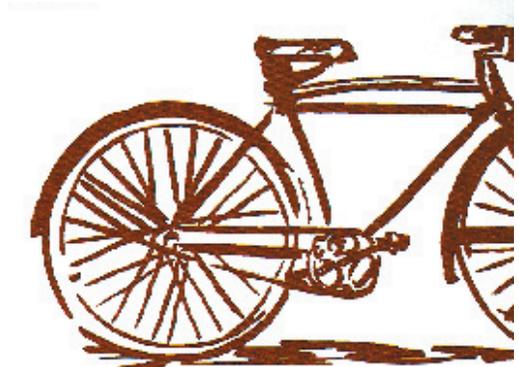
## Right-sizing

One of the most economical ways of reducing greenhouse gas emissions is to size vehicles so that they are appropriate to their task. "Right"-sizing vehicles to smaller, more efficient units or even bicycles not only reduces emissions, it will generally reduce the overall cost of ownership due to lower capital and operating costs.

In the last two equipment replacement programs, the City's Equipment Services department has identified opportunities to replace units with smaller, more efficient vehicles where task requirements permit. Equipment Services estimates that there are approximately 209 units that could potentially be replaced with smaller units, in particular mid-size cars and light trucks, and indicates that continued right-sizing has the potential to reduce greenhouse gas emissions a further two per cent. This would be equivalent to a 600 tonne reduction relative to 1990 by 2010 once corporate growth is factored in.



City of Vancouver



Georgia Basin Ecosystem Initiative

## ACTIONS

- 1 That the Corporate Management Team review and develop policies to identify vehicles that can be downsized on replacement, and direct all departments to evaluate vehicle usage and operational requirements for vehicles in their fleet in light of these policies. These policies should expressly encourage the use of bicycles where appropriate to task.**
  - 2 That the Corporate Management Team develop common standards for vehicle specifications for similar applications throughout the City to assist in the development of right-sizing policy.**
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## Shift to Diesel Vehicles

During the 1990s, Vancouver replaced many of the light duty diesels in its fleet with gasoline engines due to concerns regarding diesel common air contaminant (CAC) emissions and noise complaints. This led to increased greenhouse gas emissions, because gasoline engines are inherently less efficient than diesels. In 2007, new U.S. Environmental Protection Agency requirements will significantly reduce CAC emissions from diesel engines in the North American market, offering Vancouver a promising opportunity to also reduce its greenhouse gas emissions.

The use of diesel engines can reduce the greenhouse gas emissions from those vehicles by approximately 20 per cent. Combined with the decreased cost of diesel fuel, this efficiency can result in operational cost savings (not including decreased maintenance requirements) of approximately 30 per cent.

The City's Equipment Services department has identified approximately 300 gasoline vehicles that could likely be replaced with diesel-powered vehicles at the end of their service life resulting in a two per cent reduction in fleet greenhouse gas emissions. This would be equivalent to a 700 tonne reduction relative to 1990 by 2010 once corporate growth is factored in.

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## ***ACTIONS***

- 1** That Equipment Services evaluate purchasing "clean diesel" units upon the replacement of light duty gasoline vehicles once the diesels conforming to the new 2007 standards are available.
  - 2** That Equipment Services evaluate the possibility of postponing scheduled replacement of applicable fleet vehicles for two years prior to the new cleaner standards taking effect to increase the number of vehicles replaced with clean diesels.
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## Shift to Biodiesel Fuel

A more immediate opportunity for greenhouse gas reductions would be switching the diesel fleet to biodiesel fuel.

Biodiesel is a renewable fuel made from animal or plant based fats and oils. Biodiesel has similar properties to petroleum diesel and generally can be used in most diesel engines without any modifications. In order to keep the fuel economical, biodiesels are generally blended with petroleum diesels to produce biodiesel blends. A 20 per cent biodiesel (B20) blend is the most common.

Biodiesel and biodiesel blends have been shown to significantly reduce common air contaminant emissions of particulate matter, carbon monoxide, sulphates, and hydrocarbons. They have also been shown to have lower ozone forming potential and lower cancer causing potential than regular petroleum diesel. Since biodiesel is produced from renewable sources, a B20 blend can reduce net greenhouse gas emissions by between 10 per cent and 17 per cent over the entire fuel cycle. Also, biodiesel can be produced from recycled cooking oils (such as recovered yellow grease from restaurants), thereby reducing the impact of waste cooking oils on the environment.



Currently, there are no local producers of biodiesel, but with sufficient volume commitments or demand, local production would likely become feasible with a good potential to lower the cost of a B20 blend. If biodiesel were cost neutral, there would be a real opportunity to impact emission not only from the Corporate Fleet but also from all diesel engines in the region.

The City has the opportunity to play a lead role in transforming the diesel fuel market in the Lower Mainland by creating the initial local demand for biodiesel. Vancouver, along with six other local governments, is currently working towards running a biodiesel demonstration in early 2004. If the demonstration is successful, Vancouver (along with other members of the BC Petroleum Products buying group) will look at expanding the use of biodiesel throughout the rest of the fleet as supplies permit.

The City's flagship involvement in this demonstration would cost approximately \$90,000. If the entire City diesel fleet were converted to B20, the annual additional cost would range from \$0-\$250,000 per year (less than a one per cent increase in the fuel budget), but the estimated reduction in annual fleet related greenhouse gas emissions would be between seven per cent and 11 per cent. Using a midrange decrease of nine per cent, this would be equivalent to a 2,700 tonne reduction relative to 1990 by 2010 after accounting for corporate growth.

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## The biodiesel process...



Waste Grease



Processing Facility



Finished Biodiesel



Maintenance vehicle

UBC - EYA Biodiesel Initiative

## ACTIONS

- 1** That Equipment Services take part in a biodiesel demonstration project to confirm the suitability of this fuel for use in the City's fleet and to make recommendations regarding the ongoing use of biodiesel blends for use in the entire diesel fleet.
- 2** If biodiesel is found to be suitable for fleet use, Equipment Services should work with the other members of the Fuel Purchasing Cooperative to include biodiesel in future fuel contracts to ensure the required volumes and to reduce the cost of biodiesel blends.
- 3** Vancouver should request that the provincial and federal governments reduce taxes on biodiesel and biodiesel blends of fuel in order to promote the use of these fuels.
- 4** Vancouver should request that the GVRD study the environmental and economical impacts of biodiesel use in the region.
- 5** Vancouver should work with petroleum industry, the Vancouver Economic Development Commission and the GVRD to encourage the development of biodiesel manufacturing facilities within the GVRD.

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## Driver Training Programs

How a vehicle is operated has a significant impact on its fuel use. Implementing a driver-training course in fuel efficient driving techniques can result in a significant reduction in fuel consumption.

Recently, the City of Edmonton revised their driver training program to include a revised fuel efficient driving course targeted at the operators of high fuel consumption units (medium and heavy-duty vehicles, and high mileage automobiles). Edmonton estimates that this new program has saved the \$600,000 annually, and has reduced their annual fuel consumption by 1.2 million litres.

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Vancouver's driver training programs include instruction on fuel-efficient driving techniques for employees who are upgrading their license with the City. However, most drivers are not routinely exposed to these concepts. It is recommended that Vancouver develop a pilot program with the Engineering Department's medium and heavy duty drivers to teach fuel efficient driving techniques, and to evaluate the impact this training has on fuel consumption.

If successful, it is recommended that a program expansion be considered for all medium and heavy-duty vehicle drivers and to high mileage automobile drivers, and that a feasibility study be undertaken to expand the program to all City employees.

If similar results to Edmonton were obtained, Vancouver could reduce fuel consumption by at least five per cent over current levels. Once corporate growth is factored in, this would be equivalent to a 1,500 tonne reduction relative to 1990 by 2010.

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## ***ACTION***

- 1 The Engineering Department with consulting assistance should develop and conduct a fuel-efficient driver training program trial and report back on the feasibility of expanding the program to all departments.**
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### **Fleet Demand Management**

While reducing the size of a vehicle, changing its fuel type, and improving its efficiency are all important approaches in reducing fleet greenhouse gas emissions, additional opportunities must be explored to coordinate and possibly reduce the amount of corporate vehicle use.

By having individual departments focus on their vehicle usage, it may be possible to identify opportunities to reduce overall vehicle usage. Is it possible to combine trips? Is there any viable technology currently available to facilitate trip coordination? Is it possible to locate staff and/or vehicles closer to their most common destinations? Are some facilities or staff destinations easily accessed by transit?

Integral to this form of assessment is a consideration of pooled vehicle use. While studying vehicle usage, it may become evident that some trips could be effectively served using a pooled bicycle. Also, large city facilities such as City Hall have a number of pool vehicles for staff use while on City business. Coordination of these pooled vehicles is currently decentralized.

By centralizing the vehicle pool, there may be an opportunity to reduce the total number of vehicles or for trip efficiencies to be realized. Reducing total vehicles could increase the annual mileage of individual vehicles making higher priced but more efficient alternatives more viable.



City of Vancouver



Co-operative Auto Network



Georgia Basin Ecosystem Initiative

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## **ACTION**

- 1 That Equipment Services work with individual departments and examine centralized locations to identify opportunities to reduce corporate motor vehicle use and report back with recommendations.**
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### **Other Technologies and Fuels for Consideration**

#### **Hybrid Technologies**

Hybrid vehicles combine a gasoline engine with an electric motor and regenerative braking in one vehicle to complement one another in providing power and charging the battery. Commercially available hybrid passenger vehicles reduce fuel consumption by 20 to 40 per cent.

The City has been operating two hybrid Toyota Prius sedans in its fleet since 2003. While initial analysis indicates that while these vehicles are very fuel efficient, the total cost of ownership is estimated to be significantly higher than the City's compact sedans because the purchase price is an additional \$15,000. However, in order to be economical and reliable these cars are best suited to high mileage applications (over 30,000 km per year). Unfortunately, most City cars are normally used in low mileage applications (less than 15,000 km per year). At this time, the cost of replacing vehicles with hybrids versus the relative environmental impact is quite high.

As a potential future opportunity, there are several companies working on hybrid systems for medium and heavy-duty applications. Most of these systems are still in development and are not commercially available. It is anticipated that there will likely be suitable applications for this technology in the City's fleet. Since most medium and heavy-duty vehicles have significantly higher fuel consumption than cars, there would be greater fuel reductions and emission reductions in using a medium or heavy-duty hybrid versus using a hybrid car.



City of Vancouver

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## ***ACTION***

- 1 That Equipment Services continue to evaluate the operation of the two existing hybrids in the fleet and investigate other hybrid technologies to identify potential future opportunities for their use.**
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### **Ethanol Blended Fuels**

Blended fuels that combine ethanol (typically made from distilled grains) with gasoline offer a promising opportunity to reduce greenhouse gas emissions by making a portion of the fuel renewable. The federal government's climate change plan calls for a significant increase in the use of ethanol-blended fuels.

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## ***ACTION***

- 1 That Equipment Services report back on the opportunities and feasibility of using ethanol blends fuels in the City's fleet.**
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### **Natural Gas and Propane**

Since the 1980s, the City of Vancouver has had a significant amount of experience with natural gas and propane vehicles. In theory, propane and natural gas (methane) are cleaner burning fuels compared to more complex hydrocarbons such as gasoline and diesel. However, using these fuels in engines that were designed for other fuels has proved to be troublesome.

In the 1980s and early 1990s, the City converted many vehicles to propane and natural gas. However, the mechanical and environmental performance of these units was typically unsatisfactory. Regionally, the AirCare failure rate for vehicles converted to propane or natural gas has been almost double the failure rate of gasoline vehicles. Recent tests done by AirCare and the City have shown that even with new conversion technologies, emissions generally are worse after a gasoline engine is converted. However, the factory built units have had a much better success rate than the aftermarket conversions. Therefore, Equipment Services will not recommend converting existing gasoline engines to propane or natural gas, and will only recommend factory built units if natural gas or propane is considered for use in the City.

Generally, factory built natural gas and propane vehicles are available in many full size passenger cars and trucks, and in both dedicated and bi-fuel configurations. However, there are usually more fuel-efficient gasoline engines available for the same model. Therefore, in most cases, there is no greenhouse gas benefit to purchasing a natural gas or propane unit since a smaller gasoline engine will generally produce less greenhouse gases than the larger alternate fuel engine. Vancouver is currently working on setting up a trial of two medium-duty natural gas (spark ignition) vehicles for the City's fleet. Although there is a potential for reduced vehicle emissions, there may be no net reduction in greenhouse gas emissions due to the lower fuel efficiency of the spark ignition engines versus the diesel cycle engines.

Currently, there is a potential for high-pressure direct injection natural gas engines (the Westport HPDI system) to have lower greenhouse gas emissions since these engines maintain the higher efficiencies of the diesel cycle engine. However, these engines are still in the development stage. There has been some interest in getting a Westport engine into a City fleet unit for a trial, but there currently are logistical, maintenance and safety issues that would need to be addressed for the proposed applications and maintenance facilities.

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## ***ACTION***

- 1 That Equipment Services continue to evaluate natural gas and propane as alternative fuels for the fleet. In addition, they will continue to examine the possibility of using HPDI natural gas technology for future trials in the City fleet.**
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## Electric Vehicles

The City has operated and evaluated two electric vehicles in its fleet. Electric vehicles are often misleadingly referred to as “Zero Emission Vehicles” since they do not produce any tailpipe emissions, however the source of the electricity to charge these vehicles can have a range of emissions (from “clean” hydro or nuclear energy, through to coal burning power plants). Battery powered electric vehicles are very efficient, and are well suited to low mileage applications. However, they are usually significantly more expensive than conventional vehicles, and there are significant limitations to their use. Most major manufacturers are now canceling their electric vehicle programs due to the economics of the platform. Most electric vehicle development now is being undertaken by smaller companies.

One area that is being developed locally is low-speed electric vehicles. These vehicles are licensed under federal low speed vehicle regulations and are currently restricted to speeds less than 40 km/h. Also, these vehicles do not have to meet vehicle collision standards applicable to regular vehicles. Therefore, these vehicles tend to be lighter, more efficient and economical than previous electric vehicles.



City of Vancouver

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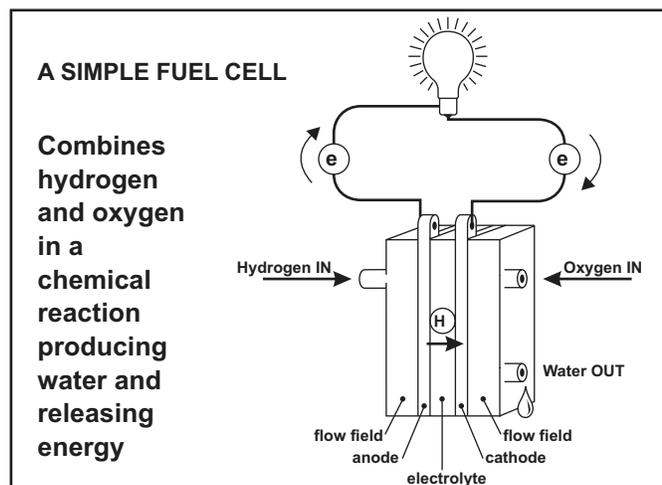
## ACTION

- 1 That Equipment Services continue to explore the use of low speed electric vehicles and determine if they are suitable for use in the fleet.**
- 

## Fuel Cells

Fuel cells are another “zero emission” type of vehicle. Typically, fuel cell powered vehicles are operated on hydrogen that is typically produced from natural gas or through electrolysis. Like electric vehicles, the source of the hydrogen can result in a range of overall emissions. Fuel cells can be more efficient than internal combustion engines, and therefore there is a potential for reductions in greenhouse gas emissions. Fuel cells powered vehicles are not expected to be available for several years, plus a new fuelling infrastructure must be created to support a hydrogen-based fuel cell fleet.

The City is working with Fuel Cells Canada to be part of a three-year demonstration trial of a fleet of five fuel cell cars in the Vancouver region. It is anticipated that the City will be operating one or two of these units during the trial period. The City will continue to examine this technology and will determine the feasibility of using fuel cells in the City’s fleet once they are commercially available.



City of Vancouver

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### **Micro Compact Cars**

On average, North American cars are much bigger than cars elsewhere in the world. In Europe, where fuel costs are significantly higher than in North America, small cars are much more popular. Sub-compact and micro-compact cars are very common, and generally vehicles are powered by much smaller engines. For example, engines as small as a 1.4 litres power the British version of the Ford Focus, while the smallest North American Focus contains a two-litre engine. As well, small diesel engines are available for this car in the European market.

However, there is some indication that some super fuel-efficient micro-compacts might be coming to Canada in the next few years. Daimler Chrysler is currently looking at importing their "Smart Car" to Canada – a two-seater developed by Swatch and Mercedes. The European Smart Cars are powered by 0.6 litre gasoline or diesel engines, and they typically have fuel efficiencies that are similar or better than current hybrids. Due to their compact size (it is short enough that it can be parked perpendicular to the curb in a normal parallel parking spot) they are an ideal urban car, yet they can still travel at highway speeds.



*Transport Canada*

## ***ACTION***

- 
- 1 That Equipment Services, in cooperation with the Sustainability Support Group, work with the Federation of Canadian Municipalities to lobby for the importation or production of small fuel efficient urban micro-compact cars.**
-

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### Other Technologies

A range of alternative forms of transportation has emerged in recent years and some are gaining popularity. Many of these technologies may hold promise for the Vancouver fleet to more closely match the “vehicle” with the task. It is expected that more of these will become available in coming years as energy prices rise. Currently, many alternative forms of transportation do not fit within the designation classes for vehicles, and as such, are not insurable and can be difficult to classify for appropriate roadway use. The City cannot promote or pursue technologies that do not fit into vehicle classifications; however there may be opportunities in the future for alternative modes.

## **ACTION**

- 
- 1 That Equipment Services is allocated an annual consulting budget to assist them in effectively monitoring emerging transportation technologies and fuels for opportunities to reduce fleet greenhouse gas emissions.**
- 

### Street/Park Lighting and Traffic Control Signals

Innovations in street lighting systems technology have historically resulted in decreasing energy consumption. The City of Vancouver will continue to keep abreast of these innovations and implement them as they are technically proven and financially viable.

The Engineering Services’ Electrical Design branch is currently researching the potential offered by using enhanced new achievements in technology to continue to reduce the electrical demand of our street, lane, and park lighting systems. Design methods and criteria will be also researched in the domain of increased visibility that a system creates, and increase safety and security without higher levels of light or increased power consumption.

Street and lane lighting has changed from incandescent and mercury lamps to high intensity discharge and fluorescent lamps over the years, contributing to energy consumption reduction. Further reduction in energy consumption is currently being researched through the use of:

- Induction lamps, pulse-start metal halide lamps, light emitting diodes (LED)
- Energy efficient luminaries
- Electronic ballasts for high intensity discharge lamps

The upgrade of traffic signals to take advantage of innovations in LED technology is underway and will be completed in the near future. LED’s offer a very low energy source of visible light but have limitations in their ability to illuminate spaces.

Vancouver is also responsible for significant lighting in our parks, plazas and other public open space, with similar potential benefits.

Street lighting retrofits have historically been justified and implemented based on their economic payback. The financial implications of installing new technologies will be specific to that initiative. BC Hydro offers significant financial support of electrical reduction initiatives, and additional financial support might be accessed through the Federation of Canadian Municipalities.

The electricity used for street lighting decreased by 24 per cent from 1990 to 1999 due to the evolution in lighting system technologies. Using this historical rate of improvement in efficiency, the City is forecasting a further 29 per cent decrease between 1999 and 2010.



City of Vancouver

### What's New with: Traffic Signals

#### LED Installation

On June 11, 2002, Vancouver City Council approved a program with BC Hydro - Power Smart to convert the city's 670 traffic signals from incandescent bulbs to energy efficient light-emitting diode (LED) traffic lights.

Power Consumption\* for a Signalized Intersection

~0.5 amps  
LED's

~4.0 amps  
Incandescent Bulbs

LED's are electronic devices commonly used for displays such as clock radios. They consume 80-90% less energy and can last 7-10 times longer than conventional light bulbs. Once implemented, LED traffic signals will save Vancouver taxpayers \$250,000 annually or 5.7GWh, equal to the amount of energy that it would take to power almost 600 homes. In addition to the cost savings, LED traffic signals provide road safety benefits, including brighter signal illumination and increased reliability.

This is part of the BC Hydro - Power Smart Program, which is an initiative to assist customers in conserving electricity, thereby saving them money and reducing further impacts on the environment. Electricity conservation helps meet capacity demands by making more efficient use of the energy that is currently generated, delaying the need for new, and large scale generation projects.



City of Vancouver

## **ACTION**

- 1 That Engineering's Electrical Design Branch continue to monitor and implement new street and park lighting systems technologies.**

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## **Corporate Waste Reduction and Landfill Operations**

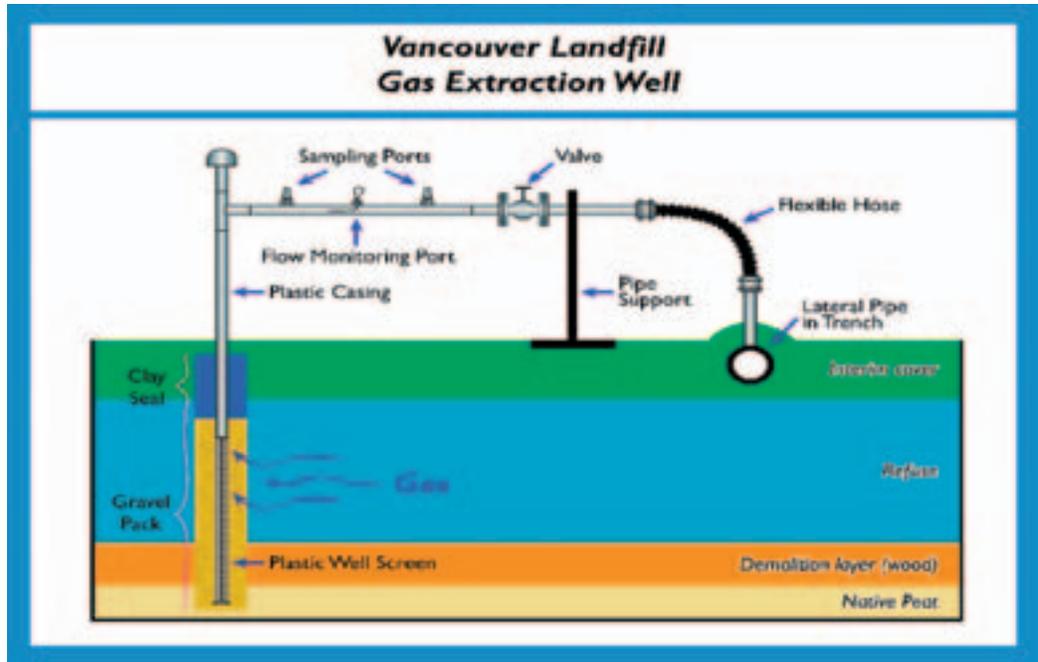
Corporate waste accounted for nearly 10 per cent of the City of Vancouver's corporate greenhouse gas emissions in 1999. The greenhouse gas emissions are the City's portion of the emissions from the Vancouver landfill based on the estimated volume of waste generated at corporate facilities.

The City conducts waste reduction and recycling programs at its facilities, with the primary focus being on recycling office paper. Departments must continue to evaluate the extent and effectiveness of the corporate waste reduction and recycling initiatives with the goal of continuous reduction in waste disposed.

One of the most significant greenhouse gas reduction initiatives implemented by Vancouver to date is the landfill gas recovery program, which received the 2003 Federation of Canadian Municipalities-CH2M Hill Sustainable Community Award for renewable energy. A landfill gas collection and flare system in place since 1991 was expanded in 2002 to increase gas recovery and use the gas to generate electricity and heat by the end of 2003.

The landfill gas will be used by Maxim Power Corporation to generate electricity for sale to BC Hydro and the waste heat will be used to heat CanAgro Produce's greenhouse operations. Initially, the project will generate about 40 GWh of electricity per year. With expansion of the facility expected in the near future, an additional 15 GWh per year of electricity will be sold to BC Hydro.

The landfill is taking a waste by-product and turning it into a creative, new energy option that provides revenue and numerous environmental benefits. Instead of simply flaring the gas, which has an inherent greenhouse gas reduction benefit, the gas is cooled, compressed, and then transported via pipeline to an adjacent generating facility where it is burned in reciprocating engines to generate electricity. As a further benefit, the heat released from the engines is used to provide hot water heating to the CanAgro tomato greenhouse next door. This means that CanAgro will rely less on fossil fuels to heat the greenhouse, thereby further reducing greenhouse gas emissions. The project will provide about 20 per cent of CanAgro's energy requirements.



City of Vancouver

## ***ACTION***

- 1** In addition to continuing with the planned landfill gas recovery system expansion, the Corporate Services Group, in cooperation with individual departments and facilities, will implement waste reduction and recycling programs at corporate facilities where these programs have not yet been implemented.



City of Vancouver

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## **Corporate Demand Side Management**

There are two approaches to reducing greenhouse gas emissions related to energy consumption: supply side management and demand side management. Most of the emission reduction measures discussed so far focus on supply side management, which means improving the efficiency of equipment or modifying energy source and fuel type to reduce the related emissions.

Equally important but more difficult to quantify are programs that reduce the demand for energy while maintaining a high level of service and functionality.

Educating people about the choices available to them and the energy impacts of those choices can not only reduce energy demand, but also make the critical link for people between their behavior and its consequences. This can affect long-term behavior not only at work but also at home.

Two specific areas for attention envisioned in this plan are commuter choices and energy usage in civic facilities.

### **Commuter Options**

In addition to energy awareness within facilities, staff and patron commuting behaviors also have significant greenhouse gas emission implications. While these emissions are not counted as part of the corporate emission inventory, they impact community emissions and need to be addressed to demonstrate leadership and responsibility. Vancouver has already made considerable effort toward supporting alternative commuter options but a coordinated and focused approach is required in order to be truly effective.

Vancouver needs to explore the opportunities to reduce employee and even facility patron vehicle trips by looking at free parking policies, bicycle facilities, increased attention on implementing and managing carpool programs, and perhaps most significantly, looking at the potential of negotiating a universal transit pass (U-pass) for City employees to encourage and facilitate their use of public transit.

### **Energy Usage Behaviors**

Building occupants can have a small but significant impact on the energy consumption of their facility. Lights left on in unoccupied rooms (during and after hours) beyond what is required for safety reasons and office equipment that is active when not in use are often the most visible examples of needless energy consumption. Not only can this waste be minimized by all staff and patrons, unique opportunities exist for "after-hours" staff such as security and janitorial to minimize energy waste.

Educating staff would be best conducted in conjunction with the energy retrofits of their facilities as these improvements are visible, frequently address energy related concerns that staff may have, and can create a system of incentives.

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The University of British Columbia has developed an award-winning program to educate its faculty and staff around the environmental impacts of their behaviors at work. UBC's experience and the experience of other organizations with similar programs has shown that employee behavior awareness programs typically reduce the energy consumption in buildings by up to five per cent.

For Vancouver, a three per cent energy reduction would create a savings of about \$150,000 in annual operational costs. After factoring in corporate growth, this would be equivalent to a 700 tonne greenhouse gas emission reduction relative to 1990 by 2010.

## ACTION

- 
- 1 That City Council approves the creation of a Coordinator-Civic Employee Sustainability Program position to undertake a full scope of activity to increase the sustainability performance of all City operations and activities, including energy usage, employee trip reductions including free parking policies, green purchasing and others, as well as examining the efficiency and cost saving effect to the environment of the compressed work week.**
- 

## Targeted Impacts of Emission Reductions Measures

The total corporate emissions in 1990 were 46,000 tonnes. A 20 per cent decrease from 1990 would require a **net** greenhouse gas emission reduction of 9,200 tonnes; this plan describes emission reduction measures with impact targets to reduce net greenhouse gas emissions by 12,750 tonnes representing a 2010 net decrease from 1990 levels of more than 25 per cent (see Appendix for a detailed breakdown of emission reduction measures).

A second growth projection affecting the impact targets of emission reduction measures is the estimated increases in the carbon intensity of electricity. Historically, most of the electricity in BC has been produced by large hydro projects. Our electricity is increasingly provided by natural gas fired generation plants and therefore has a much higher carbon intensity. The projected carbon intensity of electricity developed by BC Hydro for 2010 is based on the assumption that Power Smart programs will be widely successful, that alternate energy sources will play an increasing role in meeting our electricity demands, and that carbon offsets are available and economically viable to decrease the carbon intensity. The success of this plan is linked to the success that BC Hydro has in limiting the growth in the carbon intensity of electricity.

In addition to the quantified target emission reductions, this plan includes a number of promising opportunities to further reduce greenhouse gas emissions. The impacts of these additional measures have not been quantified because many of them rely on yet to be proven technologies, behaviors or infrastructure. While it is possible that not all of the targeted impacts of emission reduction measures will be reached, it is expected that the promise of some of these additional measures will be realized.

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## What's Next?

The corporate climate change action plan contains a wide range of approaches to address greenhouse gas reductions throughout the City of Vancouver's operations.

By pursuing the actions outlined in this plan, the City of Vancouver will not only meet City Council's greenhouse gas reduction target in a cost-effective manner, but also establish a leadership position in the region and across Canada. This plan positions Vancouver as a role-model for other corporations and institutions within the region in anticipation of the community climate change action plan that will be circulated in a consultation process later in 2004.

This plan and the community plan are only the first steps in addressing climate change. It confirms the viability of the 2010 reduction targets and establishes a responsible and credible plan of action to meet those targets. The 2010 targets are acknowledged as short-term and insufficient to meet the overall challenge of climate change, but they enable Vancouver to begin taking immediate and effective action and position us well to continue these efforts beyond 2010.

### General Recommendations

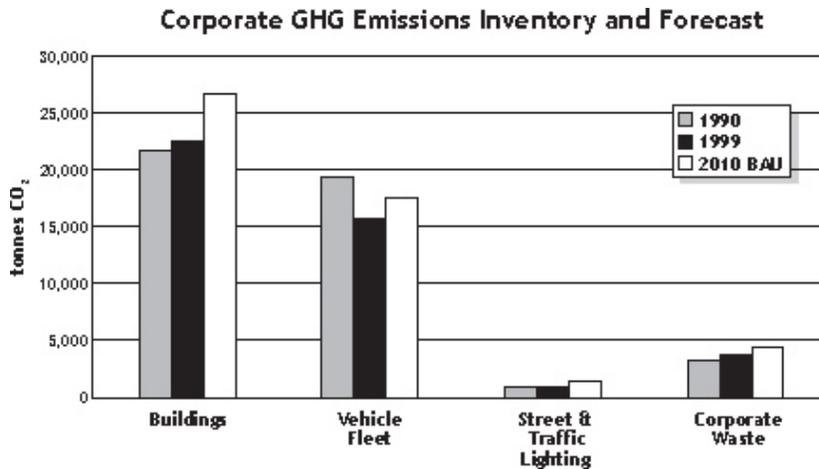
- 1) That City Council accepts the 20 per cent reduction target as viable to achieve.
- 2) That the City begins to incorporate greenhouse gas implications into all applicable corporate operations decisions.
- 3) That the engineering department, in cooperation with facility design and management, develop a systematic and repeatable approach to updating the corporate greenhouse gas inventory.
- 4) That the Sustainability Support Group provide an interim report on the implementation and impacts and cost savings resulting from the Corporate Climate Change Action Plan initiatives in 2007 and report back on proactively establishing a new greenhouse gas reduction target if the existing target has been met.
- 5) That City Council requests that the Vancouver Park Board, Police Board, and Library Board endorse this plan.
- 6) Forward this plan to the School Board to assist them in responding to climate change issues.

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## Appendix

### Corporate Greenhouse Gas Emissions Inventory

The total corporate emissions in 1990 were 46,000 tonnes. A 20 per cent decrease from 1990 would require a net greenhouse gas emission reduction of 9,200 tonnes; this plan describes the emission reduction measures and their anticipated contribution to realizing this emission reduction.



- The 1999 emission numbers are based on fuel sales and utility data. The 1990 number is based on 1990 fuel sales and a back cast from 1993 facilities energy consumption data.
- The Business as Usual (BAU) 2010 forecast is a simplistic increase in greenhouse gas emissions from 1999 based on population projections and accounting for the anticipated increases in the carbon intensity of electricity. It is presented here to illustrate that this plan has been developed taking a growth into account; for the purposes of this Plan this growth estimate is believed to be conservative and that actual growth in greenhouse gas emissions from the expansion of corporate facilities would be less than projected here.

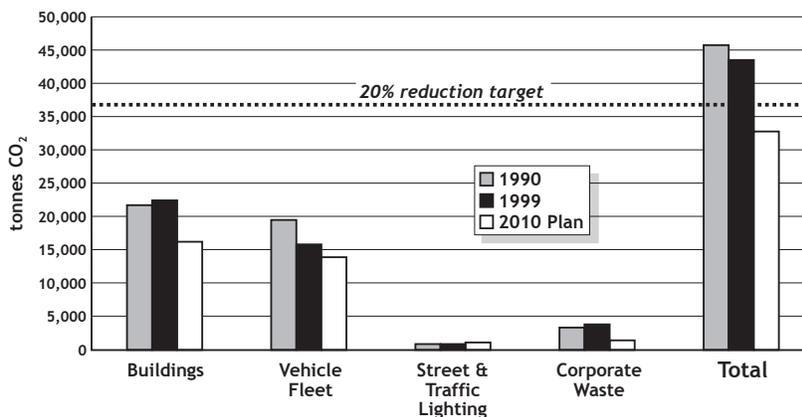
## Targeted Impacts of Emission Reductions Measures

### Targeted Impacts of Emission Reductions Measures

Emission Reduction Measure	Targeted Emission Reduction from 1990 by 2010
Energy Performance Contract	4,400 t
Energy Efficient Purchasing Policy	250 t
Vehicle Right-Sizing	600 t
Shift to Diesel Vehicles	700 t
Shift to Biodiesel Fuel	2,700 t
Driver Training Program	1,500 t
Street Lighting and Traffic Control Signals	-100 t
Landfill Gas Recovery	2,000 t
Corporate Demand Side Management	700 t
<b>Total Targeted Net Emission Reduction</b>	<b>12,750 t</b>

This net targeted greenhouse gas reduction incorporates a number of projections including growth estimates for corporate operations and for the carbon intensity of electricity. It has been assumed that facility stock and corporate fleet growth will mirror projected increases in population of 12.6 per cent from 1999 (the latest complete emission inventory) to 2010. This is a simplistic assumption but one that serves the purposes of this plan by acknowledging that growth will occur and by choosing a growth rate that is felt to overestimate the actual increases in corporate building stock and fleets in order to be conservative. It is important to stress that if initiatives to limit the impacts of future growth, such as building new and replacement civic facilities more energy efficiently, are not pursued than the effectiveness of other initiatives at reducing net emissions will be compromised; targeted decreases will be offset by higher than expected growth impacts.

### Targeted Impacts of GHG Emission Reduction Measures



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## Glossary of Terms

**CAC** – Common air contaminants include such things as particulate matter, carbon monoxide, sulphates, NOx, and hydrocarbons. References to automobile emissions frequently refer to CACs and not explicitly to greenhouse gas emissions; vehicle CAC emissions have been dropping rapidly for years but the same improvements have not been made in GHG emissions.

**CO2** – Carbon Dioxide is the most common greenhouse gas.

**eCO2** – The various greenhouse gases each has a different impact upon greenhouse effect and for simplicity and comparison, they are frequently converted to their Carbon Dioxide Equivalence.

**EPC** – An Energy Performance Contract is a contract where a private company undertakes energy efficiency capital and operational improvements for an organization in exchange for the utility savings for a specified period of time.

**ERM** – Emission reduction measure

**ESCO** - An Energy Service Company is a private company that undertakes energy performance contracts.

**GHG** – A Greenhouse Gas is one of a number of gases that work to trap the heat from the sun within the Earth's atmosphere resulting in climate change, the most common of which is carbon dioxide.

**ICLEI** – International Council of Local Environmental Initiatives

**LEED** – Leadership in Energy and Environmental Design is widely recognized "green" building rating system that allocates points for a diversity of environmental design features including, but not limited to, energy efficiency.



*Shellfish: indicator of a healthy ecosystem*

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