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# CLOUDS OF CHANGE

## Final Report of the City of Vancouver Task Force on Atmospheric Change

## Volume I

City of Vancouver

June 1990

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# CLOUDS OF CHANGE

## OVERVIEW

During 1990 Vancouver City Council heard delegations on ideas proposed by a special City Task Force on Atmospheric Change. On October 16, 1990, Council adopted a program of actions the City can take to address atmospheric change.

Clouds of Change includes:

VOLUME I

- Recommendations adopted by Vancouver City Council on October 16, 1990.
- The original report of the Task Force on Atmospheric Change.

  (People using this report are advised to cross-check the original recommendations against the Council-adopted policy.)

VOLUME II

- Appendices - Model and Example By-laws.

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# CLOUDS OF CHANGE

RECOMMENDATIONS
AS AMENDED AND ADOPTED
BY
VANCOUVER CITY COUNCIL

OCTOBER 16, 1990

## Recommendation #1 $CO_2$ and CFC TARGETS; FRAMEWORK

*Purpose: To set targets for reducing emissions of atmospheric pollutants in an international context, and to set a framework for local actions to reduce emissions of atmospheric pollutants.*

THAT, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets, Council:

a) resolve that the City of Vancouver take responsibility for the carbon dioxide emissions of its citizens and to that end commit itself to an initial reduction in 1988 level carbon dioxide emissions of 20% by the year 2005;

b) resolve that the City of Vancouver take responsibility for the chlorofluorocarbon (CFC) emissions of its citizens and to that end commit itself to phase out all emissions of CFCs and other ozone-depleting chemicals (ODCs) by the year 1995.

*Benefit: This recommendation will set targets and provide a framework for local actions to reduce emissions of atmospheric pollutants; it will also stimulate other municipalities in the Vancouver region and elsewhere to take action on reducing emissions of atmospheric pollutants.*

## Recommendation #2 REGIONAL AIR QUALITY MANAGEMENT AGENCY

*Purpose: To create an effective air quality management agency for the Lower Fraser Valley.*

THAT, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved, Council take the initiative to organize the governments responsible for the Lower Fraser Valley to create an effective agency for air quality management, monitoring, and remediation in the Lower Fraser Valley. This agency should be representative, responsive and largely self-financing with regulatory responsibility, resources and power comparable to that enjoyed by the South Coast Air Quality Management District (California), as described in the text above.

*Benefit: This recommendation will create an effective mechanism for achieving the targets in reductions of atmospheric emissions described in Recommendation #1.*

## Recommendation #3 PROVINCIAL GOVERNMENT

*Purpose: To urge the Provincial Government to enable creation of an Air Quality Management Agency for the Lower Fraser Valley; commit the Province to an initial reduction in carbon dioxide emissions of 20% by the year 2005; commit the Province to phasing out all emissions of chlorofluorocarbons and ozone-depleting chemicals by 1995; and pursue national agreements to reduce emissions of carbon dioxide and other greenhouse gases.*

THAT, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets, Council urge the Provincial Government to:

a) use all measures within its power to implement the Recommendations in this report requiring Provincial involvement, in particular enabling the creation of the Air Quality Management Agency for the Lower Fraser Valley described in Recommendation #2 above;

b) take responsibility for the carbon dioxide emissions of its citizens and to that end should commit itself to an initial reduction in carbon dioxide emissions of 20% by the year 2005. This should be part of a program to address the problem of atmospheric change and using all measures within the Government's power to reduce greenhouse gas concentrations, in particular:

   i) directing the Ministry of Transportation and Highways to assist municipal and regional governments to reduce emissions of atmospheric pollutants from motor vehicles in the Lower Fraser Valley;

   ii) supporting mandatory vehicle emissions testing;

   iii) directing the Motor Vehicles Department and the Insurance Corporation of British Columbia to set fees for vehicle registration, licensing and insurance on a sliding scale to favour less polluting vehicles;

   iv) directing the Ministry of Forests to reduce the amount and rate of carbon dioxide released into the atmosphere as a result of forest management practises; and

   v) directing the Ministry of Forests to recognize in its management and planning practices the significant economic role of forests as carbon sinks in stabilizing atmospheric change; and

c) take responsibility for the chlorofluorocarbon (CFC) emissions of its citizens and to that end commit itself to phase out all emissions of CFCs and other ozone-depleting chemicals by the year 1995. This should be part of a program to address the problem of global atmospheric change and local and regional air pollution using all measures within the Province's power; and

d) pursue national agreements to reduce emissions of carbon dioxide and other greenhouse gases.

*Benefit: This recommendation will enable the reductions of atmospheric emissions described in Recommendation #1.*

## Recommendation #4 FEDERAL GOVERNMENT

*Purpose: To urge the Federal Government to commit Canada to an initial reduction in carbon dioxide emissions of 20% by the year 2005; commit Canada to phasing out all emissions of chlorofluorocarbons and ozone-depleting chemicals by 1995; and to pursue international agreements to reduce emissions of carbon dioxide and other greenhouse gases.*

THAT, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets, Council urge the Federal Government to:

a) use all measures within its power to implement the Recommendations in this report requiring Federal involvement;

b) take responsibility for the carbon dioxide emissions of its citizens and to that end should commit itself to an initial reduction in carbon dioxide emissions of 20% by the year 2005. This should be part of a program to address the problem of atmospheric change and using all measures within the Government's power;

c) take responsibility for the chlorofluorocarbon (CFC) emissions of its citizens and to that end should commit itself to phase out all emissions of CFCs and other ozone-depleting chemicals by the year 1995. This should be part of a program to address the problem of global atmospheric change and local and regional air pollution using all measures within the Government's power;

d) set legally enforceable automobile fleet fuel efficiency standards for the year 2000 of 4.7 litres gas consumption per 100 kilometres driven, or other comparable standards as established by the California Air Resources Board;

e) adopt specific targets as part of international agreements to reduce emissions of carbon dioxide and other greenhouse gases; and

f) progressively limit imports from countries which do not adopt international targets to reduce emissions of carbon dioxide and other greenhouse gases.

*Benefit: This recommendation will enable the reductions of atmospheric emissions described in Recommendation #1.*

## Recommendation#5 BANNING AND REGULATING OZONE-DEPLETING CHEMICALS

*Purpose: To ban the use, sale and manufacture of chlorofluorocarbons (CFCs) and other ozone-depleting chemicals (ODCs), enhance the effective control and recovery of CFCs now in use; and encourage the substitution of non-ozone depleting alternatives for products and processes currently in use.*

THAT Council:

a) direct the City Department of Permits and Licenses, Health Department and Law Department to review the Greater Vancouver Regional District's proposed CFC Control Task Force by-law and report to Council ~~before the end of 1990~~ as soon as possible on an appropriate City by-law banning the use, sale and manufacture of ozone depleting chemicals and items which in their manufacturing process involve the use of ozone depleting chemicals as provided in the ordinance adopted by Newark, New Jersey which is Appendix 1 of Volume II of this report; and

b) direct the City Law Department, as part of the study described in recommendation (a), to prepare and deliver a draft by-law banning the use, sale and manufacture of ozone depleting chemicals.

*Benefit: This recommendation will reduce and eventually eliminate Vancouver emissions of chlorofluorocarbons and related chemicals which damage the ozone layer and contribute to atmospheric change.*

## Recommendation #6 SUBSTANCE REGULATION, INCENTIVES FOR CONVERSION AND CONSERVATION

*Purpose: To determine the City's powers to assist businesses with conversion from chlorofluorocarbons and ozone depleting chemicals to less harmful chemicals and products.*

THAT Council direct the City Department of Permits and Licenses, ~~and~~ City Law Department, and the Medical Health Officer to study and report to Council before the end of 1990 on specific regulatory measures, using the City's existing and any necessary new powers to regulate licensed businesses, to provide economic incentives for conversion of processes from those using ozone depleting chemicals.

*Benefit: This recommendation will help the City determine its ability to assist Vancouver businesses in reducing their emissions of chemicals that damage the ozone layer and contribute to atmospheric change.*

## Recommendation #7 REDUCE PRESENT SULPHUR DIOXIDE LEVELS

*Purpose: To reduce present unhealthful levels of sulphur dioxide emissions from regional cement works and petroleum processing refineries.*

THAT Council request the Greater Vancouver Regional District (GVRD) to use its influence to immediately reduce the levels of industrial sulphur dioxide emissions~~, especially those from cement works and petroleum processing refineries~~ in the GVRD.

*Benefit: This recommendation will reduce present levels of sulphur dioxide emissions in the Greater Vancouver area, which are linked with hospital visits for respiratory problems such as asthma and bronchitis.*

## Recommendation #8 ACCELERATE METHANE GAS COLLECTION

*Purpose: To accelerate construction of the methane gas collection system for the Burns Bog Landfill.*

THAT Council direct the City Engineering Department to accelerate construction of the methane gas collection system for the Burns Bog Landfill.

*Benefit: This recommendation will reduce present emissions levels of methane gas, a greenhouse gas which, if collected, can be sold for other uses.*

## Recommendation #9 TRAFFIC MANAGEMENT (TRIP REDUCTION) BY-LAW

*Purpose: To reduce peak hour trips and increase the number of people to vehicles from 1.3 to 1.75.*

THAT Council direct the:

a) City Law Department to draft an automobile traffic management by-law based on the model traffic management by-law which is included as Appendix 2 of Volume II of this report and deliver that traffic management by-law to Council before June 30, 1991;

b) City Engineering Department and City Planning Department to

i) study the measures necessary to implement that traffic management by-law and formulate a comprehensive plan to implement, monitor and enforce the traffic management by-law and report to Council before June 30, 1991; and

ii) formulate measures to fulfil the City's information gathering and dissemination, coordination and other responsibilities under the traffic management by-law, as contemplated in the model traffic management by-law which is included as Appendix 2 of Volume II of this report, and report to Council on those matters before June 30, 1991.

*Benefit: This recommendation would significantly reduce the number of single-occupant vehicle trips in the City, with a corresponding reduction in the emissions of atmospheric pollutants from motor vehicles.*

## Recommendation #10 PREFERENTIAL PARKING AND PRICING

*Purpose: To provide preferential parking and parking pricing that favours high-occupancy vehicles over single-occupancy vehicles.*

THAT Council direct:

a) the City Engineering Department to study, and report to Council before June 30, 1991 on the principles for establishing:

i) the pricing for preferential parking in City owned parking lots and on City streets, giving reduced parking rates to vehicles identified as high-occupancy vehicles and giving high-occupancy vehicles preference for parking space over vehicles identified as single-occupancy vehicles; and

ii) the provision of parking facilities for high-occupancy vehicles only, so that new parking for single-occupancy vehicles is limited and eventually decreased; and

b) the City Law Department to study, and report to Council before June 30, 1991 on, the feasibility of a regulatory by-law designed to require operators of private parking lots in the City to implement measures comparable to those referred to in sections (a) (i) and (ii) above.

*Benefit: By favouring high-occupancy vehicles while discouraging single-occupancy vehicles, this recommendation will result in significant decreases in Vancouver's emissions of atmospheric pollutants.*

## Recommendation #11 BICYCLE TRANSPORTATION

*Purpose: To make bicycling a better transportation alternative by providing ample bicycle parking and related bicycle facilities; implementing and expanding the Vancouver Bicycle Plan; and improving enforcement of all traffic laws relating to road sharing by bicyclists and motorists.*

THAT Council:

a) direct the City Engineering Department to:

i) with the City Planning Department, proceed rapidly in the preparation of amendments to the Parking By-Law and the Zoning and Development By-Law to require ample minimum bicycle parking in all new developments and to require minimum bicyclists' shower and locker facilities in all new developments;

ii) proceed rapidly with implementation of the Vancouver Bicycle Plan in cooperation with the Bicycle Advisory Committee; and

iii) in cooperation with the Bicycle Advisory Committee, before the end of 1991 develop measures beyond the Vancouver Comprehensive Bicycle Plan of July 1988 to increase the ease and accessibility of bicycle transportation for ordinary people and expand opportunities to make bicycling a better transportation alternative, such as protected bicycle commuting routes, improving bicycle-transit connections, etc.

b) urge the Vancouver Police Board to improve enforcement of all traffic laws relating to road sharing by bicyclists and motorists, such as obeying rules of the road, displaying lights and reflectors, and wearing helmets.

*Benefit: This recommendation will enable many Vancouver commuters to consider bicycling as a better transportation alternative, with a consequent decrease in motor vehicle usage. This is especially important in good weather, when sunlight reacts with motor vehicle exhaust to form unhealthful atmospheric pollutants such as ground-level ozone.*

## Recommendation #12 SHORT-TERM EMISSIONS REDUCTION MEASURES

*Purpose: To achieve short-term reductions in emissions of atmospheric pollutants from motor vehicles.*

THAT Council direct the City Engineering Department to:

a) identify and report to Council before ~~June 30, 1991~~ December 31, 1991 on those streets where existing traffic lanes can effectively be restricted to high-occupancy vehicles during rush hours;

b) monitor the City of Toronto's experiment with remote tailpipe sensing and the South Coast (California) Air Quality Management District's Bar-90 program and report to Council before the end of 1991, with a recommendation regarding their potential application in Vancouver; and

~~c) work with the regional air quality management authority and the Province in initiating, before the end of 1991, a hotline for reporting vehicles with excessive tailpipe emissions.~~

THAT Council request the GVRD (or regional air quality management authority) and the Province to consider a hotline for reporting excessive tailpipe emissions as part of a comprehensive emission regulation program.

*Benefit: This recommendation will achieve short-term emissions reductions by favouring high-occupancy vehicles and by targeting those vehicles responsible for a disproportionate share of emissions.*

## Recommendation #13 ROAD PRICING AND TRANSIT IMPROVEMENT

*Purpose: To study a road pricing system to fund public transit, provide transit passes for all university students, and use the revenues from these programs to improve transit service, reduce transit fares, and experiment with clean-burning fuels.*

THAT Council:

a) direct the City Engineering Department to work with the Ministry of Transportation and Highways to develop a program of fees and permits, under which high-occupancy vehicles are given pricing preference to single-occupancy vehicles, in order to encourage significant decrease in single-occupancy vehicles and, in particular, consider implementation of the Stockholm Trafikplan '89 program;

b) urge B.C. Transit to ~~agree with institutions of higher education in Vancouver that students at those institutions purchase a reduced rate transfer pass for each school year as part of their tuition fees~~ provide improved marketing in institutions of higher learning and in secondary schools to educate people about the transit system and the associated benefits of using it; and

c) urge B.C. Transit to ~~dedicate revenues generated from recommendations (a) and (b) above to funding~~ continue a comprehensive program of transit improvements (funded from present revenue sources as well as from additional road-pricing revenues when available); these improvements to include, but not be limited to, the following:

   i) improvements in the frequency, convenience, comfort and efficiency of transit service;

   ii) ~~reduced transit fares, with daily fares good for an entire day in any direction~~ price, transfer and other marketing inducements which encourage increased transit ridership;

   iii) ~~increasing the proportion of electric-powered buses in the bus fleet~~ conversion of the bus fleet to the most efficient and environmentally sensitive power sources available for each application and route; and

   iv) ~~experiments with hydrogen fuel cell powered vehicles in the City, in cooperation with the recently created Provincial Hydrogen Agency~~ reduce transit fares, with daily fares good for an entire day in any direction.

*Benefit: This recommendation would reduce atmospheric pollution by reducing vehicular traffic while funding public transit and experimenting with clean-burning fuels.*

## Recommendation #14 TELECOMMUNICATIONS

*Purpose: To encourage opportunities for telecommuting rather than commuting, so as to reduce the need for transportation.*

THAT Council direct the City Manager's Office to coordinate all Departments, in cooperation with the civic unions, in researching and supporting telecommunications opportunities that reduce the need for transportation, including but not limited to:

a) developing a telecommunications policy for internal City use;

b) examining City-wide telecommunications needs with local businesses, agencies, and developers;

c) working with neighbourhood commercial districts to identify and put into use telecommunication applications;

d) investigating opportunities for a "24-hour City Hall" to provide information by computer access on City activities, services, hearings, and cultural/recreational events;

and, before the end of 1992, report to Council with a plan for immediate implementation of the recommendations discussed in (a) through (d) above.

*Benefit: This recommendation will encourage opportunities which reduce the need for transportation, and encourage local businesses to become leaders in technological and workplace developments which enhance this objective.*

## Recommendation #15 ANNUAL EMISSIONS & TRANSPORTATION SUBSIDY REPORT

*Purpose: To monitor and evaluate progress in reducing emissions of atmospheric pollutants; to monitor and evaluate progress in reorienting subsidies from private to public forms of transit.*

THAT Council direct the City Engineering Department to ~~prepare~~ report back during the 1991 budget process on general approach and resource needs for preparing an annual report to Council on:

a) total vehicle usage, including occupancy rates; total volume of all motor vehicle fuels sold in the City; average trip length; and resultant changes in carbon dioxide and other atmospheric pollutant emissions;

b) the amount of all direct and indirect subsidies to private automobile use in the City (e.g., the costs of road maintenance, traffic enforcement, parking enforcement, land that could be used for other purposes, etc.) compared with the amount of all subsidies to public forms of transit; and

c) the relative contribution of non-automotive mobile sources of atmospheric pollutants, such as trucks, ships, and aircraft, and strategies to reduce emissions from these sources.

FURTHER THAT the City Manager be instructed to report back on regional initiatives in regard to emission reductions and transportation subsidies to ensure there is no duplication in efforts

*Benefit: This recommendation will enable the City to monitor its progress in meeting emissions reduction targets; it will also improve the City's ability to determine the true costs of public and private transportation options.*

## Recommendation #16 ENERGY-EFFICIENT LAND USE POLICIES

*Purpose: To reduce our needs for transportation and let us meet those needs in more energy-efficient ways.*

THAT Council request the City Planning Department and the Greater Vancouver Regional District's Development Services Committee to study and develop energy-efficient land use policies based on these recommendations from the Federation of Canadian Municipalities [2]:

a) encourage greater density through multiple unit residential developments;

b) integrate work, residence and shopping in mixed use development;

c) encourage residential clustering;

d) zone higher density development along established routes;

e) decentralize commercial and community services to reduce travel distances, creating self-contained communities with a better balance between employment and population;

f) place controls on outlying shopping centres, strip development and urban sprawl;

g) encourage the infilling (development) of existing vacant land in built-up areas;

h) ensure that major public facilities have provision for walking and bicycling access to transit;

i) encourage the development of high quality walking and bicycling facilities, including development design guidelines to support transportation alternatives to private automobile use, such as provision of on-site lunchrooms, daycare facilities, automated bank teller machines and other facilities;

and~~, before the end of 1991,~~ report to Council ~~with a plan for~~ on the implementation of the recommendations discussed in items (a) through (i) above as part of the proposed City-wide planning process.

*Benefit: This recommendation will reduce long-term emissions of atmospheric pollutants by reducing the need for transportation.*

## Recommendation #17 DESIGN COMPETITION

*Purpose: To facilitate energy-efficient land use policies by sponsoring an international design competition.*

THAT Council~~, in order to facilitate Recommendation #16 above, direct the City Planning Department to sponsor and announce, before the end of 1991, an international design competition based on the criteria in Recommendation #16 above for the City-owned~~ direct the City Planning Department and the Housing and Properties Department to develop a planning and design process aimed at achieving an energy-efficient development on the southeast shore of False Creek between Main and Cambie and that this process be reported to Council early in 1991.

*Benefit: This recommendation will motivate the architectural, design and building industries, as well as the public, to encourage energy-efficient land development.*

## Recommendation #18 ECOLOGICAL DEVELOPMENT INCENTIVES

*Purpose: To provide incentives for ecologically appropriate urban development.*

~~THAT Council direct the City Planning Department to study an ecological incentive program which would implement a floor space incentive system, encouraging developments which provide a prescribed range of measures, including energy efficient design, suitable density developments, low environmental impact development, creation of common areas, supply of inexpensive and more modestly sized homes, and facilities which encour-~~

~~age alternatives to the private automobile; and before June 30, 1992 report to Council with a plan for implementation of the program.~~

*Benefit: This recommendation will encourage energy-efficient land development.*

## Recommendation #19 PROXIMITY POLICIES AND INCENTIVES

*Purpose: To make access by proximity rather than access by transportation a central focus of planning in the City.*

THAT Council direct the City Planning Department and City Finance Department to make access by proximity rather than access by transportation a central focus of ~~planning in the City by: undertaking a study to develop and implement a program of~~ the City's new City-wide plan and to include proximity policies and incentives as proposals for public consideration in the planning process~~; and, no later than June 30, 1993, reporting to Council with a plan for implementation of this program~~.

*Benefit: This recommendation will result in policies and incentives that encourage people to minimize their needs for transportation.*

## Recommendation #20 RESIDENTIAL INTENSIFICATION

*Purpose: To encourage new residential units in existing buildings or on previously developed, serviced land, so as to reduce commuting and to reduce urban sprawl.*

THAT, subject to future reports on specific initiatives which will clarify costs and trade-offs, Council continue its program of encouraging residential intensification, including the creation of new residential units in existing buildings through creation of boarding houses, secondary suites, conversion of commercial buildings to residential use, and infill through, for example:

a) low-interest loans to assist homeowners wishing to provide accessory units;

b) minimum requirements for space, utilities, quality of construction and safety; and

c) technical assistance in terms of design, neighbourhood fit, etc.

*Benefit: This recommendation will increase the supply of housing units in order to reduce pressure on the transportation system and better enable proximity planning.*

## Recommendation #21 ENCOURAGE WORK AT HOME

*Purpose: To encourage people to work at home, so as to reduce the need for transportation.*

THAT Council direct the City Department of Permits and Licenses, the City Law Department and the City Planning Department to study and report to Council before June 30, 1991 on amendments to existing by-laws and regulations required to encourage appropriate home occupations.

*Benefit: This recommendation will contribute to the new focus on proximity planning and reducing the need for transportation.*

## Recommendation #22 LOCAL AREA PLANNING TERMS OF REFERENCE

*Purpose: To ensure that all local area planning programs incorporate the objectives of reducing emissions of atmospheric pollutants and include measures addressing those objectives in their recommendations to Council.*

THAT Council direct the City Planning Department to immediately require in its terms of reference for all local area planning programs that the local area planning committee consider the objectives of reducing emissions of atmospheric pollutants and include measures addressing those objectives in its recommendations to Council.

*Benefit: This recommendation will ensure that the overall goal of reducing emissions of atmospheric pollutants is enhanced by the routine decisions of local area planning programs.*

## Recommendation #23 COMMUNITY COUNCILS

*Purpose: To establish a pilot program of Community Councils to promote and support urban development compatible with the goal of reducing emissions of atmospheric pollutants.*

THAT ~~Council direct the City Manager and the City Planning Department before the end of 1991 to develop a pilot program of Community Councils to promote and support urban development compatible with reducing emissions of atmospheric pollutants. These Community Councils will review and develop plans that reflect the responsibility of neighbourhoods to reduce emissions of atmospheric pollutants~~, upon completion of the first local area planning programs which include atmospheric concerns in their terms of

reference, the City Manager and the Director of Planning be directed to report back on an evaluation of the process and its possible extension to other areas of the City.

*Benefit: This recommendation will test a mechanism for promoting and supporting urban development compatible with reducing emissions of atmospheric pollutants.*

## Recommendation #24 PLANS AND REZONING

*Purpose: To ensure that planning and rezoning contribute to the objective of reducing atmospheric pollution.*

THAT Council direct the City Planning Department immediately to:

a) require, in all plans or rezoning reports prepared by the Planning Department, a statement describing how the proposal contributes to or detracts from the objective of reducing atmospheric pollution; and

b) review all such statements with the Special Office for the Environment.

FURTHER THAT Council direct the Planning Department to work with the Special Office for the Environment and the Health Department to develop a comprehensive method for the assessment of atmospheric emissions impact and report back to Council.

*Benefit: This recommendation will ensure that the overall goal of reducing emissions of atmospheric pollutants is enhanced by routine planning and rezoning.*

## Recommendation #25 ENERGY CONSERVATION AND EFFICIENCY

*Purpose: To meet existing energy conservation standards in all new and existing residential and commercial buildings, and to discourage practices and materials that produce atmospheric pollutants in all new construction.*

THAT Council:

a) direct the City Department of Permits and Licenses to ~~expedite~~ implement~~ation of~~ an energy conservation by-law ~~requiring all new construction in the City to meet prescribed standards of efficient energy use, with that objective to be achieved if possible by adoption of relevant portions of the National Building Code or another code with energy efficiency standards~~ for commercial and multi-family construction by June 30, 1991 and monitor the administration of this by-law in preparation for its possible extension to single-family construction in 1992;

b) direct the City Department of Permits and Licenses to study, and report to Council ~~before June 30,1991, on the following~~:

i) during the 1991 budget process, on general approach and resource needs for a commercial and residential energy conservation retrofit by-law, modelled on the San Francisco retrofit ordinance which is Appendix 3 of Volume II of this report; and

ii) before June 30, 1991, on a program, in conjunction with the Greater Vancouver Regional District's CFC Control Strategy, to encourage installation of alternatives to halon fire protection systems and HVAC systems employing ozone depleting chemicals as coolants;

c) direct the City Department of Permits and Licenses to report back on general approach and resource needs during the 1991 budget process on a program to encourage infrared scanning for energy leakages in commercial and residential buildings;

d) request B.C. Hydro and B.C. Gas to invest in low-interest loan programs for residential and commercial energy conservation;

e) ~~direct the City Department of Permits and Licenses and the City Law Department to report to Council before June 30, 1991 on a by-law, incorporating existing B.C. Hydro interior lighting standards, to implement energy efficient interior lighting standards for commercial buildings based on the model by-law which is Appendix 4 of Volume II of this report;~~ and

f) request the Provincial Government to pass an Energy Efficiency Act setting minimum energy efficiency standards for appliances, similar to legislation passed in Ontario.

*Benefit: This recommendation will result in decreased emissions of atmospheric pollutants by minimizing energy waste and inefficiency, therefore enhancing the livability, economic strength, and well-being of the City's residents and businesses.*

## Recommendation #26 ANNUAL REPORTS TO ASSESS HEALTH EFFECTS

*Purpose: To monitor, in cooperation with neighbouring regional districts, the health effects of atmospheric pollutants; and assess the health effects of woodburning in the City.*

THAT Council direct the City Health Department to:

a) publish an annual report on the health effects of global and local atmospheric pollutants and on air quality in Vancouver and the Fraser Valley;

b) cooperate with the Central Fraser Valley Regional District, the Dewdney-Alouette Regional District, and the Fraser Cheam Regional District and their respective Union Boards of Health in compiling these annual reports; and

c) with the City Law Department, to study and report to Council before June 30, 1991 on the regulation of wood burning in stoves, fireplaces and outdoors, on the basis that such wood burning contributes to the deposition of particulate matter and may be harmful to the health of the City's citizens.

*Benefit: This recommendation will provide information on the health effects of atmospheric pollutants in the Greater Vancouver region.*

## Recommendation #27 CARBON DIOXIDE TAX TO FUND TRANSPORTATION ALTERNATIVES

*Purpose: To introduce a regional tax on carbon dioxide emissions to fund transportation alternatives and development of clean-burning fuels.*

THAT Council meet informally with the Task Members and receive a report before the end of the year on urgeing the regional air quality management authority and the Provincial Government to introduce before June 30, 1991 a regional vehicular carbon dioxide tax with these characteristics:

a) the tax should be levied on the amount of carbon contained in fuels per unit of energy;

b) the tax should rise in increments over a five-year period so that by 1997 the total retail cost would equal the average cost of the same fuels in representative western European nations;

c) the tax revenues would be accounted for separately and applied to uses such as:

   i) subsidizing infrastructure for alternative transportation such as bicycles and public transit;

   ii) subsidizing infrastructure for vehicles fueled by alternative fuels such as natural gas, hydrogen, or electricity;

iii) research and demonstration of advanced alternative fuels; and

iv) monitoring and reporting on the progress of carbon dioxide emissions reduction programs; and

v) reducing the inequities produced by the imposition of this tax.

*Benefit: This recommendation will encourage citizens to make atmosphere-friendly transportation choices and provide a significant source of revenue for funding the development of alternative fuels and alternative means of transportation in the Region.*

## Recommendation #28 URBAN REFORESTATION

*Purpose: To plant and nurture City forests and trees in City parks, on City streets, on private property, and to regulate the removal, damage or destruction of trees on private property in the City.*

THAT Council:

a) direct the Vancouver Park Board, the City Engineering Department, and the City Planning Department to study and report to Council before June 30, 1991 on:

i) a plan for planting and maintenance of extensive City forests in City parks and on City streets;

ii) a plan for promoting and assisting the planting of trees on private property;

iii) a plan to supplement City efforts by encouraging and coordinating community-based tree awareness, planting and maintenance programs in conjunction with community associations, schools and community organizations;

iv) a mechanism or structure to coordinate, amongst City agencies, in the most appropriate and efficient manner, all aspects of public and private tree awareness, planting and maintenance; and

v) the preparation and presentation to the Park Board and Council of an annual report regarding all tree related activities for the prior 12 months and a proposed action plan and budget for the following 12 months;

b) as soon as the jurisdiction is granted by the Provincial Legislature to the City, Council should pass a by-law to regulate the removal of, or damage or destruction to, trees on private property in the City.

*Benefit: This recommendation will improve local and global air quality by increasing the absorption of carbon dioxide from the atmosphere, and by assisting in energy conservation.*

## Recommendation #29 RECYCLING, PACKAGING & COMPOSTING

*Purpose: To reduce and recycle solid wastes; to minimize the use of nondegradable, nonreturnable and nonrecyclable food and beverage packaging,to reduce the amount of household organic waste; and to study the regulation of small incinerators.*

THAT Council:

a) encourage the City and the Greater Vancouver Regional District to accelerate the reduction and recycling of solid wastes and review programs of solid waste recycling and reduction on at least an annual basis to identify appropriate opportunities for expansion;

b) ~~direct the City Law Department to, in concert with the City Engineering Department, prepare a by-law along the lines of the ordinance adopted in Minneapolis, Minnesota which is Appendix 5 to this report, minimizing the use of nondegradable, nonreturnable and nonrecyclable food and beverage packaging originating at retail food establishments within the City, and report to Council before June 30, 1991 and that Council then should at once pass the by-law~~ continue to urge the Federal and Provincial governments to introduce stringent standards regulating nondegradable, nonreturnable, and nonrecyclable food and beverage packaging; direct the Special Office for the Environment to assess these standards when they are announced and report back on the desirability and feasibility of a supplementary City by-law; ~~and~~

c) direct the City Engineering Department to~~, in concert with the Parks Board and the School Board, before the end of 1991, to expand upon the pilot home composting program and institute neighbourhood composting programs, through community centres and schools. These neighbourhood composting programs should provide instruction regarding composting of household organic waste and develop sites for composting organic waste from multi-family dwellings where on-site composting is not possible, with the overall goal of reducing the amount of household organic waste~~ assess the current pilot composting program and report back before the end of 1991 on the feasibility and desirability of expansion, including the

possibility of joint neighbourhood programs with the Parks and School Boards; and

d) direct the City Health Department, with the City Law Department, to study and report to Council before the end of 1991 on the regulation of small incinerators, such as those operated by some universities and hospitals, on the basis that such incinerators contribute to emissions of atmospheric pollutants.

*Benefit: By reducing and recycling solid wastes, and by regulating small incinerators, the City will be better able to reduce the amount of atmospheric pollutants produced by those wastes.*

## Recommendation #30 MUNICIPAL TRANSPORTATION AND ENERGY USE

*Purpose: To shift away from fossil fuels for City vehicles; conserve energy in municipal operations; encourage commute alternatives for City employees; explore alternative fuels; and improve the fuel composition of the City's vehicle fleet.*

THAT Council:

a) resolve that in their operations all City Departments shall:

i) shift away from fossil fuel use altogether or shift away from diesel and gasoline to less harmful fossil fuels, such as propane and natural gas;

ii) phase out the use of halon fire extinguishers in City facilities and ensure the environmentally safe management and disposal of the contents;

iii) accelerate conversion to energy conserving street lights; and

iv) encourage all City employees to conserve energy in their daily activities by, for example, switching off unneeded lighting;

b) direct the City Manager ~~before June 30, 1991 to substitute free transit passes for all City employees in place of free City employee parking~~, in cooperation with the civic unions, to pursue the substitution of free transit passes for free parking for all City employees and City Council members and report back on progress before the end of 1991;

c) direct the City Manager, in co-operation with the City Engineering Department ~~and~~, City Personnel Department and the civic unions, to study

and report to Council before June 30, 1991 on a program to encourage commuting by City employees and City Council members other than by single-occupant motor vehicle, including by:

i) designating an employee to co-ordinate the program;

ii) providing modest financial incentives, comparable to the cost of parking spaces, to employees and City Council members who use commute alternatives and low emission alternate fuels (see (b) - transit pass recommendations, above);

d) direct the City Manager in co-operation with the City Engineering Department, ~~and~~ City Personnel Department and the civic unions, before June 30, 1991, to report back on the proposed program to provide ride sharing assistance through a matching service and through preferential parking for ride share vehicles;

e) direct the City Engineering Department, in consultation with the Housing and Properties Department and the civic unions, to report back before the end of 1991, on a program to:

i) provide safe, convenient and sheltered bike racks and lockers for employee bicycles;

ii) provide more shower and changing space for employee bicyclists; and

iii) encourage a mass purchasing program of bicycle helmets and other bicycle safety equipment;

f) direct the City Manager, in cooperation with the civic unions, before the end of 1992, to identify categories of employees for whom telecommuting is feasible, and study the benefits and costs to the City of promoting that mode of work including, where appropriate, through the provision of computers, modems and telephone lines to facilitate telecommuting;

g) direct the City Engineering Department and the City Finance Department, before the end of 1992, to research and develop, in cooperation with other municipalities, a program to convert the City's vehicle fleet to run on the cleanest-burning available fuels; and

h) direct the City Engineering Department to ~~ensure that before the end of 1997 at least 50% of the City's vehicle fleet operates on fuels that produce less atmospheric pollution than gasoline or diesel fuel~~ continue its research into the combination of available vehicular technology and fuel types that provide the lowest levels of emission for the City fleet and to

report at least every two years on progress toward the targets recommended in this report .

*Benefit: This recommendation will demonstrate the City's commitment to responding to atmospheric change, and set the pace for the community as a whole.*

## Recommendation #31 MUNICIPAL INVESTMENT AND PURCHASING

*Purpose: To favour companies with environmentally sound business practices for all City investments and purchasing.*

THAT Council:

a) ~~adopt by resolution a Code for environmentally sound business practices~~ instruct the Directors of Finance and Legal Services to recommend a code for environmentally sound business practices, as principles which govern all City operations, investments and purchases;

b) ~~direct all City Departments to implement this Code in a City-wide procurement policy, to be developed by the City Manager and Department of Finance and implemented before June 30, 1991, at which time that policy is to become a condition of all contracts between the City and suppliers to the City; and~~ instruct the Purchasing Agent, in consultation with relevant departments, to work with his counterparts in other regional municipalities to develop a procurement policy which balances environmental objectives with sound and efficient administrative practice, with the need to maintain competitive sources of supply, and with the other municipal procurement objectives, and report back before the end of 1991.

~~c)~~ ~~direct the City Purchasing Department to participate in formulating similar procurement policies for the Greater Vancouver Regional District.~~

*Benefit: This recommendation will redirect City investments and purchasing toward companies with environmentally sound business practices.*

## Recommendation #32 ANNUAL DEPARTMENTAL PROGRESS REPORTS

*Purpose: To monitor progress on reduction in emissions of atmospheric pollutants.*

THAT Council:

a) direct the Special Office for the Environment to coordinate an annual report in which all departments report to Council on progress during the year on atmospheric change targets; and

b) appoint an independent panel of experts and community representatives to review publicly the annual report and provide commentary to Council.

*Benefit: This recommendation will enable Council and City staff to determine the effectiveness of efforts to reduce emissions of atmospheric pollutants, and provide information for improving those efforts.*

## Recommendation #33 STUDY ADAPTIVE MEASURES

*Purpose: To be prepared for those consequences of atmospheric change for which we may already be committed.*

THAT Council instruct the Engineering Department to continue to monitor global warming trends and potential adaptive measures and report periodically to Council on current scientific consensus and possible adaptation strategies. ~~direct the City Engineering Department before the end of 1992 to study and report to Council on:~~

~~a) measures required to adapt to local consequences of atmospheric change, such as sea-level rise; and~~

~~b) estimate the costs involved of these adaptive measures, such as shoreline stabilization programs, emergency planning programs, and relocation of low-lying facilities.~~

*Benefit: This recommendation will provide Council with the necessary information to begin planning long-term measures to adapt to possible consequences of atmospheric change, and to develop means for financing such measures.*

## Recommendation #34 THE CITY'S ROLE

*Purpose: To advocate environmentally responsible policies and actions at all government levels; to facilitate the development of policy and technology related to atmospheric*

*change and energy efficiency; and to share information and projects with other cities of the world to respond to atmospheric change.*

THAT Council:

a) resolve that, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving objectives and targets, the City take a pro-active role, advocating environmentally responsible policies and actions at all government levels, including municipal organizations in Canada and globally;

b) direct the City Manager to study and report to Council before June 30, 1991 on ways in which the City can serve as a resource for development of policy and technology related to atmospheric change and energy efficiency;

c) direct the City Manager to establish necessary communication with appropriate agencies in other jurisdictions, such as South Coast Air Quality Management District (California); and

d) support Vancouver citizens and municipal officials to embark on a series of selected projects, undertaken in cooperation with other cities of the world, especially the developing world, that focus on municipal recognition and response to global atmospheric change, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets.

*Benefit: This recommendation will put the City on the leading edge of the response to atmospheric change, providing guidance and incentive to environmentally-based industries in the City, by developing policies and technologies which will be in high demand elsewhere in the country and the world.*

## Recommendation #35 PUBLIC INVOLVEMENT AND EDUCATION

*Purpose: To foster public awareness of the problems associated with atmospheric change and to develop public awareness of local initiatives to reduce emissions of atmospheric pollutants.*

THAT Council direct the City Manager to develop before June 30, 1991 a program for dissemination of information to the public and all City employees to foster public awareness about the problems associated with atmospheric change by, for example:

a) encouraging city leaders to set personal examples;

b) providing information on tax notices, paycheques, and on all publications and mailings;

c) using breaks during cable television broadcasts of Council meetings to provide environmental information;

d) posters in bus shelters, on city vehicles, and in city buildings;

e) implementing demonstration projects in city buildings and in other civic operations and development (e.g., new library, new city hall);

f) encouraging "green" neighbourhood demonstration projects;

g) city participation in arbour day;

h) creating an ongoing process whereby the City teaches, listens and learns so that citizen participation is sustained and meaningful, including funding public attitude surveys toward proposed or enacted initiatives and regulations;

i) printing environmental education messages on park board disposable food containers;

j) creating an information kit for citizens and businesses containing practical suggestions for action that can be taken immediately, to be distributed through community centres, schools, public libraries and all municipal facilities; and

k) assisting the community in implementing citizen-generated programs.

*Benefit: This recommendation will develop public support for local initiatives to reduce emissions of atmospheric pollutants.*

In addition to the amending and adopting the recommendations of the Task Force on Atmospheric Change as detailed above, City Council also adopted another resolution as follows:

THAT Council direct that the reports back on specific initiatives include, where applicable, a discussion of the costs of implementation (including social, health, and economic costs) and proposals to mitigate these costs for those with low and fixed incomes.

CITY OF VANCOUVER

# TASK FORCE ON ATMOSPHERIC CHANGE


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# CLOUDS OF CHANGE:

## Final Report of the City of Vancouver Task Force on Atmospheric Change


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# Executive Summary

Atmospheric change is not just another environmental issue.

Since the seminal Toronto conference "The Changing Atmosphere: Implications for Global Security," in June 1988, all subsequent high-level international meetings have confirmed that human activity is changing the atmosphere at an unprecedented rate and that these changes represent a major threat to both environmental health and geopolitical security.

How to respond to atmospheric change, however, is among the most difficult policy questions confronting elected officials today. There is great uncertainty over the likely public health and ecological impacts. Strategies to adapt to and reduce atmospheric change impinge upon many other environmental, economic, and municipal planning issues. From a political perspective, therefore, it may appear more expedient to do nothing. But is such inaction politically responsible at the risk of exposing society to unprecedented and irreversible environmental hazards?

Whatever the impact of atmospheric change *per se*, many corrective measures are socially desirable in their own right. For example, several governments' studies show that the economic benefits of reducing carbon dioxide emissions far exceed the costs. Thus, energy policies to enhance efficiency and conserve resources are inherently responsible and also serve to reduce atmospheric change. Clearly, if the hazards associated with global atmospheric change are significant, and the benefits of reducing the risk exceed the costs, rational decision making favours action now. The bottom line is:

Atmospheric change means *we* have to change.

Local action to initiate and encourage thoughtful and resolute response can and will make a difference. In this report to Vancouver City Council the Task Force has endeavoured to examine the rationale and strategy related to an action plan that will allow Vancouver to do its part.

This Task Force was created by Vancouver City Council to study the issues surrounding atmospheric change, gather public input, and recommend specific actions the City can take. In March 1990 the Task Force released a discussion paper on Vancouver and the changing atmosphere. In response to that discussion paper, the Task Force received 45 written submissions from the public, and heard oral presentations from 43 people. The discussion paper and the public meetings were publicized through news releases, advertisements, and cable television coverage. The analysis and recommendations contained in this Final Report are derived from those written submissions, from oral presentations made to the Task Force at public meetings April 23 and 25, 1990, and from extensive research.

Volume One of this Report is in four Parts. In Part One, we explain the causes of global and local atmospheric change, the known and probable effects of atmospheric change, and our role as a City in acting to protect public health by reducing the hazards posed by atmospheric change.

In Part Two we set forth a framework for action. The Task Force believes that the City of Vancouver should commit itself to achieving the following three targets:

**TARGET 1:** A complete phase out of all uses of products containing ozone depleting chemicals within the City by the year 1995;

**TARGET 2:** Immediately reducing emissions levels of sulphur dioxide and methane;

**TARGET 3:** A 20% reduction in 1988 level carbon dioxide emissions by the year 2005; and bringing all related atmospheric pollutants within federally determined acceptable levels.

## RECOMMENDATIONS

The Task Force urges Council to address all three targets by enacting these recommendations:

1 Adopt the above targets as the cornerstone of a program to address global atmospheric change and local and regional air pollution

2 Initiate the creation of an effective air quality management agency for the Lower Fraser Valley

3, 4 Urge the Provincial and Federal Governments to undertake a series of measures to enable the above two recommendations

In Part Three the Task Force urges Council to meet the first and second targets by enacting these recommendations:

5, 6 Phase Out All Uses of Ozone Depleting Chemicals

7 Reduce Present Sulphur Dioxide Levels

8 Accelerate Methane Gas Collection

In Part Four the Task Force urges Council to meet the third target by enacting recommendations based upon the following objectives:

- **Reduce the number of automobile trips in the City and the Region.**
- **Increase opportunities for non-auto transportation including bicycles, walking, rail, buses, and alternative vehicles.**
- **Reduce the use of gasoline and diesel use fuel in conventional buses, autos and trucks.**

The Task Force urges Council to achieve these transportation and traffic management objectives by enacting these recommendations:

9 Traffic Management (Trip Reduction) By-Law

10 Parking To Favour High-Occupancy Vehicles

11 Make Bicycling a Better Transportation Alternative

12 Short-Term Emission Reduction Measures

13 Road Pricing to Fund and Improve Public Transit

14 Telecommuting as an Alternative to Commuting

15 Monitor Emissions and Transportation Subsidies

- **Reduce the need for transportation in the City and the Region.**

The Task Force urges Council to achieve this land use planning objective by enacting these recommendations:

16 Energy-Efficient Land Use Policies

17 Design Competition

18 Ecological Development Incentives

19 Proximity Policies and Incentives

20 Residential Intensification

21 Encourage Work At Home

22 Revise Local Area Planning Terms of Reference

23 Establish Community Councils Pilot Program

24 Revise Plans and Rezoning Reports

- **Increase energy efficiency in all sectors of the City by 10 percent by the year 2000.**

The Task Force urges Council to achieve this energy conservation and efficiency objective by enacting this recommendation:

25 Energy Conservation and Efficiency

- Residential and Commercial Retrofit By-Laws
- Infrared Scanning for Energy Leakages
- Low-Interest Energy Conservation Loans [Utilities]
- Energy Efficient Lighting Standards
- Energy Efficiency Act [Province]

- **Become a Leader in Addressing Atmospheric Change.**

The Task Force urges Council to achieve this leadership objective by enacting these recommendations associated with the six principles below:

*Recognize Atmospheric Change As A Public Health Issue*

26 Annual Reports to Assess Health Effects of Atmospheric Pollutants

*Make Polluters Finance Transportation Alternatives*

27 Regional Carbon Dioxide Tax to Fund Transportation Alternatives

*Absorb Carbon from the Atmosphere*

28 Urban Reforestation Program

*Reduce and Recycle Waste*

29 Recycling, Packaging, and Composting

- Accelerate Existing Programs to Reduce and Recycle Waste
- Minimize Nondegradable, Nonreturnable, and Nonrecyclable Food and Beverage Packaging
- Establish Neighbourhood Composting Programs
- Study Regulation of Small Incinerators

*Leadership By Example*

30 Municipal Transportation and Energy Use

- Shift Away from Fossil Fuels for City Vehicles
- Conserve Energy in Municipal Operations
- Encourage Commute Alternatives for City Employees
- Explore Alternative Fuels
- Improve the Fuel Composition of the City's Vehicle Fleet

31 Redirect City Investments and Purchasing Toward Companies with Environmentally Sound Business Practices

32 Annual Departmental Progress Reports

33 Study Adaptive Measures

34 The City's Role

- Advocate Environmentally Responsible Policies and Actions at All Government Levels
- Serve as a Resource for Environmentally Responsible Policy and Technology Development
- Communicate and Cooperate With Other Cities

*Public Involvement and Education*

35 Public Education to Foster Awareness of Atmospheric Change and of Local Initiatives to Reduce Atmospheric Pollution

The Appendices to Volume One include the list of written submissions received from the public, and the list of oral presentations made to the Task Force at public meetings April 23 and 25, 1990.

Volume Two is a set of model and example by-laws from other jurisdictions which the Task Force has reviewed in formulating its recommendations.

While we recognize that some of these recommendations may seem ambitious, we believe that to do less would be to shirk the responsibility of our generation. The Task Force is confident that these recommendations, when implemented, will result in an improved quality of life for the people of our City, particularly our children and their children.

We recognize also that the power of government to effect change is determined by the will of the people. In that sense perhaps it is fortunate that the issue of atmospheric change has come to our attention at a time when public concern for the environment is higher than ever. Over and over again throughout our public process, we heard people express their desire for leadership in responding to the challenge of atmospheric change. The Task Force believes that, with this report, we have provided the citizens of Vancouver, through their Council, with effective tools to exercise that leadership.

Chapter One

# Introduction

Atmospheric change is not just another environmental issue.

Since the seminal Toronto conference "The Changing Atmosphere: Implications for Global Security," in June 1988, all subsequent high-level international meetings have confirmed that human activity is changing the atmosphere at an unprecedented rate and that these changes represent a major threat to both environmental health and geopolitical security.

How to respond to atmospheric change, however, is among the most difficult policy questions confronting elected officials today. There is great uncertainty over the likely public health and ecological impacts. Strategies to adapt to and reduce atmospheric change impinge upon many other environmental, economic, and municipal planning issues. From a political perspective, therefore, it may appear more expedient to do nothing. But is such inaction politically responsible at the risk of exposing society to unprecedented and irreversible environmental hazards?

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Volume One of this Report is in four Parts (see Figure 1). In Part One we explain the causes of global and local atmospheric change, the known and probable effects of atmospheric change, and our role as a City in acting to protect public health by reducing the hazards posed by atmospheric change.

In Part Two we set forth a framework for action. The Task Force asks Council to adopt three targets as a framework within which to guide an extensive series of recommendations.

In Part Three we propose a set of recommendations to phase out all uses of ozone depleting chemicals; reduce emissions levels of sulphur dioxide; and reduce the amount of methane released into the atmosphere.

In Part Four we address the carbon dioxide reduction challenge, and propose a series of recommendations based upon a set of six objectives.

The Appendices to Volume One include the list of written submissions received from the public, and the list of oral presentations made to the Task Force at public meetings April 23 and 25, 1990.

Volume Two is a set of model and example by-laws from other jurisdictions which the Task Force has reviewed in formulating its recommendations.

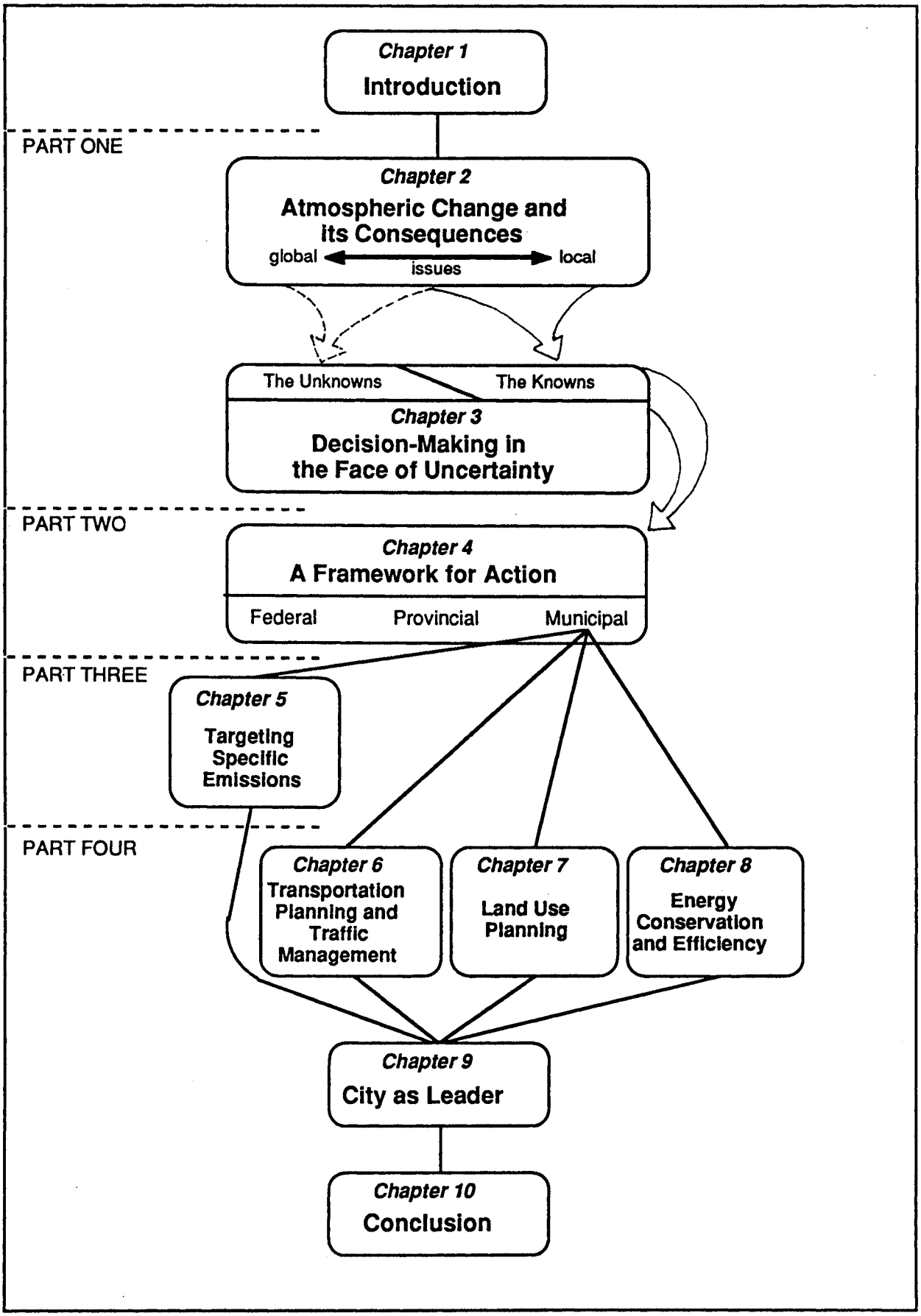


Figure 1. Format of the Report

# PART ONE

Chapter Two

## Atmospheric Change and Its Consequences

*Although research scientists are now only beginning to understand the complexities of the global atmosphere, it is becoming clear that any changes in the composition of our oceans of air can trigger a myriad of effects, often with serious global implications.*

Atmospheric Environment Service 1986; p. 4.

Human activity is dramatically affecting the earth's atmosphere: carbon dioxide concentrations have increased 25% over pre-industrial levels; methane concentrations have doubled in the last 200 years; and chlorofluorocarbons (CFCs) releases are increasing by 5-7% each year [1]. Over the last one hundred years, the average global temperature has risen 0.5-0.7C° and scientists are observing seasonal "holes" in the ozone layer over both polar regions [2]. A highly respected United Nations' intergovernment panel on climate change recently warned that human-induced global warming has already begun [3]. The implications of atmospheric change for agriculture, forestry, wildlife, and human settlements are staggering. Atmospheric change is a serious problem requiring serious responses. Significant changes are needed in development policies and planning, in urban form, and in material expectations. Although such changes may initially seem difficult or expensive to accomplish, in the long run the benefits of these changes are likely to greatly exceed the costs.

*Why Not Just Call It Global Warming?*

While global warming, or the enhanced greenhouse effect, has recently received considerable scientific and popular attention, it is only one aspect of the changing atmosphere. Other aspects include smog, acid precipitation, and depletion of the ozone layer. Each of these problems derives from different sources, has different effects, and requires different solutions.

Atmospheric change [4] is a multi-dimensional problem. Unlike water pollutants, atmospheric pollutants are difficult to control other than at source. Water can be treated before it is used but not so with air. Air circulates more quickly and over a wider area than water; therefore, air pollution problems are more likely to cut across administrative and political boundaries to become international and global in scope. This means air pollution is more difficult to resolve as polluters are often far removed from the people and ecosystems that are adversely affected by the pollution. Many air pollution problems can be seen and smelled but the potentially most serious effects, climate change and the destruction of the ozone layer, can only be detected by scientific measurement over a long period of time (Figure 2). It is difficult to motivate people to act on an "invisible" problem that may only become evident over decades. In addition, many people still consider air to be an unlimited, free resource and are reluctant to have restrictions placed on its use and misuse.

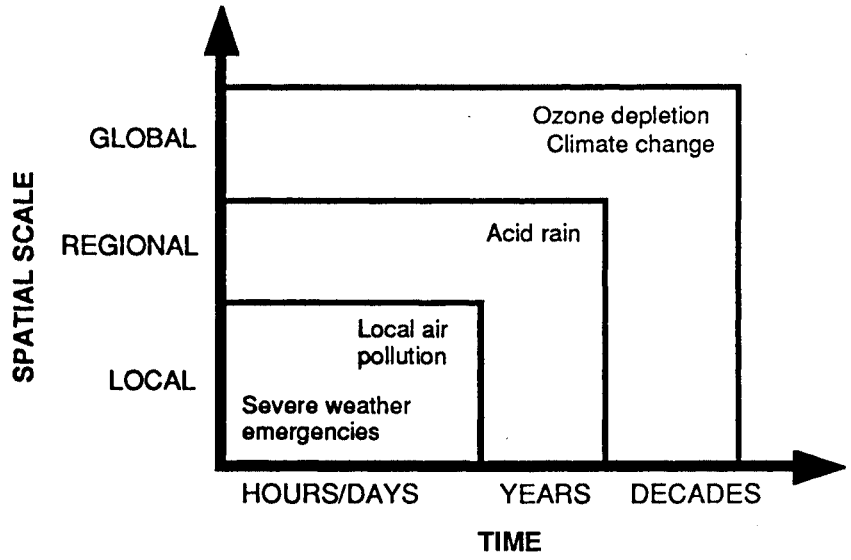


Figure 2.

The temporal and spatial dimensions of atmospheric pollution issues.

Source: Atmospheric Environment Service 1990.

This section describes the atmospheric processes that are changing because of increased emissions from human sources. Our air is 98.9% nitrogen and oxygen. Trace gases such as carbon dioxide, methane, nitrous oxides, and CFCs make up less than one percent of the atmosphere (Figure 3). Yet, changes in the relative amounts of these gases can produce observable effects such as greenhouse enhancement and acid rain.

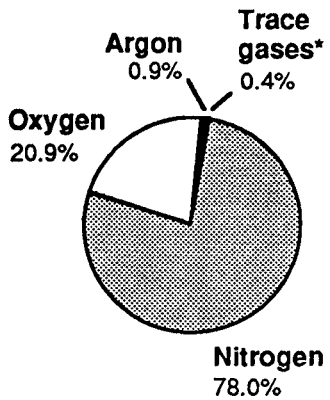


Figure 3. Composition of the Earth's atmosphere.

## Global Atmospheric Change

People can now irreversibly alter global processes upon which all life depends. Atmospheric emissions significantly affect two natural phenomena; the greenhouse effect is being enhanced and the ozone layer is being destroyed. Many scientists fear that the disruption of these processes will adversely affect climate, lead to increased incidence of skin cancers and cataracts, and inhibit photosynthesis. Although the climate has always fluctuated, the rate and magnitude of anticipated changes is unprecedented in the past 160,000 years [5].

### *The Greenhouse Effect*

Carbon dioxide, methane, nitrous oxide, and other trace gases in the atmosphere absorb the sun's energy but partially block outgoing radiated heat (Figure 4). This causes the earth's lower atmosphere to warm up, much like the inside of a greenhouse. Without these greenhouse gases, the temperature at the earth's surface would be -18°C instead of the present average of 15°C. This 33 C° difference represents the natural greenhouse effect.

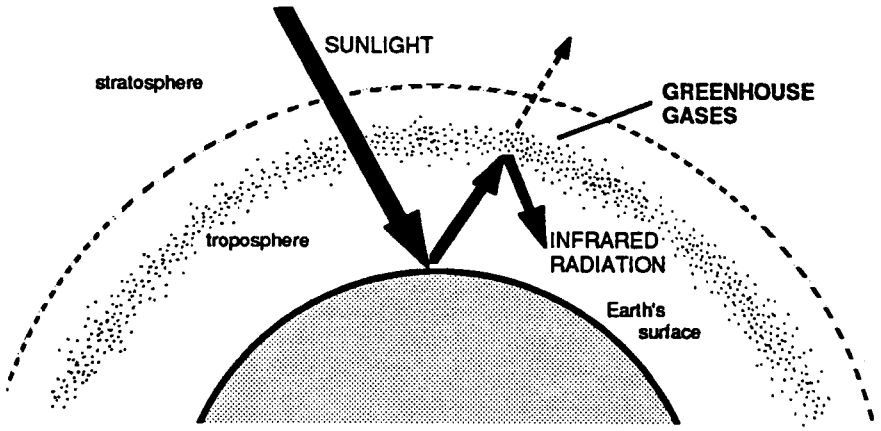


Figure 4. The greenhouse effect.

The denser the layer of greenhouse gases, the more heat is retained and, eventually, the higher the temperature of the earth's surface. Over the past 200 years, levels of greenhouse gases have increased markedly as a result of human activity. Carbon dioxide from the combustion of fossil fuels, deforestation, and the oxidation of soils is up 25% over pre-industrial levels (Figure 5). Methane has more than doubled. Chlorofluorocarbons (CFCs), usually associated with ozone depletion, are now also known to be powerful greenhouse enhancers and currently contribute 15-18% of the effect. As greenhouse gases accumulate, scientists believe that the mean surface temperature of the earth will rise and climatic patterns will change.

Scientists can correlate changes in carbon dioxide levels with historic mean global surface temperature. Data from polar ice core samples show that today's levels of atmospheric carbon dioxide are higher than at any time within the past 160,000 years and are increasing rapidly.

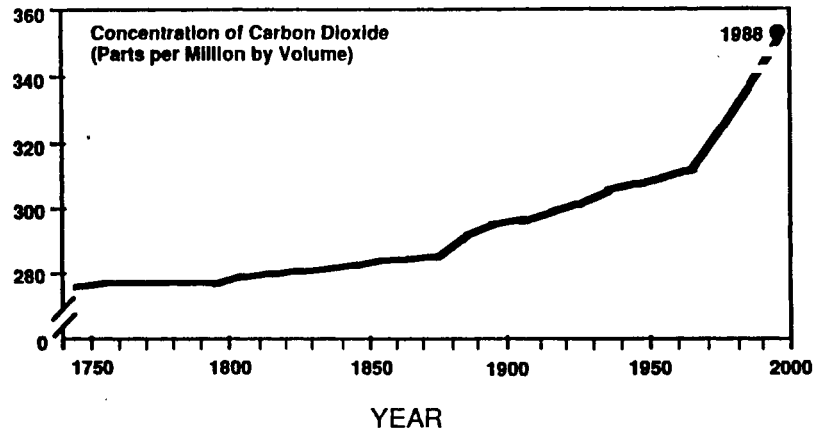


Figure 5. Atmospheric concentrations of carbon dioxide.

Source: Atmospheric Environment Service 1990.

Scientists use computer models to predict the global consequences of increasing carbon dioxide concentrations. These studies suggest that a doubling of carbon dioxide over pre-industrial levels will lead to an increase of 1.5 to 4.5 C° in the mean surface temperature of the earth [6]. At current rates of accumulation, the combined effect of greenhouse gases will be equivalent to a doubling of carbon dioxide by the middle of the next century [7]. Global warming may be accompanied by a rise in sea level of between 30 cm (12") to 45 cm (18") over this same period. Some of the likely effects on British Columbia of the resultant climate changes are shown in the accompanying box.

**Probable Effects of Climate Change in British Columbia**

- Precipitation levels on the coast may increase. With higher average temperatures during the winter, more precipitation may fall as rain, less as snow.
- Higher temperatures and greater evapotranspiration may reduce soil moisture in the interior, affecting forest and agricultural productivity.
- Forests and crops may be subject to increased attacks of pests and disease.
- Animal and plant migration to more suitable habitat would be limited by patterns of human settlement resulting in at least the local extinction of species.
- Rising sea levels would increase foreshore erosion and the salinity of estuaries and groundwater. Coastal marshes and infrastructure in low-lying areas would be flooded.

Source: Taylor and Johnstone 1989; pp. 16, 52-53, 68-69.

Table 1 shows the relative contribution of atmospheric gases to the greenhouse effect. The long residency time of these gases means that the impacts of current emissions will continue for at least another century. Although CFCs and nitrous oxides are less abundant than carbon dioxide, they are much more powerful greenhouse enhancers. Note also that CFCs, the most powerful greenhouse enhancers, are increasing at the fastest rate.

Table 1. Important characteristics of greenhouse gases.

| type of gas | contribution to greenhouse effect | lifespan in atmosphere | heat-trapping ability compared to CO2 | annual rate of increase |
|---|---|---|---|---|
| carbon dioxide | 49% | 100 years | | 0.4% |
| methane | 18% | 10 years | 25 times more | 1.1% |
| CFCs, halons | 14% | 60-100 years | 20,000 times more | 5.8% |
| other gases | 13% | various | | |
| nitrous oxides | 6% | 170 years | 250 times more | 0.3% |

Sources: Rind 1989, p. 7; Lyman 1990, pp. 7-8; Hengeveld 1988, p. 15; World Climate Research Program 1990, p. 15.

While deforestation may have contributed as much as 40% to the increase of carbon dioxide earlier in the century, *80% of today's carbon dioxide emissions are from fossil fuels* — coal, oil, and natural gas — and these will continue to be the most significant source. Despite our relatively small population (one-half of one percent of the world's population), Canada is responsible for fully 2% of greenhouse emissions (Figure 6). Indeed, on a per person basis Canadians are among the largest consumers of fossil fuels and among the largest producers of carbon dioxide (Figure 7). Other industrialized countries such as Japan, Sweden, and West Germany, with comparable standards of living, produce only half as much carbon dioxide per person as does Canada. If Canada is to be a world leader in reversing climate change, then we must reduce our carbon dioxide emissions and contribute to the development of cleaner and more energy-efficient technologies.

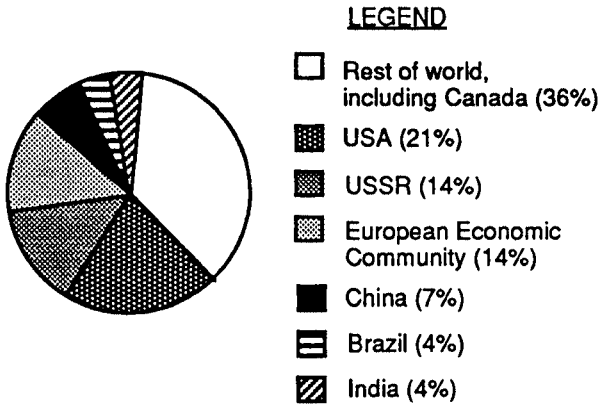


Figure 6. National contributions to the greenhouse effect.

Source: Rind 1989, p. 7.

*The United Nations World Commission on Environment and Development suggested that a five- to ten-fold increase in world industrial output would be needed to raise developing world consumption of manufactured goods to industrialized world levels by the middle of the next century. Given the emerging atmospheric problems from current levels of carbon dioxide emissions, the impact of this massive increase in energy use, if based on fossil fuels, could well prove unmanageable.*

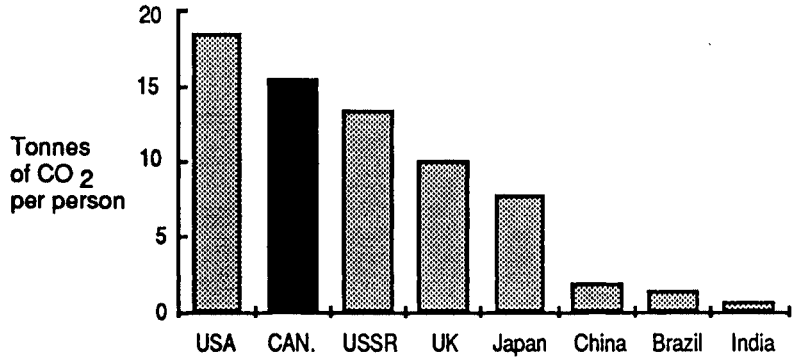


Figure 7. Per person carbon dioxide emissions (1987) for selected countries.

Source: Flavin 1990, p. 10.

Figure 8 shows the major sources of carbon dioxide emissions in Canada; transportation alone contributes one quarter of the total. Burning one litre of gasoline produces an average of 2.25 kilograms of carbon dioxide. Therefore, one car driven an average of 16,000 kilometres (10,000 miles) per year, at 14.3 litres per 100 kilometres (20 miles per gallon), produces 5,100 kilograms of carbon dioxide.

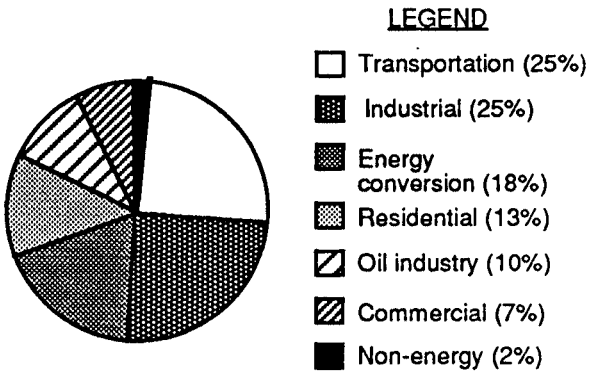


Figure 8. Carbon dioxide emissions in Canada by economic sector.

Source: Atmospheric Environment Service 1990.

We are quite certain that emissions from human sources are "enhancing" the greenhouse effect. We are less certain about the magnitude of future temperature change. Estimates from computer models of 1.5 C° to 4.5 C° increases in temperature by the middle of the next century could change depending on what new information can be discovered about the role of oceans, clouds, and other global mechanisms. However, this information will not be available from scientific surveys for another 10 to 15 years. Instead of justifying inaction, such uncertainties should motivate action — the same uncertainties which make it possible to overestimate future warming are just as likely to cause *underestimates* of atmospheric change [8].

While there are some scientists, notably in the U.S., who dispute the theory of an enhanced greenhouse effect, an international scientific consensus is emerging that global warming is underway and poses real dangers:

- The United Nations Intergovernmental Panel on Climate Change, an international body of some 1000 scientists that held a series of meetings of the last three years, recently concluded that global temperature warming is already beginning, with the global average temperature expected to increase about 1 C° over the next 35 years and 3 C° before the end of the next century [9].
- The U.S. National Academy of Sciences has regularly convened a panel of experts to look at data regarding climate change. All assessments over the past 10 years have reaffirmed the plausibility of unprecedented climate change building into the next 50 to 100 years [10].
- A joint research program of the World Meteorological Organization and the International Council of Scientific Unions concludes that the earth is already committed to global warming over the next 50 to 100 years; global environmental change is inevitable [11].
- Dr. Kenneth Hare, Chairman of the Global Change Board of the Royal Society of Canada, believes there is enough evidence to conclude that global warming is in progress and we should start to plan for it [12].

*Depletion of the Ozone Layer* [13]

Stratospheric ozone is distributed between 15 km and 35 km above the earth's surface [14]. The ozone layer absorbs most of the ultraviolet radiation from the sun, protecting people, plants and animals from radiation's adverse effects. Depletion of the ozone layer results in higher levels of ultraviolet radiation at the earth's surface.

By far the greatest contributers to ozone depletion are chlorofluorocarbons (CFCs) and related compounds such as halons and carbon tetrachloride. CFCs, widely used as refrigerants, propellants, and blowing agents, are stable, non-toxic chemicals at sea level. CFCs, halons, carbon tetrachloride, and methylchloroform are synthesized chemicals with no counterpart in nature.

CFCs are released during the manufacturing process, when equipment is serviced, and when products are broken down. For example, rigid polystyrene foam retains 90% of the CFCs used in its manufacture, which are then released as the product disintegrates. Halons, used in fire extinguishing equipment, are three to ten times more destructive than CFCs and may already account for 10% of the ozone thinning [15]. Carbon tetrachloride and methyl chloroform are used as cleaning agents and solvents. Many alternative products and technologies to these ozone depleting chemicals are currently available, such as helium-based refrigeration systems [16].

After decades of producing these chemicals, only recently have we understood how they react in the upper atmosphere. These chemicals take several years to reach the stratosphere; once there, their normally stable chlorine-fluoride bonds are broken by ultraviolet radiation, setting free atoms of chlorine which destroy ozone. One molecule of chlorine will eliminate about 100,000 molecules of ozone; and each chlorine molecule has a lifespan of *70-100 years*.

Scientists have known since 1985 that this phenomena has produced a "hole" in the ozone layer over the Antarctic the size of the United States. This "hole" only lasts for about two months, then fills in when seasonal patterns shift. In 1986, a similar but smaller "hole" was observed over the Arctic.

Experimental evidence strongly indicates that this damage can be attributed to CFCs and other ozone depleting chemicals, with

*Air pollution, damage to living organisms, and global climate change are complex and diverse problems. Yet they all share a common root — energy consumption. To slow damage to plants and animals and to avoid destructive climate change will require fundamental changes in energy policies within the next decade.*

The Global Tomorrow Coalition 1990; page 233.

atmospheric motion playing a large role in influencing ozone chemistry. Pollutants from high altitude aircraft, space vehicles and various surface sources also destroy stratospheric ozone.

Ozone losses of 1-3% are now being recorded around the world, leading scientists to believe that a generalized depletion is taking place away from the poles. Best estimates are that 2-3% of the ozone has been destroyed over north temperate zones but recent observations by Canadian scientists are that springtime ozone levels have decreased 6-8% over southern Ontario [17].

Each 1% decline in ozone is expected to result in a 4-6% increase in certain skin cancers. Plant productivity is expected to decline by 1-2% for each 1% decrease in ozone. Scientists predict this increase in ultraviolet radiation will also cause more severe sunburns, cataracts, suppression of the immune system, inhibition of photosynthesis [18], and reduced fisheries, forests and food production. The economic impacts of these changes may be massive.

Because it takes so long for ozone depleting chemicals to reach the atmosphere, the ozone depletions now being observed are actually the result of releases prior to the 1980s. Most CFCs and related chemicals are still on their way up. "Because of this huge reservoir of CFCs, major global action to control these chemicals must be taken well in advance of any evidence of major depletion of the ozone layer" [19].

Production levels of ozone depleting chemicals are increasing. Worldwide, current annual levels of production are 0.8 to 1.0 million tonnes per year. The Montreal Protocol only limits the production of CFCs and halons; other ozone depleting chemicals, such as carbon tetrachloride and methylchloroform, are not covered by the Protocol.

CFCs also act as greenhouse gases, being about 10,000 - 20,000 times more powerful than carbon dioxide in their ability to trap heat.

*Atmospheric Changes Feed Back on Each Other*

Scientists believe there may be significant positive "feedback" between ozone depletion and global warming. Each effect builds on the other. For example, if increased ultraviolet radiation reduces photosynthesis, there will be less carbon dioxide absorbed by plants. This will further increase the accumulation of carbon dioxide. It has been estimated that a 5-10% decrease in photosynthesis would be equivalent to *doubling* the combustion of fossil fuels.

As global warming progresses, the oceans will warm up because of the increase in surface temperatures. Warm water is less able to absorb carbon dioxide and so, again, the cycle of warming continues. Other such positive feedback mechanisms are described in the accompanying box.

**Local Atmospheric Change**

The release of atmospheric pollutants by human activity results in two local phenomena: smog and acid rain.

The combustion of fossil fuels, primarily from motor vehicles, produces a yellow-brown layer of pollution known as smog. It is especially evident over cities in summer months. Smog results from the reaction of nitrogen oxides and hydrocarbon gases with sunlight to produce ozone and other trace gases. Ground level ozone irritates eyes and lungs, making lungs more susceptible to infection and irritation from other pollutants, and also inhibits photosynthesis in plants.

Sulfur dioxide, emitted from stationary sources such as oil refineries, cement plants, and various industrial sources, is an

additional concern at the local level. Sulfur dioxide can contribute to increased respiratory illness and mortality; plant, forest, and crop damage; and deterioration of man-made structures and materials.

**Examples of Feedback Scenarios Related to Climate Change**

- More forest fires, as a result of drying, will send greater amounts of carbon skyward while reducing the rate of carbon removal by forests.
- Increased temperatures will result in faster decomposition of organic matter in soil, sending more carbon dioxide and methane, another greenhouse gas, into the atmosphere.
- Smaller polar ice caps will reflect less solar radiation to space and increase the rate of warming.
- Degradation of permafrost will accelerate the release of trapped methane.
- Increased temperatures will increase demand for irrigation, air conditioning, and refrigeration. The higher demand for electricity will generate still more carbon dioxide.
- Increased temperatures and enhanced ultraviolet penetration will increase the conversion of volatile organic compounds and nitrogen oxides to urban ozone. Increased urban ozone, in turn, increases conversion of sulfur and nitrogen compounds to acid particles.

Sources: A. Bates 1990, p. 30 and Cortese 1990, p. 444.

What are the health effects of atmospheric pollutants? We do not know all the answers yet, but those we do know give cause for concern. As shown in the accompanying box, we know that nitrogen oxides (a by-product of fossil fuel combustion from motor vehicles) can increase susceptibility to viral infections such as influenza, irritate the lungs, and cause bronchitis and pneumonia. Ground-level ozone (which reacts with nitrogen oxides in sunlight) irritates the lungs and respiratory system, reduces resistance to colds and pneumonia, can aggravate heart disease, asthma, bronchitis, and emphysema, and is associated with the symptoms of dry cough, chest tightness or discomfort, sore throat, headache, and eye irritation. Sulphur dioxide (emitted from cement works and oil refineries) and particulate matter concentrations can provoke or exacerbate cough, phlegm production, chest tightness and wheezing associated with asthma and chronic bronchitis. Low-level exposure to carbon monoxide (from motor vehicles) may exacerbate heart disease, and compromise brain function [20].

While levels of air pollution have improved in North America because of stricter controls on vehicle emissions, more automobiles than ever are being driven, which threatens to reverse this trend. The world's automobile population has more than doubled since 1970 and, unchecked, will grow to 500 million vehicles by the year 2000. In 1987, 11.8 million vehicles were registered in Canada with British Columbia having 1.6 million vehicles. The growing number of vehicles is of concern because existing standards for ozone and carbon monoxide provide little margin of safety in protecting public health [21]. The current health costs of failing to meet existing air quality standards in the United States is estimated by the American Lung Association at $50 billion per year.

*Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war.*

Conference Statement, World Conference on The Changing Atmosphere: Implications for Global Security. Toronto, 1988.

*Acid Rain*

Acid rain results when nitrogen oxides and sulfur dioxide gases dissolve in water to create nitric acid and sulfuric acid. Acid rain destroys habitat for most aquatic organisms and corrodes buildings and other surfaces. British Columbia does not yet have a serious acid rain problem.

*Health Effects of Some Atmospheric Pollutants*

| | |
|---|---|
| Nitrogen Oxides | Can increase susceptibility to viral infections such as influenza, irritate the lungs, and cause bronchitis and pneumonia. |
| Ozone | Irritates mucous membranes of respiratory system; causes coughing, choking, impaired lung function; reduces resistance to colds and pneumonia; can aggravate chronic heart disease, asthma, bronchitis, emphysema. |
| Sulfur dioxide | Can provoke or exacerbate cough, phlegm production, chest tightness and wheezing associated with asthma and chronic bronchitis. |
| Carbon Monoxide | Low-level exposure may exacerbate heart disease, and compromise brain function. |

Sources: French 1990, p. 102 and Kleinman 1989, pp. 1-2.

**Atmospheric Pollutants and Associated Impacts**

Tables 2 and 3 show the relationship of atmospheric pollutants, global phenomena, and air quality.

*The Other Population Explosion*

Worldwide, between 1950 and the mid-1970s, automobile traffic increased 142 percent, while the amount of energy needed to power vehicles increased 171 percent. Globally, the vehicle fleet has grown from 53 million in 1950 to 386 million in 1986. That increase translates into 5.7 percent annual growth in the automobile population — far higher than annual growth in the human population.

Source: Lyman 1990, p. 37.

Table 2.

Sources of atmospheric pollutants and their environmental impacts.

+ gas enhances the effect - gas lessens the effect

+/- role of gas is variable, depending on altitude and other factors

| GASES | SOURCES | greenhouse effect | ozone depletion | smog | acid rain |
|---|---|---|---|---|---|
| carbon dioxide $CO_2$ | fossil fuel combustion; burning forests and plants | + | +/- | | |
| methane $CH_4$ | refining and distributing fossil fuels ; landfills; farm animals; rice patties; rotting organic matter (bogs, wetlands) | + | +/- | | |
| nitrogen oxides $NO_x$ | fossil fuel combustion; burning forests and plants | | +/- | + | + |
| nitrous oxide $N_2O$ | fertilizers; deforestation; burning forests and plants | + | +/- | | |
| sulfur dioxide $SO_2$ | fossil fuel combustion; ore smelting | - | | | + |
| CFCs, halons | aerosol sprays; refrigerants; foam blowing agents; solvents | + | + | | |
| ground level ozone $O_3$ | reaction of NO x and volatile organic compounds in sunlight | + | | + | |

Source: Graedel and Crutzen 1989, p. 62.

### Local Problems, Global Effects

Above certain levels, air pollution can significantly affect human and planetary health. Air pollution in the Lower Fraser Valley is a microcosm of global problems and illustrates the institutional difficulties in taking positive action.

Although the regional airshed extends eastward as far as Hope, the jurisdiction of this area is split in two: the Greater Vancouver Regional District (GVRD) has authority for controlling industrial, commercial, and residential sources of pollution as well as mobile sources (vehicles) in the western part of this area. To the east of Coquitlam and Langley, the Provincial Ministry of Environment has jurisdiction. Monitoring is more extensive in the GVRD than elsewhere in this area. The Lower Fraser Valley airshed basin experiences calm air more frequently than any urban area in Canada, and is therefore prone to air pollution episodes [22]. Vancouver is responsible for the majority of these emissions of atmospheric pollutants.

Table 3. Consequences of atmospheric changes in Canada.

| direct effect | primary impact | secondary impacts | socio-economic effects |
|---|---|---|---|
| greenhouse effect | global warming; major shifts in climatic patterns; ocean warming | sea level rise, shifts in precipitation patterns; more frequent storms; increased evaporation; more severe droughts; increased incidence of disease and pests on plants; melting of permafrost. | significant loss of agricultural and forest productivity; loss of wetlands; decrease in fresh water supplies; increased erosion of foreshore; costs of dyking and moving facilities away from the shoreline. |
| ozone depletion | increases in ultra-violet radiation | skin cancer; repressed human immune system; photosynthesis inhibited | higher health care costs; loss of agricultural productivity |
| smog | impair lungs; inhibit photosynthesis | people more susceptible to air pollution and infections | higher health care costs; loss of agricultural productivity |
| acid rain | increase acidity of precipitation | reduced species diversity; changes in soil chemistry; increased acidity of water and shallow ground-water; buildings and monuments eroded; contributes to respiratory problems. | alter ecosystems; reduced aquatic productivity; increased costs of building maintenance; higher health care costs. |

Sources: Atmospheric Environment Service 1986, 1987; Environment Canada 1988.

Overall, air quality in the GVRD during the last ten years has been judged acceptable by current federal standards. However, concentrations of suspended particulates are above maximum acceptable levels, and ozone has exceeded the maximum tolerable levels at some monitoring stations. Although sulfur dioxide concentrations in the GVRD are below federal limits, human health is nevertheless being adversely affected.

### The Costs of Local Air Pollution

Environment Canada estimates that acid rain causes $1 billion worth of damage in Canada every year [23]. The American Lung Association estimates that annual health care benefits on the order of $50 billion could be realized if local air quality standards were met in the United States [24].

In the GVRD, 30,000 to 50,000 people are asthmatic and, consequently, potentially at risk if exposed to significant levels of sulfur dioxide. Sulfur dioxide levels in the GVRD are expected to rise 53% over the next 20 years [25]. A recent medical study by Dr. David Bates of the University of British Columbia has shown there is already a statistical relationship between current sulfur dioxide concentrations and hospital emergency visits in Vancouver [26].

The effects of air pollution are felt beyond the GVRD, much as "passive" cigarette smoke has been shown to have an adverse effect on

neighbouring non-smokers. Ozone concentrations in Chilliwack and Abbotsford often exceed Vancouver's. For example, on June 12, 1989, the air quality readings in Chilliwack and Abbotsford were 51 and 45 while the reading for Vancouver was 29 [27]. In the Fraser Valley, the loss of crops in the Fraser Valley due to damage from ozone is estimated at $8.8 million each year [28].

*Atmospheric Pollutants in the Greater Vancouver Regional District*

Emissions of oxides of sulphur and nitrogen, particulate matter, carbon monoxide and volatile organic compounds occur from a variety of sources in the Greater Vancouver Regional District (GVRD). Over 80% of the atmospheric pollutants in the GVRD come from "mobile sources" — i.e., motor vehicles, aircraft, trains, ships and off-road vehicles; over 65% of the atmospheric pollutants in the GVRD are from light duty vehicles. With the exception of sulphur oxides, Vancouver leads the 18 GVRD municipalities in the emission of atmospheric pollutants:

| Pollutant | % from Mobile Sources | % from Vancouver |
|---|---|---|
| Volatile Organic Compounds | 60.9% | 23% |
| Particulate Matter | 82.2% | 30% |
| Carbon Monoxide | 97.4% | 28% |
| Sulphur Oxides | 21.7% | 8% |
| Nitrogen Oxides | 78.2% | 24% |

Source: Concord Scientific Corporation and B.H. Levelton & Associates 1989, pp. 4-4, 4-7.

*"Let me appeal to you now to take seriously the concerns of residents down-wind of Vancouver. The Fraser Valley narrows eastward like a funnel, concentrating pollutants to levels far above those in the source areas. I was alarmed to hear Dr. Berg, from Los Angeles, say to your Task Force that readings here are already above those in his area, at least on bad days. I was impressed, too, by the evidence he cited of health problems resulting from readings as high as these."*

— Dr. Peter Cave,
Director of Planning,
Fraser-Cheam
Regional District,
submission to Task Force

**Predicting the Future**

It is difficult to estimate the hazards from atmospheric change. If global warming occurs at the rates suggested by trends in current emissions of greenhouse gases, *the rate of change will be at a level never before experienced in the previous 160,000 years.* The transition from the last ice age to our present interglacial epoch, a difference of about 6 C° occurred over 5,000 to 10,000 years. Computer predictions are suggesting changes of *3 C° over the next 50 to 100 years.*

Such changes will be beyond the capacity of many ecosystems to adapt. There will be disruptions in the growth of forests, the production of agricultural crops, and the availability of fresh water until the climate stabilizes again. The world is already vulnerable to severe disruptions in food production if the climate varies over only a three to five year period (witness the recent drought problems on the Canadian prairies and in Africa). It is doubtful that our current systems of food production could survive such chaos. An additional factor here is that the predicted changes in climate will be occurring at a time when the world's population will be nearing 9 billion (in the year 2030) — *3.5 billion more people than now* [29].

The costs of responding to widespread disruptions in food production and water availability will be very large in terms of economic and social costs, as will the costs of protecting coastal areas from rising sea levels.

Locally, current growth trends, traffic patterns, and emissions levels pose a serious threat to air quality in this region. The population of the GVRD is expected to increase by 500,000 in another twenty years [30]. Such trends are occurring elsewhere throughout the world, but are especially evident in North America where urban form is based on the automobile. This is forcing many North American cities to dramatically rethink their transportation and land development strategies.

Continuation of our past approach to air quality management — addressing pollutants individually, considering only local impacts of pollution sources, and relying on conventional air pollution control technology — will not allow us to achieve most of the defined air quality goals. It is also likely to exacerbate regional and global air quality problems [31].

Chapter Three

# Decision-Making in the Face of Uncertainty

As indicated in Chapter 2, global warming is only one part of the issue of atmospheric change. The public's attention has been diverted by the uncertainty surrounding the timing of the enhanced greenhouse effect while many other equally serious atmospheric changes, such as ozone depletion, are already occurring. Uncertainty is no longer a reason for inaction. There is a growing scientific consensus that we should act now to reduce emissions of atmospheric pollutants.

## Decision-Maker's Dilemma

Given the uncertain consequences associated with atmospheric change, should decision-makers act now or wait for more information? Global warming and the destruction of the ozone layer are essentially irreversible processes. If we wait to see the proof of these phenomena, the costs of dealing with changes in agriculture, forestry, and weather patterns will be much greater than if we act now to start reducing the likelihood of these events occurring. Are the costs of such a future really less than the costs of becoming more energy efficient, reducing air pollution, and taking actions that would in any case improve the quality of our lives?

**TABLE 4: Options for Action**

| *Do nothing* | *Treat the symptoms* | *Reduce exposure* | *Attack the cause* |
|---|---|---|---|
| This involves hoping for the best and letting society adjust unaided to whatever occurs. This option implicitly assumes low risk and predictable, manageable systems behaviour. Essentially it is business as usual. | This is low level adaptation that includes various responses to reduce the effects of change after the fact (e.g., crop and flood insurance and emergency relief). The assumption here is that likely levels of atmospheric change will not seriously change the world as we know it. | This is a more profound form of early adaptation involving such things as building dykes, resettling populations, switching crops, and changing to more sustainable land uses. | This level of response attempts to reverse the direction of negative trends by preventive action. This option assumes it is wise to act as if are in crisis now, immediate evidence perhaps to the contrary. Given the information already available, the risks of delay are too great to accept. |

Source: Rees 1990, p. 23.

As Table 4 shows, there are four ways to respond to atmospheric change. Atmospheric change is either a serious problem or it is not, but we cannot know for sure. Assuming there will be resistance to strong policy measures, the problem is one of choosing between a politically easy course that exposes society to potential hazards at an unknown level of risk, and a politically difficult course that would reduce the long-term hazards but impose significant short-term costs on society.

*"Every city, province and country has an obligation to do its part in finding solutions... Appropriate action may not only reduce the degree of atmospheric change, but it also may significantly slow the process so that human societies and natural ecosystems have more time to adapt to the changes which will take place.... The 20% [carbon dioxide emissions] reduction goal is an interim measure which will need to be followed by further and larger reduction goals."*

— Ann Hillyer,
West Coast Environmental
Law Association,
presentation to Task Force

*Most Of Us Prefer The Devil We Know*

"We could learn to live with the higher levels of CO2 and prepare for the inevitable consequences of hotter, wetter cities, and rising sea levels and even more rapid climatic change on our cities. The problem for us is that that response involves an even bigger leap into the unknown. It is not a response that we who are risk-averse willingly contemplate. Most of us prefer the devil we know — so we want to find a way of reducing climate change.

The solution is to rearrange or reorganise our affairs so that we consume less energy and reduce pollution. This is, admittedly, no new insight: the environmentalist movement has been saying this for twenty years but the community and its leaders now appear to be prepared to listen, and to act."

Source: Troy 1990, p. 18.

Our traditional information-processing and decision-making tools are inadequate for resolving this dilemma. For example, where key ecological mechanisms and processes are unknown to science, ecological impacts cannot be predicted or discovered until they occur (for example, many dimensions of the ozone and acid rain problems were only discovered after the fact).

If our decision-makers do not act, and the health and economic impacts of atmospheric change are as serious as many believe, then society will suffer the consequences. However, if decision-makers do act decisively and effectively, we will never know how great the hazard was. Furthermore, it may be decades before the ecological consequences of either action or inaction are apparent, with or without a serious crisis. This is the worst of political situations from the perspective of accountability. Where there is public hostility to major adjustments, the only political pay-off comes from inaction. If the sky eventually does fall, today's reluctant politicians will not be around to accept the responsibility.

This Task Force believes that society can only benefit by acting decisively now on atmospheric change. Decisions taken today will have a crucial influence on the scale of its impact.

*Sprawl, Density, and Carbon Dioxide Emissions*

Residents of most North American cities each produce about 5 tons of carbon dioxide per year. In contrast, each citizen of Amsterdam produces only 2.5 tons of carbon dioxide per year. Why the difference? Most North American cities are marked by sprawling, low-density development, whereas Amsterdam is marked by compact, high-density development. According to a researcher at the International Institute for Applied Systems Analysis, if we could model our future development on cities like Amsterdam, future carbon dioxide emissions would be half as much as current projections indicate. If Eastern European and Soviet cities modeled their future development on cities like Amsterdam, they would produce less carbon dioxide than they do today.

Source: Alcamo 1990

## Taking Action at the Local Level

No city has a "neutral" impact on the environment. Cities are where most people live. On a per capita basis, Canadians are among the world's most intensive users of energy. Every day millions of individual decisions are made, many of which increase the impact of atmospheric change. We could also be making decisions which reduce the impact of atmospheric change. Indeed, our ultimate success or failure to achieve a sustainable relationship with the biosphere may well be determined by our cities.

Like most North American cities, Vancouver was built on the assumption that energy and materials would always be cheap and plentiful. This is reflected in the poor insulating quality of our buildings, our addiction to the automobile, the increasing separation of our workplaces from our homes, and the sprawling form of our city.

As one of the world's richest cities, we have a responsibility to address the causes of environmental decline. If a wealthy city such as Vancouver, with a concerned, well-educated populace cannot act on atmospheric change problems, how can we ever expect the less fortunate cities of the world to take action? At the same time, there are significant economic and social benefits to be gained if Vancouver emerges as a leader in facing the global challenge of atmospheric change.

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*Local Governments Providing Models for National Policies and Programs*

"Local governments have been timid to act in the face of overwhelming evidence of global environmental decline. While resources at the local government level have been scarce, they have been even more inhibited by a narrow and ineffectual conception of the domain of local government concern. The result has been a lack of mobilization to address global problems that are largely rooted in local, day-to-day activity. Indeed, it is the world's industrial cities that produce most of the world's solid and liquid wastes, consume most of the world's fossil fuels, emit the majority of ozone depleting compounds and toxic gases, and give economic incentive to the clearing of the world's forests. While local government resources have remained unmobilized, the momentum of a global environmental crisis now threatens to work unprecedented impacts upon local jurisdictions...

"Fortunately, in the face of global challenges, many local governments have started taking singlehandedly initiatives to address the root causes of environmental decline. From recycling systems and traffic reduction programs to local bans of CFCs and city-to-city Third World development partnerships, local governments are serving as laboratories for policy invention in the environmental arena... While broad policy parameters are being formulated at the international level, local governments are developing the thousands of concrete changes in economic, political and social behaviour required to forestall an environmental crisis. The concrete innovations that they are testing are providing models for national level policies and programs."

Source: "Call to a World Congress of Local Governments for a Sustainable Future," United Nations, September, 1990

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# PART TWO

Chapter Four

# A Framework for Action

Putting aside for the moment the risks and uncertainties of climate change, decision-makers have sufficient grounds to reduce emissions of atmospheric pollutants solely on the basis of the immediate and direct impacts from ozone layer depletion and local air pollution. Given that existing forms of regulations and incentives for air pollution are nonetheless *leading* to global atmospheric change, clearly we must develop a framework for action that *reduces* emissions of atmospheric pollutants.

Many people are calling for an unprecedented global collaboration among scientists, citizens, and decision-makers to reduce emissions of atmospheric pollutants [1]. Atmospheric change cannot be dealt with in isolation; what one country or area does affects other areas and eventually the globe. For this reason, every country and every sector in society must contribute to solutions, even if their contribution seems miniscule.

There is no single strategy for dealing with the problem of atmospheric change. There are many sources of atmospheric emissions (the combustion of fossil fuels for transportation, lighting, heating; industrial and agricultural processes; and deforestation) and so there need to be a multitude of solutions. Simply treating atmospheric pollution after the fact, as we have attempted until now, is not sufficient. The best approach is to get at the root of the problem: the *creation* of atmospheric pollutants.

### The Strategy: Reduce Emissions of Atmospheric Pollutants

It is this approach, reducing emissions of atmospheric pollutants, that is becoming the dominant focus of policy decisions world-wide. At an international, landmark conference on atmospheric change, held in Toronto in June 1988, the summary statement urged governments around the world to *reduce carbon dioxide emissions by approximately 20 percent of 1988 levels by the year 2005 as an interim goal towards an eventual reduction of 50 to 80 percent.* The conference also urged governments to ratify the Montreal Protocol on ozone depleting substances, but to revise the agreement to eliminate nearly all chlorofluorocarbons (CFCs) by the year 2000.

Many European countries have committed to the 20% carbon dioxide reduction target. Britain recently vowed to reduce its carbon dioxide emissions by 30% [2]. Canada and the United States, however, have been reluctant to make any such a commitment, saying that the costs to the economy may be too great. Yet there are many industrialized countries with comparable living standards that operate at much lower levels of energy consumption and carbon dioxide emissions.

### Initiatives From Other Cities

The City of Toronto was the first city in the world to take responsibility for its own atmospheric pollution and commit to a 20% reduction in its 1988 level of carbon dioxide emissions. It will do so through a three part program of energy efficiency, recycling carbon emissions through the purchase of forests, and an urban tree planting program. The City of Portland, Oregon recently adopted an energy policy to increase energy efficiency in all sectors of the City by 10% by the year 2000.

Reducing atmospheric pollutants in cities will require a major shift away from automobiles as the cornerstone of urban transportation systems. For example, Florence has turned its downtown into a pedestrian mall during daylight hours. Budapest bans motor traffic from all but two streets in the downtown area during particularly polluted spells. In Mexico City and Santiago, one-fifth of all vehicles are kept off the streets each weekday based on their license-plate numbers [3]. Several other examples are described in boxes accompanying the recommendations in the following chapters.

### The Benefits of Taking Action

Although Vancouver contributes only a small amount to the global concentrations of greenhouse gases, the local environmental effects of atmospheric pollution are already significant. Given that the expected population growth cannot be sustained with current forms of transportation, a transition away from private automobiles will be necessary in the long run.

The Task Force believes that the City should start planning now for a significant shift in the way people live, rather than risk having to impose rigid regulations in times of crisis. At the moment, the predominant scenario of the future, if we do not change our ways, is indeed gloomy. What has been missing is a positive vision of how our city can look, and how our lives can be improved, if we plan creatively for change.

To illustrate this vision, imagine how the Vancouver region could evolve in a few decades if the City and other municipalities in the region implement the recommendations of this Task Force and immediately start to rethink their transportation, energy, and land use strategies. We might see that Greater Vancouver has evolved into a set of linked mini-cities, or urban villages, somewhat self-contained but with excellent transit between them. As in Vancouver's early days, each of these mini-cities would have its own distinct character. Most people would be able to satisfy most of their daily needs without the use of private automobiles. Most residences, in a variety of forms, would be within a reasonable walking or bicycling distance of work, shopping, entertainment, health care, and education. As a result, urban sprawl could be reduced, wilderness and agricultural areas could be reclaimed, and green, open space could surround each mini-city. The Greater Vancouver area would be one of the most desirable places to live in North America.

If this scenario seems hard to envision, remember that only a few decades ago our present automobile-oriented land development patterns would have seemed equally difficult to imagine. The scenario described here is based on land use policies suggested by the Federation of Canadian Municipalities to promote energy-efficient land use.

The additional, more immediate benefits of acting now in Vancouver to increase energy efficiency and reduce carbon dioxide emission include:

- improvements to local air quality;
- new economic opportunities that could be marketed around the world resulting from the encouragement of new technologies, such as hydrogen fuel cells;
- improvements in traffic congestion and safety; and
- reduced fuel costs, both on a corporate and individual basis.

**Taking Action: Setting Targets**

The Task Force believes that the City of Vancouver should commit itself to achieving the following three targets:

**TARGET 1:** A complete phase out of all uses of products containing ozone depleting chemicals within the City by the year 1995;

**TARGET 2:** Immediately reducing emissions levels of sulphur dioxide and methane;

**TARGET 3:** A 20% reduction in 1988 level carbon dioxide emissions by the year 2005; and bringing all related atmospheric pollutants within federally determined acceptable levels.

In Part Three we address the first and second targets by proposing a series of recommendations to phase out all uses of ozone depleting chemicals; reduce emissions levels of sulphur dioxide; and reduce the amount of methane released into the atmosphere.

In Part Four we address the third target by proposing a series of recommendations based upon a set of six objectives.

Making a commitment to these internationally recognized targets will provide common objectives for coordinating programs within the region and also with the provincial and federal governments. It will be important to tie-in with existing programs, such as the Provincial Carbon Dioxide Working Committee, which is currently undertaking a provincial inventory of carbon dioxide emissions and developing strategies for their reduction. By having a deadline in these targets, it will encourage the immediate adoption and implementation of legislation such as the GVRD's proposed CFC and Halon Control By-law.

To achieve these targets, we need to examine the human activities which create atmospheric pollutants and attempt to manage or restructure those activities so as to reduce emissions [4]. Thus, to reduce the use of fossil fuels we need to reconsider the movement of people and goods, the location of residences and work, the location of services such as daycare and health care, space heating requirements, and so on.

The Task Force believes that these objectives can best be met by an integrated combination of penalties and incentives which will encourage the most efficient solutions by providing a stimulus of price and regulatory changes.

This approach incorporates the "polluter pays" principle. Activities which damage the common good will become more expensive, or hindered, or even prohibited. Activities which enhance the likelihood of achieving the targets for atmospheric improvement are encouraged by subsidy or by regulatory changes.

*"We suggest the GVRD and its member municipalities follow the lead of Toronto and formally adopt the target of reducing carbon dioxide emissions to 20% of the 1988 levels by 2005. We recommend that staged reductions in other pollutants and adoption of other strategies should be implemented well before this date (e.g., 1995). This could be achieved through a mix of strategies involving education, regulation, enforcement, conservation, taxation, and leadership (both technological by investing in appropriate infrastructure and moral by adopting a 'model citizen' stance."*

— T.R. Oke and D.G. Steyn, Atmospheric Science Program, UBC; and D.V. Bates, Department of Health Care and Epidemiology, UBC, submission to Task Force

Throughout the recommendations, these principles are combined, so that revenues obtained by taxing or charging prices for polluting activities are used to subsidize more desirable alternatives.

In addition, we urge that these changes allow for the equitable distribution of the costs and benefits of the recommendations, and be phased in to give the public time to consider their alternatives.

The following considerations influenced the Task Force in developing its recommendations:

- Solutions should work with nature, and not create or exacerbate other environmental problems.
- Strategies should be cost-effective, and wherever possible should address several problems at once.
- Research and development of new technologies and processes should be encouraged through government and corporate purchasing policies.
- An ongoing process of discussion and education must be developed so that the public and their decision-makers know how their activities and programs affect atmospheric change.
- The public must be involved in both developing and implementing solutions.

Although this strategy to reduce atmospheric emissions has been developed specifically for Vancouver, the Task Force believes it would be even more effective if implemented at the regional level. The regional context for planning and development is guided by the seven livability goals for the region [5]. The Task Force strategy could begin to help transform those goals into reality, by integrating urban development with the natural environment, leading to the creation of a truly livable and healthy region. The Task Force encourages municipalities within the Greater Vancouver Regional District to consider implementing these recommendations, adapting them to their own circumstances.

Recommendation 1

## TARGETS and FRAMEWORK

*Purpose: To set targets for reducing emissions of atmospheric pollutants in an international context and to set a framework for local actions to reduce emissions of atmospheric pollutants.*

**THE TASK FORCE RECOMMENDS THAT Council:**

**a) resolve that the City of Vancouver take responsibility for the carbon dioxide emissions of its citizens and to that end commit itself to an initial reduction in 1988 level carbon dioxide emissions of 20% by the year 2005;**

**b) resolve that the City of Vancouver take responsibility for the chlorofluorocarbon (CFC) emissions of its citizens and to that end commit itself to phase out all emissions of CFCs and other ozone-depleting chemicals (ODCs) by the year 1995;**

**These recommendations should be the cornerstone of a program to address the problem of global atmospheric change and local and regional air pollution using all measures within the City's power.**

*Benefit: This recommendation will set targets and provide a framework for local actions to reduce emissions of atmospheric pollutants; it will also stimulate other municipalities in the Vancouver region and elsewhere to take action on reducing emissions of atmospheric pollutants.*

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*An Effective Air Quality Management Agency*

The South Coast Air Quality Management District (SCAQMD) of California is committed to achieving and maintaining healthful air quality throughout the South Coast region through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues.

The combination of the Los Angeles area's climate and geography make it almost a smog "factory." Air pollution from industry, businesses, motor vehicles and consumer products is often trapped close to the ground under an inversion layer of warm air, while the mountains slow smog's outward escape.

SCAQMD opened its doors in 1977, after the Lewis Air Quality Act of 1976 established the regional AQMD and gave it "responsibility for comprehensive air pollution control" with "the duty to represent the citizens" of the South Coast Air Basin.

SCAQMD has traditionally focused on controlling emissions from the 40 percent of local air pollution that comes from large stationary sources such as oil refineries, power plants and chemical plants to smaller fixed sites such as dry cleaners, paint spray booths, service stations, homes, and consumer products.

Recent legislation gives SCAQMD the authority to implement certain transportation controls as well, such as their programs to develop clean fuels, patrol for smoking vehicles (1-800-CUT-SMOG hotline), and require employers to offer rideshare incentives.

As part of its multi-faceted control program, SCAQMD develops and enforces rules regulating emissions; prepared and regularly updates the Air Quality Management Plan, a regional blueprint for attaining air quality standards; maintains a network of 34 air monitoring stations to track pollutant levels throughout the region 24 hours a day; researches new technologies that will help clean the air; and coordinates public outreach to the communities it serves.

Companies under its jurisdiction must get AQMD permits to build, alter and run equipment that either causes or controls air pollution. SCAQMD engineers evaluate thousands of permit requests each year. Facilities are checked by a staff of trained inspectors whose "beat" includes more than 55,000 active permits at 23,000 locations.

Penalties for violating AQMD rules or permit conditions include fines of up to $25,000 per day and/or a year in jail for each day of violation. Offenders can be forced to shut down or modify polluting equipment.

SCAQMD's 800 employees operated on a 1988-89 budget of $66 million. Fully 88 percent of their annual revenue comes from fees and fines paid by stationary source polluters — and the biggest polluters pay the most.

Despite a growing population, control programs have brought about a 35% decline in emissions of reactive organic gases and nitrogen oxides since 1975. This reduces the formation of both ozone and fine particulates, two persistent smog problems. Carbon monoxide emissions have dropped by 45%, and are expected to drop further with future control measures.

Source: SCAQMD, 1989

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*"Given the known interactions between emissions (from transportation, industrial and domestic sources) and land-use it is imperative that the [new or expanded air management] authority given jurisdiction over air management be fully connected to the planning functions for the region. It should also be provided with the necessary legislative backing and enforcement capability to control all sources in the region. This might include an ability to set airshed-wide targets for emissions."*

— T.R. Oke and D.G. Steyn, Atmospheric Science Program, UBC; and D.V. Bates, Department of Health Care and Epidemiology, UBC, submission to Task Force

## Recommendation 2

### REGIONAL AIR QUALITY MANAGEMENT AGENCY

*Purpose: To create an effective air quality management agency for the Lower Fraser Valley.*

**THE TASK FORCE RECOMMENDS THAT Council take the initiative to organize the governments responsible for the Lower Fraser Valley to create an effective agency for air quality management, monitoring, and remediation in the Lower Fraser Valley. This agency should be representative, responsive and largely self-financing with regulatory responsibility, resources and power comparable to that enjoyed by the South Coast Air Quality Management District (California), as described in the text above.**

*Benefit: This recommendation will create an effective mechanism for achieving the targets in reductions of atmospheric emissions described in Recommendation #1.*

While Vancouver can make a significant contribution in reducing emissions of atmospheric pollutants, the issues of air quality, transportation, land use and so on described in this report must ultimately be addressed at the regional level. Without an effective system of regional air quality management and regional planning, we face a future of lack of coordination, buck passing, turf wars, redundant and wasted efforts and, ultimately, an inability to achieve our objectives — reducing emissions of atmospheric pollutants.

Without a Provincial commitment to reduce Provincial emissions of atmospheric pollutants, and especially to reduce carbon dioxide emissions levels and recognize the role of forests in absorbing carbon from the atmosphere, regional efforts to reduce emissions of atmospheric pollutants will be stymied. This Task Force is aware that the Provincial Government has appointed a Carbon Dioxide Working Committee to study emissions reduction of atmospheric pollutants, and hopes that Committee will make recommendations to the Provincial Government in support of the objectives and recommendations outlined in this report.

Without a Federal commitment to reduce Canadian emissions of atmospheric pollutants, without pursuit of international agreements to reduce emissions of atmospheric pollutants, without pressure on all countries to adopt targets for reducing emissions of atmospheric pollutants, and without pursuit of national and international agreements to encourage the the development of cleaner, alternative sources of energy, the rate and magnitude of global atmospheric change are likely to increase to unmanageable proportions.

## Recommendation 3

### PROVINCIAL GOVERNMENT

*Purpose: To urge the Provincial Government to enable creation of an Air Quality Management Agency for the Lower Fraser Valley; commit the Province to an initial reduction in carbon dioxide emissions of 20% by the year 2005; commit the Province to phasing out all emissions of chlorofluorocarbons and other ozone-depleting chemicals by 1995; and pursue national agreements to reduce emissions of carbon dioxide and other greenhouse gases.*

**THE TASK FORCE RECOMMENDS THAT Council urge the Provincial Government to:**

**a) use all measures within its power to implement the Recommendations in this report requiring Provincial involvement, in particular enabling the creation of the Air Quality Management Agency for the Lower Fraser Valley described in Recommendation #2 above;**

**b) take responsibility for the carbon dioxide emissions of its citizens and, to that end, commit itself to an initial reduction in carbon dioxide emissions of 20% by the year 2005. This should be part of a program to address the problem of atmospheric change by using all measures within the Government's power to reduce greenhouse gas concentrations, in particular:**

**i) directing the Ministry of Transportation and Highways to assist municipal and regional governments to reduce emissions of atmospheric pollutants from motor vehicles in the Lower Fraser Valley;**

**ii) supporting mandatory vehicle emissions testing;**

**iii) directing the Motor Vehicles Department and the Insurance Corporation of British Columbia to set fees for vehicle registration, licensing and insurance on a sliding scale to favour less polluting vehicles;**

**iv) directing the Ministry of Forests to reduce the amount and rate of carbon dioxide released into the atmosphere as a result of forest management practises; and**

**v) directing the Ministry of Forests to recognize in its management and planning practices the significant economic role of forests as carbon sinks in stabilizing atmospheric change; and**

**c) take responsibility for the chlorofluorocarbon (CFC) emissions of its citizens and, to that end, commit itself to phase out all emissions of CFCs and other ozone-depleting chemicals by the year 1995. This should be part of a program to address the problem of global atmospheric change and local and regional air pollution using all measures within the Province's power; and**

**d) pursue national agreements to reduce emissions of carbon dioxide and other greenhouse gases.**

*Benefit: This recommendation will enable the reductions of atmospheric emissions described in Recommendation #1.*

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*Improving Automobile Fuel Efficiency*

"The most efficient cars currently available are about twice as efficient as the average new car on the road... Given the range of advanced fuel economy technologies now installed in prototypes, on the shelf, or on the drawing board, striving for [4.7 litres per 100 kilometres] for new cars by the end of the century is a reasonable goal."

Source: Renner 1988, pp. 32-35

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*"We believe the time is right for a much more effective approach to regional planning in the Lower Mainland. To build higher density centres based on transit will require planning powers and coordination at the regional level far greater than exists today."*

— John Winsor,
Senior Planner,
City of Vancouver,
presentation to Task Force

Recommendation 4

## FEDERAL GOVERNMENT

*Purpose: To urge the Federal Government to commit Canada to an initial reduction in carbon dioxide emissions of 20% by the year 2005; commit Canada to phasing out all emissions of chlorofluorocarbons and other ozone-depleting chemicals by 1995; and to pursue international agreements to reduce emissions of carbon dioxide and other greenhouse gases.*

**THE TASK FORCE RECOMMENDS THAT Council urge the Federal Government to:**

a) **use all measures within its power to implement the Recommendations in this report requiring Federal involvement;**

b) **take responsibility for the carbon dioxide emissions of its citizens and, to that end, commit itself to an initial reduction in carbon dioxide emissions of 20% by the year 2005. This should be part of a program to address the problem of atmospheric change and using all measures within the Government's power;**

c) **take responsibility for the chlorofluorocarbon (CFC) emissions of its citizens and, to that end, commit itself to phase out all emissions of CFCs and other ozone-depleting chemicals by the year 1995. This should be part of a program to address the problem of global atmospheric change and local and regional air pollution using all measures within the Government's power;**

d) **set legally enforceable automobile fleet fuel efficiency standards for the year 2000 of 4.7 litres gas consumption per 100 kilometres driven;**

e) **adopt specific targets as part of international agreements to reduce emissions of carbon dioxide and other greenhouse gases; and**

f) **progressively limit imports from countries which do not adopt international targets to reduce emissions of carbon dioxide and other greenhouse gases.**

*Benefit: This recommendation will enable the reductions of atmospheric emissions described in Recommendation #1.*

# PART THREE

Chapter Five

# Targeting Specific Emissions

As described in Chapter 2, there are several gases which contribute to atmospheric change. These gases can be divided into two categories. In one category are those gases, primarily carbon dioxide, which result from the seemingly ordinary day-to-day activity of millions of individuals, which are fully integrated into most of our lives, and from which a concerted, long-term effort will be required to reduce emissions. This challenge will be the focus of Part Four.

In the other category are those gases from which, in comparison, it is relatively easier to reduce emissions. These gases, chlorofluorocarbons (CFCs) and other ozone depleting chemicals, sulphur dioxide, and methane, are the focus of this chapter.

## *Ozone Depleting Chemicals: Protecting The Ozone Layer*

In 1987, 32 nations signed an international agreement to limit the production of ozone depleting chemicals. This agreement, known as the Montreal Protocol, was an important first step, but unfortunately the limits agreed to are not sufficient to halt further destruction of the ozone layer. For this reason, many local governments are calling for stricter actions. Making fast progress toward eliminating the release of ozone depleting chemicals is very important since their ozone depleting capacity lasts for so long. Substitute products or alternative technologies currently exist for almost all ozone depleting chemicals in use today [1].

*Replacing CFCs*

According to conventional wisdom, there is one use for CFCs (chlorofluorocarbons) that has *no* reasonable cost-effective substitute — as a solvent to clean circuit boards in the electronics industry. However, a Florida company is now producing a biodegradable terpene solvent made from orange peels, called EC-7, that can reportedly clean circuit boards at least as well as CFCs but costs the same or less. The company is currently producing enough solvent to replace all of the CFCs used worldwide. It is also developing techniques to reprocess EC-7 for reuse.

Source: Rocky Mountain Institute 1990, p. 4.

*"Scientists are flying blind. We do not know how much these holes [in the ozone shield] will expand or whether new holes will be created. And because 50% of the ozone-damaging chemicals emitted were emitted in the last ten years, chlorine levels are likely to double as they reach the stratosphere, certainly causing the holes to grow or worse. We are playing Russian roulette with our planet. It may already be too late. Time is running out."*

— Stuart Parker, Young Greens, submission to Task Force

*Other Cities Are Protecting the Ozone Layer*

Over 100 North American cities have passed bans on polystyrene foam food packaging manufactured with an ozone depleting compound. Newark, New Jersey and Irvine, California have passed comprehensive bans on the use, sale and manufacture of ozone-depleting compounds within their jurisdictions. Their by-laws:

- prohibit the use, sale, and manufacture of nearly all ozone-depleting compounds, except in the manufacture of drugs and medical devices and when military specifications call for them; and
- require all service stations and repair shops to capture and recycle CFCs.

Source: Local Government Commission 1990

Recommendation 5

## BANNING AND REGULATING OZONE DEPLETING CHEMICALS

*Purpose: To ban the use, sale and manufacture of chlorofluorocarbons (CFCs) and other ozone-depleting chemicals, enhance the effective control and recovery of CFCs now in use; and encourage the substitution of non-ozone depleting alternatives for products and processes currently in use.*

**THE TASK FORCE RECOMMENDS THAT Council:**

a) **direct the City Department of Permits and Licenses, Health Department and Law Department to review the Greater Vancouver Regional District's proposed CFC Control Task Force by-law and report to Council before the end of 1990 on an appropriate City by-law banning the use, sale and manufacture of ozone depleting chemicals and items which in their manufacturing process involve the use of ozone depleting chemicals as provided in the ordinance adopted by Newark, New Jersey which is Appendix 1 of Volume II of this report; and**

b) **direct the City Law Department, as part of the study described in recommendation (a), to prepare and deliver a draft by-law banning the use, sale, and manufacture of ozone depleting chemicals.**

*Benefit: This recommendation will reduce and eventually eliminate Vancouver's emissions of chlorofluorocarbons and related chemicals which damage the ozone layer and contribute to atmospheric change.*

*Portland's Fast Food Vendors Use Paper Cups and Containers*

As of January 1, 1990 all restaurants and retail food vendors in Portland, Oregon are prohibited from using polystyrene plastic foam. The City's inspector, nicknamed the "Styro-Cop" by local residents, has the power to issue citations for civil penalties of up to $250 for a first offense and $500 for a repeat violation. About 4,500 tons of polystyrene foam were taken to Portland landfills last year. Fourteen plaintiffs, including plastics manufacturers, filed suit against the city seeking to block the law. The case was dismissed by a county court judge, but the plaintiffs have appealed. In the meantime, a leading fast food chain has shipped all its polystyrene foam to outlets outside of Portland and is using paper cups and containers within the city.

Source: Egan 1990

Recommendation 6

## SUBSTANCE REGULATION, INCENTIVES FOR CONVERSION AND CONSERVATION

*Purpose: To determine the City's powers to assist businesses with conversion from chlorofluorocarbons and ozone depleting chemicals to less harmful chemicals and products.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Department of Permits and Licenses and City Law Department to study and report to Council before the end of 1990 on specific regulatory measures, using the City's existing and any necessary new powers to regulate licensed businesses, to provide economic incentives for conversion of processes from those using ozone depleting chemicals.**

*Benefit: This recommendation will help the City determine its ability to assist Vancouver businesses in reducing their emissions of chemicals that damage the ozone layer and contribute to atmospheric change.*

*Asthma Linked To Air Pollution*

A recent study by UBC epidemiologist Dr. David Bates shows a definite connection between asthmatic attacks and air pollution. Bates' study — published in the April 1990 issue of the New York-based journal *Environmental Research* — documents visits to nine hospital emergency departments in Greater Vancouver over a 28-month period.

Bates found a "significant association" between summertime sulphur dioxide levels and visits to the hospital for asthma and acute respiratory disease in the 15 to 60 age groups. Emergency visits in all age groups were also associated with sulphur dioxide levels in the winter.

A 0.1 ppm increase in sulphur dioxide leads to a 77 percent increase in hospital emergency visits for acute respiratory disease. The Greater Vancouver Regional District is predicting a 53 percent increase in sulphur dioxide emissions over the next 10 years. Most of these emissions come from cement works and oil refineries.

Sources: D.V. Bates 1990 and Priest 1990

## *Sulphur Dioxide: Protecting Public Health*

Recommendation 7

### REDUCE PRESENT SULPHUR DIOXIDE LEVELS

*Purpose: To reduce present unhealthful levels of sulphur dioxide emissions from regional cement works and petroleum processing refineries.*

**THE TASK FORCE RECOMMENDS THAT Council request the Greater Vancouver Regional District (GVRD) to use its influence to immediately reduce the levels of industrial sulphur dioxide emissions, especially those from cement works and petroleum processing refineries in the GVRD.**

*Benefit: This recommendation will reduce present levels of sulphur dioxide emissions in the Greater Vancouver area, which are linked with hospital visits for respiratory problems such as asthma and bronchitis.*

## *Methane: Reducing The Greenhouse Effect*

Recommendation 8

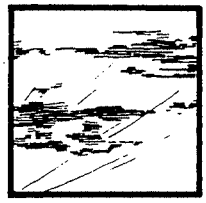
### ACCELERATE METHANE GAS COLLECTION

*Purpose: To accelerate construction of the methane gas collection system for the Burns Bog Landfill.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Engineering Department to accelerate construction of the methane gas collection system for the Burns Bog Landfill.**

*Benefit: This recommendation will reduce present emissions levels of methane gas, a greenhouse gas which, if collected, can be sold for other uses.*

# PART FOUR





Chapter Six

## Transportation Planning and Traffic Management

The burning of fossil fuels in motor vehicles and the associated release of carbon dioxide is one of the prime contributors to atmospheric pollution and change. If we continue our present trends for the next few decades, we can expect to see not only intolerable levels of atmospheric pollutants, but also increasing congestion, longer commuting times, increasing demands for shorter work hours to compensate for longer traveling hours, and higher prices due to reduced worker productivity [1].

*Transportation Control Measures*

Transportation Control Measures include employer-based transportation management; improved public transit; park-and-ride lots and fringe parking; parking management programs; rideshare (car- and van-pooling) incentives; road pricing (tolls); traffic flow improvements; trip-reduction by-laws; voluntary no-drive days; and work schedule changes. These measures "not only reduce emissions and congestion, but also save energy and money." The U.S. Department of Transportation reviewed 40 current transportation control programs and found that the most successful combined these elements:

- Site-specific planning, including a transportation coordinator, personalized in-house car-pool matching, priority car-pool parking, transit encouragements, bicycle facilities and promotions, and flex-time;
- Environmental incentives, including tight parking supply, moderate to high parking prices, low level of parking cost subsidy, little on- or off-street parking nearby, and well-enforced car-pool preferential parking; and
- Convenient transportation alternatives, including frequent transit service, ample transit capacity, and stable fares.

Source: U.S. Department of Transportation 1989

Efforts to relieve traffic congestion alone do little to reduce polluting emissions or the amount of fuel consumed. Just as many cities have set waste reduction as their main waste control goal, cities must now stress *reduction of single occupancy vehicle trips* as the only sound way to achieve improved air quality, reduce the overconsumption of energy that is contributing to atmospheric change, *and* relieve traffic congestion.

*"Reducing the use of the private automobile in Greater Vancouver (by improved transportation planning, traffic management, and land use planning) could significantly lower the production of this greenhouse gas [carbon dioxide]. However, this action would also lead to improvements in local air quality by decreasing the production of pollutants such as nitrogen oxides (and consequently ozone), sulphur oxides and carbon monoxide. Significant cost savings may also ensue from a reduction in the costs of owning and operating private motor vehicles as well as a lowering of the enormous costs building and maintaining the infrastructure created specifically for these vehicles."*

— P.J. Pender,
Regional Director General,
Atmospheric Environment Service, Environment Canada,
submission to Task Force

*"Under the provisions of the Tax Act, parking should be a taxable benefit for the employee. However, by administrative policy, Revenue Canada has declined to enforce that provision of the law. The result is that parking is a deductible expense for the employer and is costless to the employee. This policy clearly results in a massive increase in the number of cars coming into Vancouver. If employees had to pay for their parking, public transit would be more competitive. In this case there is no need for a change in law. Pressure must be applied to have the existing law enforced... Under the provisions of the Tax Act, bus passes provided by an employer are taxable benefits to the employees. Bus passes do not enjoy the administrative exemption that parking currently benefits from. This significantly disadvantages public transit."*

— Ian Moffatt,
submission to Task Force

To reduce auto-related greenhouse gas emissions, air pollution, and congestion in Vancouver, we must achieve three objectives:

- ***Reduce the number of automobile trips in the City and the Region.***

- ***Increase opportunities for non-auto transportation including bicycles, walking, rail, buses, and alternative vehicles.***

- ***Reduce the use of gasoline and diesel use fuel in conventional buses, autos and trucks.***

The recommendations which follow are designed to meet these objectives. Our reommendations reinforce and build upon the transportation strategy recently endorsed by the Greater Vancouver Transportation Task Force [2]. In particular, our proposed action plan:

- encourages transit over personal automobile use;
- identifies means for managing transportation demands, especially of commuters;
- suggests some alternative forms of funding; and
- emphasizes bicycle and pedestrian networks as valid components of a regional transportation strategy.

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*Traffic Management By-Laws*

Appendix 2 in Volume II is a model traffic management by-law requiring employers of 25 or more, or complexes with more than 100 employees, to achieve, over a three-year period, an employee participation rate of at least 50% in commute alternatives and/or alternative work hours, with fines for violations kept in a Trip Reduction Fund to subsidize commute alternatives. Other communities that have adopted similar ordinances include Bellevue, WA, Montgomery County, MD, and at least 37 cities and counties in California.

Montgomery County, a suburb of Washington, D.C., has instituted both developer requirements and a Ride Share Ordinance. Developers must prepare a ten year trip reduction plan that includes elements such as personalized ridesharing assistance, shuttle van services, transit pass subsidies and other measures. The Ride Share Ordinance requires new employers to achieve a specified increase in transit use by their employees; penalties are exacted if goals are not met. This ordinance has achieved a 31.7% increase in the number of carpools and a 59.6% increase in transit commuters within just one year.

Sources: California Department of Transportation 1990 and Local Government Commission 1990

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## Recommendation 9

### TRAFFIC MANAGEMENT (TRIP REDUCTION) BY-LAW

*Purpose: To reduce peak hour trips and increase the number of people to vehicles from 1.3 to 1.75.*

**THE TASK FORCE RECOMMENDS THAT Council direct the:**

**a) City Law Department to draft an automobile traffic management by-law based on the model traffic management by-law which is included as Appendix 2 of Volume II of this report and deliver that traffic management by-law to Council before June 30, 1991;**

**b) City Engineering Department and City Planning Department to:**

**i) study the measures necessary to implement that traffic management by-law and formulate a comprehensive plan to implement, monitor and enforce the traffic management by-law and report to Council before June 30, 1991; and**

**ii) jointly to formulate measures to fulfil the City's information gathering and dissemination, coordination, and other responsibilities under the traffic management by-law, as contemplated in the model traffic management by-law which is included as Appendix 2 of Volume II of this report, and report to Council on those matters before June 30, 1991.**

*Benefit: This recommendation would significantly reduce the number of single-occupant vehicle trips in the City, with a corresponding reduction in the emissions of atmospheric pollutants from motor vehicles.*

*Summary of Recommended Traffic Management By-Law*

| | |
|---|---|
| Applicable To: | All employers of 25 or more employees, all employers in non-exempt designated commercial districts, commercial buildings of 25,000 gross square feet or more, and any multi-tenant building or group of buildings on one site with 100 or more employees. |
| Objectives: | To reduce peak hour trips and increase the number of people to vehicles from 1.3 to 1.75. |
| Requirements: | Employers and contractors are required to implement a trip reduction program, including appointment of a transportation coordinator and any reasonable combination of commute alternative programs designed to achieve the required target.<br><br>The City is required to monitor and report annually on the success of the trip reduction programs, by administration and analysis of employee surveys. The City is also required to support trip reduction activities by gathering and disseminating material and providing car pool and van pool matching services. |
| Enforcement: | Failure to comply would enable the City to impose an effective trip reduction program or fine. Fines are to be kept in a Trip Reduction Fund for improvement of public transit and for education programs on commute alternatives. |

*"New emission control legislation will take time to implement. In the meantime let's have some action on reducing the number of kilometres driven by Vancouver people."*

— John Broderick, submission to Task Force

*"Bike routes should be implemented — special conduits designated CAR FREE — many people who would ride all the time don't do so because of the chance of run in with the death machines."*

— Oliver Hockenhull, submission to Task Force

## Recommendation 10

## PREFERENTIAL PARKING AND PRICING

*Purpose: To provide preferential parking and parking pricing that favours high-occupancy vehicles over single-occupancy vehicles.*

**THE TASK FORCE RECOMMENDS THAT Council direct:**

**a) the City Engineering Department to study and report to Council before June 30, 1991 on the principles for establishing:**

**i) the pricing for preferential parking in City owned parking lots and on City streets, giving reduced parking rates to vehicles identified as high-occupancy vehicles and giving high-occupancy vehicles preference for parking space over vehicles identified as single-occupancy vehicles; and**

**ii) the provision of parking facilities for high-occupancy vehicles only, so that new parking for single-occupancy vehicles is limited and eventually decreased; and**

**b) the City Law Department to study and report to Council before June 30, 1991 on the feasibility of a regulatory by-law designed to require operators of private parking lots in the City to implement measures comparable to those referred to in sections (a) (i) and (ii) above.**

*Benefit: By favouring high-occupancy vehicles while discouraging single-occupancy vehicles, this recommendation will result in significant decreases in Vancouver's emissions of atmospheric pollutants.*

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*Parking Measures*

Parking Offsets

Several cities have found that parking programs pay. Sacramento, California grants developers a five percent reduction in required parking for providing bicycle facilities, 15 percent for providing marked car/van-pool spaces, and 60 percent for purchasing transit passes for tenants of new offices.

Preferential Parking

Portland, Oregon and Seattle, Washington lead in on-street preferential parking programs for car-pools. Among the incentives: poolers are allowed to park downtown all day at specific metered locations, are exempted from hourly parking limits and meter fees, and enjoy spaces closest to building entrances.

Parking Pricing

The Federal Government increased its parking rates for federal employees in Ottawa, resulting in a 23 percent reduction in employees driving to work, a 16 percent increase in transit ridership among federal employees, and an increase in average vehicle occupancy from 1.33 to 1.41 passengers.

Preferential high-occupancy vehicle pricing strategies are also highly effective. Montgomery County, Maryland has achieved over 75 percent use of high-occupancy vehicle spaces. Seattle has achieved 95 percent high-occupancy vehicle use in public spaces and 35 percent in private spaces.

Source: Totten 1990, pp. T: 10 -11.

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*Making Bicycles A Better Transportation Alternative*

Fear about safety is one of the main deterrents to bicycle use in Vancouver. An integrated transportation strategy to reduce emissions of carbon dioxide and other greenhouse gases requires safe and convenient bicycle access to all parts of the city. Many cities, including Montreal, Amsterdam, and Davis, California have demonstrated that bicycles are a viable transportation mode and provide bicycle facilities and route systems.

In Vancouver, over 47,000 bicycle trips are made on an average weekday. Approximately 85% of these cycling trips are made for non-recreational purposes such as commuting to/from work and school and shopping.

Source: City of Vancouver Engineering Department 1988, p. 1.

*"It would be great if public transit had some way for cyclists to carry their bikes. Then one could ride from home to public transit, take the transit, then get off and ride to one's destination. Since it would probably be impractical for the transit to wait for cyclists to board and unboard bikes at every stop, only every 5th (or 10th, or whatever) stop could be designated as a cycling stop. Again, cyclists are flexible — it is easy to ride a few extra blocks on a bike."*

— Helen Warn,
submission to Task Force

## Recommendation 11

## BICYCLE TRANSPORTATION

*Purpose: To make bicycling a better transportation alternative by providing ample bicycle parking and related bicycle facilities; implementing and expanding the Vancouver Bicycle Plan; and improving enforcement of all traffic laws relating to road sharing by bicyclists and motorists.*

**THE TASK FORCE RECOMMENDS THAT Council:**

**a) direct the City Engineering Department to:**

**i) with the City Planning Department, proceed rapidly in the preparation of amendments to the Parking By-Law and the Zoning and Development By-Law to require ample minimum bicycle parking in all new developments and to require minimum bicyclists' shower and locker facilities in all new developments;**

**ii) proceed rapidly with implementation of the Vancouver Bicycle Plan in co-operation with the Bicycle Advisory Committee; and**

**iii) in cooperation with the Bicycle Advisory Committee, before the end of 1991 develop measures beyond the Vancouver Comprehensive Bicycle Plan of July 1988 to increase the ease and accessibility of bicycle transportation for ordinary people and expand opportunities to make bicycling a better transportation alternative, such as protected bicycle commuting routes, improving bicycle-transit connections, etc.**

**b) urge the Vancouver Police Board to improve enforcement of all traffic laws relating to road sharing by bicyclists and motorists, such as obeying rules of the road, displaying lights and reflectors, and wearing helmets.**

*Benefit: This recommendation will enable many Vancouver commuters to consider bicycling as a better transportation alternative, with a consequent decrease in motor vehicle usage. This is especially important in good weather, when sunlight reacts with motor vehicle exhaust to form unhealthful atmospheric pollutants such as ground-level ozone.*

*"California's CALTRAN and San Diego Transit have special buses with bike racks mounted externally. These buses bring cyclists from suburban areas to the perimeter of downtown San Francisco and San Diego, where they can easily complete their commute... A report by Chicago Area Transportation concluded that providing secure bike parking at transit stations would reduce hydrocarbon emissions at a public cost of $311 per ton. This compares with $96,415 per ton for express park-and-ride."*

— Grant Watson,
Vancouver Green Party,
submission to Task Force and
to Vancouver Regional
Transportation Commission

## Recommendation 12

## SHORT-TERM EMISSION REDUCTION MEASURES

*Purpose: To achieve short-term reductions in emissions of atmospheric pollutants from motor vehicles.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Engineering Department to:**

**a) identify and report to Council before June 30, 1991 on those streets where existing traffic lanes can effectively be restricted to high-occupancy vehicles during rush hours;**

**b) monitor the City of Toronto's experiment with remote tailpipe sensing and the South Coast (California) Air Quality Management District's Bar-90 program and report to Council before the end of 1991 with a recommendation regarding their potential application in Vancouver; and**

**c) work with the regional air quality management authority and the Province in initiating, before the end of 1991, a hotline for reporting vehicles with excessive tailpipe emissions.**

*Benefit: This recommendation will achieve short-term emissions reductions by favouring high-occupancy vehicles and by targeting those vehicles responsible for a disproportionate share of emissions.*

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*Each Driver's Effect On Atmospheric Pollution*

Each person using mass transit for a year instead of using their automobile saves the atmosphere, on average, about:

- 13.5 kilograms of hydrocarbons (equal in weight to the amount of pure air [14 kg] that each of us needs each day to survive);
- 99.5 kilograms of carbon monoxide (2.6 times the amount required to raise the level of carbon monoxide in BC Place Stadium to dangerous conditions);
- 1,517 kilograms of carbon dioxide (0.2 times the amount of carbon removed by one hectare of forest);
- 7.0 kilograms of nitrogen oxides (3.3 times the amount required to raise the level of nitrogen oxides in BC Place Stadium to dangerous proportions);
- 0.14 kilograms of sulphur oxides (20 times the amount necessary to produce a volume of acid rain equal to the water in an Olympic-size pool); and
- 0.12 kilograms of particulate matter (about equal to a coffee cup filled with potentially poisonous or disease-producing particles [arsenic, lead, aldehydes]).

Source: TransVision Consultants 1990, p. 61.

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*Road Pricing Strategies*

Stockholm is aiming to reduce its car traffic by fifty percent through Trafikplan '89, with implementation planned for summer of 1990. A major component of Trafikplan '89 is road pricing. All drivers entering the City Centre are required to buy a valid monthly transit pass for 300 Kroner (approximately $56). Revenue generated from pass sales will be used to improve public transit, cycling and pedestrian amenities.

In Singapore, motorists have to buy a monthly sticker for their windshield if they want to drive downtown.

In Hong Kong, traffic planners tested a prototype electronic scanning system that automatically billed car owners for being on certain streets.

When motorists fill up in Holland, they may need to put a few more kilometres on their "smart card" as well as gas in their tank. The Dutch "smart card," which uses microwave technology, is fitted in a little box attached to a corner of the windshield. It "talks" to highway scanners located on overhead gantrys and indicates the number of "paid-for" kilometres on that particular card. If it reads empty, the license plate is photographed - and the bill arrives in the mail.

Sources: Dieber 1989 and Daniels 1990

*Potential Options for Funding Transit Improvement*

Approximately 175,000 vehicles per day enter downtown Vancouver. If each driver were required to purchase a $50 monthly transit pass, the revenue from this program would be approximately $8.75 million per month or $105 million per year.

Approximately 37,000 students are enrolled at UBC and approximately 17,000 at SFU. If each of these students purchase a $300 reduced-fare yearly transit pass ($25 per month) as part of their tuition fees, the revenue from this program would be approximately $1.35 million per month or $16.2 million per year.

Together, these two initiatives would bring the City $10.1 million per month or $121.2 million per year for improving our public transit system by:

- increasing the number and frequency of buses;
- reducing transit fares; and
- converting diesel buses to clean-burning fuels.

*"The Arbutus Corridor is the only north-south route in the city that could ever be available for safe, pollution free bicycle and pedestrian transit... Bicycle ferries across False Creek and the north arm of the Fraser River would keep bikers off the bridges for additional commuting safety. The future of this city deserves nothing less."*

— Isabel Minty,
submission to Task Force

*"Alternative fuels are not good enough. There are still the costs of roads, maintenance, land that could be used for housing, disposal of used tires and car batteries and so on... We need to discourage big machines on roads... My freedom is compromised by a lack of bicycle options... Please make a strong recommendation to B.C. Transit to rethink their stand and encourage bikes on buses."*

— Laura Busheikin, presentation to Task Force

## Recommendation 13

### ROAD PRICING AND TRANSIT IMPROVEMENT

*Purpose: To study a road pricing system to fund public transit, provide transit passes for all university students, and use the revenues from these programs to improve transit service, reduce transit fares, and experiment with clean-burning fuels.*

**THE TASK FORCE RECOMMENDS THAT Council:**

**a) direct the City Engineering Department to work with the Ministry of Transportation and Highways to develop a program of fees and permits, under which high-occupancy vehicles are given pricing preference to single-occupancy vehicles, in order to encourage significant decrease in single-occupancy vehicles and, in particular, consider implementation of the Stockholm Trafikplan '89 program;**

**b) urge B.C. Transit to agree with institutions of higher education in Vancouver that students at those institutions purchase a reduced rate transfer pass for each school year as part of their tuition fees; and**

**c) urge B.C. Transit to dedicate revenues generated from recommendations (a) and (b) above to funding:**

**i) improvements in the frequency, convenience, comfort and efficiency of transit service;**

**ii) reduced transit fares, with daily fares good for an entire day in any direction;**

**iii) increasing the proportion of electric-powered buses in the bus fleet; and**

**iv) experiments with hydrogen fuel cell powered vehicles in the City, in cooperation with the recently created Provincial Hydrogen Agency.**

*Benefit: This recommendation would reduce atmospheric pollution by reducing vehicular traffic while funding public transit and experimenting with clean-burning fuels.*

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*What Are We Transporting?*

Transportation is a communications issue; often what is carried is nearly invisible, at the very least intangible. We move paper, and we move people about in order to move paper. The Postal System is an example of a arrangement that employs internal combustion engines and human backs to lug around information, an essentially weightless commodity.

Source: Johnson 1981, p. 55.

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## Recommendation 14

### TELECOMMUNICATIONS

*Purpose: To encourage opportunities for telecommuting rather than commuting, so as to reduce the need for transportation.*

**THIS TASK FORCE RECOMMENDS THAT Council direct the City Manager's Office to coordinate all Departments in researching and supporting telecommunications opportunities that reduce the need for transportation, including but not limited to:**

**a) developing a telecommunications policy for internal City use;**

**b) examining City-wide telecommunications needs with local businesses, agencies, and developers;**

**c) working with neighbourhood commercial districts to identify and put into use telecommunication applications;**

**d) investigating opportunities for a "24-hour City Hall" to provide information by computer access on City activities, services, hearings, and cultural/recreational events;**

**and, before the end of 1992, report to Council with a plan for immediate implementation of the recommendations discussed in (a) through (d) above.**

*Benefit: This recommendation will encourage opportunities which reduce the need for transportation, and encourage local businesses to become leaders in technological and workplace developments which enhance this objective.*

*"I would like to see Vancouver strive for a 50% reduction in carbon dioxide from all sources, and 80% from the private automobile... Vehicle registration should be on a sliding scale based on engine size. For example < 1.5 L: no charge; 1.5 L - 2.0 L: $20.00/year; 2.0 L - 3.0 L: $50.00/year; 3.0 L - 4.0 L: $100.00/year; and increasing by $50.00 per year for every 1.0 L increase in engine size. If the driver wishes to insure the vehicle to drive to work, then the registration charges should be triple those mentioned. The money from this is contributed to increasing the number of bus routes, having them come more often, and to give incentives to muscular means of transport."*

— Anna Bonga,
presentation to Task Force

## Recommendation 15

### ANNUAL EMISSIONS AND TRANSPORTATION SUBSIDY REPORT

*Purpose: To monitor and evaluate progress in reducing emissions of atmospheric pollutants; to monitor and evaluate progress in reorienting subsidies from private to public forms of transit.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Engineering Department to prepare an annual report to Council on:**

**a) total vehicle usage, including occupancy rates; total volume of all motor vehicle fuels sold in the City; average trip length; and resultant changes in carbon dioxide and other atmospheric pollutant emissions;**

**b) the amount of all direct and indirect subsidies to private automobile use in the City (e.g., the costs of road maintenance, traffic enforcement, parking enforcement, land that could be used for other purposes, etc.) compared with the amount of all subsidies to public forms of transit; and**

**c) the relative contribution of non-automotive mobile sources of atmospheric pollutants, such as trucks, ships, and aircraft, and strategies to reduce emissions from these sources.**

*Benefit: This recommendation will enable the City to monitor its progress in meeting emissions reduction targets; it will also improve the City's ability to determine the true costs of public and private transportation options.*

Chapter Seven

# Land Use Planning

Why do we drive as much as we do? Our needs for transportation arise directly out of the way land is used in our community. Through zoning and other techniques, land-use patterns and densities dictate travel volume, directions, and modes to a great extent. To encourage people to use the transportation system more efficiently we need to adopt land use policies which reduce our needs for transportation and let us meet those needs in more energy-efficient ways.

To create more energy-efficient travel patterns we must concentrate activities in specific areas and develop a mix of land uses in those areas. Our objectives should be to create travel patterns that can be effectively served by more energy-efficient travel modes, such as public transit, bicycling, and walking, and to reduce the average length of daily automobile trips where other modes are not feasible [1].

Energy-efficient land use provides a strong incentive for what some analysts call *reurbanization* — increasing the intensity of activity within present urban boundaries and "hardening" the urban fringe (reducing sprawl), thereby making more effective use of existing services, reducing infrastructure costs, and relieving pressures on adjacent agricultural lands.

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*Breaking the Automobile Addiction*

A study of "automobile dependence" in 32 cities found that five major physical planning factors sharply distinguish automobile-dependent cities from those with more freedom. Cities with low automobile dependence also were:

- more centralized;
- had more intense land use (more people and jobs per unit area);
- were more oriented to non-auto modes (more public transit, foot traffic, and bicycle usage);
- placed more restraints on high-speed traffic; and
- offered better public transit.

Source: Newman and Kenworthy 1989

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Striking a "balance" between jobs and housing is not enough, however, unless the people who work in a given area have the option of also living in that same area. This objective requires policies to encourage access by proximity, residential intensification to increase the supply of housing units, and incentives for ecologically-oriented development.

The transportation goals described in Chapter 6 will help us reduce our emissions of atmospheric pollutants in the near term. Reductions in the atmospheric pollutant emissions produced by each individual vehicle will eventually be outweighed by the increasing number of total vehicles on our roads. For long-term success in reducing emissions of

*"It is a fact that the price of real estate in Vancouver forces people to live in areas outside, and commute to work. Where they live, where they work, where their kids go to school or daycare, where their spouse works are all facts of most people's daily lives, and another fact is that for many of them, public transit, as it exists, is not a reasonable alternative for them."*

— D.W. Brown,
Vice President,
British Columbia
Automobile Association,
presentation to Task Force

*"As we accept that global issues like atmospheric change are directly related to how we live in our own neighbourhoods, compelling ecological and social reasons emerge for why we must reassess our urban patterns... The most important feature of a city comprised of such 'urban villages', both ecologically and socially, is that the* workforce and the workplace are in close proximity."

— Dr. Tom Perry,
submission to the Task Force

atmospheric pollutants we need to begin planning now to achieve this objective:

- ***Reduce the need for transportation in the City and the Region.***

Recommendation 16

## ENERGY-EFFICIENT LAND USE POLICIES

*Purpose: To reduce our needs for transportation and let us meet those needs in more energy-efficient ways.*

**THE TASK FORCE RECOMMENDS THAT Council request the City Planning Department and the Greater Vancouver Regional District's Development Services Committee to study and develop energy-efficient land use policies based on these recommendations from the Federation of Canadian Municipalities [2]:**

a) **encourage greater density through multiple unit residential developments;**

b) **integrate work, residence and shopping in mixed use development;**

c) **encourage residential clustering;**

d) **zone higher density development along established routes;**

e) **decentralize commercial and community services to reduce travel distances, creating self-contained communities with a better balance between employment and population;**

f) **place controls on outlying shopping centres, strip development and urban sprawl;**

g) **encourage the infilling (development) of existing vacant land in built-up areas;**

h) **ensure that major public facilities have provision for walking and bicycling access to transit;**

i) **encourage the development of high quality walking and bicycling facilities, including development design guidelines to support transportation alternatives to private automobile use, such as provision of on-site lunchrooms, daycare facilities, automated bank teller machines and other facilities;**

**and, before the end of 1991, report to Council with a plan for implementation of the recommendations discussed in items (a) through (i) above.**

*Benefit: This recommendation will reduce long-term emissions of atmospheric pollutants by reducing the need for transportation.*

## Recommendation 17

### DESIGN COMPETITION

*Purpose: To facilitate energy-efficient land use policies by sponsoring an international design competition.*

**THE TASK FORCE RECOMMENDS THAT Council, in order to facilitate Recommendation #16 above, direct the City Planning Department to sponsor and announce, before the end of 1991, an international design competition based on the criteria in Recommendation #16 for the City-owned southeast shore of False Creek between Main and Cambie.**

*Benefit: This recommendation will motivate the architectural, design, and building industries, as well as the public, to encourage energy-efficient land development.*

*"Fear of density is fear of increased automobile use."*

— Nancy Skinner, Berkeley City Council (California), presentation to Task Force

## Recommendation 18

### ECOLOGICAL DEVELOPMENT INCENTIVES

*Purpose: To provide incentives for ecologically appropriate urban development.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Planning Department to study an ecological incentive program which would implement a floor space incentive system, encouraging developments which provide a prescribed range of measures, including energy-efficient design, suitable density developments, low environmental impact development, creation of common areas, supply of inexpensive and more modestly sized homes, and facilities which encourage alternatives to the private automobile; and before June 30,1992 report to Council with a plan for implementation of the program.**

*Benefit: This recommendation will encourage energy-efficient land development.*

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*New Neighbourhoods of the 1990s*

"New neighbourhoods of the 1990s will cut auto dependence by placing all of the elements of an appealing lifestyle in close proximity... This can be accomplished with large-scale, mixed-use communities built from scratch or with small-scale, urban and suburban infill 'villages' dropped onto passed-over sites amid existing retail, commercial and recreational developments. The complete realization of the ideal is yet to come ...[but] there's a market here... Offer people the lifestyle they yearn for and they'll beat a path to your sales office. For instance, give them a mix of housing types and price ranges for diverse target markets. Two-income couples with children need daycare and preschools. Those without children want exterior maintenance and security features... They all want shopping, restaurants, entertainment and recreation nearby. Just cut the time they spend stuck in traffic... Some developments will even offer 'electronic village' communications systems that connect home computers to those at the office and around the world. Expect to see all this in the 1990s... It's beginning to happen already."

Source: Lurz and McLeister 1989, p. 76.

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*"The end solution is getting people to live closer to where they work — everybody wins... Proximity tax credits should be instituted. The closer to work one lives, the higher the tax credit."*

— Ian Moffatt,
presentation to Task Force

Recommendation 19

## PROXIMITY POLICIES AND INCENTIVES

Purpose: *To make access by proximity rather than access by transportation a central focus of planning in the City.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Planning Department and City Finance Department to make access by proximity rather than access by transportation a central focus of planning in the City by undertaking a study to develop and implement a program of proximity policies and incentives and, no later than June 30, 1993, reporting to Council with a plan for implementation of this program.**

*Benefit: This recommendation will result in policies and incentives that encourage people to minimize their needs for transportation.*

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*Residential Intensification*

"Residential Intensification" means the creation of new residential units or accommodation in existing buildings or on previously developed, serviced land generally including:

- creation of rooming, boarding and lodging houses;
- creation of accessory apartments;
- conversion of non-residential structures to residential use;
- infill;
- redevelopment.

Kingston, Ontario created a low-interest loan program in 1981 to encourage the conversion of vacant, obsolete second and third storey commercial space in the downtown area into residential units. The program, which provides financial assistance to property owners within the CBD, was funded by an initial allocation of $250,000 from Council to serve as a revolving fund for future loans. The program's advantages include business benefits to downtown merchants, cost-effectiveness, increased assessments; downtown revitalization; and easing a tight rental apartment situatio.

St. Catherines, Ontario instituted a similar program in 1987, creating a $300,000 revolving fund to provide 8% conversion loans of up to $20,000 per dwelling unit.

The Metropolitan Toronto Planning Department has estimated that the conversion aspect alone of a residential intensification program could produce 39,000 new housing units, the equivalent of 11 years of rental housing production (both private and social units).

Sources: Ontario Ministry of Municipal Affairs and Housing 1989; Kingston Planning Report 1987; St. Catherines Planning Report 1987; Metropolitan Toronto Planning Department 1987.

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## Recommendation 20

### RESIDENTIAL INTENSIFICATION

*Purpose: To encourage new residential units in existing buildings or on previously developed, serviced land, so as to reduce commuting and to reduce urban sprawl.*

**THE TASK FORCE RECOMMENDS THAT Council continue its program of encouraging residential intensification, including the creation of new residential units in existing buildings through creation of boarding houses, secondary suites, conversion of commercial buildings to residential use, and infill through, for example:**

a) **low-interest loans to assist homeowners wishing to provide accessory units;**

b) **minimum requirements for space, utilities, quality of construction and safety; and**

c) **technical assistance in terms of design, neighbourhood fit, etc.**

*Benefit: This recommendation will increase the supply of housing units in order to reduce pressure on the transportation system and better enable proximity planning.*

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*Working At Home*

Vancouver discourages many people from working at home. Some occupations have tradtionally attracted home-workers, such as writers and craftspeople. With the rise of telecommunications, many more people — from secretaries to editors to stock brokers — now have the option of reducing their commuting by conducting at least part of their work from home. Many smaller businesses, such as architects, graphic designers, and desktop publishers, have one or two employees and no need for a storefront. Traditional concerns about larger businesses creating noise, parking and traffic problems should not prevent these smaller businesses from operating in residential neighbourhoods.

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## Recommendation 21

### ENCOURAGE WORK AT HOME

*Purpose: To encourage people to work at home, so as to reduce the need for transportation.*

**THIS TASK FORCE RECOMMENDS THAT Council direct the City Department of Permits and Licenses, the City Law Department and the City Planning Department to study and report to Council before June 30, 1991 on amendments to existing by-laws and regulations required to encourage appropriate home occupations.**

*Benefit: This recommendation will contribute to the new focus on proximity planning and reducing the need for transportation.*

*"Lessons should be learnt from the Dutch 'Woonerf' system, in which sidewalks are levelled, streets filled with trees, shrubs, benches and other obstacles, and in which cars have to weave slowly in and out if they want to pass through. Reclaiming the streets for local pedestrians is a very important step in ending the colonialism of the automobile over the streets. Local Neighbourhood Councils should be formed, and charged among other things with drawing up plans for local street closures, for pedestrianisation, and for implementing 'Woonerf' type schemes, holding whatever public hearings they feel appropriate."*

— Guy Dauncey,
submission to Task Force

## Recommendation 22

### LOCAL AREA PLANNING TERMS OF REFERENCE

*Purpose: To ensure that all local area planning programs incorporate the objectives of reducing emissions of atmospheric pollutants and include measures addressing those objectives in their recommendations to Council.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Planning Department to immediately require in its terms of reference for all local area planning programs that the local area planning committee consider the objectives of reducing emissions of atmospheric pollutants and include measures addressing those objectives in its recommendations to Council.**

*Benefit: This recommendation will ensure that the overall goal of reducing emissions of atmospheric pollutants is enhanced by the routine decisions of local area planning programs.*

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*Finding the Future in the Past*

"Much of the urban form making up the City of Vancouver is little more than a coalescence of several villages. Each such village would have had an historical core and each such core has, in turn, generated patterns of growth and development around itself... The Commission suggests that these traditional village cores may be the logical centers from which to effect zoning changes which can accommodate the city-wide need for new housing stock... By adopting a comprehensive look at villages as 'life-cycle' communities with variety and commercial life, the community plan would de-emphasize the use of zoning as a means of *separating* uses and emphasize instead the *combining* of uses to reflect the heterogeneity of true urban villages in a community Official Development Plan."

Source: Vancouver City Planning Commission 1989, Section 5, pp. 55-56.

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## Recommendation 23

### COMMUNITY COUNCILS PILOT PROGRAM

*Purpose: To establish a pilot program of Community Councils to promote and support urban development compatible with the goal of reducing emissions of atmospheric pollutants.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Manager and the City Planning Department before the end of 1991 to develop a pilot program of Community Councils to promote and support urban development compatible with reducing emissions of atmospheric pollutants. These Community Councils will review and develop plans that reflect the responsibility of neighbourhoods to reduce emissions of atmospheric pollutants.**

*Benefit: This recommendation will test a mechanism for promoting and supporting urban development compatible with reducing emissions of atmospheric pollutants.*

*Special Office for the Environment*

Vancouver City Council recently voted to approve a Special Office for the Environment through the City Manager's Office. The new Environment Office is designed to ensure greater coordination and integration on environmental issues, promote environmental awareness throughout City government, and assist rapid action on priority environmental issues.

## Recommendation 24

### PLANS AND REZONING REPORTS

*Purpose: To ensure that planning and rezoning contribute to the objective of reducing atmospheric pollution.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Planning Department immediately to:**

a) **require, in all plans or rezoning reports prepared by the Planning Department, a statement describing how the proposal contributes to or detracts from the objective of reducing atmospheric pollution; and**

b) **review all such statements with the Special Office for the Environment.**

*Benefit: This recommendation will ensure that the overall goal of reducing emissions of atmospheric pollutants is enhanced by routine planning and rezoning.*

Chapter Eight

# Energy Conservation and Efficiency

The most direct route to controlling carbon dioxide emissions is by reducing fossil fuel energy consumption. Eighty percent of global energy production comes from coal, oil and natural gas. Any significant reduction in energy consumption will result in a decrease in carbon dioxide emissions. Energy consumption could be reduced substantially by minimizing waste and inefficiency [1].

Energy conservation measures are more cost effective than finding new sources of fossil fuels, for example, and are much less harmful to the environment. In addition, energy conservation reduces utility bills, saving money for local government and the consumer. A larger proportion of money spent on conservation stays in the local economy and helps develop local businesses than does money spent on energy bills [2].

*Portland's Energy Policy*

In April, the City of Portland, Oregon adopted an energy policy with the goal of "increasing energy efficiency in all sectors of the City by 10 percent by the year 2000 so as to enhance the livability, economic strength and well-being of the City's residents and businesses and reduce environmental problems, such as air pollution and emissions that contribute to global warming." The policy specifies that the City will advocate energy efficiency, promote energy efficiency in city-owned buildings and in residential buildings, promote energy efficiency through land use regulations, encourage energy efficiency in commercial and industrial facilities, provide energy efficient transportation, research and support telecommunications as an energy efficiency strategy, promote conservation as the energy resource of first choice, and promote waste reduction and recycling.

Source: City of Portland Energy Office 1990

Some may argue that our recommendations for energy conservation go beyond the mandate of the Task Force because much of our energy in B.C. is derived from hydroelectricity. However, electrical energy conservation may enable us to close fossil fuel generating facilities, such as the Burrard Thermal generating plant, thereby contributing to the improvement of both global and local air quality.

Although dams do not affect the atmosphere, they do have other environmental effects. To reduce the impacts, atmospheric and otherwise, of energy production and use, it makes sense to adopt an ethic of energy conservation overall, as well as targeting specific sources. In this way, efforts to reduce carbon dioxide emissions will also help to reduce other uses of energy.

The City has a successful energy conservation program for civic buildings, aimed toward elimination of unnecessary and inefficient lighting, conversion to natural gas, and efficient operation of building systems to reduce energy consumption. As well, the City participate's in B.C. Hydro's PowerSmart program. The Task Force applauds the City's energy conservation efforts. Atmospheric change requires us to now

increase energy efficiency in *all* sectors of the City, not just civic buildings. To this end, the City may want to work more closely with existing groups such as the B.C. Energy Management Task Force on Commercial Buildings or the B.C. Hydro Power Smart Commercial Building Retrofit Program [3]. Our objective should be to:

- ***Increase energy efficiency in all sectors of the City by 10 percent by the year 2000.***

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*San Francisco Targets Energy Conservation*

San Francisco enacted a comprehensive residential energy conservation retrofit ordinance in 1982, which has already resulted in the retrofitting of over 25,000 residential units. The San Francisco ordinance requires all existing residential buildings, including apartment buildings, to be brought up to an energy conservation standard at the time of sale. The cost of the conservation measures can be included in the financing of the residential unit. Cost-effective conservation measures required by the ordinance include ceiling insulation, weather-stripping, a water heater insulation blanket, low-flow showerheads, caulking and sealing of major cracks and joints, and insulation of heating and cooling ducts. Additional measures are required of multi-family units. The San Francisco ordinance is included in Volume II as Appendix 3.

San Francisco also has a commercial energy conservation retrofit ordinance, which is estimated to save San Francisco businesses over $50 million in energy costs after the first five years.

Source: Local Government Commission 1990

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*Energy-Efficient Lighting*

Lighting, directly and indirectly (through increased air conditioning requirements) can account for more than half of the energy used in an office building. By using new, recently-developed technologies, one can obtain the same quality of light while cutting energy requirements up to 92%. New compact fluorescent light bulbs are far more energy efficient; photocell sensors are on the market which automatically dim lights when daylight is available; and occupancy sensor controls now have the ability to automatically turn out the lights when no one is in the room.

Source: Local Government Commission 1990

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## Recommendation 25

## ENERGY CONSERVATION AND EFFICIENCY

*Purpose: To meet existing energy conservation standards in all new and existing residential and commercial buildings, and to discourage practices and materials that produce atmospheric pollutants in all new construction.*

**THE TASK FORCE RECOMMENDS THAT Council:**

a) **direct the City Department of Permits and Licenses to expedite implementation of an energy conservation by-law requiring all new construction in the City to meet prescribed standards of efficient energy use, with that objective to be achieved if possible by adoption of relevant portions of the National Building Code or another code with energy efficiency standards;**

b) **direct the City Department of Permits and Licenses to study, and report to Council before June 30,1991, on the following:**

   i) **a commercial and residential energy conservation retrofit by-law, modelled on the San Francisco retrofit ordinance which is Appendix 3 of Volume II of this report; and**

   ii) **a program, in conjunction with the Greater Vancouver Regional District's CFC Control Strategy, to encourage installation of alternatives to halon fire protection systems and HVAC systems employing ozone depleting chemicals as coolants;**

c) **direct the City Department of Permits and Licenses to encourage infrared scanning for energy leakages in commercial and residential buildings;**

d) **request B.C. Hydro and B.C. Gas to invest in low-interest loan programs for residential and commercial energy conservation;**

e) **direct the City Department of Permits and Licenses and the City Law Department to report to Council before June 30, 1991 on a by-law, incorporating existing B.C. Hydro interior lighting standards, to implement energy efficient interior lighting standards for commercial buildings based on the model by-law which is Appendix 4 of Volume II of this report; and**

f) **request the Provincial Government to pass an Energy Efficiency Act setting minimum energy efficiency standards for appliances, similar to legislation passed in Ontario.**

*Benefit: This recommendation will result in decreased emissions of atmospheric pollutants by minimizing energy waste and inefficiency, therefore enhancing the livability, economic strength, and well-being of the City's residents and businesses.*

Chapter Nine

# The City As Leader

Leadership by example is effective leadership. The City is already undertaking many programs which have a positive effect on the atmosphere (for example, the Police Department vehicles have been using propane fuels for many years and the City also has some far-sighted energy conservation policies in place). The seriousness of atmospheric pollution requires that many other policies and practices of the City must be revised.

City government is not only one of the largest employers in Vancouver, but one of the most influential — as demonstrated by the City's actions regarding smoking in public facilities. For the recommendations in this report to be effective, the City must set the pace. Atmospheric change means we all have to change, and City operations are no exception. Our objective should be to:

- ***Become a Leader in Addressing Atmospheric Change.***

The Task Force believes the City can become a leader in addressing atmospheric change by adopting the recommendations associated with the six principles below:

- Recognize Atmospheric Change As A Public Health Issue
- Make Polluters Finance Transportation Alternatives
- Absorb Carbon from the Atmosphere
- Reduce and Recycle Waste
- Leadership By Example
- Public Involvement and Education

## *Recognize Atmospheric Change As A Public Health Issue*

Environmental health problems are expensive as well as unpleasant. A 1989 study for the South Coast Air Quality Management District (California) assessed the economic impact of health benefits from improving air quality. The research team concluded that, for the South Coast region, "the best conservative estimate of the economic benefits of better health from improved air quality is $9.4 billion to $14.3 billion [1]."

The following recommendation is intended to provide information on the health effects of atmospheric pollutants in this region, and to spur action where negative health consequences are known.

*"The ozone levels at Chilliwack and Abbotsford airports often exceed those in Vancouver and, what is worse, they do so mainly on those days when the air quality is not good anywhere in the Lower Mainland... Given the assurances which we have received from Ministry of Environment officials that... by far the largest offender is the automobile, the trends are threatening... Our Regional Districts support recent government efforts to expand public transit systems, and are generally supportive of any realistic programs to reduce reliance on the automobile for commuting."*

— Central Fraser Valley Regional District, Dewdney-Alouette Regional District, and Fraser-Cheam Regional District, joint submission to Task Force

*"The role of government is to protect public health."*

— Dr. Larry Berg,
South Coast Air Quality Management District (California),
presentation to Task Force

Recommendation 26

## ANNUAL REPORTS TO ASSESS HEALTH EFFECTS

*Purpose: To monitor, in cooperation with neighbouring regional districts, the health effects of atmospheric pollutants; and assess the health effects of woodburning in the City.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Health Department to:**

**a) publish an annual report on the health effects of global and local atmospheric pollutants and on air quality in Vancouver and the Fraser Valley;**

**b) cooperate with the Central Fraser Valley Regional District, the Dewdney-Alouette Regional District, and the Fraser Cheam Regional District and their respective Union Boards of Health in compiling these annual reports; and**

**c) with the City Law Department, to study and report to Council before June 30, 1991 on the regulation of wood burning in stoves, fireplaces and outdoors, on the basis that such wood burning contributes to the deposition of particulate matter and may be harmful to the health of the City's citizens.**

*Benefit: This recommendation will provide information on the health effects of atmospheric pollutants in the Greater Vancouver region.*

### *Make Polluters Finance Transportation Alternatives*

Recommendation 27

## CARBON DIOXIDE TAX TO FUND TRANSPORTATION ALTERNATIVES

*Purpose: To introduce a regional tax on carbon dioxide emissions to fund transportation alternatives and development of clean-burning fuels.*

**THE TASK FORCE RECOMMENDS THAT Council urge the regional air quality management authority and the Provincial Government to introduce before June 30, 1991 a regional vehicular carbon dioxide tax with these characteristics:**

**a) the tax should be levied on the amount of carbon contained in fuels per unit of energy;**

**b) the tax should rise in increments over a five-year period so that by 1997 the total retail cost would equal the average cost of the same fuels in representative western European nations;**

**c) the tax revenues would be accounted for separately and applied to uses such as:**

**i) subsidizing infrastructure for alternative transportation such as bicycles and public transit;**

**ii) subsidizing infrastructure for vehicles fueled by alternative fuels such as natural gas, hydrogen, or electricity;**

iii) **research and demonstration of advanced alternative fuels;**

iv) **monitoring and reporting on the progress of carbon dioxide emissions reduction programs; and**

v) **reducing the inequities produced by the imposition of this tax.**

*Benefit: This recommendation will encourage citizens to make atmosphere-friendly transportation choices and provide a significant source of revenue for funding the development of alternative fuels and alternative means of transportation in the Region.*

## *Absorb Carbon From The Atmosphere*

A major focus of this report is reducing the amount of carbon dioxide released into the atmospheric. The other side of the equation is to improve local and global air quality by increasing the absorption of carbon dioxide from the atmosphere. The best way to do this is by planting and nurturing trees and forests. Apart from their aesthetic and carbon-absorbing qualities, trees assist energy conservation by providing cool summertime shade and by protecting buildings from cool winter winds [2].

In recognition of the importance of trees to the urban environment, in 1989 the City requested amendments to the *Vancouver Charter*. These would permit the City to regulate the removal or destruction of trees on private property. The amendments have yet to be passed by the Legislative Assembly. While these initiatives indicate that the City is serious about protecting existing trees, the Task Force believes that the City should be much more active in reforestation of its urban landscape.

In the longer term, the evolution of the City into an area of smaller mixed use communities will provide a greater role for urban forestation. The City should undertake related long range planning now in order to permit this growing need to be addressed.

The Task Force notes that in March 1990 the Vancouver Park Board signed a Cooperator Agreement with the Friends of the Earth, Ottawa, the Canadian coordinator of the American Forestry Association GLOBAL RELEAF program. The program will encourage individual, corporate and civic awareness, tree planting and tree maintenance efforts on both public and private property.

*The Value of Urban Trees*

"It is in some senses climatically now considered to be very much more valuable to plant an urban tree rather than a rural one. The difference being, both take about six kilograms of carbon dioxide out of the air per year. But the urban tree has the extra benefits that it shades hot urban surfaces, which need energy in the form of air conditioning to cool them off.

"It turns out that the urban tree is worth 15 times as much as your rural tree. And that's a very important need for the planet right now. This city has to face up to the fact that we burn up about 18 million tons of carbon dioxide per year. If we just let growth go on, we're going to be up to about 26 million tons by 2005...

"The big picture is that if we continue along as we are now, Vancouver, in 50 years, will have the same air quality as Los Angeles does now. And that's when everybody will regularly start to get sick by breathing the air."

Source: T.R. Oke

*"If the human health effects of air pollutants were widely publicized, I think you'd find them a good community motivator towards getting people to take actions which cut down on air pollution... I recommend that the city pass a bylaw prohibiting the idling of motor vehicles. It could be enforced by our Parking Meter Control Officers."*

— Bryan Strome, submission to Task Force

*"The role of recycling programs in saving energy should be stressed, as has been mentioned by several other speakers."*

— John Winsor,
Senior Planner,
City of Vancouver,
presentation to Task Force

In addition, City Council approved a comprehensive street tree management plan in April 1990 which doubled the resources available for tree pruning, care and planting. The plan also includes a limited public information program. To supplement these efforts consideration is being given to the creation of an Urban Forestry Centre at Van Dusen Gardens to combine City (Parks, Engineering and Planning) and volunteer (Master Gardeners, etc.) advisory and advocacy services by late 1990.

Recommendation **28**

## URBAN REFORESTATION

*Purpose: To plant and nurture City forests and trees in City parks, on City streets, on private property, and to regulate the removal, damage or destruction of trees on private property in the City.*

**THE TASK FORCE RECOMMENDS THAT Council:**

**a) direct the Vancouver Park Board, the City Engineering Department, and the City Planning Department to study and report to Council before June 30, 1991 on:**

**i) a plan for planting and maintenance of extensive City forests in City parks and on City streets;**

**ii) a plan for promoting and assisting the planting of trees on private property;**

**iii) a plan to supplement City efforts by encouraging and coordinating comunity-based tree awareness, planting and maintenance programs in conjunction with community associations, schools and community organizations;**

**iv) a mechanism or structure to coordinate, amongst City agencies, in the most appropriate and efficient manner, all aspects of public and private tree awareness, planting and maintenance; and**

**v) the preparation and presentation to the Park Board and Council of an annual report regarding all tree related activities for the prior 12 months and a proposed action plan and budget for the following 12 months;**

**b) as soon as the jurisdiction is granted by the Provincial Legislature to the City, Council should pass a by-law to regulate the removal of, or damage or destruction to, trees on private property in the City.**

*Benefit: This recommendation will improve local and global air quality by increasing the absorption of carbon dioxide from the atmosphere, and by assisting in energy conservation.*

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*Seattle Resolves To Reduce Solid Waste 60% by 1998*

In 1988 Seattle established a goal of reducing solid waste in the City by 60% by 1998 with intermediate goals of 40% by 1991 and 50% by 1993. Recycling, composting, and avoiding waste production were noted as the primary waste management strategies. The Seattle resolution outlined specific programs and a time line for implementation.

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### *Reduce And Recycle Waste*

Solid wastes which are not recycled contribute to incinerator emissions or to the production of methane in landfills. Either way, they contribute to atmospheric pollution. Much of these wastes are in the form of nondegradable, nonreturnable and nonrecyclable food and beverage packaging. Household organic wastes which are not composted also contribute to the production of methane. The recommendation below complements the goal recently announced by the Ministry of Environment for the Municipal Solid Waste Management Strategy: to reduce solid waste by 50% by the year 2000.

*"Recycling should be considered as part of the Waste Management action strategy as a way to reduce energy consumption."*

— P.J. Pender, Atmospheric Environment Service, submission to Task Force

## Recommendation 29

### RECYCLING, PACKAGING & COMPOSTING

*Purpose: To reduce and recycle solid wastes; to minimize the use of nondegradable, nonreturnable and nonrecyclable food and beverage packaging, to reduce the amount of household organic waste; and to study the regulation of small incinerators.*

**THE TASK FORCE RECOMMENDS THAT Council:**

a) **encourage the City and the Greater Vancouver Regional District to accelerate the reduction and recycling of solid wastes;**

b) **direct the City Law Department to, in concert with the City Engineering Department, prepare a by-law along the lines of the ordinance adopted in Minneapolis, Minnesota which is Appendix 5 to this report, minimizing the use of nondegradable, nonreturnable and nonrecyclable food and beverage packaging originating at retail food establishments within the City, and report to Council before June 30, 1991 and that Council then should at once pass the by-law; and**

c) **direct the City Engineering Department, in concert with the Park Board and the School Board, before the end of 1991, to expand upon the pilot home composting program and institute neighbourhood composting programs, through community centres and schools. These neighbourhood composting programs should provide instruction regarding composting of household organic waste and develop sites for composting organic waste from multi-family dwellings where on-site composting is not possible, with the overall goal of reducing the amount of household organic waste; and**

d) **direct the City Health Department, with the City Law Department, to study and report to Council before the end of 1991 on the regulation of small incinerators, such as those operated by some universities and hospitals, on the basis that such incinerators contribute to emissions of atmospheric pollutants.**

*Benefit: By reducing and recycling solid wastes, and by regulating small incinerators, the City will be better able to reduce the amount of atmospheric pollutants produced by those wastes.*

*"In Lyon, France, civic officials are given bus and train passes, instead of company cars. In the London Borough of Sutton, municipal officials are now given a 60p per mile bike allowance (cf a 58p per mile car allowance), when on official business. (60p = $1.20). In Oxford, civic officials are given company bikes. Company cars can be taxed heavily, instead of being given a tax break. Similar measures should be adopted for Vancouver City staff."*

— Guy Dauncey,
submission to Task Force



*The City's Vehicle Fleet*

The City of Vancouver vehicle fleet is 1030 vehicles, of which 18% operate on propane (including all police vehicles), 19% operate on diesel, and 63% operate on gasoline. The majority of the gasoline-operated vehicles have been downsized, for equal or greater pollution savings than conversion to propane or CNG.

Source: City Engineer 1990

Recommendation 30

## MUNICIPAL TRANSPORTATION AND ENERGY USE

*Purpose: To shift away from fossil fuels for City vehicles; conserve energy in municipal operations; encourage commute alternatives for City employees; explore alternative fuels; and improve the fuel composition of the City's vehicle fleet.*

**THE TASK FORCE RECOMMENDS THAT Council:**

**a) resolve that in their operations all City Departments shall:**

- **i) shift away from fossil fuel use altogether or shift away from diesel and gasoline to less harmful fossil fuels, such as propane and natural gas;**
- **ii) phase out the use of halon fire extinguishers in City facilities and ensure the environmentally safe management and disposal of the contents;**
- **iii) accelerate conversion to energy conserving street lights; and**
- **iv) encourage all City employees to conserve energy in their daily activities by, for example, switching off unneeded lighting;**

**b) direct the City Manager, before June 30, 1991, to substitute free transit passes for all City employees in place of free City employee parking;**

**c) direct the City Manager, in co-operation with the City Engineering Department and City Personnel Department, to study and report to Council before June 30, 1991 on a program to encourage commuting by City employees other than by single-occupant motor vehicle, including by:**

- **i) designating an employee to co-ordinate the program;**
- **ii) providing modest financial incentives, comparable to the cost of parking spaces, to employees who use commute alternatives (see (b) - transit pass recommendations, above);**

**d) direct the City Manager in co-operation with the City Engineering Department and City Personnel Department, before June 30, 1991, to provide ride sharing assistance through a matching service and through preferential parking for ride share vehicles;**

**e) direct the City Engineering Department, before the end of 1991, to:**

i) **provide safe, convenient and sheltered bike racks and lockers for employee bicycles;**

ii) **provide more shower and changing space for employee bicyclists; and**

iii) **encourage a mass purchasing program of bicycle helmets and other bicycle safety equipment;**

f) **direct the City Manager, before the end of 1992, to identify categories of employees for whom telecommuting is feasible, and study the benefits and costs to the City of promoting that mode of work including, where appropriate, the provision of computers, modems and telephone lines to facilitate telecommuting;**

g) **direct the City Engineering Department and the City Finance Department, before the end of 1992, to research and develop, in cooperation with other municipalities, a program to convert the City's vehicle fleet to run on the cleanest-burning available fuels; and**

h) **direct the City Engineering Department to ensure that before the end of 1997 at least 50% of the City's vehicle fleet operates on fuels that produce less atmospheric pollution than gasoline or diesel fuel.**

*Benefit: This recommendation will demonstrate the City's commitment to responding to atmospheric change, and set the pace for the community as a whole.*

Recommendation 31

## MUNICIPAL INVESTMENT AND PURCHASING

*Purpose: To favour companies with environmentally sound business practices for all City investments and purchasing.*

**THE TASK FORCE RECOMMENDS THAT Council:**

a) **adopt by resolution a Code for environmentally sound business practices, as principles which govern all City operations, investments and purchases;**

b) **direct all City Departments to implement this Code in a City-wide procurement policy, to be developed by the City Manager and Department of Finance and implemented before June 30, 1991, at which time that policy is to become a condition of all contracts between the City and suppliers to the City; and**

c) **direct the City Purchasing Department to participate in formulating similar procurement policies for the Greater Vancouver Regional District.**

*Benefit: This recommendation will redirect City investments and purchasing toward companies with environmentally sound business practices.*

*An Example Code for Environmentally Sound Business Practices*

The Valdez Principles were developed by the Coalition for Environmentally Responsible Economics (CERES), a project of the Social Investment Forum. The Forum represents 375 fund managers and investment advisors. CERES includes investors controlling more than US $100 billion — among them the pension funds of New York City and the state of California. Locally, Van City Credit Union is committed to signing the Principles. Local governments which are expected to act on the Principles this year include the municipalities of Ottawa, Philadelphia, Pasadena and Los Angeles, and the states of New York, California, New Jersey and Minnesota [3]. The Valdez Principles are outlined below:

## Valdez Principles

**Introduction**

By adopting these principles, we publicly affirm our belief that corporations and their shareholders have a direct responsibility for the environment. We believe that corporations must conduct their business as responsible stewards of the environment and seek profits only in a manner that leaves the Earth healthy and safe. We believe that corporations must not compromise on the ability of future generations to sustain their needs.

We recognize this to be a long-term commitment to update our practices continually in light of advances in technology and new understandings in health and environmental science. We intend to make consistent, measurable progress in implementing these principles and to apply them wherever we operate throughout the world.

**1. Protection of the Biosphere**

We will minimize and strive to eliminate the release of any pollutant that may cause environmental damage to air, water, or earth or its inhabitants. We will safeguard habitats in rivers, lakes, wetlands, coastal zones and oceans and will minimize contributing to global warming, depletion of the ozone layer, acid rain or smog.

**2. Sustainable Use of Natural Resources**

We will make sustainable use of renewable natural resources, such as water, soils and forests. We will conserve nonrenewable natural resources through efficient use and careful planning. We will protect wildlife habitat, open spaces and wilderness, while preserving biodiversity.

**3. Reduction and Disposal of Waste**

We will minimize the creation of waste, especially hazardous waste, and wherever possible recycle materials. We will dispose of all wastes through safe and responsible methods.

**4. Wise Use of Energy**

We will make every effort to use environmentally safe and sustainable energy sources to meet our needs. We will invest in improved energy efficiency and conservation in our operations. We will maximize the energy efficiency of products we produce or sell.

**5. Risk Reduction**

We will minimize the environmental, health and safety risks to our employees and the communities in which we operate by employing safe technologies and operating procedures and by being constantly prepared for emergencies.

**6. Marketing of Safe Products and Services**

We will sell products or services that minimize adverse environmental impacts and that are safe as consumers commonly use them. We will inform consumers of the environmental impacts of our products or services.

**7. Damage Compensation**

We will take responsibility for any harm we cause to the environment by making every effort to fully restore the environment and to compensate those persons who are adversely affected.

**8. Disclosure**

We will disclose to our employees and to the public incidents relating to our operations that cause environmental harm or pose health or safety hazards. We will disclose potential environmental, health or safety hazards posed by our operations, and we will not take any action against employees who report any condition that creates a danger to the environment or poses health and safety hazards.

**9. Environmental Directors and Managers**

At least one member of the Board of Directors will be a person qualified to represent environmental interests. We will commit management resources to implement these Principles, including the funding of an office of vice president for environmental affairs or an equivalent executive position, reporting directly to the CEO, to monitor and report upon our implementation efforts.

**10. Assessment and Annual Audit**

We will conduct and make public an annual self-evaluation of our progress in implementing these Principles and in complying with all applicable laws and regulations throughout our worldwide operations. We will work toward the timely creation of independent environmental audit procedures which we will complete annually and make available to the public.

## Recommendation 32

### ANNUAL DEPARTMENTAL PROGRESS REPORTS

*Purpose: To monitor progress on reduction in emissions of atmospheric pollutants.*

**THE TASK FORCE RECOMMENDS THAT Council:**

a) **direct the Special Office for the Environment to coordinate an annual report in which all departments report to Council on progress during the year on atmospheric change targets; and**

b) **appoint an independent panel of experts and community representatives to review publicly the annual report and provide commentary to Council.**

*Benefit: This recommendation will enable Council and City staff to determine the effectiveness of efforts to reduce emissions of atmospheric pollutants, and provide information for improving those efforts.*

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*Preparing for Atmospheric Change*

Factors such as the decades-long lifespan of certain greenhouse gases in the atmosphere, combined with increasing emissions levels of these gases, may have already committed us to some unknown amount of atmospheric change. As described in Chapter 2, possible consequences of atmospheric change for British Columbia include more rainfall, adverse effects on forest and agricultural productivity, increased incidences of pests and disease, extinction of animal and plant species, and rising sea levels, with consequent flooding of low-lying areas and facilities located in those areas.

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## Recommendation 33

### STUDY ADAPTIVE MEASURES

*Purpose: To be prepared for those consequences of atmospheric change for which we may already be committed.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Engineering Department before the end of 1992 to study and report to Council on:**

a) **measures required to adapt to local consequences of atmospheric change, such as sea-level rise; and**

b) **estimate the costs involved of these adaptive measures, such as shoreline stabilization programs, emergency planning programs, and relocation of low-lying facilities.**

*Benefit: This recommendation will provide Council with the necessary information to begin planning long-term measures to adapt to possible consequences of atmospheric change, and to develop means for financing such measures.*

## Recommendation 34

### THE CITY'S ROLE

*Purpose: To advocate environmentally responsible policies and actions at all government levels; to facilitate the development of policy and technology related to atmospheric change and energy efficiency; and to share information and projects with other cities of the world to respond to atmospheric change.*

**THE TASK FORCE RECOMMENDS THAT Council:**

a) **resolve that the City take a pro-active role, advocating environmentally responsible policies and actions at all government levels, including municipal organizations in Canada and globally;**

b) **direct the City Manager to study and report to Council before June 30, 1991 on ways in which the City can serve as a resource for development of policy and technology related to atmospheric change and energy efficiency;**

c) **direct the City Manager to establish necessary communication with appropriate agencies in other jurisdictions, such as South Coast Air Quality Management District (California); and**

d) **support Vancouver citizens and municipal officials to embark on a series of selected projects, undertaken in cooperation with other cities of the world, especially the developing world, that focus on municipal recognition and response to global atmospheric change.**

*Benefit: This recommendation will put the City on the leading edge of the response to atmospheric change, providing guidance and incentive to environmentally-based industries in the City, by developing policies and technologies which will be in high demand elsewhere in the country and the world.*

### *PUBLIC INVOLVEMENT AND EDUCATION*

Atmospheric change means we have to change — all of us.

As individuals, most of us have been conditioned to look out for what's "mine."

As a society, we are just now learning that atmospheric change is a universal challenge, one that will affect us all, regardless of income, age, race, sex, language, or any of the other differences we are so used to fighting over.

Without a major initiative of public discussion and education, efforts to reduce emissions of atmospheric pollutants will be seen by many as an infringement of "my" *individual* "freedom" to, for example, commute to work in *my* car by *my*self. *With* substantial discussion and involvement, most people will realize that our most important shared "freedom" is literally our freedom to breathe.

By involving the community in making the decisions ahead, we can foster public awareness of the problems associated with atmospheric change, develop public support for local initiatives to reduce emissions of atmospheric pollutants, encourage community participation in decision-making, and demonstrate the improvements to be gained in our collective quality of life as we move toward a more environmentally friendly society.

Recommendation 35

## PUBLIC INVOLVEMENT AND EDUCATION

*Purpose: To foster public awareness of the problems associated with atmospheric change and to develop public awareness of local initiatives to reduce emissions of atmospheric pollutants.*

**THE TASK FORCE RECOMMENDS THAT Council direct the City Manager to develop, before June 30, 1991, a program for dissemination of information to the public and all City employees to foster public awareness about the problems associated with atmospheric change by, for example:**

a) **encouraging city leaders to set personal examples;**

b) **providing information on tax notices, paycheques, and on all publications and mailings;**

c) **using breaks during cable television broadcasts of Council meetings to provide environmental information;**

d) **posters in bus shelters, on city vehicles, and in city buildings;**

e) **implementing demonstration projects in city buildings and in other civic operations and development (e.g., new library, new city hall);**

f) **encouraging "green" neighbourhood demonstration projects;**

g) **city participation in arbour day;**

h) **creating an ongoing process whereby the City teaches, listens and learns so that citizen participation is sustained and meaningful, including funding public attitude surveys toward proposed or enacted initiatives and regulations;**

i) **printing environmental education messages on park board disposable food containers;**

j) **creating an information kit for citizens and businesses containing practical suggestions for action that can be taken immediately, to be distributed through community centres, schools, public libraries and all municipal facilities; and**

k) **assisting the community in implementing citizen-generated programs.**

*Benefit: This recommendation will develop public support for local initiatives to reduce emissions of atmospheric pollutants.*

Chapter Ten

# Conclusion

Atmospheric change means we have to change.

While we recognize that some of these recommendations may seem ambitious, we believe that to do less would be to shirk the responsibility of our generation. The Task Force is confident that these recommendations, when implemented, will result in an improved quality of life for the people of our City, particularly our children and their children.

We recognize also that the power of government to effect change is determined by the will of the people. In that sense perhaps it is fortunate that the issue of atmospheric change has come to our attention at a time when public concern for the environment is higher than ever. Over and over again throughout our public process, we heard people express their desire for leadership in responding to the challenge of atmospheric change. The Task Force believes that, with this report, we have provided the citizens of Vancouver, through their Council, with effective tools to exercise that leadership.

*"We are dreamers, perhaps. We don't know the 'realities' of life."*

— Joss Hurtig, Grade 9, presentation to Task Force

# Notes

**Chapter Two**

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2. Environment Canada, *Conference Statement*, (The Changing Atmosphere: Implications for Global Security, Toronto, Ontario, June 27-30, 1988), p. 2.

3. Intergovernmental Panel on Climate Change, "Scientific Assessment of Climate Change," (Geneva: World Meteorological Organization and the United Nations Environment Program, 1990), draft.

4. By atmospheric change we mean the addition of substances to the atmosphere through human activity at a magnitude and rate that exceeds the ability of the local ecosystem to absorb these substances.

5. World Climate Research Program, *Global Climate Change*, (Geneva: World Meteorological Organization and the International Council of Scientific Unions, 1990), p. 6.

6. H. Hengeveld, "Future Climate Scenarios for Pacific Canada," *Proceedings of the Symposium on the Impacts of Climate Variability and Change in British Columbia*, (E. Taylor and K. Johnstone, eds.), December 14, 1988, Vancouver. (Vancouver, BC: Environment Canada, 1989), pp. 13-19.

7. World Climate Research Program, *op. cit.*, p. 5.

8. D. Harvey, "The Greenhouse Effect And Municipal Government," Paper presented to the GVRD Choosing Our Future Seminar, January 12, 1990, pp. 4-5 and S.H. Schneider, "The Global Warming Debate: Science or Politics," *Environmental Science and Technology* 24(4): 432-435, p. 433.

9. Intergovernmental Panel on Climate Change, *op. cit.*

10. S.H. Schneider, *op. cit.*, p. 433.

11. The World Climate Research Program, *op. cit.*, p. 33.

12. F. K. Hare, "Environmental Uncertainty: Science and the Greenhouse Effect," in *The Environmental Imperative*, (Toronto: C.D. Howe Institute, 1990), p. 31.

13. The information in this section, unless otherwise noted, is based on W.E. Rees, *op. cit.*, and Environment Canada, *Ozone layer protection*, (Ottawa: Commercial Chemicals Branch, Conservation and Protection, Environment Canada, March 1988).

14. The upper ozone layer, which is beneficial, should not be confused with ozone at ground level, which is detrimental to health.

15. W.E. Rees, *op. cit.*, p. 11.

16. Environment Canada, *op. cit.*

17. "Ozone Layer Above Toronto Getting Thinner," *Globe and Mail,* May 29, 1990, p. A9.

18. Photosynthesis is the process by which plants use carbon dioxide to produce the oxygen we breathe and the energy which all organisms need to survive.

19. Environment Canada, *op. cit.*

20. M.T. Kleinman *et al.*, "Effects on Human Health of Pollutants in the South Coast Air Basin," (El Monte, CA: South Coast Air Quality Management District/ California State University Fullerton Foundation, 1989), pp. 1-2.

21. M. Lippman, *JAPCA* 39(5): 672-695 (1989) and E.N. Allred *et al.*, *New England Journal of Medicine* 321(21): 1426-1432 (1989) as quoted in A.D. Cortese, "Clearing the Air," *Environmental Science and Technology* 24(4): 442-448 (1990), p. 443.

22. Concord Scientific Corporation and B.H. Levelton & Associates, *GVRD Air Management Plan - Stage 1: Assessment of Current and Future Air Quality,* (Burnaby: Greater Vancouver Regional District, 1989), p. 1-2.

23. Environment Canada. "Acid Rain: The Facts," (1988, brochure).

24. A.D. Cortese *op. cit.*, p. 443.

25. Concord Scientific Corporation and B.H. Levelton & Associates, *op. cit.*, p. 9-2.

26. D.V. Bates, M. Baker-Anderson, and R. Sizto, "Asthma Attack Periodicity: A Study of Hospital Emergency Visits in Vancouver." *Environmental Research* 51: 51-70 (1990).

27. P. Cave, submission to the City of Vancouver Task Force on Atmospheric Change (Chilliwack: Regional District of Fraser-Cheam, May 1, 1990), p. 4.

28. Atmospheric Environment Service, presentation to the City of Vancouver Task Force on Atmospheric Change (1990) and Concord Scientific Corporation and B.H. Levelton & Associates, *op. cit.*, p. S5-10.

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**Chapter Four**

1. Bates 1990; City of Toronto 1989; Graedel and Crutzen 1989, pp. 58-68; Rind 1989.

2. Associated Press, "Global Warming a Fact, UN Body Warns," May 25, 1990, in *Vancouver Sun*, p. A6.

3. H.F. French, "You Are What You Breathe," *Worldwatch*, 3(3): 27-34, May-June 1990, p. 32.

4. Cortese 1990, page 447.

5. The following Livability Goals were adopted as a starting point for the "Choosing Our Future" program, concerning the development of the region, which took place from December 1989 to May 1990. The goals are: 1) a region in nature; 2) an economy of growth and change; 3) accessibility for people and goods; 4) an equitable region; 5) a healthy and safe region; 6) a region of diversity and vitality; and 7) an efficient region.

**Chapter Five**

1. Local Government Commission, *Model Ordinances: Addressing Ozone Layer Destruction* (Sacramento, CA: Local Government Commission, 1990).

**Chapter Six**

1. Vancouver City Planning Commission, *Vancouver's Future: Toward the Next Million*, (Vancouver: VCPC, 1989), Section 5, p. 37.

2. GVRD Executive Committee. February 22, 1990. Completion of the review of the report of the Greater Vancouver Transportation Task Force. Appendix B.

**Chapter Seven**

1. Federation of Canadian Municipalities, *A Guidebook on Transportation Energy Management*, (Ottawa: Federation of Canadian Municipalities, 1990), p. 5-29.

2. *Ibid.*; slightly modified.

**Chapter Eight**

1. J.H.W. Karas and P.M. Kelly, *The Heat Trap* (Ottawa: Friends of the Earth, 1989), pp. 63, 66.

2. Local Government Commission, *Model Ordinances for Environmental Protection*, (Sacramento, CA: Local Government Commission, March, 1990).

3. The B.C. Energy Management Task Force on Commercial Buildings is a volunteer group, consisting of 25 members, and was initially set up six years ago by the federal Department of Energy, Mines, and Resources. Its mandate is to promote efficient energy management in commercial buildings and does so primarily through educational seminars (contact person: Mr. Dana Sundmark, past president, 432-3916 [B.C. Tel]). B.C. Hydro's Power Smart Program has recently started a Commercial Building Retrofit Program (contact person: Mr. Roy Hughes, Program Manager, 663-3288).

**Chapter Nine**

1. J. V. Hall, *et al, Economic Assessment of the Health Benefits From Improvements in Air Quality in the South Coast Air Basin,* (El Monte, CA: South Coast Air Quality Management District/ California State University Fullerton Foundation, 1989), p. E-11.

2. See: G. Moll and S. Ebenreck, *Shading Our Cities: A Resource Guide for Urban and Community Forests* (American Forestry Association, 1989); Proceedings of the Fourth Urban Forestry Conference, St. Louis, Missouri, October 15-19, 1989, *Make Our Cities Sage for Trees* (American Forestry Association, 1989); and Vancouver Board of Parks and Recreation, *Street Tree Management Plan* (Vancouver Board of Parks and Recreation, 1990), Volume 1, Executive Summary.

3. Personal communication, Tom Ghrist, Coalition for Environmentally Responsible Economics (CERES), May 10, 1990.

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Appendix 1

# List of Written Submissions Received by the Task Force

Atmospheric Environment Service, Environment Canada, P.J. Pender, Regional Director General, Pacific Region

Atmospheric Science Programme, University of British Columbia, Douw Steyn and T.R. Oke

Automotive Retailers Association, Earl Hansen, Executive Director

Bicycling Association of B.C., Danelle Laidlaw, Executive Director

Walter Block, The Fraser Institute

Anna Bonga

British Columbia Automobile Association, D.W. Brown, Vice President, Marketing and Public Affairs

B.C. Gas, R.E. Kadlec, President and CEO

B.C. Society of Landscape Architects, Kate Clark, Chair

John Broderick

Central Fraser Valley, Dewdney-Alouette and Fraser Cheam Regional Districts; Peter Cave, Planning Director, Fraser Cheam Regional District (Chilliwack)

City of Vancouver Engineering Department, W.H. Curtis, City Engineer

City of Vancouver Health Department, Environmental Health Division, D. Losito, Director

City of Vancouver Planning Department, J.B. Windsor, Senior Area Planner

City of Vancouver Planning Department, T. Fletcher, Director

Community Forum on Airport Development, Wendy Turner

William E. Cooke

Howard Coram

Guy Dauncy

Henry Einarson

Mark Fornataro

Greater Vancouver Regional District, Pollution Control, Morris Mennell, Superintendent, Technical Services

Health Sciences Association of B.C., Peter Cameron, Executive Director

Stuart Hertzog, Citizens Action Network

Oliver Hockenhull

Kitsilano Citizens' Planning Committee, Isabel Minty

Logicon Valve, Martin Tobin

Darren Lowe, Past Liberal Party Candidate, Vancouver Centre

Isabel Minty

Ian Moffatt

Marianna Neumannn

Dr. Tom Perry, MLA, Vancouver Point Grey

Regency Fireplace Products, Ken Lehman

Janka Samuhel-Corewyn

Olga Schwartzkopf

Southlands Planning Committee,Terry Slack

Bryan Strome

John Tabak

Vancouver Board of Trade, Environment Task Force, Dave Park

Vancouver Greens, Elizabeth Anderson

Vancouver Parking Association, E.A. Keate, President

Helen Warn

Grant Watson, Vancouver Green Party

West Coast Environmental Law Association, Ann Hillyer

Young Greens of B.C./Vancouver Chapter, Stuart Parker

Appendix 2

# List of Oral Presentations Made to the Task Force

Atmospheric Environment Service, Environment Canada, Eric Taylor

Atmospheric Science Programme, University of British Columbia, Douw Steyn

Automotive Retailers Association, Earl Hansen, Executive Director

Dr. David V. Bates, University of British Columbia

Laura Beatty and Jennie Muller, Pt. Grey School Environment Club and Environmental Youth Alliance

Hilda Bechler

Dr. Larry Berg, South Coast Air Quality Management District

Walter Block, The Fraser Institute

Anna Bonga

British Columbia Automobile Association, D.W. Brown, Vice President, Marketing and Public Affairs

B.C. Gas, Bill Hennessy

B.C. Ministry of Environment, Lower Mainland Regional Director, Mike Wong

B.C. Transit, Clive Rock

John Broderick

Sally Brown

Laura Busheikin

Canada Cup, Gary Durkin

Douglas Canning, State of Washington Sea-Level Rise Project

City of Vancouver Engineering Department, Assistant City Engineer, Peter Steblen

City of Vancouver Health Department, Environmental Health Division, D. Losito, Director

City of Vancouver Planning Department, J.B. Windsor, Senior Area Planner

Howard Coram

Bjorn Edblad, Vitalizer

Greater Vancouver Regional District, Pollution Control, Morris Mennell, Superintendent, Technical Services

Stuart Hertzog, Citizens Action Network

Joss Hurtig and Randy Khris, University Hill School

Isabel Minty

Ian Moffatt

Dr. Tom Perry, MLA, Vancouver Point Grey

Alderman Carol Pickup, Saanich

Olga Schwartzkopf

Dr. David Scott, University of Victoria

Nancy Skinner, Berkeley City Council

Ed Stoughton, Auto-Gas Propane

Bryan Strome

United Nations Association, David Cadman

Vancouver Board of Trade, Environment Task Force, Dave Park

Vancouver Greens, Elizabeth Anderson

Vancouver Parking Association, E.A. Keate, President

Vancouver Technical High School, Art Dept., Susan Jones

Gui Were

West Coast Environmental Law Association, Ann Hillyer

Young Greens of B.C./Vancouver Chapter, Stuart Parker

Appendix 3

# List of Volume II Appendices: Model and Example By-Laws

Several model and example by-laws from other jurisdictions are referred to in the recommendations of this report. Those by-laws are reproduced in Volume II.

1. Newark, New Jersey Ordinance Governing the Manufacture, Distribution, Sale and Recycling of Products Which Utilize Ozone-Depleting Compounds.

2. Model Traffic Management (Trip Reduction) Ordinance, drafted by Professor Elizabeth Deakin, Institute for Transportation Studies, The University of California at Berkeley.

3. San Francisco Residential Energy Conservation Ordinance.

4. Model Ordinance: Energy Efficient Interior Lighting Standards for Municipal and Commercial Buildings, prepared by Steve Weissman, Attorney, Local Government Commission (California).

5. Minneapolis Code of Ordinances, Amending Title 10, Adding a New Chapter 204, "Environmental Preservation: Environmentally Acceptable Packaging."

*The Task Force wishes to acknowledge the assistance of Councillor Nancy Skinner, of the Berkeley, California City Council, in bringing several of these By-Laws to our attention.*

October 22, 1990

# CLOUDS OF CHANGE

The following is a summary of the Council actions arising from the October 16, 1990 Council meeting concerning the recommendations of the Task Force on Atmospheric Change, arranged seriatim:

| Task Force Recommendation # | Council Action |
|---|---|
| 1. | Approved, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets. |
| 2. | Approved, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets. |
| 3. | Approved, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets. |
| 4. | Approved in principle following an amendment to clause (d) of the recommendation to read as follows:<br><br>"d) set legally enforceable automobile fleet fuel efficiency standards for the year 2000 of 4.7 litres gas consumptions per 100 kilometres driven, or other comparable standards as established by the California Air Resources Board." |
| 5. | Amended and approved as follows:<br><br>"THAT Council:<br><br>a) direct the City Department of Permits and Licenses, Health Department and Law Department to report to Council as soon as possible on an appropriate City by-law banning the use, sale and manufacture of ozone depleting chemicals and items which in their manufacturing process involve the use of ozone depleting chemicals as provided in the ordinance adopted by Newark, New Jersey which is Appendix 1 of Volume II of the Task Force report; and<br><br>b) direct the City Law Department, as part of the study described in recommendation (a), to prepare and deliver a draft by-law banning the use, sale, and manufacture of ozone depleting chemicals." |
| 6. | Amended and approved as follows:<br><br>"THAT Council direct the City Department of Permits and Licenses, City Law Department, and the Medical Health Officer to study and report to Council before the end of 1990 on specific regulatory measures, using the City's existing and any necessary new powers to regulate licensed businesses, to provide economic incentives for conversion of processes from those using ozone depleting chemicals." |
| 7. | Amended and approved in principle as follows:<br><br>"THAT Council request the Greater Vancouver Regional District (GVRD) to use its influence to immediately reduce the levels of industrial sulphur dioxide emissions in the GVRD." |
| 8. | Approved for report back and implementation as specified in the Clouds of Change report. |
| 9. | Approved. |

Clouds of Change (Cont'd)

| Task Force Recommendation # | Council Action |
|---|---|
| 10(a) | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council direct:<br><br>a) the City Engineering Department to study and report to Council before June 30, 1991 on the principles for establishing:<br><br>i) the pricing for preferential parking in City owned parking lots and garages, giving reduced parking rates to vehicles identified as high-occupancy vehicles and giving high-occupancy vehicles preference for parking space over vehicles identified as single-occupancy vehicles; and<br><br>ii) the provision of parking facilities for high-occupancy and transient vehicles only, so that new parking for single-occupancy and commuter vehicles is limited and eventually decreased; and" |
| 10(b) | Approved. |
| 11. | Approved for report back and implementation as specified in the Clouds of Change report. |
| 12(a) | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council direct the City Engineering Department to:<br><br>a) identify and report to Council before December 31, 1991 on those streets where existing traffic lanes can effectively be restricted to high-occupancy vehicles during rush hours;" |
| 12(b) | Approved for report back and implementation as specified in the Clouds of Change report. |
| 12(c) | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council request the GVRD (or regional air quality management authority) and the Province to consider a hotline for reporting excessive tailpipe emissions as part of a comprehensive emission regulation program." |
| 13(a) | Approved for report back and implementation as specified in the Clouds of Change report. |
| 13(b) | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"b) urge B.C. Transit to provide improved marketing in institutions of higher learning and in secondary schools to educate people about the transit system and the associated benefits of using it;" |

Clouds of Change (Cont'd)

| Task Force Recommendation # | Council Action |
|---|---|

13(c) Amended and approved as follows:

"c) urge B.C. Transit to continue a comprehensive program of transit improvements (funded from present revenue sources as well as from additional road-pricing revenues when available); these improvements to include, but not be limited to, the following:

(i) improvements in the frequency, convenience, comfort and efficiency of transit services;

(ii) price, transfer and other marketing inducements which encourage increased transit ridership;

(iii) conversion of the bus fleet to the most efficient and environmentally sensitive power sources available for each application and route;

(iv) reduce transit fares, with daily fares good for an entire day in any direction."

14. Amended and approved as follows:

"THAT Council direct the City Manager's office to coordinate all Departments, in co-operation with the civic unions, in researching and supporting telecommunications opportunities that reduce the need for transportation, including, but not limited to:

a) developing a telecommunication policy for internal City use;

b) examining City-wide telecommunications needs with local businesses, agencies, and developers;

c) working with neighbourhood commercial districts to identify and put into use telecommunication applications;

d) investigating opportunities for a "24-hour City Hall" to provide information by computer access on City activities, services, hearings, and cultural/recreational events;

and before the end of 1992, report to Council with a plan for immediate implementation of the recommendations discussed in (a) through (d) above.

15. Deferred for report back on general approach and resource needs during the 1991 budget process;

FURTHER THAT the City Manager be instructed to report back on regional initiatives in regard to emission reductions and transportation subsidies to ensure there is no duplication in efforts.

16. Approved following an amendment to change the last paragraph of the recommendation to read:

"and report to Council on the implementation of the recommendations discussed in items (a) through (i) above as part of the proposed City-wide planning process."

Clouds of Change (Cont'd)

| Task Force Recommendation # | Council Action |
|---|---|
| 17. | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council direct the City Planning Department and the Housing and Properties Department to develop a planning and design process aimed at achieving an energy-efficient development on the southeast shore of False Creek between Main and Cambie and that this process be reported to Council early in 1991." |
| 18. | Council took no action relative to this recommendation. |
| 19. | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council direct the City Planning Department and City Finance Department to make access by proximity rather that access by transportation a central focus in the City's new City-wide plan and to include proximity policies and incentives as proposals for public consideration in the planning process." |
| 20. | Approved in principle, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets. |
| 21. | Approved. |
| 22. | Approved for report back and implementation as specified in the Clouds of Change report. |
| 23. | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT, upon completion of the first local area planning programs which include atmospheric concerns in their terms of reference, the City Manager and the Director of Planning be directed to report back on an evaluation of the process and its possible extension to other areas of the City." |
| 24. | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council direct the Planning Department immediately to:<br><br>a) require, in all plans or rezoning reports prepared by the Planning Department, a statement describing how the proposal contributes to or detracts from the objective of reducing atmospheric pollution; and<br><br>b) review all such statements with the Special Office for the Environment.<br><br>FURTHER THAT Council direct the Planning Department to work with the Special Office for the Environment and the Health Department to develop a comprehensive method for the assessment of atmospheric emissions impact and report back to Council." |

Clouds of Change (Cont'd)

| Task Force Recommendation # | Council Action |
|---|---|
| 25(a) | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council:<br><br>a) direct the City Department of Permits and Licenses to implement an energy conservation by-law for commercial and multi-family construction by June 30, 1991 and monitor the administration of this by-law in preparation for its possible extension to single-family construction in 1992;" |
| 25(b)(i) | Deferred for report back on general approach and resource needs during the 1991 budget process. |
| 25(b)(ii) | Approved. |
| 25(c) | Deferred for report back on general approach and resource needs during the 1991 budget process. |
| 25(d) | Approved for report back and implementation as specified in the Clouds of Change report. |
| 25(e) | Council took no action relative to this recommendation. |
| 25(f) | Approved for report back and implementation as specified in the Clouds of Change report. |
| 26. | Approved for report back and implementation as specified in the Clouds of Change report. |
| 27. | Deferred for discussion between Council and the Task Force members at an informal session, and report back to Council before year end. |
| 28. | Approved for report back and implementation as specified in the Clouds of Change report. |
| 29(a) | Amended and approved as follows:<br><br>"THAT Council:<br><br>a) encourage the City and the Greater Vancouver Regional District to accelerate the reduction and recycling of solid wastes;<br><br>b) review programs of solid waste recycling and reduction on at least an annual basis to identify appropriate opportunities for expansion." |
| 29(b) | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"b) continue to urge the Federal and Provincial governments to introduce stringent standards regulating nondegradable, nonreturnable, and nonrecyclable food and beverage packaging; direct the Special Office for the Environment to assess these standards when they are announced and report back on the desirability and feasibility of a supplementary City by-law;" |

Clouds of Change (Cont'd)

| Task Force Recommendation # | Council Action |
|---|---|
| 29(c) | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"c) direct the City Engineering Department to assess the current pilot composting program and report back before the end of 1991 on the feasibility and desirability of expansion, including the possibility of joint neighbourhood programs with the Parks and School Boards;" |
| 29(d) | Approved for report back and implementation as specified in the Clouds of Change report. |
| 30(a) | Approved for report back and implementation as specified in the Clouds of Change report. |
| 30(b) | Amended and approved as follows:<br><br>"b) direct the City Manager, in co-operation with the civic unions, to pursue the substitution of free transit passes for free parking for all City employees and City Council members and report back on progress before the end of 1991;" |
| 30(c) | Amended and approved as follows:<br><br>"c) direct the City Manager, in co-operation with the City Engineering Department, the City Personnel Department and the civic unions, to study and report to Council before June 30, 1991 on a program to encourage commuting by City employees and City Council members other than a single-occupant motor vehicle, including by:<br><br>i) designating an employee to coordinate the program;<br><br>ii) providing modest financial incentives, comparable to the cost of parking spaces, to employees and City Council members who use commute alternatives and low emission alternate fuels (see (b) - transit pass recommendations, in Task Force recommendation 30);" |
| 30(d) | Amended and approved as follows:<br><br>"d) direct the City Manager, in co-operation with the City Engineering Department, City Personnel Department and the civic unions, before June 30, 1991, to report back on the proposed program to provide ride sharing assistance through a matching service and through preferential parking for ride share vehicles;" |
| 30(e) | Amended and approved as follows:<br><br>"e) direct the City Engineering Department, in consultation with the Housing and Properties Department and the civic unions, to report back before the end of 1991 on a program to:<br><br>i) provide safe, convenient and sheltered bike racks and lockers for employee bicycles;<br><br>ii) provide more shower and changing space for employee bicyclists; and<br><br>iii) encourage a mass purchasing program of bicycle helmets and other bicycle safety equipment;" |

Clouds of Change (Cont'd)

| Task Force Recommendation # | Council Action |
|---|---|
| 30(f) | Amended and approved as follows:<br><br>"THAT Council:<br><br>f) direct the City Manager, in co-operation with the civic unions, before the end of 1992, to identify categories of employees for whom telecommuting is feasible, and study the benefits and costs to the City of promoting that mode of work including, where appropriate, the provision of computers, modems and telephone lines to facilitate telecommuting;" |
| 30(g) | Approved for report back and implementation as specified in the Clouds of Change report. |
| 30(h) | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"h) direct the City Engineering Department to continue its research into the combination of available vehicular technology and fuel types that provide the lowest levels of emission for the City fleet and to report at least every two years on progress toward the targets recommended in this report." |
| 31. | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council:<br><br>a) Instruct the Directors of Finance and Legal Services to recommend a code for environmentally sound business practices, as principles which govern all City operations, investments and purchases;<br><br>b) Instruct the Purchasing Agent, in consultation with relevant departments, to work with his counterparts in other regional municipalities to develop a procurement policy which balances environmental objectives with sound and efficient administrative practice, with the need to maintain competitive sources of supply, and with the other municipal procurement objectives, and report back before the end of 1991." |
| 32. | Approved. |
| 33. | Amended and approved in accordance with the recommendation of the City Manager, as contained in his report dated September 18, 1990, as follows:<br><br>"THAT Council instruct the Engineering Department to continue to monitor global warming trends and potential adaptive measures and report periodically to Council on current scientific consensus and possible adaptation strategies." |
| 34(a) | Approved, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets. |
| 34(b) | Approved for report back and implementation as specified in the Clouds of Change report. |

Clouds of Change (Cont'd)

| Task Force Recommendation # | Council Action |
|---|---|
| 34(c) | Approved for report back and implementation as specified in the Clouds of Change report. |
| 34(d) | Approved, subject to future reports on specific initiatives which will clarify the costs and trade-offs involved in achieving the objectives and targets. |
| 35. | Approved for report back and implementation as specified in the Clouds of Change report. |

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Further recommendation of the City Manager, as contained in his report dated September 18, 1990 approved as follows:

E. "THAT Council direct that the reports back on specific initiatives include, where applicable, a discussion of the costs of implementation (including social, health, and economic costs) and proposals to mitigate these costs for those with low and fixed incomes.