NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY
TABLE RONDE NATIONALE SUR L'ENVIRONNEMENT ET L'ÉCONOMIE

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State of the Debate:

The Road to Sustainable Transportation in Canada

National Round Table on the Environment and the Economy

Table ronde nationale sur l'environnement et l'économie

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National Round Table on the Environment and the Economy
344 Slater Street, Suite 200
Ottawa, Ontario
Canada K1R 7Y3
Tel.: (613) 992-7189
Fax: (613) 992 7385
E-mail: admin@nrtee-trnee.ca
Web: http://www.nrtee-trnee.ca

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State of the Debate on the Environment and the Economy: The Road to Sustainable Transportation in Canada

The National Round Table on the Environment and Economy is of the view that this report deals with a problem that is serious and complex but, at present, troublesome for decision makers. There will likely be little public support for major actions until the damage is more obvious.

We must begin now, however, with public sensitization and government coordination, and we can start to consider the implications of the more serious, but currently not broadly accepted, alternatives which we will surely have to face in the not too distant future.

Mandate

The National Round Table on the Environment and the Economy (NRTEE) was created to "play the role of catalyst in identifying, explaining and promoting, in all sectors of Canadian society and in all regions of Canada, principles and practices of sustainable development." Specifically, the agency identifies issues that have both environmental and economic implications, explores these implications, and attempts to identify actions that will balance economic prosperity with environmental preservation.

At the heart of the NRTEE's work is a commitment to improve the quality of economic and environmental policy development by providing decision makers with the information they need to make reasoned choices on a sustainable future for Canada. The agency seeks to carry out its mandate by:

- advising decision makers and opinion leaders on the best way to integrate environmental and economic considerations into decision making;
- actively seeking input from stakeholders with a vested interest in any particular issue and providing a neutral meeting ground where they can work to resolve issues and overcome barriers to sustainable development;
- analyzing environmental and economic facts to identify changes that will enhance sustainability in Canada; and
- using the products of research, analysis and national consultation to come to a conclusion on the state of the debate on the environment and the economy.

The NRTEE's state of the debate reports synthesize the results of stakeholder consultations on potential opportunities for sustainable development. They summarize the extent of consensus and reasons for disagreement, review the consequences of action or inaction, and recommend steps specific stakeholders can take to promote sustainability.

Membership

The NRTEE is composed of a Chair and up to 24 distinguished Canadians. These individuals are appointed by the Prime Minister as opinion leaders representing a variety of regions and sectors of Canadian society including business, labour, academia, environmental organizations, and First Nations. Members of the NRTEE meet as a round table four times a year to review and discuss the ongoing work of the agency, set priorities, and initiate new activities.

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Acronyms

CCME Canadian Council of Ministers of the Environment

CMA Census Metropolitan Area

CO_2 Carbon Dioxide

COH Coefficient of Haze — a measure of visibility

COP3 Third Conference of Parties to the UN Framework Convention on Climate Change

CST Centre for Sustainable Transportation

FCM Federation of Canadian Municipalities

GDP Gross Domestic Product

GHG Greenhouse Gases

GJ Giga Jouls

GTA Greater Toronto Area

GVRD Greater Vancouver Regional District

HA Hectare

ICLEI International Council for Local Environmental Initiatives

I&M Inspection and Maintenance

IPCC Intergovernmental Panel on Climate Change

MCP Model Communities Program — Local Agenda 21

MOU Memorandum of Understanding

NAFTA North American Free Trade Agreement

NAICC National Air Issues Coordinating Committee

NGO Non-governmental Organization

No_x Oxides of Nitrogen

NRCAN Natural Resources Canada

NRTEE National Round Table on the Environment and the Economy

OECD Organization for Economic Cooperation and Development

PAH Polycyclic Aromatic Hydrocarbons

PM2.5 Respirable Particulates smaller than 2.5 microns

PM10 Inhalable Particulates smaller than 10 microns

RDIS Residual Discharge Information Systems

RMOC Regional Municipality of Ottawa-Carleton

SO_2 Sulphur dioxide

TAC Transportation Association of Canada

TCCC Transportation and Climate Change Collaborative

TCM Transportation Control Measures

VCR Voluntary Challenge Registry

VOC Volatile Organic Compounds

Foreword

The National Round Table on the Environment and the Economy established a Program on Sustainable Transportation to provide advice to Canadians on the problems and potential solutions related to Canada's current and projected trends in transportation. I am pleased to put forward this *State of the Debate Report* to stakeholders and the Canadian public. Its contents and recommendations represent the work of researchers and stakeholders from many sectors — who contributed time and effort under the direction of the Task Force on Sustainable Transportation.

Achieving sustainable transportation is going to be a long, challenging process, calling for continuous efforts by the public and by stakeholders in governments, the transportation sector and the environmental sector. The overall goal must be to change the way people think and act with respect to transportation.

Stuart L. Smith, M.D.
Chair, NRTEE

Preface

This report, *The Road to Sustainable Transportation in Canada*, is one of the National Round Table on the Environment and the Economy's (NRTEE) series of flagship *State of the Debate* publications. It is based on extensive research and consultation with a wide range of stakeholder groups, including federal, provincial and municipal government representatives, energy producers, carriers and shippers, users and suppliers, labour union members and members of transportation- and environment-related non-governmental organizations. Prepared as a tool to encourage further discussion and decision making, the report defines the problem, identifies areas of stakeholder consensus and disagreement, and offers recommendations on how to advance sustainable transportation.

The NRTEE extends its appreciation to all those who played a part in this project. In particular, thanks go to members of the NRTEE Task Force on Sustainable Transportation for their guidance and direction, and to Ronald W. Neville, Management of Technology Services, and Kenneth J. Watson, Apogee Research International Ltd., for research and development of the report. Credit is also due to the staff of the NRTEE Secretariat for their work in coordinating the multistakeholder consultations and in producing the final report.

National Round Table on the Environment and the Economy Task Force on Sustainable Transportation

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Commissioner
Bureau d'audiences publiques sur l'environnement
NRTEE Member

Dee Parkinson-Marcoux
President
Gulf Heavy Oil, Gulf Canada Resources
NRTEE Member

Ken Ogilvie
Executive Director
Pollution Probe Foundation
NRTEE Member

David Egar
Director General
Air Pollution Prevention Directorate
Environment Canada

Wayne Kauk
Director, Sustainable Development
Office of Environmental Affairs
Transport Canada

Al Cormier
Chair
Centre for Sustainable Transportation

John Hartman
Director, Transportation Forums
Transportation Association of Canada

Jocelyne Beaudet
Policy Consultant

Executive Summary

In 1996, the National Round Table on the Environment and the Economy (NRTEE) established a Program on Sustainable Transportation for the purpose of providing advice to Canadians on this issue of increasing national concern. To direct the program, the NRTEE established a Task Force on Sustainable Transportation comprised of experts in the field. The program included commissioned research to establish the state of knowledge, and a multi-stakeholder consultation process to obtain Canadian stakeholder perspectives on the need for sustainable transportation as well as the means of achieving it. This *State of the Debate Report* presents the findings of the NRTEE from the research and consultations, and proposes immediate actions to deal with the risks and impacts of current trends away from sustainability.

Transportation in Canada is on an unsustainable path, with the transport sector generating about 30 percent of all greenhouse gases arising from human activity. The international scientific community, through the Intergovernmental Panel on Climate Change, has concluded that "the balance of evidence suggests a discernible human influence on global climate." Furthermore, the health of Canadians is being compromised as a result of emissions of ground-level pollutants from transportation, including precursors of smog and particulates. Most indicators, including the projected growth in fossil fuel use in transportation, point to increasing impacts from transportation-produced air pollution in the future, in Canada and globally.

As the second highest per capita energy-consuming nation on Earth, Canada is particularly vulnerable to the possible economic impacts of international agreements to reduce air pollution, including greenhouse gas emissions.

A number of governments in Canada are working to develop and implement policies and plans to reduce ground-level air pollution, and with some success. However, few concrete measures have been taken to stabilize or reduce greenhouse gas emissions from transportation over the long term, even though it is widely recognized among experts that reductions in these emissions would help to reduce air pollution at ground level as well.

Canada projects a 40 percent growth in fossil fuel consumption for transportation over the next 25 years. This stands in stark contrast to the 50 percent reduction in greenhouse gas emissions which the Intergovernmental Panel on Climate Change estimates is needed to stabilize atmospheric concentrations of these gases at 1990 levels. It will thus be extremely difficult, if not impossible, for Canada to meet future international targets for greenhouse gas emission reduction unless there is significant action for change.

Among stakeholders who participated in NRTEE-sponsored consultations, there is agreement, although not consensus, that the use of fossil fuels in transportation will continue to grow fastest in the highest energy-consuming modes, including cars, trucks and air transport. Stakeholders agree that reversing current trends will be extremely difficult because of market forces and consumer behaviours which are entrenched in Canadians' values and aspirations.

Decision making related to transportation is highly fragmented in Canada, both institutionally and among consumers. The necessary changes are the responsibility of all sectors of society. They cannot be achieved by governments acting alone.

Stakeholders also agree that current pricing signals run counter to the ideal of sustainable transportation, offsetting gains made by regulation and advancing technology. Gasoline and diesel fuel prices are at historic lows in constant dollars, further inflating demand for transportation. Various subsidies and tax policies continue to shield consumers and businesses from paying for the full social costs of their transportation choices.

Most of the stakeholders taking part in the NRTEE consultations agree that enough is known about the problems and available solutions to justify immediate action. However, there are areas where opinions diverge or there is uncertainty, primarily concerning the measures to be used. Opinions also differ on the extent to which technology can provide solutions in the future. The level of non-renewable fossil fuel use at which transportation could be considered sustainable is not firmly established. Further, the notion of moving future urban development towards more compact, mixed use, with less dependence on automobiles has not found universal support. Finally, the use of economic instruments to modify consumer behaviour and business decisions in transportation is controversial, in part because of fear of economic dislocations.

Emission reductions will come from a mix of policy measures which have three basic objectives:

- *reducing the need for motorized transportation,* by providing alternative means of access;
- *reducing consumption of non-renewable energy per unit of transportation,* by improving the fuel

efficiency of vehicles and by encouraging shifts away from high energy-consuming modes, such as automobiles, trucks and aircraft; and

- *reducing emissions of air pollutants per unit of energy consumed in transportation,* through the development and use of cleaner vehicles and cleaner fuels.

Summary of Recommendations

The NRTEE recommends urgent action to encourage Canada on a path towards sustainable transportation. The following presents specific recommendations under three action areas strongly endorsed by stakeholders during the consultations. In this summary table, the institution best suited to take ownership of the initiative and stimulate action is identified. Chapter 5 of the main report also identifies other institutions which have the power to either implement or contribute to implementing the recommendations.

Implement Programs of Education and Awareness

1. Implement a national program on the risks of the status quo and the changes needed for a shift to sustainable transportation.
   Lead: Federal Minister of Transport

2. Create and implement sustainable transportation education programs from primary grades to university curricula.
   Lead: Centre for Sustainable Transportation

3. Create and support sustainable transportation awareness partnerships among:

(a) local grassroots organizations.
Lead: Federal Minister of Environment

(b) national professional associations.
Lead: Centre for Sustainable Transportation

Government Coordination

1. Build consensus for a definition, vision and principles, as elements of a national strategy for sustainable transportation, based on the prior work of the NRTEE.
   Lead: Federal Ministers of Transport and Environment

2. Create a national strategy to:

(a) reduce greenhouse gas emissions from transportation; and

(b) integrate transportation into the National Action Program on Climate Change.
Lead: Federal Minister of Transport

3. Encourage:

(a) municipal targets for reduction of greenhouse gas emissions from transport;

(b) municipalities to adopt sustainable transportation plans; and

(c) large cities to report progress on the Transportation Association of Canada's (TAC) *New Vision for Urban Transportation.*
Lead: Federation of Canadian Municipalities

Reduce the Environmental Impacts of Transportation

1. Lead analysis and debate on the use of a specific package of economic instruments as part of an integrated package of instruments for achieving sustainable transportation.
   Lead: Federal Minister of Finance

2. Ensure that more data collection and analysis are undertaken to support full-cost accounting and user-pay principles.
   Lead: Federal Minister of Transport

3. Ensure that provincial land use legislation and policies support the principles in TAC's *New Vision for Urban Transportation.*
   Lead: Provincial Ministers of Municipal Affairs

4. Implement vehicle emission Inspection and Maintenance programs for road vehicles in all provinces.
   Lead: Provincial Ministers of Transport and Environment

I. Introduction

The contribution of transportation to Canada's economic and social well-being is massive. According to the Royal Commission on National Passenger Transportation, expenditures on all transportation services and infrastructure account for an estimated 16 percent of Gross Domestic Product.[1] No sector of the economy, especially the export sector, could function without an efficient transportation system. Transportation is essential to Canada's social fabric, linking Canadians in our urban regions and throughout our large land mass.

However, current trends related to projected long-term growth threaten to overtake the benefits derived from transportation. In particular, environmental impacts — especially those resulting from emissions of air pollutants due to growing fossil fuel use — must be reduced to ensure sustainability.

In 1996, the National Round Table on the Environment and the Economy (NRTEE) established a Program on Sustainable Transportation for the purpose of providing advice to Canadians on this issue of increasing national concern. To direct the program, NRTEE established a Task Force on Sustainable Transportation comprised of experts in the field. The program included commissioned research to establish the state of knowledge, and a multistakeholder consultation process to obtain Canadian stakeholder perspectives on the need for sustainable transportation as well as the means of achieving it. This *State of the Debate Report* presents the findings of NRTEE from the research and consultations, and proposes immediate actions to deal with the risks and impacts of current trends away from sustainability.

Phase 1 of the program included a review of the extensive domestic and international literature on the subject and interviews with 15 key governmental and non-governmental stakeholder organizations. The results of Phase 1, conducted by Apogee Research, were reported in a *Backgrounder on Sustainable Transportation in Canada*, published by NRTEE in December 1996.

Phase 2 of the program included a National Forum on Sustainable Transportation, where 66 people from across Canada met to share views and offer input into the program, using the Phase 1 *Backgrounder* as a starting point. Participants included federal, provincial and municipal government representatives, energy producers, carriers and shippers, users and suppliers, labour union members and members of transportation- and environment-related non-governmental organizations.

Although the NRTEE has developed this *State of the Debate Report* based on commissioned research and national consultation, the synthesis is the responsibility of the NRTEE. The present report defines the problem, identifies stakeholder perspectives and provides recommendations on how to advance sustainable transportation.

II. Why Transportation in Canada is Not Sustainable

Canada's highly developed transportation networks are vital to our international competitiveness. They also contribute in countless ways to the vibrancy of the economy and the quality of our lives. For many Canadians, distance no longer poses a barrier to social and commercial interaction.

However, current patterns of transportation use are not sustainable. If existing trends are allowed to continue, Canada's transportation networks will become more polluting, increasingly congested and, with urban sprawl, more costly to maintain. The economy, the environment and the quality of Canadians' lives will suffer as a result.

There is wide agreement among stakeholders that among the many negative impacts of transportation, air pollution poses the most severe threat. Major challenges arise in two areas:

- health problems resulting from poor ground-level air quality; and
- the impacts of climate change from increasing concentrations of greenhouse gases in the atmosphere.

Air pollution from transportation is forecast to continue growing. The economic, political and social roots of unsustainable transportation trends are so deeply entrenched that concerted action by all segments of society will be needed to get Canada on track.

Ground-Level Air Quality and Risks to Canadians' Health

People in the major urban areas of Canada, such as the Lower Fraser Valley of British Columbia and the Windsor-Quebec Corridor, are experiencing the negative health impacts of air pollution. Science has confirmed direct links between transportation, poor air quality and human health.

- A Health Canada study found "strong associations ... between premature mortality due to respiratory disease and airborne particulates, COH (coefficient of haze — a measure of visibility), ground-level ozone and nitrogen dioxide."[2] The same study found that the mortality rate from respiratory disease increased by 2 to 4 percent during periods of poor air quality and that such increases "could be attributed to the pollutant levels ... in the range commonly observed in Toronto. Similar associations were observed for cardiovascular deaths...."
- In a study of 168 hospitals in Ontario, researchers found that 5 percent of daily hospital admissions for respiratory problems between the months of May and October were associated with ozone.[3] "Most importantly, there does not appear to be a 'threshold level' for ground-level ozone below which no (health) effects are observed." A Canada-wide study confirmed these findings, with evidence showing that hospital admissions for respiratory symptoms rose as daily levels of air pollutants increased in 16 Canadian cities.[4]
- A study for the B.C. Ministry of Environment, Land and Parks concluded that for each 10 micrograms per cubic metre increase in the level of fine particulate matter (PM10), hospitalizations rise by 0.8 percent, emergency room visits for respiratory illness by 1.0 percent and school absenteeism by 4.1 percent.[5]
- Although much past research and regulatory policy has related to *inhalable* particulates smaller than 10 microns (PM10), recent studies have shown that very fine *respirable* particulates, smaller than 2.5 microns (PM2.5), are of "most concern because only these are able to travel deeply into the lung."[6] Certain health impacts are directly attributable to respirable particulates, including increased severity of the symptoms of asthma and cardiac disease.

Apart from the health impacts documented in the above studies, deteriorating air quality imposes significant economic costs on the health care system. The best available estimates of such costs from air pollution, contained in a report prepared for the Canadian Council of Ministers of the Environment (CCME), suggest that between 1997 and 2020, $10.8 billion to $38.2 billion in health care and other human health costs could be avoided by implementing regulatory scenarios for reducing emissions of smog precursors, such as NO_x and volatile organic compounds (VOCs), and particulates from transportation.[7]

Transportation is one of the largest contributors of the emissions responsible for poor air quality and human health effects. In 1995, transportation accounted for 58 percent of NO_x emissions and 28 percent of emissions of VOC, both precursors of ground-level ozone.[8] The use of diesel engines in transportation contributes to emissions of fine particulates. While transportation contributes a relatively small percentage of *inhalable* particulates (PM10), it is the predominant contributor of *respirable* particulates (PM2.5).

Greenhouse Gas Emissions and Risks from Climate Change

Increasing concentrations of greenhouse gases in the atmosphere, primarily from the burning of fossil fuels, appear to be resulting in destabilization of global and regional climates. At the end of 1995, the Intergovernmental Panel on Climate Change (IPCC), representing 2,500 of the world's leading scientists in this field, declared that "the balance of evidence suggests a discernible human influence on global climate."[9] This finding adds an important new dimension to the 1990 conclusion of the IPCC that "projections of future global mean temperature rise confirm the potential for human activities to alter the Earth's climate to an extent unprecedented in human history."[10] Moreover, the long time scales governing the accumulation of greenhouse gases and climate response mean that many aspects of climate change are effectively irreversible.

Concentrations of greenhouse gases are expected to continue to rise, and scientists project that global average temperatures will increase by 1.0° C to 3.5° C during the next century.

Current science does not enable researchers to make highly reliable predictions regarding the regional impacts of global warming. However, scientists from the IPCC have recently written that "... it now seems probable that warming will accompany changes in regional weather. For example, longer and more intense heat waves ... would result in public health threats and even unprecedented levels of mortality, as well as such costly inconveniences as road buckling and high cooling loads, the latter possibly leading to electrical brownouts or blackouts ... Climate change would also affect the patterns of rainfall and other precipitation, ... changing global patterns and occurrences of droughts and floods."[11]

One study of impacts in Ontario, presented in a report prepared for the Transportation and Climate Change Collaborative (TCCC), estimated that the expected doubling of concentrations of carbon dioxide during the next century could, among other impacts:

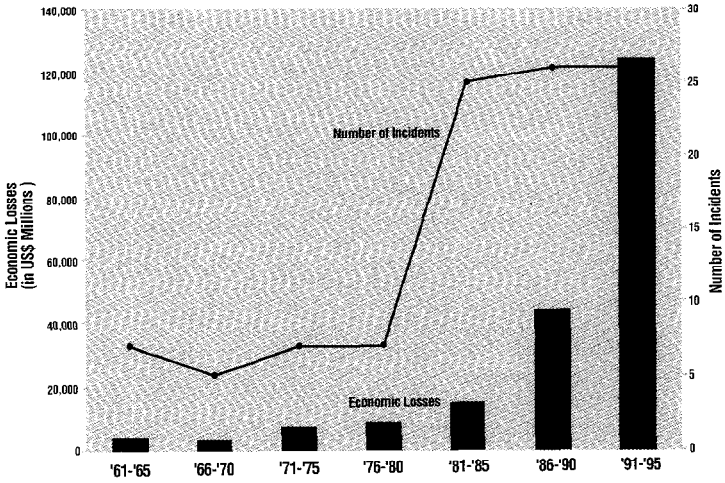
- decrease the net supply of surface water to the Great Lakes Basin by as much as 50 percent;
- reduce the mean levels of the Great Lakes by 0.5 to 2.5 metres;
- cause much of the boreal forest in the Great Lakes Basin to be lost and replaced with temperate forest; and
- result in invasions by species of insects and wildlife not normally seen in Ontario.

> "The negative economic and social effects of climate change (in Ontario) would likely include: loss of shoreline amenities and recreational opportunities; less hydroelectricity production in the Great Lakes region; conflicts and trade-offs among water users, including demands for diversion of Great Lakes water to the United States and within Ontario; more frequent dredging of shipping channels and harbours; a higher rate of mortality due to heat stress; more frequent (poor) air quality incidents, with related fatalities and respiratory and cardiovascular illnesses; and increased forest losses from fires, insects and diseases."
>
> Source: Environment Canada, Smith & Lavender Consultants, and Sustainable Futures, *Climate Change Impacts*, prepared for the Ontario Transportation and Climate Change Collaborative (1995).

The global insurance industry has registered strong concern about the risks associated with climate change, based on empirical evidence of the increasing number and severity of natural disasters around the world. The industry has published figures for 1960 to 1996, as shown in Exhibit 1, which show that the number of disasters, annual economic losses and annual insured losses have increased by factors of four, eight and fifteen respectively. The industry acknowledges that it is not possible to prove scientifically that these increases are the direct result of climate change, but argues that they are of such significance that the possibility of such links should be considered by decision makers.

Exhibit 1
Worldwide Great Natural Disasters

(Over US$100 Million in Losses)



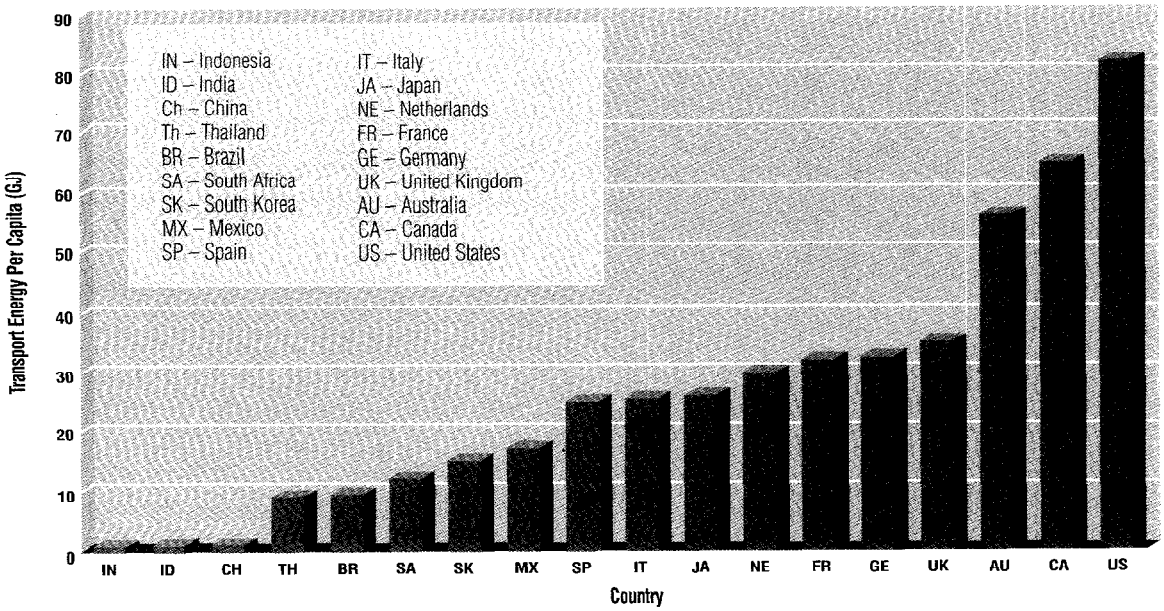
Source: Munich Re, "Topics: An annual review of natural catastrophes" (1997).

The Insurance Bureau of Canada reports a trend for Canada similar to that of the global industry, albeit based on a smaller sample of catastrophes. The flood disasters in the Saguenay region of Quebec in 1996 and Manitoba in 1997 illustrate the potential impacts of climate variability. The possible links between such disasters and millions of personal transportation-related decisions by consumers and businesses must be considered. The purchase of large vehicles, the consumption of products shipped by truck from the southern United States or Mexico, and long-distance vacation flights all result in high consumption of transportation fuels and higher greenhouse gas emissions.

> "The danger of unmanageable extreme weather situations is ... not a future threat but already an acute one which, although it is not being conjured up now by human interference in the climatic system, is being dramatically intensified by it."
>
> Source: *Global Warming: Element of Risk*, Swiss Reinsurance Company, Zurich (1994), p. 47.

Transportation is the largest contributor of greenhouse gases in Canada, generating about 30 percent of the total produced by human activity. Canada is the world's second highest per capita consumer of fossil energy for transportation (Exhibit 2). Only citizens of the United States consume more per capita than Canadians. There is a clear need for transportation to be fully integrated into Canada's program for addressing climate change.

Exhibit 2: Per Capita Use of Transportation Energy



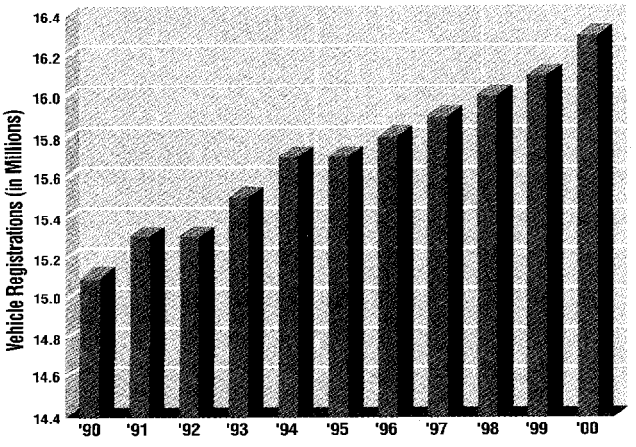
Source: International Panel on Climate Change "Climate Change, 1995: Impacts, Adaptation and Mitigation of Climate Change: Scientific-Technical Analyses," adapted from figure 21-3 on p. 684 (1996).

What the Future Holds

Current trends indicate that increased travel will offset market acceptance of advanced fuel efficiency technologies, resulting in increased use of fossil fuels in transportation and increased emissions of greenhouse gases.

- The total number of road vehicles in Canada has grown steadily and is expected to continue increasing in response to growths in population and economic activity (Exhibit 3).

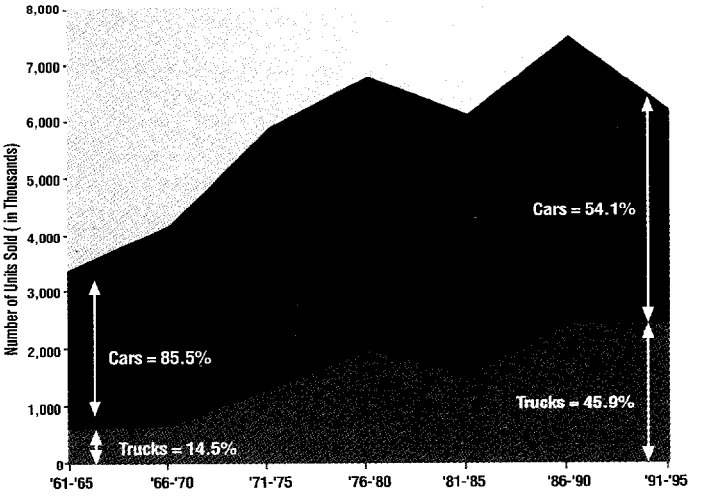
Exhibit 3
Total Light Vehicles in Canada



Source: DesRosiers Automotive Consultants (1997).

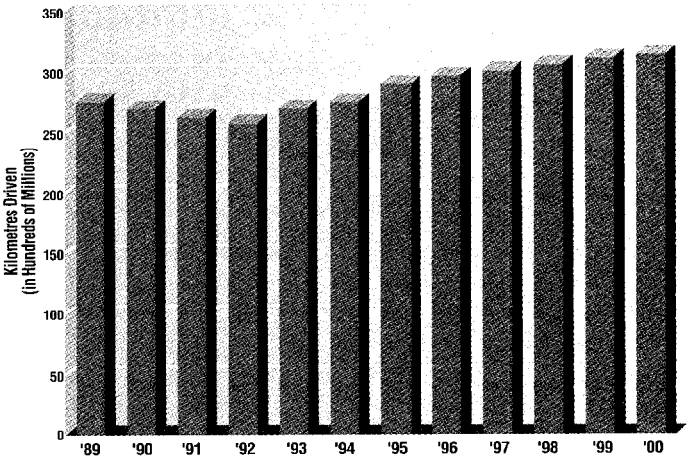
- The size of the average light-duty vehicle is increasing, with sales of minivans, sport utility vehicles and light trucks growing faster than those of automobiles. This trend has resulted in an increasing market share for six-cylinder engines, which average higher fuel use than four-cylinder engines (Exhibit 4).
  - The total distance travelled annually by road vehicles is increasing (Exhibit 5).
  - Transportation fuel prices are at historic lows in current dollars, contributing to the high growth in transportation use (Exhibit 6).

Exhibit 4
Unit Sales of Cars and Trucks



Source: DesRosiers Automotive Consultants (1997).

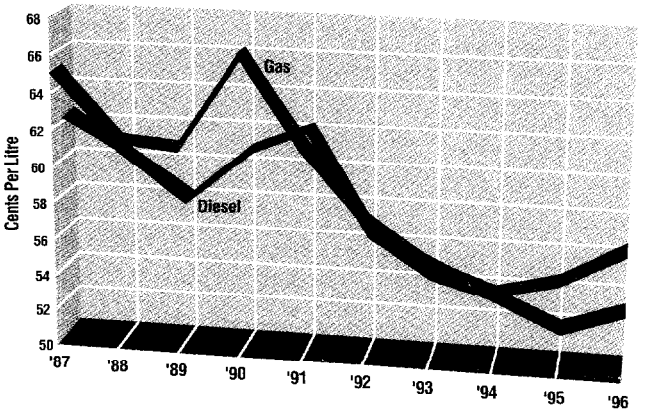
Exhibit 5
Total Kilometres Driven in Canada
(Light Vehicles Only)



Source: DesRosiers Automotive Consultants (1997).

Exhibit 6
Gas and Diesel Fuel Prices at the Pump

(Constant 1996 Canadian Dollars)



Source: Natural Resources Canada, Oil Division "Annual Gas Prices" and "Annual Diesel Prices" Facts Line, (613) 947-4747.

- Fossil energy consumption is projected to increase substantially for all modes of transportation over the next two decades (Exhibit 7). Overall energy consumption in the transport sector is projected to increase by about 40 percent in this period.

Exhibit 7
Projected Growth of Energy Consumption for Transportation in Canada, 1991-2020[12]

Mode	Percentage Growth
Road	42.4
Air	38.4
Rail	25.8
Marine	21.5
Total	40.0

- Air transport, with annual traffic projected to grow at 5 percent worldwide and 3.8 percent in Canada, is the fastest-growing mode of transportation. Energy efficiency of air transport is expected to improve by approximately 2 percent per annum as newer more fuel-efficient aircraft replace the current fleet. The net increase in energy consumption in Canadian air transport will, therefore, be approximately 1.8 percent per annum. Air transport is the most energy-intensive mode per unit of transport delivered for either passengers or freight (Exhibits 8 and 9).

Exhibit 8
Greenhouse Gas Emissions by Mode of Passenger Transport[13]

(Grams of Carbon Dioxide Equivalent per Passenger Kilometre)

Mode	Grams/Passenger Kilometre
New catalyst car	197
Diesel car	161
Bus	69
Diesel train	79
Electric train	76
Local train	54
Aircraft	853

Exhibit 9
Greenhouse Gas Emissions by Mode of Freight Transport[15]

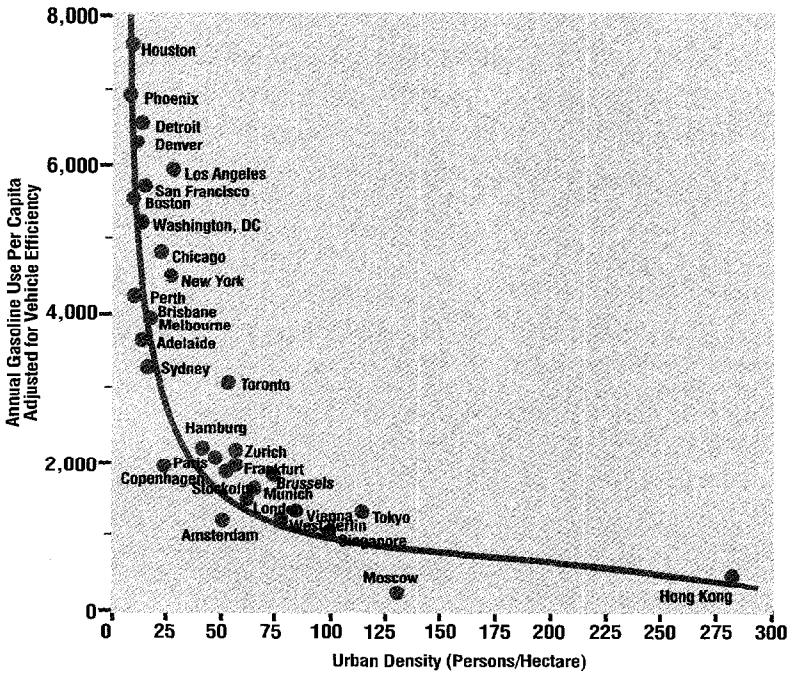
(Grams of Carbon Dioxide Equivalent per Ton Kilometre)

Mode	Grams/Ton Kilometre
7.5 ton truck	174
40 ton truck	56
Fast rail	39
Slow rail	14
Aircraft	3,414

- Between 1990 and 1995, the use of fuel in diesel trucking grew by 32 percent in Canada. In contrast, rail energy use declined by 10 percent in the same period.[14]
- In Canadian cities, the use of less energy-intensive urban transit (rail and bus modes) is declining, relative to more energy-intensive automobile use.

Exhibit 10
Per Capita Gasoline Consumption vs Urban Density

(Selected International Cities)



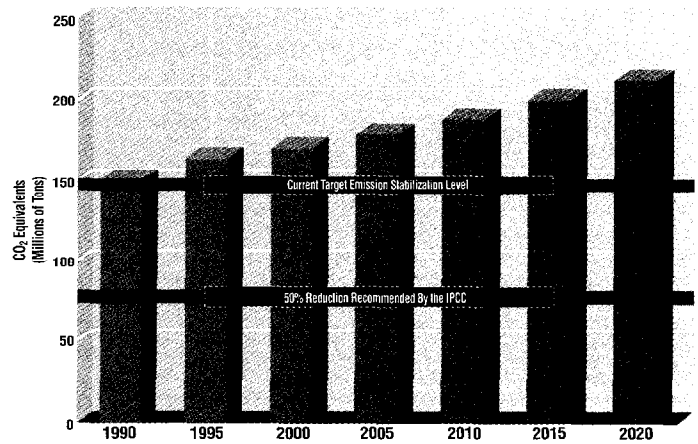
Source: P. Newman and J. Kenworthy, *Cities and Automobile Dependence: An International Sourcebook*, Gower Technical, 1991.

- Research on transportation patterns in cities around the world has demonstrated that there is a direct link between population density and per capita use of transportation fuel. Exhibit 10 shows that in the core of the city of Toronto, with a population density of approximately 42 persons per hectare, per capita fuel use exceeds that in many European cities, but is still low by North American standards. However, when the full Greater Toronto Area (where most of the population resides) is considered,[16] population density, which averages 5.5 persons per hectare, is comparable to many U.S. cities, and per capita fuel use is much higher than in Toronto's downtown core.

Current urban land development and property tax policies in Canada encourage automobile-dependent urban sprawl. Compared to more compact urban land development,[17] urban sprawl results in higher infrastructure costs. It also leads to higher transportation energy consumption than compact, transit-intensive land development of the type found in other parts of the world.

In summary, more vehicles, declining fuel economy of the fleet because of increasing average vehicle size, and shifts to more energy-intensive modes contribute to greater overall fuel consumption. Even allowing for expected fuel-efficiency improvements and stricter regulation, the government of Canada projects that greenhouse gas emissions from transportation will *increase* by about 40 percent between 1990 and 2020.[18] This stands in stark contrast to the emission *reductions* of more than 50 percent considered necessary by the IPCC to stabilize atmospheric concentrations of greenhouse gases at 1990 levels.

Exhibit 11
Trends in Greenhouse Gas Emissions from Transportation



Source: Data from Natural Resources Canada, *Canada's Energy Outlook —1996-2020* (1997), Annex C, p. C-7.

Projections for Canada (Exhibit 11) are consistent with those for other developed countries, including the United States. The Organization for Economic Cooperation and Development (OECD) predicts that global energy consumption from the road transportation sector will increase by 73 percent by the year 2030.[19]

Other Factors Contributing to the Unsustainability of Transportation

Besides air pollution, the many other negative impacts of transportation include: congestion; accidents; loss of productive arable, recreational and natural habitat lands; environmental damage from spills; and isolation for many people who lack ready access to transport alternatives, especially the automobile. Governments in Canada are experiencing difficulty in expanding transportation infrastructure to support continued urban sprawl and growth in demand for transportation.

Deeply-Rooted Canadian Values Lead to Unsustainable Transportation

The need for action to move towards sustainable transportation is now clear. However, change will not come easily, since unsustainable transportation practices are firmly established within the economic, social and political fabric of Canada.

Transportation services and infrastructure account for 16 percent of Canada's GDP, a figure that belies their importance.[20] Our transportation system represents large-scale public and private investment decisions spanning more than a century. New vehicle manufacturing and fossil fuel production and distribution are major drivers of the Canadian economy. The liberalization and expansion of international trade in a wide range of sectors relies on fast and inexpensive transportation to meet the demands of the global marketplace. In turn, this contributes to the growing use of fossil fuel.

Where and how we live, work and play are intimately tied to our access to transportation. Unlimited personal mobility, often in single-occupant road vehicles, is highly valued at every level of Canadian society. A single-family home on a large lot in the suburbs, a recreational property in the country and dependency on personal vehicles are key components of the Canadian dream. Where once they walked or cycled, children in urban areas are now driven to school and other activities, whether because of fear for their safety or the physical distances between home, school and recreational activities — in part a consequence of the low-density, single-use urban sprawl that now predominates in Canada's urban regions.

Changing consumer preferences and the continuing globalization of the marketplace mean that Canadians now spend more on goods and services brought from around the world.

Consumers buy flowers flown from Europe and South America, tangerines from Morocco and tomatoes trucked from Mexico or California. Moreover, air travel is growing rapidly, as international trips for both personal and business reasons become increasingly affordable.

The division of powers among levels of government fragments decision-making with respect to transportation, and militates against investment decisions which maximize economic efficiency and minimize environmental and social costs. Moreover, responsibilities for land use and transportation planning are divided among provincial governments and municipalities in ways that often hinder the sustainable development of urban areas.

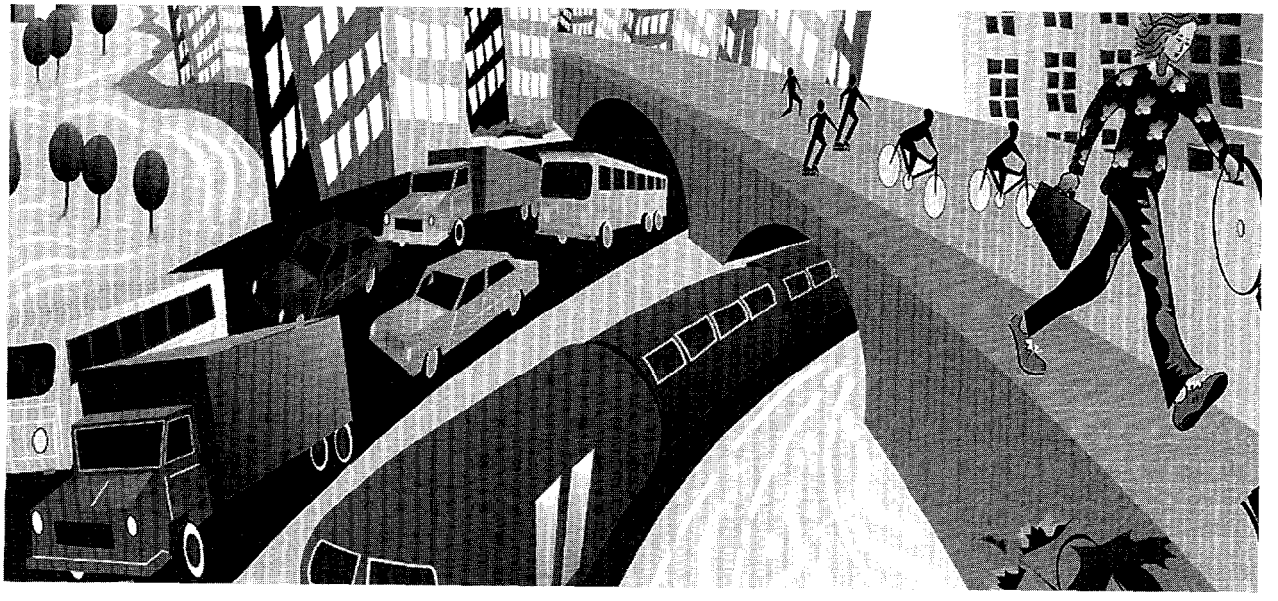
Users do not pay the full societal costs, including the environmental costs, of transportation. For example, the high costs of the transportation infrastructure needed to serve suburban areas are mostly paid for out of general tax revenues and not by the individuals directly served. This means that transportation is "overused" from an efficiency perspective.

These and many other elements of Canadian values and institutional structures create barriers to sustainable change in transportation use and energy consumption.

In the past, efforts by governments and industry to deal with transportation and air quality issues have produced some successes. However, at best, current commitments to change are likely to lead to marginal shifts *away* from unsustainable transportation.

The human health and climate change risks related to unsustainable trends in transportation are serious and will require a societal response on a scale unprecedented in the history of motorized transport. Stakeholders concur that urgent action is needed to address these risks by every sector of society, including governments, business, non-governmental organizations and, particularly, the public.

III. Reversing Unsustainable Trends



There are no easy "fixes" to reverse the unsustainable trends in Canada's transportation system. However, three critical modes, three critical targets and three critical challenges have emerged from the debate to focus the immediate search for solutions. They are as follows:

Critical modes:

- urban transportation (automobile and light-duty trucks);
- intercity freight (heavy-duty trucks); and
- air transportation.

Critical targets:

- reduce the need for motorized travel;
- reduce consumption of energy per unit of transportation; and
- reduce emissions per unit of energy consumed.

Critical challenges:

- raise public awareness;
- coordinate government action; and
- ensure that price signals encourage sustainable transportation.

Critical Modes

A sustainable transportation strategy must focus on those transportation modes which present the greatest opportunities to reduce risks to human health and global climate. Based primarily on the magnitude and growth of their emissions, cars, trucks and aircraft are the "critical modes" to be targetted.

Automobiles and Light-Duty Trucks in Urban Transportation

A major focus of efforts to achieve sustainable transportation must be the use of automobiles and light-duty trucks for urban transportation. The greatest adverse effects on human health are occurring in major urban areas where, despite current policy efforts, ground-level ozone continues to place the health of Canadians at risk. Smog Management Plans are being developed by federal and provincial governments to address this issue, and further progress can be expected. However, the projected growth in fuel consumption will result in increased emissions of greenhouse gases from light-duty vehicles.

Heavy-Duty Trucks for Intercity Freight

Because of its large contribution to transportation-related emissions and the complexity of reducing those emissions, intercity freight movement by heavy-duty trucks requires attention.

Heavy-duty road vehicles account for the second-largest portion of transportation-related greenhouse gas emissions, about 16 percent in CO_2 equivalents compared to rail and marine transportation, which account for about 3.5 percent each. Heavy-duty vehicles also emit 23 percent of the transportation sector's emissions of No_x. Combined, marine and heavy-duty vehicles contribute nearly 60 percent of the transportation-related emissions of SO_2, although transportation accounts for only a small portion of Canada's total SO_2 emissions.

Shipping freight by truck consumes between 1.3 and 5.1 times more energy than shipping the same tonnage by rail over the same distance.[21] Yet market forces are resulting in more and more freight being shipped by truck.

The Transportation and Climate Change Collaborative (TCCC) has noted that "more improvements [in energy efficiency of freight transportation] are anticipated, but not on the scale of the breakthrough technologies that are possible in the auto sector."[22]

Intercity freight movements occur within complex markets. In the quest for sustainability, such factors as trade liberalization and other international considerations, changing technologies for intermodal shipments, and fierce competition between transportation modes on cost, speed, reliability, availability and safety need to be taken into account.

If pricing policies were to reflect the full social costs of transportation, this could, in theory, influence shippers to use less energy-intensive modes than trucking to move freight. However, the issue is a very complex one, with many questions unanswered. In particular, controversy surrounds:

- the true extent of freight subsidies, particularly the relative subsidies for truck and rail;
- the best policy instruments to use for implementing full-cost pricing and shifting traffic to less energy-intensive modes;
- the most effective approaches to implementing full-cost pricing within the North American and international context of freight shipments; and
- the potential effects of full-cost pricing on the environment and the economy.

Limited analytical work has been done to illuminate the potential effects of shifting to less energy-intensive movement of intercity freight.

Air Transportation

Air transportation is projected to be the fastest-growing transportation mode in the foreseeable future. Natural Resources Canada projects growth in air travel of 3.8 percent per year at least until 2007.[23] Underlying this growth are the ongoing globalization of business and leisure travel, increased leisure travel by the elderly, and more international flights resulting from the Open Skies Agreement between Canada and the United States.

Air transportation is also the most energy-intensive mode per passenger-kilometre or ton-kilometre. By flying from Canada to Disneyworld in Florida, a family of four will consume approximately 12 times more fuel than by driving in the family minivan. Although the phasing-in of newer aircraft will bring fuel-efficiency gains of 2 percent per year, net demand for aviation fuels is expected to rise at the rate of 1.3 percent per year.[24]

Nitrogen oxides produced at high altitudes during flights are believed to be particularly potent greenhouse gas emissions. Ozone is most effective as a greenhouse gas at altitudes of 8,000 metres at the Poles and 17,000 metres at the Equator, the range where many commercial jet aircraft fly.

Despite the rapid growth in air transportation and the potency of its greenhouse gases, this mode of transportation has been almost entirely neglected by researchers and policy makers. Virtually no work has been done, in Canada or elsewhere, on the sustainability of air transportation, very little literature exists on technical options to reduce air emissions, and there has been almost no discussion of policy instruments.

Critical Goals to Reduce Air Emissions

Efforts to achieve sustainable transportation must focus on pursuing three goals:

- reduce the need for motorized travel;
- reduce the consumption of energy per unit of transportation; and
- reduce emissions of greenhouse gases and other pollutants per unit of transportation energy consumed.

Reducing the Need for Motorized Transportation

Canadians place a high value on access to goods and services, social opportunities, jobs and other activities. Unfortunately, we have come to rely on unlimited personal mobility, often in single-occupant vehicles, to provide that access. The challenge of reducing vehicle kilometres travelled lies in providing access through means other than single-occupant vehicles.

Alternative non-motorized ways of providing access are well known, with telecommuting, walking and cycling being the most prominent. Urban areas offer the greatest opportunities for reducing the need for motorized travel. However, fundamental changes will be required in the design of our urban regions, and in our approach to work and other activities.

More Compact, Mixed-Use Communities

The design of most Canadian communities virtually guarantees unsustainable transportation patterns. Urban sprawl and single-use zoning patterns result in over 90 percent of employed Canadians commuting to work.[25] Total time to

work and back averaged 48 minutes in 1992. Toronto and Vancouver had the longest average daily commutes at 60 minutes. Ten percent of commuters nation-wide spent more than 90 minutes commuting each day.

Urban sprawl forces most commuters to rely on personal automobiles. Walking and cycling are impractical due to the length of commutes and the lack of infrastructure to make these alternatives safe, pleasant and convenient. Low-density populations also reduce the efficiency, effectiveness and financial viability of public transit.

Yet a home in the suburbs remains the choice of many Canadians. In all but one of Canada's 25 Census Metropolitan Areas (CMAs),[26] the core cities are growing at a much lower rate than their suburbs.[27] The same trend is evident in smaller cities such as Regina, Trois-Rivières and St. John's.

A first step toward changing this trend would be to increase awareness of the full environmental and financial costs of the decision to live in new, detached dwellings in low-density, single-use areas. At the same time, immediate action is needed by all three levels of government to change the way communities develop in the future.

Provincial governments could implement policies in which land use and transportation planning are more closely linked. The current division of political power fragments transportation and urban development decisions, resulting in community design and building approvals which ignore many environmental and transportation implications.

Many incentives, including subsidies and tax policies, encourage low-density single-use urban sprawl. Full-cost pricing for municipal water and wastewater services and transportation infrastructure could improve the environmental and financial sustainability of these services and, by influencing consumer decisions about where to live, discourage urban sprawl.

Besides the obvious benefits to be derived from reducing air emissions from transportation, such reforms would lead to the development of more liveable, sustainable communities. Conservation of prime agricultural land, lower water use and improved recycling rates are some of the additional environmental benefits of more compact communities. Lower costs to governments for drinking water, sewers, schools and transportation would also assist municipalities to deal with fiscal pressures. For example, one study of the Greater Vancouver Regional District estimated that the region could save $2.2 billion on transportation costs alone if urban growth became more concentrated.[28] Similarly, the Greater Toronto Area Task Force estimated that the cost savings from containing urban sprawl would be about $1 billion each year, thereby reducing the burden on municipal governments and increasing the region's competitiveness.[29]

It will take time before the full benefits of more compact, mixed-use communities become apparent. Despite this, new approaches to urban planning are needed if sustainable transportation is to become a reality.

Telecommuting

By allowing employees to work at home or local work centres some of the time, telecommuting helps to reduce work trips. Although the potential impact of telecommuting on travel remains a matter of speculation, studies in the United States suggest that reductions in vehicle kilometres travelled of up to 3.4 percent might be possible.[30]

Consumption of Local Goods and Services

Encouraging consumption of locally produced goods and services can reduce the amount of intercity freight transportation and air emissions, as well as road maintenance and other external costs. Consumer preferences and the efficiency gains from centralized production and trade agreements limit the options available to governments to encourage consumption of local goods and services. Nevertheless, several actions are feasible.

First, public education can increase consumers' awareness of the environmental implications of

their purchasing decisions. Second, eliminating subsidies for freight transportation can ensure that consumers pay more of the full social cost of their purchases, as well as encouraging the purchase of locally-produced goods. Estimates of freight subsidies in Canada in 1994 (Exhibit 12) range from 18 percent of total costs for intercity truck freight to 9 percent for intercity marine freight.[31] In the referenced study by IBI Group, total subsidies are defined as the sum of basic government subsidies (net costs to governments) and external costs (emissions, accidents, health, policing, etc.).

Exhibit 12
Intercity Freight Transportation Subsidies in Canada, 1994
(Cents Per Ton-Kilometre)

Mode	User Charges	Full Cost	Total Subsidy (Basic Subsidy + External. Costs)	Subsidy as a % of Full Cost
Truck	11.53	14.05	2.50	18%
Rail	2.73	3.10	0.37	12%
Marine	2.60	2.86	0.26	9%

Source: IBI Group, "Full-Cost Transportation Pricing Study," prepared for the Transportation and Climate Change Collaborative (1995).

Reducing Consumption of Energy Per Unit of Transportation

Reducing the energy intensity of motorized transportation can be accomplished in two ways:

- at a micro level, by improving the fuel efficiency of vehicles; and
- at a macro level, by shifting to less energy-intensive modes.

Improving the Fuel Efficiency of Vehicles

There is some potential to reduce emissions by improving the fuel efficiency of vehicles. One OECD study suggests that energy savings of 5 to 20 percent could be achieved in North America by applying technologies which do not reduce other car attributes but would pay for themselves in fuel savings.[32]

A strategy for fuel efficiency should aim to improve the fuel efficiency of new vehicles, encourage consumers to purchase vehicles on the higher end of the fuel-efficiency spectrum, and encourage good vehicle maintenance to ensure that vehicles operate at peak fuel efficiency. A range of regulatory, pricing and public education programs can help to achieve these goals.

Shifting to Less Energy-Intensive Modes: Public Transit, Car Pooling and Rail

Urban transit is several times more energy-efficient per passenger-kilometre and considerably less land use intensive than the automobile. Yet the last decade has seen a decline in transit modal share in Canada's largest cities. For example, in the Greater Toronto Area, transit modal share for all daily trips dropped from 17 percent in 1986 to 14 percent in 1991.[33] In British Columbia's Lower Fraser Valley, transit modal share decreased by 11 percent between 1985 and 1992, although absolute transit ridership rose by 22 percent.[34] These declines in transit modal share are occurring despite continued public investments in transit.

As with public transit, car pooling provides people with access to jobs and other amenities while reducing energy consumption per passenger-kilometre. Each car pool can save an average of 2,000 litres of gasoline per year and reduce CO_2 emissions by almost five tons.[35]

Exhibit 12 indicates that trucking is subsidized in Canada at an estimated rate of 18 percent, compared to 12 percent for rail. Governments should explore whether shifts from truck to rail could result from levelling the subsidy (and taxes) applied to these modes as an approach to reducing use of higher energy-intensive transportation modes. It is noted that estimates of relative subsidy levels are controversial.

Reducing Air Emissions Per Unit of Energy Consumed in Transportation

Cleaner vehicles and cleaner fuels can reduce air emissions per unit of energy consumed in transportation. However, even combined measures to

encourage cleaner vehicles and fuels may not be sufficient to stabilize or reduce greenhouse gas emissions from transportation.[36]

Cleaner Vehicles

Cleaner vehicles reduce emissions of pollutants responsible for local air quality problems, but they do not significantly affect the reduction of greenhouse gas emissions.

The two primary tools for promoting cleaner vehicles are more stringent emission performance standards for newly-manufactured vehicles and inspection and maintenance (I&M) programs for vehicles in use. While the North American context of the automobile manufacturing industry requires coordination of new vehicle emission standards between Canada and the United States, the same does not apply to I&M programs, which can thus be implemented independently in Canada.

AirCare, British Columbia's I&M program, reduced emissions of hydrocarbons, carbon monoxide and NO_x by 20, 24 and 2.7 percent respectively between 1992 and 1994.[37] AirCare's results are very close to the largest reductions possible from well-run light-duty vehicle I&M programs (25 percent for hydrocarbons and carbon monoxide, and 10 percent for NO_x), as estimated by an OECD study.[38]

Cleaner Fuels

Mandatory specifications for traditional fuels can provide some additional opportunities for emission reductions, with Canada's recent low-sulphur diesel requirements being an example. However, more significant gains are possible from increased use of alternative fuels, such as natural gas, propane, ethanol and methanol.

Alternative fuels can help reduce emissions, including both greenhouse gases and the regulated pollutants responsible for local air quality problems. Going beyond the small niche markets already occupied by these fuels, a range of initiatives is possible, including research and development, tax incentives, fleet conversion and procurement programs. Coupled with environmental benefits, economic development opportunities are often a key motivation behind efforts to develop alternative fuel markets.

In addition to the alternative fuels currently on the market, "breakthrough" fuels such as hydrogen and electricity provide hope for long-term sustainable power sources. However, these require further research and development prior to commercialization.

A key caveat with all alternative fuels is that their desirability must be assessed from a life cycle perspective. Only by examining the complete fuel life cycle can the environmental benefits achieved through vehicle operation be balanced off against negative environmental impacts resulting from fuel production and distribution.

Finally, the low prices of conventional gasoline and diesel fuels must be acknowledged as a major barrier to increased market acceptance of alternative fuels.

Critical Challenges to Implementing the Solutions

Three critical challenges emerge from the above discussion. A sustainable transportation strategy must:

- raise public awareness;
- coordinate government action; and
- ensure that price signals move Canada towards sustainable transportation, rather than away from it.

Raising Public Awareness

Solutions are available to increase the sustainability of Canada's transportation system, but those that offer the most promise can often be the most difficult to implement. Fuel efficiency standards, fuel taxes and more compact, mixed-use communities may present the greatest opportunities for short- and long-term progress, yet all of these approaches face significant opposition from one or more stakeholders.

Increasing public awareness is the most significant step needed to lay the groundwork for effective action. As part of a sustainable transportation strategy, public education is needed to:

- inform individuals of the risks and costs of current transportation trends;
- educate individuals about steps they can take to contribute to sustainable transportation; and
- build public support for the political actions that will be necessary for sustainable transportation.

Coordinating Government Actions

Overcoming the deeply-rooted trends that underlie unsustainable transportation will require action at all levels of government, as well as by industry, non-governmental organizations and the public. Integrated packages of policy instruments are needed to mobilize all stakeholders, avoid duplication of efforts and exploit potential synergies.

There are many examples of the need for policy coordination.

- The federal government is participating in international negotiations on new commitments to reduce greenhouse gas emissions, yet authority to implement many of the policy instruments needed to achieve such reductions rests with the provincial and municipal governments.
- Transportation has not been fully integrated into the National Action Program on Climate Change.
- Sustainable transportation will require coordination of land use and transportation planning, often across many different jurisdictions.
- Because much intercity transportation is international in nature, the governments of Canada, the United States and other countries will need to cooperate in order to address the transportation issues. The North American Free Trade Agreement (NAFTA), in particular, is a key driver in the growth of intercity freight movement. Air transportation is also strongly driven by international forces.
- Ministers of Finance have the primary authority to implement many of the pricing changes that will likely be necessary for sustainable transportation. Federal and provincial finance ministers must become fully engaged in the development of economic policy instruments, integrated with such measures as regulation of emissions and fuel-efficiency standards.
- Many other areas of government policy can influence the sustainability of transportation, including housing, economic development, infrastructure funding, procurement and energy efficiency.

Ensuring that Price Signals Move Canada Towards Sustainable Transportation

A key theme running through the above discussion is the importance of establishing the right prices to encourage the desired changes. In some ways, price signals are an ideal way to encourage sustainable transportation, given the highly decentralized decisions required. The sustainability of transportation is affected by millions of daily decisions — for example, to walk rather than drive to the store, to buy local rather than imported produce, to spend a vacation locally rather than abroad, or to drive a car rather than a sport-utility vehicle. While not well-suited to regulatory instruments, behavioural change on such a micro level can be influenced through pricing policies.

Current Price Signals: Major Barriers to Sustainable Transportation

Despite recent reductions in transportation subsidies, most transportation services for people and goods continue to be available at prices lower than their full societal costs. The Royal Commission on National Passenger Transportation has estimated the true costs of subsidizing long-haul trucking and air transport. These subsidies result

primarily from the failure of governments to recover infrastructure costs. In 1990, for example, the "subsidy to the air passenger system was about 20 percent, and the subsidies to large trucks were very conservatively estimated at $13,000 per 60 ton truck per 100,000 km...."[39,40]

Full-cost accounting and user-pay approaches can create the right price signals to start changing people's decisions about where to live and work, how and when to travel, and what to buy. In addition to managing travel demand and reducing environmental impacts, they can also provide sustainable financing mechanisms to maintain a quality transportation system in an era of smaller government.

As population and economic wealth grow, the low cost of fuels for road transport only serves to encourage increased consumption. Next to the United States, Canada has the secon cheapest gasoline in the world.

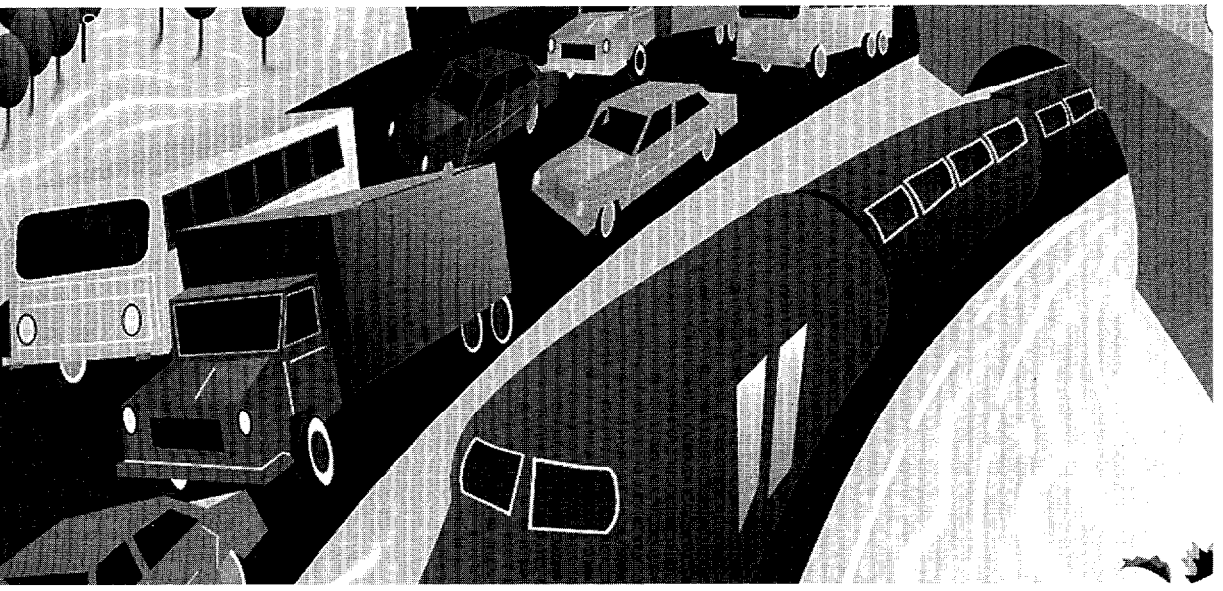
Price Signals Must Be Part of an Integrated Package of Policies

There is a widespread agreement that, although not able to achieve sustainable transportation by themselves, pricing mechanisms must be part of integrated packages of policy tools. Even if full-cost pricing were introduced to account for all environmental, economic and social impacts of transportation, it has not been demonstrated that sustainable transportation would result. Economic instruments may be required which, along with regulation, technology and other measures, are designed to achieve specific sustainability targets. Furthermore, the use of economic instruments by senior levels of government will be required to reinforce urban development reforms and sustainable transportation initiatives at the local level.

Price Signals Must Extend Beyond Transportation

By reducing the number and length of trips using motorized transport, a user-pay system for municipal infrastructure and services can play an important role in creating cities that facilitate sustainable transportation. In addition, user fees for water and wastewater services can improve both the sustainability and the effectiveness of these important environmental services.

IV. What is Happening Now?



Present trends suggest that the battle for sustainable transportation is being lost, with projections pointing to continued growth in the use of fossil fuels for transportation. Major, long-term shifts in market behaviours, transportation use and urban settlement patterns will be required to halt or reverse these established trends.

The complex nature of current transportation systems presents a major difficulty. Millions of individual and institutional decisions are made daily which contribute to the trends away from sustainability. People do not easily connect the risks and threats of air pollution, especially from climate change, to their individual transportation choices. Further, although they have been extensively studied by transportation experts, the severity of the costs and risks of current transportation practices and the effectiveness of alternative strategies and policy measures have not yet been broadly debated by the public. There is no generally accepted strategy for achieving sustainable transportation in Canada.

Air pollution continues to be addressed primarily through the regulation of emissions and fuel efficiency of new vehicles. Regulation and voluntary agreement certainly encourage vehicle and engine manufacturers to bring advanced technologies to market. However, the regulatory approach fails to address the key factors that influence consumer behaviour, overall transportation demand and modal choice, and is therefore unable to effectively constrain the continued growth in fossil fuel use.

On the positive side, Canadian public and private sector stakeholders are undertaking many initiatives aimed at moving transportation in a more sustainable direction. Some of these are described below.

International Activities

The Third Conference of Parties (COP3) to the UN Framework Convention on Climate Change will be held in Kyoto, Japan, in December 1997. At COP3, an attempt will be made to negotiate an international protocol for specific, mandatory CO_2 reduction targets. COP3 is a political response to the conclusion reached by the Intergovernmental Panel on Climate Change (IPCC), at the end of 1995, that climate change is linked to greenhouse gases produced by human activity. Meeting reduction targets will be a major challenge for Annex 1 countries, including Canada, which are not expected to meet their earlier, more modest commitment of stabilizing emissions at 1990 levels by the year 2000.

Efforts are ongoing to limit the transboundary movement of ground-level ozone precursors and particulates between the United States and Canada. In Ontario, for example, approximately 50 percent of ground-level air pollutants are the result of transboundary movement from the northern industrial states of the United States.

From Canada's perspective, a key barrier to bilateral progress on this issue is that the American standard for acceptable levels of ground-level ozone is 120 ppb, compared to Canada's current objective of 80 ppb. Both standards are currently under review. At the time of writing, the United States government had announced legislation to establish a new standard of 80 ppb. This legislation is expected to face challenges in Congress before it can become law.

Federal Activities

The federal government plays a key role in national initiatives such as the NO_x/VOC Management Plan and its successor, the National Smog Management Plan, as well as the National Action Program on Climate Change. Other federal initiatives relevant to transportation include the Ozone Depleting Substances Plan and the federal FleetWise program. The latter is aimed at reducing environmental impacts from vehicle fleets operated by the federal government.

In 1994, Canada's environment and energy ministers requested the preparation of a National Smog Management Strategy, to consist of:

- a National Smog Management Plan;
- four Regional Smog Management Plans for the Ontario and Quebec portions of the Windsor-Quebec Corridor, the Lower Fraser Valley and the Southern Atlantic Region; and
- an expanded scope to consider other pollutants, such as inhalable particulates.

The National Action Program on Climate Change (NAPCC), was developed as a federal-provincial response to the UN Framework Convention on Climate Change, to which Canada is a signatory. However, the NAPCC does not include an integrated strategy, or emission targets for transportation, reflecting the importance of the latter as a large and growing source of greenhouse gas emissions. NAPCC is also silent on the use of economic instruments by the federal and provincial governments to promote long-term changes in transportation market behaviour.

The Voluntary Challenge and Registry (VCR) is currently the main national initiative under the NAPCC. To date, it has been targeted at large corporations and government bodies, and does not therefore involve a large percentage of transportation users. In its present form it is unlikely to have a major impact on transportation.

In October 1996, the VCR was endorsed by the Board of Directors of the Transportation Association of Canada. TAC is now encouraging its members to participate. This initiative will include provincial departments of transportation, some of which may not have been involved in earlier submissions from environmental and energy ministries to the VCR.

The VCR is in its early stages of development, with approximately 600 signatory organizations in the register. It is the intent of the federal and provincial sponsors of the VCR that its reach be expanded over time to include a broader range of organizations, both large and small. Even so, the future impact of the VCR on transportation emissions remains unknown.

In recent years, Transport Canada has been transformed from its previous focus on subsidizing, building and operating transportation infrastructure to a role more focused in the areas of regulation and transportation policy. According to the department's 1996 Transport Business Plan, "The new policy framework emphasizes a national vision of safety, efficiency, industry viability and environmental responsibility." The role of Transport Canada in sustainable transportation continues to evolve. Although the department does not control many of the necessary policy levers, it can play an important leadership role as a catalyst for a national commitment to sustainable transportation.

Provincial Activities

Canada's provinces have primary jurisdiction over land use planning. Land use plays a key role in the long-term sustainability of transportation. Modal share by public transit can be increased and total demand for all modes of motorized transportation can be reduced through careful urban design and more compact, mixed-use urban form. In general, provinces establish land use policies and vest most responsibilities for planning and implementation at the municipal level.

Provincial governments play a major role in transportation decision making. Capital and maintenance costs of road infrastructure and public transit, the registration and licensing of vehicles, fuel taxes, safety, policing and regulation of the insurance industry are all provincial responsibilities.

Some provinces have embarked on programs aimed at sustainable transportation. The following are examples of initiatives at the provincial level.

- British Columbia has adopted its Clean Vehicles and Fuels Policy, which contains a variety of regulatory, technology and market development measures, and which is expected to keep air quality and, by extension, health impacts, at current levels in the Lower Fraser Valley through to 2020, despite projected growth in vehicle use. British Columbia is forecasting an increase in greenhouse gas emissions by 2020 because of a projected doubling of the number of vehicles in the Lower Fraser Valley by that time.

  British Columbia has in place the first mandatory Vehicle Inspection and Maintenance Program in Canada. AirCare, as it is called, applies to light-duty road vehicles in the Lower Fraser Valley. The program has been

successful in reducing emissions of ground-level air pollutants from vehicles of all ages on the road, and plans are under way to extend it to include heavy-duty vehicles.

- Ontario is preparing a regional Smog Accord and Plan to address the problems of ground-level ozone and particulates. The transportation element of the Ontario plan will be focused on NO_x and VOC reductions from new vehicle emission standards which came into effect in 1996. These standards are incorporated in a Memorandum of Understanding between the automobile manufacturers and Transport Canada.

  The government of Ontario is considering plans for a mandatory Inspection and Maintenance Program for cars and light trucks, the details of which are still pending. It has been estimated that a program for the Greater Toronto Area (GTA), in addition to reducing ground-level pollutants, would reduce carbon dioxide emissions by 400 kilotons per year, approximately one percent of total emissions from transportation in Ontario.

  The Ontario Ministry of Transportation has initiated the development of a GTA Transportation Plan in cooperation with the regional municipalities within the city-region.[41] The priorities of this plan reflect the increasing difficulty of financing expansion of transportation infrastructure, and are focused on making the most efficient and effective use of existing facilities.

  In 1994 and 1995, under the sponsorship of the Ontario Round Table on Environment and Economy and the National Round Table on the Environment and the Economy, the Transportation and Climate Change Collaborative prepared and submitted to the government of Ontario a report entitled *A Strategy for Sustainable Transportation in Ontario*. This report and the reports of the 10 research studies commissioned by the Collaborative represent an important body of knowledge in the Canadian context.

- Since 1993, Quebec provincial law has required regional municipalities to integrate transportation planning into municipal planning. The Quebec Ministry of Transportation has taken the lead in the development of a long-range transportation plan for the Montreal urban region, comprising about 135 municipalities. Major objectives are to improve regional air quality and traffic flow. Increasing modal share for public transit is a key goal, since continuing auto dependence would require costly new bridges to access Montreal Island.

  In 1995, the Ministry of the Environment and Wildlife of Quebec created a registry program for voluntary measures to be taken by organizations and companies operating in Quebec to stabilize their greenhouse gas emissions at 1990 levels.

  The government of Quebec has also recently created a regional transportation agency to address transit and road infrastructure needs in the Greater Montreal Region. The agency will have broad transportation planning powers, as well as dedicated sources of revenue to support regional public transit services.

Regional and Municipal Government Activities

Regional and municipal governments are key players in efforts to achieve sustainable transportation. Land use planning to encourage higher density mixed-use communities is one clear municipal role that can make a long-term contribution to sustainable transportation. The Federation of Canadian Municipalities cosponsors the 20% Club, in which 30 Canadian municipalities have committed to actions aimed at reducing greenhouse gas emissions by at least 20 percent from 1990 levels. Reductions in transportation emissions are included in these municipal plans.

In 1996, the Transportation Association of Canada published an *Urban Vision Sampler*, which highlights sustainable transportation

efforts by 12 regional and city governments. These diverse municipal efforts generally relate to:

- traffic demand management;
- public transit services;
- cycling infrastructure;
- pedestrian infrastructure;
- parking policies; and
- the "greening" of municipal fleets.

Planning in the Greater Vancouver Regional District is based on three complementary initiatives:

- the Liveable Region Strategic Plan, providing a land use plan including compact mixed-use communities and increased transportation choice;
- Transport 2021, providing long- and medium-range transportation plans based on desired urban form and a priority on walking, cycling, public transit, goods movement and then the automobile; and
- the Air Quality Management Plan, providing controls on many sources of air pollution, including transportation.

The Regional Municipality of Ottawa-Carleton (RMOC) has adopted two vision documents as the basis for decision making related to development of its transportation system:[42]

- *Ottawa-Carleton's Community Vision — A region of communities that are environmentally healthy, safe, caring, prosperous and diverse;* and
- The Transportation Association of Canada's *New Vision for Urban Transportation.*

Among the key issues of concern identified in public consultations in Ottawa-Carleton are the following:

- the desire for increased opportunities for walking and cycling;
- the need for reduced dependence on the automobile; and
- support for improved transit service.

Those surveyed during the RMOC community vision process ranked the environment as a number one priority, despite current economic conditions.

The Council of the Regional Municipality of Hamilton-Wentworth has adopted a vision statement and implementation report entitled *Vision 2020: The Sustainable Region*, which addresses the need for broader linkages between the economy, the environment and health/social factors in order to achieve a sustainable community.

Hamilton-Wentworth is Canada's designated community participating in the United Nation's Local Agenda 21 Model Communities Program (MCP). The MCP is a three-year international research and development collaboration to create tools and models for local sustainable development planning. Transportation is a key element, with emphasis on new land use policies, walking, cycling, transit, less reliance on automobiles, and intermodal integration. The Program is being coordinated by the International Council on Local Environmental Initiatives (ICLEI), headquartered in Toronto.

Other Activities

The *New Vision for Urban Transportation*, published by the Transportation Association of Canada, has been widely endorsed, including citation by the OECD as an example of "best thinking on environmentally sustainable transportation in Canada." More recently, TAC has published a briefing entitled *Financing Urban Transportation*, which incorporates the principles of sustainable transportation from its *New Vision.*

The Centre for Sustainable Transportation was recently established as a not-for-profit organization by a number of stakeholder groups. The mission of the Centre, the first of its kind in the

world, is "*to provide leadership in achieving sustainable transportation in Canada by facilitating cooperative actions, and thus contributing to Canadian and global sustainability.*" Initial funding has been provided by Transport Canada and Environment Canada.

A number of non-governmental organizations are active in analysis and advocacy for sustainable transportation. In addition, a large number of grassroots organizations all across Canada are making important contributions to the emerging debate.

Shortfalls in Canada's Approach to Sustainable Transportation

The fundamental shortfall in Canada's approach to sustainability is the lack of a national commitment to reverse the trend to increased use of fossil fuels in transportation.

Ground-level ozone, particulates and greenhouse gases are the pollutants of most concern. Past experience has shown that emission regulations and fuel-efficiency standards (which primarily affect the technology of transportation) are not sufficient to overcome the growth in total emissions from the expanding use of high energy-consuming transportation modes, including cars, trucks and aircraft. This basic reality must be addressed by all sectors of Canadian society before sustainable transportation can be realized.

In more specific terms, the following are lacking at present:

- national and regional targets for the reduction of greenhouse gas emissions. Without targets, there can be no accountability or sense of common purpose;
- a coordinated national strategy for sustainable transportation involving all stakeholders, integrated into a national strategy for sustainable development;
- full integration of transportation into the National Action Program on Climate Change;
- commitment by the United States to reduce the transboundary movement of air pollution into Canada, in support of the targets of Canada's Smog Management Plans;
- commitment by governments to implement policy measures (in addition to regulation, technology and the voluntary approach) aimed at achieving long-term changes in patterns of transportation demand and use;
- public awareness of the threats, and commitment to address the cause-and-effect linkages between transportation use and air pollution;
- broad understanding of the economic, social and environmental benefits of combining lower energy-consuming modes of transportation with compact, mixed-use urban land development;
- standards, source inventories and an epidemiological understanding of the health impacts of a broad range of air pollutants, including respirable particulates; and
- attention to sustainable transportation in the intense ongoing public debate surrounding the governance of large urban regions.

V. Perspectives of Stakeholders and Recommendations

In January and February 1997, 66 participants from across Canada, representing a broad range of transportation stakeholder organizations, took part in a Forum on Sustainable Transportation in Ottawa. The objectives of the Forum, which consisted of four days of workshops, were to:

- identify and understand sustainable transportation issues, including barriers and constraints to progress; and
- provide input to the recommendations of the NRTEE Task Force on Sustainable Transportation for the development and implementation of a sustainable transportation strategy for Canada.

Areas of Agreement

Among the stakeholders who participated in the consultations, there is broad agreement, although not consensus, on the following:

- Enough is known about the severity of the problems and available solutions to justify urgent action now. Delay will only increase the severity of risks and impacts.
- The national debate on sustainable transportation is in its infancy. While there is a solid body of literature on the severity of the problems and analysis of potential solutions, there is no sense of urgency in the public, and no national consensus on what actions need to be taken. Despite its profound implications for the future, sustainable transportation is not widely debated among Canadians, and ranks lower than jobs, health care, education or national unity as an issue of national attention.
- Transportation is a principal source of air pollution, and health and climate change impacts from air pollution place Canadians and people worldwide at great risk, economically and socially. Air pollution also has many other negative impacts on the biosphere.
- Transportation is the fastest growing sector for fossil fuel use and the most difficult to constrain. Current long-term trends in transportation are not sustainable. Notwithstanding the ever-increasing demand for accessibility, action is urgently needed to reduce air pollution from transportation.
- Ground-level air pollution remains a serious threat to human health, despite decades of progress in emission regulation and technology.
- Entrenched societal values and commercial interests, backed up by massive transportation and urban infrastructure, pose formidable barriers to slowing or reversing the growing use of fossil fuels in transportation in order to reduce air pollution, including greenhouse gases. Achieving sustainable transportation will take decades, and possibly generations.
- Sustainable transportation is the responsibility of all sectors of society, and cannot be achieved by governments alone. However, the federal government must assume the leadership role.
- Prerequisites to effective long-term action are increased public awareness of the risks, and commitment to changes in behaviours and policy measures.
- Current market pricing signals run counter to sustainable transportation. Users do not bear the full societal costs of transportation.
- The National Action Program on Climate Change should include an integrated strategy for transportation.
- Federal, provincial and municipal targets are required for the reduction of greenhouse gas emissions from transportation, to ensure accountability and shared commitment.
- Integrated packages of coordinated, mutually-reinforcing policy measures will be required. No single policy measure will be adequate, including reliance on regulation, technology or new economic instruments based on full-cost accounting principles.
- Transportation and land use policies and planning must be integrated. Past practices of allowing urban areas "to sprawl outward to accommodate population growth and social desires through low-density development on less expensive land"[43] are strongly linked to

the growth of fossil fuel consumption. Major reform of urban land use policy is required.

- Finance ministries must participate fully in the development of economic instruments that support the achievement of emission-reduction targets.
- Although highly valued by users, cars, trucks and air transport are the most unsustainable modes of transportation.
- There is significant long-term potential to improve fuel efficiency and reduce emissions from the vehicle fleet on the road through the commercial application of advanced technologies, facilitated by appropriate regulation *and* market signals.
- Canada's strategy must consider the economic, social and environmental costs and benefits of mitigation actions. Canada must also consider the consequences of its strategies and programs in the context of the directions taken by the United States on this issue.
- Efforts must continue to secure commitments by the United States to reduce transboundary movement of air pollution into Canada.

Areas of Divergent Opinion and Uncertainty

The NRTEE Forum workshops also highlighted several areas of divergence of opinion or uncertainty among participants. These relate primarily to the feasibility, effectiveness and political acceptability of available measures for limiting emissions of air pollutants from transportation.

- Opinions are mixed about the extent to which technology will provide solutions in the future. Some stakeholders point to worldwide research and development efforts to develop low- and zero-emission vehicles using fuels from renewable energy sources, the fuel-cell technology of Vancouver-based Ballard Power Systems being one of many examples. Others argue that there is no technological "Silver Bullet" which can overcome the effects of increasing demand for transportation. It is not so much the feasibility of specific technologies that is in doubt as their long-term and widespread commercial viability.
- There is controversy over the levels at which non-renewable fossil fuels can continue to be used in a sustainable transportation system. While some argue that the focus should be on moving completely to energy from such sources as hydrogen, alcohols from biomass or electricity from renewable sources, the extent to which such fuels can be made commercially viable has not been established.
- There is disagreement about the public acceptability of moving future urban development towards more compact, mixed use. "Opponents of intensification within core urban areas believe that it results in increased crime, devaluation of property and a general loss in the quality of life."[44] Other voices argue that governments can no longer afford the infrastructural costs associated with sprawl, and that more liveable, economically efficient, environmentally sustainable and socially inclusive communities can be developed, or redeveloped, over the long term, using well-designed, compact urban form.
- The use of fuel taxes to modify consumer behaviour is controversial. Advocates argue that fuel taxes are among the most efficient and effective means of modifying market behaviours, in that they affect the broadest range of decisions made by individuals and businesses. Opponents argue that fuel taxes could prove to be economically disruptive and regressive, that Canada's fuel taxes are already far higher than those in the United States and, given the relative inelasticity of transportation demand with respect to fuel price, that large fuel tax increases would be required to produce substantial changes in market behaviour.

- Some argue that fiscal pressures on provinces and municipalities provide an opportunity for motivating decision makers to invest in "least societal cost" transportation systems, by carefully evaluating the merits of alternative transportation solutions — for example, road versus public transit, or intermodal versus truck movement of goods. Others contend that established patterns of decision-making will not necessarily change in an era of tighter budgets.

- Existing cost data are incomplete, precluding a comprehensive analysis of the full societal costs of transportation options. Some argue that such data may never be available in a form that would fully satisfy policy maker needs, and that the lack of complete information should not be used as an excuse for inaction. Others take the view that the necessary data gathering is feasible and should be undertaken before major policy decisions are made.

- Opinions differ about the potential economic impacts of policies favouring expanded use of lower energy modes — for example, public transit rather than increased automobile use, or intermodal over trucking. Some argue that serious economic harm could result from measures aimed at constraining road-vehicle use. Others cite research suggesting that the economic impacts of shifts to lower energy-consuming modes and the more selective use of cars, trucks and aircraft could actually provide net economic benefits.

- There is considerable uncertainty about measures which could realistically be applied to reduce greenhouse gas emissions from air transport, given the latter's high growth rate. There has been limited research into the long-term sustainability of air transport, since it does not yet contribute to a large percentage of air pollution from the transport sector. However, if growth projections are realized, air transport will gain increasing prominence as a source of greenhouse gases in future.

Recommendations

Implement Education and Awareness Programs

The current trends away from sustainable transportation are deeply rooted in our culture, our economy and our massive built infrastructure. They have little hope of reversal unless there is widespread public demand for substantial change. Increased public awareness and understanding of the issues surrounding sustainable transportation are thus prerequisites to political action. All Canadians need to be much better informed about the risks they face. They must be willing to alter their transportation choices, and be open to changes in government policies and programs.

The main messages to be delivered are that:

- there will be serious costs and risks to bear if the present unsustainable practices are allowed to continue;

- there are short- and long-term benefits to be derived from a shift to sustainable practices; and

- there are actions that individuals and institutions can take now to begin the necessary change.

Recommendation #1

Of the millions of transportation choices made daily by Canadians, few are driven by considerations of sustainability. Distorted by subsidies or pricing which do not reflect their full costs to society, many are made because of their perceived economic efficiency.

Where and how Canadians live, work and play, and what kind of transportation they use, reflect cultural values developed throughout our country's history. They also reflect commercial and political decisions made over many decades. Our transportation infrastructure and urban development approaches accord with our cultural values.

There is a need to direct a broad-based awareness campaign on sustainable transportation to the general public. The program would focus on the risks of maintaining the status quo, and the need to find ways of substantially reducing non-renewable energy use in transportation, as well as promoting the other benefits of sustainable transportation practices. The delivery of a national program on the scale foreseen requires federal leadership.

It is recommended that the federal Minister of Transport lead the development and implementation of a long-term national campaign to raise awareness of the risks of inaction and the changes which will be required throughout Canadian society to achieve sustainable transportation by reducing:

- **the need for motorized travel;**
- **the consumption of energy per unit of transportation; and**
- **the emissions per unit of energy consumed.**

Lead: Federal Minister of Transport

Others: Many other public and private sector organizations across Canada

Recommendation #2

Sustainable transportation is at once a short-term and an intergenerational issue. As a goal, it will be realized only if future decision makers understand, and act to achieve, the complex long-term shifts required in consumer behaviour. The issues relating to sustainable transportation should be included within the broader sustainable development components of educational curricula. Moreover, the NRTEE believes that because of its potential impacts on climate change and human health, as well as its pervasiveness in society, transportation should be a distinct element in such curricula.

It is recommended that educational programs on the benefits and options for sustainable transportation be developed and delivered:

(a) **in primary, junior, intermediate and secondary grades, with prepared units supplied to teachers which would complement environmental programs currently in use in the classroom.**

Lead: Centre for Sustainable Transportation

Others: Provincial ministries of education, school boards

(b) **in colleges and universities, with priority in faculties of transportation, engineering, urban planning, geography, environmental studies, geography and medicine.**

Lead: Centre for Sustainable Transportation

Others: Relevant faculties in post-secondary educational institutions

Recommendation #3

The NRTEE believes that there is an important role for information partnerships among groups of stakeholders. Not only would such partnerships help to create awareness of mutually supportable sustainable transportation information and actions, but they would demonstrate shared concern and understanding.

Many effective examples already exist at the institutional and grassroots community levels. However, many more are needed to increase public awareness of sustainability issues. Government funding support to these largely volunteer organizations can be highly leveraged and effective in building awareness and national consensus around the need for change throughout society.

It is recommended that:

(a) **the federal Environment Minister provide funding support to enhance the local development of information and awareness partnerships related to sustainable transportation among companies, individuals, cycling organizations, boards of trade, downtown improvement groups, service clubs, sport clubs and governments. The Federation of Canadian Municipalities could encourage such partnerships and act as a clearinghouse for cost-effective applications from grassroots organizations seeking federal funding.**

Lead: Federal Environment Minister

Others: Federation of Canadian Municipalities, provincial municipal associations, local politicians, non-governmental organizations, business and community groups

(b) **awareness/education programs be created by the Centre for Sustainable Transportation and shared with national associations of transportation engineers, land use planners developers, transit operators, intercity goods and passenger carriers, so that these associations can become advocates for sustainable transportation, to their own membership and to the public and private sectors.**

Lead: Centre for Sustainable Transportation

Others: National associations

Government Coordination

Coordinated action is a prerequisite to achieving sustainable transportation. However, the current division of responsibilities for transportation, including its environmental, social and economic implications, is highly fragmented. Moreover, existing policy coordination mechanisms are failing to move Canada towards sustainable transportation.

Policy coordination is required both within and between governments.

Recommendation #1

A common language for planning and action is needed if consensus is to emerge on an integrated national strategy and coordinated approaches. Drawing on earlier work (see Appendix 2), the NRTEE will develop a package for presentation to the federal government, proposing a definition of sustainable transportation, a national vision and a set of principles to guide decision making.

It is recommended that the federal Ministers of Transport and the Environment use the package of Definition, National Vision and Principles of Sustainable Transportation, to be presented by NRTEE, as the basis for building a consensus on these elements of a national strategy.

Lead: Federal Minister of Transport and federal Environment Minister

Others: Federal, provincial, and municipal governments, vehicle manufacturers, transportation carriers, labour organizations, etc.

Recommendation #2

No coordinated national strategy currently exists to address the emissions of greenhouse gases produced by transportation. Given the strong trend towards increased emissions from transportation, such a strategy is urgently needed. This should be recognized by fully integrating transportation into the National Action Program on Climate Change. Because of the complex nature of transportation decision making, specific targets for the reduction of greenhouse gas emissions will need to be set for the sector as a whole, as well as for each transport mode. The setting of such targets is necessary for purposes of accountability and as a means of measuring collective progress.

Reductions in fossil fuel consumption and, by extension, greenhouse gas emissions, would have many collateral benefits. For example, reducing the use of high energy-consuming modes, such as cars, trucks and aircraft, would reinforce the measures being taken in Canadian Smog Management Plans to reduce ground-level air pollutants.

It is recommended that the federal Minister of Transport:

(a) **lead the creation of a national strategy for reducing greenhouse gas emissions from the transport sector; and**

(b) **ensure that transportation is fully integrated into the National Action Program on Climate Change.**

Lead: Federal Minister of Transport

Others: Provincial Ministers of Transportation, Transportation Association of Canada

Recommendation #3

Municipalities must play a key role in moving towards sustainable transportation, both by their own actions and by advocating supportive actions to other levels of government.

Municipalities should be encouraged to set their own targets for greenhouse gas emissions in support of national targets. Some cities have already taken this step, including those which are members of the 20% Club sponsored by the Federation of Canadian Municipalities. The main efforts of municipalities should be directed towards the implementation of:

- transit-supportive, compact, mixed land use;
- sustainable transportation plans; and
- green fleets programs (public and corporate).

It is recommended that:

(a) **municipalities which have not already done so set targets for reducing greenhouse gas emissions from transportation;**

(b) **municipalities adopt sustainable transportation plans; and**

(c) **large cities and urban regions support sustainable transportation by monitoring and reporting progress in implementing the *New Vision for Urban Transportation* proposed by the Transportation Association of Canada.**

Lead: Federation of Canadian Municipalities

Others: Canadian cities

Reduce the Environmental Impacts of Transportation

The following recommendations reflect the NRTEE's conclusions on the steps that can and should be taken immediately to set Canada on a longer-term path to sustainable transportation, and to secure modest available short-term emission reductions.

Recommendation #1

Serious public debate is needed on the use of economic instruments to reduce transportation-generated emissions of air pollution, including greenhouse gases. By reinforcing public awareness and education efforts while also respecting the travelling public's aversion to mandated solutions, such instruments may offer the best chance of inducing the widespread behavioural changes that are required to achieve sustainable transportation in Canada.

It is recommended that the federal Minister of Finance take initial steps towards an economy in which decision making supports sustainable transportation. This means developing a clearer understanding of how economic instruments, as critical elements of an integrated package of policy tools, can help to achieve specific targets for sustainable transportation, as well as a better appreciation of their social and economic impacts. Analysis and debate are needed on the potential use of economic instruments, with priority consideration given to an integrated package of policy instruments which includes:

- **increased fuel taxes to influence travel demand, vehicle purchase decisions and shifts to less energy-intensive modes;**
- **new fuel economy standards for transportation vehicles;**
- **other economic instruments, including tax rebates for fuel-efficient road vehicles, registration and parking fees;**
- **tax and development fee policies which encourage land use compatible with sustainable transportation in urban areas;**
- **major subsidies and incentives for increased use of public transit; and**
- **road pricing.**

It is recognized that responsibility for applying the various elements of the above package will fall to different levels of government. The federal Minister of Finance should take the leadership role in facilitating a coordinated national approach to the use of economic instruments to achieve sustainable transportation and, in particular, to meet greenhouse gas emissions reduction targets.

Lead: Federal Minister of Finance

Others: Federal Ministers of Transport, the Environment and Natural Resources; provincial Ministers of Transportation and Finance; Centre for Sustainable Transportation; Transportation Association of Canada

Recommendation #2

The Royal Commission on National Passenger Transportation, the Ontario Transportation and Climate Change Collaborative and others have begun to identify and quantify the full social costs of transportation. However, the picture is not complete and more work is required to help inform the policy choices of decision makers.

It is recommended that the federal Minister of Transport take the lead to ensure that more data collection and analysis is undertaken to guide application of full-cost accounting and user-pay principles. More specifically, there is a need to identify and quantify, to the extent possible, the full social costs, including environmental costs, of all modes of transportation, and to assess the impacts of internalizing full costs. The lack of complete data, however, should not be allowed to impede the development and use of economic instruments.

Lead: Federal Minister of Transport

Others: Federal Minister of Finance

Recommendation #3

In the long term, sustainable transportation will require an integrated approach to transportation and urban development. Provincial governments need to ensure that planning and policy frameworks promote sustainable cities and towns, including urban design that encourages walking, cycling and transit use and limits low-density urban sprawl. The Transportation Association of Canada's Urban Transportation Council has proposed a *New Vision for Urban Transportation* that goes a long way towards sustainable transportation.

It is recommended that provincial Ministers of Municipal Affairs incorporate the principles set forth in the Transportation Association of Canada's *New Vision for Urban Transportation* into municipal land use planning legislation and government policies.

Implementation of this recommendation should begin in the short term. Its full impact will be felt many years into the future, as urban regions are redeveloped.

Lead: Provincial Ministers of Municipal Affairs

Others: Provincial municipal associations

Recommendation #4

Mandatory Inspection and Maintenance Programs (I&M) for vehicles on the road address the problem of deteriorating emissions performance by vehicles as they age, the failure of emission control systems in newer vehicles, and cases of tampering. Such programs reduce emissions of both ground-level and greenhouse gas pollutants. In areas where I&M programs are in place, it has been estimated that improvements in fuel efficiency from repairs following inspections would reduce greenhouse gases by an estimated one percent across the fleet on the road.

I&M Programs should be implemented for all classes of road vehicles, as planned in British Columbia.

In addition to providing immediate emission reduction benefits, I&M Programs raise individuals' awareness of their own contribution to transportation-related air emissions and the impacts of such emissions on human health and the environment.

It is recommended that Inspection and Maintenance Programs be implemented by all provinces, for light-duty road vehicles in the short term and for all classes of road vehicles in the medium term. Programs should be mandatory in large urban areas, but could be voluntary in other areas of the country.

Lead: Provincial Ministers of Transport and the Environment

Appendix 1: List of Participants

List of Participants who Attended Multistakeholder Workshops on Sustainable Transportation, January 14-15 and February 11-12, 1997, in Ottawa, Ontario

Federal Government

Normand Beaudoin
Environment Canada

Janet Connor
Environment for Health
Health Canada

Susan Fisher
Politics, Research and Communication Division
Canada Mortgage and Housing Corporation

Claude Guérette
Transportation Development Centre (TDC)
Transport Canada

Ron Harper
Environmental Affairs Branch
Industry Canada

Barry Jessiman
Air Issues Section
Environmental Health Directorate
Health Canada

John Lawson
Economic Analysis Directorate
Transport Canada

Ross Robinson
Environment Canada

Marie Schingh
Transportation Energy Use Division
Natural Resources Canada

Victor Thom
Environmental Affairs
Transport Canada

Provincial/Territorial Governments

Dave Duncan
Ontario Ministry of Transportation

C. David Hall
Environmental Sciences and Standards Division
Ontario Ministry of Environment and Energy

Catherine Hirou
Ministère de la Métropole
Province de Québec

Richard Hyndman
Department of Energy
Government of Alberta

Jean-Luc Labalette
Service de la concertation et des outils d'intervention
Direction de la promotion du développement durable
Ministère de l'Environnement et de la Faune du Québec

Eric Lawton
Ontario Ministry of Environment and Energy

Frances Martin
Policy, Planning and Coordination
Nova Scotia Department of Environment

Louise Maurice
Service de l'environnement
Ministère des Transports du Québec

Bruce McCuaig
Urban and Regional Planning Office
Ontario Ministry of Transportation

Marcia Weaver
Ontario Ministry of Environment and Energy

Dr. Menna Weese
Environmental Office
Ontario Ministry of Transportation

Municipal

Martin L. Crilly
International Centre for Sustainable Cities

Kathleen Llewellyn-Thomas
Planning and Design
Metro Transportation

Morris Mennell
Air Quality Planning and Program Development
Greater Vancouver Regional District

Geoff Noxon
Planning and Development Approvals Department
Regional Municipality of Ottawa-Carleton

Anna Pace
Policy Division, Metro Planning
Municipality of Metropolitan Toronto

Rajan Philips
Planning and Development Approvals Department
Regional Municipality of Ottawa-Carleton

Nicole Richer
20% Club and Community Energy Systems
Federation of Canadian Municipalities

Mike Sheflin
Environment and Transportation
Regional Municipality of Ottawa-Carleton

Brian T. Smith
Halifax Regional Municipality

Carriers

Roger Cameron
Public Affairs
Railway Association of Canada

Graham Cooper
Government Affairs
Canadian Trucking Association

Jeremy L. Cornish
International Centre for Aviation
and the Environment

Douglas Dawson
Engineering and Maintenance
Air Transport Association of Canada

William Denning
Research and Planning
GO TRANSIT

Users

Brian Collinson
Commercial Policy
Alliance of Manufacturers and Exporters Canada

Michel Labrecque
Groupe Velo

David Leonhardt
Public and Government Relations
Canadian Automobile Association

Robert Redhead
Environment Committee
Canadian Chamber of Commerce

Debra Ward
Tourism Industry Association of Canada

Suppliers

Bill Davis
Government Relations
Ontario/Toronto Automobile Dealers' Association

Energy

Jack Belletrutti
Canadian Petroleum Products Institute

Barbara Campbell
Pembina Institute

Chris Peirce
Strategic Planning
Canadian Association of Petroleum Producers

Labour

Nick De Carlo
Canadian Auto Workers Union

Ken Foster
Amalgamated Transit Union

François Laporte
Government Affairs and Public Relations
Teamsters Canada

Keith Madill
Canadian Auto Workers Union

Amelia Shaw
Amalgamated Transit Union

NGOs

Richard Gilbert
Centre for Sustainable Transportation

Gail McEachern
Transport 2000 Canada

Ron Nielsen
Pollution Probe

Normand Parisien
Transport 2000 Quebec

Consultants

John Cowan
KPMG Consultants

André Delisle
Transfert Environnement

Chris Holloway
Private Consultant

Jacques Ruelland
GREIGE — UQAM

Lee Sims
IBI Group, Canada

Richard Soberman
Faculty of Engineering
University of Toronto

Appendix 2: Elements of a Sustainable Transportation Strategy

An effective, comprehensive strategy to achieve sustainable transportation will require consensus by many stakeholders on its elements, beginning with a definition and vision of sustainable transportation and decision-making principles to guide decision makers.

Considerable work has already been completed by various bodies on these strategy elements. Furthermore, a draft vision statement was developed during stakeholder consultations.

A Definition of Sustainable Transportation

The Centre for Sustainable Transportation has developed and will continue to refine the following draft definition of sustainable transportation.

A sustainable transportation system is one that:

- allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health and with equity within and between generations;
- is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy;
- limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, reuses and recycles its components, and minimizes the use of land and the production of noise.

A Vision for Sustainable Transportation in Canada

A vision for sustainable transportation shared among stakeholders throughout society would be a powerful way of illuminating the long-term behavioural changes that will be required for sustainability. Following is the draft vision statement developed during the NRTEE's workshops.

The transportation system supports a sustainable, high quality of life for all Canadians.

- People and businesses have access to safe, comfortable, efficient and affordable transportation systems.
- Public awareness and understanding of sustainable transportation is high. All sectors of society are committed to maintaining sustainable transportation systems.
- Urban automobile use has declined and is no longer a major contributor to air quality problems because the choice not to drive is easy. This has resulted from:
  - — better access to safe and convenient public transit, walking and cycling opportunities;
  - — new urban forms based on higher density, mixed use and in-fill development; and
  - — increased use of telecommunications to reduce the need for travel.
- Intercity freight transport has declined because cities and regions are becoming more self-producing and self-consuming. Intermodal freight systems allow more long-haul freight to move by the most sustainable mode. Advanced logistics techniques are being used to minimize the need for goods movement.
- Users pay the full social costs of transportation. There are no subsidies that encourage inefficient, unsustainable transportation.
- Coordination between and within all levels of government and other stakeholders enhances the sustainability of transportation and allows reinforcing synergies between policies and measures.
- Use of fossil fuels has declined. Transportation is increasingly powered by clean, renewable energy. The best available technologies are used to greatly reduce air pollution and other wastes from transportation.
- Canada is achieving targets set in international agreements to address international environmental issues such as climate change and trans-boundary pollutants.

Decision-Making Principles

Sustainable transportation will only be achieved through significant changes in the way individuals, businesses and governments make decisions. At the request of the Federal Minister of the Environment, the NRTEE initiated a consultative process to develop a draft set of sustainable transportation principles. These were presented at the March 1996 OECD Conference, *Towards Sustainable Transportation*, held in Vancouver, and modified by the OECD Task Force on Transport under the coordination of Environment Canada. The latest version is found below.

Draft Principles of Sustainable Transportation

Principle	Description
Access	
Access	People are entitled to reasonable access to other people, places, goods and services.
People and Communities	
Equity	In meeting the basic transportation-related needs of all people, including women, the poor, the rural, the disabled, and children, nation states and the transportation community must strive to ensure social, interregional, and intergenerational equity. Developed economies must work in partnership with developing economies in fostering practices of sustainable transportation.
Individual and Community Responsibility	All individuals and communities have a responsibility to act as stewards of the natural environment, undertaking to make sustainable choices with regard to personal movement and consumption.
Health and Safety	Transportation systems should be designed and operated in a way that protects the health (physical, mental and social well-being) and safety of all people, and enhances the quality of life in communities.
Education and Public Participation	People and communities need to be fully engaged in the decision-making process about sustainable transportation, and to be empowered to participate.
Integrated Planning	Transportation decision makers have a responsibility to pursue more integrated approaches to planning. They must involve partners from relevant sectors such as environmental, health, energy, financial, urban design, etc.
Environmental Quality	
Land and Resource Use	Transportation systems must make efficient use of land and other natural resources while preserving vital habitats and maintaining biodiversity.
Pollution Prevention	Transportation needs must be met without generating emissions that threaten public health, global climate, biological diversity or the integrity of essential ecological processes.
Economic Viability	
Economic Well-Being	Taxation and economic policies should work for, and not against, sustainable transportation. Market mechanisms must account for the full social, economic and environmental costs, both present and future, in order to ensure that users pay an equitable share of costs.

Source: *Sustainable Transportation, Monograph No. 2.* Prepared in connection with Canada's participation at the meeting of the United Nations Commission on Sustainable Development by Environment Canada and Transport Canada (Ottawa, April 1997), pp. 17-19.

While more effort is needed to refine the elements of the definition, vision and decision-making principles and to seek further input and support for them, the NRTEE considers that the preceding statements represent a reasonable starting point for action on a broad front and for development of a national strategy for sustainable transportation.

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344 Slater Street, Suite 200, Ottawa, Ontario, Canada K1R 7Y3
Tel.: (613) 992-7189 • Fax: (613) 992-7385 • E-mail: admin@nrtee-trnee.ca • Web: http://www.nrtee-trnee.ca

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