Sustainable Transportation: The Canadian Context

Monograph No. 15

Canada

SUSTAINABLE TRANSPORTATION

The Canadian Context

A Canadian contribution to the dialogue at the Ninth Session of the United Nations Commission on Sustainable Development, April 16 to 27, 2001

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Preface

At its ninth session in the spring of 2001, the United Nations Commission on Sustainable Development (CSD) will review progress made by member countries with respect to sustainable energy development and transportation systems as outlined in Chapters 7 and 9 of Agenda 21 and the Energy, Transport, and Atmosphere section of the Programme for Further Implementation of Agenda 21. The Programme of Work for CSD 9 also includes information for decision making and participation, as well as atmosphere and international cooperation for an enabling environment as key cross-sectoral themes for review and action. As a contribution to the CSD 9 dialogue, Canada has prepared a series of three monographs relating its experiences and challenges on energy, transportation, and information for decision making.

Energy is necessary to most forms of economic and social activity. Canada is an energy-rich nation, with substantial resources of oil, natural gas, coal, and uranium, as well as renewable energy sources such as hydro, wind, solar, and tidal power. While energy will continue to fuel economic activity and social development in Canada and other nations, its production and consumption will also present environmental challenges. The first monograph in this CSD 9 series, *Energy and Sustainable Development: A Canadian Perspective*, examines the issue of energy and sustainable development from both domestic and international standpoints. It describes Canada's efforts to improve the efficiency of energy production and use and to develop and promote alternative fuels and processes that minimize environmental impacts. The monograph confirms Canada's commitment to work with other members of the global community to foster energy options for sustainable development worldwide.

As a vast trade-dependent and modern country with a challenging climate and rugged terrain, Canada must be able to rely on a sustainable transportation system—one that is safe, efficient, and environmentally friendly. The second monograph in this CSD 9 series, *Sustainable Transportation: The Canadian Context*, describes the state of transportation in Canada and highlights Canadian activities that are moving us toward a more sustainable transportation system.

Access to pertinent and reliable information—social, economic, and environmental—is critical to good decision making related to sustainable development. *Information for Decision Making in Sustainable Development*, the third in the CSD 9 series, illustrates the work Canada is doing on many fronts to improve the quality of, and access to, the information needed by citizens, businesses, and governments to make better decisions and take action to support sustainable development. From grassroots community awareness to sophisticated analysis for high-level policy development, Canada is meeting the challenge to bridge the data gap and improve the availability of information.

In 2002, the CSD will undertake a ten-year review of the overall progress achieved by member states in their implementation of Agenda 21. Information offered in the Sustainable Development in Canada Monograph Series describes Canada's contribution to global efforts toward sustainable development and provides a baseline against which future conditions and activities can be assessed. For Canada, sustainable development is best represented as a journey, not a destination. The monographs described above, as well as the other monographs in the series, are milestones on this journey.

SUSTAINABLE TRANSPORTATION

The Canadian Context

INTRODUCTION

Transportation has always been critical to the development and growth of Canada and the Canadian economy. As a vast trade-dependent and modern country with a challenging climate and rugged terrain, Canada must be able to rely on a sustainable transportation system—one that is safe, efficient, and environmentally friendly.

In Canada, we believe that sustainable transportation can be advanced by integrating economic, social, and environmental considerations into decisions affecting transportation activity. Economically, we need a transportation system that is efficient and competitive. Socially, our transportation system must be safe and accessible. In addition, we need a transportation system that respects the natural environment. It is not always easy to balance these three considerations—sometimes there are trade-offs, but there are also win-win-win situations. The challenge is to make informed decisions so that we can enjoy the best possible transportation system.

Sustainable transportation requires action by all Canadians. Government needs to work with industry, individuals, and other stakeholders to raise awareness and promote a transportation system that is sustainable. An array of specific programs and actions are already being undertaken to make Canada's transportation system more sustainable and to encourage Canadians to make more sustainable choices. The issues, however, are complex and challenging, and much remains to be done.

Canada recognizes that sustainable transportation is a goal that is international in scope and must be pursued together with other nations. There is much that we can learn from the rest of the world in the area of sustainable transportation, but there is also much that Canada can offer.

This monograph describes the state of transportation in Canada as it relates to sustainable development. Reflecting recent developments in sustainable transportation, it discusses the nature of the challenges we face and what we are doing to address them.

THE STATE OF TRANSPORTATION IN CANADA

Safely Moving People and the Economy

An immense transportation system is necessary to link all corners of a country the size of Canada. In 1999, there were some thirty million people living in Canada. We are a largely urban country. Almost 80 percent of the population lives in centres of one thousand or more people. Roughly two-thirds of Canadians live in centres of at least 100 000 people. Population concentration is greatest in our three largest metropolitan areas: Vancouver on the Pacific coast and Montreal and the Toronto–Niagara region in central Canada. A significant portion of our population is within 120 kilometres of our biggest trading partner, the United States. Like other countries, Canada is experiencing changes in its transportation needs and patterns due to trade liberalization, economic and population growth, the Internet, and advances in telecommunications and e-commerce.

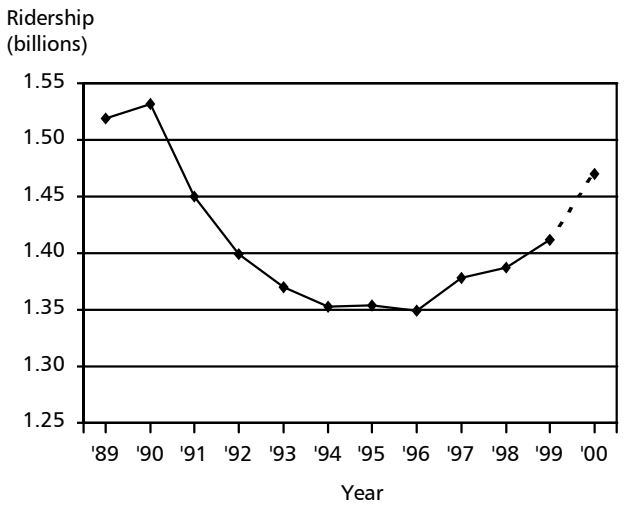
Getting to work in large urban areas is a challenge for many Canadians. Three out of four Canadians drive their own vehicles to work. Public transit is used most heavily in large centres. While usage declined in the early 1990s, the popularity of public transit has risen since 1996, with a major surge in ridership in 1999 and 2000. In particular, rail commuter services in the Toronto, Vancouver, and

Transportation Infrastructure

In Canada, there are

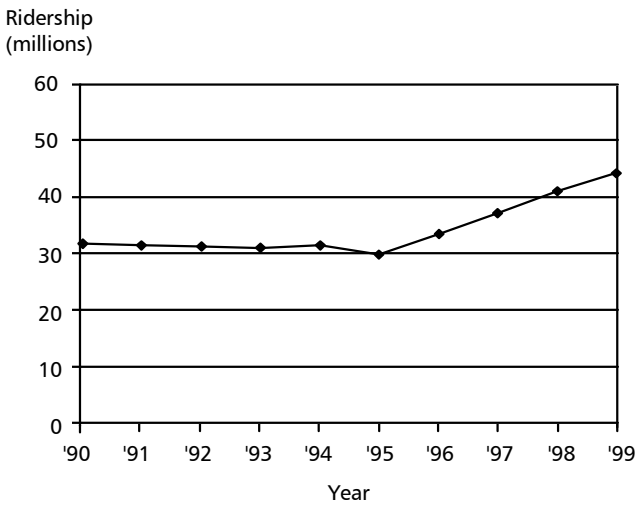
- *1 800 aerodromes/airports*
- *28 000 registered aircraft*
- *50 000 kilometres of railway track*
- *3 260 rail locomotives, 112 000 freight cars, and 430 passenger cars*
- *300 marine ports*
- *2 170 commercial marine vessels*
- *900 000 kilometres of road*
- *11 600 urban transit buses*
- *2 500 urban passenger rail vehicles*
- *375 000 heavy-duty trucks*
- *17 million cars and light trucks*
- *16 000 service stations*
- *20 million licensed drivers*

Annual ridership—Canadian transit systems.



Source: Canadian Urban Transit Association (CUTA).

Rail commuter ridership.



Source: GO Transit, TransLink, and VIA Rail.

Montreal regions have seen dramatic increases, totaling almost 40 percent since 1990. Lower unemployment and rising fuel costs are two factors associated with these increases. It is expected that in 2001 over 4.5 billion trips will be made on public transit in Canada. Further, the number of passengers on VIA Rail Canada, a Crown corporation created in 1977 to operate Canada's national passenger rail service, increased by 8 percent from 1995 to 2000.

In 1998, Canadians moved 429 million tonnes of commodities within domestic borders. Rail accounted for over 200 million tonnes, close to 50 percent of commodities moved, followed by for-hire trucking at almost 180 million tonnes and marine at close to 50 million tonnes. Air accounted for the least number of tonnes moved at less than one million tonnes.

Transportation demand is the measure of all transportation-related expenditures by households, businesses, and governments on transportation goods and services used in the movement of people and freight. In 1999, transportation demand grew faster than the economy as a whole, as was the case for the last five years. This increase can be explained partly by the increasing importance of exports to the Canadian economy.

In 1999, imports and exports reached 40 and 43 percent of Canada's gross domestic product, respectively. Every day we do over $2.2 billion worth of business—exports and imports of goods and services—with the world. In fact, in Canada, one job in three depends on exports. Shipping commodities to and from other countries is critical to trade transactions. If globalization of the world economy continues on its current track, transportation of goods over longer distances may increase the demand for transportation, and changing demand patterns may impact on our choice of modes.

Current commuter, trade, and tourism patterns are resulting in congestion in and around Canada's main cities and on some of Canada's major highways. Congestion can have a profound impact on quality of life, health, and the economy. According to a 1999 report on funding transportation, more than 70 percent of the highway network is congested during peak periods in the Greater Toronto area, creating an unacceptably low level of service to business and residents.

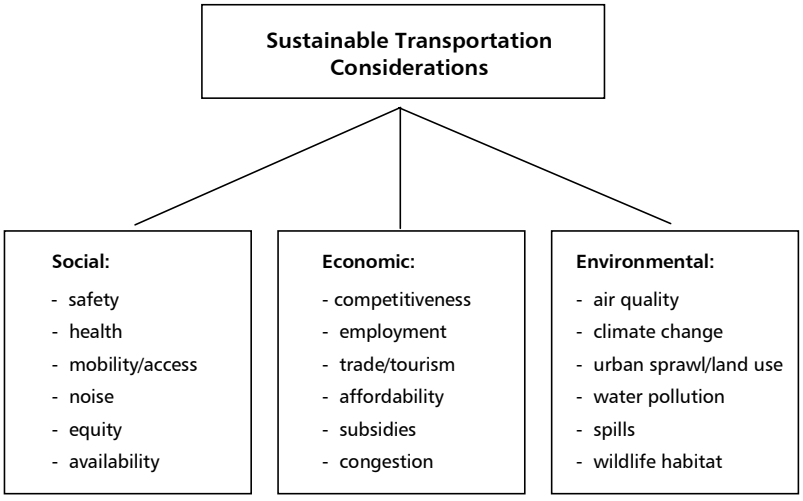
The following sections explore the concept of sustainable transportation and actions being taken to make transportation more sustainable.

Sustainable Transportation—Definition and Pressure Points

Sustainable Transportation

In its 1987 report, *Our Common Future*, the World Commission on Environment and Development defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". In the transportation sector, this means that the transportation system, and transportation activity in general, must be sustainable on three counts—economic, environmental, and social. In practice, this means that governments, industry, and individuals must work together to integrate economic, social, and environmental considerations into decisions affecting transportation activity. A number of national and international organizations—for example, the Environment Directorate of the Organisation for Economic Co-operation and Development, the Transportation Association of Canada, and the Canadian Centre for Sustainable Transportation—have interpreted sustainable transportation.

Social and economic considerations have long been part of transportation decision making. On the economic side, costs and services must continually be improved to remain competitive, and scarce public resources must be invested strategically to ensure the greatest impacts on improving our quality of life. On the social side, transportation safety remains a top priority for Canada, and we have been seeing promising results in recent years. In 1999, the number of



accidents in the air and road sectors were at a twenty-five–year low. The number of marine and rail accidents was up slightly over 1998 levels, but were still below the five-year average.

Environmental Impacts

Although transportation provides many economic and social benefits, the movement of people and goods can have significant environmental consequences, which can in turn have social and economic repercussions. Sustainable transportation calls for ensuring that the environment is considered along with economic and social considerations in transportation decision making. Environmental impacts of transportation include air and water pollution, greenhouse gas emissions, and the use of land and other natural resources. A range of transportation activities contribute to these pressures, including the construction of infrastructure; road system operation and maintenance; the production, operation, maintenance, and disposal of vehicles; and the provision of energy and fuel, including nonrenewable resources. Social and economic repercussions can include higher health care expenses and the costs of cleaning up pollution.

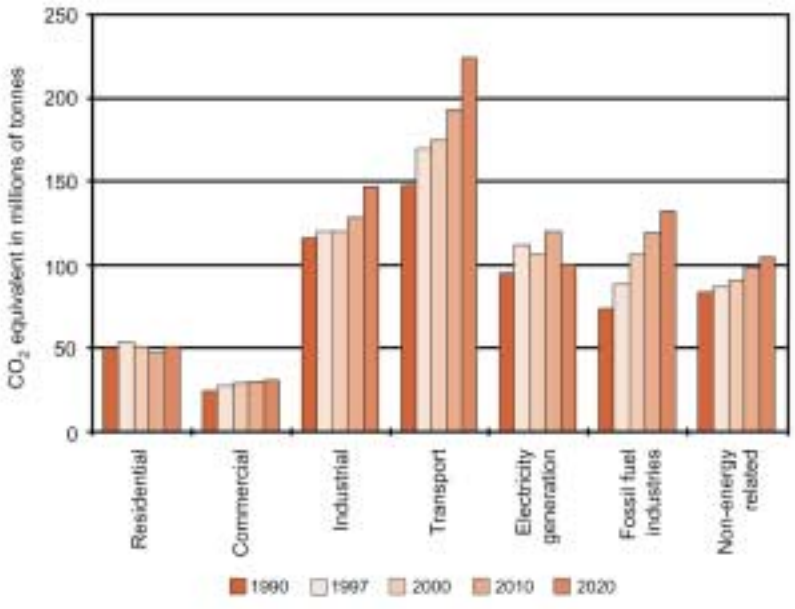
Greenhouse gas emissions and the resultant environmental effects are a major issue for Canada. Among the major sources of greenhouse gases in Canada, transportation is the single largest, accounting for about 25 percent of total emissions. In December 1997, Canada and other developed countries negotiated the Kyoto Protocol to the United Nations Framework Convention on Climate Change. The protocol commits Canada to reducing its greenhouse gas emissions to 6 percent below 1990 levels during the five-year period from 2008 to 2012. If current trends continue, greenhouse gas emissions from transportation are expected to exceed 1990 levels by 32 percent by 2010 and by 53 percent by 2020.

Exhaust emissions release nitrogen oxides (NO_x), volatile organic compounds (VOCs), carbon dioxide (CO_2), and particulate matter into the air. These emissions contribute not only to climate change and acid rain, but also to air pollution and smog, particularly in urban areas. Transportation in Canada accounts for about 52 percent of all NO_x emissions, 40 percent of CO_2, 20 percent of VOCs, and 5 percent of particulate matter—the major constituents of urban smog.

Spills and leaks of fuels, oils, and solid and hazardous waste by-products, can contaminate land, surface water, and groundwater. Spills and illegal discharges of oil and oily wastes by ships travelling

along Canada's coast may contaminate beaches and fishing areas. It has been estimated, for example, that discharges of oil by passing ships kill tens of thousands of birds every year.

Canada's greenhouse gas emissions.



Source: Transportation and Climate Change: Options for Action. Options Paper of the Transportation Climate Change Table. *1999*.

Trends in Transport—Pressure Points

As the population and the economy grow, so too does the demand for transportation. Worldwide, over the next forty years, 800 million more people are expected to own cars. Given current technology and consumer behaviour—particularly where land use plans are designed around continued reliance on the automobile—this would cause enormous disruptions to the environment.

Canada is no exception. Between 1995 and 2000, Canada's economy grew at a rate of about 3 percent per year. Population increases, along with a rise in the number of Canadians travelling, is leading to ever-increasing levels of passenger transportation activity, particularly on the road and in the air. Similarly, growth in domestic and international trade and changes in freight activity patterns are leading to significant increases in freight transportation activity. Overall, freight movement is expected to increase by 60 percent between 1990 and 2020, with the greatest growth in the air and trucking sectors.

As a result, if current trends continue, total transportation energy demand in Canada is projected to rise by over 50 percent from 1990 to 2020, with major increases in the demand for gasoline and diesel and aviation fuels leading the way. The modes showing the greatest growth—private automobiles, trucking, and aviation—have the greatest impact on the environment, primarily due to air emissions and land use. Actions we are taking in Canada to promote sustainable transportation are discussed below in the section Global Problems: Local Solutions.

In the long term, technology holds the promise of providing Canadians with transportation options that are safe, efficient, and environmentally friendly. It takes time to commercialize new technology, retool manufacturing plants, provide support for parts and services, and generate consumer acceptance. In the case of automobiles, turning over a fleet of millions of vehicles may take twenty to thirty years under current conditions and markets. Furthermore, transportation infrastructure has evolved over the last one hundred years and will also take time to change.

Photo credit: Ian A. McCord, Rail&Road Images.

Some of the challenges to sustainable transportation that we face in Canada—increased demand due to population and economic growth, moving people and goods more efficiently, and reducing greenhouse gas emissions, air pollution, and congestion—are challenges faced by many countries around the world. Other challenges—moving people and goods across the rugged terrain of our vast country in all kinds of weather and often under extreme conditions—are uniquely Canadian.

Although some sustainable transportation issues involve trade-offs, solving some problems can have benefits on all three counts—economic, social, and environmental. Reducing congestion in urban centres would be a good example of a win-win-win scenario because economic losses resulting from delays, time spent on the road, and air emissions that contribute to both local air pollution and climate change would all be reduced. A shift from single-occupancy vehicles to public transit can significantly reduce congestion, but large capital investments are required to ensure that systems can effectively handle increased use. While building more roads may decrease congestion in the short term, it is likely to cause an increase in traffic over time. What would be the impact of increasing the cost to drivers through road tolls, for example? What is the role of intelligent transportation systems?

Although work has been done to improve information on transportation activities, there is more to be done. This incomplete state of

information on transportation activities, together with the impacts and associated costs of these activities, the costs and implications of potential policy measures, and the range of private- and public-sector stakeholders involved result in an intricate policy context for the sector's sustainability.

SUSTAINABLE TRANSPORTATION MANAGEMENT

Responsibility for Transportation in Canada

In Canada, three levels of government share responsibility for transportation. In general, the federal government is responsible for national, interprovincial, and international transportation; provincial governments are responsible for intraprovincial transportation; and municipalities are responsible for urban transit and local planning decisions. Federal and provincial ministers of transportation coordinate activities through the Council of Ministers Responsible for Transportation and Highway Safety.

At the federal level, Transport Canada has evolved significantly to meet the changing needs of Canadians since it was formed as a federal department in 1936. Generally, the department is moving away from its role as operator of the transportation system toward that of regulator and policy maker.

Provincial responsibility for the local movement of goods and people within incorporated urban areas is in many cases delegated to municipal governments to provide for more locally responsive delivery of services. Municipalities vary according to the actual and potential scope of their actions related to sustainable transportation, in part because the degree of delegation by provincial governments varies and also because of size. Larger municipalities generally have more scope for action than smaller municipalities because it is usually more feasible for them to operate effective public transportation systems.

The Federation of Canadian Municipalities (FCM) is the national voice of municipal governments, dedicated to improving the quality of life in all communities by promoting strong, effective, and accountable municipal government. The FCM provides guidance to municipal decision makers on a range of issues, including transportation and environmental protection. Some of these actions are discussed in more detail below.

Many other forums and organizations in Canada contribute to sustainable transportation goals. The Transportation Association of Canada (TAC) is a nonprofit association of transportation stakeholders in government, private industry, and educational institutions. It is a neutral forum for gathering or exchanging information and knowledge in support of technical guidelines and good practices. Its mission is to promote the provision of safe, effective, and environmentally and financially sustainable transportation services in support of Canada's social and economic goals.

The Canadian Urban Transit Association (CUTA) is the association of providers of urban transit services, suppliers, and related organizations of Canada. Its mission is to promote the role of public transit as the solution to urban mobility in the achievement of sustainable transportation and to assist its members in the fulfillment of their mandates.

Given the nature of sustainable transportation issues, shared jurisdiction, and the range of private and public sector stakeholders involved in the transportation sector, working together is essential to finding the best path for Canada.

GLOBAL PROBLEMS: LOCAL SOLUTIONS

Planning for Sustainability

Canada has varied landscapes and climate, a diverse economy, and communities that range from small remote villages to large metropolitan centres. Given these differences, multiple approaches at different levels are needed to manage transportation issues. At the planning stages, governments, industry, and stakeholders must work together to help advance sustainable transportation.

In 1995, the Government of Canada passed legislation requiring each federal department to prepare sustainable development strategies through the lens of its own mandate. The legislation also established a Commissioner of the Environment and Sustainable Development within the Office of the Auditor General of Canada to monitor and audit the implementation of federal departments' sustainable development strategies. Transport Canada's second sustainable development strategy has been prepared and will be tabled in Parliament in early 2001. The strategy is the department's plan for making better decisions together with key stakeholders in

the transportation sector and is a step in the journey toward a more sustainable transportation system in Canada.

In response to the Kyoto Protocol and as part of a national process to develop measures to combat climate change, Canada established sixteen issue tables, including one on transportation. The issue tables brought 450 experts from industry, academia, nongovernmental organizations, municipalities, and federal, provincial, and territorial governments to the discussion. The process was open, inclusive, and comprehensive. It advanced our understanding of the issues and of potential solutions.

The Transportation Table completed an options paper in November 1999 that assessed over one hundred potential measures to reduce greenhouse gas emissions from transportation. The results of the table's work fed into the *Government of Canada's Action Plan 2000 on Climate Change* and the first business plan of the National Implementation Strategy announced in October 2000.

Provinces and territories approved the business plan of the National Implementation Strategy. Some jurisdictions identified their actions for inclusion in this first integrated plan of committed and proposed federal, provincial, and territorial actions. Other jurisdictions, such as the province of Quebec, have adopted the themes and objectives, in whole or in part, and identified their own business or action plans, which are appended to the national plan. Examples of actions approved and under way include British Columbia's SkyTrain expansion, Alberta's further adoption of intelligent transportation systems (ITS) measures, Saskatchewan's short-line Railway Advisory Program, Newfoundland's Fleet Replacement and Maintenance initiative, and Nova Scotia's action to increase awareness of transportation options and encourage behavioural change. Provinces and territories are currently pursuing further work to develop longer-term action and implementation plans that will provide sustained reductions in transportation emissions. Municipalities also have their own varied and diverse action plans.

Another significant sustainable transportation challenge facing Canada is air pollution. In December 2000, Canada and the United States brought into force an agreement to significantly reduce smog-causing pollutants. The Ozone Annex to the 1991 Canada–United States Air Quality Agreement commits both governments to significantly reduce the creation of smog-causing pollutants—nitrogen oxides and volatile organic compounds. In Canada, new regulatory standards for vehicles and fuels, aligned with those in the United States, will be put in place as

Action on Transportation

The transportation sector component of the Government of Canada's Action Plan 2000 on Climate Change *is based on five elements:*

- *Fuel efficiency—launch negotiations to achieve new vehicle fuel efficiency targets by 2010.*
- *New fuels—increase the supply and use of ethanol produced from biomass such as plant fibre, corn, and other grains.*
- *Fuel cell vehicles—develop refuelling infrastructure for fuel-cell vehicles that emit low or zero emissions.*
- *Freight transportation—encourage efficiencies and technologies in the aviation, rail, marine, and trucking industries.*
- *Urban transportation—demonstrate the best urban transportation technologies and strategies to reduce greenhouse gas emissions.*

Action Plan 2000 *can be found at* http://www.climatechange.gc.ca/english/whats_new/pdf/gofcdaplan_eng2.pdf.

part of a broader clean air agenda. Also, Canada has phased out lead in gasoline and supports the elimination of lead in gasoline worldwide.

At the municipal level, the FCM is committed, among other things, urging municipal governments to

- adopt policies that favour public transit over private automobiles
- review their transportation policies with a view to shifting to environmentally friendly modes of transportation
- ensure that infrastructure required to support alternate modes of transportation, such as walking and cycling, is adequate.

Many Canadian communities have embraced sustainable development concepts within municipal and regional plans. These plans, developed in consultation with local stakeholders, aim to mitigate environmental impacts associated with urbanization, including transportation. Housing types and residential patterns that reduce land requirements and facilitate the use of more sustainable modes of transportation are encouraged. Improved long-term planning and

Partners for Climate Protection

Partners for Climate Protection communities are encouraged to

- *profile and forecast energy use and emissions for municipal operations and the community*
- *establish a reduction target—preferred targets are 20 percent and 6 percent greenhouse gas reductions from municipal operations and the community, respectively*
- *develop and finalize a local action plan to reduce emissions and energy use in municipal operations and the community*
- *implement the local action plan*
- *monitor, verify, and report greenhouse gas reductions.*

See http://www.fcm.ca/newfcm/Java/frame.htm *for more information on Partners for Climate Protection.*

Canadian Cities: Funding Sustainable Transportation

The Metropolitan Transportation Agency, created by the province of Quebec in 1996, is a provincial agency that coordinates the planning and funding of public transportation in the Montreal region. The agency receives revenue from a dedicated gasoline tax of 1.5 cents per litre collected within the region and a vehicle license surcharge of $30 per vehicle in the region.

In 1999, the province of Alberta approved an arrangement for funding transportation capital in Calgary and Edmonton that provides funding of 5 cents per litre from provincial fuel taxes collected in those regions. Calgary and Edmonton have integrated governance structures that allow them to plan and implement sustainable transportation policies on a comprehensive basis.

In 1999, the Greater Vancouver Regional District (GVRD) and the Province of British Columbia created the Greater Vancouver Transportation Authority (TransLink) to provide transit, funding and coordination of major roads, transportation demand management, and the motor vehicle emission testing system known locally as AirCare. TransLink has access to a number of transportation-related revenue sources, including fares and a share of the existing provincial fuel tax (initially 8 cents per litre and rising to 10 cents per litre by 2005).

modeling exercises are being used to better respond to growth, changing demographics, and lifestyle preferences.

In 1998, Partners for Climate Protection (PCP) was established to support municipal government commitments to reduce greenhouse gas emissions. The PCP program supports capacity building through networking and partnership, information exchange, and the use of case studies and technical tools, including greenhouse gas software, training, public education, and outreach.

Sustainability and Efficiency

A challenge for sustainable transportation is to implement measures that improve the efficiency of the different modes of transport and the transportation system as a whole. While there is no simple or single means of achieving efficient transportation, measures could include the following:

- encouraging greater modal integration for efficiency and environmental reasons
- contributing to the financing of strategic transportation infrastructure
- promoting greater use of more environmentally efficient modes and strategic environmental assessment of policies and programs
- improving transportation planning, particularly in urban centres
- encouraging appropriate modal choices
- promoting the use of advanced technologies that enhance system operations
- integrating transport and urban and regional planning strategies to reduce environmental impacts of transport.

More efficient transportation would deliver the same results with fewer or more efficient movements, thus enhancing Canada's overall efficiency and productivity. Fewer or more efficient movements would mean that legitimate needs for mobility and trade could be met with reduced environmental impacts.

Following is a review of a selection of activities in Canada that improve fleet performance or encourage the development and use of alternative fuels or intelligent transportation systems.

Promoting Rail and Road Efficiency

In the spring of 2000, Canada's federal minister of transportation announced a new five-year funding package to revitalize VIA Rail Canada. The investment is targeted for spending on system fleet renewal, modernized signaling on VIA-owned track, strategic infrastructure improvements, station refurbishment, and environmental waste-management improvements. Providing VIA with important new capital funds will ensure that VIA can operate safely and efficiently in the years to come, giving Canadians more frequent service, more modern VIA trains, and a more reliable system. This will provide a stable, safe, and environmentally friendly transportation option to Canadians and reduce congestion and greenhouse gas emissions. By 2004, it is expected that capacity will be increased by 19 percent and the number of passengers by 25 percent.

The federal Auto$mart Program provides Canadian motorists with helpful tips on buying, driving, and maintaining their vehicles to reduce fuel consumption and greenhouse gas emissions. The program promotes energy-efficient practices through publications, events, and joint projects, as well as a kit for student drivers available to driving instructors across Canada.

Canada's federal department of the environment initiated a vehicle emissions inspection program in 1986. Since then, it has organized voluntary vehicle emissions clinics in conjunction with various regional organizations in both the public and private sectors. In 1999, emissions clinics were conducted in sixteen different locations throughout Canada. A total of 3 298 vehicles were tested for hydrocarbon and carbon monoxide emissions, providing a substantial base for comparison with future emissions data.

Many of the provinces operate clean driving programs, such as British Columbia's AirCare and Ontario's Drive Clean. Under Ontario's Drive Clean program, emissions testing and repair have become mandatory requirements for vehicle registration and transfer of ownership. In its first year, the program achieved fuel savings equal to more than 120 000 fill-ups for a midsize car, resulting in an estimated 6.7 percent reduction in the emission of smog-causing pollutants.

Dynamometer

The Ottawa–Carleton Regional Transit Commission (OC Transpo) now has an innovative Multi-Dynamometer Simulator built by Environment Canada. Buses are driven onto the dynamometer at OC Transpo's maintenance facility and a series of tests are performed to quickly analyze the performance of the engine, power train, brake systems, and exhaust emissions. Once the dynamometer's computer performs its analysis, mechanics fine-tune the bus based on the data provided. The result is safer and cleaner buses.

It is expected that carbon dioxide and other pollutants will be reduced by five tonnes per year for each of the eight hundred buses in the fleet, and fuel consumption will decrease 3 to 5 percent a year. This saving alone should allow the equipment to pay for itself within two years. In addition, electrical energy produced when the dynamometer simulates road speeds is used throughout the maintenance facility.

Learn more at http://www.ec.gc.ca/pp/en/storyOutput.cfm?storyID=51

Alternative Fuels

Progress has been made in vehicle and fuel technologies that result in low or zero emissions. Electric vehicles, hybrid electric vehicles, and fuel cell power systems will all have a role to play in the future of the transportation sector. Fuel cell technology, such as that being developed by Ballard Power Systems of British Columbia, is currently being tested in small residential trials and transit buses in several North American cities. In addition, Iogen Corporation, in cooperation with Petro-Canada, is developing and demonstrating a cost-effective process for the production of ethanol from biomass. The process will turn straw, grasses, corncobs, and corn stalks into a clean-burning ethanol fuel.

The Montreal 2000—Electric Vehicle Project responds to commitments made by Canada to reduce greenhouse gas emissions. There are four project sponsors: Hydro-Québec, the governments of Canada and Quebec, and the Centre d'expérimentation des véhicules électriques du Québec. This project involves proposing an alternative to fossil fuel, gasoline, and other similar products in order to reduce greenhouse gas emissions. The purpose of the project is to facilitate the introduction of the first light electric vehicles into institutional and commercial vehicle fleets within the Greater Montreal region. The project will be carried out until March 2001 within the Greater Montreal region.

The federal government's new Natural Gas Vehicle Program is funded through the $7 million Market Development Incentive Payments fund. A contribution of $2 000 is payable to owners of factory-built natural gas vehicles purchased between 1 February 1999 and 31 January 2002. A contribution of $500 per conversion, payable to the owner of the vehicle, is available to convert vehicles to natural gas operation.

Performance, reliability, and efficiency are the hallmark characteristics that make diesel engines the power source of choice for trucks, buses, ships, locomotives, and electricity generators worldwide. But their pollutant emissions harm the environment, health, and the global economy. Transit buses powered by electricity or alternate fuels may be capable of matching the performance of diesel-fuelled buses while far surpassing them with lower levels of carbon dioxide, carbon monoxide, and particulate emissions, as well as reduced noise, vibration, and fuel costs.

Diesel to Clean-Burning Natural Gas

Vancouver-based Westport Innovations Inc. is commercializing a technology that allows diesels to run on clean-burning natural gas. Its high pressure direct injection (HPDI) technology maintains the high efficiency and performance of diesels while drastically reducing particulate matter, smog-causing emissions of nitrogen oxides, and greenhouse gases. Nitrogen oxides and particulate matter are reduced by approximately 50 percent and greenhouse gas emissions by up to 25 percent compared to current diesel engines. HPDI has been tested successfully on transit buses in Canada and California and is being introduced in heavy-duty truck applications.

Learn more at http://www.ec.gc.ca/pp/english/stories/westprte.html.

Improving Efficiency through Intelligent Transportation Systems

Another challenge to sustainable transportation is to develop and promote the use of new and innovative technologies that reduce the environmental impacts of transportation while meeting the service needs of passengers and shippers. Technology holds the promise of providing Canadians with transportation options that are safe, efficient, and environmentally friendly. In addition, new technology will reduce the costs of meeting environmental objectives and provide a basis for improvements in productivity and new markets for Canadian products and services. Transport policy initiatives, regulatory responsibilities, and operations are all affected by technological developments. Important technology already exists; properly adapted and promoted, it can be very effective in helping achieve sustainable transportation.

Technology is also proving to be an effective tool in improving the sustainability of Canada's transportation systems (for example, incident management systems and road weather information systems). Some of the first developments in intelligent transportation systems (ITS) occurred in Canada, including the world's first computer-controlled traffic signal system in Toronto. ITS includes the application of advanced technologies, including information processing, communications, sensing and control, and management strategies, in an integrated manner to improve the functioning of the transportation system. By bringing together system users, vehicles, and infrastructure into one integrated system, ITS enables information exchange for better management and use of available resources. ITS is helping to smooth the flow of traffic and improve mobility on congested corridors while making them safer. It is improving intermodal transfers and speeding the processing of travelers and goods across international borders.

One such example is Toronto's Highway 407 Express Toll Route, the world's first all-electronic toll highway. Electronic sensors there can identify and recognize vehicles entering and leaving the expressway. In other applications, there have been groundbreaking advances in global positioning and transponder technology, and a pilot project has demonstrated the feasibility of allowing specially equipped and pre-cleared trucks to cross the Canada–U.S. border with minimal delay.

In September 2000, the federal government committed approximately $3 million to nineteen cost-shared projects under Transport Canada's Intelligent Transportation Systems (ITS) Deployment and Integration Plan.

ITS Projects

Some of the projects selected for funding under the Intelligent Transportation Systems (ITS) Deployment and Integration Plan include the following:

- *TransLink in Vancouver, British Columbia, will receive $75 000 to conduct an evaluation of ITS to be used in a twenty-kilometre bus rapid transit system.*
- *The Transportation Commission in St. John's, Newfoundland, will receive $250 000 for the design and implementation of an automatic vehicle location system for the city's transit system based on a global positioning system.*
- *The Alternative Transportation Options Association of Toronto will receive $250 000 for Integrated Mobility Systems, which is a multi-modal, multi-application, smart-card initiative.*
- *The Société de transport de l'Outaouais will receive $250 000 for the development of a strategic ITS plan and pilot deployment of dynamic message signs at bus stops in the Outaouais region of Quebec.*

For a complete list of the projects, see http://www.tc.gc.ca/releases/nat/00_h067e.htm.

Sophisticated intelligent transportation systems, including satellite communication and navigation, are not only getting us to different places accurately and faster, they are also making connections between various modes of transportation much easier. More and more, urban transit systems are linking downtown with rail stations, airports, and ports. Canadians will have more options from which to choose the best combination of commuter rail, intercity bus, subway connections, railways, or cars, benefiting the environment by increasing the use of more sustainable modes.

Choosing the Sustainable Option

Achieving sustainable transportation will depend largely on changing behaviour. One of the biggest challenges is to build awareness among the general public about sustainable transportation in Canada. This involves raising awareness of the issues themselves, as well as promoting concrete actions that individuals can take to reduce the adverse impacts of transportation and improve quality of life. Working together with other federal departments, provinces and territories, industry groups, and nongovernmental organizations is necessary in developing and delivering consistent messages that promote sustainable transportation options.

Behaviour change is the ultimate goal of improving public awareness of sustainable transportation. When individuals understand the impacts of their transportation behaviour, they can in turn make choices that reduce the need for resources and minimize the adverse impacts of transportation.

Clean Air Day Canada has been proclaimed by the Government of Canada to increase public awareness and action on two key environmental priorities: clean air and climate change. It is very much a grassroots, locally based event relying on strong partnerships with all sectors of society. The program in 2000, managed by the Canadian Urban Transit Association (CUTA) with participation from Environment Canada, Transport Canada, Health Canada, and Bombardier Transportation, focused on sustainable transportation and highlighted initiatives by environmental and health organizations, transit companies, and private sector businesses in over sixty communities all across Canada.

In its Speech from the Throne in January 2001, the Government of Canada committed to working with partners across the country to launch a dialogue on the opportunities and challenges facing urban

centres. The urban transportation system is a key component of this dialogue. In this context, the Government of Canada has committed to cooperate with provincial and municipal partners to improve public transit infrastructure.

To raise awareness about the benefits of choosing more sustainable transportation modes for commuting to work, in 2000, Transport Canada launched an internal Green Commute program to promote sustainable commuting behaviour among its employees in the National Capital Region. The Green Commute program is about removing barriers to enable employees to make more sustainable choices about the commute to and from work. Green commuting is broken down into three different transportation categories: active transportation, which encompasses walking, biking, and in-line skating; public transit and carpooling; and telecommuting. Transport Canada is committed to working in partnership to develop and initiate a Green Commute program for implementation at Transport Canada's regional offices and other federal department offices across Canada. The program will be extended to corporate industry in Toronto, Vancouver, and Montreal by 2004.

In addition, two federal programs, the EnerGuide for Vehicles and the Fuel Consumption Guide, provide buyers of new vehicles with information on energy consumption and costs so that they can compare different vehicles and purchase the most fuel-efficient one to suit their needs.

The Climate Change Action Fund (CCAF) was established by the federal government to support Canadians in reaching the targets in the Kyoto Protocol. The public education and outreach part of the fund is aimed at supporting initiatives that increase public awareness and understanding of climate change. The objectives of this component are to provide balanced information to Canadians; explore the barriers to action; motivate positive behaviour change; focus on what Canadians can do at home, at work, and on the road; encourage activities in communities, schools, businesses, and industries; and leverage resources and promote partnerships. Just under one-quarter of the projects are transportation-related.

Transport Canada launched the $1-million Moving on Sustainable Transportation (MOST) Program in 1999 to encourage organizations to implement projects that stimulate the development of innovative tools, approaches, and practices in increasing the sustainability of

CCAF Public Education and Outreach Projects

The public education and outreach part of the Climate Change Action Fund (CCAF) supports a wide range of initiatives. The following are a few examples.

The Canadian Centre for Sustainable Transportation has received funding from the CCAF to undertake a project to explore options for better integrating sustainable transportation into the university curriculum. The project is expected to enhance the training that future transportation professionals receive on sustainable transportation practices.

Some programs under the CCAF focus on shared transport. For example, Commuter Challenges are annual one-day or one-week events with the primary objective to motivate Canadians to leave their cars at home as they head to work. Coordinators at Sustainable Alberta's Commuter Challenge propose to develop the Canada Commuter Challenge, an annual nationwide event to take place during Canada Environment Week. It will formalize and expand the Commuter Challenge projects that already exist in six major Canadian urban centres.

Another CCAF-funded program called Climate Connection proposes to establish a rideshare program at twenty post-secondary educational institutions across Canada. The program is expected to result in two thousand four-person carpools, raise awareness among students of the economic and environmental costs of single-occupant vehicles, a reduction of atmospheric pollution by more than 28 000 tonnes per year, and environmental benefits valued at $28 million annually.

For more information, see *http://climatechange.gc.ca/english/actions/action_fund/index.shtml*

Canada's transportation system; realize quantifiable results in Transport Canada's sustainable development priorities; and provide Canadians with practical information and tools for better applying sustainable transportation thinking to their daily lives.

To date, approximately $400 000 has gone to twelve programs, including Active and Safe Routes to School. This is a national program encouraging the use of active modes of transportation to and from school such as cycling and walking. The benefits include increased physical activity for children and youth; a healthier lifestyle for the whole family; less traffic congestion around schools; safer, calmer streets and neighborhoods; improved air quality; and a cleaner environment.

Another critical program supported by MOST is the Visibility, Image, and Positioning initiative spearheaded by CUTA. The objective of this program is to enhance the visibility and image of public transit through

value shifts that will improve the perceptions of transit among the general public. This includes identification of target markets, development of a range of strategic approaches, testing of emotion-based messages for each target market, and identification of appropriate tactics for effective implementation of awareness campaigns at a national and local level. The program will identify perceived barriers to using public transit, recognize opportunities, and develop strategies to promote increased use and support of public transit.

CANADIAN INVOLVEMENT IN INTERNATIONAL ACTIVITIES

Canada believes that regional and international cooperation plays a useful role in fostering effective sustainable development policies. Canada is active in a number of international fora to advance sustainable development and achieve transportation systems that are safe and minimize negative impacts on the environment, including the United Nations, the Organisation for Economic Co-operation and Development (OECD), the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), the North American Commission for Environmental Cooperation (NACEC), and the forum for Asia–Pacific Economic Cooperation (APEC).

More specifically, Canada agrees with the general objectives of the World-Wide Fuel Charter for gasoline and diesel fuels. The charter is an effort to develop common, worldwide recommendations for "quality fuels", taking into consideration customer requirements and vehicle emission technologies, which will in turn benefit our customers and all other affected parties. Global fuel standards are vital if the developing world, where car ownership is increasing at an enormous rate, is to benefit from the newest vehicle technologies. This objective is in line with the United Nations Economic Commission for Europe's Agreement Concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles.

The national greenhouse gas mitigation targets established in the Kyoto Protocol do not cover emissions from international marine and aviation activities. Under the protocol, parties agreed to address greenhouse gas emissions from international shipping through the IMO, while international aviation emissions are to be addressed through ICAO. In this context, ICAO and the IMO are working with member countries to reduce the level of greenhouse gas emissions

while recognizing the need to balance these efforts with safety and economic concerns. In addition, ICAO is working on measures to mitigate air traffic congestion and noise pollution. The IMO is also working to prevent pollution from ships.

Canada is also signatory to a number of international environmental agreements, such as the United Nations Framework Convention on Climate Change and the Canada–United States Air Quality Agreement, which influence our sustainable transportation actions at home.

Developing countries also face difficult challenges to sustainable transportation. In many countries, for example, congestion and air pollution are major problems. As their populations grow and their economies expand and diversify, there will be increasing pressures on transportation and on the environment. Developing countries can benefit from the experiences and expertise of each other and of industrialized nations. Organizations such as the Canadian International Development Agency (CIDA) are playing an active role, facilitating broad participation in developing countries and emerging economies to develop better transportation policies and implement cost-effective technologies that have less of an environmental impact.

For example, CIDA and the Government of Bangladesh are co-funding the Bangladesh Environmental Management Project. The project will strengthen the institutional capacity of the Bangladesh Department of Environment, enabling it to carry out its legislative powers, mandate, and functions, including reduction of emissions. Part of the project is to finance pilot projects, one of which has made rapid progress in raising awareness about the conversion of two-stroke three-wheeled auto-rickshaws in the capital, Dhaka. With the vast reserves of natural gas in Bangladesh, the project is now poised to rapidly expand the use of compressed natural gas (CNG) by two-stroke auto-rickshaws. Plans to commercialize CNG conversions in Dhaka with a government-led institution are now widely accepted. There have been numerous requests to replicate the program in other cities of Bangladesh and for other two-stroke models.

Canada will continue to work with other countries, both developed and developing, on a bilateral and multilateral basis. By sharing experiences, expertise, and resources, all countries can help move the global transportation system to a more sustainable path.

Cooperation in Action

BC Gas International Inc. of Vancouver has been working with two Romanian companies, Dacia Automobile and Romgaz, to use a natural gas fuel-injection system developed by the Saskatchewan Research Council to convert automobiles in Romania. Initially, Dacia plans to convert and test five vehicles and expects to begin mass-producing these vehicles in 2001. The vehicles being tested or produced as part of this project with the bi-fuel natural gas technology will reduce greenhouse gas emissions by about sixteen tonnes per year. The total projected greenhouse gas emission reductions could amount to well over eight thousand tonnes per year, with mass production of bi-fuel vehicles.

(Source: http://www2.climatechange.gc.ca/ccaf/show_e.cfm?id=87*)*

THE PATH FORWARD

The challenges of sustainable transportation are immense and will not be solved overnight. Sustainable transportation is a long-term goal, requiring the cooperation of many partners, domestically and internationally, in the search for effective solutions. Progress toward sustainable transportation must be made incrementally. In Canada, the key will be to better integrate economic, social, and environmental considerations into decisions affecting transportation activity.

Canada has already begun to take action. Much has been accomplished, however, much more needs to be done. We will continue to work together with other countries in the pursuit of global sustainable transportation.

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WEB SITES

Federal Government

Auto$mart Program:
http://oee.nrcan.gc.ca/vehicles
Canadian Coast Guard:
http://www.ccg-gcc.gc.ca
Canadian Environmental Solutions:
http://strategis.ic.gc.ca/SSG/es00001e.html
Canadian International Development Agency:
http://www.acdi-cida.gc.ca
Environment Canada—Green Lane:
http://www.ec.gc.ca
Environmental Affairs Program:
http://www.tc.gc.ca/envaffairs/english/newindexclf.htm
Fisheries and Oceans Canada:
http://www.ncr.dfo.ca
Fitness and Active Living Program Unit:
http://www.hc-sc.gc.ca/hppb/fitness
Government of Canada Global Climate Change Website:
http://www.climatechange.gc.ca
Industry Canada:
http://www.ic.gc.ca
Millennium Eco-Communities:
http://www.ec.gc.ca/eco
National Research Council Canada:
http://www.nrc.ca
National Roundtable on the Environment and the Economy:
http://www.nrtee-trnee.ca
Natural Resources Canada:
http://www.nrcan.gc.ca
Office of Energy Efficiency:
http://oee.nrcan.gc.ca/
Environment Statistics—Statistics Canada:
http://www.statcan.ca/english/Pgdb/Land/enviro.htm
Strategis—Canada's Business and Consumer Site:
http://strategis.ic.gc.ca
Transport Canada:
http://www.tc.gc.ca
Transportation Safety Board of Canada:
http://tsb.gc.ca

Provincial and Territorial Governments/Ministries

Alberta
Alberta Environment:
http://www.gov.ab.ca/env/index.html
Alberta Infrastructure:
http://www.infras.gov.ab.ca

British Columbia
Ministry of Environment, Lands and Parks:
http://www.gov.bc.ca/elp
Ministry of Transportation and Highways:
http://www.gov.bc.ca/th

Manitoba
Manitoba Conservation:
http://www.gov.mb.ca/natres
Manitoba Highways and Government Services:
http://www.gov.mb.ca/hwy

New Brunswick
Environment and Local Government:
http://www.gnb.ca/elg-egl
Transportation:
http://www.gnb.ca/dot

Newfoundland and Labrador
Department of Work, Services and Transportation:
http://www.gov.nf.ca/wst
Environment and Labour, Environment Branch:
http://www.gov.nf.ca/env/Env

Northwest Territories
Department of Transportation:
http://www.gov.nt.ca/Transportation
Resources, Wildlife and Economic Development:
http://www.rwed.gov.nt.ca

Nova Scotia
Department of Environment and Labour:
http://www.gov.ns.ca/enla
Department of Transportation and Public Works:
http://www.gov.ns.ca/tran

Nunavut
Department of Community Government and Transportation:
http://www.gov.nu.ca/eng/Departments/CGT.htm
Department of Sustainable Development:
http://www.gov.nu.ca/eng/Departments/sd.htm

Ontario
Ministry of Environment:
http://www.ene.gov.on.ca
Ministry of Transportation:
http://www.mto.gov.on.ca
Ontario's Drive Clean:
http://www.driveclean.com

Prince Edward Island
Fisheries, Aquaculture and Environment:
http://www.gov.pe.ca/fae

Transportation and Public Works:
http://www.gov.pe.ca/tpw

Quebec
Ministère de l'Environnement:
http://www.menv.gouv.qc.ca/index-en.htm
Ministère des Transports:
http://www.mtq.gouv.qc.ca/index_en.htm

Saskatchewan
Environment and Resource Management:
http://www.serm.gov.sk.ca
Highways and Transportation:
http://www.highways.gov.sk.ca

Yukon Territory
Community and Transportation Services:
http://www.gov.yk.ca/depts/cts
Department of Renewable Resources:
http://www.renres.gov.yk.ca

Municipal/Regional Government

Federation of Canadian Municipalities:
http://www.fcm.ca
Toronto Atmospheric Fund:
http://www.city.toronto.on.ca/taf
TransLink:
http://www.translink.bc.ca

Industry

Canadian Industrial Transportation Association:
http://www.cita-acti.ca
Canadian Institute of Traffic and Transportation:
http://www.citt.ca
Canadian Renewable Fuels Association:
http://www.greenfuels.org
Canadian Transportation Research Forum:
http://www.ctrf.ca
Canadian Urban Transit Association:
http://www.cutaactu.on.ca
Centre d'expérimentation des véhicules électriques du Québec:*
http://www.ceveq.qc.ca
Energy Council of Canada:
http://www.energy.ca
Montreal 2000—Electric Vehicle Project:
http://www.ve-montreal2000.com
Transportation Association of Canada:
http://www.tac-atc.ca
Victoria Transport Policy Institute:
http://www.vtpi.org

Environmental Organizations

Better Environmentally Sound Transportation:
http://www.best.bc.ca
Canadian Energy Efficiency Alliance:
http://www.energyefficiency.org/alliance/home.htm
Canadian Environmental Network:
http://www.cen-rce.org
Canadian Institute of Planners:
http://www.cip-icu.ca
Centre for Sustainable Transportation:
http://www.cstctd.org
David Suzuki Foundation:
http://davidsuzuki.org
Friends of the Earth Canada:
http://www.foecanada.org
Go for Green:
http://www.goforgreen.ca
Green Communities Association:
http://www.gca.ca
Intersection Online:
http://www.web.apc.org/~detour
Moving the Economy On-Line:
http://www.city.toronto.on.ca/mte
Ontario Environment Network:
http://www.web.net/~oen
Pembina Institute for Appropriate Development:
http://www.pembina.org
Pollution Probe:
http://www.pollutionprobe.org
Transport 2000 Canada:
http://www.transport2000.ca

*Available only in French.