

Wherever life takes you



Toronto Transit Commission

# PUBLIC TRANSIT: A CLIMATE CHANGE SOLUTION

Public transit can play an important role in reducing Canada's greenhouse gas (GHG) emissions. Canadian transit systems and suppliers believe that our national Kyoto Protocol commitment is an opportunity to improve our quality of life and foster innovation. The vast majority of Canadians also recognize Kyoto as a necessary response to the serious social, environmental and economic consequences of climate change.

Many Canadians are showing their desire to act on climate change by making smart lifestyle choices, like taking transit instead of driving a car. In the last five years, national transit ridership has risen 11% to reach an all-time high of nearly 1.6 billion riders in 2004. While this trend will help reduce GHG emissions from transportation, it will also help improve air quality and demonstrate other aspects of transit's value in the battle against climate change.

This issue paper addresses transit's potential as a key contributor to Canada's climate change strategy. It reviews GHG emission trends in urban transportation, transit's current and potential role within a national strategy, and progress toward emission reductions from transit operations.

## The Kyoto Protocol and Canada's urban transportation challenge

In the 1997 Kyoto Protocol, 84 nations agreed they would have to reduce their GHG emissions to slow climate change. Canada ratified Kyoto in 2002, committing the nation to reducing national GHG emissions to 6% below 1990 levels by the period between 2008 and 2012. The Protocol became a legally binding treaty in February 2005.

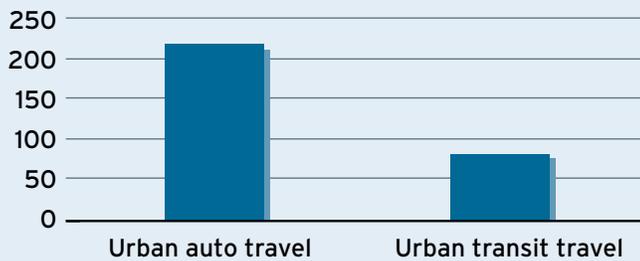
To date, Canada's progress in reducing GHG emissions from the transportation sector has been poor. From 1990 to 2003, transportation emissions rose by one-quarter and now represent 26% of national GHG emissions.<sup>a</sup> Almost half (48%) of these transportation emissions were from gasoline-powered cars and light trucks, used mainly for personal transportation.

The Transportation Association of Canada's 2004 *Urban Transportation Indicators* project surveyed progress toward sustainable transportation in Canada's 27 largest metropolitan areas.<sup>b</sup> Between 1991 and 2001 in those communities, gasoline sales increased by 25% in absolute terms and by 11% per capita. Just two communities (Regina and Saskatoon) saw a reduction in gasoline sales per capita from 1991 to 2001, and only five (Victoria, Calgary, Regina, Saskatoon and Montreal) saw a reduction in per-capita gasoline sales from 1996 to 2001.

For Canada's transportation sector to contribute to the nation's Kyoto target, we must reverse the rapid growth in GHG emissions from urban transportation. Public transit is essential to this task. A transit rider creates 65% fewer GHG emissions than an auto user for the same trip (see figure).<sup>c</sup> Commuters who take transit just twice a week can reduce their emissions by 25%. When millions of people leave their cars at home, it can have a real impact on national GHG emission levels.

The *National Vision for Urban Transit to 2020*, commissioned by Transport Canada, points out that public transit has many co-benefits that complement its GHG reductions. These include the need for fewer new roads, as well as improved air quality, reduced congestion, healthier downtowns, improved social mobility, and a positive impact on economic sectors such as tourism and export development.

**GHG emissions by mode**  
(grams per passenger-kilometre)



### The role of public transit in Canada's climate change strategy

In April 2005, the Government of Canada launched a new plan to reduce national GHG emissions. The multi-pronged strategy of "Project Green" emphasizes the federal purchase of emission credits in the marketplace, energy-related infrastructure and technology investments in partnership with provinces and territories, and industrial emission reductions. Of greater relevance to public transit, it also includes federal programs in sectors including transportation

(such as the Urban Transportation Showcase Program), as well as information and incentives to help consumers make energy-efficient decisions (see the One-Tonne Challenge profile, below).

The federal climate change plan also acknowledges the important role of the New Deal for Cities and Communities in the battle against climate change. It highlights the New Deal's targeted gas tax transfer of \$5 billion of federal funds over five years that will support a range of environmentally sustainable infrastructure but "especially public transit, which is a key focus of the New Deal where investments will make gains in the areas of climate change, smog and congestion in our urban centres."<sup>d</sup>

Canada's transit industry supports the expansion of federal infrastructure investments and other targeted programs. This is because these measures can effectively direct resources to sectors like urban transportation, or industries like public transit, that offer important social benefits in addition to GHG reductions, and because they can be applied in a manner that ensures equity among regions and sectors.

### Going green: Reducing emissions from transit operations

It is clear that transit's greatest potential to reduce GHG emissions is by converting car drivers to new riders. However, the industry takes great pride in leading by example and is actively pursuing ways to minimize GHG emissions from transit operations.

Moving large vehicles and huge passenger volumes is an energy-intensive activity. In 2004, the cost of fuel and energy consumed by Canadian transit operations surpassed \$300 million.<sup>e</sup> Even modest gains in energy efficiency can therefore reduce emissions significantly, and save money that can be used to improve service and build ridership. The two main approaches to reducing the energy consumed by transit systems are through operational strategies and advanced fuel and vehicle technologies.

### The One-Tonne Challenge: Bringing home the need for smarter choices

In their day-to-day lives, individual Canadians produce about five tonnes of GHG emissions each year — more than one-quarter of Canada's total emissions. To encourage individuals to reduce their personal emissions, the Government of Canada has launched a multi-faceted public outreach program, the One-Tonne Challenge.

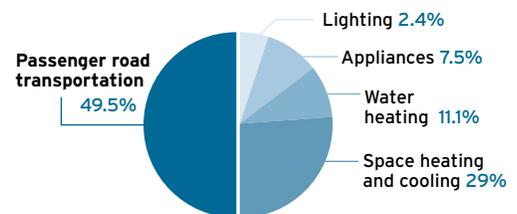
The One-Tonne Challenge uses community action and national promotion to engage Canadians in reducing their personal GHG emissions by 20% (about one tonne) each year. The program provides Canadians with the motivation and tools they need to successfully reduce emissions at home and through their transportation choices.

In 2004, Environment Canada asked CUTA to manage a sustainable transportation campaign in support of the One-Tonne Challenge. CUTA developed new creative materials and distributed almost 1,500 exterior bus boards, 7,000 interior car cards and 500 shelter posters to over 50 local transit systems, making the One-Tonne Challenge a highly visible national campaign.

CUTA members have been instrumental in this initiative, showing their support by supplying space to showcase signs in prominent locations, and by organizing local activities around the One-Tonne Challenge.

For more information, visit [www.climatechange.gc.ca/onetonne](http://www.climatechange.gc.ca/onetonne)

**Personal GHG emissions from energy use in Canada**



Source: [www.climatechange.gc.ca/onetonne](http://www.climatechange.gc.ca/onetonne)



**Operational strategies.** There are several ways to operate transit vehicles more efficiently on a day-to-day basis.

- Operator training can help reduce energy use and GHG emissions by teaching fuel-efficient driving techniques. The SmartDRIVER program, managed by CUTA and developed by Natural Resources Canada based on innovation and experience in the City of Edmonton (see profile, next page), has trained over 100 transit system representatives to pass on these skills to their own operators.
- The installation and monitoring of global positioning system (GPS) technologies on transit vehicles helps service supervisors and fleet managers optimize vehicle allocation and scheduling, reducing delay and fuel usage due to needless idling.
- Transit priority measures like traffic signal pre-emption and queue jump lanes reduce intersection delay experienced by buses. This means less idling, faster average travel speeds, and lower fuel consumption and emissions.

**Fuel and vehicle technologies.** New fuel and vehicle technologies are making transit operations cleaner and more energy-efficient.

- Canadian transit systems have started to purchase significant numbers of buses powered by hybrid diesel-electric engines. Long-term tests of hybrid buses in New York City have shown up to a 30% reduction in fuel usage. BC Transit, which in May 2005 launched Canada's first full-time hybrid buses in Kelowna, projects up to a 50% reduction in fuel usage in stop-and-go applications.
- Eight Canadian transit systems used biodiesel-powered buses in 2004. Biodiesel is a blend of clean or low-sulphur diesel fuel with up to 20% vegetable oils or animal fats. Pilot tests in Toronto and Montreal have shown that the fuel efficiency of buses fuelled with biodiesel is similar to that of buses using regular diesel, but with significant reductions in GHGs, particulate matter and sulphur emissions.<sup>f</sup>
- Six Canadian transit systems used natural gas-powered buses in 2004. When compared to diesel fuel over its entire life cycle, natural gas may lead to slightly lower levels of GHG emissions.<sup>g</sup>
- Calgary Transit uses commercial wind energy to power its light rail system, meaning that its C-Train operates with practically no GHG emissions.

- Fuel cell technologies that use hydrogen to power zero-emission vehicles are still not ready for full-scale commercial transit application. They remain a bright prospect, however, and Canada is home to several industry leaders.

## Tax-exempt transit benefits: An incentive to reduce GHG emissions

Canadian business, labour, health and environmental groups have spent more than a decade urging the federal government to give tax-exempt status to employer-provided transit benefits. Canada's Kyoto commitment makes tax-exempt transit benefits more important than ever, because they represent a targeted and cost-effective way of promoting public transit use and contributing to our climate change objectives.

The federal budget in February 2005 identified tax-exempt transit benefits as an environmental measure that would be worthy of consideration. In response, CUTA commissioned an independent analysis of tax-exempt transit benefits. The study projected the following dramatic impacts by 2016 in Canadian communities served by transit:

- 32% to 57% of workers would be offered tax-exempt transit benefits of \$55 per month, on average.
- Transit ridership would increase 27% to 54% among commuters who accept the benefit, and 8.3% to 31% among all commuters.
- GHG emissions from commuting would decrease by 1.1% to 4.0% (90,000 to 330,000 tonnes).
- Annual economic benefits to society would total \$385 million to \$1.4 billion per year, or \$4,260 per tonne of GHG emissions reduced. These benefits would greatly outweigh the lost federal revenue of \$725 to \$1,460 per tonne of GHG emissions reduced.
- There would be a significant equity improvement for transit commuters who do not enjoy the tax-exempt free parking benefits accepted by their co-workers.

*Data taken from Tax Exemptions for Employer-Provided Transit Benefits (IBI Group, 2005)*



BC Transit

*Canada's first hybrid diesel-electric bus entered regular service in Kelowna, B.C. in May 2005*



Société de transport de Montréal

*Montreal's BIOBUS pilot project in 2002-2003 demonstrated the benefits and viability of biodiesel in Canada's climate*

Edmonton, Alberta

## Reducing emissions and energy use with Fuel Sense

Fuel Sense is a four-hour program that uses practical and classroom training to help the City of Edmonton's fleet and transit drivers become more fuel-efficient. It provided the model for the national SmartDRIVER train-the-trainer program developed by Natural Resources Canada and managed by CUTA.

The program teaches drivers to operate vehicles for maximum fuel efficiency while also considering operational needs. A computerized fuel dispensing system tracks the fuel usage of individual drivers to allow Fuel Sense to measure results at regular intervals.

Over 800 municipal vehicle operators have received Fuel Sense training to date, with an average fuel efficiency gain of 12%. The program has reduced fuel consumption by over 200,000 litres per year, yielding annual GHG reductions of about 350 tonnes from Edmonton's fleet operations.<sup>h</sup>



Edmonton Transit

Greater Vancouver, British Columbia

## Clean technologies hit the road

In September 2005, the Greater Vancouver Transportation Authority (TransLink) began a six-month demonstration project to evaluate the latest bus propulsion technologies and alternative fuels. Five pairs of buses, each with a unique colour scheme, will be tested during regular service for up to 23 hours a day, alternating between eight bus routes.

The five propulsion technologies to be tested include diesel-electric hybrid, compressed natural gas, 20% biodiesel blend, low-sulphur clean diesel, and standard diesel (as a baseline). Criteria to be measured in the project include fuel consumption, emissions, on-road performance, operating and capital costs, maintenance requirements, and customer reaction.

"TransLink expects to purchase more than 1,000 buses over the next eight years, and results from this test program will help us identify the most suitable and cost-effective technology to service the region," said TransLink Chairman Doug McCallum.

Transport Canada is providing funding for the diesel-electric hybrid buses through its Urban Transportation Showcase Program.

## A look ahead

Transit systems can help reduce Canada's GHG emissions by convincing drivers to leave their cars at home, and by making their own operations more efficient. However, success on these fronts will require substantial, predictable and long-term transit investments to enable local implementation of energy-efficient infrastructure, technologies and processes. The industry is grappling with an infrastructure investment shortfall of \$9 billion over the period from 2004 to 2008, and many Canadian transit systems need additional capacity to carry new riders. Investment is also needed in new technology, research, and public awareness campaigns to encourage behavioural change.

Complying with Kyoto is now a fact of life for Canadians, and public transit will be a significant contributor to the cause. The transit industry believes that Canada can meet the challenge of climate change through the coordinated efforts of the public and private sectors, and through the collective actions of individuals across our country.

## REFERENCES

- a) Environment Canada, *Summary: Canada's 2003 Greenhouse Gas Inventory* (available at [www.ec.gc.ca](http://www.ec.gc.ca))
- b) IBI Group for Transportation Association of Canada, *Urban Transportation Indicators (Third Survey)*, 2004
- c) Transportation Climate Change Table, Government of Canada, *Transportation and Climate Change: Options for Action*, 1999 (available at [www.tc.gc.ca](http://www.tc.gc.ca))
- d) Government of Canada, *Moving Forward on Climate Change: A Plan for Honouring our Kyoto Commitment*, 2005 (available at [www.climatechange.gc.ca](http://www.climatechange.gc.ca))
- e) Information provided by CUTA members
- f) Information provided by CUTA members
- g) United States Department of Energy, "Natural Gas Buses: Separating Myth From Fact", 2000 (available at [www.eere.energy.gov](http://www.eere.energy.gov))
- h) Transport Canada, "Fuel Sense: Making Fleet and Transit Operations More Efficient", Urban Transportation Showcase Program Case Study 24, 2004 (available at [www.tc.gc.ca/utsp](http://www.tc.gc.ca/utsp))

The Canadian Urban Transit Association (CUTA) is the voice of Canada's public transit industry. For additional information including research reports, industry updates, news bulletins and more, please contact us or visit our website.

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