

REGION OF OTTAWA-CARLETON
 RÉGION D'OTTAWA-CARLETON

REPORT
 RAPPORT

Our File/N/Réf. Your File/V/Réf.	47-99-0039
DATE	31 January 2000
TO/DEST.	Co-ordinator Transportation Committee
FROM/EXP.	Planning and Development Approvals Commissioner
SUBJECT/OBJET	TRANSPORTATION AND CLIMATE CHANGE OPTIONS PAPER TRANSPORTATION CLIMATE CHANGE TABLE

DEPARTMENTAL RECOMMENDATION

That the Transportation Committee recommend Council:

- 1. Endorse the general direction of the Transportation Climate Change Table;**
- 2. Forward this report to the Transportation Association of Canada (TAC).**

PURPOSE

This report provides information on the options identified by Transportation Climate Change Table (the Table) within the jurisdiction of the Region or having an impact on our operations.

BACKGROUND

The Transportation Climate Change Table was created in May 1998 by the Federal, Provincial, Territorial Ministers of Transportation to analyse options to meet or exceed the Kyoto Protocol commitment to reduce Greenhouse Gas (GHG) emissions by 6% from 1990 levels by 2008 to 2012. Transportation is one of 15 issues being examined and represents the single largest source of GHG emissions in the nation. The Table examined all aspects of transportation. The membership of the Table was very broad based including members of the air, marine, railway, trucking, transit, and intercity bus associations, the petroleum, pulp and paper, and automotive industries, three levels of government, transportation and automobile associations, and environmental groups.

Annex A provides a summary of the Table's Options for Action pertinent to the Region. It discusses the urban issues and includes information on the national transportation system that may be of interest. The Table's report is an excellent document that provides a compendium of measures with their associated costs and benefits. It does not recommend strategies but provides a neutral examination of issues. A final version will be submitted to Ministers of Transport and the National Climate Change Secretariat. Following integration with other issues tables, broader consultations and analysis, this will be considered by First Ministers.

Promising Measures: The report quantifies the impact on GHG emissions of various transportation measures. It covers all modes of transportation. The Most Promising Measures identified, related to urban passenger transportation, included the tax-exempt transit pass. This measure involves employers being able to provide to employees a tax-exempt transit benefit or to be able to purchase transit passes with pre-tax income. This is followed by the transit smart card, telecommuting and car sharing. On the road infrastructure side, enforcing existing speed limits, followed by intelligent transportation systems (ITS) and synchronising traffic signals make up the Most Promising Measures. These are followed by Promising Measures which include enhanced transit, pedestrian and bicycle facilities; voluntary ridesharing programs; high occupancy vehicle lanes; expanded ITS and better road maintenance. The only pricing mechanism cited was parking pricing for Montreal, Toronto and Vancouver. This particular measure was cited as being highly effective and having considerable potential.

Less Promising and Unlikely Measures: Some of the relevant Less Promising Measures cited included parking pricing for other urban areas (population over 125,000), urban road pricing and mandatory ridesharing. Unlikely Measures included the High-speed rail in the Quebec-Windsor corridor (proposals for which have included Ottawa), parking cash-out, distance based vehicle charges and parking supply restrictions. These measures were put in these categories because they were more difficult, more expensive, less effective or involved large transfers in the economy. The Table would be interested in input on these and the other measures. The Table states that although they have had a significant number of stakeholders represented in the study, "the measures have not had the benefit of a peer review or broader input from the transportation community." Thus the need for the consultation process in February.

Ancillary Issues: The Table's report highlights the concerns around funding acknowledging the benefits of pricing strategies and dedicating fuel taxes but failing to reach agreement. It also recommends better integration of land-use policies and improved public awareness. One of the contributing studies examined combined strategies for major cities. As has become evident in many studies recently, there is increasing evidence that a variety of strategies and policies will have to be implemented to effect a large change in emissions. Montreal, Vancouver and Toronto were studied separately from the general urban study through case studies. Measures were identified in workshops and were quite consistent across these three major cities. They identified barriers and called for the following changes to improve the situation:

- strong federal, provincial and regional partnerships
- centralised responsibility for funding and planning/decision making with respect to both land use and transportation planning
- a stable, dedicated funding source for transportation measures.

Effectiveness: To date, the Kyoto target has not been disaggregated by sector. However, if it is applied according to how much the sector generates, transportation will have to reduce its emissions by 54 Mt by 2010. According to the Table's study, the top two categories of measures would not quite meet this target. The supporting study on passenger transportation in urban Canada identified the Kyoto target (if applied equally to urban transportation) would be 10.2 Mt in 2010. If the urban passenger measures are isolated and added up, the Table's study indicates that it is feasible to reach this target if the Most Promising and Promising Measures are applied.

Accuracy: The Table states there is little empirical evidence upon which to base estimates. The report later states during the discussion of the fuel tax results that the effects may be overstated or the costs of other measures have been understated. This highlights the need for improved local analytical tools to assess the cost-effectiveness of measures.

Fuel Taxes: The report states that there was no consensus on the issue of fuel taxes but most members of the Table felt that large increases in the fuel tax were not warranted. Instead most but not all the members thought that a small increase in the fuel tax to support the other measures and to fund urban transit was warranted. The two options that received the most discussion were an additional fuel tax of 1 cent per litre per year for 10 years (total of 10 cents per litre by 2010), or a fuel tax applied to urban areas only of 4 cents per litre.

Dedicated Funding: A number of Table members recommend the approach taken by the United States in the Transportation Efficiency Act for the 21st Century which outlines funding priorities and mechanisms for funding transportation with dedicated gasoline taxes.

IMPLICATIONS FOR THE REGION

The Table's measures will be integrated with the 14 other issue tables and thus it is difficult to predict what the outcome will be of the combined analysis. Transportation may take a more major or minor role than was contemplated in the report and thus the measures required may be more or less onerous. Also, it is unknown whether the federal government will allow the measures to be adopted on a voluntary basis or whether they will mandate legislative changes.

CONFORMITY TO OFFICIAL PLAN AND TRANSPORTATION MASTER PLAN

The Table's recommendations are in keeping with the general strategy and spirit of the Official Plan (OP) as outlined below with the possible exception of HOV. The two highest categories of measures do not, however, include the parking or automobile user costs supported in the OP and the Transportation Master Plan (TMP).

Tax-exempt transit benefits and parking pricing are supported in the TMP in Section 2.4 in which it states that other responsible governments will be encouraged to change legislation that inequitably subsidises automobile travel relative to public transit use. More specifically, Section 2.4.1 (7) urges the federal government to cut subsidized parking for its employees, enforce the taxable benefit status of

employer-provided free or subsidized parking, designate employer-provided transit fare subsidies as non-taxable benefits. It urges the provincial government to enable municipalities to introduce taxes on parking.

In section 4.1.2 of the OP, policy 4 states “investigate and support initiatives to improve the information-technology and telecommunication infrastructure of Ottawa-Carleton...” Section 9.5 (1) discusses implementing telecommuting either alone or in collaboration with others. Section 2.5.1 of the TMP identifies an afternoon peak hour reduction of 4% due to teleworking. This value is similar to that used in the Table’s study. Partnerships with private and public sector agencies are contemplated in Section 2.5.1 (6e) of the TMP.

The pedestrian, bicycle, and transit measures are supported in the OP and TMP. Section 9.1 of the OP details network requirements and modal split targets for each mode and sets as a goal to ensure that the implementation and operation of transportation facilities is consistent with environmental and social objectives. These are echoed in Section 2 of the TMP.

Car sharing is specifically supported in the TMP in Section 2.5.1 (3b).

The transit pricing measure is supported in Section 2.4.1(6) which seeks to base fares upon the objective of maximizing transit usage.

Section 3.4.2 (17) of the OP states Council will “work with the City of Ottawa to support the provision of moderately-priced, short-term parking to serve the retail and commercial sectors and limit the provision of long-term parking to discourage the use of private vehicles for work trips.” In Section 9.4 (15), area municipalities are required to amend parking requirements to support transit in the vicinity of rapid transit stations. In Section 9.4 (16), area municipalities are to be encouraged to amend parking requirements in areas served by transit.

Voluntary ridesharing is supported in Section 9.5(7). The TMP contemplates ridematching programs, employer-provided incentives and carpool lots (Section 2.5.4).

In Section 9.4 (13), the OP supports transit priority measures, such as traffic signal priority and bus lanes but is silent on HOV lanes. Section 2.5.4 of the TMP discusses HOV in detail stating it does not have wide applicability in the Region. However, HOV could be considered as a transitional measure to eventually introducing a bus lane. Also, a specific case for transit priority purposes was identified as necessary on the Queensway for the introduction of a rapid cross-town transit service linking the East and Southeast Transitways to the West and Southwest Transitways. It was considered as an HOV only due to physical constraints and prevailing traffic flows. In Section 2.5 of the TMP it suggests a framework is required for consideration of HOV lanes. The Table’s report recommends additional work to determine feasibility of high-occupancy vehicle lanes in congested urban areas and to assess concerns about enforcement and whether they induce additional traffic. Also the cost is considered to be significant and warrants additional analysis.

Section 9.5 (2) calls for implementing transportation system management measures similar to those five Most Promising and Promising Measures suggested under ITS in the Table's report. The Region's studies assume a 5% increase in road capacity to 2021 due to implementation of these measures (TMP Section 2.5.2). However, it is not easy to compare between studies. The estimates produced in the Table's report are based on extrapolations from limited case studies using the National Highway System data. The penetration rates were based on the consultant's best knowledge and are not detailed.

Section 2.4.2 (1) of the TMP also supports a Promising Measure for Road Vehicles which calls for incentives for alternative fuels for fleets and buses. The TMP transit priority principles support the suggested road and passenger measures.

Regional Council declared its commitment to climate change action in 1997 by joining the Federation of Canadian Municipalities *Partners for Climate Protection Program*. The Region pledged to reduce GHG emissions from municipal operations by 20% within 10 years and to reduce community-wide GHG emissions to 80 % of 1990 levels by 2007. The plan for the former municipal operations objective is being finalized. The latter objective is in the OP. If the Kyoto target is applied equally across sectors, which is not clear at this time, the Kyoto target roughly translates to a reduction of emissions from the urban passenger transportation in cities the size of Ottawa of 20% by 2010 (Hagler Bailly, 1999). Therefore, the Region's current objective matches the Kyoto Protocol.

The TMP, in Section 2.5.1, supports initiatives for increasing automobile user costs including investigating use-based registration and insurance fees, municipal fuel taxation, and supporting them if desirable. The Table examined parking supply management in which reductions in the supply of parking at new employment sites were modelled. These measures did not make it into the Table's Most Promising or Promising Measures lists.

CONSULTATION

No consultation by the Region is required at this time. The Climate Change Table will be holding open forums to collect comments on the report in early February. There will not be a forum in Ottawa, however, there will be one in Toronto on 17 February 2000. Geoff Noxon, currently Manager, Mobility Management, co-chaired the urban passenger study and was a member of the urban passenger working group.

FINANCIAL IMPLICATIONS

Due to the preliminary nature of this process, it is difficult at this time to foresee the financial implications of the Table's work. However, since none of this work was done specifically for the Ottawa area, the costs and benefits do not translate directly. There would need to be further analysis to determine the local and administrative impacts of the recommended measures.

Approved by
Nick Tunnacliffe, MCIP, RPP

/soc

Attach. (1)

TRANSPORTATION AND CLIMATE CHANGE: OPTIONS FOR ACTION

This paper is a summary of the above report which was submitted to Transport Canada in November 1999. This summary covers only those issues within the jurisdiction of the Regional Municipality of Ottawa Carleton and thus does not cover all aspects of transportation. The charts and tables are taken directly from the report unless otherwise noted.

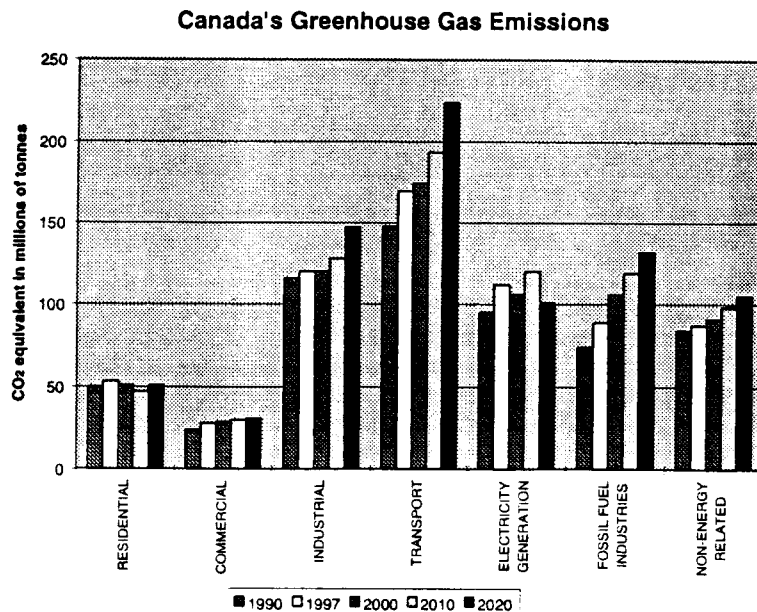
1.0 Introduction

The Transportation Climate Change Table (the Table) was created in May 1998 by the federal, provincial, territorial ministers of transportation to analyse options to meet or exceed the Kyoto Protocol commitment to reduce Greenhouse Gas (GHG) emissions by 6% from 1990 levels by 2008 to 2012. Transportation was one of 15 issues being examined and represents the single largest source of GHG emissions in the nation. The Table examined all aspects of transportation: "freight modes (road, rail, marine, air), transportation fuels, passenger transport (intercity and urban), vehicles and equipment, infrastructure, intermodal transportation, and transportation demand management." (p.2) The membership of the Table was made up of staff from Transport Canada and Natural Resources Canada.

The size of the transport sector is described. It accounts for 4 percent of the gross domestic product, plays an important part in trade, is fundamental to tourism and has an extensive infrastructure system. Some of these statistics are included in Appendix 1.

Transportation accounted for 25 percent of total emissions in 1997. The main greenhouse gases - water vapour H₂O, carbon dioxide (CO₂), methane (CH₄), Nitrous oxide (N₂O), ozone (O₃), and halocarbons (CFCs, HFCs). Each have different impacts, however they have been converted to CO₂ equivalents for this study.

The following chart illustrates how transportation compares to other sectors.

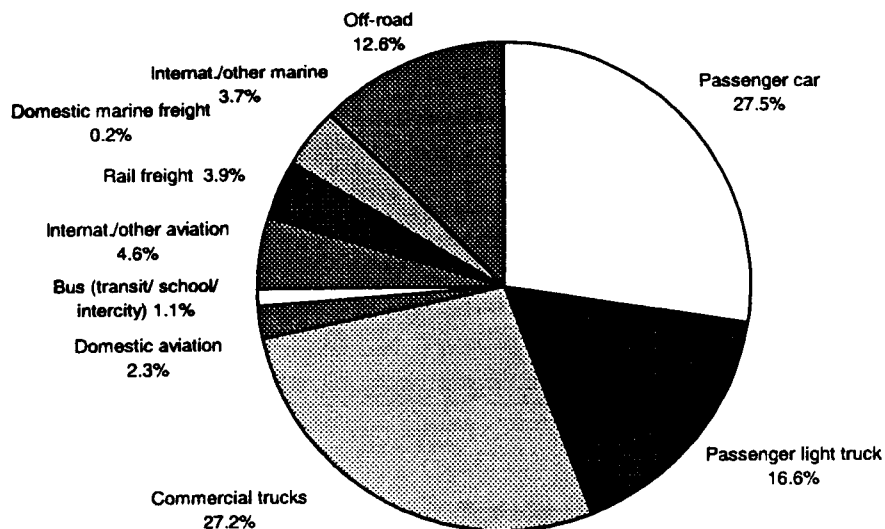


Targets have not been allocated by different sector, however, if applied equally, for all the aspects of transportation “GHG emissions would have to be reduced by 28 percent (about 54 Mt) by 2010 from the baseline scenario”(p. 8). In Ontario, transportation comprises 30% of total emissions although, per capita, Ontario has the second lowest transportation emissions behind only Quebec.

On a national level, road transportation dominates total transportation GHG emissions at 70 percent as illustrated in the below chart. Under the baseline scenario, the growth predicted in GHG emissions between 1990 and 2020 is as follows:

- on-road diesel vehicles - 74 percent
- on-road gasoline vehicles - 44 percent.

Source of Transportation GHG Emissions, 1997



1.1 Urban Transportation

In terms of total passenger travel, urban passenger travel accounts for 60 percent of the GHG emissions. It produces twice the amount of GHG emissions per passenger-kilometre as compared to other modes (p.12).

The challenge in urban transportation is the trend in the change in the mix of automobiles used and the increase in distances travelled. Sport utilities and vans as a percentage of passenger cars has increased from 24 percent to 36 percent in the last ten years. These trends counteract efforts to increase the fuel efficiency of vehicles. This type of vehicle accounts for about three-quarters of the growth in urban GHG emissions.

Direct trucking, rail and air measures will not be discussed in detail in this summary report because they are outside the jurisdiction of the Region and the measures suggested have little or no impact on our operations.

2.0 Policy Levers for Reducing Emissions

The report lists the following general policies as possible means for reducing emissions.

level of transport activity

- raising prices
- limiting the expansion of infrastructure
- policies to reduce use of transportation

transportation system efficiency

- reduce congestion
- integrate different modes
- shifting to less energy-intensive modes (such as transit)

energy efficiency within each mode

- significant technological change
- changing operating practices

carbon content of fuels

- technological and economic changes

3.0 Key Challenges

The report lists the following as key challenges facing the transportation sector.

Transportation Affects our Quality of Life: Change must involve the public and currently their awareness is low. The public should participate in discussion and governments must be aware of the differences in transportation choice between urban and rural settings. Change needs to be connected with another positive - in the past convenience or cost avoidance have worked.

Transportation is a Derived demand: As the economy grows so too does demand for transportation. Also it is an important industry in its own right.

Competitiveness impacts: Need to be looked at within and between modes. Transportation plays a role in the economy - natural resources industries may not be able to pass on increases in transportation costs; speed and service may be key competitive tools for some industries and thus limit their choice of modes.

New technologies take time: Although it holds great potential for the future, because of the time taken to commercialise and deploy new technologies, it alone will not meet the Kyoto timeframe.

Safety concerns: Often there are trade-offs between safety and the environment. Need to take the time to ensure safety standards are met.

Other environmental benefits: Transportation produces a great percentage of major air pollutants. It generates:

- 52% of all nitrogen oxides (NOx)
- 40% of carbon monoxide (CO)
- 20% of volatile organic compounds (VOCs)
- 5% of particulate matter (PM)

It is not always the case that reducing one emission will reduce others. “It is extremely important in the transportation sector to assess options for impacts on both GHG and air quality.” (p22)

Many diverse players: Four levels of government have jurisdictional control over transportation but millions of transportation decisions are made each day by carriers, drivers, shippers, consumers and the public. Thus not only intergovernmental cooperation is required but also “a new climate of policies, market signals or prices that will encourage millions of decision makers to consider the GHG implications of their decisions.” (p22)

Regional differences: The importance of transportation varies across the country due to the way the transportation system has developed in response to “region’s geography and climate, the nature of its economy, the importance of trade and the location of its population.” (p22) Policies need to be flexible.

4.0 Transportation Measures

Twenty-four research studies were contracted as part of the Table’s work. They were coordinated with the other aspects of climate change. The basis for assumptions which had to be made where data was limited or non-existent are described clearly in the report.

The non-road modes, trucking and fuel measures will not be discussed here as they are not within the jurisdiction of the Region. The trucking measures were reviewed and did not appear to have any impact on the Region. The following three packages of measures will be described herein: the passenger, road infrastructure and fuel tax packages.

4.1 Passenger Measures

Three separate studies were conducted: a broad urban study which the Region was involved with, a case study approach for the three largest urban centres, and a specific examination of the effectiveness of establishing tax-exempt status for employer-provided transit passes. A summary of the measures examined and their impact is provided in Table 4.10 from the Table’s report provided as Appendix 2. Most of the measures are self-explanatory.

4.1.1 Combined Urban Measures

One of the more interesting studies was the combined strategies for major cities. As has become evident in many studies recently, there is increasing evidence that no one strategy

will effect a large change in emissions. They conducted three case studies in Montreal, Vancouver and Toronto. Measures were identified in workshops and “were remarkably consistent across cities, including investment in public transport (rapid transit and service delivery), land use-planning and control, region-wide parking pricing, parking supply management (Vancouver only), road pricing mechanism (except Montreal), ITS (except for Toronto), public education and awareness.”(p. 64). The results are listed in Appendix 2.

The consensus continues into identification of a long list of barriers to implementation: existing institutional framework, fiscal inequities, lack of funding, lack of political and public awareness or “buy-in”, economic impacts of the packages on the region, lack of co-operation between levels of government, lack of participation by senior levels of government in funding and implementation, current trends in land development and forces, resistance to pricing mechanisms, lack of a stable source of funding for transit.

They called for the following changes to ameliorate the situation:

- strong federal, provincial and regional partnerships
- centralised responsibility for funding and planning/decision making with respect to both land use and transportation planning
- a stable, dedicated funding source for transportation measures.

4.1.2 Tax-exempt Transit Pass

This measure involves employers being able to provide to employees a tax-exempt transit benefit or to be able to purchase transit passes with pre-tax income. This is seen to equalise the tax-exempt status of employer-provided parking currently enjoyed by employees. It also would open up new transit agency marketing avenues through employers. The results are provided in Appendix 2.

4.2 Highway Infrastructure

This group of measures encompassed road pricing, more frequent resurfacing of pavements, and the effectiveness of HOV lanes. The road pricing was applied to urban and intercity networks and recouped the full cost including external environmental costs. The costs for urban travel were estimated to increase 100 percent. Pavement resurfacing was modelled to improve vehicle fuel efficiency. An analysis of converting existing general purpose lanes to HOV (transit and two-passenger vehicles) lanes was conducted. The data was very limited. It estimates a positive impact on GHG emissions but also warns that “HOV lanes are usually quite expensive and most effective on highways at least 16 km long with high congestion, where there are appreciable time savings to the high-occupancy vehicles.” (p69)

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Summary of Road Infrastructure Measures

Measure	2010 GHG Savings (Mt)	2020 GHG Savings (Mt)	Direct Costs (NOV lifetime) (\$M)	Cost/ Tonne (\$)	Financial Cost/ Tonne (\$)
Road pricing	2.8	3.2	\$3900	\$68	\$0
Enforcement of existing speed limit	4.2	4.7	\$850	\$10	-\$59
More frequent resurfacing	0.4	0.5	-\$300	-\$15	-\$15
HOV lanes	0.9	1.1	-\$20,000	-\$1000	-\$187

Based on Table 4.12, page 70

4.3 Intelligent Transportation Systems

Most of the ITS technology is highly applicable to urban situations. They generally reduce emissions by improving traffic flow and reducing congestion. “(I)t was difficult to assess the additional traffic that would be generated from less congestion, which would reduce some of the GHG benefits of these measures.” (p 71)

Summary of ITS Measures

Measure	2010 GHG Savings (Mt)	2020 GHG Savings (Mt)	Direct Costs (NOV lifetime) (\$M)	Cost/ Tonne (\$)	Financial Cost/ Tonne (\$)
Incident Management (early detection and response)	.108	.215	-\$170	-\$39	\$10
Adaptive signal control systems (respond to real-time conditions)	.100	.141	-\$880	-\$278	\$
Advanced en-route and pre-trip traveller information systems	.154	.300	\$33	\$6	\$30
Transit automated vehicle- location systems	.004	.008	\$11	\$65	\$0
electronic toll collection	.253	.549	-\$1500	-\$137	\$10
Transit Smartcard	.025	.051	-\$27	-\$28	\$10
Advanced vehicle control systems (to avoid collisions)	.047	.206	-\$13	-\$4	\$2

Based on Table 4.13, page 71

4.4 Pricing

The Table did not have the resources to complete a study of the full pricing of transportation and agreed that there is still a lot of controversy on this topic. They looked at fuel taxes, road pricing and parking charges as proxies for a more full recovery of costs. “Full cost pricing remains a potential approach to better reflect the environmental costs of transportation, but requires a significant and longer term analytical effort.” (p 114)

4.4.1 Fuel Taxes

The Table conducted an extensive study of this issue. The report provides the current federal and provincial tax rates across Canada. It also illustrated that real gas prices are lower now than in the mid-eighties. The effect of either a national fuel tax or a national embedded GHG tax would result in gasoline prices doubling by 2010 to meet the Kyoto target. Under the base case elasticity scenario, “the tax would produce increased revenues to the federal and provincial governments of over \$33 billion per year.”(p. 74). The 2020 GHG savings were estimated at 89 Mt. A gas tax applied in only urban areas of up to 4 ¢/litre was examined which produced 2.6 MT of GHG savings by 2020. “Such GHG reductions would be reinforced if the revenues generated were used to support other measures, such as improved public transportation and related measures.” (p.75) In a final two scenarios, road gasoline and diesel fuels were taxed at a gradually increased level up to 10 and 20 ¢/litre which produced a GHG savings by 2020 of 16 to 29 Mt respectively.

The report states that some of the lower costs estimated for specific measures may be at odds with the results of the fuel tax analysis.(p. xi)

4.4.2 Ancillary Effects

They examined the reduction in the growth in gas tax revenues if measures to reduce GHG emissions were to be put into effect. The loss if the most promising and promising measures were to be implemented would be equivalent to the 1 cent per litre over ten years measure. However, some of the pricing measures generate significant revenue. The report examined competitiveness issues quantitatively. There are many important issues which require further study. The report quantified the improvements in air quality based on the measures examined for GHG emissions reduction. The effect of combining measures was examined but not analysed. Therefore conflicting or enhancing effects of combinations are not taken into account. Land Use was examined separately in the Municipalities Table and thus the effects of those measures on the transportation system were not examined.

5.0 Assessing the Measures

The table then proceeded to group the more than 100 measures to reduce emissions from transportation that were examined. The criteria used are displayed in the following table.

Criteria for Assessing Transportation GHG Measures

GHG impact	Cost-effectiveness
Public support	Economic impacts
Complementarity to other measures	Ease of implementation
Certainty/risk	Equity effects
Ancillary impacts (e.g. safety, health, environment)	Other financial factors (e.g. taxes, costs to government)

Based on table, page V, Executive Summary

Categories of Measures

The following four categories used to rate the measures are described in the report:

1. **Most Promising Measures:** measures that are cost effective (generally have positive benefits or cost less than \$10/tonne), are easier to implement, or do not involve significant resource transfers. They may require some additional analysis and design.
2. **Promising Measures:** Measures that have potential for various levels of GHG reductions at low to modest cost, or which are included to complement other measures in the package. They may need some additional analysis or development.
3. **Less Promising Measures:** Generally, higher cost measures that may have GHG reduction potential in the medium to longer term and/or require significant additional analysis, much greater public acceptance, or considerable technological development.
4. **Unlikely Measures:** Measures that Table members believe do not warrant active consideration at this time due to high cost (over \$200 per tonne of GHG), limited potential to reduce emissions, or extreme difficulty in implementation. (p. v)

6.0 Results

The Most Promising and Promising measures identified which are related to urban transportation within the jurisdiction of the Region are as follows:

Category	Measure
Passenger Most Promising	tax-exempt transit pass transit smart card telecommuting car sharing
Passenger Promising	enhanced transit pedestrian and bicycle ride sharing parking pricing
Road Most Promising	enforce existing speed limits ITS synchronise traffic signals
Road Promising	high-occupancy vehicle lanes Expanded ITS More frequent road surfacing

These most promising measures concentrate on enhancing alternatives to the automobile that are voluntary and have general public acceptance. The promising measures include all the transit measures and alternatives to the automobile. The only disincentive is parking pricing. This particular measure was cited as being highly effective and having considerable potential. However, the measure is classified as promising for Vancouver, Toronto and Montreal at this point. Further analysis is recommended on how to target

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the pricing strategy at commuters not business or shopping trips. Also stated consultation with municipalities was required and targeted public awareness measures would be required.

The report states that there was no consensus on the issue of fuel taxes but most members of the Table felt that large increases in the fuel tax were not warranted. Instead most but not all the members thought that a small increase in the fuel tax to support the other measures was warranted. The two options that received the most discussion were an additional 1 cent per litre per year for 10 years, and an urban gas tax of 4 cents per litre.

There was some support for dedicating these funds to urban transportation improvements.

They warn in their conclusions that the study covered a complex topic in a short time and that it was not “intended to provide a prescription for implementing different measures. This may require more detailed analysis, design and consultation, including analysis by individual jurisdictions.”(p. xiv)

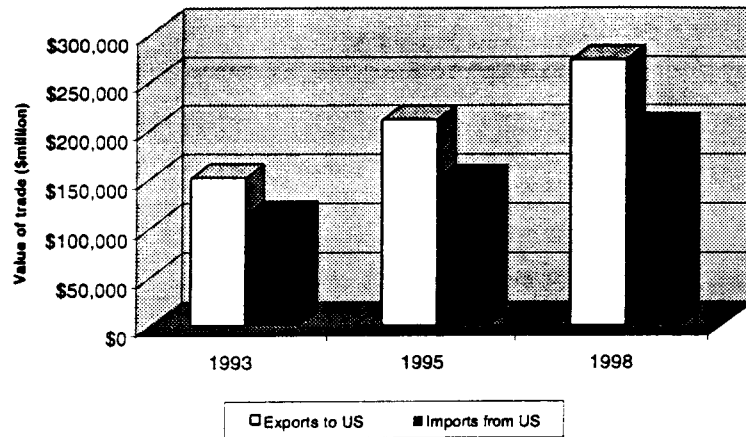
Appendix 1: The Transportation Sector

Economic Importance of Transportation, 1998¹⁰

Sector	GDP (\$billion)	Employment (000)
Air	\$4.3	110.2
Marine	\$1.9	29.0
Rail	\$4.0	45.9
Road	\$11.0	369.7
Bus, urban transit and other	\$6.6	176.7
Total	\$27.8	731.5

From Transportation and Climate Change: Options for Action, Page 4

Canada's Trade with the USA



Canada's Transportation Infrastructure¹²

Physical Infrastructure
1800 aerodromes/airports, including 83 flight service stations 44 air traffic control towers 7 control centres
901 903 kilometres (km) of road, including 24 239 km in the National Highway System 15 080 km operated by the federal government 229 486 km operated by provincial governments 655 892 km operated by municipal governments
18 gasoline refineries
16 000 service stations, including 13 300 gasoline and/or diesel stations 3000 vehicle refuelling appliances (VRA) 1500 propane stations 975 E10 fuel stations 200 natural gas stations 3 methanol fuel stations 1 E85 fuel station

From Transportation and Climate Change: Options for Action, Page 5

Appendix 1 (Continued)

Transportation Vehicles and Operators¹³

Mode	Vehicles	Operators
Air	27 988 fixed wing aircraft, including 21 577 private aircraft 6132 commercial aircraft 279 state aircraft 1689 helicopters 1400 electronic navigation aids	27 891 private pilots 9274 commercial pilots 10 629 passenger pilots 3769 helicopter pilots
Marine	174 merchant vessels 239 tugs and offshore supply vessels	
Rail	3259 locomotives 112 000 freight cars 428 passenger cars	
Road	11 900 000 cars (gasoline) 3 950 000 light trucks (gas) 150 000 heavy-duty vehicles (gas) 348 000 motorcycles 120 000 cars (diesel) 91 000 light trucks (diesel) 373 000 heavy-duty trucks (diesel) 254 000 alternative fuel vehicles	19 744 000 licensed drivers

From Transportation and Climate Change: Options for Action, Page 6

Appendix 2

Summary of Urban Passenger Measures

Measure		2010 GHG (Mt)	2020 GHG (Mt)	Direct Costs (NPV lifetime) (\$M)	Cost/ Tonne (\$)	Financial Cost/ Tonne (\$)
Pedestrian and cycling enhancements (A1)	L	0.3	0.4	\$750	\$147	\$147
	H	0.6	0.7	\$1500		
Transit, infrastructure (A2)	L	1.3	1.4	\$2120	\$102	\$102
	H	1.7	1.9	\$3180	\$115	\$115
Transit, service improvements (A3)	L	1.4	1.6	\$980	\$42	\$42
	H	1.9	2.1	\$1430	\$46	\$46
Transit, pricing (A4)	L	1.7	1.9	\$980	\$27	\$12 to
	H	5.7	6.4	\$1930	\$16	\$19
Tax-exempt transit pass (A20)		0.2	0.2	-\$3398	-\$941	-\$941
Telecommuting (A5)	L	0.4	0.4	-\$730	-\$99	-\$99
	H	1.0	1.1	\$4690	\$223	\$223
Road pricing (A8)	L	0.9	1.0	\$1070	\$72	\$72
	H	1.8	2.0	\$4290	\$120	\$120
Distance-based vehicle charges (A9)	L	0.2	0.3	\$570	\$146	\$146
	H	0.4	0.5	\$2010	\$190	\$291
Car-sharing programs (A7)		0.3	0.4	\$20	\$3	\$3
Parking pricing (A10) -	L	7.7	8.6	\$11 300	\$89	\$0**
	H	13.7	15.4	\$40 000	\$179	\$0**
	H*	0.52	0.58	\$2140	\$202	\$202
Parking, employer cash-out (A12)	L	0.2	0.2	\$630	\$178	\$178
	H	0.4	0.5	\$1260		
Parking, supply (A11)	L	0.2	0.2	not estimated	not estimated	not estimated
	H	0.4	0.4			
Ride sharing (voluntary)(A6L) to be studied						
Ride sharing (mandatory) (A6H)		2.4	2.7	\$7300	\$144	\$144
Vehicle inspection and maintenance (A13)		0.4	0	\$810	\$1350	\$1350
Accelerated vehicle retirement (A14)	L	0.1	0	\$100	\$77	\$77
	H	0.2	0	\$230	\$62	\$62
Traffic signalization improvements (A15)	L	0.4	0.4	\$90	\$14	\$14
	H	0.8	1.1	\$940	\$70	\$70
Driver education/awareness (A16)	L	0.4	0.4	-\$500 to	-\$76 to	-\$76 to
	H	1.2	1.3	-\$1530	-\$78	-\$78
3 CITY PACKAGES						
Vancouver, primary measures (A19)		0.8	1.0	\$1810	\$99	\$99
Toronto (no ITS) (A18a)		1.9	2.7	\$4705	\$105	\$105
Toronto (with ITS) (A18b)		2.0	2.9	\$5139	\$106	\$106
Montréal (no road pricing) (A17a)		0.9	1.2	\$1418	\$68	\$68
Montréal (with road pricing) (A17b)		1.1	1.4	\$2467	\$98	\$98

* Uses blended estimate reflecting GHG estimates from Three Cities Study, with cost estimates derived by Table.

** Costs estimated by consultant were imputed value of foregone trips, with no allowance for administrative costs.