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"Efficiency - Equity - Clarity"

**Evaluating Mobility Management Strategies for Reducing
Transportation Emissions in the Fraser River Basin**
Report Summary

The full 121-page report is available at www.vtpi.org/ec_mm.pdf.

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By

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Abstract

This report evaluates the benefits, costs and feasibility of 24 mobility management (MM) strategies. Each strategy is describe and rated according to various criteria, including energy, emission and congestion reductions, facility cost savings, consumer impacts, safety impacts and implementation requirements. Examples and case studies are discussed. A spreadsheet model is used to evaluate and compare the strategies. The model takes into account the portion of travel that is affected by each strategy, and the time required to achieve various levels of implementation. The analysis indicates that if properly selected and implemented, mobility management programs can offer economic benefits that exceed their costs. These benefits include reduced traffic congestion, road and parking facility cost savings, consumer cost savings, increased traffic safety, support for more efficient land use patterns, energy conservation and reduced pollution emissions. It identifies eleven strategies that appear to offer the most attractive combination of cost-effectiveness and political acceptability. It discusses barriers to their implementation, and describes actions by various levels of government that could help implement appropriate mobility management strategies. This document summarizes the comprehensive, 120-page report.

Introduction

This is the summary report of a study that evaluates potential *Mobility Management* (MM) strategies for reducing transportation energy consumption and emissions in the lower Fraser River Basin (the greater Vancouver region). It involves the following tasks:

- Identify and describe potential transport energy consumption and emission reduction strategies.
- Evaluate potential economic, social and environmental benefits provided by each strategy.
- Evaluate likely equity impacts of each strategy, including fairness, and impacts on physically and economically disadvantaged groups.
- Evaluate technical, administrative, legal and political obstacles to each strategy's implementation.
- Identify examples and case studies of these strategies, particularly those that are transferable to this region.
- Identify strategies that appear to be justified based on their economic benefits (i.e., that have a positive Benefit/Cost ratio based on financial savings to governments, businesses and consumers), which also help achieve environmental objectives (energy conservation, emission reductions and efficient land use).
- Provide conclusions as to which transportation strategies are most suitable for implementation, with recommended targets and implementation programs.

Mobility management (also called *Transportation Demand Management* or *TDM*) is a general term for strategies that result in more efficient transport patterns. There are many different mobility management strategies, which work at various levels and have a variety of travel impacts. Some create policy and planning practices that better support mobility management, or involve programs that deliver specific services. Some improve travel options, others provide an incentive to choose more efficient travel patterns. Some reduce the need for physical travel through mobility substitutes or more efficient land use. Mobility management strategies can change travel timing, route, destination or mode. The table below describes the 24 strategies evaluated in this study.

Table 1 Mobility Management Strategies Evaluated in This Study

Strategy	Description
Mobility Management Programs & Institutional Reform	Create policies and programs that support mobility management within transport agencies and other suitable organizations.
Employee Trip Reduction (ETR) Programs	Create and support ETR programs.
School & Campus Transport Management	Implement policies and programs to better manage school and campus transport.
Tourist & Special Event Transport Management	Implement policies and programs to better manage tourist and special event transport.
Freight Transport Management	Manage freight transport to increase efficiency and reduce external costs.
Aviation Transport Management	Manage air travel to increase efficiency and reduce external costs.
Transportation Management Associations (TMAs)	Create and support TMAs to provide transport and parking management services in specific commercial districts.
Commuter Financial Incentives	Provide financial incentives for commuters to use efficient travel options, such as Parking Cash Out and transit benefits.
Distance-Based Fees	Convert fixed vehicle registration, sales tax and lease payments into distance-based fees.
Pay-As-You-Drive Vehicle Insurance	Convert vehicle insurance into a distance-based fee.
Fuel Tax Increases	Increase fuel taxes.
Road Pricing	Charge tolls for driving on certain highways and bridges.
Parking Management and Parking Pricing	Use existing parking facilities more efficiently, and charge motorists directly for parking.
Mobility Management Marketing	Use marketing to inform people about efficient mobility options and to encourage their use.
Transit Improvements and Incentives	Improve transit service and provide incentives to use transit rather than driving.
High Occupant Vehicle (HOV) Priority	Give transit and rideshare vehicles priority on roadways to increase their travel speed.
Ridesharing	Encourage vanpooling and carpooling.
Nonmotorized Improvements & Encouragement	Improve walking and cycling conditions, and encourage the use of these modes.
Telework/Flextime	Encourage telecommunications to substitute for physical mobility. Allows more flexible work schedules.
Land Use Management Strategies	Create more accessible land use patterns, by encouraging more clustered, mixed and multi-modal land use patterns.
Carsharing and Alternative Vehicle Ownership Options	Make vehicles available for short-term rental in residential areas as a substitute for private vehicle ownership.
Car-Free Planning and Vehicle Restrictions	Create areas where private automobile use is not needed and implement restrictions on vehicle traffic.
Traffic Calming	Roadway design features that reduce vehicle traffic speeds.
Traffic Speed Reductions	Management strategies that reduce vehicle speeds.

This table describes the mobility management strategies evaluated in this study.

These strategies tend to be complementary and synergistic (the impacts of several strategies implemented together can be greater than the sum of their impacts if implemented separately). For this reason, mobility management is usually best implemented as an integrated program that includes a variety of strategies.

Mobility Management is an increasingly common response to transport problems, particularly in urban areas with growing populations. There are several reasons for this.

For one thing, it is increasingly expensive to increase roadway and parking capacity to accommodate additional automobile traffic. In addition, mobility management solutions can support a variety of environmental, economic and social objectives, including reduced energy consumption and pollution emissions, improved transportation options for consumers, and support for regional land use development objectives.

Mobility management strategies face many obstacles that must be overcome if they are to be implemented to the degree justified by their full benefits. The Vancouver region has various plans to implement mobility management strategies, but few of the mobility management strategies planned for this region have been fully implemented. There are many reasons for this. Some strategies face political opposition. Others require cooperation from other levels of government. Others require additional funding.

As a result, mobility management strategies can be viewed in two different ways. They can be considered a set of strategies that have been tried and failed, or they can be considered a set of strategies that have yet to be used, but could make a major contribution toward addressing regional transport problems if given a fair chance.

It would be a mistake to underestimate the obstacles facing mobility management strategies. Implementation often requires overcoming a variety of barriers, including existing planning practices, institutional structures and public concerns. Their benefits tend to be widely dispersed and difficult to measure, while their costs are often concentrated and clearly visible. They contradict the well-established image of automobiles as a symbol of economic success and economic development. The most effective mobility management strategies tend to be the ones that face the greatest obstacles, because they involve changing transportation investment and pricing practices.

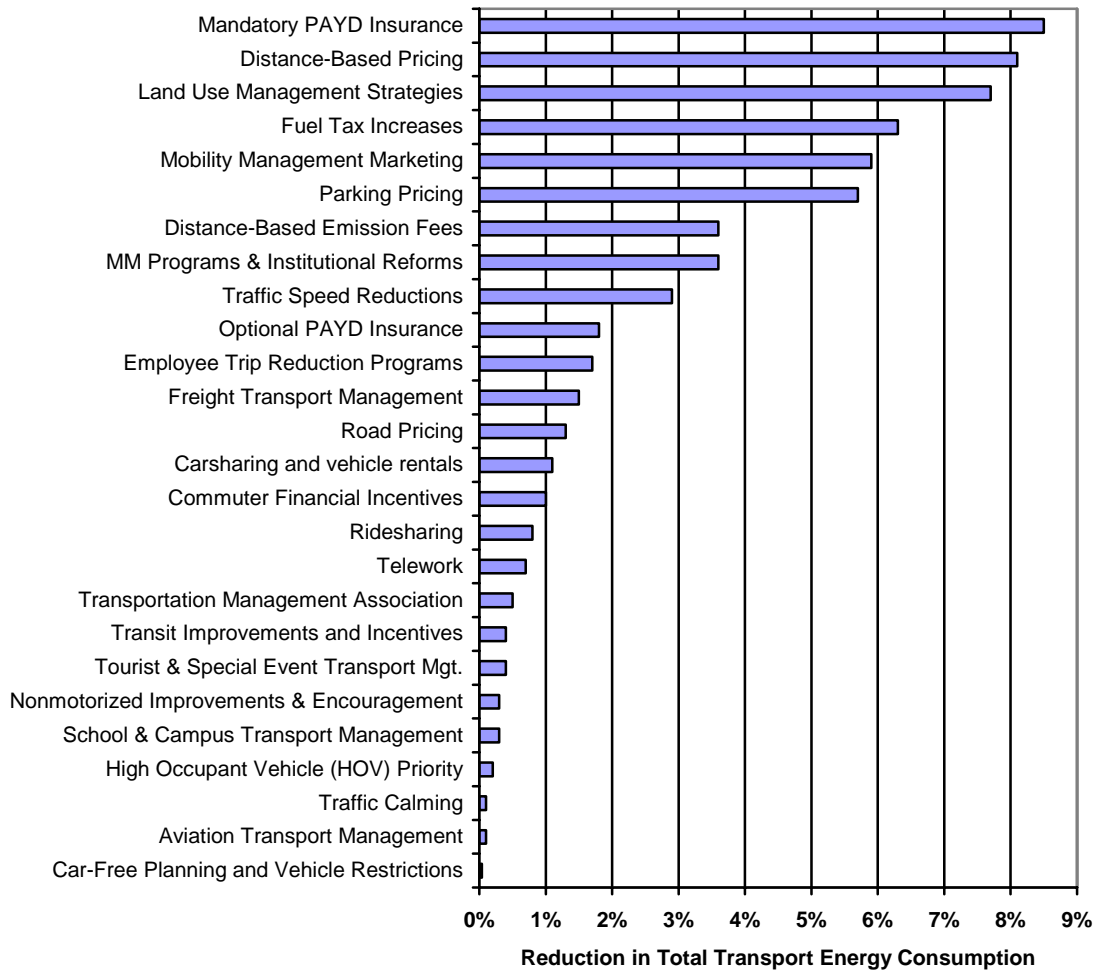
On the other hand, it would be a mistake to exaggerate these obstacles and conclude that mobility management is futile. Other reforms that initially seemed unrealistic have been successful, including seat-belt promotion, recycling programs, tobacco use reduction, and increased competition in telecommunications markets. These indicate that, given suitable information, incentives and encouragement, consumers can accept and even embrace changes that affect their opportunities and behavior. The potential benefits of mobility management strategies are large. When all factors are considered, mobility management strategies are often the most cost effective way to improve transportation, and consumers can benefit directly as well as indirectly, so significant investments and policy reforms can be justified to support mobility management.

Evaluation of Mobility Management Strategies

Quantitative Analysis

An Excel spreadsheet model was developed that calculates the total projected emission reductions of each strategy over a 20-year period, taking into account the size of its sector, the energy growth rate of its sector, average emission reduction per participant and predicted Take Up within the sector over the 20-year period. Figure 1 illustrates the results. Of course, actual results will vary depending on many factors.

Figure 1 Predicted Potential 20-Year Energy Savings



This figure compares the potential energy conservation impacts of the mobility management strategies described in this report. Actual results will vary depending on many factors.

Qualitative Evaluation

The strategies were rated from 3 (very good) to -3 (very bad) according to the following criteria:

- Congestion Reduction
- Road and Parking Cost Savings
- Traffic Safety
- Land Use Impacts
- Consumer Costs
- Transportation Options
- Equity Impacts
- Technical and Administrative
- Public/Political Acceptability

These are subjective ratings by the author and various stakeholders that were consulted. Another process or stakeholder group would probably result in somewhat different ratings. The table on the next page illustrates the results of this analysis. When these ratings are summed, the strategies listed below rank highest. Of course, these results depend on the inputs and assumptions that are used, and may change if different weightings are used.

- Transit Tax Exemption
- Mandatory Pay-As-You-Drive Vehicle Insurance and Registration Fees
- Optional Pay-As-You-Drive Vehicle Insurance
- Employee Trip Reduction Programs
- Carsharing
- Transportation Management Association
- School and Campus Transport Management Programs
- Mobility Management Marketing
- Land Use Management Strategies

Evaluating Mobility Management Strategies - Summary
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Table 2 Qualitative Analysis Summary

	Totals	Emission Red.	Cong. Red.	Road & Parking	Safety	Land Use Impacts	Consumer Costs	Transport Options	Equity Impacts	Tech./Adm. Requ.	Popular/ Political
Commuter Financial Incentives	25	2	3	3	2	3	3	3	3	1	2
Mandatory PAYD Insurance & Reg. Fees	24	3	2	2	3	2	2	3	3	2	2
Optional Pay-As-You-Drive Vehicle Fees	23	2	2	2	3	2	2	3	3	2	2
Employee Trip Reduction	23	2	3	3	2	2	2	3	3	2	1
Transportation Management Association	21	2	3	3	2	2	2	2	2	2	1
Carsharing	20	1	1	2	2	2	3	3	2	2	2
School and Campus Management	18	1	2	2	2	2	2	3	3	-1	2
Mobility Management Marketing	18	2	2	2	2	2	2	2	1	2	1
Land Use Management Strategies	17	2	1	2	2	3	1	2	2	2	0
Institutional Reforms	14	2	1	2	2	2	2	2	2	2	-3
Transit Improvements and Incentives	16	1	3	3	2	3	2	3	2	-1	-2
Ridesharing	16	1	3	3	2	0	2	3	2	-2	2
Distance-Based Taxes and Lease Fees	15	2	2	2	2	2	2	2	2	-1	0
Nonmotorized Improvements	15	2	1	2	0	2	2	3	3	-2	2
High Occupant Vehicle (HOV) Priority	14	2	3	3	1	1	2	2	2	-3	1
Mobility Management Programs	14	3	3	3	2	2	2	2	2	-2	-3
Telework/Flexitime	14	1	3	2	2	-1	2	3	2	-2	2
Tourist/Event Transport Management	11	1	2	2	2	2	2	2	1	-2	-1
Traffic Calming	11	1	0	1	3	3	0	2	1	-2	2
Car-Free Planning and Vehicle Restrictions	7	1	1	1	1	1	1	3	1	-2	-1
Traffic Speed Reductions	7	2	0	1	3	2	0	1	0	-2	0
Freight Mobility Management	5	3	1	1	1	1	0	0	0	-1	-1
Fuel Tax Increases	2	3	1	1	1	1	-1	-2	0	0	-2
Parking Management and Parking Pricing	2	3	2	3	1	2	-2	-3	0	-2	-2
Aviation Transport Management	-1	2	1	1	0	0	-1	-2	0	-1	-1
Distance-Based Emission Fees	-2	3	1	1	1	1	-1	-2	0	-3	-3
Road Pricing	-2	2	3	2	1	1	-2	-3	0	-3	-3

This table summarizes the qualitative analysis of mobility management strategies, based on a seven-point ranking system from 3 (very good) to -3 (very bad). Of course, these ratings may vary depending on perspective and situation.

Implementation

The table below identifies the administrative level with major implementation responsibilities for the various strategies. *Pub. Agency* refers to public agencies such as schools, hospitals and ports.

Table 3 Mobility Management Implementation Responsibilities

	Federal	Prov.	Reg.	Local	Pub. Agency	Private
Mobility Management Programs & Institutional Reform	X	X	X	X	X	
Employee Trip Reduction Programs			X	X	X	X
School & Campus Transport Management			X	X	X	
Tourist & Special Event Transport Management			X	X	X	X
Freight Transport Management	X	X	X	X	X	X
Aviation Transport Management	X	X	X		X	X
Transportation Management Associations			X	X	X	X
Commuter Financial Incentives	X	X	X	X	X	X
Distance-Based Fees		X				X
Pay-As-You-Drive Vehicle Insurance		X				
Fuel Tax Increases	X	X				
Road Pricing		X	X			
Parking Management and Parking Pricing			X	X	X	X
Mobility Management Marketing	X	X	X	X	X	X
Transit Improvements and Incentives		X	X	X		
High Occupant Vehicle (HOV) Priority		X	X	X		
Ridesharing			X	X	X	X
Nonmotorized Improvements & Encouragement		X	X	X		
Telework/Flexitime			X		X	X
Land Use Management Strategies		X	X	X	X	X
Carsharing and Alternative Vehicle Ownership Options		X	X	X	X	X
Car-Free Planning and Vehicle Restrictions			X	X		X
Traffic Calming and Roundabouts		X	X	X		
Traffic Speed Reductions		X	X	X		

This table indicates the administrative levels with major implementation responsibilities.

Many mobility management strategies appear to be technically feasible and economically justified, that is, their total economic benefits (congestion reductions, road and parking facility cost savings, road safety, consumer savings, and direct consumer benefits) can exceed their incremental costs. As a result, they can provide “free” energy savings and emission reductions. This is not to say that there are no costs or barriers to their implementation, or that they are always effective and efficient, but it does mean that if properly implemented society can benefit overall, regardless of the value assigned to climate change emissions and other vehicle pollutants.

Political acceptability is as important as cost-effectiveness in selecting mobility management strategies. Table 11 rates these strategies according to these two factors, identifying those that seem to offer the best combination of benefits and political acceptability. Of course, these factors vary depending on assumptions, conditions and how a strategy is implemented.

Table 4 Strategies Categorized By Net Benefits and Political Acceptability

	Greatest Political Acceptability	Moderate Political Acceptability	Least Political Acceptability
Greatest Net Benefits	Optional Employee Trip Reduction (ETR) Programs Optional PAYD Insurance Commuter Financial Incentives	Commuter Financial Incentives Exemption Parking Management Ridesharing Transit Improvements Institutional Reforms Land Use Management Distance-based Taxes and Lease Fees	Road Pricing Mandatory PAYD Fees Speed reduction programs
Moderate Net Benefits	TMA's NMT Transport Improvements MM Marketing School and Campus MM	Traffic Calming Freight MM Traffic Speed Reductions (HOV) Priority	Distance-based Emission Fees Aviation MM Fuel Tax Increases
Least Net Benefits	Telework/Flextime Carsharing	Tourist/Event MM	Carfree Planning

This table illustrates how various mobility management strategies rank according to total economic benefits and political acceptability.

Even strategies that appear politically unattractive may be implemented when conditions are favorable. For example, there may be circumstances in which parking pricing or road pricing become acceptable, because of an urgent need, because other options are even less acceptable, or because consumer attitudes and preferences change.

Federal and provincial policies can increase their political feasibility by offering appropriate support and incentives. For example, they can provide funding for mobility management programs, and infrastructure grants can be contingent on communities establishing more efficient transportation and land use policies.

Conclusions

This study evaluates the benefits, costs and feasibility of 27 mobility management (MM) strategies. This analysis indicates that if properly selected and implemented, mobility management programs can offer economic benefits that exceed their costs, and so can provide “free” energy and emission reductions. This is not to say that their implementation is costless or easy, but it does mean that society can benefit overall. The following appear to offer the best combination of benefits and political acceptability.

Commuter Incentives	NMT Improvements	School and Campus MM
Distance-based taxes and fees	Optional ETR Programs	TMAs
Land Use Management	Optional PAYD Insurance	Transit Improvements
Institutional Reforms	Parking Management	
MM Marketing	Ridesharing	

A portion of current vehicle travel results from market distortions (pricing, tax policies and planning practices that favor motor vehicle use). Many mobility management strategies reflect market principles that correct existing distortions, and so tend to increase overall economic efficiency and productivity while reducing vehicle mileage.

Most individual mobility management strategies only affect a small portion of total vehicle traffic, and so provide modest benefits. When evaluated based on just one or two objectives, such as congestion reduction or energy conservation, they may not seem very cost effective. However, as more impacts are considered, mobility management becomes increasingly attractive. An integrated mobility management program can effect a significant portion of total vehicle traffic in an area, and provide large total benefits.

Mobility management face various political and institutional obstacles. Some require changing current policy and planning practices, or new organizational responsibilities. Others impose costs that are concentrated on specific groups, while benefits are more dispersed. Some face common misconceptions of their costs, benefits and equity impacts.

The Vancouver region is already a leader in mobility management, although many of the most effective mobility management strategies have yet to be fully implemented. In some cases, relatively modest additional effort may result in more successful implementation.

One of the major challenges of mobility management implementation is that it requires coordination between various public and private organizations: employers, developers, local, regional, provincial and federal governments. The federal government currently has little direct role in implementing most strategies. However, federal policies and programs could make important contributions toward mobility management implementation by providing incentives to other levels of government, supporting research and pilot projects, and helping to create new relationships.

The next section summarizes specific actions that can be taken by various levels of government to help support mobility management implementation.

Action Options

Below are potential federal and provincial government actions that could help implement mobility management strategies that this study indicates are likely to be cost effective.

Federal Practices and Programs

- Environment Canada and other federal agencies could help fund mobility management programs, particularly pilot projects for innovations that have high potential of long-term benefits but face short-term obstacles, such as PAYD insurance and TMA development.
- Allow mobility management programs to qualify for emission reduction credits (i.e., as a way to meet federal air quality standards).
- Provide incentives for local governments to implement institutional reforms that encourage efficient transport and land use development. For example, make federal infrastructure grants contingent on implementing least cost planning, mobility management programs, and “smart growth” development standards.
- Require that matching funds for infrastructure projects reflect mobility management objectives by using efficient roadway user charges such as congestion tolls and parking fees.
- Expand programs such as Transport Canada’s Urban Transportation Showcase Community grants, which are only funding a small portion of the total innovative transportation programs that were proposed.
- Change federal policy to allow tax exempt transit benefits and tax deductions to employers who implement ETR programs.
- Develop a cooperative program involving federal (Environment Canada, Transport Canada, Natural Resources Canada), provincial and regional agency officials to support and implement regional mobility management plans.
- Develop tools to better evaluate transportation policies and projects, including mobility management programs and alternative modes.
- Consult with stakeholders to identify appropriate mobility management programs and reforms. For example, consult with municipal officials, the Planning Institute, the Canadian Institute of Transportation Engineers, and consumer organizations to identify potential policy reforms to encourage more efficient transport and land use patterns.

Employee Transport Management

- Help develop a regional ETR agenda that provides interagency coordination, information materials for policy makers, planners, business leaders and employers; and ongoing funding.
- Encourage provincial, regional and local governments to pass ETR legislation. For example, make infrastructure grants contingent on implementing such policies.
- Implement ETR programs for federal agencies and federally-supported organizations. Develop appropriate training materials for agency planners, personnel departments and managers. Expand commuter financial incentives offered to federal employees.
- Encourage local governments to reduce minimum parking requirements for employers that offer commuter financial incentives, and support other parking management strategies. This allows businesses to capture savings from reduced automobile commuting.

Freight Transport Management

- Consult with stakeholders and sponsor studies of the potential of implementing freight transport management in this region.
- Support development of a regional freight management program.
- Work with existing freight transport planners to incorporate sustainability objectives and apply mobility management strategies as much as appropriate.
- Make federal infrastructure policies and grants consistent with freight transport management objectives. For example, provide grants for port and rail system improvements, and for industrial development along multi-modal freight corridors.

Aviation Transport Management

- Sponsor a federal study of the potential of implementing aviation transport management at a national level.
- Investigate “hidden” subsidies and public policy biases that favor air travel over other travel options and consumer expenditures.
- Sponsor a process to develop and implement a regional aviation management program.
- Make federal infrastructure policies and grants consistent with aviation transport management objectives. For example, fund transit improvements to airports, and support improved intercity rail service.

School and Transport Mobility Management

- Consult with stakeholders and sponsor studies to identify opportunities to improve school transport management programs.
- Help establish ongoing funding for school transport management programs. This could include provincial, regional or local funding included in transportation, school or environmental program budgets.
- Evaluate school policies to identify biases that favor automobile travel over other modes (such as funding for parking facilities and school bus programs that is not available for mobility management programs, and policies that favor urban fringe school location).
- Sponsor conferences, workshop and education programs to develop better communication among school administrators, transportation professionals and local public officials concerning ways to implement school transport management programs.

Tourist Transport Management

- Consult with stakeholders and sponsor studies of the potential of implementing tourist and special event transport management.
- Support development of a regional tourist transport management program.
- Work with other federal and provincial agencies to support tourist transport management programs to achieve other goals, such as wildlife protection.
- Implement visitor transportation management programs at federal parks and for federally-supported events.

Transportation Management Associations

- Promote the development of TMAs through special funding (such as start-up grants) and workshops involving local and regional officials and business representatives.
- Have federal agencies and federally-sponsored programs support development of TMAs to help serve their employees.

Distance-Based Fees

- Support research and pilot projects that involve converting fixed vehicle charges into distance-based fees.
- Change federal tax policies so vehicle sales taxes can be prorated by mileage.
- Provide incentives to provincial governments to implement distance-based vehicle insurance, registration fees, weight-distance fees and taxes.
- Provide incentives, such as regulations or tax discounts, to private companies that offer distance-based insurance and lease fees.

Fuel Tax Increases

- Support research on the economic impacts of tax shifting.
- Support an integrated North American policy to increase fuel taxes.

Road Pricing

- Establish a federally-funded road pricing pilot project to identify congestion pricing barriers and opportunities, test potential electronic road pricing technologies, and demonstrate the feasibility and benefits of road pricing.
- Encourage regional and local governments to use road pricing to fund transport projects, for example, as a way to match federal grants.

Parking Pricing and Management

- Consult with stakeholders and sponsor studies concerning the benefits, costs and barriers to increased parking management and parking pricing.
- Encourage regional and local governments to use parking taxes as a way to fund transportation projects, for example, as a way to match federal grants.
- Promote development of TMAs to provide parking management and brokerage services.
- Have federal agencies and federally-sponsored programs implement parking management and parking pricing.
- Increase enforcement of employee parking benefit tax collection.

Transit Improvements

- Provide federal matching grants for transit service improvements.
- Sponsor research on cost-effective ways to improve transit service and encourage ridership.
- Help establish long-term transit funding.

HOV Priority

- Consult with regional transit and transport planners to identify cost-effective HOV projects.
- Provide funding and support for HOV priority projects.
- Encourage relatively high standards for HOV ridership (e.g., 3+ or 5+) and enforcement.

Ridesharing

- Consult with stakeholders to identify barriers and opportunities for increasing ridesharing in this region.
- Help establish and fund a regional rideshare development and marketing plan.
- Coordinate efforts to establish regional ridematch database or protocol for data sharing.
- Find ways to increase funding for rideshare program.

Nonmotorized Transportation Improvements

- Work with planning organizations to improve nonmotorized transport evaluation methods.
- Survey stakeholders to identify barriers and opportunities to increase walking and cycling.
- Encourage local governments to create walking and cycling plans, and to integrate these plans with transportation, transit, land use and school planning activities.
- Use federal grants to leverage increased provincial, regional and local expenditures on walking and cycling facilities and programs.

Mobility Management Marketing

- Sponsor mobility management marketing pilot projects.
- Help develop regional transportation management associations that can provide both general and targeted mobility management marketing programs.
- Help change policies so mobility management strategies can compete equally with capital investments for transportation funding.

Telework/Flextime

- Sponsor research on the travel impacts of telework and flextime.
- Develop a national telecommunications plan that help create infrastructure for telework.
- Promote telework and flextime for federal employees and federally-sponsored programs.

Land Use Management

- Sponsor research on the relationships between public policies, land use development patterns, travel behavior and transportation energy use/pollution emissions.
- Sponsor research projects and contests to develop high quality urban designs that address concerns about higher-density, mixed use, infill development.
- Locate federal facilities (e.g., offices and service centers) to support smart growth objectives.
- Reform federal policies to correct any biases that favor greenfield over infill development.