Workshop Report

Complementary Measures

A Report of the Pollution Probe Workshop to Scope Measures that Promote and Encourage Consumer Demand for More Fuel Efficient Vehicles

Workshop Date: June 28, 2005

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Pollution Probe is a non-profit charitable organization that works in partnership with all sectors of society to protect health by promoting clean air and clean water. Pollution Probe was established in 1969 following a gathering of 240 students and professors at the University of Toronto campus to discuss a series of disquieting pesticide-related stories that had appeared in the media. Early issues tackled by Pollution Probe included urging the Canadian government to ban DDT for almost all uses, and campaigning for the clean-up of the Don River in Toronto. We encouraged curbside recycling in 140 Ontario communities and supported the development of the Blue Box programme. Pollution Probe has published several books, including *Profit from Pollution Prevention*, *The Green Consumer Guide* (of which more than 225,000 copies were sold across Canada) and *Additive Alert*.

In the 1990s, Pollution Probe has focused its programmes on issues related to air pollution, water pollution, climate change and human health, including a major programme to remove human sources of mercury from the environment. Pollution Probe's scope has also expanded to new concerns, including the unique risks that environmental contaminants pose to children, the health risks related to exposures within indoor environments, and the development of innovative tools for promoting responsible environmental behaviour.

Since 1993, as part of our ongoing commitment to improving air quality, Pollution Probe has held an annual Clean Air Campaign during the month of June to raise awareness of the inter-relationships among vehicle emissions, smog, climate change and human respiratory problems. The Clean Air Campaign helped the Ontario Ministry of the Environment develop a mandatory vehicle emissions testing programme, called Drive Clean.

Pollution Probe offers innovative and practical solutions to environmental issues pertaining to air and water pollution. In defining environmental problems and advocating practical solutions, we draw upon sound science and technology, mobilize scientists and other experts, and build partnerships with industry, governments and communities.

December 2005

To: Participants of the Complementary Measures Workshop

Pollution Probe is pleased to publish this report summarizing the presentations and discussions of the workshop on Complementary Measures, held in June 2005.

Governments and industry around the world are faced with the challenge of rising greenhouse gas emissions from the transportation sector. In order to address this issue, in part, the Canadian government and auto industry signed a Memorandum of Understanding (MOU) to reduce greenhouse gas emissions from the light-duty vehicle fleet by 5.3 megatonnes by 2010. The goal of the workshop was to scope measures that would be complementary to government and industry efforts, such as the MOU, by shifting consumer demand toward more fuel-efficient vehicles in order to achieve greater greenhouse gas emissions reductions from the light-duty vehicle fleet.

This report is the beginning of discussions on complementary measures. We are expecting to follow up with initiatives on complementary measures in the upcoming year.

We want to thank you for your participation in the workshop. Your expert contributions to the presentations and discussions helped make this workshop a success.

Sincerely,

Mary Pattenden
Director, Climate Change Programme

Acknowledgements

Sponsors

Pollution Probe expresses its sincere appreciation to the main sponsors of our Motor Vehicle Fuel Efficiency Project. Their generous contributions enabled Pollution Probe to conduct the workshop on Complementary Measures and prepare this report.

The main sponsors are:

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Introduction

On June 28, 2005, Pollution Probe hosted a workshop on Complementary Measures. The objective of this workshop was to scope measures that promote and encourage a sustained shift in consumer demand towards light-duty vehicles with lower levels of fuel consumption and greenhouse gas (GHG) emissions.

The Government of Canada and the Canadian Auto Industry signed a Memorandum of Understanding (MOU) on April 5, 2005, committing industry to reduce GHG emissions from light-duty vehicles by 5.3 megatonnes (MT) by 2010. The MOU target represents only a small percentage of the 280 MT of reductions from business-as-usual projections required under Canada's Kyoto Protocol commitments. Given that GHG emissions from light-duty vehicles constitute about 12 per cent of Canada's total emissions, further reductions will be required from light-duty vehicles in the long term.

Continuing efforts by the federal government and the auto industry to reduce GHG emissions from Canada's light-duty vehicle fleet (such as that represented by the MOU) can be complemented with measures that increase market demand for new passenger cars and light trucks that are more fuel efficient and produce fewer GHG emissions. Such complementary measures have the potential to align market demand with the policy aims of government and industry, helping to make the ultimate goals easier and less disruptive to achieve.

This report provides background information on the complementary measures that were presented at the workshop, and an account of the scoping discussions among the participants. The measures presented were selected based on the potential to generate broadly-based and sustained market demand for improved levels of fuel efficiency and GHG emissions performance.

It should be noted that this report does not constitute an exhaustive or exclusive compilation of all possible complementary measures; rather, it is a point of reference from which to consider and scope new policy options and voluntary initiatives that are complementary to the fuel efficiency objectives of government and industry.

Overview

Motorists can reduce the amount of fuel consumed and GHGs emitted by their vehicles by keeping engines properly tuned and tires inflated to the optimal pressure, and by reducing the amount of travel. One of the most effective decisions they can take, however, is at the point of purchase, when they can choose a more fuel efficient vehicle. This workshop focused on measures that can help shift consumer demand towards new vehicles with improved levels of fuel efficiency (thus consuming less fuel) and reduced GHG emissions. Since these measures can contribute to the broader goal of reducing GHG emissions from the light-duty vehicle fleet, the measures are called *complementary*.

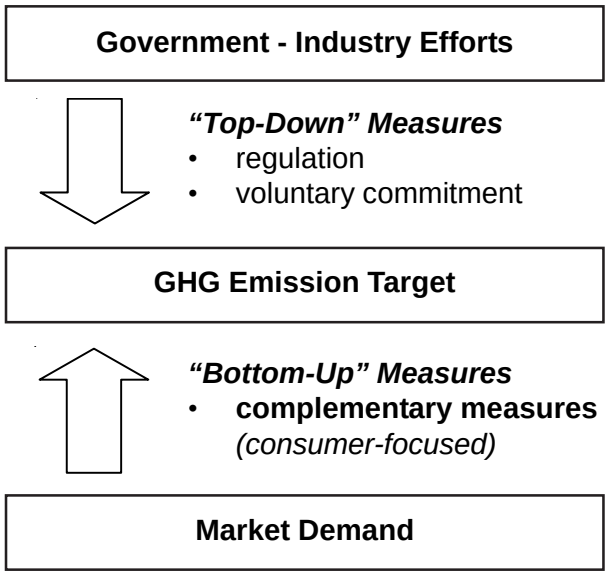
Complementary Measures Defined

Within the scope of this workshop, complementary measures were defined as those that:

lead to a shift in consumer demand towards more fuel efficient vehicles.

This definition recognizes the consumer as a potential driver of change. Consumer-focused measures are, therefore, complementary to government and industry efforts to improve fuel efficiency levels and reduce GHG emissions. The recently announced MOU, for example, places the onus on industry and government to reduce GHG emissions. A measure that shifts consumer demand towards more fuel-efficient vehicles could complement the MOU by broadening the market for fuel efficiency. Sustained consumer demand for fuel efficient vehicles could help make deeper, longer-term reductions in GHG emissions much easier and less disruptive to achieve.

In short, the *top-down* policies of government and industry to achieve target-level fuel efficiency and GHG emissions are complemented by measures that generate *bottom-up* market demand for fuel efficient vehicles, as illustrated below.



Complementary measures scoped during the workshop were organized into three categories:

- economic instruments
- preferential treatment mechanisms
- information tools and social marketing

These categories describe the general nature of a given complementary measure, but should not be considered exclusive definitions, as some measures have elements that fit more than one category. Presentations were made on complementary measures in each category, and the workshop participants discussed the relative advantages, limitations and impacts of each measure.

The goal of the workshop was not to arrive at firm conclusions or recommendations on different complementary measures; rather, it was to assess the potential of the measures to shift consumer demand and to identify the issues that would need to be addressed should the measures be further developed into effective policy options and voluntary initiatives.

The following sections describe the presentations, discussions and relevant subject matter, matching the order of the workshop agenda.

Update: Light-Duty Vehicle Fuel Efficiency and GHG Emissions in Canada

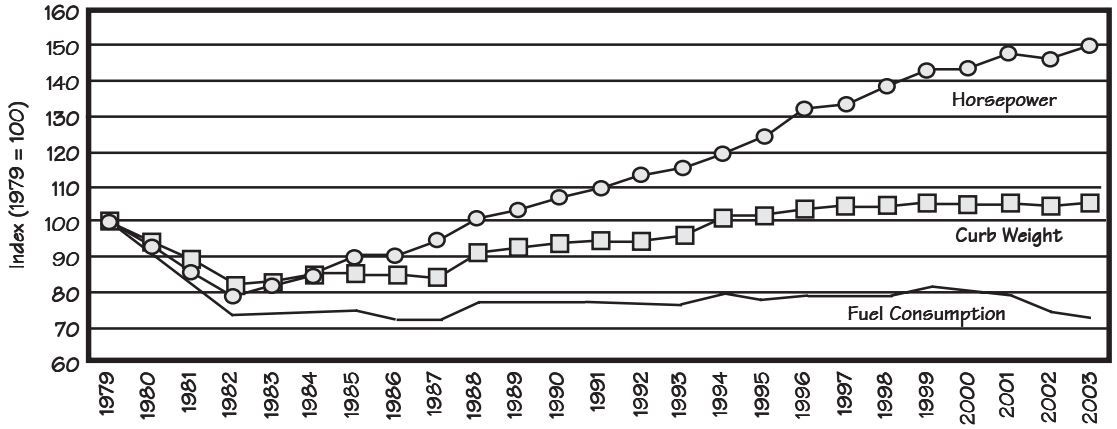
Paul Khanna of Natural Resources Canada presented an update on the status of GHG emissions in the transport sector. Overall transportation-related GHG emissions represented 26 per cent of the national total in 2003. Total emissions have increased by 25 per cent since 1990, with the gasoline-powered light-duty truck segment as the fastest growing source (reflecting the increased popularity of minivans and SUVs during this time period).

The trends in light-duty vehicle design, shown in Figure 1, highlight the missed opportunities to reduce fuel consumption and the rising levels of vehicle weight and engine power in the Canadian fleet over the past 20 years. As shown, a combination of reductions in vehicle weight and engine power contributed to significant fuel savings in the late 1970s and early 1980s. Since then, fuel consumption levels have stagnated, as many of the advancements in automotive technology and design that could have contributed to continuing reductions in fuel consumption and GHG emissions were instead utilized to accommodate increases in curb weight and horsepower.

The government regards this trend as an issue to be addressed. To improve fuel consumption levels, NRCan has initiated a number of programs to inform the public about fuel efficiency, including the EnerGuide label for vehicles and the annual Fuel Consumption Guide, both of which provide consumers with estimates of fuel use and GHG emissions for passenger cars and light trucks sold in Canada. These programs are discussed later in the section on *Information Tools and Social Marketing*.

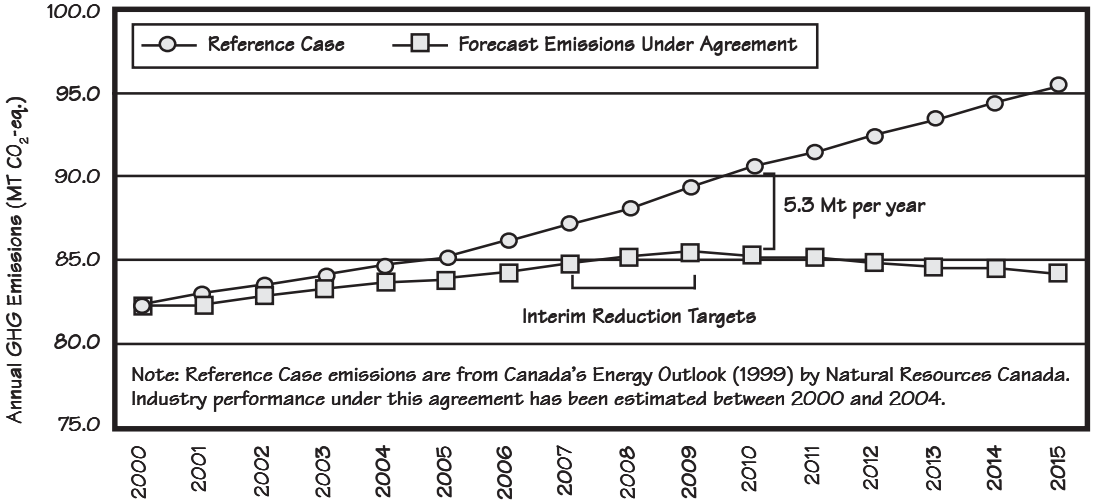
Most recently, the Government of Canada and the Canadian Auto Industry, representing

Figure 1: New Light-duty Vehicles, Canada, 1979–2003



Source: NRCan, 2005

Figure 2



Source: NRCan, 2005

domestic manufacturers and makers of imported vehicles, negotiated and signed a **Memorandum of Understanding** (MOU) that commits the parties to reducing GHG emissions from the light-duty vehicle fleet (i.e., passenger cars and light trucks) in Canada by 5.3 MT by 2010. The government considers this level of reduction to be consistent with its original target to reduce average fuel consumption levels 25 per cent by 2010, as the target was presented in the Climate Change Plan for Canada in 2002.

Figure 2 was presented, which illustrates one possible scenario of the impact of the MOU on overall light-duty vehicle fleet GHG emissions.

The reference case[1] shown in the figure represents the projected rise in GHG emissions based on the combined effects of increasing vehicle population (on-road stock), vehicle use and vehicle fuel efficiency levels, as well as the anticipated effect of new air pollution regulations on fuel efficiency. The performance case will generally be measured as actions by industry to reduce fuel consumption and GHG emissions from new vehicles. It was explained that changes in GHG emissions due to factors that are considered beyond industry control, such as reduced vehicle use or reduced vehicle population, would not be considered part of industry's performance case. This appears to focus the GHG emissions reduction effort on changes in vehicle technology and design within the fleet.

An auto sector participant suggested that the MOU reduction target only represents mitigation of the growth of GHG emissions, and that absolute reductions from today's levels may not occur if these reductions are offset by increases in vehicle population and vehicle travel. This is an important point because it highlights the role of consumer behaviour in maximizing GHG emissions reductions. Alone, the MOU may not generate the absolute reductions expected under Canada's plan to achieve its Kyoto target. This reinforces the need for complementary measures that shift consumer demand towards more fuel efficient vehicles.

[1] Note that the official reference case for the MOU has not yet been determined. The reference case shown in the chart was developed in a 1999 report and is not intended to represent the actual reference used for the MOU. The chart is for illustrative purposes only.

Economic Instruments

The purpose of economic instruments is generally to bolster the financial case for choosing a vehicle with better fuel efficiency and lower GHG emissions levels. To assess the merits of various economic instruments, it is useful to understand some of the economic principles that influence vehicle use and ownership.

Economic Theory Regarding Vehicle Ownership

According to Greene and Schafer,[2] the full cost of vehicle use consists of five distinct elements:

1. **Vehicle ownership costs**, including purchase price, maintenance and insurance,
2. **Variable costs**, such as fuel and tolls,
3. The cost of the vehicle operator's **time** and that of the passengers,
4. The cost of **infrastructure**, such as roads,
5. **External costs** imposed on others, but not directly borne by the vehicle operator or passengers. These are the costs that are often associated with the impacts of air pollution, climate change and traffic congestion, for example.

The first three costs are usually paid fully and directly by the vehicle operator and passengers. The fourth cost is partly paid through general government revenues (e.g., income taxes) and partly paid directly by the vehicle operator and passengers in the form of tolls and fuel taxes. None of the external costs are directly paid by the operator and passengers.

Accounting for the external costs (i.e., *internalizing* the externalities) can be more difficult than it might first appear. Calculating the cost of all the external damages and converting it into a per-kilometre levy on vehicle travel or a per-litre surcharge on fuel may be possible. However, this approach would fail to distinguish new and well-maintained cars from those producing more pollution per kilometer traveled due to poor maintenance or inferior emissions control technology. Moreover, the health-related cost impact of vehicle emissions on the public is dependent on many variables, such as ambient temperature, atmospheric conditions and the number of people exposed. A simple tax on vehicle travel or fuel could add unfair cost to responsible and conscientious travelers while letting the primary polluters off the hook for the full cost of the damage that they cause.

Instead, governments in the past have relied on regulations and standards to minimize the external costs. Technology mandates and emission standards have been very successful in reducing the per-vehicle amount of toxic and smog-forming emissions. Similarly, fuel efficiency standards required manufacturers to slash fuel consumption levels in half by the mid-1980s from their levels only a decade earlier. Although they have not been substantively changed since, these fuel efficiency standards have at least been effective in maintaining fleet-average fuel consumption levels below what otherwise would have been the case, particularly during the fall of real gasoline prices from record levels in the early 1980s.[3]

On the other hand, addressing the specific externality of climate change may be appropriate with some form of standard charge

[2] Greene, David L. and Andreas Schafer, 2003. *Reducing Greenhouse Gas Emissions from U.S. Transportation*. Pew Center on Global Climate Change. pp. 41.

[3] National Academy of Sciences. 2002. *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards*. pp. 3.

on fuels. Most transportation fuels (i.e. gasoline, diesel, natural gas, ethanol) are made up of molecular arrangements of primarily hydrogen and carbon atoms. Most of the carbon in these fuels is emitted from vehicles in the form of carbon dioxide (CO_2). Thus, there is a way to relate reductions in fuel consumption to reductions in CO_2 emissions (although not precisely due to the varying amounts of other GHGs in vehicle exhaust). But simply adding a charge on fuels equal the estimated cost of the external damage caused by a tonne of CO_2 emitted from a vehicle may not generate the desired reductions. Historically, the private vehicle market has not responded as effectively as might be expected to price signals related to fuel price or fuel efficiency. Studies have generally shown that a 10 per cent increase in fuel price (due to a carbon tax, for example) would only result in a one to two per cent reduction in vehicle travel. Of course, a fuel price increase should also cause people to consider fuel efficiency attributes in the purchase of a new car. But economic analyses predict that the same 10 per cent increase in fuel price would induce only a four per cent increase in fleet-average fuel economy ratings.[4] Combining these results, the expected impact of a 10 per cent increase in fuel price due to additional tax would be a reduction in CO_2 emissions of only five to six per cent over the long term (the impact on vehicle travel would occur immediately; the impact on fleet-average fuel efficiency would take time for new vehicle products and technologies to enter the market).

Part of the reason why an increase in fuel price alone fails to generate market demand for fuel efficiency improvements sufficient to offset the higher cost of fuel, may be that it is difficult for consumers to calculate the level of fuel efficiency that generates the maximum benefit. This issue is illustrated in Figure 3.

Figure 3

Figure A: Price and Value of Increased Fuel Economy to Passenger Car Buyer, Using NRC Average Price Curves and Valuing Fuel Savings Over 14-year Vehicle Life

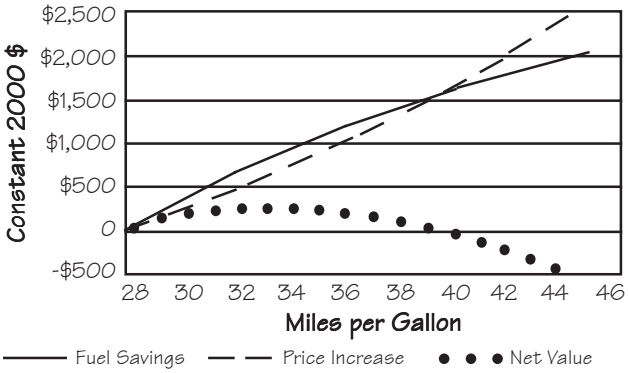
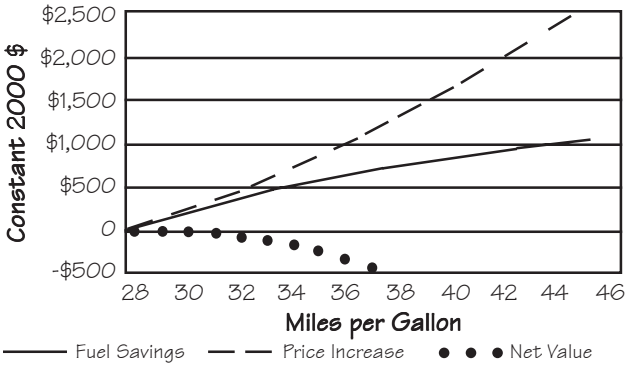


Figure B: Price and Value of Increased Fuel Economy to Passenger Car Buyer, Using NRC Average Price Curves with a 3-year Simple Payback



Note: Figures A and B assume cars driven 15,600 miles per year when new, decreasing at 4.5 per cent per year, 12 per cent discount rate, 14-year vehicle life, $1.50 per gallon gasoline, 15 per cent shortfall between EPA test and on-road fuel economy. Source: Greene, David L. and Andreas Schafer. 2003. *Reducing Greenhouse Gas Emissions from U.S. Transportation*. Pew Center on Global Climate Change. pp. 15.

[4] Greene, David L. and Andreas Schafer, 2003. *Reducing Greenhouse Gas Emissions from U.S. Transportation*. Pew Center on Global Climate Change. pp. 45.

The charts in Figures A and B both show the **Price Increase** for better fuel efficiency measured in Miles per Gallon (mpg); this is the premium paid on the purchase price of a vehicle that has been made more fuel efficient through the application of available technology improvements. As fuel efficiency increases, so does the price of the vehicle. In addition, as fuel efficiency increases, the total **Fuel Savings** also increases (as less fuel is required to operate the vehicle). From the vehicle owner's perspective, the **Net Value** of better fuel efficiency is determined by subtracting the Fuel Savings from the Price Increase. As long as the Fuel Savings are greater than the Price Increase, there is positive Net Value to the owner for better fuel efficiency.

While both charts show the same Price Increase curve, the Fuel Savings and Net Value curves are shown under different return-on-investment (payback) conditions. Figure A shows the present-worth value of the total Fuel Savings discounted over the full 14-year lifespan of the vehicle. Here, there is a positive Net Value if the owner takes a long-term view of operating a more fuel efficient vehicle.

Figure B shows the value of the Fuel Savings over a simple 3-year payback period. This case is based on a survey conducted by the U.S. Department of Energy that concluded the average consumer only values the first three years of fuel savings against the price premium for improved fuel efficiency (Patterson, 2002). As shown in Figure B, no Net Value is apparent to the owner who takes the short-term (3-year) view Fuel Savings. The implication is that consumers, however economically rational in their purchasing decisions, will not necessarily demand increased levels of vehicle fuel efficiency if they have a shorter-term view of the Net Value of better fuel efficiency.

Even if consumers take a long-term view of the Net Value of better fuel efficiency, this will not create demand for the *highest* fuel efficiency levels that are *cost-effective*. To understand why this is so, refer again to Figure A. Note that Net Value peaks at about 33 mpg, where the difference between Fuel Savings and Price Increase is at its greatest. Thus, in order to maximize their Net Value, the economically rational consumer would only pay extra for better fuel efficiency up to 33 mpg. After this point, the Net Value of better fuel efficiency begins to diminish, becoming cost-neutral at about 39 mpg. In this example, it is important to note that 39 mpg is achievable *at no net cost* to the vehicle owner, but delivers no direct financial gain either. In theory, if the demand for fuel efficiency is driven by the net value derived from fuel savings *only*, then the market would not be expected to deliver more than 33 mpg, even though 39 mpg is achievable at no additional financial cost to consumers (given a longer-term view of the Net Value).

For consumers to develop an intrinsic preference for fuel efficiency, there must exist added perceived values to fuel efficient vehicle use and ownership. These values may be tangible, as in the case of a driver enjoying access to reserved parking spaces or express lanes (i.e., the value of saved time for the driver), or somewhat less tangible, such as compliance with social norms.

Fuel Taxes and GHG Emission Taxes (Carbon Taxes)

Taxing fuel can increase the cost of driving and thus enhance the economic case for drivers to reduce fuel consumption. Similarly, taxation according to the GHG emissions produced by a vehicle can generate demand for lower-emitting vehicles.

Fuel excise taxes, though not historically levied to induce energy conservation, have been in place for many years in Canada. The federal excise tax on gasoline is currently set at 10 cents per litre, generating about $3.5 billion in federal revenues annually. Provincial excise taxes vary from 6.2 to 17 cents per litre for gasoline. As gasoline and diesel prices increase, excise taxes comprise a decreasing share of the total price at the pump.

In order to promote the use of alternative fuels, the excise tax is omitted on the sale of ethanol, natural gas and propane.

In the Transport Canada presentation on Economic Incentives, André Bourbeau noted that fuel taxes are expected to reduce distances driven in the short term, and have an impact on fuel efficient vehicle choices over the long term. Thus, fuel taxes have the capacity to generate immediate reductions in GHG emissions from the light-duty vehicle fleet, because the tax encourages a shift in driver behaviour towards reduced fuel use (by driving moderately or by driving less). A fuel tax also encourages a shift in consumer behaviour towards fuel efficiency among new vehicles, but the full impact of this requires time, as the on-road vehicle stock is gradually replaced with new vehicles.

André also noted, however, that a fuel tax increase is generally expected to place a disproportionate burden on lower income earners. This concern was also identified in the work of The National Climate Change Issue Table on Transportation, in which it was stated that the reduction of GHG emissions through a fuel tax alone would require the tax to be prohibitively high — especially for low-income households.[5] The report indicated that additional measures would be required to offset the cost impact of a fuel or carbon tax, in order to enhance public support for such policies.

[5] Transportation Climate Change Table. 1999. *Transportation and Climate Change: Options for Action*. pp. 113–117.

Fees, Rebates and Feebates

Fees can be applied to the purchase of vehicles that consume more fuel and emit more GHGs, thereby discouraging demand for these vehicles. The following describes the Federal Government's current fee structure to address fuel consumption, which is based on vehicle weight and optional energy consuming devices.

Tax on High-Energy Consuming Motor Vehicles — This tax is levied on passenger cars weighing more than 2,007 kg and on vans and wagons weighing more than 2,268 kg, according to the following schedule:

- $40 for the first 45kg in excess of the threshold,
- $50 for the next 45kg, and
- $60 for each additional 45kg.

Auto Air Conditioner Tax — Considered a luxury device that consumes additional energy, the tax on automobile air conditioners adds $100 to the purchase price of a new vehicle.

Rebates function in the opposite manner, enhancing demand for higher levels of fuel efficiency by rebating to the consumer a portion of the cost of purchasing a fuel-efficient vehicle. The chart on the following page depicts the Government of Ontario's current Tax for Fuel Conservation, which includes fees on the purchase of vehicles with fuel consumption ratings (based on the federal *highway* test cycle) of 6.0 L/100km or more, and a $100 rebate on the purchase of vehicles with a fuel consumption rating that is less than 6.0 L/100km.

Some jurisdictions offer additional rebates on the purchase of vehicles with a **specific technology content**, such as hybrid-electric drive systems, with the expectation that it will yield higher fuel efficiency levels. The Government of Ontario currently rebates the provincial sales tax (up to $1,000) on the purchase of hybrid-electric vehicles, while the Government of Prince Edward Island provides a consumer rebate of $3,000 on the purchase of hybrid-electric vehicles.

Government of Ontario Tax for Fuel Conservation

Highway Fuel Use Ratings (L/100 km)	Tax on New Passenger Cars	Tax on New SUVs
Fee Schedule		
6.0 to 7.9	$75	$0
8.0 to 8.9	$75	$75
9.0 to 9.4	$250	$200
9.5 to 12.0	$1,200	$400
12.1 to 15.0	$2,400	$800
15.1 to 18.0	$4,400	$1,600
over 18.0	$7,000	$3,200
Rebate Schedule		
Under 6.0	**$100 rebate**	$0

Source: www.trd.fin.gov.on.ca/userfiles/HTML/cma_3_6287_1.html

Feebates are a combination of fees and rebates. Generally, feebates can be designed to incorporate a **pivot point**, which can be set at a specific level of fuel consumption or GHG emissions. Purchasers of vehicles with fuel consumption levels above the pivot point are charged a fee, while rebates are given for vehicles with fuel consumption levels below the pivot point. A **rate** can be used to calculate the fee and rebate schedule on either side of the pivot point. Rates can either be designed as continuous functions or as a stepwise model, the impacts of which can vary.

Feebates can also be made revenue-neutral if the fees collected from vehicle owners on the *fee side* of the pivot point are rebated to owners on the *rebate side*. As the fleet becomes more fuel efficient, the pivot point of revenue-neutrality continues to move along the scale towards lower fuel consumption levels. In this way, a revenue-neutral feebate generates a continuous incentive for greater levels of fuel efficiency in new model year vehicles. This is similar to a fuel efficiency standard that is raised consistently over time. A revenue-neutral approach also has the political advantage of altering consumer demand without adding to society's overall tax burden.

André Bourbeau of Transport Canada described the government's work on a model to help assess the impact of potential feebate proposals. This was identified as part of the federal government's larger aim to develop in-house analytical capacity to assess various incentive options to reduce GHG emissions from transportation. The model was adapted from one used by the U.S. Department of Energy and designed by Dr. David Greene of Oak Ridge National Laboratory.

In terms of revenue-neutral feebate options, the model predicted a significant rise in fuel efficiency levels among new vehicle fleets. When simulating a feebate that applied in Canada and the U.S., the model predicted that the fuel efficiency increases would mainly be derived from consistent technology improvements in all vehicle classes, and that little change would occur in the mix of vehicles sold (i.e., share of cars, minivans, SUVs, pickups, etc.). When simulated as a Canada-only feebate, the fuel efficiency increases were partly achieved by a shift in the mix of vehicles sold, and partly through manufacturer decisions to adopt new fuel efficient technologies. This was due to the assumption that implementing technology

improvements in vehicles for sale only in Canada would come at a relatively higher cost (given that the auto market in Canada is relatively small from a global perspective).

An auto sector representative suggested that the model may fail to properly account for the leeway available to shift consumers into the more fuel-efficient vehicles currently available in Canada. The participant estimated that only about 20 per cent of vehicle owners in Canada may have the flexibility to move into more fuel efficient vehicles without sacrificing some elements of functionality that they require.

A participant from the provincial level of government also expressed concern that the model may not account for the possibility that a feebate could encourage some consumers to continue driving older vehicles, rather than to pay a fee on newer vehicles. André acknowledged that the model needs to be continually updated with empirical data, as it becomes available, that better describes the behaviour of Canadian consumers.

Alex Long of NRTEE also presented on the development of feebates. In Budget 2005, the Federal Government asked NRTEE to develop options for a revenue-neutral vehicle feebate through consultation, research and analysis, and to make recommendations in October 2005. The criteria against which the NRTEE would evaluate potential feebate options are: environmental effectiveness, fiscal impact, economic efficiency, fairness and simplicity.

An auto sector representative pointed out that only about eight per cent of the fleet is turned-over each year in Canada. If feebates were to slow the pace of turn-over, it could hinder improvements in fleet-wide fuel efficiency levels. This assumes that new model year fleets would be more fuel efficient than in previous years.

The extent to which Canadian manufacturers would be impacted (in terms of vehicle technology and design) by a Canada-only feebate is unclear. One participant remarked that a feebate could reduce SUV sales, an important product from Canadian plants. However, another pointed out that most vehicles made in Canada are for export markets, and that most vehicles bought by Canadian drivers are currently imported, thus the impact on domestic manufacturers should be minimal.

Some participants were concerned that vehicle choice could be limited under a feebate system, insofar as the market for vehicles that might qualify for a rebate is limited in Canada. Others countered that consumer choice could increase, as importers would have greater incentive to introduce to the Canadian market more of their existing fuel efficient models sold in the global markets (i.e., the Smart Car is available in Canada, but not in the U.S., as is the Toyota Echo Hatchback and the Acura 1.7).

One participant from the municipal level of government noted that the timing of fees, rebates or feebates should be considered. Currently, most economic instruments are applied at the time of purchase or upon the filing of a tax return. In either case, the effect is that of a one-time economic hit. Alternatively, economic instruments could be designed to generate a persistent effect on consumers. For example, a fee or rebate could be applied each time a vehicle owner renews his/her license. This would reinforce the incentive for fuel efficient vehicle use by providing consumers with an annual reminder.

One federal government representative noted that consumers are often not even aware that they qualify for the Ontario rebate of $100 on the purchase of cars until after the sale is made. This raised the issue of the role that messaging and communications might play in the successful implementation of a feebate program.

An auto sector representative expressed concern about governments' ability to maintain a feebate program as revenue-neutral, and suggested instead that revenues from a tax on vehicles with high fuel consumption ratings be dedicated to a specific program that reduces GHG emissions from transportation overall, such as funding for public transit. The participant also

noted that the current Ontario rebate of $100 on vehicles rated at under 6.0 L/100 km on the highway was too small an economic incentive to be effective, and noted that governments do not typically have the political will to implement fees and rebates large enough to be effective. Others agreed, noting that consumers considering the purchase of an expensive and inefficient SUV would not likely be influenced by even a $1,000 fee, and that a higher rate would be required (i.e., $3,000 or more).

A representative of municipal government suggested a variation on feebates that was technology-specific. For example, if a consumer required a large SUV that was assigned a fee due to its higher fuel consumption rating, a countervailing rebate could be offered if he/she chose fuel-efficient technology options that are available on that vehicle (e.g., variable cylinder management or a hybrid-electric drivetrain). The rebate could offset the fee to ensure that fuel-efficient technology is valued in large vehicles.

Another participant cautioned against technology-based financial incentives, as GHG emissions reductions is the focus, not technology promotion. There is no guarantee that the targeted technology would be used to reduce GHG emissions. It may be better to let the market decide how best to address the need for fuel efficiency.

An auto sector representative countered this argument, suggesting that the incentive should be based on the environmental benefit of the technology. He also noted that the incentive need not be cash directly, but could take the form an income tax deduction. In either case, the participant recommended that such measures should only be in effect for a limited and have a defined sunset date, as the objective should be to create the initial, critical mass to generate the necessary market momentum for a given technology. Once the technology is widely implemented across the fleet, economies of scale should mitigate the relative price premium for an advanced technology, reducing the need for continued incentives.

It was pointed out, however, that the idea of the feebate as a complementary measure was to generate sustained market demand for fuel efficiency — not simply to function as a temporary technology incentive. Part of the function of the feebate is to correct for the market failure in valuing the full benefits of fuel efficiency, and this is not something that is expected to change on its own. Another participant supported this viewpoint, noting that the 5.3 MT target under the MOU is just the beginning of a sustained effort to reduce GHG emissions over the long term.

Financing Rates

Financing rates can be set to provide an incentive for the purchase of fuel-efficient vehicles. Since the majority of vehicle purchases are financed through loaning institutions, preferred rate-setting for fuel-efficient vehicles is one way the private sector can contribute to GHG emissions reductions.

Andrea Harris presented on VanCity's Climate Change Solutions Program, which includes preferred loan rates on the purchase of fuel-efficient vehicles. VanCity is Canada's largest credit union with branches throughout British Columbia and subsidiary companies across the country, including Citizen's Bank of Canada.

One of VanCity's programs is the Clean Air Auto Loan, in which purchase loans are granted at zero per cent over the prime rate for vehicles that have hybrid-electric drive systems or run on natural gas. Andrea reported that the loan program, thus far, has not generated an exceptionally high proportion of hybrid sales. This is partially a result of the low volume of hybrid vehicles currently available in the market, as well as some issues related to marketing. Nevertheless, Andrea reported that the Clean Air Auto Loan is delivering 353 tonnes of CO_2 reductions annually, mainly among taxis and courier fleets.

A representative of the auto sector commented that the Clean Air Auto Loan is creative and shows potential. Andrea mentioned that the program could be enhanced by tying qualification criteria for preferred loan rates to GHG emission ratings, instead of specific vehicle technology or fuels. An auto sector participant suggested that industry could provide emissions rate data for this purpose.

One participant suggested that the strategy of a preferred financing rate could be extended to include preferred auto insurance rates. It was suggested that, to the extent that climate change increases an insurance company's risk exposure to damage claims related to weather events, there may be a solid business case for insurance companies to promote the use of low GHG-emitting vehicles.

Summary

Modeling indicates that economic instruments can be an effective way to promote and encourage demand for more fuel-efficient vehicles by providing direct financial incentives towards their purchase and use. In particular, feebates that function under a revenue-neutral mandate represent an innovative way to generate a persistent market demand for ever higher levels of fuel efficiency. Continuing competition for the fuel efficient vehicle market could lead to significantly lowered GHG emissions levels among new model year fleets.

While economic incentives that occur at the point-of-purchase of a new vehicle can be effective in shifting market demand towards greater fuel efficiency, the possibility of long-term, persistent impacts can also be considered. For example, a feebate that is applied annually, as in the case of a driver's license renewal, could provide a consistent reminder of the value of a fuel efficient vehicle purchase.

In designing economic instruments, possible interactions with the used car market and impacts on vehicle retirement rates should be considered. In particular, an economic penalty applied to the purchase of new, fuel-*in*efficient vehicles may encourage motorists to hold onto their old vehicles for a longer period of time, or buy used vehicles, if the newer, more fuel-efficient models don't appeal to them.

Preferential Treatment Mechanisms

The aim of preferential treatment mechanisms is to raise the apparent value of owning and operating a fuel efficient vehicle, or one that otherwise emits fewer GHG emissions, by creating indirect benefits. These indirect benefits may be financial in nature, or may represent value to the driver in other ways, as the following examples illustrate.

Reserved Access

In the U.S., a federal waiver exists that allows states to open high-occupancy vehicle (HOV) lanes — usually reserved for carpool traffic — to hybrid cars with a rated fuel economy level of at least 45 mpg. Many states have implemented such measures, or are in the process of passing the required legislation. Allowing drivers of fuel-efficient hybrid vehicles access to HOV lanes helps them to avoid congestion and reduce travel time. To the extent that reduced travel time is valued by people, this can provide a powerful incentive to consider the purchase of fuel-efficient hybrid vehicles.

The following excerpt from a news story in the Washington Post[6] related to hybrid vehicle sales illustrates this point:

> *Several car dealers in Northern Virginia said it's because of the HOV exemption. "I'd say 95 percent of the people who buy a Prius say it's to get into HOV," said Jay Taye, sales manager at Ourisman Fairfax Toyota. "They talk about the tax break and the HOV, and once in a while they say they prefer it for the gas mileage as well."*

[6] www.washingtonpost.com/wp-dyn/articles/A54561-2005Jan6.html

Such measures could be implemented for any vehicle achieving a relatively high level of fuel efficiency, and not just for hybrids.

In Paris, France, the city is considering a ban on SUV use within the downtown area. Insofar as this measure restricts access to the city by SUVs, it may increase the value of owning and operating a more fuel-efficient vehicle by reserving access for smaller passenger cars.

Preferential Parking Rates and Privileges

Parking lots can offer reduced rates for more fuel efficient vehicles (or higher rates for less fuel efficient vehicles). In his presentation at the workshop, Doug Manarin of the City of Vancouver described one program currently underway that offers drivers **a 50 per cent discount on the price of parking in the city-owned *EasyPark* facilities** (off-street parking lots) for drivers of vehicles that emit fewer than 12.6 kg of CO_2-equivalent per 100 km traveled (12.6 kg eCO_2/100-km). Currently, the following vehicles qualify for the discount:

- Toyota Prius (hybrid-electric)
- Honda Insight (hybrid-electric)
- Honda Civic Hybrid (hybrid-electric)
- Mercedes Smart Car (diesel-powered)

Doug noted that there are currently 38 EasyPark facilities in Vancouver that offer the preferential parking rate.

The City of Vancouver has projected that light-duty vehicle use will contribute 29 per cent to the municipality's total GHG emissions level in 2012. This draws equal with commercial emissions as the city's most significant source of GHGs. Doug reported that the city has committed to reducing GHG emissions by

450,000 tonnes annually by 2012 from its baseline projection of 3.2 million tonnes. To achieve this, the city has identified vehicle emissions improvements as a low-hanging fruit option to meet its target, anticipating 180,000 tonnes of reduced GHG emissions through improved vehicle fuel efficiency, better vehicle maintenance and changes in driving behaviour that save fuel.

Doug Manarin also noted that The City of Vancouver is pursuing other strategies to encourage and reward citizens who choose fuel-efficient vehicle travel options. This includes working with City partners to promote the use of "high fuel-efficiency" vehicles, a review of available regulatory options, "idle-free" programs, and social marketing and messaging campaigns.

Some participants pointed out that many people may not be able to afford the purchase of new vehicles that qualify for the *EasyPark* discount rate, and that there may be a social equity issue to consider in such preferential treatment mechanisms. Doug reported that the City is also pursuing strategies for increased transit use, trip reduction techniques and smart growth planning to reduce dependence on private vehicle use.

When asked if other cities around the world have initiated similar measures, Doug identified Australia has having initiated some preferential treatment programs. One participant noted that The Cities for Climate Protection Campaign has more than 600 members worldwide with 126 Canadian municipalities. Thus, there is the potential for more cities to collaborate on such initiatives.

When asked by one auto sector representative why the City of Vancouver was focusing on vehicles for GHG emissions reductions instead of other areas that, collectively, represent more emissions in total (e.g., commercial and residential sector emissions added together), Doug explained that since vehicle fleets turn over more quickly than building stock, they represent an important opportunity for improvement. At the same time, Doug affirmed that the City is also pursuing GHG emissions reduction strategies in other sectors.

It was also noted that parking lot managers could reserve the best spots (those close to exits, for example) for vehicles with top-rated fuel efficiency and GHG emission levels.

Special Exemption Measures

In Ontario, hybrid-electric vehicles are exempt from the biannual Drive Clean emissions testing program. To the extent that there is a fee for the mandatory emissions test, and that the owner must incur the expense of traveling to and from the testing site, the exemption provides a financial incentive to consider the purchase of a hybrid-electric vehicle. This example, and others, indicate that there is a range of creative options for preferential treatment mechanisms.

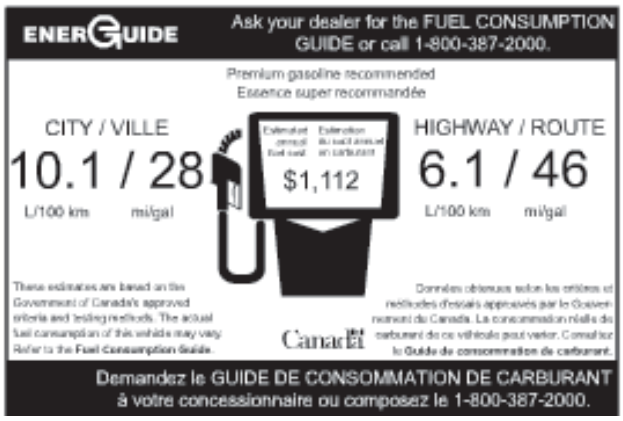
Summary

Preferential treatment mechanisms can promote and encourage demand for more fuel-efficient vehicles by indirectly adding value to their ownership and use. These mechanisms include access to reserved routes and areas, preferred parking rates and privileges, and special exemptions from fees. Such measures often fall within provincial and municipal jurisdictions, empowering them to take leadership roles in driving change towards a more fuel efficient fleet, thus helping to reduce Canada's GHG emissions.

Such measures can be considered in terms of their incremental impacts and as complementary to the larger policy drivers that ultimately change consumer behaviour. Equity concerns should also be considered in the design of preferential treatment mechanisms.

Information Tools and Social Marketing

There is a broad array of unique and integrated strategies that can be harnessed to help develop an underlying social value system regarding vehicles, fuel efficiency, greenhouse gas emissions and climate change. The campaign to reduce cigarette use and smoking in Canada (a credit to federal, provincial and municipal levels of government, as well as the efforts of non-governmental organizations) demonstrates the potential of social marketing to effect positive social change.



Source: Natural Resources Canada

Information Tools

In the past, governments have primarily focused on communicating the financial benefits of fuel efficiency and have provided consumers with information tools that enable them to make fuel-efficient vehicle choices. Such information tools, examples of which are listed below, are an important part of the broader social marketing campaign that is required.

EnerGuide for Vehicles Labeling

The EnerGuide label is a temporary information tool that provides consumers with an estimate of a new vehicle's relative fuel consumption attributes. This can help consumers select vehicles that are most fuel efficient for their purposes.

Cathy Kerr of Natural Resources Canada presented information on a new vehicle ranking system based on the EnerGuide data for fuel consumption and CO_2 emission levels. She explained that the ranking system must convey information in a manner that is user-friendly, simple and readily available to new vehicle consumers. The new ranking system is scheduled to be released before the 2007 model year vehicles are introduced.

Some workshop participants suggested that ranking information should include not only new model year vehicles, but also older vehicles as well. In this way, used vehicle shoppers would have access to important fuel efficiency information. Cathy explained that web-based tools are being developed that will include data on older vehicles.

One participant noted that when a new vehicle is purchased, the EnerGuide label is removed from the window, which has the effect of diminishing its perceived importance. In contrast, engine size is often prominently displayed somewhere on a vehicle's hood, rear or side panels. It was suggested that fuel consumption information could be permanently affixed to the rear bumpers of vehicles, so that the driver (and others on the road) remain informed of the vehicle's fuel consumption and GHG emissions performance. The participant suggested that this may generate greater profile for fuel efficiency as an important vehicle attribute.

Cathy's presentation illustrated how information tools may also serve a marketing function, depending on how the information is conveyed.

Fuel Consumption Guide

The Office of Energy Efficiency (OEE) at Natural Resources Canada freely distributes a guide that is updated annually with fuel consumption information for new model year vehicles. This tool allows consumers to compare fuel consumption attributes of light-duty vehicle models for sale in Canada.

Personal Vehicles Initiative Website

The OEE at Natural Resources Canada maintains an interactive website with information for consumers on how to purchase, operate and maintain vehicles such that fuel consumption and GHG emissions are minimized. Similar to the Fuel Consumption Guide, the website also includes a searchable database that permits users to compare the fuel consumption and CO_2 emissions attributes of light-duty vehicle models for sale in Canada. The database includes vehicles for the past ten model years, and thus can be used by consumers of both new and previously-owned vehicles.

EnerGuide for Vehicles Awards

Each year the OEE recognizes the most fuel-efficient vehicle in its class in a public awards ceremony.

One-Tonne Challenge

The One-Tonne Challenge is referred to in the federal government's *Project Green* as part of the plan to honour Canada's Kyoto commitments. Its primary function is to inform citizens on how to reduce their personal GHG emissions levels. For example, roughly half of the GHG emissions generated by individuals are from personal transportation activities, on average. Therefore, the One-Tonne Challenge guide booklet recommends that motorists use the most fuel-efficient vehicles that meet their everyday needs (i.e., avoid a 4-wheel drive vehicle if off-road travel is not a frequent situation).

The One-Tonne Challenge is also intended to motivate social change around the issue of climate change, and is thus representative of a more integrated social marketing approach to the issue.

Social Marketing

Jim Mintz of Health Canada opened his presentation with a definition of social marketing (attributed to Alan Andreasan):

> *"The application of marketing technologies developed in the commercial sector to the solution of social problems where the bottom line is behaviour change."*

It involves:

> *"the analysis, planning, execution and evaluation of programs designed to influence the voluntary behaviour of target audiences to improve their personal welfare and that of society."*

Jim Mintz referred to his experience in the federal government's campaign to improve public health conditions by reducing cigarette use (smoking), and suggested that a similar, long-term program is needed to address the issue of vehicle GHG emissions and fuel efficiency. He explained that social marketing is used to establish themes and provide a public focus on an issue, to reach many people at the same time and to inform the public that the government is concerned about a specific issue.

Social marketing differs from public education and other information tools in that its goal is not just to increase knowledge, but to change behaviour. Jim further elaborated on the process by which the target audience is defined, the key stages of change, when and what kind of interventions are required (i.e., different kinds of information tools, marketing, strategic alliances) and the setting of intermediate goals to measure impacts.

Of the many lessons learned from the smoking campaign, Jim noted that the emphasis on creating a social climate conducive to social change can be more effective than focusing on behavioural change at the individual level. He also explained that, with few exceptions, only long-term, multi-year campaigns can produce measurable social changes. Furthermore, while some fundamental elements of successful target marketing must be balanced against government mandates, it is important for governments to understand that social marketing requires a greater commitment than that required for simple public education programs — the long-run goal is behaviour change and the method is true social marketing.

Much of the workshop discussion about social marketing focused on the reasons for the vehicle purchasing decisions made by people. Both a provincial government representative and an auto sector representative claimed that people purchase SUVs for reasons other than practicality and need. Jim Mintz recommended that an evaluation of how SUVs are marketed be conducted to determine why people seem to value SUVs, noting that the vehicles are rarely seen on European roads.

Another participant noted that one of the current fastest-growing market segments is compact premium vehicles, where the cars are smaller, but built with luxury features and marketed for their performance attributes. Despite their acceleration performance, luxurious accruements and high price, they are among the more fuel-efficient models available. Some participants suggested that some sort of symbol be permanently affixed to vehicles that reflects the fuel consumption or GHG emissions performance of the vehicles. The idea being that some form of well-understood "green" certification could provide a physical signal upon which to focus behavioural change.

Jim emphasized that research is important to validate any such initiative, and that it is crucial to define *what is to be accomplished* and *what people will be asked to do*. It is important to understand what is preventing people from changing their behaviour, and then to address those barriers.

Summary

Social marketing could be an effective way to promote and encourage demand for fuel-efficient vehicles. If conventional marketing has been effective in promoting certain aspects of vehicle performance in the past, such as power and acceleration, then perhaps the use of social marketing is appropriate to help develop a responsible view of vehicle ownership among consumers, which includes fuel efficiency as a way to contribute to the reduction of GHG emissions.

Information tools are an important component of a social marketing campaign and are complementary to other government and industry efforts to reduce GHG emissions from light-duty vehicles. In order to better understand how to design and implement a social marketing campaign, more research into how and why consumers make their vehicle purchase decisions is required.

Other Measures to Improve Fuel Efficiency and Reduce GHG Emissions

Throughout the workshop, several options were raised that did not fit the strict definition of a complementary measure to promote and encourage demand for more fuel-efficient vehicles. However, many of these options are valid as measures to reduce GHG emissions from vehicles and transportation, in general. They are listed here for reference:

- Increased retirement rate for older, less fuel-efficient vehicles.
- Public transit incentives.
- City core access restrictions for personal vehicles.
- Transportation demand management.
- Fuel efficiency and GHG emissions standards for vehicles.
- Emissions trading credits for criteria air contaminants and greenhouse gases.
- Social marketing related to the full range of personal transportation choices, and not just cars, trucks, SUVs and minivans.

In addition, one participant suggested that measures to promote fuel-efficient vehicle use should be considered within a broader context of related measures, such as "Smart Growth" and city planning and design. Integration of different measures, such as those to increase both fuel efficiency *and* public transit use, could have a multiplier effect on the potential for GHG emissions reductions. The integration of emissions credit trading with these programs may also lead to a greater incentive to reduce emissions.

Additional References

The workshop kit included several documents with content relevant to discussions on complementary measures. These materials are listed here for reference.

1. Department of Finance Canada. *Budget 2005 — Budget Plan, Annex 4, A Framework for Evaluation of Environmental Tax Proposals*.
2. Lawson, John. *A Primer on Feebates*. Commissioned by NRTEE.
3. Lawson, John. 2005. *Interpretation of Requirements for the Assessment by the National Round Table on the Environment and the Economy of Options for a Motor Vehicle Fuel Efficiency Feebate*. Commissioned by NRTEE.
4. Greene, David L., Philip D. Patterson, Margaret Singh and Jia Li. 2005. "Feebates, rebates and gas-guzzler taxes: a study of incentives for increased fuel economy." *Energy Policy 33*, 757–775.
5. Kurani, Kenneth S. and Thomas S. Turrentine. 2004. *Automobile Buyer Decisions about Fuel Economy and Fuel Efficiency*. Institute of Transportation Studies, University of California.
6. A short compilation of recent news items related to complementary measures in automobile jurisdictions around the world.
7. British Columbia Automobile Association. 2005. *BCAA cost analysis shows hybrids nor as expensive as most think*. www.bcaa.com.

The following papers are also valuable resources for information on complementary measures, but were not included in the workshop kit.

- DeCicco, John. 1998 *It's Not (just) Technology, It's the Market (stupid!)*. American Council for an Energy-Efficient Economy.
- Perrin, Dan. 2000. *Options to Reduce Light Duty Vehicle Emissions in British Columbia*. Perrin, Thorau & Associates Ltd.
- Greene, David L. and Andreas Schafer. 2003. *Reducing Greenhouse Gas Emissions From U.S. Transportation*. Pew Center on Global Climate Change.
- Fulton, Lewis. 2001. *Saving Oil and Reducing CO_2 Emissions in Transport — Options & Strategies*. IEA-OECD.
- Difiglio, Carmen. 2000. *The Road From Kyoto — Current CO_2 and Transport Policies in the IEA*. IEA-OECD.
- Esvelt, Michael, Laura Evangelista and Burkard Mausberg. 2001. *Promoting Pollution, Not Conservation — The Effectiveness of Ontario's Tax for Fuel Conservation*. Canadian Environmental Defense Fund.

Workshop Agenda

Location: Delta Chelsea Hotel, Scott Room, Downtown Toronto, Ontario

Objective: To scope measures that promote and encourage consumer demand for light-duty vehicles that achieve improved fuel consumption and greenhouse gas emission levels.

10:00 **Introductory Remarks —** *Ken Ogilvie, Executive Director, Pollution Probe*
Workshop Overview — *George Matheson, Marbek Resource Consultants*

10:15 **Canadian Update —** *Paul Khanna, Senior Advisor, Office of Energy Efficiency, Natural Resources Canada*

10:30 **Classifying Measures as Complementary —** *George Matheson, Marbek Resource Consultants*

10:45 **Economic Instruments**

- *Phil Kurys, Director, Sustainable Development and André Bourbeau, Manager, Economic Analysis, Environmental Affairs, Transport Canada* — **Technical Analyses of Economic Instruments**
- *Alex Long, Research Associate, National Round Table on the Environment and the Economy* — **Development of Options for a Vehicle Feebate**
- *Andrea Harris, Sustainability Programs Manager, VanCity Credit Union* — **Climate Change Solutions and the Clean Air Auto Loan**

11:45 **Facilitated Discussion** on taxes, fees, rebates, feebates, financing rates and other economic measures.

12:15 **Lunch**

12:45 **Preferential Treatment**

- *Doug Manarin, Sustainability Group, City of Vancouver* — **Municipal Measures Regarding Low GHG-emitting Vehicles**

1:00 **Facilitated Discussion** on dedicated lane access, special parking access, preferred parking rates and other preferential treatment measures.

1:30 **Consumer Awareness-Building, Social Marketing**

- *Jim Mintz, Director, Marketing and Corporate Communications Division, Health Canada* — **Social Marketing**
- *Cathy Kerr, Program Officer, EnerGuide for Vehicles, Natural Resources Canada* — **New Vehicle Ranking System Discussion**

2:15 **Break**

2:30 **Facilitated Discussion** on information tools, promotional media, messaging and other social marketing measures.

3:00 **Facilitated Discussion —** Continued discussion on measures, including those that fall outside the workshop definition of complementary measures.

3:50 **Closing Remarks**

4:00 **Adjourn Workshop**

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