



May 25, 2007

**Pollution Probe's 1<sup>st</sup> Expert Meeting on  
Vehicle Fuel Efficiency Standards for Canada – March 14, 2007**

In October 2006, the Government of Canada announced that it will regulate light-duty vehicle fuel efficiency levels beginning with the 2011 model year fleet. Pollution Probe supports this action as an effective means to reduce greenhouse gas emissions from automobiles in Canada. Pollution Probe has called for a policy development process that involves stakeholders, including representatives of the auto industry, labour, consumers and the environment, and includes input from experts in the field.

On March 14, 2007 in Toronto, Pollution Probe convened a meeting of top experts and researchers on vehicle technology and fuel efficiency policy. The objectives of the meeting were to identify the most effective options for structuring a fuel efficiency standard for Canada, the main areas of research required for the development of a standard, and the complementary measures that round out Canada's policies on reducing overall vehicle fuel consumption and greenhouse gas emissions.

Pollution Probe is making the minutes of the meeting and the presentations publicly available by posting the materials on our website. Pollution Probe expresses its sincere thanks to the meeting participants for their contributions at the meeting and for their subsequent review of the minutes recorded and prepared by Marbek Resource Consultants.

We welcome the opportunity to contribute to the government's work on fuel efficiency standards and we look forward to organizing future expert meetings as the regulatory process develops. For further information on Pollution Probe's work on vehicle fuel efficiency standards and complementary measures, please contact Bob Oliver, Transportation Programme Director (ext. 237).

Best regards,

Ken Ogilvie  
Executive Director



**M A R B E K**  
Resource Consultants Ltd.

**MINUTES OF THE  
POLLUTION PROBE EXPERT MEETING ON VEHICLE FUEL  
EFFICIENCY STANDARDS FOR CANADA**

**Toronto Sheraton Gateway Hotel  
Wednesday, March 14, 2007**

*Submitted to:*

**Pollution Probe**

*Submitted by:*

**Marbek Resource Consultants Ltd.**

*May 18, 2007*

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## **DRAFT MINUTES OF THE POLLUTION PROBE EXPERT MEETING ON VEHICLE FUEL EFFICIENCY STANDARDS FOR CANADA**

These minutes provide a brief working summary of the Pollution Probe *Expert Meeting on Vehicle Fuel Efficiency Standards for Canada*, focusing on the discussion that took place and on key meeting conclusions. The minutes are structured to follow the meeting agenda, attached as Annex A. The list of meeting participants is provided as Annex B. These minutes do not include detailed summaries of the speaker presentations (which are available separately).

### **A. OPENING SESSION (INTRODUCTION AND WELCOME)**

Introductory remarks were presented by Ken Ogilvie, Executive Director of Pollution Probe. He referred to the Canada Gazette Notice and the Federal Government's commitment to introducing a vehicle fuel efficiency standard by 2011, and indicated that Pollution Probe would like to play a pivotal role in guiding the government's efforts in this regard. Based on this, Ken reviewed the objectives of the Expert Meeting:

- 1) To identify the most effective options for structuring a vehicle fuel efficiency standard for Canada that will maximize sustained GHG emissions reductions.
- 2) To identify and prioritize the main areas of research and analysis that are required to support development of vehicle fuel efficiency targets and implementation timelines.
- 3) To identify the complementary measures that can help maximize GHG emissions reductions (e.g., driver behaviour, vehicle maintenance, fuel standards, consumer incentives, education/awareness programs, technology-use measures, R&D support etc.).

Ken noted that once the areas of research have been identified, the work needs to be done as soon as possible. Finally, he advised participants that Pollution Probe did not invite full representation from the auto industry because this is not a stakeholder meeting, but noted that Probe is in a continuous dialogue with the industry.

George Matheson of Marbek Resource Consultants Ltd., the meeting facilitator, presented the agenda and noted that the goal was to obtain as much input as possible on the various issues to be discussed. The goal was not necessarily to achieve consensus on these issues, although points of consensus were noted when they emerged.

### **B. PRESENTATIONS SESSION**

The substantive discussions began with three presentations providing information on research carried out recently for Pollution Probe:

**Presentation #1: Very Brief Review of U.S. Debate, “25 by 20” and the Pollution Probe Canadian Fuel Use Model.** David Greene, Oak Ridge National Laboratory

**Comments/Questions:** For GHG emissions from the on-road automobile fleet in Canada, the study modelled a 25% reduction from 1990 levels by 2020, **strictly** through improvements in **new** vehicle fuel efficiency. A participant asked about technology assumptions in the model used by David Greene. David re-iterated that his model was not a technology model but rather a fuel economy model that looked at emission impacts of improved fuel efficiency in the new vehicle fleet. John Lawson, Lawson Research, noted that in reality the vehicle kilometres driven are increasing and that David’s model doesn’t represent this accurately. David responded that John’s observation was correct and that the vehicle kilometres driven factor used in his model is conservative. John German stated that in the long-term, the addition of very efficient new vehicles into the fleet would reduce carbon emissions significantly, but a fleet wide 25% reduction will just not occur by 2020.

**Presentation #2: Quantifying Mileage Impact: Driver, Road, and Vehicle.** Matt Stevens, Team Leader, University of Waterloo Alternative Fuels Team

**Comments/Questions:** Peter Reilly-Roe asked if the model could be adapted to Canada’s colder climate. Matt Stevens responded that the model was run assuming a temperature of 20°C, but it has the capability to be run at different temperatures. Heather MacLean asked if the model would be able to take into account alternative fuels, and noted the importance of looking at fuel choice. Again, Matt stated that the model has the flexibility to use different fuel options.

**Presentation #3: Fuel Economy Standards and Vehicles: Production, Announced and Concept.** Mike Millikin, President, BioAge Group, LLC and Editor, Green Car Congress

**Comments/Questions:** Margaret McCuaig-Johnston, Natural Resources Canada, inquired if the Chinese vehicles expected to be imported into Canada next year were factored into the data as presented. She noted that the Chery vehicle will be marketed towards lower income consumers and thus may become a significant part of the fleet mix. Mike Millikin responded that he didn’t include the Chinese imports into the fleet mix, but that they could have an important impact on the baseline. John German, American Honda Motor Company, noted that Japan and Europe are planning to create a fuel efficiency standard that increases fuel economy by 2% per year.

Bob Oliver stated that Pollution Probe’s reason for commissioning these various studies was to scope out where the organization should put its efforts and to help Probe speak with greater confidence to the government about fuel efficiency standards. David Greene commented that although the answers to the Pollution Probe questions showed that the modelled reductions were improbable under the short timelines, it was nonetheless a useful exercise to determine the nature of the challenge. Additionally, David asked the group if it would be important to improve the vehicle test cycle so that it more accurately represents real world GHG performance of vehicles.

## **C. DISCUSSION SESSION 1: STRUCTURING A CANADIAN VEHICLE FUEL EFFICIENCY STANDARD**

### ***Question 1: Are fuel efficiency standards the most effective approach to reduction of vehicle greenhouse gas emissions?***

Malcolm McHattie, consultant, suggested that the market would not achieve significant fuel efficiency gains on its own and thus standards need to be implemented. However, other complementary measures, such as transport demand management, are also required to achieve major fuel consumption and greenhouse gas emission reductions. Additionally, Steve Plotkin, Argonne National Laboratory, commented that fuel economy standards have worked in the US and Japan, while all other tools have been shown to be weak or haven't resulted in clear success. He stated that a fuel efficiency standard would have the single most important impact on reducing emissions. Similarly, John German agreed that technology and fuel efficiency are the biggest levers for achieving reductions, while fuel prices are a comparably weak lever. David Greene stated that experience has shown that most gains are made with fuel efficiency standards.

On the other hand, it was noted that a fuel efficiency standard doesn't address the upstream and downstream creation of greenhouse gas emissions. Roydon Fraser, University of Waterloo Alternative Fuels Team, stated that it was imperative to include lifecycle greenhouse gas emissions and that a fuel efficiency standard wouldn't address this. Furthermore, it wouldn't encourage the use of alternative fuels. Paul Khanna, Natural Resources Canada, responded that there are other policies to provide incentives for alternative fuel consumption. John German added that the use of alternative fuels is a separate subject, since it is independent of the vehicle's design. In addition, Scott Smith, AIA Canada, stated that fuel efficiency standards only affect the front end of the fleet and that other options (i.e. tire inflation, maintenance, etc.) would affect the entire fleet.

David Greene stated that fuel efficiency standards and feebates are somewhat overlapping measures, in that both encourage manufacturers to change the design of their vehicles (whereas a fuel tax, for instance, will influence the number of kilometres driven). Conversely, feebates were seen by some other participants as more complementary to fuel efficiency standards. Louise Bedworth, Public Policy Institute of California, added that an analysis is currently underway to quantify the effectiveness of feebates on top of the state's GHG standards and the report should be released in the next month. Peter Reilly-Roe added that the selection of fiscal measures would be dependent on the percentage reduction in emissions that is needed.

John Lawson commented that cost-effectiveness would guide government targets and that the same approach that the US uses for cost-benefit analysis should be used by Canada. David Greene disagreed that this would be appropriate, since the analysis assumes that the market is perfect and doesn't take into account market failures. In particular, greenhouse gas costs are valued at very small to negligible dollar amounts. John Lawson responded that the valuation of externalities is part of the regulation development process in Canada. Louise Bedworth added that development of the California regulations

involved consideration of many variables, including the value of consumer choice.

*Summary:* A fuel efficiency standard was deemed to be a necessary component of efforts to reduce vehicle greenhouse gas emissions; however, other complementary measures are also needed to achieve the maximum possible emission reductions throughout the on-road vehicle fleet.

***Question 2: How should a fuel efficiency standard be structured to best deliver greenhouse gas emission reductions while maximizing economic and social benefits?***

As a point of departure, one participant suggested that the preferred fuel efficiency standard would be structured as follows:

1. The standard would be based on CO<sub>2</sub>e/km (CO<sub>2</sub> equivalent per km)
2. It would be applied to a single category combining passenger cars and light trucks
3. It would be specified as either a single standard for the fleet, or as a size-based standard.

Steve Plotkin stated that the problem with a single standard or number is that it creates unfairness between the manufacturers, particularly if the passenger car and light truck fleets are combined. Steve does not favour a single standard, but if this approach is selected he recommends that the fleets not be combined, as this will devastate truck manufacturers. In contrast, a size-based standard allows for the combination of the fleet. However, it removes an incentive to move towards smaller cars, and eliminates the ability to set the overall fuel economy level for the new vehicle fleet (since the overall fuel economy level will depend on what sells in the marketplace).

Ken Ogilvie asked how those manufacturers most affected by the fuel efficiency standard could be accommodated. David Greene responded that the arguments used by opponents of fuel efficiency standards in the United States are that it's unfair to domestic manufacturers (because they produce less fuel efficient vehicles) and that it's unsafe (because vehicle safety would be sacrificed for higher fuel economy). Regarding fairness, a size-based approach takes into account manufacturing equity and job impacts. Regarding safety, although the National Highway Traffic Safety Administration (NHTSA) states that more weight makes vehicles safer, a study commissioned by Honda showed that it is in fact size (length and width but not necessarily mass) that may make vehicles safer. Based on this, a size-based approach appears to take into account safety issues. Indeed, it was noted that NHTSA employed a size-based standard (i.e., a vehicle footprint approach) for the new CAFE standard for light trucks.

John Lawson asked if size would be the right metric, assuming an attribute-based approach (such as vehicle size or weight) is to be used and assuming the fleet is to be combined. Steve Plotkin responded that moving to a size-based standard is not perfect but it is better than the current approach in the U.S. If weight is used instead of size to prescribe fuel efficiency, weight can be added to vehicles relatively inexpensively so that they qualify for a lower standard based on the higher weight factor. In contrast, adding to

vehicle size is more difficult and costly, making it more difficult to qualify for a lower standard. Furthermore, size is probably a better metric than weight if maintaining vehicle safety is an important factor. Steve also stated that a weight-based standard lowers the potential for efficiency improvements, since it takes weight reduction off the table as a way to improve fuel efficiency.

Roydon Fraser agreed that a size-based standard would allow for the greatest reductions in greenhouse gas emissions. Furthermore, Matthew Stevens stated that having a size-based standard doesn't necessarily eliminate the incentive for car manufacturers to shift to smaller vehicles; this depends on the slope of the curve that defines the efficiency standard that a vehicle must meet. Another participant noted that with respect to efficiency levels for a size-based standard, a single line can work for vans, cars and pickup trucks, but SUVs stick out as having very low fuel efficiency (i.e., SUVs do not fall onto the curve for fuel efficiency as a function of vehicle size).

The United States has adopted a size-based (footprint) standard for light trucks and will probably use it for passenger cars. Thus it is possible that the entire US standard will be size-based. Therefore, it is important to obtain more analysis on passenger cars to determine if a size-based standard makes sense. A size-based approach has the most unknown consequences and would require further study to determine its applicability in the Canadian context.

Matthew Stevens asked what kind of calculation would be used to convert between CO<sub>2</sub>e and mileage. John German stated that California's structure is excellent and should be considered. It measures grams of CO<sub>2</sub> per mile and includes factors for incorporating methane emissions and NO<sub>2</sub> from the tailpipe, and better air conditioning systems are included as offsets.

Roydon Fraser stated that a g/km standard goes beyond efficiency to consider fuel choice i.e. it addresses different objectives. He also noted that action in Canada is being pushed by climate change while in the United States energy security is the major lever. Another participant responded that using ethanol will lower lifecycle greenhouse gas emissions, but the focus of vehicle standards should be on the vehicle design (not the fuel).

*Summary:* There is support for a size-based fuel efficiency standard, recognizing that there are unknowns about this approach. These unknowns will require further study in the Canadian context (regarding, for instance, unintended impacts on vehicle size and the question of whether to combine car and light truck fleets). In addition, some participants believe that greenhouse gas emissions should be the metric used in the standards, with a structure similar to California's that takes into account additional attributes.

***Question 3: To what degree can Canada adopt approaches and targets that are different from those adopted in the US?***

Participants expressed a range of views regarding the issue of harmonization between Canadian and US standards. Comments were provided concerning the level of the

standard, structure of the standard, and vehicle performance test procedures.

Regarding the level of the standard, Steve Plotkin noted that Canada's fleet mix involves a greater proportion of cars with smaller engines. By adjusting for this power differential, Canada could set more stringent standards than in the US, without requiring a greater "technical push" from the manufacturers. Malcolm McHattie stated that due to Canada's smaller market, it wouldn't be able to influence the technology needed if it implemented a stricter standard than the US. He also noted that if a size-based standard is implemented in Canada, its effects will be felt differently here than in the US. It will be important to "do the math" to determine differential impacts on different companies.

Ken Ogilvie asked if it would be possible for Canada to harmonize its standard with the global market and not with the US. David Greene responded that imports into Canada are different than the US, and importing countries are developing better technology and instituting stricter standards. Additionally, markets other than the US, in particular the Asian markets, are growing and Canadian made cars could be sold there. Peter Reilly-Roe commented on the fact that only 26% of cars sold in North America are designed here. However, John German responded that North American and Asian consumer's tastes are different with respect to engine power and this limits what kinds of cars foreign manufacturers will sell here.

Regarding the structure of the standard, David Greene stated that it may not be necessary to adopt the same form as the US. For instance, framing the standard based on reducing greenhouse gas emissions might be more politically feasible in Canada. Other participants suggested that it would be important to harmonize the structure of the standard with the US or California, and that within this harmonized structure more ambitious targets could be adopted.

Regarding test procedures, Peter Reilly-Roe stated it was important to harmonize with the US on test procedures since it would be too costly for Canadian consumers if these differed. John German agreed. Ken Ogilvie stated that he wanted the government to do the analysis to find out how test procedures need to be changed to more accurately fit the Canadian context.

*Summary:* Most participants supported harmonization with respect to the structure of standards and test procedures (harmonization with the US or perhaps with California). Participants also recognized that more aggressive standards would be possible in Canada compared to the US without requiring a greater "technical push" (due to the greater proportion of vehicles in Canada with smaller engines). However, there were differing opinions as to whether Canada could successfully adopt technically more aggressive standards than the United States.

## D. DISCUSSION SESSION 2: REQUIRED RESEARCH AND ANALYSIS

### *Question 4: What areas of research and analysis should take priority to support the development of a Canadian standard that maximizes greenhouse gas reductions?*

Through an open discussion process, participants identified eleven general areas requiring research and analysis. These eleven research areas are presented below, divided into two clusters – high priority and lower priority -- based on the results of an informal straw vote. The specific voting results are indicated for each research area.

#### **High Priority:**

1. *Research concerning application of footprint based standards in Canada.* This research should consider design and impacts of such standards, including unintended consequences. (12 votes)
2. *Research to provide a complete understanding of the current Canadian market.* This research is necessary to support design of effective and efficient vehicle fuel efficiency standards. One participant also noted that these data would demonstrate to manufacturers the strong potential demand in Canada for their smaller vehicles. (11 votes)
3. *Research to support selection of fuel efficiency levels to be included in the Canadian standard.* This would include cost-benefit analysis, as well as research to address such questions as: How much flexibility exists for Canada to have different standards than the US? If Canada benchmarked against the best standards in the world what would be the consequences? (10 votes)
4. *Comprehensive consumer research.* This research should consider a wide range of consumer related issues, such as: general consumer awareness of vehicle fuel efficiency standards; what is required to promote new standards; potential consumer demand for very small vehicles; consumer expectations regarding performance; and relative effectiveness of standards vs. fuel price mechanisms (how consumers value lifetime fuel savings). (8 votes)
5. *Research on Canadian linkages to the use of alternative fuels.* This research would include analysis of lifecycle impacts of alternative fuels and technologies, including their impacts on mileage. (7 votes)
6. *Assessing different technologies and their costs.* (7 votes)

#### **Lower Priority:**

7. *Research to provide a better understanding of Canadian driving conditions and their effects on fuel economy.* This research would provide a basis for improved

- test protocols, and ultimately encourage and assist manufacturers to innovate and improve on-road performance in real Canadian conditions. (6 votes)
8. *Research to contribute to the setting of national short, medium and long-term climate change targets.* This research would address the link between vehicle efficiency targets and broader national climate change targets. (5 votes)
  9. *Research on Canadian linkages between vehicle efficiency and safety.* (5 votes)
  10. *Research concerning institutional requirements.* What kind of structure do we need to create fuel efficiency standards? What institutions should set the standard and how do the standards get set? What are the ongoing requirements to maintain the standards? (2 votes)
  11. *Research that looks at fluctuations in fuel efficiency over the life of the vehicle, including the impact of inspection programs and vehicle maintenance.* (David Greene noted that fuel efficiency only degrades slightly over time, and referred participants to research on the Department of Energy's website.) (1 vote)

***Question 5: How can Pollution Probe contribute to this research and analysis?***

Ken Ogilvie stated that Pollution Probe hopes to contribute to efforts to build a more effective and stronger approach to vehicle fuel efficiency. Probe can help engage people who would not normally be engaged, in part through consumer-oriented educational programs. He also stated that Pollution Probe would be more effective and better able to help advance the fuel efficiency agenda through better access to information and research, arising for instance from the current MOU. Margaret McCuaig-Johnston welcomed Probe's contribution and encouraged continued engagement in this process.

**E. DISCUSSION SESSION 3: COMPLEMENTARY MEASURES**

***Question 6: There is a need to increase consumer awareness and demand for fuel efficient cars. What elements are going to give us the biggest payoff and what should Pollution Probe be focusing on?***

(See also discussion of feebates and other complementary measures, included in the summary of Discussion Session 1.)

Bob Oliver noted that complementary measures fall into at least two categories: instruments that affect people (drivers) and instruments that affect technology. There needs to be research to determine where the most opportunity for reductions is to be found.

Steve Plotkin recommended that information on websites be upgraded to inform consumers on what they can do to increase their vehicles' fuel efficiency. He suggested that research be done to observe if having a fuel economy meter in a vehicle affects

driving behaviour (and if so, credit for such a device might be provided for in the standards).

Louise Bedsworth suggested that vehicle fuel economy labels be upgraded and a greenhouse gas emission recognition system be put in place so that consumers can have that information easily available when they are buying cars.

John German suggested that a tire rolling resistance labelling program be initiated to target cars that are already sold (i.e., the tire replacement market). Additionally, implementing a “pay at the pump” vehicle insurance program would increase demand for fuel-efficient cars. It would allow fuel prices to rise, which affects the types of cars that consumers buy, but might be more politically saleable than increased fuel taxes.

Roydon Fraser suggested that work with City Planners is an important complementary measure, since the design and management of traffic systems influences GHG emissions. He also suggested consideration of mechanisms to address embodied energy in vehicles.

Other technical suggestions included efforts to regulate fuel efficiency of larger vehicles (i.e. not just passenger cars and light duty trucks), perhaps in collaboration with California; introduction of technical devices such as speed limiters on vehicles; and low carbon fuel standards (for instance biodiesel). Other non-technical suggestions included promotion of car sharing and creative partnerships (with the police, for instance).

*Summary:* There is a need for complementary measures in addition to fuel efficiency standards. Furthermore, there is a need for research to identify where the most opportunity for reductions are with respect to complementary measures, followed by active implementation.

## **F. WRAP-UP SESSION**

George Matheson thanked Pollution Probe for organizing the expert meeting. Ken Ogilvie and Bob Oliver provided concluding remarks and thanked participants for attending the session.

Ken stated that Pollution Probe’s objective is to get the best possible standard for Canada and that the dialogue that occurred at the meeting will allow Probe to define what they can do and what they can encourage the government to do. Ken and Margaret McCuaig-Johnston agreed that follow-up discussion will be important and worthwhile.



## **Annex A**

### **Agenda for the Pollution Probe Expert Meeting on Vehicle Fuel Efficiency Standards for Canada**

**10:00 Introduction and Welcome** – Ken Ogilvie, Executive Director, Pollution Probe  
**Meeting Overview** – George Matheson, Marbek Resource Consultants (Facilitator)

**10:15 Presentations**

David Greene, Oak Ridge National Laboratory  
Matthew Stevens, Team Leader, University of Waterloo Alternative Fuels Team  
Mike Millikin, Editor, Green Car Congress

**Question and Discussion Period to follow presentations**

**11:15 Health Break**

**11:30 Discussion Session 1 — Structuring a Canadian Vehicle Fuel Efficiency Standard**

*Question 1:* Are fuel efficiency standards the most effective approach to reduction of vehicle GHG emissions?

*Question 2:* How should a fuel efficiency standard be structured to best deliver GHG emission reductions while maximizing economic and social benefits?

*Question 3:* To what degree can Canada adopt approaches and targets that are different from those adopted in the US?

**12:30 Lunch**

**1:15 Discussion Session 2 – Required Research and Analysis**

*Question 4:* What areas of research and analysis should take priority to support the development of a Canadian standard that maximizes GHG reductions?

*Question 5:* How can Pollution Probe contribute to this research and analysis?

**2:45 Health Break**

**3:00 Discussion Session 2 (continued)**

**4:00 Discussion Session 3 – Complementary Measures**

*Question 6:* In addition to standards, what complementary measures are needed to maximize GHG emission reduction?

*Question 7:* What other roles should Pollution Probe play in promoting fuel efficient vehicle production and use?

**4:45 Wrap-up**

**5:00 Adjourn**

## Annex B

### Participant List for the Pollution Probe Expert Meeting on Vehicle Fuel Efficiency Standards for Canada

<b>Name</b>	<b>Affiliation</b>
Louise Bedsworth	Public Policy Institute of California
Roydon Fraser	University of Waterloo Alternative Fuels Team
John German	American Honda Motor Company
David Greene	Oak Ridge National Laboratory
Jamie Hulan	Transport Canada
Paul Khanna	Natural Resources Canada
John Lawson	Lawson Research
Heather MacLean	University of Toronto
George Matheson	Marbek Resource Consultants Ltd.
Malcolm McHattie	Consultant
Margaret McCuaig-Johnston	Natural Resources Canada
Chris Mendes	University of Waterloo Alternative Fuels Team
Mike Millikin	Green Car Congress
Nathan Muegge	ICF International
Ken Ogilvie	Pollution Probe
Bob Oliver	Pollution Probe
Steve Plotkin	Argonne National Laboratory
Peter Reilly-Roe	Consultant
Scott Smith	AIA Canada
Don Stewart	Environment Canada
Matthew Stevens	University of Waterloo Alternative Fuels Team
Jennifer Tuthill	Marbek Resource Consultants Ltd.