ECO-ENERGETIC LABELLING OF VEHICLES and Incentive Programs

Research Project - Final Report
Submitted to Industry Canada's
Office of Consumer Affairs

by

June 2007

Research report published by:

6226 Saint-Hubert Street, 3rd floor
Montreal, Quebec H2S 2M2

Telephone: 514-521-6820
Toll-free: 1 888 521-6820
Fax: 514-521-0736

union@consommateur.qc.ca
www.consommateur.qc.ca/union

Members of Union des consommateurs
Abitibi-Témiscamingue ACEF
Amiante – Beauce – Etchemins ACEF
Montreal East ACEF
Île-Jésus ACEF
Lanaudière ACEF
Estrie ACEF
Grand-Portage ACEF
Montérégie East ACEF
Montreal North ACEF
Quebec City South Shor ACEF
Consumer Association
for Quality Construction
Individual members

Union des consommateurs is a member Consumers International, a federation of 234 members from 113 countries.

Research
- Michel Tanguay

Writing
- Michel Tanguay
- Charles Tanguay
- Marcel Boucher

Translation
- Moderna Reg'd/Mark Manning

ISBN: 978-2-923405-18-6

Union des consommateurs thanks Industry Canada for financial aid provided to this research project. The opinions expressed in this report are not necessarily those of Industry Canada or the Government of Canada.

To facilitate reading and streamline the content of this report, we have chosen to employ the masculine to represent both genders.

UNION DES CONSOMMATEURS: *Strength through Networking*

Union des consommateurs is a non-profit organization whose membership is comprised of several ACEFs (*Associations coopératives d'économie familiale*), *l'Association des consommateurs pour la qualité dans la construction* (ACQC), as well as individual members.

Union des consommateurs' mission is to represent and defend the rights of consumers, with particular emphasis on the interests of low-income households. Union des consommateurs' activities are based on values cherished by its members: solidarity, equity and social justice, as well as the objective of enhancing consumers' living conditions in economic, social, political and environmental terms.

Union des consommateurs' structure enables it to maintain a broad vision of consumer issues even as it develops in-depth expertise in certain programming sectors, particularly via its research efforts on the emerging issues confronting consumers. Its activities, which are nation-wide in scope, are enriched and legitimated by its field work and the deep roots of its member associations in the community.

Union des consommateurs acts mainly at the national level, by representing the interests of consumers before political, regulatory or legal authorities or in public forums. Its priority issues, in terms of research, action and advocacy, include the following: family budgets and indebtedness, energy, telephone services, radio broadcasting, cable television and the Internet, public health, food and biotechnologies, financial products and services, business practices, and social and fiscal policy.

Finally, regarding the issue of economic globalization, Union des consommateurs works in collaboration with several consumer groups in English Canada and abroad. It is a member of Consumers International (CI), a United Nations recognized organization.

TABLE OF CONTENTS

1 INTRODUCTION

The first oil crisis hit 35 years ago, and during the years that followed, the U.S. automotive industry discovered Japanese and European products. Smaller, less powerful and less prestigious, but more efficient, these cars began to capture the North American market.

Since then, other oil crises have raised concerns among consumers while the Japanese, German and Korean automotive industries won the battle of quality and diversity. Important gains in vehicle fuel efficiency have resulted in the proliferation of heavier and more powerful automobiles instead of more eco-efficient ones.

> *Since 1990, the fuel consumption of Canadian vehicles has improved by approximately 5 percent, far less than it could have, were it not for offsetting changes in horsepower and weight, and for a shift from cars to trucks in the early 1990s. As far as GHG emissions are concerned, the improvements in vehicle fuel efficiency have been negated by the increasing number of vehicles and longer distances travelled. According to Natural Resources Canada (NRCan), the automotive sector represents almost 90 megatonnes (Mt), or more than 12 percent of Canada's total GHG emissions, and the sector's emissions have increased by more than 17 percent since 1990.*[1]

The price of fuel has remained high in Europe since the first oil crisis, but citizens enjoy a close-knit urban fabric, better serviced by railway or subway transportation than is North American urban sprawl. Generally, the European automotive industry has always furthered its research in order to provide consumers with small, light automobiles that are very efficient in terms of fuel consumption. For example, Citroën features the CI model, with a one-litre or 1.4-litre diesel, three-cylinder engine and a combined city/highway fuel consumption of 4.6L/100km or 4.1L/100km for diesel.

In North America, the price of gasoline responds to changing world market pressures, and in Canada, the federal and provincial governments impose an excise tax and sales taxes, which represent nearly 40% of prices at the gas pump. Consequently, gas prices are higher in Canada than in the United States, but lower than in Europe, where a much higher tax is levied. Canadian and especially Quebec consumers respond by choosing smaller and more economical cars than all other North American buyers.

Overall, there is general agreement among observers that the excise tax is the most effective lever to adjust the demand for gasoline. In fact, the demand is partially elastic. When gas prices are low, consumers are less reticent to buy less energy-efficient cars. And if gas prices fall for a while, consumers will take this opportunity to see more of the world and concentrate their leisure time on activities requiring the use of a car.

---

[1] **Marbek Resource Consultants** in association with Resources for the Future *et* DesRosiers Automotive Consultants*, Development of options for a vehicle feebate in Canada – Final Report,* prepared for the National Round Table on the Environment and the Economy, Ottawa, Ontario, Canada. October 13, 2005, 98 pages, summary, p. ii. [online] http://www.nrtee-trnee.ca/eng/programs/Current_Programs/gbudget/Feebates/Feebates-Final-Report_E.pdf (accessed May 24, 2007).

However, no North American politician can afford to face the popular discontent that an excise tax increase would cause, especially one that would result in levels equal to those presently applied in Europe. In addition to discontent, such a measure would provoke a major economic slowdown, because beyond daily merchandise transportation by truck, which is essential to our manufacturing and trading economy, personal transportation would drain the resources customers use for other expenses. Urban sprawl and our underdeveloped mass transit system leave us very little margin of manoeuvre in the event of eventual fuel price fluctuations.

Our governments thus face the following challenge: Canada subscribed to the Kyoto Protocol targets before reversing course, after failing to demonstrate the necessary political will for certain industrial sectors to seriously take means to reduce their greenhouse gas production. On the contrary, given the pressure exercised by American demand for our oil, the intensified Alberta tar sands development will increase our contribution to global warming even more.

Moreover, for years, various programs of the federal Natural Resources Department and other Departments have been appealing to the "individual" good will of Canadians. Other than eventually raising public awareness, this path has little measurable impact. The best-known of these programs, the "One-Tonne Challenge", enjoined citizens to reduce by one tonne their individual contribution to GHG production. To the driver of a small car, that implied reducing by 20% the distances he drove. Observing that "*Key barriers to actions include low interest/concern, the lack of information about how to reduce emissions*", the report evaluating the program concludes as follows:

> ***Conclusions and lessons learned***
> *Based on the findings above, this evaluation concluded that in order to achieve GHG emission reductions, national public education and outreach (PEO) programs like the OTC need to be complemented by additional tools (e.g., economic instruments, regulations) to assist Canadians in reducing the GHG emissions that they produce. In selecting such tools in the future, close scrutiny should be given, for example, to how they may increase the reach of the intended audience, stimulate the demand for new GHG-emission reducing products and create synergies across relevant initiatives, including those being used and developed at the provincial and territorial levels.*
>
> *Furthermore, consistent and integrated messaging would also be necessary given the existence of other related initiatives, including those at the provincial/territorial levels. To this end, national public education messaging in the area of climate change should better account for other key motivators (e.g., energy conservation, financial, environment in general) that are driving many related undertakings.*[2]

Canadians already buy smaller vehicles than Americans; they have changed their leisure driving habits to a certain extent, but active transportation and mass transit habits are changing slowly. And yet, we're still very far from a significant decrease of GHGs. Achieving that goal will likely require fundamental changes in habits regarding daily transportation, transportation as a leisure activity, the automobile as a status symbol, etc.

Our governments will have to establish more vigorous programs to communicate their intentions to the public. Between the time when the present research project was formulated and the time when we wrote this report, the situation has progressed considerably: in the recent federal

[2] **Environment Canada**, Evaluation of the One-Tonne Challenge Program, July 2006. [online] http://http://www.ec.gc.ca/ae-ve/default.asp?lang=En&n=E0530F2A-1 (accessed April 22, 2007).

budget, the Canadian government announced an incentive program for purchases of fuel-efficient vehicles. The Quebec government and those of four other provinces have done so as well.

In terms of vehicle fuel efficiency, we're emerging from 30 years of inertia during which governments relied on the leadership of manufacturers. It took the leadership of Japanese manufacturers introducing hybrid vehicles to raise media enthusiasm and strike the popular imagination, and for people to demand subsidies for acquiring less energy-consuming vehicles. As we will see in reviewing the documentation, the incentive programs recently announced by the federal government and some provincial governments are the result of long-term reflection that may well be starting to bear fruit.

Our study seeks to provide an overall picture of the best consumer information and incentive practices urging consumers to make more responsible choices.

2 LITERATURE REVIEW: OVERVIEW OF THE ISSUES

Faced with the issue of energy performance in passenger cars for the past 30 years, the automotive industries in Europe, America and Asia have dealt differently with the evolution of vehicle efficiency. It is really only over the past decade that the more widespread challenge of global warming began to play a leading role in reaching the general public and compelling governments to take greenhouse gas emissions seriously.

Nevertheless, consumer behaviours continue to astonish us: Why would consumers still want to use the same amount of fuel by choosing vehicles with more space or power than they would ever need, instead of demanding or buying vehicles that are more energy- and fuel-efficient and gaining from improved energy efficiency?

Given the enormous economic and ecological stakes, many people are reflecting on these issues. We have chosen a few texts that demonstrate the advancement of knowledge and thinking on the issues raised by our study: How should we convey the message of energy performance to consumers and encourage them to purchase vehicles with a lesser impact on the environment? Although we don't claim that our overview is exhaustive, we believe that these texts will shed enough light on the issues for us to meet the study's objectives.

Since adopting effective public policies to guide public choices is impossible without a prior realistic analysis of the people targeted by such policies, we will focus first on consumer behaviours and concerns (motivations, levels of information, etc.) in choosing a vehicle model.

We will then consider the motives that have led several governments to adopt a "feebate" system. After an overview of current and future issues, as perceived by international bodies and certain knowledgeable advisers in the American government, we will compare the approaches taken by several countries or recommended to them for an overall management of their auto population's energy efficiency.

2.1 Consumer Choices

For nearly twenty years, Turrentine and Kurani have been studying consumer behaviour regarding motor vehicles. A recent study, "Car Buyers and Fuel Economy?"[3], focused on the perceptions and behaviours of American consumers regarding the energy performance of vehicles, to help researchers and political leaders base their work on those factors. The study concluded that no household analyses its fuel costs systematically when buying either a vehicle or fuel, and that almost none takes fuel costs explicitly in the family budget.

> *These households may know the cost of their last tank of gasoline and the unit price of gasoline on that day, but this accurate information is rapidly forgotten and replaced by typical information. One effect of this lack of knowledge and information is that when consumers buy a vehicle, they do not have the basic building blocks of knowledge assumed by the model of economically rational decision-making, and they make large errors estimating gasoline costs and savings over time.*[4]

Investigators have also found that the value consumers attach to energy efficiency is not solely rooted in monetary savings, but is also symbolic, and they conclude that "*consumer responses to fuel economy technology and changes in fuel prices are more complex than economic assumptions suggest*"[5].

The following sections are based on this study by Turrentine and Kurani.

2.1.1 The Myth of the Rational Buyer

The researchers met with 57 households, i.e., about 80 Californians belonging individually or as a couple to nine socio-professional groups, and discussed their reasons and criteria for choosing a new car recently or in the near future.

In their introduction, the authors present the typical case of a couple of two financial services professionals who were asked whether they would be prepared to pay more for the big SUVs they want, but with fuel cost savings of 50% (11 to 17 m/gal). Very early in the interview, it appeared that they had no idea of their vehicles' annual fuel costs. So they ended up estimating those costs arbitrarily at $3,000. The authors note that, if financial professionals are incapable of giving a realistic estimate of their gasoline consumption costs, it can hardly be expected that other consumers could answer that question, which thus becomes irrelevant.

The authors then reviewed a few of their key research concepts and presented a short history of oil prices and energy efficiency issues. Among their assumptions: Despite a few crises, of short duration, the cost of gasoline has never been high in the United States. In the early eighties, the American government set an industry standard, the *Corporate Average Fuel Economy* (CAFE),

---

[3] **Turrentine, Thomas S.** and **Kenneth S. Kurani**, *Car buyers and fuel economy? Energy Policy* 35 (2007), 1213 – 1223, Institute of Transportation Studies, University of California, Davis, California, United States [online] http://pubs.its.ucdavis.edu/download_pdf.php?id=1064 (accessed June 19, 2007).
[4] **Turrentine, T.** and **K. Kurani.** *Car buyers and fuel economy?* Abstract, Energy Policy 35 (2007). Institute of Transportation Studies, University of California, Davis, California, United States, February 2007, [online] http://pubs.its.ucdavis.edu/publication_detail.php?id=1064 (accessed May 20, 2007).
[5] *Ibid.*

which imposed an improvement in energy performance on each manufacturer's total production. The CAFE standard is still, at present, the only mandatory set of regulations adopted in the United States on vehicle energy efficiency. This law effectively forced the industry to improve car fuel efficiency, and thus offer consumers, for equal or equivalent energy consumption, more powerful and faster vehicles, with more features desired by the public, such as power steering, air conditioning, four-wheel drive, etc. Fuel consumption being equivalent, consumers don't compromise on new vehicle options but improve on them, and they base their decision mainly on the information immediately available to them.

The models developed up to now, as well as certain concepts the authors consider "esoteric", such as that of the investment "amortization period" for a less energy-consuming vehicle, are highly questionable in their view. Indeed, there is no reason to suppose that the vehicle purchaser is rational in his choices regarding energy:

> *Further, past interviews we have conducted with automobile buyers lead us to think that the rational actor model is not an accurate or useful view of how consumers think about fuel economy and automotive fuel costs.*[6]

2.1.2 Why Consumers Don't Want "Economical" Vehicles

According to the authors, several factors can explain consumers' apparent lack of concern for vehicle fuel efficiency:

1. Until recently, American vehicles that were very fuel-efficient were associated with economical vehicles, destined for consumers of limited means;
2. Fuel consumption is only one variable among many, in an extremely diversified market in terms of sizes, models, technologies, colours, interior finishes, accessories, etc. Fuel consumption is a quickly forgotten variable, particularly when fuel prices are low;
3. Most vehicles have a rudimentary consumption indicator, merely reminding people to fill up rather than measuring consumption or its cost;
4. As a corollary of 3, consumption calculations or record-keeping are not "normal" behaviours. Those who engage in them generally do so to verify engine performance;
5. The reduction over the years of the real price of gas, in tandem with the increase in vehicles' engine power, size and consumption factors, has eroded the favourable context for fuel economy that prevailed in the seventies and early eighties.

2.1.3 The Changing Context

Moreover, the authors observe that new data might lead consumers to attach more importance to energy efficiency:

1. Volatile gas prices, which have been rising in recent years;
2. New consumption-measuring instruments;
3. Evident impacts of CO_2 vehicle emissions on global warming;
4. Growing dependency on imported oil, as highlighted by a recent war in an oil-producing region. Certain radical American conservatives have even recently advocated, as a strategic national policy, the goal of American oil self-sufficiency and greater vehicle fuel efficiency;

[6] *Op. cit.* 3, p. 1215.

5. The much greater fuel efficiency of hybrid electric vehicles (HEV) opens the door to new perceptions and values regarding motor vehicles.

2.1.4 Turrentine and Kurani's Research Methodology

The interviews, of 57 households just having bought or about to buy a new vehicle, were conducted in 2003-2004. Their duration was two hours on average. Generally, no one interviewed kept a record of his fuel expenses, and most – even the accountants, financial advisers and computer experts among them – don't know their vehicle's consumption rating.

The interviews were conducted in four stages:

1. At the beginning, the subjects were invited to talk freely about their previous vehicles, the factors that motivated their purchasing decisions at various times of their lives, and the influences that contributed to their latest purchase. They were not questioned about energy efficiency;
2. Secondly, the subjects were invited to give details on the purchase of their latest motor vehicle, to determine, without guiding them in that direction, whether fuel economy was one of their purchasing criteria;
3. The third stage consisted of asking the subjects to imagine their dream vehicle, whether car or truck, by giving levels of priority to various factors: performance, number of places, safety, consumption, pollution, accessories, etc. For each factor, three closed choices were possible, each accorded a certain number of points (for example, the vehicle may have 4, 6 or 8 places, which "costs" 1, 2 or 3 points). The only design restriction was a limit on the number of points. Once a first design was completed, the total of points available was increased and the respondents were invited to adjust their design. In this exercise, respondents were asked to pay more to obtain better fuel economy, thus contradicting their assumption (later revealed) that fuel-efficient vehicles cost less;
4. Finally, the interviewers disclosed that the object of their research was in fact energy efficiency. The goal was to observe the responses of consumers who were asked to pay more for a fuel-efficient vehicle and consider amortization periods, and who thus demonstrated whether they had the necessary tools for rationally appreciating energy efficiency on the basis of annual costs, m/gal. consumption ratings, etc.

2.1.5 Results

- Stages 1 and 2
  Fuel efficiency was rarely mentioned spontaneously. Those who took this criteria into account did so in lean periods or when they had to commute daily over long distances. Students are more concerned with saving money because fuel can be a major budget item for them. Middle-class or wealthy families with children want larger vehicles, often four-wheel drive ones, to enable winter or off-highway activities (even when this type of activities is not in fact practiced by the family). When the children are young, households have a marked interest in safety.

- Stage 3
  Even when fuel efficiency is explicitly put in competition with other considerations, it is a priority for almost no one. In the hypothetical exercise, those who choose a vehicle with average or superior fuel efficiency do so more because of long-term social or ecological

commitments, or because they have experienced high gas prices at certain moments in their lives.

- Stage 4
  The researchers disclosed here their interest in vehicle energy efficiency and asked responders if they considered that "*fuel economy*" and "*fuel efficiency*" had the same meaning:
  The most common ''off-the-top-of my-head'' response is that the two terms mean the same thing. To many people this meaning is rather abstract—''It's the gasoline it takes to get around, to go all the places we go.'' As some of them continue to talk, they convince themselves that fuel economy is about saving money while fuel efficiency is about saving gasoline.

  When we ask our respondents to tell us what type of automobile comes to mind when we say "good fuel economy", most think of the smallest, cheapest vehicles. In contrast, "good fuel efficiency" tends to split the respondents into those for whom there is no different image and those who say fuel efficiency evokes images of higher quality vehicles and HEVs.[7]

When consumers were asked how much they would be willing to pay for a vehicle 1.5 time more fuel efficient, the responses ranged from $1,000 to $10,000, but 50% of households declared that they could not or would not answer the question. The discussion on respondents' reasons for their response revealed that the vast majority do not have the necessary tools for expressing a rational response.

When asked how long they thought they could "amortize" such an investment in a more economical vehicle, two-thirds answered that they were incapable of responding, and the others arbitrarily estimated the payment period or the period during which they would keep the vehicle. Generally, here again, no one had the information to enable him to calculate an actual amortization period.

Purchasers of hybrid vehicles

The interviewers also met with eight recent purchasers of hybrid electric vehicles. This interview did not follow the same logic as the others. However, none of those eight purchasers was recording his gasoline consumption or knew its annual cost. Most knew more about their chosen vehicle's overall ecological impact than about their own consumption. For many of them, choosing a hybrid vehicle came at a time in their life when they wanted to start reducing the ecological impact of their lifestyle.

2.1.6 Discussion

The study led the authors to conclude that there is a deep chasm between the actual behaviour of consumers and what experts have assumed regarding the "rational buyer". The inability of all respondents to perform simple mathematical operations on the issue of consumption leads the authors to question the communication strategies generally adopted with regard to vehicle energy efficiency.

[7] *Ibid.* p. 1218.

Further, motor vehicles are assigned symbolic meanings. As we find in our interviews, many households express considerable anger towards owners of large SUVs, and are willing and even eager to talk about it. Even owners of small and mid-sized SUVs express anger at drivers of full-size SUVs. Oil companies are also targets. Evidence from this study suggests that a common consumer response to rising gasoline prices is not to change travel or buy more fuel economical vehicles, but simply to get angry with oil companies. Fuel economy is conflated with many of these symbolic meanings and has become part of conversations about larger issues than household budgets.

We offer two hypotheses from this set of interviews:

1. *Over the past several decades of declining real gasoline prices and rising personal incomes, consumers engaged in a limited economic rationality, possibly using simplifying heuristics in the place of algorithmically correct evaluations. Abetted by limited fuel use and cost instrumentation, consumers give little attention to fuel economy. If gasoline prices increase enough, consumers will develop more calculating, economically rational decision-making regarding fuel economy.*

2. *Automobiles are repositories of many high-value meanings, some of which have important but non quantifiable/non monetized value. Because of these meanings, few automobile buyers paid much attention to the small financial differences provided by the historically available differences in fuel economy of otherwise similar vehicles. Even if gasoline prices rise, buyers may respond to shifts in these other meanings rather than respond solely to shifts in fuel costs in economically rational ways.*

The first hypothesis simply implies that gasoline has been too cheap for the past decades for it to be "sensible" for consumers to be « rational ». The second states that the value of fuel economy is more than differences in fuel costs, but include other symbols, meanings and values, and that those are unlikely to be processed in an economically rational algorithm under any conditions.

[...]

Even in a sample constructed such as the one in this study, if economic rationality is pervasive in the population, we should have found some one who articulated their automotive purchase and use decisions in a manner consistent with the assumptions of that model. We did not. Therefore, we cannot support the continued assumption that economic rationality is the sole sufficient behavioral model for policymaking and policy analyses of automotive purchases and gasoline consumption.[8]

2.2 Strategies Recommended to Governments: Feebates

To discuss the strategy known as feebates, we present two studies, one Canadian and the other American.

Commissioned to the National Round Table on the Environment and the Economy, following the 2005 budget, the Canadian study by Marbek Resource Consultants, *Development of Options for*

[8] *Ibid.* pp. 1222-1223.

a Vehicle Feebate in Canada[9] (hereinafter "Marbek") is the one used by the federal government to establish, in its spring 2007 budget, a feebate system. The study mainly consisted of a theoretical assessment of the impacts of a feebate system applied to Canada.

Marbek defined feebates as an economic instrument whereby vehicles are submitted to taxes or rebates in proportion, respectively, to their excess or deficit with respect to a given reference factor, the pivot point. Generally, this factor is the vehicle's average fuel consumption rating for a given year.

In simple terms, the feebate combines a tax on high fuel consumption vehicles with a rebate on low fuel consumption vehicles.

The mathematical models used by Marbek, as well as the logical and economic approach applied to the study, are borrowed from an American study by David L. Greene et al., *Feebates, Rebates and Gas-Guzzler Taxes: a Study of Incentives for Increased Fuel Economy*[10] (hereinafter "Greene"), dated 2003, that, based on data documenting the behaviours of consumers and the American automotive industry, attempts to determine the effects of feebates on those behaviours.

2.2.1 In the United States: the Greene Report

The study conducted by *Greene* re-examines feebate models and assesses how consumers' undervaluation of fuel savings can hamper the effectiveness of such measures. The study tests the measures' sensitivity to the cost of energy-saving technologies and to the price elasticity of consumer demand, and adds estimates of the isolated effects of over-consumption (gas-guzzler) taxes or rebates.

> *A feebate rate of $500 per 0.01 gallon per mile (GPM)[11] produces a 16 percent increase in fuel economy, while a $1000 per 0.01GPM results in a 29 percent increase, even if consumers count only the first 3 years of fuel savings. Unit sales decline by about 0.5 percent but sales revenues increase because the added value of fuel economy technologies outweighs the decrease in sales. In all cases, the vast majority of fuel economy increase is due to adoption of fuel economy technologies rather than shifts in sales.*[12]

Highly technical, the Greene report is above all an exercise in economic mathematics using documentation on the behaviours of consumers and the American automotive industry. Without claiming to give here the entire essence of the demonstration, we think it is useful to present an overview of the report's key ideas.

The fact that consumers undervalue fuel savings must be taken into account when devising policies. Since the vehicle's price is a major consideration at purchase time, changes in the

---

[9] *Op. cit.,* 1.

[10] **David L. Greene, Philip D. Patterson, Margaret Singh, Jia Li**, *Feebates, rebates and gas-guzzler taxes: a study of incentives for increased fuel economy*, Energy Policy (2003), Elsevier Editor, Center of Transportation Analysis, Knoxville, Tennessee, United States [online] http://www-cta.ornl.gov/cta/Publications/Reports/FeebateEnergyPolicy_FINAL.pdf, (accessed May 29, 2007)

[11] 1 gallon per 100 miles = 2.35 L/100 km; 1 US gallon = 3.79 L; 1 UK gallon = 4.55 L.

[12] Greene, *Op. Cit.,* 10. Abstract.

price of vehicles rather than fuel would be more effective than a gas tax. The authors assume that manufacturers will weigh very precisely the costs and benefits of more fuel-efficient vehicles so as to avoid additional fees applied to the price of their vehicles, and to benefit instead from applicable rebates[13].

Regarding the long-term benefits of feebates, the Greene report states the following:

> *A key advantage of feebates over fuel economy standards is that they provide a continuing incentive to increase fuel economy as new technologies are developed (Gordon and Levenson, 1989). Once fuel economy standards are met, there is no incentive for manufacturers to make further increases. The feebate schedule provides an ever-present extra incentive to increase fuel economy whenever new, more cost effective technologies become available.*

The authors insist that fuel economy standards must be mandatory and higher than what market forces alone could attain without the additional pressure. They declare that non-mandatory standards are absolutely useless.

Since 1980, the Americans have been levying a special tax (*Gas-Guzzler Tax*) on passenger cars that consume a lot of gas (less than 22.5 MPG, or 10.45 L/100 km). However, this surtax does not apply to light trucks. The enthusiasm of the industry and consumers for the various types of SUVs, light trucks and minivans, not subject to the surtax, tends to confirm the authors' hypothesis.

The Greene report notes that, unless long-term fuel savings are considered, consumers will likely take advantage of increased fuel efficiency to buy heavier and more powerful vehicles:

> *On the other hand, if consumers fully value the lifetime fuel savings that will result from an improvement in new vehicle fuel economy, then market forces would produce a light-duty MPG level of 32 in the absence of any fiscal incentives. - This result is directly dependent on the assumption that other vehicle attributes, particularly power and weight, remain constant. In reality, some fraction of the potential to increase fuel economy would be traded off for increased horsepower and weight.*[14]

Because in a feebate system the tax rate defines the marginal cost or benefit related to vehicle fuel efficiency, whereas the pivot point only determines to whom the taxes or rebates will apply, the authors estimate that the fuel savings achieved by a feebate system, as well as their economic cost, will depend entirely on the tax rate rather than the pivot point determination.

In conclusion:

> *This study confirms that the economics of fuel economy improvement strongly favor technological solutions over changing the mix of vehicles sold. Davis et coll. (1995) found that approximately 90 percent of the increase in fuel economy due to a feebate system would be due to the adoption of fuel economy technology rather than changes in the mix of vehicles sold. In this study, typically 95 percent, or more, of the increase in fuel economy is the result of use of technology; only about 5 percent is due to changes in the mix of vehicles. Doubling the price elasticities of vehicle choice (well beyond what*

[13] *Ibid.*, p. 758.
[14] *Ibid.*, p. 769.

> *can be supported based on the economic literature) increases the sales mix effect to only 16 percent.*[15]

The authors note the disadvantages of a feebate schedule and propose means to mitigate them.

> *Disadvantages of feebates include the possibility that they will be perceived as a kind of tax and that they will undoubtedly confer different benefits and costs on different manufacturers. The first disadvantage can be mitigated by designing feebates to be revenue neutral: to pay out as much in rebates as they collect in fees. The second disadvantage can be mitigated by establishing different feebate schedules for different vehicle classes (…).*

[15] *Ibid., p. 769.*

2.2.2 In Canada: the Marbek Report

The Marbek report[16] is based on the mathematical models developed for the Greene study, but uses Canadian data.

This is another very elaborate study, very technical economically, fiscally and in terms of probability calculations. It applies to the Canadian context mathematical formulas that associate certain feebate scenarios with anticipated greenhouse gas reductions.

Those scenarios are used for assessing the impact of different feebate levels, from 2003 to 2018, on sales of various vehicle models (and, as a corollary, the impact on overall Canadian automobile fuel consumption).

The report first describes the Canadian context in general:

> *In contrast with the US, Canadian vehicle ownership is low and relatively stable, and preferences are for smaller, more fuel-efficient vehicles. However, both Canadians and Americans purchase less fuel-efficient vehicles than those purchasers in other countries. [...] Consumer choice is driven primarily by purchase price, value, reliability and styling. In comparison, consumers rank 'fuel economy' and 'safety features' in the middle of the pack and they rank 'environmentally friendly' last of 21 factors in new-vehicle purchase.*
>
> *Since 1990, the fuel consumption of Canadian vehicles has improved by approximately 5 percent, far less than it could have, were it not for offsetting changes in horsepower and weight, and for a shift from cars to trucks in the early 1990s. As far as GHG emissions are concerned, the improvements in vehicle fuel efficiency have been negated by the increasing number of vehicles and longer distances travelled.*[17]

[16] *Op. Cit.,* 1.
[17] *Ibid*.

#1 Most Important Reason For Choice		
1	Price/Cost to Buy	4,131
2	Reliability/Dependability	2,879
3	Exterior Styling	2,840
4	Value For The Money	2,564
5	Interior Comfort	2,461
6	No Answer	2,324
7	Manufacturer's Reputation	1,731
8	Fun To Drive	1,525
9	Storage & Cargo Capacity	1,311
10	Quality of Workmanship	1,275
11	Fuel Economy	1,237
12	Engine Performance	1,056
13	Safety Features	1,010
14	Road-holding/Handling capabilities	955
15	Ride Quality On Highway	699
16	Durability/Long Lasting	594
17	Future Trade-In Or Resale Value	483
18	Rebate/Incentive	415
19	Length of Warranty	244
20	Discount/Value Package	183
21	Environmentally Friendly Vehicle	37
Unweighted Sample Total Count		29,954

Table 1
Important factors in choice of new vehicles — 2002[18] *(our highlight)*

In Table 1, we note that fuel economy is exactly in the middle among factors affecting consumer choices. If the first factor is the vehicle's purchase price – which shows that the economic factor remains predominant – it is surprising that vehicle durability, although closely related to price, is only ranked 16th. The third rank of "exterior styling" demonstrates again that certain irrational criteria are decisive in the choice of vehicle. We also note that rebates, incentives, discounts or package deals are among the factors least often cited by consumers for choosing a vehicle.

[18] **Turrentine, T.** and **K. Kurani.** *Automotive Fuel Economy in The Purchase Decisions of Households*, presented at the Transportation Research Board 84th Annual Meeting, January 9-13, 2005, Washington, D.C., United States, cited in Marbek, p. 11.

2.2.2.1 — Capturing Undervalued Savings

In his introduction, Marbek briefly comments on the Greene study cited above and emphasized that:

> *A key factor in these results was the assumption that consumers significantly undervalue fuel savings in purchasing decisions and that there are economic gains to be made by capturing these unvalued savings through the application of a feebate.*[19]

[19] Marbek, *Op. Cit*., 1, p. 2.

2.2.2.2 — Technological Improvements

The report reviews a series of technological improvements that could raise the energy performance of popular models in the short or medium term, to the extent that the Canadian market would not be alone in attempting to justify the investment.

Technology Type	Fuel Economy Improvement (%)	Cost (C)	Cost Effectiveness (C/FE%)
4 VALVE	0.0	0	S.O.
CYLINDER CUT	0.0	0	S.O.
6-SPD AUTO	0.0	0	S.O.
AUTOMATED MANUAL	2.0	3	1.6
EARLY LOCK UP	0.5	6	13.0
5W-20 OIL	1.0	16	15.6
AGG. SHIFT LOGIC	2.0	39	19.5
IMPROVED TIRES	2.0	52	26.0
CVT	3.9	110	28.2
ELEC POWER STRNG.	2.0	59	29,3
FRIC. REDUCTION I	1.5	46	30.3
VVT	2.0	65	32.5
VVL-DISCRETE	5.0	195	39.0
FRIC/ REDUCTION II	1.5	59	39.0
VVL CONTINUOUS	3.0	124	41.2
MATERIAL SUB.	3.3	137	41.4
DIRECT INJECTION	3.5	163	46.4
DRAG REDUCTION	1.7	85	49.7
VVT DUAL	1.0	65	65.0
IMPROVED ACCESSORIES	1.0	73	72.8
TURBO	7.5	585	78.0
CAMLESS VALVE	3.0	306	101.8
42V W/IDLE CUT	4.5	910	202.2
MILD HYBRID	3.0	650	216.7

Table 2
Canadian small car technology cost curve[20]

The column on the right indicates the ratio of cost (in Canadian) to fuel economy percentage. As we can see, most of these improvements are not onerous individually. However, introducing all these measures simultaneously would raise vehicle prices prohibitively. It should also be noted that none of these technologies, taken individually, would decisively improve vehicle fuel economy. Finally, some of these technologies are already available on certain luxury vehicles.

[20] Energy and Environmental Analysis Inc. *Automotive Technology Cost and Benefit Estimates.* Prepared for Transport Canada, March 2005. p. 47. Cited in Marbek, p. 15.

"Idle cut" (second-to-last row) refers to the system that automatically cuts the engine when the vehicle stops, for example at a red light or in a traffic jam, and restarts it as soon as the gas pedal is pressed. Citroën, which already makes this technology available on some of its models under the name of Stop & Start, claims that it can save 10% in fuel consumption in the city.

Regarding the introduction of new technologies, Marbek comments:

The opportunities to introduce new technologies will depend not only on the availability of the technology, but also on the timing of vehicle redesigns, and whether or not the market is large enough to justify the investment.

Redesign of vehicle models is influenced by many external variables, including the market environment, political environment, and individual manufacturer direction, and is therefore subject to a lot of uncertainty. Notwithstanding this uncertainty, it is anticipated that 75 percent of vehicles will see a retrofit opportunity in the next 3 years, and that most remaining vehicles will see another opportunity within the next 10 years.

Redesign thresholds depend on the type and cost of the technology and the value of the vehicle. Typically, manufacturers would not consider significant technology investments solely for the Canadian market. [...] *Nevertheless, if the Canadian demand was large enough, some investments might be considered*.[21]

2.2.2.3 — Feebate Parameters

The Marbek report discusses the many forms that a feebate system can take, and the various parameters that can influence its application.

To project the results of various feebate levels, the authors' basic assumption is that in 2003, the average consumption of vehicles sold was 9L/100 km, and that, without incentives, that consumption would later stabilize at 8.3 L/100 km until 2018. The authors also examine scenarios for feebates of $250, $500 and $1,000 per reduction of 1 L/100 km. $1,000 in taxation would reduce average consumption to 7.5 L/100 km. The study concludes as follows:

> *Overall, a feebate of $1000 per litre per 100 km would appear to be most promising since it delivers the greatest economic benefit, and avoids the large shifts in market share associated with higher rates. This option would produce GHG reductions of 3 Mt per year in 2010 rising to 6 Mt per year by 2018. (By comparison, the MOU target is 5.3 Mt per year in 2010.)*[22]

To assess the impacts of various feebate levels, the report reviews the following aspects: fiscal impact, economic performance, fairness to manufacturers (where it appears that suggested measures would pose a greater challenge to GM, Ford and Daimler-Chrysler, because of their less diversified offer of economy cars) and simplicity.

[21] Marbek, *Op. Cit*.,1, pp. 15-16.
[22] *Ibid.*, p. 46. (*Note: MOU = Memorandum of understanding between the Government of Canada and the automotive industry*)

Like Greene, this report's authors consider that the feebate mechanism is not likely to exercise a decisive influence on consumers' purchasing decisions, but that it is above all an incentive for the industry to improve its offer of low-consumption vehicles, remove from the market certain high-consumption vehicles, etc.

> *Feebates would induce significant investment in technology. In fact, the model suggests that most improvements in fuel efficiency will likely flow from technology improvements as opposed to shifts in purchasing.*[23]

Among the report's other conclusions is the following:

> ***Fuel Savings and GHG Emissions**. The combination of technology improvements and shifts in purchasing is expected to yield fuel consumption improvements of 0.2 litres per 100 km to 0.8 litres per 100 km, with an improvement of 0.4 litres per 100 km for a $500 per litre per 100 km feebate (equal to 1.2 billion litres per year). Corresponding GHG reductions are expected to range from 1.5 Mt per year to 6.2 Mt per year, with 3.0 Mt per year for a $500 per litre per 100 km feebate.*[24]

2.2.2.4 — Discussion

For Marbek as well as Greene, the conclusions on the effectiveness of feebate measures are paradoxical and require us to clarify our understanding of those statements. First, we know that the consumer's first choice factor is the vehicle's purchase price. Therefore, if two vehicles are of equivalent size and price and one is more efficient to the point of qualifying for a rebate, it is certain that the consumer will favour that vehicle, which will compel the losing manufacturer to improve its product quickly and thus remain in the race. However, in the researchers' opinion, if a person wants a 2-litre vehicle, the rebate will not motivate him to settle for a 1.4 L vehicle in order to receive a $1,000 rebate.

Finally, with regard to buyers of powerful vehicles, a feebate can play a role in consumers' purchasing decisions; but it's assumed that those who buy vehicles of $35,000 and up have already decided to pay a premium for factors such as "luxury" and "performance". On the other hand, again, it is likely that some manufacturers will make efforts to "capture the rebate" or "avoid taxation", which would give them a competitive advantage.

Marbek mentions an issue of fairness between American and foreign manufacturers. However, neither author mentions tax fairness issues raised by government measures of this kind. We will examine this question in the section on the new Canadian measures.

2.3 Current and Future Issues

On January 30, 2007, David L. Greene of Oak Ridge National Laboratory, the author of the report quoted above, testified before the American Senate Committee on Energy and Natural Resources. The conference text[25], which summarizes public policy issues regarding energy

[23] *Ibid.*, p. 38.
[24] *Ibid.*, p. 39.
[25] **Greene, David L.,** *Policies to increase passenger car and light truck fuel economy*. Testimony to the United States Senate Committee on Energy and Natural Resources, 2:30 pm, January 30, 2007 [online]

efficiency, is all the more interesting because the author is addressing himself to political decision-makers who have a direct influence on some of the legislation he advocates.

In his introduction, Greene mentions of course the American contribution to the greenhouse effect — a consumption of 6300 gallons of oil per second solely for transportation — but mainly warns his audience against the risk of depleting the resource in the near future. Why does the United States need an energy conservation policy?

> *For too long we have ignored the urgent need to reduce our petroleum dependence, protect the global climate and chart a course toward a sustainable energy system. For the past twenty years we have spent the technology that could have been used to raise fuel economy to instead increase horsepower and vehicle mass. Since 1987 horsepower is up 85% and mass over 25%. In part, this is because consumers value acceleration and speed. But it is also because car buyers undervalue fuel economy. Raising the fuel economy of passenger cars and light trucks will not by itself solve our energy dependence, greenhouse gas emissions and sustainable energy problems. But significantly increasing vehicle efficiency is an essential component of any meaningful strategy to address these important goals.*[26]

Greene cites the results of Turrentine and Kurani's study and evokes a National Research Council study concluding that an increase in vehicle efficiency from 28 to 32 MPG (from 8.4 to 7.35 L/100 km) saves the consumer $500 over 3 years (fuel savings less additional purchase cost of the vehicle, for one gallon of gas @ $2 US), but that beyond 32 MPG the consumer's savings decrease down to nothing. For manufacturers, changing the average fuel consumption from 28 to 40 MPG (from 8.4 to 5.9 L/100 km) would involve a complete overhaul of all assembly lines and a reinvestment of several billion dollars over a decade.

Nevertheless, fuel consumption costs and related savings continue to be undervalued by consumers:

> *The NRC (2002) fuel economy study considered the undervaluing of fuel economy in their cost-efficient fuel economy calculations. (A fuel economy increase was considered cost-efficient if the marginal cost of the increase was less than or equal to the marginal benefit in fuel savings to the consumer). [...] Valuing fuel economy as both consumer and manufacturers say they do, little or no improvement was justified.*[27]

The same applies of course to indirect costs, which are still substantial:

> *Finally, the consumption of oil produces additional costs that are of great significance to us as a nation but are generally not considered by individuals in their car purchase decisions:*
> *1. Economic costs of oil dependence*
> *2. Military, strategic and foreign policy costs of oil dependence*
> *3. Climate change impacts of carbon dioxide emissions*
> *4. Other environmental impacts*
>
> *By my estimates, the economic costs of oil dependence alone exceeded $300 billion last year. Military and foreign policy costs are extremely difficult to measure in dollars but in*

---

http://cta.ornl.gov/cta/Publications/Reports/Policies_to_Increase_Passenger_Car.pdf (accessed April 29, 2007).

[26] *Ibid.*, p. 1.

[27] *Ibid.*, pp. 4-5.

> *my opinion they are at least as great a problem for our nation. All of these additional costs of oil use are what economists call public goods (or bads). In general, consumers give them little or no weight in their individual purchase decisions. Such problems must be addressed by public policy if they are to be solved.*[28]

Greene then considers policy models that have the greatest impact on the fuel economy of new vehicles. First he emphasizes that since the fuel economy market is not efficient, fuel economy standards[29] have been favoured by many governments; notably, as he points out, the European Union, Japan, China, Canada, Australia, South Korea and the United States all have fuel economy standards for light vehicles.

> *In many of these countries gasoline prices exceeded 4 and even 5 per gallon last year (EIA, 2006, table 11.8). Yet fuel economy standards are still needed because of the inefficiency of the market for fuel economy and because markets are not concerned with the public goods, such as energy security and preserving the global climate. Raising gasoline taxes is a less effective way to increase fuel economy than standards or feebates. Nevertheless, higher fuel taxes are an important complementary policy because they send a consistent message to consumers that reducing fuel consumption is important, they mitigate against the very small increase in driving that fuel economy increases would otherwise produce, and they can be used to offset the loss of revenues to maintain and improve transportation infrastructure that would otherwise occur.* [30]

Greene ends his treatise by recalling the advantages of feebates, which bypass the market's incapacity to correctly appreciate the value of fuel savings and constitute a constant incentive for manufacturers to rely on the latest technologies and apply them to improve vehicle fuel efficiency.

[28] *Ibid.,* p. 5.
[29] Fuel economy standards consist in legislation that requires a specific level of fuel efficiency for new model vehicles. The United States were pioneers in the field when they levied a tax surcharge on gas guzzlers with a consumption of more than 22.5 mi/gal. In Canada, the *Motor Vehicle Fuel Consumption Standards Act* was presented to Parliament in 1982, but was not proclaimed because the motor vehicle industry agreed to comply voluntarily with the requirements of the Act. [online] http://www.tc.gc.ca/programmes/environnement/carbpgm/prog/menu.htm (accessed May 18, 2007).
[30] Greene, *Op. Cit.*, 28, pp. 6-7.

2.4 Avenues Open to Governments

A very complete document, Alternative Legal Measures to Improve the Fuel Efficiency of Motor Vehicles[31], produced in 1999 on behalf of the United Nations, describes in detail the various legislative avenues open to governments to intervene in matters of vehicle fuel consumption.

The document, addressed mainly to Asia-Pacific governments, constantly refers to the situation of Japan and Korea, which resembles that of Canada in that 1) their automotive industry is very developed and focused on exports, and 2) their governments prefer consultation and conciliation with the automotive industry, rather than coercive measures[32].

Indeed, Japan and Korea are well placed to reduce greenhouse gases, given their technologically advanced economies, their well-developed public transportation systems, the collaboration between government and industry economically, socially and ecologically, etc. The study's author, an Australian jurist, also documents the Australian context, where the federal government and provincial governments share jurisdictions in matters of consumption and the environment. A large multinational automotive industry is also established in Australia.

2.4.1 Tax Incentives

The author first states that governments can affect fuel consumption through tax incentives and regulations; taxes and other fiscal interventions can encourage vehicle owners and users to pay more attention to fuel consumption characteristics.

Among the measures mentioned by the author are: modulating sales taxes to favour the purchase of small vehicles and penalize that of larger ones; modulating registration fees according to vehicle energy efficiency; increasing gasoline excise taxes; and feebates in the form of tax credits for purchases of vehicles that meet certain fuel economy standards.

According to the author, the purpose of the regulations is to ensure that minimum required changes are made by the public. He identifies three main regulatory instruments:

- *fuel economy standards;*
- *requirements for vehicle fuel consumption;*
- *disclosure of fuel consumption specifications in vehicle advertisements.*

[31] **Bradbrook, Adrian J.** *Alternative Legal Measures to Improve the Fuel Efficiency of Motor Vehicles*, In *Compendium on Energy Conservation Legislation in Countries of the Asia and Pacific Region*, Vol. 1, United Nations Economic and social commission for Asia and the Pacific, United Nations, September 3, 1999, [online] http://www.unescap.org/esd/energy/publications/compend/ceccontents.htm (accessed May 14, 2007).

[32] The Canadian automotive industry numbers 12 high-volume assembly plants producing cars, minivans and light trucks, produces 2.6 million light vehicles annually (which makes it the 8th largest automotive industry in the world), ships 60.7 billion worth of products. Our balance of payments in this sector is positive. (Source: http://strategis.ic.gc.ca/)

2.4.2 The American CAFE System

Bradbrook then presents the American *Corporate Average Fuel Economy* (CAFE) system (1975), which requires each manufacturer to attain a certain fuel consumption performance for the average of vehicles sold in the United States in a given year. The current CAFE standard for automobiles is 27.5 MPG (8.55 L/100 km), whereas that of light trucks is 20.5 MPG (11.47 L/100 km). The vast majority of sport utility vehicles (SUVs), minivans and pick-up trucks, being built on a truck platform, are subject to a much lower standard.

The author comments on the CAFE system from the viewpoint of a legislator attempting to reduce fuel consumption, but he also shares the viewpoint of the American legislator concerned not to harm the growth and sales of an industry vital to the national economy. Here are the main weaknesses he finds in the CAFE system:

a) *CAFE works against market forces. Customers do not wish to consider energy efficiency when the cost of petrol is very low (as is currently the case on a worldwide basis). Thus, while most customers in the United States appear to want large cars, the CAFE regulations prevent the manufacturers from satisfying the demand.*

b) *CAFE distorts the price of vehicles. The major United States manufacturers now over-price their large cars in order to be able to sell small cars as cheaply as possible.*

c) *The way that the CAFE regulation is fixed is unfair to domestic manufacturers. While United States manufacturers have been forced to spend large sums on technological research and development, many car importers (especially from Japan) have had no difficulty in reaching the standards set. At the time when CAFE was fixed at 27.5 miles per gallon, Japanese cars were already achieving much better fuel economy. Thus, CAFE is regarded as having helped the Japanese at the expense of the United States car manufacturers. In fact, because the Japanese importers have such a wide margin of comfort, the fuel economy of Japanese cars imported into the United States has worsened since the advent of the CAFE regulations.*

d) *The current civil penalty for breaching CAFE regulations is too light. [...]*

e) *Many safety standards militate against compliance with CAFE regulations. The standards for safety invariably involve increasing the weight of vehicles and are mandated by the Government without any apparent consideration of the adverse effect that such safety standards would have on fuel economy.*

f) *CAFE regulations increase the price of new cars. This has the effect of causing people to retain their old cars, which are usually very fuel inefficient, for longer periods.*

g) *The CAFE regulations only affect new cars and have no impact on existing vehicles.*

h) *CAFE does not affect driver behaviour. There is evidence in the United States that if motorists achieve greater fuel economy, they will simply do more discretionary driving. This results in the same level of fuel consumption overall.*

i) *CAFE distorts the market and leads to gaming by manufacturers. For example, when the CAFE regulations were introduced, stationwagons were effectively phased out by*

vehicle manufacturers and replaced by 4-wheel-drive vehicles. The reason for this is that the 4-wheel-drive vehicles class as light trucks and are treated much more favourably in relation to the CAFE fuel consumption standards. Retention of stationwagons, which class as cars, would have adversely affected compliance with the CAFE regulations for cars.[33]

2.4.3 The Japanese System

The Japanese system creates three classes of vehicles, according to their weight. For each class, fuel consumption reduction objectives have been established, starting with an average reduction of 8.5% for the year 2000.

Vehicle Weight in Kg)	Fuel Efficiency Targets in Km/Litre)	% Improvement Ratio over 1990
0 to 702	19.2	6.5
702 to 827	18.2	7
827 to 1015	16.3	7.2
1015 to 1515	12.1	7.9
1515 to 2015	9.1	9.5
2015 and +	5.8	13.6

Table 3
Fuel efficiency targets for motor vehicles in Japan (by the year 2000)
Note: For trucks weighing less than 2.5 tonnes, an energy efficiency improvement of 4.8 to 5.8% relative to 1993 is stipulated.

We note that to discourage manufacturers from increasing vehicle size and mass, fuel efficiency improvement targets, in percentages (column on the right), are higher for large vehicles than for smaller ones. A fuel efficiency of 19.2 km/litre corresponds to a consumption of slightly more than 5 L/100 km. If those objectives were attained in 2000 and Japanese regulations have continued to require improvements since then, we can well understand that the Japanese car population has currently attained an average consumption of 5.1 L/100 km.

The study then discusses the effectiveness of various models of consumption standards and their applicability to Asian markets. For example, starting in 1989, the Australian model attempted to make a number of construction standards uniform across the various provinces. By means of the Australian Design Rules, the federal government has regulated motor vehicle safety and polluting emissions. The author observes that the federal government could use the same law to impose fuel consumption standards.

[33] **Bradbrook**, *Op. Cit.,* 32, Chapter 3, part 2. [online] http://www.unescap.org/esd/energy/publications/compend/ceccpart3chapter2.htm (accessed May 20, 2007).

2.4.4 Fuel Consumption Labelling

Fuel consumption labelling requirements exist (as the time of the study's writing) in most advanced countries. In Canada, fuel consumption labelling is subject to a voluntary industry program.

The author first emphasizes the difficulty arising from the fact that gasoline consumption data obtained during tests are not reproduced on the highway. Depending on the country, this problem is remedied by applying correction factors to test results so as to present a less optimistic gasoline consumption value.

For labelling requirements to yield results, how should they be designed and applied?

> *For a suitable regulatory system, it will be necessary to prescribe the exact form of the label by law, preferably in the regulations attached to the enabling statute. As the labelling system is designed as a consumer protection and information measure, it is essential that the label be carefully designed so as to disclose the relevant amount of information in a manner that is easy to understand. (…)*
>
> *It is suggested that the desirable form of a label would consist simply of fuel consumption information and, like the United States label, would give separate figures for city and highway fuel consumption, appropriately discounted from the figures obtained from standard test conditions, and for comparative purposes would indicate the range of fuel consumption figures obtained by passenger vehicles and light trucks generally. It is further suggested that a global figure for the estimated annual fuel cost for the vehicle, which forms part of the United States' label, not be included in the newly designed label. The estimated fuel cost is considered by the writer to be too vague and misleading, from a consumer perspective, as the figure will depend greatly on the number of kilometres driven in a given year. This will be unknown in each case and will vary greatly between customers.*[34]

2.4.5 Eco-Efficiency and Advertising

In Australia, working groups on sustainable development have proposed that all automobile advertisements specifically refer to the energy performance of advertised car models. This measure is currently applied in France, among other countries.

The author makes a series of arguments in favour of a measure to compel advertisements to include vehicle fuel consumption data:

> *First, it would raise the public awareness of fuel consumption as a factor in the purchase decision; second, it would put fuel consumption information before the prospective buyer at an early stage in the purchasing process; third, sufficient fuel consumption data exists, so that the need for additional testing costs is avoided; and fourth, it ranks fuel efficiency alongside other attributes in the overall image of desirability of ownership delivered by the advertisement.*[35]

[34] *Ibid.*, chapter 4.
[35] *Ibid.*, chapter 5.

The problem of false advertising in this area was substantial enough for the Australian Competition and Consumer Commission to publish in 1992 guidelines on advertising claims regarding fuel consumption. The author considers that legislative supervision of car advertising is justified. He draws an analogy with tobacco advertising, movie ratings and food product advertising (advertising in these fields is currently regulated in Canada):

> *Based on these analogies, particularly that of tobacco advertising, the following form of legislation could be adopted by the governments of the member countries of the ESCAP region to ensure that fuel consumption information is compulsorily included in all advertising for new model-specific motor vehicles:*
>
> > *A corporation shall not publish, or cause to be published, an advertisement for a new model-specific motor vehicle unless the advertisement incorporates, or appears in conjunction with, information relating to the fuel consumption of the vehicle. Such information must be published in the prescribed manner and form.*
>
> *[...] The legislation should also give the government the power to make regulations prescribing the format and content of the information relating to the fuel consumption of motor vehicles to be included in all advertisements.*

2.4.6 Tax Incentives

The study then reviews the tax incentives that can be used by governments:

1. *Differential sales tax rates based on motor vehicle fuel efficiency:*
   - *Skewed sales taxes, imposed on manufacturers or consumers, in the form of a lump sum or variable tax rates, and penalizing inefficient vehicles.*
   - *A feebate system.*

2. *Skewed registration charges penalizing inefficient vehicles.*

3. *Increasing the fuel excise tax. Gasoline taxes are a direct incentive to consumers to reduce gasoline use and purchase fuel-efficient vehicles.*

4. *Tax Incentives. Tax rebates or credits could be offered to buyers of vehicles that meet specified fuel economy standards.*

5. *Grants, low interest loans or loan guarantees to businesses or public corporations for the lease of purchase of fuel-efficient vehicles.*

In his final analysis, the author observes that the formula of differential registration fees raises problems of fairness: Low-income groups drive older, less fuel-efficient vehicles, and would thus likely be more heavily taxed by such measures. On the other hand, a system of grandfather clauses applying differential registration fees only to new vehicles would convey the message that it is best to keep old vehicles, likely more polluting, and would thus contradict in practice the main message aiming to raise fuel economy awareness.

As we will see below, it might be argued that each of the formulas proposed raises problems of fairness.

2.4.7 Conclusions

The author concludes that government intervention would ideally combine the various tools available. He notes that measures monetarily rewarding or penalizing buyers – who are in the last resort responsible for vehicle fuel efficiency – would have the greatest impact in raising awareness:

> *The proposed sales tax changes should exist concurrently with increases to the petroleum excise taxes and with a system of government grants, subsidies or loans to businesses for the purchase of highly fuel-efficient vehicles. Increasing petroleum excise taxes would compensate for the revenue shortfall that would be caused by the reduction of sales tax for a significant proportion of motor vehicles. Such increases can also be justified as being consistent with the user-pays system for maintenance of the highway system. In addition, being an up-front and highly visible charge, it is the most powerful possible incentive for fuel economy.*
>
> *The combination of skewed sales tax and higher excise charges would amount to a carrot-and-stick system, whereby the consumer is simultaneously rewarded for taking the right approach to vehicle fuel economy (in this case, by reduced sales tax) and punished for taking the wrong approach (by higher petrol excise taxes). The two tax changes thus mutually reinforce each other.*[36]

[36] *Ibid.*, chapter 8.

3.0 ECO-ENERGETIC LABELLING OF VEHICLES

Motor vehicle fuel efficiency labelling is now commonplace. However, each country determines the type of label to be used, the information to appear on it, and the degree of coercion applied to the industry regarding compliance and signage.

In Canada, motor vehicle fuel efficiency labelling is voluntary. In print advertising, the information is often lost in small print, unless a manufacturer wants to insist on the fuel efficiency of a particular vehicle model. On the other side of the Atlantic, new vehicle labelling is governed by a European standard, which is then applied differently in the various countries. In this chapter, we will examine the various label models used and the information appearing on them.

3.1 In Canada: the EnerGuide Label

The EnerGuide label has been affixed on household appliances and light bulbs for ten years in Canada, so we are familiar with information related to the consumption rate of certain products.

Following negotiations between government and industry, the EnerGuide label affixed on new vehicles, which is similar to the one affixed on household appliances, was adopted in Canada as the model for revealing vehicle energy consumption to consumers.

As opposed to the European style, the EnerGuide label does not present an evaluation of mixed consumption, i.e., the average between urban and highway consumptions. Rather, it presents, in two distinct sections, data on urban and highway driving, according to statistics obtained through tests standardized by the Minister of Natural Resources. Consumption is indicated in litres per 100 km (L/100 km) and in miles per gallon (mi/Gal or MPG).

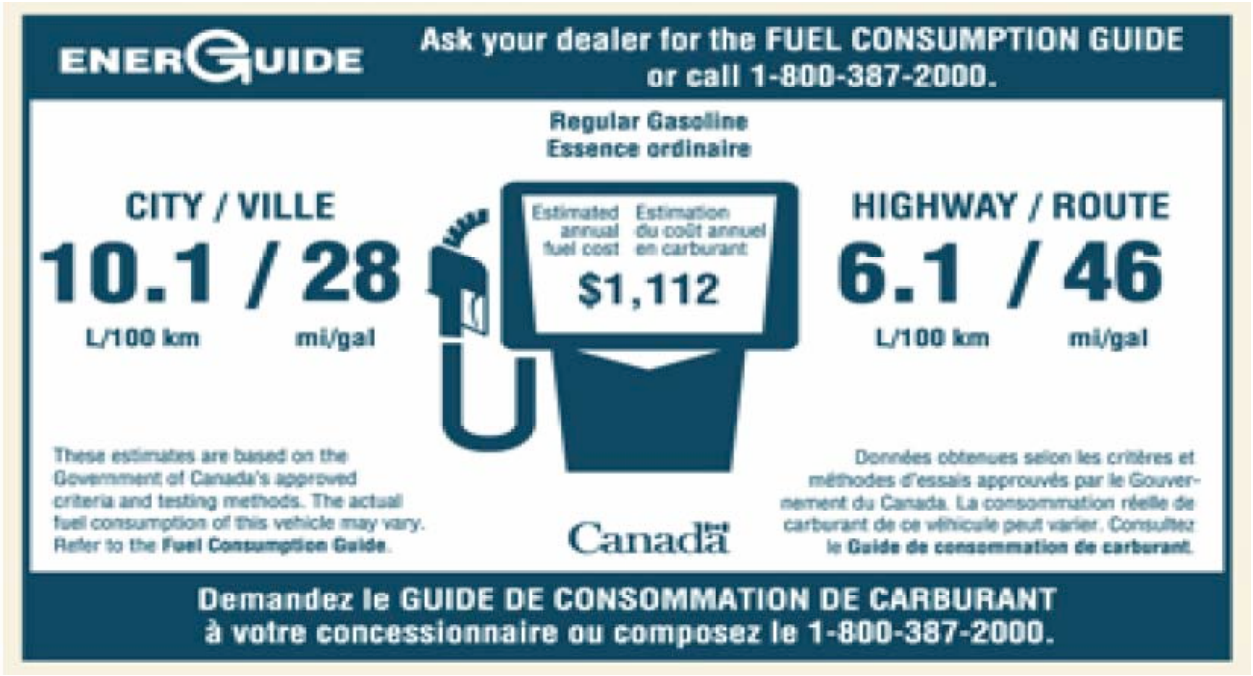


Illustration A
Canadian Label
(EnerGuide label affixed on new vehicles sold in Canada)

The label is completed by a dollar estimate of the vehicle's annual fuel cost, assuming an annual use of 20,000 km - 55% in the city and 45% on the highway – and according to the average price of gasoline at the pump in Canada.

In the light of consumer understanding and behaviour data taken from the studies cited above, that dollar estimate is likely to influence consumers directly. Although it enables consumers to make an easily understood comparison (annual cost) between various available models, the absence on the label of data supporting that estimate makes the amount indicated perfectly abstract.

Some might add that the presence on the label of obsolete units of measurement (mi/gal) does not improve the label's readability or bring a useful point of comparison – not even with American data, since our gallon is different (imperial gallon = 4.5 litres - US gallon = 3.8 litres).

The Automobile Protection Association (APA)[37], which conducted more than 50 anonymous inspections at car dealerships in Canada in 2004, revealed that the EnerGuide labels, rather than being clearly visible on the vehicle, were hidden in the glove compartment most of the time.

3.2 Measurement of Greenhouse Gas (GHG) Production

GHG production is not so much a measurement of vehicle energy efficiency as a way to evaluate the ecological impact of vehicles without regard to their fuel efficiency.

The main difference between the EnerGuide label and the European labels is that the Canadian label provides no indication of a vehicle's greenhouse gas (GHG) production. The European label, on the other hand, measures GHG production in grams per kilometre.

As an absolute measurement, that of GHGs is probably the simplest to standardize. However, it doesn't have much pedagogical value, since the "CO_2 gram" evokes strictly nothing for the vast majority of consumers. On the other hand, knowing that a vehicle that consumes 9.5 L/100 km releases 5.4 t of GHGs per year is not useful in itself either. Although the uniform display of this information can be used to compare the emission rates of different vehicles, it remains impossible to make sense of the variance between emission rates or to measure the impacts.[38]

3.3 The European Commission Directive

Eco-energetic labelling is governed in Europe by Directive 1999/94/CE of the European Parliament and Council, on December 13, 1999, regarding the availability of information on fuel consumption and CO_2 emissions addressed to consumers when marketing new passenger cars.[39] The European Union's Web portal summarizes that directive as follows:

> *At the December 1997 Kyoto Conference on climate change, the Community undertook to reduce its emissions of a basket of greenhouse gases by 8% during the period 2008 to 2012 relative to 1990 levels. This Directive is part of an overall Community strategy aimed at meeting this commitment to reduce CO_2 emissions, in particular those caused by passenger cars.*
>
> *The purpose of the Directive is to ensure that information relating to the fuel economy and CO_2 emissions of new passenger cars offered for sale or lease in the Community is*

[37] Telephone interview with Georges Iny, Director of the Automobile Protection Association (APA), June 18, 2007.

[38] The brochure titled brochure titled "*Your Guide to the One Tonne Challenge*", issued by the government of Canada, informs us that "*The volume of one tonne of GHGs would fill a two-storey, three-bedroom house*", Environment Canada, Ottawa, Ontario, [online] http://dsp-psd.tpsgc.gc.ca/Collection/M144-27-2003F.pdf (accessed May 28, 2007).

[39] Directive 1999/94/ce of the European Parliament and the Council, JO L 12 of 18.1.2000, pp. 16–23 (ES, DA, DE, EL, EN, FR, IT, NL, PT, FI, SV). Available on the Web site of EurLex. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:012:0016:0023:FR:PDF (accessed May 15, 2007).

made available to consumers. This consumer information system is to be set up using the following four methods:

- *attaching a fuel consumption and CO_2 emissions label to the vehicle;*
- *producing a fuel consumption and CO_2 emissions guide;*
- *displaying posters in car showrooms;*
- *including fuel consumption and CO_2 emissions data in promotional material.*

The Directive stipulates that a fuel economy label must be attached to the windscreen of all new passenger cars at the point of sale. This label must be clearly visible and meet certain requirements set out in Annex I. In particular, it must contain an estimate of fuel consumption, expressed in litres per 100 kilometres or in kilometres per litre (or in miles per gallon), and of CO_2 emissions.

A fuel economy guide must be produced at national level at least once a year. It must set out all the information specified in Annex II, including a list of the 10 most fuel-efficient new car versions in terms of their CO_2 emissions by fuel type. This guide must be compact, portable and free of charge. Consumers must be able to obtain it both at the point of sale of the dealer and from a designated body within each Member State. In addition, the Commission will make available an electronic version of the guide, accessible on the Internet.

For each make on sale, the dealer must display on posters or in any other form (including electronic displays) a list of the fuel consumption data of all the models. These data should be broken down by type of fuel and ranked in order of fuel efficiency as indicated by CO_2 emission levels.

The Directive also provides that promotional material (advertisements in newspapers, posters, brochures) used in marketing new cars must contain fuel consumption and CO_2 emissions data.

The Directive requires the prohibition of any marking relating to fuel consumption which does not comply with the above provisions and which might cause confusion.[40]

[40] **Europa.** *Information on the Fuel Consumption and CO_2 Emissions of New Cars*. European Union [online] http://europa.eu/scadplus/leg/fr/lvb/l32034.htm (accessed May 28, 2007).

3.4 Various Labels in Europe, Singapore and the United States

The explanations below are taken from the press kit distributed by the Agence de l'environnement et de la maîtrise de l'énergie (ADEME)[41] regarding the main European labels.

The European directive makes it mandatory to display a CO_2 label at the place of sale of new cars in Europe, but several member countries have gone beyond the label directive in providing consumers with more precise information.

Most of the countries that have established a specific national label have opted for a colour scale (most often from green to red) and a letter classification (most often from B to H).

The fundamental differences are found in the definitions of vehicle classes. There are two approaches: static and dynamic.

- The static approach is based on fixed values and defines limits for each class. In France, a class A car emits less than 101 g/km, a class B car emits 101 to 120 g/km, etc. France, the United Kingdom, Belgium and Denmark use this approach.
- The dynamic approach calculates average CO_2 emissions and defines classes by the deviation or the deviation gap with respect to this average: in Spain, for instance, vehicles whose CO_2 emission is 25% lower than the average emissions of the vehicles sold the previous year, are placed in class A, and those whose emission is 15% to 24% lower than the average appear in class B. The Netherlands and Spain use this approach.

These two approaches each have their advantages and drawbacks:

- The static approach involving limits allows an automatic classification of each model since the vehicle's emission is the only information needed to make the classification. However, if in the long term too high a percentage of models of a car appear in the first classes (A or B), the classification loses its meaning and a new definition of the limits proves necessary. In addition, if the weight of gas emitted, per se, means nothing to the consumer, the classification may be perceived as arbitrary and as uselessly drawing an abstract comparison between classes and within a given class of vehicles.
- The dynamic approach requires an annual calculation of the average and a reclassification of vehicles each year according to that average. However, this method allows a dynamic definition of classes since it is independent of absolute CO_2 emissions. To the consumer, the deviation from an average might be more eloquent than static data. However, here again, the classification's pivot point means nothing per se, since a slight deviation from a low consumption average may be preferable to a large deviation from a high consumption average. Nevertheless, the dynamic approach has the marked advantage of having a ripple effect: the most innovative auto manufacturers cause the average to improve, thus inciting others to improve vehicle fuel efficiency, as the average improves over time.

We reproduce below the various European labels identified as of January 11, 2006.

[41] Principales étiquettes européennes — Press release issued by the Agence de l'environnement et de la maîtrise de l'énergie (ADEME), France, May 9, 2006, http://www2.ademe.fr/servlet/getDoc?cid=96&m=3&id=31126&ref=16247&p1=B (accessed April 22, 2007).

3.4.1 Austria Label

The Austria label does not use a letter classification, but rather a colour code that appears at the top of the label. However, a letter classification project is underway. The label shows a single consumption value, as well as a *g* value for CO_2 emissions per km. The emission value is indicated on a colour scale.

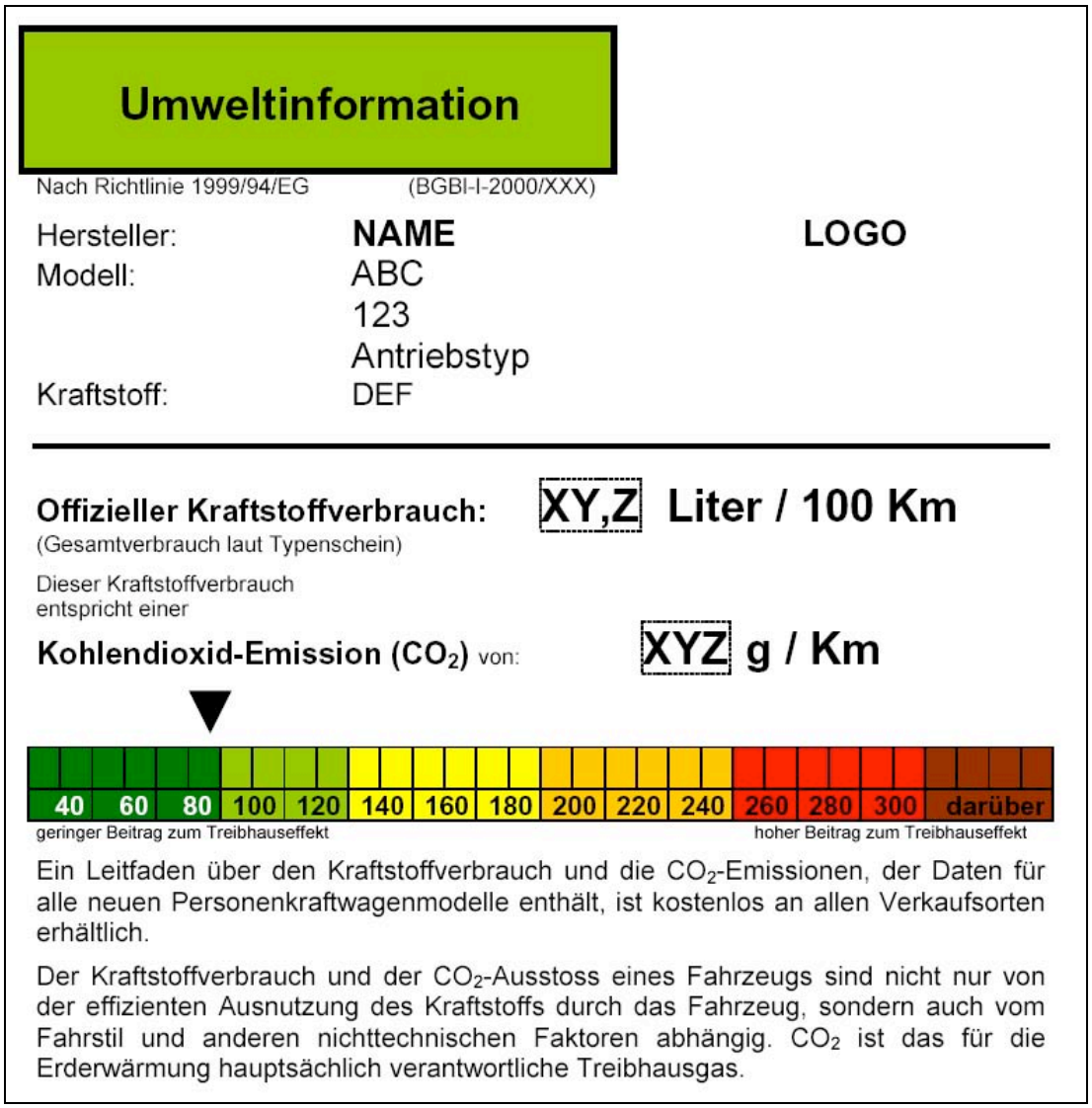


Illustration B
Austria label

3.4.2 United Kingdom Label

The United Kingdom's classification combines letters A to F and colours green to red, based on the CO_2 emission rate, indicated below in g/km. It provides an economic indicator of the annual fuel cost on the basis of 12,000 miles driven, as well as the tax amount applied to the vehicle. Consumption rates are provided for city and highway driving, in litres/100 km and in MPG. (The diesel Mini Cooper, whose label is illustrated below, has a remarkable rating of 3.8 L/100 km). A note mentions that some of the model's features can cause the emissions to vary.

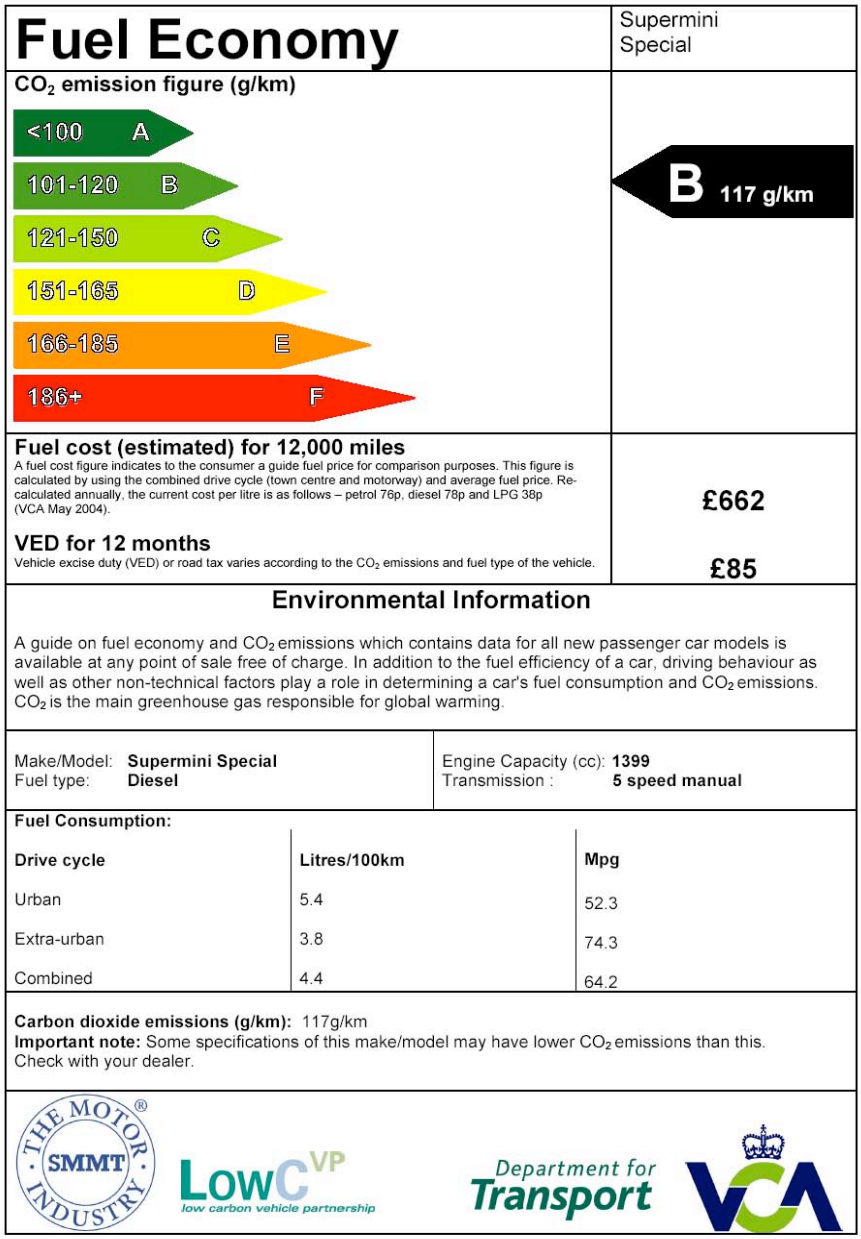


Illustration C
United Kingdom label

3.4.3 Belgium label

The Belgium label provides, on a single colour scale, a car's rating for consumption and CO_2 emissions, after indicating the model's features in litres/100 km and in g/km. The label also shows the average consumption of cars and the average CO_2 emission of cars in Belgium, per type of fuel. The label specifies the vehicle's type of fuel and transmission.

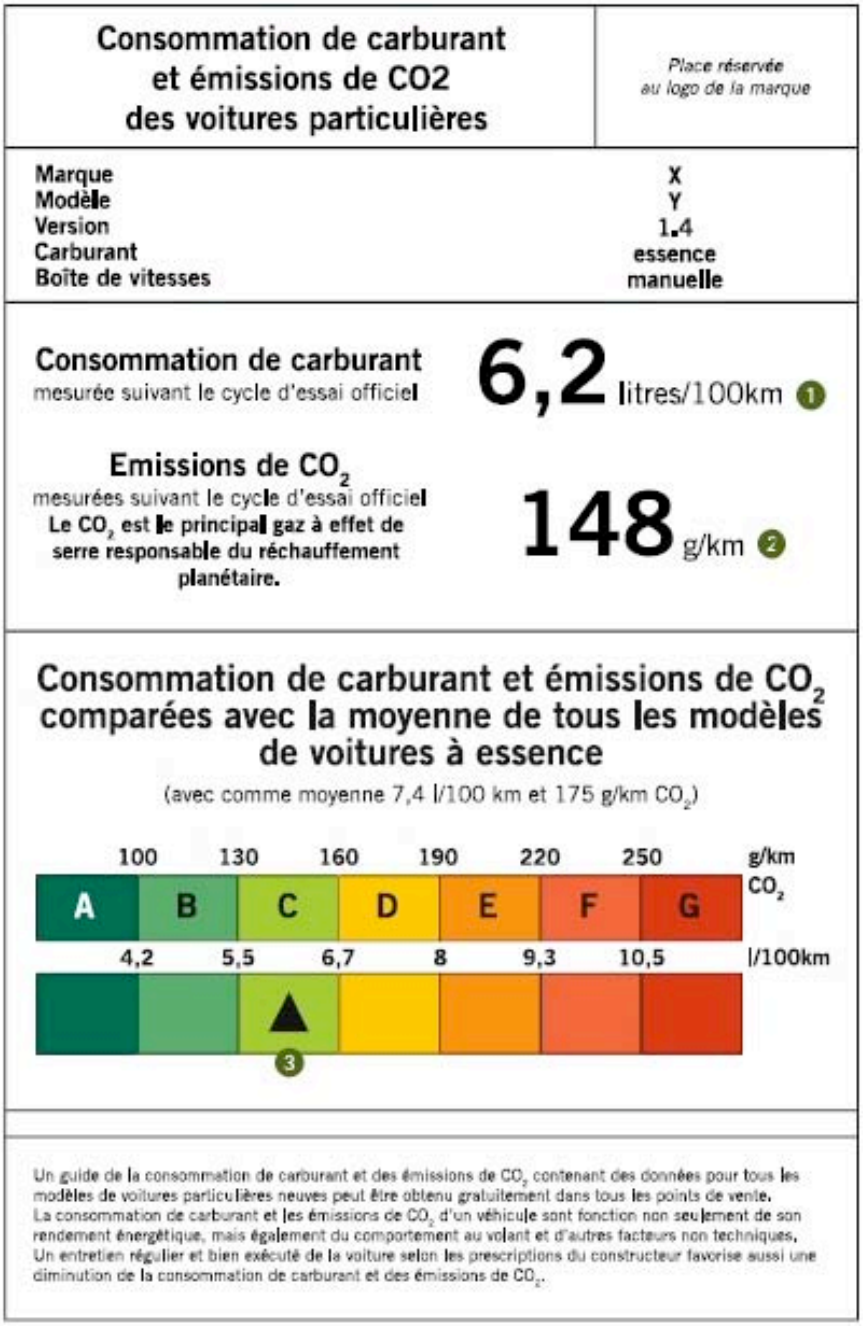


Illustration D
Belgium label

3.4.4 France Label

The France label indicates the type of fuel, the city and highway consumptions and their average, as well as a rating based on CO_2 emissions and referring to a colour scale. The label mentions that consumption and CO_2 emissions also depend on driving behaviour.

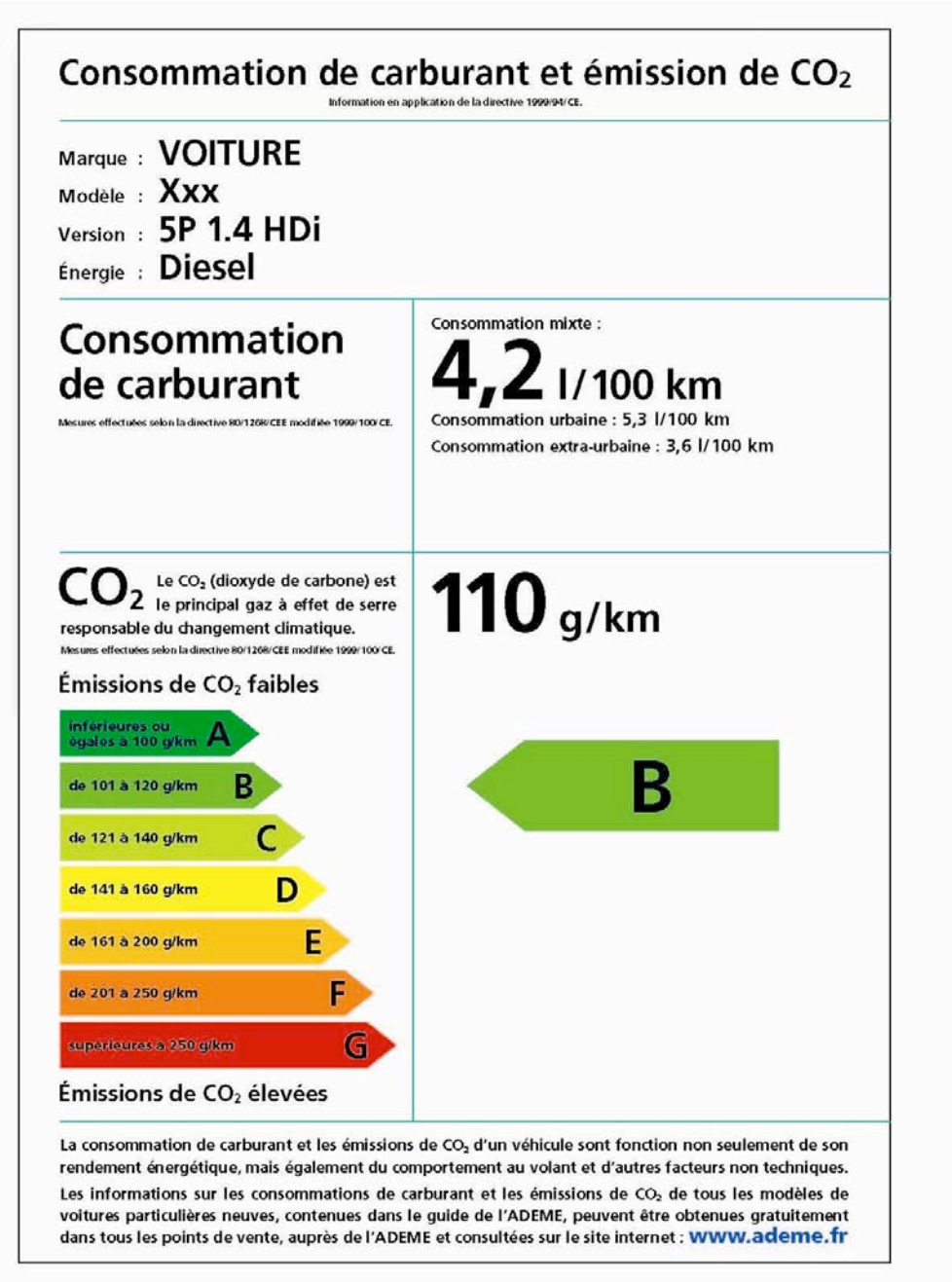
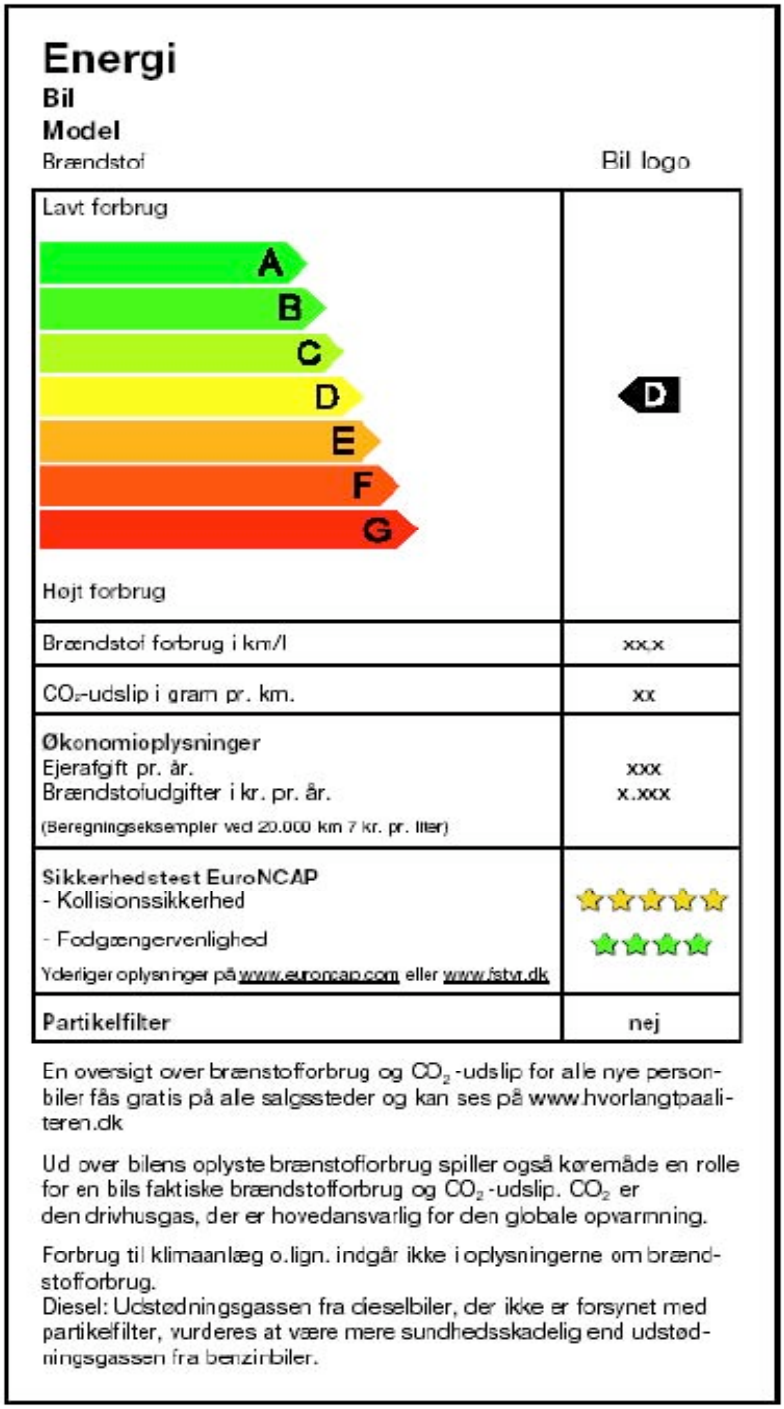


Illustration E
French label

3.4.5 Denmark Label

The Denmark label offers, according to fuel types, two different scales, based on consumption in km/L and presented in letters and colours. It also indicates safety points in the form of stars (euroNcap test rating) and the presence of a particle filter.



Essence	Km/l
A	Plus de 18,2
B	15,4 - 18,1
C	14,3 - 15,3
D	12,5 - 14,2
E	11,8 - 12,4
F	10,5 - 11,7
G	Under 10,4

DIESEL	Km/l
A	Plus de 20,5
B	17,3 - 20,4
C	16,1 - 17,2
D	14,1 - 16,0
E	13,2 - 14,0
F	11,9 - 13,1
G	Under 11,8

Illustration F
Denmark label

3.4.6 Netherlands Label

The Netherlands label is an example of the dynamic approach. The ratings indicating the deviation from the average refer to a letter and colour scale. The label also indicates the vehicle's features in the form of numbers. Consumption is presented in litres/100 km and in km/litre.

Illustration G
Dutch label

Classification:

A: More than 20% lower than average

B: 10 - 20% lower than average

C: 0 - 10% lower than average

D: 0 - 10% higher than average

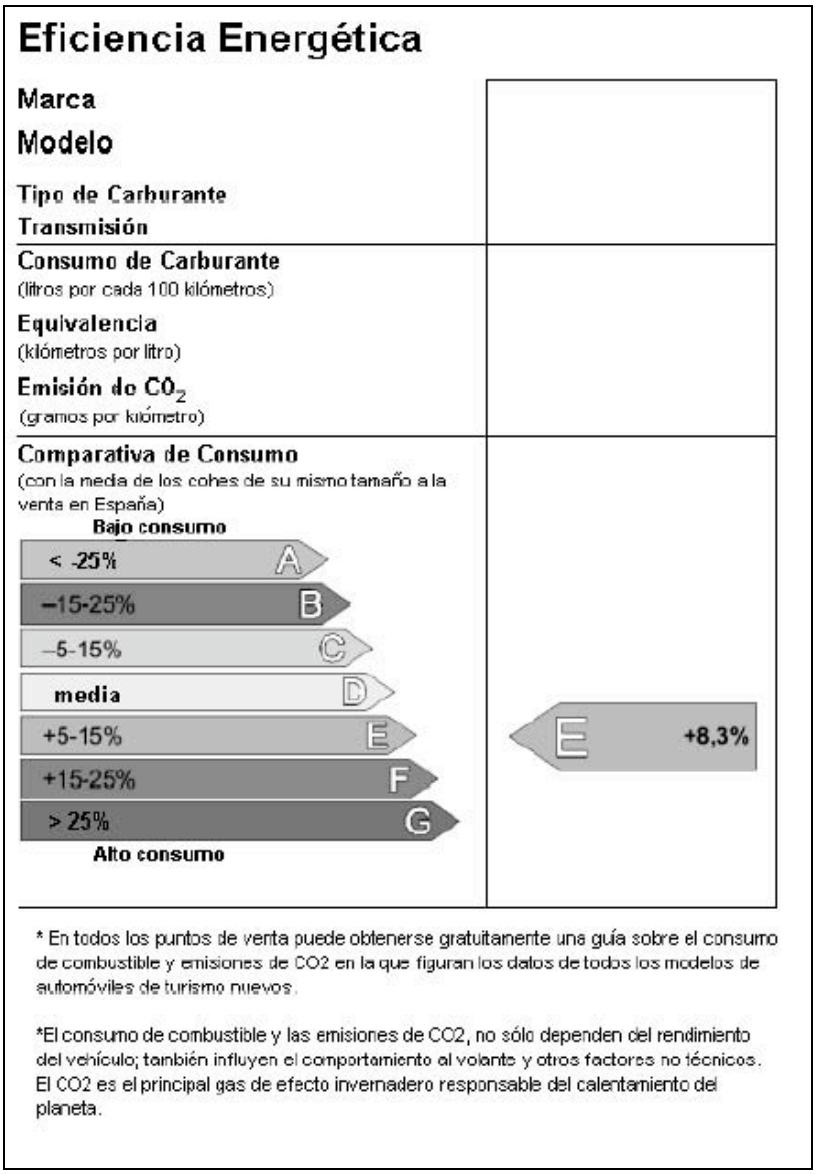
E: 10 - 20% higher than average

F: 20 – 30% higher than average

G: More than 30% higher than average

3.4.7 Spain Label

Adopted in 2002, the Spanish label is based on the average fuel consumption of vehicles sold in the previous year. This is also an example of a dynamic label. Here again, consumption is indicated in litres/100 km and in km/litre.



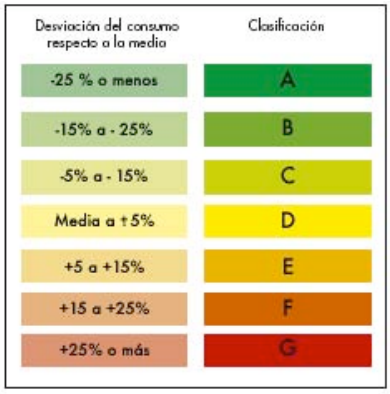


Illustration H
Spanish label

3.4.8 Singapore Label

Singapore uses a very simple label that highlights fuel consumption in km/litre, indicates the engine capacity, and provides a scale of comparison for city driving only (Singapore being a city-state) for vehicles of comparable engine capacity.

It is indicated that fuel consumption will vary depending on vehicle condition, traffic and driving habits. A note also mentions that fuel consumption tests were performed without air conditioning, although Singapore is located very near the Equator.

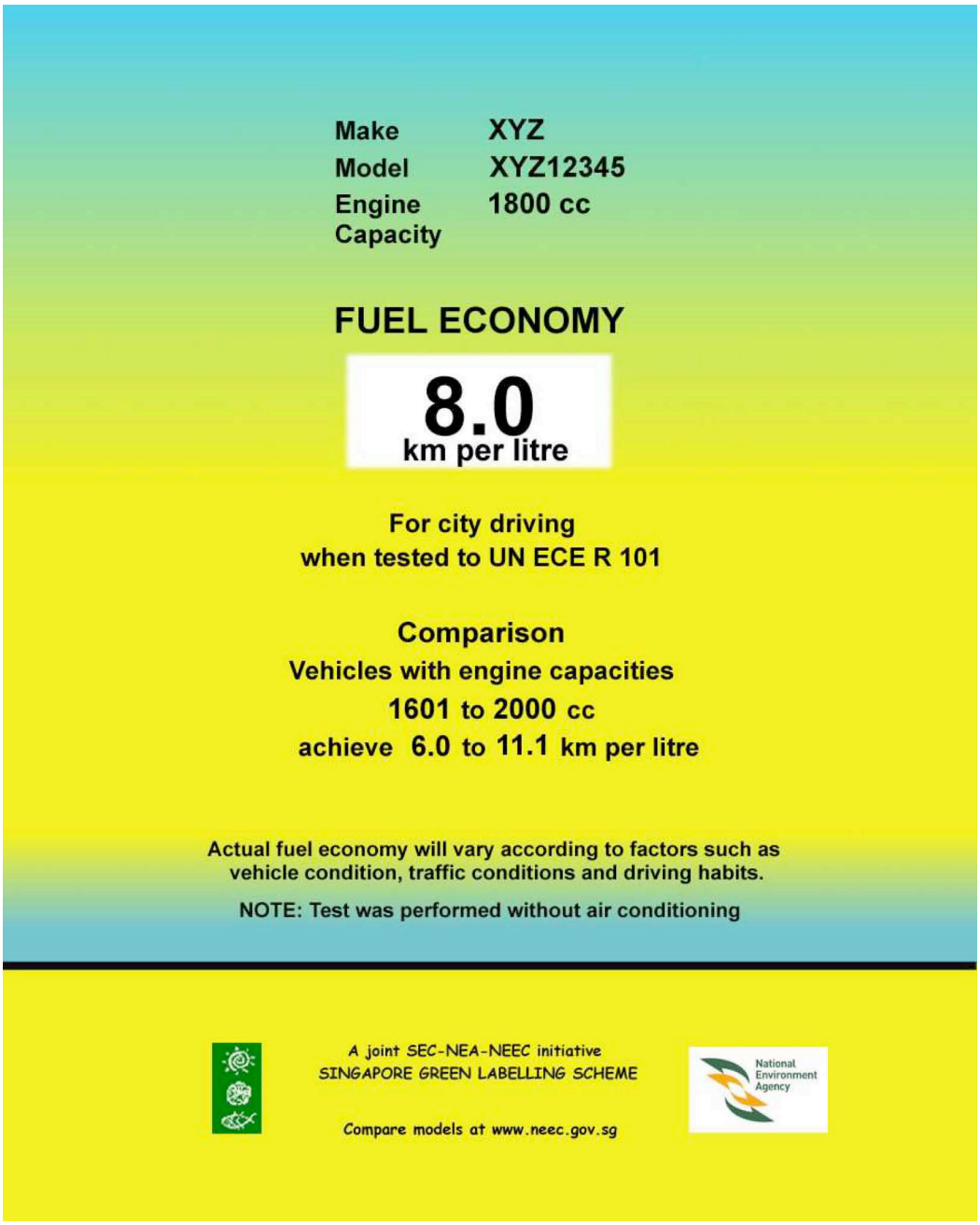


Illustration I
Singapore label

3.4.9 United States Label

The new American label provides fuel consumption values estimated for city and highway conditions, as well as a combined value. Ranges are indicated for “highway” and “city” ratings as well as the combined value. The annual fuel cost is mentioned, along with the assumptions (distance driven and price of a gallon of gasoline) used to estimate it. It is indicated that consumption will vary depending on vehicle condition and driving habits. Notably, all this vehicle consumption data is presented under the heading “Fuel Economy”.

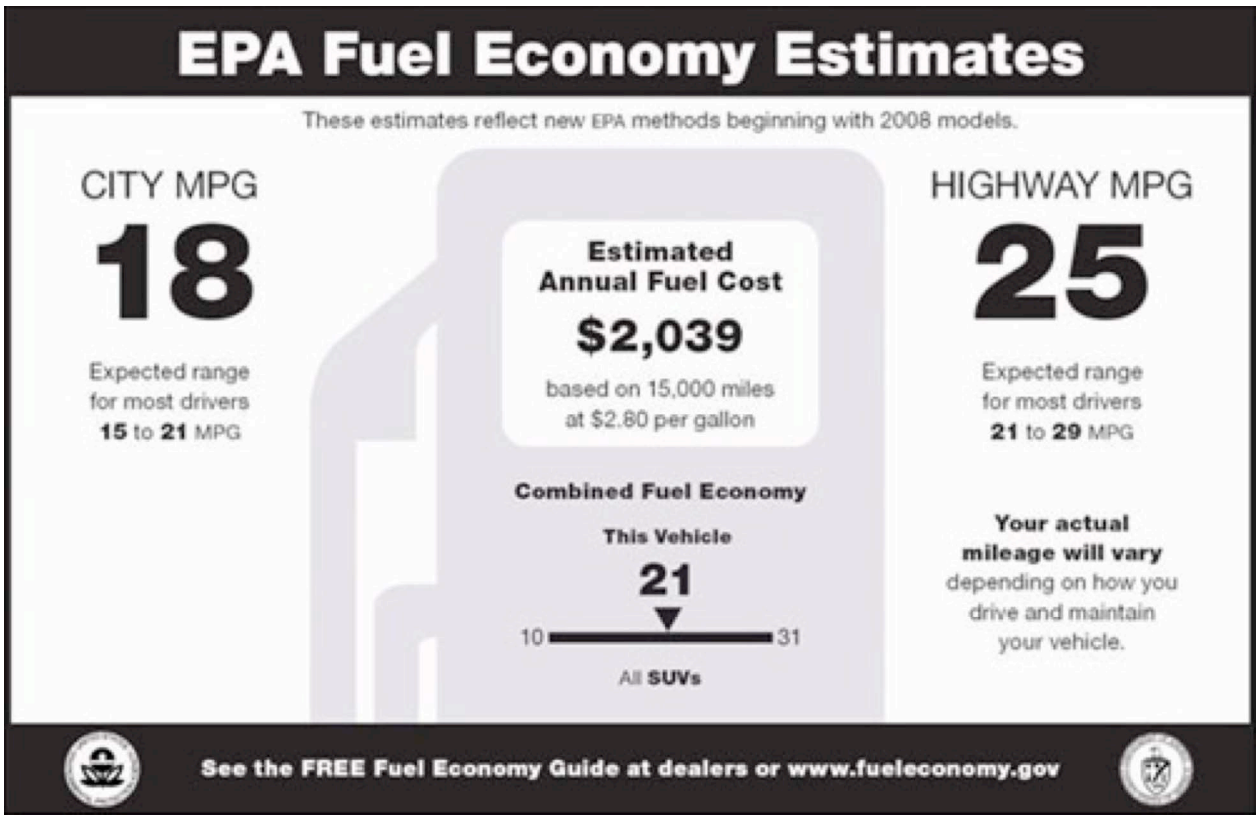


Illustration J
New American label

3.5 Comments

Colour codes, found on all European labels, are also used for classifying a wide variety of consumer products according to their energy efficiency, notably household appliances, heating and air conditioning units, and lighting fixtures. Recently, the same type of code was adopted in France to indicate the energy performance of new houses and apartments for sale. Likewise, in Canada and the United States, we observe a graphic continuity, for various types of consumer products, between the EnerGuide and Energy Star labels.

All European labels show the following information:

- a consumption rating in litres per 100 km, in some cases with the equivalent in km/L (or, in the United Kingdom, in MPG);
- CO_2 emissions in g par km;
- Classification of the car model on a colour code scale of efficiency. As explained above, these colour codes can belong to a static or dynamic approach and reflect absolute values or relative and evolving values.

Some countries also present “city” and “highway” ratings, with a “mixed” rating. Some labels mention that driving habits, among other factors, will influence fuel consumption. Depending on their graphic composition, labels attach more importance to GHG emissions or the fuel consumption rating.

The fuel cost is rarely mentioned on the labels examined. When it is, the label indicates the assumptions used in the calculation, i.e., distance travelled and fuel cost.

The British label adds a heading on the amount of the annual registration fee.

The Belgian label presents fuel consumption and GHG emissions in parallel and presents an average for both that reflects the features of all vehicles on sale for a given year. Surprisingly, fuel consumption and GHG emission scales do not indicate, in the upper (red) section, very high values. And yet, we know that some German and British SUVs consume up to 14 or 15 litres per 100 km.

The Danish label associates the colour code with consumption in km/litre, in orders of efficiency similar to those of other European countries. Remarkably, the GHG contribution is mentioned discreetly, on an isolated line, with a two or three digit number, in g per km. Finally, the label emphasizes safety ratings.

The Dutch and Spanish labels classify fuel consumption ratings in comparison to a given annual average.

The Singapore label indicates only one consumption value and adds the consumption range for vehicles with engines of equivalent capacity.

Finally, the new label advocated by the American Environmental Protection Agency (EPA) responds to the criticism raised by the former labels, by providing, for fuel consumption values (called “fuel economy”), a wide range of possible values. Although the label gives an evaluation of the annual cost, with the values supporting the assumption, no measurement of GHG production is present. The label rates the personal vehicle according to the consumption range of similar vehicles: the vehicle carrying the label illustrated above consumes 21 MPG, whereas vehicles of the same family may consume 10 to 31 MPG.

3.6 What Labelling System Should Canada Adopt?

As mentioned above, the EnerGuide label has certain flaws. Canadian labelling might certainly provide more complete and mobilizing information. Ideally, the label should be perceived and used by the industry and the authorities as a communication and teaching tool helping consumers make the right choices for the right reasons, particularly by enabling them to compare several vehicles of the same class as well as those of various classes.

To prevent the label from being hidden in the glove compartment of showroom vehicles, it should be mandatory to affix it clearly on each new vehicle on sale. The windshield and the driver side window appear to be the locations where it would be most visible; in any case, this is what several countries have mandated. Ideally, the label should be printed on the front and back, so that the consumer can see the information when he's in the driver's seat.

To give more weight to the label information and make it more influential in the choice of vehicle, it should also be mandatory to display the label, or at least some of its key components such as the consumption and GHG emission ratings, in plain view in the advertising materials of car manufacturers. In a later chapter, we will address in greater detail the issue of advertising.

Finally, standardized data presented on the label could serve as a basis for calculating the scales used for incentive programs: feebates, sales tax modulations, or registration fees.

3.6.1 The Colour Code

The colour code has the advantage of being a symbolic reference for people who don't like numbers. This reference is more easily understood at a glance, as opposed to numbers, which must be read and decoded. Green, yellow and red, widely used for labelling in Europe, are symbols easy to decode and often associated with driving.

The Belgian labelling model seems particularly eloquent to us in the way it draws a direct parallel between fuel consumption and GHG production.

The dynamic model, which classifies according to annually revised averages of the eco-energetic performances of all vehicles sold in the previous year, appears to us more likely to maintain competition between manufacturers, each one seeking, year after year, to improve its comparative rating.

We also find it more appropriate to establish a classification for all vehicles as a whole, rather than class by class, in order to make buyers of high-consumption vehicles clearly aware of the financial and environmental costs related to their choices.

In opting for such a dynamic classification, which might be based both on fuel consumption and polluting emissions, the eco-energetic rating of vehicles can also serve as a basis of comparison for establishing incentive programs. This would notably have the advantage of providing an objective, rigorous and fair criterion for those programs on the basis of information already available and standardized; it would also serve to reinforce the importance of label information in offering criteria for consumers to evaluate vehicles.

Such an approach would also encourage car manufacturers to improve eco-energetic performance.

3.6.2 Annual Cost Factors in Fuel Consumption

The current Canadian and American labels provide a value for the total annual consumption of a vehicle. Even in this era of rapid fluctuations in gas prices, this information, however relative, gives the consumer a useful comparative value. This information strengthens the relative importance of fuel consumption in the consumer's mind, since it has an impact "where it hurts" – the pocketbook.

Ideally, the label use would clearly indicate the data entered in the calculation, in terms of distance and gasoline cost per litre. Of course, for the purpose of comparing vehicles, it is important that the data be standardized for all vehicles.

3.6.3 Annual Cost Factors in Registration or Taxation

The label could carry an indication of the tax or registration fee supplement resulting from the eco-energetic rating. If a particular vehicle model is thus charged, the label should indicate the additional amount. Exempt vehicles would carry a mention of zero.

These fees could be charged by the federal or provincial authorities, so provincial differences should be taken into account in entering this information on the labels.

3.6.4 GHG Production

Although the concept of CO_2 grams per km is abstract for the majority of consumers, this information provides them with an indication of environmental damage that is easy to memorize and useful for purposes of comparison. The polluting emissions number is already used in Europe, where the unit of measurement is standardized and reliable. So this is already available information that, if integrated to labelling, will be useful and important to consumers, given their growing awareness of and concern about climate change.

3.6.5 Vehicle Options

One can imagine a label specific to each vehicle model, with data adjusted according to the various options specific to a particular model: manual or automatic transmission, engine power, presence or absence of air conditioning, four-wheel or front-wheel drive, turbocharger, etc.

The label would thus provide information applying specifically to a given vehicle and, if that label's eco-energetic rating is chosen as a basis of comparison for establishing incentive programs, those programs could be targeted even down to the choice of various options for a given model. Given that certain options can greatly affect the energy performance of same-model vehicles, this factor seems important.

However, we don't know the level of complexity that would be entailed by establishing such a measure. Moreover, consumers visiting a showroom might be misled in viewing a specific vehicle if, for example, the salesperson chooses to show a vehicle with manual transmission

and no air conditioning, whereas the consumer's intention is to buy a model equipped with automatic transmission and air conditioning. At the very least, it should be mandatory that the information contained in the label specific to the model chosen be disclosed to the consumer before the contract is signed.

Similar problems would arise if some label information was compelled by regulations to appear in advertising as well. If the information applies to the least energy-consuming version of a model advertised, the advertiser should be compelled to indicate that the addition of this or that option makes the eco-energetic rating increase by a given number of points.

If the idea of imposing a specific label to a given car, on the basis of its own features and options, proves impractical or fraught with complications, other mechanisms should be planned to make consumers clearly aware of the effect of certain options on the energy efficiency of a given model.

For example, the label should mention the type of transmission installed in a given car (manual, automatic, continuously variable transmission (CVT), 2-wheel drive, full-time or part-time 4-wheel drive) and indicate as a percentage the positive or negative effect of the choice of transmission. Generally, manual transmissions are considered about 15% more economical than automatic transmissions. Moreover, manufacturers are claiming that the new CVT transmissions should considerably improve the eco-energetic performance of cars. Inversely, four-wheel drive systems, full- or part-time, generally add a few hundred kg to vehicle mass as well as substantial rolling resistance. This adds a few more litres to base fuel consumption. Labelling requirements would oblige manufacturers to establish a comparison between performances obtained according to a standardized test protocol.

The label would provide, for a given model, the model's base fuel consumption and indicate, for each option (transmission, more powerful engine, four-wheel drive, air conditioning, spoilers and marquees, etc.), the percentage of that consumption's increase or decrease.

Each label should thus carry a mention indicating that the data applies to the base model and should add:

> *"The addition and use of air conditioning will increase your fuel consumption and GHG emissions by about x%."*
>
> *"Automatic transmissions increase average vehicle fuel consumption and GHG emissions by* x%.*" Etc.*

In addition, if the eco-energetic rating is established only for the base model and is used for comparing possible incentive programs, those programs should also take into account the various options affecting energy performance, and the tax or rebate should be adjusted accordingly.

In any case, the specific effects, on the vehicle's eco-energetic features, of each option likely to affect those features (automatic transmission, air conditioning, four-wheel drive, etc.), should be disclosed explicitly on the label. This information would enable the consumer to evaluate the impact of adding or removing those options.

3.6.6 On-Board Computers

Driving behaviour certainly has an impact on fuel consumption. For example, fast starts and stops at streetlights increase fuel consumption by 37%, whereas driving at 120 km/h rather than 100 km/h can increase fuel consumption by 20%[42].

Luxury cars and some mid-range models have, instead of a simple speedometer, an on-board computer that provides at all times an estimate of fuel consumption according to the driver's way of driving. The driver will thus be advised immediately when a full-throttle start makes fuel consumption skyrocket. He can also, in cruise control on the highway, choose the speed that will yield the best energy performance. This type of mechanism should be made mandatory on all cars sold in Canada, and its provision, which includes an on-board computer, could be the object of a purchase subsidy.

[42] **Natural Resources Canada** – Web site of the Office of Energy Efficiency: *Auto$mart Thinking – Fuel-efficient Driving Tips and Preventive Maintenance of Your Vehicle*, Ottawa, Ontario, Canada [online] http://oee.nrcan.gc.ca/transports/personnel/conduite/bon-sens-au-volant-habitudes-de-conduite.cfm?attr=8 (accessed June 15, 2007)

3.6.7 Good Advice

Following the example of certain foreign labels, the Canadian label could carry reminders that driving habits and vehicle condition will have an effect on eco-energetic performance, and could refer consumers to additional information on these matters.

4 INCENTIVE PROGRAMS

As we observed in our review of the documentation, governments have several fiscal levers with which to influence consumer choices in terms of vehicle energy efficiency. The federal and provincial governments all levy an excise tax on the price of gasoline, which is lower than in Europe, but clearly higher than in the United States.

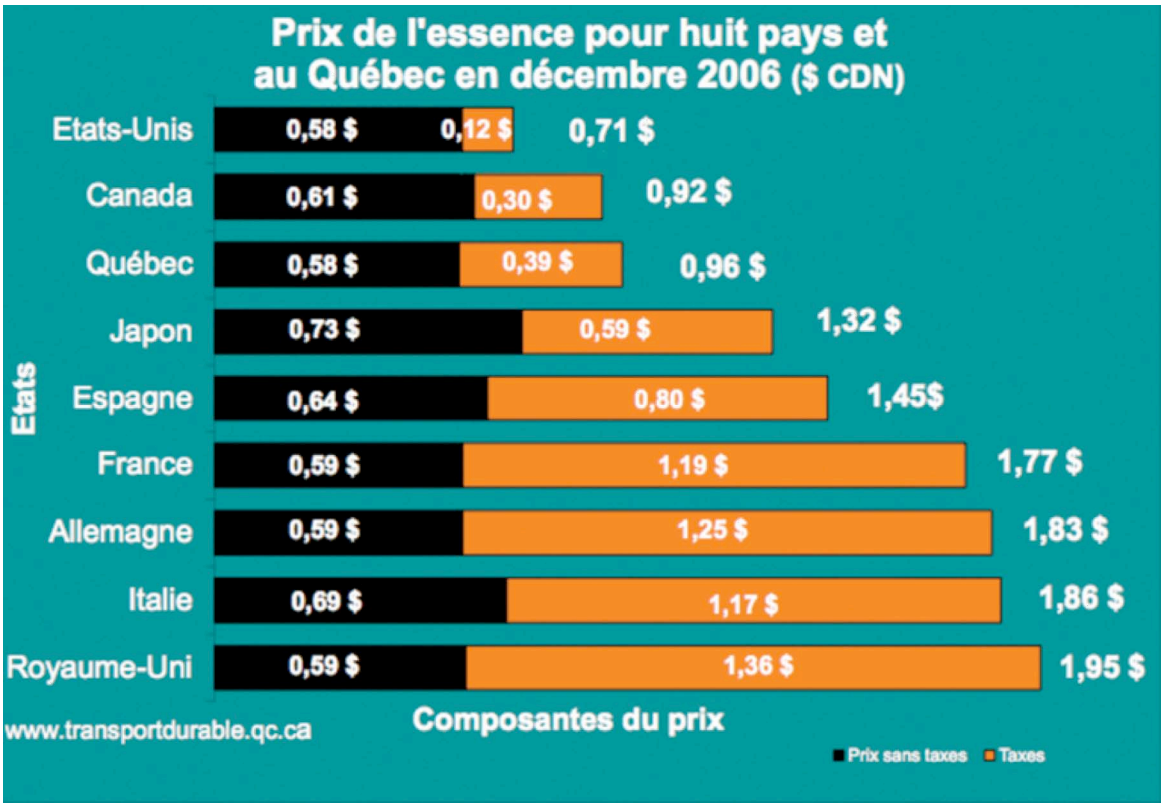


Table 4
Price of gasoline in eight countries and Quebec in December 2006 (CA$)[43]

Our review of the documentation has outlined the analyses that have led our governments to opt for certain means of intervention. Now we will discuss the new measures in effect in Canada. We will also review the French and American programs.

Before proceeding to that review, we will take a look at the necessity of applying those measures. It is interesting to note the average consumption (L/100 km) of vehicles in different countries and to compare those averages with the price of fuel in those countries, in order to determine the possible influence that the price of oil may have.

[43] **Option transport durable**. *Les prix de l'essence dans le monde*. Montreal, Quebec, Canada [online] http://www.transportdurable.qc.ca/prix_essence.htm (accessed May 29, 2007).

Country/Region	Average Fuel Consumption (L/100 km)
United States	9.8
Canada	9.2
Australia	8.1
China	8.0
European Union	6.3
Japan	5.1

Table 5
Comparison of the average fuel consumption of light vehicles (2002)[44]

What the juxtaposition of tables 1 and 2 reveals is that the price of gasoline or its taxation level do not appear to intervene decisively as principal factors in the overall energy efficiency of the car population. Although Japan does not sell gasoline at a particularly high price compared to the other countries mentioned, has seen the average fuel consumption of its car population decrease to 5.1 L/100 km. The Japanese conciliation of national ecological objectives with manufacturer's economic objectives has resulted in a much more rational use of energy resources. The extraordinary energy performance of the Japanese car population thus apparently results from public policies and their effect on manufacturers as well as consumers.

Recently, other countries, including France, have adopted feebate measures similar to those recently adopted in Canada, while this proposal is being debated in the United Kingdom, New Zealand and Australia.

[44] An, Feng, Amanda Sauer. (December 2004). *Comparison of Passenger Vehicle Fuel Economy and Greenhouse Gas Emission Standards Around The World.* Pew Center on Global Climate Change, p. 21., cited in Marbek/RFF/DesRosiers. p. 9.

4.1 Canadian Programs

Most federal and provincial programs involve feebates (from "fee" + "rebate"). Briefly, those incentives include:

- a rebate granted for eco-energetic vehicles;
- the status quo for vehicles of average eco-energetic performance;
- a new excise tax, called a "green levy", applied to high fuel consumption vehicles.

4.1.1 Federal Programs

- ecoAUTO: since March 20, 2007, the government of Canada has been offering rebates of $1,000 to $2,000 on the purchase of long-term lease (12 months or more) of an eco-energetic vehicle. The list of eligible vehicles includes conventional gasoline models, hybrids and flex-fuel vehicles. The rebate amount varies according to fuel efficiency. New vehicles consuming 6.5 L/100km or less and new light trucks consuming 8.3 L/100km or less are eligible. The list includes electric hybrid and very fuel-efficient vehicles. In addition, new flex-fuel vehicles with a combined fuel consumption rating of E85 that consume 13.0 L/100km or less are eligible.[45]

- New excise tax, or green levy[46]: vehicles with a weighted average fuel consumption of 13 litres or more per 100 km will be taxes at the following rates:
  - at least 13, but less than 14 litres per 100 km: $1,000;
  - at least 14, but less than 15 litres per 100 km: $2,000;
  - at least 15, but less than 16 litres per 100 km: $3,000;
  - 16 litres or more per 100 km: $4,000.

  The tax should be paid by the manufacturer or importer at the moment the vehicle is delivered to a buyer (usually a dealer) or imported.

4.1.2 National Programs not Administered by the Federal Government

- Desjardins Assurances générales offers a rebate of 10% on the insurance premium for gas-electric hybrid vehicles.[47]

[45] **Transport Canada.** *ecoAUTO Rebate Program*, government of Canada, Transport Canada, Ottawa, Ontario, Canada, June 11, 2007 [online] http://www.tc.gc.ca/programmes/environnement/ecotransports/ecoauto.htm (accessed June 12, 2007).
[46] **Canada Revenue Agency**. *Excise Tax on Fuel Inefficient Cars*. Government of Canada, Canada Revenue Agency, Ottawa, Ontario, Canada, 28 mars 2007 [online] http://www.cra-arc.gc.ca/agency/budget/2007/excise-f.html (accessed June 11, 2007).
[47] **Desjardins assurances générales**. *Desjardins Assurances générales offre un rabais de 10 %*, Lévis, Quebec, Canada, 2007 [online] http://www.desjardinsassurancesgenerales.com/DAG/FR/Index/Actualites/desjardins+assurances+generales+offre+un+rabais.htm (accessed May 29, 2007).

- Citizen's Bank offers its members prime-rate loans on purchase of a gas-electric hybrid or natural gas vehicle. The maximum term is 5 years, the reduction in interest charges can total up to $3,000 per vehicle, and the maximum loan is $35,000.[48]

4.1.3 Quebec

- Additional registration rates on vehicles of large engine capacity: In Quebec, the registration fee for vehicles of less than 3000 kg is usually $225 annually ($255 in large urban centres). However, for vehicles with an engine capacity of 3.95 litres or more, of the 1995 model year or newer, valued at $40,000 or more, the rate is now increased by 1%[49].

- Partial QST refund for hybrid vehicles: 7.5% of the purchase price (maximum of $1,000 per vehicle). Owners of gas-electric hybrid vehicles purchased after February 20, 2007 and before January 1, 2009 can obtain a refund the Quebec sales tax (QST), up to $2,000. This measure also applies to long-term leasing (for a period of 12 months or more).[50]

- Car Heaven (Quebec): Up to $1,000 per recycled vehicle, plus free towing. By having a 1995 or older vehicle recycled, the owners can receive a $1,000 certificate applicable to the purchase of certain new vehicles or a tax receipt of $50 or more. Towing is free (value of $200). Vehicles and parts thus recovered will be destroyed ecologically.[51]

4.1.4 Ontario

- Tax credit for fuel conservation / tax for fuel conservation (for new vehicles): By choosing a new car with a nominal consumption of less than 6 litres of gasoline or diesel fuel per 100 km (on the highway), buyers obtain a rebate of $100 on the provincial tax. Inversely, new cars exceeding that level are subject to a penalty called the tax for fuel conservation (TFFC). In the majority of cases, the penalty is $75, but it can reach up to $7,000 for the most energy-consuming vehicles. The penalty is subject to the federal (7%) and provincial (8%) taxes. Choosing a low-consumption vehicle, such as a gas-electric hybrid, thus yields a $100 rebate, and $75 plus taxes in avoided penalty.

---

[48] **Citizen's Bank of Canada**. *Clean Air Auto Loan*. Vancouver, British Columbia, Canada, 2007 [online] https://www.citizensbank.ca/Personal/Products/LoansLinesofCredit/CleanAirAutoLoan/ (consulted June 4, 2007).

[49] **Société de l'assurance automobile** (SAAQ). *Additional Registration Fees for Luxury Vehicles*, Quebec, Quebec City, Canada, May 2, 2006 [online] http://www.saaq.gouv.qc.ca/immatriculation/luxe.html (accessed June 8, 2007).

[50] **Revenu Québec**. QST Rebate for Hybrid Vehicles, ministère du Revenu du Québec, Quebec, Canada, 2003 [online] http://www.revenu.gouv.qc.ca/fr/particulier/taxes/remboursement/remb_part_tvq_vehicule_hybride.asp (accessed June 6, 2007).

[51] **Car Heaven**. Fresh Air Foundation. *About the Program*. Toronto, Ontario, Canada, 2007 [online] http://www.cleanairfoundation.org/autosociel/index.asp (accessed June 5, 2007).

New sport utility vehicles (SUVs) with a nominal consumption of less than 8 litres of gasoline or diesel fuel per 100 km (on the highway) are exempt from the TFFC. In the case of SUVs that exceed that level, the penalty usually increases to $400 or $800, but it may reach up to $3,200 for the most fuel-consuming vehicles. For a low-consuming SUV, the savings are thus at least $460 or $920 ($400 or $800 in avoided penalty + taxes).[52]

- Refund of the penalty and tax for alternative-fuel vehicles: up to $2,000 per vehicle, plus refund of the TFFC penalty (usually $75 for a car and $400 or $800 for an SUV). People who buy or lease (for at least 12 months) a new or used vehicle can obtain a refund of the 8% provincial sales tax if their vehicle is fuelled or has been converted to be fuelled:
  - exclusively by electricity
  - by gas-electric hybrid technology
  - exclusively by propane, natural gas, ethanol, methanol or another manufactured gas
  - by bioenergy, i.e., with one of the fuels mentioned above combined with traditional fuels (gasoline or diesel).

  The refund is limited to $750 for propane vehicles, to $1,000 for vehicles using another alternative fuel, and to $2,000 for hybrid electric vehicles.[53]

4.1.5 Manitoba

- Since March 2007, the Science, Technology, Energy and Mines Department offers a rebate on the purchase or long-term lease of a "green" vehicle (Manitoba Hybrid Electric Vehicle Rebate Program). Manitoba residents will be mailed a $3,000 rebate if they complete a simple application during vehicle registration.

  Designed as an applicable transition measure applicable until low-emission vehicles are more easily available, the rebate program will continue until November 2008.[54]

4.1.6 British Columbia

- The government offers a tax reduction on the purchase of a new hybrid or alternative-fuel passenger vehicle.

  In British Columbia, the provincial sales tax (Social Service Tax) rates are:
  - vehicles costing less than $55,000: 7%
  - vehicles costing $55,000 to $55,999.99: 8%
  - vehicles costing $56,000 to $56,999.99: 9%
  - vehicles costing $57,000 or more: 10%[55]

[52] **Ministry of Revenue**. *Tax for Fuel Conservation.* Oshawa, Ontario, Canada, 2007 [online] http://www.rev.gov.on.ca/french/guides/rst/513.html (accessed June 3, 2007).
[53] **Ministry of Revenue**. *Refund Program for Vehicles Powered by Alternative Fuels,* Oshawa, Ontario, Canada, 2007 [online] http://www.rev.gov.on.ca/french/refund/vpaf/ (accessed June 3, 2007).
[54] **Manitoba Public Insurance Corporation**. News Release - Drive Green, Save $2000: Rondeau, Winnipeg, Manitoba, Canada, February 5, 2007 [online] http://www.mpi.mb.ca/English/newsroom/articles/2007/GovHybridRelease.html
[55] Social Service Tax Act [RSBC 1996] Chapter 431, section 6.

On the purchase or lease (for 12 months or more) of an eligible vehicle, the tax rate will be that applied to a vehicle whose price would be $7,000 less. In addition to this rate adjustment, buyers (purchase or lease) are eligible for an additional tax reduction that varies according to the vehicle chosen. For gas-electric hybrids, the tax reduction is 100%, up to $2,000. For other eligible vehicles, the reduction is 50% of the tax amount, up to $1,000.

Non-motorized bicycles are exempt from the sales tax[56].

4.1.7 Prince Edward Island

- Refund of the tax paid on purchase of a hybrid vehicle: persons who buy or lease (for at least 12 months) a gas-electric hybrid vehicle can obtain a refund of the provincial sales tax, up to $3,000[57].

4.2 French Programs

- Tax credit or reduced taxes for vehicles fuelled in whole or in part by natural gas (NGV) or liquefied petroleum gas (LPG) and for hybrid vehicles. The tax credit amount on purchase or lease of an eligible vehicle is €1525 ($2,200 CA) and increased to €2300 ($3,300 CA) upon destruction of a vehicle registered before 1992.

- Specific assistance for electric vehicles: the Agence de l'environnement et de la maîtrise de l'énergie (ADEME) grants subsidies enabling buyers to choose between an electric vehicle and an equivalent thermal vehicle without the price difference being a hindrance. This assistance applies:
  - to electric passenger cars and minivans,
  - to specific registered vehicles with 3 or 4 wheels,
  - to electric mopeds.

  The amount of the assistance is €3200 ($4,600 CA) for passenger cars and minivans, €2000 ($2,875 CA) (payload less than or equal to 500 kg) or €3000 ($4,300 CA) (payload greater than 500 kg) for specific vehicles. It is €400 for a moped.

- Waiver of grey card (annual registration) for certain hybrid, electric or alternative-fuel vehicles: this measure, an initiative by some regional councils, is not uniformly applied on French territory as a whole.

- Insurance rebate for electric, LPG and NGV vehicles. Various programs offered by insurers.

- Variable registration cost according to engine power. Since February 2006, the Government Decentralization Act allows the regions to set registration rates themselves.

---

[56] *Ibid,* section 75.

[57] **Info PEI**. Tax Incentive for Hybrid Vehicles, government of Prince Edward Island, Charlottetown, Prince Edward Island, Canada, 2007 [online] http://www.gov.pe.ca/infopei/index.php3?number=1017738&lang=E/ (accessed May 28, 2007).

4.3 American Programs

The American government is being pressured to adopt a feebate system, but the reticence is substantial: such a system would favour Japanese manufacturers and penalize the American industry. Although the United States pioneered incentive measures, with the "gas guzzlers tax", we observe how the industry has succeeded, by offering new lines of vehicles built on a truck platform, to avoid having its vehicles affected by such taxes. To avoid the taxes, consumers, rather than choosing less-consuming vehicles, opted en masse for more powerful vehicles. And yet, the United States has almost 140 programs for promoting the purchase and use of fuel-efficient vehicles or vehicles fuelled by non-conventional sources of energy (liquefied natural gas, propane, biofuels, etc.), some fifteen of those programs being federal and the rest from states or municipalities. Those programs are very diversified: from subsidies to the establishment of liquid propane fuelling stations to parking discounts in some urban sectors. We will list here the types of programs.

4.3.1 Federal Government Programs and Laws

The American federal government alone is responsible for dozens of laws and programs offering highway fuel efficiency incentives and promoting the country's energy independence[58]. It takes 20 pages just to summarize those programs and laws. First we present a few programs that resemble the incentives that we have discussed up to now:

4.3.1.1 — Qualified Alternative Fuel Motor Vehicle Tax Credit (QAFMV)

The law provides for a tax credit equivalent to 50% of the additional cost that would entail the purchase of an alternative fuel motor vehicle, plus 30% of the additional cost for near-zero emissions vehicles ("super ultra low emissions vehicles" or SULEV). The credit applies to the purchase of light, medium-size and heavy vehicles, fuel cell powered, hybrid, natural gas, propane and hydrogen powered vehicles. Light diesel "lean burn" vehicles are also eligible. Since June 2006, this credit also extends to the conversion of existing vehicles to alternative technologies.

4.3.1.2 — Credit for Qualified Hybrid Vehicles

A tax credit is granted to buyers of light hybrid vehicles (less than 8,500 lb) according to their fuel consumption improvement and their fuel conservation potential over the vehicle's service life. The fuel conservation component is based on efficiency gains compared to 2002 models.

[58] All these programs and laws are summarized on the Web site of the U.S. Department of Energy, Washington DC, United States, May 30, 2007 [online] http://www.eere.energy.gov/afdc/progs/fed_all.cgi?afdc/US/0, (accessed May 30, 2007).

Efficiency gain of	125% - 149%	Credit of	$400
	150% - 174%		$800
	175% - 199%		$1200
	200% - 224%		$1600
	225% - 249%		$2000
	250%+		$2400

The credit for fuel conservation over the vehicle's service life can reach $1,000, for 3,000 gallons or more in fuel conservation.

4.3.1.3 — Tax Credit for Fuel Cell Vehicles

A tax credit of $8,000 is offered to the buyer of a light fuel cell vehicle. In 2010, this credit will be decreased to $4,000. Credits are also available on purchase of medium-size or heavy vehicles, according to a weight scale.

4.3.1.4 — Tax Credit for Electric Vehicles

This program, which ends in 2007, offered a credit equivalent to 10% of the cost of an electric vehicle, up to $4,000. The program applies to passenger and commercial vehicles and covers vehicles that draw their energy from batteries or other portable sources.

4.3.1.5 — Tax Credit for Biodiesel and Ethanol

This tax credit is offered to fuel distributors and directly funds the marketing of alternative fuels. For example, the tax credit reaches $0.51 per gallon of ethanol mixed with traditional fuels.

4.3.1.6 — Energy Policy Act of 1992 (EPAct))

The Energy Policy Act of 1992 (EPAct) covers all aspects of energy supply and demand in all its forms. Its purpose is to reduce American dependence on oil imports. For example, it provides that 75% of light vehicles purchased for federal fleets must be alternative fuel vehicles (AFV). Similar requirements apply to vehicle fleets managed by the states.

4.3.1.7 — The Variety of Other Federal Energy Programs:

Here is a partial list of other federal laws and programs:

- Credit for "small producers" of agribiodiesel or ethanol, i.e., those producing less than 60 million gallons annually;
- Financial assistance for the establishment of alternative fuelling infrastructures (e.g., LNG, etc.);
- The Clean School Bus USA program: subsidies are provided to improve energy efficiency and reduce pollution, including conversion to biodiesel, in school transportation;
- Programs supporting bus transportation and improved bus fuel efficiency;

- Urban support programs to improve traffic flow, integrate mass transportation, etc.;
- A program to improve the standardized measurement of vehicle fuel consumption, in order to make those measurement more credible in the eyes of consumers;
- Generally, a major effort to use the Internet to communicate and popularize the issues and programs.

4.3.2 State Programs

All the American states are responsible for environmental legislation. This responsibility also leads them to study issues of vehicle fuel efficiency.

Faced with major problems of air pollution, California has become a world leader in energy efficiency requirements. With 30 million residents, California's market alone at least as large as all of Canada's, so manufacturers have no choice but to comply with the State's requirements.

California numbers 37 different incentive programs, shared between the State and local governments. Other large states, such as New York and Texas, each have a dozen programs. In listing the types of Californian programs, we cover the variety of intervention methods currently applied in United States.[59]

A) Several programs are regional subsidy mechanisms acting on many fronts simultaneously: infrastructure subsidies, vehicle acquisitions, destroying old vehicles, acquisition and retrofitting discounts, etc.

- Emission reduction subsidies, which may apply to the acquisition of more-efficient or alternative fuel vehicles;
- Subsidies for converting heavy vehicles to alternative fuels;
- Subsidies for alternative fuel infrastructures;
- Modernization of school buses;
- Emission reduction subsidies;
- Research and development on alternative fuels;
- Incentives for buying/leasing natural gas, electric and alternative fuel vehicles.

Many highways have lanes reserved for HOVs (high occupancy vehicles: vehicles carrying at least 2 passengers or more, depending on the areas). Vehicles classified as SULEV and ZEV are permitted to use those lanes, even with one occupant, on condition of carrying the ad hoc vignette. In the same vein, some vehicles can cross bridge and highway tolls if they meet certain fuel economy standards.

Some municipal governments offer free or discount parking for hybrid vehicles. The same incentives exist for alternative fuel vehicles. The Los Angeles Airport provides free parking and charging for electric vehicles.

One insurance company offers a 5% discount to owners of electric, hybrid and alternative fuel vehicles.

Discounts on electricity rates for charging electric vehicles are offered by three public utilities.

[59] **U.S. Department of Energy**. State & Federal Incentives & Laws. Washington DC, United States, 2007 [online] http://www.eere.energy.gov/afdc/laws/incen_laws.html (accessed June 5, 2007).

4.4 Comments and Observations

Incentive programs for buying fuel-efficient vehicles are now in effect in Canada, several provinces and other countries. A large number of these programs are based on feebate principles. The studies we have reviewed are unanimous: feebate programs, rather than changing consumer demand, motivate manufacturers to change their offer to avoid taxation and attract consumers with rebates.

If we consider to which vehicles the rebates apply in Canada, we observe that certain Toyota models (Yaris and Corolla) are already popular favourites and are selling well, irrespectively of rebates. As for the hybrid models to which the rebates apply, the least expensive retail for about $30,000. The combined rebate and tax discount decrease the price by $3,000; that still doesn't make those vehicles affordable to the majority of people.

A rebate also applies to four "flex-fuel" vehicles, i.e., two Chevrolet Impala models and two Chrysler Sebring models. The 2 Chevrolet models, with 3.5 L V6 engines, consume 12.7 L/100 km, while the 2 Chrysler models, with 2.7 L V6 engines, consume 13 L/100 km. We may question why the rebates are applicable to two such high-consumption vehicles.

The other hybrid models – Honda Accord, Toyota Camry, Nissan Altima, VUS Ford Escape, Jeep Patriot, for example – are actually luxury cars, for which, again, efficiency gains made possible by hybrid technology have been used to increase engine power.

The all-terrain hybrid Toyota Highlander weighs 2500 kg, has a 3.3-litre 6-cylinder engine that consumes 7.7 L/100 km. The car is therefore eligible for a $1,000 rebate from Transport Canada's Eco-Auto program. The vehicle's retail price, before preparation and taxes, is $45,000.

The Mini-Cooper is eligible, thanks to its combined consumption of 6.5 L/100 km, for a federal rebate of $1,000. And yet, this is a vehicle whose base model sells for more than $25,000.

We could continue this analysis on a vast range of hybrid SUVs, which, although more efficient than their non-hybrid counterparts, are still heavy luxury vehicles.

Given the vehicles that will benefit from the rebates, we can question the very design of the program, which appears more effective in doling out subsidies to a certain range of luxury vehicles than in applying pressure to reduce fuel consumption. The question is all the more relevant because, under this program, nothing prevents the consumer from receiving the rebate to, for example, add air conditioning to his vehicle and thus cancel the efficiency gain made possible by the new technology.

Moreover, we can ask ourselves why several programs, to establish a discount or a surtax, compare models by class. This results, for example, in discounts offered for certain vehicles, clearly more fuel-efficient than others of the same class, but still high-consumption vehicles among vehicles as a whole.

These questions lead us to consider the fairness of the various incentive programs. To prevent them from becoming in fact subsidies for new vehicles, which would be unfair to consumers without any vehicle or poorer consumers forced to drive old vehicles, the programs should be tax-neutral, i.e., the rebates should be fully compensated for by surtaxes.

Under the pretence that it is difficult to bring a buyer to change vehicle class and that it is therefore preferable, for a given class, that the buyer choose the most fuel-efficient vehicle in its class, certain programs establish a class-by-class scale. This method also leads to fiscal and ecological inequities, since it encourages the purchase of certain powerful luxury vehicles that are relatively inefficient compared to the overall automobile population. Indeed, a more powerful vehicle with a better fuel efficiency rating within its class might enable a buyer to obtain a better discount than might a less luxurious vehicle that would be more eco-energetic but less well rated within its own class. The class-by-class scale is also unfair to consumers who choose the most economical models.

In our view, to minimize unfairness, programs should on the contrary put all vehicles on the same footing and offer rebates only to vehicles that perform best according to a rating that takes both fuel consumption and polluting emissions into account. In making the pivot point correspond to a level of eco-energetic performance that would be clearly above average, i.e., the level of the best-performing vehicles on a scale classifying all vehicles, we raise the likelihood that the most luxurious vehicles, generally heavier and more powerful, do not qualify for a rebate. The pivot point, set at a certain percentage above the average, would also rise year after year along with that average. Above and below the pivot point, rebates and taxes should follow a pronounced exponential curve.

A $1,000 rebate on a $50,000 vehicle is not much of an incentive to a buyer who has the means to buy such a vehicle. Inversely, in the case of SUVs, minivans or other types of heavier, more powerful and more luxurious vehicles, it is preferable to rely on the surtax to encourage manufacturers to improve energy performance and consumers to choose better-performing vehicles. Establishing the pivot point closer to the best-performing vehicles would make it possible to modulate the “fee” effect on a greater number of vehicles; using the “stick” lightly on models slightly above the pivot point, and more firmly on very inefficient models, it is possible to reward the most efficient vehicles more generously, by offering them a “carrot” while maintaining an effect – by incentive or disincentive – on models as a whole.

It is likely that Canadian motorists will continue to choose, in growing proportion, vehicles yielding the best possible eco-energetic performance. No one knows how the price of gasoline will progress in coming years, but we can assume that, for the vast majority of consumers, the carefree years are over.

Over time, the country’s vehicle fleet will be renewed, and older models, less efficient than recent ones, will progressively be replaced by more and more fuel-efficient ones.

We can hope that the enthusiasm for large vehicles (SUVs and minivans) will dissipate, with the help of an aging population, and that Canadian vehicles as a whole will be more fuel-efficient. It seems likely that the constant rise in gas prices, and the public’s growing awareness of climate change, will contribute to stabilize fuel consumption, if not reduce it as prescribed by our initial commitment to the Kyoto Protocol.

However, the public still lacks preparation regarding issues of energy consumption, and one of the essential roles of government programs should be to educate and sensitize the public through the aspect that remains, at purchase time, one of the first to be taken into consideration: the vehicle’s price.

Consumer information, education and awareness-raising is all the more challenging because automotive industry advertising continues to sell the illusion that its product is a tool of seduction, a status symbol, a means to freedom, a key to power, etc.

Other than feebates and sales tax modulations, the federal and provincial governments should consider using every available means to raise public awareness of eco-energetic issues.

5 THE ISSUE OF AUTOMOBILE ADVERTISING

The American automotive industry was faced with its irresponsibility by the 1965 publication of Ralph Nader's *Unsafe at any Speed: The Designed-in Dangers of the American Automobile*, and then by the first oil crisis 35 years ago. If the safety problems pointed out by Nader have been corrected, those of vehicle fuel consumption remain without a definitive response. And yet, the industry appears to have certain solutions at its disposal: vehicles consume on average half in Japan what they do in North America.

The heart of the problem is not simply technological. It is related in part to the messages given the public, each day, hour after hour, on television, in movies, newspapers, magazines; but it is also related to urban planning, whereby the automobile continues to dominate at the expense of residents, pedestrians, cyclists, and speeds along "like in the ads".

The automotive industry has always demonstrated in its advertisements a troubling irresponsibility, which it attempts to impart to the consumer. Whereas alcohol advertisements that would show us people abusing alcohol, euphorically aggressive, out of control, totally uninhibited, would rightly provoke public indignation, television relentlessly airs advertisements showing drivers euphoric at their vehicle's power, speeding at 200 km/h in desert or urban environments, and performing stunts, without the public reacting to the perverse message conveyed.

5.1 A Question of Values

Euphoria, weightlessness, speed, power, escape – these are the values peddled by auto advertising, particularly on television but also in a variety of media, as well as on the public space that is the street. Is the need for engine power, speed and uninhibition so great? Must we remind ourselves that each year the automobile kills hundreds of young drivers who assume they have the skills to drive "like in the ads"?

The values conveyed by auto advertising make the issue not only one of ecological survival, but also of public health: beyond the thousands of road accidents, the Canadian public is sick from its automobiles: obesity, heart disease, diabetes are directly related to the growing inability of large numbers of people, including a lot of young people, to use means of transportation that require physical effort, even for short distances and leisure activities. In addition, increasing motor vehicle traffic is gravely polluting the air and increasing the number of respiratory illnesses.

In the universe concocted by advertising, a bicycle or kayak excursion, or a simple outing with the children, is never enjoyed without a long drive. Just as, 25 years ago, skiing or climbing needed to be completed by smoking a good cigarette.

Our inability to take control of our transportation may very well result in good part from car advertising and its profound subconscious effect. We're no longer able to name trees, birds or flowers – that mental space is now taken up by the names of 400 car models. This is what *Adbusters* magazine calls the pollution of mental ecology by advertising. We're paying the price with our health, our unsafe roads, our environment, our public policies.

Transported, when the time comes to acquire a new automobile, by daily induced visions of freedom and power, people find it difficult to focus on such prosaic concerns as saving fuel, saving our health or saving our planet.

5.2 The Example of Tobacco

Canada was a pioneer 25 years ago when, confronting the public health problem posed by tobacco consumption, it dared attack cigarette advertising. The prohibition of such advertising, on television and later in other media, in addition to certain targeted educational or incentive public policies, opened the door to changes in people's attitudes and behaviours.

If smokers were only 30% of the Canadian population in 1990, they nevertheless acted as a majority to whom everything was permitted. This attitude was carefully maintained by advertising and its ideology: smoking cigarettes was a kind of freedom, an escape, a gratification, etc. After prohibiting advertising, legislators even imposed labels denouncing the product's dangers and detrimental effects.

Today, the European Union, mindful of controlling public health budgets, has developed a complete anti-tobacco policy[60] similar Canada's. All over the world, Canadian policy is held up as a model of anti-tobacco efforts.

5.3 Automobile Advertising Regulations: Taboo?

In the recommendations of the study sponsored by NATO, Bradbrook considers that car advertising regulations constitute one of the important levers that developing countries can use to control the fuel consumption of the automobile population. If this type of measure is possible and desirable in developing countries, the Canadian authorities also might want to consider them.

Faced with the industry's irresponsibility regarding crucial issues of public health and ecology, the public must demand, as it did for smoking, that auto advertising be regulated. Several concrete actions could be considered:

- The industry could acquire a strict code of ethics. This code of ethics could be developed and managed through a public and transparent consultation process whereby civil society will be adequately represented;
- Part of the resources dedicated by the industry to car advertising should serve to promote active transportation, alternatives to individual transportation (public transportation, carsharing, carpooling) and responsible behaviours regarding vehicle use and energy consumption. The promotion of cars and of alternatives should be balanced and intrinsically linked: no car advertising without promotion of responsible behaviours and alternatives;
- Each car advertisement should contain warnings of the product's dangers and its impacts on health and the environment[61], as well as advice on ways of reducing the risks;

[60] **Europa**, *Tobacco*, European Union, 2007 [online] http://ec.europa.eu/health/ph_determinants/life_style/Tobacco/tobacco_fr.htm (accessed 20 juin 2007).

- The question of the ecological impact of various vehicle models should appear in the forefront of all forms of automobile advertising, in proportion to the severity of that impact.

Such initiatives could contribute to reverse current trends, change perceptions, and influence the behaviours of Canadians in their daily transportation, leisure activities, driving behaviours, urbanistic choices, etc.

[61] See the recommendations of the New Economics Foundation (NEF): *Gas-Guzzling SUVs Should Get Tobacco-Style Warnings: British Think Tank*. Agence France Presse, Portland, Maine, United States, 2004 [online] http://www.commondreams.org/headlines04/1125-07.htm (accessed June 3, 2007).

6 CONCLUSIONS

For ten years, global warming issues have been officially acknowledged. Governments have invited citizens to mobilize individually to influence our collective production of greenhouse gases. However, the results of this approach have been very modest, as demonstrated for example by the One-Tonne Challenge[62]. Individually, the consumer, even strong-willed and well-intentioned, does not have the resources, knowledge or state of mind necessary to reverse deeply rooted social behaviours.

The present study has taught us that, despite the theoretical models developed by economists, consumer behaviour at the moment of choosing a vehicle, or of using or not using it, is not rational. This comes as no surprise since our culture, urbanism, economy and perceptions have been diverted by the automotive industry and its marketing for at least two generations.

The context requires that we undertake collectively to reorganize our daily transportation so as to reduce our contribution to GHGs. Canadians and Quebecers are already demonstrating that, when offered smaller and lighter vehicles, they adopt them in large numbers, and when efficient public transportation is organized for them, they use it.

Technological solutions, lighter and more efficient vehicles, are already available to the industry, which could deploy them commercially across North America now. In fact, to accelerate this process, the last federal budget established a rebate measure that affects seventeen vehicle models so far, along with a “green levy” for inefficient vehicles. As for the Quebec budget, it offers a sales tax rebate on six fuel-efficient vehicles, along with an annual registration surtax on high-consumption vehicles.

If the industry holds the technological solutions, public expectations are probably still not clear enough to impose a change in the vehicle offer. In tandem with government incentives and penalties, it is important to inform consumers so that they cannot but consider the fuel efficiency data of vehicles and their impact on the environment as well as their pocketbook. It is also important to make deprogramming efforts now so that consumers may re-evaluate their values and behaviours regarding automobiles, in order to counter the effects that auto advertising has had on our perceptions, individually and collectively, of individual transportation.

[62] Environment Canada, *Audit and Evaluation, Evaluation of the One-Tonne Challenge Program*, Environment Canada, Ottawa, Ontario, Canada, July 27, 2006 [online] http://www.ec.gc.ca/ae-ve/default.asp?lang=Fr&n=E0530F2A-1 (accessed June 3, 2007).

7 RECOMMENDATIONS

Whereas it is important for Canada to reduce its emissions of greenhouse gases;

Whereas automotive technological improvements of recent years have been mainly applied to increasing vehicle power and weight, rather than improving their energy performance;

Whereas in the choice of motor vehicles, the Canadian industry offers a limited range of solutions;

Whereas the solutions proposed by the industry do not lead to improved eco-energetic efficiency, although more effective solutions are already available on the Japanese and European markets;

Whereas the information provided to consumers does not generally promote responsible and ecologically viable behaviours in the choice and use of automobiles;

Whereas consumer choices and behaviours regarding automobile use, which have been influenced by the marketing strategies of the automotive industry, are often irrational;

Whereas households do not systematically analyse fuel costs when buying a vehicle or fuel, and do not explicitly take these costs into account in the family budget;

Whereas governments may act on fuel consumption through tax incentives and regulations, to encourage vehicle owners and users to better evaluate their vehicles' consumption features;

Whereas the fact that consumers undervalue fuel savings and that the vehicle's price is a major consideration at purchase time must be taken into account in developing policies;

With regard to eco-energetic labelling

Whereas the current EnerGuide model used in Canada has major deficiencies;

Whereas the voluntary use of the EnerGuide label causes it to be often invisible when the consumer is choosing a new vehicle;

Whereas consumers' buying decisions are mainly based in information readily available to them;

Whereas the experts state that, to be effective, labelling guidelines and standards must be mandatory;

Whereas the experts state that mandatory guidelines must address the form and display as well as the content of labels;

Whereas false representations are likely to pose a problem for labelling;

Union des consommateurs recommends:

1) that a new label model be developed by Natural Resources Canada and submitted to public consultation. The label model should retain the best features used in other countries and listed in the present report;

2) that, for each vehicle, this label indicate a mixed consumption rating expressed in litres per 100 km; a rating indicating the quantity of CO_2 emissions expressed in grams per km; an estimation of the annual fuel cost based on a standardized calculation whose parameters remain to be specified; and a rating situating the vehicle on a scale whereby all vehicles sold in Canada are rated, on an annual basis, according to their eco-energetic performance, based on a calculation that would take into account both fuel consumption and the level of polluting emissions and would adopt the "dynamic approach" described in the present report;

3) that affixing this label on the windshield or side windows of any new vehicle sold in Canada be mandatory;

4) that the label affixed on each vehicle indicate clearly and explicitly the effects, on the vehicle's eco-energetic features, of adding each option likely to affect those features, such as automatic transmission, air conditioning or four-wheel drive;

5) that the government provide for severe penalties for false representations and that a monitoring system be established to ensure the observance of standards.

With regard to incentive programs

Whereas the consumer's irrational attitude leads him not to attach enough importance to eco-energetic issues when choosing a new vehicle;

Whereas information made available by a new eco-energetic label is not, by itself, sufficient to change consumer behaviour and that additional measures are required that complete and reinforce each other to change behaviour;

Whereas the experiences of other countries and the views of certain experts, as cited in the present report, should be taken into account;

Whereas price is generally the first criterion in consumer choice;

Whereas programs using incentives to encourage energy-saving behaviours and using taxation to discourage wasteful behaviours have been recognized as effective in motivating consumers to choose more eco-energetic vehicles;

Whereas "feebate" programs have a direct influence on vehicle prices and prove most likely to lead car manufacturers to offer consumers more fuel-efficient vehicles, so that the rebates serve as an added incentive in consumers' choice of vehicles;

Whereas, as opposed to consumption-reduction objectives, feebate programs continuously encourage manufacturers to improve vehicle fuel efficiency as technologies develop;

Whereas it is important to ensure that incentive programs for purchasing more fuel-efficient vehicles are not unfair;

Whereas it is important to ensure that incentive programs for purchasing more fuel-efficient vehicles do not have the effect of leading consumers to choose more powerful vehicles;

Whereas applying feebate programs per vehicle class rather than to the automobile population as a whole has perverse effects;

Whereas harmonizing feebate programs with vehicle labelling standards would ensure more cohesion and enable consumers to better understand the importance of the eco-energetic rating;

Union des consommateurs recommends:

6) that the federal government establish a feebate program modulated according to the vehicle eco-energetic rating proposed for the new label described above;

7) that this program be applied in a tax-neutral manner, so that rebate amounts granted are fully compensated by penalty amounts collected;

8) that the scale used for applying taxes and rebates consider all vehicles in our auto population on the same level rather than by distinct classes. The scale would thus serve to distinguish between penalized vehicles, those on which the program has no effect, and those that are favoured due to their better eco-energetic rating compared to that of all available vehicles;

9) that the “pivot point” of the program be set so that only the most eco-energetic vehicles, compared to the automobile population as a whole, qualify for a rebate;

10) that the tax and rebate scale have a steep exponential curve;

11) that provincial governments adopt incentive programs with the same parameters or change their own programs to harmonize them.

With regard to auto advertising

Whereas auto advertising is omnipresent;

Whereas such advertising essentially promotes values moving consumers away from rational eco-energetic behaviours;

Whereas in an urban environment, omnipresent automobiles and irresponsible driving behaviours are more and more damaging to the public space, the environment and public health;

Whereas advertising regulations and mandatory notices regarding effects and risks have had success in anti-smoking efforts;

Whereas it is imperative for Canada to lead consumers to change their vehicle choices and driving behaviours, to make them better correspond to environmental challenges;

Union des consommateurs recommends

12) that displaying the new eco-energetic label on new vehicles, or at least its essential features – fuel consumption rating, CO_2 emission rating and eco-energetic rating – be mandatory in any vehicle advertisement;

13) that the federal government form a study group to review auto advertising and related environmental issues, in order to propose a code of ethics or any other regulatory framework for auto advertising.

Other recommendations

Whereas several measures acting simultaneously are likely to have an overall ripple effect in improving the environmental impact of personal transportation in Canada and changing the attitudes and behaviours of Canadians;

Whereas the adoption of other incentive or deterrent measures must, to the extent possible, not involve fairness problems;

Whereas some social groups are likely to be more heavily taxed by certain measures;

Whereas some government measures, such as improving public transportation or retiring old vehicles, can mitigate fairness problems caused by certain incentives;

Union des consommateurs recommends

14) that the federal and provincial governments review the various incentive measures mentioned in the present report, and evaluate the possibility and relevance of their adoption, in order to increase the effect of the above recommended measures and improve vehicle fuel efficiency (for example, modulating sales taxes for all vehicle classes, including mopeds, bicycles and recreational vehicles, modulating registration fees, gradual fuel tax increases, promoting fuels that are less damaging to the environment, improving public transportation, financial assistance for retiring older vehicles, assistance for the development of new cleaner technologies, programs to acquire more effective vehicles for the fleets of businesses, governments and public corporations, etc.);

15) that, for each measure considered, impact studies be conducted to avoid fairness problems, and that, if a measure is likely to penalize certain social groups (such as low-income people, large families, people living in remote areas, people whose work requires the use of a given type of vehicle, etc.), fiscal measures be adopted to compensate for the unfair effect;

16) that to promote more ecological driving habits, the federal government make it mandatory that motor vehicles sold in Canada be equipped with on-board computers controlling digital fuel gauges calculating at all times a vehicle's real-time fuel consumption;

17) that the federal government review other technical innovations available on certain auto vehicles and cited in the present report, notably to make them mandatory or establish incentives to broaden their adoption.

MEDIAGRAPHY

Agence de l'environnement et de la maîtrise de l'énergie (ADEME), Principales étiquettes européennes — Press release, Paris, France, May 9, 2006.
http://www2.ademe.fr/servlet/getDoc?cid=96&m=3&id=31126&ref=16247&p1=B

Canada Revenue Agency, *Excise Tax on Fuel Inefficient Cars*. Government of Canada, Canada Revenue Agency, Ottawa, Ontario, Canada, March 28, 2007.
http://www.cra-arc.gc.ca/agency/budget/2007/excise-f.html

Air Resources Board, *Mobile Resource Program*, Sacramento, California, United States, January 16, 2007.
http://www.arb.ca.gov/msprog/msprog.htm

Amis de la terre, *Transports: se libérer du pétrole*, pétition, Amis de la terre.org, Paris, France, September 29, 2005.
http://www.amisdelaterre.org/article.php3?id_article=1674

Car Heaven, *About the Program*. Clean Air Foundation. Toronto, Ontario, Canada, 2007.
http://www.cleanairfoundation.org/autosociel/index.asp

BRADBROOK, Adrian J. *Alternative Legal Measures to Improve the Fuel Efficiency of Motor Vehicles*, in *Compendium on Energy Conservation Legislation in Countries of the Asia and Pacific Region*, Vol. 1, United Nations Economic and Social Commission for Asia and the Pacific, United Nations, September 3, 1999.
http://www.unescap.org/esd/energy/publications/compend/ceccontents.htm

California Energy Commission, *Incentives for alternative fuel and hybrid vehicles*, Consumer Energy Center, Sacramento, California, United States, 2006.
http://www.consumerenergycenter.org/transportation/incentives/index.html

Corporate Average Fuel Economy (CAFE), CAFE Overview - Frequently Asked Questions. NHTSA, National Highway Traffic Safety Administration (NHTSA), Transport Department, Washington DC, United States, unknown date.
http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.30351f8e7e40c1cbf62a63101891ef9a/

National Research Council Canada (NRCC), Internet Resources, Vancouver Information Centre, Vancouver, British Columbia, Canada, August 11, 2003.
http://cisti-icist.nrc-cnrc.gc.ca/nis/vancouver_internet_f.html

Citizen's Bank of Canada. *Clean Air Auto Loan*. Vancouver, British Columbia, Canada, 2007
https://www.citizensbank.ca/Personal/Products/LoansLinesofCredit/CleanAirAutoLoan/

ConvertWorld.com
http://www.convertworld.com/en/fuel_consumption/

cvma.ca, Canadian Vehicle Manufacturers' Association, Toronto, Ontario, Canada, 2007.
http://www.cvma.ca/clean

Desjardins assurances générales. *Desjardins Assurances générales offre un rabais de 10 %*, Lévis, Quebec, Canada, 2007
http://www.desjardinsassurancesgenerales.com/DAG/FR/Index/Actualites/desjardins+assurances+generales+offre+un+rabais.htm

DriveClean,ca,gov, *Incentives*, California, United States, 2007.
http://www.driveclean.ca.gov/en/gv/incentives/index.asp?blnBtnHit=true

Energy and Environmental Analysis Inc. *Automotive Technology Cost and Benefit Estimates*. Prepared for Transport Canada, March 2005.

Environment Canada

Evaluation of the One-Tonne Challenge Program, government of Canada, Environment Canada, Ottawa, Ontario, Canada, July 2006.
http://www.ec.gc.ca/ae-ve/default.asp?lang=fr&n=E0530F2A-1

Audit and Evaluation, Evaluation of the One-Tonne Challenge Program, Environment Canada, Ottawa, Ontario, Canada, July 27, 2006.
http://www.ec.gc.ca/ae-ve/default.asp?lang=Fr&n=E0530F2A-1

Europa

Tobacco, European Union, 2007
http://ec.europa.eu/health/ph_determinants/life_style/Tobacco/tobacco_en.htm

Information on the Fuel Consumption and CO_2 Emissions of New Cars. European Union, 2007
http://europa.eu/scadplus/leg/fr/lvb/l32034.htm

Greene, David L., *Policies to Increase Passenger Car and Light Truck Fuel Economy*, Testimony to the United States Senate Committee on Energy and Natural Resources, 2:30 pm, January 30, 2007 [online]
http://cta.ornl.gov/cta/Publications/Reports/Policies_to_Increase_Passenger_Car.pdf

GREENE, David L., Philip D. PATTERSON, Margaret SINGH, Jia LI, *Feebates, Rebates and Gas-Guzzler Taxes: a Study of Incentives for Increased Fuel Economy*, Energy policy (2003), Elsevier editor, Center of Transportation Analysis, Knoxville, Tennessee, United States
http://www-cta.ornl.gov/cta/Publications/Reports/FeebateEnergyPolicy_FINAL.pdf

Fuel Consumption Guide of NR Canada, Web site of Natural Resources Canada, Office of Energy Efficiency of Canada, 2007.
http://oee.nrcan.gc.ca/transports/outils/consommation-carburant/guide-consommation-carburant-2007.pdf

Honda Canada, for the hybrid Accord model, site of Honda Canada, Toronto, Canada, 2007
http://www.honda.ca

Industry Canada, Statistical Review of the Canadian Automotive Industry. Government of Canada, Industry Canada, Ottawa, Ontario, Canada, December 15, 2006.
http://strategis.ic.gc.ca/epic/site/auto-auto.nsf/fr/h_am01668f.html

Info PEI. Tax Incentive for Hybrid Vehicles, government of Prince Edward Island, Charlottetown, Prince Edward Island, Canada, 2007.
http://www.gov.pe.ca/infopei/index.php3?number=1017738&lang=E/

International Institute for Sustainable development, Tax Differentials for Catalytic Converters and Unleaded Gasoline in Germany, Green Budgets Reform, Case Studies, Energy and Automotive, Winnipeg. Manitoba, Canada, 2007.
http://www.iisd.org/greenbud/catconv.htm

JACKSON, Andrew, *The Vehicle Efficiency Incentive*, Progressive Economics Forum, March 21, 2007.
http://progecon.wordpress.com/2007/03/21/the-vehicle-efficiency-incentive/

Marbek Resource Consultants, in collaboration with Resources for the Future *and* DesRosiers Automotive Consultants*, Development of Options for a Vehicle Feebate in Canada – Final Report prepared for:* the Round Table on the Environment and the Economy, Ottawa, Ontario, Canada, October 13, 2005, 98 pages, summary, p. ii.
http://www.nrtee-trnee.ca/eng/publications/feebates/final-report-feebates-eng.pdf

Environment Canada, brochure titled "*Your Guide to the One Tonne Challenge*", issued by the government of Canada, informs us that *« The volume of one tonne of GHGs would fill a two-storey, three-bedroom house*", Environment Canada, Ottawa, Ontario.
http://dsp-psd.tpsgc.gc.ca/Collection/M144-27-2003F.pdf

Ministry of Finance.

*Refunds Programs***,** government of Ontario, Toronto, Ontario, Canada, May 25, 2007.
http://www.fin.gov.on.ca/french/tax/refund/vpaf/index.html
Motorists, Government of Ontario, Toronto, Ontario, Canada, May 25, 2007.
http://www.fin.gov.on.ca/english/resources/motorists.html

Ministry of Revenue.

Tax for Fuel Conservation. Oshawa, Ontario, Canada, 2007.
http://www.rev.gov.on.ca/english/guides/rst/513.html
Refund Program for Vehicles Powered by Alternative Fuels, Oshawa, Ontario, Canada, 2007.
http://www.rev.gov.on.ca/english/refund/vpaf/

New Economics Foundation (NEF): *Gas-Guzzling SUVs Should Get Tobacco-Style Warnings: British Think Tank*. Agence France Presse, Portland, Maine, United States, 2004.
http://www.commondreams.org/headlines04/1125-07.htm

Option transport durable. *Les prix de l'essence dans le monde*. Montreal, Quebec, Canada.
http://www.transportdurable.qc.ca/prix_essence.htm

PARKER, David, *Cars for Sale to Have Fuel Efficiency Information*, government of New Zealand, New Zealand, November 7, 2006.
http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=27626

Pew Center, "About the Center" Web page, Arlington, Virginia, United States, 2007.
http://www.pewclimate.org/about/index_fre.cfm

British Columbia Programs, on the Web site of the government of British Columbia, Victoria, British Columbia, Canada, 2007.
http://www.rev.gov.bc.ca/ctb/publications/bulletins/sst_085.pdf

Natural Resources Canada

Web site of the Office of Energy Efficiency: *Auto$mart Thinking – Fuel-efficient Driving Tips and Preventive Maintenance of Your Vehicle*, government of Canada, Environment Canada, Ottawa, Ontario, Canada, December 16, 2005.
http://oee.nrcan.gc.ca/transports/personnel/conduite/bon-sens-au-volant-habitudes-de-conduite.cfm?attr=8

Programs for personal vehicles, government of Canada, Environment Canada, Ottawa, Ontario, Canada, June 7, 2007.
http://oee.nrcan.gc.ca/transports/initiative-vehicules-personnels.cfm

Revenu Québec. QST Rebate for Hybrid Vehicles, ministère du Revenu du Québec, Quebec, Canada, 2003.
http://www.revenu.gouv.qc.ca/fr/particulier/taxes/remboursement/remb_part_tvq_vehicule_hybride.asp

Service de veille technologique et stratégique du Centre d'expérimentation des véhicules électriques du Québec (CEVEQ), L*'étiquetage obligatoire des émissions de CO_2 et de la consommation de carburant des véhicules neufs*, Centre d'expérimentation des véhicules électriques du Québec (CEVEQ), Saint-Jérôme, Quebec, Canada, unknown date.

Manitoba Public Insurance Corporation

News release - Drive Green, Save $2000: Rondeau, government of Manitoba, Winnipeg, Manitoba, Canada, February 5, 2007.
http://www.mpi.mb.ca/English/newsroom/articles/2007/GovHybridRelease.html

According to the Minister of Science, Technology, Energy and Mines of Manitoba, a "green" car will save you $2000, government of Manitoba, Winnipeg, Manitoba, Canada, February 5, 2007.
http://news.gov.mb.ca/news/index.fr.html?archive=week&item=1132

Société de l'assurance automobile (SAAQ). *Additional Registration Fees for Luxury Vehicles*, Quebec, Quebec City, Canada, May 2, 2006.
http://www.saaq.gouv.qc.ca/en/vehicle_registration/luxury.php

Turrentine, Thomas and **Kenneth S. Kurani.**

Automotive Fuel Economy in The Purchase Decisions of Households, presented at the 84th annual meeting of the Transportation Research Board, January 9-13, 2005, Washington, United States, cited in Marbek, p. 11.

Car Buyers and Fuel Economy? Energy Policy 35 (2007), 1213 – 1223, Institute of Transportation Studies, University of California, Davis, California, United States. 2007.
http://pubs.its.ucdavis.edu/download_pdf.php?id=1064

Car Buyers and Fuel Economy? Abstract, Energy Policy 35 (2007). Institute of Transportation Studies, University of California, Davis, California, United States, February 2007.
http://pubs.its.ucdavis.edu/publication_detail.php?id=1064

Transport Canada. *ecoAUTO Rebate Program*, government of Canada, Transport Canada, Ottawa, Ontario, Canada, June 11, 2007.
http://www.tc.gc.ca/programmes/environnement/ecotransports/ecoauto.htm

U.S. Environmental Protection Agency (EPA)

Green vehicle Guide
http://www.epa.gov/greenvehicles/

Light-Duty Automotive Technology and Fuel Economy Trends: 1975 Through 2006, Washington DC' United States, 2007 http://www.epa.gov/otaq/fetrends.htm

U.S. Department of Energy
State & Federal Incentives & Laws. Washington DC, United States, 2007.
http://www.eere.energy.gov/afdc/laws/incen_laws.html

Transport Canada

About the Fuel Consumption Program, Ottawa, Ontario, Canada, January 15, 2007.
http://www.tc.gc.ca/programmes/environnement/carbpgm/prog/menu.htm

ecoAUTO Program
http://www.tc.gc.ca/programmes/environnement/ecotransports/ecoauto.htm

Wikipedia, Corporate Average Fuel Economy (CAFE), June 27, 2007.
http://en.wikipedia.org/wiki/CAFÉ