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Frédéric Beauregard-Tellier
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The Kyoto Protocol: Addressing Greenhouse Gas Emissions from On-Road Vehicles

INTRODUCTION

By ratifying the Kyoto Protocol, the Government of Canada has made a commitment to reduce Canada's greenhouse gas (GHG) emissions to 6% below 1990 levels in the 2008-2012 timeframe. This is a very challenging task; 720 megatonnes (Mt) of greenhouse gases were emitted in Canada in 2001, or about 25% above the targeted level. In the absence of concerted action to halt and reverse this growth, emissions are expected to keep growing, to over 800 Mt by 2010.(1)

The combustion of transportation fuels such as gasoline and diesel is a major source of Canada's greenhouse gas emissions. In 2001, the latest year for which data are available, on-road vehicles were responsible for 134 Mt, or 18.6%, of Canada's total GHG emissions.(2) Reducing GHG emissions from the on-road transportation sector is therefore important if Canada is to meet its Kyoto commitment. Because nearly two-thirds of these emissions can be attributed to passenger vehicles, the motoring public must be involved in reaching this objective.

The *Climate Change Plan for Canada*, released in November 2002, outlines the government's approach to reducing emissions. The Plan sets out the initiatives and targeted measures that the government is undertaking to reduce GHG emissions from all sectors, including transportation. Funding for many of these measures was announced in the 2003 Budget and was confirmed on 12 August 2003, when the Prime Minister unveiled details of $1 billion in spending towards the Plan's implementation.

THE COST OF GREENHOUSE GAS EMISSIONS

It is now widely accepted that the accumulation of greenhouse gases in the atmosphere is contributing to climate change, which could entail major economic costs. Models have been developed to estimate the costs, but there is still considerable uncertainty on this point. Until costs are better understood, the precautionary principle remains the fundamental impetus for reducing GHG emissions.

The costs of mitigating emissions are somewhat better known. Many experts, including the federal-provincial-territorial Analysis and Modelling Group,(3) believe that the marginal cost of reducing GHG emissions will be between CDN$10 and CDN$50 per tonne of carbon dioxide.(4) It is worth noting, too, that many experts expect the cost to be ultimately closer to the lower end of this range.(5) If Canadians accept those estimates and deem the expenditure reasonable, the issue then becomes one of determining who should bear the costs.

APPLYING THE "USER PAY" PRINCIPLE

Because GHG emissions from on-road vehicles are a direct outcome of fuel consumption, some have suggested that the cost of mitigating these emissions should be reflected in the price of fuel (the "user pay" principle). The burden of mitigating emissions would thus be shifted from society as a whole to those individuals and businesses that directly benefit from the transportation activity.

On-road gasoline-fuelled vehicles emit 2.36 kg of CO_2 per litre of fuel burnt, while on-road diesel-fuelled vehicles emit 2.73 kg CO_2 per litre of fuel.(6) If the cost of reducing GHG emissions is between CDN$10 and CDN$50 per tonne of CO_2, as suggested in the *Climate Change Plan for Canada*, then mitigating the GHG emissions from a litre of fuel would cost between 2 and 12 cents per litre of gasoline and between 3 and 14 cents per litre of diesel. A "user pay" approach would see this cost incorporated into the price of fuel in the form of a CO_2 tax.

A CO_2 tax of only a few cents per litre is unlikely to significantly reduce the demand for fuel. Research suggests that demand for fuel is fairly inelastic; that is, it does not respond very much to small changes in price. Demand for transportation is fundamental to the Canadian lifestyle and therefore very robust. This implies that a small CO_2 tax, in itself, would likely not bring about substantial reductions in GHG emissions from the on-road transportation sector. Nonetheless, such a tax has the potential to raise considerable amounts of revenue. As an example, consider that total motor gasoline consumption alone in Canada was 39.6 billion litres in 2001.(7) A 2-cent CO_2 tax on motor gasoline could raise some $800 million per year in government revenue.

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(1) Government of Canada, *Climate Change Plan for Canada*, November 2002. To achieve Canada's Kyoto Protocol target, average annual emissions in the 2008-2012 timeframe must be reduced to 571 Mt (6% below 1990 levels).

(2) Environment Canada, "1990-2001 GHG Emission Estimates for Canada," http://www.ec.gc.ca/pdb/ghg/ghg_tables_2001_e.cfm. In 1991, emissions from on-road vehicles were 104 Mt, accounting for 17.3% of Canada's total GHG emissions.

(3) The Analysis and Modelling Group, a federal-provincial-territorial working group of economists, was established by federal, provincial and territorial energy and environment ministers to provide an integrated assessment of the economic implications for Canada of various policy options to achieve the Kyoto target.

(4) Carbon dioxide, CO_2, is by far the most important greenhouse gas.

(5) *Climate Change Plan for Canada* (2002).

(6) Environment Canada, *Canada's Greenhouse Gas Inventory 1990-2000*, Ottawa, 2002; see Appendix D. Reducing fuel use is the only way to reduce CO_2 emissions, since a litre of fuel essentially has a fixed carbon content and there is no feasible technology for capturing CO_2 emissions from motor vehicles.

(7) Statistics Canada, *Energy Statistics Handbook*, 2003, Quarter 1.