A Simple Approach for Bettering the Environment and the Economy: Restructuring the Federal Fuel Excise Tax

Jack Mintz
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Sustainable Prosperity
Making markets work *for* the environment.

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Executive Summary

Overview

To achieve a better allocation of resources in an economy, pricing—be it through fiscal or regulatory policies—has been recommended by many experts to ensure that people take into account the cost imposed by their actions on the environment. One existing tax, the federal excise tax on vehicle fuels, serves little purpose other than to raise revenue, since its initial role to reduce dependence on imported oil has become outdated. However, the tax could become an important federal environmental policy that applies to all fuels according to their environmental damage such as carbon and air pollutants. Broadening the federal excise tax to reflect environmental costs would result in substantial new revenues to the federal government that could be used to reduce inefficient taxes in the economy. This report provides the rationale for this revenue-neutral tax proposal, and discusses how such environmental taxation can be useful in improving the overall tax structure to achieve cost-effective environmental protection. In short, converting the existing tax on vehicle fuels into a broader, environmentally based fuel tax, and using the revenues to reduce other taxes, could contribute to both a better environment and economy.

The Case for Change

Canada's performance in improving environmental quality has been mixed over the past 25 years. While progress has been made in some areas, significant environmental problems remain. For example, Canada's per capita emission levels of greenhouse gases (GHGs) and air pollutants are among the highest for developed countries. The challenge is to find better ways to address these pollution problems while building a healthy, competitive economy.

A primary cause of environmental degradation is the fact that individuals and businesses are not faced with the true costs of the damage they cause to the natural environment. In effect, "users" of the environment do not pay for the impact their actions are having, which leads to excessive pollution and natural resource use. Applying the "user pay" principle would promote both economic efficiency and greater fairness, by ensuring that consumers and businesses are responsible for the environmental costs imposed by their actions.

The combustion of fuels results in very real and significant costs to public health and the environment, including climate change and smog. Businesses and consumers do not currently pay for most of the costs associated with fuel combustion. Those costs are, in effect, a public subsidy to fuel users—one that is detrimental to the environment and public health.

Traditionally, environmental challenges have been addressed through regulations, which simply require polluters to meet a minimum standard and provide no incentive for reducing emissions below that level. By contrast, *market-based instruments* attach an explicit cost to pollutants or environmentally harmful activities. These instruments, which include taxes, user fees, and emissions trading, ensure that the real environmental costs of a polluting activity are better reflected in its price. In short, they create a visible economic incentive to reduce pollution.

Market-based instruments can generally achieve environmental targets at less cost and with fewer distortions to the economy than traditional regulation. They can therefore help improve the efficiency and fairness of the overall tax system, and can also stimulate innovation. Market-based approaches are being explored and implemented with generally positive results for the economy and the environment in a number of countries, particularly in Europe. However, Canada has made relatively little use of these approaches to date. While some provincial governments have begun to develop carbon taxes, there are virtually no federal taxes with an explicit environmental purpose.

The Current Federal Fuel Excise Tax

Greater use of market-based regulatory approaches could contribute to making Canada more environmentally sustainable and competitive.

The federal fuel excise tax was introduced in 1975 as part of a package of measures to raise revenue and curb

reliance on imported oil. This tax applies to fuels used in vehicles at a rate of 10 cents per litre for gasoline and four cents for diesel (other types of fuel are exempt). It is an important source of revenue for the federal government, raising $5.1 billion in 2006–07.

By raising the price of vehicle fuel, this tax encourages reductions in fuel use for transportation, but not for other purposes. This is inefficient from an environmental standpoint because other fuel uses that release emissions, such as the use of coal to generate electricity, are not taxed, even if they produce more pollution. In addition, to recover the tax, businesses may charge higher prices to those purchasing their products, resulting in uneven impacts on the final prices of goods and services sold to consumers. The existing federal fuel excise tax is therefore neither economically efficient nor effective in pursuing environmental objectives.

The Proposal: A Tax on the Carbon and Pollutants in Fuels

A fuel tax that applies more broadly and has rates based on environmental impacts would reduce the inequities in the excise tax while providing incentives to reduce consumption of more polluting fuels. Taking a revenue-neutral approach, in which the additional revenues from an environmentally based fuel tax are matched by cuts in other taxes, would help offset any burdens caused by the tax on the economy, especially with respect to economic growth and job creation.

The authors therefore recommend that the federal government, in co-ordination and consultation with the provinces, replace the federal fuel excise tax with a more broadly based environmental tax designed to reduce emissions of greenhouse gases and air contaminants. Since the federal tax applies narrowly to gasoline and diesel used for vehicles, we propose that it be broadened to cover other fuels. Leaving the existing excise tax rate on gasoline unchanged, this would be equivalent to a tax on the carbon in fuels of approximately $42 per tonne CO_2.

Emissions of greenhouse gases and air pollutants would decrease under this scenario because the tax base, and therefore the costs to business and consumers, would better reflect actual environmental costs. Over time, the environmental tax would result in reduced fuel use and a shift to energy sources and technologies that are less pollution-intensive.

The restructured tax will bring in incremental revenues from those fuel uses previously untaxed by the federal government. We estimate it would raise approximately $12 to $15 billion in new tax revenue annually. This substantial increase in revenue could be used to reduce taxes or fund government tax credits related to climate change technologies. We support a *revenue-neutral* tax shift: the incremental tax revenues should be returned to the economy in the form of lower taxes. In other words, there should be no net increase in taxes associated with this proposal.

We estimate that the additional revenues from this broader environmental tax would allow the federal government to reduce corporate and personal income taxes by 10 percent in the short run and eight percent in the longer-term (given that the tax should diminish with lower fuel consumption over time). This is a substantial tax cut. The form of the tax cut can help mitigate impacts on low-income individuals or businesses and to accelerate the development of clean technologies. For example, the tax rates on the lowest brackets can be cut the most, as was done in British Columbia's carbon tax.

While we focus on carbon for our calculations, we believe that the fuel excise tax could be broadened to include other health-affecting air contaminants such as sulphur dioxide (SO_2) and nitrogen oxides (NO_X). This would entail additional design considerations (e.g., to address the fact that different combustion processes affect emission levels of these pollutants). Therefore, we recommend that the tax begin by reflecting the carbon content in fuels, since this is fairly simple, and then incorporate other pollutants once a robust methodology is designed.

An environmentally based fuel tax, while potentially effective if comprehensively applied to consumers and businesses, could also be combined with a cap and trade system for carbon emissions, as is being by pursued by the federal government and some provinces. This would complement and improve on such a system by ensuring that there is a price on carbon across the entire economy (given that cap and trade systems typically cover only about half of our carbon emissions—those released by large industries). Moreover, provinces could also pursue this proposal by converting provincial

fuel taxes into environmentally based taxes and using the revenues for other provincial tax cuts.

Reforming the fuel tax would be a first step towards more comprehensive tax reform that would broaden tax bases while shifting away from income and other taxes that discourage savings, investment, employment and innovation—towards more consumption and user-pay taxes, such as environmental taxes. This restructuring of the tax system would promote sustainable economic growth and incomes, and protect our natural environment today and for generations to come. In short, it would be good for the environment and the economy.

About This Paper

The 1998 Report of the Technical Committee on Business Taxation explored, among other things, the issue of environmental taxes and proposed a restructuring of the federal fuel excise tax to improve both environmental quality and the efficiency of the tax system. However, these recommendations have not yet been implemented.

On the report's tenth anniversary, the Committee's Chair, Jack Mintz, and one of its members, Nancy Olewiler, believe it is time to revisit this proposal in light of increasing concerns over climate change and air pollution. As a result, the report from which this summary is drawn updates the Committee's recommendation to restructure fuel excise taxes as a first step towards comprehensive environmental tax shifting.

This report is being released by Sustainable Prosperity, a new research-policy initiative aimed at building a healthy environment and economy, by making markets work *for* the environment.

Introduction

With recent policies proposed or enacted in Canada, federal and provincial governments have begun putting a "price" on environmental costs resulting from the consumption of fuels with respect to greenhouse gases and other pollutants. The existing federal excise tax on fuels offers a good opportunity to restructure the tax system by converting it to an environmental tax that applies to all fuels based on their level of carbon and other air pollutants. Below we provide the rationale for this conversion, explain its benefits, and propose solutions to some of the difficulties that would need to be dealt with in order to implement the policy.

Federal and provincial governments share the responsibility for protecting Canada's environment. Along with their regulatory and expenditure powers, governments across Canada have introduced taxes and fees to encourage better environmental practices. These include provincial vehicle efficiency taxes and excise taxes on heavy vehicles, and special provincial taxes on tires, lead acid batteries, beverage containers, disposable diapers, and other commodities. Federal and provincial governments have also provided corporate income tax incentives, including special write-offs for renewable energy and energy conservation investments, energy efficiency, water and air pollution control, and wetland rehabilitation.

But these taxes are far from comprehensive and Canada has made relatively little use of price-based policy instruments to reduce the release of air contaminants and other pollutants. Energy production and consumption, for example, release a host of compounds that harm humans, plants and animals, hasten materials deterioration, and add greenhouse gases to the atmosphere. These waste products degrade our natural environment, lower the quality of life for Canadians, and reduce the productive capacity of our economy. It is inefficient for an economy to allow these wastes to be released without signaling through prices in the form of taxes or charges (or emission markets) their adverse impact on our country—too many wastes will be produced, environmental quality will be too low.

At the same time, the Canadian tax system could be made more efficient and fair. This could be achieved through comprehensive tax reform that broadens tax bases while shifting away from income taxes—that discourage savings, investment, and risk-taking—and relying more on consumption and user-pay taxes, such as environmental taxes. Such a change would make Canada more competitive, enhance sustainable economic growth and incomes, and protect our natural environment today and for generations to come.

Current federal and provincial excise taxes on motive fuels—gasoline, diesel, and jet fuel—could be viewed as emissions taxes because combustion of these fuels produces a number of air contaminants. However, these excise taxes were not generally designed with environmental objectives in mind. The federal fuel excise tax, for example, was imposed in 1975 as part of a package of measures intended to raise revenue and curb reliance on imported oil. It continues to be an important source of revenue for the federal government, raising $5.1 billion in 2006–07. Provincial gasoline excise taxes also raise significant revenue and are, in part, a charge for the use of roads and highways provided by government. These fuel excise taxes were thus not set on the basis of assessments of environmental damage or to achieve environmental targets.

While provincial gasoline levies are arguably related to the use of highways and roads, the federal tax lacks this relationship. Some have argued that the federal excise tax contributes to a better environment through its impact on fuel consumption. However, the federal fuel excise tax, as currently structured, is not the best instrument for pursuing environmental objectives. The tax base is not closely related to the causes of urban air pollution; neither is the tax base well designed from the perspective of greenhouse gas emissions from the combustion of fossil fuels. In 2005, 27 percent of Canada's greenhouse gas emissions came from fuels used in the transportation sector, compared to 55 percent from combustion of fossil fuels that are not subject to specific federal taxes.[1] In

1 Non-energy related greenhouse gas emissions account for 18 percent of the total. These emissions are incurred through waste, mineral products and industrial processes (Environment Canada, 2007).

other words, the current tax does not cover all fuels that release greenhouse gases and air contaminants.

A primary cause of environmental degradation is the fact that individuals and businesses do not pay the full costs of their use of and damage to the natural environment.

A primary cause of environmental degradation is the fact that individuals and businesses are not faced with the full costs of their use of the natural environment and associated environmental damage. Because many environmental resources are not "owned" by any individual or group, there are no markets to determine how much a person should pay for damaging the environment. In the absence of markets to provide incentives to manage and protect the natural environment, too much pollution and waste will be discharged into our soils, atmosphere, and waters. The "users" of the environment thus do not pay for the impact their actions are having.

User charges or taxes are those levied to reflect the benefits received by the consumer or business from publicly provided goods and services, or the costs imposed on society. Application of the user pay principle, such as through environmental taxes, would promote both economic efficiency and greater fairness, by helping to ensure that consumers and businesses bear more of the social costs imposed by their actions.

The combustion of fuels results in very real and significant costs to public health and the environment, such as smog and climate change. Currently businesses and consumers do not pay for most of the costs associated with fuel combustion. Those costs are, in effect, a public subsidy to fuel users—a subsidy that is detrimental to the environment, public health, and economic efficiency.

The traditional response to this lack of environmental markets has been to introduce various forms of environmental regulation. Regulations can reduce environmentally harmful activities by fiat and therefore are effective in application. But regulation does not conform well to the user pay principle because under regulation, payments are *implicit* (for example, through higher costs of production from use of abatement technologies or reduction in output) rather than *explicit*. Each firm or consumer may face different implicit prices based on how much the regulation impacts their emissions. This is inefficient because each regulated party may face a different implicit price for emitting an additional unit of pollution—meaning the total cost of achieving a given emissions target is higher than it would be otherwise.

In addition, regulations on emissions typically specify the threshold where they become binding. Emissions up to that threshold are "free." Therefore, regulations simply require polluters to meet a minimum standard. There is no incentive to reduce emissions below that standard. Creating such an incentive would encourage innovation, lower costs, and reduce pollution.

Interest has been expressed in market-based instruments such as tradable permits and environmental taxation to reduce pollution. Each has its advantages and disadvantages as discussed below. In our view, Canada should adopt various policies, including regulations, as a suite of instruments will be needed to achieve environmental objectives efficiently and effectively.

Many have proposed the use of taxes on fuels to reduce the growth of greenhouse gas emissions and air pollutants. The possible use of fuel excise taxes as environmental policy instruments raises several broad policy issues. Are taxes an effective and efficient policy tool for achieving environmental objectives? What are the respective roles of federal and provincial governments? How do Canada's environmental practices and existing indirect taxes compare to those of other countries? Could the federal fuel excise tax be restructured in ways that would incorporate environmental considerations in the tax base and rate structure, and enhance economic efficiency? What should government do with the tax revenues obtained from additional environmental taxes?

In this report, we examine the potential for applying the user charge approach to environmental costs, and propose that the federal fuel excise tax be restructured in keeping with this principle.

In particular, we examine a broadening of the existing federal fuel excise tax, currently 10 cents a litre on

gasoline and four cents on diesel and aviation fuel, to a carbon-based tax on the consumption of fuels. Using the current tax on gasoline—equivalent to a $42 tax per tonne of carbon dioxide—we calculate the per unit carbon-equivalent tax for fuels, holding the gas tax constant, as an example of the relative rates on energy fuels and the revenue raised.

Overall, the tax system would be more efficient and fair if a broad-based environmental tax were adopted as a substitute for the existing federal fuel excise tax, and combined with income tax cuts.

We estimate that applying the current gas excise tax rate to fuels would yield $12 to $15 billion in additional revenues over and above the existing federal fuel excise tax. This revenue could be used to reduce personal and corporate income tax by 8–10 percent, and mitigate those impacts that affect the most individuals, businesses and regions. We believe this would be the most efficient and fair use of the revenue in order to offset the cost to Canadians and businesses from the additional carbon tax. Overall, the tax system would be made more efficient and fair if a broad-based environmental tax were adopted as a substitute for the existing federal excise tax and to address the most distortive provisions in personal and corporate income taxes. Such a revenue-neutral tax shift could promote cleaner air and enhance economic efficiency.

The Federal Fuel Excise Tax

The federal fuel excise tax applies to gasoline and motive fuel products consumed by individuals and businesses. The rate of tax is 10 cents per litre for gasoline and four cents for diesel. Alternate transportation fuels—methanol, ethanol, compressed natural gas, and propane from renewable sources—are exempt from the tax. Provinces also apply taxes on motive fuels and provide similar exemptions.

The federal and provincial fuel excise taxes have a number of important impacts on the Canadian economy. The fuel excise taxes encourage use of tax-exempt fuels relative to gasoline and other motive fuels. Moreover, the tax is levied only on motive fuels—i.e., fuels used for transportation. The federal government does not tax other energy resources that release emissions, such as the use of coal to generate electricity (which releases greenhouse gases and air pollutants).

This is inefficient from an environmental standpoint when the untaxed fuels produce more emissions per unit of energy obtained than the taxed fuels. It is also unfair in that some sectors of the economy bear the adjustment costs of a "fuels" tax, while others do not. Fuel excise taxes increase the cost of production for many businesses. To recover the fuel excise taxes, businesses may charge higher prices to consumers and other businesses that purchase their products. The fuel excise taxes thus have uneven effects on the final prices of goods and services sold to consumers, since the taxes affect business costs at different stages of production and distribution.

Rationales other than revenue-raising have been suggested for levying federal and provincial excise taxes on gasoline and motive fuels. As noted above, at the provincial level, the fuel excise tax has been viewed as a tax on owners of vehicles for the use of highways and roads built and maintained by provincial and municipal governments. This rationale does not apply to the federal fuel excise tax, however, since the federal government is not directly responsible for highways and roads.

Another suggestion has been that the federal fuel excise tax encourages a more efficient use of oil resources at the consumer level. These efficiencies have positive effects on the environment by reducing emissions of various pollutants. This raises the question of how much the federal excise tax currently contributes to better environmental practices in Canada.

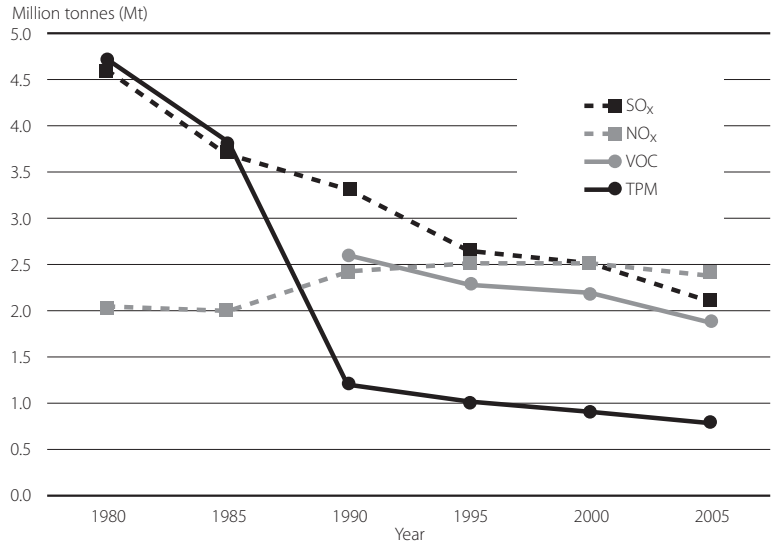
Over the past 25 years, indicators of environmental quality in Canada suggest that our performance has been mixed, with improvements in some areas and declines in others.[2] Water quality in the Great Lakes has improved since the 1970s, for example, and sulphuric deposition (also called acid rain) in central and eastern Canada has diminished over the same period. Significant environmental problems remain, however, including greenhouse gas emissions, air quality concerns in southern Ontario and greater Vancouver arising from smog and particulates; poor ground and surface water quality in many parts of Canada due to discharges of a large variety of toxic compounds; and contamination of soils from a variety of waste products. Canada's emissions per capita, or relative to value added or employment, are higher than those for many developed countries as measured by a number of environmental indicators. Compared to 30 other OECD countries in 2004, Canada had the second highest emissions of nitrogen oxides, sixth highest emissions of sulphur dioxide, and fifth highest emissions of carbon dioxide (CO_2e) per unit GDP.[3]

Figures 1a and 1b provide information on Canadian emissions of major air contaminants: sulphur and nitrogen oxides, total particulate matter, and greenhouse gases over the period 1980–2005. Of these pollutants, sulphur oxides (SO_X), total particulate matter (TPM), and volatile organic compounds (VOC) show a consistent downward trend, with VOCs declining more slowly than the other two. Greenhouse gas emissions and nitrogen oxides have increased over the period. Nitrogen oxides (NO_X) contribute to smog, a major health concern. Canada's rising GHG emissions are a major challenge given our international commitments to significantly reduce them.

2 See Canada, Environment Canada (2003), for detailed information on measures of environmental quality in Canada.

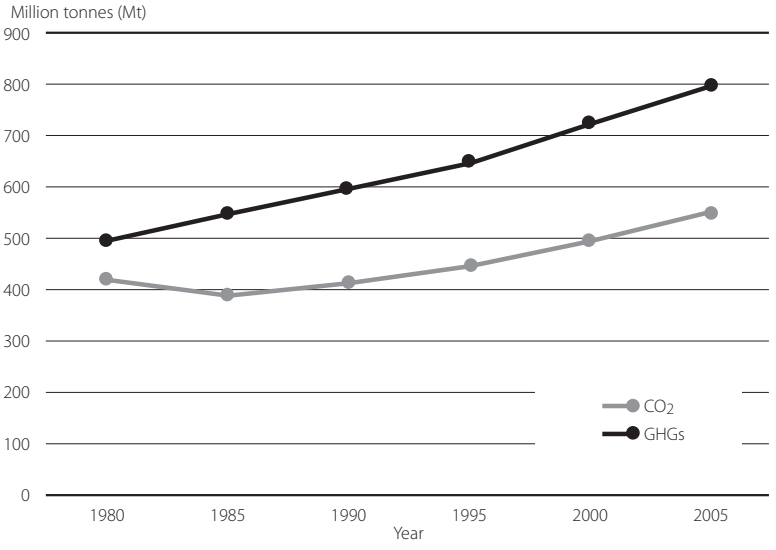
3 See Organization for Economic Co-operation and Development (2004).

Figure 1a: Canadian emissions of air contaminants



Notes: SO_X refers to sulphuric oxides; NO_X to nitric oxides; VOC to volatile organic compounds; and TPM to total particulate matter.
Source: Criteria Air Contaminants Division, Environment Canada, March 2007.

Figure 1b: Canadian greenhouse gas and carbon dioxide emissions



Note: GHGs are measured in CO_2 equivalents. Data for 2005 are estimated.

Sources:
For carbon dioxide emissions: United Nations Statistics Division. Common Database. 2007 (originally data reported by CDIAC/MDG).
For GHGs: National Inventory Report, 1990–2004 – Greenhouse Gas Sources and Sinks in Canada.
http://www.ec.gc.ca/pdb/ghg/inventory_report/2004_report/ta8_2_e.cfm

Canada's economic circumstances and trade relations are also important factors in considering the potential role for environmental taxes. While there have been suggestions for increased use of environmental taxes, particularly to raise the overall price of fossil fuels, we appreciate the potential competitiveness impacts of unilateral action. However, as many countries grapple with the challenge of reducing greenhouse gas emissions and air pollutants, market-based policies including tradable emission permits, carbon taxes, and other charges are being investigated and implemented in a number of jurisdictions such as the EU, the U.S. and some Canadian provinces.[4] Canadian policy must take account of these developments, including more ambitious environmental targets and the implications of international negotiations on a range of environmental issues.

Finally, in considering the potential for restructuring the federal fuel excise tax, there are a number of economic advantages of environmental taxes. As discussed in more detail below, such taxes and other economic instruments offer a way of improving both the efficiency of resource use, and the fairness of the net impacts of use on the wider community. In particular, if a *revenue-neutral* approach is used, by combining environmental charges with reductions in other taxes, it could generate additional economic benefits. These benefits parallel those of user charges for publicly provided goods and services. This suggests that better environmental policies—including replacing existing taxes with well-designed environmental taxes and using the revenue to reduce reliance on inefficient taxes—have the potential to promote better living standards in Canada.

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4 International competitiveness plays an important role in the development of environmental policies in many countries, including the provision of exemptions especially for export-oriented businesses. See OECD (2006).

Environmental Protection: Regulation and Market-based Instruments

Two broad classes of policy commonly employed to deal with the release of environmental contaminants are direct regulation and market-based (or economic) instruments. Regulatory policies seek to achieve environmental objectives by using emission standards to control the quantities of pollutants released by specified types of sources, or by prescribing technology-based standards setting out the type of production processes or pollutant-control technologies to be used.

Market-based instruments aim to alter the behaviour of decision-makers by attaching an explicit cost to pollution or activities that harm the environment.

Market-based instruments aim to alter the behaviour of decision-makers by attaching an explicit cost to emitting pollutants or to undertaking other activities with adverse environmental impacts. These "pricing" instruments include taxes, user charges and fees, tax incentives and disincentives, and markets for transferable emission permits, as discussed further below.[5]

These measures make businesses and individuals take account of the wider impacts of their decisions; the measures achieve reductions in the use of polluting processes and goods by raising their price relative to those generating less pollution. In short, they create an economic incentive to reduce pollution and environmentally harmful behaviour.

While Canada has depended primarily on the regulatory approach, in recent years many experts and organizations have advocated greater use of market-based incentives. It is argued that, in many circumstances, they are more cost-effective, and specified environmental targets may be reached at less cost to business and with fewer distortions to the economy than with traditional regulation.[6] These advantages apply to both taxes and tradable emissions permits.[7]

Recently, much interest has been expressed in tradable permits, typically cap and trade markets, to price emissions under regulation. The market thus creates explicit prices for emissions, and has been successfully shown with sulphur dioxide emission trading in North America.

Cap and trade systems mainly involve large stationary sources of emissions where sources with better technologies sell their excess allowances to others. This eases the cost of regulatory compliance, although prices can be volatile, thus requiring businesses to develop hedging strategies to minimize risk. Some businesses having the initial allowances for sale may actually be better off with a cap and trade scheme than without it. On the other hand, if governments auction off the initial allowances, the revenues could be used to reduce taxes, analogous to the use of tax revenue from environmental taxes. The European Union has introduced an emission trading system for carbon, and a number of U.S. states and several Canadian provinces are in the process of setting up a cap and trade system.

5 User fees for environmental discharges are closely related to environmental taxes. A user fee is typically interpreted as a fee for service, as, for example, the provision of sewage treatment. Broadly speaking, environmental taxes are a charge or penalty for the discharge of pollutants into the environment. Taxes and user fees are most effective where the charge is directly related to the damaging activity. A weight- or volume-based waste disposal fee is likely to have a greater behavioural impact than a fee unrelated to use. Examples of user charges in Canada include waste-discharge fees, water-use charges, assurance bonds for site restoration, and the "temporary" fee imposed by some provinces in deposit-refund systems on beverage and paint containers.

6 There is extensive policy and theoretical literature on the cost-effectiveness of market-based policies in comparison to regulatory policies and the role of environmental taxes. See the discussion in Organization for Economic Co-operation and Development (1989, 2001, 2006), Canada, Environment Canada (1992), United States, Environmental Protection Agency (1991), United States, Environmental Protection Agency (1992), Ontario, Fair Tax Commission (1992), European Environmental Agency (EEA) (2005).

7 Tradable emissions permits are becoming an important market-based policy for mitigating environmental damage from pollutants with the sulphur oxide market in the United States and the EU's carbon trading. Under what is known as a "cap and trade" system, businesses are allocated individual emissions permits in the form of a fixed quantity or quota, typically called allowances, that they may use or sell to others. As a result, each business has an incentive to reduce its emissions. If they are unable to do so cost-effectively, they can purchase additional allowances from others. The United States has used transferable discharge permits to phase out the use of lead in gasoline and the production of chlorofluorocarbons. Its sulphur oxide market has reduced emissions below target levels at compliance costs that are well below what was expected and below compliance costs for previous regulation. See Environmental Protection Agency (2006) for further details on this program.

Tradable permit schemes have limitations. First, they typically focus only on large emitters that can bear the transaction costs involved with such schemes. Other mechanisms (such as a tax) would be needed in order for smaller businesses and consumers to be responsible for the environmental cost of their activities. Second, the design of any permit scheme is complex and some systems have failed to deliver desired emission reductions.[8] Further, businesses may prefer a tax since the "price" is known with certainty (which encourages long-term investments in pollution reduction) and tax rates could be set bearing various objectives in mind.

The general principle of environmental taxation is to set the tax equal to the difference between the private marginal costs of producing and using the good, and the full social costs of production and consumption, including all environmental consequences. In other words, the full environmental costs of a polluting activity should be reflected in the price.

The general principle of environmental taxation is that the full environmental costs of a polluting activity should be reflected in the price.

While the principle is widely accepted, in practice these social costs in the form of pollution and other kinds of environmental degradation are often very difficult to quantify with precision. Further, the effects of environmental taxes on behaviour are uncertain as economic studies vary substantially in terms of their estimated impacts (OECD, 2006). The rates for existing environmental taxes around the world have been determined according to a mix of environmental considerations, revenue objectives and political factors and often start at relatively low levels at their inception.

Environmental taxes can take a number of forms. While a tax on emissions usually makes the clearest link between environmental quality and the polluting good or activity, in practice it is often difficult to measure and monitor emissions. Tax bases that are proxies for measured emissions may be used in such cases. These include taxes on the inputs that lead to waste discharge or excise taxes on pollution-intensive goods such as fuels, pesticides, batteries, paints and tires. The closer the link between environmental damages and the use of the input or good, the better the proxy these taxes are for emission taxes. No single type of policy response is appropriate for all environmental problems. The choice of instrument depends on a range of factors, including the nature of the environmental problem, the jurisdiction of the taxing authority, and the trade characteristics of polluting industries.

Another significant advantage of environmental taxes over many general taxes is that they have the potential to correct market distortions rather than introducing new ones. Therefore, the replacement of an existing distortionary tax—such as the personal and corporate income taxes that affect work effort, savings, investment and risk-taking—with a corrective environmental tax—one that works to reduce the difference between private and social costs—could have the effect of improving the efficiency and fairness of the tax system as a whole. The reduction in the use of distortionary taxes can improve incentives to invest and create jobs.[9] One potential difficulty is that governments become reliant on the revenue and may thus be less interested in curbing harmful activities than raising money.[10] While there are options for reducing this problem, a trade-off may be involved between achieving environmental targets and the revenue being sought to fund public services.

8 An example is the initial setup of the European carbon emission trading system. Too many allowances were issued in the first phase of the market operation.

9 The benefit arising from replacing an existing distortionary tax with a non-distortionary environmental tax is often referred to in recent analyses as the "double dividend." The "first" dividend is unambiguously positive, representing both improved environmental quality and the direct improvements in resource allocation associated with the better pricing of environmental services. The size and sign of the "second" dividend—the non-environment-related benefits of the tax shift—depend on both the nature of the existing tax being reduced and on the existing tax-induced distortions. See Goulder(1995), Parry (1995), and Schöb (1997) for a review of these issues. More recent papers provide some estimates of the potential size of the dividends that vary with the distortionary tax being reduced See Patuelli *et al*. (2005) and Takeda (2007). However, as Bovenberg (1999) reminds us, the double dividend can only exist if governments are not choosing optimal tax rates in the first instance.

10 Governments have levied "sin" taxes on alcohol, tobacco and gambling and have rarely set tax rates so high as to eliminate the economic behaviour involved.

Environmental taxes can also have the effect of stimulating innovation and technological change in a way that is not achieved by regulations that prescribe technology.[11] The latter policies lock a polluter into using the technology specified by the regulation. An environmental tax, on the other hand, provides a continuous incentive to search for ways to minimize the use of the taxed input or output. In the case of a tax on emissions of a pollutant, for example, it is in the interests of the taxpayer to continue to search for better and cheaper technologies to reduce taxed emissions.

As environmental policies have evolved in other countries (OECD, 2006), governments have relied upon a combination of policies to support environmental protection. We believe that an environmental tax would be a good policy to adopt as part of an overall approach, especially to involve all parts of the economy to reduce environmental harms, keeping in mind that policies will generally need to be harmonized.

11 See Cairncross (1992), Organization for Economic Co-operation and Development (1989, 2001, 2006), Porter (1991, 1995), Greaker (2006), Ambec and Lanoie (2007), and Lash and Wellington (2007) for a discussion of these issues.

Other Countries' Experiences with Environmental Taxation

Environmental taxes make up an increasing share of total tax revenue in many European countries, where the trend in tax reform is to shift away from income taxation toward value-added taxes and other indirect taxes, including environmental taxes.[12] The rationale for these reforms is to reduce adverse impacts on labour and capital markets while providing incentives to improve environmental quality. Carbon and/or energy taxes have been introduced in Denmark, Norway, Sweden, Germany, the U.K., Finland, and the Netherlands. Environmental taxes now comprise 2.5–3 percent of GDP across OECD countries (OECD, 2006) and as much as five percent of GDP in Denmark and Turkey, although OECD governments continue to rely most on motor fuel and vehicle taxes as the bulk of their environmental tax revenues.[13] Environmental tax revenues in Canada and the United States are among the lowest for OECD countries, at roughly one percent of GDP. Table 1 below provides revenue shares for 2005 for selected OECD countries.

The introduction of environmental taxes has been a component of tax reforms in Austria, Germany, France, Belgium and the United Kingdom, in the form of a general trend toward greater use of product charges and taxes, and transportation and energy taxes. In energy taxes, the trend is toward restructuring existing taxes to give consumers incentives to use energy in ways that are less harmful to the environment. At the same time, there has been some reduction in the relative significance of income tax incentives, such as accelerated depreciation or investment tax credits for environmentally friendly investments.

Tax revenues have been used for various purposes in some countries. For example, Germany's carbon tax revenues were used to lower deductions from wages for pension contributions. The Netherlands' Small Energy Users Tax returns tax revenue to the same sectors that pay it, through reductions in existing taxes and establishment of a tax-free threshold of energy use, plus some expenditure programs targeted at lower-income households.[14]

Table 1: Revenues from environmentally related taxes as a percentage of GDP for selected OECD countries, 2005

Country	Revenues/GDP
Australia	2.0
Canada	1.2
Denmark	4.8
Finland	3.1
Germany	2.5
Netherlands	3.7
Norway	2.8
Sweden	2.9
Turkey	5.5
United Kingdom	2.5
United States	0.9

Source: OECD http://www2.oecd.org/ecolist/queries/index.htm (accessed March 2008).

12 Discussion of the impacts of carbon and energy taxes in Europe can be found in Buvoll and Larsen (2004), Ekins (2007), Finland Ministry of Environment (2001), Johansson (2007), O'Brien and Hoj (2001), OECD (2004) and United Kingdom, HM Revenue and Customs (2006).

13 European Environment Agency. "Revenues raised by environmentally related taxes for selected countries, 2005." OECD, available online: http://www2.oecd.org/ecoinst/queries/index.htm (accessed December 6, 2007).

14 A recently completed analysis of environmental tax reforms in Europe over the past decade, sponsored by the EU, suggests that these taxes may have been effective at reducing GHG emissions and targeted polluting activities. Modeling undertaken by the study also concluded that these environmental tax reforms overall likely have a small net positive impact on GDP (COMETR, 2006).

Excise Taxes on Fuels and Other Energy Taxes

Excise taxes on fuels warrant special attention, because they are the most common environmentally related taxes in OECD countries and raise the greatest share of revenue. Some countries have used the revenues from new or increased energy taxes to reduce other taxes. As noted above, the United Kingdom's policy is specifically designed to meet targets for reductions in greenhouse gas emissions, with excise tax rates on motive fuels rising over time. Finland has restructured its fuel tax from an excise partly based on the carbon component to a combined carbon/energy tax on diesel and gasoline. Sweden has differentiated fuel excise taxes on diesel and gasoline, based on energy and carbon content. Denmark is gradually increasing its excise taxes on electricity and coal with the intention of aligning them with the energy content of the excise tax on oil.

Other approaches being considered commonly seek to broaden the tax base beyond petroleum-based products to include other energy forms and sources of environmental contaminants. Sweden has introduced a specific charge on nitrogen oxide emissions from industry. Norway has imposed a tax at various rates on carbon dioxide that is contained in petroleum products, or emitted from offshore oil and gas production.

Table 2 summarizes the use of key energy and environmental taxes in selected OECD countries. As the OECD notes, taxes on fuel and motor vehicles account for 90 percent of environmental levies (OECD, 2006). Fuel excise taxes per litre of unleaded gasoline are shown in the first two columns of Table 2 (in constant year 2000 Canadian dollars). Excise taxes have declined in real terms over time as most countries have raised these taxes only slightly since 1997. In addition, the next two columns indicate that the share of excise taxes in total fuel prices has fallen due to the significant increase in gasoline prices over the past nine years. The reduction in excise shares would be even more dramatic if 2008 gasoline prices were used.

The share of total taxes in gasoline prices in 2006 is relatively constant in the European countries shown, reflective of the role of the European Union in harmonizing taxes across member states. Note that the U.K. also has approximately the same share of taxes in gasoline prices. All the European countries also have excise taxes on non-automotive fossil fuels, while most tax electricity.

Canada's total tax share for gasoline relative to that of the European countries has fallen from 64 percent in 1998 to 50 percent in 2006. Overall, Canada's absolute level of excise taxes on gasoline and the total tax share of its gasoline price are the second lowest among OECD countries.

Generally, Canada has not taken a comprehensive approach to energy and environmental taxation. Provincial governments levy royalties on fossil fuel extraction and recently some provinces have begun to develop carbon taxes related to energy. The most notable example is British Columbia, which introduced in its February 2008 budget a carbon tax that will apply to gasoline (2.4 cents per litre), diesel (2.76 cents per litre), natural gas, coal, propane, and home heating fuel. It comes into effect on July 1, 2008 at $10 per tonne, rising to $30 per tonne in 2012. The tax is revenue-neutral with the revenues used to reduce personal and corporate income tax rates. A credit of $100 per adult and $30 per child for those eligible for the GST tax credit was provided to offset the impact of the carbon tax on low-income households.

In 2007, Alberta introduced a form of carbon levy on large emitters by which businesses that exceed their GHG emission limits can pay a $15 per tonne levy that can be used to finance carbon-reducing technologies.

The federal proposal, to begin in 2010, is similar in principle. Under this proposal, a levy would be applied to large businesses that would be used to fund new technologies. Both the federal and Alberta levies apply only to emissions in excess of allowable limits. Quebec has introduced a carbon tax applied to gasoline (0.8 cents per litre), diesel (0.9 cents per litre), heating oil and natural gas, coal ($8 per tonne) and thermal energy.

Table 2: Environmentally related taxes in selected OECD countries

Country	Unleaded gas $2000 CAD 1997 (a)	Unleaded gas $2000 CAD 2006 (b)	Percent of total taxes in gas price 1998 (c)	Percent of total taxes in gas price 2006 (c)	Non-automotive fossil fuels 1997	Non-automotive fossil fuels 2006	Electricity 1997	Electricity 2006
Australia	0.46	0.28	62.9	39.8	No	No	No	No
Canada	0.28	0.20	47.6	30.8	No	No	No	No
Denmark	0.80	0.73	71.3	60.8	Yes (e)	Yes (e)	Yes	Yes
Finland	0.87	0.69	76.9	62.7	Yes (e)	Yes (e)	Yes	Yes
France	1.00	0.74	80.6	62.6	Yes	Yes	No	Yes
Germany	0.86	0.75	74.1	62.3	Yes	Yes (e)	No	Yes
Japan	0.56	0.46	59.9	43.9	No	No	Yes	Yes
Netherlands	0.90	0.80	73.4	61.9	Yes (e)	Yes (e)	Yes	Yes
Norway	0.78	0.71	74.1	61.9	Yes (e, f)	Yes (e, f)	Yes	No
Sweden	0.86	0.62	72.9	62.0	Yes	Yes (e)	Yes	Yes
U.K.	0.85	0.83	76.0	63.1	Yes	Yes (e)	No	Yes
U.S.	0.16	0.09	31.5	14.3	Yes (g)	Yes (g)	No	No
Average of European countries	0.87	0.73	74.9	62.2				

Notes:

(a) Values represent excise taxes on premium non-leaded gasoline (except Australia and Japan are regular unleaded) imposed by all levels of government for 1997, converted to Year 2000 Canadian dollars using exchange rates for 1997.

(b) Values represent excise taxes on premium nonleaded gasoline (except Australia and Japan are regular unleaded) imposed by all levels of government for 2006, converted to Year 2000 Canadian dollars using exchange rates for 2006.

(c) Total taxes on gasoline include all taxes except value added taxes.

(d) Tax on one or more "pollution-intensive" commodities.

(e) Tax on the carbon content of the fuel.

(f) Tax on the sulphur content of the fuel.

(g) The Hazardous Substances Superfund Tax.

Sources: Information on excise taxes on gasoline, other fossil fuels and electricity from International Energy Agency (1997, 2007). Supplementary information on fossil fuels taxes and information on non-excise taxes compiled from Organization for Economic Co-operation and Development (1995, 2001), and Iten (2007).

The Potential for Environmental Tax Reform in Canada

Any consideration of applying the user pay principle to pollutants under federal jurisdiction through environmental taxes must take into account the respective roles of Canada's federal and provincial governments, the emissions characteristics of Canadian businesses, and the wider economic context. We focus on energy-related emissions of greenhouse gases and air contaminants.

Federal and Provincial Roles in Environmental Taxation

Canada's federal structure allocates regulatory powers between the federal and provincial jurisdictions. In the environmental field, the Constitution allows for substantial overlap between federal and provincial powers.

Under Section 92 of the *Constitution Act*, provinces have power over local works, property and civil rights within the province, matters of a local or private nature, and authority over provincially owned lands and resources. These powers have been judicially interpreted to give provinces broad (though not exclusive) authority over intra-provincial pollution and environmental matters. Section 92A gives each province exclusive jurisdiction over the development, conservation and management of its energy and forest resources, and hydroelectric power facilities. Section 92(2) also gives provinces the power over "Direct taxation within the Province," which provides the basis for most provincial taxes.

Section 91 of the *Constitution Act* sets out the federal government's powers. Of particular relevance is Section 91(3), "The raising of money by any mode or system of taxation," which confers on Ottawa broad authority to impose environmentally related taxes. Section 91 also confers more specific powers over matters such as ocean and inland fisheries, navigation and shipping, and over federal lands and waters. These provide the basis for environmental regulation over water pollution and activities on federal land.

Ottawa also has exclusive powers to enter into international treaties, and there are many significant international environmental agreements to which Canada is a party. These include numerous air pollution agreements such as the Montreal Protocol for ozone-depleting substances, the Kyoto Protocol on greenhouse gas emissions and a number of bilateral agreements with the United States on trans-boundary matters such as air pollution, water pollution, and migratory birds.

Finally, the federal government has two main sources of power to enact cross-cutting environmental laws. The "peace, order, and good government" clause in the preamble to Section 91 allows the federal government to address any problem that is of "national concern," which has been interpreted to include trans-boundary environmental problems. The "criminal law" power in section 91 has been interpreted as allowing the federal government to address significant environmental problems (such as toxics), provided it uses powers that are mainly punitive (as opposed to regulatory) in nature (Elgie, 2008).

These two powers provide the main constitutional bases for the *Canadian Environmental Protection Act* (CEPA)—a major piece of legislation dealing with toxic pollution, ocean dumping, international air pollution and other matters. CEPA is also the statute under which the proposed federal regulations on air pollutants and greenhouse gases will be enacted.

Both the federal and provincial governments have broad powers to impose environmental taxes or levies and other market-based instruments.

In sum, both the federal and provincial governments have broad powers to impose environmental taxes or levies and other market-based instruments (such as emissions trading). There is a good deal of overlap between their powers in this field—a not uncommon situation under Canada's constitution.

In practice, it is not unusual for both federal and provincial governments to exercise similar taxing

powers. With income and sales taxes, the federal and some provincial governments have entered into tax collection agreements in order to reduce economic, administrative and compliance costs associated with these overlapping powers.

A critical issue, however, is that any emissions tax will be borne much more heavily by some jurisdictions compared to others. Thus, environmental tax revenues raised by the federal government could have significant regional effects depending on how the revenue is used to reduce other taxes. This point will be further discussed below.

In our view, the federal government has the additional responsibility to work with the provinces in coordinating and harmonizing environmental policies, so as to reduce both the economic and compliance costs arising from their implementation. In an effort to reduce overlap, federal and provincial governments have taken some steps in recent years to harmonize their environmental policies. However, in recent months, some of the provinces are moving more aggressively to address greenhouse gas emissions.

Given the complexity of jurisdictional and economic issues, the federal and provincial governments should undertake comprehensive consultations aimed to harmonize environmental taxes with broad implications. Given the importance that environmental taxation can have on our international trade policies, a myriad of different policies across the country could undermine the benefits that could be achieved by increasing reliance on environmental taxes as part of an overall restructuring of the tax system.

Fuel Taxes and Prices

Canadian fuel taxes and prices are generally lower than those of other countries, with the important exception of the United States. Perhaps more importantly, however, this tax burden is not evenly distributed across fuels and energy sources. In 1997, in most countries, oil products incurred the highest taxes, while coal the lowest, as shown in Figure 2. This situation has not changed appreciably over time. The only specific excise tax on coal in any of the OECD countries is a $10 per tonne charge on steam coal in the U.K., where the pre-tax price in 2006 was $91 per tonne (both expressed in Canadian dollars). As noted above, many of the European countries have introduced carbon and energy taxes as well as a cap and trade system for carbon emissions, but these are too complex to show as a share of the total market price of the energy commodities.

The fuel tax burden is not evenly distributed across all fuels and energy sources. Coal combustion generally produces more pollution than oil combustion, but incurs lower taxes.

This tax treatment is the reverse of the pollution characteristics of these two energy sources, with coal combustion generally resulting in significantly more environmental contaminants per unit of energy than the combustion of oil products. A rebalancing of excise taxes on fuels to account for their environmental impact would increase taxes on coal and, more modestly, on natural gas relative to those currently on oil.

The U.K. is the only country to levy an excise tax on natural gas for industrial use, with a charge in 2006 of C$12 per 10^7 kcal, where the pre-tax price is C$423 per 10^7 kcal. Denmark and the U.K. have excise taxes on electricity for industrial use. Denmark's tax in 2006 was one cent per kilowatt hour (kwh), where the pre-tax price was 10 cents/kwh. The U.K.'s tax is one-half of one cent per kwh, relative to a pre-tax price of 12.8 cents/kwh (all in Canadian dollars).[15]

The data support the argument that most countries could meet environmental objectives more effectively and with fewer economic distortions if they broadened their tax bases to reflect known environmental impacts. A more neutral treatment, taking account of environmental considerations, would improve overall economic efficiency.[16]

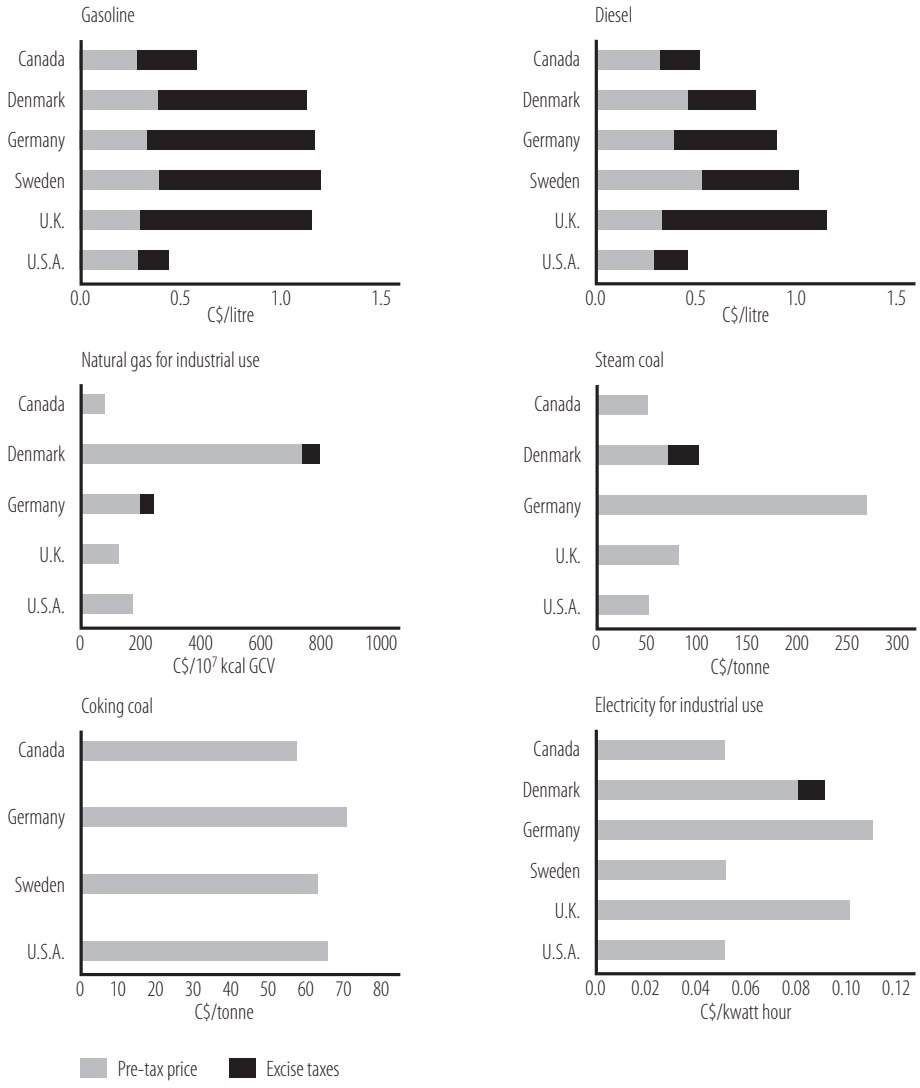
More specifically for Canada, there appears to be some scope for rebalancing excise taxes on fuels by replacing the federal fuel excise tax with a more broadly based environmental tax. This tax would cover all fuels that emit greenhouse gases and air contaminants, with the tax rate based on emissions per unit at the end use when the fuel is combusted. Such a tax would be more fair, in that it would apply to all fuels, not just motive fuels, and more effective in that the tax rate would be tied to the polluting impacts of a given fuel type.

The scope for a restructuring of Canada's federal fuel excise tax can be illustrated by considering the environmental impact of existing excise taxes on fuels, converting the tax rates into an implicit tax on the carbon content of these fuels. Carbon may be regarded as a proxy for a range of environmental damages from these fuels, such as the impacts on local and regional

15 See International Energy Agency (2007).

16 Economic efficiency gains for Canada from environmental taxes may be dampened somewhat due to transborder pollution, particularly in those parts of the country, notably Ontario and Quebec, where environmental quality is affected by pollution from the United States. The rebalancing of the fuel excise tax may have a smaller impact on Canadian environmental quality in these regions, if U.S. emissions of pollutants are not controlled.

Figure 2. Energy prices and excise taxes for selected OECD countries, 1997



Notes

- "Excise taxes" are defined to include all product taxes and special charges, other than valued-added taxes which are refundable when the energy product is used for commercial purposes. These include excise taxes, gasoline and automotive diesel taxes, non-refundable sales taxes (Canada, U.S.), special taxes (Germany, U.S.), environmental taxes (Denmark, U.S.), emergency storage fund (Germany), energy taxes (Sweden), carbon dioxide taxes (Sweden), sulphur taxes (Sweden) and inspection fees (U.S.).
- Data are for the first quarter of 1997, with the following exception: U.K. natural gas and steam coal is for fourth quarter 1996, Canadian electricity and natural gas is for fourth quarter 1994, German electricity, natural gas and coking coal is for 1995, German steam coal is for 1994, Swedish coking coal is for 1989 as this series has been discontinued. (The current price for Swedish steam coal is not shown, due to the variation in taxes based on carbon dioxide and sulphur.)
- The "pre-tax price" shown for Canadian electricity and U.S. natural gas and steam coal may include provincial sales taxes and general state sales taxes respectively. Sales taxes on U.S. electricity are not shown. Data on Canadian coal prices use U.S. export prices.

Source: International Energy Agency (1997).

air quality (reducing visual amenity, damaging ecosystems, and the contribution to a range of health problems), as well as their contribution to climate change impacts. In addition, data on fossil fuel use and carbon content are reliable, widely available, and not a function of the way the fuel is burned. Air contaminants such as sulphur and nitrogen oxides present more challenges as their emissions are not a simple function of fuel burned.

Table 3 expresses fuel excise taxes in selected OECD countries as of 1997 in terms of the average tax rate on the carbon content of total fossil fuel consumption.[17] The table indicates that implicit carbon taxes[18] as of 1997 varied widely across the OECD countries, due to the large differences in excise tax rates, fuel mix and the types of fuel that are subject to tax (as shown in Figure 2 and Table 2). Canada's implicit carbon tax was the third lowest of the countries shown, but is nonetheless over two times that of the United States. Table 3 also shows the energy and carbon intensity of each country (calculated as primary energy measured in tonnes of oil equivalent per thousand dollars of output and energy-related carbon emissions per million dollars of GDP for the years 1997 and 2005, with GDP expressed in constant dollars [base year 2000]).

A number of points can be drawn from the table. First, Canada has the second most carbon-intensive economy in the OECD (behind only Australia). Second, Canada's relative carbon intensity is getting worse; in 1997, it was approximately 30 percent above the OECD average, whereas in 2005 it was 50 percent above the OECD average, indicating we have lost considerable ground in that time relative to the rest of the OECD.[19]

Canada's carbon intensity is now 25 percent above that of the United States, reflecting in part the increased share in GDP energy extraction (e.g., oil sands) has in Canada relative to the United States. In relative terms, the decline in Canada's carbon intensity is the third worst among all the countries represented in Table 1.[20] The European countries are clearly moving to decouple energy intensity from carbon intensity as the spread between their carbon intensities and energy intensities has narrowed from 1997 to 2005. This could be due to these countries' greater use of carbon policies (e.g., carbon and other energy taxes) as well as changes in industrial structure. It is clear that Canada's below average implicit carbon taxes, which reflect Canada's relatively low fuel tax rates and narrow fuel excise base, have contributed to its high carbon intensity, along with relatively low fossil fuel prices, cold climate, geography, and low urban and rural population densities.

17 We were unable to update the implicit carbon tax rates for this table from 1997, but have inflated the 1997 figures to constant dollars (base year 2000). Implicit carbon taxes would no doubt be considerably higher today for European countries, but have changed very little for Canada, the United States, and Australia, given there has been virtually no change in any energy-related taxes since 1997.

18 The implicit carbon taxes take the existing tax rates on any fuel and convert them to a tax rate based on the fuel's carbon content. For example, a 10 cent per litre tax on gasoline converts to a $42 per tonne tax on the carbon content in gasoline.

19 Canada contributes just over two percent of the world's carbon dioxide emissions but is the sixth largest source in absolute terms. The two largest sources are the United States at 21 percent and China at 19 percent. See International Energy Agency (2007). If Canada continues with current policies, carbon dioxide emissions are forecast to rise at an annual rate of 0.9 percent over the period 1990–2010, then rise at an annual rate of 1.2 percent from 2010 to 2020. Environment Canada (2005).

20 New Zealand and Italy show basically no reduction in their carbon intensities from 1997 to 2005.

Table 3: Implicit carbon taxes, energy intensity, and carbon intensity for selected OECD countries, 1997 and 2005

Country	Implicit Carbon Tax (a) C$/tonne carbon 1997	Implicit Carbon Tax (b) C$/tonne carbon 2005	Energy Intensity (c) tonnes of oil equivalent/ C$ thousands 1997	Carbon Intensity (d) tonnes of carbon dioxide/ C$ thousands 1997	Energy Intensity (e) tonnes of oil equivalent/ C$ thousands 2005	Carbon Intensity (f) tonnes of carbon dioxide/ C$ thousands 2005
United States	47	70	0.23	0.56	0.14	0.36
Japan	107	107	0.09	0.22	0.07	0.16
Canada	112	156	0.25	0.5	0.22	0.45
Australia	136	157	0.21	0.64	0.18	0.54
New Zealand	151	185	0.21	0.38	0.18	0.38
Netherlands	189	232	0.17	0.41	0.13	0.3
United Kingdom	243	270	0.16	0.41	0.09	0.22
Germany	280	364	0.14	0.38	0.12	0.28
Italy	288	320	0.11	0.28	0.11	0.27
Sweden	372	477	0.17	0.18	0.13	0.13
France	424	492	0.15	0.23	0.13	0.18
OECD average (g)	128	157	0.17	0.38	0.13	0.3
OECD Europe	269	322	0.14	0.3		

Notes and sources:

(a) Based on the Hoeller and Coppel estimate of implicit carbon taxes, representing total fossil fuel and energy tax revenues per tonne of carbon, adjusted for changes between 1988 and 1997 in exchange rates and excise rates on unleaded gasoline, under the assumption of no change in the mix of energy sources. In 2000 $CAD.

(b) Based on the 1997 estimate of implicit carbon taxes in the first column, inflated to 2005 dollars.

(c) Estimated Total Primary Energy Supply in tonnes of oil equivalent per thousand U.S. dollars of GDP at 1990 prices and exchange rates, converted to Canadian dollars using 1997 exchange rates.

(d) Estimated energy-related CO_2 emissions per thousand U.S. dollars of GDP at 1990 prices and exchange rates, converted to Canadian dollars using 1997 exchange rates.

Sources for implicit carbon taxes and 1997 data: Hoeller and Coppel (1992) and International Energy Agency (1994, 1996, 1997).

(e) Estimated Total Primary Energy Supply in tonnes of oil equivalent per thousand U.S. dollars of GDP at 2000 prices and exchange rates, converted to Canadian dollars using 2005 exchange rates.

Source: International Energy Agency. Key World Energy Statistics 2007. Total primary energy supply : OECD Factbook 2007: Economic, Environmental and Social Statistics - ISBN 92-64-02946-X - © OECD 2007

(f) Estimated energy-related CO_2 emissions per thousand U.S. dollars of GDP at 2000 prices and exchange rates, converted to Canadian dollars using 2005 exchange rates.

Source: OECD in Figures. 2005 edition. Weblink: http://dx.doi.org/10.1787/324013367460. Exchange rate C$/US$ in 2000 is 1.485 (source: OECD Factbook 2007: Economic, Environmental and Social Statistics ISBN 92-64-02946-X - © OECD 2007)

(g) OECD countries as of 1988, other than Greece, Luxembourg, Turkey and Iceland.

Restructuring the Federal Fuel Excise Tax

As the discussion above illustrates, Canada has made relatively little use of environmental taxes to assist in meeting our domestic and international environmental objectives. No federal taxes are levied with an explicit environmental purpose although the federal government has broad authority to enact them. We endorse the principle that environmental damages associated with particular activities should be incorporated in the prices that Canadians pay for the related goods and services, and the revenues should be used to reduce other taxes so as not to increase the overall tax burden. There are, however, two important limitations to federal influence that we wish to underscore.

The first is that some environmental issues are best addressed through international co-operative efforts, particularly when there are significant environmental spillovers between countries. The phenomenon of acid rain between Canada and the United States, and greenhouse gas emissions, which are produced by both developed and developing countries, are examples of instances where Canada has been and continues to be a party to international initiatives to address environmental problems. Canada has signed the Kyoto Accord, but the federal government has indicated that Canada will not meet its targets. The government has introduced plans to meet a different set of greenhouse gas targets over the period to 2020.

The second concern also relates to jurisdictional issues: we believe that the federal and provincial governments must work together in developing policies—with our own special interest being tax policies—that aim to promote better environmental practices.

The current fuel excise tax levied by the federal government is clearly not an appropriately structured environmental tax. This federal tax on motive fuels was initially designed to raise revenue and encourage self-sufficiency in petroleum, and not for the purpose of promoting the efficient use of energy resources taking into account environmental damages. By placing a disproportionate burden of taxes on certain petroleum products and allowing other carbon-based energy fuels to be relatively untaxed, the current fuel excise tax has major shortcomings from both an economic and an environmental perspective.

Combustion of petroleum products for transportation purposes is far from the only source of fuel-related pollution, yet it is the only one that is taxed. A fuel excise tax with a broader base and rates based on environmental factors would work to reduce the inequities in the excise tax while providing incentives to reduce consumption of fuels that emit greenhouse gases and air contaminants.

The additional revenue gained from the tax could be used to reduce taxes that undermine economic growth and fairness. This revenue-neutral approach should avoid any adverse effects on Canada's economy and may even lead to overall economic benefits over time.

Proposal: A Tax on the Carbon and Pollutants in Fuels

We propose that the federal fuel excise tax be restructured to include in its base the domestic consumption of fuels including oil, natural gas, coal, and those fuels used to generate electricity.[21] The purpose of the tax would be to set rates to reflect the environmental damage associated with energy sources. The government might consider basing the tax rates on an index of the relative damage of environmental pollutants—carbon dioxide, sulphur and nitrogen oxides, particulates, and volatile organic compounds—and greenhouse gas emissions.[22]

21 In principle, we advocate taxing all fuels, not just fossil fuels, based on their impact on the environment. However, data are insufficient to make these calculations. Our pragmatic focus is thus on fossil fuels. Inclusion of biofuels and ultimately, fuels used in nuclear power plants may be desirable, but we cannot include them in our analysis at this point due to data limitations. Non-energy uses of fuels, such as the use of petrochemical feedstocks, would not be taxed.

22 In the estimations that follow, we use carbon as a proxy for a more comprehensive tax on carbon plus air contaminants because we cannot readily compute a tax rate to reflect damages from air contaminants.

In designing a broad-based environmental tax, we keep in mind several important principles.

- *Efficiency and Effectiveness:* Environmental taxes should be set according to the relative damage caused by consumption of the product.
- *Comprehensiveness:* Any tax should apply broadly to all sectors of the economy to ensure effectiveness.
- *Minimize Administrative and Compliance Burdens:* Environmental taxes should be applied to minimize compliance costs for taxpayers and administrative costs for governments.
- *Equity:* Taxes should be applied neutrally on all forms of consumption related to environmental damage. Any relief measures provided to offset the impact of taxes on low-income Canadians should be in the form of offsets that provide relief unrelated to the pricing of products.
- *Border Adjustments and International Competitiveness:* Taxes should be levied to reduce environmental damage related to consumption of products in Canada (exports exempt and imports subject to tax) unless governments agree internationally to a set of production-based tax policies whereby imports into Canada have already been subject to tax elsewhere and other governments recognize the tax imposed on exports by Canada in formulating their policies.
- *Revenue-neutrality:* Revenues received by the government should be used to reduce the most distortionary aspects of the tax strucutre and to provide relief for distributive purposes (e.g., to low-income persons).
- *Phasing in to minimize transition costs:* Fuel tax increases should be phased in on a schedule over time with periodic re-evaluations to allow time for adjustment and provide predictability for businesses and consumers.

Detailed determination of tax rates is best left to precise calculations of emissions from each fuel. However, using data on carbon intensity of each fuel, we provide an estimation of the tax rates and revenues raised with a restructuring of the federal fuel excise tax to broaden the base and include all fossil fuels that emit carbon when combusted. The excise tax restructured in this manner can increase total tax revenues substantially and allow the federal government to reduce other taxes that distort economic activity, while leveling the playing field among major energy sources. It would help to ensure that the costs of goods and services produced by using these sources would better reflect actual environmental costs.

Table 4 illustrates a restructured federal fuel excise tax that includes all fossil fuels used by residential, commercial, and industrial sectors, with transportation fuels consumed by all sectors and fuels used for electricity generation treated separately. Given the complexity of designing and implementing a comprehensive environmental tax, we focus on restructuring the fuel excise tax around each fuel's carbon content. Computation of the emissions and pollution-intensity of fuels for sulphur dioxide, nitrogen oxide and other criteria air contaminants is dependent on many factors, hence a tax on the consumption of these fuels will be more challenging to implement, and so our tax rates are based on carbon content of each fuel.[23]

We determine the carbon tax rate assuming the current federal excise tax of 10 cents per litre on gasoline remains constant. Since the federal tax applies narrowly to gasoline and diesel, our proposal is to broaden the tax to include other sources of energy. Starting with the gasoline tax, which is higher than the tax rate on diesel, we calculate the carbon-equivalent tax rate on each energy source (diesel is therefore taxed more heavily under the restructured federal excise tax given its carbon content). We leave the 10-cent per litre tax on gasoline unchanged and also assume provincial rates are constant, so gasoline consumption does not change. Given the large increase in petroleum prices and resulting impact on retail prices of gasoline, consumers are already feeling the impact of higher fuel prices. (However this rate, currently one of the lowest in the OECD, could increase over time to meet GHG and air pollution objectives.) The broadening of the tax base would result in higher taxes on energy excluding gasoline, and therefore lower consumption and emissions.

The 10 cents per litre tax is equivalent to a carbon tax of approximately $42 per tonne CO_2. Initially, the restructured fuel excise tax would raise approximately $20 billion annually, adding an additional $15 billion to existing federal fuel excise taxes with this illustration.

23 We thank John Nyboer for data on the carbon intensity of fuels and the rates of a carbon dioxide tax per fuel.

Table 4: Restructuring the Federal Fuel Excise Tax to a fuel tax based on carbon intensity

Sector	Fuel Consumption in million gigajoules (GJ) 2005 (a)	Restructured Fuel Tax Rate $/GJ ($42/tonne CO_2)	2005 Tax Revenue ($ million)	2007 Tax Revenue ($ million) Short-run Price Elasticity (b)	2007 Tax Revenue ($ million) Long-run Price Elasticity
Residential					
Natural gas	646.6	2.1	1358	1382	1105
Heating oil	92.7	3	278	283	226
Industrial					
Natural gas	896.6	2.1	1883	1916	1533
Diesel	156.8	3	470	479	383
Heavy fuel oil	126.1	3.1	388	395	316
Petroleum coke/still gas	434.3	2	869	884	707
LPG NGL	53.6	2.3	126	128	103
Coal (d)	58.6	3.7	217	221	177
Coke	123.7	3.6	445	453	363
Commercial					
Natural gas	504.9	2.1	1060	1079	863
Heavy fuel oil	55.6	3.1	171	174	139
Light fuel oil	83.1	3	249	254	203
Electricity					
Natural gas	347.7	2.1	730	743	594
Heavy fuel oil	128.5	3.1	396	403	322
Light fuel oil/diesel	6	3	18	18	15
Coal (d)	1077.5	3.7	3987	4057	3246
Petroleum coke	48	3.8	184	188	150
Transportation					
Natural gas	1.9	2.1	4	4	3
Gasoline (e)	1377.5	2.8	3857	3857	3857
Diesel	781.8	3	2345	2387	1909
Heavy fuel oil	67.5	3.1	208	212	169
Aviation gas	259.4	2.8	726	739	591
Propane	10.3	2.5	26	26	21
Total Revenue			**19.995 billion**	**20.282 billion**	**16.995 billion**

Notes: (a) Source: Canada. Natural Resources Canada. Fuel Consumption by Sector.

(b) Short-run price elasticity is assumed to lower all fuel consumption (except gasoline due to no change in its price) by 5%. Fuel consumption is assumed to grow at an average annual rate of 3.5% for all fuels.

(c) Long-run price elasticity is assumed to lower all fuel consumption (except gasoline due to no change in its price) by 20%.

(d) Tax on coal would differ by the type of coal. We do not have fuel consumption data by coal type, the tax is an average rate based on bituminous and lignite coal from domestic and imported sources.

(e) There is no change in the federal excise tax on gasoline. A tax of approximately $2.80 per GJ is equivalent to 10 cents per litre.

Emissions of pollutants could be expected to decrease under such an environmental tax because the tax base, and therefore the costs to business, would better reflect actual environmental costs. While our initial assumptions of the response by all the sectors to the restructured fuel tax are modest, over time, the environmental tax would result in reduced energy consumption and a shift to consuming energy sources that are less pollution-intensive.

The sensitivity to prices of the demand for energy fuels is relatively small over the short term for many types of energy consumption, but tends to increase over time as consumers switch to substitute fuels and replace current equipment with more energy-efficient technologies.[24] Table 4 provides a very rough illustration of how a very modest (short run) versus more responsive (long run) price elasticity would affect fuel consumption and tax revenues. If sectors are able to substitute away from the most carbon-intensive fuels, their consumption will fall as will total revenues.

Our rough simulation shows total revenues falling from approximately $20 billion per year to $17 billion, yielding an additional $12 billion in revenue over and above the existing federal excise tax. Of course, actual consumption of the most intensive fuels such as coal could fall by much more than we have simulated as renewable and less carbon-intensive energy sources are accessed. A detailed study of price elasticity by fuel type and sector is needed to predict the responses more precisely.[25]

The approach modeled above, immediately raising all fuel taxes to the current rate of the gasoline tax, is of course not the only possible approach. For example, another option might be to phase in the increase in taxes on other fuels over several years, allowing them to gradually rise to the level of the gas tax. This would allow consumers and businesses time to adjust. Another option would be to reduce the level of the gas tax while raising other fuel taxes. For example, lower the gas tax to five cents and raise other fuel taxes to the equivalent carbon tax rate of the gasoline tax (approximately $20 per tonne). This would generate $4 to $5 billion additional revenue which can be used to cut other taxes.

There will be distributional impacts associated with our proposal. Next to gasoline (whose tax is unchanged under this scheme), coal consumers pay the most in tax. As noted above, if coal consumers can switch to less intensive fuels, their tax burden will fall. On the residential side, the current excise tax is regressive, in that low-income individuals typically spend a higher proportion of their income on taxed products relative to those at higher-income levels. Space heating costs for households will rise, thus exacerbating these regressive impacts. Households that have limited access to less carbon-intensive fuels for home heating will be affected more than those who can substitute less carbon-intensive fuels. Costs of other necessities may also rise.

The tax would have greater effects on some regions of the country than others. Parts of the country that use coal as either a direct energy source or as the feedstock for electricity generation will pay proportionately more than those regions dependent on hydropower and natural gas.

The additional tax revenues from the restructured fuel tax can assist considerably in helping sectors adjust to these new relative prices. The revenues generated by the restructured tax could, in addition to lowering corporate and personal income taxes, also be used to mitigate specific distributional or regional impacts, and to provide incentives to substitute away from the most carbon-intensive fuels. Careful study of the impact of the tax is necessary to help design appropriate mitigation policies. It is important to remember that *all* environmental policies impose costs on people and businesses, but not all provide revenues that can be used to offset these costs. The benefit of a tax compared to other policies is that the government can use the tax revenue collected to mitigate distributional impacts and specific hardships.

Revenue-Neutral Tax Reform

The restructured federal fuel excise tax will bring in incremental revenues from those energy sources previously untaxed by the federal government.[26] The

24 See Waverman (1992) for a survey and discussion of energy elasticities and substitution possibilities among fuels; Elkhafif (1992) for estimates of energy elasticities for Ontario; and Bernard *et al.* (2005) for price elasticities of demand by residential, commercial and industrial sectors of Quebec. See also summary in OECD (2006).

25 There are currently underway a number of studies that estimate the reduction in greenhouse gases in response to carbon taxes set at different rates. It is beyond our scope to calculate the impact of the simulated restructured fuel tax on carbon dioxide emissions.

26 There will also be some incremental revenues obtained from the GST collected on the fuel excise tax.

substantial increase in revenue could be used to reduce taxes or fund climate-related government tax credits.

One potential use of the revenues would be to follow Alberta's lead, through which any levies on carbon are used to fund new carbon-reducing technologies. Even though this may seem to be a sensible approach if the revenues are not too large, it is not clear that it would be appropriate to dedicate the tax revenue to a specific purpose. It might be that too much revenue is created for this purpose or might be wasted on high-cost actions given that the funds become freely available. Governments might wish to spend more funds on environmental programs, but that should be part of the process to determine expenditure priorities from all revenues that are being raised.

Another use of the revenue would be simply to add to the government's overall budget, but it is far from clear that an environmental tax is required just to fund new public spending. Norway has used its carbon taxes to fund its future pensions (as well as its non-renewable revenues) but its public budget is unsustainable without large savings by the government.

We support a revenue-neutral tax shift: incremental tax revenues should be returned to the economy in the form of lower taxes. The revenues from a broad-based fuel tax would allow government to cut personal and corporate income tax by eight percent or more.

We support a revenue-neutral tax shift: the incremental tax revenues should be returned to the economy in the form of lower taxes (levels and/or rates and some tax credits for environmental technologies). In other words, there should be no net increase in taxes. Using revenues in support of comprehensive tax reform for Canada would enhance economic growth and help lead to better incomes and jobs for Canadian workers.[27]

Given that federal personal and corporate income taxes in 2006–07 total almost $150 billion, the new federal excise tax on energy sources would allow the federal government to reduce corporate and personal income taxes by 10 percent in the short run and eight percent in the longer run. This would be a substantial tax cut even without changing the 10-cent-per-litre tax on gasoline as the basis for the carbon tax.

Several candidates should be considered for tax reductions. Criteria to help choose the taxes to cut should include those that:

- Improve economic growth by increasing the economic efficiency of production, encouraging investment and saving, and promoting innovation;
- Ensure fairness/equity across sectors and households;
- Enhance environmental quality—use the tax revenue to create even more incentives to improve the state of our environment;
- Ensure that regions are not harmed by the tax restructuring;
- Account for the impact of the excise tax over time—revenues should decline over time as the incentive effects of the tax are realized; and
- Minimize administrative complexity and compliance costs.

We propose consideration of the following tax reforms, all of which meet our criteria above:

- *Reduce corporate income tax rates*. Many studies indicate that Canada's federal corporate tax rates are significantly higher by international standards, despite proposed reductions that bring down Canada's corporate tax rates to the OECD average (Mintz, 2007). These rates act as a disincentive for investment and employment as well as likely reduce total tax revenues because corporations shift their costs into Canada and profits to lower-tax regimes.

27 See Mintz (2007) on comprehensive tax reform for Canada.

- *Realign the capital cost allowances (CCA) within the corporate income tax to be consistent with economic depreciation*. As Chen and Mintz (2004) discuss, a revision to bring CCA rates in line with economic depreciation would enhance economic efficiency by reducing disincentives for investment in capital assets.

- *Reduce personal income tax rates to improve incentives to work and save, and to assist people with low or modest incomes*.[28] Lowering personal income taxes provides positive incentives for the economy and helps individuals. A particular problem that the environmental tax shifting could help address is the very high marginal personal tax rates on people with modest incomes. These high rates are created by claw backs under income-tested federal programs combined with payroll and income taxes. The result is marginal tax rates on employment and savings of over 70 percent. These are tax rates much higher than those faced by high-income individuals (Mintz, 2007). In addition to reducing these high claw backs, it is also important to decrease tax rates on the lowest income levels. These measures will help offset any increased tax burden on lower income people resulting from the restructured excise tax.

- *Tax credits for environmental technologies:* Some tax credits such as for carbon storage and recapture technologies could serve a dual function in assisting businesses with these costs as well as ensuring the overall tax change is neutral among regions.

In devising environmental taxes, other policies should be kept in mind in order to not create large burdens on some sectors and regions. For example, if cap and trade schemes are developed for large emitters, some offset credit should be provided so that there is not double payment. It is quite possible to design a fuel tax system that will complement a cap and trade regime—in fact this would be desirable since it would ensure that a carbon price applies to all segments of the economy, not just large industries. Further, incentives for new capital expenditures to adopt environmental technologies will likely be aimed more at those industries and regions that will need to accommodate price changes induced by environmental taxes.

It is quite possible to design a fuel tax system that will complement a cap and trade regime—in fact this would be desirable since it would ensure that a carbon price applies to all segments of the economy, not just large industries.

A significant concern that we have with the environmental tax option is that the revenues should decline over time as emissions decline. If this is the case, governments cannot become too reliant on the revenues. Given a successful environmental tax should reduce emissions, expenditure programs and tax incentives related to environmental practices should also be reduced when emissions fall. Various models forecasting the impact of taxes on carbon emissions (e.g., Rivers and Sawyer, 2008) project that carbon taxes will need to rise above the level we have sketched and that it will take time for emissions to fall.

The federal government will need to review all the tax rates and revenues collected over time. Tax rates for the restructured excise tax will need to be set to ensure they work to reduce emissions of greenhouse gases and air contaminants to desired levels—in other words, they are high enough to promote real change in the economy and are not simply a "sin" tax levied to finance public services rather than deter activity. The amount of potential tax restructuring will vary with the revenues obtained from the excise tax as well as general economic conditions, so re-examination of the taxes reduced should occur at regular intervals.

28 Another possible measure is to increase the GST tax credit to help offset increases in fuel bills faced by lower income individuals. However, with recent reductions in the GST rate from seven to five percent in the past two years without adjustments to the GST credit, lower income households are in better position to deal with higher taxes on energy. Increasing the GST credit would also result in higher marginal tax rates resulting from clawbacks. Therefore, we believe it would be better to reduce high marginal tax rates on savings and work for low income individuals.

Conclusion

Consultation and co-operation with the provinces is vital to the restructuring of the federal fuel excise tax. If provincial governments introduce their own environmental taxes without coordination or harmonization, it could have adverse effects on competitiveness. The federal government's recent statement that B.C.'s carbon tax will likely qualify for equivalency with the federal greenhouse gas regulations is helpful in this regard. We recognize that practical issues dictate the manner in which environmental tax reform could be introduced. Sufficient transition mechanisms should be put in place to permit those affected to adjust their production and consumption plans. Further, the federal government should consider a sequential process whereby it first implements emission taxes on commodities for which links to environmental damages are well established, and measurement of emissions is practical. As knowledge increases, taxes encompassing other forms of emissions and damage could be examined. Thus, the first stepwould be to restructure the federal fuel excise tax on a broader base with tax rates reflecting the source's emissions of greenhouse gases.

We recommend that the federal government, in co-ordination and consultation with the provinces, replace the federal fuel excise tax with a more broadly based environmental tax that is designed initially to reduce emissions of greenhouse gases, and over time to address air contaminants. The incremental tax revenue raised should be used to reduce other inefficient taxes, to maintain the same overall level of tax revenues. Candidates for tax reductions include: lower marginal tax rates under the corporate and personal income taxes; tax assistance to low-income Canadians; realignment of capital cost allowances in line with economic depreciation; and some limited incentives for Canadians and firms to cope with higher energy prices through the adoption of new technologies.

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The 1998 Report of the Technical Committee on Business Taxation explored, among other things, the issue of environmental taxes and proposed a restructuring of the federal fuel excise tax to improve both environmental quality and the efficiency of the tax system. However, this recommendation has not yet been implemented.

On the report's tenth anniversary, the Committee's Chair, Jack Mintz, and one of its members, Nancy Olewiler, believe it is time to revisit this proposal in light of increasing concerns over climate change and air pollution. As a result, this report updates the Committee's recommendation to restructure fuel excise taxes as a first step towards comprehensive environmental tax shifting.

This report is being released by Sustainable Prosperity, a new research-policy initiative aimed at building a healthy environment and economy, by making markets work *for* the environment.

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