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1. Introduction

Governments around the world are increasingly pursuing a new policy initiative, referred to by some as “environmental tax shifting”. Environmental tax shifting is a process that involves levying environmental taxes and “recycling” the revenue from the environmental taxes. The revenue can be recycled as rebates to those who pay the taxes, or as reductions in existing taxes and charges.

The key motivation for environmental tax shifting is that the production, transport and consumption of many types of goods and services cause degradation of environmental and natural resources. This affects our daily lives in the form of air and water pollution, loss of habitats for wildlife, depletion of natural resources, climate change, and threats to human health and safety. Indeed, evidence of environmental damage is widespread and perceptible to us all. Yet when we buy goods and services, environmental costs are rarely incorporated in the prices we pay. There is growing recognition around the world that the prices of goods and services need to more closely reflect the total cost of production including environmental costs if we are to make progress toward a more environmentally sustainable society.

One way to bring prices into line with our values about environmental costs is to apply “environmental taxes”. Such taxes reflect, to a certain degree, the damages caused by the production and consumption of goods and services.
and offer incentives to decrease production and/or consumption of the good or service to which they are applied. Environmental taxes are increasingly being applied in both developed and developing countries. In B.C., for example, taxes are already charged on batteries and tires to reflect, in part, the environmental costs from these products.

While there are sound arguments for environmental taxes, there is a limit to the public's willingness to accept additional taxes of any kind. However, correcting prices to reflect environmental damage does not necessarily need to increase net taxes if the environmental tax revenue is directly recycled by decreasing existing taxes and charges. When the revenue from the environmental taxes is used to reduce existing taxes or charges that create disincentives to hiring workers or to domestic investment, additional positive impacts on the economy may be realized.

The government of British Columbia has recently expressed interest in promoting a public discussion of environmental tax shifting as part of its Green Economy initiative. To increase the public's awareness of the issue, and focus the discussion, the government has commissioned this report. The purpose of the report is to (1) explain the principles of environmental tax shifting and (2) identify opportunities for environmental tax shifting in British Columbia. The paper is divided into eight sections. Following this Introduction, the Background section further clarifies key concepts and sets environmental tax shifting within the context of other environmental and tax policies. The third section discusses
some of the key benefits, on the one hand, and challenges, on the other, of an environmental tax shift. Thus, it looks at the potential impacts of environmental tax shifting on adjustment costs, social objectives (for regions and income groups), revenue stability and administration and compliance costs. The fourth section summarizes some of the new policy initiatives elsewhere that involve environmental tax shifting or supporting policies. The fifth section looks at options for reductions in existing taxes and charges while the sixth section considers options for environmental revenues. The seventh section presents supporting policies to environmental tax shifts for British Columbia. The eighth and final section provides examples of environmental tax shift scenarios for B.C.

This report does not suggest which specific policies are most appropriate for B.C. Instead, it explains what an environmental tax shift policy might look like. This can help British Columbians and their government choose a combination of environmental policies that best meets their specific needs and values.

2. Background: What are Environmental Taxes and What is an Environmental Tax Shift?

2.1 What are Taxes?

A tax can be defined simply as a charge levied by government. In this context, a tax includes an array of charges ranging from traditional taxes, such as income and sales taxes, to user fees for public goods, such as a charge at a provincial campground. This range is shown in figure 1 below.
On the left side of the figure, traditional taxes include, among others, taxes on invested capital, income taxes, royalties, sales taxes, value added taxes, property taxes and excise taxes. A gasoline tax is in the middle of the figure because it can be seen as either a traditional tax, for example a sales tax, or as a user fee for using public roads and bridges. On the user fee side of the figure are payments for government services such as camping fees at a provincial park, paid to the Ministry of Environment, Lands and Parks. These user fees must be distinguished from the payments for normal goods and services provided by crown corporations, such as electricity from B.C. Hydro, insurance from the Insurance Corporation of B.C. and transport from B.C. Ferries. These latter charges are not considered to be taxes because they are for goods and services that can be, and often are, provided by private firms in competitive markets.¹

2.2 Environmental Externalities

An environmental externality is environmental damage that results from the consumption and/or production of a good or service that is not directly

¹ This distinction (admittedly a judgment call) is based on considerations such as whether the good is more or less of a "public good" (i.e., difficult for private firms to profitably provide in competitive markets) and
reflected in the price that is charged for the good or service, or compensated for in some other, non-price way. Environmental externalities usually exist because relatively open access to the environment (air, water and land) means that it can be treated as a free receptacle for the wastes of production and consumption. Some examples of environmental externalities include:

- extinction of certain salmon species caused by hydroelectric projects;
- reduction in the quality of drinking water because of pollutants seeping from a nearby landfill; and
- reductions in air quality due to vehicle emissions.

Economists describe an environmental externality as a market failure, a condition in which unfettered economic activity makes society worse off. This is because the prices of goods and services are too low. They fail to reflect full societal costs: conventional financial costs plus externality costs. As a consequence, more of the good or service is likely to be consumed than would be the case if all the costs were considered. Economists therefore tend to argue that the externality needs to be included in the cost of producing the good or service in order for society to make better decisions about how much of the good or service to produce.

This does not require zero pollution, only that the level of pollution should be consistent with a full consideration of the costs and benefits of producing and consuming goods or services. Thus, partial or complete accounting of whether the providing entity is a government ministry or a financially separate corporation.
environmental externalities would lead to higher costs of production, with resulting higher prices to consumers, lower levels of consumption, and lower levels of pollution. Externalities are also generated directly by the consumption of goods, e.g., consumers with low efficiency vehicles emit more pollutants per kilometre traveled than those with higher efficiency vehicles. The principle of internalization is the same; the externality could be addressed by increasing the cost to the consumer of generating the emissions. In contrast, ignoring externalities leads to more pollution, lower quality of life, and can ultimately have a significant negative impact on the productivity of the economy: lower crop yields, higher health care costs, higher expenditures to meet requirements for air and water quality, etc. Thus, an externality imposes real costs; but if there is no price signal or other form of compensation, the costs are borne by society as a whole through reduced quality of life or future cleanup costs.

There are different viewpoints on what to do about externalities. Some argue that harm to the environment is uncertain and attempts to address externalities through changes in market prices will lead to more problems, including fewer jobs and reductions in the goods and services people value from the economic system. Others argue, in contrast, that only by eliminating all externalities can we sustain life on Earth. This paper looks at some of society's options if it wishes to address the externality problem.

2.3 Policy Approaches to Address Externalities

When society decides to include external costs in the market system for
producing goods and services, the next step is to decide how that should occur.

i. Regulation

The most common method of dealing with environmental externalities is regulation in the form of restrictions on pollution emissions and effluents or legislating pollution abatement or more efficient technologies.\(^2\) This regulatory response was particularly dominant in Europe and North America in the 1970s. Current examples in B.C. are: Air Care which sets emission limits for vehicles; the Forest Practices Code; emission and effluent regulations for industries like pulp and paper; energy efficiency regulations for industry, buildings and durable goods; and sewage discharge requirements for municipal governments.

The experience with regulations as a policy response to externality costs has been mixed. On the one hand, significant progress on pollution has been made in some areas, such as automobile emissions per vehicle.\(^3\) On the other hand, research has shown that this can be a very expensive way for society to address externalities. Regulations tend to require a uniform approach in technology and behaviour by all firms and/or households, in spite of the fact that pollution reduction is cheaper for some than others. Also, there is no incentive to go beyond the regulated technology or level of emissions/effluent; effort beyond compliance will not save more money for the household or increase profits for the firm. As a consequence, alternative approaches to addressing

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\(^2\) Emissions typically refer to air pollutants, while effluents are water pollutants. However, the terms are sometimes used interchangeably to refer to any type of residuals discharged into the environment.

\(^3\) While emissions per vehicle have declined significantly over the past 25 years, as the total number of vehicles in use in metropolitan areas rises, total emissions may begin to rise over time.
environmental externalities emphasize the importance of flexibility, allowing individuals to respond differently depending on their costs. These approaches also reward pollution reduction innovations and actions that may go beyond required technologies and practices. Both tradable permits and environmental taxes, described below, have this flexibility and incentive to do more. Use of these flexible mechanisms, as they are known, can allow society to meet environmental targets at lower total costs than with uniform regulations imposed on pollution or requiring the use of specific technologies.

There is an argument that having very restrictive environmental regulations may be beneficial to an economy in the long run. The idea is that such regulations force industry to be innovative with many spin-off benefits such as more rapid productivity gains and eventual export opportunities for cleaner technologies. However, a counter argument is that regulations may not be needed at all once industry realizes (with government help perhaps) that many environmentally beneficial investments (energy efficiency for example) can improve long run profitability and that "greenness" can be an effective marketing strategy. Recent examples of this approach are voluntary challenges to industry to reduce greenhouse gas emissions, and stewardship of toxic compounds by the chemical industry.

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ii. Tradable Permits

A second approach that has been developed is the use of “tradable permits”. Under this approach, effluent or emission levels are capped for a particular region, country or the entire globe. Permits for emissions and effluents are then allocated among individual firms (or perhaps households or countries) such that the total number of permits equals the total cap on emissions or effluents. Permit trading is then allowed. While this approach needs various conditions to be met to work properly, it can potentially be an efficient way of achieving an environmental target. The cap and permits ensure that the target is achieved, and trading encourages economic efficiency by ensuring that firms with the lowest costs of pollution abatement do most of the pollution reduction, selling their extra permits to others. Some jurisdictions have used this approach, notably the United States in developing policies to reduce acid rain. Canadian governments have had extensive discussions and some policy development in applying tradable permits to meeting local air pollution and greenhouse gas emission targets. In 1998 the B.C. government initiated a pilot project for greenhouse gas emission reduction trading (GERT).

iii. Environmental Taxes

A third way to address externalities is to charge a fee - "an environmental tax" - for the emissions or effluents themselves, or for the externality-producing activity. As noted, if nothing is done about externalities, the prices of goods and services will not reflect the costs of environmental damages. This implies that pollution-intensive goods and services will be over-consumed, imposing additional costs
on current and future generations. By having prices begin to reflect such costs, environmental taxes send signals through the economy that allow each firm or household to make its own decision about how much to adjust its behaviour and technology choices to reduce its tax payments. Like tradable permits, this is considered to be economically efficient because only those firms and households that find it cheapest to reduce pollution will do so. Therefore the pollution reduction target will be achieved at least cost.

The idea that government should levy environmental taxes to help address environmental externalities has gained prominence over the last decade. In introducing such policies, governments have rarely expected to correct prices to exactly match the estimated value of environmental damages. This is because, first, such values are still highly uncertain and, second, governments do not wish to impose potentially large adjustment costs on businesses and households in a short period of time. Therefore, environmental taxes have been introduced generally as a gradual effort to move prices toward full societal costs.

2.4 Environmental Tax Shifting

While the motivation for environmental taxes is to have prices better reflect conventional production costs plus the value of environmental externalities, the environmental taxes generate government revenue. An environmental tax policy must therefore include decisions about what to do with the revenue that is generated by the environmental taxes.
A critical factor in the decision about what to do with environmental tax revenues is the rather strong public distaste for taxes that are not linked directly with the provision of specific public benefit programs. As a consequence, environmental tax proposals are frequently associated with an automatic provision that all tax revenues be directly tracked and recycled back to the economy in a revenue neutral manner instead of being amalgamated into the general revenue account of government. Revenue neutrality means that the tax shift would be designed to ensure that total government revenue from taxes did not increase. In other words, any additional revenue from a new environmental tax would be offset by an equivalent reduction in provincial revenue. This could be accomplished by reducing existing provincial taxes or fees, or by providing new tax incentives to encourage environmentally friendly behaviour. This is the essence of the environmental tax shift policy approach.

All government tax revenue is recycled (used) in some way. However, the environmental tax shift involves a more immediate and traceable recycling. This distinction is illustrated in figure 2 below. At the most immediate level, the revenue is returned directly to those who pay. An example is a deposit-refund system for bottles: the deposit can be recovered by the same person who paid it if they return the used bottle. Less immediate (and with different distributional impacts) is a feebate system that charges a fee for the purchase of less efficient cars and uses the money to provide a rebate for the purchase of more efficient cars. Also in this category would be the adjustment of an existing tax to be more
consistent with environmental damages, without changing the total revenue received by government. For example, current vehicle fuel taxes could be reallocated among fuels according to their relative contributions to local air pollution and global climate change, but set at such a level that the revenues to government remained unchanged.

At a less immediate level (middle of the figure) is the use of environmental tax revenues to lower other charges and taxes of government, especially those that are seen as having undesired effects. For example, income taxes are seen as necessary to provide desired government services but not necessarily desirable in and of themselves. If revenue from environmental taxes were used to reduce income taxes in a full and transparent recycling, then two objectives are met simultaneously by the environmental tax shift: a cleaner environment and reduced income taxes.

Finally, the bottom of the figure shows that the environmental tax revenue could be used to augment general government revenues in order to pay down public debt; or increase government expenditures on education, health care, social services, the environment, infrastructure or other general budget areas. This latter category is generally not considered to be within the definition of environmental tax shifting because of the inability to track clearly the recycling of the environmental revenues and because total taxes collected would then rise. Tax shifting thus involves no net change in total taxes collected by the government.
In this report, the emphasis is on the first two levels: that is, a tax shift that "transparently, directly and completely" recycles the environmental tax revenue as refunds or reductions in less desirable government taxes and charges.

**Figure 2. Options for Environmental Tax Revenue.**
2.5 Utility Pricing Policies that Support Environmental Tax Shifting

The idea that prices should reflect environmental costs has also led to concern with the pricing policies for certain public utility services, including those delivering natural resource-based commodities like water, natural gas and electricity, and those treating sewage and solid waste. This issue is different from environmental tax shifting, although it is sometimes confused with it. Advocates of utility pricing reform are not focused on increasing the total revenue from consumption of a good or service. They wish to change the way in which costs are recovered, with more cost recovery shifted from a fixed annual charge to a charge per unit consumed.

Specifically, society establishes monopolies for certain services that benefit from dramatic economies of scale, meaning that one firm can operate at lower costs than two or more. To ensure that the lower costs result in lower prices, the monopoly - usually called a utility - is either a crown corporation or a regulated private firm required to collect only enough revenue to recover all its costs. As monopolies, utilities have considerable freedom in how they collect this revenue. Often, they have developed a tradition of charging a fixed fee. Thus, in many communities households pay a fixed annual fee for water, sewer and garbage collection. Even electricity and gas utilities have at times had very large fixed fees, with only a percentage of revenue collected from a unit charge on consumption. Automobile insurance is also a monopoly in B.C.\textsuperscript{6} Its revenues are

\textsuperscript{6}The definition of a public utility involves some subjectivity. Thus, some argue that aspects of insurance
currently collected from a single annual fee (which may be paid in installments). Part of this fee could be collected instead on a distance-driven basis, say as part of the price of gasoline or in payments based on odometer readings.

With a fixed annual fee, increases in consumption and waste generation are free. If, instead, some of the revenue of the utility were collected from a unit charge, people would be motivated to reduce consumption and waste generation (they save money with each unit reduced). There is a lot of evidence that this response can be significant. Examples include the dramatic water use reductions that often occur when communities install water meters and switch to unit charges, even though the total revenue collected may not change. Another example is the substantial reduction in waste generation that has been observed when communities introduce unit charges for garbage that exceeds a limit (say two cans per household per week).

Note that this change in utility pricing policy is not intended to increase the total costs of the good or service. Thus, it is different from environmental tax shifting. However, the movement toward unit pricing of utility services is supportive of environmental tax shifting in that it discourages excessive resource use and waste production, and thereby reduces environmental damages. This report, therefore, includes consideration of policies like unit pricing for water and sewer services, unit pricing for solid waste disposal, and even distance based

are like a utility service while others argue that all insurance can and should be provided by private competitive markets. Likewise, changes in the relative competitiveness of electricity generation technologies lead some to conclude that the production phase of the industry should no longer be a utility.
automobile insurance.

2.6 Policies for Industry Product Responsibility: Cradle-to-Grave

Another way to account for environmental costs is to require or provide incentives to the firms that produce a good to seek to minimize the environmental impact of the good from the time of its production to the time it is recycled or disposed of in some way. This is often referred to as a "cradle-to-grave" policy. We describe it separately here, although some would argue that it is simply a form of regulation. An example is the current requirement in B.C. for paint manufacturers to provide used paint disposal facilities. However, this program does not involve the extent of product responsibility that is envisioned by some for the cradle-to-grave approach, which may involve the posting of bonds to ensure that goods are ultimately recycled to the maximum extent possible.

Cradle-to-grave policies can be supportive of environmental tax shifting. Cradle-to-grave is especially applicable in cases where there is a well-defined product that can be recovered fairly easily at the end of the product's life, the examples being durable consumer goods like appliances and vehicles. There may be very significant challenges in applying this policy fairly to domestically produced and imported products. Making firms responsible for the emissions of the good during its useful life may also be desirable, but is more difficult to achieve from a policy perspective.
3. Understanding the Benefits and the Challenges of Environmental Tax Shifting

3.1 The Benefits of Environmental Tax Shifting

Proponents of environmental tax shifting suggest that there are a number of reasons to support this policy.

i. Supports Civic Society Values

From a civic perspective, environmental tax shifting represents an adjustment of the tax system to more closely reflect society's values. While taxes will never be popular, public acceptance of their need and fairness is a critical component of a strong civic society. Ironically, the current tax system primarily levies taxes and charges on factors that society seeks to encourage, while many of the activities that result in environmental damage are virtually free. Environmental taxes are more likely than many other taxes to garner public support, especially as part of an environmental tax shift that reduces taxes and charges on income, employment and environmentally friendly technologies.7

Popular support for environmental tax shifting was found in a national telephone survey commissioned by Friends of the Earth, and conducted by International Communications Research between May 29 and June 2, 1998. This survey found that two out of three voters sampled support an environmental tax shift that reduces taxes from payrolls and income and implements taxes on energy sources (such as coal, gasoline, natural gas, propane and diesel) that contribute

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7 Taxes on cigarettes are an example of taxes that receive general public support.
to environmental pollution.\(^8\)

**ii Contributes to Economic Efficiency**

From an economic efficiency perspective, environmental tax shifting brings prices more closely into line with social costs (conventional costs plus externalities). This helps individual market behaviour lead toward outcomes - in terms of the mix of goods and services - that maximize social well-being. At the same time, environmental taxes are considered to be a least-cost way of striving for environmental targets because they allow each firm and household to determine its response to the tax based on a consideration of its unique opportunities and preferences. The range of responses is thus much wider - and the potential for cost saving greater - than when an identical technology or emission level is specified for all.

**iii Complementarity with Other Environmental Policies**

From an environmental policy perspective, environmental tax shifting can be a powerful tool contributing to the achievement of environmental targets in that it provides disincentives for environmentally damaging behaviour while also providing incentives for innovation and entrepreneurship that improves the environment. Environmental taxes increase the incentive for firms and households to go beyond permitted levels and regulated technologies in the pursuit of profit making reductions in emissions and effluents. To the extent that environmental targets are approached, the province will benefit from improved environmental conditions and government expenditure on pollution-related

\(^8\) The executive summary of the survey can be viewed at: www.foe.org/envirotax/taxexecsum.html.
health effects and environmental restoration may be reduced.

In some cases, environmental tax shifting may remove the need for certain environmental regulations. In other cases, environmental tax shifting may reinforce environmental regulations. In both cases, government red tape and regulatory costs may be reduced as the fiscal incentives for individuals and firms will become more consistent with society's environmental objectives.

3.2 The Challenges of Environmental Tax Shifting

In spite of the apparent benefits, there are also challenges to environmental tax shifting. The challenges are presented below and, in the section that follows, possible strategies for addressing these challenges are considered.

i. Adjustment Costs

An environmental tax shift changes the costs of doing business and prices for consumers, yet firms and households have made decisions about technologies and lifestyle based on the previous tax regime. Some input and product prices may rise, while others may fall. Depending on the size and nature of the tax shift, some types of equipment (for example, older cars, low-efficiency furnaces) might be rendered uneconomic. This can lead to high adjustment costs.
ii. Concentrated Impacts and Tax Skepticism

By changing prices, environmental tax shifting changes the long-run costs of production for firms. Pollution-intensive firms may see their costs of production increase and, in some cases, the higher cost of production may result in lost sales and even closure of firms and industries or their migration to other jurisdictions. This type of effect will generally not be experienced uniformly throughout the province and the economy, but instead may be concentrated in certain regions and economic sectors. Depending on the vulnerability of key industries, and the way in which environmental taxes are recycled, their introduction may even have broader effects on the output of the provincial economy. Not surprisingly, those who fear they will be most negatively affected will be motivated to lobby against an environmental tax shift.

Similarly, an environmental tax shift has the potential to concentrate impacts on low-income earners. In this way, it may work against society's income distribution goals. If pollution-intensive expenditures represent a higher proportion of the budget of lower income households, they will experience a disproportionately greater income impact from environmental taxes. This effect may be exacerbated by the inability of lower income households to fund adjustments to the tax that will eventually decrease their tax payments. For example, in spite of the long-term importance to their budget, lower income households are less likely and able to buy high efficiency energy-using equipment, often because these appliances have a higher up-front price than do energy-intensive appliances. The extent of the impact on low-income households will also be
dependent on how the environmental tax revenue is recycled.

The public as a whole is generally skeptical of any policy that includes new taxes. They are likely to be suspicious that new environmental taxes will not be completely off-set by reductions in existing taxes.

iii. Uncertainty About Tax Revenue and Environmental Improvement

To implement an environmental tax shift, governments will need to predict how consumers and firms will respond to the imposition of the environmental tax and the recycling of this tax revenue to ensure that the uses of the revenue closely offset the revenue generated by the tax. There is considerable uncertainty in this. For example, if there is little response to the environmental tax in the form of reduced consumption of the taxed good, then the revenues generated will be relatively stable and predictable. If, however, there is a significant response, the tax revenues will erode over time, at a rate that can be difficult to estimate. This will in turn make it difficult to determine by how much other taxes (e.g., income taxes) should be reduced to accomplish the revenue neutral recycling. Continual adjustment of tax rates may then be necessary. Uncertainty in the adjustment of tax rates is administratively costly for government and makes it difficult for firms and households to plan investment, production, and consumption activities.

Because it is difficult to predict how much pollution will fall if environmental taxes are implemented, these taxes can be a highly uncertain way of pursuing
environmental targets. In contrast, tradable permits set the total permit level (the cap) at the environmental target, meaning that successful implementation will attain the environmental target. Likewise, regulations on the characteristics of technologies, or the emission and effluent levels of firms, lead to fairly predictable outcomes, allowing one to see if the environmental target will be achieved. With environmental taxes, only over time will it become apparent if the government has over- or under-estimated the response to the environmental tax shift. Responses to taxes can be complex and difficult to estimate. The ultimate impact on pollution will depend on how much the prices of goods and services change as a result of the tax and, in turn, how responsive producers and consumers are to price increases.

Because of this uncertainty, there are cases where the use of environmental taxes is inappropriate. For example, in some locations, the level of emissions or effluents must be below a specific threshold for ecological or human health reasons. Environmental taxes cannot ensure that this will occur.

iv. Application Constraints

It can be very difficult to apply environmental taxes in ways that encourage the most cost-effective means of reaching an environmental objective. For example, a tax on the energy content of fuels does not distinguish between the different levels of pollution caused by each type of energy product; it only rewards energy efficiency. However, environmental objectives may be reached more cost effectively through a policy that promotes fuel switching. If
the environmental concern is carbon dioxide emissions from energy-use, a carbon tax on energy inputs will be better than an energy tax. However, even the carbon tax provides no incentive to those who might find unique ways to prevent or sequester CO₂ emissions; the implicit assumption of a carbon tax is that all carbon ends up as emissions. Tax mechanisms that prevent these kinds of distortions are often difficult to implement, requiring reporting and confirmation of emission flows that are not regularly measured.

Jurisdictional constraints may also impede the application of environmental tax shifting. Under the Canadian constitution, the federal government has legislative power over raising money by any system of taxation and the responsibility to develop environmental policies for addressing environmental issues of national or international concern. Provincial governments have the authority to protect provincial natural resources and to implement taxes for raising revenue for provincial purposes.⁹ Divergence in authority over taxes and environmental protection may raise jurisdictional concerns with respect to the raising of revenue through taxes implemented for the protection of the environment.

Finally, the provincial government could be challenged by potentially high administrative and implementation costs associated with environmental taxes. In such cases, the costs may overshadow the benefits derived from imposing the

⁹ Provincial governments have the authority to implement only direct taxes for raising provincial revenue. The exception to this is provincial natural resources on which provinces can levy indirect taxes as well.
tax.\textsuperscript{10}

3.3 Strategies for Overcoming the Challenges of Environmental Tax Shifting

The challenges outlined above are indeed substantial, although there is not widespread agreement on their magnitude. Moreover, there are ways to mitigate these impacts, despite potential disagreement on how effective such mitigation might be.

i. Adjustment Costs

The adjustment costs for firms and households from environmental tax shifting can be reduced substantially if: (1) the environmental tax levels represent a modest change; (2) the tax change is implemented gradually; (3) firms and households are informed well in advance about future tax levels; and (4) some of the environmental tax revenues are recycled in ways that help firms and households to make adjustments. While people do not buy a new furnace, car or appliance every year, with enough warning they can take the present and projected tax into account when such purchases are slated to occur. When a purchase is made, the extra cost of more efficient equipment is sometimes very small compared to the accumulated operating cost savings that such equipment provides. Thus, the long-run cost of industry production and household services might not change a great deal with modest environmental

\textsuperscript{10} See Don Fullerton (1995) “Why Have Separate Environmental Taxes” National Bureau of Economic Research, Working Paper No. 5380, for estimates of administrative and compliance costs versus environmental benefits for several environmental taxes and charges in the United States. He finds that some existing environmentally related taxes and charges had high administrative and compliance costs and were not necessarily reaching their intended environmental objectives.
tax levies. Indeed, if the environmental tax shift includes reductions in other costs to firms (such as reductions in other business taxes) the net effect on costs of production might be smaller still or even positive, although some firms will be worse off at least until they are able to adjust to the new tax regime.

**ii. Concentrated Impacts and Tax Skepticism**

In spite of gradual implementation of an environmental tax shift, low-income earners and some pollution-intensive firms may experience cost increases from environmental tax shifting. In such cases, careful policy design is needed to minimize or mitigate such impacts.\(^\text{11}\) One possibility, by itself or in combination with other measures, is to rebate some of the tax payments back to those firms who can demonstrate competitive pressure from firms in jurisdictions without comparable environmental taxes.\(^\text{12}\) This rebate might be reduced over time depending on the circumstances. Alternatively, some of the environmental tax revenue could be recycled in the form of tax credits to help with new environmental investments in those regions and industries that might be more affected by environmental taxes.

Similar measures at the household level could reduce or eliminate disproportionate impacts of environmental taxes on lower income households. Again, this might include tax rebates to help with transition investments, on the one hand, and income-based, partial tax rebates on the other. A good

\(^{11}\) As noted before, costs of production will be impacted less the lower the level of the environmental tax but lower taxes also decrease the likelihood of meeting environmental targets.

\(^{12}\) It is important that the rebate be made in a way that does not affect the externality-generating activity. It could be a lump-sum redistribution, or based on some measure unconnected to emissions.
example of an environmental tax shift that protects low-income earners is the Dutch Small Energy Users Tax. With this tax, a tax-free threshold of energy use has been established and the revenue from the tax is returned to households according to their respective tax payments. In addition, households get income tax relief such that an average energy user in each of four income groups will be made no worse off from the tax (high users are hurt and low users are better off).

Although taxes will never be popular, and skepticism towards a policy that includes implementing new taxes will remain, environmental taxes are more likely than many other taxes to earn public support. This is especially true in the case of environmental tax shifting, where taxes and charges on socially-valued things like employment and domestic investment are reduced. An environmental tax shift that is transparent, complete and direct will mitigate skepticism about its immediate revenue neutrality. Public acceptance of environmental tax shifting may also be stronger if the environmental taxes chosen are closely linked to perceptible environmental problems and environmental targets.

iii. Uncertainty About Tax Revenue and Environmental Improvement

The uncertainty about tax revenue and environmental improvement from an environmental tax shift has significant policy implications. Tax revenue uncertainty can be reduced if environmental taxes are implemented gradually. This will allow governments to make modest adjustments to the posted rate of change of the tax over time, as long as these are within an acceptable range.
that does not undermine the predictability of the tax for decisions by firms and households. If this occurs at the same time as small adjustments to the tax recycling measures, it should be relatively easy for government to achieve revenue-neutrality.

With respect to uncertainty on the impact of taxes on environmental conditions, the environmental taxes could be implemented along with other, complementary environmental policies, like regulations or investment support. For example, government might implement modest carbon taxes while also (1) passing tougher energy efficiency regulations, and (2) providing financial support for newer, efficient technologies and fuel switching. These latter two measures are being pursued by the Danish government in concert with its CO$_2$ tax as part of its climate change policy package. Thus, many advocates see environmental taxes not as a single means of addressing environmental externalities, but instead as one of several instruments combined most effectively together.

The meshing of other environmental policies with an environmental tax shift policy is also relevant to the issue of the appropriateness of environmental taxes. With some highly toxic substances (lead, mercury, plutonium), society will simply prohibit their existence in effluent and emissions rather than applying taxes which may or may not lead to total elimination. In such circumstances, site-specific technology regulations or emission limits will be necessary. Again, this suggests that environmental tax shifting is best seen as one component of a
package of instruments for addressing environmental externalities.

**iv. Application Constraints**

An environmental tax shift policy should strive to create incentives for all activities that might contribute to the environmental objective. This may require careful design in some cases. For example, if technologies are invented that permanently capture and sequester CO\(_2\) from the atmosphere, any carbon tax mechanism should be adapted to allow those who emit CO\(_2\) to purchase tax rebate credits from those who capture it. Concern for careful policy design explains why earlier proposals to address climate change with an energy tax have been set aside; researchers have shown that an energy tax may penalize activities that would actually decrease greenhouse gas emissions.

Careful design of the environmental tax shift policy should also ensure that the constitutional constraints of implementing environmental tax shifts in Canada are met. Policies may require intergovernmental cooperation in some cases.

To the extent that government is limited by administrative costs, the province should look to the existing tax structures in the province. Where environmental taxes can be easily included in already established taxes, the administrative costs will be reduced. For example, emission taxes on CO\(_2\), SO\(_2\), NO\(_x\) and VOCs could be piggy-backed on (or replace) the existing fuel taxes in the province. Similarly, taxes on certain chemicals and excessive packaging could be piggy-backed on the provincial sales tax. Implementing environmental taxes on
activities or substances which are already monitored in the province would also reduce monitoring and enforcement costs. In cases of pollution from many diffuse sources, a tax on associated products, where a direct link between the polluting substances and the consumption of the products can be established, would lessen administrative costs.

Finally, many of the shortcomings described above relate to the challenges of environmental taxes by themselves rather than the environmental tax shift as a whole. This is why advocates of environmental tax shifting emphasize the social benefits that can be achieved from the recycled tax revenue. Careful policy design is needed to ensure that this revenue has the greatest positive impact and can thus offset part or perhaps all of the costs associated with the introduction of environmental taxes.

Table 1 summarizes the challenges discussed in the previous section and the strategies for addressing those challenges.
Table 1. Challenges of Environmental Tax Shifting and Possible Strategies for Addressing Them.

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Possible Strategies for Addressing the Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment Costs</td>
<td>• Modest taxes that are implemented gradually, known well in advance, and include adjustment assistance where needed</td>
</tr>
</tbody>
</table>
| Concentrated Impacts and Tax Skepticism         | • Adjustment investment assistance to vulnerable firms and households  
                                               | • Tax relief to firms that are placed at a competitive disadvantage  
                                               | • Complete, direct and transparent revenue recycling |
| Uncertainty About Tax Revenue and Environmental Improvement | • Gradual implementation of environmental taxes with necessary adjustments to revenue recycling programs to ensure revenue-neutrality  
                                               | • Complementary implementation with other policies like regulations |
| Application Constraints                         | • Careful policy design to ensure the correct incentives and to avoid jurisdictional disputes  
                                               | • Use of existing tax structures and monitoring programs to minimize application costs |

4. Experience with Environmental Tax Shifting and Supporting Policies

This section summarizes several new policy initiatives that involve either environmental tax shifting or supporting policies. Table 2 provides examples of environmental tax shifting that have occurred in several European countries.13

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13 See Thomas A. Barthold (1994) “Issues in the Design of Environmental Excise Taxes” *Journal of Economic Perspectives* 8, 133-151, for an extensive list of taxes in the United States that have environmental links.
### Table 2. Examples of Experience with Environmental Tax Shifting.

<table>
<thead>
<tr>
<th>Region</th>
<th>Application (yr of implementation)</th>
<th>Rate (Canadian Dollars) (^{14})</th>
<th>Revenue Recycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>CO(_2) (1992-93)</td>
<td>$20.54/tonne of CO(_2) for households, $10.27/tonne of CO(_2) for businesses</td>
<td>Refunds to energy intensive industries and reductions in social security contributions</td>
</tr>
<tr>
<td>Norway</td>
<td>CO(_2) (1993)</td>
<td>$75.24/tonne of coal, $75.24/m(^3) of oil, $150.49/1000m(^3) of natural gas and $0.15/L of petrol</td>
<td>When the tax was established in 1993, the energy tax on oil, coal and natural gas was abolished</td>
</tr>
<tr>
<td>Germany</td>
<td>Environmental Tax Shift Proposal (1999)</td>
<td>Price of gasoline would increase by $0.04/year for 4 years</td>
<td>Reductions in employment insurance charges for firms</td>
</tr>
<tr>
<td>Sweden</td>
<td>Nitrogen oxide emissions (NO(_x)) from large combustion plants for energy production (1992)</td>
<td>$6.99/kg NO(_x) emitted</td>
<td>Refunds to the liable plants in proportion to their energy production</td>
</tr>
<tr>
<td>Sweden</td>
<td>Vehicles meeting the 1993 Swedish requirements for efficiency (1992)</td>
<td>$349.55/vehicle</td>
<td>Rebates to those who purchase vehicles which meet the more stringent 1994 California standard</td>
</tr>
</tbody>
</table>

Note that most of these examples involve revenue recycling within the same sector as the tax is levied and are thus examples of the small revenue recycling circle. Because of the relatively short amount of time that such policies have been in place, it is difficult to estimate their environmental effectiveness. Response to imposition of a tax and tax shifting will depend on a host of complex factors such as the responsiveness of demand for final goods to a
change in price, availability of substitutes to industry and households, industry structure, and even international trade developments.

In contrast to the short amount of time in which environmental tax shifting has been in place, there is considerable experience with changing utility pricing policies in a manner supportive of environmental tax shifting. Table 3 shows the impact that the switch from a fixed annual fee to unit charges has had on solid waste generation and water consumption in certain jurisdictions.

### Table 3. Experience with Moving from Fixed Fees to Unit Charges.

<table>
<thead>
<tr>
<th>Region</th>
<th>Application (yr of implementation)</th>
<th>Rate (Canadian dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Region District, B.C.</td>
<td>Residential solid waste (1992)</td>
<td>One bag/week paid for by fixed rates, $1.50-$2.50/additional bag</td>
</tr>
<tr>
<td>Central Okanagan, B.C.</td>
<td>Residential solid waste (1994)</td>
<td>Two bags/week paid for by fixed rates, $1.50/additional bag</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>Residential solid waste (1981)</td>
<td>$5.50/32 gallon container</td>
</tr>
<tr>
<td>Vernon, B.C.</td>
<td>Residential water consumption (1994)</td>
<td>Up to 40 m$^3$ for 3 mo = minimum charge of $33, 41-300 m$^3 = $0.35/m$^3$, &gt;301m$^3 = $0.45/m$^3$</td>
</tr>
<tr>
<td>White Bear Lake, MN</td>
<td>Residential solid waste (1970)</td>
<td>$4.04/32 gallon container</td>
</tr>
</tbody>
</table>

Environmental Effectiveness

- 22% reduction in solid waste from households
- 40% reduction in solid waste from households
- 70% reduction in solid waste from households
- 34% reduction in water consumption
- 22% reduction in solid waste from households

It is worth noting that several states are interested in the possibility of environmental tax shifting as well. Research in Vermont, Minnesota and New York has investigated the potential gains from implementing various policies of environmental tax shifting. As well, the Oregon House Revenue Committee has

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recently created a task force to look at six to eight specific proposals for tax shifting in Oregon. The proposals expect to consider environmental taxes on industrial practices, fertilizers, air pollution and packaging.

5. Options for Tax Reductions

This section looks at some of the options for tax reductions that might be part of an environmental tax shift policy initiative in B.C. These options fall into three categories: income and capital tax reductions, provincial sales tax reductions, and payroll charge reductions. While the focus here is on actions that the B.C. government could take on its own, collaboration with the federal government would widen the available range of options.

5.1 Reductions in Income and Capital Taxes

The revenues from environmental taxes could be directly linked to corresponding reductions in income and capital taxes. Options include personal and corporate income taxes and corporate capital taxes.

Personal income taxes could be reduced in a number of ways. One approach is to reduce the marginal tax rates. This is seen as encouraging high income individuals to stay and invest in the province, reducing the loss of highly skilled professionals, and improving the province’s attractiveness for entrepreneurs. If the government wishes to focus on middle- and low-income earners, it could use

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a low income tax credit that would lower the average tax rate for this group.

Corporate income tax rates could also be reduced. This could be in the form of an across-the-board decrease in the corporate income tax rates. Or, government could focus its efforts on certain types of corporations, say the tax rate for small businesses. Tax rate reductions could also be linked to specific actions by corporations, an example being a tax credit linked to new investment.

Many corporations also pay a tax on invested capital. The government could reduce this tax rate or increase the exemption threshold, either of which may improve the province's attractiveness for investors.

5.2 Reductions in the Provincial Sales Tax

The provincial sales tax rate is 7% of the price of goods and services, although there are various exemptions. The revenue from environmental taxes could be used directly to reduce this rate.\(^\text{16}\)

Some argue that a reduction of sales tax is in conflict with the intent of an environmental tax shift because the sales tax reduction does not distinguish between consumption that is good for the environment and consumption that is harmful to the environment. Overall, the effect of sales tax reductions is to

\(^{16}\) It is important to note, however, that each unit decrease in the sales tax rate has a significant effect on government revenue. A decrease in the provincial sales tax of one percent would decrease government revenue by about $400 million.
encourage greater consumption. An alternative approach, therefore, is to use the environmental tax revenue to provide selective reductions in the provincial sales tax. Activities that are considered to impose external costs would not receive a sales tax reduction. However, the advantages of this approach would have to be carefully weighed against the increase in complexity for vendors. This is, in fact, already part of current tax policy in B.C. Cloth diapers are not subject to the provincial sales tax while disposable diapers are. Likewise, there are sales tax exemptions for bicycles and exemptions or tax reductions from fuel tax for certain, environmentally desirable, fuels (natural gas and ethanol and methanol blends of 85% or above are exempt, propane is taxed at the provincial sales tax rate of 7%).

5.3 Reductions in Payroll Charges

When firms hire someone, they are faced with a number of costs in addition to the person's salary. These include payments for employment insurance, Canada Pension Plan, and Worker's Compensation insurance and are referred to as payroll charges. Because increased employment is valued by society, the government may wish to use the environmental tax revenues to reduce these payroll charges, thereby making it economically advantageous for some businesses to hire extra workers.

From a provincial perspective, this option has some challenges. Employment insurance and the Canada Pension Plan are both federal government programs. A coordinated approach would therefore be needed between the
two levels of government. A second concern is that, to varying degrees, payroll
charges are not really taxes, but rather fees for specific insurance programs
(retirement, job injury and unemployment). Lowering these fees distorts the true
costs of the programs. At least in the case of Worker's Compensation, however,
it is possible to set insurance rates for firms that reduce the total costs of the
program (hence the cost of hiring someone) while still penalizing with higher
charges those firms with poor safety records.\footnote{This is called experience rating of firms according to their safety records.} This ensures that the incentive for
safe work practices is not lost with the environmental tax shift policy.

6. Environmental Taxes for Tax Shifting

This section looks at some examples of environmental taxes that might be part of
an environmental tax shift policy initiative in B.C. These examples fall into three
broad categories: user fees for public goods, resource and product charges,
and charges for using the environment for disposal of wastes (emissions, effluents
and solid wastes).

Environment-related revenue mechanisms should be subject to the same criteria
as other forms of government revenue generation. Specifically, economic
efficiency, fairness, simplicity and low administrative and compliance costs all
are important considerations. As noted, environmental taxes help promote
economic efficiency by correcting market prices to include a portion of the
environmental damages.
Fairness means that individuals and firms in equivalent circumstances are taxed in a similar way. Simplicity means that the tax or charge is easy to understand. Administrative and compliance costs will be relatively low if the tax is linked to an existing payment vehicle or a new one that is relatively easy to implement. Administrative and compliance costs will also be lower if the policy involves only one level of government.

6.1 User Fees for Public Goods

Public goods are goods and services that are provided by government because of a desire for universal service regardless of income and also because access is difficult to restrict. Examples are roads, bridges, and provincial parks.

Because roads and bridges are used by motor vehicles and vehicles emit air pollution, user fees for these public goods could comprise part of an environmental tax shift strategy. However, there can be fairness issues and decisions about where to put highway tolls or which bridges should have tolls can be very controversial.\(^\text{18}\)

Provincial parks can be threatened with over-use. While the regulatory approach is to limit access, an environmental tax approach would charge user fees. This kind of policy is already in place in B.C., where user fees for parks cover some of the expenses of providing park services. Again, the challenge

\(^{18}\) Nonetheless, bridge and highway tolls are used throughout the world. Singapore is especially known for
with user fees is that they should not be so large as to prevent access for those with lower incomes.

6.2 Charges on Resource Use and Final Products

The use of resources and consumption of products does not necessarily imply environmental degradation. For example, some agricultural practices are sustainable. And some products can be consumed with virtually no environmental effects. However, to the extent that resource use and consumption of products is associated with environmental degradation, environmental taxes are justified.

Among resources, this is the case in many jurisdictions for water use. It is almost universally the case for fossil fuel use. And, it is often the case for land use. Land allocated to a number of urban uses, notably vehicle parking, will be associated with environmental costs, as will non-urban uses including mining, forestry, landfills, and even agriculture. Land taxes, set to reflect the relative extent of externalities, are a possible source of revenue from environmental damage. Thus, a portion of the property tax rate could be based on environmental costs from land use. Administrative costs would be thus relatively low and tax recycling could be within the property tax base (e.g., keeping the total property tax revenues collected constant).

Environmental taxes on products can also be reflective of environmental
damages. Examples of candidate products include fertilizer, pesticides, household chemicals, batteries, tires, paint, transportation fuels, and motor vehicles. The tax could involve a change in the sales tax rate for certain products. This will cause administrative complications for small business especially, so such a policy should be limited to only a few categories of products and only a small number of tax rates.

6.3 Emissions, Effluents and Solid Waste Charges

The closer the environmental tax policy can get to levying a charge directly on the pollutant itself, as opposed to indirectly via product and resource charges, the more likely the policy is to be effective. Thus, environmental taxes might preferably be directed at organo-chlorines, phenols and other chemicals in industrial effluents and at raw or incompletely treated municipal sewage, all of which can impact fresh and marine water quality. Polluting emissions are well known, including CO$_2$, NO$_x$, SO$_x$, VOCs, and particulates. Finally, solid wastes might also be taxed. Municipalities are increasingly moving from a fixed fee to a charge for garbage volume in excess of a weekly limit. Environmental fees could be added relatively easily, at least up to modest levels.

7. Options for Policies Supportive of Environmental Tax Shifting

As noted in sections 2.5 and 2.6, other policies can be implemented in support of environmental taxes and environmental tax shifting. These are utility pricing policies that change from fixed annual fees to unit prices, and policies to foster
industrial product responsibility, also called cradle-to-grave policies.

7.1 Utility Unit Pricing Policies

While there is a general trend with public utility pricing from fixed annual fees toward unit charges, some utilities are moving more quickly than others. For example, electric and natural gas utilities recover at least part of their costs from unit charges. Water utilities are headed in this direction, with more and more communities requiring that all new developments include water meters. The installation of water meters is currently a requirement for new developments in Vancouver for example. Eventually, unit charges are likely to be implemented. There is no reason why the application of meters and unit charges could not occur district by district, to avoid the costs of attempting to switch the whole city at one time. Thus, for example, within the Greater Vancouver Regional District, the City of Langley and the University Endowment Lands are already metered for water consumption by households. Unit prices already apply to sewage for industrial and some commercial enterprises. This policy will be more difficult to apply at a residential and small commercial level. Water use may serve as a proxy for sewage production, but the correlation is imperfect. As for solid waste disposal, it is relatively easy to identify the volume of solid waste generated per week and to charge unit fees. However, there will still be a challenge in terms of the environmental target, as households look for ways to avoid the unit charges (compacting garbage, illegal dumping, etc.).

Last year, the B.C. Greenhouse Gas Forum, an advisory body to government,
tested the gasoline price changes required to implement a policy in which about 15% of the annual insurance fee for each motorist was to be recovered from a surcharge on gasoline. While this policy is feasible, it requires coordination of a crown insurance corporation, provincial taxes and private gasoline retailers.

### 7.2 Policies for Industry Product Responsibility

Cradle-to-grave policies are being explored by several European countries. While these are more of a regulatory approach to addressing environmental externalities, they have some link to environmental tax shift policies. They create costs for firms, but may also provide some benefits. In particular, a cradle-to-grave policy creates economic opportunities for some firms in the same way that mandatory recycling programs create opportunities for firms engaged in recycling. The challenge to this kind of policy is the difficulty for one jurisdiction to implement it in isolation. Canadian jurisdictions would likely need to see similar policies in the U.S., at least for major products like vehicles and large consumer durables.

### 8. Examples of Environmental Tax Shift Scenarios

The elements of environmental tax shifting, as described in this paper, provide a wide range of policy opportunities. While the general principle of environmental tax shifting is that an environmentally motivated increase in taxes is offset by an equivalent decrease in other tax revenues, there are many possible policy
alternatives. To help visualize ways in which an environmental tax shift might actually be implemented in B.C., this section describes two contrasting approaches: one involving many technology-specific and service-specific charges and tax changes, the other involving a less complex but more broad reaching strategy of charging three resource / waste streams and using all the revenue to reduce only one government charge.

8.1 A Comprehensive Package of Technology and Product Environmental Tax Shifts Combined with Unit Pricing of Services

In this example, the approach is to combine, in a comprehensive package, many focused measures that are directed to specific technologies, products or services, and that recycle any tax revenue in a very direct and immediate loop. Such a policy might involve the following:

- New vehicle sales in the province would be subject to a feebate system in which, for a given type of vehicle (sedan, sport utility vehicle, pick-up, etc.), the government would establish two or more categories of efficiency. Lowest efficiency vehicles would pay a sales tax premium of say $500 to $1000, with this amount provided to purchasers of highest efficiency vehicles as a sales tax rebate of similar magnitude. The exact amounts depend on relative sales and the need for full revenue recycling.

- The provincial sales tax would be adjusted to reflect the full-cycle wastes associated with different products. This is essentially a fuller development of policies already in place (e.g. the sales tax is zero for bicycles) and would need sales tax rates that exceed the current rate of 7% in order to be
revenue neutral. The variable sales tax rate could also address the degree of waste-producing packaging used for similar products; in other words, the same product could be taxed at two different levels depending on how it is packaged.

• Taxes on motor fuels, home heating oil, natural gas and other fuels would be further adjusted to reflect the externalities associated with different fuels. This is already done in part but does not account for current understanding of the relative contributions to local and global air pollution of different fuels.

• Property taxes could be adjusted to reflect the relative externalities associated with different land uses. Uses like parking lots, landfills, and pollution-intensive industries would be charged higher tax rates with any revenue used to reduce the tax rates on more benign land uses.

• After a reasonable phase-in period, all forms of water use, sewage and solid waste disposal in the province could be required to be charged at unit rates.

• The payment for automobile insurance premiums could be converted from the current 100% fixed annual charge to a payment that is recovered 85% from a fixed annual fee and 15% from a distance-based charge recovered from gasoline sales. While total insurance revenue does not increase, the lower fixed fee would be offset by a gasoline price increase of 8 cents/litre.

8.2 Selective Taxation of Water Use, Solid Waste Disposal and Carbon Dioxide Emissions Using the Revenue to Decrease Payroll Charges

In this example, the environmental tax shift policy might involve a broad
reaching strategy of assessing charges on three resource/waste streams and using all of the resulting revenue to reduce a specific government charge. This example was recently explored in a research study conducted at Simon Fraser University.\(^1\)

The study explored the environmental and economic impacts of modest, gradually rising environmental taxes on water use, solid waste disposal and carbon dioxide emissions from fossil fuel consumption over the period 2000 to 2020. These impacts were estimated using a technology and economics focused computer model that simulates how firms and households might change their behaviour in response to the cost changes resulting from the taxes. An ambitious tax scenario and a tentative tax scenario were tested. However, even the ambitious scenario is moderate compared to many recent environmental tax studies. For example, with the ambitious scenario the price of gasoline in 2010 would be 8 cents/litre above projected prices, less than the price fluctuations of the past year.

Depending on the scenario, annual environmental tax revenue ranged from $1-$2.5 billion by 2020. Water consumption fell by 15-35 percent, solid waste generation by 25-50 percent and carbon dioxide emissions by 8-15 percent.

The study also estimated the employment effects of recycling all the environmental tax revenue by reducing employer paid payroll charges that make it costly to employ someone. Specifically, Worker's Compensation

Premiums in British Columbia were reduced by the amount of the tax revenue generated\textsuperscript{20}. Depending on the assumptions about the job creation potential of such cost reductions, the study estimated employment increases of four to nine percent.

The net effect on employment would depend on how the environmental taxes affected the competitive position of pollution-intensive sectors and regions of the economy. However, the relatively modest tax levels tested and the gradualness of their application, did not lead to significant increases in the cost of production. Without more detailed study, and testing of policy alternatives to mitigate any impacts, it is difficult to assess the extent to which the environmental tax shift policy would result in decreased output and employment from specific sectors and regions. This would need to be examined carefully before implementing such a policy.

The revenue could have been recycled in any number of ways. For example, $1 billion of revenue (the tentative scenario) could translate into a reduction of provincial sales tax (excluding liquor) from 7\% to 5\%, or a reduction of personal income tax from 49.5\% to 40\% of the federal income tax rate, or reducing the corporate income tax rate of large and small businesses by 13\%.

\textbf{9. Summary}

\textsuperscript{20} Other payroll charges include employment insurance and pension premiums. Reducing these payments would require cooperation from the federal government.
Environmental taxes are one way to bring prices of goods and services into line with society's values about environmental costs because they reflect the damages caused by the production and consumption of goods and services and provide incentives to reduce these environmentally damaging activities. Environmental tax shifting introduces environmental taxes on environmental contaminants or activities that contribute to the degradation of the environment while not allowing total taxes collected to rise. The tax revenue collected from environmental taxes is recycled back to the economy in the form of reductions in general taxes such as income and capital taxes or as rebates to those who pay the tax (as in a deposit-refund system). The revenue recycling is to be visible to the public to provide assurance that there is no net change in taxes collected by the government. Environmental tax shifting should have positive impacts on the economy by contributing to higher levels of environmental quality and reducing disincentives to investment and employment.

Key components of environmental tax shifting and opportunities for its introduction in British Columbia are identified in this report. We do not recommend specific policies but offer background information for discussion of environmental policy options for British Columbians. Environmental targets can be met using a number of different environmental policies including taxation, restriction of emissions, and tradable permits. No single policy is appropriate for all types of environmental issues. Complementary policies such as unit pricing of utility services for water and solid waste and cradle-to-grave materials management add to the list of instruments governments can use to manage
Environmental and natural resources.

The benefits of environmental tax shifting are many. Tax shifting adjusts the tax system to better reflect society's values by reducing taxes on factors such as employment and investment that society wishes to encourage and imposing taxes on activities that damage the environment. Environmental tax shifting contributes to economic efficiency because it brings prices more closely into line with the social costs of producing the goods and services we consume. Environmental taxes are also a least cost way of achieving environmental targets because they allow households and firms to choose their best and cheapest response to the tax be that by altering behaviour, seeking new and innovative ways of producing goods, or producing and consuming more environmentally-friendly products.

Implementation of environmental tax shifting involves challenges that can be met with careful policy implementation. Modest environmental taxes that are implemented gradually with known schedules of tax rates will allow consumers and producers to plan their adjustment to the environmental tax shift in cost-saving ways. Gradual introduction will also assist policy makers in ensuring that there is no net change in tax revenue as they determine the responses of the economy to the addition of environmental taxes and reduction of other taxes. Adjustment assistance may also ease distributional impacts of environmental taxes on low-income households or specific industries and regions of the province.
We have sketched some examples of environmental taxes that might be part of an environmental tax shift policy for British Columbia. These include user fees for public goods such as roads, bridges, and provincial parks, resource and product charges that might apply to water, land, and goods such as fertilizers, pesticides, and household chemicals, and charges on pollutants discharged into the environment. We illustrate environmental tax shift scenarios for vehicle efficiency feebates and charges on water, solid waste and carbon dioxide. Examples show how the environmental tax revenue can be used to reduce income taxes, investment taxes on environmentally desirable technologies, sales taxes on certain products and services, and payroll charges that discourage employers from hiring extra workers.

In conclusion, we reiterate that although taxes will never be popular, environmental tax shifting may receive widespread public support if it is transparent, clearly identifies which existing taxes are reduced, and has a strong link between the environmental tax and environmental targets. Environmental tax shifting provides an opportunity to have what some have called a "double dividend" -- higher levels of environmental quality combined with lower taxes on activities that contribute to the well-being of British Columbians.
10. Selected Readings


