MARKET-BASED SOLUTIONS TO PROTECT THE ENVIRONMENT

Executive Summary

Momentum is building to take stronger action to address environmental concerns. Leaving the science of climate change for others to debate, we focus on the economics of environmental action. The conventional view is that there is a trade-off between the economy and the environment. But that trade-off can be sharply influenced by the design of the policies. Most economists, including ourselves, believe that any injury inflicted on Canadian jobs, incomes and competitiveness can be mitigated through reliance upon market-based policies that change the price structure to pollution. Doing so serves two purposes. It ensures that polluters pay for the social cost of their actions. And, it alters behaviour when the price for pollution becomes steep. Polluters will seek alternatives, thereby spurring innovation and reducing the need for further, more intrusive and costly environmental policies.

Market failure at the root of the problem

The existence of externalities and market failures has long been one of the key rationales for government intervention in the economy. The ultimate goal is to change the price-cost structure to appropriately reflect the social costs. Negative externalities occur when individuals or organizations take an action that benefits them while forcing unwanted costs onto other people. For instance, smog alerts in Ontario have nearly quadrupled from 1995 to 2005, in part because a resource like clean air is considered a "free" good. Herein lies the crux of the problem, known formally as market failure. The most economically efficient path to alter the price-cost relationship in the environment is to employ market-based tactics (such as taxes, subsidies, tradable permits), which often can't be effectively implemented to the exclusion of some of the more traditional methods of regulation and moral suasion.

Environmental standards: a command and control approach

Although environmental regulation tends to meet considerable political backlash, it is effective in targeting clearly defined sources of pollution through a system of emission restrictions and heavy penalties for failure to comply. For instance, the U.S. effectively employed regulation to reduce airborne concentrations of lead by 93% between 1980 and 2000 in the U.S. Clean Air Act.

However, regulation is best used to complement market-based policies because they are inefficient and can be overly burdensome to participants. There are two main drawbacks to regulation. First, a blanket emissions policy can impose exorbitant compliance costs on firms and individuals, to the point where the cost may end up higher than the value society places on reducing the environmental damage in the first place. There is also little incentive for firms or households to innovate and invest in new technology that will help them exceed the minimum threshold for compliance since the financial benefit in doing so is zero.

One area where regulations can have a symbiotic relationship with market-based policies is in a tradable permit framework, where firms use their differing costs to establish a price for a unit of pollution. If regulations were not put in place to cap emissions, free reign on emissions would render the price of pollution equal to zero.

Moral suasion: in search of the warm and fuzzy feeling

Tactics that use moral suasion and voluntary guidelines are far more politically friendly than regulation, because they provide flexibility in choosing when and how to implement environmental improvements. However, these policies are more useful as an information building block to complement a national environmental policy framework, rather than a stand-alone policy tool. Moral suasion has an inherent "free rider" problem. The burden of the policy tends to fall on those who are morally sensitive and/or those who have lower marginal abatement costs. It allows individuals who do not respond to still enjoy the benefits of the actions of others without assuming any of the costs. A

program like this generally lacks accountability and public trust, making it increasingly likely that it will fail to hit the desired environmental targets. Be it industry or households, participants must believe that other participants are subject to the same criteria for monitoring and reporting. And, even if a voluntary program is designed to include mechanisms to stimulate the diffusion of existing technologies, it does not provide the incentive to develop new abatement technologies.

Environmental taxes: making the polluter pay

Environmental taxes (or user-pay principle), promote both economic efficiency and greater fairness, because they help ensure that polluters bear the cost of their actions, thereby eliminating the free-rider problem. In addition, setting the appropriate price structure to polluting allows other environmental objectives to be realized endogenously. For instance, if it's much more expensive to engage in a polluting activity, individuals and firms will reduce that activity and search for alternatives. Take hybrid automobiles, which are more expensive to purchase than gas guzzlers. If the reverse was true, people would automatically seek out fuel efficient cars. This would spark innovation by producers and could alleviate any need to impose regulations on fleet mileage.

Environmental taxes are best applied where the pollution is created and the revenues should not be a 'revenue-grab' by the government. Rather, the revenue should be used to lower other taxes in the economy or to finance subsidies that help the environment. This is known as 'tax shifting' and can provide additional positive impacts on the economy when environmental tax revenues help reduce existing taxes that currently create economic distortions including disincentives to working or investing. Like other environmental policies, user fees are not a silver bullet. Governments must find the fine balance between making the tax rate high enough to adequately address the underlying environmental concern, but not so high as to unduly compromise economic efficiency.

Subsidies are the nudge in the night

Subsidies work in exactly the opposite way as taxes. If the cost of emission reduction for individuals or firms is too financially onerous, the government can provide a subsidy to lessen the financial burden. However, like taxes, choosing the optimal amount for a subsidy is extremely difficult. Subsidies only work if they change behaviour, otherwise they will result in a free-rider problem. Even when a subsidy achieves the desired GHG emission reduction, it may require other complementing programs in order for it to truly succeed. For instance, a subsidy that significantly increases the use of public transit may also require enhancement of the infrastructure to avoid straining the transit system.

The tax-payer ultimately bears the cost of the subsidy. It must either come from an equivalent increase in taxes, or from a drawdown in existing government coffers (i.e. surpluses), which in turn amounts to forgone future tax or debt reductions. So, subsidies act as tax shifting, but there are some considerable pitfalls that governments must avoid. In too many cases the person paying for the subsidy may not be the polluter of the targeted activity, such that the polluter-pays principle is violated. Worse still, taxpayers could end up shouldering the cost of a subsidy that results in unforeseen negative externalities. For instance, subsidies favouring palm oil as a bio fuel in Europe led to severe environmental damage in Indonesia and Malaysia through clear cutting huge tracts of land, and draining and burning peatland that sent huge amounts of carbon emissions into the atmosphere. Governments must take care to look at the whole lifecycle of a process, often cited as the 'energy-out minus energy-in' principle.

If a government decides to pursue subsidies, the ideal candidate is new environmental technology, either for firms or consumers. In the market environment, price signals for current technology do not incorporate the cost to the environment. There is therefore no incentive to embrace new and costly technology that will only be beneficial to the environment. A subsidy can make up the difference between the marginal private cost and social benefit.

A cap and trade system

Of all the market-based environmental tools, cap-and-trade policies are probably gaining the most international buzz as a successful 'polluter-pay' system. Cap-and-trade systems are not easy to implement, but once up-and-running they have proven benefits. The fundamental appeal of a cap-and-trade system is that it aligns the incentives of firms with the objective of reducing GHG emissions. Firms that are successful in reducing emissions beyond their allowances not only contribute to a healthier environment, but also receive a financial gain by being able to sell their unused credits to those in need. By extension, firms that have exceeded their allowances have to face a personal-

ized economic cost to their pollution and therefore have a financial incentive to reduce future emissions. From the perspective of the economy as a whole, GHG emissions can be reduced in an efficient and least-cost manner with those willing to bear the costs of pollution paying the market price for that decision. A second advantage of a cap-and-trade system is that there are no restrictions or guidance placed on the nature of the technology employed to reduce emissions. This allows firms the flexibility to customize their own solutions and timelines.

There is already a global push towards trading systems in carbon pricing, and the longer Canadian firms have to become accustomed to the cap-and-trade program the better off they will be. Plus, if technology-adoption is made early, there is a better chance that Canada will be a provider of surplus credits on the global stage.

That said, the international carbon market is still in its infancy with what is almost too large a range of abatement costs. This can lead to a situation where a technologically advanced country like Canada (where abatement costs are relatively high) may be forced to purchase carbon credits from a country like China where reducing their abatement costs is considerably less expensive. This leads to a direct transfer of wealth from the Canadian economy to developing nations. Over time, the excessive earnings will be worked out of the market as the emerging economies implement new technology. But for the time being, this market anomaly makes it relatively more attractive to start with a domestic emissions trading platform before linking up to other international systems.

Bottom Line

Although sensible environment policy regimes will require elements of almost everything we've discussed, those that change the price structure of pollution to the users are most effective in changing consumer behaviour towards emissions. Tax-tilting to the polluter can endogenously achieve a number of environmental proposals with less financial costs to society.

There should also be long term continuity in policies to build market confidence in the framework. Most businesses around the world now expect some type of emissions regime and many have already geared up for it. As such, any delay or vagueness in policy annoucements creates an economic cost in itself. So while there is an economic cost of action, there is also a cost of further delay, especially if it results in more pronounced emission cuts down the road.

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Special Report

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Momentum is building to take stronger action to address environmental concerns. Leaving the science of climate change for others to debate, the focus of this report will be on the economics of environmental action. The conventional view is that there is a trade-off between the economy and the environment. But that trade-off can be sharply influenced by the design of the policies. Most economists, including ourselves, believe that any injury inflicted on Canadian jobs, incomes and competitiveness can be mitigated through reliance upon market-based policies that change the price structure to pollution. Doing so serves two purposes. It ensures that polluters pay for the social cost of their actions. And, it alters behaviour when the price for pollution becomes steep. Polluters will seek alternatives, thereby spurring innovation and reducing the need for further, more intrusive and costly environmental policies.

HIGHLIGHTS

- **There is no silver-bullet environmental policy, but polluter-pay policies can minimize the economic costs of environmental gains**
- **Changing the price structure of pollution helps change consumer behaviour towards emissions**
- **Regulations can be effective in bringing about desired environmental outcomes, but they also tend to be inefficient and burdensome**
- **Regulations are best used to complement market-based policies**
- **Some of the economic pain can be alleviated through tax shifting and encouragement of technological innovation and adoption**

Greenhouse gases: too much of a good thing

The earth needs naturally occurring greenhouse gases (i.e. carbon dioxide, nitrous oxide, methane and water vapour) to help regulate the climate by trapping heat in the atmosphere and reflecting it back to the surface. But, there is something called 'too much of a good thing'. The vast majority of scientists are in agreement that rising atmospheric concentrations of carbon dioxide are contributing to climate change and that human activity is at least partly responsible.[1] Climate change is also projected to impact human health by leading to an increase in respiratory illnesses, heat stress, and the transmission of insect and waterborne diseases – all of which would place added strain on a nation's health care infrastructure.[2]

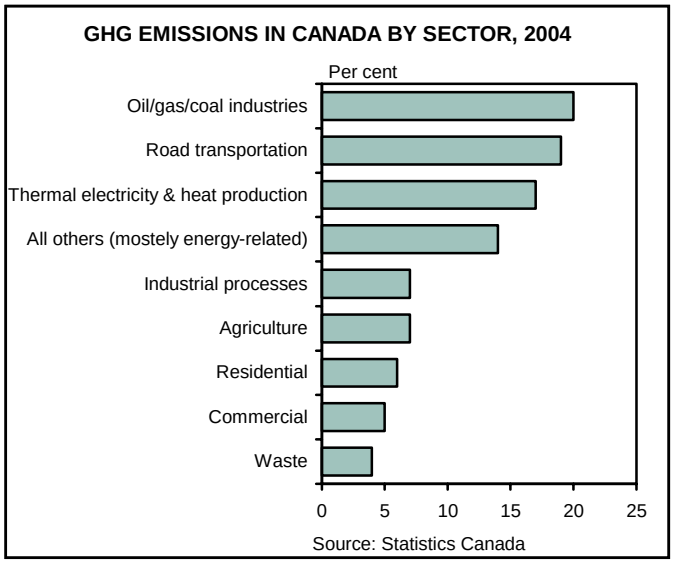
So how does Canada fare on the global stage of greenhouse gas (GHG) emissions? Poorly. One study ranked Canada 27th out of 29 countries for GHG emissions per capita.[3] And, it appears efforts to improve our standing have fallen flat. In 1992, Canada signed the United Nations Framework Convention on Climate Change, pledging to stabilize GHG emissions at 1990 levels by the year 2000. And then in 1997, Canada signed the Kyoto Protocol, formally committing to reduce GHG emissions by 6% below 1990 levels by 2010. Both of these international efforts have failed to bear fruit. Statistics Canada estimated that between 1990 and 2004, GHG emissions per capita rose 10%. Meanwhile, any hope in meeting targets under the Kyoto Protocol look increasingly distant, with 2004 emissions 35% above the target to be achieved in the 2008-2012 period.

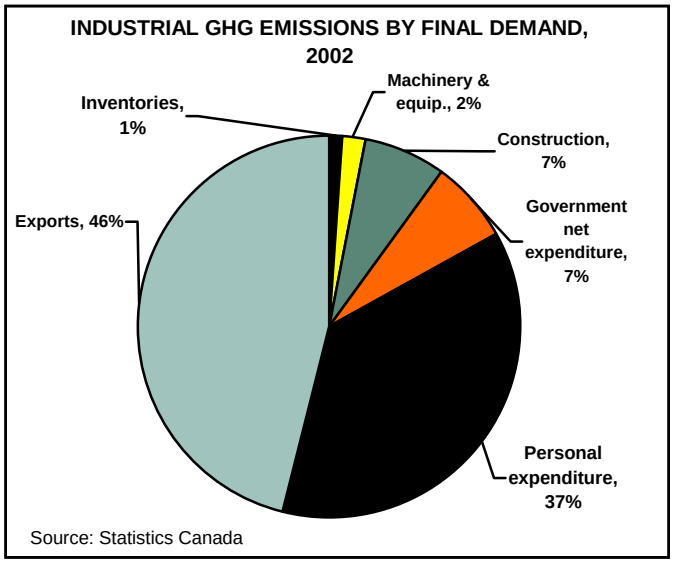
In fairness, Canada's abnormally high GHG emissions are not because citizens or governments care less than

other countries, but rather because the growth in the economy is more skewed than most other nations to resource-based energy-intensive industries that are largely export-oriented in nature (i.e. oil and gas, mining, steelmaking, pulp/paper and petrochemicals). Plus, Canada's low population density and northern climate doesn't help matters, since it heightens energy use for transportation and heating.

At the heart of the problem is the production and consumption of energy, which was responsible for 82% of total GHG emissions in 2004. Specifically, oil, gas and coal industries saw a 49% increase in GHG emissions between 1990 and 2004. Much of the increase was due to production and processing to satisfy rapid export demand. If this continues to go unchecked, GHG emissions could worsen considerably since crude oil requires much more energy for extraction than in the past, especially as a larger share of production is taken up by the oil sands.

In addition, road transportation emissions rose by 36% from 1990 to 2004. During this period, the number of vehicle-kilometers increased for passenger transportation and there was also a shift from automobiles to minivans, sport utility vehicles and small pickup trucks. These heavier vehicles emit on average 40% more GHG per kilometer than automobiles. So, while GHG emissions from cars fell about 8%, those from light duty trucks rose 101%.[4] Meanwhile, freight transportation also saw a doubling in the number of heavy-duty diesel vehicles from 1990 to 2004, such that GHG emissions from this class jumped 83%. While reducing the number of kilometres driven can help limit the emissions from the transportation sector, there are also





significant gains from switching to more fuel-efficient and emission-efficient vehicles.

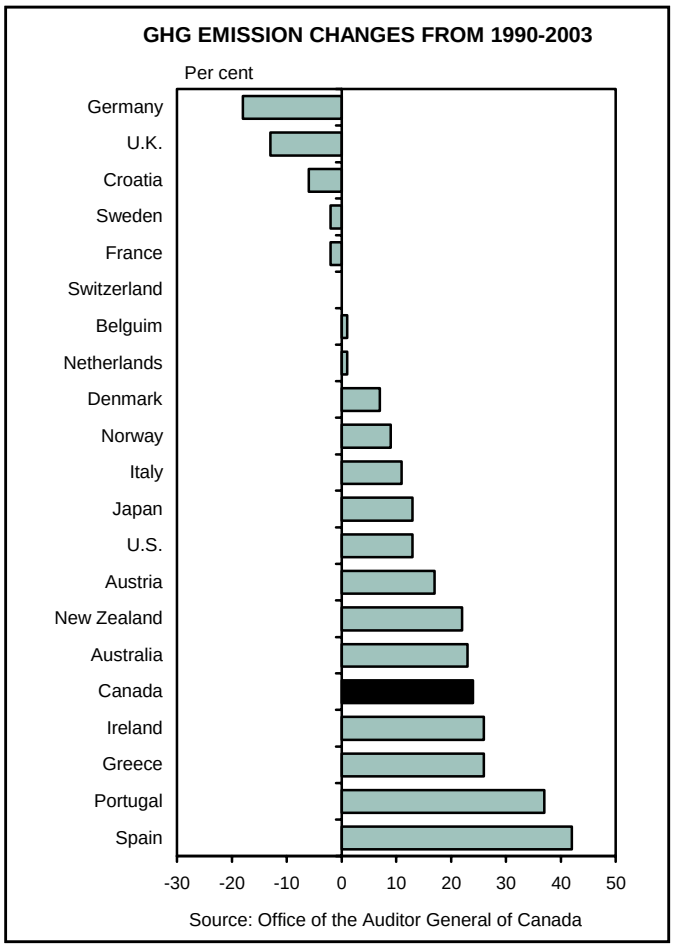
There is no way to escape the fact that the bulk of GHG emissions come from energy production and consumption. So, any cost-effective and efficient environmental policy will have to directly address these areas through some policy mix of:

- Regulations and standards
- Voluntary and negotiated agreements
- Information, education and public awareness
- Pollution charges
- Research and development
- Market instruments, such as emissions trading

Reducing pollution: easier said than done

Yellow smog suspended in the horizon, exhaust fumes emitted from traffic, smoke wafting out of production plants are all examples of what economists refer to as 'negative externalities'. Negative externalities occur when individuals or organizations take an action that benefits them while forcing unwanted costs onto other people. In Ontario, the all-too familiar 'smog alerts' have nearly quadrupled from 1995 to 2005.

So who should be accountable? Are you going to sacrifice the flexibility and ease of driving a car, even though everyone else in your neighbourhood continues along their merry way? What incentive does a firm have to incur additional costs to alter operations towards cleaner gen-



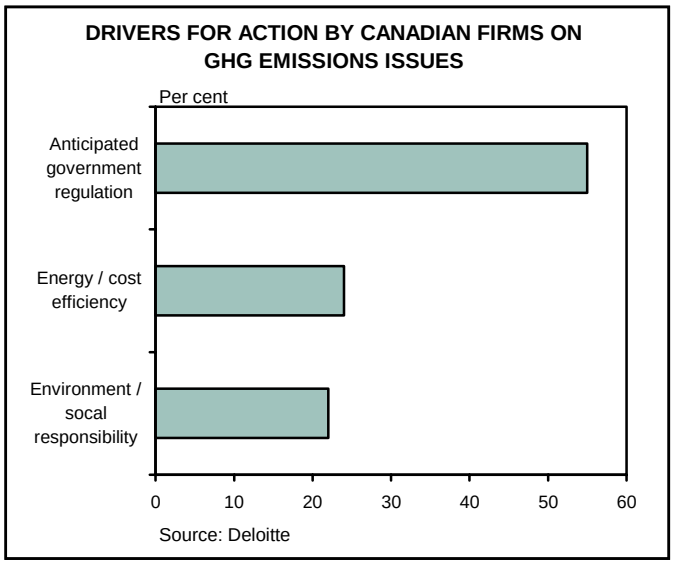
eration when other firms are not doing the same? Herein lies the crux of the problem, known formally as market failure. It's too cheap to pollute and too expensive not too. A resource like clean air is considered a "free" good, where the imputed price by the individual and firm is often deemed to be zero. Property rights are not well-defined, or when they do exist, market prices underestimate the social costs. As a result, overuse occurs because each person does not take into account the consequence of his or her actions on other people.

The existence of externalities and market failures has long been one of the key rationales for government intervention in the economy. The ultimate goal is to change the price-cost structure to appropriately reflect the social costs. This means that polluters should bear a higher cost for their actions, and conversely, those making an effort to pollute less should incur a lower cost (or greater benefit). So how can we go about doing this? The most economically efficient path is to employ market-based tactics (such as taxes, subsidies, tradable permits), which often can't be effectively implemented to the exclusion of some of the more traditional methods of regulation and moral suasion. For instance, absent any type of regulation, most consumers would demand larger, more powerful vehicles, ignoring fuel economy and emissions of GHG pollutants – vehicles that get more than 35mpg make up less than 1% of new car sales.[5] Why? Price signals encourage that choice. Internal combustion engines are still the cheapest system and likely to remain so for at least another decade. If consumers prefer a system that emits significantly less GHG, like hybrid cars, they will have to pay $5000-$6000 more for that choice. This is a case where the combination of emission regulations, taxes on gas guzzling vehicles and/or consumer subsidies to encourage purchases of low emission vehicles can work together to send the right price signal and achieve environmental targets on CO_2 emissions.

Environmental standards: a command and control approach

If the objective of an environmental strategy is to simply reduce the amount of pollution, the most straight forward way is to impose regulations mandating a specific environmental outcome, such as a maximum level of permissible emissions or adoption of specific technological standards. If the outcome is not met, the government could then prohibit consumption or production of the activity or impose significant financial or other penalties. While at first blush, traditional command-and-control policies appear to be extremely autocratic, they are effective in targeting clearly defined sources of pollution that pose significant public health risks. For example, the U.S. Clean Air Act reduced airborne concentrations of lead by 93% between 1980 and 2000. Command and control polices can also represent an effective policy choice in situations where there are multiple stages of an increasingly complex production chain. For example, in an effort to control automobile emissions, it is likely easier imposing requirements on the characteristics of fuel instead of on the downstream production of automobile engines or on the end use by consumers.

Although command-and-control policies can be effective in bringing about the desired environmental outcome, from an economic perspective, they are inefficient and can be overly burdensome to participants. For example, in an industry that faces differing costs to lowering their emissions, a blanket emission reduction policy will cause some firms to face exorbitant compliance costs. Measured over the industry as a whole, the cost of such a program may



end up higher than the value that society places on reducing the environmental damage in the first place. There is also little incentive for firms or households to innovate and invest in new technologies that will help them reduce emissions below the regulatory threshold since the financial benefit in doing so is zero. And, there is a strong disincentive for exceeding the standard because it may invite the regulator to impose more stringent standards in the future. Lastly, command-and-control policies are often accompanied by some degree of political backlash by industry groups, which could undermine the environmental effectiveness of the program.

While in isolation, command-and-control policies have little resemblance to market-based solutions, they can be augmented by market elements. For example, if punishment to a firm for exceeding an emission target is determined by the size of the miss, then the legislation takes on a market feel because the incremental cost of exceeding the target will be factored into a firm's bottom line. Perhaps it is cheaper to slightly exceed an emission target year-after-year rather than implement costly new technology and training. Regulation also takes on a market feel if firms with differing cost structures have leeway to choose the method by which they comply in reducing emissions. The natural market-based extension of this type of legislation is a tradable permit framework where firms can use their differing costs to establish a price for a unit of pollution. However, this market system can only be effective if regulations are first in place to cap emissions, otherwise free reign on emissions would render the price of pollution equal to zero. In this way, legislated outcomes can complement market-based solutions.

Moral suasion: in search of the warm and fuzzy feeling

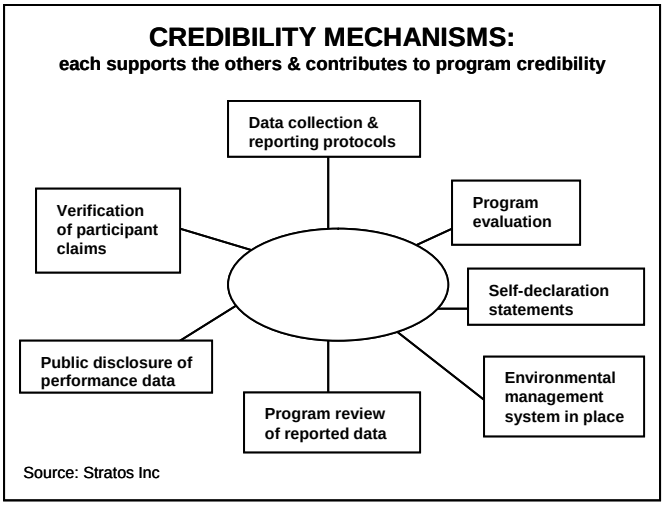
Over the past decade, governments have shied away from regulation in favour of more politically-friendly environmental policies like moral suasion. Under these policies, the government objective is to train, educate, and increase awareness of the public's contribution to environmental problems. Governments essentially act as a social conscious to deter undesirable behaviour, without changing the price-cost structure to the polluters.

"Don't Litter" campaigns are an example of moral suasion programs that appeal to an individual's sense of civic duty, rather than trying to gain compliance through threats. Throwing an empty chip bag onto a road while driving may seem innocent enough, but if every driver did it we would end up with unsightly accumulation of litter that could even pose a driving hazard.

What's more, broader society incurs an out-of-pocket expense for clean-up. So, negative externalities are borne in both a direct and indirect manner. "Don't Litter" campaigns are an attempt to educate and alter perceptions of costs, so a person thinks beyond "what's in my best interest" to incorporate "what's in everyone's best interest".

Individuals and firms tend to prefer this method largely because participation is voluntary, which provides flexibility in choosing when and how to implement environmental improvements. From the government's perspective, moral suasion tactics are relatively inexpensive, quick to implement and tend to be met with little political backlash.

However, due to the many shortcomings of this soft policy approach, it is more useful as an information build-



ing block to complement a national environmental policy framework, rather than a stand-alone policy tool. Moral suasion has an inherent "free rider" problem. The burden of the policy tends to fall on those who are morally sensitive and/or those who have lower marginal abatement costs. It allows individuals who do not respond to still enjoy the benefits of the actions of others without assuming any of the costs. In general, firms or individuals with higher marginal abatement costs will have the strongest economic incentive to try to free-ride on the performance of others.

Take the One Ton Challenge (OTC) in Canada as an example. The OTC sought to educate households into reducing CO_2 emissions by one ton per year, but the program was not embraced by the broader Canadian population. Environment Canada noted:

> To achieve GHG emission reductions, national public education and outreach (PEO) programs like the OTC need to be complemented by additional tools (e.g., economic instruments, regulations) to assist Canadians in reducing the GHG emissions that they produce … To this end, national public education messaging in the area of climate change should better account for other key motivators (e.g., energy conservation, financial, environment in general) that are driving many related undertakings.[6]

A program like this generally lacks accountability and public trust, making it increasingly likely that it will fail to hit the desired environmental targets. Be it industry or households, participants of the program must believe that other participants are subject to the same criteria for monitoring and reporting.

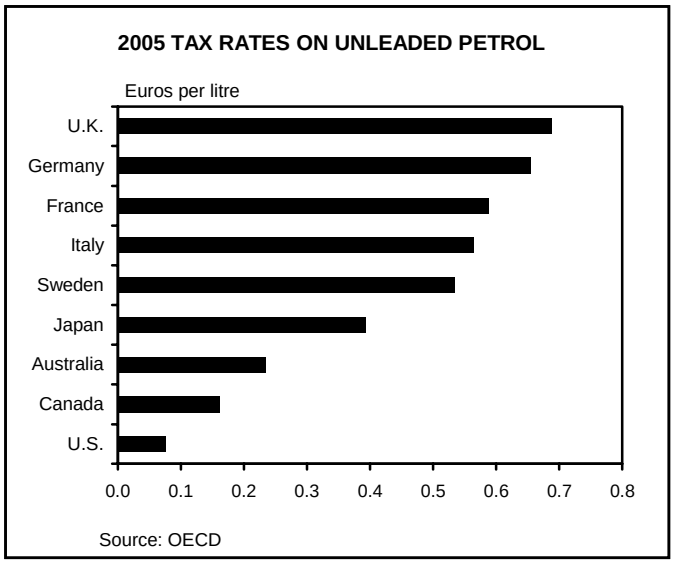
More importantly, there is no conclusive evidence that moral suasion or voluntary agreements are effective in reducing emissions to desired targeted levels. A recent OECD study found that "while environmental targets of most – but not all – voluntary approaches seem to have been met, there are only a few cases were such approaches have been found to contribute to environmental improvements *significantly different* from what would have happened anyways".[7] Since firms and industries plan investment expenditures well in advance – especially as the threat of government regulation rises – many have already put in place the needed capital infrastructure prior to (or shortly after) voluntary agreements are enacted. So the targets met under the voluntary agreement are little different than what would have occurred in a business-as-usual scenario (see box on voluntary environmental policies). And just to add insult to injury, even if a voluntary program is designed to include mechanisms to stimulate the diffusion of existing technologies, it does not provide the incentive to develop new abatement technologies – which is the same inherent problem contained in regulation.

Voluntary programs also tend to be less efficient than market driven policies such as subsidies, taxes, fees and tradable permits. So it is a tactic best used in support of other environment policies, in order to help educate polluters of the consequence of their actions. Most economists, including ourselves, argue that changing the prices that consumers and producers face is a more effective way of transmitting information and influencing behaviour. So, let's now turn our attention to some of these tools.

Voluntary environmental policies: A Canadian Case[8]

In the 1990s, the Canadian government began to increasingly experiment with voluntary programs as an alternative to regulation. One such program was launched in the mid-1990s, known as ARET (Accelerated Reduction/Elimination of Toxics). The broad objectives of the program were to virtually eliminate the release of 30 persistent, bioaccumulative and toxic substances, and to reduce the release of another 87 toxic substances to harmless levels. The program was embraced by nine major industry sectors. However, since most were large emitters of ARET substances, by now the threat of possible regulation was a good motivator to join the 'voluntary' program. Although the program looked successful on the surface – ARET was reduced by about 75% – most participants were already involved in several other voluntary initiatives at the time, making it difficult to ascertain the effectiveness of the ARET program. Even Environment Canada noted that, in some cases, more than half of the reductions had been achieved prior to the formal launch of the program.

Despite its shortcomings and uncertain impact, the program was successful in improving communication between government and industry, and in assisting industry to focus on toxic substances. And some might add that it was a good first step in Canada's first formal, pollution-related government-issued challenge program.



A taxman dressed in green

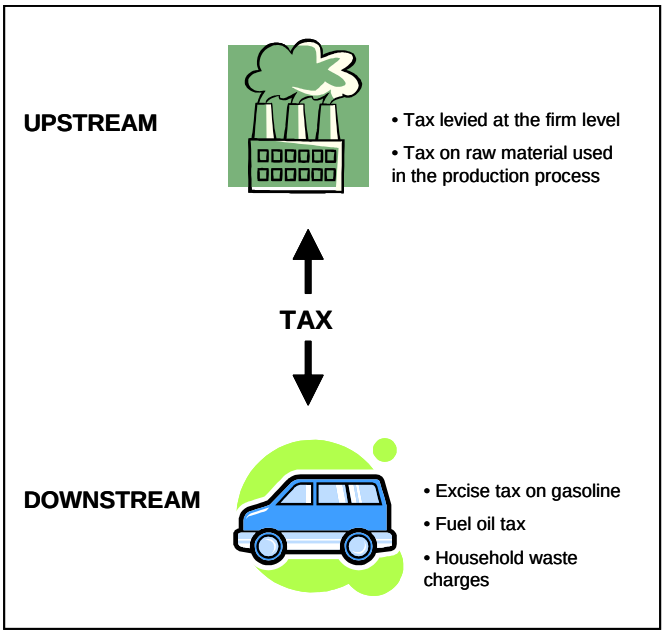
A higher price for a good or service typically induces lower consumption while a lower price will encourage greater use. The challenge surrounding environment policy is that existing prices for pollution are too low, and hence it is over-consumed since it does not reflect its 'true cost' (i.e. market failure). Environmental taxes (or user-pay principle), promote both economic efficiency and greater fairness, because they help ensure that polluters bear the cost of their actions. Thus, taxes bring prices more closely into line with social costs (conventional costs plus externalities) and limits the free-rider problem by making 'polluters pay'. In contrast to regulatory standards where the incentive is to simply meet the standard, environmental taxes provide a continuing incentive to minimize the charges.

In addition, setting the appropriate price structure to polluting allows other environmental objectives to be realized endogenously. For instance, if it's much more expensive to engage in a polluting activity, individuals and firms will reduce that activity and search for alternatives. This, in itself, will spark industry to create alternatives. As an example, hybrid automobiles are more expensive to purchase than gas guzzlers, but if the reverse was true people would automatically seek out fuel efficient cars. This could alleviate any need to impose regulations on fleet mileage. The increase in demand for low-emission vehicles would eventually encourage producers to more actively seek economical ways of delivering these cars to the market. This, in turn, would lessen the need for subsidies on hybrid purchases or the layering of other policies. The bottom line is that policies that do not impose the correct price signals automatically require other things to be addressed, which might naturally fall into place through demand and supply forces.

Environmental taxes more effective if broadly applied

In order for environmental taxes to be efficient and effective, they should be broadly based rather than a piecemeal distribution on various products. This means that a tax program would go beyond just targeting CO_2 emissions (i.e. a carbon tax) to include other sources of pollution (such as sulphur, nitrogen oxides, particulates, and volatile organic compounds). This would help ensure the effectiveness of an environmental policy, by making sure all sources of pollution reflect the appropriate 'price tag'. For instance, in most countries, oil products bear the highest taxes and coal the lowest, even though coal combustion (absent of recent developments in 'clean coal' technology) generally results in more environmental contaminants per unit of energy than the combustion of oil products.

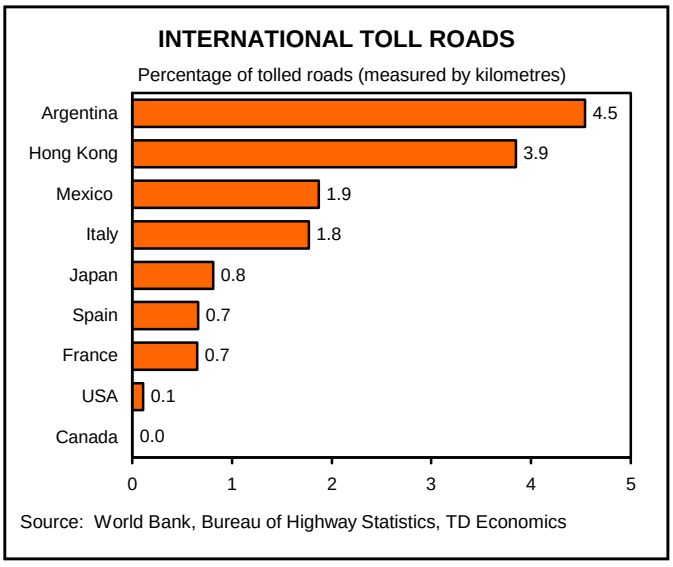
There are two ways that a government can go about implementing environmental taxes. It can be applied to firms and industries during a production process that emits pollution, such as a wellhead. This is known as an upstream tax, since it is applied at the first stage where pollution is created. Environmental taxes can also be applied to the end-user of the product, such as the person who uses the refined oil to heat their homes or fuel their cars. This is known as a downstream tax, since it is applied at the final

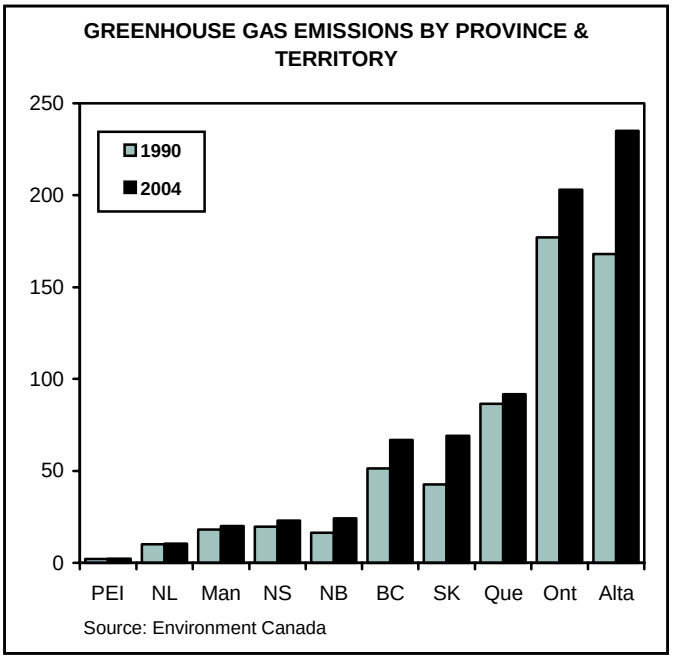


stage of consumption.

Environmental taxes can be applied either upstream or downstream. The general principle is that they should be applied when the pollution is created. For example, taxing gasoline would represent a downstream tax since the bulk of the pollution occurs in the end use by the consumer. By facing the tax directly, the consumer is able to act in their own best interest by either limiting their consumption or accepting and paying the social cost. Applying a tax on the production of a pulp and paper mill would be an example of an upstream environmental tax. By facing the tax directly, firms can take efficient steps towards minimizing the cost of the tax. Governments must be sensitive to several issues when imposing upstream taxes. For instance, a firm's ability to compete internationally may be impeded as it faces higher input costs than its competitors. This may strain the broader economy through lower export demand, shrinking domestic demand for locally produced goods (since consumers could substitute with cheaper imports) and job losses. Plus, it is not always the case that those who pollute end up bearing the true cost of the tax. Depending on the degree of competitiveness within the industry, firms may raise prices to recover the cost of the tax and depending on where on the production process the tax is administered, there may be an uneven effect on the end-user. In any case, environmental taxes are most appropriate when services are clearly defined and can be directly connected to specific users. Conversely, nonusers must be precluded from paying fees.

Unfortunately, user-pay policies often make for political hotbeds. Most Canadians balk at the idea of having to



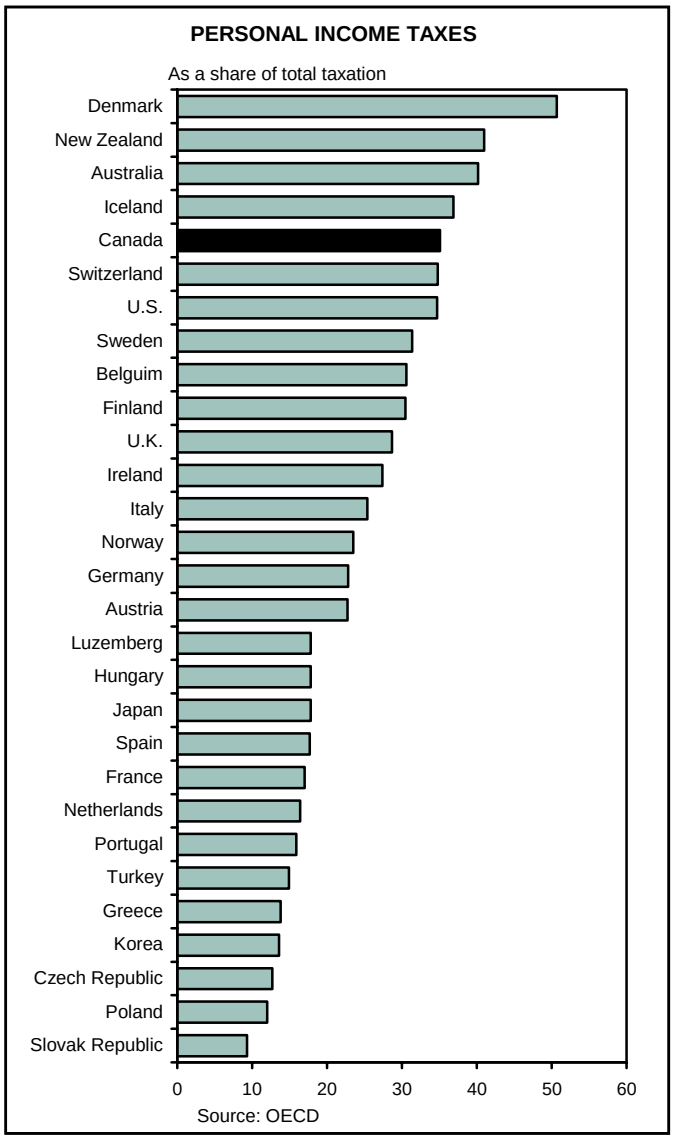


pay the true market cost for electricity, which has traditionally been heavily subsidized by governments. Conversely, even though toll roads are commonplace in Europe, it is highly contested in Canada. Part of the problem is that Canadians view user-fees as another layer of taxes, which is hard to stomach in a country that already has a high reliance on income taxes to generate government revenues. In addition, since Quebec, Alberta and Ontario are the highest producers of GHG, the cost of user fees would be heavily shouldered by these provinces – though this will depend on where the tax is placed along the production-consumption process. An end-user energy tax would be largely borne by Ontario and Quebec due to population concentrations.

Environmental taxes should not be a revenue grab by the government. The revenue should be used to lower other taxes in the economy or to finance subsidies that help the environment (this is discussed in detail later in the report). This is known as 'tax shifting' and can provide additional positive impacts on the economy when environmental tax revenues help reduce existing taxes that currently create economic distortions including disincentives to working or investing. And, once again, transparency is key. Governments should ensure any tax shift policy is transparent and direct in order to gain public support.

Reward the good and tax the bad

One candidate for tax shifting policy is personal income



taxes. While income taxes are necessary to provide desired government services, high marginal effective tax rates reduce the incentive to work and invest in human capital by encouraging people to cut back their hours and their investment in themselves, be it training, education or taking higher paying jobs. It is estimated that a 10% increase in after-tax wage rates encourages a 1-2% increase in hours worked by men and a 5% increase by married women.[9] In Canada, the marginal effective tax rate for lower income individuals is particularly egregious. A C.D. Howe study found that the combined effects of personal income taxes, payroll taxes (EI and CPP) and claw backs of government programs in Ontario and Alberta, resulted in marginal tax rates that approach 80% for incomes around $37,000 in both provinces.[10]

Tax shifting policies need not only target personal income taxes, it can be applied to any area that promotes employment, innovation and investment by reducing existing distortions and barriers. As well, tax shifting can be used to lower taxes in low polluting activities or to finance environmental subsidies. And, in the case where low income households bear a greater share of the tax burden – because they spend a greater share of their incomes on gasoline and home-heating costs – the government can address this inequity by providing credits to offset the cost of higher taxes.

Not a silver bullet

Like any of the policies discussed in this paper, environmental user fees are not a silver bullet and come with some administrative baggage. The greatest obstacle is that governments will not know with precision how firms or consumers will react. This makes it very difficult to choose the optimal level for a tax. Theoretically speaking, a tax should equal the difference between the cost the individual faces for the product and the cost that using the product imposes on the environment. But it is this social cost that is exceedingly difficult to quantify. As a result, environmental taxes are shaped by not only considering the likely environmental outcome, but by also taking into account potential revenue and other political factors. The challenge for governments is to find the fine balance between making the tax rate high enough to adequately address the underlying environmental concern, but not so high as to unduly compromise economic efficiency.

Another difficulty is jurisdictional in nature. If the tax is not applied equally across regions it can distort competitiveness. For instance, in Norway, industries such as air transport and domestic fishing and shipping are exempt from a national carbon tax. This creates a distortion in sectoral output and less of a reduction in total emissions. Canada would have the challenge of co-ordinating policy with provinces in order to ensure equality across the nation.

None of these challenges are insurmountable, but rising above them would require a considerable degree of political fervour. And, like any policy, environmental taxes can be used in a wider, more comprehensive strategy to complement other market-based policies, regulation or moral suasion.

Subsidies are the nudge in the night

Subsidies work in exactly the opposite way as taxes. If

the cost to a firm of reducing emissions is too financially onerous, the government can provide a subsidy to lessen the financial burden of improving air quality. Or for the consumer, if an environmentally-friendly hybrid automobile is too expensive compared to other less environmentally-friendly alternatives, the government can help defray the cost to the individual (see accompanying box on hybrid cars).

However, like taxes, choosing the optimal amount for a subsidy is extremely difficult. Subsidies only work if they change behaviour, otherwise they will result in a free-rider problem. The free-rider problem arises when firms or consumers receive a subsidy for actions that they were already planning to undertake. For example, technological innovation has increased the energy efficiency for many production processes. If a firm were to replace obsolete equipment it may be incorrectly interpreted as an effort to lower emissions and therefore be eligible for a subsidy. Instead of modifying behaviour, the subsidy is simply an extra boost in wealth to those who receive it. Some studies have estimated that the free-ridership rate for subsidy programs can be as high as 60%.

As a practical example, take the Federal transit tax break announced in the spring of 2006. Monthly pass holders could reduce their costs by 16% or, on average, $153 dollars per user. However, public transit is significantly more affordable than owning and operating an automobile with or without the subsidy. The question then becomes, how likely is it that an extra $153 a year will induce vehicle users to switch to public transit? In practice, the vast majority of the tax credit is accruing to existing transit pass holders (who are free-riders) and is not drawing in significantly more non-transit riders. The total cost of the program has been estimated to be $400 million, which the CD Howe Institute notes is an extremely expensive $2,000 per tonne of CO_2 reductions. Conversely, if the subsidy is too large, the cost to the government will end up being excessive, limiting funding for other programs, and transferring an excessive amount of wealth to the recipients.

Even when a subsidy achieves the desired GHG emission reduction, it may require other complementing programs in order for it to truly succeed. Sticking with the transit example, if it did increase new riders substantially, could the infrastructure handle it, or would it just lead to a congested and strained transit system in cities that were already operating near capacity? In this particular case, the subsidy would need to be complemented with infrastructure enhancement.

The tax-payer ultimately bears the cost of the subsidy. It must either come from an equivalent increase in taxes, or from a drawdown in existing government coffers (i.e. surpluses), which in turn amounts to forgone future tax or debt reductions. So, subsidies act as tax shifting, and in too many cases the person paying for the subsidy may not even be the polluter of the targeted activity, such that the polluter-pays principle is violated. In addition, one can im-

Hybrid Cars don't send the right price signal

In 2004, the transportation sector accounted for 25% of all GHG emissions in Canada. Hybrid technology, which has been available in Canada since 2000, represents one option to curtail personal vehicle emissions. However, since the technology is still relatively new, hybrid cars are priced at a premium of anywhere between $5000 and $6000 relative to non-hybrid equivalents. While fuel and maintenance cost are indeed lower for hybrid automobiles, a recent study conducted in the U.S. noted that owners would recover their cost over five years or 70,000 miles (just less than 113,000 kilometres) – which is a fairly long period of time to own an automobile. Furthermore, since the current hybrid models are relatively new, it is not known if there are any technology or performance issues that may crop up in the later years of ownership. Plus, there is the outstanding issue of how to dispose of the lead batteries.

In order to encourage greater hybrid sales, several provincial governments provide modest subsidies for purchases, but the subsidies are too low to significantly alter consumer behaviour. In British Columbia, hybrid vehicles are eligible for an exemption of a maximum of $2,000 from the provincial sales tax. In Ontario, purchases of hybrid vehicles are eligible for a partial refund of the provincial retail sales tax up to a maximum of $1,000. In PEI, up to $3,000 of the paid provincial sales will be refunded. In comparison to the United States, there are currently no Federal tax breaks or subsidies for the purchase of hybrid vehicles. So in the end, it still costs more to purchase a hybrid than an equivalent combustion engine vehicle, placing the burden of emission reductions on those with a stronger environmental conscience.

Source: Los Angles Times, The Hybrid Experience Report, Kanetix

agine a situation where the cost burden of the subsidy is even downshifted to low income individuals, resulting in both vertical and horizontal inequities. This applies as well to policies such as accelerated capital cost allowances (CCA) since they represent lost taxation revenue that could be directed elsewhere in the economy.

What's worse is that taxpayers could end up shouldering the cost of a subsidy that results in unforeseen negative externalities that ultimately undermine the environmental objective. In the Netherlands, generous subsidies encouraged energy companies to design generators that run on biofuel, which consisted mainly of palm oil from Southeast Asia. However, when scientists studied the plantation processes in Indonesia and Malaysia they found that rising European demand for palm oil had resulted in clearing huge tracts of Southeast Asian rainforest and the overuse of chemical fertilizer. In addition, space for planting was often created by draining and burning peatland, which sent huge amounts of carbon emissions into the atmosphere.[11] In North America, ethanol seems to be the biofuel of choice for subsidies, but in order to not violate the 'energy-out minus energy-in' principle, governments should take care to look at the whole lifecycle of a process to ensure that alternative fuels are produced in a responsible manner.

Subsides and new technology go hand-in-hand

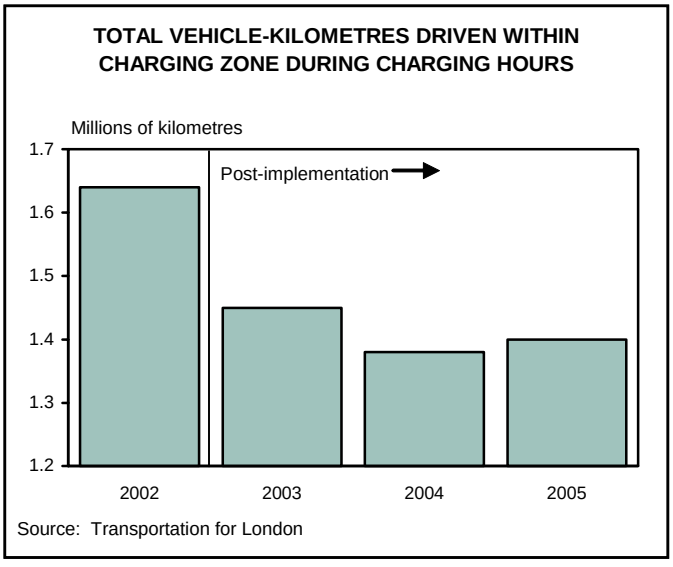
If a government decides to pursue subsidies, the ideal candidate is new environmental technology, either for firms or consumers. In the market environment, price signals for current technology do not incorporate the cost to the environment. There is therefore no incentive to embrace new and costly technology that will only be beneficial to the environment. This represents the natural role for governments to provide a subsidy – essentially making up the difference between the marginal private cost and social benefit. This subsidy could be applied to making existing technologies more affordable or funding either alone or in partnership with industry new technologies. New technology also tends to be more expensive than older tried and tested alternatives and firms take on risk when embracing new machinery. As such, the size of the subsidy must also cover the uncertainty that surrounds the technology in question which adds to the overall cost of the program with little environmental gain.

An example of such a subsidy program is clean coal technology (CCT). While there is a spectrum of different technological options available, they can broadly be classified into two groups: combustion and gasification. The combustion route is based on improving the efficiency of the production process (using less coal for a given amount of energy output) as well as limiting the emissions of cer-

Following the polluter-pay principle

Rather than give subsidies to those who already don't pollute on the roads, why not charge those who do through tolls on highly congested roads and highways. For instance, in early 2003 the city of London, England introduced a toll system for cars entering the city centre. The tolls were applied between the hours of 7 am and 6:30 pm on weekdays, with exemptions for buses, taxis, disabled drivers, and electric vehicles. For those living within the region, they face only 10% of the total toll. An independent study was carried out a year after the toll was introduced and found that total vehicle kilometres had fallen by almost 15% since the introduction of the toll. Bus patronage rose by 29,000 in 2003. Congestion was also alleviated by fewer parked cars, as the number of parking events fell by 28% in the first year when tolls were applied. The congestion zone has recently been enlarged to include more of the downtown region.

Source: Association of London Government



tain pollutants such as nitrous and sodium oxides. Gasification involves converting most of the emissions into synthetic gasses which can then be used for other industrial purposes. Whereas much of the technology in the combustion option exists today, gasification technology is still relatively new. As such, providing subsidies to combustion technology may yield an incremental benefit to further reductions or help firms adopt the existing technology, while subsidies dedicated to gasification projects will likely benefit development projects.

Tax shifting can fund subsidies

Tax shifting from other environmental taxes could limit the drain on government coffers and polluters finance the subsidy. The only caveat to this arrangement is that there may be a greater gain in using the revenue to reduce other distortionary taxes in the economy. Subsidies can also be used in conjunction with regulation to encourage both adoption of proven technology and the development of new solutions. For instance, the Government of Canada recently announced through the ecoEnergy technology initiative a $230 million program for research and development for clean-energy technology including CCT. Another $1.5 billion has also been earmarked for renewable energy sources within the electricity industry as well as renewable heat for businesses. While more information will be released this April, the program will also be accompanied by direct regulation of emissions to help reach emission standards.

Canada also has accelerated CCA rates in place for environmental technologies, but as it currently stands, these rates only apply to equipment acquired prior to 2011. Consideration could be given to extending this deadline in order to fuel further development and adoption of environmentally-friendly technology.

A cap-and-trade system

Of all the market-based environmental tools, cap-and-trade policies are probably gaining the most international buzz as a successful 'polluter-pay' system. The basic idea is that a target for an economy-wide reduction in emissions is established, which is then allocated across a set of firms within specific industries using emission credits. These credits represent the amount of emissions that each firm is allowed to produce over a given time frame. If a firm ends up exceeding their allowance, they must either purchase credits from other producers who have surplus credits or face a hefty penalty. The interaction of buyers and sellers of credits creates a financial market in which a unit of pollution has a specific price. Firms observe this price and decide if it is cheaper to find ways to reduce their emissions (through investing in technology, restructuring their production, or shutting down inefficient facilities) or pay for the right to exceed their initial emission allocation. A financial market for pollution, however, cannot exist without first imposing regulation on emission caps. Caps present a supply constraint for permit issuances, which, in turn, support the prices that alter consumer behaviour. So, the cap-and-trade system is a blend of a free-market principle with government regulation.

6 Requirements for an Emissions Trading System

- Restricted supply of permits
- Large number of participants
- Mandatory compliance
- Monitoring mechanisms
- Credible punishment for non-compliance
- Creation of GHG financial market

The fundamental appeal of a cap-and-trade system is that it aligns the incentives of firms with the objective of reducing GHG emissions. Firms that are successful in reducing emissions beyond their allowances not only contribute to a healthier environment, but also receive a financial gain by being able to sell their unused credits to those in need. By extension, firms that have exceeded their allowances have to face a personalized economic cost to their pollution and therefore have a financial incentive to reduce their emissions. From the perspective of the economy as a whole, GHG emissions can be reduced in an efficient and least-cost manner with those willing to bear the costs of pollution paying the market price for that decision.

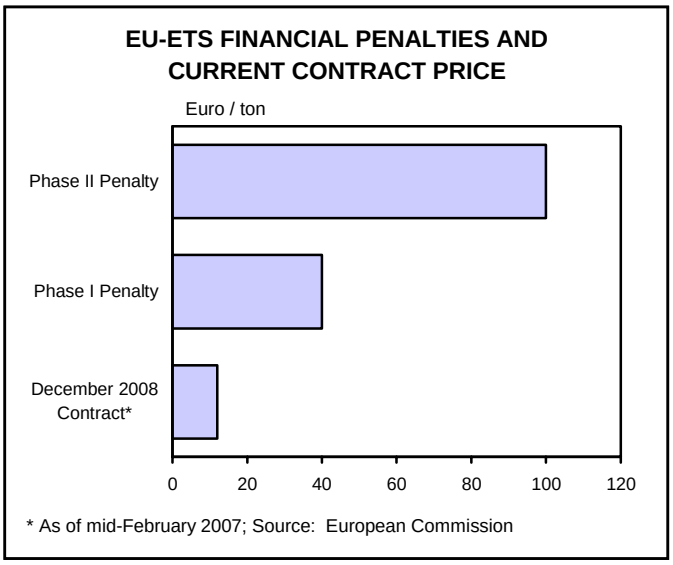
A second advantage of a cap-and-trade system is that there are no restrictions or guidance placed on the nature of the technology employed to reduce emissions. This allows firms the flexibility to customize their own solutions and timelines.

Requirements for a trading system

Setting up an effective permit trading system, however, is not without its challenges. In order for the system to

have a strong backbone, there must be:

- regulation that imposes reasonable emissions caps on industries. Without a supply constraint to emissions, permit prices would trend to zero, making the program completely ineffective.
- a large number of participants with a wide range of abatement costs and potential benefits from reducing emissions. If the member firms face similar costs and receive similar benefits to reducing their GHG emissions, they are unlikely to participate in trading and a more traditional command-and-control policy would likely be equally effective.
- mandatory compliance in order to avoid the trappings of free riders. If the system is strictly voluntary, only firms that emit a low volume of pollution would have an incentive to join the market. Mandatory compliance also helps ensure market liquidity for emission permits through an adequate number of participants.
- effective and timely monitoring mechanisms of emissions. This requires the installation of costly monitoring technology as well as the development of administrative programs for audit and repair. Fortunately, emission trading systems (ETS) have long been in practice throughout the world, such that existing and well-proven technology can be introduced in Canada with minimal development costs.



- effective punishments for exceeding the allowable level of emissions. This is needed to deter cheating behaviour that would undermine carbon pricing. Penalties can be financial or criminal in nature, though the common international practice is a financial penalty high enough to impose a significant cost on non-compliance. The revenue from these fines can be used to finance the program or can be redistributed elsewhere in the economy.
- the creation of a GHG financial market. Here, Canada is well positioned. In anticipation of the 2002 Climate Change program introduced by the previous government, the Montreal Exchange established a partnership with the Chicago Climate Exchange, which is the trading platform for the only emission trading program in the United States. This relationship in conjunction with the expertise of the Montreal Exchange will ensure the necessary financial knowledge and experience to manage the exchange.

Initial conditions of the market

Once the market superstructure is established, attention can then turn to the initial conditions of the market. There are a number of key issues that need to be estab-

Regulation to Prevent Localized Environmental Damage

Another role for regulation to play in a market-based emission trading system is to prevent localized environmental damage (so-called hotspots). In an unregulated market, there would be no mechanism to prevent a geographic cluster of firms purchasing a large number of permits and emitting an inordinate amount of pollution. As such, governments have imposed regulatory constraints including geographic trading zones to prevent permits to flow from low to high pollution areas. For example, the Regional Clean Air Incentives Market (RECLAIM) program in the United States created two separate trading zones. The success of these regulations, however, has been called into question. A study released in 2003 noted that although hotspots could be a result of an emission trading system, there has been no evidence to suggest that this has been the case. Furthermore, regulation has been found to introduce uncertainty and inflexibility into the market place, detracting from the overall benefit of the program.

Source: Temporal Hotspots in Emission Trading Programs: Evidence from the Ozone Transport Commission's NOx Budget, Alexander E. Farrell, May 2003

lished which require more than sensible economics. For example, determining the target reduction in GHG is very important. This requires getting the science right. Some factors that complicate the baseline estimate are the state of the economy, technological innovation, and weather patterns. Emissions are influenced by economic activity as firms produce more when demand for their products intensifies. Accordingly, the sample period needs to be chosen with care to include a complete business cycle.

In addition to this, if the emission target is established during a period prior to any major innovation, the result may be a target that is too easily reached – with the effect of too many permits being issued which in turn will drive down their value and be less of an incentive to reduce emissions.

Furthermore, industries that are in their infancy must be given special consideration. For example, emerging technologies in the tar sands may have an uncertain level of emissions. If not properly estimated, the subsequent targets may be misaligned, distorting the incentives and reducing the effectiveness of the overall program.

The international experience with ETS

So now that we know what an ETS program is and how it can be efficiently implemented, how does it perform in practice? There are a number of ETS programs in existence, but perhaps the one that has met the greatest success is the U.S. Acid Rain reduction program. As of 2005, sulphur dioxide (SO_2) emissions in the United States have been reduced by 11.3 million tons (44%) when compared with 1980 levels (the base line). Meanwhile, nitrogen oxide (NO_X) emissions have been reduced by 31% from 1980 levels.

Part of the success of the program is attributed to the fact that permit prices had a high degree of integrity due to the requirement that utilities install continuous emissions monitoring devices to accurately measure actual emissions.[12] In addition, the program was effective in integrating federal and state levels of government, and in providing common rules concerning affected sectors, compliance provisions and allocation rules.

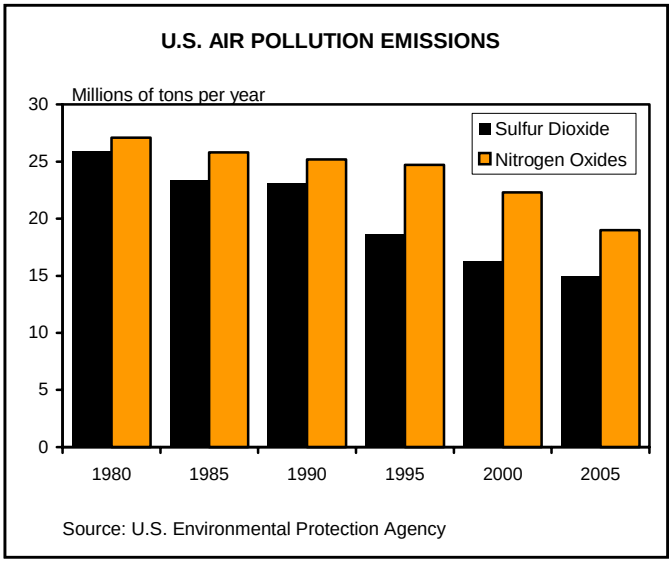
The highly successful U.S. ETS program has been around so long that it fails to garner much media attention anymore. Instead, public scrutiny has turned to the challenges encountered by the newly launched European Union ETS – the largest international system (EU-ETS). Under a Burden Sharing program to meet targets in the Kyoto Protocol, this 25-country cap system requires reductions of greenhouse gas emissions below their 1990 baseline period. The program was launched in 2005, with the first phase (2005-2007) focusing only on carbon dioxide (CO_2) emissions.

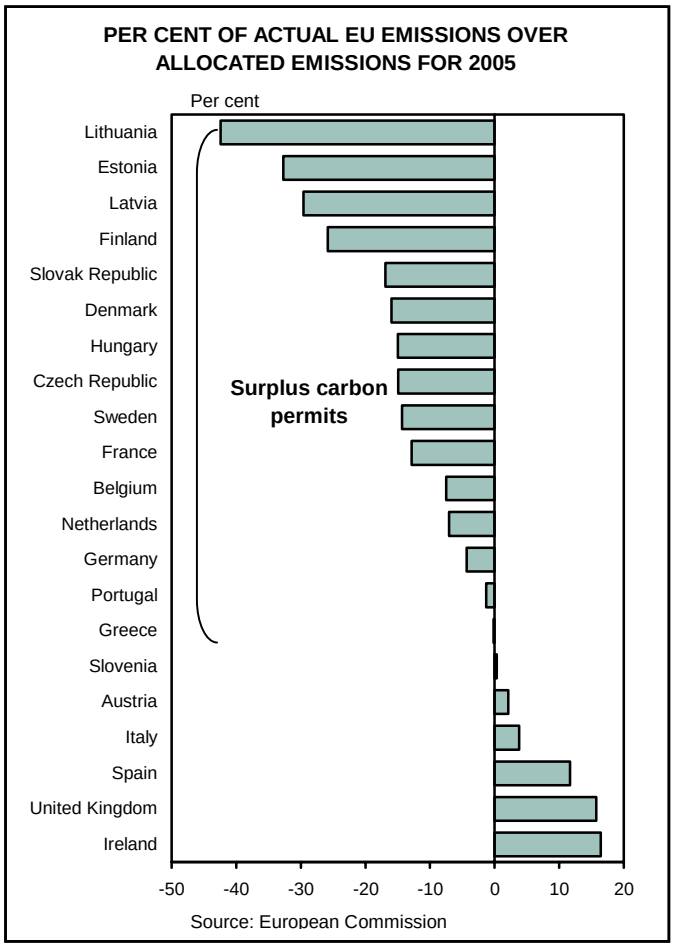
After its first year in full operation, critics had a field day when the European Commission released firm-level

The U.S. experience with a cap-and-trade system

The Acid Rain cap-and-trade system was established in the 1990s with the intention of reducing sulphur dioxide (SO_2) and nitrogen oxide (NO_X) emissions by 10 million tons and 2 million tons, respectively, from 1980 levels. The first phase of SO_2 emissions reductions was started in 1995, with a second phase of reduction initiated in the year 2000. Although the program had low levels of trading in its early years, a robust market of bilateral SO_2 permit trading emerged, resulting in cost savings on the order of $1 billion annually, compared with the costs under some command-and-control regulatory alternatives.

Source: Experience with Market-Based Environmental Policy Instruments, Robert N. Stavins, July 2002

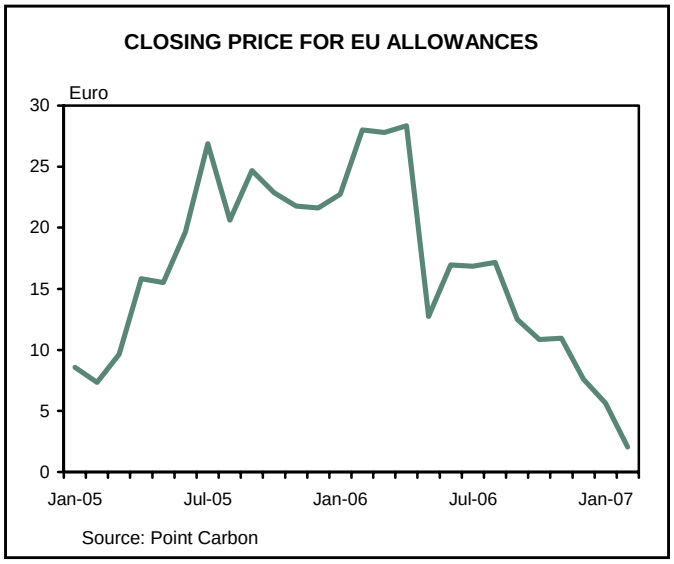




data showing CO_2 emissions were about 80 million tons (or 4%) *lower* than the number of allowances distributed for 2005 emissions. This long position in the market was interpreted as evidence of over-allocation, raising speculation as to whether the EU-ETS was effective at reducing CO_2 beyond business-as-usual. At the time of reporting, only four of the member states needed to buy permits, meaning that the vast majority had 'surplus' positions. Market reaction caused carbon permit prices to plummet 70%. In mid-February of this year, the December 2008 contract for carbon was priced at just over 12 euros/ton (or just under $16 U.S. dollars). However, some estimates show that carbon pricing is only truly effective at mitigating emissions if prices are in the range of $25-35/ton, otherwise most firms will decide at the margin that it's still cheap to pollute.

All this doesn't mean the ETS is flawed in concept. The EU-ETS appears to have the right overarching framework for creating a trading market, but it stumbled badly by providing an overly generous allocation of permits that undermined carbon prices. This harks back to the necessity of getting the science right. Since 2005-2007 is considered the warm-up phase for the EU, it is a critical learning period to make adjustments for future allocation commitments. Member countries are now in the process of submitting national allocation plans (NAPs) for the second phase (2008-2012), and the European Commission (EC) appears to be taking a more hard-lined approach in tightening up emission allocations. As of early February, decisions on 13 allocation plans saw only two – U.K. and Slovenia – get approval without a change in the amount of allowances compared to the original submission. Member states were asked to cut their proposed NAPs by an average of about 8.8 per cent. Going out even further, the environment ministers of the EU member states agreed to reduce greenhouse gas emissions by 20% below 1990 levels by 2020, and that 30% should be the reduction target sought in international negotiations. This should create a much tighter and credible futures permit market that would push carbon prices back to the $25-35/ton range that is likely needed. Once the program gets beyond its growing pains, theory and history dictate that it will likely succeed in reducing GHG emissions to targeted levels.

In fact, this appears to be what the international community is betting. Recently the United Nations announced a cooperative effort with China to set up a carbon trading exchange in Beijing. If successful, the exchange would be the first in the developing world and would compete with private sector carbon exchanges established in Europe and the U.S. In turn, it would further open up the lucrative Chinese market in carbon credits.



International Experience with Auctions

Despite the economic appeal of auctioning the initial emission allocation, the backlash from industry has proven too strong and the vast majority of credits have been provided to industry for free. In Phase I of the EU ETS period, governments were allowed to auction up to 5% of the allowances. However, just four of the 25 countries held auctions and within those countries, only Denmark reached the full 5%. By comparison, Hungary auctioned 2.4%, Lithuania 1.5% and Ireland 0.75%. While Denmark used the revenue to purchase JI/CDS credits, the remaining countries used the revenue to offset the administrative costs of the program. Given this track record, it doesn't appear likely that auctions will gain much traction in Phase II (for the 2008-2012 period) where member governments will be allowed to auction 10% of the emission credits.

Who gets what

Every country that embarks on an ETS program has to make hard (and often politically unpopular) decisions on the distribution of allocations across industries. Basically the decision boils down to whether governments should sell emission allowances (via auctions) or give them out for free. Although pure economic theory dictates that the only efficient way to distribute the permits is through an auction, this tends to meet considerable industry resistance such that there are few cases where auctions are the dominant distribution channel on the international stage. In fact, many suspect a contributing factor to over-allocation in the EU was due to its concession to grandfather 95% of the permits in Phase I (the warm-up phase). Grandfathering in this case means handing permits out for free based on the historical emissions over the 1998-2003 period.

When firms purchase permits through an auction system, the costs are directly factored into their decisions, thereby internalizing the environmental externality. The revenue generated from the auction is returned to public coffers which can then be used to offset some of the costs of the program (administrative or other) or reduce distortionary taxes elsewhere in the economy. In a grandfathered system, these rents go to those who receive the permits, which could cause a redistribution of wealth across participants. For example, if the permits were handed out incorrectly or if the process was affected by lobbying from certain industries, the final distribution would be equivalent to a subsidy (or profit windfall) to some of the players (if they receive more than would be allocated under the market) and a tax to others. Also, there is the potential for more environmental damage in the short-run if firms know that their permit allocation at some point in the future will be a function of their current emission. In other words, they would pollute more now to receive greater benefit in the future. Likewise, what consideration would be given to those Canadian companies that acted some time ago to cut emissions in good faith that some sort of environment program would be put in place. Should they get credit for this early (pre-program) progress or does the clock start ticking now? Grandfathering permits adds another layer of complexity to policy, since it requires governments to provide guidelines on how to deal with new entrants into the market.[13]

Concluding thoughts on ETS

There is already a global push towards trading systems in carbon pricing, and the sooner Canadian firms become accustomed to the cap-and-trade program the better off they will be. Plus, if technology-adoption is made early, there is a better chance that Canada will be a provider of surplus credits on the global stage.

That said, the international carbon market is still in its infancy with what is almost too large a range of abatement costs. This can lead to a situation where a technologically advanced country like Canada (where abatement costs are

The HFC Loophole

Trifluoromethane gas (HFC-23) is a particularly noxious GHG with a global warming potential of 11,700 times that of carbon dioxide. As such, reducing a small quantity of HFC-23 yields a large quantity of carbon credits on the international market. Chemical plants in China have dramatically reduced the quantity of HFC-23 by installing relatively inexpensive scrubbing technology (estimates place the installation cost around $10 million to $30 million for a typical factory) and amassed a considerable sum of money in the process. While fully legal, this is typical of the kind of growing pains the international carbon market has faced. Going forward, as new and inexpensive technology is installed, there will less opportunity for developing economies to extract excessive returns.

Source: The Financial Times, World Watch Institute

Key to an effective ETS program - Keep it Simple

- *Consistency*: firms must have confidence that the rules of the game will remain constant. Any subsequent tinkering will increase uncertainty in the market, lead to speculative behaviour, and distort the underlying incentives of the market participants.
- *Simplicity & Flexibility*: building the market with minimal extra regulation and fine-tuned user-specific policy. Government should focus on setting goals and assuring results, not on approving individual compliance actions. The market must be free to develop their own technological and financial solutions to the problem
- *Monitoring & enforcement*: ensures accurate and timely information to market participants and sends a strong signal that compliance is the preferred.

relatively high) may be forced to purchase carbon credits from a country like China where reducing their abatement costs is considerably less expensive (see accompanying box for a recent example). This leads to a direct transfer of wealth from the Canadian economy to developing nations. Over time, the excessive earnings will be worked out of the market as the emerging economies implement new technology. Monitoring and enforcement is also a large concern in an international trading market. Developing and imposing credible punishments for both non-compliance and the likely instances of fraud will prove challenging, especially in developing economies where monitoring technology remains scarce. For the time being, these issues make it relatively more attractive to start with a domestic trading platform.

So, any venture into a Canadian-ETS program may find greater success (including more public and industry support) if it is initially based on a home grown platform. One of the complicating factors for the EU-ETS is that it is a multi-national system that incorporates 25 different nations, each trying to serve their own interest. The backbone of the system – NAP setting process – is opaque and decentralised, limiting the EC's ability to oversee what the Member States are doing, and in evaluating the effects on competition between comparable companies in different Member States'.[14] Although the process of setting Phase II NAPs has been more transparent and could lead to definite emissions reductions in that phase, Canada may be better served to work out the domestic dealings between federal and provincial governments along with industry stakeholders in the first stage. A made-in-Canada ETS, however, should not forever remain a stand-alone platform. Once operations are running smoothly, Canada would then be well-positioned to link up to the EU-ETS. Alternatively, Canada could form a North American ETS alliance in order to strengthen trade relationships. For instance, California's decision to look at the entire life cycle of a production process could prevent oil from Alberta's oil sands from being exported to California. More importantly, if other states follow California's example, the ultimate cost to Canada could be a loss in export production and revenues.

On a final note, since an ETS program causes firms to internalize pollution costs, much or all of this could eventually be passed on to the end-user (i.e. consumer). However, there are two key points to keep in mind. Studies indicate that the costs to industries in complying with caps are cheaper with trading, than without trading. And, costs are only meaningful if benchmarked against the benefits. For instance, the U.S. Environmental Protection Agency estimates that its Acid Rain program will result in $120 billion annually in domestic benefits in 2010, including $6 billion in benefits to Canada! Part of the government's role in establishing an ETS program is to educate the public on both the costs and benefits associated with any program, whether it be financial or welfare in nature.

Conclusion

Although sensible environment policy regimes will require elements of almost everything we've discussed, those that change the price structure of pollution to the users are most effective in changing consumer behaviour towards emissions. If it's much more expensive to engage in polluting activities, individuals and firms will reduce that activity and search for alternatives. In itself, this will spark industry to create alternatives and blunt the need for other environmental policies. This form of 'tax-tilting' to the polluter can endogenously achieve a number of environmental proposals with less financial costs to society. However, there must be long term continuity in policies in order to build market confidence in the framework. Most businesses around the world now expect some type of emissions regime and many have already geared up for it. As such, any delay or vagueness in policy announcments carries an economic price-tag in itself. So while there is an economic cost of action, there is also a cost of further delay,

especially if it results in more pronounced emission cuts down the road. And, it should be recognized that once policies are implemented, behavioural lags will exist. For instance, judging by recent experience, demand appears to have been relatively unresponsive to high gasoline prices. However, a person is not likely to replace their car before its lifespan, but they might purchase a more efficient one when the time comes.

Since there is no silver-bullet environmental policy, governments should take a holistic approach, coordinating policy approaches to capitalize on the relevant strengths of each. If they get the policy mix right, it is possible for Canada to be green and grow. However, not everyone will share equally in the winnings, since Ontario and Quebec have the largest GHG consuming population base and Alberta is the largest producer of GHG emissions. Governments can alleviate some of the economic pain through tax shifting measures and the encouragement of technological innovation and adoption.

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ENDNOTES

[1] Although precise impacts are not known, climate change is expected to cause rising sea levels, changing precipitation patterns, thinning of polar ice caps, heat waves, floods, droughts, water shortages and disruptions of forests and agriculture.

[2] Canadian Environmental Sustainability Indicators 2006, Statistics Canada

[3] Canada vs. the OECD: An Environmental Comparison , David Richard Boyd, University of Victoria, 2001

[4] Canadian Environmental Sustainability Indicators 2006, Statistics Canada

[5] Evaluating Automobile Fuel/Propulsion System Technologies, Progress in Energy and Combustion Science, Volume 29, Issue 1, 2003

[6] http://www.ec.gc.ca/ae-ve/default.asp?lang=En&n=E0530F2A-1&offset=6&toc=show

[7] OECD, Voluntary Approaches for Environmental Policy", 2003, pg 15

[8] OECD, Voluntary Approaches: Two Canadian Cases, 2003

[9] The 2006 Tax Competitiveness Report, No. 239, Jack Mintz, September 2006.

[10] The 2006 Tax Competitiveness Report, No. 239, Jack Mintz, September 2006.

[11] "Once a Dream Fuel, Palm Oil may be an Eco-nightmare", Elisabeth Rosenthal, The New York Times, January 31, 2007

[12] Implementing Greenhouse Gas Trading In Europe, Catherine Boemare and Philippe Quirion, June 2002

[13] This is often achieved through "set-asides", which are permits held by the government for a range of purposes. It can also act as an incentive delivery device for certain technologies, or as a correction system if errors are made in the original distribution. It should be noted that set-asides should come from the existing cap and not be introduced after the fact.

[14] Trading Up, Reforming the European Union's Emissions Trading Scheme, Tim Gibbs and Simon Ratallack, December 2006.