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**TALKING WITHOUT WALKING:  
CANADA'S INEFFECTIVE CLIMATE EFFORT**

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# 11 Talking without Walking: Canada's Ineffective Climate Effort

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Since the late 1980s, Canada has been an active participant in international negotiations to limit emissions of greenhouse gases (GHG) in order to reduce the risk of human-induced climate change. In these processes it has made several commitments to decrease its domestic GHG emissions. To meet these commitments, the government's dominant policy approach has been to provide information and subsidies to encourage Canadian businesses and consumers to voluntarily shift to technologies and lifestyles that reduce GHG emissions.

As chapters 1 and 2 have shown, however, during this period domestic GHG emissions have continued to rise and the country's GHG trajectory shows no signs of deflecting downward. In fact, domestic emissions have risen more rapidly in the past fifteen years than in the preceding decade of 1980 to 1990 when government had no GHG policy.

In this chapter, we attempt to explain the reasons why Canada has done a lot of talking but not walking when it comes to GHG emissions reduction. Some of the reasons relate to complex forces of growth that governments are usually unable or unwilling to control in pursuit of environmental objectives: population growth, economic growth, and growth in the exploitation of valuable natural resources such as the oil sands of Alberta. Some of the reasons relate to reliance on ineffective policies, such as information and subsidies, to induce wide-scale voluntary actions by firms and households. These ineffective policies are explained in part by a poor understanding of the full costs of technological change. They are also explained by jurisdictional and regional divisions in Canada and, as Clarkson's analysis in chapter 4 has shown, by the country's close trading ties to the United States – a

country that has refused to make a national commitment to reduce GHGs.

Finally, it is important to recognize that Canada's Kyoto target is much more challenging than almost any other Kyoto signatory, presumably the consequence of poor preparation and lack of coordination or unrealistic optimism during the international negotiation of national commitments. This does not justify Canada's continued emissions growth, but it helps explain why Canada's gap between commitment and reality is extreme, relative to other signatories of the Kyoto Protocol, including that of Germany, as examined by Weidner and Eberlein in chapter 12.

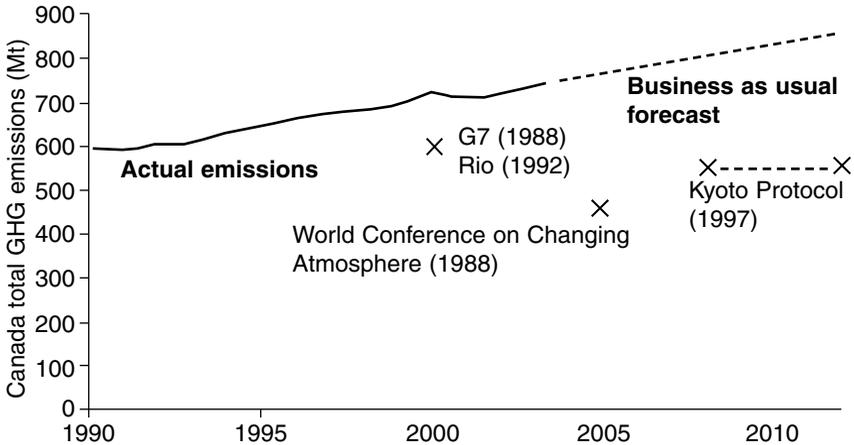
### **Government Commitments versus Actual Emissions**

In 1988, Canada hosted the World Conference on the Changing Atmosphere, the first scientific conference on climate change. During these talks, Canada developed a target of reducing its output of GHG by 20 per cent from 1988 levels by 2005. Later that year, Canada pushed to have climate change included on the agenda for G7 talks. During these discussions, Canada's prime minister made an international commitment to stabilize national GHG emissions at 1990 levels by 2000.

These commitments were echoed in national policy documents in 1990, and again committed to internationally at the 1992 Earth Summit in Rio de Janeiro, when Canada ratified the United Nations Framework Convention on Climate Change (UNFCCC), which came into effect in 1994. This latter agreement was superseded by the Kyoto Protocol to the UNFCCC, under which Canada committed to a 6 per cent reduction from 1990 GHG emissions levels during the period 2008–2012. Canada signed the Kyoto Protocol in 1997 and ratified it in 2002. In 2005, Canada hosted the first Meeting of the Parties to the Kyoto Protocol, the largest intergovernmental climate conference since the Kyoto Protocol was adopted in 1997. More recently, mounting public pressure and increasing scientific confidence has spurred the Canadian government to make new longer-term emissions-reductions commitments. As chapter 1 has shown, in 2007 the Conservative federal government promised to reduce emissions by 20 per cent by 2020 and by 65 per cent by 2050, compared to 2006 levels.

While Canada has been an engaged participant in the negotiation of international agreements to abate climate change, the evolution of its GHG emissions stands in sharp contrast to the domestic commitments

Figure 11.1 GHG emissions in Canada, 1990–2003, and international commitments to reduce GHG emissions

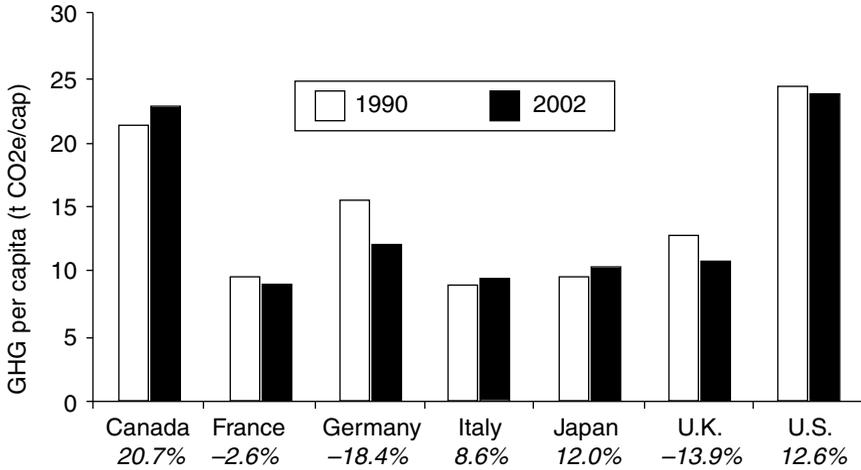


Source: Canada's Greenhouse Gas Inventory 2005 (Environment Canada 2006).

it has agreed to. Figure 11.1 compares Canada's international commitments to reduce GHG emissions with its actual emissions record from 1990 to 2003. Canada's emissions had risen to 24 per cent above 1990 levels by 2003, meaning that it has missed targets agreed to at the 1988 G7 meeting, the 1992 Earth Summit in Rio, and the 1988 World Conference on the Changing Atmosphere. In addition, Canada's domestic emissions will greatly exceed its Kyoto commitment in the 2008–2012 target period. Current estimates are that, in spite of domestic commitments and apparent policy efforts, Canada's emissions are on a path to exceed its Kyoto target to a very significant extent in 2010 (Government of Canada 2005).

Canada's record on GHG emission reduction appears to be more ineffective than that of other G7 countries, including the United States, even though the latter has refused to ratify the Kyoto Protocol. Figure 11.2 shows that Canada's high level of GHG emissions per capita in 1990 had increased by 2002, while that of the United States and most other countries declined. Japan and Italy saw some increase in per capita emissions, but their levels remain less than half that of Canada. At an aggregate level, Canada's increase of over 20 per cent

Figure 11.2 GHG intensity per capita in G7 countries, 1990 and 2002



Source: United Nations Framework Convention on Climate Change.  
 Note: Values below columns show total 1990–2002 growth in GHG emissions (not per capita).

in its total emissions during this period far exceeds that of any other G7 country.

To understand why Canada’s GHG emission abatement effort has been so ineffective in achieving, or even progressing toward, its international commitments, it can be helpful to distinguish between the different drivers of GHG emissions. The Kaya Identity (Kaya 1990) decomposes total GHG emissions into a series of explanatory factors:

$$GHG = \sum_{ij} Pop \cdot \frac{GDP}{Pop} \cdot \frac{GDP_i}{GDP} \cdot \frac{E_i}{GDP_i} \cdot \frac{E_{ij}}{E_i} \cdot \frac{GHG_{ij}}{E_{ij}}$$

*Pop* is population, *GDP* is gross domestic product, and *E* is energy, and where the subscript *i* indexes subsectors of the economy and *j* indexes fuel types. The Kaya Identity shows that total GHG emissions in a country result from the size of the population, per capita income (GDP per capita), economic structure (relative size of different sectors

of the economy), energy intensity (the amount of energy consumed per unit of GDP produced in each sector of the economy), fuel mix, and GHG per unit of fuel (a result of fuel type and/or the existence of GHG emission-capture technologies). A change in any of these factors, everything else held constant, changes the overall GHG emissions of a country.

Typically, governments consider the first three factors in Equation 1 – population, per capita income, and economic structure – to be drivers of GHG emissions that are unavailable as levers for emissions policy. No government yet has tried to slow population or economic growth, or to redirect economic activity, as part of its climate policy. These are therefore even further broader aspects of both complexity and coordination, as suggested in the framework introduced in chapter 1 and examined further in chapter 15.

Instead, government GHG control policies focus on changing the evolution of the last three factors in Equation 1 – reducing the amount of energy consumed to produce a unit of output in the economy (energy efficiency), lowering the relative share of high GHG emission fuels (fuel substitution away from high-emission fossil fuels like coal), and GHG emissions controls. In the following section we focus on the uncontrolled drivers of GHG emissions and show that at least part of Canada's fast growth in emissions is due to demographic and economic factors that are generally considered outside the scope of climate change policy.

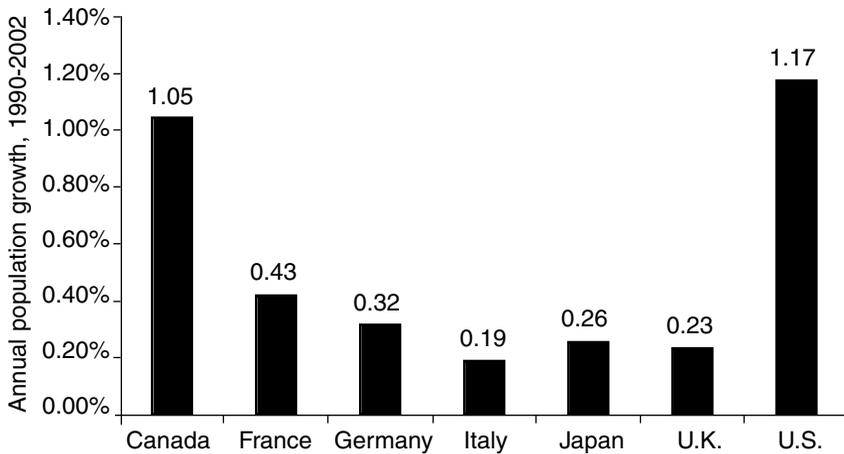
## **Uncontrolled Drivers of GHG Emissions**

### *Population Growth*

Compared to most other developed countries, Canada has a very high rate of population growth. As shown in figure 11.3, Canada's population increased by 1.05 per cent annually between 1990 and 2002. Of the G7 countries, only the United States had a faster population growth rate during this period, and population growth in the other five G7 countries was much slower.

Canada's population growth rate results from the combination of two factors: a natural increase (birth rate – death rate) of about 0.4 per cent per year, and a net immigration of about 0.65 per cent per year. Although Canada's natural rate of increase during this period is

Figure 11.3 Population growth in G7 countries, 1990–2002



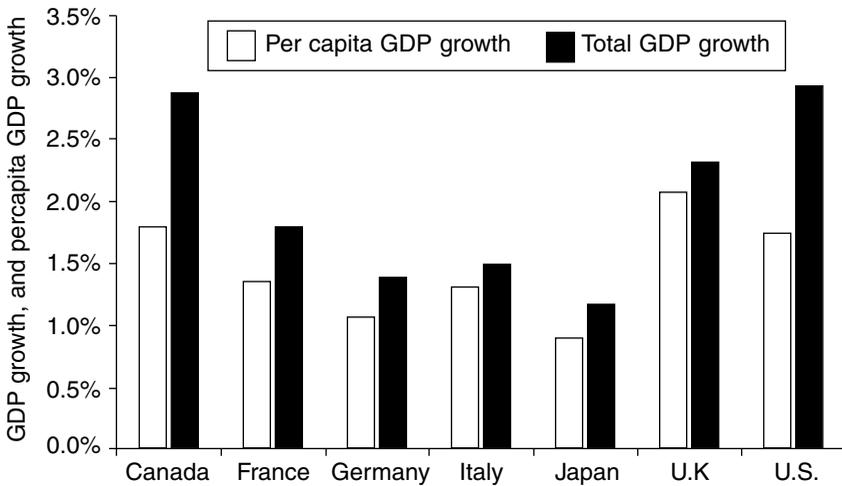
Source: Energy Information Administration 2003.

second only to that of the United States, it is Canada's high immigration rate that has contributed most to the relatively high population growth from 1990 to 2002. Canada had the highest immigration rate of the G7 countries during the period, about 17 per cent higher than the United States, and far higher still than European countries and Japan (Statistics Canada 2005).

Canada's relatively fast growing population has been an important contributor to its increasing GHG emissions. Had its growth rate been 0.3 per cent per year, similar to that of the European countries and Japan, Canada's GHG emissions would have grown only by 10.6 per cent from 1990 to 2003, instead of 24 per cent.

Canada's population growth rate is likely to remain high, relative to that of other developed countries, for several decades to come. Because it has a higher birth rate and somewhat younger population than European countries, Canada's death rate is not expected to exceed its birth rate until about 2025 (Statistics Canada 2005). Further, there is no indication that Canada will attempt to lower its immigration rate in the near future. As a result, population growth will continue to exert a strong upward influence on overall GHG emissions in Canada for the foreseeable future.

Figure 11.4 Trends in economic growth in G7 countries, 1990—2002



Source: Energy Information Administration 2003.

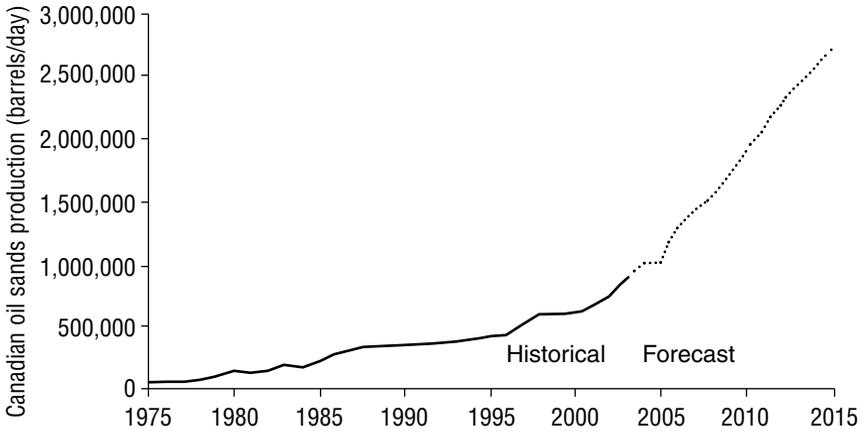
### *Economic Growth*

Canada's annual GDP growth (US\$2000) from 1990 to 2002 was 2.9 per cent, equal to that of the United States and significantly greater than that of all other G7 countries (Energy Information Administration 2003). Economic growth in Canada surpassed that of Europe and Japan in part because of much faster population growth, but also because Canada's per capita GDP grew much faster than that of all other G7 countries except the United Kingdom. Trends in both total GDP growth and per capita GDP growth are shown in figure 11.4.

This trend is important because in the absence of energy efficiency, fuel switching, or emission controls, economic growth will cause rising GHG emissions in the country's fossil fuel-based energy system. If Canada's per capita GDP had grown at 1.1 per cent annually as in most of Europe and Japan, emissions would have grown by only 12.1 per cent from 1990 to 2003, instead of 24 per cent.

Canada's GDP is expected to continue its rapid growth rate. A projection by the Conference Board of Canada (2004) suggests that

Figure 11.5 Canadian oil sands output and forecast, 1975–2015



Source: Historical oil sands output from National Energy Board (2004). Forecasted oil sands output from Canadian Association of Petroleum Producers (2005).

Canada's GDP will grow at an average rate of 2.6 per cent through 2025.

### *Oil Sands Growth*

With 174 billion barrels of proven oil reserves, Alberta's oil sands make Canada the country with the second-largest oil reserves in the world after Saudi Arabia (*Oil and Gas Journal* 2002). Limited commercial development of the oil sands started in 1967, but engineering challenges and high extraction costs constrained output for several decades. However, since the mid-1990s, technological advances, and more recently higher world crude oil prices, have stimulated significant expansion of oil sands operations. Daily oil sands production has tripled in volume since 1990, and is projected by the National Energy Board to continue its rapid growth (figure 11.5).

Oil sands are extracted either by surface mining (and then washed to remove bitumen from sand, silt, and clay) or by injecting steam into deeper deposits, which frees oil from the sand and drives it to the

surface. The resulting heavy oil must be upgraded through the addition of hydrogen. Each of these steps requires a significant amount of energy and, as a result, extracting oil from oil sands is more GHG- and energy-intensive than extracting it from conventional oil fields.<sup>1</sup>

Canada's surging oil sands production is an important reason for its increasing GHG emissions. We estimate that increases in oil sands production between 1990 and 2003 have increased Canada's GHG emissions by about 15–20 megatonnes (Mt). Without growth in oil sands since 1990, Canada's emissions would have increased by only 21 per cent instead of 24 per cent. The forecasted rapid expansion of oil sands production will continue to exert strong upward pressure on Canada's GHG emissions in the foreseeable future.

### **Ineffective Policies**

As noted, governments have been unwilling or unable to restrain population growth, per capita income increases, or economic structural change (such as increasing oil sands production) using climate change policy. In fact, the Canadian government has aggressively pursued increases in population (through a high immigration rate), per capita income growth (through economic development and taxation policies), and oil sands production (through tax exemptions and research assistance for oil sands developers). Growth in all of these factors has significantly increased GHG emissions in Canada since 1990.

In this section, we assess the policies that the Canadian government has applied to influence those GHG emissions factors that it perceives to be within its domain: energy efficiency, fuel switching, and emissions control. We present reasons why its policies have been ineffective. These include underestimation of the full cost of GHG emissions reduction, and the choice of non-compulsory policies that are ineffective at changing technology choices by firms and households when GHG emissions reduction is costly. We conclude the section by explaining Canadian-specific obstacles in achieving effective policies in Canada.

#### *Underestimating the Full Cost of Reducing GHG Emissions*

Since climate change has been recognized as a serious environmental problem, researchers have attempted to understand the costs associ-

ated with greenhouse gas abatement, especially from the energy sector (Jaccard, Nyboer, Bataille, and Sadownik 2003). Researchers have historically fallen into two groups. Environmentalists and engineers have a good understanding of technologies, but a limited understanding of economics and human behaviour. They tend to see myriad technological opportunities throughout the economy for cost-effective reductions of greenhouse gas emissions. For example, their typical analysis of the transportation system shows simultaneous GHG benefits and financial cost savings for individuals that would accompany a wholesale switch from private automobiles to public transit. They call such examples no regrets opportunities for GHG reductions. Because they identify many no regrets opportunities, they conclude that the cost of major GHG reductions is small or even negative. Given this low cost, they often recommend that government use information and subsidies to convince households and firms to act on these GHG reduction opportunities for financial gain or for moral reasons.

The second group consists primarily of economists, who have a less developed understanding of technologies, but a more complex understanding of costs and economic feedback effects. Economists argue that market evidence shows that the financial cost identified by the engineers/environmentalists is only one factor that determines the full costs of adopting a particular technology or lifestyle. For various reasons, competing technologies may differ such that some are seen as more valuable to consumers and firms than others. In the example above, where the engineer/environmentalist sees large cost savings from a switch to public transit from private automobiles, the economist sees substantial intangible costs, related to convenience, status, and comfort associated with such a switch. As a result of these high intangible costs, economists predict that consumers would not make a wholesale switch from private automobiles to public transit without extremely aggressive policies.

As experience is gained with estimating costs of reducing GHG emissions, and as strengths and weaknesses of both approaches are recognized, estimates of the cost of GHG emissions reduction are converging towards an estimate between the two groups. Jaccard et al. (2003) report that reductions of GHG emissions of about 25 per cent over ten years would reduce Canada's GDP by about 3 per cent, roughly equivalent to a one-year recession. These estimates are similar to cost estimates produced for the U.S. government using the National Energy Modeling System, and fall between estimates of abatement

cost produced by a conventional engineering costing approach and a conventional economics costing approach (Rivers and Jaccard forthcoming). They imply that a GHG tax of about \$150/t CO<sub>2</sub>e (1995 \$CDN) would need to be applied to generate a 25 per cent reduction of GHGs over a short timeframe of less than a decade. Such a policy is far more aggressive than anything the government has attempted, as is explained below, and would likely generate significant financial and competitiveness impacts on specific sectors of the economy.

In other words, reducing GHG emissions by a significant amount over a short time is likely to be expensive. This has important implications for policy design.

### *Choosing Ineffective Policies*

Many different GHG emission reduction policies have been pursued around the world and studied by academics and governments. Most of these policies can be arranged along a spectrum that portrays their degree of compulsoriness (Jaccard, Rivers, and Horne 2004). A strict government regulation that dictates the types of technologies that can be purchased would be at the compulsory end of the spectrum, while a government program that focused on education and moral suasion would be at the non-compulsory end. Instruments like taxes and subsidies, which offer some flexibility of response, but still produce an impact on prices and government spending, would be somewhere between the two extremes, with subsidies closer to the non-compulsory end of the spectrum, and taxes closer to the compulsory end.

Canadian policies to address climate change have been developed over the course of a decade, in several distinct initiatives. The government included GHG initiatives in its omnibus Green Plan of 1990. This plan, which involved over two hundred environmental policy initiatives and a budget of \$3 billion over five years, included \$175 million for twenty-four GHG reduction policies, focused mostly on energy-efficiency and alternative energy programs. In 1995, Canada issued a major policy document on mitigating climate change, the *National Action Program on Climate Change* (NAPCC), which encouraged voluntary actions through information programs and some modest subsidies (Environment Canada 1995). The primary policy instrument for addressing GHG emissions under the NAPCC was the Voluntary Challenge and Registry (VCR), under which companies submitted an action plan for GHG reduction and provided regular progress reports,

Table 11.1 Primary policies for GHG reduction under Action Plan 2000

Sector	Initiative	Policy type
Transportation	Partnerships with automotive manufacturers and ethanol producers	N/A
	Information provision through <i>EnerGuide for Vehicles</i> Demonstration projects for hydrogen distribution infrastructure and efficient urban transportation	Information Information
Energy sector	Demonstration project for carbon sequestration	Information
	Information provision and moral suasion through the Canadian Industry Program for Energy Conservation	Information
	Voluntary agreements with industry	Voluntary
	Financial incentive for renewable energy Purchase of green power by government	Subsidy N/A
Industry	Information gathering and benchmarking	Information
	Energy-efficiency audits for small and medium enterprises	Subsidy
Buildings	Information provision to encourage retrofits in commercial sector	Information
	Information provision through <i>EnerGuide for Houses</i>	Information

Source: Adapted from Action Plan 2000 on Climate Change.

all on a voluntary basis. The NAPCC also included other policy measures at the non-compulsory end of the policy evaluation spectrum, including the Federal Buildings Initiative, whereby federal government buildings would be retrofitted for energy efficiency, and the National Communication Program would educate Canadians about climate change.

After signing the Kyoto Protocol in 1998, the federal government launched Action Plan 2000 on Climate Change, a set of initiatives designed to reduce annual domestic emissions of GHGs by 49 Mt CO<sub>2</sub>e by 2010 (Government of Canada 1998). As table 11.1 shows, most of these initiatives continued the non-compulsory approach, including some limited subsidies for renewable energy and some financial assistance for energy audits in small businesses.

Prior to ratifying the Kyoto Protocol in 2002, the federal government released the Climate Change Plan for Canada, which outlined policies for reducing emissions by a further 100 Mt CO<sub>2</sub>e by 2010 (Government of Canada 2002). The primary program proposed in the Climate

Change Plan, responsible for 55 Mt of emissions reductions, was a system of negotiated covenants with large industrial emitters (including electricity generators), including an emissions intensity cap for key sectors and a tradable permit system. If implemented, this policy would have deviated somewhat from the non-compulsory approach that had characterized the government's policy direction. However, the extent to which the proposed emissions cap-and-tradable permit system should be considered a compulsory policy depends on whether government negotiators had a political mandate for firm reductions, even were these to cause some costs to industry, or were instead constrained to negotiate only what industry was willing to accept.

Other policies in the Climate Change Plan continue the focus on voluntary action complemented with modest government subsidies. These programs include some financial support for public transit coupled with a voluntary target for increased transit use; encouraging high-efficiency insulation standards by commercial building developers; a voluntary target of 10 per cent renewables for new electricity generation; and a voluntary target for improved vehicle efficiency. Through a combination of these programs in concert with broader information programs, government expected that each Canadian would reduce average annual GHG emissions by one ton. It counts for 24 Mt of these reductions (assuming that over 75 per cent of Canada's 31 million citizens reduce GHG emissions by one ton) in forecasting the impact of its approach on emissions.

In early 2005, the government released *Project Green: A Plan for Honouring Our Kyoto Commitment* (Government of Canada 2005). While much of this new plan continues previous programs, there are some differences. The system of negotiated covenants with the large final emitters was eliminated, and the proposed target for the sector was adjusted from 55 down to 45 Mt. In addition, Project Green proposed that large final emitters be allowed to contribute to a government-administered research and development fund for greenhouse gas reduction technologies instead of reducing emissions or purchasing offset credits (contributions to this fund can count for only a maximum of 9 Mt of the large final emitter goal), effectively further reducing the large final emitter target to 36 Mt.

Other major thrusts in Project Green include expanded support for renewable energy through continued funding of the Wind Power Production Incentive and the start of the Renewable Power Production

Incentive, which both provide about \$0.01/kwh for qualifying power generation projects; a Climate Fund, with initial funding of \$1 billion, that aims to purchase domestic and international offset credits; a Partnership Fund to encourage provincial participation in climate change mitigation; and the One-Tonne Challenge to encourage voluntary action by Canadians.

Finally, in 2006 and 2007, the newly elected Conservative government launched a series of initiatives under its 'ecoACTION' banner, culminating in the release in April 2007 of its 'regulatory framework for air emissions.' Although billed as a new policy effort, many of the elements of the new Conservative policies are nearly identical to those of the previous Liberal government. Economic analysis of the ecoACTION policies revealed that the policies would be insufficient to counter the rising GHG emissions in Canada (Jaccard and Rivers 2007).

In summary, the past fifteen years of Canadian climate policy development can be summarized as follows:

- Early policies focused almost entirely on educating individual Canadians and businesses about climate change and opportunities to reduce greenhouse gas emissions, and on attempting to convince Canadians to take voluntary action on climate change.
- In subsequent policy development, some modest financial incentives (subsidies) were included, but the overall focus was still on information provision, education, and moral suasion.
- More recently, government has increased its reliance on subsidy mechanisms.
- In 2002, government first presented a plan for a regulated emission cap for large industrial emitters, although it is uncertain if this policy would lead to significant reductions by industry.
- The Conservative government elected in 2006 has generally continued the policy approach of the previous Liberal government, with a few small changes.

In stark contrast to Germany (see chapter 12 by Weidner and Eberlein), Canada relies primarily on non-compulsory policy measures. This evaluation of policy compulsoriness is significant, given that mounting research puts into question the effectiveness of non-compulsory policies. They do not, in relation to this book's focus, supply the capacity to act effectively and in a coordinated way (see chapters 1

and 2). Harrison and Antweiler (2003) find that voluntary policies have had limited success in controlling pollutants released by firms in Canada, and Harrison (1999) shows that the aggregate effect of voluntary policies is questionable. In a survey of voluntary approaches to environmental protection, Khanna (2001) noted that only a few empirical studies have tried to estimate the actual environmental impact of such programs, and found that these have not had much effect. Similarly, the OECD recently concluded that the 'environmental effectiveness of voluntary approaches is still questionable.' It added, 'The economic efficiency of voluntary approaches is generally low' (OECD 2003, 14). Studies have also specifically addressed the voluntary nature of Canada's GHG reduction program, and found them almost entirely ineffective (Bramley 2002; Takahashi, Nakamura, van Kooten, and Vertinsky 2001).

Similar criticism has been made of subsidy programs to encourage energy efficiency and reduced GHG emissions. It is difficult to design subsidy programs to exclude free-riders – participants who qualify for the subsidy even though they would have undertaken the action anyway. Presence of such participants significantly reduces the cost-effectiveness of a subsidy program. Sutherland (2000) conducted a simple analysis of subsidy programs, using comparative statistics, and found that most benefits of subsidy programs accrue to free-riders. He concluded, 'The simple, but unfortunate principle is that rebates (subsidies) have their greatest appeal to exactly the wrong participants. An implication of this principle is that rebates (subsidies) are unlikely to be cost-effective' (Sutherland, 2000, 91). There is empirical evidence to support this claim. Loughran and Kulick (2004) showed, in a survey of demand side management programs in the United States, that the cost of subsidy programs is often higher than expected. By comparing relative changes in electricity consumption over a decade in jurisdictions with demand side management (usually subsidy) programs to those without, they found that the benefits are systematically overestimated, often because the electric utilities ignore the effects of free-riders.

Subsidy programs also suffer from the unintended problem of encouraging a rebound effect in the demand for energy services. By subsidizing efficient technologies, government is effectively making the service provided by the technology less expensive. As a service become less expensive, consumers demand more of it, reducing the impact of the government subsidy program. The magnitude of this rebound effect is disputed, but most studies suggest that the rebound

effect reduces the effectiveness of energy efficiency programs by about 10–35 per cent (Greening, Greene, and Difiglio 2000).

Together, the rebound effect and the presence of free-ridership significantly weaken the environmental effectiveness of subsidy programs and render them much less economically efficient. The non-compulsory nature of voluntary GHG reduction programs likewise renders them ineffective.

More generally, the government's application of non-compulsory policies has been ineffective because the overall cost of GHG abatement is higher than the engineering/environmentalist perspective suggests, as we discussed in the preceding section. In order to generate large reductions of GHG emissions in a short time, government needs to apply and have the capacity to implement compulsory policies. So far it has been unwilling to do that.

#### *Canadian-Specific Obstacles to Effective Policy*

The policy shortcomings we describe above are not unique to Canada. In fact, our criticisms can be levelled at other industrialized countries that have ratified the Kyoto Protocol: most started by applying non-compulsory policies for GHG reduction. However, as evidence of the ineffectiveness of the information and subsidy approach has become apparent, other countries, especially in Europe, have shifted toward more compulsory policies, in particular Germany (see chapter 12 by Weidner and Eberlein). There are a couple of reasons why Canada has lagged behind.

First, Canada's continued focus on non-compulsory policies is partly explained, as Gattinger's analysis in chapter 8 has shown, by the allocation of powers within its federal system of government. While the federal government has the sole authority to sign international treaties, like the Kyoto Protocol, the provinces have control over natural resources, the electricity sector, and municipal government – all critical areas for reducing GHG emissions. Thus, efforts by the federal government to reduce GHG emissions from fossil fuel exploitation and use require cooperation from the provinces, little of which has been forthcoming. Alberta in particular has been vocal in suggesting that federal policies to reduce GHG emissions will constrain its economic growth or divert some of its growing fossil fuel income to the federal government. More recently, the federal government has redefined CO<sub>2</sub> as a pollutant under the *Canadian Environmental Protection*

*Act*, giving itself greater jurisdictional authority to take actions under its environmental protection mandate. This will improve its ability to pursue compulsory policies.

Second, Canada's status as one of the most open economies in the world (it derives almost half of its GDP from trade) has also hindered its inherent capacity and ability to implement stringent GHG reduction policies, especially after its U.S. trading partner withdrew from the Kyoto Protocol in 2001. Industry and labour groups in Canada are concerned that implementation of policies that would reduce emissions substantially in Canada would slow economic growth and cause job losses. This opposition has constrained the ability of the federal government to pursue more stringent climate change abatement policies.

### **Canada's Exceptionally Unrealistic Kyoto Commitment**

Even if Canada had applied effective, compulsory policies within two years of signing the Kyoto Protocol in 1997, it would have been extremely difficult to have achieved its Kyoto commitment in 2010. Its commitment is exceptionally aggressive, compared to the Kyoto commitments of other countries.

Canada has significantly missed past GHG emission targets, and with 2003 GHG emissions 24 per cent above the 1990 level, appears on track to dramatically exceed its Kyoto Protocol target. Canada's Kyoto Protocol target is shown in table 11.2 relative to all other Annex B signatories of the Kyoto Protocol.<sup>2</sup>

Increasingly, Canada's GHG commitments, particularly its Kyoto Protocol target, are recognized as the most challenging in the world. Canada's Kyoto Protocol target to reduce emissions to 6 per cent below the 1990 level by 2008–12 is at the more aggressive end of the range of targets negotiated by Annex B countries, although somewhat less aggressive than that of most European countries. However, even in the absence of climate change policies, GHG emissions in European countries would have decreased after 1990 as a result of two major economic changes. First, the dissolution of the Soviet Union caused a major economic downturn in countries that formerly comprised it, including, as the Weidner and Eberlein analysis of German climate change in chapter 12 shows, East Germany. This economic downturn was accompanied by a large decrease in GHG emissions in these countries throughout the 1990s. Second, Britain closed most of its coal mines in the 1980s and 1990s, and made a major switch from coal to

**Table 11.2** Countries included in Annex B to the Kyoto Protocol, their emissions targets, and their current emissions

Country	Target (1990 <sup>b</sup> - 2008/2012)	Change in emissions (1990-2003) <sup>d</sup>
EU-15, <sup>a</sup> Bulgaria, Czech Republic, Estonia, Latvia, Liechtenstein, Lithuania, Monaco, Romania, Slovakia, Slovenia, Switzerland	-8%	EU-15 = -1.4% FSY countries = -25% to -60% except Liechtenstein = +5%
U.S. <sup>c</sup>	-7%	+13.3%
Canada, Hungary, Japan, Poland	-6%	Canada = +24.2%, Japan = +12.8%
Croatia	-5%	-6.0%
New Zealand, Russian Federation, Ukraine	0	Russian Federation = -38.5%
Norway	+1%	+9.3%
Australia <sup>c</sup>	+8%	+23.3%
Iceland	+10%	-8.2%

<sup>a</sup>The EU-15 members have agreed to redistribute their targets amongst themselves.

<sup>b</sup>Some economies-in-transition have a baseline other than 1990.

<sup>c</sup>The United States and Australia have indicated that they will not ratify the Kyoto Protocol.

<sup>d</sup>Excluding land-use, land-use change, and forestry.

*Source:* United Nations Framework Convention on Climate Change, Key GHG Data, 2005.

natural gas for power generation, primarily for economic reasons. This change reduced methane emissions from coal mining and GHG emissions from power generation significantly. Because of these changes, the Kyoto targets agreed to by European nations do not represent a large departure from business as usual trends. In contrast, because of a fast-growing economy and population, as well as rising oil sands output, GHG emissions have increased quickly in Canada since 1990. In other words, the factors beyond government control acted to reduce GHG emissions in the European countries, while they exerted the opposite pressure in Canada.

Table 11.2 shows that the United States negotiated a -7 per cent Kyoto Protocol target, which is more aggressive than Canada's.

However, the United States has indicated its intention not to ratify the protocol, effectively negating its target. Norway negotiated a +1 per cent target, with the less aggressive target reflecting limited opportunities for GHG reductions from Norway's predominantly hydroelectric power generation system, as well as its forecasted growth in crude oil output for export throughout the 1990s. Australia (which did not ratify the Kyoto Protocol) negotiated a +8 per cent target, which still represents an aggressive target in the face of Australia's fast-growing population and economy. Canada, with a predominantly hydroelectric power generating system and rising crude oil production, like Norway, and with a fast-growing population and economy, like Australia, still negotiated a large reduction in GHG emissions under the Kyoto Protocol. Taking into account the trends discussed throughout this chapter, Canada's GHG reduction targets are probably the most aggressive of all countries bound by the Kyoto Protocol.

## Conclusions

Since 1988, Canada has committed internationally to several GHG reduction targets, with the most recent being a 6 per cent reduction of GHG emissions below the 1990 level between 2008 and 2012, under the legally binding Kyoto Protocol. Canada's GHG emissions since 1990 have risen by 24 per cent (through 2003), and appear on track to continue this fast-paced growth. As a result, Canada has missed several historic GHG reduction targets, and domestic emissions appear likely to substantially exceed the Kyoto Protocol target. Canada's record on GHG emissions growth is amongst the worst in the developed countries. As we have seen, there are several reasons why Canada's emissions have increased so quickly since 1990.

First, Canada's population is growing quickly, partly as a result of natural increase (births and deaths), but more importantly as a result of Canada's high immigration rate. Canada's fast population growth, which is somewhat unusual amongst developed countries, is the largest contributor to the fast growth in GHG emissions. Second, Canada's growth in per capita economic activity, which is also somewhat unusual amongst developed countries, has been an important factor. Third, Canada has aggressively developed its oil sands since 1990. Since production of oil sands is energy- and GHG-intensive, this has been an important factor. All of these factors are generally considered beyond the scope and capacity of governments in addressing climate change.

Also, Canada has been ineffective in influencing those factors generally considered to be within the scope of climate policy. In stark contrast to Germany (see chapter 12 by Weidner and Eberlein), Canada's federal government has relied almost completely on non-compulsory policies to encourage GHG reduction, even though increasing evidence suggests that this approach is ineffective and hard to coordinate. Canada negotiated perhaps the most aggressive GHG target in the world under the Kyoto Protocol, and its main trading partners are not faced with similar targets. As a result, Canada's government has been constrained in its lack of capacity to enact policies because of complex arguments by industry, labour, and regional interests that this will have negative impacts on economic competitiveness and employment. It seems likely that Canada will fail its Kyoto Protocol targets more dramatically than any other country.

Most of these trends are not likely to change over the next two decades. Canada's population is projected to continue growing, as a result of natural increases and immigration, which will increase GHG emissions. Canada's economy is also projected to continue its fast pace of growth over the coming two decades. Forecasts have been developed for oil sands production in Canada over the coming two decades, and show continued rapid expansion for the foreseeable future. In the absence of dramatically different processing technologies (such as carbon capture and sequestration) this trend will also increase GHG emissions. In terms of policy, although Canada has tentatively begun to explore more compulsory GHG reduction policies, it continues to concentrate mostly on less effective non-compulsory policies in order to minimize political resistance.

### **Postscript May 2008**

In the period between the writing of our chapter and the final editing of this collective manuscript, there have been several climate policy developments in Canada, at the provincial and federal levels. In presenting these, we focus on the policy initiatives in Alberta and BC. at the provincial level, before turning to review the most recent incarnation of the federal government's approach. The movement toward compulsory policies in BC has been remarkable. In contrast, while the federal government and Alberta have tightened somewhat their regulations on some industrial emissions, these provisions have retained mechanisms by which industrial emissions might not even decline over the next two decades.

*Alberta*

In 2007, after a decade of unfulfilled negotiations with industry by the federal government, Alberta introduced the country's first cap-and-trade regulatory system on the major industrial GHG emitters within the province. The policy covers only large industrial emitters – oil and gas extraction and processing, refineries, electricity generators, petrochemicals, and others – but these represent a significant share of Alberta's total emissions. The cap is intensity based. By July 2008, each industrial emitter must have reduced its emissions per dollar of production by 12 per cent from its 2006 levels. Any emitter failing to reach this target must either purchase excess permits from emitters who have exceeded their 12 per cent reduction target (tradable permits), purchase 'offsets' from unregulated businesses, consumers, or farmers 'only within Alberta' who have apparently reduced their emissions, or pay fifteen dollars per ton to a 'technology fund' administered by the provincial government. Because the emitter must pay only for its emissions in excess of its intensity target, the fifteen dollars per ton represents only its incremental cost of emissions. With the 12 per cent reduction requirement, this \$15 leads to an average emission cost closer to three dollars / tCO<sub>2</sub> for some of the large industrial emitters. To the extent that an emitter can purchase lower-cost excess permits from other industries or lower-cost offsets from unregulated emitters in Alberta, the average cost of emissions could be even lower than three dollars for an industrial emitter.

This policy is attractive for several reasons. With the exception of the technology fund, it exempts government from the politically challenging task of collecting and redistributing revenues, which it would have to do with a carbon tax. The policy also has a minimal impact on the production costs of large emitters (the three dollars / tCO<sub>2</sub>), yet it creates an incentive for emitters to reduce emissions where they can do so for less than fifteen dollars / tCO<sub>2</sub> (unless the cost of offsets or tradable industry permits are lower than this, which they could well be). Finally, the Alberta policy levies a lower financial hit on rapidly growing sectors, like the oil sands, since it focuses on emissions intensity rather than absolute emissions levels. This is desirable to the Alberta government, although it may not be desirable to anyone hoping to substantially reduce Canadian emissions as cost-effectively as possible.

The criticisms of the policy are predictable. First, intensity targets do not guarantee that emissions will fall. If, over the next few years, the high-intensity sectors like oil sands grow much faster than the 12 per

cent intensity reduction required by the regulation, then emissions could actually rise. Indeed, the Alberta policy is conspicuously silent on future rates of intensity reduction. (This is in contrast with the proposed federal policy that starts with an 18 per cent requirement by 2010 and then an annual 2 per cent intensity reduction in future periods.) Second, the policy does not provide a carbon price signal across the entire Alberta economy. The offset provision for unregulated sectors is supposed to take care of this job, but we have already shown the overwhelming evidence from international research and past Canadian policy that subsidies to emission reduction, whether from government or other private entities, are likely to be highly ineffective because of the impossibility of preventing free-ridership – offset payments to farmers, foresters, small businesses, and consumers for reductions they were going to make anyway, and therefore have no downward effect on the GHG trajectory. Third, the value of emissions reductions tend to be more uncertain in a cap-and-trade system in comparison to a carbon tax. But this critique is only partial in that the technology fund provides a sort of price cap for industry, at least for the next while.

In January 2008, in anticipation of the March provincial election, the Alberta government released a climate policy update that included some additional policies and set a long-run target for GHG reduction. The major policies included an offer to subsidize carbon capture and storage by industry, support for renewable energy, tighter energy efficiency standards for buildings, assistance to municipalities to plan low-emission urban development, and assistance for sequestration and emissions reductions in the forestry and agricultural sectors.

According to the government, the net effect of its policies over several decades will be to reduce Alberta emissions about 50 per cent from their projected levels in 2050. However, because these emissions were expected to grow rapidly with the growth of the oil sands, this represents only a 14 per cent reduction from current levels – after more than forty years. Yet research by the National Roundtable on the Environment and the Economy has shown that Alberta's emissions need to fall by about 40 per cent from current levels for Canada to achieve an aggregate 50 per cent reduction by 2050. In other words, if the federal government fails to implement more stringent policies that override these of the Alberta government, Canada will not reach its emissions target of a 50 per cent reduction from current levels by 2050.

Of course, this situation is not unique to the province of Alberta. With the exception of perhaps British Columbia, none of the other provinces have enacted policies that could collectively achieve the federal target of a 50 per cent reduction from current levels by 2050.

Over the past year, some people – notably Peter Lougheed, Alberta's former premier and elder statesman – have suggested that climate policy will lead to a major constitutional crisis in Canada. This may be true. But we must be careful not to see the present through the prisms of the past. The issue is different in that the climate risk is a global problem in which all countries are grappling with the design and implementation of effective policies, and one of the objectives is to make sure that other jurisdictions are also contributing and not free-riding on the efforts of others. This explains why proposed U.S. state and federal legislation increasingly focuses on how policies that incur obligations and costs on U.S. domestic industry will also impose similar costs on their external competitors.

The state of California and even the U.S. federal government have pursued legislation that mandates a maximum level of emissions from a given quantity of commercial fuel, including emissions associated with the production of that fuel. This means that gasoline produced from the oil sands must not produce more emissions throughout its production than gasoline produced from a conventional oil well. In effect, Alberta would be barred from selling oil from the oil sands into the U.S. market.

### *British Columbia*

The British Columbian government, under the premiership of Gordon Campbell, has quickly distinguished itself as a government that is truly serious about reducing emissions. Ironically, in the Campbell government's first term in office, from 2001 to 2005, it showed little interest in climate policies, focusing on economic performance. But starting in 2006, Campbell has demonstrated a keen understanding of the need for compulsory policies if GHG emissions are truly to fall. A key first step was to restructure responsibilities within government. Campbell created a powerful climate change secretariat with a deputy minister reporting directly to the premier. The secretariat's mandate is to focus all aspects of government on the achievement of the emissions target, and to this end the quick implementation of strong climate policies has become a clear priority for the government.

Already in 2007, while the secretariat worked away at drafting a slate of new legislation, the government took its first major initiative, the announcement of a new electricity policy. This could be achieved without legislation because of the government's control of BC Hydro, the large Crown corporation that dominates the BC electricity sector. According to the new electricity policy, BC Hydro is required to ensure that at least 90 per cent of new electricity generation in the province comes from clean sources, meaning zero emission. The remaining 10 per cent simply allows for unique locations or circumstances where diesel or natural gas generation might be required or where co-generation projects are desirable. The new policy also stated that coal plants would not be allowed unless they included carbon capture and storage technology that cut emissions almost to zero.

With its electricity policy alone, the BC government had already distinguished itself as a leader in Canada, North America, and even globally. In effect, virtually all new electricity would be zero emission. Then, the provincial budget of February 2008 introduced North America's first substantial carbon tax. While it should be recognized that Quebec had already introduced a carbon tax in 2007, with the tiny tax of three dollars / tCO<sub>2</sub>, the Quebec government acknowledged that it did not expect increases in the prices of gasoline or other fuels, arguing that fuel producers should somehow swallow the increase.

In contrast, the BC carbon tax was set at ten dollars / tCO<sub>2</sub> in 2008, with a schedule setting out annual increases of five dollars / tCO<sub>2</sub> until the price reached thirty dollars / tCO<sub>2</sub> by 2012. This would be a 2.4 cents per litre increase of the price of gasoline in 2008, rising to 7.5 cents per litre by 2012.

A key component of the BC carbon tax is that it is revenue neutral. The government has tabled legislation that requires all revenues from the carbon tax to be returned to British Columbian businesses and households in the form of corporate and income tax reductions, as well as some provincial sales tax reductions on 'low-emission' technologies. The personal income tax cuts are especially targeted at families earning less than \$70,000 per year in order to offset any regressive aspects of the carbon tax.

With the carbon tax as centrepiece, the Campbell government has also pushed ahead with a flurry of other regulations, many requiring new legislation. To date, these include a low carbon fuel standard, requiring that all gasoline and diesel sold in the province by 2010 have at least 5 per cent biofuel content, legislation to allow BC to participate

in the industrial emissions cap-and-trade system being developed by states in the western United States, with the potential participation of some Canadian provinces, and potential changes to vehicle emissions standards and building codes.

It is too early to say if the BC government's policies will be sustained. But for the moment, they represent a radical departure from two decades of ineffectual policies.

### *Canada*

In reports for the C.D. Howe Institute, we have assessed the Canadian government's recent climate policies. In 2007, we estimated that while the policy package developed in 2006–7 by the federal Conservative government would significantly slow the growth of Canadian emissions over the next decades, these policies would not achieve the government's commitment of a 20 per cent reduction from 2006 levels by 2020. We estimated that Canadian emissions in 2020 would be close to today's levels rather than 20 per cent below them.

The main reason that the government's claims are once again likely to be an exaggeration are because of its substantial reliance on the ineffective subsidy approach – this time in the form of the offset loophole that allows large industrial emitters to subsidize apparent reductions in the uncapped and untaxed emissions of all the other sectors of the economy. We were not alone in predicting that the government's policies would not put the country on a path to achieve either its 2020 and 2050 emissions targets. Similar conclusions were drawn by the Conference Board, the Toronto Dominion Bank, the Pembina Institute, and the National Roundtable on the Environment and the Economy.

After a year of in-depth consultations with the industries to be regulated, the Conservative government released a refinement of its industrial policy in March 2008. While this updated policy is not significantly different in design, it incorporates detailed refinements and more aggressive technology requirements. The updated policy retains the same requirement for an 18 per cent reduction in emission intensity by 2010, followed by annual 2 per cent reductions thereafter. It retains the technology fund at fifteen dollars / tCO<sub>2</sub>, with this option for industry declining to zero by 2017. It also retains other 'flexibility provisions,' including limited recourse to credits for early actions, limited international offsets in developing countries through the Clean Development Mechanism of the Kyoto Protocol, and unlimited offsets

in the unregulated sectors of the Canadian economy – just like the Alberta industrial policy with its unlimited Alberta-specific offsets.

Implicitly acknowledging the critiques from various parties (including us) that the government's 2007 policy package would not achieve its 2020 emissions target, the government also set facility-specific, technology-based emission intensity requirements on future investments in oil sands production and coal-fired electricity generation. Specifically, oil sands processing plants and coal-fired electricity generation facilities completed after 2017 will have their intensity target based on the assumed incorporation of carbon capture and storage technologies. In the interim, facilities completed between 2004 and 2017 would be required to meet the emissions intensity levels equivalent to the best conventional technologies available today in oil sands production and electricity generation. This would be oil sands production using natural gas for upgrading and coal-fired generation using 'supercritical' steam.

These are not technology requirements. They are facility-specific emission intensity requirements based on low-emission technologies expected to be commercially ready over the next decade. Estimating the effect of these policies on future industrial emissions is complicated. It depends on the definition and relative costs of the flexibility provisions. If offsets are of relatively low cost, large industrial emitters may reduce their emissions very little, instead purchasing offsets from the unregulated sectors of the economy. If these offsets are not real emissions reductions from a business-as-usual forecast, which they are likely to be, then total Canadian emissions will not fall and Canada will not hit the Conservative government's 2020 emissions reduction target.

In modelling the policy, however, government assumes that industry will acquire no offsets from the unregulated sector other than a limited number of projects that capture methane emissions from agriculture and urban landfills. Because of this assumption of a restrictive market, the government forecasts an offset and permit trading price that rises already to sixty-five dollars / tCO<sub>2</sub> by 2018.

However, we find no basis for this assumption. It is more likely that the market price for carbon will remain very low, reflecting the fact that many different kinds of offset projects will be eligible for funding from industrial emitters. And, based on past experience, a large percentage of these projects are likely to cause much less emissions reduction than advertised. For the government to be credible in this area, it

should put a tight cap on the allowance for offsets. Better still, it should disallow them all together and extend the cap-and-trade system to the entire economy or use a carbon tax to cover all remaining unregulated emissions.

A key benefit of a uniform economy-wide price on greenhouse gas emissions is that it ensures that society does not pursue high cost emissions reductions in one sector while ignoring low cost actions in another. Such an approach is a more costly way to achieve a given level of emissions reduction. Yet the government's policy is headed in just this direction. Large industrial emissions face a price different from that for consumer emissions. In fact, the emissions from using a backyard patio heater, and thousands of other such devices, are free under the Conservative government's approach. Even within the industrial sector, the 'refined' policy has many similar conditions. Emissions from new facilities face a emissions price different from that for old facilities. Process emissions, which are not covered by the regulation, face in effect a price of zero dollars / tCO<sub>2</sub>. This is likewise the case for emissions from small industrial facilities that are exempt from the federal policy. With these and other provisions, the federal policy will be much more costly than need be.

Another cost associated with the federal climate policy approach, which stands in sharp contrast to a carbon tax, is all of the extra bureaucratic and transaction costs it causes. Conservative governments promote themselves as being especially keen to reduce the burden of government on society. Yet the offset system and other technology-specific provisions in the policy require multiple regulatory procedures and will require a large staff to administer them properly. The offset system alone has a great potential for fraud, as investigators are already finding out with companies providing offset services to the airline industry. Administrative costs are likely to be substantial.

At the same time, a cap-and-trade system requires many brokers and traders for permit exchanges – costs to society that are not required by a simple carbon tax, which relies on existing taxation systems. It is again ironic that a Conservative government should be responsible for taking such a costly approach to achieving society's climate policy objectives.

Finally, another concern is how the federal government's climate policy approach will mesh with the policies of provincial governments and Canada's major trading partners. This is a difficult question. Europe has an absolute cap-and-trade system, while Canada's is inten-

sity based. The United States may implement a policy similar to that of Europe. Within Canada, the new carbon taxes in Quebec and BC create a challenge for attaining national policy cohesion.

The latest developments in federal climate policy in Canada do, indeed, represent an improvement over the largely non-compulsory policies of the past. But with the exception of the policies of the government of British Columbia, Canada has a long way to go before closing the climate policy gap with many European countries such as Germany.

## NOTES

- 1 Extracting synthetic crude from oil sands produces about 100 kg carbon dioxide equivalent (CO<sub>2</sub>e) per barrel, while extracting conventional light crude oil in Canada produces only about 50 kg CO<sub>2</sub>e per barrel. In countries where the majority of conventional light crude oil is extracted offshore, like Norway and the United Kingdom, GHG emissions are only about 20 kg CO<sub>2</sub>e per barrel.
- 2 Annex B countries are the thirty-nine emissions-capped industrialized countries and economies-in-transition listed in Annex B of the Kyoto Protocol.

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