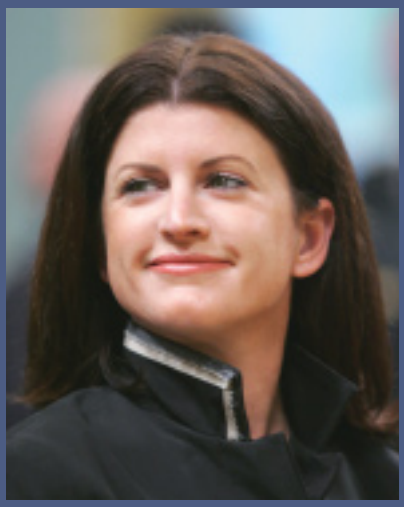
IMPROVING CANADA'S CLIMATE CHANGE PERFORMANCE

Katherine Cinq-Mars



"Why are Canada's emissions so high and why have they increased by so much compared with other countries?" This is the central and embarrassing question Katherine Cinq-Mars poses about Canada's performance on reducing emissions, relative to most industrialized countries in the OECD. As a signatory of the Kyoto Protocol, Canada is committed to reducing greenhouse gas emissions to 6 percent below 1990 levels by 2008-12. Instead, emissions increased by 27 percent through 2004 — fully 35 percent above Kyoto targets. How can Canada do better? By moving to lower carbon technologies, and turning an environmental challenge into an economic opportunity.

« Pourquoi les émissions canadiennes sont-elles si élevées et ont-elles tant augmenté par rapport à d'autres pays ? » Cette question aussi centrale que gênante est soulevée par Katherine Cinq-Mars à propos de la performance du Canada en regard des pays industrialisés de l'OCDE. En tant que signataire du Protocole de Kyoto, le Canada s'est engagé pour 2008-2012 à réduire ses émissions de gaz à effet de serre à 6 p. cent de moins que leur niveau de 1990. Or ces émissions ont augmenté de 27 p. cent en 2004 pour dépasser de 35 p. cent les cibles de Kyoto. Comment redresser la situation ? En se tournant vers les technologies du carbone et en transformant les défis environnementaux en avenues de développement économique.

In the late 1980s, mounting evidence that greenhouse gas (GHG) emissions released by human activity were adversely affecting the global climate started putting pressure on governments to control their countries' emissions. Since then, national GHG emissions records show that some countries have been considerably more successful than others. Canada's GHG emissions record is among the worst: it is one of the world's highest per capita emitter of GHGs (24 metric tonnes) and its total emissions have grown by 27 percent or 159 million tonnes (Mt) between 1990 and 2004, the latest year for which data is available from Environment Canada. On a per capita basis, Canada now emits as much GHGs as the United States. Canada is not the only country to have seen its emissions increase by that much. Greece, Portugal and Spain's emissions have also skyrocketed, but their per capita emissions levels remain much lower than Canada's. Other rich OECD countries have reported lower growth rates over 1990 to 2004 (figures 1, 2), such as the United States (16 percent), Japan (12 percent) and the Netherlands (1 percent), and even reductions, namely France (-1 percent), Sweden (-3.5 percent), the UK (-14 percent), and Germany (-17 percent).

Why are Canada's emissions so high and why have they increased by so much compared with those of other countries'? Common explanations for Canada's high emissions levels and growth emphasize the country's unique economic and structural characteristics. Canada is a big and cold country where people and goods travel over long distances and where harsh winters drive up energy consumption. The country is also rich and its economy is booming, thanks in no small part to energy-intensive natural resource extraction.

Economic wealth and growth, according to traditional economic theory, imply an unfortunate but inevitable trade-off with environmental quality. In other words, if Canada's emissions have grown so much, it is because of factors that are beyond our control (size of the country, climate, rich natural resources) or that we would not wish to affect (economic wealth and growth).

However, over the last decade and a half, the experience of countries that have succeeded in limiting their GHG emissions shows that there is an array of policy measures that can be effectively used to mitigate climate change. As this article argues, among rich OECD countries, the differ-

ence between those countries that have succeeded in controlling their emissions and those that have failed is more a reflection of conscious policy choices than of economic/structural factors.

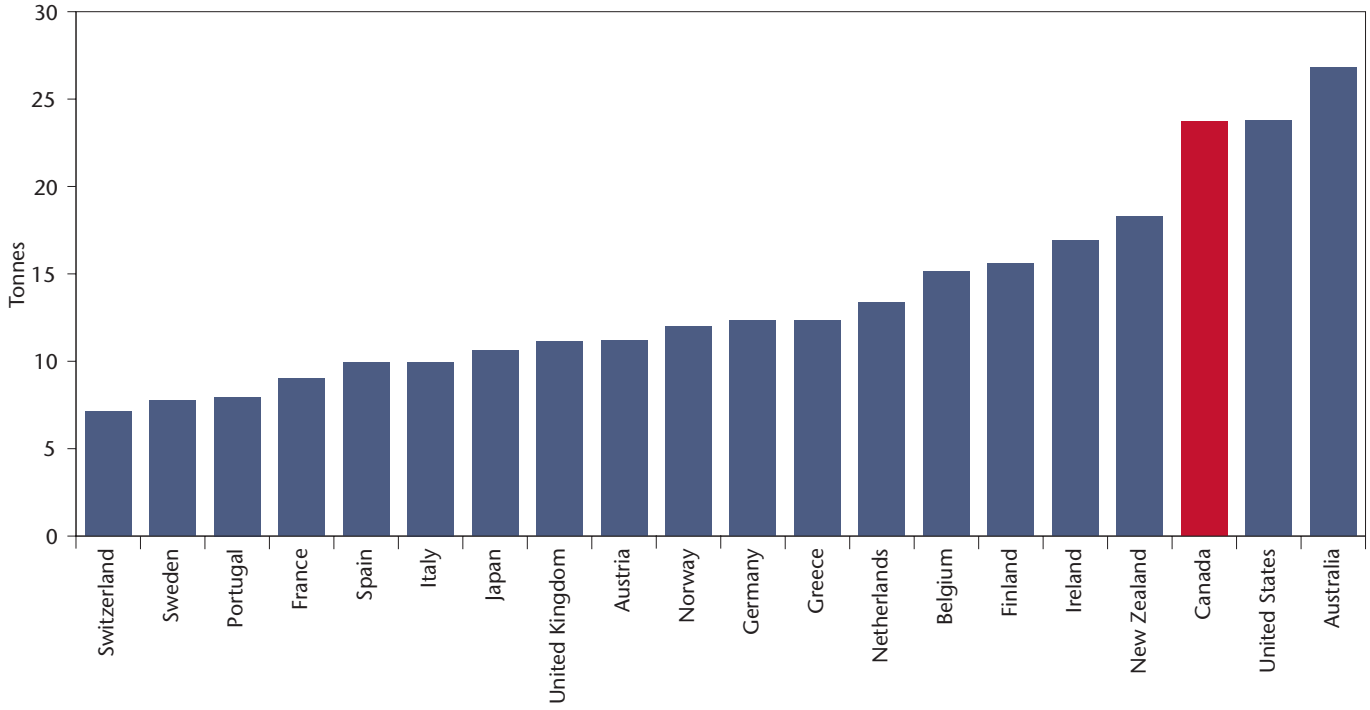
First, to understand why Canada's emissions are so high and why they have increased by so much, we need to look at the breakdown of emissions by source and their evolution over time. As is the case in other industrialized countries, the energy sector in Canada is by far the largest contributor to national GHG emissions. Emissions related to oil and gas activities (production, transmission, processing, refining and distribution) were 50 percent higher in 2004 than in 1990. This translates into an increase of about 52 Mt of GHG emissions, or fully one-third of the net increase in total national GHG emissions between 1990 and 2004. Another important proportion of total national emissions growth is due to rising demand for electricity and a greater proportion of electricity generated from fossil fuels. Emissions from electricity and heat generation saw a 37 percent increase over the 1990 to 2004 period. This raised Canadian GHG emissions by 35 Mt and represents over one-fifth of the growth in total national emissions. In 2004, emissions from road transportation were 36 percent or 38 Mt above 1990 levels. This increase in emissions from vehicles accounts for nearly one-quarter of the growth in total national emissions since 1990. Within that category, GHG emissions from SUVs and pickups doubled between 1990 and 2004 and accounted for 60 percent of the growth in total emissions from transportation, despite representing only 36 percent of the total vehicle fleet. The fleet of heavy diesel trucks used to transport freight also saw a steep 83 percent increase in emissions. The growth in the number and the horsepower of vehicles as well as the longer distances travelled by passengers also contributed to raising emissions from road transportation, negating the positive effect of efficiency gains in fuel consumption (figure 3).

In other sectors, smaller increases have been observed. Agricultural emissions grew by 22 percent for an additional 10 Mt over 1990 levels. Emissions from the mining sector were over 9 Mt higher in 2004 than in 1990. In 2004, waste disposal produced 29 Mt, 4 million more than in 1990. There have been no significant changes in the "industrial processes" category overall, while manufacturing industries registered a 4 Mt decrease in emissions.

Combined, the growth in GHG emissions from oil and gas, electricity and heat generation and road transportation accounts for close to 80 percent of the growth in Canada's total emissions between 1990 and 2004. Other countries face upward pressure on their emissions in these areas. Here is what some of the most successful countries are doing to try to slow the growth and even in some cases reduce their emissions from these sources.

Oil and gas. Another signatory country to the Kyoto Protocol that has to deal with high GHG emissions from the petroleum industry is Norway. According to statistics from BP, Norway and Canada had a similar share of the global oil production in 2005 (3.5 percent and 3.7

FIGURE 1. GREENHOUSE GAS EMISSIONS PER CAPITA IN SELECTED OECD COUNTRIES, 2004 (TONNES PER CAPITA, CO_2 EQUIVALENT)



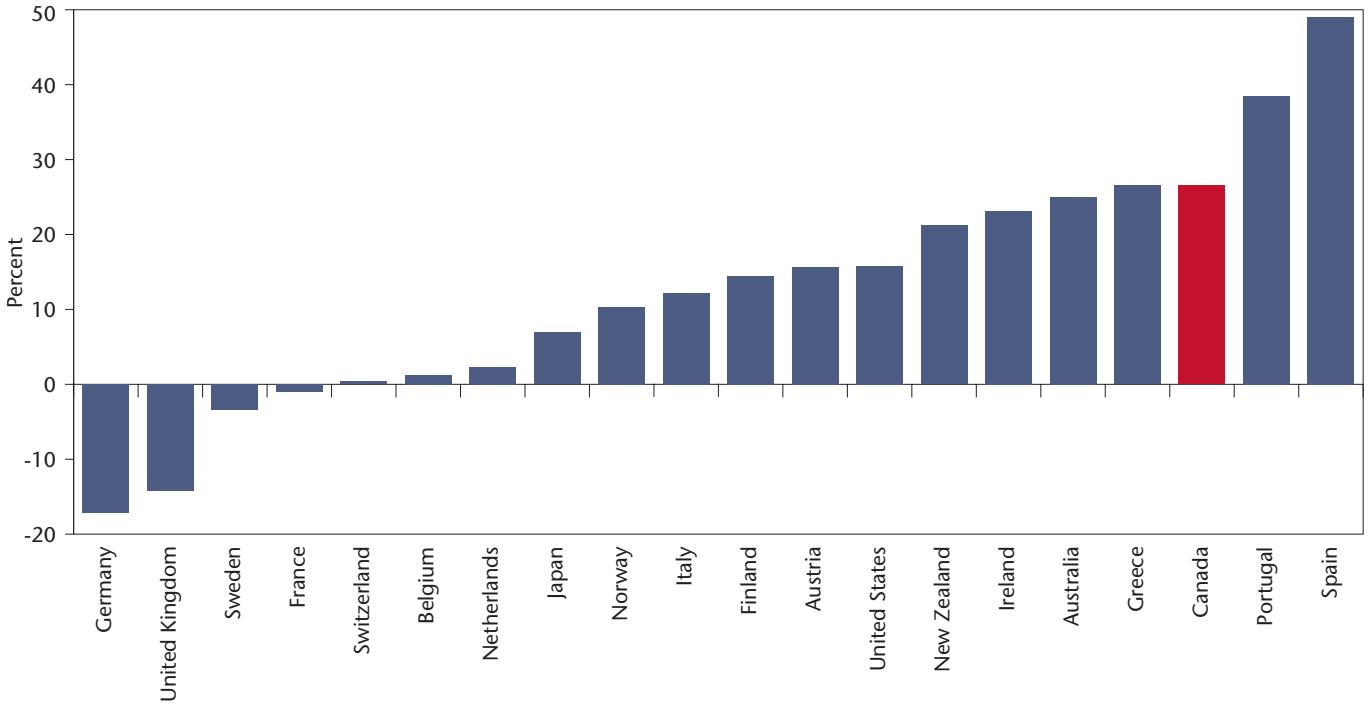
Source : National GHG inventory reports 1990-2004, United Nations Framework Convention on Climate Change website (www.unfccc.int)

percent, respectively). Given that Norway's population and economy are much smaller than Canada's, the oil and gas sector plays a correspondingly greater role. In 2004, the petroleum sector contributed 21 percent of GDP, 27 percent of state revenues, 47 percent of the value of Norway's exports and 24 percent of the country's total investments. It also produced about 25 percent of its total greenhouse gas emissions (in Canada, the equivalent figure is 20 percent). Norway was nevertheless one of the first countries to implement a CO_2 tax in 1991. This tax covers 68 percent of CO_2 emissions and rates range up to C$58 per tonne. It is one of the highest in the world: as a point of reference, one tonne of CO_2 is currently trading at about C$17-25 on the European emissions trading market. While some economic sectors are exempted, this is not the case of the petroleum sector and carbon taxes on oil and gas are relatively high. According to its 2005 Status Report on GHG emissions, Norway partly credits this tax for the emissions-efficiency gains that have been achieved in the production of oil and for investment in carbon capture and storage (CCS) technology. Indeed, between 1990 and 2003, CO_2 emissions per unit of produced oil equivalent fell by 22 percent and independent researchers found that while the overall effect of the carbon tax was small in reducing national GHG emissions (due to numerous exemptions and the inelasticity of demand for some of the products being taxed), it was strongly driven by the Norwegian oil and gas sector. Moreover, every year since 1996, 1 Mt of CO_2 (equivalent to 2 percent of Norway's domestic emissions of greenhouse gas) is separated in the production of natural gas and injected into an aquifer 1,000 meters beneath the sea bed. Another project for carbon sequestration from the production of liquefied natural gas (LNG) is expected to begin operating next year.

Electricity and heat generation. These projects for carbon sequestration in the production of oil and gas are raising hopes that the CCS technology will soon become widely commercially viable for coal and natural gas power plants. While virtually all of Norway's electricity is from hydro (which also explains why despite an equally important oil and gas sector, Norway has a GHG emissions per capita level of 12 tonnes compared to Canada's 24 tonnes), it is starting to resort to coal and gas to meet increasing demand for electricity. Concerned with GHG emissions, the government has stated that new licenses for gas-fired power plants would be based on CCS technology.

However, CCS is more a stopgap than a permanent solution, as it doesn't eliminate carbon dioxide emissions. It only stores them away and buys us time. There are other ways to reduce emissions from electricity generation, and the UK has an impressive record in this area. Over the 1990-2004 period, the UK saw a 26 percent decrease in emissions from power stations, despite a 24 percent increase in electricity use. The difference is mainly due to a shift from coal to natural gas (and upgrades to more efficient gas stations equipped with catalytic emissions control to reduce GHG emissions). Using natural gas instead of coal cuts emissions by about half (depending on the quality of the coal).

FIGURE 2. PERCENT CHANGE IN TOTAL NATIONAL GREENHOUSE GAS EMISSIONS, 1990-2004



Source : National GHG inventory reports 1990-2004, United Nations Framework Convention on Climate Change website (www.unfccc.int)

HOW CAN INDUSTRY BEST

ADDRESS CLIMATE CHANGE?

- ☐ "Dear Mr. Change"
- ☐ Pretend it doesn't exist
- ☐ Hope that somebody else will take care of it
- ☐ Invest over $8 billion in environmental improvements

Over the past decade, Canada's forest products industry has invested over $8 billion in facility upgrades and innovative processes in a continued effort to improve its environmental performance and limit its impact on climate change. In so doing, the industry has reduced its fossil-fuel dependence to the point where nearly 60% of the pulp and paper sector's energy needs are self-generated from renewable sources. From an environmental perspective, these efforts have had tangible results: a 46% improvement in greenhouse gas emissions intensity, a 30% reduction in landfill waste, and a 30% reduction in greenhouse gas emissions. These environmental improvements also bring distinct economic benefits, as the industry has increased its production by 28%.

There remains enormous potential for the industry to go even further. In fact, with the right kind of policy incentives, such as accelerated capital write-offs, a number of emerging technologies could allow us to become a net source of green power in the future while further improving our productivity and cost-competitiveness.

Forest Products Association of Canada
fpac.ca

To learn more, visit fpac.ca.

Natural gas is more expensive than coal, but the UK was able to make the investments at a time of strong economic growth. The UK has also acquired 19 energy from waste (EfW) power plants and the government has introduced the "Renewables Obligations." These require electricity suppliers to generate a certain amount (which will increase over time) of electricity from renewable sources. It is also looking into supporting micro-generation: households and institutional and commercial buildings generating their own electricity and heat through, for example, solar panels or geo-thermal heating systems. The UK government has also put in place the Carbon Trust, an independent company funded by the government to help businesses and the public sector save energy, reduce carbon dioxide emissions and commercialize low carbon technologies. The Low Carbon Buildings Programme supports projects to increase energy efficiency, micro-generation, and the adoption of zero-emissions technologies. And in 2001, the UK introduced the climate change levy, a set of agreements with industry whereby the levy or energy tax is reduced as long as the industry agrees to a set of measures to reduce GHG emissions. The UK, along with other European countries, is also starting to apply the EU Energy Performance of Buildings Directive, which sets relatively high minimum standards for the energy efficiency of new buildings and of existing buildings undergoing major renovations. Moreover, to encourage energy efficiency improvements to homes and buildings, an energy efficiency audit has to be done before owners can rent out or sell their property.

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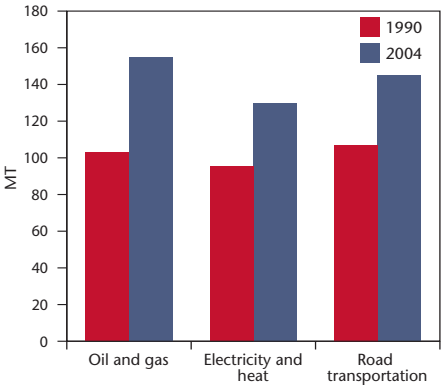
FIGURE 3. GHG EMISSIONS LEVELS OF THE THREE FASTEST GROWING CATEGORIES IN 1990 AND 2004 (MT)



Source : Environment Canada, 2006

Road transportation. This is the "bête noire" of GHG emissions control. Germany is the only country to have experienced a reversal in its GHG emissions from road transportation. Its emissions steadily increased until 1999, after which they started declining. Between 1999 and 2003, GHG emissions from this category fell by 8.5 percent, or 15 Mt. The German government attributes this change to the ecological tax reform that it introduced in 1999. The main thrust of the tax consists in steadily raising prices for fuels that contain carbon, while at the same time cutting employers' contributions to the national pension fund. This makes the tax almost revenue-neutral and prevents it from being perceived as just another way for the government to fill its coffers. In Norway, in addition to the CO_2 tax already mentioned, a car purchase tax was introduced in 1996. The level of the tax differentiates according to car weight, engine output and volume. The Netherlands government is planning to introduce a similar tax on car purchases, but one that would differentiate according to the CO_2 emission efficiency of the vehicle. France credits its high taxes on fuel for the relatively low emission-intensity of the country's passenger fleet. It is also providing financial support to the tune of 100 million euros for the commercial deployment of a hybrid vehicle for families by 2010. Since 2005, new owners of vehicles that meet the highest CO_2 emissions efficiency standards receive an income tax credit. The cost of car licence plates also varies according to the vehicle's emissions efficiency. Finally, a number of countries are encouraging "eco-driving" by stepping up the enforcement of speed limits.

Waste. While waste only accounted for 4 percent of total GHG emissions in 2004, it is a sector where Canada could readily achieve long-overdue emissions reductions. For the sake of comparison, in Canada per capita emissions from waste are 0.9 tonne. In the United States they are 0.65 tonne, in the UK and Japan 0.4 tonne, in Germany 0.2 tonne, and in Switzerland, the most zealous waste manager, an insignificant 0.1 tonne. If waste emissions per capita dropped only to the United States level, it would save about 8 Mt of GHG emissions every year. If they dropped by 60 percent, as has been the case in Germany and the UK between 1990 and 2004, it would represent an annual saving of over 17 Mt of GHG emissions. The main reasons why

emissions from waste disposal are relatively high in Canada is that Canadians generate on average a considerable amount of waste (over 970 kg every year on a per capita basis), the large majority of solid waste is landfilled as opposed to incinerated or recycled, and only a fraction of landfills are equipped to recover landfill gas. The anaerobic decomposition of organic waste in landfills produces methane, a GHG that is much more potent than carbon dioxide. The more organic waste in landfills, the more methane is produced. According to a 2005 report by Statistics Canada, organic materials make up about 40 percent of total residential waste. Moreover, in 2002, only 20 percent of residential solid waste was diverted to recycling facilities. A few Canadian municipalities have very successful waste management programs. Edmonton, for example, has one of the highest diversion rates in Canada: 43 percent of the waste is either recycled or composted. The Alberta capital has one of the largest composting facilities in North America.

Several European countries, where space is at a greater premium than in Canada, have developed comprehensive waste management strategies. Landfill taxes encourage reduction of waste, recycling, composting. Some countries have also recently introduced outright bans on the landfilling of biodegradable waste. In Sweden, an important portion of household waste is converted into fuel, which is then used in the increasingly popular district heating networks (a centralized system used to distribute heat to several homes and buildings). Actually, as much as half of all the fuel used in district heating networks come from municipal biodegradable waste. The UK is also planning on increasing its recovery of energy from residual municipal waste to generate electricity.

Looking at other countries' experience with climate policy shows that there is a raft of policy measures and programs that Canada could adopt to try to take better control over its GHG emissions. However, in order for this to happen, there first has to be a shift in our thinking about climate change as a cost to seeing it as an opportunity and a technology race. The whole world will soon be looking for low-carbon technologies. One way the Canadian government can help domestic companies to better position themselves to be able to benefit from this new market is to provide demand for such technologies at home. This can happen if there is also a shift in our climate policy approach.

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Moreover, emissions trading should not be dismissed as a tool for controlling domestic and global emissions. Domestically, a cap-and-trade system could ensure that emitters start internalizing the cost of emissions and see an incentive to devote greater efforts and investment towards reducing their emissions. It could also help pay for the cost of outfitting landfills with gas recovery systems, for example. Internationally, the Kyoto Protocol's Clean Development Mechanism (CDM) is an ingenious way of channelling investment to reduce emissions in developing countries, transferring clean or "cleaner" technology and financing its adoption over cheaper but more polluting alternatives, and of achieving global emissions reductions where it is most cost-effective to do so. Here are just a few examples of projects to be supported through the CDM: retrofitting a heating plant in Mongolia, optimizing technology at a cement production firm in India, financing wind power projects or the installation of landfill gas recovery systems in China, and improving energy efficiency in a low-cost urban housing development in South Africa. This is not "buying hot air," as some early critics feared.

Finally, perhaps the only argument for doing something about climate change that needs to be mentioned at all is that it is not a problem that is going to go away for a long time. The longer serious action is delayed and the more GHG emissions are released into the atmosphere, the faster the global climate is going to change, and the more it is going to stress our capability to adapt. It is no longer a question of whether reducing emissions is going to be necessary or not, it is a question of how long it will take before we start making the transition to the economy of the future, which will be a low-carbon economy.

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