



Human Development Report **2007/2008**

**Fighting climate change:
Human solidarity in a divided world**

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OCCASIONAL PAPER

Canada Country Study

Simon D. Donner

EXECUTIVE SUMMARY

The energy rich country of Canada has seen greenhouse gas emissions soar since 1990. Despite agreeing to a 6% reduction in emission by 2008-2012 in the Kyoto Protocol, Canada's growing economy and burgeoning oil and gas sector have led emissions to rise to 27% over 1990 levels. Under a business-as-usual scenario, Canada's emissions would reach more than double 1990 levels by the year 2050. Domestic disagreement over how to manage emissions without damaging the growing economy has led to ongoing uncertainty over short-term and long-term emissions policy. Placing Canada on a path to carbon-neutral growth will require a substantial shift towards energy efficiency and higher automotive fuel efficiency as well as control of emissions from the growing development in the oil sands region of Alberta.

1. Current greenhouse gas emission trends

A large, northern country reliant on its natural resources, Canada is unique among the Annex 1 nations and parties to Kyoto Protocol. It is the only signatory to Kyoto that is both a large producer of energy and a large (per-capita) consumer of energy. In 2004, Canada emitted 758 Mt¹ of greenhouse gases (GHG), roughly 2% of global emissions, despite a population of only 32 million people less than 0.5% of the world population. The per capita GHG emissions (23.7 Mt per person²) ranks alongside the United States and Australia as the highest in the world. The high emission rate is traditionally attributed to long travel distances between population centres, high heating requirements and an economy dependent on resource extraction and energy production. However, some experts observe that recent emissions trends may be influenced as much by policy choices as by structural factors³.

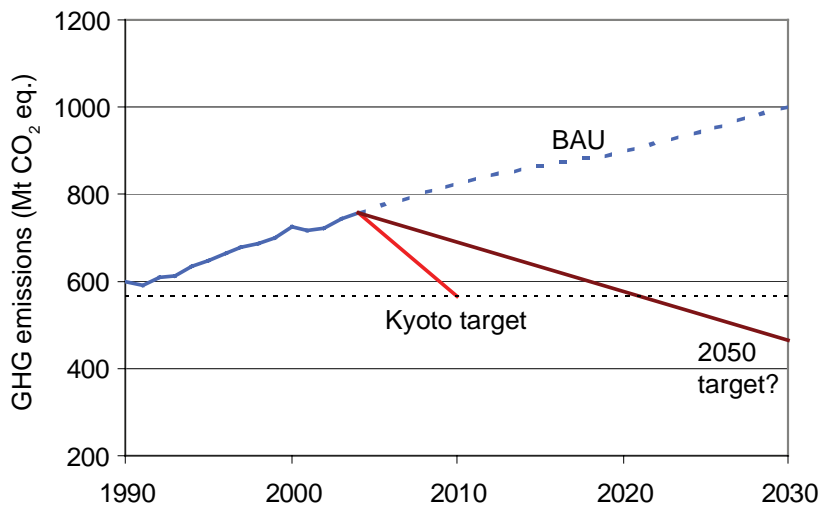


Figure 1. Canadian GHG emissions trend, 1990-2030. Shown is 1990-2004 data with business-as-usual (BAU) trend to 2030. The red line represents the path to the Kyoto target (6% below 1990 levels); the maroon line represent path to 60% below 1990 levels by 2050.

Canadian GHG emissions rose from 599 Mt in 1990 to 758 Mt in 2004 (excluding emissions from land cover and land use change), an increase of 26% (Figure 1). The rising emissions since 1990 places Canada 35% above the target agreed to in the Kyoto Protocol, a 6%

reduction below 1990 levels. The increase was driven largely by rapid growth in the domestic economy, due in part to international economic forces like rising oil prices, and increased demand for natural resources. Canada's gross domestic product (GDP) rose 49% over the same period. As the rise in GDP outpaced the rise in GHG emissions, there was a 15% decrease in the intensity of GHG emissions intensity (emissions per \$ of GDP), suggesting some modest decoupling of GHG emissions and the economy.

A 67% increase in GHG emissions from the oil and gas sector accounted for one-third of the total emissions increase between 1990 and 2004. This change was predominately due to development in the oil sands region of the province of Alberta (see box). Transportation accounted for a further 28% of the increase; freight volume increase by almost 50%, and emission from light trucks, which includes minivans and SUVs, increased by over 100%. Large increases were also seen in power generation (22%). The only significant areas of decrease were in non-energy industries.

With the changes in emissions over the past 15 years, roughly 85% of Canada's GHG emissions are currently connected with energy production or energy consumption (industrial, commercial and residential). By sector, the largest emitters are transportation, oil and gas, other industry and power generation (Figure 2). The Canadian automotive industry, the third largest exporter of passenger vehicles in the world, is the largest segment of the manufacturing sector.

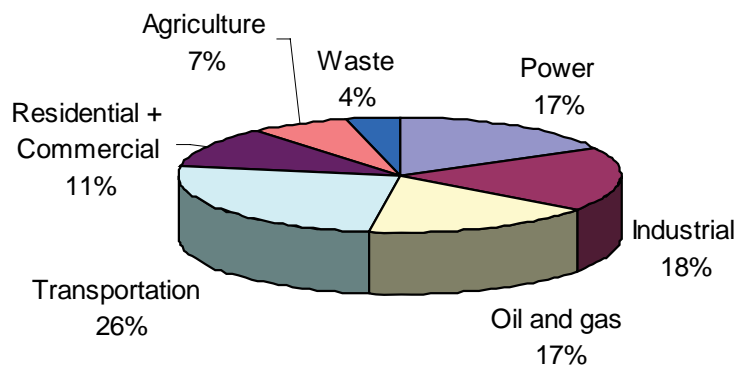


Figure 2. Canadian GHG emissions by sector, 2004

Because of the broad distribution of natural resources and population, GHG emissions vary widely across the country. In 1990, the province of Ontario, home to one-third of the country's population, was the highest emitting province. Between 1990 and 2004, the province of Alberta surpassed Ontario in total emissions due to the expansion of oil extraction in the oil sands region (Figure 3). Alberta also has the highest per capita emissions; the lowest is found in Québec, the second most populated province, where hydropower provides over 80% of electricity.

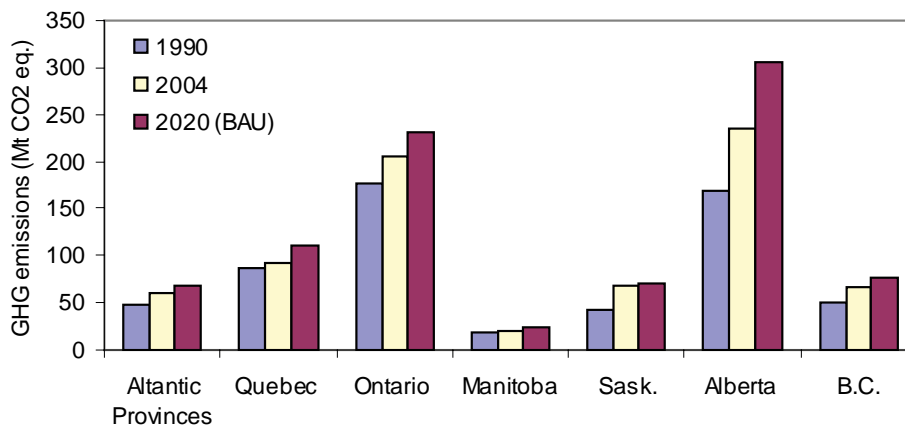


Figure 3. Canadian GHG emissions by province. The 2020 projection is based on a business-as-usual scenario (2020) from the Government of Canada.

The most recent Canadian Government energy projections conclude that, absent enforcement of a Kyoto-related policy, greenhouse gas emissions will grow to 828 Mt in 2010⁴. The 265 Mt difference between the emissions projection for 2010 and the Kyoto target is commonly referred to in Canada as the “Kyoto gap”. Absent any substantial changes in policy, the country expects further 1.1% annual emissions growth between 2010 and 2020⁵. Emissions from 2004 to 2020 are projected to increase from the most from oil and gas, largely in the Alberta oil sands, and from growth in transportation, largely vehicle miles and freight volume. Small decreases are anticipated from power generation as coal-burning plants in Ontario and other provinces are closed or switched to natural gas and wind power generation expands.

A continuation of this business-as-usual (BAU) trend would bring Canada’s emissions to 1001 Mt in 2030 (67% over 1990 levels) and 1246 Mt in the year 2050 (108% over 1990 levels). A commonly suggested long-term emissions reduction target for Canada is a 60% reduction in GHG emissions below 1990 levels by the year 2050⁶. Reaching this target would require a 53% reduction in Canadian emissions from the BAU scenario for 2030 and an 80% reduction in Canadian emissions from the BAU scenario for 2050. With the large planned investment in carbon-intensive capital stock (in the oil and gas sector) and ongoing emissions growth in the transportation sector, shifting to such a carbon-neutral emissions path will be a formidable challenge for Canada.

2. An overview of current emissions policy and target-setting

In the 1997 Kyoto Protocol, Canada agreed to reduce GHG emissions by 6% below 1990 levels by the 2008-2012 commitment period. The Kyoto Protocol was not officially ratified until December 17, 2002, due in large part to concerns of opposition parties in Parliament and Alberta and other provinces that the failure of the U.S. to ratify Kyoto would hurt Canada’s competitiveness⁷. The delay in ratification slowed development of a federal implementation plan. The first thorough plan for meeting the Kyoto target was not released in late 2002, around the time of ratification.

The 2002 Climate Change Plan for Canada called for meeting the national Kyoto target by 2010 through purchasing of offsets from other nations, credits for exports of clean energy, credits for forestry practices (“sinks”) and a variety of new and existing programs⁸. The new programs included a emissions cap and trade system for large final emitters or LFEs – heavy industry including oil and gas, mining, manufacturing and electricity generation – that are

responsible for almost half of the domestic GHG emissions. Other emissions cuts were expected to come from voluntary initiatives like the One Tonne Challenge, begun in 2004, which promoted ways the average Canadian could reduce their personal greenhouse gas emissions by 20% or one tonne.

In 2005, the federal government released a *Project Green*, an updated plan to meet what was a growing gap between emissions and the Kyoto target⁹. The core of the updated policy was a \$4-5 billion federal “Climate Fund” which would be used to purchase domestic and international offsets, a \$2-3 billion partnership fund to support emissions reduction by the provinces and the private sector, including carbon capture and storage and clean coal technology, and intensity-based emissions caps for the LFEs.

The plan was criticized¹⁰ for reliance of voluntary measures, including a voluntary agreement with the large automotive sector¹¹ and emissions offsets. The LFEs were responsible for only one-eighth of the total burden for the emissions reductions, and they could comply by purchasing carbon offsets or investing in a technology fund, rather than reducing actual emissions. A report by Canada’s Auditor General, a watchdog for federal government policies, concluded that the national climate change plan was “not well organized and not well managed” and lacked “leadership, planning and performance”¹².

In January of 2006, a new minority government led by the Conservative Party assumed power. With emissions far above the Kyoto target, the new government concluded that reaching the Kyoto target was impossible and cancelled all previous federal climate change programs. A new Clean Air Act that called for a 45-65% reduction in GHG emissions below 2003 levels by 2050, but contained no specific policies and no binding targets before 2020¹³. The new policy was harshly criticized by opposition parties in federal Parliament, provincial and municipal leaders, environmental organizations and a public increasingly concerned about the impacts of climate change. Political pressure led to a line-by-line Parliamentary review of the disputed Clean Air Act¹⁴ and to legislation, passed by the opposition parties, calling on the government to enact a policy that complies with the Kyoto target¹⁵.

The dispute over domestic climate policy, ongoing at the time of publication, is likely only to be settled by a federal election. Public outrage over the Clean Air Act and strong advocacy by both environmental and business groups guarantees that the next Parliament, regardless of its composition, will enforce an emissions policy. The new policy will likely feature both short-term and long-term targets and a specific prescription for meeting at least a fraction of the Kyoto target.

One possibility, a proposal released by the opposition Liberal party, pledges to meet the Kyoto target through the *Project Green* programs, public financing for energy efficiency improvements, expansion of wind power and other renewable energies, reduction of tax breaks for development in the Alberta oil sands¹⁶. Under a potential cap-and-trade system¹⁷, LFEs would pay a fine [\$CAN 20-30 per tonne of CO₂ equivalent] for each tonne of GHG in excess of a hard emissions cap. The funds would target that would be directed towards a Green Investment Account (GIA) for the country to support research, technology and emissions reductions. The proposal would allow LFEs to offset up to 25% of excess emissions through the purchase domestic or international carbon credits certified by the Kyoto Protocol.

The ongoing federal discord inspired a number of emissions reduction initiatives and policies at the municipal and provincial level¹⁸. Quebec was the first province to set an emissions target (1.5% below 1990 levels by 2012), which the government plans to achieve through an expansion of wind energy, hydropower, public transit and energy efficiency¹⁹. Québec and the Atlantic provinces joined the New England states (in the US) in a voluntary agreement that called for stabilizing emissions at 1990 levels by 2010 and at 10% below 1990 levels by 2020²⁰.

In early 2007, the government of British Columbia set the most aggressive short- and long-term emissions targets (e.g., 10% below 1990 levels by 2020) of any jurisdiction in North America which it plans to meet through actions including expansion hydropower, closure of coal-

fired generating stations, improvements in home energy efficiency, investments in public transportation and modernization in the electrical transmission grid²¹. Ontario is expected to make a similar pledge, achieving emissions reduction through ongoing initiatives like the development of energy efficient building codes, the closure of coal-fired power generating stations and mandated improvements in automotive fuel efficiency²². While the other provinces have not set targets, several like Manitoba have expressed interest and have ongoing renewable energy and energy efficiency initiatives that should at the very minimum slow emissions growth.

The most effective emissions policies to date have been enacted at the municipal level. Toronto, the largest city in the country and host to the International Council on Local Environmental Initiatives, was the first city in the world to commit to emission reductions. By 2005, the city reduced its operational emissions by 40% below 1990 levels through energy efficiency initiatives, retro-fitting of old buildings and capture of landfill gas²³. A number of other Canadian cities are joining Toronto in pledging to meet CO₂ emissions targets of a 30% reduction (below 1990 levels) by 2020 and an 80% reduction by 2050.

Although the municipal and provincial initiatives have shown promise, emissions reduction by LFEs, transportation and the expanding oil and gas sector will require leadership from the federal government²⁴. Support for aggressive emissions policy varies widely across Canadian industry and the business community. Some Canadian corporations like Alcan have set and abided by stringent emissions targets based on actual emissions; others have actively lobbied against climate change policy. Regardless of the position of the individual companies on federal policy, the industry and the business community as whole awaits a policy signal from the government to aide in long-term capital investment decisions²⁵.

3. The role of government and other major actors in international processes and agreements

Canada has a strong history of leadership on global environmental and atmospheric issues, from acid rain, to ozone depletion to climate change. The Government of Canada hosted the first international conference on climate change (in Toronto) in 1988 where then-Prime Minister Brian Mulroney called climate change a concern “second only to nuclear war”. Five years later, the Canada passed its first National Action Program on Climate Change, calling for a 20% reduction in CO₂ emissions below 1988 levels by the year 2005, a target first proposed during the 1988 Toronto meeting. Canada’s role in international climate policy has since been compromised by a rancorous domestic debate over the Kyoto Protocol and a subsequent failure to slow GHG emissions growth.

Unfortunately, understanding the change in the Canadian position requires some knowledge of federal-provincial relations and domestic politics. First, only the federal government has the right to negotiate, sign and ratify binding international agreements. The federal government also has jurisdiction over the energy policy and trans-border environmental concerns. However, the provinces have jurisdiction over natural resources, power generation, transportation, and building codes. Therefore, provincial agreement is necessary for any domestic or international long-term climate change or energy policy²⁶. Second, Canada’s leverage in any international agreement is also limited by the strong economic relationship with the United States. The North American Free Trade Agreement covers trade in every sector of the economy, including energy, and therefore constrains domestic energy policy.

In 1997, the federal government run by the Liberal Party, supported largely by Ontario and Quebec, agreed with the provinces agreed to seek a target of stabilizing emissions at 1990 levels by the year 2010 in international negotiations. Shortly before the COP meeting in Kyoto later that year, the federal government decided unilaterally to seek a target of 3% below 1990 levels²⁷. Driven by international pressure, the Canadian government agreed to an even lower target 6% below 1990 levels by the years 2008-2012. The unilateral decisions by the federal

government upset relations with the provinces, particularly with Alberta, and helped ignite the current discord over domestic policy and Canada's role in international policy.

The U.S. decision not to ratify the Kyoto Protocol placed Canada in the unenviable position of choosing to abide by an international agreement that would effect economic production without its largest trading partner. The federal government finally ratified the Kyoto Protocol five years later, over the objections of the Alberta government, but failed to ever fully implement either of the plans designed to meet the target set under the Kyoto Protocol.

Until the change in government in 2006, the Canadian government tried to maintain a leadership role in international climate policy despite the lack of domestic action on emissions. In December, 2005, Canada hosted the 11th Conference of Parties (COP) to the UN Framework Convention on Climate Change (in Montreal). The host delegation, led by then-Environment Minister Stéphane Dion, pushed for the development of a post-Kyoto long-term climate policy against the objections of important allies like the U.S.

In 2006, the new Conservative government, elected with more support from Alberta and the western provinces, signaled that it would be "impossible" for Canada to meet the Kyoto target, but stopped short of withdrawing from the Kyoto Protocol²⁸. The government has since expressed interest in joining the Asia-Pacific Partnership on Clean Energy and Climate, the non-binding accord between the United States, China, Japan, India, the Republic of Korea and Australia²⁹. In July, at the 12th COP meeting in Nairobi, the delegation placed less emphasis on the need for binding targets in a post-Kyoto international policy. These policy positions are expected to change, either due to pressure from the opposition parties in Parliament or a change in government.

One means by which Canada may engage in international processes to reduce GHG emissions is through development assistance and the Clean Development Mechanism. The Canadian International Development Agency (CIDA) has a history of promoting sustainable development in Asia, Africa and the Pacific Islands although it is currently also very active in developing oil and gas overseas³⁰. A former Canadian Prime Minister, Lester B. Pearson, originated the now-popular concept that developed nations should increase their international development assistance to 0.7% of gross national income. The cost of Canada's Kyoto target via purchasing international emissions credits has been estimated as similar to the cost of increasing development assistance this target³¹. Although little action has occurred to date, it is possible that under a post-Kyoto international climate policy, development aid will be directed towards renewable energy and emissions reductions projects overseas.

4. Achieving carbon neutral growth

Over the past fifteen years, Canada has failed to control growing GHG emissions despite a number of policy pronouncements. With a rapidly growing economy, grounded in oil and gas, and a growing population, achieving carbon neutral growth in Canada appears to be a formidable challenge. However, one should not forget that Canada is a highly educated and innovative nation with a strong history of promoting peace, equality, international development and global environmental protection. Canada also has a strong national interest in mitigating climate change which may already be impacting forestry and its Arctic peoples. A recent example is temperature-driven northward spread of the mountain pine beetle in British Columbia and Alberta that has devastated the Canadian forestry industry and forced the federal government to change its policy on including forests in the national carbon emissions budget³².

Canada could achieve carbon neutral growth by shifting the national attention to improving energy efficiency, reducing emissions from energy production and developing new low-carbon technologies. The National Roundtable on the Environment and the Economy, an independent advisory body for the federal government, reports that Canada could achieve a 60%

reduction in energy-related emissions 2050 through energy efficiency measures and new technologies in energy production³³. In addition to reducing Canada's emissions burden, setting the country on this path would also address growing concerns about air quality and produce expertise and technology that could be exported to the world. A plan based on the following five themes would place Canada on the path towards long-term reductions in emissions without sacrificing economic development.

- 1. Strong leadership from the federal government:** Following on the recommendations of Auditor General³⁴, Canada's climate change effort should be centralized, ideally in the Prime Minister's Office. This could ease integration of emissions reduction goals into all government operations, including energy, environment and international development, and reduce the territorial disputes between government departments and the provinces that inhibited past federal efforts. Though the provincial emissions reduction policies are promising, due to the breakdown of powers and taxation in the federalist system, the federal government must take the lead on implementation of carbon capture and storage technology in the energy sector, automotive fuel efficiency and funding public transit
- 2. Leverage existing policies.** Despite years of relative inactivity on emissions reduction, many useful policy levers do exist³⁵. For example, the implementation plan can take advantage of: i) the Canadian Environmental Protection Act for regulating air pollutants, ii) the Energy Efficiency Act for setting residential, commercial and industrial standards, iii) the Wind Power Production Initiative for a framework for a renewable energy portfolio standards, iv) the Income Tax Act for expanding capital cost allowances for energy efficient construction and reducing capital cost allowances for development in the oil sands. Existing municipal and provincial policy initiatives and renewable portfolio standards can help introduce the appropriate forms of renewable energy – like hydro in Quebec, Manitoba and British Columbia, and wind in Alberta, Saskatchewan and Manitoba – into each region's electricity mix.
- 3. Address the large final emitters (LFEs).** To date, no government to has shown willingness to address the LFEs, responsible for almost half of Canada's emissions³⁶. A clear policy signal from the federal government would direct capital investment and provide incentives for companies to develop new technologies. The most effective option may be the proposed cap-and-trade system that features hard emissions targets by sector, limited purchase of domestic and international offsets and the development of a national green investment fund. It would take advantage of existing market forces, provide financial opportunities for Canadian industry and fuel spending in research and development.
- 4. Empower communities.** Canadian cities have shown the ability to reduce emissions through control over urban planning, public transit, energy purchases and building codes. Infrastructure funding from higher levels of government can be directed to proven initiatives like tax credits for retrofitting buildings, mortgage assistance for energy efficiency improvements, expanded public transit, vehicle and road restrictions, waste reduction and landfill gas capture, electricity co-generation and development of renewable energy sources.
- 5. Promote new technology.** Reducing emissions from the oil and gas sector and the transportation sector will depend on technological development, some of which will occur outside the country. Federal policy and infrastructure funding will be needed to promote the development of carbon capture and storage technology to reduce emissions

from the oil sands. Although Canada has little direct control over vehicle technology, joining the initiatives by some U.S. states to place limits of carbon emissions from passenger vehicles, and direct U.S. attention to the often overlooked issue of truck fuel efficiency, would expedite the shift to more fuels efficient vehicles.

The shift in national attentions must happen soon to meet a long-term the suggested emissions target. With almost \$100 billion in investments in development planned for the next 15 years in the oil and gas sector alone, Canada risks increasing its global atmospheric burden. A binding, long-term federal emissions policy and implementation plan is crucial to encouraging sustainable investment by the private sector, especially in the oil and gas sector.

5. Box: A case study of the oil and gas sector

Energy production is one of the cornerstones of the Canadian economy. Roughly 40% of Canada's greenhouse gas production is associated with the production and distribution of energy for domestic use and for export³⁷. Oil and gas represents over 90% percent of Canadian energy exports. Canada is currently the largest foreign supplier of oil to the United States. Growth in the oil and gas sector since 1990 has helped drive the record growth in the Canadian economy and the increase in GHG emissions.

The primary reason is the development of the tar sands or oil sands in Alberta. Oil sands are a mixture of sand, silt, water, clay and bitumen, a thick tar-like mix of hydrocarbons. The bitumen deposits in three regions of northern Alberta – Athabasca, Cold Lake and Peace River – together may represent the largest known reserve of extractable oil on the planet. Unlike conventional oil, however, the highly viscous bitumen is not recoverable through wells. Instead, it must be extracted either by more costly and energy-intensive methods like mining or in-situ methods like underground steam heating³⁸.

The mining method, responsible for 61% of current extraction in Canada (2006 data³⁹), involves stripping away the overlying layers of soil and directly removing the oil sands. The in situ methods involve removing the bitumen from the sands underground. The most common approach, used in 28% of extraction, is to add steam heat to the underlying sands. This makes the bitumen less viscous, allowing it to flow to the well. After extraction, the majority of the separated bitumen is then upgraded to create synthetic crude oil. The synthetic crude can be upgraded by refineries into transportation fuel or other products.

Development in the Alberta oil sands first began in 1960s. It did not expand until the 1990s, when the depletion of other oil reserves, the availability of natural gas to drive extraction and higher oil price made development more attractive and cost-efficient. From 1996 to 2004, \$34 billion was spent on new projects⁴⁰. By May 2006, oil sands projects accounted for 62% of all major projects listed by the Economic Development department of the Alberta Government⁴¹. The Canadian Association of Petroleum Producers and the Canadian National Energy Board estimates that roughly \$95 billion will be spent in construction of oil sands operations from 2006-2016, including capital expenditures and money to sustain capital. Total output from the oil sands was 1.1 million barrels per day in 2005 and is expected to at least triple by 2015. With a decline in conventional oil production, the oil sands are expected to represent 80% of Canada's oil production by 2020⁴².

The challenge for producers is the energy-intensive extracting, refining and processing the oil from the oil sands currently can generate anywhere two to four times the GHG emissions of conventional oil drilling. The rapid development in the oil sands is the prime reason that GHG emission from the oil and gas sector increased by more than 50% from 1990 to 2004 and that Alberta surpassed Ontario as the largest emitting province. For example, 79% of emissions of Suncor, Inc, one of largest oil and gas firms in Canada, now come from its oil sands operations⁴³.

Continued oil sands development is expected to account for 41-47% of national emissions growth to 2010⁴⁴. The GHG emission from the oil sands could increase by three to five times by 2020⁴⁵.

The economic opportunity in the oil sands has led the oil and gas industry in Canada and the province of Alberta to oppose binding national GHG emissions targets in the past⁴⁶. However, Canada's Auditor General recently indicated that the federal government must identify targets for GHG emissions reductions from oil and gas and develop an implementation plan⁴⁷. The increasing capital expenditure in the carbon-intensive oil sands is expected to be one of the central challenges in achieving long-term emissions reductions in Canada. Since oil sands projects are expected to have a lifespan of 30 years or more, current and planned investments could commit Canada to continued emissions growth.

The best opportunity for mitigating emissions from the oil sands without harming the economy may be the development of carbon capture and storage (CCS) technology. Multiple levels of governments and energy corporations have begun supporting demonstration projects that capture CO₂ generated during the extraction process in Alberta and inject into geological reservoirs. An ongoing international storage and monitoring project in an oil field in Weyburn, Saskatchewan is currently the largest carbon sequestration project in the world. The technology is potentially attractive to energy companies operating in western Canada because the injected CO₂ could enhance oil recovery. While current CCS projects have produced negligible emissions reduction (at the national level), they have indicated the potential for expansion. One obstacle in will be developing a pipeline to rout CO₂ from its source in the Alberta to the ideal locations for geological storage in neighbouring Saskatchewan.

An emissions policy centered on CCS technology could eventually help Canada achieve carbon-neutral growth⁴⁸. One study estimated that oil sands activities could become carbon-neutral by 2020 through investing in CCS, improving energy efficiency, switching to low-carbon fuels (e.g. biofuels) to drive extraction processes, and purchasing offsets⁴⁹. The cost was estimated a 2-14 US\$ per barrel of oil, which could be acceptable if oil prices remain high⁵⁰. A potential means for funding development of CCS technology would be requiring foreign purchasers of energy from the oil sands to also fund offsetting emissions from the extraction and production process. Although no direct policy levers currently exist, the upcoming federal domestic emissions policy may include either regulations or incentives to speed the implementation of CCS technology in oil sands operations.

Conclusion (250)

Canada is at a crossroads. A country of only 32 million people, Canada has long played a disproportionate role in the global economy and the development of international policy. After demonstrating strong early leadership on international climate and greenhouse gas emissions policy, Canada has failed to deliver promised emissions reductions. A growing economy, domestic politics and external economic pressure led the current state of uncertainty over the country's commitment to the Kyoto Protocol. The public response to the current government's new Clean Air Act and rejection of the Kyoto Protocol target, and the aggressive initiatives at the municipal and provincial levels, suggests that Canada has the will to shift from the current path, one of emissions growth, to a carbon neutral path. The country must now translate that momentum into aggressive improvements in energy efficiency and aggressive reductions in GHG emissions from the energy producing and transportation sectors of the economy.

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