



Home > Country Analysis Briefs > **Canada: Environmental Issues**

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## Canada: Environmental Issues

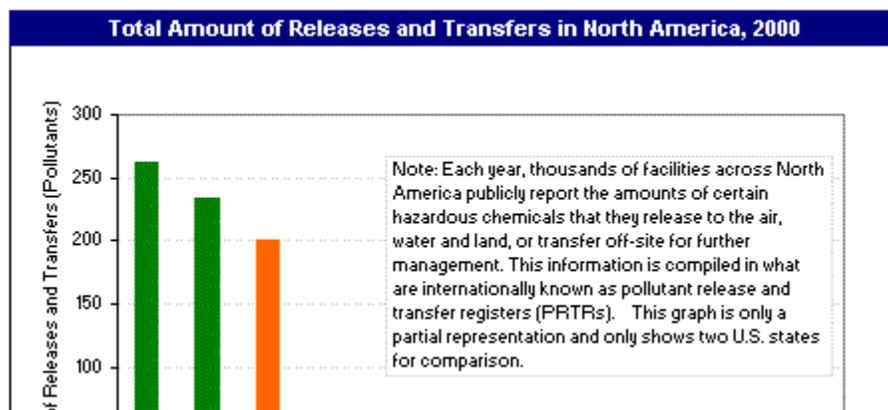
### Introduction

Canada's energy abundance has encouraged the development of a highly energy-intensive economy based on natural resource extraction and processing. Total Canadian oil production, for example, increased from 1.8 million barrels per day (bbl/d) in 1984 to an estimated 3.1 million bbl/d in 2003. Canada's growth in oil output, particularly recently, can be attributed to the development of oil sands in Western Canada, as well as to large oil projects off the coast of Newfoundland. Oil sands projects are large, use considerable amounts of energy, particularly natural gas, and release both gaseous and particulate emissions into the atmosphere. Although the oil sands processes have become more efficient and have reduced greenhouse gas (GHG) emissions per unit of production, an increase in output could lead to an increase in total emissions. Other environmental challenges associated with oil sands processing are disposing of tailings, wastewater management, and land reclamation.

Canada is the world's third largest natural gas producer and second largest natural gas exporter. According to Environment Canada (EC), a branch of the Canadian government, about half of all homes in Canada use natural gas as the main source for heating. Natural gas also is used extensively by the electricity generation, industrial and commercial sectors. Oil and natural gas exploration is impacting coastal communities from the Beaufort Sea region to waters off Cape Breton and Prince Edward Island.

Heavy reliance on energy-intensive industries could make it more difficult for Canada to meet its environmental commitments, particularly on climate change. Despite protests from Canadian industries and provincial governments, the Canadian House of Commons on December 17, 2002, ratified the Kyoto Protocol, committing the country to reducing greenhouse gas emissions 5.2% below 1990 levels during the period 2008-2012. The loudest protests came from Alberta's oil sands producers worried that the protocol would hurt the economics of their operations. In July 2003, former Prime Minister Chrétien attempted to quell their worries by promising safeguards to the Canadian oil industry to limit the economic impact of the Kyoto Protocol. Nonetheless, the protocol remains controversial in Canada. Newly-appointed Prime Minister Paul Martin commented in December 2003 that Canada does not yet have a concrete plan for meeting its Kyoto commitments.

Besides close bilateral ties with the United States, Canada also works closely with Mexico. All three countries participate in the [Commission for Environmental Cooperation \(CEC\)](#), a tri-national organization established under the [North American Agreement on](#)



### Environmental Cooperation

(NAAEC). The CEC addresses environmental concerns associated with increased trade in North America, such as air pollution and enforcement of environmental law. The Agreement complements the environmental provisions of the North American Free Trade Agreement (NAFTA).

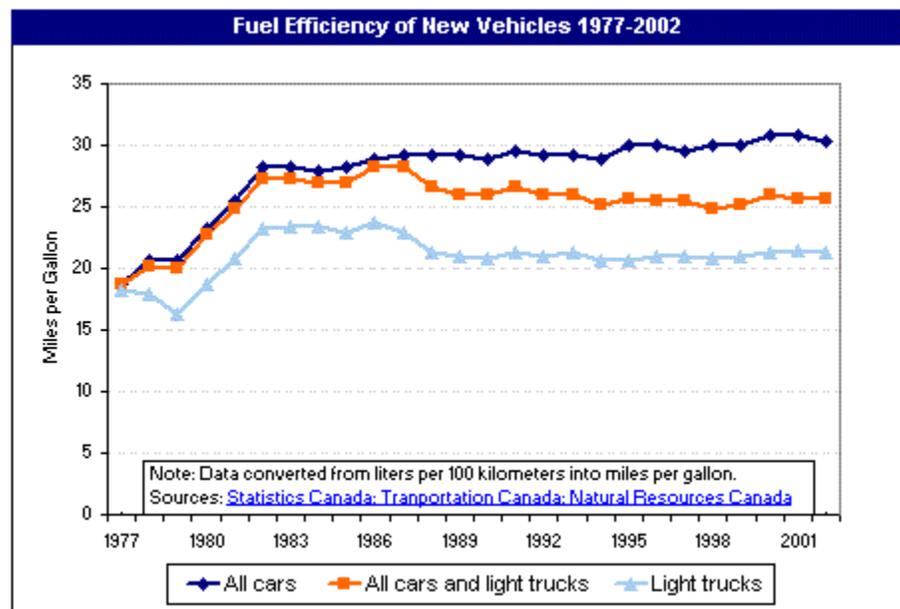
### **Air Pollution**

In a report from the NAFTA Commission for Environmental Cooperation, Ontario was the third-worst polluting state or province in both Canada and the United States in 2000 (see [graph](#)). In addition, Canadian toxic air emissions from plants and mills increased by 7% from 1998 to 2000 while those in the United States fell by 8% over the same period.

According to EC, air quality in Canada has improved in some areas while it has worsened in others. For example, ambient levels of nitrogen dioxide, sulphur dioxide and carbon monoxide dropped between 1990 and 2000 in urban areas, while emissions of volatile organic compounds from all sources did not improve. One main contributor to Canada's air pollution is emissions generated from automobiles. EC reported that the transportation sector is responsible for 40% of nitrogen oxide and 25% of carbon dioxide emitted into Canada's atmosphere. Between 1990 and 2000, automobile travel increased 9%, while fossil fuel consumption increased 21% over the same period. Moreover, EC pointed out that between 1990 and 2002 energy efficiency in the passenger transportation sector decreased 1.1%, reflecting a shift away from passenger cars towards larger vehicles, such as sport utility vehicles and minivans (see [graph](#)).

In February 2001, Environment Minister David Anderson announced the government's [10-year Plan of Action for Cleaner Vehicles, Engines and Fuels](#). Some of the initiatives outlined in the plan include reducing the level of sulfur by 2006 in diesel fuel used by trucks and buses and getting automobile manufacturers to introduce low-emission vehicles in Canada for model years 2001-2003.

Canada also has undertaken measures to reduce cross-border air pollution. In December 2000, for example, Canada signed the [Ozone Annex to the 1991 Canada-U.S. Air Quality Agreement](#) to reduce the flow of air pollutants transcending the border. In June 2003, Canada and the United States deepened cooperation on reducing cross-border air pollution by agreeing to the Border Air Quality Strategy. The program supports [three pilot projects](#): the Great Lakes Basin Airshed Management Framework; the Georgia Basin/Puget Sound International Airshed Strategy; and a study on the feasibility of emissions trading for NO<sub>x</sub> (nitrogen oxides) and SO<sub>2</sub> (sulfur dioxide).



### **Energy Use and Carbon Emissions**

In 2001, Canada ranked as the seventh-largest consumer of primary energy in the world, at 12.5 quadrillion Btu (quads). Between 1991 and 2001, Canada's total energy consumption increased 15%, while total consumption of fossil fuels rose 21% over the same period. The Canadian government attributes the country's high energy consumption to vast land distances in regards to transportation; a cold climate; an energy-intensive industrial base; relatively low energy prices; and a high standard of living.

In 2001, Canada was one of the world's leading carbon emitting countries, generating 156.2 million metric tons (mmt) of energy related carbon emissions (2.5% of the world total). According to [Canada's Greenhouse Gas Inventory \(CGGI\)](#), compiled by the [Greenhouse Gas Division of Environment Canada](#), Canada's GHG emissions decreased in 2001, the first year-on-year decrease since 1991. Nonetheless, emissions increased 18.5% between 1991-2001. The greatest contributions in 2001 were from the electricity and petroleum industries, which accounted for 38% for total national emissions, followed by the transportation sector with 25%, according to CGGI. Overall, the energy sector (including stationary and transportation combustion sources and energy used during the extraction of fossil fuels) accounted for over 80% of Canada's total GHG emissions in 2001. Of the provinces, Alberta accounted for 31.2% of total GHG emissions, followed by Ontario (27.9%) and Quebec (12.5%).

Canada has started initiatives to reduce GHG emissions, namely the [Climate Change Plan for Canada](#), announced in November 2002. The plan received a needed boost in August 2003, as the government [committed \\$1 billion](#) to measures outlined in the program.

### Energy and Carbon Intensity

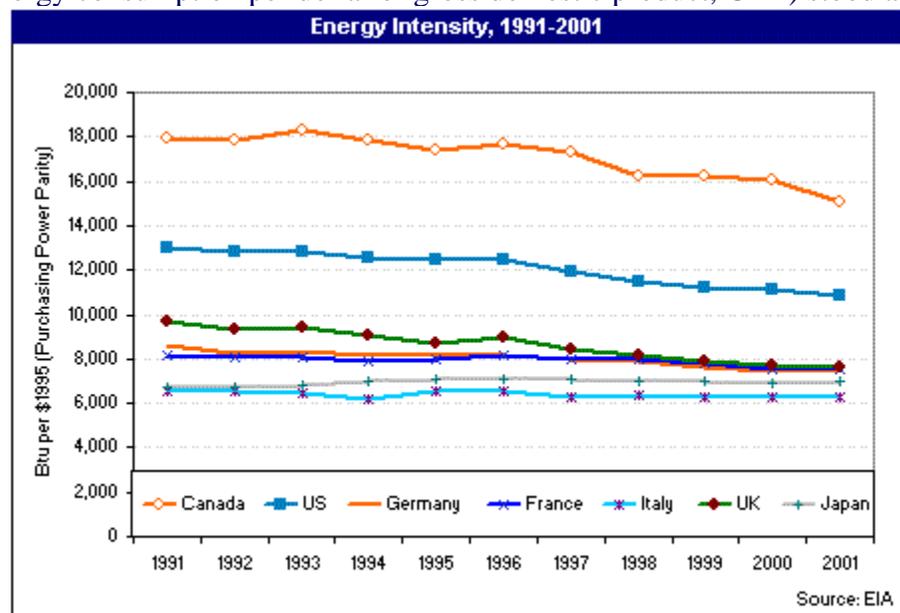
Canada is one of the most energy-intensive countries in the industrialized world. In 2001, the country's energy intensity (energy consumption per dollar of gross domestic product, GDP) stood at 15,029 Btu per \$1995 in purchasing power parity (PPP), well above other Organization for Economic Co-operation and Development (OECD) countries. Canada's energy intensity has been declining over the past two decades, but remains high due to its energy-intensive industries.

Canada's carbon intensity, 0.19 metric tons of carbon per thousand \$1995-PPP in 2001, was also the highest among industrialized economies. According to

Environment Canada, Canada's higher carbon intensity in comparison to other OECD countries has been due to increased consumption of fossil fuel for electricity generation, increased energy consumption in the transportation sector, and growth in fossil fuel production (largely for export).

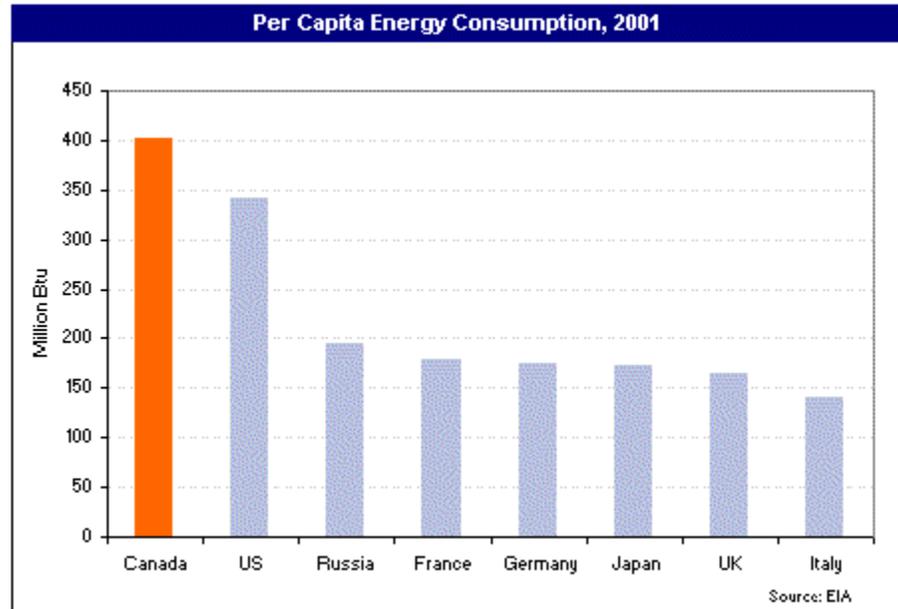
### Per Capita Energy Consumption and Carbon Emissions

Canada's 2001 per capita energy consumption, 402.6 million Btu per person, was the highest in North America, above the U.S. level of 341.8 million Btu per person. Relative to other OECD



countries, Canada's per capita energy consumption is considerably higher than France's (177.8 million Btu per person), the United Kingdom's (164.8), Germany's (174.3), Japan's (172.2), and Italy's (140.0).

Canada's 2001 per capita carbon emissions of 5.0 metric tons (mt) were below the U.S. level of 5.5 mt/person, but high relative to Germany (2.7), the United Kingdom (2.6), Japan (2.5), Italy (2.1) and France (1.8). Per capita carbon emissions, while decreasing slightly from their 1980 level of 5.2 mt/person, have remained fairly steady over the past two decades.



### Renewable Energy

Renewable energy sources, such as hydroelectricity and wind-power, are beginning to gain much attention as Canada moves forward in its efforts to reduce GHG emissions. In 2001, hydroelectric power accounted for 56% of the country's total electricity generated, followed by thermal (28.3%) and nuclear (13.0%). Other renewable energy sources, such as geothermal, solar, wind, wood, and waste, accounted for the remainder.

Although there are still plans to add some large-scale hydroelectric power in Canada, these projects are slowly giving way to smaller-scale projects. This shift in energy policy is partially due to environmental concerns, such as inundation of important ecological zones and the displacement of agricultural lands. Increased hydro-power production has important implications for GHG emissions, since hydroelectricity does not release carbon dioxide.

Wind energy use is increasing in Canada, although it accounts for less than 1% of its electricity requirements. According to the Canadian Wind Energy Association (CWEA), Canada had about 205 megawatts (MW) of wind generation plant installed at the beginning of 2002, which grew to 323 MW, as of January 2004. CWEA believes that Canada can increase its wind generation capacity to 10,000 MW by 2010.

### Outlook

According to the United States Energy Information Administration's (EIA) "[International Energy Outlook 2003](#)," Canadian energy consumption is expected to increase to 2025 at an average annual percent change of 1.3%, slightly less than projections for all of North America (1.7%) in the reference case projections. Canada's total energy consumption is projected to be 17.1 quadrillion Btus by 2025.

During the same projection period, Canadian natural gas consumption is expected to grow at a rate of 2.3%, nuclear energy at a rate of 0.6%, coal consumption will grow at an average annual rate of 0.2%, renewable at 1.1%. Canadian carbon emissions are expected to grow at an average annual rate of 1.2%.

Entering the 21st century, Canada is striving to be a leader in addressing environmental concerns. In 1999, the Canadian government illustrated its commitment to environmental protection with the release of a revised [Canadian Environmental Protection Act \(CEPA\)](#), which came into force on March 31, 2000. The new Act focuses on pollution abatement and prevention and authorizes enforcement officers to deal with polluters who break the laws. Furthermore, it provides a "right to sue" the federal government if they fail to enforce new CEPA rules.

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