

# COUNTRY ANALYSIS BRIEFS

## Canada

Last Updated: April 2007

### Background

**Canada is a net exporter of oil, natural gas, coal, and electricity. It is one of the most important sources for U.S. energy imports.**

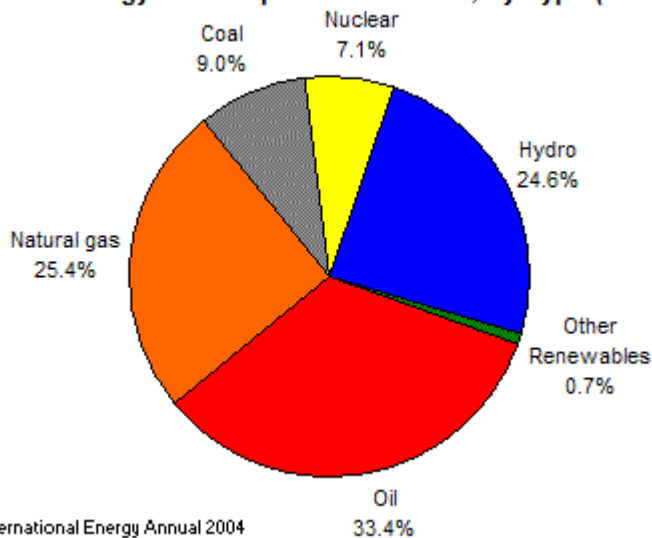
Canada has considerable natural resources and is one of the world's largest producers and exporters of energy. In 2004, Canada produced 18.6 quadrillion British Thermal Units (Btu) of total energy, the fifth-largest amount in the world. Since 1980, Canada's total energy production has increased by 81 percent, while its total energy consumption has increased only by 40 percent; in contrast, total world energy production increased by 54 percent during 1980-2004. Almost all of Canada's energy exports go to the United States, making it the largest foreign source U.S. energy imports: Canada is consistently among the top sources for U.S. oil imports, and it is the largest source of U.S. natural gas and electricity imports. In total for 2006, Canada exported to the United States 2.3 million barrels per day (bbl/d) of oil and petroleum products (11 percent of U.S. supply), 3.6 trillion cubic feet of natural gas (16 percent of U.S. supply), and 41.2 billion kilowatthours of electricity (1 percent of U.S. supply). Recognizing the importance of the energy trade between the two countries, both participate in the [North American Energy Working Group](#), which seeks to improve energy integration and cooperation between Canada, the U.S., and Mexico.



In 2004, the largest source of energy consumption in Canada was oil (33 percent), closely followed by natural gas (25 percent) and hydroelectricity (25 percent). Both coal (9 percent) and nuclear (7 percent) constitute a small share of the country's overall energy mix. Over 1984-2004, the share of oil in total energy consumption has remained mostly constant, whereas natural gas has increased from 21 percent to 25 percent: most of the increase in natural gas consumption has come at the expense of coal, whose share of total energy consumption fell from 12 percent to 9

percent over that time period.

**Total Energy Consumption in Canada , by Type (2004)**



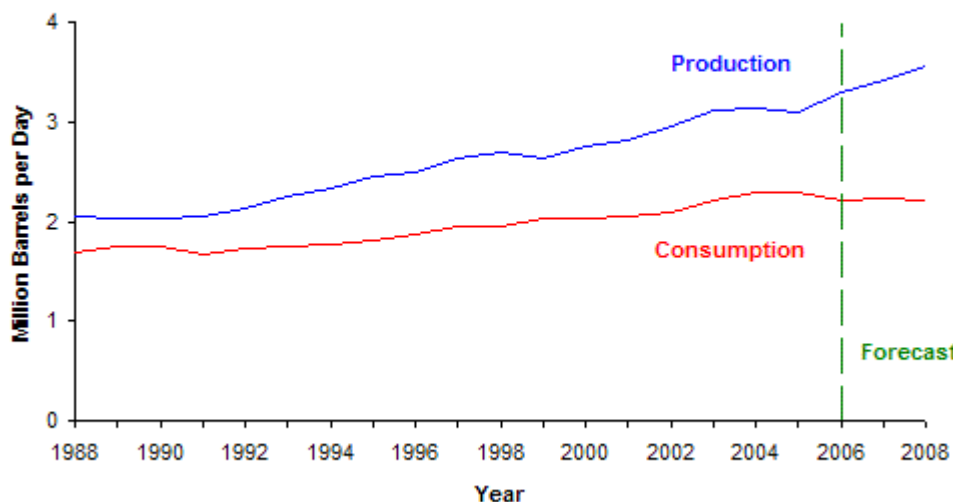
Source: EIA International Energy Annual 2004

### Oil Overview

**Canada is consistently one of the top three suppliers of oil imports to the United States.**

According to *Oil and Gas Journal (OGJ)*, Canada had a reported 179.2 billion barrels of proven oil reserves as of January 2007, second only to Saudi Arabia. The bulk of these reserves (over 95%) are oil sands deposits in Alberta, which are much more difficult to extract and process than conventional crude oil.

**Canada's Oil Production and Consumption**



Source: EIA International Energy Annual; Short Term Energy Outlook Mar 2007

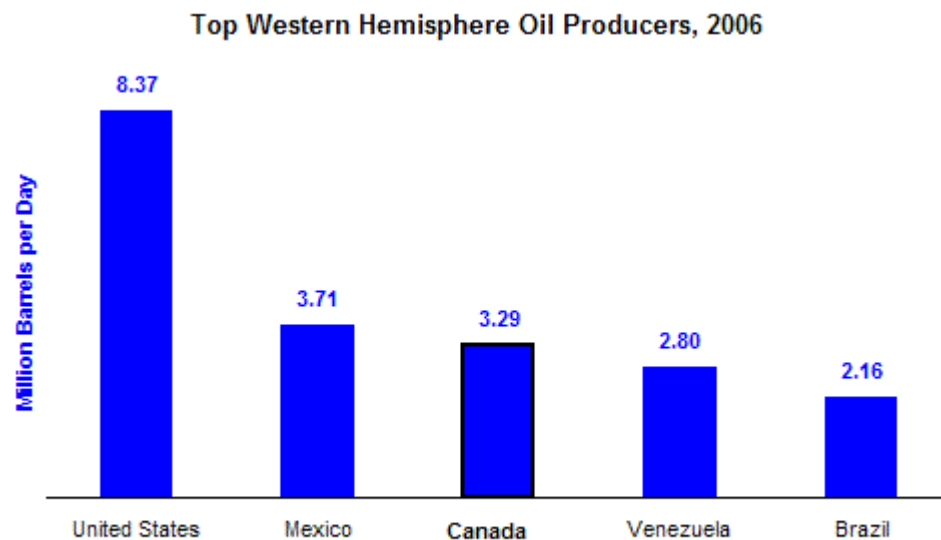
Canada's total oil production (including all liquids) was 3.3 million bbl/d in 2006. The country's oil production has steadily increased as new oil sands and offshore projects have come on-stream to replace aging fields in the western provinces: from 1996-2006, Canada's oil sands production has increased from 445,000 bbl/d to 1.2 million bbl/d. Overall, EIA predicts that oil sands production will increase even further in coming years and more than offset the decline in Canada's conventional crude oil production. Canada consumed an estimated 2.2 million bbl/d of oil in 2006. The country sends over 99 percent of its oil exports to the U.S., and it is consistently one of the

top three sources of U.S. oil imports.

### Sector Organization

Canada has a privatized oil sector that has witnessed consolidation in recent years. The largest integrated operator in the country is Imperial Oil, majority owned by ExxonMobil. In 2002, Alberta Energy Company and PanCanadian Energy merged to create EnCana, Canada's largest independent upstream operator. Other significant oil producers in Canada include Talisman Energy, Suncor, EOG Resources, Husky Energy, and Apache Canada.

Canada's oil sands producers have attracted increasing attention from Asian oil companies, seeking to satisfy growing demand in their countries and secure equity oil stakes. In July 2006, state-run Korea National Oil Corporation (KNOC) purchased the BlackGold bitumen deposit from Newmont for \$250 million; BlackGold contains an estimated 250 million barrels of crude oil, and KNOC plans to bring 35,000 bbl/d of production onstream at the site by 2010. China's Sinopec earlier purchased a 40 percent stake in the Syneco's Northern Lights oil sands project, which Syneco plans to bring online in 2010 at a production rate of 100,000 bbl/d. In addition, the China National Offshore Oil Corporation (CNPC) holds a stake in MEG Energy, a subsidiary of EnCana that operates the Christina Lake project.



Source: EIA International Petroleum Monthly

The Canadian government formed Petro-Canada in 1975 in an effort to reduce the dominance of U.S. companies in Canada's oil industry. The company received considerable initial resources from the Canadian government in its early years, though critics accused Petro-Canada of inefficiently deploying those resources and interfering with the operations of private companies. In 1991, the Canadian government began to privatize Petro-Canada, and in late 2004, the government sold its remaining 20 percent stake in the company.

### Exploration and Production

Canadian oil production comes mainly from three sources: the Western Canada Sedimentary Basin (WCSB); the oil sands deposits of northern Alberta; and offshore fields in the Atlantic Ocean. Alberta contains the largest share of Canada's oil production, as it holds the majority of oil sands deposits and the bulk of the WCSB: according to Canada's National Energy Board, Alberta represented 69 percent of Canada's national oil production in 2006.

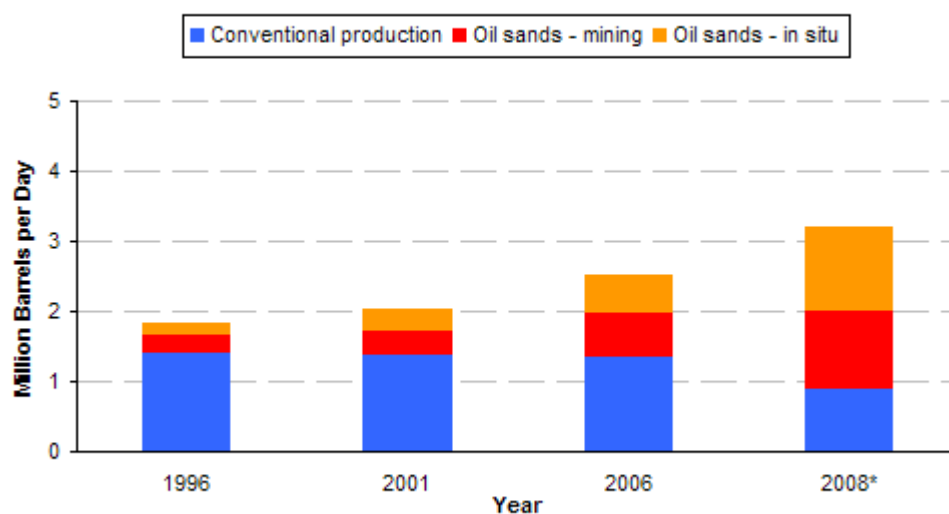
#### *Western Canada Sedimentary Basin*

The WCSB, underlying most of Alberta and parts of British Columbia, Saskatchewan, Manitoba and the Northwest Territories, has been the main source of Canadian oil production for the past 50 years. The age of many of the fields, though, has led to a steady decline in conventional oil production in the WCSB. Analysts predict that oil sands will supplant conventional sources as the focus of future oil production in western Canada.

### Oil Sands

Oil sands contain deposits of bitumen, a heavy, viscous oil. There are two methods currently used to extract bitumen from the ground: open pit mining and *in situ* ("in place"). Open pit mining resembles conventional mining techniques and is effective in extracting oil sands deposits near the surface. However, the bulk of Canada's estimated oil sands deposits (80 percent) are too deep below the surface to use open pit mining. The second method, *in situ* can reach these deeper deposits. *In situ* extraction involves the use of steam to separate bitumen from the surrounding sands and lift it to collection pools near the surface. To date, Canadian oil sands producers have employed each method almost equally, but future production will likely shift to emphasize *in situ* extraction. Once extracted, oil sands producers must add lighter hydrocarbons to the bitumen to allow it to flow through pipelines. Upgraders then process most of the bitumen into "synthetic crude," which can then be sold to a traditional oil refinery, though some bitumen is also sold in raw form for the production heavy products like tar and asphalt. Some oil sands projects have integrated upgrading capacity, while others must send their raw bitumen production to another facility.

Canada's Crude Oil Production, by Type



Source: Canadian Association of Petroleum Producers; EIA Short Term Energy Outlook \*Forecast

The Athabasca oil sands deposit, in northern Alberta, is one of largest oil sands deposits in the world. There are also sizable oil sands deposits on Melville Island in the Canadian Arctic, and two smaller deposits in northern Alberta near Cold Lake and Peace River.

The large oil sands projects in the Athabasca area utilize open-pit mining. The Syncrude Project, operated by Canadian Oil Sands Limited, produced 214,000 bbl/d of synthetic crude in 2005. Suncor operates another large open-pit mining project in Alberta, which produced a combined 260,000 bbl/d of crude oil (254,000 bbl/d of synthetic crude, 6,000 bbl/d of raw bitumen marketed directly) in 2006. Finally, the Athabasca Oil Sands Project (AOSP), operated by Shell Canada, began production in 2002 and currently has a capacity of 155,000 bbl/d. AOSP utilizes a facility adjacent to Shell's Scotford refinery to upgrade raw bitumen produced by the project.

The *in situ* oil sands projects in the Athabasca area are smaller than their mining counterparts. In 2004, Suncor began operations at its Firebag project, which utilizes a relatively new *in situ* technology called steam-assisted gravity drainage (SAGD). Firebag produced around 34,000 bbl/d in 2006. Other SAGD projects include Petro-Canada's MacKay River (30,000 bbl/d) and Dover (1,400 bbl/d); EnCana's Foster Creek (40,000 bbl/d), and Christina Lake (10,000 bbl/d); and Nexen's Athabasca (1,300 bbl/d) and Long Lake (2,500 bbl/d). Petro-Canada's Dover facility also contains a demonstration project of a new *in situ* technology called vapor extraction (VAPEX). VAPEX utilizes solvents, such as butane, to extract raw bitumen, rather than steam; VAPEX could allow significant cost savings for *in situ* operators, since the operators can re-use most of the solvents.

Outside of the Athabasca deposit, the largest oil sands project is Imperial Oil's Cold Lake *in situ* facility, with a capacity of 140,000 bbl/d. Also in the Cold Lake area, CNRL operates Primrose (50,000 bbl/d), while Husky operates the 30,000-bbl/d Tucker project. In the Peace River deposit, Shell Canada operates Cadotte Lake (11,000 bbl/d).

Despite the excitement surrounding the development of Canada's oil sands reserves, there are still several difficulties that could impede the future development of the industry. Analysts predict that the production of synthetic crude from oil sands is only economically viable with synthetic crude prices in the \$30-\$40 per barrel range. While further advances in oil sands technology could reduce production costs, it is likely that synthetic oil production will continue to be dependent upon high crude oil prices.

Second, the oil sands industry is heavily reliant upon water and natural gas, which is necessary in both the extraction of bitumen from oil sands and the upgrading of bitumen to synthetic oil. Even though there have been some efforts to reduce this dependence on natural gas, any increase in natural gas prices or sharp reduction in natural gas supply would have critical repercussions for the oil sands industry. Newer technologies could reduce the need for natural gas, such as the aforementioned VAPEX *in situ* process. Some companies are developing techniques to burn residual bitumen or other by-products to produce heat and steam. Finally, there has been some discussion of the potential of using nuclear power plants to provide energy for steam generation, though no one has developed any concrete plans to implement this approach. In any event, water or natural gas constrains in the area put downward pressure on any forecast of future oil sands production (see below).

Finally, there are reports that the oil sands boom is creating a labor shortage in Alberta's oil industry, especially in Fort McMurray. This has led to an escalation in labor costs and construction delays due to a lack of available workers. Several companies planning or developing oil sands projects have significantly increased their cost estimates due to rising prices for labor, materials, and support services. In 2005, Shell Canada announced that the planned costs for its proposed 100,000-bbl/d expansion of the AOSP project had increased from C\$4 billion to C\$7 billion; in 2006, Western Oil Sands, a stakeholder in the AOSP project, warned that these costs could rise even further to C\$11 billion.

Even considering these concerns, most forecasts of world oil markets estimate that Canadian oil sands will become an increasingly important component of world oil supply. EIA's [International Energy Outlook 2006](#) (IEO) estimates that Canadian oil sands operators will produce 3.6 million bbl/d by 2030.

#### *Offshore*

Canada has three oil projects off its Atlantic coastline, all located in the Jeanne d'Arc Basin: Hibernia, Terra Nova, and White Rose. First discovered in 1979, the Hibernia field produced 204,000 bbl/d of crude oil in 2004. Production at Terra Nova began in 2002, and the field currently has a production capacity of 160,000 bbl/d; in June 2005, Petro-Canada, the majority owner of the field, sought regulatory approval to expand production at the field to the Far East reservoir, which contains an additional 40 million barrels of recoverable oil. Finally, Husky Energy brought the White Rose field onstream in late 2005: production at the field is increasing and will eventually reach 135,000 bbl/d.

There is also exploration activity in the Orphan Basin, located in the deep waters north of the Jeanne d'Arc Basin. However, operators at the Atlantic oil fields must contend with harsh natural conditions, including rough seas, seasonal icebergs, and extreme temperatures. These factors increase the difficulty and costs of oil production in the region. Off the Pacific coast, industry experts believe that there could be sizable oil and natural gas reserves. However, there has been no production to date there, because of a federal ban on offshore oil activities in the Pacific Ocean.

#### **Pipelines**

##### *Domestic System*

An extensive pipeline system transports western Canadian oil to domestic and U.S. markets. There are two major oil pipeline operators in Canada: Enbridge Pipelines and Kinder Morgan Canada (formerly Terasen). Enbridge operates a 9,000-mile network of pipelines and terminals, delivering oil from Edmonton, Alberta, to eastern Canada and the U.S. Great Lakes region. Kinder Morgan operates the Trans Mountain Pipe Line (TMPL), which delivers oil mainly from Alberta west to refineries and terminals in the Vancouver, British Columbia area.

The expansion of Alberta's oil sands industry has necessitated the construction of several new pipelines to transport diluted bitumen and synthetic crude to downstream facilities in the Edmonton area. In 1999, Enbridge completed construction of its 920-mile, 570,000-bbl/d Athabasca pipeline, which links Suncor's oil sands operations to Enbridge's terminal in Hardisty, Alberta. Kinder Morgan operates the 280-mile, 260,000-bbl/d Corridor pipeline linking oil sands production near Muskog River to an upgrader facility at the Shell oil refinery in Scotford, Alberta. In August 2005, Kinder Morgan began preliminary engineering work on doubling the capacity of Corridor system, scheduled for completion by 2009. Both companies plan to link other oil sands projects as they come on-stream.

#### *Export Pipelines*

Canada has extensive oil pipeline connections with the United States. Enbridge maintains connections between major Canadian cities and Chicago, integrating the Canadian and U.S. components of its network. Enbridge also operates Spearhead, a 650-mile pipeline with a capacity of 125,000-bbl/d that links Chicago with Cushing, Oklahoma; originally carrying oil from Cushing to Chicago, Enbridge received regulatory approval in late 2004 to reverse the flow of the pipeline, allowing it to export oil from Canada deep into the U.S. market.

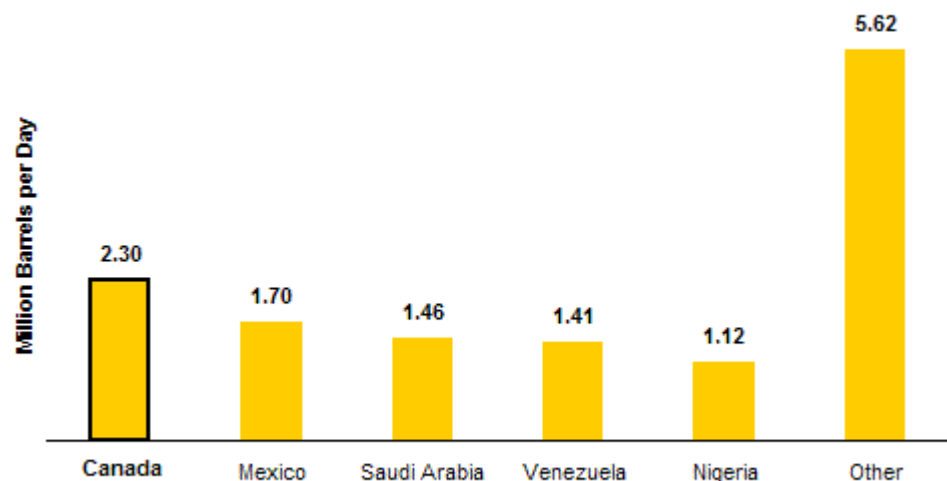
Kinder Morgan exports oil to the U.S. through an extension of the TMPL that reaches northern Washington. It also operates Express, a 790-mile, 170,000-bbl/d pipeline that links Hardisty, Alberta and Casper, Wyoming; from Casper, the company's 930-mile, 120,000-bbl/d Platte pipeline runs to Wood River, Illinois.

Enbridge has sought regulatory approval for the construction of its 720-mile, 400,000-bbl/d Gateway pipeline from Edmonton to Kitimat, a deepwater port in British Columbia capable of supporting very large crude carriers (VLCC). The project would also include a parallel condensate pipeline flowing in the opposite direction, facilitating condensate imports into Alberta. The Gateway pipeline would facilitate the export of oil sands to Asia and California. Enbridge stated that it could complete the \$2 billion project by 2014, and in April 2005, PetroChina committed to purchasing at least half of the capacity of the Gateway pipeline. Kinder Morgan has discussed plans to build a similar pipeline or upgrade the capacity of the TMPL.

#### *Oil Exports and Imports*

In 2006, Canada exported 2.3 million bbl/d of crude oil and refined products to the U.S., the single-largest source of U.S. oil imports. The largest share of U.S.-bound Canadian oil exports go to the Midwest (PAD District III), with smaller amounts heading to the Rocky Mountains (PAD District IV), the East Coast (PAD District I), and the West Coast (PAD District IV). The bulk of Canadian exports to the U.S. have traditionally gone to PAD Districts III and IV, because those areas are well connected to Alberta by oil pipelines and are not well served by coastal import terminals in the U.S.

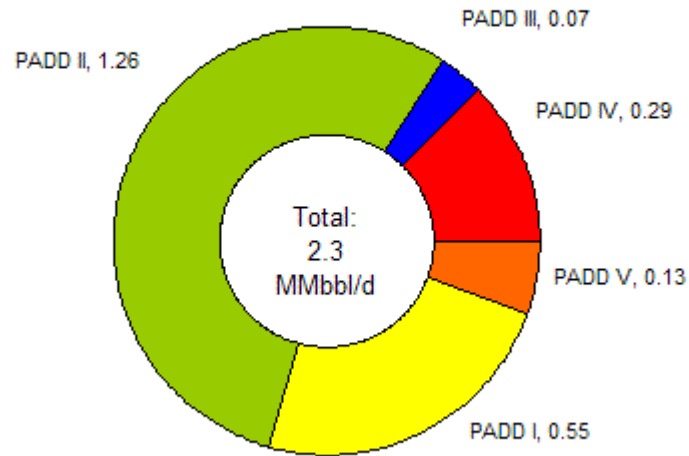
**Sources of U.S. Petroleum Imports,\* 2006**



Source: EIA International Petroleum Monthly

\*Includes oil and refined products

### Canadian Petroleum\* Exports to the United States, 2006 (million barrels per day)



Source: EIA Petroleum Supply Monthly

\*includes oil and refined products

Even though Canada is a net oil exporter, it imports sizable quantities of crude oil and refined products. According to the International Energy Agency (IEA), Canada imported around 1.2 million bbl/d of crude oil and refined products in 2006. Canada's major population centers in the eastern part of the country are not well connected to its principle production facilities in the western interior, meaning that it is often easier to import oil along the coastlines rather than transport it domestically. Most oil imports come from Algeria (crude oil), Norway (crude oil) and the U.S. (refined products).

#### Refining

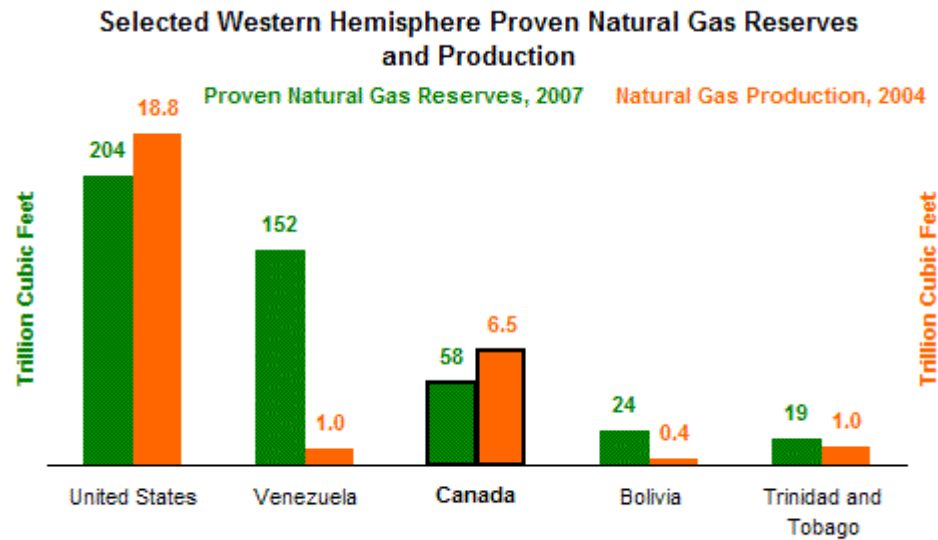
OGJ reported that Canada had 2.0 million bbl/d of crude oil refining capacity in January 2007. While Alberta contains most of Canada's crude oil production, a large portion of its refining capacity resides in the more-populated eastern part of the country. Alberta has four refineries, with total capacity of 447,400 bbl/d, whereas Ontario and Quebec have a combined 987,000 bbl/d of refining capacity. According to Natural Resources Canada, the largest single refinery in the country is Irving Oil's 280,000 bbl/d St. John plant in New Brunswick.

In January 2007, Irving Oil initiated the environmental review process for the construction of the 300,000 bbl/d Eider Rock refinery in St. John. The facility would occupy land near the company's existing refinery and under-construction LNG terminal (see Natural Gas section for more information). The project would cost an estimated \$7 billion and supply both the domestic market and potential exports to Boston and New York. If completed, the facility would be the first grassroots refinery in Canada in the last 20 years.

#### Natural Gas

*Oil and Gas Journal* (OGJ) reports that Canada had 57.9 trillion cubic feet (Tcf) of proven natural gas reserves in January 2007. The country produced 6.5 Tcf of natural gas in 2004, while consuming 3.4 Tcf. The country is the second largest producer of natural gas in the Western Hemisphere, after the United States. Canada is an important source of the U.S. natural gas supply. In 2006, it exported 3.6 Tcf of natural gas to the United States, representing 86 percent of total U.S. natural gas imports that year. Most Canadian natural gas exports enter the U.S. through pipelines in Idaho, Montana, North Dakota, and Minnesota. According to EIA's [Annual Energy Outlook 2007](#), both Canadian natural gas production and exports are expected to decline in the coming years, with net exports to the United States forecasted to reach 1.2 Tcf in 2030, or 22 percent of net U.S. natural gas imports.

**Canada is one of the world's largest natural gas producers and exporters.**



Source: Oil and Gas Journal; EIA International Energy Annual

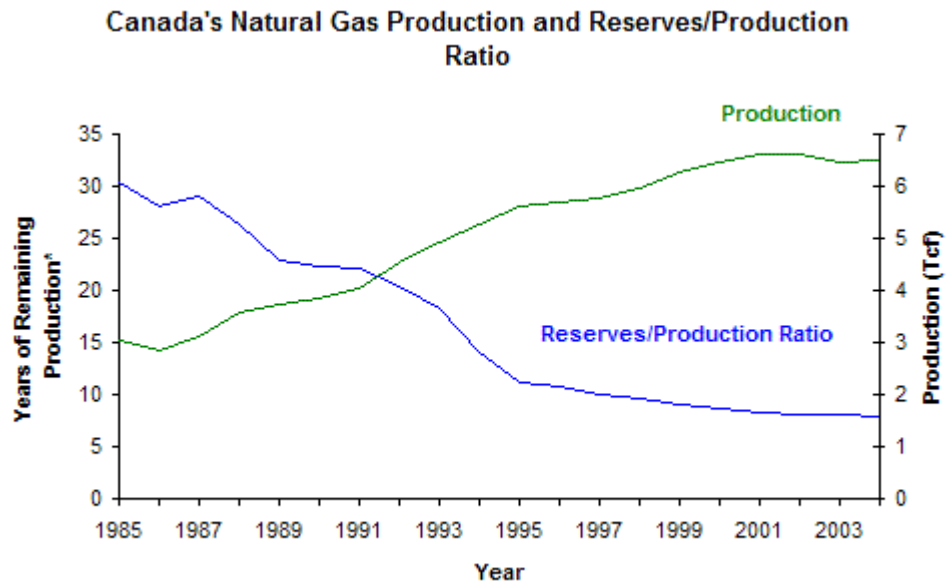
### Exploration and Production

Like the oil industry, Canada's natural gas production is concentrated in the WCSB, particularly in Alberta. Even though there have been some new conventional natural gas finds in the WCSB, many analysts predict that conventional natural gas production in the WCSB has reached its zenith. Future natural gas production should center on coal bed methane (CBM) deposits in the WCSB, Arctic frontier natural gas deposits, the Deep Basin area, and offshore natural gas fields.

#### *Western Canada Sedimentary Basin (WCSB)*

The WCSB includes most of Alberta and parts of British Columbia, Saskatchewan, and Manitoba. Natural gas production in the WCSB grew rapidly in the 1990s, increasing over 60 percent during the decade. Production has since leveled at 16.7 billion cubic feet per day (Bcf/d) in 2005, according to CAPP, of which 80 percent occurred in Alberta. High natural gas prices in recent years have motivated increased drilling activity in the WCSB, even though average returns from each well have declined. Despite the increased drilling activity, Canada's production/reserves ratio (the number of years of proven reserves remaining at existing production levels) has declined from 30 percent in 1985 to 7 years in 2004.





Source: Canadian Association of Petroleum Producers

\*At prior year production level

Production in the WCSB has begun to move away from Alberta towards new discoveries in British Columbia. In 2005, natural gas production in the portion of the WCSB in British Columbia was about 2.7 Bcf/d, up from 1.9 Bcf/d in 1996. There is also a small amount of natural gas production in the portion of the WCSB in Saskatchewan and Manitoba.

The Deep Basin area has the potential to offset some declines in production from the WCSB. Analysts estimated that the Deep Basin contains at least 15 Tcf of recoverable natural gas reserves. In late 2005, Shell Canada brought its Tay River discovery onstream at a rate of 50 million cubic feet per day (MMcf/d).

#### *Offshore*

The Scotian Basin, off the coast of Nova Scotia, is the center of natural gas production on the Atlantic coast. The Sable Offshore Energy Project (SOEP), led by ExxonMobil and Shell Canada, began production in 1999. SOEP encompasses numerous offshore fields, with the Alma and South Venture fields the latest brought on-line. SOEP has a production capacity of 400 MMcf/d of natural gas and 20,000 bbl/d of natural gas liquids (NGLs).

Offshore oil operators in Newfoundland predict that they could also produce sizable natural gas volumes from their reserves. The Hibernia and White Rose fields contain a combined 4 Tcf in recoverable natural gas reserves. Though there is no current natural gas production at either site, both ExxonMobil (Hibernia) and Husky Energy (White Rose) plan to commence natural gas production in the near future. The offshore basins in British Columbia contain an estimated 43.4 Tcf of total natural gas reserves, though the previously-mentioned federal moratorium on drilling in the area prevents any production activity there.

#### *Arctic*

The Mackenzie Delta, located in the Northwest Territories, holds an estimated 5-6 Tcf of recoverable natural gas reserves. Natural gas from the region could begin flowing to southern markets by 2010, if natural gas companies can complete the Mackenzie Gas Pipeline on schedule (see below). There are three large, proven natural gas fields in the Mackenzie Delta: Imperial Oil's Taglu field (3 Tcf); ConocoPhillips' Parsons Lake field (1.8 Tcf); and the joint Shell Canada-ExxonMobil Niglintgak field (1 Tcf); In 2005, Devon Energy received preliminary environmental approval to begin an exploratory drilling program in the Beaufort Sea, which would be the first such drilling since 1989.

#### *Unconventional Natural Gas Sources*

CBM production is still in its infancy in Canada, with the first wells drilled only in 1997. There is a strong belief that CBM production will eventually replace the decline in conventional natural gas production. According to the NEB, Alberta produced 280 MMcf/d of CBM in 2005, but the agency

predicted that this could rise to as high as 950 MMcf/d by 2008. According to the Alberta Geological Service, there could be as much as 500 Tcf of CBM gas in place in Alberta alone. Shale gas is another potential source of unconventional natural gas production in Canada that is still in the early stages of development.

## **Pipelines**

### *Domestic System*

TransCanada Pipelines is the largest operator of natural gas pipelines in Canada. Its 25,600-mile network transports the bulk of Canada's natural gas production. Important parts of the TransCanada network include the 13,900-mile, 10.6-Bcf/d Alberta System, the 120-mile, 0.9-Bcf/d British Columbia System, the 8,900-mile, 7.2-Bcf/d Canadian Mainline, and the 600-mile, 3.0-Bcf/d Foothills System.

### *Mackenzie Gas Project*

A consortium of natural gas companies, led by Imperial Oil, plan to build the Mackenzie Valley natural gas pipeline. The 760-mile, 1.2-Bcf/d pipeline would carry natural gas from inside the Arctic Circle to northern Alberta, where it would flow into the existing natural gas transportation system; there would also be a parallel pipeline to carry NGLs. The NEB scheduled a series of public hearings on the project for 2006, to consider the technical aspects of the project, as well as its economic and environmental impacts. If the project attains regulatory approval, construction of the system would likely last four years and cost some C\$8 billion.

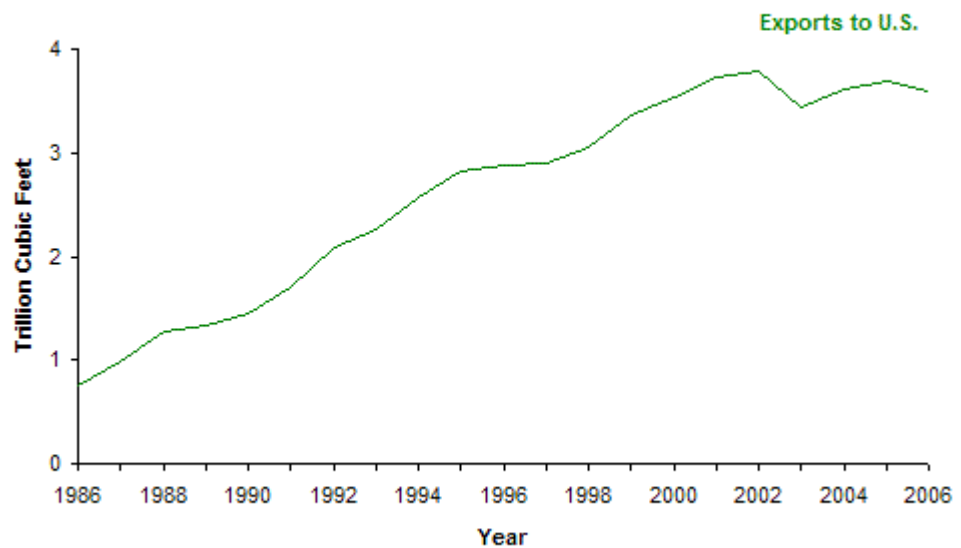
### *Alaskan Pipeline*

Supporters of the Mackenzie pipeline also worry about the completion of a rival natural gas pipeline from Alaska's North Slope to the United States. The 3,400-mile, 4.6-Bcf/d Alaskan pipeline would likely not enter service before 2018. The U.S. Congress approved US\$18 billion in loan guarantees in late 2004 for the US\$20 billion project. In March 2007, Alaska Governor Sarah Palin introduced a bill that would provide up to \$500 million in state money to spur construction of a pipeline, with the goal of beginning pipeline construction as soon as 2008. According to its Annual Energy Outlook 2007, EIA expects the Alaskan pipeline to come onstream in 2018, with Alaskan natural gas production reaching 2.2 Tcf by 2030.

### *Export Pipelines*

Canada's natural gas pipeline system is highly interconnected with the United States. The 1,300-mile, 1.9-Bcf/d Gas Transmission Northwest pipeline runs from the British Columbia-Idaho border to the Oregon-California border, connecting TransCanada's western Canadian network to the U.S. domestic market. The 2,000-mile, 2.4-Bcf/d Great Lakes Gas Transmission pipeline runs from Emerson, Manitoba to St. Clair, Ontario, servicing Minnesota, Wisconsin, and Michigan. Running from the New York-Canada border to Long Island, the 400-mile, 0.9-Bcf/d Iroquois Gas Transmission System pipeline serves natural gas distribution networks in New York State. The 280-mile, 0.2-Bcf/d Portland Natural Gas Transmission System distributes natural gas from Quebec to greater New England. The 780-mile, 650-MMcf/d Maritimes and Northeast Pipeline transports natural gas from Canada's Atlantic natural gas fields to Dracut, Massachusetts, where it interfaces with the U.S. domestic network.

### Canada's Natural Gas Exports to the U.S.



Source: EIA Natural Gas Annual

Alliance Pipeline Limited, a partnership of Enbridge and the Fort Chicago Energy Partners income fund, operates the 970-mile, 1.3-Bcf/d Alliance pipeline from Gordondale, Alberta to the Saskatchewan-Montana border. Its U.S.-based partner company operates the U.S. portion of the pipeline, which runs 890 miles to Illinois.

#### Liquefied Natural Gas

To compensate for reduced domestic production, Canadian natural gas companies have begun to explore the construction of liquefied natural gas (LNG) receiving terminals. Natural gas companies either could sell re-gasified LNG on the domestic market or re-export it to the United States. In total, there are seven LNG regasification projects in Canada at various stages of development, including one in Nova Scotia, one in New Brunswick two in British Columbia, and three in Quebec. These projects represent a combined 4.9 Bcf/d of regasification capacity, though the Canaport LNG project is the only to have actually begun construction.

Proposed LNG Receiving Terminals in Canada			
Name	Location	Status	Initial Capacity
Maple LNG	Nova Scotia	Pending Regulatory Review	1.0 Bcf/d
Bear Head LNG	Nova Scotia	Cancelled	1.0 Bcf/d
Canaport LNG	New Brunswick	Under Construction	1.0 Bcf/d
Kitimat LNG	British Columbia	Pending Initial Construction	600 MMcf/d
Prince Rupert	British Columbia	Pending Regulatory Review	300 MMcf/d
Gros Cacouna	Quebec	Pending Regulatory Review	500 MMcf/d
Rabaska LNG	Quebec	Pending Regulatory Review	500 MMcf/d
Grande-Anse	Quebec	Proposed	1.0 Bcf/d

#### Nova Scotia

In 2006, a consortium led by Netherlands-based 4Gas purchased the Maple LNG project, a planned LNG terminal in Nova Scotia. The Maple LNG terminal could feed domestic customers or export natural gas to the United States through the Maritimes & Northeast Pipeline. In early 2007, the project received preliminary environmental approval from the provincial government. According to 4Gas, the project could come onstream in 2010, with an initial send-out capacity of 1.0 Bcf/d. Keltic Petrochemicals plans to develop an adjacent petrochemicals plant.

#### New Brunswick

In New Brunswick, Canaport LNG, a consortium of Irving Oil and Repsol-YPF, began construction of a 1 Bcf/d LNG terminal at Canaport in September 2005, with estimated costs of the project at \$750 million. The Canaport project will provide natural gas for Irving Oil's oil refinery in St. John and local power plants. However, the project will also feature a connection to the Maritimes & Northeast Pipeline, facilitating exports to the United States. Canaport LNG estimates the project onstream in 2008.

#### *British Columbia*

WestPac Terminals has proposed the construction of an LNG terminal at Prince Rupert, with initial send-out capacity of 300 MMcf/d. The company has reportedly secured financing for preliminary engineering and environmental review of the project. Galveston LNG received approval from federal and provincial authorities in early 2007 to build its LNG terminal in Kitimat. The company has stated that it will begin construction of the project by the end of 2007. The terminal would have an initial send-out capacity of 600 MMcf/d.

#### *Quebec*

Petro-Canada and TransCanada Pipelines have announced plans to build a 500-MMcf/d LNG receiving terminal at Gros Cacouna, on the St. Lawrence River. Petro-Canada has held talks with Russia's Gazprom to feed the Gros Cacouna terminal from Gazprom's planned Shtokman natural gas field. The project must still gain final regulatory approval. A consortium of Enbridge, Gas Metro, and Gaz de France has proposed another project in the province, the Rabaska LNG terminal. Located in Levis, the Rabaska LNG project would have an initial send-out capacity of 500 MMcf/d. As of February 2007, the project was still under environmental review by a joint federal-provincial panel. Finally, Energia Grande-Anse has proposed to build an LNG receiving terminal along the Saguenay River in Quebec. That project is still in the preliminary stages of development.

## **Coal**

***Canada is an exporter of thermal coal (for steel-making), mostly to Asia.***

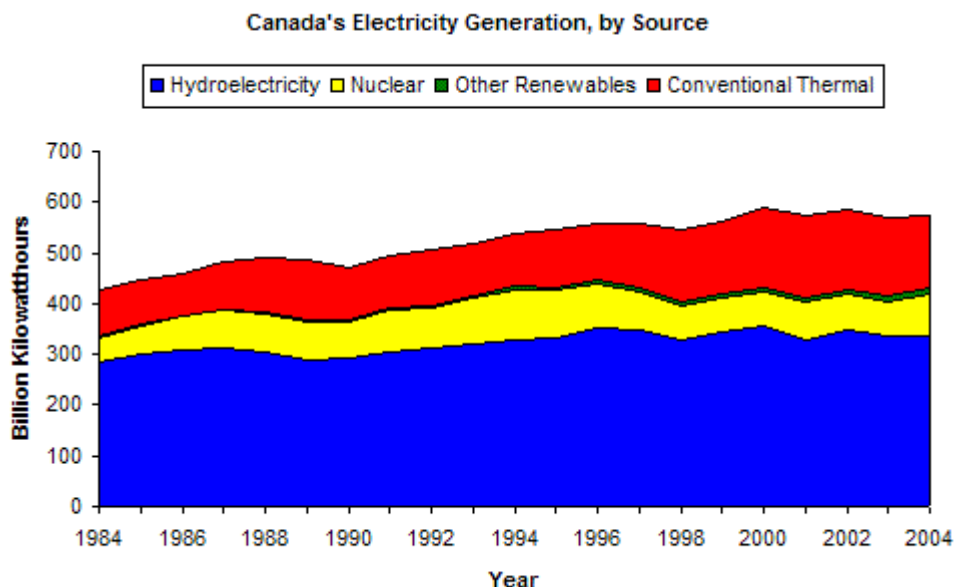
Canada holds an estimated 7.3 billion short tons of recoverable coal reserves. Coal production in the country has declined steadily in recent years. The country produced 68.5 million short tons (Mmst) in 2003, down from a peak of 86.7 Mmst in 1997. Coal production is concentrated in the western part of the country, with Alberta containing about half of total coal production. In contrast to Canadian coal production, coal consumption has increased over the past decade, reaching 69.4 Mmst in 2003. The bulk of consumption fuels electricity generation, with the remainder used in the production of steel or as primary consumption at industrial facilities.

Canada exports over half its coal production, mostly to Asia, with the rest going chiefly to Europe and Latin America. These exports are overwhelmingly coking coal. On the other hand, Canada imports some thermal and coking coal, mostly from the United States.

## **Electricity**

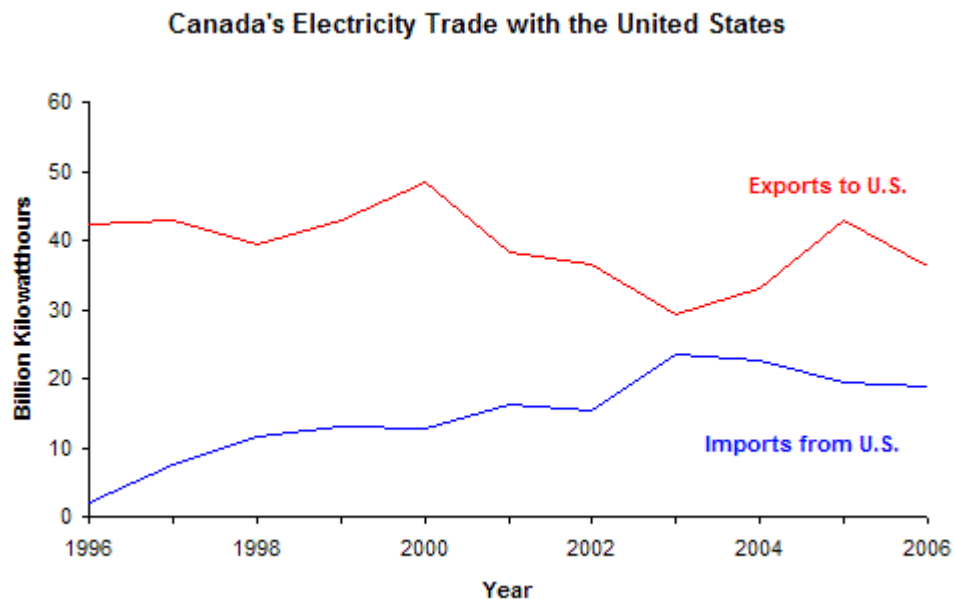
***Canada is the world's largest producer of hydroelectricity.***

Canada had 118 gigawatts of installed electricity generating capacity in 2004. The country produced 573 billion kilowatt hours (Bkwh) of electric power in 2004 while consuming 522 Bkwh. Some 58 percent of Canada's electricity generation comes from hydroelectricity, followed by conventional thermal (25 percent), nuclear (15 percent), and other renewables (2 percent).



Source: EIA International Energy Annual

Canada and the United States have an extensive electricity trade, and the electricity networks of the two countries are heavily integrated. In 2003, Canada exported 33.0 Bkwh of electricity to the United States while importing 22.5 Bkwh. While Canadian electricity exports to the U.S. in 2003 increased from 2002, the trend in recent years has seen exports to the U.S. decline, while imports have increased. Due to the increasing interdependence of the networks in both countries, a dependency made clear during the 2003 Northeast blackout, there have been greater efforts to increase cooperation and coordination between Canada and the U.S. A bilateral commission is planning the formation of the [North American Electric Reliability Organization](#), an intergovernmental organization that would monitor network reliability, settle trans-border disputes, and formulate common industry standards.



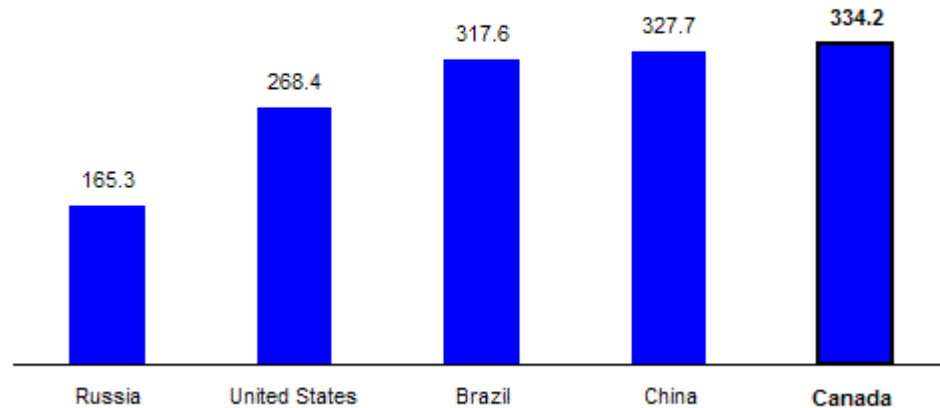
Source: EIA Electric Power Annual 2006, Table 6.3; National Energy Board

#### Hydroelectricity

Canada is the world's largest producer of hydroelectricity, generating over 334 Bkwh from the source in 2004. Quebec's La Grande plant is one of the world's largest hydroelectric facilities, with

an installed capacity of 15,000 MW. Quebec has the largest share of Canada's hydroelectric production, followed by British Columbia.

**World's Top Hydroelectricity Producers, 2004 (Billion kilowatthours)**



Source: EIA International Energy Annual

## Profile

### Country Overview

<b>Head of Government</b>	Prime Minister Stephen Harper (since February 2006)
<b>Location</b>	Northern North America, bordering the North Atlantic Ocean on the east, North Pacific Ocean on the west, and the Arctic Ocean on the north, north of the conterminous US
<b>Independence</b>	1 July 1867 (union of British North American colonies); 11 December 1931 (independence recognized)
<b>Population (2006E)</b>	33,098,932

### Economic Overview

<b>Currency/Exchange Rate (March 9, 2007)</b>	1 Canada Dollar (CAD) = 0.853 USD
<b>Inflation Rate (2006E)</b>	2.0%
<b>Gross Domestic Product (GDP, 2006E)</b>	\$1.3 trillion
<b>Real GDP Growth Rate (2005E, 2006E)</b>	3.3%, 2.9%
<b>Unemployment Rate (2006E)</b>	6.4%
<b>External Debt (2006E)</b>	\$685 billion
<b>Exports (2006E)</b>	\$401 billion
<b>Exports - Commodities</b>	motor vehicles and parts, industrial machinery, aircraft, telecommunications equipment; chemicals, plastics, fertilizers; wood pulp, timber, crude petroleum, natural gas, electricity, aluminum
<b>Exports - Partners (2005E)</b>	US, Japan, UK
<b>Imports (2006E)</b>	\$353 billion
<b>Imports - Commodities</b>	machinery and equipment, motor vehicles and parts, crude oil, chemicals, electricity, durable consumer goods
<b>Imports - Partners</b>	US, China, Mexico

(2005E)

**Current Account Balance** \$22 billion  
(2006E)

## Energy Overview

**Proven Oil Reserves** 179.2 billion barrels  
(January 1, 2007E)

**Oil Production (2006E)** 3,300 thousand barrels per day, of which 76% was crude oil.

**Oil Consumption (2006E)** 2,200 thousand barrels per day

**Crude Oil Distillation Capacity (0E)** 2,000 thousand barrels per day

**Proven Natural Gas Reserves (January 1, 2007E)** 57.9 trillion cubic feet

**Natural Gas Production (2004E)** 6.5 trillion cubic feet

**Natural Gas Consumption (2004E)** 3,384.9 billion cubic feet

**Recoverable Coal Reserves (2003E)** 7,251 million short tons

**Coal Production (2004E)** 72.7 million short tons

**Coal Consumption (2004E)** 57.8 million short tons

**Electricity Installed Capacity (2004E)** 118.1 gigawatts

**Electricity Production (2004E)** 573 billion kilowatt hours

**Electricity Consumption (2004E)** 522.4 billion kilowatt hours

**Total Energy Consumption (2004E)** 13.6 quadrillion Btus\*, of which Oil (33%), Natural Gas (25%), Hydroelectricity (25%), Coal (9%), Nuclear (7%), Other Renewables (1%)

**Total Per Capita Energy Consumption (2004E)** 418.4 million Btus

**Energy Intensity (2004E)** 13,529.9 Btu per \$2000-PPP\*\*

## Environmental Overview

**Energy-Related Carbon Dioxide Emissions (2004E)** 588 million metric tons, of which Oil (49%), Natural Gas (31%), Coal (19%)

**Per-Capita, Energy-Related Carbon Dioxide Emissions (2004E)** 18.1 metric tons

**Carbon Dioxide Intensity (2004E)** 0.6 Metric tons per thousand \$2000-PPP\*\*

**Environmental Issues** air pollution and resulting acid rain severely affecting lakes and damaging forests; metal smelting, coal-burning utilities, and vehicle emissions impacting on agricultural and forest productivity; ocean waters becoming contaminated due to agricultural, industrial, mining, and forestry activities

**Major Environmental Agreements** party to: Air Pollution, Air Pollution-Nitrogen Oxides, Air Pollution-Persistent Organic Pollutants, Air Pollution-Sulfur 85, Air Pollution-Sulfur 94, Antarctic-Environmental Protocol, Antarctic-Marine Living Resources, Antarctic Seals, Antarctic Treaty, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands

## Oil and Gas Industry

<b>Organization</b>	Private sector. Major companies include ExxonMobil (via its Imperial Oil subsidiary), Royal Dutch Shell, Suncor, EnCana, and Talisman Energy
<b>Major Pipelines</b>	Enbridge, Kinder Morgan, TransCanada, Alliance Pipeline Limited, Maritimes and Northeast.
<b>Major Refineries (capacity, bbl/d)</b>	Irving Oil St. John (250,000), Valero Energy Levis (215,000), Imperial Oil Edmonton (187,200)

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data. \*\*GDP figures from OECD estimates based on purchasing power parity (PPP) exchange rates.

## Links

### U.S. Government

[CIA World Factbook - Canada](#)

[U.S. Department of Energy on Electricity Trade and Canada](#)

[U.S. Department of State Country Background Notes - Canada](#)

[U.S. Embassy in Canada](#)

[U.S. International Trade Administration, Country Commercial Guide - Canada](#)

### Associations and Institutions

[Canadian Association of Oilwell Drilling Contractors](#)

[Canadian Association of Petroleum Producers](#)

[Canadian Centre for Energy Information](#)

[Canadian Energy Research Institute](#)

[Canadian Wind Energy Association](#)

[Energy Council of Canada](#)

[Oil Sands Discovery Centre](#)

[The Coal Association of Canada](#)

### Foreign Government Agencies

[Alberta Department of Energy](#)

[Alberta Energy and Utilities Board](#)

[British Columbia Ministry of Energy and Mines](#)

[Manitoba Petroleum Division](#)

[National Energy Board of Canada](#)

[Natural Resources Canada, Energy Sector](#)

[New Brunswick Ministry of Energy](#)

[Newfoundland and Labrador Ministry of Mines and Energy](#)

[Newfoundland Offshore Petroleum Board](#)

[Nova Scotia Offshore Petroleum Board](#)

[Ontario Ministry of Energy](#)

[Québec Ministry of Energy](#)

[Saskatchewan Industry and Resources](#)

### Oil and Natural Gas

[Aboriginal Pipeline Group](#)

[Alliance Pipeline](#)

[Anadarko Petroleum Corporation](#)

[BP Canada](#)

[Burlington Resources Incorporated](#)

[Canadian Natural Resources Limited](#)

[Canadian Superior Energy Incorporated](#)

[ChevronTexaco Canada](#)

[Deer Creek Energy Limited](#)

[Devon Energy](#)

[Enbridge](#)

[EnCana](#)

[EOG Resources](#)

[Husky Energy](#)

[Imperial Oil](#)

[Japan Canada Oil Sands Limited](#)

[Kinder Morgan Canada \(former Terasen\)](#)



[Maritimes and Northwest Pipeline](#)  
[Millennium Pipeline](#)  
[Murphy Oil Corporation](#)  
[Norsk Hydro Canada](#)  
[Petro-Canada](#)  
[Opti Canada Incorporated](#)  
[Shell Canada Limited](#)  
[Suncor Energy](#)  
[TransCanada Pipelines](#)

## Sources

Access Northeast Energy  
Alberta Energy and Utilities Board  
British Columbia Ministry of Energy and Mines  
Calgary Herald  
Cambridge Energy Research Associates  
Canadian Association of Petroleum Producers  
Canada 's National Energy Board  
Canadian Business  
Canadian Press  
CIA World Factbook  
ConocoPhillips  
Daily Oil Bulletin  
Deutsche Bank  
Devon Energy  
Dow Jones  
Economist Intelligence Unit ViewsWire  
Edmonton Journal  
Electric Utility Week  
Enbridge Pipelines  
EnCana Energy Corporation  
Energy Daily  
ExxonMobil  
Foster Natural Gas Report  
Financial Times  
Gas Daily  
Gas-To-Liquids News  
Globe and Mail  
Global Insight  
Houston Chronicle  
Husky Energy  
Imperial Oil  
International Gas Report  
International Energy Agency  
International Herald Tribune  
International Oil Daily  
Inside F.E.R.C.  
Investor's Business Daily  
Kinder Morgan  
Market News Publishing  
Missoulain  
National Energy Board  
National Post  
Natural Gas Intelligence  
Natural Gas Week  
Natural Resources Canada  
Newfoundland Offshore Petroleum Board  
Montreal Gazette  
New York Times  
Nova Scotia Department of Energy  
Oil and Gas Journal  
Oil and Gas Investor  
Oil Daily  
Oilweek  
Offshore  
Ottawa Citizen

Petro -Canada  
Petroleum Economist  
Petroleum Intelligence Weekly  
Pipeline and Gas Journal  
Platt's  
Power Engineering  
Reuters  
Shell Canada  
Statistics Canada  
Suncor  
Syncrude  
TransCanada Pipelines  
Toronto Star  
U.S. Energy Information Administration  
Vancouver Sun  
Wall Street Journal  
World Markets Online

## Contact Info

cabs@eia.doe.gov  
(202)586-8800  
[cabs@eia.doe.gov](mailto:cabs@eia.doe.gov)