Energy Information Administration www.eia.doe.gov

COUNTRY ANALYSIS BRIEFS

Canada

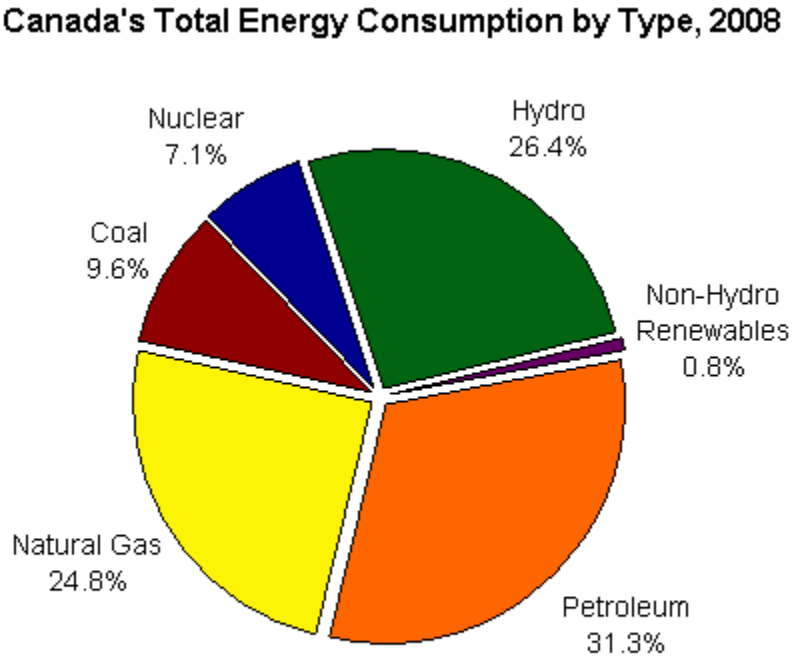
Last Updated: April 2011

Background

Canada is the most significant source for U.S. energy imports, providing the highest foreign volumes of primary energy and electricity.

Canada has been a significant component of the global energy trade due to its proximity to and trade with the largest energy consumer in the world, the United States. Canada maintains a surplus in all sellable energy commodities, exporting crude oil, natural gas, coal and electricity. The country is the most significant source for U.S. energy imports. The United States has traditionally provided the markets for Canada's energy exports. However, Asian countries are seeking greater access to Canada's natural resources to fuel Asia's own long-term economic growth.

Canada produces and exports substantial volumes of primary energy and electricity. In 2008, Canada ranked fifth globally in total energy produced, generating 19.11 quadrillion British Thermal Units (Btu) of primary energy. Canada's geographical location and geological composition allow for a diversified supply of energy sources, ranging from coal to considerable hydropower generation capacity.



Source: EIA

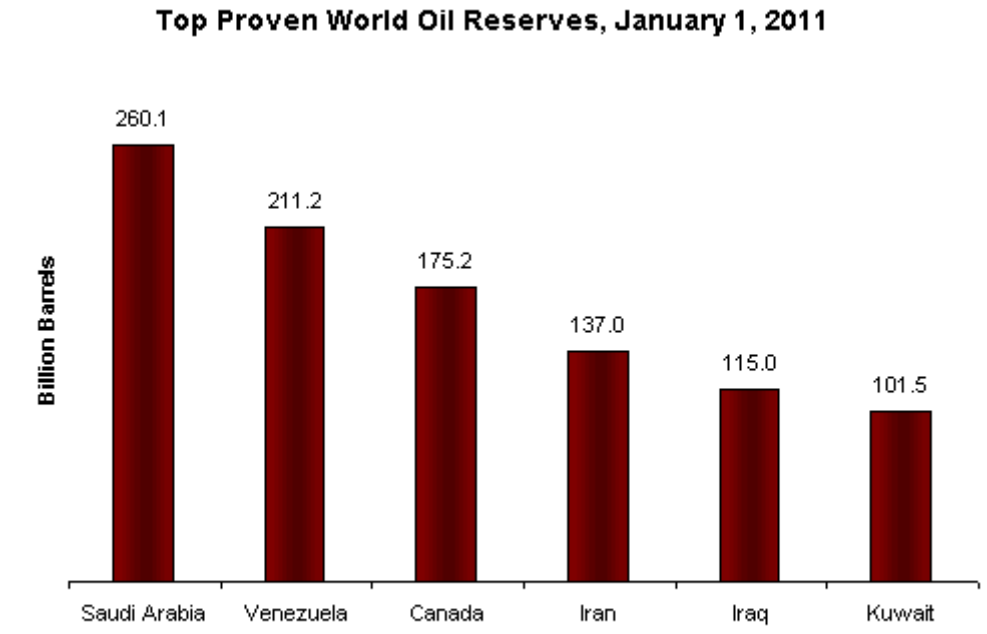
Consumption of primary and secondary energy in Canada reached 14.03 quadrillion Btu in 2008. Petroleum comprised the largest source of energy consumed at 31.3 percent, mainly in the transportation sector. Both hydroelectricity and natural gas have achieved relative gains recently, up to 26.4 percent and 25 percent, respectively. This has come from lower petroleum and coal consumption. Coal and nuclear energy provide 9.6 and 7.1 percent, respectively, while other renewables (non-hydro) make up the final 1 percent. With rising concern over carbon emissions, government policies will continue to favor less carbon-intensive sources of energy.

Oil

Overview

Canada's 175.2 billion barrels of proven reserves of oil places it third globally, behind Saudi Arabia and Venezuela, and is the only non-OPEC member in the top five.

Oil and Gas Journal (OGJ) revised Canada's proven reserves of crude oil downward by over 1.5 percent in 2010, which remained constant for January 2011. Despite the decrease from a previous estimate of 178.1 billion barrels, Canada's 175.2 billion barrels of proven reserves of crude oil places Canada third globally, behind Saudi Arabia and Venezuela. Canada is the only non-OPEC member among the top five reserve holders. Approximately 170 billion barrels (97 percent) of Canada's reserves are unconventional, mainly from bitumen deposits. These unconventional deposits place Canada as one of the central sources of non-OPEC production growth in the coming decades.



Source: Oil & Gas Journal

Sector Organization

Canada has a privatized oil sector that has seen consolidation and specialization in the wake of the global economic downturn. International participation has risen rapidly in Canada's oil sector, although this has been for non-controlling stakes in projects. A recent regulation of foreign investment in Canada titled the "Invest Canada Act" outlines that any large investment in Canada must be of "net benefit" to Canada, indicating a limit on foreign control of strategic commodities.

Numerous Canadian oil firms went through significant strategic corporate restructuring in the past two years. In August of 2009, Suncor completed its acquisition of Petro-Canada, the former state oil firm, creating Canada's largest oil and gas firm. In December 2009, Encana completed its plans to spin-off its oil and traditional gas assets into a new, wholly independent firm, Cenovus. Other Canadian firms, such as Talisman Energy and Petrobank, have sought increased specialization by creating separate entities to focus on specific areas, such as shale gas in British Columbia or shale oil in Saskatchewan and Manitoba. Asian firms have also been buying up Canadian assets through corporate acquisition.

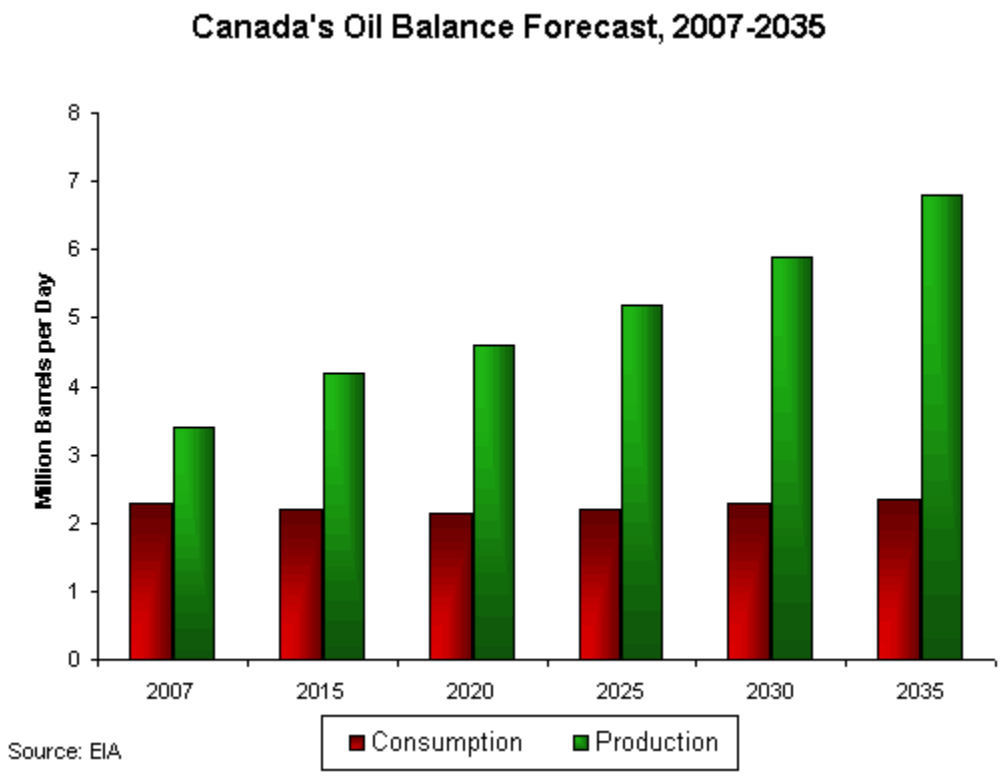
Canada's regulatory framework is one in which federal and provincial bodies coordinate policy and regulation. Provincial authorities handle most of the oversight in the sector. The national regulatory body is the National Energy Board (NEB). The largest and most influential of the provincial regulators is the Alberta Energy Resources Conservation Board (ERCB).

Exploration and Production

Oil production in Canada currently comes principally from three sources: the oil sands of Alberta, the Western Canada Sedimentary Basin (WCSB), and the offshore oil fields in the Atlantic. Additional reserves are known to be under the Beaufort Sea in the Arctic, off the Pacific coast and in the Gulf of St. Lawrence. Alberta provides the bulk of oil production and encompasses the major share of Canada's hydrocarbon resources. Moreover, production from the conventional offshore reserves off the eastern provinces comes from mature oilfields, with few opportunities to replenish depletion rates. As such, western provinces will comprise an increasing proportion of overall Canadian oil production in the future.

Total oil production in Canada amounted to 3.46 million bbl/d in 2010, of which 2.65 million bbl/d was crude oil. Canada consumes around 2.3 million bbl/d, with consumption rates for petroleum relatively flat over the long-term, with a 0.1 percent expected average growth rate through 2035, according to the Energy Information Administration (EIA). This trend allows for any increase in production to be exported; Canada thus comprises a major source of non-OPEC oil production

growth in the medium to long-term.



Oil Sands

Of the 2.7 million bbl/d of crude produced in Canada in 2009, 1.35 million bbl/d of that derived from the oil sands of Alberta. These volumes and growth from the oil sands will make them the largest single source of U.S. crude imports, the additional conventional Canadian exports notwithstanding.

Oil sands consist of a mineral called bitumen, an unconventional petroleum which is naturally found blended with sand, clay, and water. Once extracted, bitumen is a heavy, viscous type of crude oil. The bitumen must be “upgraded” through a complex process which yields a light, sweet “synthetic” crude. The technically sophisticated process by which bitumen is processed requires a separate facility known as an “upgrader” and utilizes significant amounts of water and diluents (a light hydrocarbon that aids the transport of the heavy crude).

There are two different methods used to extract petroleum from the oil sands: traditional pit mining and *in-situ*. Pit mining has been the dominant technique, but it results in residual toxins, called tailings, in addition to issues of severe alteration of landscapes and ecosystems. The other method, *in-situ* extraction, involves various uses of steam injection, softening the bitumen so that it can travel to the surface. It is estimated that the vast majority of bitumen deposits (135 billion barrels) are only accessible by way of *in-situ* techniques.

Concerns over the environmental impact of producing petroleum from bitumen have now transformed into political pressure. Environmentalists are concerned with three main aspects of extracting oil from bitumen: the toxicity of the tailings ponds, greenhouse-gas emissions during production, and water usage. Environmental groups have gone so far as to call on Alberta’s Energy Resources Conservation Board (ERCB) to cancel approvals for development. In 2009, the ERCB sanctioned environmental standards for oil sands management of tailings created during production and land reclamation, called Directive 74.

The largest projects in the oil sands are currently mining operations. Suncor runs its own large-scale operations and has a stake in the Syncrude Canada project. The Athabasca Oil Sands Project (AOSP) is operated by Shell Canada, which produces 155,000 bbl/d. The Horizon Oil

Sands Project, operated by Canadian Natural Resources, Ltd. (CNR) achieved initial capacity in September of 2010, adding an initial 110,000 bbl/d to output from the region.

Numerous greenfield projects and expansions to current operations were approved or are under construction, as the rebound in oil price has reinvigorated financial interest. These projects are the largest planned in Albertan Oil Sands and will be the main source of production growth from Canada:

Planned Canadian Oil Sands Projects - Expansions

Project	Company	Expansion (Phase)	Expanded Capacity	Commission Date
Millenium	Suncor	180,000 bbl/d (North Steepbank Extension)	501,000 bbl/d	2012
Firebag	Suncor	272,000 bbl/d (4 Phases)	367,000 bbl/d	2012-2019
Long Lake	Nexen; OPTI Canada	216,000 bbl/d (3 Phases)	288,000 bbl/d	2012-2018
Jackpine (AOSP)	Shell Canada; Chevron Canada; Marathon Oil	200,000 bbl/d (2 Phases)	355,000 bbl/d	2012-2014
Christina Lake	MEG Energy	185,000 bbl/d (4Phases)	210,000 bbl/d	2013-2020
Christina Lake	Cenovus; ConocoPhillips	240,000 bbl/d (6 phases)	258,000 bbl/d	2013-2017
Foster Creek	Cenovus; ConocoPhillips	90,000 bbl/d (3 phases)	210,000 bbl/d	2014-2017
Jackfish	Devon	35,000 bbl/d (Phase 3)	105,000 bbl/d	2015
Surmont	ConocoPhillips; Total E&P	83,000 bbl/d (Phase 2)	110,000 bbl/d	2015
Mildred Lake/Aurora	Syncrude Canada	200,000 bbl/d (2 Phases)	407,000 bbl/d	2016-2018

Source: Government of Alberta, Oil Sands Developers Group

Planned Canadian Oil Sands Projects - Greenfield			
Project	**Company**	**Capacity**	**Commission Date**
Kearl	Imperial; Exxon Canada	110,000 bbl/d (Phase 1); 200,000 bbl/d (Phases 2-3)	2012-2018
Mackay River	Athabasca Oil Sands Corp.; PetroChina	115,000 bbl/d (3 Phases)	2014-2019
Sunrise	Husky; BP	210,000 bbl/d (4 Phases)	2014-2018
Fort Hills	Suncor; Total E&P; Temek Resouces	190,000 bbl/d	2015-2016
Joslyn	Total E&P; Suncor; Occidental	200,000 bbl/d (2 Phases)	2017
Narrows Lake	Cenovus; ConocoPhillips	130,000 bbl/d	2017
Pierre River Mine (AOSP)	Shell Canada; Chevron Canada; Marathon Oil	200,000 bbl/d	2018-2022

Source: Government of Alberta, Oil Sands Developers Group

Chinese firms have begun to forge a potent presence in the oil sands over the last year. In January 2010, PetroChina finalized the acquisition of a 60 percent stake in the MacKay River and Dover projects from Athabasca Oil Sands Co. (AOSC). Sinopec acquired ConocoPhillip's stake in Syncrude Canada. Syncrude Canada Project produces 350,000 bbl/d and is one of the largest open-pit mines in the Athabasca Oil Sand region. China National Offshore Oil Company (CNOOC) also purchased a stake in the Christina Lake and Surmont oil sands projects from MEG Energy. The premier of Alberta, Ed Stelmach, even made an official state visit to Beijing in May 2010 to expand ties between the two countries and regions.

Western Canada Sedimentary Basin

The traditional center of Canada's oil production has been the Western Canada Sedimentary Basin (WCSB), which stretches from British Columbia across Alberta and Saskatchewan to Manitoba. This sedimentary basin contains some of the most abundant supplies of oil and natural gas in the world, supplying much of the North American market. Despite production from oil sands having surpassed conventional production in 2006, the WCSB remains a significant source of conventional oil production. In fact, depletion rates of conventional oil production in the WCSB are expected to fall in the coming years, as new horizontal drilling techniques are applied to old wells and new resource deposits (see Shale Oil below), particularly in the Cardium formation in Alberta.

Offshore

The traditional areas of offshore oil production are found in the Jeanne d'Arc Basin, off the eastern shore of Newfoundland. Currently, oil production is concentrated in three oil fields: Hibernia, Terra Nova, and White Rose fields.

The Hibernia oil field is located in the Grand Banks region, with reserves estimated at 1.3bn barrels (bbl) of total reserves remaining under the Ben Nevis-Avalon and Hibernia sandstone formations. The nearby Hebron field, with an estimated 400-700 million barrels of recoverable resource, is expected to begin production by 2017, mitigating increased decline rates in mature fields. The Terra Nova field lies to the southeast of Hibernia and reserve estimates are 531 million

barrels of total reserves. With the third main oilfield, White Rose, having begun to decline, three satellite oil fields are being developed: North Amethyst, West White Rose, and South White Rose. In May 2010, production started at the North Amethyst Field, and West White Rose was given governmental approval. Production from these three areas amounted to approximately 300,000 bbl/d in 2010.

Drilling also continues north of Grand Banks, off the coast of Labrador. Statoil has been drilling in the Flemish Pass, northeast of Labrador, where significant hydrocarbons were discovered in 2009. Chevron also completed drilling Canada's deepest oil well, Lona O-55, in the Orphan Basin at a depth of 1 mile.

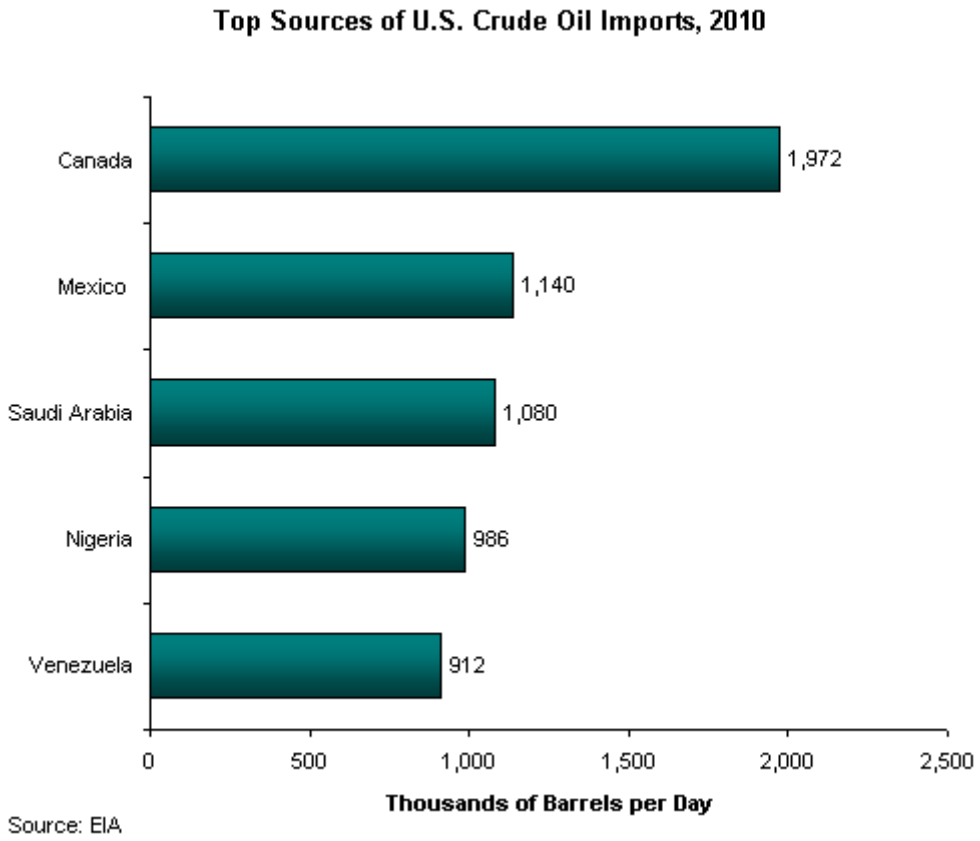
Canada's offshore exploration and production is confined by numerous regulatory and legal impediments. A federal review of offshore drilling prevents progress in the Arctic and a 1972 moratorium prevents field development off the Pacific coast. Oil majors such as Imperial Oil, ExxonMobil Canada, BP, and Chevron have invested significantly to secure acreage in the Beaufort Sea. Off the Pacific coast, there are an estimated 9.8 billion barrels, ten times the size of Hibernia.

Oil Shale

As the mature, conventional oil fields in the WCSB continue their decline, technological advances have made shale formations an alternative for conventional petroleum production. The Bakken and Spearfish formations, running from southern Saskatchewan and Manitoba across North Dakota and Montana, and the Cardium formation, encompassing much of central Alberta, are attracting significant attention. These formations are similar in composition and contain conventional oil reserves in addition to crude oil trapped in shale deposits. Technological advances in extraction techniques, such as horizontal drilling and hydro-fracturing have increased the accessibility of these oil reserves. These formations may well add billions of barrels to Canada's oil reserves.

Exports and Pipelines

Exports of oil come mainly from the western provinces, while the eastern regions, those with the highest populations, must import much of the energy products they consume. Canada exported 1.97 million bbl/d of crude oil and 2.53 million bbl/d of total oil to the United States in 2010. The United States is the main market, consuming essentially all (99 percent) of Canadian petroleum exports. At the same time, Canada is the largest supplier of crude oil to the US market, contributing approximately 22 percent of total oil imports. With the potential demand growth in Asia, however, Canada is seeking to diversify its export markets, though this shift will be gradual.



Pipelines

According to the Canadian Energy Pipeline Association (CEPA), Canada has a network for the transportation of crude oil encompassing over 62,000 miles of pipeline under operation. Canada's crude pipeline system is concentrated in the western provinces and largely oriented toward exports to the U.S. market. Three Canadian companies operate the majority of export pipelines: Enbridge, Kinder Morgan, and TransCanada. Canada does not have the refining and processing capacity that is present in the U.S. Midwest, necessitating imports of refined products from the United States.

Domestic Pipelines

Various companies operate several domestic pipeline systems that complement the export infrastructure. Pembina Pipeline, Spectra Energy, Access Pipeline, and Inter Pipeline all operate systems in Western Canada. In July of 2010, Pembina was approved for the construction and operation of the Nipisi Pipeline Project, which is a combination of heavy crude and condensate pipelines originating in Northwestern Alberta and destined for processing in Edmonton. Kinder Morgan operates the Trans Mountain Pipeline System, transporting crude oil and refined products. Product originates in Edmonton, Alberta and travels to various marketing and refining stations near Vancouver, B.C. It is the only pipeline that transports oil and petroleum products to the west coast of North America.

Export Pipelines

Enbridge operates the largest export oil pipeline network, the Canadian Mainline and Lakehead Systems. This 3,300-mile network carries 2 million bbl/d of oil from Edmonton, Alberta to Quebec and the U.S. Midwest. Around 70 percent of Canada's oil exports travel through this system. During the summer of 2010, leaks in three of the main pipelines in this system adversely impacted the export of crude oil from Alberta to the United States, causing some firms to shut in as much as 10,000 bbl/d. Kinder Morgan operates the other major oil pipeline between Canada and the United States. The Express and Platte Lines transport crude from Hardisty, Alberta, an emerging Canadian oil hub, to Wyoming, Colorado and Utah, connecting to pipelines bound for Illinois. TransCanada has gained a foothold in Canada's crude export market with its Keystone Project. Once finished, the Keystone Pipeline System, including the Keystone XL extending to the Gulf,

would reach 3,811 miles. This pipeline system will carry Canadian heavy crude to refineries in the United States, then transport it to the GulfCoast for delivery to international markets.

Source: Canadian Association of Petroleum Producers (CAPP) (click on map to view larger version)

In the wake of the financial crisis, large up-front capital investments such as upgraders and refineries have become less viable. This has led to cancellation of upgrader and refinery projects, bolstering plans for pipelines to the US refining sector. In July 2010, Enbridge began commercial operation of the Alberta Clipper pipeline, an expansion of an initial 450,000 bbl/d to an eventual 800,000 bbl/d to Enbridge's current capacity. The Southern Lights pipeline, a parallel pipeline to the Alberta Clipper, transports lighter hydrocarbons back to Alberta to be used as diluent in processing and transporting bitumen.

Enbridge has also proposed the Northern Gateway Pipeline Project. This pipeline system will carry crude oil to the planned Kitimat Terminal, on the western coast of British Columbia. Kitimat will provide diversification to Canadian exports, allowing access to Asian markets. The crude will be sourced from Edmonton. A parallel pipeline will carry condensate used as diluent back to Edmonton for reuse. The flow rate for the incoming crude will ultimately reach a plateau throughput of 1 million bbl/d. Several firms are also assessing the feasibility of other potential terminals to facilitate exports to Asia-Pacific region.

Refining and Upgrading

The refining sector in Canada was the hardest hit by the financial downturn. Refining and upgrader plans were cancelled due to financial illiquidity and depressed demand forecasts. In January 2010, Shell announced plans to convert its 130,000 bbl/d Montreal East refinery into a gas distribution terminal. Upgrading facilities also present major upfront capital costs. As many as eight new upgraders were planned in 2008, currently only two are going ahead. In October 2010, Shell Canada announced the cancellation of a vast 400,000 bbl/d expansion of the Scotford Upgrader outside Edmonton. Total also cancelled an upgrader planned for Edmonton, but this was in a deal with Suncor that resurrected plans for the 200,000 bbl/d Voyageur upgrader, to be built in parallel with Suncor's Fort Hills project.

The Government of Alberta is taking strides to mitigate this loss of upgrading and refining

capacity. The provincial government instituted a Bitumen Royalties In-Kind (BRIK) policy in which oil sands producers pay royalties with raw bitumen supplies. In February 2011, Canadian Natural Resources and Northwest Upgrading signed an agreement to construct and operate the 150,000 bbl/d upgrader and refinery. The Albertan government will provide half of the feedstock to the complex from the BRIK program. This facility will be the first to have the capacity to convert raw bitumen into final petroleum products.

Carbon Capture and Storage (CCS)

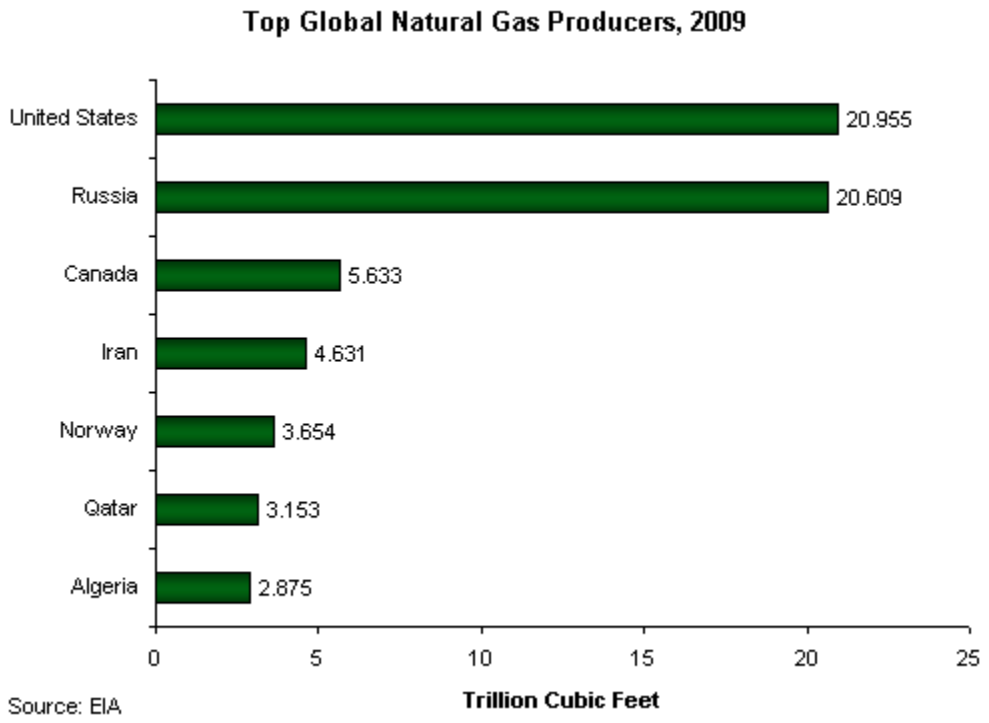
Canada has the largest and most advanced carbon capture and storage (CCS) projects in the world. CCS is a process by which emissions of carbon dioxide, especially prevalent in the industrial sector, are filtered out and stored, keeping it from being released into the atmosphere. The carbon dioxide that is normally discharged is separated, compressed and transported for injection into subterranean formations.

The economic viability of capturing carbon and storing it has been prohibitive. The use of carbon dioxide in enhanced oil recovery (EOR) techniques, however, could prove the decisive factor in its development. At the close of 2009, the Alberta government signed an agreement to build a pipeline from Fort Saskatchewan, the location of Alberta's industrial center, to producing oil fields in order to inject carbon gas into the ground to increase recovery rates at declining fields.

Natural Gas

Canada is the world's third largest natural gas producer and exporter.

Oil and Gas Journal (OGJ) estimates that Canada's proved natural gas reserves amount to 61.95 trillion cubic feet (Tcf) as of January 2011, a 7 percent increase from the previous year. Despite its relatively small amount of reserves of natural gas, Canada is third in dry natural gas production, as well as the third largest net exporter of natural gas globally. Vast deposits of unconventional natural gas reside in the WCSB in the form of coal bed methane (CBM), tight gas and gas found in formations of shale. Although development of these resources is not as advanced as in the United States, they nevertheless make up a significant source of growth potential in natural gas production.



Exploration and Production

Annual production over the last decade has held steady at historical highs of around 5.6-6.6 Tcf. In 2009, Canada produced 15.43 billion cubic feet per day (Bcf/d) of natural gas, of which they exported 9.07 Bcf/d. Canada consistently accounts for over 85 percent of the United States'

natural gas imports. Most of Canada's natural gas deposits reside in the Western Canada Sedimentary Basin (WCSB), interconnected with the vast oil deposits in the same region. Although production of conventional natural gas is in decline in the WCSB, technological advances have spurred rapid investment in the region, especially in shale and tight gas plays in British Columbia and Alberta. Otherwise, reserves of natural gas are concentrated off the eastern shore of Canada, principally around Newfoundland and Nova Scotia, from the Arctic region, and off the Pacific coast.

Western Canada Sedimentary Basin

The vast majority of Canada's natural gas production derives from the WCSB, principally Alberta, producing 75 percent of Canada's total marketable natural gas production in 2010. Unconventional sources of natural gas and a relatively restrictive royalty structure have driven investment to neighboring provinces. Increasingly, natural gas production from the WCSB will come from shale gas, tight gas, and coal-bed methane (CBM).

Offshore

Offshore natural gas production has been focused primarily off the coast of Eastern Canada, in the Scotian Shelf geological area. The most mature project is the Sable Island Offshore Energy Project (SOEP), an area that contains 3 Tcf of proved gas reserves. SOEP produces as much as 500 million cubic feet per day (MMcf/d). In September 2009, Exxon announced the integration of the Chebucto gas field to SOEP, adding 330 Bcf of natural gas to the project's resources by 2012. EnCana is developing another major natural gas project off Newfoundland, the Deep Panuke Project, which is set to come on-line in 2011. At its completion, reserves of 1Tcf will yield a flow rate of 400 MMcf/d, expandable to 650 MMcf/d.

The Grand Banks region, off the eastern coast of Newfoundland, is home to numerous oil fields that yield a significant amount of associated gas. Although these reserves are considerable, at 4 Tcf, the extracted natural gas is mainly re-injected into reservoirs for possible future extraction and production. Canada's moratorium on offshore drilling in the Pacific, in place since 1972, has hampered any attempts at production off British Columbia. The Government of British Columbia has commissioned geological surveys showing upwards of 42 Tcf of accessible natural gas deposits off its coast.

Unconventional Gas

With the decline of traditional gas production and few opportunities for exploration, unconventional reserves of shale gas, tight gas, CBM will all feature centrally in future Canadian natural gas production going forward. Shale gas provides the most promising natural gas resource in Canada, with reserves in-place amounting to trillions of cubic feet. Tight gas plays, often geologically connected to shale deposits, and CBM potentially add trillions of cubic feet in additional reserves. The scale of these resources indicate that unconventional gas will maintain Canada's high production volumes, although greater access to international markets, especially in Asia, will determine its export potential.

Shale Gas

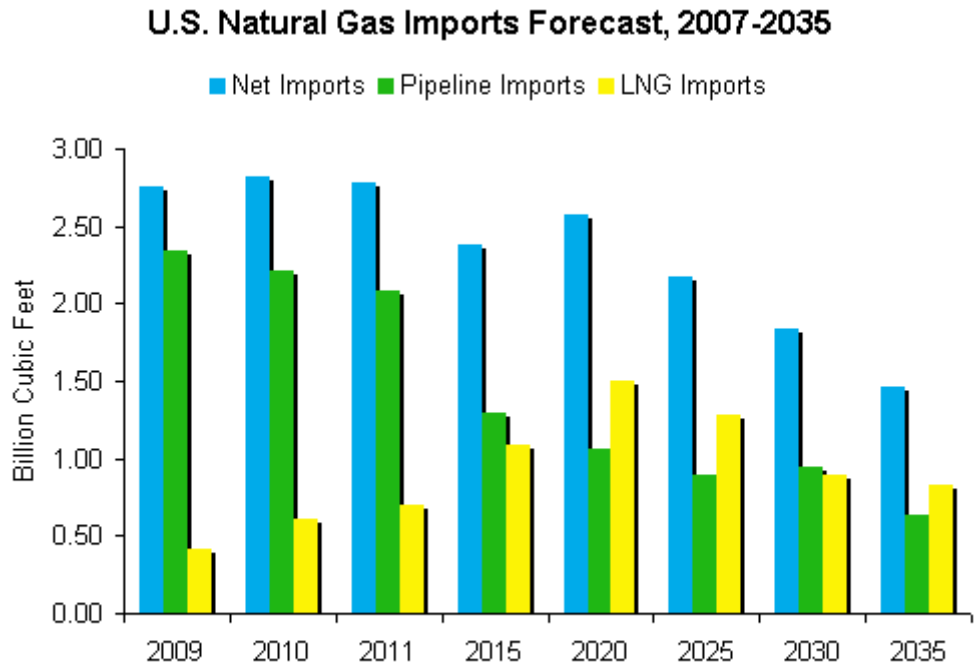
Proven natural gas reserves in Canada reflect primarily the remaining conventional resource. The 355 Tcf of technically recoverable shale reserves is more than five times the current official proven reserve estimate of natural gas (61.95 Tcf). Natural gas can be locked in mineral deposits of shale, a flaky, permeable mineral. Through a technique called hydraulic fracturing, also known as "fracking", a mixture of sand, water and chemicals is discharged at high pressures to cause fractures in the sediment, releasing hydrocarbons. Although still a nascent industry, foreign firms have made significant investments in the past year. In December 2010, Talisman Energy concluded a strategic partnership agreement with Sasol of South Africa to develop shale gas with estimated reserves of 4-12 Tcf. Encana has concluded deals with the Korean Gas Corp. (KoGas), state oil firm PetroChina, and another with the China National Petroleum Corporation (CNPC), all indicating the level of foreign interest in Canadian shale deposits.

Major Canadian Shale Deposits			
Play	Recoverable Reserves (Tcf)	Reserves In-Place (Tcf)	Province
Horn River	132	378	British Columbia/ Northwest Territories
Cordova Embayment	29	83	British Columbia/ Northwest Territories
Liard Basin	31	125	British Columbia/ Northwest Territories
Montney (Deep Basin)	69	222	British Columbia/ Alberta
Colorado Group	61	408	Alberta/ Saskatchewan
St. Lawrence (Utica)	31	155	Quebec
Horton Bluff	2	9	Nova Scotia
Frederick Brook	N/A	N/A	New Brunswick
Total	**355**	**1,380**	

Source: EIA

Exports and Consumption

In 2009, of the 15.43 Bcf/d produced, Canada exported 9.08 Bcf/d to the United States. Canada consistently accounts for over 85 percent of U.S. natural gas imports. As Canada develops its newly accessible reserves of natural gas, it will also have to enable exports to markets outside the United States. The extraction of shale gas in the U.S. has led to an increase in domestic production that will require less imported gas in the future. Additionally, these smaller import volumes will be increasingly met by imports of liquefied natural gas (LNG), rather than from pipelines, the traditional mode of export for Canada to U.S. markets. This has prompted firms to look to Asia for the necessary markets to sell the increasing amounts of gas, as well as attracting Asian investment.



Source: EIA Annual Energy Outlook

Pipelines

TransCanada operates the largest network of natural gas pipelines in North America. The network includes some 37,000 miles of gas pipeline in operation, comprising thirteen major pipeline systems, both in Canada and the United States. In the Northeast, the main arteries for natural gas are the Maritimes & Northeast System, and the Trans Québec & Maritimes Pipeline, which links to Portland Gas Pipeline System on the US side. In the West, Spectra Energy operates the BC Pipeline System. Finally, the Alliance Pipeline, a 2,311-mile pipeline system, is a significant source of natural gas for the U.S. Midwest, which delivers 4.6 Bcf/d to both Canadian and U.S. markets.

After six years of regulatory review, the NEB approved the MacKenzie Pipeline project. Imperial Oil and TransCanada are partners in the Mackenzie Pipeline, a 745-mile pipeline from Canada's Beaufort Sea to northern Alberta, where it can join existing pipeline networks. This pipeline would have a capacity of 800 Bcf/d. This proposal, however, is competing with two other pipeline schemes for the transport of natural gas from Alaska's North Slope.

Liquefied Natural Gas (LNG)
Import Terminals

Discoveries of vast sources of domestic natural gas supplies have diminished the necessity for Canada to increase its capacity to import liquefied natural gas (LNG). As such, the majority of import terminal plans have either been cancelled or placed on hold indefinitely. As many as seven import terminals were in some form of planning or operation through 2009, plans for five of them have seemingly been abandoned.

In June 2009, the Canaport LNG import terminal began operations. The Canaport terminal is operated by Repsol and has a nameplate capacity of 1.2 Bcf/d. Repsol has begun to supply Canaport from its Peruvian assets and recently finalized a long-term supply agreement with Qatargas. In January 2011, QatarGas delivered a record shipment of 22 Bcf of LNG to Canaport in a contract calling for up to 66 billion cubic feet per year (Bcf/y). Canaport currently has a throughput capacity of 1 Bcf/d.

Plans for two other import terminals have proceeded, albeit with delays. The MapleLNG facility is under construction and will have an initial throughput of 1 Bcf/d, expandable to 2 Bcf/d. The terminal is expected to come on-line in 2012. The Rabaska LNG Terminal is a joint venture between GDF Suez, Gaz Métro, and Enbridge, expected to receive LNG shipments beginning in

2014. Gazprom has a standing commitment to supply Rabaska with natural gas from the Shtokman gas field in the Russian Arctic.

Exports Terminals

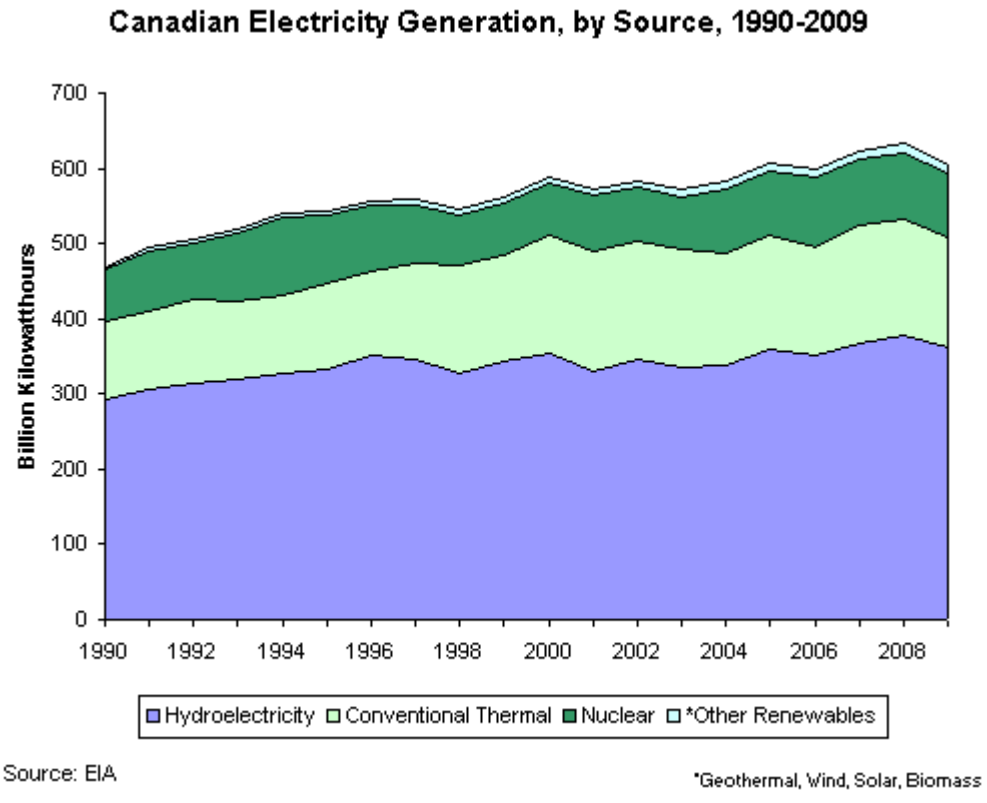
The Kitimat LNG facility will provide the outlet necessary to reach these markets. Galveston LNG sold its entire working interest to Apache Canada and EOG Resources Canada in 2010. In 2011, Encana purchased a 30 percent stake in the prospective terminal, with Apache maintaining majority with 40 percent and EOG reducing its stake to 30 percent. The $3 billion facility will process 667 MMcf/d, expandable to 1.3 Bcf/d. Firms such as Mitsubishi, KoGas and Spain's Gas Natural have signed memoranda of understanding (MoU) for all the available export capacity. This project would be the first LNG export facility in North America.

With the rebound in global LNG prices and the increased LNG demand growth potential in the wake of the nuclear disaster in Japan, other export terminals are being evaluated. Royal Dutch Shell, in cooperation with Mitsubishi, KoGas, and PetroChina, is looking at constructing an export terminal on Rupert Island, north of Kitimat. A capacity between 1.2-2 Bcf/d is being considered. Another, smaller terminal project called Douglas Channel LNG, a facility with a capacity of 125 MMcf/d, would connect to the Pacific Trails Pipeline, which will be built to feed the Kitimat terminal.

Electricity

Canada is one of the world's largest producers of hydroelectricity.

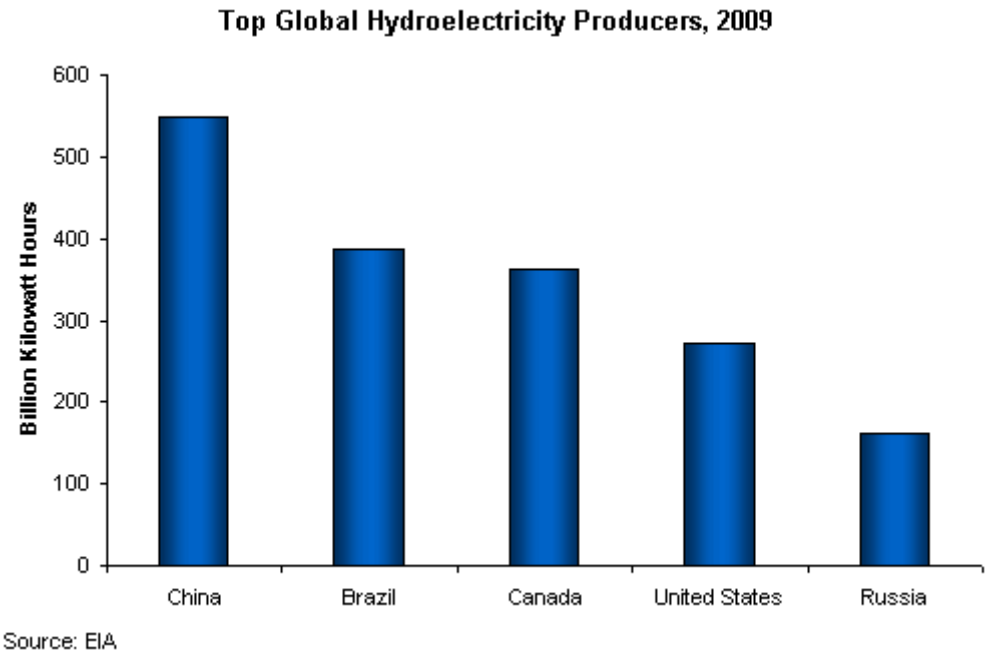
Canada had 127.6 gigawatts (GW) of installed electricity generating capacity in 2008. Canada's electric capacity increased steadily during the 1980s and 1990s, expanding by 55 percent. In 2008, Canada generated 614.25 BKWh of electricity and consumed just 536.05 BKWh. Most of the electricity generated in Canada (58 percent) is produced from hydropower, an exception to the general international trend of reliance upon hydrocarbon sources for electric power generation.



The electricity networks of Canada and the United States are highly integrated. In 2009, Canada exported 51.1BKWh of electricity to the United States, while importing 17.5BKWh, yielding net exports of 33.6 BKWh in electric power.

Hydroelectricity

Canada is one of the world's largest producers of hydroelectricity, generating 363.4 BKWh from hydropower in 2009. Canada's hydroelectric capacity is 70,858 MW. Hydropower is a critical source of electricity for two reasons: it is renewable and the conversion efficiency is as high as 95 percent, relative to 30 percent for some hydrocarbon sources. 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.



Source: EIA

Links

EIA Links

EIA – Canada Country Energy Profiles

U.S. Government

CIA World Factbook - 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 Pipeline Association
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
New Brunswick Ministry of Energy

Newfoundland and Labrador Ministry of Mines and Energy
Newfoundland Offshore Petroleum Board
Nova Scotia Offshore Petroleum Board
Québec Ministry of Energy
Saskatchewan Industry and Resources

Sources

Americas Oil and Gas Insights
BusinessWire
Calgary Herald
Cambridge Energy Research Associates
Canadian Association of Petroleum Producers (CAPP)
Canadian Business
Canadian Corporate Newswire
Canadian Energy Pipeline Association (CEPA)
Canadian Press
Canwest News Service
CIA World Factbook
ConocoPhillips
Daily Oil Bulletin
Deutsche Bank
Devon Energy
Dow Jones
Economist Intelligence Unit
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
Investor's Business Daily
Kinder Morgan
Marketwire
National Post
Natural Gas Intelligence
Natural Gas Week
Natural Resources Canada
Montreal Gazette
New York Times
Oil and Gas Journal
Oil Daily
Oil Sands Developers Group (OSDG)
Oil W eek
Ottawa Citizen
Petroleum Economist
Petroleum Intelligence Weekly
Pipeline and Gas Journal
Platt's
Power Engineering
Project Finance
Reuters
Shell Canada
Statistics Canada

Suncor
Syncrude
Talisman Energy
Telegraph-Journal (New Brunswick)
TendersInfo
TransCanada Pipelines
Toronto Star
Vancouver Sun
Wall Street Journal
World Gas Intelligence
World Markets Online

Contact Info

cabs@eia.doe.gov
(202)586-8800
cabs@eia.doe.gov