

CANADA



CANADA COUNTRY PROFILE

OVERVIEW

Canada is the 5th largest producer of natural gas and the 6th largest producer of crude oil in the world, trailing only to China, US, Russia and Saudi Arabia.

Ninety-seven percent of the world's largest oil reserves are located in the Alberta oil sands. Remaining oil reserves are located in Saskatchewan and offshore Newfoundland & Labrador. Natural gas fields are located in British Columbia, Alberta and offshore Nova Scotia. Northern Canada is also seeing increasing exploration and development. The oil and natural gas industry is Canada's largest private sector investor, with oil sands alone injecting almost CAD\$23 billion into Canada's economy in 2015.¹

¹ <http://www.canadasoilsands.ca/en/explore-topics/economic-contribution>

Country Facts

Nominal GDP	\$2067 billion
Population	36.4 million
Total Trade/GDP	25%
Currency	CAD Dollar
Top Merchandise Imports	\$46,312 millions
Total FDI	\$188 billion
Main Imports	Crude Oil, Automobile and Truck Parts, Medications, Electronics

Figure 1 Source: Statistics Canada April 2017

Canada is an energy intensive country compared to other industrialized nations. Much of this is due to the reliance on automobiles and remoteness of populations from major city centres. As the country is vast, so is the energy industry between its provinces and territories.

For the most part, Canada's economy is fueled by petroleum, natural gas, and hydroelectricity. In 2016, the government made a commitment to invest in clean technology, including new energy related projects.

This country profile focuses on the provinces of Alberta, Nova Scotia and Newfoundland as these are the host provinces to the World Energy Cities of Calgary, Halifax and St. John's.

COUNTRY SOURCES OF ENERGY

Hydroelectricity remains the primary source of electric power in Canada accounting for 55% of total capacity. Natural gas, coal, and nuclear plants provide most of the remaining supply, while non-hydro renewables such as wind, solar, and biomass

make up 9% of the capacity.² Two-thirds of Canada's fossil fuel generation plants are fueled with coal.

The electricity supply mix varies significantly amongst the provinces and territories. Quebec, British Columbia (BC), Manitoba, Newfoundland & Labrador, and Yukon have significant hydroelectric resources which are used to supply most of their electricity needs. Saskatchewan and Alberta rely on locally abundant coal resources but have been expanding their natural gas-fired resources. Nuclear power plants represent approximately one-third of Ontario's capacity, with natural gas and hydro providing much of the remaining power. Atlantic Canada relies on a combination of hydro, various fossil fuels, nuclear, and non-hydro renewable resources. Diesel-fueled plants account for most of the capacity in Nunavut and NWT.³

CURRENT STATE OF ENERGY USE AND 'ENERGY DIRECTION'

Alberta leads the country's demand for oil and gas, particularly for operating the oil sands. Energy use trends in Atlantic Canada can be unpredictable depending on the demands of the region's industrial activities. Atlantic Canada uses a much higher share of refined products than the rest of Canada due to infrastructure limitations. In the western provinces, natural gas is used relatively more than other regions because it is readily available and it is price competitive.⁴

Canada's oil sands had experienced the worst market in decades causing company shut downs and project delays. This resulted in the oil and gas industry undergoing rapid transformations in both the types of resources extracted and extraction technologies. Continued productivity will play an important role in the exploration and shaping of Canada's fossil fuel industry. Analysts predict that

² <https://www.neb-one.gc.ca/nrg/ntgrtd/ftr/2016/fslctrct-eng.html>

³ National Energy Board of Canada 2016

⁴ <https://www.neb-one.gc.ca/nrg/ntgrtd/ftr/2016pt/prvnc-trrtrl-cmprsn-eng.html>

the oil sands industry will grow by 800,000 barrels in 2017.

The outlook for the industry across Canada is improving. Canada's energy producers are returning to growth mode. The renewed focus on expansion is occurring as the Canadian government in 2016 approved construction of two expanded energy pipelines that will add almost a million barrels a day of export capacity to Western Canada.⁵

Politically, the country is trying to balance energy development with its commitment to reduce greenhouse gas emissions by 30% below 2005 levels by the year 2030. Canada's employment and economic prosperity relies heavily on its energy sectors. Canadians want a vibrant industry and they want the industry to use good environmental practices.

In response, the federal government created The Pan-Canadian Framework on Clean Growth and Climate Change.⁶ The framework outlines Canada's strategy to reach its climate change target and to position Canada as a leader in the clean technology industry.

New and improved technology in the energy sector will be key to Canada's growth. To address the need for alternative energy resources, Canadian provinces are investing in hydropower, wind power and tidal power. Improved technologies in deep water exploration are also helping to elevate Canada's productivity.

ENERGY INDUSTRY

OIL AND GAS

Canada's oil and gas reserves, including reserves of non-conventional resources (oil sands) and shale gas, makes Canada one of the world's leading

⁵ <http://calgaryherald.com/business/energy/canadas-oilpatch-moves-into-growth-mode-finally>

⁶ <https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html>

exporters. Canada has 171 billion barrels of oil that can be recovered economically.

Companies in the country's oil sector are both domestic and international. Many Canadian firms participate in upstream oil and natural gas ventures, from large-scale active or planned commercial projects, to smaller pilot projects that serve as test beds for new technologies. The largest Canadian energy companies with a presence in the domestic upstream and downstream sectors include Suncor (which acquired Petro-Canada in 2009), Syncrude, Canadian Natural Resources Limited, Imperial Oil, Cenovus (which was spun off from Encana), and Husky Energy. Other Canadian companies, particularly Enbridge and TransCanada, dominate midstream pipeline infrastructure.⁷

OIL SANDS

Oil sands development is expected to contribute more than CAD\$4 trillion to the Canadian economy over the next 20 years — about CAD\$200 billion per year. Direct employment in Canada as a result of new oil sands investments are expected to grow from 151,000 jobs in 2014 to 225,000 jobs in 2038. When including indirect jobs, employment numbers will more than double across Canada.⁸

Within Alberta, there are three major oil sands deposits, the largest of which is the Athabasca deposit, followed by Cold Lake and Peace River. Additionally, the traditional center of Canada's oil production has been the Western Canada Sedimentary Basin (WCSB). This field stretches from British Columbia across Alberta and Saskatchewan to Manitoba and part of the Northwest Territories. The WCSB contains some of the world's most abundant supplies of oil and natural gas, and still remains a significant source of conventional oil production.

OFFSHORE

The offshore oil and gas industry is important to Atlantic Canada's economy. Through royalties, taxes

and job creation, the highs and lows of the energy industry has a major impact on all four provinces.

The East Coast offshore is still considered a frontier industry, yet many prominent oil companies are pursuing this market. There is an estimated 12 billion barrels of crude oil off Newfoundland & Labrador, as well approximately another eight billion barrels of oil off of Nova Scotia. Only 5% of Newfoundland & Labrador's offshore is under license. The East Coast offshore is categorized as deepwater and harsh climate.

Total expenditures of CAD\$39 billion have been generated from the offshore since 1996. The sector contains more than 800 companies both domestic and international, directly employing more than 9,500 people.

NEWFOUNDLAND & LABRADOR

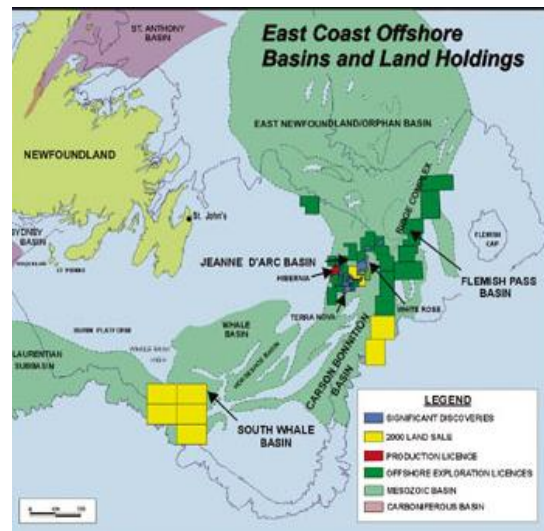


Figure 2 Offshore Map Source: Government of Newfoundland & Labrador

Most offshore crude oil and other liquids production in Canada takes place in the Jeanne d'Arc Basin, off the eastern shore of Newfoundland & Labrador. Light crude oil production from offshore areas in

⁷ US Energy Information 2015

⁸ <http://www.canadasoilsands.ca/en/explore-topics/economic-contribution>

Eastern Canada averaged about 220,000 b/d in 2014, nearly 14% of Canada's total crude oil production.⁹

Significant Offshore Fields:

Hibernia

Most of Canada's offshore output comes from the ExxonMobil-operated Hibernia field, which came online in 1997 and produced about 115,000 b/d in 2014. Continued drilling is happening at the Hibernia Southern Extension (HSE). The Hibernia Management and Development Co. (HMDC) is planning a CAD\$2-billion expansion to enable additional wells to further develop the Ben Nevis-Avalon reservoir.

Terra Nova

Terra Nova, operated by Suncor on behalf of a large consortium, accounted for nearly 46,000 b/d of production in 2014. Output from this field increased in 2014 compared with the prior year, although that level is still lower than production achieved in the past decade. Suncor Energy's main activities this year for the Terra Nova oilfield will be ongoing maintenance. In 2015, Terra Nova produced about 37,000 b/d.

White Rose

Husky Energy operates White Rose; production from this field has been below its historical levels, about 54,000 b/d in 2014 (combined with the North Amethyst field production). In 2015, White Rose produced about 33,000 b/d.

Production from the North Amethyst-Hibernia zone is scheduled to begin in 2017. Production from the West Rose satellite field is expected to begin in the 2020.

Hebron

The Hebron oil field is located in the Jeanne d'Arc Basin and is estimated to contain 700 million barrels of recoverable resources. The project is currently under development. It is owned by a co-venture of ExxonMobil Canada Properties (35.5%), Chevron Canada Limited (29.6%), Suncor Energy Inc. (21%), Statoil Canada Ltd. (9%), Nalcor Energy - Oil and Gas Inc. (4.9%).

The Bull Arm fabrication site in Trinity Bay faces an uncertain future after the Hebron project is towed out to sea. Nalcor says it's not ruling out any options for the property, including an outright sale. Work on the Hebron project is nearing completion. Nalcor is currently searching for new uses for the site either in oil and gas, manufacturing and/or shipbuilding.¹⁰

Flemish Pass

Statoil has confirmed it is planning to drill two exploration wells in the Flemish Pass Basin in 2017. The exploration drilling could bring hundreds of new jobs to Newfoundland & Labrador's offshore oil sector. The Flemish Pass Basin is estimated to contain between 300 and 600 million barrels in the Bay du Nord.

⁹ US Energy Information 2015

¹⁰ <http://www.cbc.ca/news/canada/newfoundland-labrador/bull-arm-exxon-husky-1.4026061>

NOVA SCOTIA

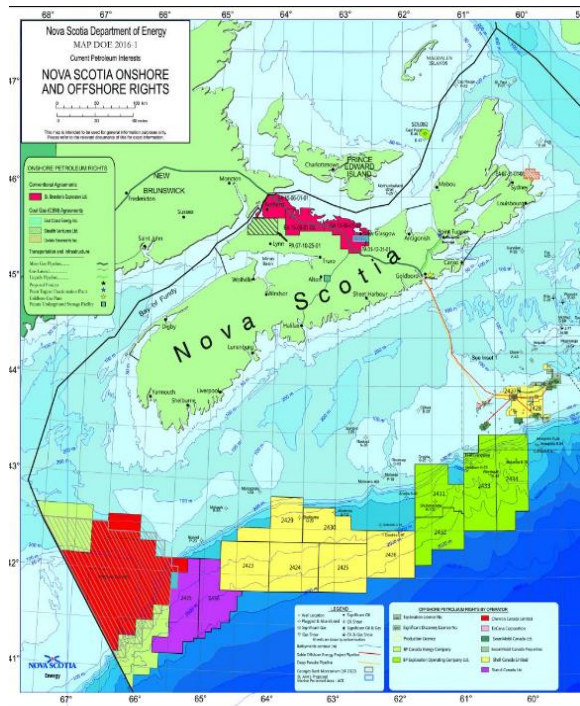


Figure 3 Nova Scotia Offshore Map Source: Nova Scotia Department of Energy

There are two producing offshore natural gas projects in Nova Scotia: the Sable Offshore Energy Project (operated by ExxonMobil) and Deep Panuke (operated by Encana). There is currently no oil being produced in Nova Scotia.

However, there is significant exploration activity underway. Statoil has acquired two licences offshore Nova Scotia. As well, even though Shell has discontinued their exploration in the Shelburne basin, the company is still encouraged that there will be future opportunities. Over CAD\$2 billion in exploration commitments have been made in recent years, with activity focused on deep water prospects. The Government of Nova Scotia estimates Nova Scotia's offshore resource potential is 120 trillion cubic feet of natural gas and 8 billion barrels of oil.

OTHER ENERGY

Shale Gas

Significant deposits of unconventional natural gas reside in the WCSB in the form of coalbed methane (CBM), shale gas, and tight gas. Canada has an estimated 573 Tcf of unproved technically recoverable shale gas. By 2030, the National Energy Board projects moderate growth in light oil production from tight oil plays in the WCSB as conventional heavy oil production declines. However, the development of tight oil reservoirs in Canada is still in its early stages.

In 2014, the Nova Scotia provincial government legislated a ban on hydraulic fracturing. New Brunswick currently has moratorium in effect.

Coal

Canada has about 6.6 billion tonnes of proved recoverable coal reserves, or 96 years of production at the current rate. The great majority of Canadian coal resources are located in Western Canada, but coal has also been produced in New Brunswick and Nova Scotia. After a 15 year hiatus, coal is once again being mined in Nova Scotia. The Donkin Mine opened in March 2017. The mine is managed by the Kameron Coal Management Ltd., a subsidiary of US mining giant, the Cline Group.

LNG

Canada has a burgeoning LNG (liquid natural gas) industry on both the East Coast and West Coast of Canada. Twenty-eight companies have applied for 35 LNG export licenses in the country.

The Canaport terminal, operated by Repsol in partnership with Irving Oil, began exporting LNG from New Brunswick in 2009. In Nova Scotia, there are two new plants under development. The Goldboro LNG owned by Pieridae Energy Canada will supply natural gas via the existing Maritimes & Northeast Pipeline, which is located directly adjacent to the project. The Bear Head LNG Corporation is developing a billion dollar 8-12 mtpa LNG export

terminal in Point Tupper, Nova Scotia. Nova Scotia is well positioned to become a leading LNG exporter and has many competitive advantages such as deep tide-water access, unrivaled infrastructure, clear environmental processes, access to pipelines in North America and attractive shipping distances to overseas markets.

Pipeline Infrastructure

Canada’s transmission pipelines move approximately 1.2 billion barrels of liquid petroleum products and 5.4 trillion cubic feet of natural gas annually. This energy export contributed CAD\$11.5 billion to Canada’s gross domestic product (GDP) in 2015. The industry is responsible for almost 34,000 full-time equivalent jobs across Canada. In 2015, the industry invested CAD\$16.7 million in innovative technology focused on reducing corrosion, improving pipeline inspection and leak detection. The industry estimates they will invest a total of CAD\$50 billion in Canadian pipeline projects over the next five years.¹¹

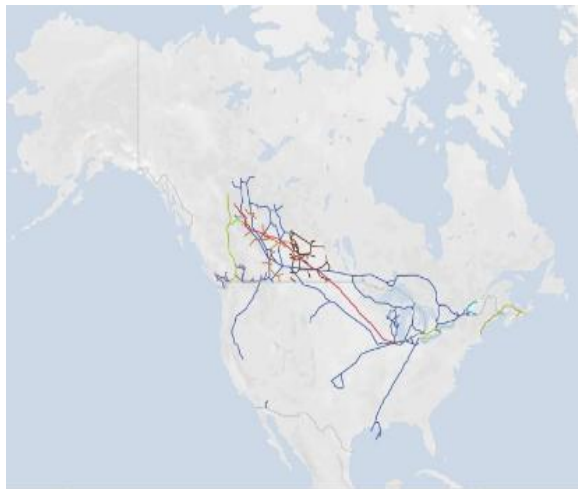


Figure 4 Map of Pipelines Source: CAPP

A number of pipeline projects have recently been approved.

- Line 3 Replacement project: (Enbridge) Approved 2016
- **Keystone XL:** (TransCanada) Approved March 2017

¹¹ CEPA Canadian Energy Pipeline Association

- **Trans Mountain Expansion:** (Kinder Morgan) Approved 2016

The Northern Gateway: (Enbridge) Was not approved in 2016

Energy East - Extensions: (TransCanada) In approval process.

Energy East is a 4,500-kilometre pipeline that will transport approximately 1.1 million barrels of crude oil per day from Alberta and Saskatchewan to the refineries of Eastern Canada and a marine terminal in New Brunswick.¹²

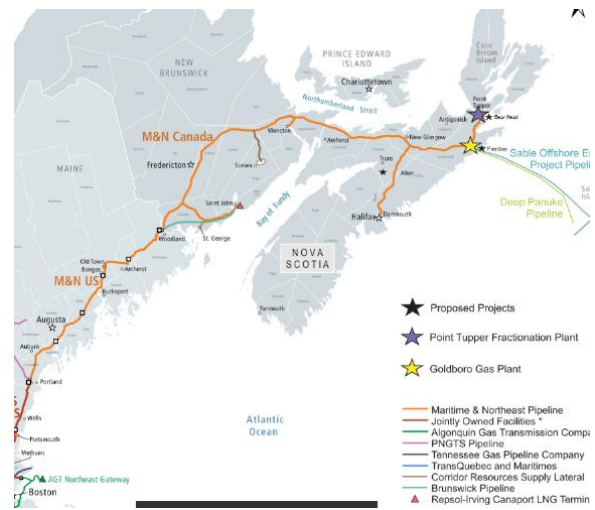


Figure 5 Nova Scotia Pipelines Source: Nova Scotia Department of Energy 2017

PROJECTS

WESTERN CANADA

- MEG Energy Corp plans to spend CAD\$590 million in operations this year in Alberta, almost five times more than in 2016, as it expands production at the Christina Lakes oil sands site by about 25 percent.
- Canadian Natural is moving ahead with its 40,000-barrel-a-day Kirby North project.
- Imperial Oil’s Kearl Mine started in Q3 2015. Phase 3 of the project is expected by

¹² <http://www.energyeastpipeline.com/>

2020. The cost of the project is CAD\$16 billion. Beyond 2020, the Kearn debottlenecking project is going to increase capacity by 125,000 bbls/d and Cenovus is looking to start Narrows lake Phase A, which will bring 45,000bbls/d.

- Teck Cominco Frontier Oil Sands Mine - Regulatory review process will continue into 2016. The capital cost has been increased to CAD\$20.6 billion and the total capacity is now 260,000 bbls/d.
- Suncor Fort Hills - 2017 fourth quarter is on stream date and 180,000bpd. Estimated development costs of CAD\$13.5 billion.
- Athabasca Oil Corporation HS-2B Expansion for 2019 adding 32,000 bbls/d.
- ExxonMobil is currently working on the development of the WCC LNG project in British Columbia. A definite starting production date is still to be determined. The project will add 30 million metric tons per year of liquefied natural gas and is estimated to cost more than CAD\$25 billion.

operator, Navitas Petroleum. Delek will own 70% of the venture and Navitas the rest. The partners have committed to invest CAD\$48 million.

- BP Oil plans to drill a well in 2018 in deep waters offshore **Nova Scotia**. The maximum number of BP wells would be six under this plan.
- Sable Offshore Energy Decommissioning project will begin in 2017 in **Nova Scotia**. ExxonMobil Canada (EMC) is the proponent. Opportunities may be found with contractors Blue Water Group, HNZ Group, and Secunda Canada LP.
- Husky Energy announced an expanded West White Rose project. The \$2.2-billion project is to produce first oil in 2022, using a fixed wellhead platform tied to the SeaRose floating production, storage and offloading vessel about 350 kilometres east of St. John's, N.L. Peak production is estimated to reach rates of about 75,000 barrels per day by 2025.

EASTERN CANADA

- Oil companies have promised to spend CAD\$757,989,794 for the right to explore off the East Coast of Newfoundland & Labrador. Six out of the seven bids in the Eastern Region were accepted, with BP Canada Energy Group and Noble Energy Canada gaining an interest in four areas in the West Orphan and Flemish Pass basins. Hess Canada Oil and Gas will partner on the work in three of the parcels. Other companies promising to do work include Navitas Petroleum, DKL Investments and Nexen Energy. In the Jeanne d'Arc region, about 340 kilometres east-southeast of St. John's, two out of three bids on the three parcels were accepted. Husky Oil Operations Ltd. won both parcels, and will spend CAD\$244,017,776 for the right to determine oil prospects in these parcels.
- Israeli energy conglomerate, Delek Group, won a tender for the right to explore a deep-water block offshore Newfoundland & Labrador, with a small private Israeli

GOVERNMENT REGULATIONS AND POLICIES

Policies, programs, and regulations are continually under development at federal, provincial, territorial, and municipal levels.

WESTERN CANADA - OIL SANDS

Federal review of oil sands development proposals is coordinated by the Canadian Environmental Assessment Agency (CEAA). CEAA works cooperatively with industry and it facilitates the coordination of federal regulatory reviews and provincial regulators.

Alberta's facilities are regulated by the provincial government's Environment and Parks department, which sets the policy, and the Alberta Energy Regulator (AER) ensures the policy is applied.

Alberta Environment and Parks sets the thresholds to minimize the impact of oil sands development on air, land and water and the development of

environmental frameworks. It is also responsible for regional planning, integrated land management and land use policy.¹³

EASTERN CANADA- OFFSHORE

The primary legislation governing oil and natural gas activities offshore Newfoundland & Labrador and Nova Scotia is under the Canada–Newfoundland and Labrador Atlantic Accord Implementation Act¹⁴ and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act.¹⁵ Offshore oil and natural gas operations in Newfoundland & Labrador are regulated by the Canada-Newfoundland & Labrador Offshore Petroleum Board (C-NLOPB), an independent administrative board jointly appointed by the federal and provincial government. Their mandate is to interpret and apply the provisions of the Atlantic Accord and the Atlantic Accord Implementation Acts to all activities of operators in the Newfoundland & Labrador Offshore Area, and to oversee operator compliance with those statutory provisions.

Similarly, in Nova Scotia, the Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) regulates the industry. Operators are required to submit a variety of plans and meet specific requirements in order to receive authorization from the C-NLOPB or C-NSOPB to conduct work offshore: Safety Plan, Environmental Protection Plan Contingency Plan, and a Benefits Plan. The Benefits plan describes a plan for the employment of Canadians and, in particular, members of the labour force of the province. Canada may also ask for a Community Development Agreement. Part of the agreement may be the hiring of First Nation peoples.

For more information:

<http://atlanticcanadaoffshore.ca/regulation/>

¹³ <http://www.canadasoilsands.ca/en/explore-topics/regulation-and-monitoring>

¹⁴ <http://laws-lois.justice.gc.ca/eng/acts/C-7.5/>

¹⁵ <http://laws-lois.justice.gc.ca/eng/acts/C-7.8/>

CERTIFICATION AND STANDARDS

Alberta Oil Sands requires all standard oil and gas certifications.

There are a number of mandatory safety training courses required before working on an offshore installation in Atlantic Canada.¹⁶ This includes:

- Basic Survival Training
- Helicopter Underwater Emergency Breathing Apparatus (HUEBA)
- Helicopter Underwater Escape Training (HUET)
- Hydrogen Sulphide (H₂S) Awareness
- Workplace Hazardous Materials Information System (WHMIS)
- Regulatory Awareness Training

WORKING IN CANADA

To do business in Canada, exporters have many factors to consider. The country has six time zones, 10 provinces, and three territories, each which is own provincial government. As the 2nd largest country in the world, the population is spread out with 90% of people living within 200kms of the US border.

The country has two official languages, English and French. Unless doing business in Quebec or New Brunswick, English will be spoken for businesses in the energy industry.

Market Strengths:

- Strong economic growth and banking sector
- High personal wealth
- Large and diverse natural resource sectors
- Strong business and consumer base
- Low corruption
- Proximity to the US
- Incentives for foreign companies to open branch offices

¹⁶ <http://atlanticcanadaoffshore.ca/training/>

Market Challenges:

- Each province has its own government system, rule and regulations and taxes for working in the energy industry, provincially and municipally, plus there is another set of rules and regulations federally
- High income and sales taxes. These too vary by province
- Remoteness for travel
- The development of tight oil reservoirs is still in early stages in Canada. The extent to which these resources can be produced from is largely undetermined
- Future exchange rates present an uncertainty for Canadian oil producers. Oil exporters are paid in US dollars, while most expenses are incurred in Canadian dollars. A volatile exchange rate would add further uncertainty in predicting economic returns for Canadian producers

As of March 2016, all visitors to Canada are required to obtain an Electronic Travel Authorization (eTA) before travelling to Canada.

<http://www.cic.gc.ca/english/visit/eta.asp>

Work permits for foreign employees are required. The types depend on the country of origin. Please seek advice from your nearest Canadian Consulate or Embassy.

OPPORTUNITIES IN CANADA

Canada's energy industry is exploring ways to improve well economics by reducing the cost of explorations and increasing well productivity. This will largely be achieved through technology and process development.

Top opportunities related to the energy sector in Canada will be predominantly based on dealing with large industry players working on long term projects, both in the oil sands and offshore.

FOREIGN DIRECT INVESTMENT

By 2025, oil production is expected to rise to 4.7 million barrels. To support this growth, investment

estimated at CAD\$2 trillion is required. By having 55% of the world's oil reserves available for private sector investment, Canada allows for many opportunities for foreign companies.

MAJOR COMPANIES

Suncor
Enbridge
Canadian Natural Resources
Husky Energy
TransCanada Corp.
Cenovus Energy
Imperial Oil
Encana
ExxonMobil
Crescent Point Energy
Pembina Pipeline
Repsol (formerly Talisman Energy)
Canadian Oil Sands Limited
Pacific Rubiales Energy
Irving Oil
Nexen
Syncrude
BP Canada
Statoil Canada
Shell Canada
Athabasca Oil Corporation
Tourmaline Oil Corp
Hibernia Management and Development Co
Nalcor Energy Oil and Gas
Aker Solutions Canada Inc.
Atlantic Towing Limited
Crosbie Salamis Limited
Halliburton Group Canada
Schlumberger Canada Ltd.
Wood Group Canada Inc.

For a full listing of local companies, please contact the following industry associations:

<http://www.maritimesenergy.com/>
<http://www.noia.ca/>
<http://www.capp.ca>
<http://www.cossd.com/>

NOVA SCOTIA

The Nova Scotia Department of Energy (NSDOE) is the leading provincial government department for the energy industry. Nova Scotia's offshore is rich with potential. Several world leaders in oil and gas are investing in Nova Scotia's offshore, including Shell Canada, BP, ConocoPhillips Canada, Suncor Energy, Woodside Petroleum and the Hess Corporation. In renewable energy, Nova Scotia is moving away from coal-based electricity and towards the use of fuels that are cleaner and lower in carbon such as natural gas and other renewables. The province has an abundance of natural renewable resources including wind, marine-renewable, hydropower, geothermal, solar, biomass and energy storage.¹⁷

World Energy City, Halifax, is the capital city of the province of Nova Scotia with a population of 417,847.

Key Advantages

- Primary economic engine for Atlantic Canada - 20% of the region's GDP
- Strategically located between major North American, European and Asian markets
- Ranks 8th in International Business Cost Competitiveness (KPMG, Competitive Alternatives 2016) Major North American transportation and logistics hub
- Major projects totaling CAD\$31 billion in Halifax; with CAD\$125 billion throughout Atlantic Canada
- Diverse economy powered by growing industry sectors such as financial services, transportation and logistics and ocean technology
- One of the most highly-educated workforces in North America - close to 70% of the working age population have post-secondary certification
- Ranked Top 10 for Business Friendliness in FDI Magazine's ranking of American Cities of the Future 2015/2016
- Halifax is a world leader in oceans research and technology, a growing sector generating CAD\$4.5 billion in GDP in Nova Scotia and employing 14% of the

province's workforce. Nova Scotia has the highest concentration of oceans-related PhDs in the world.

- Nova Scotia's commercial aerospace and defence sector, with locations throughout the Province, employs 3,000 people and generates more than CAD\$850 million in revenues each year. Add the Department of National Defence (DND) to the mix, with an additional workforce of 14,439 and annual expenditures of CAD \$1.7 billion, and you will see why Nova Scotia can compete with jurisdictions worldwide.¹⁸

Best Prospects - Oil Sands:

Calgary, Alberta is the World Energy Cities Partnership member in Western Canada representing many corporate offices of operators in the oil sands.

- Maintenance, Repair and Operations (MRO) for current projects and future start-ups
- Equipment; specialty mining and extraction equipment/services; drilling services, refinery equipment, pipeline construction equipment
- Environmental protection services, water resources, land reclamation, and reducing associated greenhouse gas emissions
- Environmental remediation technology and services, tailings treatment, barrier walls, off-stream water storage
- Safety/security equipment and services
- Pipeline construction equipment and services
- New technologies for solvent injection/co-injection (in situ), waterless extraction (mining), radiofrequency heating/electrical heating (in situ), and "field" upgrading techniques
- Innovative methods for cutting down operating costs and increasing the value of existing assets

¹⁷ <https://energy.novascotia.ca/>

¹⁸ Invest Canada & Halifax Partnership

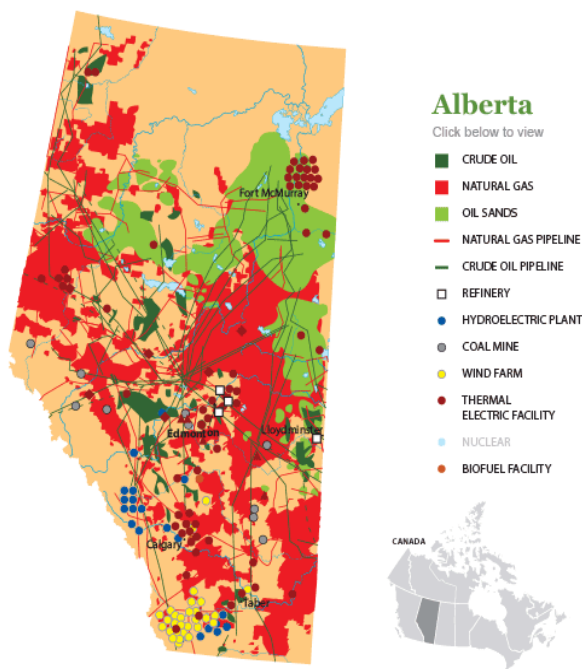


Figure 6 Alberta Resource Map Source: Government of Alberta

Best Prospects – Offshore:

- Installation products and services including integration and commissioning of all the topsides modules, the installation of the drilling support module and the derrick equipment set
- 2D, 3D and 4D seismic survey services
- Environmental seabed survey services
- FPSO maintenance and upgrade services
- Water-injector technology
- Decommissioning services of natural gas wells
- Equipment: flexible jumpers, flying leads, connectors and Christmas tree flow lines, light well interventions

LNG

LNG Development will generate an estimated CAD one trillion over the next 30 years.¹⁹ The government committed resources to get plants online by 2020. Companies with expertise in

¹⁹ Natural Resources Canada

construction and development of LNG plants have good opportunities to work in Canada.

IMPACTS DUE TO THE VOLATILITY IN OIL PRICES

The drop in oil prices had an adverse impact on the Canadian economy, mostly in the province of Alberta. Some projects were put on hold or shelved, employment suffered (110,000 job losses) and several companies restructured. Additionally, the reduction in output caused a slowdown in capital expenditures by 62%, plus drops in cash flow, loss in equity market capitalization, more debt earnings, and a drop in production royalties earned by the provincial governments.²⁰

RENEWABLE INDUSTRY

Canada is one of the world's leaders in the production and use of energy from hydro, wind, solar and biomass. Canada is the world's 3rd largest producer of hydroelectricity. The country is also making significant developments in geothermal and marine energy.

Between 2010 and 2014, non-hydro renewables were the fastest growing generation source in percentage terms, with an annual growth rate of 20 percent. In 2014, Canada had close to 13 GW of wind, solar, and biomass installations, accounting for 9% of total capacity.

Tidal Energy

Nova Scotia has been harnessing the power of the tides since 1984 and is home to one of three tidal generating plants in the world. Moreover, the highest tides in the world are located in the Bay of Fundy off the coast of Nova Scotia. The tides present opportunities to capture the kinetic energy that is both renewable and predictable.

²⁰CAPP <http://www.capp.ca/media/news-releases/capital-investment-in-canada-oil-and-gas-industry-down-62-per-cent-in-2-years>

In 2009, the world's first in-stream demonstration turbine was deployed in the Bay of Fundy. The potential to use the tides through the development of this new technology led to the creation of the Fundy Ocean Research Center for Energy (FORCE).²¹ FORCE is Canada's leading test centre for in-stream tidal energy technology and acts as a host to technology developers, providing the electrical infrastructure to deliver power to the grid. FORCE also oversees independently reviewed environmental monitoring at the test site. At present, there are five developers that sublease berths at FORCE and they have received approval to test new technologies. One developer, Cape Sharp Tidal Venture, recently deployed a 2MW in-stream tidal turbine at FORCE which has been connected to the Nova Scotia electrical grid. This turbine is the first of its kind in North America.

There are future plans to deploy more turbines in the Bay of Fundy. Nova Scotia could see in-stream tidal energy devices producing up to 25 MW of electricity in the Bay of Fundy by 2019 and has a post-2020 goal of achieving 300 MW of electricity produced. In addition to FORCE, associations Marine Renewables Canada²² and the Ocean Energy Research Association (OERA)²³ are engaged in strengthening Nova Scotia's oceans industry.

Nova Scotia also has up to 2.95 megawatts of approved small scale tidal energy projects in the Digby area. These projects all have local investment from the community through the Community Economic Development Investment Fund. This is a unique option where there is a pool of capital which is raised from individuals within Nova Scotia to invest in for-profit entities within a defined community and in turn the investors receive a substantial tax-credit. These projects will be connected to the distribution grid, powering the local communities. The Province of Nova Scotia supports the development of a tidal energy industry

and has given Feed-in Tariffs to encourage large and small tidal projects, like those in the Digby area.

Wind Power

Canada had 6,066 wind turbines totaling more than 11,200 MW of installed capacity operating at the end of 2015, the 7th largest wind generating fleet in the world. The costs associated to producing wind energy plummeted by 60% over the last six years. The decrease in expenditures will benefit the growth of the industry.

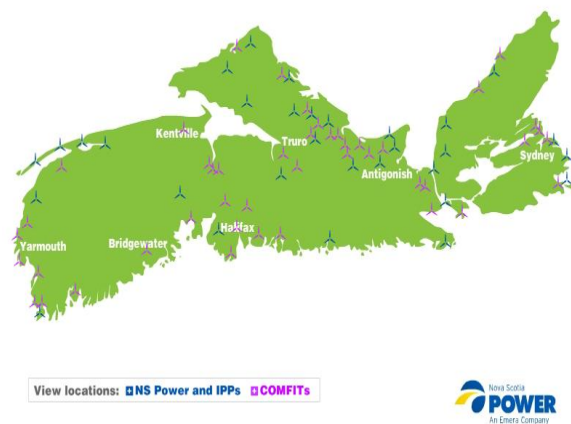


Figure 7 Wind Farm Map Source: Nova Scotia Power

According to the Canadian Wind Energy Association, Canada's wind capacity was 10.4 GW as of September 2015. A record year in terms of wind energy developments, 2014 saw 37 new wind projects added, totaling 1.9 GW of capacity. Financially, the wind energy business is expected to increase from about CAD\$290 million a year to an estimated CAD\$450 million by 2020.²⁴

Atlantic Canada has the country's strongest winds. And, because the winds also correlate with peak demand, wind energy has become the lowest-cost option for new electricity supply.

Nova Scotia leads the region with 597 MW of onshore wind energy, developed through a unique mix of ownership models that includes independent

²¹ www.fundyforce.ca/

²² www.marinerenewables.ca

²³ <http://www.oera.ca/>

²⁴ BP Statistical Review of World Energy 2014

power production, utility partnerships, and community investment.²⁵

According to Nova Scotia Power, wind now provides from 13% - 17% of electricity in Nova Scotia. Nova Scotia Power reached its target of 28% in 2016 of renewable energy to its grid and the company estimates 40% by 2020.

Companies operating the Nova Scotia's wind power industry are local, national and international. Companies include Cape Breton Explorations Ltd., Scotia WindFields Inc., Natural Forces Inc., Renewable Energy Services Inc., Capstone Infrastructure Inc. and Shearwind. Some wind farms are operated by the municipality. International companies working in the province include Enel S.p.A., GDF SUEZ Energy North America Inc., Acciona Wind Power and Enercon. German company, IFE Eriksen, recently announced it was opening an office in Halifax to spearhead its Canadian properties.

Newfoundland & Labrador has 55 MW of wind, consisting of two utility-scale projects and one wind-diesel installation. In 2016, Copenhagen Infrastructure Partners announced that it has established a partnership with the Canadian-based developer Beothuk Energy to develop the 180MW St Georges Bay Project off the coast of Newfoundland. Ontario remains Canada's leader in clean wind energy with 4,781 MW of installed capacity, supplying approximately 5% of the province's electricity demand. Ontario also added 11 installations to the province's current wind fleet -an additional 420 MW to current generation capacity.²⁶ Alberta now ranks 3rd in Canada with an installed wind energy capacity of 1,479 MW. Companies operating in Alberta include ACCIONA, S.A., Carmanah Technologies Corp., Conergy AG, Effisolar Energy Corp., Endurance Wind Power Inc., Hitachi Canadian Industries Ltd, Partner Technologies Inc., Sequoia Energy Inc., Sustainable Energy Technologies Ltd., TransAlta Corp. and Western Wind Energy Corp.

²⁵ <http://canwea.ca/wind-energy/atlantic-canada/>

²⁶ <http://canwea.ca/wind-energy/ontario/>

Hydropower

Canada is the 3rd largest producer of hydropower in the world behind China and Brazil. Canada currently has an installed capacity of about 78,000 megawatts and has the ability to more than double capacity to 160,000 megawatts.

The Robert-Bourassa generating station (formerly known as La Grande-2) is the largest hydroelectric power station in Canada, located in James Bay, Quebec. The station can generate 5,616MW. The Churchill Falls Generating Station in Newfoundland & Labrador is the 2nd largest in Canada, generating 5,428 MW. The hydropower station is a joint venture between Churchill Falls Labrador Corporation Ltd., Nalcor Energy and Quebec Hydro.

Nalcor is also in the process of building a new station on the Churchill River in Newfoundland & Labrador, Muskrat Falls. The station will generate an estimated 824 megawatts (MW), and the company will be building more than 1,600km of associated transmission lines.

Construction is set to be completed by 2018 for the underwater Maritime Link transmission line from Newfoundland & Labrador to bring Muskrat Falls' hydropower to Nova Scotia.

Nova Scotia Power owns and operates 33 hydroelectric plants on 17 hydro river systems across Nova Scotia, totaling 400 MW of generation capacity. Many plants have been providing clean, renewable electricity to Nova Scotians for decades, with some established in the early 1900s.²⁷

Biomass

With Canada's ample forests, the country has great opportunities to develop its biomass industry. Biomass is becoming an attractive alternative for heating in the form of wood pellets, especially in the NWT, where it is cost-competitive with alternative heating fuels. The total installed capacity of

²⁷ <http://www.nspower.ca/en/home/about-us/how-we-make-electricity/renewable-electricity/hydro-station-map.aspx>

registered wood-pellet boilers in the NWT has increased by 35% per year since 2006.

Biomass energy is expected to grow from 2.2 GW in 2014 to 3.8 GW in 2040. Most new capacity is being added in British Columbia, Ontario, Quebec and Alberta. In Ontario, two former coal-fired units were recently converted to biomass.²⁸

In Nova Scotia, large and medium-sized pulp and paper companies use wood chips to create electricity to run their mills. Some companies sell excess power to Nova Scotia Power. The provincial energy provider also operates a 60 megawatt biomass power plant in Port Hawkesbury.²⁹

Nuclear

Nuclear energy accounted for 15% of total electricity generation in Canada in 2014. Following the shut-down of the Gentilly facility in Quebec in 2012, Ontario and New Brunswick are the only provinces using nuclear power to generate electricity.

Solar Power

Canada has more than 2,500 MW of cumulative installed solar electricity generation capacity. The country is one of the top-ten largest national global markets.³⁰

Ontario is the leader for solar energy projects. Ontario has the 3rd largest solar capacity in North America after California and North Carolina. Currently, Ontario has PV capacity of over 2 GW, enough to place Canada among the top 20 solar countries worldwide.³¹

Canada also offers programs to promote use of solar energy. In Alberta, its government has a rebate program worth CAD \$36 million over two years to encourage rooftop solar panels on homes and

businesses.³² In Nova Scotia, the Nova Scotia Department of Energy is running a pilot program, “Solar for Community Buildings”. The program works with eligible community groups and organizations to generate solar photovoltaic (PV) electricity on their roofs or properties and sell it to their utility under a 20-year contract.³³ Companies working in Nova Scotia’s solar industry are members of Solar Nova Scotia, <http://www.solarns.ca/>.

OPPORTUNITIES

Canada ranks high on the list of top markets for renewable energy exporters, despite its comparatively small market size compared to other countries.

Best Prospects:

- Electric Motors and Generators
- Boards & Panels for Breakers and Fuses
- Electrical Transformers
- Wind turbines, tower sections, rotor blades, casting and forgings and transformers
- Gears and generators for wind turbines
- Hydro energy turbines and equipment
- Engineering, construction, and logistics services
- Smart Grid connection and energy monitoring equipment
- Biomass systems technology transfer
- New technology for wave and tidal power generation
- Marine consulting on the environmental effects of tidal turbines
- Products and service for the Maritime Link underwater transmission cable between Newfoundland & Labrador and Nova Scotia.

GOVERNMENT POLICIES/REGULATIONS THAT ENCOURAGE SUSTAINABLE TECHNOLOGIES

Emissions from the combustion of fossil fuels accounted for approximately 80% of Canada’s GHG emissions. In March 2016, the Canadian federal

²⁸ <https://www.neb-one.gc.ca/nrg/ntgrtd/fttr/2016/index-eng.html>

²⁹ <http://www.nspower.ca/en/home/about-us/how-we-make-electricity/renewable-electricity/default.aspx>

³⁰ <http://www.cansia.ca/solar-pv.html>

³¹ <https://www.investinontario.com>

³² <http://www.cbc.ca/news/canada/edmonton/alberta-announces-36m-rebate-program-for-solar-panels-on-homes-businesses-1.4002193>

³³ <https://novascotia.ca/solar/>

government created the Vancouver Declaration Clean Growth and Climate Change.³⁴ This declaration built upon the 2015 Quebec Declaration and Canadian Energy Strategy³⁵ and the Paris Agreement.³⁶ The Government of Canada plans to develop a strategy to achieve Canada's international commitments through a pan-Canadian framework for clean growth and climate change.³⁷ In December 2016, the Government of Canada created a national climate plan featuring a price on carbon and significant support for Canada's clean tech sector. The plan outlines federal government department strategies and funding programs.

The carbon tax will be a new tax for most provinces. Provinces have two choices: (1) a carbon tax of CAD\$10 per tonne in 2018, rising to CAD\$50 by 2022; or (2) a cap-and-trade system consistent with Canada's emissions target. The federal government's plan requires all provinces and territories to have a price on carbon by 2018.

Provincial governments have also set carbon reducing targets. Nova Scotia has legislated that 40% of its electricity be generated from renewable energy sources by 2020. The Alberta government's target is 30% of electricity in the Province be sourced from renewable sources. Newfoundland & Labrador generates more than 95% of its power from renewable resources, primarily hydro. Newfoundland & Labrador set out a GHG reduction target of 10% below the 1990 level by 2020 and then to 75-85% below 2001 levels by year 2050.³⁸

³⁴<http://www.scics.gc.ca/english/conferences.asp?a=viewdocument&id=2401>

³⁵ <http://canadapremiers.ca/en/initiatives/130-energy-working-group>

³⁶ <http://www.climatechange.gc.ca/default.asp?lang=En&n=EF6CE373-1>

³⁷ <http://www.scics.gc.ca/english/conferences.asp?a=viewdocument&id=2401>

³⁸ <https://www.neb-one.gc.ca/nrg/sttstc/lctrct/rprt/2016cndrnwblpwr/prvnc/nl-lb-eng.html>

FUNDING INCENTIVES

Funding in Canada for SME's derives mostly from the federal government and may be implemented by provincial governments, nonprofit groups or trade associations. As well, provincial governments offer a variety of incentives for foreign direct investment.

Foreign companies should have a Canadian partner as the lead to access Canadian funding programs.

Some federal funding incentives include:

NRCan

Clean Energy Fund (has been fully allocated)
<http://www.nrcan.gc.ca/energy/funding/current-funding-programs/cef/4949>

Energy Innovation Program

<http://www.nrcan.gc.ca/energy/funding/current-funding-programs/18709>

Sustainable Development Technology Canada (SDTC)
SD Tech Fund <https://www.sdtec.ca/en/apply/sd-tech-fund>

Next Gen Biofuels Fund

<https://www.sdtec.ca/en/funding/funds/nextgen>

SD Natural Gas Fund

<https://www.sdtec.ca/en/apply/sd-natural-gas-fund>

Business Development Bank of Canada
Industrial, Clean and Energy (ICE) Technology
Venture Fund <https://www.bdc.ca/en/bdc-capital/venture-capital/strategic-approach/pages/energy-cleantech-venture-fund.aspx>

National Research Council Canada

IRAP (Industrial Research Assistance Program)

http://www.nrc-cnrc.gc.ca/eng/irap/services/financial_assistance.html

Natural Sciences and Engineering Council of Canada
Grants

http://www.nserc-crsng.gc.ca/Business-Entreprise/FundingPrograms-ProgrammeDeSubventions/index_eng.asp

Canada Revenue Agency
Scientific Research and Experimental Development (SR&ED)
<http://www.cra-arc.gc.ca/txcrdt/sred-rsde/menu-eng.html>

Atlantic Canada Only:
Atlantic Canada Opportunities Agency (ACOA)
Atlantic Innovation Fund (AIF)
<http://www.acoa-apec.gc.ca/eng/ImLookingFor/ProgramInformation/AtlanticInnovationFund/Pages/AtlanticInnovationFund.aspx>

OTHER SOURCES OF INFORMATION

US Government EIA Country Analysis Brief – Canada
<https://www.eia.gov/beta/international/>

UK Government Doing Business in Canada
<https://www.gov.uk/government/publications/>

Offshore Technology – Canada <http://www.offshore-technology.com>

Government of Canada
<https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html>

National Energy Board
<https://www.neb-one.gc.ca/nrg/ntgrtd/ftr/2016/index-eng.html>

Canadian Wind Energy Association
<http://canwea.ca/wind-energy/>

Statistics Canada
<http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/dsbbcan-eng.htm>

NOIA-Newfoundland & Labrador Oil & Gas Industries Association
www.noia.ca

Invest in Canada 2014 Renewable Energy Wind & Solar

Canadian Association of Petroleum Producers
www.capp.ca

Natural Resources Canada Energy Fact Book 2015-2016

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