



Energy in Atlantic Canada

Atlantic Canada's energy sector is booming. With abundant sources of energy, world-class researchers and facilities, excellent business and transportation infrastructure, low business and energy costs and well-educated workers, the region is a world leader in energy production, export and research.

BUSINESS COSTS

In addition to a plentiful energy supply, Atlantic Canada's energy costs are among the lowest in the world. The *Competitive Alternatives: KPMG's guide to international business costs, 2006* found that electricity costs in Atlantic Canada are the lowest among the G7 countries and are, on average, 20% lower than the United States. What's more, three cities from Atlantic Canada placed in the top five locations for overall lowest business costs, according to the study.

COMPARATIVE BUSINESS COSTS INDEX*

OVERALL RESULTS

YOKOHAMA, JP	108.3	ATLANTIC CANADA	ST. JOHN'S, NL	94.3
FRANKFURT, DE	109.7		HALIFAX, NS	92.2
LONDON, UK	109.1		MONCTON, NB	91.1
NEW YORK, NY	112.6		CHARLOTTETOWN, PE	91.7
SEATTLE, WA	104.4		SYDNEY, NS	92.2
BOSTON, MA	107.8		TRURO, NS	89.4
TOULOUSE, FR	100.2		PICTOU, NS	89.9

source: *Competitive Alternatives: KPMG's guide to international business costs, 2006 Edition.*
 * Business costs are expressed as an index, with the United States average being assigned the baseline index of 100. A cost index of less than 100 indicates lower costs than those in the U.S.

ELECTRICITY PRODUCTION

Atlantic Canada has one of North America's most diverse and cost-effective energy generating systems. With hydro, nuclear, oil, coal, diesel and natural gas powered generating stations, as well as wind energy, the region boasts among the highest per capita electricity production ratios in the world.

Newfoundland and Labrador Hydro

This is the fourth largest utility in Canada with installed generating capacity of 7,289 megawatts (MW). Newfoundland and Labrador Hydro has announced plans to expand its role to become a major player in offshore energy development.

Newfoundland Power

This utility operates 23 hydro generating plants, three diesel plants and three gas turbine facilities in Newfoundland and Labrador, and has a total installed generating capacity of 145.5 MW.

Electricity costs in Atlantic Canada are the lowest among the G7 countries and are, on average, 20% lower than the United States, according to *Competitive Alternatives: KPMG's guide to international business costs, 2006*.

With hydro, nuclear, oil, coal, diesel, natural gas-powered generating stations and wind energy, Atlantic Canada has one of the highest per-capita electricity production ratios in the world.

Churchill Falls

Named the “Largest Underground Powerhouse in the World”, the Churchill Falls hydro development in Labrador generates 5428.5 MW with plans for further development. The National Energy Board of Canada has ranked the 2,200 megawatt Gull Island site on the Churchill River the lowest cost undeveloped hydro electric site on the North American continent.

NB Power

NB Power operates one of North America's most diverse generating systems, with an installed capacity of 3,133 MW. Its Belledune Generating Station in New Brunswick is considered a “Best Performer” by the Electric Utilities Cost Group, an association of electric utilities in North America. The provincial utility operates a nuclear facility at Point Lepreau. The generating station is a CANDU-6 station with a net capacity of 635 MW. NB Power's export sales represent 2% of total provincial exports.

In recognition of the importance of the energy industry to the regional economy, Halifax, Nova Scotia, and St. John's, Newfoundland and Labrador, are members of the World Energy Cities Partnership. This Partnership promotes collaboration between 11 ‘energy cities’ around the world. Atlantic Canada is the only region in the world to have two cities in this prestigious group.

Emera

Emera is a diversified energy and services company with 550,000 customers and more than \$800 million in annual revenues. Based in Halifax, Nova Scotia, Emera owns Nova Scotia Power, which has a total installed generating capacity of 2,293 MW fueled by a mix of renewable energy sources and fossil fuels. Emera also owns Bangor Hydro Electric Company (Maine, US), Emera Energy, and has investments in the Maritimes & Northeast Pipeline and the Sable Offshore Energy project.

Maritime Electric

Maritime Electric services approximately 66,000 customers throughout Prince Edward Island and has an installed generating capacity of 103.5 MW.

OIL AND GAS PRODUCTION

Three major oil refineries in Atlantic Canada enjoy access to marine transportation for crude oil and petroleum products. These refineries produce more than their domestic needs and are geared toward export markets, particularly in northeastern United States and Europe.

Irving Oil Refinery in Saint John, New Brunswick – the largest refinery in Canada – completed a \$1.5 billion upgrade in 2000 and now exceeds the United States Environmental Protection Agency's new source performance standards for petroleum refineries. In 2005, Irving Oil's 300,000 barrels per day refinery accounted for 64% of Canada's total petroleum product exports to the U.S.

Imperial Oil Refinery in Dartmouth, Nova Scotia, has a processing capacity of 89,000 barrels of crude oil per day and manufactures over 50 products including gasoline, jet fuel, stove oil, furnace fuel, diesel and ship fuel.

Point Tupper Fractionation Plant, located on a 72-acre site in Point Tupper, Nova Scotia, is operated by Sable Offshore Energy Incorporated. The plant processes natural gas liquids from the Goldboro Gas Plant.

There are also two new large scale Liquefied Natural Gas (LNG) plants being constructed at the Irving Oil deepwater Canaport oil terminal near Saint John, New Brunswick and at Bear Head, Nova Scotia.

OIL & GAS EXPLORATION

Atlantic Canada's oil and gas exploration and production sector has influenced the growth of the region's GDP more than any other sector in recent years. Since 1998, the region's oil and gas exports have grown by an amazing 400%, to just over \$9.6 billion in 2005. The value of oil and gas exports currently accounts for more than half the total value of the region's top 10 exports.

In Atlantic Canada, the oil and gas production industry generates over \$6.8 billion in annual revenues and supports over 17,000 direct and indirect jobs. Some of the industry's biggest players are active in the region including ExxonMobil Canada, Husky Energy, EnCana Corporation, Petro-Canada, BP Canada Energy, Chevron Canada Resources, Norsk Hydro, Shell Canada, Murphy Oil Corporation and Conoco Canada Limited.

The untapped resources in the region are enormous. Gas reserves off the coast of Labrador alone are estimated to exceed 4 trillion cubic feet or 123 million barrels of natural gas liquids. This represents about half the province's total gas reserves and, at current prices for natural gas, that's a \$40 billion industry.

Onshore Exploration

Atlantic Canada also holds potential for onshore oil and gas development. There have been over 50 exploratory wells drilled in the past ten years and the recent discovery of natural gas at the McCully field in New Brunswick has heightened interest in onshore exploration in the region.

NEW ENERGY DEVELOPMENT

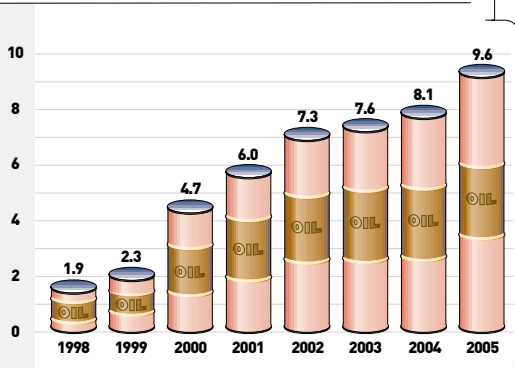
Wind Energy

Atlantic Canada is leading the way in Canada for the development of wind energy. For example, the Prince Edward Island **Wind-Hydrogen Village** is Canada's first wind-hydrogen village demonstration project. This multi-faceted initiative will demonstrate, in real-life and in real-time, how wind energy and hydrogen technologies can work together to offer clean and sustainable energy solutions across a wide range of applications.

Nova Scotia's **Pubnico Point** wind farm is the first in the province and consists of seventeen wind turbines each with a nameplate generating capacity of 1,800 kilowatts (30.6 megawatts in total). New Brunswick is also adding wind energy to its electricity production infrastructure.

OIL AND GAS EXPORTS

FROM ATLANTIC CANADA (\$ BILLIONS CDN)



source: Statistics Canada (2006)
NAICS 32411 - Petroleum Refineries
NAICS 21111 - Oil and Gas Extraction

New Brunswick will be adding 400 megawatts of wind energy to the energy mix over the next few years.

Tidal Energy

In Nova Scotia, the **Annapolis Tidal Generating Station** is one of only a handful of operational tidal power plants in the world. It uses Bay of Fundy tides to produce 20 megawatts of energy, or enough to power 4,500 homes.

Atlantic Canada has been identified as the best location to develop tidal power in North America. The Electric Power Research Institute of California studied sites in eastern Canada and on both the east and west coasts of the U.S., including Alaska, and identified multiple sites in Atlantic Canada as the best sites for tidal power development.

RESEARCH AND DEVELOPMENT

The region's research facilities reflect the depth and diversity of Atlantic Canada's energy sector.

Alliance for Marine Remote Sensing

(Halifax, NS) is an international not-for-profit association that develops and promotes marine applications of remote sensing technology, including offshore oil and gas applications. It has over 600 members from academia, government and industry, representing 27 countries.

Bedford Institute of Oceanography

(Dartmouth, NS) is Canada's largest ocean research centre. It advises on the management of marine environments and provides navigational services through the Canadian Hydrographic Service. The Institute also conducts research on habitat

ecology, fisheries, marine chemistry and marine environmental geoscience.

C-CORE (St. John's, NL) conducts research that contributes to the development of Canada's natural resources. It specializes in applied R&D, technology transfer, commercialization of intellectual property and advisory services.

Canadian Centre for Marine Communications

(St. John's, NL) collaborates with the Canadian marine industry to develop products and services in marine communications, navigation and information technology.

Centre for Earth Resources Research

(St. John's, NL) conducts research activities related to oil and gas, mineral development and environmental geosciences. Facilities and equipment are made available to private sector and government researchers at fair-market cost.

Centre for Marine Simulation

(St. John's, NL) conducts basic and applied R&D in ship automation, ice-class vessel design, port and waterway design, and behavioural studies. The Centre has a \$12 million simulator facility for the development of response skills and training for life threatening situations.

Centre for Marine Compressed Natural Gas

(St. John's, NL) is looking at the challenges and opportunities for getting natural gas to market and conducting research into harsh environment, carrier vessel, transportation of compressed natural gas.

Centre for Nuclear Energy Research

(Fredericton, NB) is jointly owned by the New Brunswick Research and Productivity Council and the University of New Brunswick and is highly regarded around the world. The Centre performs a variety of services including R&D in nuclear energy and development of plant display systems and training materials.

Centre for Offshore and Remote Medicine

(St. John's, NL), also known as Medicor, researches medical concerns of industries operating in remote locations. It develops and delivers health and education programs and promotes occupational health and safety in the ocean industries. Its research facilities include a four-chamber hyperbaric facility with a 300-metre depth capacity.

MAJOR OIL AND GAS PROJECTS IN ATLANTIC CANADA

- **Hibernia** (Newfoundland and Labrador) has been an anchor for the offshore oil sector since 1997. Hibernia produces over 200,000 barrels of oil per day.
- **The Sable Offshore Energy Project** (Nova Scotia) was the first offshore natural gas development in Canadian history. It is forecasted to produce a 20-year supply of natural gas at a rate of 400 to 500 million cubic feet of natural gas and 20,000 barrels of natural gas liquids daily.
- **Terra Nova** (Newfoundland and Labrador) began production in 2002 and averages 130,000 barrels of oil per day.

Centre for Petroleum Engineering

(Halifax, NS) at Dalhousie University provides professional engineering education and research with a particular focus on Atlantic Canada's oil and gas industry.

Centre of Excellence in Petroleum Development

(Sydney, NS) provides expertise and facilities in the area of process technology and fractionation, instrumentation and control systems, fluid flow and measurement, well and reservoir simulation, and codes, standards and specifications.

Institute of Ocean Technology

(St. John's, NL) is Canada's national centre for ocean technology research and development. The Institute's combination of internationally recognized expertise and world-class facilities provides innovative solutions in support of Canada's ocean technology industries.

Ocean Engineering Research Centre

(St. John's, NL) provides research, development and consulting services for the offshore and shipbuilding industries. The centre researches sea-ice and ice structure interaction, hydrodynamics, wave structure interaction, offshore structures, and ocean monitoring and instrumentation.

ENERGY SECTOR IN ATLANTIC CANADA



PROVINCES AND ABBREVIATIONS

NB - NEW BRUNSWICK
PE - PRINCE EDWARD ISLAND
NS - NOVA SCOTIA
NL - NEWFOUNDLAND AND LABRADOR

If you would like more information on this sector, please contact:

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Catalogue number: IU89-4/3-7-2004E

ISBN: 0-662-37770-2 **ACOA:** 2006-09

The paper used for this document contains 10% post-consumer fibre. Vegetable-based inks were used in the printing process.



Petroleum Research Atlantic Canada

(Halifax, NS) administers and directs millions of dollars in funds provided by industry organizations to address issues affecting the region's energy industry and to pursue R&D initiatives. The Institute also hosts workshops, conferences and supports studies.

Wind Energy Institute of Canada

(North Cape, PE) focuses on testing, research and development and commercialization efforts in wind energy and village electrification systems.

INDUSTRY SUPPORT

The rapid growth of the energy industry has led to the development of a number of industry associations and alliances to support the unique attributes of the sector in Atlantic Canada.

The **Newfoundland Ocean Industries Association** is a Pan-Atlantic group

comprised of approximately 500 member companies with a common interest in oil and gas industry development. The Association works closely with licence holders, trade associations and all levels of government.

The Offshore/Onshore Technologies Association of Nova Scotia

is an association of over 500 organizations that identifies, promotes and supports the development of opportunities in oil, gas and associated industries, with a particular emphasis on the offshore.

The Atlantica Centre for Energy

(Saint John, NB) is setting an agenda for the energy cluster that will advance research and development, engineering and procurement, construction, transmission, generation, emission controls, LNG, CNG, energy efficiency, alternate energy generation, advanced manufacturing and energy advocacy.

ENERGY IN ACTION

Atlantic Canada's energy industry continues to grow rapidly. Many of the region's top construction projects, in various stages of development, are related to the energy sector including:

- A \$1.4 billion refit of the **Point Lepreau** nuclear power generating facility in New Brunswick.
- A \$750 million **Irving Liquefied Natural Gas Terminal** plant being constructed near the deepwater Canaport oil terminal near Saint John, New Brunswick.
- A \$750 million liquefied natural gas (LNG) import terminal near Port Hawkesbury, Nova Scotia, is under construction by **Bear Head LNG Corporation**, a subsidiary of Anadarko Petroleum Corporation. The terminal is one of the most advanced new LNG facilities in North America.
- A large scale expansion to the **Maritimes & Northeast Pipeline** that will more than triple its capacity transporting more than 1.5 billion cubic feet of natural gas daily from the Bear Head LNG terminal and the Irving Canaport LNG terminal.
- A \$120 million expansion of the **Heritage Gas** natural gas distribution system in Nova Scotia.

There are also a number of exploration and production projects currently underway including:

- The **Terra Nova** floating production storage and off-loading vessel, the first to be tried in the frigid waters of Newfoundland and Labrador's Grand Banks, is producing light, sweet crude oil from the field. This field is expected to produce upwards of 470 million barrels.
- The **White Rose** project, also located in the Grand Banks area off the coast of Newfoundland and Labrador is expected to produce upwards of 250 million barrels of oil.



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Opportunities
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