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**The Energy Sector
An Investment in the People
and Communities of Atlantic Canada**

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North America needs energy and Canada, the United States and Mexico want to find it closer to home. These twin needs of increasing demand and increased security have created a unique opportunity for Atlantic Canada that could drive job creation, community development and investment in the region well into the next decade and beyond.

Oil, natural gas and electricity; Atlantic Canada develops and delivers all three major forms of energy for its own communities and for export around the continent to be used as heat, fuel and power in homes and businesses. Over the last few decades, the Atlantic Canadian energy industry has laid the foundation for what has become one of the most significant sectors in the regional economy, and, increasingly, one of the most diverse with its mix of traditional thermal and hydroelectric generation with newer technology such as nuclear, wind, bioenergy and tidal.

On the doorstep of a growing market

Energy accounts for just over half of all exports from Atlantic Canada and it now stands poised to significantly increase its reach. The populations of both Canada and the United States are increasing, but that growth is not evenly distributed. Driven largely by immigration, the population swell is occurring primarily in large urban centres. Atlantic Canada lies on the border of one of these growth centres; the American northeast, which stretches from Maine down through Boston and onto New York City.

About 14.3 million people live in New England, which encompasses the states of Massachusetts, Connecticut, Rhode Island, New Hampshire, Vermont and Maine. That's six times the population of Atlantic Canada. Within this region are major metropolitan areas centred around Boston,

MA (4.5 million), Providence, RI (1.6 million) Hartford, CT (1.2 million), Bridgeport, CT (900,400) and Portland, ME (513,700). Then there's the New York City metropolitan area. It is the most populous urban centre in the U.S., boasting a population of 18.8 million people.

Combined, that's just over 33 million people – about 11 per cent of the U.S. population – living within a day's drive of our region. In a world where trade wraps around the globe, the New England-New York City corridor and Atlantic Canada are next door neighbours.

Distance between Atlantic Canada's major centres and the ports of Boston and New York

Route	Land	Air	Sea
Saint John to Boston	650 km	520 km	280 nautical miles
Halifax to Boston	1,120 km	660 km	360 nautical miles
Charlottetown to Boston	1,020 km	770 km	420 nautical miles
St. John's to Boston	2,420 km	1,560 km	840 nautical miles
Saint John to New York	990 km	810 km	440 nautical miles
Halifax to New York	1,460 km	950 km	520 nautical miles
Charlottetown to New York	1,360 km	1,060 km	580 nautical miles
St. John's to New York	2,760 km	1,850 km	1,000 nautical miles

These routes, long-established by historical links, are being viewed in a new way as Canada, and in particular the East Coast, considers what role it may play in connecting the rest of the world with eastern North America. Atlantic Canada has always had a strong connection with western Europe but as global trade grows, the region is expanding its reach to Asia, South America, Africa and northern/polar routes. Known as the Atlantic Gateway initiative, its aim is to significantly increase the flow of goods through the region via an interconnected, or intermodal, transportation network. The four Atlantic provinces and the federal government are working together to develop an action plan that will benefit all import- and export-driven sectors of the economy.

The energy sector has two roles to play in the development of the Atlantic Gateway. Petroleum products are the top import and

export in the region and expanding that trade, along with the distribution of natural gas and electricity, is essential for economic growth. The region's energy sector can also act as a magnet to attract other businesses to the region, thereby increasing Atlantic Canada's overall exports through the Atlantic Gateway.

Atlantic Canada's energy mix

Atlantic Canadian companies can deliver goods and services to New England and elsewhere in North America quickly and safely. This is increasingly important, as the United States looks to meet its burgeoning energy requirements in the face of increasing unrest in the Middle East, its traditional source of oil and gas, and diminishing reserves along its own Gulf Coast near Texas and Louisiana.

Naturally, it is looking north, to Canada, its major trading partner. Our country is blessed

with ample supplies. There is Alberta, with its massive reserves, much of it concentrated in the oil sands; Saskatchewan, a producer of crude oil and a relatively new – but rising – player in the development of natural gas; and Quebec, which is powered by its extensive hydro-electric resources and wind power developments. Ontario is in the midst of reconfiguring its power system, moving away from traditional coal-fired plants, reinvesting heavily in nuclear power and exploring the possibilities of alternative energy, such as wind.

Crude oil and gasoline. Natural gas. Nuclear power. Hydro. Renewable energy. This is Canada's energy mix and Atlantic Canada is unique because it is the only region of the country that produces all these forms of energy. What is now a diversified energy portfolio grew out of a necessity to produce power for the region's businesses and for its people. For decades, coal was the only raw energy resource available in Atlantic

Canada, so, to serve its growing domestic requirements, the region imported the raw materials it needed to power electricity and transportation needs. The end result was the construction of significant energy production, processing and transmission facilities.

Towards the end of the 20th century, the discovery, and subsequent development, of offshore oil and gas fields significantly enhanced the regional energy sector and shifted the public policy focus from domestic production to the development of export markets.

These projects also brought significant outside investment from companies such as ExxonMobil Canada, Husky Energy, EnCana Corporation, Petro-Canada, BP Canada Energy, Chevron Canada Resources, Norsk Hydro, Shell Canada, Murphy Oil Corporation, Repsol YPF SA and Conoco Canada Limited.

Projects and players in Atlantic Canada's energy sector

Cumulatively, the companies and projects listed below make up a mix of resources that will provide energy to Atlantic Canadian homes, industries and the economy well into the 21st century.

The energy sector will do this by exporting its commodities to neighbouring markets, primarily in the U.S., and by providing the necessary infrastructure to support new business development, and the job growth that comes with it, in the region.

In Atlantic Canada, energy is both a product and a service.

New Brunswick

- **Irving Oil**

Owns Canada's largest refinery in Canada that, following a \$1.5 billion upgrade, now exceeds the U.S. Environmental Protection Agency's performance standards for petroleum refineries. The Saint John-based refinery, which produces 300,000 barrels per day, accounts for two-thirds of Canada's total petroleum product exports to U.S.

The company announced in 2006 that it is exploring the potential to build a second oil refinery in Saint John, which would double the company's capacity.

- **NB Power**

Operates one of North America's most diverse generating system, including the region's only nuclear facility at Point Lepreau, which is undergoing a \$1.4 billion refurbishment of its existing reactor. It just completed the refurbishment of Coleson Cove, the largest generation plant in the province and has announced plans to purchase up to 300 MW of wind power from private sector developments by November 2010.

- **Atomic Energy of Canada Limited (AECL)**

In August 2007, the AECL-led Team CANDU announced it is conducting a feasibility study for a second nuclear reactor at Point Lepreau. This facility would produce power for the export market and the feasibility study includes an in-depth consideration of market conditions in the northeastern United States. The members of Team CANDU are: AECL, Babcock & Wilcox Canada, GE-Hitachi Nuclear Energy Canada Inc., Hitachi Canada and SNC-Lavalin Nuclear.

- **Canaport LNG**

Canada's first liquefied natural gas (LNG) import and regassification plant, which will process 28 million cubic meters (one billion cubic feet) of natural gas a day. It is a partnership between Repsol YPF SA (75 per cent) and Irving Oil (25 per cent). Repsol is the largest importer of liquefied natural gas into the U.S. Repsol Canada, an indirect subsidiary, will import the gas and then transport it via the Brunswick Pipeline system.

- **Brunswick Pipeline**
A wholly-owned subsidiary of Emera, this 145-kilometre pipeline will transport natural gas from Canaport LNG to the Maritime and Northeast Pipeline at a connection point at the Canada/U.S. border.
- **J.D. Irving, Limited**
A large user of energy, it is aggressively developing alternative energy sources to fuel its industrial needs and supply excess power to the regional power grid. The company produces 30 MW of bioenergy energy, half of it through the St. George Dam, New Brunswick's only TerraChoice-certified energy site. Additional bioenergy energy is produced at a number of sites related to J.D. Irving's extensive forestry land holdings.
- **Enbridge Gas New Brunswick**
Owned by Enbridge Inc. and several private investors, Enbridge Gas New Brunswick distributes natural gas to over 7,500 institutional, commercial, industrial and residential customers in New Brunswick. The company provides service to eight communities: Dieppe, Fredericton, Moncton, Oromocto, Riverview, Saint John, St. George, and St. Stephen.
- **Corridor Resources**
Natural gas began flowing from the McCully gas field onshore development in Sussex in mid-2007.

The site, which belongs to Halifax-based Corridor Resources, is expected to produce 45 million cubic feet per day and will be transported via the Maritimes and Northeast Pipeline system.

- **The Floating Pipeline Company Incorporated (FPC Inc.)**
Established in 2003, FPC builds lightweight composite reinforced pressure vessels, or gas transport modules (GTMs), which are used to transport natural gas, natural gas liquids and specialty gases via a number of methods including sea, rail and road. The manufacturing facility has been set up in a 120,000 sq ft building in the Port of Saint John. Its corporate head office is in Halifax.
- **Atlantic Hydrogen Inc.**
A privately-owned environmental technology company that has developed a unique, low-temperature technology, CarbonSaver™, which dissociates natural gas to form gaseous hydrogen and solid carbon without generating carbon dioxide. It represents a potential for the next generation of clean energy and two demonstrations are planned for 2008. One is in a 100 kW natural gas-burning combined heat and power micro-turbine, the other is as a cleaner fuel for natural gas vehicles.

Nova Scotia

- **Emera**
 A Halifax-based diversified energy and services company. It owns Nova Scotia Power, Bangor Hydro Electric Company (in Maine), Brunswick Pipeline (in New Brunswick) and has investments in the Maritimes and Northeast Pipeline and the Sable Offshore Energy project. Through Nova Scotia Power, it owns and operates the Annapolis tidal generation station, one of only three tidal power plants in the world and the only one in the western hemisphere. In January 2007, Nova Scotia Power announced a partnership with OpenHydro, of Ireland, to provide in-stream tidal technology for further tidal energy development in the Bay of Fundy.

- **Sable Offshore Energy Project**
 An offshore natural gas development project that produces between 400 and 500 million cubic feet of natural gas and 20,000 barrels of natural gas liquids every day. The first tier was completed in December 1999 and involved the development of the Thebaud, North Triumph, and Venture fields. Alma, the first Tier II platform came onstream in late 2003 while production from South Venture, the second field began late in 2004. Natural gas is processed at the Goldboro gas plant; natural gas liquids are processed at the Point Tupper fractionation plant.

- **Maritimes and Northeast Pipeline**
 A 1,400-kilometre pipeline transmission system, of which 890 kilometres travel through Nova Scotia and New Brunswick, that transports Sable Offshore natural gas to markets in Canada and the U.S.

- **Heritage Gas Limited**
 A Nova Scotia-based natural gas distribution company, it is a partnership between SaskEnergy Inc., Scotia Investments Limited and AltaGas Utility Holdings (Nova Scotia) Inc. Within the next decade, Heritage Gas will build a system that will include Cumberland County, Colchester County, Pictou County, Guysborough County, Halifax Regional Municipality, and Hants County. As of the end of 2007, it is in parts of Halifax, Dartmouth and Amherst.

- **Imperial Oil**
 Dartmouth-based refinery has a processing capacity of 89,000 barrels per day and manufactures over 50 products.

- **Atlantic Wind Power Corp.**
 This Nova Scotia-based wind energy developer operates the 17-turbine Pubnico Point generating site, which has an installed capacity of 30.6 MW. It plans to develop a second site in Pugwash, N.S.

- **Renewable Energy Services Limited**
 With its head offices in Halifax, Renewable Energy Services operates six wind energy sites, in Brookfield, Digby, Fitzpatrick Mountain, Goodwood, Marshville and Point Tupper, with a total installed capacity of 4.8 MW.

- **Cape Breton Power**
 The company operates a 17.4 MW-capacity wind site in Lingan, close to the Nova Scotia Power generating

station. It also operates smaller sites in Glace Bay and New Aberdeen.

- **Brooklyn Power Corporation**
Commissioned in 1995, this 28 MW bioenergy generating facility makes

electricity out of the wood waste produced by a nearby paper mill and purchased from several local sawmill operators in southern Nova Scotia for sale to Nova Scotia Power.

Newfoundland and Labrador

- **Hibernia**
Canada's first offshore oil exploration project and its fifth largest field. Discovered in 1979, it began operations in 1997, with an expected 18-year lifespan. It has an estimated 884 million barrels of oil. Hibernia averages a production of 140,000 barrels per day.
- **Terra Nova**
Located 22 miles from Hibernia, this offshore field began production in 2002 and is expected to produce between 370 and 470 million barrels of oil. Its floating production storage and offloading vessel is the first to operate in the cold waters of the Grand Banks and is producing light, sweet crude oil.
- **White Rose**
A second offshore project on the Grand Banks. It is expected to produce up to 283 million barrels of oil and 2.7 trillion cubic feet of natural gas, making it the largest discovered gas resource on the Grand Banks.
- **Hebron**
This fourth field, discovered in 1981, contains 700 million barrels of oil. The provincial government recently announced development of this field.

- **Newfoundland and Labrador Hydro**
The fourth largest utility in Canada, Newfoundland and Labrador Hydro has two core businesses; its generation and transmission unit that supplies electricity to the island of Newfoundland, and the Churchill Falls Corporation, which operates the world's eighth largest hydroelectric power project. The existing Churchill Falls station generates 5,428 MW of electricity. The Crown corporation has begun developing the Lower Churchill, which consists of two sites, Gull Island (2,000 MW) and Muskrat Falls (824 MW). Newfoundland and Labrador Hydro also has equity holdings in White Rose and Hebron offshore oil and gas developments.
- **Fortis Inc.**
The largest publicly-traded distribution utility in Canada. Its regulated holdings include; five Canadian electric utilities, including Newfoundland Power and Maritime Electric (PEI); Terasen Gas, a natural gas utility in British Columbia; and three electric utilities in the Caribbean. It owns non-regulated hydroelectric generation assets in Canada, Belize and New York State. It also owns hotels and commercial real estate in Canada.

- **North Atlantic Refining**
The company, owned by Calgary-based Harvest Energy Trust, operates a 115,000 barrels a day refinery in Come by Chance, NL, and a chain of gas stations in the province. It recently completed a \$600-million upgrade and is expected to spend an equal amount in the coming decade. The company is exploring increasing capacity and an upgrade of its #6 fuel oil unit to produce higher value products.
- **Aurora Energy Resources Inc.**
This uranium exploration and development company is in the pre-

feasibility stage for a proposed uranium mine and processing site in the central mineral belt of coastal Labrador.

- **Newind Group Inc.**
The company is constructing the 27 MW St. Lawrence wind project on the Burin Peninsula. A subsidiary of ENEL North America Inc., Italy's largest power company, Newind partnered with a consortium with Newfoundland companies fga Consulting Engineers Limited and Quadratic Inc. The St. Lawrence wind project will begin operations in 2008.

Prince Edward Island

- **Maritime Electric**
A subsidiary of Fortis Inc., Maritime Electric provides electricity to 66,000 Island customers. It operates generating plants in Charlottetown and Borden and a province-wide transmission grid. The majority of its electricity is purchased from NB Power and transmitted via two submarine cables.
- **PEI Energy Corporation**
This partnership between the Governments of Canada and PEI, operates the Atlantic Wind Test Site, Canada's national wind energy laboratory, in North Cape. About 20 per cent of this power is purchased by Maritime Electric, with the PEI government purchasing some for

use in its buildings. In 2005, the corporation partnered with Hydrogenics Corporation to create the Wind-Hydrogen Village test site. The first in Canada, this site is examining how wind energy and hydrogen technology can work together for both residential and commercial users.

- **SUEZ Renewable Energy NA**
A business unit of the French multinational, the SUEZ Group, the company produces 29 MW of electricity at its Norway Wind Park and West Cape Wind Energy facility. It has an additional 80 MW under construction at West Cape - the largest private sector investment in PEI's history.

Exporting energy resources; importing human resources

Atlantic Canadians don't have to worry about the availability of energy; this region has more than enough capacity to serve its own domestic needs. However, maintaining and upgrading these key pieces of infrastructure is expensive and while the domestic market is the first priority of Atlantic Canadian energy companies, the region's population is not large enough to sustain its energy sector. Collectively, the four Atlantic provinces are home to 2.4 million people. Trade is essential for all aspects of the regional economy. Fortunately, the energy sector has a well-established export base.

Newfoundland and Labrador is the most trade-dependent of the four provinces. In 2006, energy, and more specifically petroleum products, accounted for 76 per cent of its total exports. The primary export was heavy petroleum, the bulk of it destined for Texas, Florida, New Jersey and Georgia. Its number two export was light petroleum (gasoline), the majority of which went to New England states.

In New Brunswick, the export picture is slightly more mixed, where 63 per cent of all exports are energy-based. The majority of exports originate at the Irving Oil refinery in Saint John but there is potential for growth in the electricity sector.

Nova Scotia is a relatively new player in the energy export market, with one-quarter of its trade driven by the energy sector, most via the Sable Offshore Energy Project.

PEI remains a net importer of energy, receiving the bulk of its electricity from neighbouring New Brunswick. The provincial government wants PEI to be able to serve its own energy needs with energy produced on the Island for Islanders by

2015. In addition, Corridor Resources is exploring three potential natural gas sites on the Island.

That theme of energy self-reliance is also driving policy development in the United States. The U.S. federal government estimates energy consumption will increase by about two per cent each year over the next decade. At the same time, Washington wants to reduce its dependence on foreign oil, specifically from the Middle East. However, it has a finite level of reserves off its Gulf Coast and changing weather patterns have reduced oil companies' willingness to develop production facilities in this hurricane-heavy zone. This has created an opportunity for Canadian producers to increase their U.S. market share and, with the added capacity, create jobs back home.

Work has already begun in Atlantic Canada to meet the anticipated demand. The Canaport LNG facility, which will open in 2008; the refurbishment of Point Lepreau and the feasibility study into a second reactor; the refurbishment of Coleson Cove; and the proposed second Irving Oil refinery are all centred around Saint John, N.B.

In Nova Scotia, the centre of activity is Guysborough, about three hours east of Halifax at the head of Chedabucto Bay, which separates mainland Nova Scotia from Cape Breton Island.

Encana's Deep Panuke offshore natural gas project received regulatory approval in fall 2007 and drilling is expected to begin in late 2008 or early 2009. Once operational it is expected to produce 300 million cubic feet per day of natural gas, which will be transported by underwater pipeline to Guysborough where it will be processed and shipped via the Maritimes and Northeast Pipeline.

Halifax-based Keltic Petrochemicals also has a significant development planned for the area. In partnership with Maple LNG, it is proposing an integrated petrochemical and LNG facility. All of these projects are predicated on selling energy into the United States.

With these projects, comes sustained employment for Atlantic Canadians. When energy company executives sit down to plan future needs, their decisions are based on long-term forecasts that look decades into the future. It is a necessity in a sector that requires significant financial investments in order to construct and operate technologically advanced facilities. Which means that when a company announces plans to either build a new facility or expand existing operations, it is also creating long-term employment.

In 2006, about 28,000 Atlantic Canadians were directly employed in the energy sector, just over two per cent of the region's total labour force. The oil and gas production industry alone creates 17,000 direct and indirect jobs. In fact, according to Statistics Canada, the energy sector has been the primary driver of economic growth in the region and in the rest of the country over the past five years. This trend is expected to continue, but in order to grow, companies in the energy sector must be able to find workers.

It is unlikely that Atlantic Canada will experience the chronic high unemployment that has too often plagued it in the past. Rather, the region is headed for a labour shortage. In simple terms, it is a workers' market.

Three nationwide trends are driving employment growth in the energy sector:

- 1. Demographics:** The baby boom of the 1950s and 1960s was a high point for Canadian birth rates. Since then, the national birth rate has decreased from a high of 28.5 in 1959 to 10.8 in 2006/07. This boom and bust in Canada's demographics have culminated to produce a labour shortage as the larger population group prepares to retire – without enough younger Canadians available to fill their places.
- 2. Technology:** Advancements in industrial processes and equipment means employers require workers with higher skill sets. Training opportunities, such as increased spaces in training programs, haven't kept pace with demand.
- 3. Going Green:** As the energy sector evolves and works to improve its environmental performance, companies will create new job opportunities for workers educated and trained in environmental technologies and sciences.

Matching people and skill sets

Oil, gas and electricity production are complex industries and beyond the need for a significant number of trades people to construct and operate energy plants and systems, each requires a strong circle of

supporting companies and professions to assist with its development, including financial, accounting, legal and business services, human health and safety, transportation and land use planning.

Occupations that will be required by the Atlantic Canadian energy sector over the next decade

Skilled Trades	Professional Services	Support Services
Equipment operators	Chemical engineers	Accountants
Computer technicians	Mechanical engineers	Economists
Truck drivers	Civil engineers	Security guards
Electricians	Computer science engineers	Lawyers
Power linemen	Computer programmers	Human resources professionals
Boilermakers	Software engineers	Customs brokers
Pollution control technologists	Environmental engineers	Administrative support
Gasfitters	Environmental auditors	Custodians
Ironworkers	Land surveyors	Web designers
Painters	Geomatics engineers	Ergonomists
Plumbers	Occupational health specialists	Commercial divers
Roofers	Industrial designers	Boat captains and deckhands
Metal workers	Industrial engineers	Food services supervisors
Pipefitters	Landscape architects	Cooks
Wastewater and water treatment plant operators	Safety, environmental, welding and quality control inspectors	Barge engineers
Draughtsmen	Marine engineers	Architects
Machinists	Geologists	Technical writers

According to a recent Conference Board of Canada report¹, the division of labour in the energy sector is almost equally divided between companies in the sector itself and companies that provide services. In Canada,

there are 150 companies working directly in the oil and gas sector; an additional 130 companies provide support. That means when an energy company comes to town, odds are it will attract others too. That has important implications for communities in Atlantic Canada, because significant growth in the energy sector will stimulate a development boom across a number of sectors, including hospitality, entertainment,

¹ Conference Board of Canada. "Mission Possible: A Canadian Resources Strategy for the Boom and Beyond." The Canada Project Final Report, Vol. II. 2007.

business services and retail. This is particularly true during the construction phase of a major capital project, such as those planned for the Saint John region over the next five years. The large influx of workers caused by large-scale energy projects bring with them a need for a community to increase consumer and personal services such as: accommodations and housing; medical services; education; retail; restaurants and hospitality; recreation and arts and culture. This initial phase of development will serve to attract other energy investments because the region will be viewed as a place where employees can enjoy a strong quality of life in a community with a wide range of services and employment opportunities.

Engaging in all aspects of community life

Of course these energy projects must be developed in balance with community expectations, particularly as they relate to human health and safety. This includes issues such as land use, emergency preparedness and air and water quality. In the 21st century, good corporate citizenship is equal parts steady employment, community development through philanthropy and proactive environmental management.

Within Atlantic Canada, industry continues to upgrade equipment and introduce new technologies to reduce overall emissions. In recent years, significant progress has been made by Atlantic Canadian energy companies with respect to reducing nitrogen oxides, sulphur dioxide and volatile organic compounds (VOCs) emissions in response to concerns over their impact on human and environmental health.

A recent comparison study of lichen² within

² Clayden, Stephen. "Thirty years of change in the lichen flora of Saint John." The

the city limits of Saint John conducted by researchers at the New Brunswick Museum, concluded there is greater lichen species diversity now than there was 30 years ago. This is significant because lichen growth is inhibited by sulphur dioxide, so an increase in lichen suggests a decrease in sulphur dioxide emissions.

As societies around the world develop strategies to address increasing concerns over the impact of emissions on global climate change, the energy sector will continue to demonstrate leadership through the deployment of new technologies, innovative operational practices and community-based research.

Investing in the region's future

Atlantic Canada's international trading traditions run deep. The sea lanes between Europe and the Atlantic coast have been well-travelled since the late 15th century. Initially, Europeans came for fish but as the region became more settled by the French and then British, fortunes were built by harvesting the forests. The cities of Saint John, Halifax and St. John's grew in size and prestige thanks to the shipbuilding industry, and were recognized financial centres by the mid-1800s.

It is once again time for Atlantic Canada to take its place as an important hub of wealth creation and population growth. Global demand for energy is expected to double by 2030. Our region has one of the most diverse mixes of energy in North America and we stand on the threshold of a market that is 14 times larger than we have in our four provinces. The energy sector will lead Atlantic Canada in opening new markets, developing new technologies, creating new job opportunities and welcoming new people to the region. It is an investment in our communities and our people that will

Industrial City in Transition mini-conference, Saint John, N.B., August 2006.

pay dividends for years to come.

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The Atlantica Centre for Energy supports and promotes opportunities in the regional energy sector. Based in Saint John, N.B., the Centre acts as a bridge between energy companies and communities by providing information and encouraging discussion on energy-related issues.

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