

Canada is one of the world's most energy-rich nations, a major producer of fossil fuels, biomass and uranium as well as nuclear reactors and other energy technologies.

So why then would we seek European clean energy know-how and services?

For starters, Europeans are world leaders in renewable energy technologies that Canada needs more of, such as wind and geothermal. Further, Europe's major energy players have the experience, capabilities and financial resources to help us meet our growing demand for energy while addressing our climate change and air quality concerns. Marry those strengths with Canadian engineering and other energy sector expertise and the potential for enhanced bilateral trade appears nothing short of powerful.

ENERGY FUTURES

BY RANDALL ANTHONY MANG

A host of Europe's largest power companies including Enel from Italy, wind energy giant Vestas from Denmark, Siemens of Germany, and AMEC and Centrica from the UK are considering further investment opportunities in Canada's power sector. According to Canadian experts participating in The 2005 Energy Roundtable, which begins tomorrow at the Toronto Stock Exchange, European interest is widely welcome.

"Energy is a sensible premise on which to build and expand Canada's trading relationships with Europe," said Jason Langrish, executive director of the Canada Europe Roundtable for Business (CERT), which organized the roundtable. "Europe's increasingly integrated energy market has produced large companies that have the experience, financial strength and technologies that Canada needs."

While Canada possesses vast energy resources and expertise, like other Kyoto signatories, Canada's need to deploy more renewable and other clean energy technologies, as well as demand-side systems such as smart metering, is fast rising. Simultaneously, electricity demand is already straining Canada's transmission and distribution systems, making their upgrade vital.

In all these areas, Europeans are considered leaders. In a recent issue of The Economist, GE CEO Jeffrey Immelt said, "America is the leading consumer of energy. However, we are not the technological leader. Europe today is the major force for environmental innovation."

The CERT-led roundtable hopes to stimulate business by bringing together Europe's top energy players with Canadian provincial and federal authorities as well as companies including ATCO, Atomic Energy of Canada Limited (AECL), Ontario Power Generation, TransAlta and others

from Canada's power and transaction services sectors.

Mr. Langrish sees opportunities for Canadians to leverage European investment – through partnerships and acquisitions as well as via transfer of policy and technology – to increase Canada's clean energy production and stability and expand Canadian energy trade interprovincially and internationally.

"These joint partnerships could stimulate further trade for Canadian companies like Hydro Quebec, AECL and emerging technologies like fuel cells," said Mr. Langrish. "With more investment, provinces like Manitoba can generate excess power and sell to their neighbours the same way Alberta does with B.C."

Pat Concessi, a partner in Deloitte's Global Energy Markets practice, says Canada has been improving its investment climate and has "raised a lot of interest, especially on the renewable energy side."

British Columbia, for example, is stimulating private-power production and natural gas networks.

Alberta's competitive electricity market and expanding transmission network is open to investment. Quebec is intent on expanding wind-farms and renewable power generation. Maritime provinces including Newfoundland and Labrador desire to expand hydro and other power capacity.

In Ontario alone, measures including a policy commitment to

eliminate coal-fired energy as well as plans to rebuild, conserve or replace a staggering 25,000 megawatts (MW) of generating capacity over the next 20 years are expected to generate upwards of \$40 billion in investment.

In addition to investing in renewable energy, Ontario is considering adding to its nuclear capacity, a powerful, zero GHG-emitting option.

Robert Van Adel, president of Atomic Energy of Canada Limited (AECL), maker of CANDU nuclear reactors, confirmed, "In Ontario, as coal is phased out, old plants are retired and demand increases, there is clearly a requirement to build new CANDU base-load capacity over the long term."

Sasha Jacob, who leads Dundee Securities' Power Investment Banking Group, said renewable portfolio standards and other regulations combined with the need for new power generation are helping drive investments in renewable energy. He notes that Ontario recently issued a Request for Proposals (RFP) for another 1,000 MW of renewable electricity.

Mr. Jacob said federal and provincial programs including tax incentives and the new federal Renewable Power Production Incentive (RPPI) add further lustre.

The RPPI, for example, rewards renewable energy suppliers with a 1-cent per kilowatt (kW) payment for 10 years. "It is significant because it's a direct payment to the

bottom line. It provides a benefit to investors and increases the renewable developer's ability to access low-cost capital," he said.

Mr. Jacob said another big advantage provided by governments in most Canadian jurisdictions is long-term power purchase agreements. "A government-backed off-take agreement provides ideal stability and certainty for investors."

While such incentives are well received, some urge that Canadian energy policies and bureaucratic processes also require attention.

Marlo Reynolds, executive director of environmental policy research organization the Pembina Institute asked, "What can we learn from inventive and effective European policy? We're kidding ourselves if we think we can take full advantage of their technology without their policy framework."

"We need a newer mindset around energy. It's critical that we develop a plan, through a multi-stakeholder engagement process, that will provide the energy services we want and help our economy grow in the most efficient manner possible."

AECL boss Robert Van Adel noted that in Ontario, the government is facing critical decisions about how to meet future energy needs and has asked the Ontario Power Authority to make a recommendation about the best new supply options.

"To meet an earliest in-service date of 2015 for new nuclear installations, Ontario needs to start the approval processes now – especially the environmental assessment for site-specific projects."

Pat Concessi said, "Governments should always think of investors – domestic and foreign – with an awareness of competition and opportunities worldwide. What are their issues? What is going to make them want to invest in Canada?"

For more information, visit www.europe-canada.org



GETTY IMAGES

A new age for nuclear?

Environmentalists weigh in

BY JOHN ARDEN

Nuclear energy – a technology often viewed as much with apprehension as it is with reverence – is finding new support from sources who once would have seemed unlikely – environ-

mentalists. Their vote may not be unanimous, but a number of respected greens now champion nuclear as a powerful, low-emissions technology that can help the world stave off environmental catastrophe while meeting ever-increasing demand for electricity.

In a recent speech, Greenpeace founder Patrick Moore, now the chair and chief scientist of Green-spirit Strategies Ltd., said, "There is a great deal of scientific evidence showing nuclear power to be an environmentally sound and safe choice."

Dr. Moore sees nuclear energy as part of a technology mix that should also include greater emphasis on renewable energy. He notes, however, "While hydro, geothermal and wind energy all form an important part of reducing our reliance on fossil fuels, without nuclear energy that reliance will likely not diminish."

Other prominent environmentalists such as Hugh Montefiore, former leader of Friends of the Earth, Gaia theorist James Lovelock, and Stewart Brand, founder of the Whole Earth Catalog, are among those who support nuclear energy.

In a recent edition of the Massachusetts Institute of Technology's

Technology Review, Stewart Brand cited the nuclear industry's maturity, half-century of experience and improved engineering among his reasons for favouring the technology. "Problematic early reactors like the ones at Three Mile Island and Chernobyl can be supplanted by new, smaller-scale, meltdown-proof reactors like the ones that use the pebble-bed design. Nuclear power plants are very high yield, with low-cost fuel."

Not all environmentalists agree. In a letter recently published in The Globe and Mail, John Bennett of the Sierra Club of Canada cited high costs and waste management

among his concerns. "There are ample means of providing all the energy we need without relying on nuclear and coal-power plants."

However, in a recent speech, respected British scientist James Lovelock urged, "Like a fire, global warming is accelerating, and we have little time left to act. To retain civilization, our survivors will need Draconian energy saving, the self-restraint to stop burning fossil fuel, and a secure and reliable source of energy. There is no sensible alternative to nuclear energy. I believe this supply of electricity will give us the chance to survive through the difficult times to come."

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Built on an established Canadian foundation, Direct Energy has the global strength and resources that come with being a part of the Centrica plc group of companies.

Centrica is a leading international supplier of energy, home and business services with approximately 31 million customer relationships worldwide.

Each day we touch the lives of over five million people across North America who rely on us for energy expertise, products, solutions and services.



Direct Energy.

Attracting foreign investment requires level regulatory playing field

DERYK KING

President and CEO of Centrica
North America



UK-based Centrica plc is active in deregulated energy markets on both sides of the Atlantic. The company is in the unique position of being one of the largest "non-utility" players in multiple regulatory regimes across North America and the UK. Experience has taught us that successful implementation of energy deregulation is a marathon, not a sprint, and the benefits to consumers justify the effort.

It is almost 5 years since Centrica brought its experience of European markets to North America with the launch of its subsidiary Direct Energy. In this time, it has invested more than \$3 billion Cdn in North America and now serves over 5 million business and residen-

tial customers with gas, electricity and heating/ventilation services in Canada and the United States. Direct Energy has also acquired and developed substantial gas assets in Alberta and 1,000 MW of power generation capacity in Texas.

We've learned valuable lessons along the way.

North American energy markets

are fundamentally different from Centrica's home market. The UK has one consistent regulatory framework for gas and electricity, a clear vision of the desired end-game and strong political support for "seeing it through."

In Canada, energy regulation is administered by the provinces and is different in every jurisdiction. Models range from fully integrated utilities, where competition is effectively prohibited, to models such as Alberta, where competition and choice are strongly encouraged.

Even in Alberta, however, the government has intervened, with natural gas rebates and electricity hedging mechanisms introduced in response to short-term problems or pressure from vested interest groups. In Ontario, a price cap on electricity was introduced in November 2002 – a policy reversal that ended a short-lived experiment with open markets and shook the

confidence of investors. Private investment now has to be encouraged with government-backed long-term contracts that mean ratepayers – not investors – are bearing the risk.

Huge investment is required in North America's energy infrastructure in the near term, both to

its full cost, rather than subsidizing through price caps, rebates and so on. This also means continued education to all Canadians on the benefits of demand-side management.

Of course, society must protect the most vulnerable while this transition is in process. This is a valid and appropriate use of taxpayers'

competition if both government and industry are willing to work together to advance a level playing field for all market participants, and not waver in the face of temporary adversity.

Centrica has the financial strength to be a key investor in Canada's evolving competitive

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improve security of supply and to replace aging plants with more efficient, clean technology.

Governments can best play their part by creating a stable investment climate for the private sector, and setting clear, transparent rules for sustainable environmental improvement. This means pricing energy at

funds. Focused delivery of such assistance comes at a far lower price than scattergun rebates and other mechanisms that many recipients simply do not need.

Perhaps the most valuable lesson Centrica has learned about energy restructuring is patience. Consumers will only see the true benefits of

energy markets. It has the endurance for the marathon and will be an active investor, provided that the playing field is level. That means rules that are consistent, robust and rely on market mechanisms to create transparent and liquid investment and risk management opportunities. ■

A blended family of energy systems

What sort of energy technologies does the future hold? It is likely that the world will become more reliant on a blend of the renewable and conventional systems. Here's how they compare.

BY GRANT WING

Fossil Fuel

Fossil-fuelled plants burn coal or natural gas to produce steam that drives an electric turbine-generator. Coal-fired plants cost between \$1,000 to \$1,500 US per kW (kilowatt) to build, while gas-fired plants cost about \$800 US per kW. Gas-fired plants produce fewer CO₂ emissions than coal, but future "clean coal" technologies may produce electricity for about 6 to 8 cents per kWh (kilowatt-hour) with near zero emissions.

Hydroelectric

Hydroelectric stations harness the force of falling water to drive a turbine, which rotates a generator to produce electricity. They require dams to impound water and cost about \$2,000 US per kW to build. Hydroelectricity costs about 5.5 cents per kWh to produce, consumes no fuel and produces no emissions.

Nuclear

Nuclear power stations use heat

from the splitting or fission of uranium atoms to produce steam that drives turbine-generators. Nuclear power plants cost between \$1,500 and \$2,500 US per kW to build. Nuclear power plants produce no emissions, but have high operating costs. They can generate vast amounts of electricity for 2 to 3 cents per kWh.

Wind

Large windmill-like turbines harness the wind and drive generators that produce electricity. Consuming no

fuel and producing no emissions, wind-powered electrical stations cost between \$800 and \$1,800 US per kW to construct. Wind-generated electricity costs between 6 to 12 cents per kWh to produce.

Wave

Wave energy harnesses the immense energy of ocean waves with pneumatic, floatation, spillover or raft devices to drive a turbine-generator. Consuming no fuel and producing no emissions, prototype wave-generated electrical facilities cost \$2,000 to \$3,000 US per kW. Current wave technology can produce electricity between 6 and 15 cents per kWh.

Low-impact or Run-of-River Hydroelectric

Low-impact hydroelectric stations harness the natural flow of rivers and streams and use minimal damming to drive a turbine-generator. They cause low environmental

impact, consume no fuel and produce no emissions. They cost between \$1,500 and \$2,500 US per kW to build and produce electricity at about 5 cents per kWh.

Fuel Cells

Fuel cells extract electricity from hydrogen or hydrocarbon fuels in an electrochemical process that causes few to zero harmful emissions. The only byproducts are heat and water. Currently, fuel cells for stationary applications are in the advanced prototype stage. Research is focused on reducing costs and improving systems performance.

Cogeneration

Cogeneration is the simultaneous production of electrical, heat and mechanical energy from the same fuel source by capturing and recycling waste heat from existing coal or gas-fuelled plants. Cogeneration costs between \$1,200 and \$4,000 per kW to install but can double

fuel efficiency from 40 per cent to 80 per cent.

Solar

Solar energy captures and converts sunlight directly into electricity with photovoltaic cells. They require no fuel and produce no emissions. The construction costs of solar facilities are between \$3,000 and \$9,000 US per kW. A relatively expensive renewable energy technology, solar electricity costs about 27 cents per kWh to produce.

Biomass

Biomass generation produces electricity by burning organic material such as wood waste or methane biogas made from organic material. Biomass fuels can be burned in existing coal- and gas-fired turbine-generators. While biomass produces some emissions, it is greenhouse gas neutral and fuels are renewable. Biomass-generated electricity costs between 5 and 8.5 cents per kWh to produce. ■

This special information supplement was produced by Randall Anthony Mang in conjunction with the advertising department of The Globe and Mail, Richard Deacon, project manager • e-mail: rdeacon@globeandmail.ca

CANDU® – PART OF OUR HERITAGE, KEY TO OUR FUTURE

Ontario is facing critical decisions about how to meet our future electricity needs. Building new CANDU plants is a reliable, affordable solution that will improve Ontario's air quality.

It can take up to 10 years to plan, get approval for and build a major power project, all of which involves extensive public consultation. A full environmental assessment is a proven process for the open and public discussion we need to have about the nuclear option.

We need to start an environmental assessment now, so that the CANDU option is available when Ontario needs it.

AECL has delivered the last six CANDU reactors on time and on budget in

Korea, China and Romania. It has also developed the next generation Advanced CANDU Reactor (ACR-1000™). This Canadian solution is highly competitive with other forms of energy production and is ideally suited to supply base-load power for Ontario. AECL will design, build and finance new CANDUs in Ontario with other private sector partners.

CANDU is Ontario's best option for reliable, clean, affordable electricity.

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