



2010 REASONS TO DO BUSINESS IN CANADA



A RENEWABLE ENERGY POWERHOUSE

Overview of Canadian Capabilities

Canada is a world leader in the development and deployment of cost-effective and environmentally responsible renewable energy technologies, including large and small hydro; wind, solar and ocean energies; bioenergy and hydrogen and fuel-cell.

- expertise in landfill gas electricity generation projects design, construction and operation
- low cost turnkey anaerobic digester and power generation systems for livestock farms

Bioenergy

Canada has more biomass resource per capita than any other nation. The renewable energy sources, produced from Canadian abundant biomass resources, currently accounts for approximately 6% of Canada total energy supply. Canada's bioenergy production includes combustion, pyrolysis, gasification, anaerobic digestion, landfill biogas utilization, fermentation and catalytic hydrotreating of biomass oils.

Canadian firms can provide the following:

- expertise in the design, construction and operation of large-scale ethanol production plants
- technology for large-scale production of high quality biodiesel fuels, derived from vegetable and animal fats at a cost that competes with petroleum diesel
- high efficiency wood burning appliances and automated commercial systems



© 2007, Her Majesty the Queen in Right of Canada, as represented by the Minister of Agriculture and Agri-Food

Hydrogen and Fuel Cell

Canada is recognized as a global leader in the hydrogen and fuel cell industry, along with the US, Germany and Japan. Our expertise is vast and builds on strong achievements made over the past 30 years. The hydrogen and fuel cell industry is at



the nascent stage, but with much potential yet to be tapped.

Canadian companies in this sector offer:

- a world leading position in hydrogen and fuel cell technology
- fuel cell production, including light duty automotive fuel cells
- expertise in the development of hydrogen projects such as the Hydrogen Highway to be built between Vancouver and Whistler
- fuelling systems and fuel storage

Hydropower

With 475 hydropower plants, this sector is the oldest and best established green industry in Canada. Hydro power accounts for 97% of Canada's renewable electricity generation and nearly 13% of the global production of hydropower. Canada is a world leader in hydropower production, with an installed capacity of over 70,858 MW and an annual average production of 350 terawatt hour (TWh). The industry generates the fewest greenhouse gases - 60 times less than coal-fired power plants and 18-30 times less than natural gas power plants.

Canada can provide:

- consulting services for numerous hydrological and hydropower feasibility studies around the world
- design, manufacturing, installation and testing of automated control and safety systems used in hydropower plants
- design, manufacturing, installation and testing of all type of turbines used in hydroelectric facilities
- design and supervision of the construction of many hydropower plants across North America
- refurbishment, rebuilding and updating of hydropower facilities of all sizes in many region of the world

Small Hydro

Small-scale hydropower is a vital part of the Canadian hydropower industry. In fact, over the last decade, hydroelectric facilities, generating 30MW or less, contributed about \$150 million per year to the Canadian economy in manufacturing and services. The Canadian hydropower industry includes more than 20 equipment manufacturers

and about 70 engineering firms focused on small scale hydropower projects development.

The Canadian hydropower industry has developed a variety of cutting edge technologies for small-scale hydropower projects including:

- a low-cost, modular approach to powerhouse automation
- water turbines with high efficiency and reliability
- turbine upgrade and retrofitting expertise
- world leading control systems for off-grid application
- advanced computer modeling for flow-through turbines



© 2007, Her Majesty the Queen in Right of Canada, as represented by the Minister of Agriculture and Agri-Food

Ocean Energy

Bordered by three oceans, Canada is exceptionally rich in tidal current and wave energy resources. Canada became active in the ocean energy fields when it constructed the 20MW tidal energy plant at Annapolis Royal on the Bay of Fundy in Nova Scotia. The plant has been in operation since 1984 and is the only one of its kind in North America.

Canada is fast becoming a recognized expert in areas including: marine fabrication and marine operations; horizontal and vertical axis turbine for harnessing currents and tides; operation of tidal generation stations; manned and unmanned specialized remote tooling systems for subsea work; and, wave technology test and simulation facilities at the Institute for Ocean Technology and the Canadian Hydraulics Centre.

Solar Energy

Canadian firms offer a variety of innovative technologies, products and services in the two key segments of solar thermal and photovoltaics (PV). As of 2007 there was approximately 544km² of solar collector capacity operating in Canada – primarily for pool heating and commercial building air heating.

Canada can provide products and technologies for both solar thermal and PV applications:

- solar collectors for domestic and commercial water or air heating
- photovoltaic manufacturing equipment and automation expertise
- high efficiency solar-LED lighting systems
- expertise in the design of solar electric systems for off-grid, remote or northern locations
- design of solar electric systems for large-scale grid-tied applications
- concentrated solar power collectors designed to combine solar heat and power generation in one unit
- cold climate expertise for PV and solar thermal applications



© 2007, Her Majesty the Queen in Right of Canada, as represented by the Minister of Agriculture and Agri-Food

Wind Energy

The Canadian wind energy industry is maturing and is the fastest growing renewable energy source in Canada. In 2008, Canada became the 11th country in the world to surpass the 2,000 MW mark for

installed wind energy capacity and by the end of 2009, it is poised to reach 3,000 MW. Approximately, 430 companies are active in Canada in the wind energy sector, with a combined workforce of 4000 people. Wind power development which includes projects development, project operation and independent power generation is the largest segment of Canada's wind energy industry. More than 40 percent of wind energy companies are active in this industry segment. Manufacturing is the focus of 16 percent of Canadian wind energy firms. The main products manufactured in Canada are wind-related components such as rotor, blades, control systems, turbines, inverters, nacelles, towers and meteorological towers.

Canadian firms can offer:

- wind resources assessment and mapping expertise
- wind farm planning, financing and development expertise
- expertise in large scale wind turbine tower, base frame and rotor blade manufacturing
- nacelle assembly expertise
- leading edge technology in electric inverter, power conditioning equipment and large scale battery storage
- expertise in cold and harsh climate wind turbine research and application
- design, installation and integration of wind generation systems for isolated, and off-grid hybrid system applications

Research and Development (R&D)

The Canadian R&D community is actively involved in the research and development of renewable energy technologies, working not only to meet energy demands but also to reduce the technical and financial risks associated with each technology. This work is performed alongside industry to establish standards and to openly share new knowledge and information about renewable energy technologies. For 2008/2009, an estimated \$1.8 billion dollars was spent on renewable energy R&D.

Current focus in R&D:

- fundamental resource assessment and understanding of renewable energy impacts on the environment
- codes and standards development
- development of small-scale hydro and wind

technologies

- solar resources assessment and forecasting
- combine solar heat and power technologies to reduce cost and increase performance
- second generation transport biofuels from agricultural, marine and forest residues
- biomass for heat and electricity including co-firing

The Canadian Trade Commissioner Service (TCS)

The Canadian Trade Commissioner Service is a key resource for anyone interested in doing business internationally. Our global network of trade offices and dedicated officers are there to provide assistance and resources to maximize engagement with companies and government. For more information on Canadian expertise, we encourage you to contact one of Canada's local Trade Commissioners. You can access their knowledge and networks at:

www.tradecommissioner.gc.ca

For More Information...

Clean Energy Portal, a repository of information related to Canadian climate change mitigation expertise

www.cleanenergy.gc.ca/index_e.asp

CanmetENERGY, Canada's largest research center on clean energy, renewable energy and energy efficiency

canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/index.html

National Resources Canada, Canada's Federal department with responsibility for energy issues

www.nrcan-rncan.gc.ca/com/index-eng.php

National Research Council of Canada:

www.nrc-cnrc.gc.ca/eng/index.html

Industry Associations

Canadian Bioenergy Association

www.canbio.ca

Canadian Hydrogen Fuel Cell Association

www.h2fcc.ca

Canadian Hydropower Association

www.canhydropower.org

Canadian Renewable Fuels Association

www.greenfuels.org

Canadian Solar Industry Association

www.cansia.ca

Canadian Wind Energy Association

www.canwea.ca

Ocean Renewable Energy Group

www.oreg.ca

Wind Energy Institute of Canada

www.weican.ca