



**[ RENEWABLE ENERGY - WIND AND SOLAR ]**

**Canada's competitive advantages**

# CANADA'S RENEWABLE ENERGY SECTOR

With the world's third-largest capacity for renewable energy<sup>1</sup>—renewable sources generate 65 percent<sup>2</sup> of its total electricity—Canada offers foreign investors numerous opportunities across the entire value chain: from technology development and fuel supply to generation, storage and distribution.

Each year, renewables account for a greater share of Canada's electricity-generation capacity. Hydroelectricity is the largest single source, accounting for 63 percent of total capacity in 2012.<sup>2</sup> Other renewable sources, such as biomass, wind, marine and solar, help increase Canada's capacity for renewable energy; wind and solar are the country's two fastest-growing sources of electricity.

## SOLAR PHOTOVOLTAICS (PV)

Canada has the resources and insolation necessary to build and successfully operate solar farms on par with global PV leaders.<sup>3</sup> Solar PV capacity has grown substantially in Canada, reaching 1210 MW of cumulative installed capacity in 2013.<sup>4</sup> The Canadian Solar Industries Association (CanSIA) forecasts that the Canadian market will continue its steady growth and that annual capacity will increase three-fold by 2025.<sup>5</sup> The Canadian solar PV industry received \$2 billion of private sector investment in 2011<sup>6</sup> and, in 2012, CanSIA identified 650 organizations and companies servicing solar industries in Canada, including over 100 manufacturers of various solar PV components. As an emerging technology, solar PV is R & D intensive; Canada has the world-class research institutes and testing facilities needed for growth in the solar PV market.

## WIND

Canada has seen tremendous growth in its installed wind-energy capacity over the last decade, moving from just 300 MW of installed capacity in 2003 to close to 8,000 MW by the end of 2013.<sup>7</sup> Developers expect to add a record 1,300 MW in 2014, and another 5,000 MW of projects are contracted to be built over the next three years. With some of the world's largest wind resources, Canada is on track to meet the industry target of 12,000 MW capacity by 2016.<sup>8</sup>

Some of the largest global wind energy companies are present in Canada, as are opportunities in component manufacturing, construction, transportation, engineering, operations and maintenance (O&M). Wind-energy clusters continue to develop across Canada to serve this rapidly expanding market with a growing supply chain of companies manufacturing nacelles, towers, foundations, blades and mechanisms for wind turbines.

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<sup>1</sup> International Energy Agency.

<sup>2</sup> Statistics Canada. Survey 2151 (2012).

<sup>3</sup> Canadian Solar Industries Association.

<sup>4</sup> Y. Poissant, P. Luukkonen, *National Survey Report of Photovoltaic Power in Canada 2013*.

<sup>5</sup> Canadian Solar Industries Association. *Canadian Solar Industry Directory*, 2012.

<sup>6</sup> ClearSky Advisors Inc. *Economic Impacts of the Solar PV Sector in Ontario 2008-2018*.

<sup>7</sup> KPMG. *Wind Energy in Canada: Realizing the Opportunity, Issue 2*. July, 2013.

<sup>8</sup> Global Wind Energy Council. *Global Wind Report—Annual Market Update 2012*.

# WIND AND SOLAR ENERGY CLUSTERS

Canada's wind and solar energy industry covers the supply chain from raw materials to component manufacturers, and system integrators to developers, retailers and distributors.



## WESTERN CANADA

### » Companies 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.

## ATLANTIC CANADA

### » Companies include:

Cape Breton Explorations Ltd., Daewoo Shipbuilding and Marine Engineering Co., Ltd., Enel S.p.A., GDF SUEZ Energy North America, Inc., Scotian WindFields Inc., Shear Wind Inc. and Wind Dynamics Inc.

## ONTARIO

### » Companies include:

ALGATEC Solar AG, Canadian Solar Inc., Celestica Inc., Centennial Global Technology Inc., CS Wind Corp., Eclipsall Energy Corp., EDF EN Canada (EDF Energies Nouvelles Co.), ENERCON GmbH, GDF SUEZ Canada Inc. (GDF SUEZ Energy North America, Inc.), GE Wind Energy (General Electric Co.), Heliene Inc., Lumin Solar Inc., Pattern Energy Group Inc., Senvion SE (former REpower Systems AG), Samsung Electronics Canada Inc., Schletter Canada Inc., Schneider Electric SA, Siemens AG, Silfab Ontario Inc., Silicor Materials, Inc., Solgate Inc., TSP Canada Towers Inc. and Unirac, Inc.

## QUEBEC

### » Companies include:

Innergex Renewable Energy Inc., Daewoo Shipbuilding and Marine Engineering Co., Ltd., Opsun Systems Inc., Matrix Energy Inc., The Solart Group, Sunforce Products, Inc., EDF EN Canada (EDF Energies Nouvelles Co.), LM Wind Power Holding A/S, Marmen Inc., Matrix Energy Inc., Senvion SE (former Repower Systems AG), Composites VCI Inc., ENERCON GmbH, 5N Plus Inc. and Woodward, Inc.

## RECENT INVESTMENTS

COMPANY	BUSINESS ACTIVITY
Senvion (former REpower AG) (Germany)	Wind-turbine blade manufacturer
Shanghai Taisheng Wind Power Equipment (TSP) (China)	Wind-tower manufacturer
ENERCON GmbH (Germany)	Wind-turbine electrical components

# CANADA'S ADVANTAGES

## NATURAL RESOURCES

Canada's long coast lines and huge land mass give it some of the best wind resources on the planet. Despite the widespread perception that Canada is a cold northern country, it is also home to a strong solar resource. In fact, insolation across much of Canada compares favourably with that of other countries with strong solar-PV generation capacity.

## LARGE DOMESTIC AND REGIONAL MARKET

As the sixth-largest consumer of electricity in the world, Canada offers a sizable market for renewable-energy investors. At the same time, Canada's energy markets are highly integrated with those of the United States—the largest electricity consumer worldwide. Under various international agreements, Canada enjoys protection against local-content requirements (e.g. Buy American), enabling Canadian suppliers to bid, or to serve as subcontractors, on a range of procurement opportunities posted by public utilities in the U.S. Secure access to these U.S. opportunities represents an additional advantage for manufacturers based in Canada.

## GENEROUS FEDERAL AND PROVINCIAL INCENTIVES

Incentives may be available at the federal, provincial, local and utility levels in Canada. Most provinces now offer net metering, which enables small wind-turbine owners to offset their electricity consumption or earn credits from their local utility if they produce excess power. Some incentives offered in Canada include:

- **Saskatchewan Net Metering Program:** Offers a rebate of 35 percent of eligible costs, with a maximum of \$35,000 for Turbines 100 kW or less installed in Saskatchewan and that comply with the local utility's net-metering policies.
- **Ontario Feed-in Tariff:** Large wind turbines compliant with Ontario's domestic-content rules, along with small wind turbines, receive a feed-in tariff of 12.8 cents/kWh.

## RESEARCH & DEVELOPMENT CAPABILITIES

Canada is also a world leader in collaborative R & D in the renewable energy sector. Partnerships between industry, government, universities and research institutes such as CanmetENERGY, along with testing facilities such as WEICan and TechnoCentre Éolien create an excellent environment for R & D and innovation in this sector.

"ENERCON's experience in Canada over the past 12 years has been overwhelmingly positive. Strong support from local industry including depth, maneuverability and integrity of the supply chain, superb wind resources, strong policy initiatives, a highly trained and motivated labour force and a rock-solid financial system have reinforced the 2001 decision to build our presence in this market."

Adrienne Downey, B. Eng.,  
Operations and Business Development Manager,  
ENERCON Canada, Inc.

# INNOVATION

## SOLAR

Between 2003 and 2012, Canada registered an estimated 233 patents in PV technology with the U.S. Patent and Trademark Office.<sup>9</sup>

- Canada operates one of the world's largest indoor solar simulators at the **National Solar Test Facility** in Mississauga, Ontario. Under the SolarCity Partnership, the Toronto and Region Conservation Authority recently established a facility to test the performance of commercial PV products.
- Testing facilities are also available at the **Open Solar Outdoors Test Field** in Kingston, Ontario, under an initiative led by Queen's University, and at Concordia University's unique **Solar Simulator-Environmental Chamber**. The Chamber, in Montréal, Quebec, supports research into solar-energy applications and advanced structural envelopes for net-zero energy buildings.
- **CanmetENERGY**, within Natural Resources Canada, specializes in solar PV and solar thermal energy, and promotes grid integration of renewable power. Moreover, its PV Program conducts reviews of Canadian university research and innovation in the field of solar PV cell R & D. It is also home to an outdoor performance test bed, Varennes Research Centre (Varennes, Quebec), providing detailed information on energy yields for systems with conditions similar to those in Montréal, Quebec.

## WIND

- The **Wind Energy Institute of Canada** (North Cape, Prince Edward Island) is a not-for-profit, independent research and testing institute, whose mission is to advance the development of wind energy across Canada through research and demonstration, collaboration, testing, certification, training and public education. The Institute's location—on a cape jutting out into the Gulf of St. Lawrence—features reliable winds, making it an excellent choice for testing wind-energy systems.
- The **TechnoCentre Éolien**, in Gaspé, Quebec, conducts research into the operation of wind turbines in cold climates.
- The **Wind Energy Strategic Network**, established by the Natural Sciences and Engineering Research Council, is the first of its kind in Canada. The Network comprises 39 leading researchers from 16 universities across the country who work in collaboration with 15 partners from industry, academia and government.
- **CanmetENERGY**, within Natural Resources Canada, conducts research into one of the biggest challenges in wind-turbine operation: energy losses due to the effects of cold temperatures. The research investigates how to quantify losses at specific locations in order to improve forecasting and mitigate energy loss.

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<sup>9</sup> fDi Intelligence based on USPTO data. March 2013.

# INVEST IN CANADA TO ACHIEVE GLOBAL EXCELLENCE

## **A WELCOMING BUSINESS ENVIRONMENT**

Canada is ranked as the best country for business in the G-20.

Source: Forbes and Bloomberg

## **A HIGHLY EDUCATED WORKFORCE**

Canada's workforce is the most highly educated among members of the OECD, with half of its working-age population having a tertiary-level education.

Source: Organisation for Economic Co-operation and Development (OECD)

## **LOW TAX RATES**

Canada's overall marginal effective tax rate on business investment is by far the lowest in the G-7—about 17 percentage points lower than that of the United States.

Source: Department of Finance Canada

## **COMPETITIVE R & D ENVIRONMENT**

Canada offers the lowest business costs in the G-7 for R & D-intensive sectors, with a 15.8 percent cost advantage over the United States.

Source: KPMG

## **FINANCIAL STABILITY**

For six consecutive years, the World Economic Forum has declared Canada's banking system to be the soundest in the world.

Source: World Economic Forum (WEF)

## **UNPARALLELED MARKET ACCESS**

Canada's NAFTA advantage gives investors access to 470 million consumers. Many Canadian production hubs are actually closer to U.S. markets than American production sites—of Canada's 20 largest cities, 17 are within an hour-and-a-half drive of the U.S.

Source: The World Bank

## **A GREAT PLACE TO INVEST, WORK, AND LIVE**

Canada is one of the globally most multicultural countries with world-class universities, a universal health care system and clean and friendly cities in addition to having the second highest standard of living in the G-20, as measured by GDP per capita.

Source: The World Bank

Unless otherwise noted, all values in this publication are in Canadian dollars. Content is based on the latest available information at time of publication.



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