



INVEST IN **CANADA**

CANADA'S COMPETITIVE ADVANTAGES

**RENEWABLE ENERGY
— WIND AND SOLAR**



CANADA'S RENEWABLE ENERGY SECTOR

Every year, renewables account for a greater share of Canada's electricity-generation capacity. Hydroelectricity is the largest single source, accounting for approximately 58 percent of total electricity generation in 2014; Canada is the world's second-largest hydroelectric power producer.³ Other renewable sources, such as biomass, wind, marine and solar, help increase Canada's capacity for renewable energy, which is now sufficient to power more than 35 million homes.

WIND

Canada has seen tremendous growth in its installed wind-energy capacity, moving from 351 MW of installed capacity in 2003 to 11,890 MW at the end of 2016,⁴ making it the world's eighth-largest producer in cumulative terms.⁵ Canada's new wind-energy projects in 2015 represent over \$3 billion in investment. The Global Wind Energy Council estimates that wind power supplies approximately five percent of Canada's electricity demand. Canadian wind installed capacity has demonstrated a five-year annual average growth rate of 18 percent.⁵

Some of the largest global wind-energy companies are present in Canada, as are opportunities in component manufacturing, construction, transportation, engineering, and 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.

SOLAR PHOTOVOLTAICS (PV)

Canada has the resources and insolation necessary to build and successfully operate solar farms on par with global PV leaders.⁶ Solar PV capacity has grown substantially in Canada, reaching 2,715 MW of cumulative installed capacity in 2016.⁴ It is forecasted that the Canadian market will continue its steady growth and that annual capacity will increase three-fold by 2025. In 2015, there were 250 organizations and companies servicing solar industries in Canada. By 2019, cumulative investment in solar PV is expected to exceed \$11 billion.⁷ As an emerging technology, solar PV is R&D intensive; Canada has the world-class research institutes and testing facilities needed to grow the industry.

- 1 International Energy Agency, Renewables 2015 Global Status Report.
- 2 Statistics Canada, Installed generating capacity, by class of electricity producer.
- 3 International Energy Agency Key World Energy Statistics 2016.
- 4 BP, Statistical Review of World Energy 2017, June 2017.
- 5 Global Wind Energy Council, Global Wind Report 2016: Annual Market Update.
- 6 Canadian Solar Industries Association.
- 7 ClearSky Advisors Inc., Economic Impacts of the Solar PV Sector in Ontario 2008-2018.

WITH THE WORLD'S FIFTH-LARGEST CAPACITY for renewable energy at 89 GW¹ and renewable sources generating 64 percent of its total electricity,² Canada offers foreign investors numerous opportunities across the entire value chain, from technology development and fuel supply to generation, storage and distribution.



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.

BRITISH COLUMBIA: ACCIONA, AltaGas, Alterra Power, Capital Power, Carmanah, Conergy, EffiSolar, Innergex Renewable Energy

PRAIRIES: Algonquin Power & Utilities Corp., CORE Renewable Energy, Enbridge, GP JOULE, HES PV, Mitsubishi Hitachi Power Systems Canada, Partner Technologies, Pattern Energy, SkyFire Energy, Sequoia Energy, Suncor, TransAlta

QUEBEC: 5N Plus, BORALEX, Brookfield Renewable, Composites VCI, Daewoo Shipbuilding and Marine Engineering, EDF EN Canada, Elecnor, ENERCON, LM Wind Power, MARMEN, Matrix Energy, Opsun, RES Group, Senvion, Sunforce

ONTARIO: ALGATEC Solar, Canadian Solar, Celestica, CS Wind, Eclipsall Energy, EDF EN Canada, ENERCON, ENGIE, Fronius, GE Wind Energy, Heliene, Morgan Solar, NextEra Energy Canada, Northland Power, Pattern Energy, Samsung Electronics, Schletter, Schneider Electric, Silfab, Silicor Materials, Unirac

NEW BRUNSWICK: ACCIONA, TransAlta, ENGIE, Wind Dynamics

NOVA SCOTIA: Cape Breton Explorations Ltd., Capstone Infrastructure, Scotian WindFields

PRINCE EDWARD ISLAND: Bullfrog Power, ENGIE

NEWFOUNDLAND AND LABRADOR: Enel Green Power

RECENT INVESTMENTS



In 2017, Danish-based blade manufacturer LM Wind Power (a GE Renewable Energy business), expanded its plant in Quebec to serve wind projects in the US market. The US\$12 million expansion is expected to create 265 jobs by 2018.



In 2015, Italian-based Silfab Solar announced it was increasing capacity its Mississauga, Ontario, solar PV module manufacturing facility. The plant expansion will bring annual production to more than 300 MW, compared to 90 MW initially, and will create 30 jobs.



In 2017, EDF EN Canada, a subsidiary of French-based EDF Energies Nouvelles Group, will be completing its Rivière-du-Moulin, Quebec, wind project. This project is the company's largest such facility globally, and by the end of 2017, EDF EN Canada will have 1,599 MW of wind and solar projects throughout Canada.



In 2017, German-based solar installation company Soventix started construction of a solar project in Vilna, Alberta, as part of a 140 MW solar power portfolio in the province. The company plans to further develop its business activities in the Canadian solar market.



In 2017, California-based Pattern Energy completed its 184.6 MW Meikle Wind power project in British Columbia, the largest wind facility in the province. The new installation will increase British Columbia's installed wind capacity by 38 percent.

CANADA'S ADVANTAGES

NATURAL RESOURCES

Canada's long coastlines 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 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, to which manufacturers based in Canada have secure access. Under various international agreements, Canada enjoys protection against local-content requirements (e.g. the American Recovery and Reinvestment Act), enabling Canadian suppliers to bid, or to serve as subcontractors on a range of procurement opportunities posted by public utilities in the U.S.

SUPPORTIVE GOVERNMENTS

Federal and provincial governments in Canada are committed to increasing the use of renewable energy. The federal government has developed programs and policies, with strong focus on tax incentives, environmental regulations and funding programs. Provinces are implementing a variety of policies, initiatives and measures, such as: renewable-energy targets; legislated renewable-portfolio standards; and requests for proposals, standard-offer contracts and feed-in tariff programs.

RESEARCH & DEVELOPMENT CAPABILITIES

Canada is also a world leader in collaborative R&D in the renewable-energy sector. Partnerships between industry, governments, 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.

TESTIMONIAL:

"Silfab S.p.A. chose Canada and Ontario to establish its first North American plant for multiple reasons, the most important being the availability of skilled workforce, the proximity to the U.S. market and the existence of an innovative and progressive Green Energy Act in the Province of Ontario.

"Since the decision was made, Silfab has taken advantage of consulting services from various federal entities like the Canadian Embassy in Rome, Export Development Canada, Sustainable Development Technology Canada and Global Affairs Canada, and received significant support from the province of Ontario, and has been able to expand its operations fivefold, becoming one of the largest solar PV manufacturers in, and a supplier to, all of the Americas."

— Paolo Maccario
Chief Operating Officer and General Manager
Silfab Ontario



INNOVATION SUPPORT PROGRAMS

Sustainable Development Technology Canada (SDTC) finances and supports innovative clean technology projects through development and pre-commercial demonstration.

Scientific Research and Experimental Development (SR&ED) provides income-tax credits and refunds for expenditures on eligible R&D activity in Canada.

Export Development Canada (EDC) and **Business Development Bank of Canada (BDC)** provide flexible financing programs and solutions tailored to support foreign direct investment in Canada.

Foreign investors can also count on a wide range of specialized wind and solar organizations to further support their R&D efforts.

WIND

» The **Wind Energy Institute of Canada**, in North Cape, Prince Edward Island, is a not-for-profit 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 by the Gulf of St. Lawrence is ideally situated for wind study.

» The **TechnoCentre éolien**, in Gaspé, Quebec, is a centre of expertise that supports the development of the wind industry through research, technology transfer and technical assistance for businesses. Its primary areas of activity relate to wind energy in cold climates and complex terrain, and adaptation of technologies.

» The **WindEEE (Wind Engineering, Energy and Environment) Institute** at Western University in London, Ontario, is home to the world's first three-dimensional wind-testing chamber. Its facility, known as the **WindEEE Dome**, enables scientists to address important scientific, economic and societal challenges related to wind, while evaluating energy potential and damage risks.

» **CanmetENERGY**, within Natural Resources Canada, conducts research into energy losses due to the effects of cold temperatures, a major challenge in wind-turbine operation. The research investigates quantifying losses at specific locations, improving forecasting and mitigating energy loss.

SOLAR

» Canada operates one of the world's largest indoor solar simulators at the **National Solar Test Facility** in Mississauga, Ontario. The Facility is a leading centre for testing and rating solar technologies under controlled sunlight, temperature and wind.

» State-of-the-art testing facilities are 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** specializes in PV and solar-thermal energy, and promotes grid integration of renewable power. It is also home to the Varennes Research Centre (Varennes, Quebec), an outdoor performance testbed that validates PV performance models and solar-resource forecasts, and tests PV module-rating methodologies.

» The **Refined Manufacturing Acceleration Process Network (ReMAP)**, headquartered in Toronto, Ontario, is developing an ecosystem for commercialization that links academics, companies and customers. The ReMAP network aims to facilitate commercialization of electronics innovations. Projects focus on materials, optics and photonics, and solar photovoltaic components.

AN ENABLING BUSINESS ENVIRONMENT

CANADA HAS A STRONG
AND STABLE business climate
that is open for business,
investment, and trade. Canada
benefits from a sound, efficient
financial system supported by
low taxes and business costs
and a government investing in
the innovative, clean, inclusive
economy of tomorrow.

A WELCOMING BUSINESS ENVIRONMENT

Canada is the second best place
for business in the G20.

Source: Forbes

A HIGHLY EDUCATED AND TALENTED WORKFORCE

Canada has the most educated talent pool in
the OECD with more than half of its population
aged 25-64 having a tertiary level education.

Source: OECD

LOW BUSINESS TAX RATES

Canada is the most tax competitive
country in the G7.

Source: KPMG

WORLD-CLASS CLUSTERS OF INNOVATION, WITH GOVERNMENT AS PARTNER

Canada has strong geographic and sectoral
clusters, as well as R&D-intensive sectors
with the lowest business costs in the G7.

Source: KPMG

FINANCIAL STABILITY

Canada's banking system, ranked 3rd by
the World Economic Forum (WEF), remains
one of the soundest in the world following
eight consecutive first place standings.

Source: World Economic Forum

A GREAT PLACE TO INVEST, WORK AND LIVE

Canada ranked first among 60 countries for
quality of life. Canada is ranked first in the G7
and G20 for overall prosperity of citizens.

Sources: U.S. News and the
Legatum Prosperity Index

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

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