



INVEST IN CANADA

CANADA'S COMPETITIVE ADVANTAGES

CLEAN
TECHNOLOGY



THE CANADIAN GOVERNMENT IS INVESTING HEAVILY IN CLEAN TECHNOLOGY AND CLEAN GROWTH

The international community is forging ahead in the fight against climate change through Mission Innovation, with a commitment to accelerate innovation and make clean energy accessible and affordable worldwide. As a member, Canada has committed to double government investments in clean energy research, development and demonstration (RD&D) over five years, while encouraging greater levels of private sector investment in transformative clean energy technologies.

To meet its commitments and drive clean innovation, Canada's 2017 Budget commitments include more than \$2.3 billion to support clean technology research, development, demonstration and adoption, as well as scaling-up clean technology businesses. This is in addition to broader innovation measures, including better

supporting growing companies through government procurement. It is also in addition to the government's plan to invest \$21.9 billion in green infrastructure, which will create jobs and position Canada for the low-carbon economy of the future.

THE TIME TO INVEST IN CANADA IS NOW

The government is collaborating with stakeholders and jurisdictions across Canada to meet our climate change commitments and bring innovative and competitive clean technology to market. New financing will be used alongside private sources to increase the overall amount of capital. Strong international linkages will promote Canadian technology as solutions to global challenges, attract new private sector investment and create new economic opportunities.

Foreign investment in clean technology is on the rise, and Canada's commitment to clean technology growth and adoption makes Canada a hotbed of clean technology potential.

A CLEAN ENVIRONMENT AND A STRONG ECONOMY

go hand in hand:

Clean technology is a key component of Canada's approach to promoting clean growth and will play a critical role in Canada's transition into a low-carbon economy.

The government's new Innovation and Skills Plan will help position Canada as a leader in the global economy with world-class clusters of innovation and a highly skilled and mobile workforce.

13 CANADIAN FIRMS IN THE 2018 GLOBAL CLEANTECH 100¹, 3 ON THE ONES TO WATCH LIST²



In 2017, the Global Cleantech Innovation index ranked Canada



1. Cleantech Group, 2018 Global Cleantech 100, 2018.
 2. Cleantech Group, 2017 Global Cleantech 100 Ones to Watch, 2017.
 3. Cleantech Group and WWF, The Global Cleantech Innovation Index 2017, 2017.

CLEAN TECHNOLOGY
SUPPORT ACROSS
THE ECONOMY

\$12 M

CLEAN GROWTH HUB
Whole-of-government focal point for clean technology program coordination and stakeholder engagement.

\$2 B

LOW CARBON ECONOMY FUND
will leverage investments in projects that will generate clean growth and reduce greenhouse gas emissions towards meeting or exceeding commitments under the Paris Agreement.

\$75 M

IMPACT CANADA: CLEAN TECHNOLOGY Innovative funding approaches (e.g., prizes, co-creation) to solving Canada's big challenges.

\$300 M

IMPACT CANADA: SMART CITIES Innovative funding approaches (e.g., prizes, co-creation) targeted at communities to solve tough problems.

**CANADA'S
COMMITMENT TO
CLEAN TECHNOLOGY⁴**

\$1.4 B

NEW FUNDING for equity financing, growth capital and project financing for promising clean technology firms through the **Business Development Bank of Canada (BDC)** and **Export Development Canada (EDC)**.

\$1.26 B

STRATEGIC INNOVATION FUND supports firms of all sizes across all sectors through four streams: R&D; growth and expansion; attracting and retaining large scale investments; and advanced industrial research.

\$429 M

CLEAN TECHNOLOGY IN NATURAL RESOURCES, CLEAN ENERGY AND CLEAN TRANSPORTATION INVESTMENTS support clean technology RD&D in national laboratories and with external participants, including in the energy, mining, forestry, agriculture and fisheries/aquaculture sectors.

\$21.9 B

INVESTMENTS IN GREEN INFRASTRUCTURE, including \$822M for clean energy infrastructure across five streams: smart grids, renewables, reducing diesel in rural and remote communities, electric vehicle infrastructure, and energy efficient buildings.

\$400 M

SUSTAINABLE DEVELOPMENT TECHNOLOGY CANADA (SDTC) Recapitalization of the **SD Tech Fund** that supports the development and demonstration of pre-commercial clean technology.

CLEAN TECHNOLOGY ACROSS CANADA



HYDROGEN AND FUEL CELLS –

Canada is recognized internationally as a global leader in hydrogen and fuel cell technologies, with a leading presence in British Columbia.

FEATURE TECHNOLOGY –

Mercedes-Benz Canada's \$53 million automated fuel cell production and technology development facility in Burnaby, B.C. has consistently played an instrumental role in the global commercialization of fuel cell technology.



CLEAN RESOURCES –

Canada offers forward-looking innovation in clean resource technology development and implementation.

FEATURE TECHNOLOGY –

British Columbia-based MineSense has developed High Frequency Electromagnetic Spectroscopy (HFEMS) and High Speed X-Ray Fluorescent (HSXRF) technologies combined with laser telemetry to measure and report ore grade in real-time for large-scale mines.



CARBON CAPTURE, UTILIZATION AND STORAGE (CCUS) –

Canada is a CCUS technology demonstration leader with cutting-edge projects in Saskatchewan, Alberta and British Columbia.

FEATURE TECHNOLOGY –

Nova Scotia-based CarbonCure retrofits concrete plants with an innovative technology that recycles carbon dioxide to make stronger, greener concrete. CarbonCure's technology is currently operational in a growing number of concrete plants across North America, including several of the world's largest vertically-integrated cement and concrete companies.



ENERGY STORAGE –

Canada's energy storage industry is rapidly building momentum with leading technologies and showcase installations. Ontario is a leading jurisdiction for energy storage in North America.

FEATURE TECHNOLOGY –

Hydrogenics, a leading developer and manufacturer of hydrogen generation and hydrogen-based power modules, has a 20 megawatt project pipeline for its industry leading PEM power-to-gas systems for hydrogen production. For bulk storage, Hydrogenics' electrolysis technology directly converts excess renewable energy into hydrogen which is then fed into the local natural gas pipelines, helping to reduce the region's carbon footprint.





INDUSTRIAL BIOPRODUCTS –

Canada is an active centre for research and innovation in bioproduct technologies. Major clusters are located in Ontario and Quebec.

FEATURE TECHNOLOGY –

Quebec-based Enerkem's patented technology chemically recycles the carbon contained in non-recyclable waste (i.e. garbage). In less than 5 minutes, Enerkem's process first converts this carbon into a pure synthesis gas (also called syngas), which is then turned into biofuels and chemicals, using commercially available catalysts.



RENEWABLE ENERGY –

With renewable sources generating 64% of Canada's total electricity, Canada has become a world leader in collaborative R&D in the renewable energy sector.

FEATURE TECHNOLOGY –

Cape Sharp Tidal is an exciting demonstration project that is harnessing the energy of the highest tides in the world in Nova Scotia's Bay of Fundy. The in-stream tidal turbine is designed to be deployed directly on the sea-bed where it allows the extraction of renewable and sustainable energy from the tides. The project is a joint venture between Halifax-based Emera Inc. and Irish company OpenHydro (a DCNS company).



E-MOBILITY –

Exciting forward-looking activity in Quebec, Ontario and British Columbia which is shaping the future of electric mobility.

FEATURE TECHNOLOGY –

Quebec-based TM4 pioneered the electric propulsion system technology developed by Hydro-Quebec's renowned research center (IREQ). Today, it provides customers in more than a dozen countries with patented technology and distinctive expertise in electric motors, generators and inverters for the transport and energy markets.



WATER TECHNOLOGIES –

Canada is a known leader in the development of innovative and technologically advanced water technologies that are helping to solve global water challenges, with exceptional clusters in Quebec, Ontario and British Columbia.

FEATURE TECHNOLOGY –

Ontario-based Trojan UV has led the development of water treatment solutions using environmentally friendly ultraviolet (UV) light. Trojan UV has the largest installed base of UV systems in operation on the planet. Trojan Technologies' UV water treatment solutions were adopted by Chicago and New York City – where the company is treating water for more than 10 million people. In China, one in five people are using this technology to treat wastewater.



SMART GRID –

Canada is pioneering Smart Grid deployment across the country with world-leading knowledge and expertise in Ontario.

FEATURE TECHNOLOGY –

GridOS is the signature product from Toronto area-based utility Opus One. From integrated planning to real-time distribution system state estimation using physics-based modeling and a limited number of data points, GridOS uses the grid's DNA to perform advanced distributed energy analytics and to execute constraint management actions, while optimizing available grid resources and maximizing capacity.

CANADA'S COMPANIES AND NETWORKS LEAD THE WAY



CARBON CAPTURE, UTILIZATION AND STORAGE

Research and Innovation: Alberta Carbon Conversion Technology Centre (AB), Alberta Clean Technology Industrial Alliance (AB), Carbon Capture & Conversion Institute (BC), International CCS Knowledge Centre (SK), NSERC Carbon Capture Initiative (AB), Petroleum Technology Research Centre (SK), Shand Carbon Capture Test Facility (SK)

» **Some leading companies:** Biothermica (QC), Carbicrete (QC), Carbon Engineering (BC), CarbonCure Technologies (NS), CO2 Solutions (QC), Enhance Energy (AB), Inventys (BC), Pond Technologies (ON), Shell (AB)



CLEAN RESOURCES

Research and Innovation: Canada's Oil Sands Innovation Alliance (AB), Canada Mining Innovation Council (ON), Centre for Excellence in Mining Innovation (ON), CMC Research Institutes (AB), Petroleum Technology Alliance Canada (AB)

» **Some leading companies:** Barrick Gold (ON), Biothermica (QC), BQE Water (BC), Canadian Natural Resources Limited (AB), Cenovus Energy (AB), Eosense (NS), Filterboxx (AB), Glencore (ON), Goldcorp (BC), Husky Energy (AB), Imperial Oil (AB), MEG Energy (AB), MineSense (BC), Newterra (ON), PyroGenesis (QC), Quantiam Technologies (AB), Rio Tinto (QC), Suncor Energy (AB), Syncrude (AB), Teck (BC), Vale (ON), Terra CO2 Technologies (BC), Terragon Environmental Technologies (QC)



E-MOBILITY

Research and Innovation: ABB North American Centre of Excellence in E-Mobility (QC), Canadian Urban Transit Research & Innovation Consortium (ON), Innovative Vehicle Institute (QC)

» **Some leading companies:** ABB Canada (QC), AddÉnergie (QC), New Flyer (MB), Nova Bus (QC), TM4 (QC), TransPod (ON)



ENERGY STORAGE

Research and Innovation: Institut de recherche d'Hydro Québec (QC), MaRS Advanced Energy Centre (ON), Wind Energy Institute of Canada (PE)

» **Some leading companies:** Corvus Energy (BC), eCAMION (ON), Electrovaya (ON), Esstalion Technologies (QC), E-Zn (ON), Hydrostor (ON), Kelvin Thermal Energy (ON), NRStor (ON), Sigma Energy Storage (QC)



HYDROGEN & FUEL CELLS

Research and Innovation: Automotive Fuel Cell Cooperation (BC), BC Cleantech CEO Alliance (BC), Cascadia Innovation Corridor (BC), Evok Innovations (BC), Foresight Cleantech Accelerator Centre (BC), Hydrogen Research Institute (QC), Lambton Energy Research Centre (ON), Mercedes-Benz Canada Fuel Cell Division (BC), NRC Institute for Fuel Cell Innovation (BC)

» **Some leading companies:** Ballard Power Systems (BC), BioGenerator (ON), Hydra Energy (BC), Hydrogen Technology & Energy Corporation (BC), Greenlight Innovation (BC), Hydrogenics (ON), Next Hydrogen (ON), Powertech (BC), Loop Energy (BC)



INDUSTRIAL BIOPRODUCTS

Research and Innovation: Bioindustrial Innovation Canada (ON), Composites Innovation Centre (MB), CRIBIQ (QC), Drayton Valley Bio-Mile (AB), FPIInnovations (QC)

» **Some leading companies:** Agrisoma (QC), Archer Daniels Midland (AB), BioAmber (ON), Cargill (MB), CelluForce (QC), Comet Biorefining (ON), Competitive Green Technologies (ON), EcoSynthetix (ON), Enerkem (QC)(AB), Ensyn (ON), GreenField Global (ON), Husky Energy (SK), Novozymes (ON) (SK), Origin Materials (ON), S2G BioChem (BC), Solegear Bioplastics (BC), Suncor Energy (ON), Woodland Biofuels (ON)



RENEWABLE ENERGY

Research and Innovation: Fundy Ocean Research Center for Energy (NS), MaRS Advanced Energy Centre (ON), TechnoCentre éolien (QC), Wind Energy Institute of Canada (PE), WIndEEE Research Institute (ON)

» **Some leading companies:** 5N Plus (QC), Black Rock Tidal Power (NS), ENERCON (QC), ENGIE (ON), Canadian Solar (ON), Cape Sharp Tidal (NS), Celestica (ON), Emera (NS), Heliene (ON), GE Renewable Energy (QC), Marmen (QC), Morgan Solar (ON), Nexterra (BC), Samsung Renewable Energy (ON), Schletter (ON), Schneider Electric (ON), Scotian WindFields (NS), Silfab (ON), Wind Dynamics (NB)



SMART GRID

Research and Innovation: GE Grid IQ Global Innovation Centre (ON), Institut de recherche d'Hydro-Québec (QC), Kinectrics (ON), MaRS Advanced Energy Centre (ON), Powertech (BC), Schneider Electric Smart Grid Laboratory (ON), Siemens Smart Grid Centre of Competence (NB), Smart Grid Innovation Network (NB)

» **Some leading companies:** ABB Canada (QC), CircuitMeter (ON), Clear Blue Technologies (ON), dTechs (AB), Ecobee (ON), Enbala (BC), Hatch (ON), N-Dimension Solutions (ON), Opus One Solutions (ON), S&C Electric Company (ON), Siemens (NB), Tantalus Systems Corporation (BC)



WATER TECHNOLOGIES

Research and Innovation: University of Guelph OWRC Demonstration Site (ON), University of Toronto Institute for Water Innovation (ON), University of Waterloo Water Institute (ON), Southern Ontario Water Consortium (ON), Trojan Technologies (ON), WaterNEXT (AB), WaterTAP (ON)

» **Some leading companies:** American Water (ON), Aslan Technologies (ON), Axine Water Technologies (BC), BI Pure Water (BC), BQE Water (BC), Evoqua Water Technologies (ON), H2O Innovation (QC), Island Water Technologies (PE), LuminUltra (NB), Nalco (ON), Pure Technologies (AB), Saltworks Technologies (BC), SUEZ Water Technologies & Solutions (ON), Trojan Technologies (ON), UV Pure (ON), Veolia Water Technologies (ON)

WHY CANADA FOR R&D AND INNOVATION?

SIGNIFICANT GOVERNMENT FUNDING ALONG THE INNOVATION SPECTRUM:

Sustainable Development Technology Canada (SDTC)'s SD Tech Fund supports late-stage development and pre-commercial demonstration of clean technology solutions. Since its launch in 2001, SDTC has invested \$928 million in 320 clean technology projects, and leveraged more than \$2.45 billion from other project partners.

The **Energy Innovation Program (EIP)** supports innovation in the clean energy sector by providing funding for research, development and demonstration projects.

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. They provide insurance and bonding, financing, equity and venture capital, as well as a variety of consulting and advisory services to facilitate foreign trade.

The **National Research Council-Industrial Research Assistance Program (NRC-IRAP)** is Canada's premier innovation assistance program for small and medium-sized enterprises. It is a vital component of the NRC, a cornerstone in Canada's innovation system, regarded world-wide as one of the best programs of its kind.

FRAMEWORKS THAT ENCOURAGE INVESTMENT IN CLEAN INNOVATION:

The pan-Canadian approach to **pricing carbon pollution**, announced in October 2016, will expand the application of carbon pricing to all jurisdictions in Canada in 2018.

The **Scientific Research and Experimental Development (SR&ED)** program provides both a business income tax deduction and an investment tax credit. The tax deduction enables a business to reduce its tax liability in the current year, or carry forward to a future year.

Accelerated Capital Cost Allowance (ACCA). Canada's income tax system encourages businesses to invest in a broad range of clean energy generation and energy efficiency equipment by allowing them to deduct the cost of eligible capital assets on an accelerated basis (e.g., electric vehicle charging stations, electrical energy storage equipment, and geothermal energy projects).

HOTBEDS OF EXCELLENCE IN SCIENCE, TECHNOLOGY AND ENGINEERING FIELDS:

Mitacs supports research internship programs designed to increase deployment of highly educated graduates, especially in science and mathematics, into the private sector.

Natural Sciences and Engineering Research Council of Canada (NSERC) supports university students in their advanced studies, promotes and supports discovery research, and fosters innovation and research at the vanguard of science.

WORLD-CLASS RESEARCH INSTITUTIONS, INNOVATION CENTRES AND R&D NETWORKS:

CanmetENERGY Labs, a network of national energy labs with world class expertise from oil and gas research and development to smart grid and renewable energy – equipped for leading-edge collaborations with the private sector.

CMC Carbon Capture and Conversion Institute is a collaborative venture between CMC Research Institutes and BC Research Inc. This alliance creates a unique ecosystem of experts and to accelerate the development, piloting, scale-up, and validation of new carbon capture and conversion technologies.

Green Aviation Research and Development Network is an industry-led consortium of public and private sector partners, supporting prototyping, testing and demonstrating early-stage, pre-competitive research on next-generation aircraft, engines and avionics systems.

Grid IQ™ Global Innovation Centre is GE's state-of-the-art facility designed to foster innovation and global collaboration to improve the efficiency, reliability and security of the world's electrical grids.

National Research Council (NRC) mobilizes its world-class research and technology development capabilities to solve problems facing Canadian society and industry, including on energy, mining and environment.

Petroleum Technology Research Centre (PTRC) is a not-for-profit corporation founded to foster research and development into enhanced oil recovery and carbon storage, with the goals of improving recovery rates while reducing the environmental footprint of the oil and gas industry.

Southern Ontario Water Consortium works with private companies and academic researchers to accelerate and commercialize innovative water technologies.

Wind Energy Institute of Canada (WEICan) is a not-for-profit entity that advances the development of wind energy across Canada through research, testing, innovation and collaboration.

AN ENABLING BUSINESS ENVIRONMENT

MARKET ACCESS

Companies operating in Canada have preferential market access to more than 40 countries with over 1.2 billion consumers and a combined GDP of over US\$41.3 trillion, representing over one-half of the world's output of goods and services.

Source: IMF World Economic Outlook

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 one of the most tax competitive countries in the G7.

Sources: KPMG, Finance Canada

WORLD-CLASS CLUSTERS OF INNOVATION, WITH GOVERNMENT AS PARTNER

Canada has strong geographic and sectoral clusters, as well as R&D-intensive sectors with one of 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: WEF

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.

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

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.

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.

Images: Shutterstock. All Rights Reserved.

RECENT FOREIGN INVESTMENTS



In 2017, Swiss-based ABB announced that its new Canada headquarters in Montreal, Quebec would also be home to the ABB North American Centre of Excellence in E-Mobility. The Centre will support the development of environmentally friendly, energy-efficient transport networks.



In 2017, US-based Origin Materials announced plans to construct its first commercial-scale demonstration facility in Sarnia, Ontario by late 2018. The facility will transform multiple bio-based feedstocks into a broad range of chemical intermediates.



Global Affairs Canada
111 Sussex Drive, Ottawa,
Ontario, K1N 1J1, CANADA

Catalogue number:
FR5-38/29-2017E-PDF
ISBN 978-0-660-23620-9

Spring 2018



Follow us on Twitter!
@invest_canada

investincanada.com