



CANADA: A GLOBAL LEADER IN CARBON CAPTURE, UTILIZATION, AND STORAGE (CCUS)



Canada is globally recognized for its expertise in developing carbon capture, utilization and storage (CCUS) technologies. Canada has demonstrated success and leadership in commercializing capture and storage projects as well as in its world-class research and development centres, its leading innovators, supportive carbon policies and strong investment history. Canada is well positioned to become a leading supplier of CCUS technologies and relevant knowledge to international markets.

Most credible models to stabilize global temperature increases below 1.5 C include the deployment of CCUS technology to help reduce carbon dioxide (CO₂) emissions in hard-to-decarbonize industrial sectors and to remove CO₂ directly from the atmosphere. Utilization and conversion technologies can also allow companies to seize new revenue opportunities from their investments in CCUS.

Canada is ready to take advantage of the increased global focus on CCUS. Canada has a strong pipeline of CCUS technologies that are attracting international attention and helping key Canadian sectors compete in a carbon-constrained global economy.

Did you know? Canada's Budget 2021 proposes to introduce an investment tax credit for capital invested in CCUS projects with the goal of reducing CO₂ emissions by at least 15 megatonnes annually.

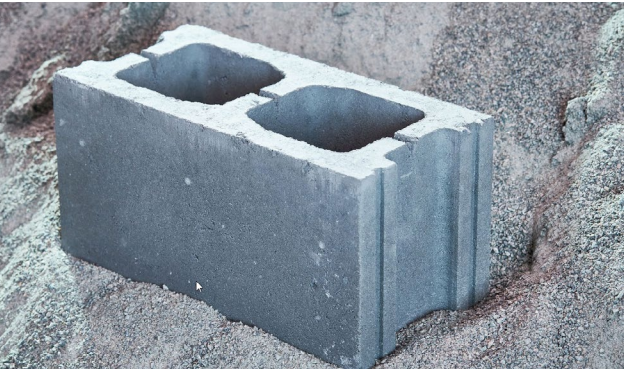
AREAS OF STRENGTH IN CANADA'S CCUS INDUSTRY

Canadian companies are developing and exporting Canada's world-class CCUS solutions, and there are growing opportunities for international investment and partnerships. Canada's strong CCUS ecosystem is supported by its policy environment, proven track record of successful commercial projects, innovation performance, and world-class purpose-built CCUS research and testing facilities. Of special note are Canada's:

- › CCUS-specific regulations and policies
- › expertise in carbon-to-building material conversion technologies
- › experience in large-scale infrastructure project development
- › federal carbon pollution pricing system
- › government RD&D funding
- › purpose-built CCUS technology test centres
- › state-of-the-art research institutions
- › suitable geology for carbon storage

Canadian companies are renowned for efficient public-private partnership procurement projects and for expertise in project-development and operational and advisory services. Ethical practices, along with on-time and on-budget delivery, are hallmarks of the Canadian advantage and readily transfer to projects in international markets.

INTERNATIONALLY RECOGNIZED CANADIAN CCUS COMPANIES



CARBICRETE (MONTREAL, QC)

CarbiCrete has developed an innovative technology that uses CO₂ and industrial by-products in the production of cement-free, carbon-negative concrete. The process reduces CO₂ emissions in 2 ways: (1) it eliminates the need for cement, the production of which is energy intensive; and (2) the CO₂ used in the production process is permanently stored in concrete. The resulting product is also stronger than cement-based concrete.

CarbiCrete's technology can be used in any precast concrete manufacturing plant. CarbiCrete is licensing use of its technology and supplies the material, process and training necessary to assist operators to produce carbon-negative concrete.

› carbicrete.com



CARBONCURE (DARTMOUTH, NS)

CarbonCure manufactures a unique technology that injects captured CO₂ into concrete, enabling the production of the same reliable concrete with a reduced carbon footprint. The technology can be retrofitted into any existing concrete plant in just one visit.

CarbonCure's technology is being used in more than 300 concrete plants worldwide, and to date, CarbonCure concrete producers have saved a combined total of more than 100,000 tonnes of carbon emissions from the atmosphere. CarbonCure was named one of two winners in the global NRG COSIA Carbon XPRIZE competition. The company's concrete is being used in Amazon's second headquarters in Virginia—cutting material needs by 5%.

› carboncure.com



CARBON ENGINEERING (SQUAMISH, BC)

Carbon Engineering's (CE's) Direct Air Capture (DAC) technology captures CO₂ directly from the atmosphere. This technology pulls CO₂ out of the air and delivers it in gas form that can be sequestered underground or used in fuel-synthesis operations. CE's DAC plants can be built almost anywhere and can be flexible in size, although they are most cost-effective at large scale.

CE partnered with 1PointFive, a development company formed by Oxy Low Carbon Ventures and Rusheen Capital Management, to deploy its technology in the U.S. Its first commercial plant, which will be the world's largest DAC facility when it is built, will be deployed in the Permian Basin, with construction expected to begin in 2022.

› carbonengineering.com



SVANTE (BURNABY, BC)

Svante offers companies in emissions-intensive industries a commercially viable way to capture large-scale CO₂ emissions from existing infrastructure, either for safe storage or to be recycled for further industrial use in a closed loop. With the ability to capture CO₂ directly from industrial sources at less than half the capital cost of existing solutions, Svante makes industrial-scale carbon capture a reality.

Svante's technology is the world's first post-combustion CO₂ capture process that uses structured adsorbents and is currently being deployed in the field at pilot plant-scale by industry leaders in the energy and cement manufacturing sectors.

› svanteinc.com

EXAMPLES OF CCUS PROJECTS IN CANADA

ALBERTA CARBON TRUNK LINE (ALBERTA)

The Alberta Carbon Trunk Line (ACTL) is a milestone project showcasing how industries can collaborate to reduce emissions while sharing costs. CO₂ is captured at the North West Redwater Partnership Sturgeon Refinery and Nutrien's Redwater Fertilizer Facility, moved down a 240-km pipeline owned by Wolf Midstream, and injected into an Enhance Energy reservoir for storage and enhanced oil recovery. Capable of transporting up to 14.6 million tonnes of CO₂ per year, the pipeline was designed to connect more facilities and storage reservoirs as demand increases for emissions-management solutions. The ACTL was jointly funded by Wolf Midstream, Enhance Energy and the governments of Canada and Alberta.

› actl.ca



BOUNDARY DAM CARBON CAPTURE PROJECT (SASKATCHEWAN)

SaskPower's Boundary Dam project was the world's first commercial-scale coal-fired power plant to be equipped with carbon capture and storage technology. The project, which began operations in 2014 and had captured 3.7 million tonnes of CO₂ by the end of 2020, feeds captured carbon to the Weyburn Oil Field for enhanced oil recovery and to the Aquistore Project site, a field lab for the study of CO₂ storage and monitoring. The project was jointly funded by the governments of Saskatchewan and Canada.

› saskpower.com



PROJECT CO₂MENT (BRITISH COLUMBIA)

Project CO₂MENT is a unique partnership between Lafarge Canada Inc., Svante and Total SA to demonstrate Svante's capture technology. In early 2021, the project reached a major milestone by successfully demonstrating the capture of CO₂ from cleaned flue gas at Lafarge's Richmond plant. In the next phase of the project, utilization technology partners will be invited to join the site's network and use the captured CO₂ in their technologies, leading to further proofs of concept. This unique project provides learnings about the performance and costs of the Svante capture system and about utilization technologies. In subsequent commercialization steps, the partners can marry Svante's larger-scale capture systems with the successful utilization technologies, turning CO₂ into a raw material rather than a waste.

› svanteinc.com



QUEST CARBON CAPTURE AND STORAGE PROJECT (ALBERTA)

Since 2015, the Quest Carbon Capture and Storage (CCS) project has captured and stored 5 million tonnes of CO₂ in a saline reservoir near Edmonton, Alberta. CO₂ is captured at the Scotford Upgrader, compressed and transported via a 65-kilometre pipeline where it is injected 2 kilometres deep and permanently stored. This project marks the most CO₂ stored by any onshore CCS facility dedicated to geological storage and represents the first commercial application of CCS at an oil sands upgrading facility. Quest is operated by Shell on behalf of the Athabasca Oil Sands Project (AOSP) and was jointly funded by the governments of Alberta and Canada.

› shell.ca



ADDITIONAL CANADIAN FIRMS OFFERING CCUS SOLUTIONS

Carbon Upcycling Technologies (Calgary, AB)

Carbon conversion technology for use in concrete and plastics production

› carbonupcycling.com

CERT (Toronto, ON)

Converts CO₂ to fuels and chemical feedstocks using electricity

› co2cert.com

CleanO2 (Calgary, AB)

Captures CO₂ from commercial boilers for use in soaps and detergents

› cleano2.ca

CNERGREEN (Calgary, AB)

Superior CO₂ storage and enhanced oil production via nanotech foams

› cnergreen.ca

SeeO2 Energy (Calgary, AB)

Converts greenhouse gas emissions into high-value fuels and chemicals

› seeo2energy.com

Delta Cleantech (Regina, SK)

Modular, commercially ready CO₂ capture and solvent reclaiming systems

› deltacleantech.ca

Hyperion Global Energy (Ottawa, ON)

Carbon capture and conversion from heavy industry into valuable feedstock minerals

› hyperionenergy.ca

Pond Technologies (Markham, ON)

Feeds industrial emissions into bioreactors to create algae-based feedstock

› pondtech.com

Quantiam Technologies (Edmonton, AB)

Converts CO₂ and solar hydrogen to methanol as a carbon negative solution

› quantiam.com

Xebec (Blainville, QC)

Produces low-carbon fuels through renewable natural gas and hydrogen solutions

› xebecinc.com

STRENGTHS FOSTERING CANADA'S CCUS INNOVATION LANDSCAPE

Effective policy framework: Canada has a federal carbon pollution pricing system in place that is set to increase the price of carbon pollution through to 2030, which helps incentivize CCUS opportunities. Canada also has existing and emerging regulatory frameworks for CCUS operations.

Innovation performance: Canada ranks fourth in the world for the number of CCUS patents granted (14% of the global total) and is 1 of only 3 countries worldwide with large-scale CCUS facilities for both the generation of electricity and in large-scale industrial plants.

World-class research and testing facilities: Canada has 8 publicly funded labs, testbeds and scaling facilities dedicated to developing CCUS technologies. This is in addition to post-secondary labs and private organizations.

Proven track record: Canadian companies have a number of commercial CCUS projects in operation. Canada is home to 4 large-scale CCUS projects, which are: the Alberta Carbon Trunk Line, the Boundary Dam Carbon Capture Project, the Quest Carbon Capture and Storage project and the IEAGHG Weyburn-Midale CO₂ Monitoring and Storage Project. These projects have led to the capture and storage of millions of tonnes of CO₂. In addition, Canada is also home to many leading CCUS technology developers.

REASONS TO DO BUSINESS WITH CANADA



Scalability



Strong international presence



Depth of expertise



On-time project delivery



Cost competitive



Value for money



Project-finance
Acumen and leadership



World-class research institutions



Highly skilled and diverse workforce

Canada's Trade Commissioner Service (TCS) is a government organization that has facilitated trade with Canada since 1895. With offices across Canada and around the world, we are accessible to both Canadian and international companies looking to increase their business and find trusted partners. With an in-depth knowledge of global markets and insight on Canadian industry sector capabilities, we can connect you with strategic procurement, investment, innovation or education partners in Canada. Let our team of professionals help you at tradecommissioner.gc.ca!