

# Carbon Capture and Storage (CCS)

## What is CCS?

CCS is a technology used to reduce carbon dioxide (CO<sub>2</sub>) emissions from large-scale industrial facilities, which account for 70% of Alberta's emissions (e.g., oil sands, electricity generation, cement, and petrochemical manufacturing facilities). CCS is a safe and permanent means of CO<sub>2</sub> emission reduction. A CCS project will 1) capture emissions that would normally be vented into the atmosphere, 2) transport the emissions to a well site, and 3) inject the CO<sub>2</sub> into deep underground rock formations for permanent storage.

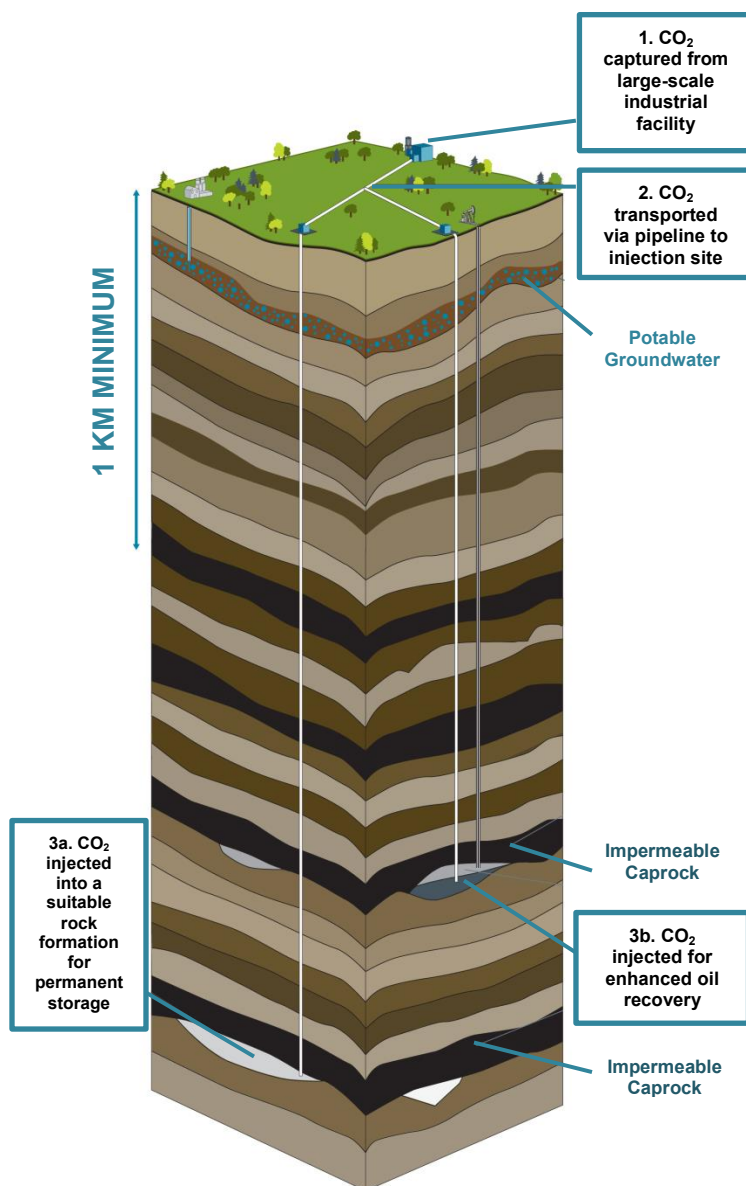
Alberta has the ideal geology for CCS. The same rock formations that have securely stored oil and gas for millions of years can store CO<sub>2</sub> permanently. For more information please visit: <http://www.energy.alberta.ca/OurBusiness.asp>

## What is Alberta Doing to Advance CCS?

The Alberta government has committed \$1.24 billion to two commercial-scale CCS projects in the oil sands and fertilizer sectors. The projects will capture a combined 2.76 million tonnes of CO<sub>2</sub> per year, equivalent to the yearly emissions from approximately 600,000 cars. Alberta has already seen real reductions in its greenhouse gas emissions as the Quest project began commercial operations in October 2015. The Alberta Carbon Trunk Line is expected to come on line in early 2018 and be fully operational later that year (see reverse for information).

The Alberta government also works to ensure it has the right regulations in place to support safe and environmentally responsible CCS development.

Further, the Alberta government supports innovation and research through Emissions Reduction Alberta (<http://www.eralberta.ca/>) and with Alberta Innovates (<http://albertainnovates.ca/>).



# CCS Projects in Alberta

## The Quest Project

Fully Operational: October 2015

Project Partners: Shell Canada, Chevron, and Marathon Oil



The Quest project has seen Shell's Scotford upgrader retrofitted for CCS. The project will capture CO<sub>2</sub> from oil sands upgrading and transport it 65 kilometres north for permanent storage 2 kilometres below the earth's surface.

Quest is designed to

capture up to 1.08 million tonnes of CO<sub>2</sub> per year (approximately 35% of the CO<sub>2</sub> produced by the upgrader). Quest is the first application of CCS technology at an oil sands upgrader in the world.

The Alberta government has committed \$745 million in funding over 15 years for this project. More information on the Quest project is available at

<http://www.shell.ca/en/aboutshell/our-business-tpkg/upstream/oil-sands/quest.html>

## CCS Throughout the World

Governments, environmental agencies and technical organizations worldwide are promoting CCS as one way of combatting climate change. There are approximately 20 large-scale CCS projects in operation or under construction world-wide.

CCS technologies have existed for decades and are proven to safely reduce CO<sub>2</sub> emissions from large-scale emitters. Some notable examples are listed below:

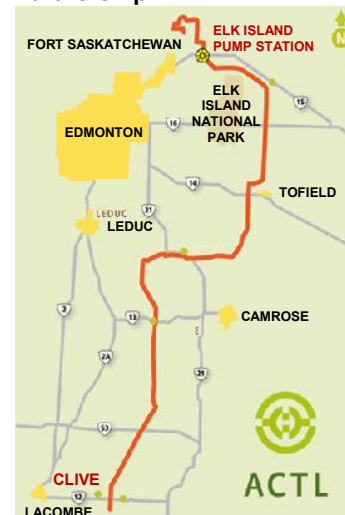
### NORWAY'S SLEIPNER PROJECT

The Sleipner project has safely and permanently stored over 15 million tonnes of CO<sub>2</sub> from an offshore natural gas processing plant in a deep geological formation under the ocean floor.

## The Alberta Carbon Trunk Line Project (ACTL)

Fully Operational: 2018

Project Partners: Enhance Energy and Northwest Redwater Partnership



The ACTL is a 240-kilometre pipeline that will carry CO<sub>2</sub> captured from the Sturgeon Refinery and the Agrium fertilizer plant to enhanced oil recovery projects in central Alberta. The ACTL will initially see an emissions reduction of 1.68 million tonnes of CO<sub>2</sub> per year when the project is fully operational in 2018.

Source: Enhance Energy Inc.

The designed capacity of the pipeline is 14.6 million tonnes of CO<sub>2</sub>/year, which could allow future CCS projects to use it if the CCS industry expanded. The Alberta government has committed \$495 million over 15 years for this CO<sub>2</sub> infrastructure project.

More information on the ACTL is available at

<http://www.enhanceenergy.com/>

## SASKATCHEWAN'S BOUNDARY DAM PROJECT

The Boundary Dam project retrofitted a coal-fired electricity generation unit with CCS technology, continuing power generation while reducing over 1 million tonnes CO<sub>2</sub> emissions each year.

### Sharing Alberta's CCS Knowledge

The Alberta government's investment in CCS is helping to reduce barriers facing industry in implementing large-scale CCS technology. Alberta has committed to sharing the knowledge gained from the publicly funded CCS projects. The documents are available at

<http://www.energy.alberta.ca/CCS/3845.asp>