

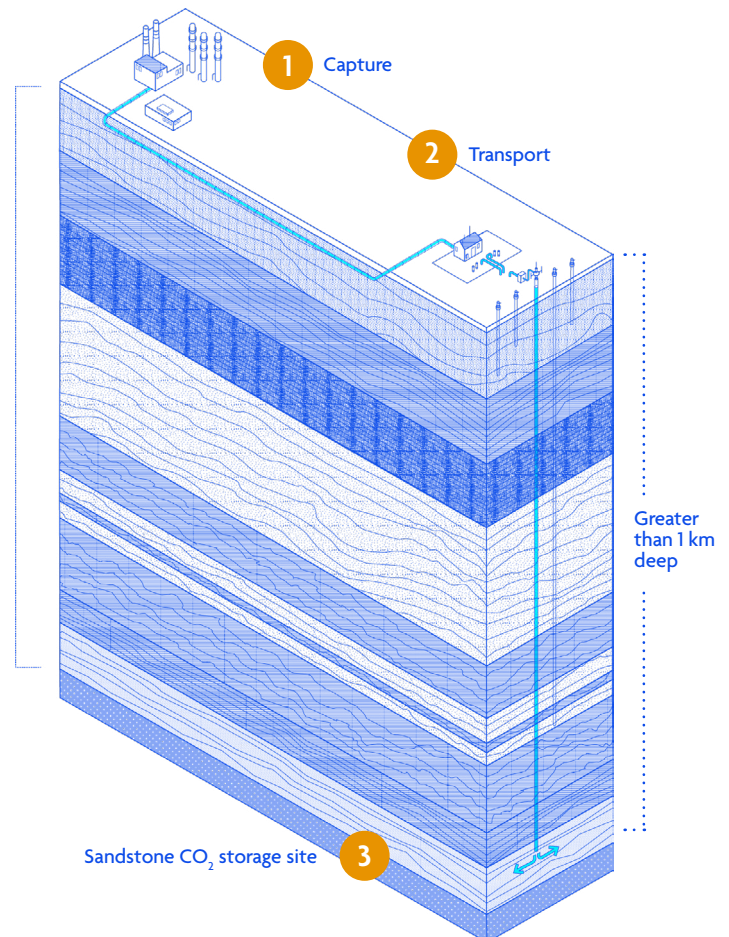


## Carbon capture and storage

The Pathways Alliance proposed foundational project is a carbon capture and storage (CCS) network and pipeline that would have the capacity to transport captured CO<sub>2</sub> from multiple oil sands facilities to a hub in the Cold Lake area of Alberta for permanent underground storage. Once it's operating, the pipeline and hub could be made available to other oil producers and industries seeking CO<sub>2</sub> emissions sequestration. We're working with governments to obtain sufficient levels of fiscal support and the regulatory approvals required to make this project a reality.

### Carbon capture

CCS is a proven technology used around the world, including here in Canada. CCS technologies capture CO<sub>2</sub> from a large emissions source before it reaches the atmosphere. The CO<sub>2</sub> is pressurized and turned into liquid form, which can flow through a pipeline to a storage facility, where it is stored deep underground. Captured CO<sub>2</sub> is typically stored between 1,000 and 2,000 metres beneath the Earth's surface.





## How CCS works

CCS is a three-step process that includes capture, transport and storage.



### Step 1: Capture

In this process, capture equipment is fitted to a large emissions source, which diverts the CO<sub>2</sub> before it reaches the atmosphere. A chemical is used to separate the CO<sub>2</sub> from any remaining flue gas.



### Step 2: Transport

The captured CO<sub>2</sub> is pressurized so that it becomes a liquid, which can flow through the pipeline network to the storage facility.



### Step 3: Storage

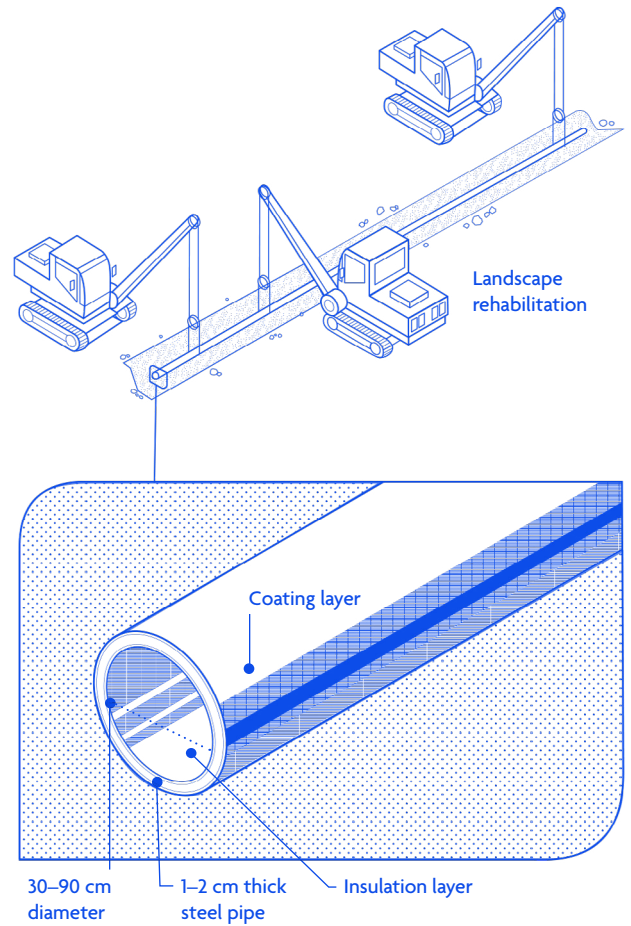
The liquefied CO<sub>2</sub> is injected deep below the Earth's surface, typically between 1,000 and 2,000 metres. The liquefied CO<sub>2</sub> fits into tiny spaces in the sandstone storage layer. This layer is constantly monitored to make sure the liquid doesn't move into the surrounding rock.

# CCS safety

Located in the Western Canadian Sedimentary Basin, the Basal Cambrian Sandstone geologic formation underlies large parts of Alberta and has great depth and multiple overlying layers of salt formations that act as seals to keep the CO<sub>2</sub> stored underground.

Alberta has experience and expertise in the safe construction and operation of large-scale projects. For example, between 2015 and 2022, the Quest facility captured and permanently stored 7.7 million tonnes of CO<sub>2</sub>. According to operator Wolf Midstream, the Alberta Carbon Trunk Line (ACTL) project stores 1.6 million tonnes of CO<sub>2</sub> per year.

**RIGHT:** In the transport process, liquid CO<sub>2</sub> is transferred by a specially designed pipeline to the secure storage hub. The proposed Pathways Alliance transportation line will follow existing pipeline routes wherever practical, to limit land disturbance.



## Deep and safe storage

Captured CO<sub>2</sub> is stored deep below the Earth's surface, typically between 1,000 and 2,000 metres underground. By comparison, freshwater aquifers in this area are typically around 150 metres below the surface. The depth of the CO<sub>2</sub> storage layer is well below any freshwater sources.

Extensive work is undertaken to make sure a site is safe and appropriate for injection and storage. Ongoing seismic monitoring is a regulatory requirement for CCS projects in Alberta, and it forms a significant part of a project's Measurement, Monitoring and Verification program.

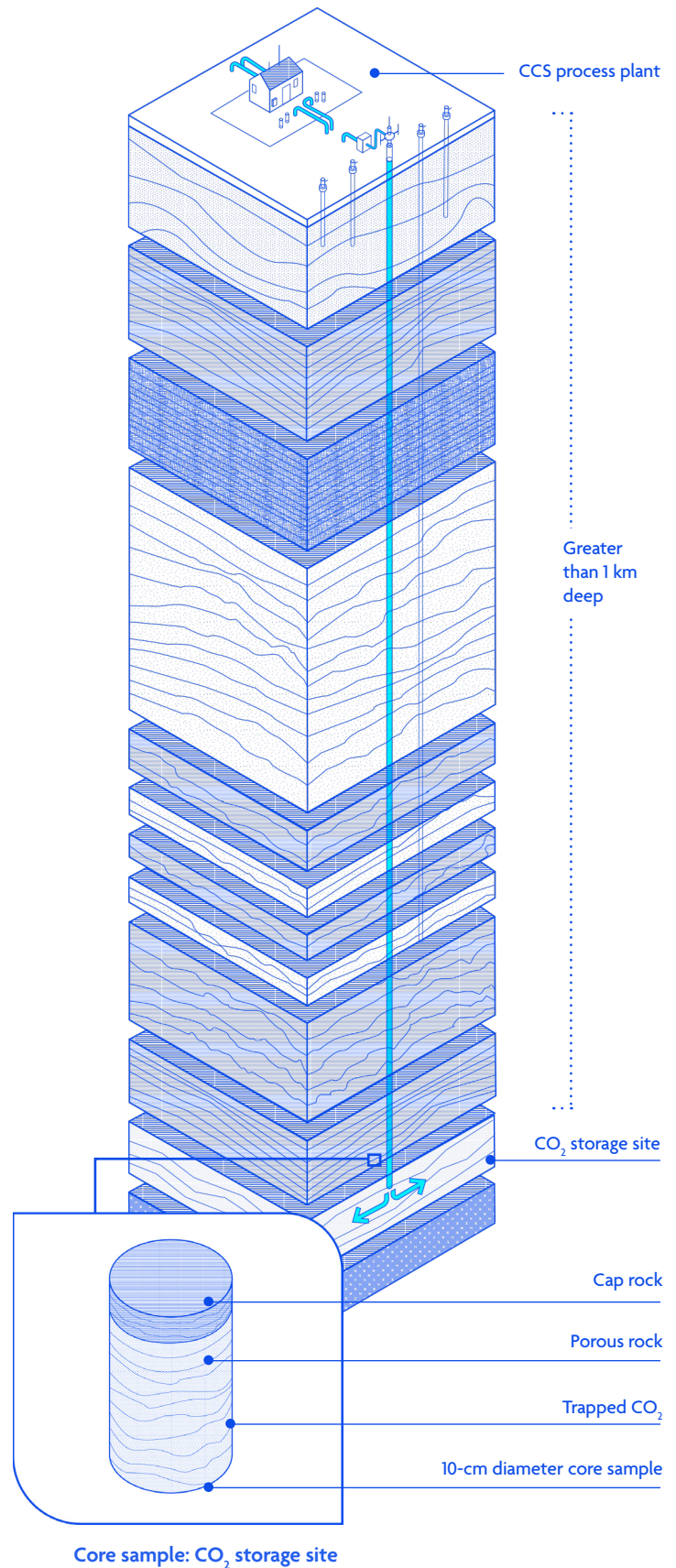
## Monitoring

The proposed CO<sub>2</sub> transportation network and storage hub will have multiple monitoring points. This technology is placed along the underground transportation pipeline, at the CO<sub>2</sub> injection site and down into the storage hub. Any unusual activity triggers an immediate alert.

Human operators oversee the pipeline monitoring systems 24/7/365. Any change in pipeline pressure or temperature will alert the operator to isolate the affected section of pipe.

The proposed CO<sub>2</sub> storage hub is also connected to multiple injection wells with real-time pressure monitoring. This helps distribute and track injection pressure in the storage space.

Once CO<sub>2</sub> is underground, seismic imaging will show how it's distributed through the storage layer. It also monitors geological formations above the storage layer to confirm CO<sub>2</sub> is remaining in place and not moving upward.



Learn more at

[PathwaysAlliance.ca](https://pathwaysalliance.ca). You can also reach us at [contact@pathwaysalliance.ca](mailto:contact@pathwaysalliance.ca).

**ABOVE:** Rock formations that have securely stored oil and gas for millions of years can also safely and permanently store CO<sub>2</sub>. These multiple overlying layers of impermeable rock formations act as natural seals.