CARBON CAPTURE
Regulation and Responsibilities

October 2023

Safe
Geological mechanisms prevent impact on water, plants, or soil.

Proven technology
In use for more than 50 years. Roughly 300 million tonnes of CO_2 have already been captured.

Captured & injected underground
Fossil fuels have been trapped in similar deep geological formations for millions of years.

Careful site selection & rigorous monitoring
Ensures injected CO_2 remains sequestered.

Responsible regulation
Three regulatory bodies oversee the activites in Alberta.

Carbon capture, utilization, and storage (CCUS) is a safe and proven technology that is deployed in several jurisdictions around the world, including Alberta, Saskatchewan, the United States, Norway, Australia, the Netherlands, and Iceland. CCUS technology has been in use for more than 50 years, and around 300 million tonnes of carbon dioxide have already been successfully captured globally and injected underground (source: Global CCS Institute).

Through CCUS, captured carbon dioxide will be stored in deep saline aquifers below the earth's surface. For millions of years, fossil fuels (oil and gas) were trapped underground in similar geological formations. The geological formations targeted to store carbon dioxide are the same type as those currently hosting the oil and gas. Research demonstrates that various geological trapping mechanisms will safely contain the carbon dioxide deep underground.

Careful site selection and rigorous monitoring helps ensure that the injected carbon dioxide remains sequestered and does not have any impact on fresh water, plants, or the soil.

The Alberta Energy Regulator (AER) and two Government of Alberta departments – Energy and Minerals and Environment and Protected Areas – have responsibilities related to the development of carbon sequestration activities in the province.

The AER is the provincial regulatory body that ensures the safe, efficient, orderly, and environmentally responsible development of oil, oil sands, natural gas, coal resources, geothermal, and brine-hosted mineral resources through the entire operational life-cycle. This includes allocating and conserving water resources, managing public lands, and protecting the environment while providing economic benefits for all Albertans.

Questions?
inquiries 1-855-297-8311
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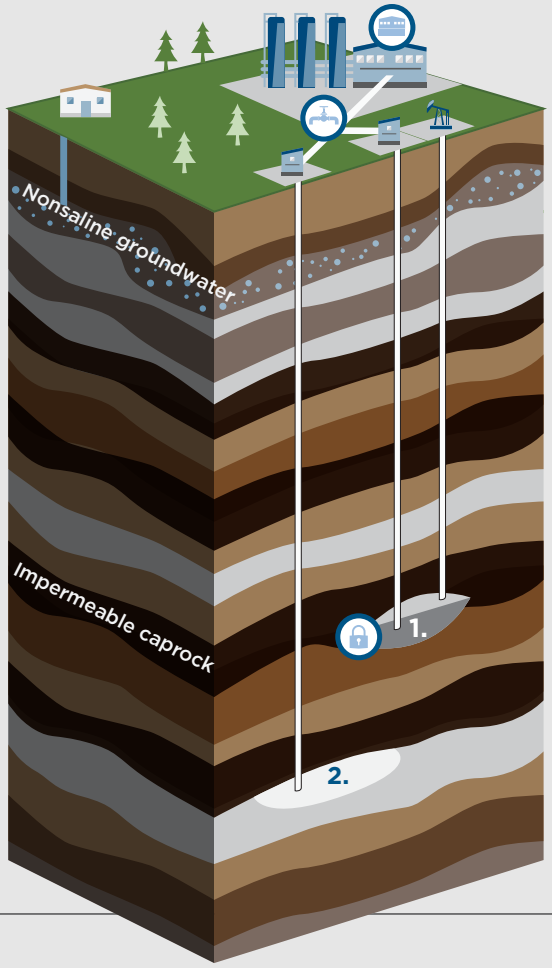
Alberta Energy Regulator

Carbon Capture, Utilization, and Storage Process



CAPTURE
Capturing CO_2 from industrial and energy-related processes.

TRANSPORT
Transporting CO_2 by pipeline.

STORAGE
1. Injecting CO_2 in underground oil and gas reservoirs for enhanced oil recovery and for permanent storage.

2. Injecting CO_2 in underground geological formations for permanent storage.

USE
Using captured CO_2 as input or feedstock to create products.

Alberta

Alberta Energy Regulator

Alberta Energy and Minerals

- ensures the development of policy and regulatory frameworks to enable the advancement of CCUS in the province,
- issues tenure rights for evaluation and sequestration of carbon dioxide, and
- manages the Post-Closure Stewardship Fund that carbon sequestration operators pay into to offset costs associated with the long-term monitoring and maintenance of sequestration site assessments for monitoring and closure plans.

Alberta Environment and Protected Areas

- regulates carbon dioxide capture facilities not connected to, or associated with, energy resource activity (e.g., chemical manufacturing plant),
- leads implementation of the Emissions Reduction and Energy Development Plan, and
- manages the Technology Innovation and Emissions Reduction (TIER) regulatory system that promotes CCUS by allowing companies to generate credits.

Alberta Energy Regulator

- regulates energy-related facilities that capture carbon dioxide;
- regulates pipelines that transport carbon dioxide;
- regulates subsurface injection activities;
- oversees measurement, monitoring, and verification (MMV) plans and closure plans, and
- issues closure certificates.

Summary of AER's CO_2 Sequestration Application Process

EVALUATION PHASE

STEP 1

Ensure there is an appropriate right from Alberta Energy and Minerals prior to application to the AER. This could be the form of the right to evaluate for CO_2 sequestration.

2 OneStop

Proponent for CO_2 sequestration applies to the AER for a well licence in accordance with *Directive 056: Energy Development Applications and Schedules* through OneStop to evaluate for suitability of CO_2 storage. Apply for licence as type "Disposal (CCS)" and one-year confidentiality may be given. Injection of CO_2 is not permitted at this stage.

3

The proponent may begin geological characterization and acquire baseline data as described in the *Directive 065 Monitoring, Measurement, and Verification (MMV) Principles and Objectives for CO_2 Sequestration Projects* evaluation stage. There is no AER MMV application submission at this stage.

4

Ensure there is an appropriate right from Alberta Energy and Minerals prior to application to the AER. Evidence that you have the right to inject captured CO_2 for sequestration into the proposed zone.

SEQUESTRATION PHASE

5 DDS

Applicant applies to the AER for a nonconfidential *Directive 065: Resources Applications for Oil and Gas Reservoirs* CO_2 sequestration scheme, which includes the MMV and closure plan.

6 IAR

The AER issues a *Directive 065* scheme approval that allows for the commencement of CO_2 injection if all the following are met:

- Injection wells have been drilled and completed.
- *Directive 065* and the associated directive requirements have been met.
- The MMV, risk management plan, and closure plan requirements have been met.

If not, the AER may issue a provisional *Directive 065* decision. **Review time up to six months.**

Monitoring, measurement, and verification throughout.

7 DDS IAR

Operator may at any time apply to the AER to amend a *Directive 065* CO_2 sequestration scheme approval under a sequestration tenure. Changes to *Directive 065* approval may be for updating the items listed in step 6. **Review time up to six months.**

8 DDS IAR

Every three years and no fewer than 90 days before the expiry date, operator submits a renewal of MMV and closure plans to the AER by submitting a *Directive 065* CO_2 Sequestration application through DDS. AER reviews the plans for renewal and makes an approval decision. **Review time of up to three months.**

CLOSURE PHASE

9 DDS

Operator submits a closure plan to the AER as a *Directive 065* application as described in the *Directive 065* Appendix P Monitoring, *Measurement, and Verification Principles and Objectives for CO_2 Sequestration Projects* closure stage. AER reviews the closure plan and risk management plan.

10 IAR

AER approves amendment to *Directive 065* for rescinding of injection wells and requires annual closure reporting. **Review time up to six months.**

11 DDS IAR

Operator submits an application for closure certificate. AER reviews the application and makes a decision to issue a closure certificate.

12

Post-closure monitoring and maintenance continues.

AER: Alberta Energy Regulator

Proponent/Applicant/Operator

DDS: Digital Data Submission system for application submission.

IAR: Integrated Application Registry tool to check on the status of applications registered with the AER.

2 AER-regulated processes

CO_2 sequestration schemes and enhanced oil recovery (EOR).

25+ Quarter of a century regulatory history

EOR storage schemes have been regulated by the AER for more than 25 years.

All projects must meet AER's regulatory requirements before being allowed to sequester captured carbon dioxide into an approved subsurface formation(s).

There are **two types** of CCUS processes regulated by the AER: ***Carbon Capture and Storage (CCS)*** – CCS projects are also referred to as CO_2 sequestration schemes, the permanent storing and trapping of carbon dioxide in an approved subsurface formation. This is also called dedicated storage. A carbon sequestration tenure or agreement from Alberta Energy and Minerals is required if a company wants to apply for a CCS project. An example of a CO_2 sequestration project that has received AER approval is the Shell Quest CCS project.

Application requirements and processes for CO_2 sequestration schemes are available on the AER website.

Carbon Capture, Utilization, and Storage (CCUS) – CCUS projects are also referred to as CO_2 enhanced oil recovery (EOR) storage schemes. Using carbon dioxide in EOR schemes improves the production of residual oil, and some or all the injected carbon dioxide is permanently sequestered in the depleted oil pool.

The AER has been regulating CO_2 EOR schemes for more than 25 years. CO_2 EOR and storage schemes are expected to store large volumes of carbon dioxide to help reduce greenhouse gas emissions.

Application requirements and process for CO_2 EOR storage schemes are available on the AER website.

Our subsurface requirements for carbon dioxide schemes are set out in *Directive 065: Resources Applications for Oil and Gas Reservoirs*. Subsurface requirements provide the containment of injection carbon dioxide and provide the monitoring of site-specific risks such as potential impacts to groundwater and potential for induced seismicity.

Compliance and Enforcement

We regularly conduct inspections and audits to make sure that companies are following our requirements. If we find that a company is noncompliant, we will take the appropriate compliance and enforcement actions, as identified in AER Manual 13. (https://static.aer.ca/prd/documents/manuals/Manual013.pdf)

Web resources

Alberta Energy Regulator

Providing Information – Carbon Capture, Utilization and Storage
(https://www.aer.ca/providing-information/by-topic/carbon-capture)

Alberta Government

Carbon Capture, Utilization and Storage – general information
(https://www.alberta.ca/carbon-capture-and-storage)

Carbon Capture, Utilization and Storage Fact Sheet
(https://www.alberta.ca/carbon-capture-utilization-and-storage-environmental-safety)

Carbon capture, utilization and storage – how it works and benefits
(https://www.alberta.ca/carbon-capture-utilization-and-storage-how-it-works-and-benefits)

Carbon capture, utilization, and storage – Environmental safety
(https://www.alberta.ca/carbon-capture-utilization-and-storage-environmental-safety)

For more information on carbon capture, utilization, and storage:

Please visit our website, email inquiries@aer.ca or call 1-855-297-831.