



UNDERSTANDING CO₂: NORTH DAKOTA'S ROLE

POLICY MAKER FREQUENTLY ASKED QUESTIONS

North Dakota takes great pride in our agricultural and energy heritage—it's a core part of who we are. As federal regulations are imposing stricter standards, our fossil fuel (oil, coal, gas) and ag producers are under increasing pressure to produce low- or no-carbon products and energy to remain viable. While this shift brings legal, regulatory, and economic challenges, it also creates great opportunity for North Dakota with an increase in demand across energy and ag sectors for capturing, using, and storing carbon dioxide (CO₂) deep underground.

WHAT IS CO₂?

Carbon Dioxide, or CO₂, is a non-flammable, non-explosive, naturally occurring gas. It is exhaled by humans every time you breathe; is used in hundreds of products including soda, dry ice and fire extinguishers; and is a necessary component of plant growth.

WHAT IS CARBON CAPTURE?

Carbon Capture is the act of separating CO₂ molecules from the flue gas of an industrial facility (such as a power plant or ethanol plant), or directly from the atmosphere. **Carbon Storage**, or **Sequestration**, is injecting captured CO₂ deep underground within porous rock beds, covered by a solid rock cap.



ECONOMIC OPPORTUNITY

POTENTIAL ECONOMIC BENEFITS OF CO₂ CAPTURE AND STORAGE FOR NORTH DAKOTA



Job creation in construction, operation, and maintenance of capture and storage facilities



Additional income for local farmers and landowners through easement and pore space leases



Energy sector sustainability by helping our coal and gas plants meet federal regulations



Attract investment in local infrastructure and technology development



Enhanced market for corn and ethanol producers (Ethanol plants purchase 80% of their corn from North Dakota farmers. *)



Enhanced oil recovery to extend the life of ND oil fields and gross production tax funding

*Source: North Dakota Ethanol Council, www.ndethanol.org

HOW IS CARBON CAPTURE, STORAGE AND UTILIZATION FUNDED IN NORTH DAKOTA?

Funding for these projects comes from a mix of public and private sources. Federal grants and tax credits, state incentives, and investments from energy companies and other stakeholder contribute to financing CO₂ capture, storage, and utilization initiatives.

WHAT REGULATIONS GOVERN CARBON CAPTURE AND STORAGE IN ND?

In 2018, the U.S. Environmental Protection Agency (EPA) granted North Dakota primacy (regulatory authority) of Class VI (CO₂ storage) injection wells within the state. As a result, North Dakota Industrial Commission's Department of Mineral Resources - Oil & Gas Division has authority over all CO₂ storage injection well activities. The North Dakota Public Service Commission approves the siting of transmission pipelines, including CO₂, and the Pipeline Hazardous Materials Safety Administration (PHMSA) is accountable for safety in design, construction, and operation of CO₂ transmission pipelines.

ARE LANDOWNER RIGHTS PROTECTED?

A company requesting land easements will negotiate directly with property owners for fair and just compensation for any rights being sought. Payments commonly meet or exceed market value, and easements are typically for very limited surface rights. When granting an easement, the landowner retains ownership of the land and is allowed to continue to use it.

In addition, the deep underground pore space where CO₂ is injected continues to be owned by the surface landowner. Landowners are paid royalties per CO₂ injected into their pore space, similar to oil and gas mineral rights.

Mineral owners may still extract oil, gas, and coal reserves. The CO₂ injected deep underground for storage goes into layers that do not contain commercially valuable extractable minerals. Comprehensive state regulations provide for safe oil and mineral exploration near CO₂ storage facilities.

North Dakota law also protects landowners from financial responsibility for damage to their property or related environmental impacts of CO₂ transport or storage, meaning no additional insurance coverage is needed.

HAS THIS BEEN DONE BEFORE?

Underground CO₂ injection first began more than 50 years ago in western Texas. Decades of data has helped us understand how CO₂ behaves deep underground, and how to safely transport it through pipelines. Today, millions of metric tons of CO₂ are safely transported across the country through 5,000+ miles of pipeline – including nearly 200 miles in North Dakota.

CO₂ CAPTURE AND STORAGE IN ND

- **Red Trail Energy Ethanol Plant, Richardton**
Began operations on June 16, 2022; captures and stores up to 180,000 metric tons of CO₂ annually.
- **Blue Flint Ethanol, Underwood**
Began operations on October 28, 2023; captures and stores up to 220,000 metric tons of CO₂ annually.
- **Great Plains Synfuels Plant, Beulah**
Began operations on February 4, 2024; captures and stores up to 2.7 million metric tons of CO₂ annually.

CO₂ PIPELINES

- **Dakota Gas/Souris Valley Pipeline**
Began operations in 2000. This 205-mile pipeline runs from Beulah, northwest past Tioga, and into Saskatchewan, Canada. It has been transporting up to 2 million metric tons of CO₂ annually for enhanced oil recovery (EOR) for nearly 25 years.
- **Denbury/ExxonMobile Pipeline**
Began operations in 2022. The final 9 miles of this pipeline, which starts in Wyoming, delivers CO₂ to the Bowman area for enhanced oil recovery (EOR).

IS IT SAFE TO TRANSPORT CO₂ IN UNDERGROUND PIPELINES?

Pipelines are designed to safely operate under the pressures (between 1200-2200 psi) required for "dense phase" CO₂ transport. Before any CO₂ is transported, pipelines are filled with fresh water or inert gas at a pressure 125% of their maximum operating pressure to ensure structural integrity.

Pipelines and storage sites have stringent regulations, monitoring, and mitigation requirements. North Dakota prioritizes significant planning and research, training, and technology into all aspects of pipeline safety to be prepared for any unexpected scenarios.

IS STORING CO₂ UNDERGROUND SAFE? IS IT HARMFUL TO CROPS OR WATER?

CO₂ capture, utilization and storage projects are designed to be safe for people, animals, plants, and the environment. Before a CO₂ storage project begins,

scientists carefully identify and evaluate acceptable sites to be considered.

North Dakota's unique geology is perfectly suited for safe storage of CO₂ nearly a mile or more below the surface, and thousands of feet below the water table.

Similar to how oil reserves deep underground do not have an impact on the surface or water supply, CO₂ will also remain safely beneath an impervious cap rock and will not have an impact on the surface, water, soil, or plants. Crops and grass can grow above these areas and animals will be able to safely graze.

DOES CO₂ EXPLODE? WHAT HAPPENS IF THERE IS A LEAK?

Unlike natural gas and liquid petroleum - which are transported through millions of miles of pipelines across the U.S. – CO₂ is not flammable or explosive. In the unlikely occurrence CO₂ escapes from a pipeline or through the surface, it will become dry ice or go back to a gaseous state. While prolonged exposure to high concentrations of CO₂ can cause breathing difficulty, the gas typically quickly evaporates into the air and requires little to no clean-up. In the event of a leak, pipeline systems are designed to automatically shutdown, ceasing all operations until the cause is determined and repaired; and a reporting process through North Dakota Department of Environmental Quality (DEQ) is triggered.

WHAT HAPPENED IN MISSISSIPPI?

The 2020 CO₂ pipeline failure in Satartia, Mississippi was a "worst-case scenario," and resulted in several lessons learned. First, the pipeline operator was cited for violating multiple regulations. When federal pipeline regulations are followed, pipelines outperform the safety standards of both rail and truck transit.

Second, the unstable soil where the pipeline was installed was susceptible to movement from the preceding heavy rains (7.5 to 13.5 inches above average), resulting in a landslide that ruptured the pipeline as the ground shifted.

Lastly, local weather conditions, lack of wind, and the density and volume of CO₂ released slowed its dissipation; the pipeline operator models underestimated the potential affected area; the operator did not adequately inform local emergency responders; and the pipeline did not contain pure CO₂.

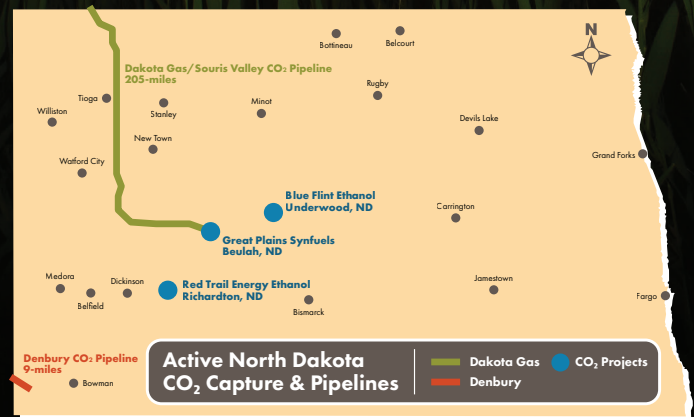
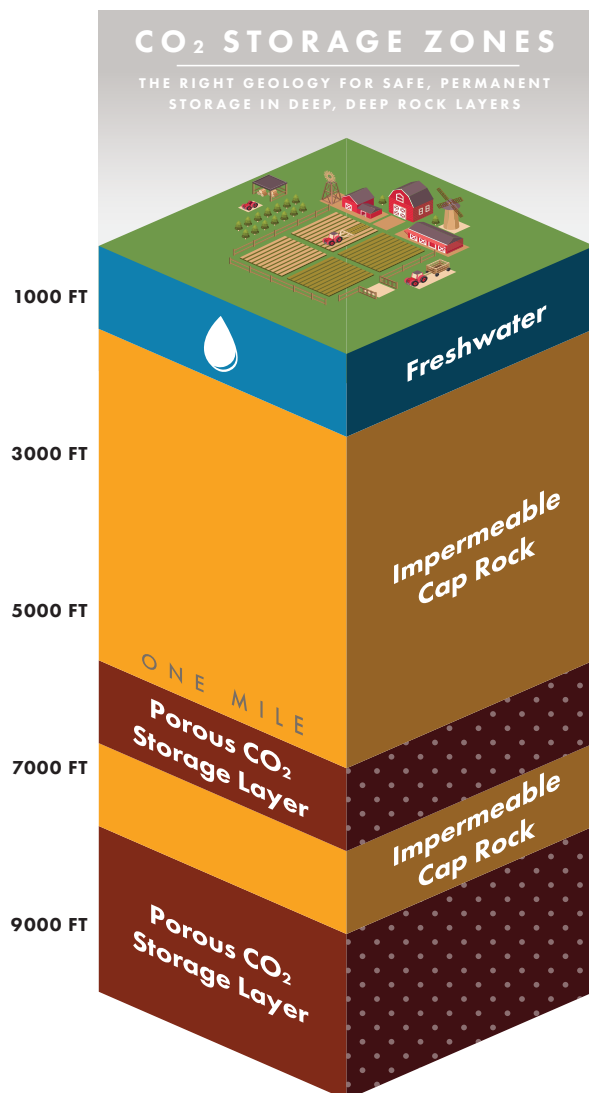
One misconception is that this pipeline "exploded." However, CO₂ is non-flammable and non-explosive. Rather, the pipeline experienced "explosive decompression." This happens when a pipe that carries gas or liquid breaks very quickly – like blowing up a balloon and popping it with a pin. The material escapes quickly, causing a powerful rush and noise, disturbing the ground immediately around the break point.

WHAT SAFEGUARDS ARE IN PLACE?

North Dakota requires extensive review and approval of plans to operate pipelines and inject CO₂, including next-level monitoring.

- Class VI well construction with surface casing/corrosion-resistant cementing from the surface to the injection point, protecting water resources
- Multi-layer, multi-protection, multi-action 24/7/365
- Leak detection, alerts and shutoff requirements
- Deep underground and surface monitoring
- Risk assessment and mitigation
- Liability on storage facility owner, not landowner
- Post injection site care and closure monitoring for at least 10 years

CO₂ storage facility operators must have the proper financial instruments and ability in place to cover the cost of any necessary corrective action, injection well plugging, post-injection site care/facility closure, and emergency and remedial response before the CO₂ storage facility ever begins injection. These instruments are required to remain in place until the CO₂ storage facility is approved for closure.



NORTH
Dakota | Industrial Commission

If you're interested in learning more about CO₂ and North Dakota's role, visit

CarbonND.com

