



UNDERSTANDING CO₂: NORTH DAKOTA'S ROLE

LANDOWNER FREQUENTLY ASKED QUESTIONS

In North Dakota, we take great pride in our agricultural and energy heritage—it's a core part of who we are. But now, we're facing new challenges. Federal regulations are tightening their grip on the oil, gas, biofuel, and coal industries, leading to a sharp rise in the need for capturing, using, and storing carbon dioxide (CO₂) deep underground.

While there's still debate about how much CO₂ impacts our atmosphere, the reality is our local farmers and energy workers are under increasing regulations to produce low- or no-carbon products and energy.

For our community, navigating these changes is crucial. It's about finding the best ways to adapt, ensuring that our way of life continues while meeting these new demands.



WHAT IS CO₂ AND WHAT IS CARBON CAPTURE, UTILIZATION, STORAGE, AND/OR SEQUESTRATION?

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.

- **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 (nearly a mile or more in North Dakota) within porous rock beds, covered by a solid rock cap.
- **Carbon Utilization** is using captured CO₂ for other purposes, including enhanced oil recovery (EOR).

IS STORING CO₂ UNDERGROUND SAFE?

North Dakota has been at the forefront of studying and implementing CO₂ initiatives for more than 20 years. CO₂ capture, utilization and storage projects are designed to be safe for people, animals, plants, and the environment. Before a CO₂ storage project ever begins, scientists identify and evaluate acceptable sites to be considered.

Our 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.

WILL STORING CO₂ UNDERGROUND BE HARMFUL TO MY GRASS, CROPS OR DRINKING WATER?

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 thousands of feet above. Crops and grass can grow above these areas and animals will be able to safely graze.

IS IT SAFE TO TRANSPORT CO₂ IN UNDERGROUND PIPELINES?

CO₂ pipelines have been operating safely in the United States for more than 50 years. 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.

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, research, training, and technology to be prepared for any unexpected scenarios.

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).

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's Unified Spill Reporting System 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 soil where the pipeline was installed was unstable, and susceptible to movement from high rainfall. The incident followed heavy rains (7.5 to 13.5 inches above average) that resulted in a landslide, rupturing the pipeline as the ground shifted.

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

One misconception is that this pipeline "exploded." 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.

WILL STORING CO₂ PREVENT ME FROM HARVESTING OIL OR OTHER MINERALS?

The CO₂ injected deep underground for dedicated permanent storage goes into layers that do not contain harvestable minerals such as oil, and does not co-mingle with oil-bearing layers. Comprehensive state regulations provide for oil and mineral exploration near CO₂ storage zones while keeping the CO₂ securely in place.

HOW DO I BENEFIT FROM A CO₂ PIPELINE EASEMENT ON MY PROPERTY?

In nearly all circumstances, a company requesting land access will ask for an easement – the right to access or use a portion of private property for a specific reason, outlined in an easement agreement. Easements can be temporary (for construction); permanent (for long-term maintenance or access to a pipeline or facility); or both.

When granting an easement, the landowner retains ownership of the land and can continue to use it. Specific terms or limited restrictions can be negotiated and are defined within the agreement. Any company requesting an easement will negotiate directly with property owners for fair and just compensation for any rights being sought. Payments typically meet or exceed market value.

HOW DO I BENEFIT FROM CO₂ STORAGE UNDER MY PROPERTY?

The deep underground pore space where CO₂ is injected also 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.

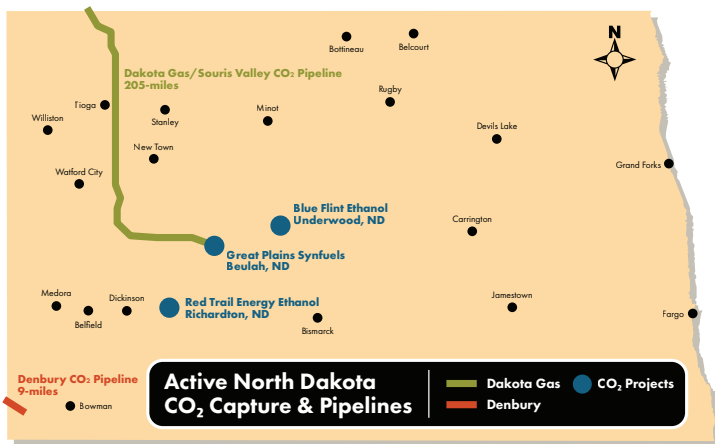
HOW ARE LANDOWNER RIGHTS PROTECTED?

The terms "eminent domain" and "amalgamation" have gotten a lot of media attention recently. Eminent domain broadly refers to the government's ability to compensate a property owner to convert a portion of private property to public use.

Amalgamation broadly refers to the government's ability to include underground pore space owned by non-consenting landowners as part of a CO₂ storage facility. This can only happen when consent is given by at least 60% of the pore space owners. Like eminent domain, property owners are equitably compensated. Amalgamation of pore space is similar to the unitization of oil and gas minerals.

When it comes to CO₂, the focus is **voluntary participation** and **fair compensation**. There is no intention or desire to take land ownership. It is important to understand that even if eminent domain or amalgamation were exercised, ownership of the land would still remain with the property owner and would not result in the loss of land. CO₂ efforts only pertain to pipeline easements or underground storage agreements and have very little impact on surface uses.





HOW IS THIS GOOD FOR NORTH DAKOTA? WHY DO IT AT ALL?

Because of stringent federal regulations, capturing and storing CO₂ benefits our coal and ethanol plants by allowing them to continue operations in a low- or non-carbon market. A developing CO₂ industry also has the potential to benefit corn producers from increased ethanol production, provide tax and economic benefits to the state and can help extend the life of North Dakota oil fields through enhanced oil recovery.

HOW WILL CO₂ PIPELINES OR UNDERGROUND STORAGE AFFECT MY PROPERTY VALUE AND INSURANCE?

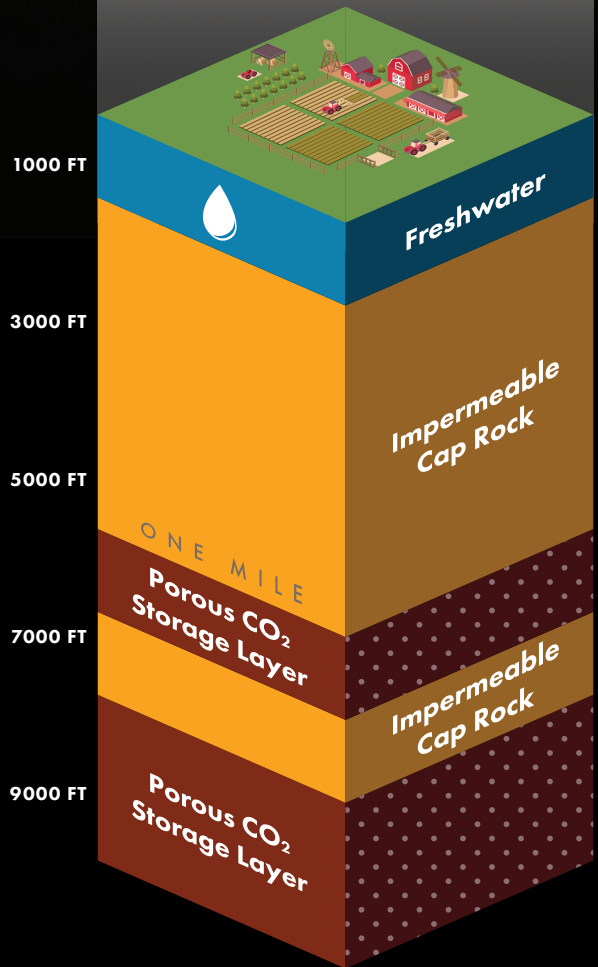
Property values are typically influenced by factors such as lot size, yard space, and development potential. This tends to be consistent in new and mature neighborhoods, as well as in both urban and rural settings. Natural gas and liquid petroleum pipelines have existed near or beneath North Dakota homes for decades and have not deterred economic or residential development or values.

There is no precedent for landowners needing additional insurance for pipelines on their property. This is also true for CO₂ pipelines or underground storage. North Dakota law protects landowners from financial responsibility for damage to their property or related environmental impacts, in these instances.

In addition, 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.

CO₂ STORAGE ZONES

THE RIGHT GEOLOGY FOR SAFE, PERMANENT STORAGE IN DEEP, DEEP ROCK LAYERS



NORTH
Dakota | Industrial Commission

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

CarbonND.com

