

NORTH Dakota | Industrial Commission

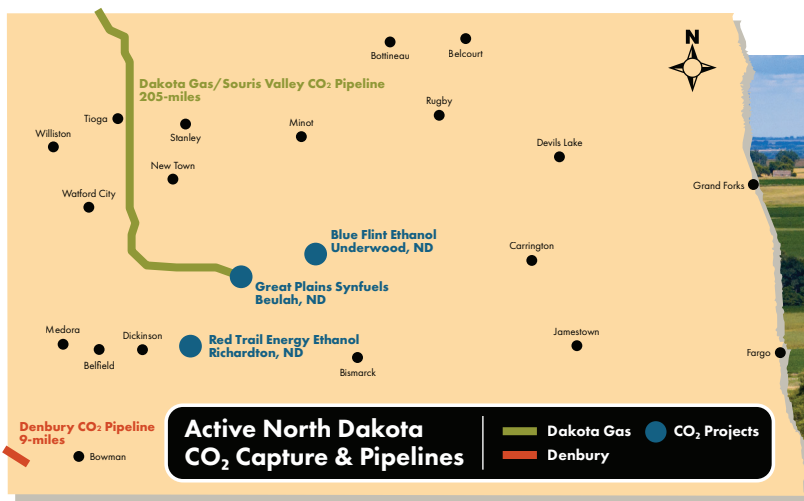
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UNDERSTANDING CO₂: NORTH DAKOTA'S ROLE FREQUENTLY ASKED QUESTIONS

North Dakota is known for, and extremely proud of its agriculture and energy production. As federal regulations continue to impose stricter standards on the oil, gas, biofuel, and coal industries, the state has seen a drastic increase in demand across all energy sectors for capturing, using, and permanently storing carbon dioxide (CO₂) deep underground.

While the impacts of increasing CO₂ levels in the atmosphere are debatable, the reality is that fossil fuel (oil, coal, gas) and ag producers are facing increased legal, regulatory, and economic pressures to produce low- or no- carbon products and energy. It is vital for the state's energy and ag industries to figure out the best way to manage these challenges.



UNDERSTANDING CO₂

WHAT IS CARBON DIOXIDE (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.

CO₂ *is not* Carbon Monoxide (CO), a dangerous gas that is produced by burning of fuels in gas appliances, fireplaces, grills, and automobiles.

WHAT DOES CARBON CAPTURE, UTILIZATION, STORAGE, AND/OR SEQUESTRATION MEAN?

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 cap rock.

Carbon Utilization is using captured CO₂ for other purposes, including enhanced oil recovery (EOR).

WHY DO WE WANT TO DO THIS, ESPECIALLY HERE IN NORTH DAKOTA?

North Dakota's unique geology is perfectly suited for the permanent, safe storage of CO₂ nearly a mile or more beneath the surface.

In addition to helping our coal and ethanol plants meet the increasing burden of federal regulations, a developing CO₂ industry has the potential to benefit corn producers from increased ethanol production, provide tax and economic benefits to the state and could extend the life of North Dakota oil fields through enhanced oil recovery.

HAS THIS BEEN DONE BEFORE IN NORTH DAKOTA, OR ANYWHERE ELSE?

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.

In the U.S. today, there are multiple operating CO₂ projects and more than 50 CO₂ pipelines spanning over 5,000 miles. North Dakota has three active CO₂ storage projects and nearly 200 miles of operating CO₂ pipeline. (see map above and descriptions below)

CO₂ CAPTURE AND STORAGE

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

SAFETY CONCERNS

IS IT SAFE TO STORE CO₂ UNDERGROUND?

CO₂ capture, utilization, and storage projects are designed to be safe for people, animals, and the environment. Before a CO₂ storage project ever begins, scientists identify and evaluate acceptable sites to be considered.

Permanent CO₂ storage needs porous (small spaces or holes) rock layers where CO₂ can be injected and stored at pressures low enough to avoid breaking the rock. This porous storage layer must also be capped by an impermeable (or solid) rock where CO₂ can't escape.

DOES UNDERGROUND CO₂ NEGATIVELY IMPACT MY GROUNDWATER, SOIL QUALITY, GRASS, TREES, OR CROPS?

In North Dakota, CO₂ is stored 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 thousands of feet above.

IS IT SAFE TO TRANSPORT CO₂ IN UNDERGROUND PIPELINES?

Pipelines transport millions of metric tons of CO₂ annually across entire regions of the country. They 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 an inert gas at a pressure 125% of their maximum operating pressure to ensure structural integrity.

DOES CO₂ EXPLODE? WHAT HAPPENS IF CO₂ LEAKS?

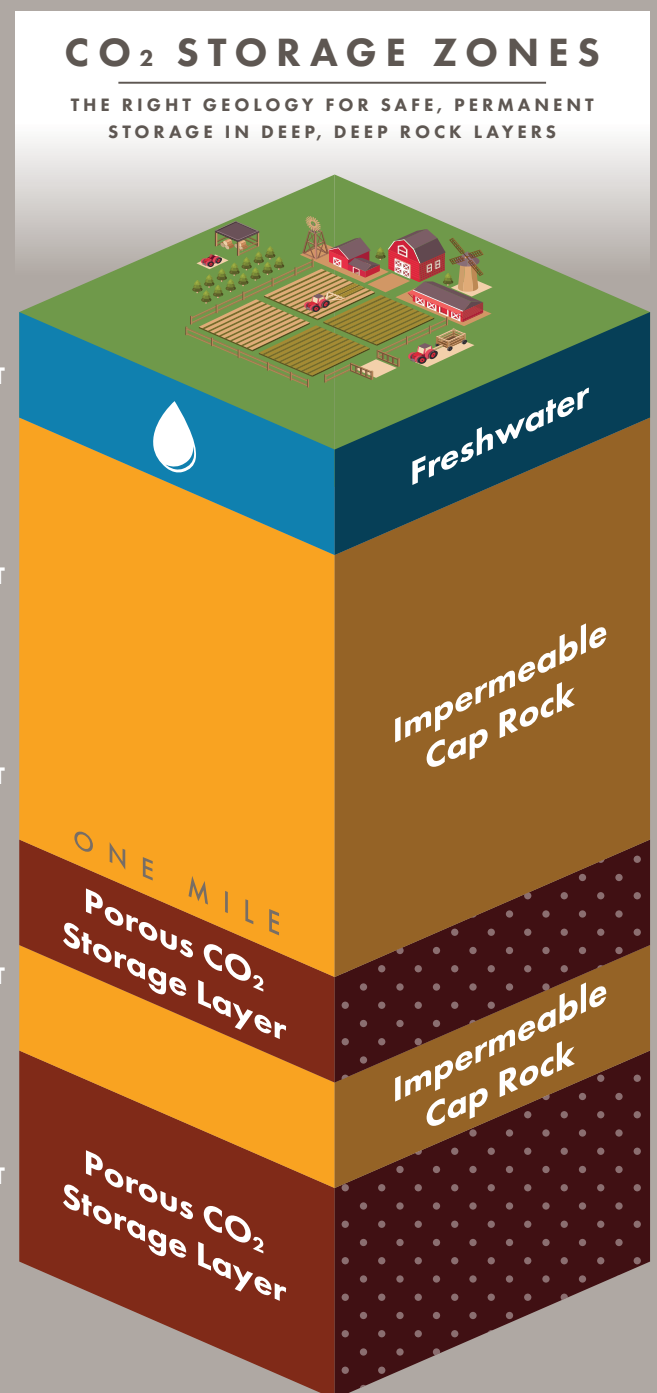
Unlike natural gas and liquid petroleum - which are transported through millions of miles of pipelines across the U.S. - CO₂ is not flammable or explosive.

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 will quickly evaporate 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.

HOW ARE UNDERGROUND CO₂ STORAGE SITES AND PIPELINES MONITORED?

Once injected into the ground, the movement of CO₂ is required to be monitored to ensure it is going where it is supposed to go, and staying where it is supposed to stay. Pipelines also have stringent regulations, monitoring, and mitigation requirements.

North Dakota prioritizes significant planning and research; intentionally planning for the what-ifs and incorporating training and state-of-the-art technology into all aspects to be able to effectively and safely handle any unexpected scenarios.





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

CarbonND.com

