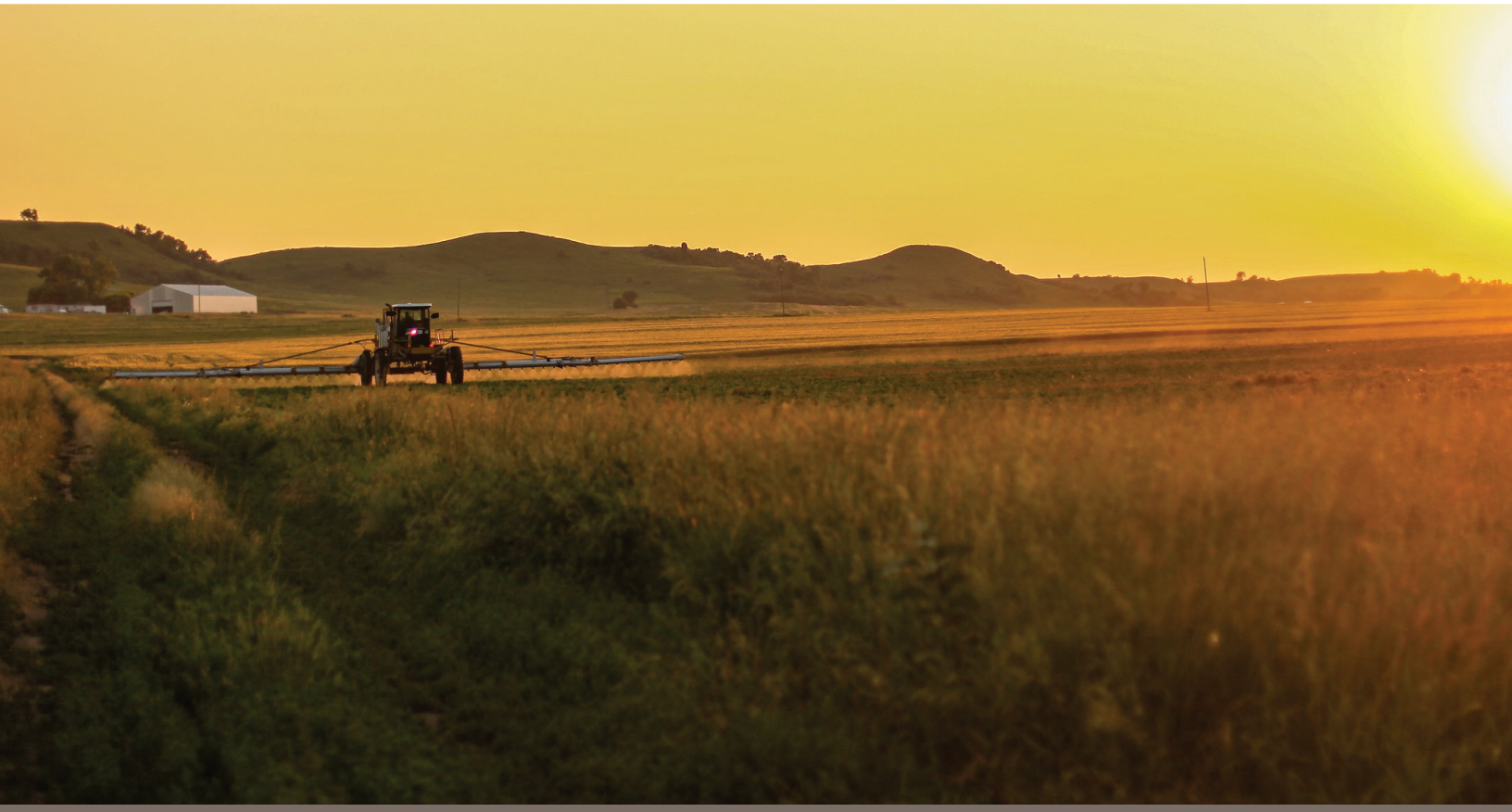
NORTH Dakota | Industrial Commission

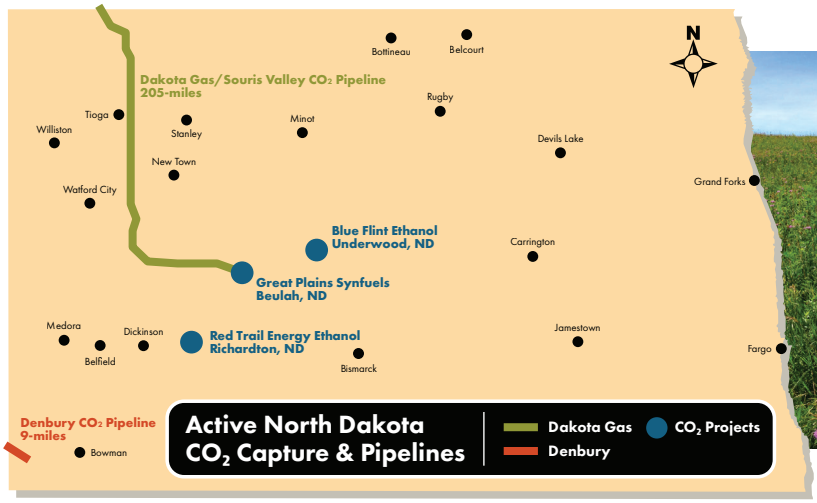
Be Legendary.



UNDERSTANDING CO_2: STORAGE & PIPELINE SAFETY

North Dakota's commitment to safety and responsible practices is, and continues to be, our top priority. As we navigate the legal, regulatory, and economic factors involved in the growing CO_2 industry, our focus remains unwavering – ensuring safety and sustainability in every step we take. We are dedicated to finding the best ways to create opportunities with CO_2, uphold our values and way of life, and keep a strong focus on the health, safety, and wellbeing of our communities.

North Dakota prioritizes significant planning, research, training, and technology into any proposed CO_2 storage, transport, or utilization project. We consider it critical to be prepared for any unexpected scenarios, no matter how unlikely.



CO_2 CAPTURE HISTORY DECADES OF PROGRESS & STUDY

North Dakota has been at the forefront of studying and implementing CO_2 initiatives for more than 20 years. Underground CO_2 injection first began more than 50 years ago in western Texas. Decades of data has helped us understand how CO_2 behaves deep underground, and how to safely transport it through pipelines.

Today, millions of metric tons of CO_2 are safely transported across the country through 5,000+ miles of pipelines – including nearly 200 miles in North Dakota. There are also three active CO_2 storage projects within the state. Before a CO_2 storage project ever begins, scientists identify and evaluate acceptable sites based on their geological sustainability to securely contain CO_2.

North Dakota's unique geology is suited for safe storage of CO_2, nearly a mile or more below the surface, and thousands of feet below the water table.

Carbon dioxide, or CO_2, 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.

It should not be confused with the toxic gas carbon monoxide (CO).

SAFEGUARDS & PROTECTIONS

Safety is ensured through rigorous site selection, extensive monitoring, and regulatory oversight. North Dakota requires extensive review and approval of plans to operate pipeline and storage facilities and inject CO_2.

- Class VI well construction with surface casing/ cementing protecting water resources; cementing from the surface to the injection point; and corrosion-resistant materials
- Next-Level Monitoring: multi-layer, multi-protection, multi-action 24/7/365
- Operational monitoring for temperature and pressure changes that could indicate early anomalies
- Leak detection and alerts
- Deep underground monitoring to ensure that the CO_2 remains securely in the storage zone
- Surface and near surface monitoring to ensure no environmental effects
- Surface water, groundwater and soil regular testing
- Automatic shutoff requirements
- Risk assessment and mitigation including comprehensive manuals at each site and control center with actions for various scenarios
- Post injection site care and closure, including continuous monitoring after injection ends, until it is demonstrated that the CO_2 stops moving (at least 10 years)
- Pipeline operators partner with local emergency managers to develop and review emergency response plans, and conduct regular trainings and drills
- Comprehensive financial burden on storage companies to cover the cost of any necessary corrective action, injection well plugging, site care or closure, and emergency or remedial response

CO_2 STORAGE SAFETY

CO_2 capture, utilization, and storage projects are designed to be safe for people, animals, plants, and the environment.

Permanent CO_2 storage needs porous (small spaces or holes) rock layers where CO_2 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 CO_2 can't escape.

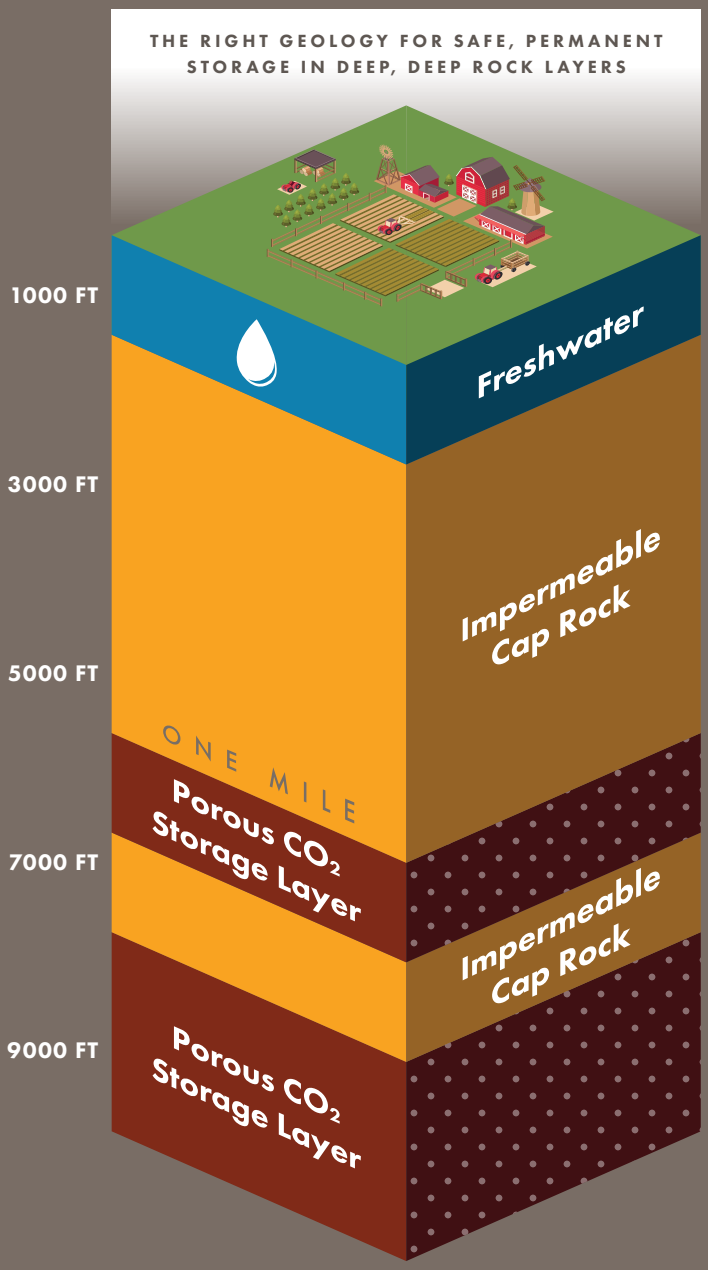
A CO_2 injection well is constructed with a minimum of three layers of steel protection to prevent any underground discharge into the water supply.

- **Layer 1**: Set below the deepest underground source of drinking water and cemented back to the surface
- **Layer 2**: Set into the injection formation nearly a mile or more below the surface and cemented in place
- **Layer 3**: Injection tubing running from the surface to the injection zone

These casings ensure CO_2 only flows to the target formation, and will remain within the porous rock bed layer, trapped by cap rock.

Similar to how oil reserves deep underground do not have an impact on the surface or water supply, CO_2 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 can safely graze.



LEAK DETECTION & RESPONSE

Unlike natural gas and liquid petroleum - which are transported through millions of miles of pipelines across the U.S. – CO_2 is **not flammable or explosive**. In the unlikely occurrence CO_2 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 CO_2 can be hazardous, the gas typically evaporates quickly into the air and requires little to no clean-up. In the unlikely 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.

Because water and CO_2 combined may be corrosive, systems are designed to incorporate dehydration, so no free water touches the pipeline. Several additional steps are taken to ensure pipeline and equipment integrity through all conditions, including:

- Using corrosion-resistant materials
- Applying protective coatings or linings
- Using corrosion inhibiting chemicals
- Using cathodic (electrical currents) protection
- Regular monitoring and maintenance

Manuals are required at every facility and call center that outline action steps and emergency protocol for any possible leak scenario.

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If you're interested in learning more about CO_2 and North Dakota's role, visit

CarbonND.com

In 2018, the U.S. Environmental Protection Agency (EPA) granted North Dakota primacy (regulatory authority) of Class VI (CO_2 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 CO_2 storage injection well activities. This oversight ensures our commitment to protecting our lands and communities, and that these projects uphold our proven safety protocols founded in our long history of working with oil and gas industries.

The North Dakota Public Service Commission approves the siting of transmission pipelines, including CO_2, and the Pipeline Hazardous Materials Safety Administration (PHMSA) is accountable for safety in design, construction, and operation of CO_2 transmission pipelines.

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