



Fact Sheet

Practical, Environmentally Sound CO₂ Sequestration

Bell Creek Integrated CO₂ EOR and Storage Project

Injecting carbon dioxide (CO₂) into an underground oil zone can help boost production in a process called CO₂ enhanced oil recovery, or CO₂ EOR. If the injected CO₂ used for EOR comes from human activity, then the EOR process can help reduce our carbon footprint by putting the CO₂ into permanent storage deep underground.

An oil recovery project using CO₂ injection ...

Denbury Onshore LLC (Denbury), a leader in CO₂ EOR operations, is implementing a commercial CO₂ EOR project that will add 20-plus years and 40–50 million barrels of oil to the life of the Bell Creek oil field in southeastern Montana. The 232-mile-long Greencore Pipeline system supplies the Bell Creek Field with over 1 million tons of CO₂ a year from the Lost Cabin gas plant and the LaBarge Field. CO₂ injection for EOR and associated CO₂ storage began in the spring of 2013.

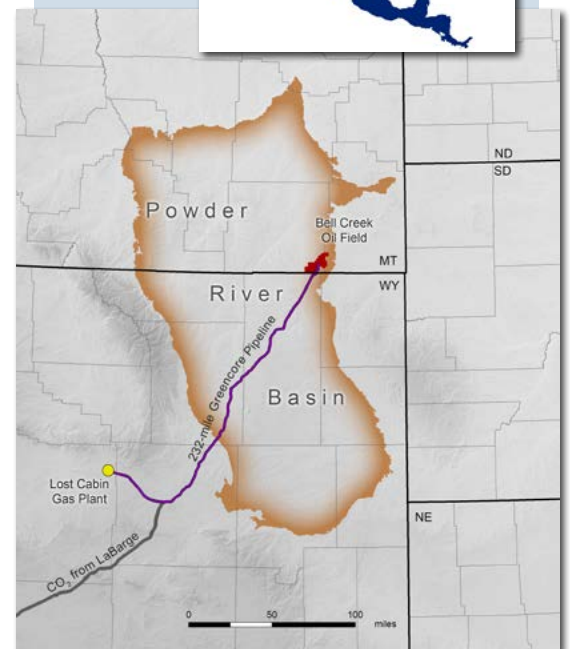
... combined with the innovative use of subsurface CO₂ modeling and monitoring systems ...

Denbury has teamed with the Plains CO₂ Reduction Partnership, led by the Energy & Environmental Research Center, to characterize and model CO₂ behavior in the subsurface as a basis for designing a comprehensive monitoring plan for the CO₂ storage and EOR operation. Detailed site characterization, modeling, subsurface risk analysis, and monitoring of the CO₂ EOR and storage operations allow site operators to account for the CO₂ utilized in oil production and to verify that the CO₂ remains in place once EOR operations are complete.

... to benefit the environment and the economy.

The integrated approach at the Bell Creek oil field helps meet the commonsense safety expectations of local landowners and communities. Further, by storing human-generated CO₂ at the Bell Creek oil field, Denbury benefits the environment by decreasing the carbon footprint of its regional oilfield operation. The results of the Bell Creek project will help future projects effectively implement a proven CO₂ monitoring, verification, and accounting (MVA) system as part of a comprehensive approach to subsurface CO₂ management and EOR operations.

The Bell Creek Integrated CO₂ EOR and Storage Project combines the proven techniques of CO₂ EOR with the characterization and monitoring needed for effective carbon storage. The result is a new standard for safe and practical geologic CO₂ EOR to CO₂ storage operations.



The 232-mile-long Greencore Pipeline system supplies the Bell Creek Field with over 1 million tons of CO₂ a year from the Lost Cabin gas plant and the LaBarge Field. Once at the Bell Creek oil field, the CO₂ is injected into the oil-bearing rock of the Muddy Formation sandstone.

Bell Creek Project Benefits

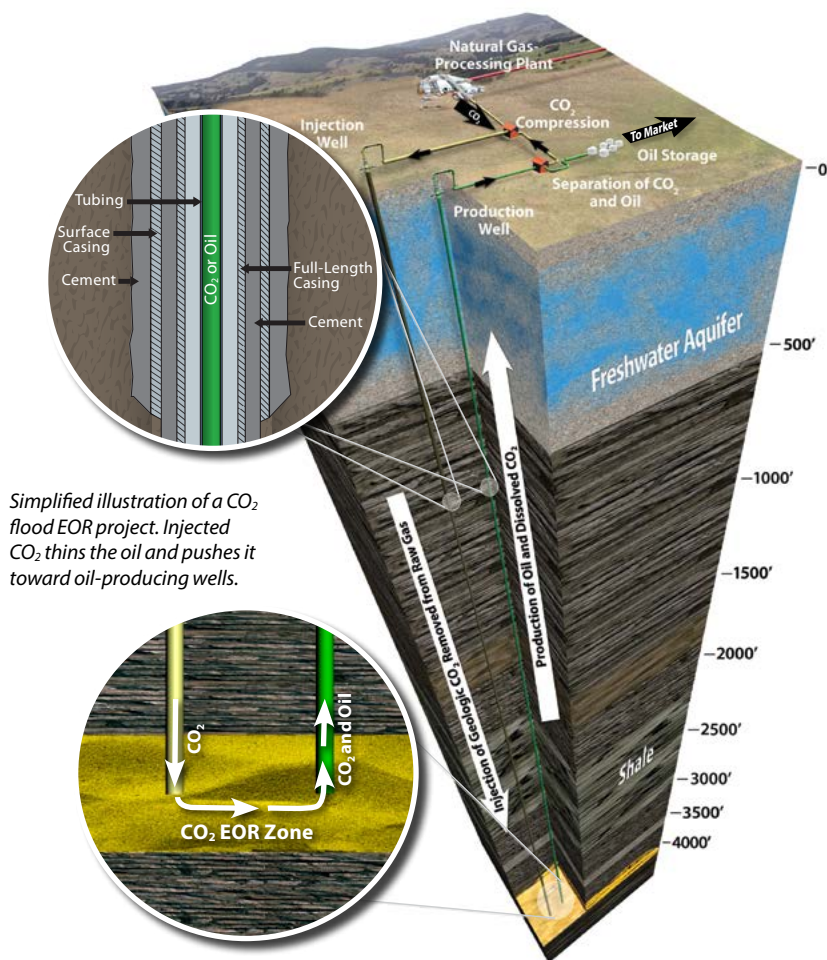
- Approximately **40–50 million barrels** of incremental oil
- Millions of tons of CO₂ **safely in storage**

Natural Gas, Gas Processing, and Carbon Capture

When natural gas comes from the production well, it can contain impurities like CO₂ and hydrogen sulfide (H₂S), along with petroleum liquids like butane and propane. These constituents must be removed before the natural gas can be tied into a distribution pipeline or used by a customer. This cleanup is done at large facilities called natural gas-processing plants. There are more than 1300 natural gas-processing plants in the United States and Canada and over 1900 worldwide (PennWell, 2013, Worldwide gas-processing database). Because natural gas-processing plants are among the few sources of relatively pure streams of CO₂, they are good candidates for geologic CO₂ storage—the permanent storage of CO₂ deep underground. The Bell Creek project is using the CO₂ produced at the Lost Cabin natural gas-processing facility and from the LaBarge Field in Wyoming in a commercial CO₂ project.



The Bell Creek oil field is located in southeastern Montana in the northern portion of the Powder River Basin. The oil is produced from sand bodies encased in shale at a depth of nearly a mile. These deep, isolated sands make ideal compartments for the safe, long-term storage of CO₂ from human activities.



Simplified illustration of a CO₂ flood EOR project. Injected CO₂ thins the oil and pushes it toward oil-producing wells.

How CO₂ EOR and Storage Work

Injecting CO₂ into a producing zone is called CO₂ EOR. When CO₂ comes into contact with oil, a significant portion of the CO₂ dissolves into the oil, reducing oil viscosity and increasing the oil's mobility. This, combined with the partial restoration of original reservoir pressure, can result in increased oil production rates as well as an extension of the operational lifetime of the oil reservoir.

In an oil field, CO₂ floods are designed to be active for decades. Over the years, there are many cycles of CO₂ injection. With each cycle, another portion of injected CO₂ becomes permanently trapped, or stored, in the oil reservoir. This is called associated CO₂ storage. As a result of ongoing CO₂ EOR projects since the 1970s, a large amount of CO₂—hundreds of millions of tons—is now permanently stored in oil fields.

The Bell Creek project employs an innovative approach that integrates EOR, associated CO₂ storage, and MVA in a commercial oil production operation in the northern Great Plains.

The Plains CO₂ Reduction (PCOR) Partnership is a group of public and private sector stakeholders working together to better understand the technical and economic feasibility of storing CO₂ emissions from stationary sources in the central interior of North America. The PCOR Partnership is led by the Energy & Environmental Research Center (EERC) at the University of North Dakota and is one of seven regional partnerships under the U.S. Department of Energy's National Energy Technology Laboratory Regional Carbon Sequestration Partnership Initiative. To learn more, contact:

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Visit the PCOR Partnership Web site at www.undeerc.org/PCOR. New members are welcome.



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