

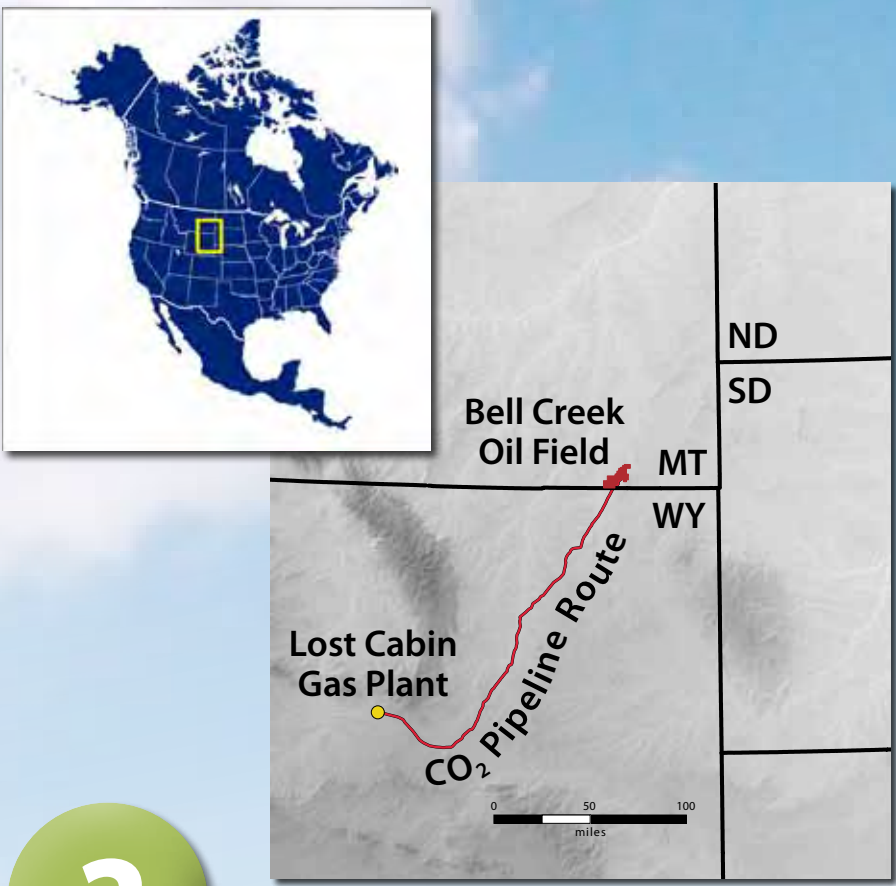
# CO<sub>2</sub> Emissions Go to Work to Produce More Oil

## The Bell Creek Story

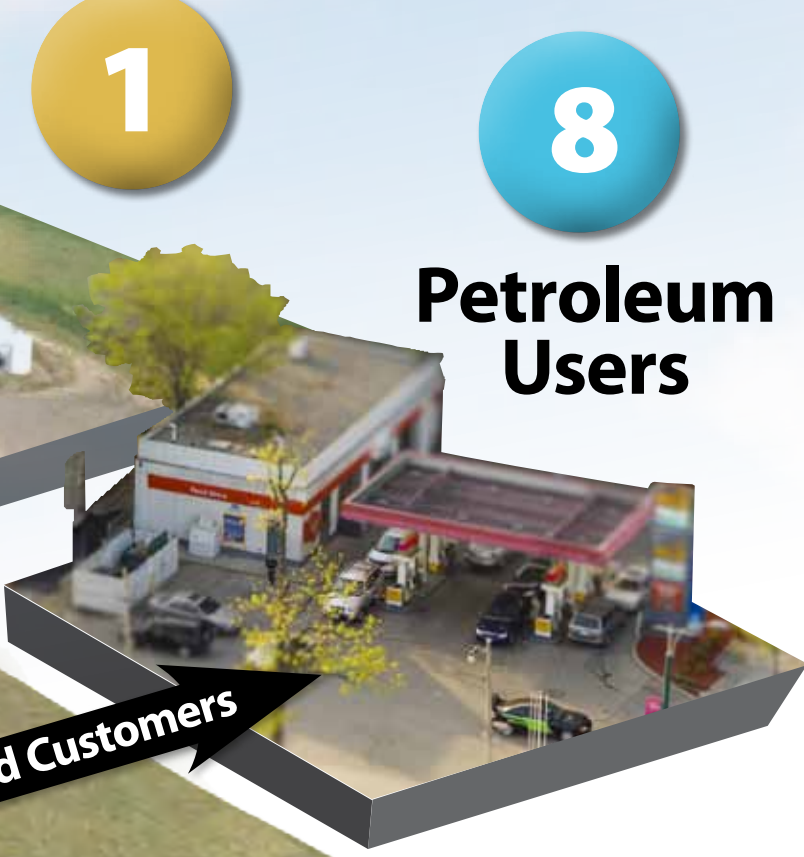
Denbury's Bell Creek oil field in Montana is the site of an innovative oil recovery/greenhouse gas storage project that benefits the economy and the environment:

- Carbon dioxide (CO<sub>2</sub>) (from natural underground processes) comes to the surface with raw natural gas.
- The Lost Cabin gas-processing plant captures this CO<sub>2</sub> instead of releasing it into the atmosphere (the current practice elsewhere).
- The CO<sub>2</sub> separated from the raw natural gas at Lost Cabin goes by pipeline to the Bell Creek oil field where it is injected into an oil reservoir to help produce more oil. This practice is called CO<sub>2</sub> enhanced oil recovery, or EOR.
- Eventually, the injected CO<sub>2</sub> is trapped in the underground injection zone.
- Monitoring helps ensure that the CO<sub>2</sub> remains securely stored.

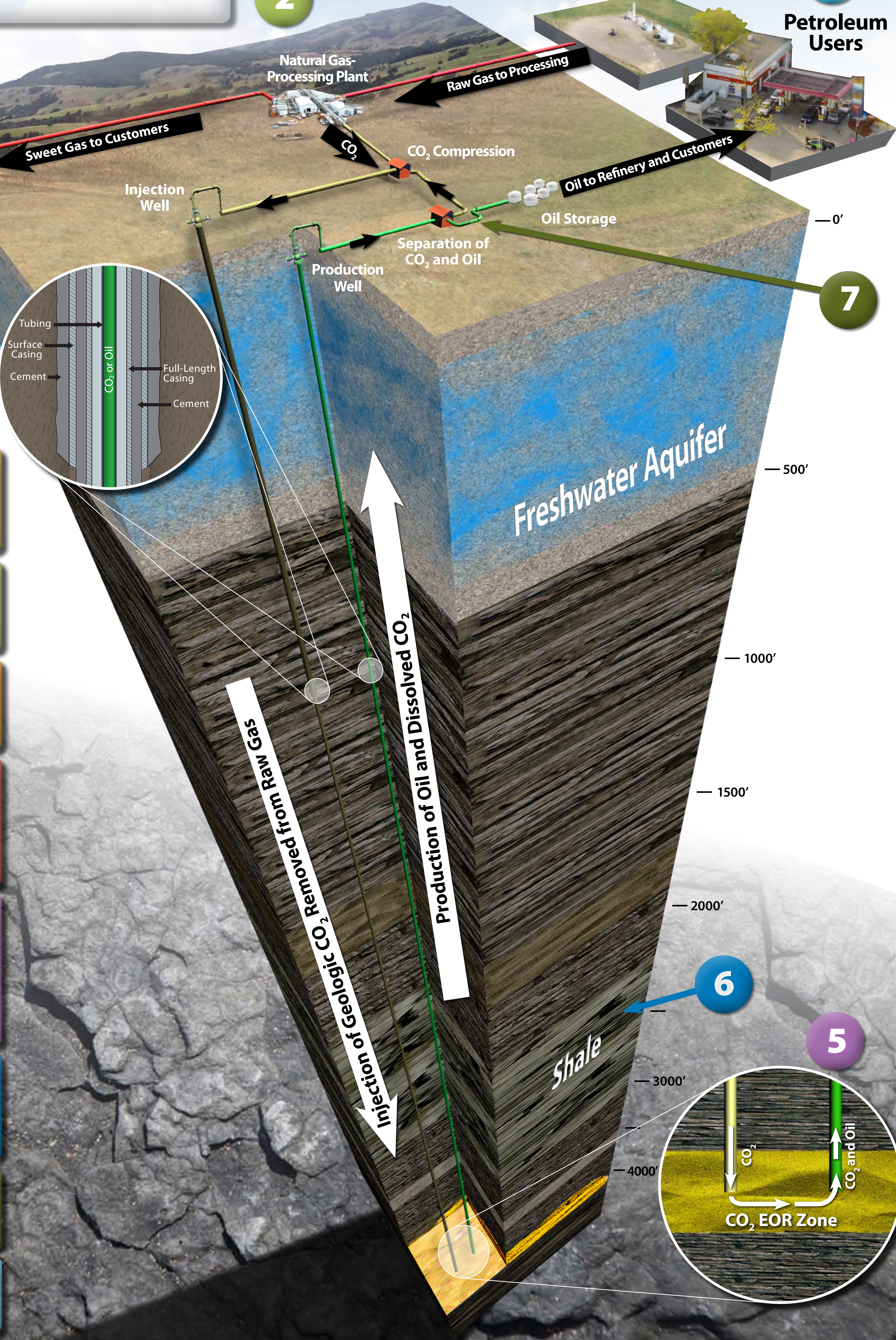
This greener form of oil and natural gas production results in less CO<sub>2</sub> ending up in the atmosphere and extends the lifetime of an existing oil field.



Natural Gas Users



Petroleum Users



### 1 Raw Natural Gas Contains Impurities

Natural gas is found in rocks underground and often contains impurities like CO<sub>2</sub> and water. This raw natural gas needs to be processed to desired purity and energy content. The CO<sub>2</sub> in the raw natural gas comes from natural geologic processes deep underground.

### 2 Making Raw Gas Sweet Nets CO<sub>2</sub>

Raw natural gas has to be purified before it can go to customers. This happens in a gas-processing plant. Most plants release the CO<sub>2</sub> impurities to the atmosphere. At the Lost Cabin plant, CO<sub>2</sub> is captured and piped to the Bell Creek oil field.

### 3 Using Sweet Gas Reduces CO<sub>2</sub> Emissions

Natural gas is mainly used for heating and cooking in the home because it burns cleanly with few by-products. Some power plants burn natural gas to generate electricity. As with any fossil fuel, the burning of natural gas still results in CO<sub>2</sub> emissions.

### 4 Protecting Freshwater Aquifers

Whether for CO<sub>2</sub> injection or oil production, wells are engineered to protect precious groundwater resources. Well construction is governed by state and federal regulations. Three layers of steel (casing and tubing) and two layers of durable, long-lasting cement separate the contents from the surrounding groundwater in accordance with Montana regulations. Monitoring the wells adds an extra layer of security.

### 5 Removing the Oil...Some CO<sub>2</sub> Remains Trapped

In the enhanced oil recovery or EOR process, the injected CO<sub>2</sub> dissolves into the oil, thins it, and creates enough pressure to drive a portion of the previously unrecoverable oil to the production well. Some of the CO<sub>2</sub> remains behind, trapped in the pore spaces in the oil zone rock, while the rest travels up the production well dissolved in the oil. At the surface, the CO<sub>2</sub> is separated from the oil and reinjected. Over time, more and more CO<sub>2</sub> remains trapped in the pore spaces in the rock. This trapped CO<sub>2</sub> will remain securely stored.

### 6 Keeping Oil and CO<sub>2</sub> in Place

Shale is a barrier rock that holds gases and liquids in place underground. The CO<sub>2</sub> EOR zones of the Bell Creek oil field are not only surrounded by shale but are overlain by thousands of feet of shale. This shale that has held oil in place for millions of years will also hold the CO<sub>2</sub> in place.

### 7 Reusing CO<sub>2</sub>

Any CO<sub>2</sub> that comes up with the oil is separated, captured, compressed, and reinjected into the oil zone. The oil is then sent to a refinery.

### 8 Boosting Domestic Oil Production

This domestic oil production reduces dependence on foreign oil. Using the captured geologic CO<sub>2</sub>, we are producing oil that could not have been produced otherwise.

Denbury

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