

# ENHANCED OIL RECOVERY (EOR)



# NETL

NATIONAL ENERGY TECHNOLOGY LABORATORY

## OVERVIEW

As the United States grapples with the challenges of reducing dependence on foreign energy sources and reducing emissions of greenhouse gases, the topic of carbon dioxide (CO<sub>2</sub>) enhanced oil recovery (EOR) has emerged as both a viable EOR technology for increased oil recovery from conventional and unconventional fields, and as a method to store CO<sub>2</sub> underground to mitigate its greenhouse impacts.



As much as two-thirds of conventional crude oil discovered in U.S. fields remains unproduced, left behind due to the physics of fluid flow that results in oil clinging to matrices in underground formations. CO<sub>2</sub> EOR enhances sweep efficiency, or the ability to flush the oil droplets off the formation matrices, thereby enhancing production. The technology is applicable to hydrocarbons in unconventional rocks or that have unconventional characteristics (such as oil in fractured shales, kerogen in oil shale, or bitumen in tar sands) which constitute an enormous potential domestic supply of energy.

CO<sub>2</sub> injection, already the most common EOR method, holds even greater promise if it can be applied to mature oil fields across the country. The re-injection of natural gas associated with oil production is also being investigated as a mechanism for EOR. The use of associated natural gas as an injectate for EOR not only improves incremental recovery – it also reduces the potential for the flaring of natural gas to the atmosphere during production, further mitigating greenhouse gas emissions.

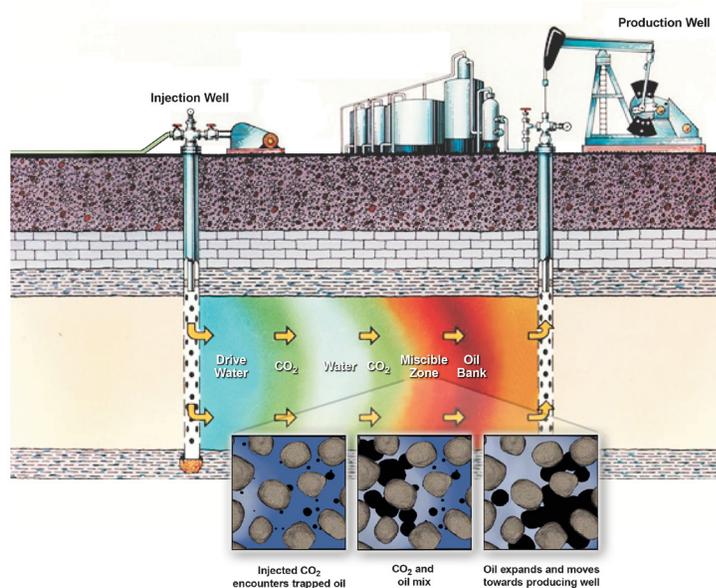
NETL is funding field-based research to accelerate the development and application of technologies for enhancing the recovery of petroleum from both conventional and unconventional reservoirs, with goals to expand EOR technologies and methods to new conventional, unconventional and mature fields.

Research drivers that provide a clear focus for research in this area include:

- Next generation CO<sub>2</sub> EOR technologies that can increase recovery from existing CO<sub>2</sub> EOR projects and accelerate application of the process to other mature oil fields around the country.
- Accelerating development of novel EOR methods that can reduce the environmental risks of onshore oil production and remediate areas that have been impacted by historical production activities.
- Ways to improve performance and lower costs of CO<sub>2</sub> and other gas floods, as well as ways to accelerate their application by independent producers.
- Targeting hydrocarbons locked in unconventional reservoir rocks like the Bakken shale or that have characteristics that make their production difficult (such as heavy oil in Arctic reservoirs).

## TECHNOLOGY PARTNERSHIPS

NETL maintains research partnerships with industry and academia for field laboratories to catalyze development and demonstration of innovative technologies and methodologies for EOR development.



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