National Enhanced Oil Recovery Initiative

Environmental Benefits

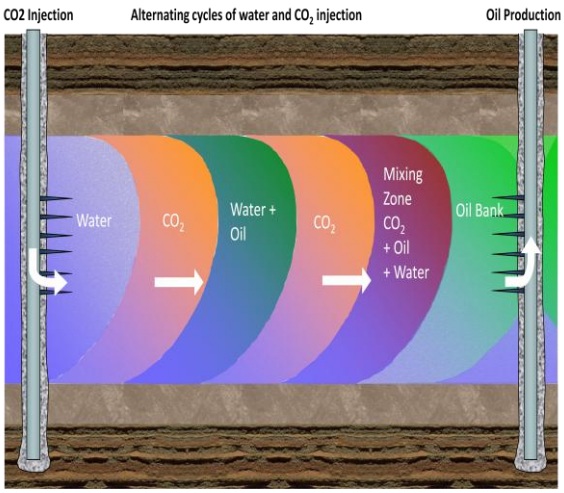
The National Enhanced Oil Recovery Initiative brings together diverse public and private leaders to increase U.S. domestic oil production, energy security, and reduce emissions by capturing carbon dioxide (CO_2) from power plants and industrial facilities[1] and safely storing it in oil fields.

Launched in July 2011, the National Enhanced Oil Recovery Initiative's purpose is to develop policy recommendations to increase U.S. domestic oil production from existing oil fields through enhanced oil recovery (EOR) and to store CO_2 captured from power plants and industrial facilities. The private sector, government and NGO leaders participating in this initiative aim to enhance U.S. energy security, promote job and economic growth, and reduce CO_2 emissions.

How does CO_2-EOR work? CO_2-EOR works most commonly by injecting CO_2 into already developed oil fields where it mixes with and "releases" additional oil from the formation, thereby freeing it to move to production wells. CO_2 is separated from the produced oil in above-ground equipment and re-injected in a closed-loop system many times over the life of an EOR operation.

CO_2-EOR, a commercial technology established in North America in 1972, could more than double economically recoverable U.S. oil reserves.[2]

CO_2 Mixing with Oil to Increase Production



How does EOR reduce CO_2 emissions? Using CO_2 captured from power plants and industrial sources to enhance oil production has the potential to help the U.S. reduce its emissions by improving the CO_2 intensity of the industrial and power generation sectors. Over the life of a project, for every 2.5 barrels of oil produced, it is estimated that EOR can safely prevent one metric ton of CO_2 from entering the atmosphere.[3]

A current estimate of CO_2 use for EOR is 72 million metric tons per year; 55 million metric ton of CO_2 come from natural sources and 17 million metric tons come from anthropogenic sources. But the potential for EOR to contribute

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to CO_2 reduction goals is great, as supplies of natural CO_2 are constrained. The volume that could be captured and sequestered from industrial facilities and power plants to support "next generation" EOR could be 20- 45 billion metric tons of CO_2. This is equal to the total U.S. CO_2 production from fossil fuel electricity generation for 10 to 20 years.[4]

Will CO_2-EOR harm groundwater resources? EOR is governed by federal regulations that require the protection of underground sources of drinking water, under the EPA's Underground Injection Control (UIC) program. Many states have obtained authority from EPA to administer the UIC program and have laws that meet or exceed EPA's requirements. Permits issued by the EPA or states require that EOR operators manage their site in a manner that will prevent CO_2 (and other formation fluids) from migrating out of the subsurface confining formation and into drinking water aquifers.[5]

The University of Texas Bureau of Economic Geology's (TBEG) Gulf Coast Carbon Center has studied the longest running EOR site in the world at the Scurry Area Canyon Reef Operators in Scurry County, Texas (SACROC). SACROC has been operating since 1972 and has injected over 175 million tons of CO_2. TBEG has found no evidence that CO_2 has escaped the EOR site and contaminated groundwater resources.[6]

Furthermore, the International Energy Agency's Greenhouse Gas Programme (GHGP) Weyburn-Midale CO_2 Monitoring and Storage project is the site of the world's largest CO_2 monitoring project. Since 2000 more than 30 internationally recognized research organizations have conducted scientific assessments of the integrity of the geological storage system, monitored CO_2 in the deep subsurface, and tested for any evidence of anthropogenic CO_2 at the surface. None of the studies have detected anthropogenic CO_2 in the soils or groundwater.[7]

What is the land use impact? CO_2-EOR largely takes place at existing oil fields and CO_2 is transported through underground pipelines thus reducing land use impacts.

The National EOR Initiative is committed to building a pathway to a secure and low-carbon energy future through expansion of CO_2-EOR. At its launch, the Initiative received bipartisan support from several members of Congress who are monitoring the Initiative's progress and will receive final recommendations for legislative consideration.

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[1] Examples of industrial facilities include fertilizer production, ethanol production, cement and steel plants.

[2] The US EIA estimates proved reserves of 22.3 billion barrels. www.eia.gov/oil_gas/natural_gas/data_publications/crude_oil_natural_gas_reserves/cr.html Advanced Resources International estimates 26-60 billion barrels of economically recoverable oil are available through CO_2-EOR. ARI, 2011

[3] Industry Sources

[4] ARI, *Improving Domestic Energy Security and Lowering CO_2 Emissions with "Next Generation" CO_2-Enhanced Oil Recovery (CO_2-EOR)*, June 20, 2011, DOE/NETL-2011/1504.

[5] 40 CFR §144.12

[6] See the SACROC Research Project website for a complete list of studies. www.beg.utexas.edu/gccc/sacroc.php

[7] Cenovus Energy, *Site Assessment Weyburn Unit SW30-5-13W2*, November 2011.