

# New drilling method opens vast oil fields in US

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A new drilling technique is opening up vast fields of previously out-of-reach oil in the western United States, helping reverse a two-decade decline in domestic production of crude.

Companies are investing billions of dollars to get at oil deposits scattered across North Dakota, Colorado, Texas and California. By 2015, oil executives and analysts say, the new fields could yield as much as 2 million barrels of oil a day — more than the entire Gulf of Mexico produces now.

This new drilling is expected to raise U.S. production by at least 20 percent over the next five years. And within 10 years, it could help reduce oil imports by more than half, advancing a goal that has long eluded policymakers.

"That's a significant contribution to energy security," says Ed Morse, head of commodities research at Credit Suisse.

Oil engineers are applying what critics say is an environmentally questionable method developed in recent years to tap natural gas trapped in underground shale. They drill down and horizontally into the rock, then pump water, sand and chemicals into the hole to crack the shale and allow gas to flow up.

Because oil molecules are sticky and larger than gas molecules, engineers thought the process wouldn't work to squeeze oil out fast enough to make it economical. But drillers learned how to increase the number of cracks in the rock and use different chemicals to free up oil at low cost. "We've completely transformed the natural gas industry, and I wouldn't be surprised if we transform the oil business in the next few years too," says Aubrey McClendon, chief executive of Chesapeake Energy, which is using the technique.

Petroleum engineers first used the method in 2007 to unlock oil from a 25,000-square-mile formation under North Dakota and Montana known as the Bakken. Production there rose 50 percent in just the past year, to 458,000 barrels a day, according to Bentek Energy, an energy analysis firm.

It was first thought that the Bakken was unique. Then drillers tapped oil in a shale formation under South Texas called the Eagle Ford. Drilling permits in the region grew 11-fold last year.

Now newer fields are showing promise, including the Niobrara, which stretches under Wyoming, Colorado, Nebraska and Kansas; the Leonard, in New Mexico and Texas; and the Monterey, in California.

"It's only been fleshed out over the last 12 months just how consequential this can be," says Mark Papa, chief executive of EOG Resources, the company that first used horizontal drilling to tap shale oil. "And there will be several additional plays that will come about in the next 12 to 18 months. We're not done yet."

Environmentalists fear that fluids or wastewater from the process, called hydraulic fracturing, could pollute drinking water supplies. The Environmental Protection Agency is now studying its safety in shale drilling. The agency studied use of the process in shallower drilling operations in 2004 and found that it was safe.

In the Bakken formation, production is rising so fast there is no space in pipelines to bring the oil to market.

Instead, it is being transported to refineries by rail and truck. Drilling companies have had to erect camps to house workers.

Unemployment in North Dakota has fallen to the lowest level in the nation, 3.8 percent — less than half the national rate of 9 percent. The influx of mostly male workers to the region has left local men lamenting a lack of women. Convenience stores are struggling to keep shelves stocked with food.

The Bakken and the Eagle Ford are each expected to ultimately produce 4 billion barrels of oil. That would make them the fifth- and sixth-biggest oil fields ever discovered in the United States. The top four are Prudhoe Bay in Alaska, Spraberry Trend in West Texas, the East Texas Oilfield and the Kuparuk Field in Alaska.

The fields are attracting billions of dollars of investment from foreign oil giants like Royal Dutch Shell, BP and Norway's Statoil, and also from the smaller U.S. drillers who developed the new techniques like Chesapeake, EOG Resources and Occidental Petroleum.

Last month China's state-owned oil company CNOOC agreed to pay Chesapeake \$570 million for a one-third stake in a drilling project in the Niobrara. This followed a \$1 billion deal in October between the two companies on a project in the Eagle Ford.

With oil prices high and natural-gas prices low, profit margins from producing oil from shale are much higher than for gas. Also, drilling for shale oil is not dependent on high oil prices. Papa says this oil is cheaper to tap than the oil in the deep waters of the Gulf of Mexico or in Canada's oil sands.

The country's shale oil resources aren't nearly as big as the country's shale gas resources. Drillers have unlocked decades' worth of natural gas, an abundance of supply that may keep prices low for years. U.S. shale oil on the other hand will only supply one to two percent of world consumption by 2015, not nearly enough to affect prices.

Still, a surge in production last year from the Bakken helped U.S. oil production grow for the second year in a row, after 23 years of decline. This during a year when drilling in the Gulf of Mexico, the nation's biggest oil-producing region, was halted after the BP oil spill.

U.S. oil production climbed steadily through most of the last century and reached a peak of 9.6 million barrels per day in 1970. The decline since was slowed by new production in Alaska in the 1980s and in the Gulf of Mexico more recently. But by 2008, production had fallen to 5 million barrels per day.

Within five years, analysts and executives predict, the newly unlocked fields are expected to produce 1 million to 2 million barrels of oil per day, enough to boost U.S. production 20 percent to 40 percent. The U.S. Energy Information Administration estimates production will grow a more modest 500,000 barrels per day.

By 2020, oil imports could be slashed by as much as 60 percent, according to Credit Suisse's Morse, who is counting on Gulf oil production to rise and on U.S. gasoline demand to fall.

At today's oil prices of roughly \$90 per barrel, slashing imports that much would save the U.S. \$175 billion a year. Last year, when oil averaged \$78 per barrel, the U.S. sent \$260 billion overseas for crude, accounting for nearly half the country's \$500 billion trade deficit.

"We have redefined how to look for oil and gas," says Rehan Rashid, an analyst at FBR Capital Markets. "The implications are major for the nation."