

Features

Plenty of Bakken Oil Left, If Prices Support Drilling

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Extending across northwest North Dakota and into neighboring parts of Montana and Canada, the Bakken Shale was the launch pad for the US tight oil boom about 10 years ago. North Dakota's oil production had previously stagnated below 100,000 barrels per day for 15 straight years in the 1990s and the first half of the 2000s. But that came to an abrupt end when the combination of horizontal drilling and hydraulic fracturing that had already unleashed a US shale gas boom was applied to the oil-prone Bakken region. The state's monthly oil production eventually topped out at 1.2 million b/d and despite the big drop in oil prices since 2014 it has not yet dipped below 900,000 b/d. The Bakken rig count has risen gradually since May of last year and production should recover in due course too, although it is unlikely to surpass 2 million b/d by the end of the decade as some had once predicted.

And while it has been eclipsed by the explosive growth of the Permian Basin in recent years, speakers at Hart Energy's recent DUG Bakken and Niobrara conference in Denver agreed that there is still plenty of life left in the Bakken.

Based on an analysis of wells drilled in 2015, researchers from the Bureau of Economic Geology at the University of Texas (UT) estimate that the Bakken still holds more than 15 billion barrels of technically recoverable oil. To put that number in perspective, it is 10 times the 1.5 billion barrels produced from the Bakken and Three Forks formations through 2015, according to North Dakota's Department of Mineral Resources. That should leave operators with plenty of running room. Svetlana Ikonnikova, a research scientist who worked on the UT's Bakken study said the estimate of recoverable resources should continue to rise as advances in drilling and completion increase the volumes of oil that can be recovered from each well. That seems a reasonable assumption, given that the US Geological Survey had previously pegged the Bakken's undiscovered, technically recoverable oil reserves at around 3.6 billion barrels in 2009, and at just 151 million barrels in 1995. "The operators keep testing and trying to push the technology frontier further," Ikonnikova told EI Finance on the sidelines of the Denver conference.

Operators in the core of the Bakken/Three Forks play say they have achieved better results by experimenting with tighter clusters of wells, adding more frack stages, and increasing proppant loadings. Oasis Petroleum said it recently tested 10 million pound frack jobs on its Wild Basin acreage and found that the wells performed 25% better than the company's standard type curve for the area, which assumes recovery of 1.5 million barrels of oil equivalent. Chief Operating Officer Terry Reid said the additional sand proppant increases drilling and completion costs by less than 20%. "It's pretty compelling economics, especially if we can bring that \$6.5 million [well] cost down over time as we continue to do bigger jobs," Reid told the conference. He noted that the company has already reduced its average well costs by 50% over the last two years.

Continental Resources' Chief Operating Officer Jack Stark said Bakken producers also stand to gain from completion of the 570,000 b/d Dakota Access oil pipeline, which will reduce their dependence on expensive rail transportation and should support higher prices for Bakken crude. "We are going to have more pipeline takeaway from the Bakken than we have production," he said. Stark noted that operators who continued to work in the Bakken during the downturn had focused their efforts on their very best acreage, concentrating on the "core of the core." Some operators contend that better completion techniques have expanded the core of the play, but Stark said the best results are still limited to certain areas. "Zip code matters," he said. Other speakers agreed. Reid of Oasis contrasted the type curve of 1.5 million boe for wells with high-intensity completions in his company's Wild Basin focus area with the average of just over 1 million boe for its wells in other areas of the Bakken. Hess Chief

Operating Officer Greg Hill said returns on wells drilled in the best areas of the Bakken are competitive with those that can be attained in the Permian.

Eric Mullins, co-chief executive of private equity firm Lime Rock Resources, said the relative maturity of the Bakken will probably dampen M&A activity in the play, at least in terms of purchases by public companies. "I think the operators in the Bakken are pretty well established, so you don't have a lot of new entrants," he said. However, Mullins said the play can be an attractive option for privately funded operators who don't want to pay the big premiums required to pick up assets in the Permian. "We tend to look for properties that have a slightly higher percentage of proved developed producing [reserves] as opposed to pure drilling," Mullins said. Lime Rock acquired Occidental Petroleum's Bakken assets in the fall of 2015 for \$600 million (EIF Jun.1'16).

While upstream companies have been returning to work in the Bakken after dialing down their activity during the worst of the downturn (EIF Mar.1'17), Stark said the pace of the recovery will ultimately depend on oil prices and the rig count. Stark said it would take 100 rigs to take Bakken production back to its previous high of 1.2 million b/d and he does not think that is realistic. Baker Hughes reported that there were 42 oil rigs operating in the Bakken in its latest weekly report, up from a low of 22 in May of last year. Ikonnikova, the UT researcher, said that roughly two thirds of the remaining 15 billion barrels of recoverable oil in the Bakken would need an oil price of \$100 for it be extracted. So in the end, future production in the Bakken will be determined more by prices than by the availability of resources. "It's about the pace at which it's being drilled, and the pace is really driven by price," said Stark.

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