Modern Refracking Technologies Unlock Significant Bypassed Production in Legacy US Shale Plays

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New tech brings new life to old wells

Increasingly sophisticated recompletions or 'refracking' technologies are rejuvenating oil and gas production from older, depleted wells in legacy US oil and gas shale plays, with median enhanced ultimate recovery (EUR) increased by 70% to 100%, according to new research from S&P Global Commodity Insights.

The S&P Global Commodity Insights analysis series assessing recompletion performance consists of two new reports—the first focused on the Eagle Ford and Bakken shale oil plays, and the second assessed the Barnett and Haynesville natural gas plays. All four plays are mature and have been in production for over 15 years.

In *Refracs: Unlocking a new opportunity set in old wells: Assessing refrac performance in the Bakken and Eagle Ford* report and *Refracs: Weak gas prices imperil refrac economics in gassy plays: Assessing refrac performance in the Haynesville and Barnett*, researchers say production following recent recompletions compares favorably with production from newly drilled wells, which could provide relief for producers facing core acreage exhaustion.

"The EUR uplift seen from recent refracks is significant—our analysis indicates these may increase recovery by 70% to 100%* at the median for core wells in the plays we studied," said Prescott Roach, principal analyst, Companies and Transactions at S&P Global Commodity Insights and author of both reports. "Under the right circumstances, we see the economics of refracks as being competitive to new wells drilled on middling class 2 or class 3 acreage," Roach said. "Producers are getting a new well in terms of incremental production."

Roach said the new S&P Global Commodity Insights studies were possible due to the company's unique repository of vast, detailed historical data on well performance over time that allowed him to guide his analysis and compare early drilling and completion techniques and production volumes against those delivered by newer recompletion technologies.

Roach said the S&P Global Commodity Insights research includes type curves for the refracked wells that illustrate the production uplift following recompletion. An example of a recompletion using mechanical isolation technologies, is referenced below.

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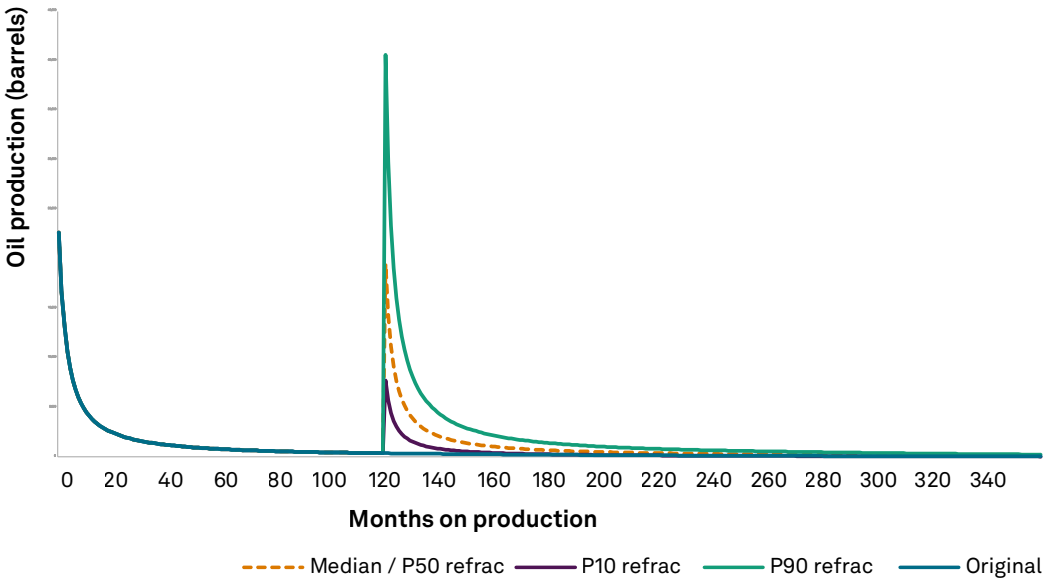
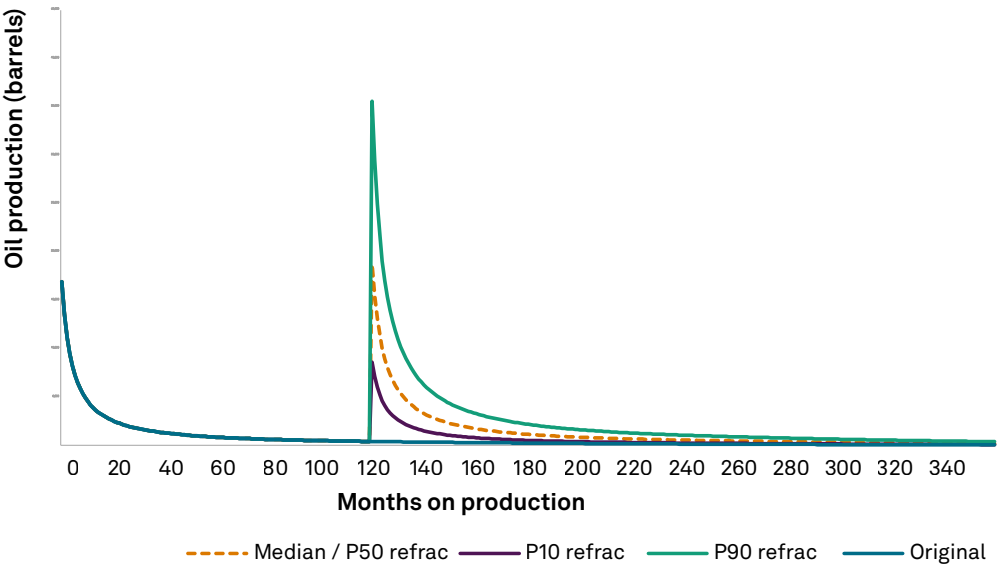
Single-well liquids production profile: Eagle Ford modern refrac



Source: S&P Global Commodity Insights, 2024

Single-well liquids production profile: Bakken modern refrac



Source: S&P Global Commodity Insights, 2024

According to new research from S&P Global Commodity Insights, modern refracks in the Eagle Ford or Bakken legacy US oil plays can deliver a production uplift of 70%-100% EUR for older wells.

Early recompletions left behind untapped potential

Roach said thousands of completions in the early days of shale development were suboptimal. “Producers historically used very low proppant loads and fluid volumes and there was often wide cluster spacing between perforations, so there is a lot of untapped potential left behind in those bypassed zones,” he said.

Two things have propelled the new era of refracks, the S&P Global Commodity Insights study said. First is targeting the right wells located on the right acreage, which generally includes older wells with suboptimal completions that are found in core acreage in legacy unconventional plays. Second is the use of advanced recompletion techniques, particularly mechanical isolation.

The mechanical isolation method involves isolating produced zones by first inserting an expandable liner down the well’s original casing to seal existing (old) fracs in the wellbore. Next, frack crews plug and perforate previously untreated zones located between the well’s original stages. When the refrack stimulates zones that were not accessed by the original completion, potentially vast volumes of previously bypassed hydrocarbons can be produced.

Modern refracs deliver ‘significant productivity uplift’; could help operators confront core acreage exhaustion

“By successfully targeting previously untapped rock, these modern refracks are proving out their ability to deliver significant productivity uplift,” Roach said. “This is due largely to technological advancements and the ever-increasing volume of historical data that supports the notion that modern refracks can deliver.”

Early refracks had a reputation for unreliable, lackluster performance—often referred to as the era of ‘pump and pray’ due to the uncertainty of the outcome, he said.

Many operators in those aging plays are being confronted with core acreage exhaustion and refracks look attractive, since they provide an avenue to increase their available inventory in core acreage. “Operators have several advantages already because the land and infrastructure are already paid for, and the lead time to bring on this incremental production is very short,” Roach said. “These refracks are expensive – four to five million dollars for a single well is probably not atypical, but from a productivity standpoint, it makes good sense to optimize these assets.”

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ConocoPhillips and Devon capitalizing on core acreage refracks

The modus operandi for producers using these new fracking techniques is to use contracted crews who are already booked for new well completions to fill in any gaps in their schedules by piggybacking these refracks in. Several operators have already added refracks to their strategic planning. Roach said that when ConocoPhillips recently bought Marathon, the company said it would be acquiring 1,000 wells that were candidates for refracks.

"In doing so, ConocoPhillips received a lot of untapped potential considering how many refrack candidates found on core acreage came with the Marathon acquisition," Roach said. "Devon has also led the field in leveraging modern refracks in the Eagle Ford, and they have some fantastic acreage there."

Despite the benefits of these new recompletion technologies, the S&P Global Commodity Insights analysis found that recompleting these wells is relatively expensive, and they are still not as economically attractive as a new drill in core acreage. Roach said the study results for the new refracks are not atypical, but cautions that every well differs, and there is still "significant variability in terms of results."

The S&P Global Commodity Insights research on legacy gas plays found similarly impressive productivity results as the oil plays following recompletion using modern techniques, but the challenge for recompleting these gas plays at present is economics, rather than technology. The second report in the two-part series—*Refracs: Weak gas prices imperil refrac economics in gassy plays: Assessing refrac performance in the Haynesville and Barnett* details the challenges operators face in leveraging these new technologies to address depletion in these mature gas plays, since the persistent low price for natural gas makes recompletions more costly than in the oil plays.

Gas players curb their enthusiasm: Gas well recompletions still economically challenged — for now

Roach said refrack activity in gas-prone plays has largely been limited to the Haynesville and Barnett, primarily because of play maturity, and like the oil plays he assessed, they hold a large stock of depleted wells developed in the early days of the shale revolution that feature antiquated, suboptimal completions designs with wide spacing that left behind significant potential production.

"A lack of undeveloped drilling inventory within core acreage has likely led these gas-play operators to consider alternatives to new wells, but unlike oil plays, gas-play refracks have all but ceased owing to low Henry Hub gas pricing," Roach said.

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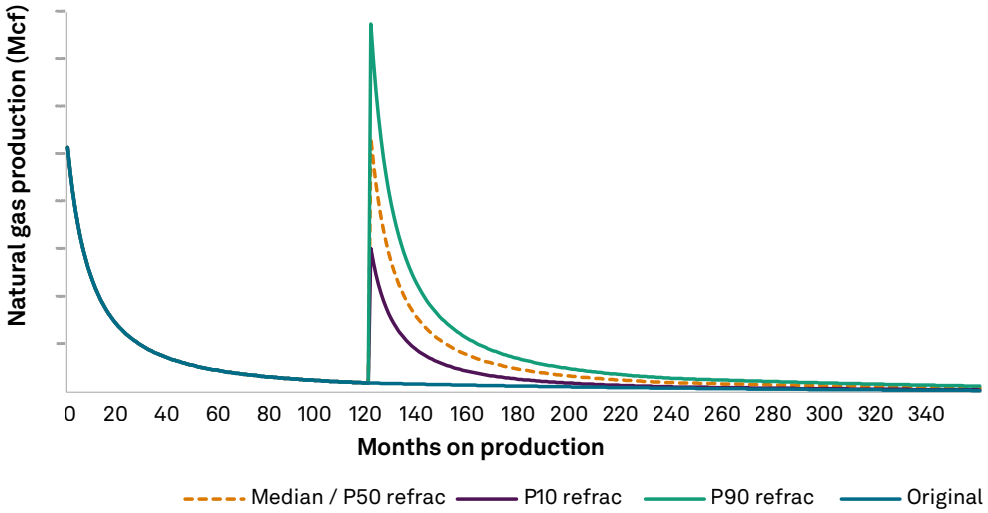
Single-well gas production profile: Haynesville modern refrac



Source: S&P Global Commodity Insights, 2024

According to a new research study by S&P Global Commodity Insights, using modern refrack techniques to recomplete core wells in the Haynesville gas play can deliver EUR uplift of approximately 80%. Researchers estimate refrack economics are comparable to newly-drilled wells on Class 2 and 3 acreage, but current natural gas prices have muted activity—for now.

"Refrack activity in the Haynesville and Barnett plunged in 2023 as Henry Hub pricing fell below $3.00 per million British Thermal Units (MMBtu), but the post-2025 natural gas price outlook should support recovery. S&P Global Commodity Insights projects natural gas prices will climb above $4/MMBtu starting around 2025, rendering refracks economically viable once again."

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*The S&P Global Commodity Insights legacy gas-play 'refrac' or refrack research study indicates these results for the new refracks are not atypical, but cautions every well differs, and there is still significant variability in terms of results.

Can gas-play refracks deliver capital efficiency on par with new drills? Roach said that according to his analysis, "there is ample evidence that refracks do increase gas well productivity, but repeatability, long-term performance and cost remain key uncertainties, particularly if gas prices are low."

Nevertheless, the study found that gas well refracks can generate attractive returns under the right circumstances. S&P Global Commodity Insights estimates Haynesville and Barnett refracks are economic at Henry Hub prices of approximately $2.70/MMBtu. This places refracks in line with financial returns generated by new drills on Class 2 and 3 acreage in the Haynesville, and in the Barnett, the S&P Global Commodity Insights model suggests refracks deliver higher returns than all locations outside of Class 1 acreage.

*The alternate spelling of refracks is 'refracs.'

Roach said because the analysis is focused on legacy plays, it is not yet indicated for the more recent plays in the Permian Basin. "It would be exciting to see this analysis extend to the Permian, but there is still core acreage there that is yet to be developed," Roach said. "The Permian is not yet suffering from core acreage exhaustion to the same extent as the Eagle Ford and the Bakken, but this technology could be useful to the Permian at some point. Even so, since Permian unconventionals developed later than the Bakken and Eagle Ford, we think there is likely a much smaller crop of potential refrack candidates with suboptimal completions."

"For now, we see a second harvest for operators using modern completion techniques in these four legacy US plays," Roach said. "While each well is unique and results can vary, many of the core wells in these plays offer significant bypassed potential waiting to be produced, and for operators with heavily developed core acreage, that is a tremendous strategic advantage."

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