
Will Shale Output See New Highs?

Industry recovery a long-term hope.

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Data Sources for This Publication
EIA
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Embers of Hope

The United States exploration and production sector is on the ropes as year-end approaches, after a bruising run-in with the coronavirus caused prices and demand to collapse in May. Shale production has driven crude growth in the past decade to the point where it's the backbone of domestic output. Predictions of the demise of shale aren't new. After a major bust in 2015 when pundits wrote it off, shale recovered to break new records just over a year later. In the past three weeks embers of hope have emerged with higher oil prices and vaccine treatments on the horizon. Last Thursday OPEC+ agreed to postpone all but 0.5 million barrels/day of planned output increases starting January. This analysis looks at whether and when shale oil production will surpass this year's rout.

Shale

In the past decade, output from shale formations expanded to encompass the majority of U.S. crude production. According to Energy Information Administration, or EIA, data, between 2010 and 2019 annual average tight oil production increased more than ninefold from 0.83 mmb/d to 7.75 mmb/d. By 2019 fracking accounted for 63% of 12.3 mmb/d average domestic output compared with 15% in 2010. This year shale output retreated to average 7.39 mmb/d between January and September, but still represents 65% of total production.

Shale production is typified by high initial production and rapid decline rates. That means output falls when the pace of drilling slows as it did this year. A 65% retreat in drilling rigs deployed to shale basins between December 2019 and October 2020, left declining wells outpacing new production (see our August note: [What if Shale Doesn't Recover?](#)). The EIA's monthly Drilling Productivity Report, or DPR, forecasts declining output from old wells will exceed new production in the final quarter of this year and the trend will likely continue next year. With drilling budgets largely on hold and shale basins the dominant U.S. production resource, the EIA's November Short Term Energy Outlook forecasts annual average U.S. crude output at 11.1 mmb/d in 2021, down from an estimated 11.39 mmb/d in 2020.

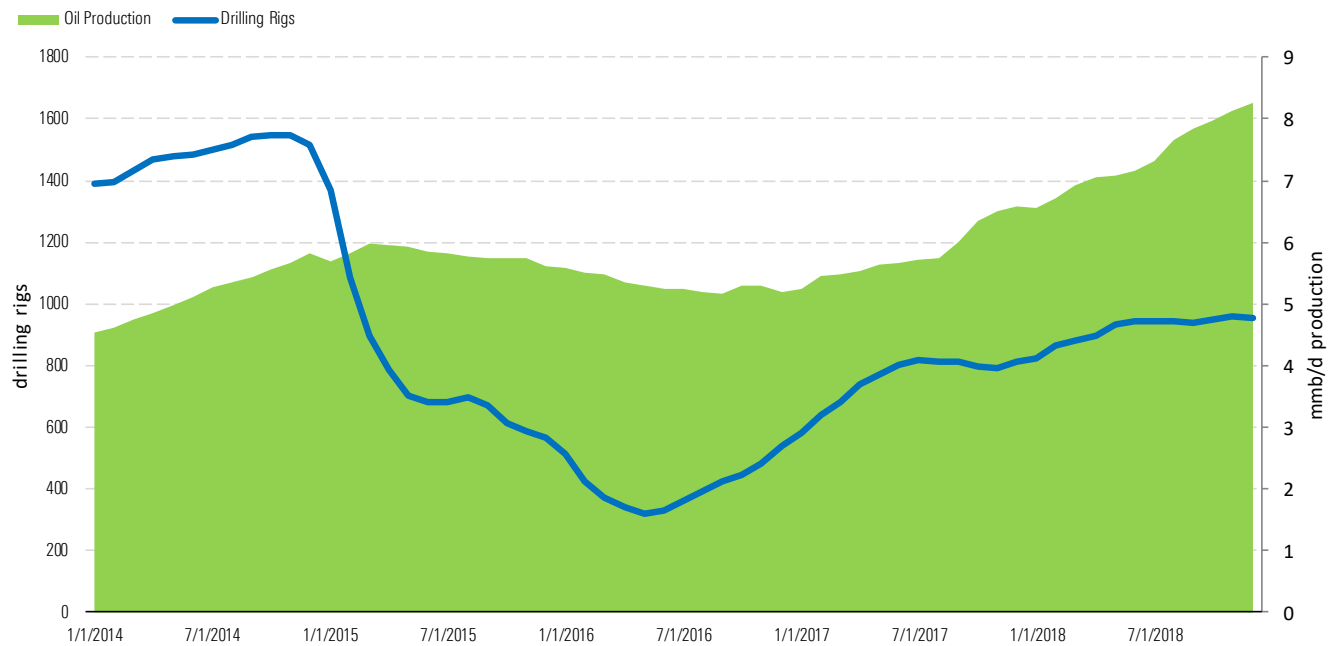
Most commentators agree that shale output will decline next year, but doubt remains over whether the downward trend will continue after 2021 or if a recovery can revive the industry as happened after the first shale bust ended in November 2016.

First Bust

That first shale bust was less dramatic than this year's price and production crash. It began in 2014 as booming shale crude output pushed out U.S. imports, starting a global glut that pressured prices down.

U.S. benchmark crude West Texas Intermediate peaked at a monthly average \$105.15/barrel in June 2014 before retreating to a low of \$30.61/barrel in February 2016. OPEC members initially refused to protect prices in the belief that rival shale producers would be wiped out by lower returns. According to the DPR the number of rigs deployed in shale basins peaked four months after prices at 1,549 rigs in October 2014, then fell 80% over the following 19 months to 317 rigs in May 2016. Production peaked at 5.97 mmb/d in March 2015, nine months after prices began falling, then lost 0.8 mmb/d to bottom out at 5.17 mmb/d in September 2016. The bust lasted 20 months before the OPEC+ producer group agreed to output cuts in November 2016 that kicked off higher prices, new shale drilling and ultimately a second shale boom (Exhibit 1).

Exhibit 1 Shale Basin Oil Production and Rig Count 2014-2018



Source: EIA, Morningstar.

Rebound

After the first shale bust, monthly average prices never recovered above \$100/barrel—peaking at \$70.76/barrel in November 2018. The number of drilling rigs deployed never recovered from the bust, peaking since then at 958 rigs in November 2018. But after the downturn, shale producers increased productivity and efficiency—allowing them to drill for and produce more oil at lower prices, using fewer rigs. Shale production recovered above previous record levels in September 2017, 12 months after hitting a low of 5.17 mmb/d.

Second Bust

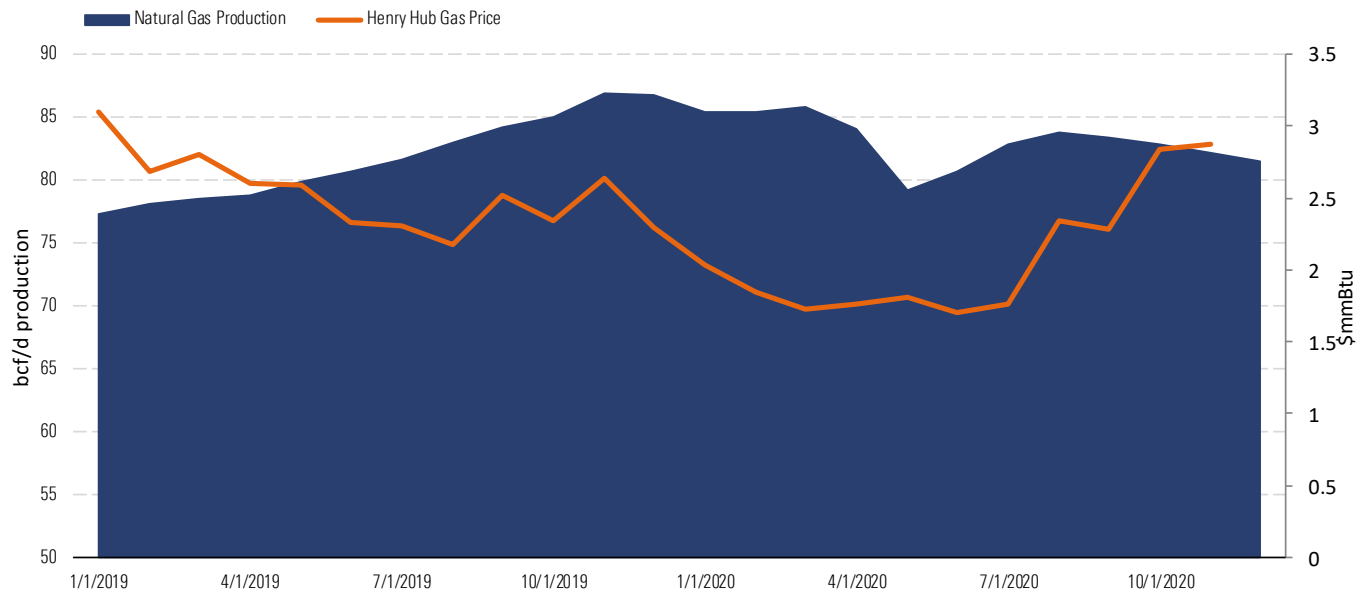
The second shale boom ended in November 2019 when production peaked at 9.16 mmb/d, 13 months after WTI prices peaked at \$70.76/barrel. The crash came suddenly compared with the slow-building

2015 event, starting with the collapse of the OPEC+ agreement in February 2020 and worsening when the coronavirus pandemic caused a worldwide lockdown that destroyed demand for transport fuels at the end of March. A dramatic price collapse for May delivered WTI futures at the end of April (see our April note: [Crushing Cushing: Wider Impact of Negative Crude](#)) caused producers to shut-in wells and slash drilling activity in fear of negative prices. As a result, shale basin crude output tumbled 26% from its December 2019 peak to 6.8 mmb/d and prices fell 76% from their peak to average \$16.70/barrel in May 2020. By August 2020 736 rigs, amounting to 77% of the shale fleet, had been pulled out of service.

Recovery from this second shale bust began almost immediately. Outside the U.S. the OPEC+ partners quickly agreed to a huge 9.7 mmb/d reduction in crude output during May and June, later tapered to 7.7 mmb/d in August. Prices for WTI crude rebounded relatively quickly to average \$42.39/barrel in August as a result of output cuts and OPEC+ cutbacks. U.S. crude production saw an initial recovery between June and September as producers brought shut-in wells back online. However, as noted above, a shale drilling slowdown undermines a recovery because high decline rates overcome lower new production. That means shale oil production will continue to decline in 2021. According to EIA monthly data, overall U.S. crude production continued to recover through September to 10.8 mmb/d but a record Gulf Coast hurricane season causing offshore production volumes to fluctuate, making it harder to read the trend.

Resilient Gas

One upside for shale producers has come from higher demand and prices for natural gas. Prior to this year, monthly average natural gas prompt prices for the U.S. benchmark, Henry Hub Louisiana CME Group futures contract, fell consistently from over \$4/million British thermal units in November 2018 to \$1.84/mmBtu in February 2020. COVID-19 lockdowns destroyed international demand and disrupted domestic usage causing prices to fall to an average \$1.70/mmBtu in June. Since then, gas prices have staged a recovery to average \$2.87/mmBtu in November as domestic output fell, with shale oil cutbacks reducing associated gas production and Asian demand for liquified natural gas picking up. This rapid price recovery meant gas production in Appalachia, the Haynesville and the Permian Basin are all forecast to be higher in 2020 than they were in 2019, according to DPR data. After hitting a peak of 87 billion cubic feet/day in November 2019, gas output fell 9% to 79 bcf/d in May 2020 but DPR forecasts a recovery to 82 bcf/d in December, only 6% below last years' peak (Exhibit 2).

Exhibit 2 Shale Basin Natural Gas Production and Henry Hub Prices 2019-2020

Source: CME Group, EIA, Morningstar.

Export Recovery

The end of the first shale bust was marked by an OPEC+ agreement to curb output starting in January 2017. That agreement caused surplus crude inventory to draw down and supported prices high enough to encourage new shale drilling in the U.S. The second shale boom was also encouraged by Congress ending a ban on foreign crude sales except to Canada. Once crude exports were allowed it was easier to balance domestic output that increasingly consisted of light shale crude with refinery demand for the heavier crudes most plants are configured to process. Instead of discounting domestic shale crude to make it palatable to refiners, it could be exported to overseas markets and refiners could import preferred heavier grades. Exports increased from an average 0.6 mmb/d in 2016 to 3.0 mmb/d in 2019. Those exports took market share from the OPEC+ producers that had cut their output to support higher prices.

Barriers

This time around two barriers lie in the way of U.S. shale producers eclipsing previous output records. First is an investment environment that has soured on oil and gas production. The market value of oil and gas companies dropped by 57% between December 2019 and April 2020 as measured by the S&P Global GSCI Energy Index. Although valuations have rebounded since then, they are still down around 30% this year. Despite an economic environment where interest rates are at record lows, oil producers are reducing debt to protect their cashflow rather than investing in expansion. Industry consolidation has happened where larger companies like Chevron (Noble Energy) and ConocoPhillips (Concho Resources) buy up smaller stressed rivals, but these acquisitions are bargain hunting in a shrinking pool, not premium purchases with an eye to expansion. Larger, conservative players now dominate the

industry, intent on securing investment returns rather than record-setting production through innovation.

A second, related barrier to shale expansion is uncertainty about crude prices and demand in the short- and long term. In the short term the concern is COVID-19 and its impact on oil demand. Despite recent optimism over vaccines that bolstered oil prices in the latter half of November, the speed of any demand recovery remains unknown. Last week's OPEC+ decision to postpone all but 0.5 mmb/d of a planned 1.9 mmb/d expansion of their output will be a key influence on prices and increase the export market for U.S. crude.

Longer term, post-virus changes to commuter and business travel patterns may have consequences for the shape of any demand recovery. The coronavirus has altered perceptions about transport that could hasten the transition to alternative fuels, lowering overall demand and prices. The new Joe Biden Administration could impose limits on fracking or raise environmental costs. These questions weigh on prices and reduce drilling incentives.

Law of Decline

In this environment, positive prospects for a U.S. shale oil recovery are at best a long-term consideration. Assuming oil and gas exploration and production is subject to budget constraints today, the law of decline dictates that supplies will tighten in future. When that happens, oil prices will increase to a point somewhere above \$50/barrel, where returns from drilling are compelling to investors. In that case shale drilling is attractive because of its lower risk and speed to production. Shale supplies from basins like the West Texas Permian are close to market and can take advantage of adequate delivery infrastructure developed in the final throes of the second shale boom.

It's possible that scenario won't arise before the transition away from oil reduces the urgency of replacing declining oil supplies. And if shale drilling and production do recover, they may never surpass the 12.2 mmb/d record monthly output set in December 2019. Either way we'll have to wait until at least 2022 to find out. ■■

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