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MACROCOSM

The Mighty DUCs Are Gone

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The fracklog has been exhausted everywhere but the Permian. Time to drill – but will they?

US oil production continues to be irrelevant to global intersection of demand (returning as the world economy emerges from pandemic lockdowns) *and supply* (at the margin, at the whim of OPEC+, with 5.5 million barrels per day of spare capacity). *Both global factors are unpredictable, while at home the political climate worsens for the industry. We think this is decelerating what could have been a more rapid and widespread recovery of US production, with the long-term implication that oil prices are likely to be higher longer.*

- What are domestic producers to do in this political environment?
- The Biden administration is raising the cost of production by trying to change the tax code to accrue $35 billion from oil and gas companies annually; and reducing pipeline throughput thereby increasing transportation costs. Meanwhile the administration has just financed a new pipeline in Iraq through an overseas lending facility and calls on OPEC to increase oil production. Iran is saying nuclear talks are on again with the US.
- So oil and gas companies that have international opportunities likely view economics abroad as relatively more favorable, preferable at the margin to developing assets at home. For example Exxon Mobil announced they will cut their investment in the Permian by 40% over the next four years while leaving their CAPEX for Guyana and Brazil unchanged. They will be growing production overseas that could easily have been grown in the US. And Royal Dutch Shell just sold its Permian assets to ConocoPhillips.
- Most of the shale players are entirely domestic operators, so they don't have those competing global opportunities. But they will need to think carefully about how the higher cost of production impacts volumes. They will likely raise CAPEX budgets more slowly than we originally expected in order to read the tea leaves (see "No, We Still Don't See $100 Oil" July 6, 2021).
- With that said, independents, smaller publicly-traded shale players, and privately owned oil and gas companies will grow domestic production going forward, albeit more slowly than previously forecasted (see. Among others, "Shale Survives, and May Soon Thrive" December 8, 2020).

Update to strategic view

OIL: US shale producers face political headwinds, and the uncertainty of arbitrary control of prices by OPEC+ while uncertain demand faces enormous cartel spare capacity. Post-pandemic production growth has come predominantly from completions of drilled but uncompleted wells. The "fracklog" has now been exhausted in all shale plays but the Permian – and all it's achieved has been flat-line production following the initial surge from the pandemic lows. Today's high prices for oil and gas are attractive lures for CAPEX investment operators so far has not been willing to make. Those prices are bad news for the party in power, so after the 2022 midterms, the political headwinds could ease. In the meantime, operators who can look outside the US are doing so, and those trapped in the US are taking a wait-and-see attitude. We are lowering our US production forecast for end-2022 from 13 million barrels per day to 12.5 million.

[Strategy dashboard]

- Every shale play has its own problems. Tax changes in Oklahoma, pipeline issues with the Bakken and political policies against drilling in Colorado cloud their futures. *Other than in the Permian, it is unlikely that production will get back to pre-pandemic levels unless pricing stays at today's levels and higher to justify the costs and risks. To be sure, at the margin our more gloomy outlook on production growth itself argues for high prices. But that is far from assured, considering that ultimately it is at the unpredictable whim of OPEC+.*
- After recovering sharply from their pandemic lows, volumes have rebounded is most shale plays, yet remain well below their pre-pandemic highs (please see the table below). The Permian is the closest to full recovery.

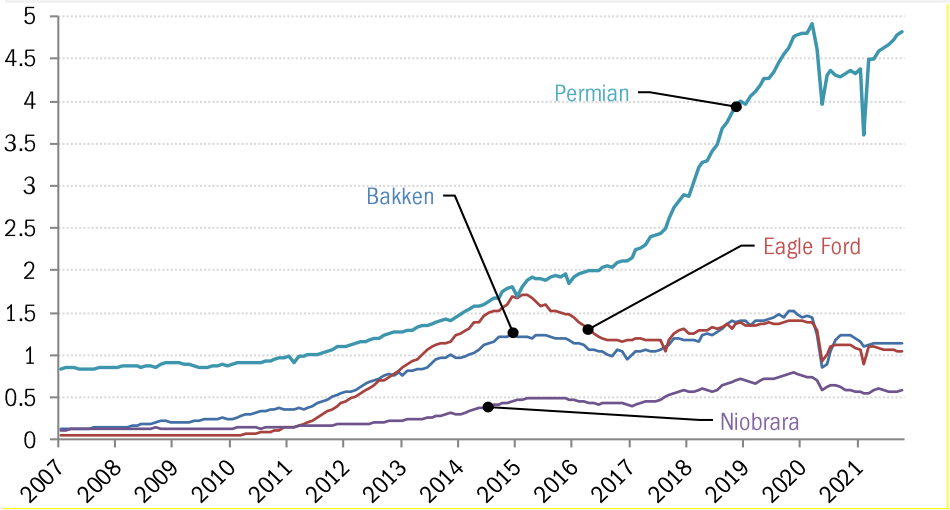
US shale crude oil production dynamics around the pandemic

	Pre-Pandemic High	Pandemic Low	Current Production		
	MMb/d	MMb/d	MMb/d	vs. high	vs. low
Anadarko	0.61	0.31	0.37	-24%	+6%
Bakken	1.53	0.86	1.14	-39%	+28%
Eagle Ford	1.41	0.93	1.05	-36%	+13%
Niobrara	0.80	0.55	0.58	-22%	+6%
Permian	4.91	3.96	4.83	-9%	+87%
Total Shale	9.26	6.64	7.97	-129%	+134%

Source: DOE IEA, TrendMacro calculations

- The Permian is also the only play where the volume trajectory is currently doing anything but flatlining after the initial recovery from the pandemic bust and then the Texas freeze (please see the chart below, and updated monthly in "Data Insights: Oil").

Crude oil production in US shale regions Million barrels per day



Source: DOE IEA, TrendMacro calculations

- That generally poor performance in production recovery has come, in large part, from completion of drilled but uncompleted

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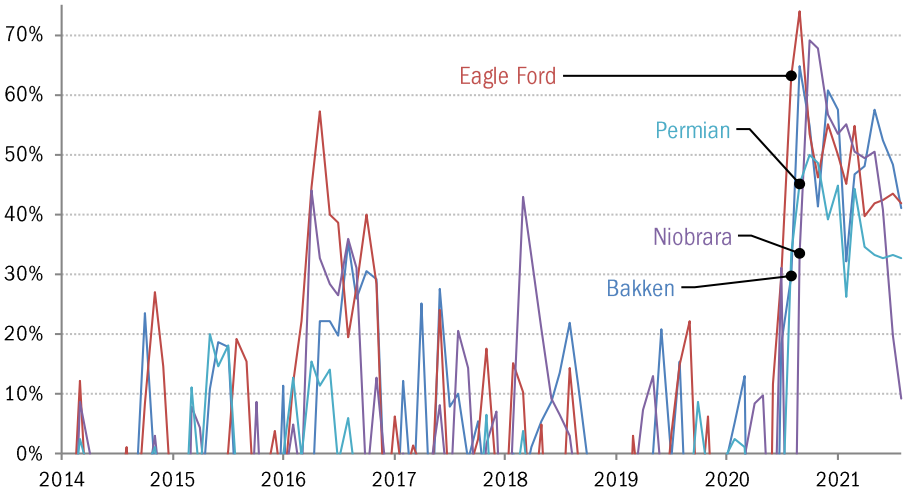
wells – the “fracklog.” Since the pandemic, the share of completions attributable to DUCs (as opposed to newly drilled wells) has been the greatest in history, on a sustained basis (please see the chart below). The previous high for such completions was across 2016, the year of the OPEC-driven shale bust, another period in which producers thought it wisest to conserve CAPEX.

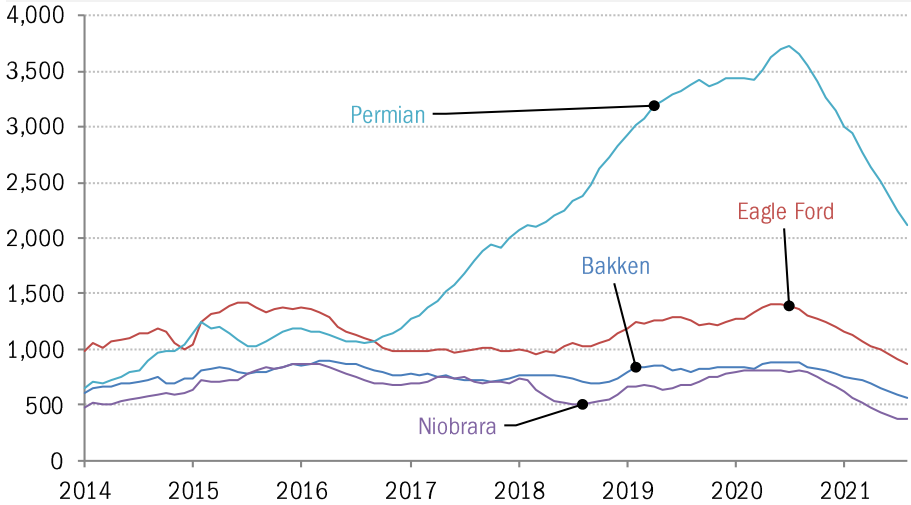
Completed DUCs as a share of total completions



Source: DOE IEA, TrendMacro calculations

- But this can’t go on forever – there are only so many DUCs, and then more new wells have to be drilled. Except for the Permian, DUCs have been drawn down to below where they started in 2018, before the two glory years in which shale drilling flourished as the US was pulled out of the Iran nuclear deal, briefly becoming the world’s largest crude producer (please see the chart below). The Permian started with the biggest fracklog, and added

Drilled but uncompleted wells

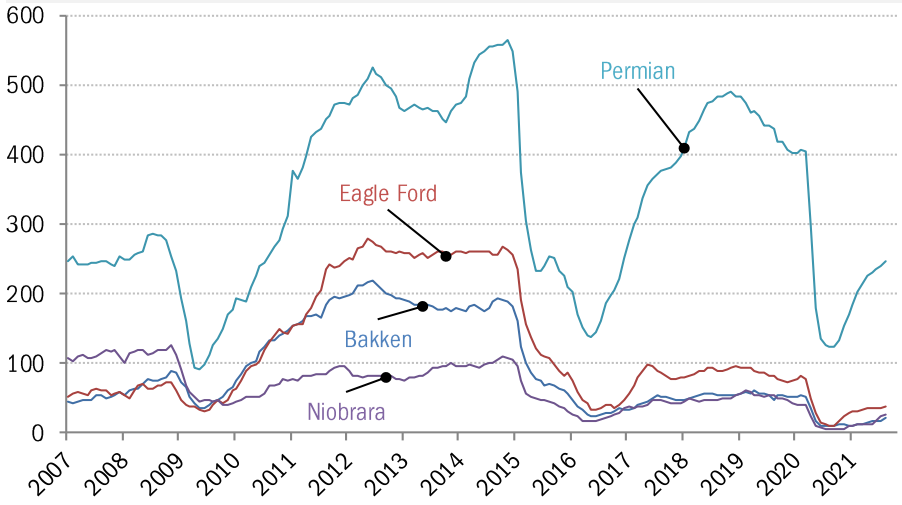


Source: DOE IEA, TrendMacro calculations

to it the most until the pandemic. Now it's the only play with more than 1,000 left. The others now have the fewest DUCs in the history of the data.

- So far rig counts have doubled or trebled from the pandemic lows. But they remain miniscule across the shale plays other than the Permian (please see the chart below). That's been tolerable so far because the DUCs were there – now, other than the Permian, they are effectively gone. It's crunch time: *if production is to grow, it's going to be from drilling – and that's expensive, just when producers don't want to invest the CAPEX*.

Rigs



Source: DOE IEA, TrendMacro calculations

- At the moment, high oil (and gas) prices – while alarming to those worried about inflation, and about the implications for re-opening the global economy – are at levels which (if sustained) cause the economics of new drilling to make some sense. And, in the fullness of time, high prices likely ease some of the political risk the producers face. After all, rising energy costs are not favorable to the party in control, so next year's mid-term elections could have severe consequences for the anti-fossil fuels Democrats in the House and the Senate.
- *The best case is the Permian – which is also by far the dominant shale play, and the largest single factor in US crude production.* Under our model, operators in the Permian need to complete about 320 wells per month to maintain production. Since the February freeze in Texas completions have run about 390. With 70 more completions than needed to hold production steady, Permian volumes are nearing their all-time peak.
- Equally important is the rate of production per completion. Since the February freeze, production per completion has been running at about 744 barrels per day in the Permian, slightly lower than the 2019 average of 755 barrels.
- Permian rigs have more than doubled to 259 from a low of 123 a year ago, but are far below the 2019 average 442. Rig efficiency is 8% lower than the 2019 average. In 2019, on average, Permian

operators spudded – that is, initiated drilling – about 1.2 wells per month per rig. In 2020 rig efficiency slipped to as low as one well per month. Since the February freeze, rigs are averaging 1.1 wells per month and moving higher.

- Shale spuds don't produce oil and gas but must be drilled before completing a well and getting production. Since the February freeze, about 260 wells are spudded each month and 390 wells are completed per month, which has more than fully replaced Permian legacy lost production, growing net production to near the pre-pandemic high.
- We expect the Permian rig count to rise to 320 and drilling efficiency to marginally increase to 1.2 wells per rig over next 12 months. Permian production can grow to an all-time high – surely before this year is out – and the inventory of DUCs can start to be rebuilt next year.
- The rest of the US shale plays may never do so.
- Will Permian production growth be enough to compensate for smaller plays? Of course not. It may end up exceeding some past high-water mark for overall shale production, but that level has to be lower than what it would be if all the shale plays were growing.
- For now, given the evident reaction in the industry to political headwinds, we have to lower our forecast of overall US production by the end of 2022 to 12.5 million barrels per day, down from our earlier estimate of 13 million (see "$100 Oil" May 28, 2021).

Bottom line

US shale producers face political headwinds, and the uncertainty of arbitrary control of prices by OPEC+ while uncertain demand faces enormous cartel spare capacity. Post-pandemic production growth has come predominantly from completions of drilled but uncompleted wells. The "fracklog" has now been exhausted in all shale plays but the Permian – and all it's achieved has been flat-line production following the initial surge from the pandemic lows. Today's high prices for oil and gas are attractive lures for CAPEX investment operators so far has not been willing to make. Those prices are bad news for the party in power, so after the 2022 midterms, the political headwinds could ease. In the meantime, operators who can look outside the US are doing so, and those trapped in the US are taking a wait-and-see attitude. We are lowering our US production forecast for end-2022 from 13 million barrels per day to 12.5 million.