



RystadEnergy

Whitepaper:

US shale industry bottlenecks linger, weigh on activity despite capacity additions

Top drillers still hold cold-stacked capacity that can be refurbished or upgraded

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The US shale industry has been struggling to cope amid an expansion in activity, with bottlenecks across all five major segments, which will linger in 2023.

Much like the broader global industrial sector, supply chain bottlenecks have been an ongoing theme in the oilfield services space since 2021. Brought on by the mass deactivation of equipment due to the Covid-19 pandemic and a lack of investment, these headwinds have hindered growth in overall activity and production levels. Amid a surge in inflationary pressures, driven by higher fuel and raw material costs, oilfield services have struggled to cope with the sudden spurt in demand from US shale operators keen on expanding activity to cash in elevated energy prices. Nearly three years out from the drawdown in 2020, reactivations and new builds continue in both the drilling and completions sector as many look to improve revenue and margins, with commodity prices remaining high to support healthy activity levels through

2023. Even so, lead times for frac equipment new builds remain roughly a year out as the cold-stacked inventory dwindles down. Adding to the pain many oilfield service companies face in the form of labor and equipment lead times is the still prevalent cost inflation considerations. In this commentary, Rystad Energy breaks down the US services industry into five key areas:

- Drilling
- Pressure pumping
- Proppant
- Labor
- OCTG

and explores how each segment has grappled with bottlenecks thus far and when some relief and expansion is to be expected.

Figure 1: The five bottlenecks in the US Shale industry



With high demand for super-spec rigs and limited inventory, rig day rates have soared to more than \$30,000 per day. The rig market will continue to see price inflation next year unless demand stabilizes.

The drilling business is experiencing a very high level of utilization across the US lower 48 region, with **demand for super spec drilling rigs expected to remain robust through 2023**. Currently, much of the existing super spec equipment is already deployed. It is progressively being tied to longer-term contracts as operators seek surety of supply for their upcoming drilling programs. These conditions have led to a continuous increase of leading-edge base day rates for super-spec rigs, which are now firmly testing the mid to **high \$30,000 per day range**.

Drilling contractors are moving more equipment to long-term contracts versus the spot market as leading-edge rates are providing stronger returns.

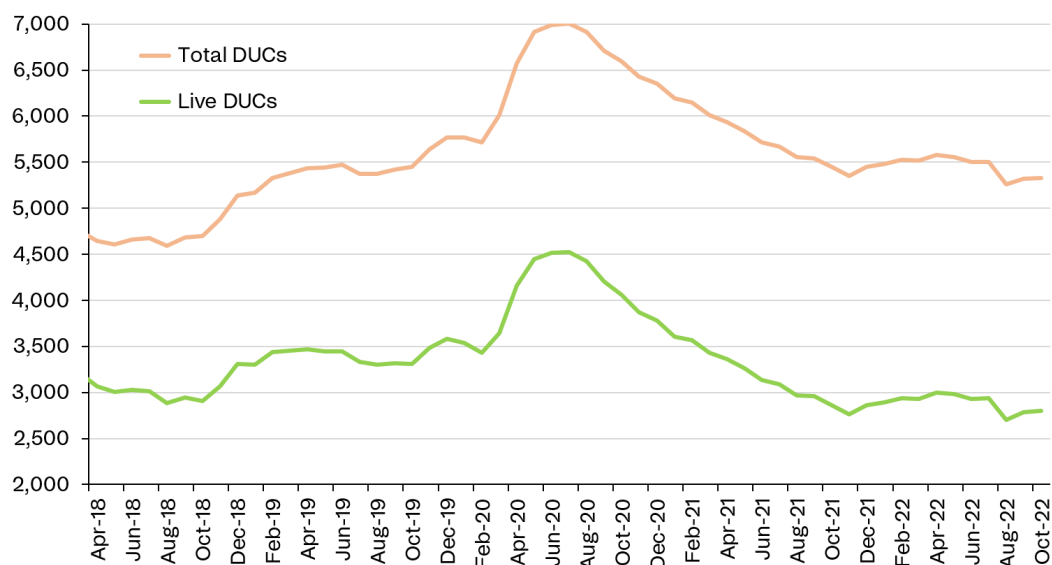
Typical arrangements for rig reactivations or upgrades require the operator to cover the upfront capital cost and sign near leading edge rates for multi-year contracts that may include price escalation. **The pace of reactivations or upgrades is expected to slow in 2023** as upgrade costs climb further, with equipment requiring the least amount of additional expenditure already getting deployed. The challenge of staffing new rigs in conjunction with rising reactivation and upgrade costs will ensure the rig market remains highly utilized through the short to medium term.

Signing two-year contracts to secure rigs are becoming an increasingly common feature, marking a turnaround for a business that for years was happy to offer up equipment for much shorter durations to improve utilization. Instances of three-year contracts have also been reported by some drilling contractors. These contracts often have six month or one year pricing escalations built in to fend off any future inflationary concerns, while also offering the drilling contractor clarity on the returns. As demand for incremental super spec rigs continue to rise in 2023, with existing equipment nearly all spoken for, **additional capacity will likely come from cold-stacked equipment** that can be easily reactivated or upgraded to a super spec class.

The frac market in North America is sold-out, and frac pricing has been soaring to more than \$10,000 per pumping hour. In light of the situation, the market remain tight, though to a lesser degree than 2022.

With the US horizontal rig count now above 700, the inventory of live drilled uncompleted (DUC) wells – or wells drilled less than two years ago – has begun to stabilize. This remains a leading indicator of overall shale completion activity. The stability, however, is also telling on active frac fleet deployments and explains why there hasn't been a significant build-up of live DUCs. Through the first half of 2022, the DUCs build was essentially brought on by a lack of horsepower as many private operators failed to secure completion crews. This trend has recently changed, however, as the fleet count continues to tick upwards, with **275 active horizontal fleets** currently deployed and additional reactivations and new builds set to enter the market for 2023.

Figure 2: Total and live* DUC inventory in major oil regions by month**
Number of wells



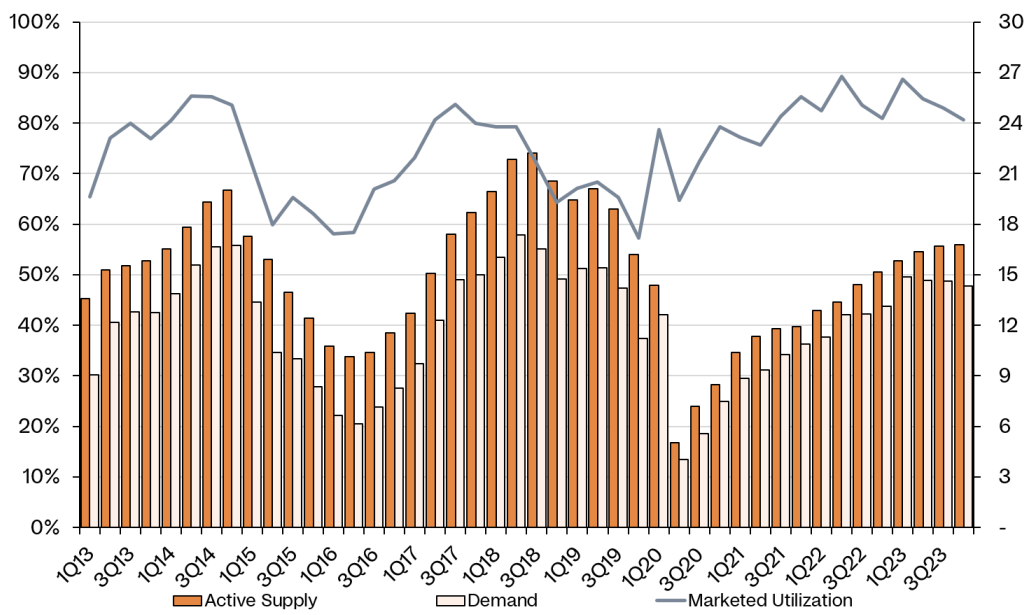
*Includes all horizontal wells which are not classified as abandoned and viewed as good completion candidates in future
**Permian, Eagle Ford, Bakken, Niobrara and Anadarko
Source: Rystad Energy ShaleWellCube

Bottleneck 2: Pressure pumping

However, **horsepower availability** will also afflict private operators who have been unable to secure fracking capacity through the first half of 2022. Some argue that a possible overbuild cycle is approaching as many pressure pumpers continue to activate but not replace fleets despite guidance through their earnings calls. Rystad Energy has even observed several diesel fleet reactivations and acquisitions, which have been justified given the current pricing levels. Even so, the high attrition of legacy fleets deployed warrants additional retirement, which is largely expected in 2023, that will, in turn, **keep the market tight, though to a lesser degree than 2022.**

Figure 3: US Land Horsepower Marketed Utilization

Utilization vs million hydraulic horsepower (HHP)



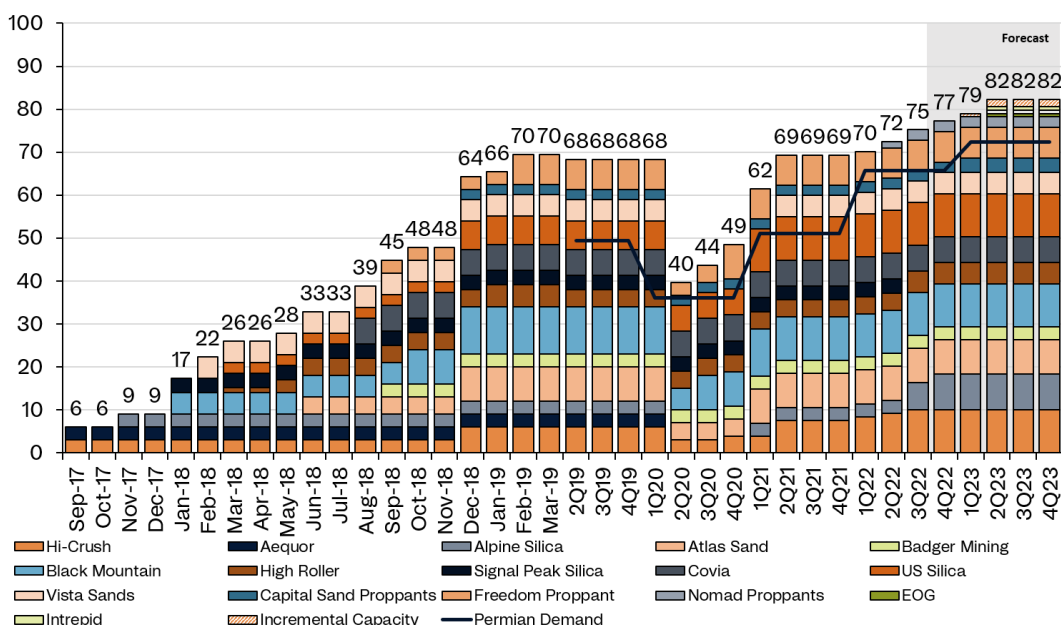
Source: Rystad Energy ShaleWellCube; Rystad Energy research & analysis

Rising demand for oil and natural gas has turned the proppant market from being oversupplied to undersupplied, creating a third bottleneck.

The proppant market has recorded **high utilization rates** as in-basin frac sand providers struggle to meet robust demand. In addition to the overall levels of demand remaining elevated, an expansion in the size of wells is further adding to demand. Frac sand consumption per well reached an all-time high in the Permian Delaware region at **23 million pounds**, while frac sand intensity in the Delaware is 19% higher compared to one year ago. During this time of demand expansion, all regions have shown remarkable discipline in keeping additional capacity limited, even as in-basin prices reach

near all-time highs. The Permian remains an exception, however, where Rystad Energy is tracking over 8 million tons in additional supply through brownfield expansions and greenfield mines. Rystad Energy is confident that an additional 8 million tons can make it to the market by the end of 2023, though any increase in capacity on top of that will be difficult to achieve in 2023, given the significant lead times. Staffing the expanded capacity once it is completed may also prove to be a challenge, resulting in a slow build up to reach full capacity amid labor shortages.

Figure 4: Permian in-basin nameplate frac sand supply vs. Permian demand
Million tons



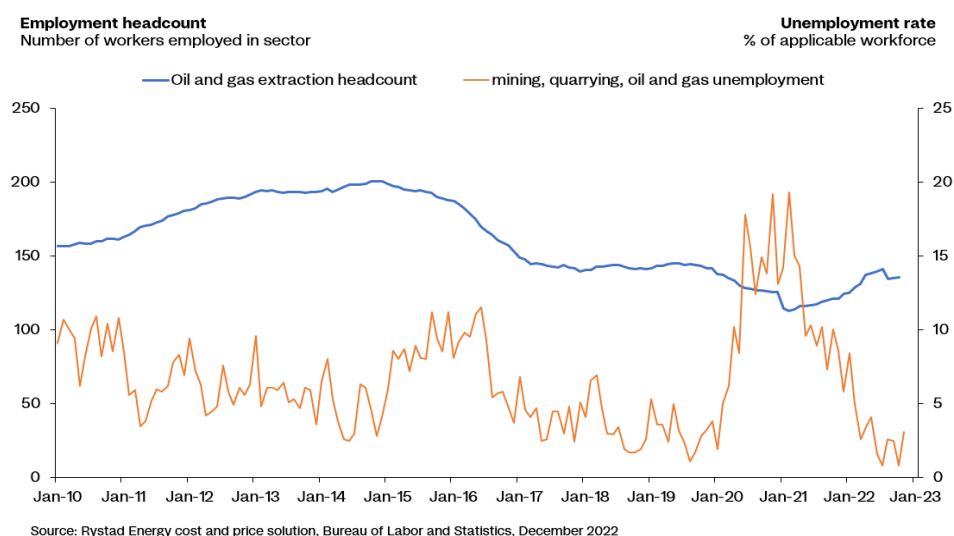
Source: Rystad Energy research and analysis

A near 50-year low for US unemployment and a record-high number of job vacancies has challenged the oil and gas industry to compete for labor, resulting in bottlenecks and higher costs for both operators and suppliers.

Labor has been a key pain point for OFS companies all through this upturn and is expected to remain a bottleneck well into 2023. Despite the successive interest rate hikes by the US Federal Reserve, intended in part to cool a heated US labor market, **unemployment** in the broader US economy and specifically within mining, quarrying, and oil and gas extraction **space remains at historically low levels**. Job vacancies across the broader economy, despite falling 10% from their highs in March, remain 50% higher compared to the 2019 yearly average. Unemployment across all industries still hovers at 3.7%, equating to roughly 6 million people, nearly 4 million less than the number of

job openings being reported by the Bureau of Labor and Statistics. Within oil and gas, labor shortages continue to remain acute. Unemployment within the sector has only fallen to below the current 0.8% rate once previously, in October 2005, since the time the data began being reported in January 2000. Because of these shortages, employers have had to increase wages to attract more talent to reach full capacity amid labor shortages. We anticipate **wage growth for oil and gas positions to continue in the 5-10% range in 2023** as activity increases further amid a historically low number of oil and gas workers currently on the sidelines.

Figure 5: US oil and gas extraction headcount (LHS); mining, quarrying, oil and gas extraction sector unemployment rate (RHS)



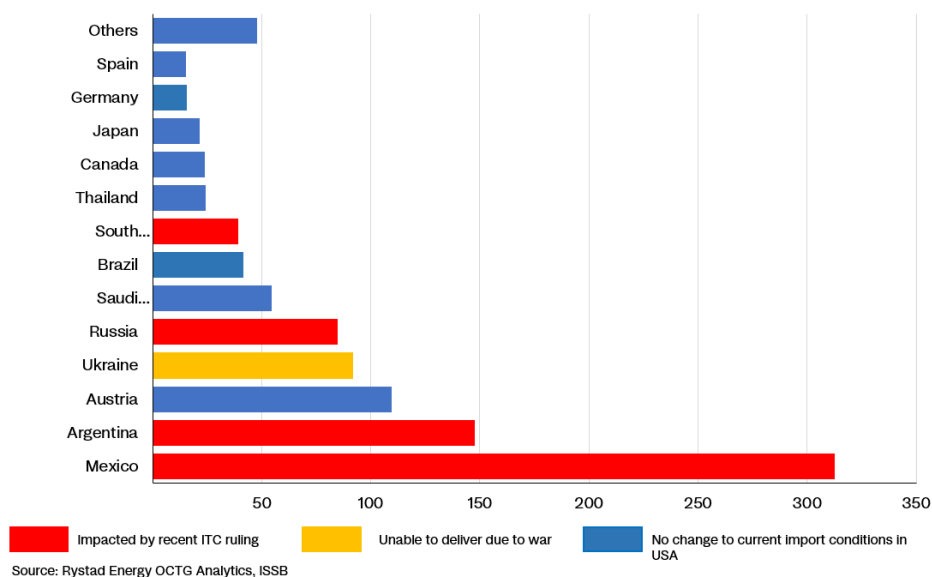
Domestic mills struggle to satisfy the demand of OCTG as prices soar. The sector is facing extremely low inventories for several tubing and stainless OCTG products, which will remain a challenge in 2023.

Procurement of oil country tubular goods (OCTG) such as casings has been a major challenge for E&Ps looking to expand their drilling programs over the course of 2022. Supply from domestic mills has been tight through the year, worsened by a combination of fast-recovering demand, a time lag for capacity expansion, and raw material price fluctuations. The nature of challenges for procurement has evolved. Early bottlenecks were largely driven by **extremely high raw material costs** on welded goods at the beginning of the year, in addition to reduced capacity as the Omicron variant spread throughout the US, impacting casing availability. This evolved following Russia's invasion of Ukraine in late February, where

concerns around securing raw materials led to a major increase not only in the cost of hot-rolled coils, which had receded in the preceding weeks, but hot briquetted iron and steelmaking materials in the US. This arguably reduced the pace of US domestic production growth compared to expectations at that time. As the conflict endured, seamless tubing supplies from Ukraine's Interpipe essentially dried up at the same time as demand for rigs rose amid a steady recovery in oil prices. We expect **OCTG procurement to remain challenging in 2023**, representing a key bottleneck which is likely to evolve further before prices retreat closer to more standard levels.

Figure 6: Leading seamless OCTG exporters to the USA in 2021

Thousand metric tonnes



The way forward

Despite the challenges the industry faces across all major drilling and completions segments, **modest production growth is still forecast for 2023**. While 2022 has been a year plagued by bottlenecks and cost inflation, the industry has come a long way from the depths of the 2020 market crash. Though many would like to see a world free of constraints for US shale, perhaps the lid that has been kept on further growth through oilfield services bottlenecks has blessed the industry with **record high profitability and a stable price floor**. But as many of these bottlenecks sort themselves out in the

coming year, Rystad Energy offers a word of **caution to long-term contracts at current price levels**. While most public operators will continue to demonstrate discipline in spending and production growth, the operator landscape has significantly shifted largely in favor of private players who do not face the same pressures from investors and shareholders. Should the US onshore shale industry see further growth as bottlenecks alleviate, private operators may react swiftly to a dynamic commodity price environment, resulting in material drilling and completions demand destruction.

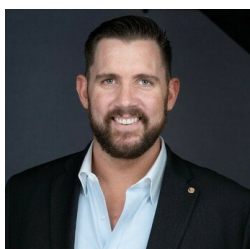


Get in contact

If you have any questions regarding the topics covered or would like to learn more about our solutions for the Shale industry and our supply chain offering, you can contact Thomas Parambil Jacob or Jordan Barnes directly.



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