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Drilling Productivity Report Supplement

With low rig counts, the inventory of drilled but uncompleted (DUC) wells provides short-term reserve for completions of new wells

September 2020



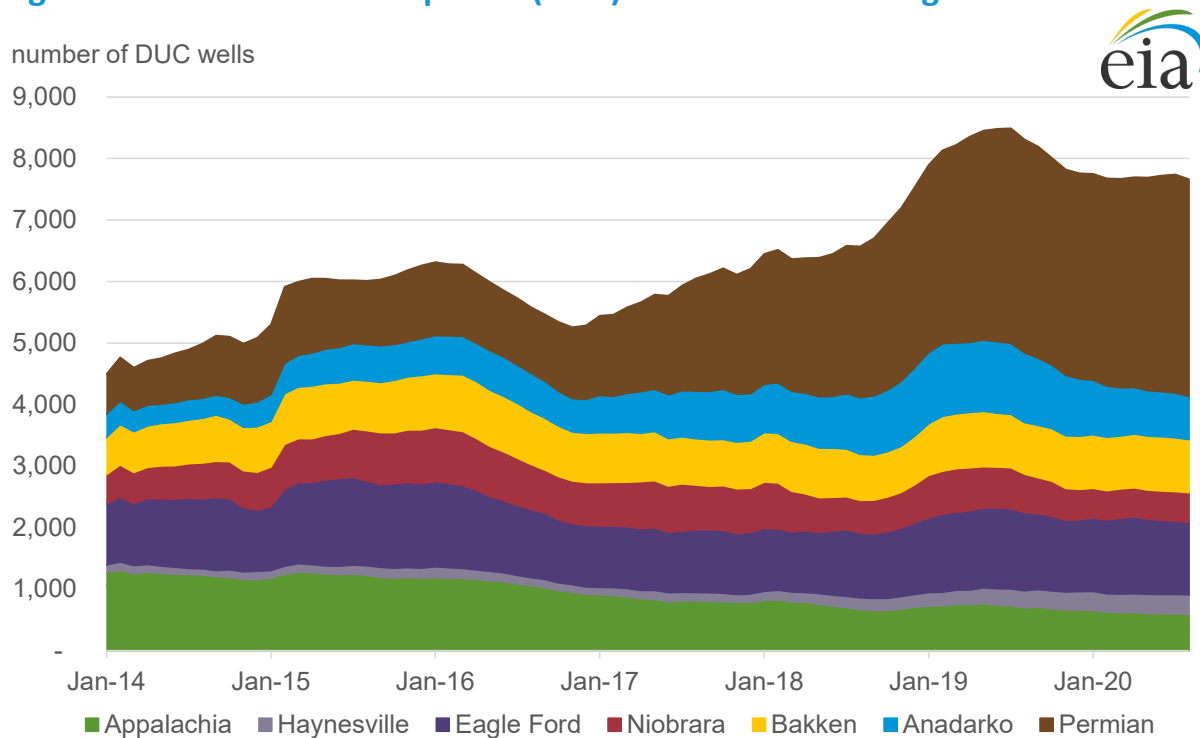
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With low rig counts, the inventory of drilled but uncompleted (DUC) wells provides short-term reserve for completions of new wells

U.S. crude oil production declined sharply in the first half of 2020. It declined 5.8% month over month in April and 16.6% in May, mostly as a result of declining crude oil demand and prices. Although U.S. oil production has been recovering since June 2020, rig counts remain near record-low levels. In contrast to the very low rate of new wells drilled in the past few months, the inventory of drilled but uncompleted (DUC) wells is relatively high. The current inventory of DUC wells may provide a sufficient supplemental supply of wells for completion and new production for the short term until drilling activities increase. This supplement to the [Drilling Productivity Report](#) (DPR) will review how DUC well inventory functions as a necessary buffer between drilling activities and oil demand.

The U.S. Energy Information Administration (EIA) publishes monthly updates to the DUC well inventory estimates in the DPR. The estimates of DUC well inventory in various regions since 2014 are shown in Figure 1.

Figure 1. Drilled but uncompleted (DUC) wells in the DPR regions



Source: U.S. Energy Information Administration, *Drilling Productivity Report* (DPR), September 2020

Oil and natural gas production from tight or shale formations contains two major phases:

- Phase 1, Drilling:** The drilling phase includes activities such as obtaining permits and deploying heavy-duty rigs to drill horizontal wellbores parallel to the geologic layers in the producing formation.

- Phase 2, Completion:** The completion phase involves hydraulic fracturing of the horizontal wellbore, a process that has become more specialized and costly with advanced fracturing techniques.

These two phases are often implemented independently; a crew from one company performs the drilling process and another crew from a different company performs the completion process. However, as illustrated in Figure 2, these phases are closely correlated to each other, and both can fluctuate in response to crude oil and natural gas market conditions, including demand and prices.

Figure 2. Monthly drilled and completed wells in the DPR regions



Source: U.S. Energy Information Administration, *Drilling Productivity Report (DPR)*, September 2020

The drilling process is increasingly managed using mass production operations, such as pad drilling, cube drilling, and multilateral drilling, to achieve higher cost efficiency in both the physical and contractual management of heavy-duty and fully automated drilling rigs. The completion process, on the other hand, remains flexible enough to provide specialized procedures to meet reservoir characteristics and the needs of producers.

A DUC well inventory is necessary to provide flexibility in coordinating the drilling and completion phases to avoid operational delays, especially because of the long-term advanced booking required for completion crews. Producers maintain a reasonably large DUC well inventory, equivalent to supply for several months, to ensure that they do not deplete the amount of drilled wells ready for completion.

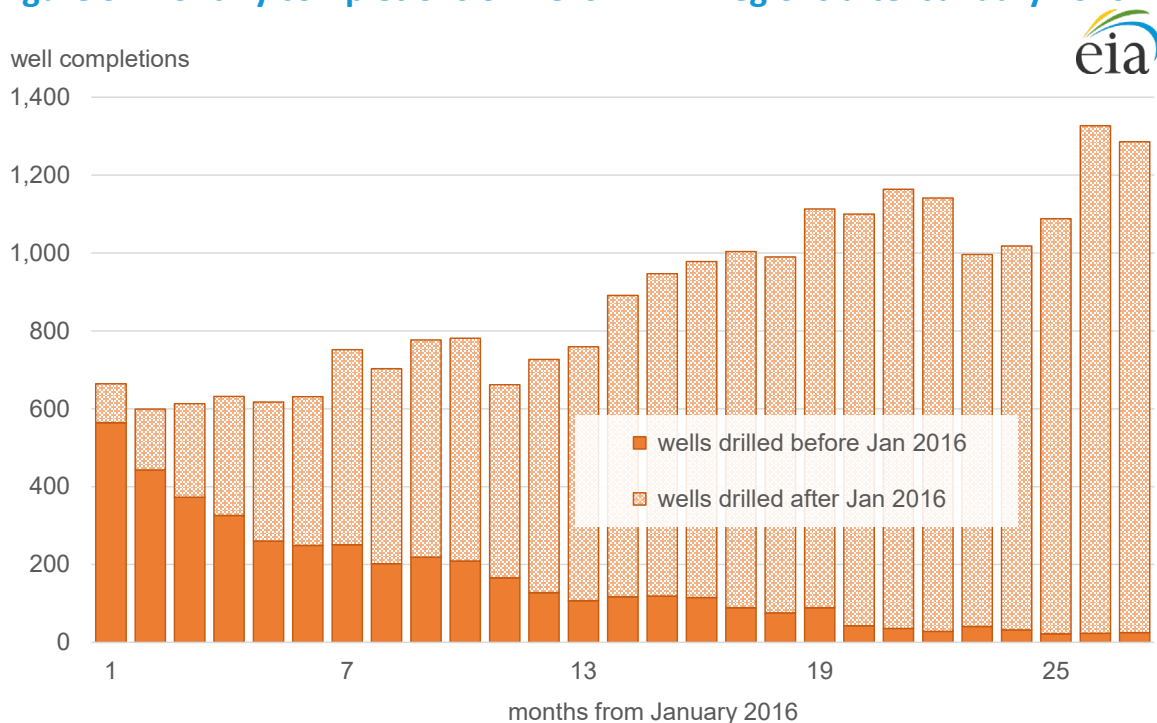
EIA estimates that most DUC wells are completed and delivered to production within about one year after they are drilled. However, the timeline and rate of completing wells vary based on oil and natural gas prices and corresponding completion activities.

In years when oil and natural gas prices and completions activities were low, such as 2016, the DUC inventory provided a considerable buffer to ensure that producers did not run out of new wells despite a lack of new drilling.

For example, according to the September 2020 DPR update, the DUC inventory as of January 2016 contained 6,317 wells, which would have provided supply for completion for more than 10 consecutive months at the January 2016 rate of 600 wells per month, assuming no new wells had been drilled over that period. In practice, after January 2016, producers completed not only the DUC wells but also a portion of the newly drilled wells. Therefore, the completed wells comprised a mixture of existing January 2016 DUC wells and new wells drilled after January 2016. As a result, some January 2016 DUC wells remained uncompleted for much longer than 10 months. DPR calculation shows it took 16 months to complete 60% of wells in the January 2016 DUC inventory.

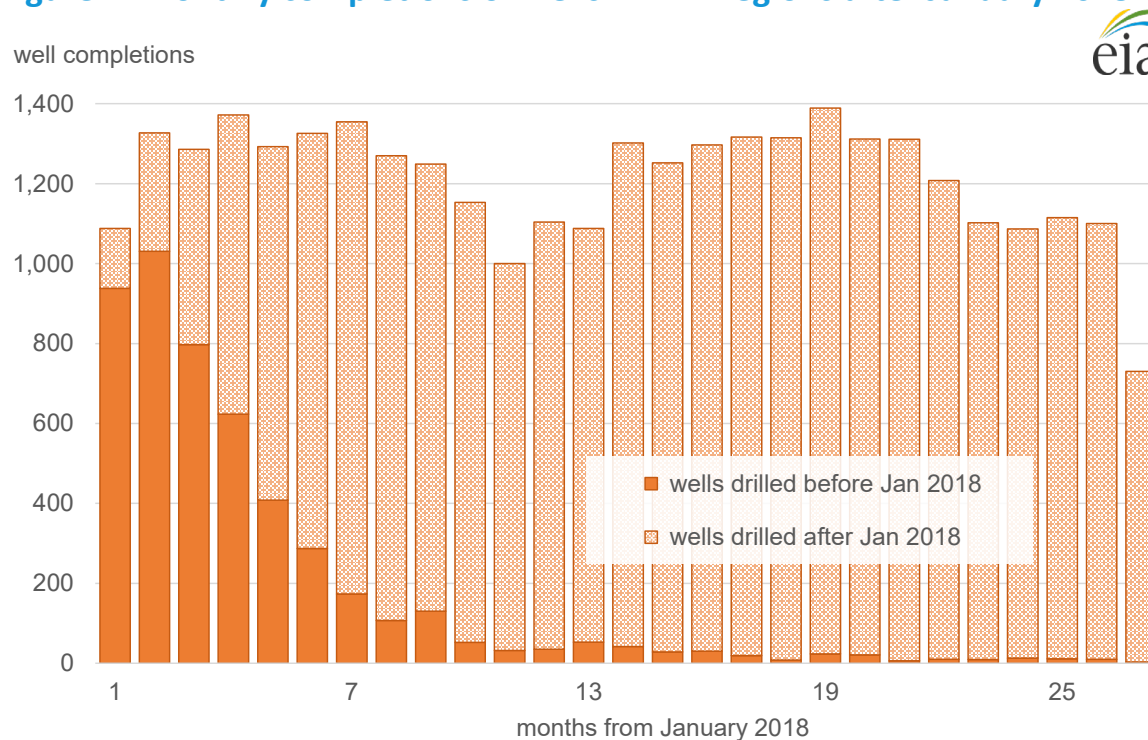
In Figure 3, for each month after January 2016, the number of January 2016 DUC wells completed is shown in the solid bars, and the number of newly drilled wells completed is shown in the patterned bars.

Figure 3. Monthly completions of wells in DPR regions after January 2016



Source: U.S. Energy Information Administration, *Drilling Productivity Report (DPR)*, September 2020

Contrary to 2016, in a year when oil and natural gas prices and completions activities were higher, such as 2018, the DUC inventory provided a supply of wells for fewer months. According to the September 2020 DPR, the DUC inventory as of January 2018 contained 6,448 wells, which would have provided supply for completion for only six consecutive months at the January 2018 rate of 1,000 wells per month, provided no new wells were drilled during that period. DPR calculations show that it took only six months to complete 60% of the January 2018 DUC well inventory (Figure 4).

Figure 4. Monthly completions of wells in DPR regions after January 2018

Source: U.S. Energy Information Administration, *Drilling Productivity Report (DPR)*

DPR September 2020 estimates show the August 2020 DUC inventory has more than 7,600 wells, which could cover the current very low completion rate of 369 wells per month for 20 consecutive months, provided no new wells would be drilled and the low completion rate would not change.

Although completing DUC wells requires less incremental capital to bring a well to production, not all DUC wells will be completed if oil prices remain low. EIA expects that 10% to 30% of the current DUC well inventory may require significantly higher oil and natural gas prices for producers to complete them. If prices remain low, many DUC wells may remain uncompleted for years. Currently, DUC wells that are several years old may be less attractive completion candidates because they have less exposure in the target formation or generally have lower reservoir quality. However, if oil and gas prices are sufficiently high, such weaknesses in older wells could be offset by new and advanced completion technology such as more efficient perforation and hydraulic fracturing and a larger amount of proppant to achieve higher production.

Production implication

If the low rig counts and slow completion activities persist, particularly in the major crude oil producing regions, EIA anticipates the supply of newly drilled wells ready for completion will be supplemented by the extensive current DUC well backlog in the relatively higher reservoir quality regions. Alternatively, if oil prices resume increasing significantly, the rig count will respond accordingly and quickly boost the remaining DUC well inventory with a large portion of newly drilled wells. In either case, the current DUC backlog can provide several months of backstop well supply for new-well completion. EIA expects that the inventory will supplement the newly drilled wells to provide a boost to new-well production as well as new-well production per rig in the coming months.