

HAYNESVILLE AND APPALACHIAN - GAS FOCUS

PREVIEW | FundamentalEdge Report | Sept 2020



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Introduction and Key Takeaways

- **HAYNESVILLE AND APPALACHIAN-GAS FOCUS** is the September 2020 installment of the Enverus FundamentalEdge Series. This report reviews upstream and midstream activity in these two key basins.
- Along with the overall economy, the energy industry was drastically impacted by the COVID-19 pandemic. Operators were forced to readjust their 2020 plans as prices fell due to oversupply in the market. These revised 2020 activity plans guided for reduced rig activity and reduced production outlooks from most operators, particularly those in oil-directed plays.
- The oversupply in the crude market and the subsequent price drop have lowered activity in crude directed plays. While this activity reduction is needed to help balance the crude markets, associated gas in these areas will also be taken off the market as a result. To offset the drop in associated gas dry gas plays will need to fill the gap, and this will require higher prices to incentivize production.
- The two main dry gas plays in the Lower-48 are the Appalachian, which is composed of the Marcellus and Utica shales, and the Haynesville in Louisiana and Texas.
- **Appalachian – Marcellus and Utica**
 - In terms of production, the Marcellus and Utica plays have held strong through the pandemic. Production dropped at the start of the year, and then dropped further in May as wells were shut-in. However, volumes have recovered to levels higher than the start of 2020.
 - While production in the Marcellus and Utica has battled through the pandemic, rigs have fallen as a result of COVID-19. That yields the question: How can production be up if new wells aren't being drilled? The answer is DUCs. The DUC inventory in the Appalachian has been drastically decreased as operators have chosen to complete wells that have already been drilled in the past, as opposed to running rigs and drilling new wells.
 - Rigs have fallen off in the Appalachian, but there are still rigs running and new wells being drilled. Production is expected to continue to climb in the Marcellus and Utica. The Mountain Valley Pipeline (MVP) is expected to come online in early 2021, which will add 2 Bcf/d of takeaway capacity to the region and send gas to the Transco Zone 5 region. Should MVP meet the same fate as the Atlantic Coast Pipeline, which was cancelled in early July, pipeline bottlenecks could be seen in the region as early as mid-2021. Enverus does not expect this to happen.
- **Haynesville:**
 - In 2020, Haynesville production showed some resiliency by growing through May while the rest of the US started to decline in April. However, since then, production has declined and currently is down 0.6 Bcf/d year to date.
 - With the drop in crude oil prices, higher natural gas prices are needed to make pure gas plays economical. Higher gas-directed production will offset the production losses from associated gas in order to meet demand in the US. As production grows, additional takeaway capacity is needed from the play. At least four pipeline projects have been proposed to transport gas from the Haynesville to demand in the Gulf Coast.

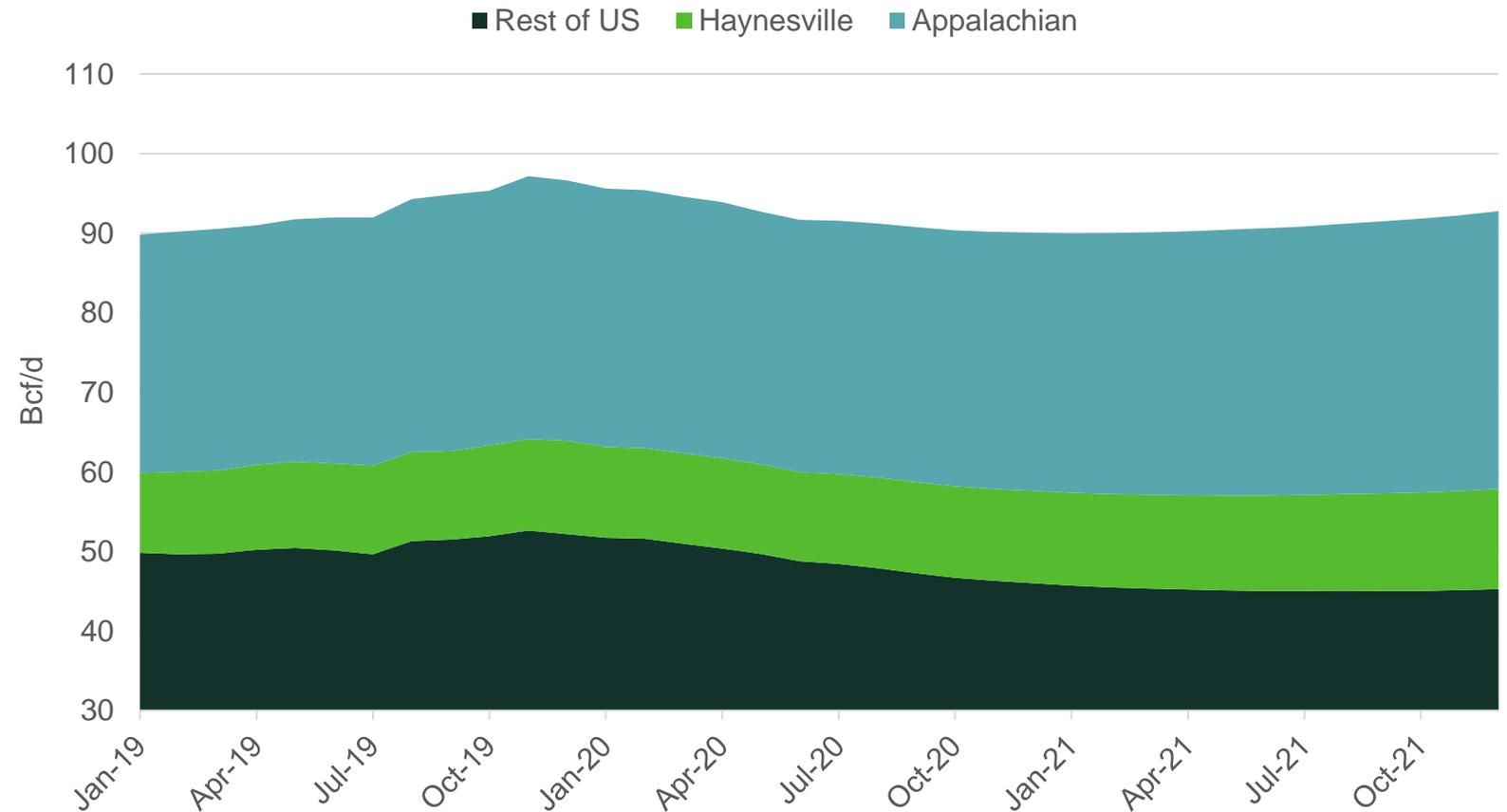
Haynesville and Appalachian to Lead Production Growth in 2021

The world economy was rocked by the COVID-19 pandemic, and the energy industry was not immune to the disruption. Operators revised plans as demand for products fell and supply flooded the market.

While all operators were impacted, the production impact came mostly from liquids-rich plays. With the drop in production, a shift to more gas-focused areas, like the Marcellus and Haynesville, will be required. Demand for heating and power is not impacted as drastically as refined crude products like gasoline and jet fuel.

Region	12/1/19 (Bcf/d)	12/1/21 (Bcf/d)	Delta (Bcf/d)
Appalachian	32.72	34.91	2.19
Haynesville	11.73	12.57	0.85
Rest of US	51.72	45.27	(6.92)
Total US	96.63	92.75	(3.88)

Dry gas production: Haynesville and Appalachian vs. the Rest of US



US Rig Count Is Down Almost 70% in 2020



Active Rigs vs WTI Price

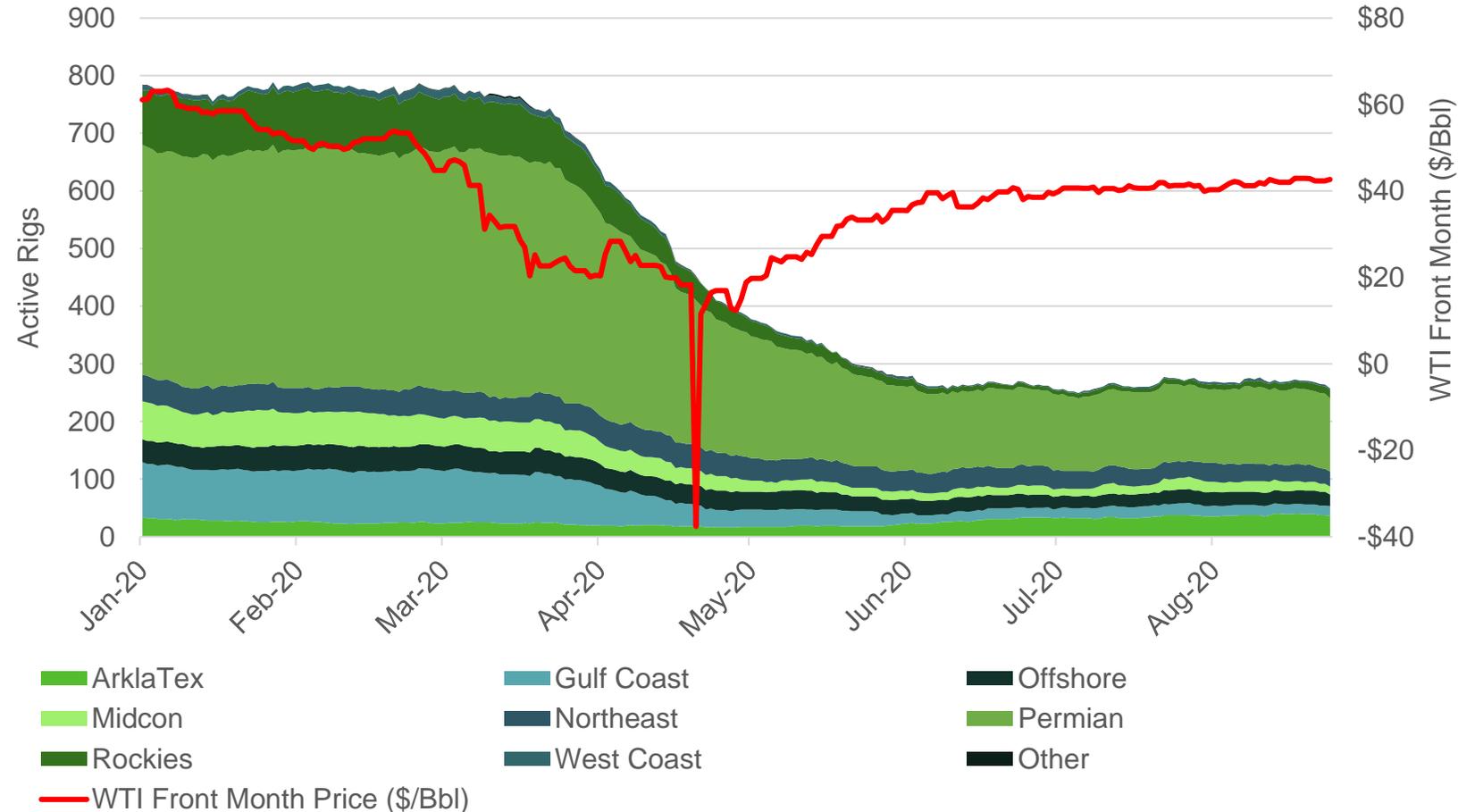
Operators drastically reduced spending as COVID-19 impacts came full speed ahead into the market and demand plummeted.

On March 1, 2020, there were 779 active rigs in the Lower-48. Just three months later, June 1, 2020, only 277 active rigs remained.

Along the way another historical moment took place: WTI posted its first-ever negative settle. As demand crashed, supply couldn't come offline fast enough, resulting in severe imbalance in the crude markets.

Since the historic crash, WTI has strengthened back to \$40+/Bbl, but rigs haven't yet followed suit.

Since June 1, active rigs have averaged ~265/day, with nearly half of those rigs in the Permian basin.

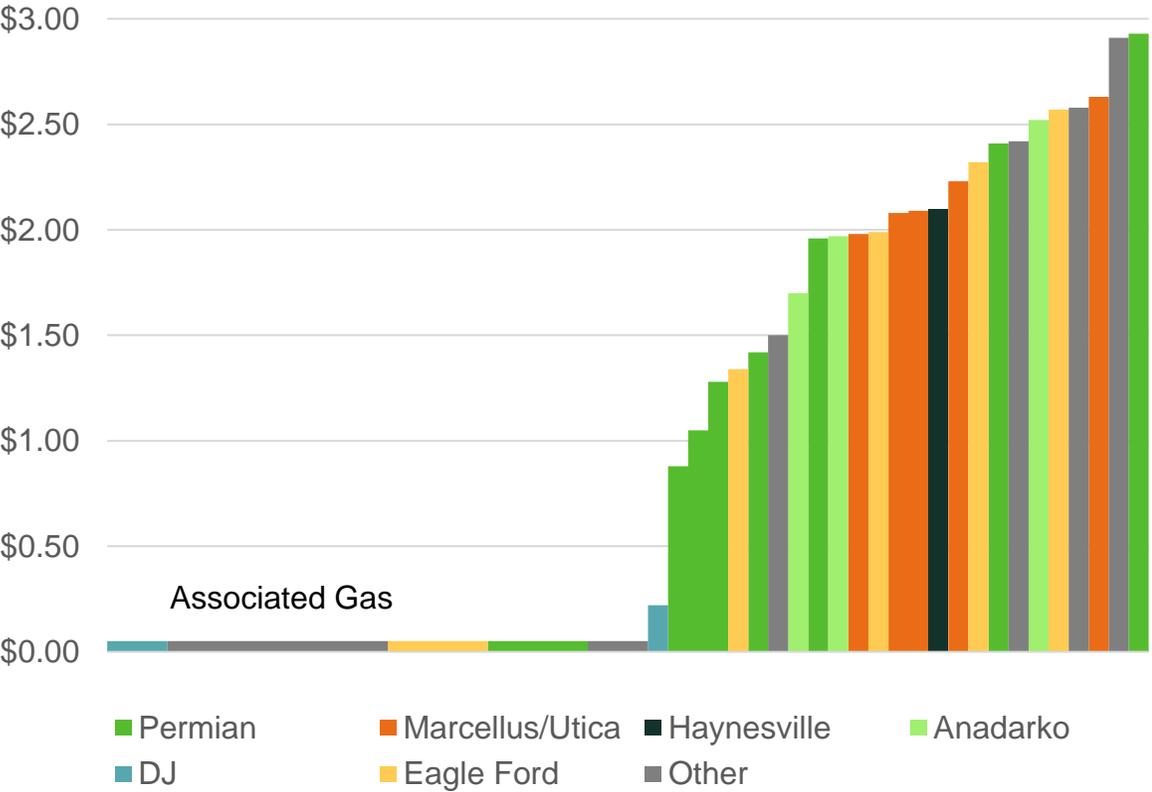


Gas Breakevens' Sensitivity to Crude Oil Prices

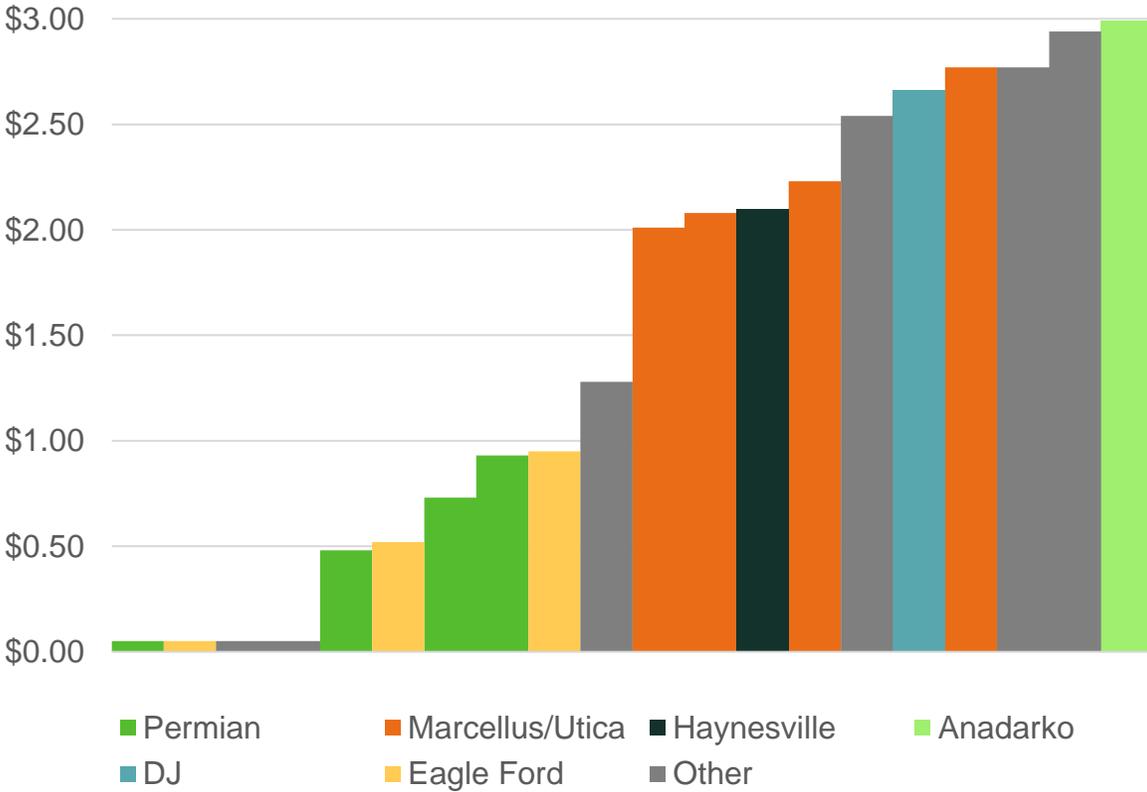
Natural gas breakevens under \$3/MMBtu at different WTI prices are presented in the charts below. Note the significant reduction in associated gas when WTI prices drop to \$40. As such, dry gas plays like the Marcellus/Utica and Haynesville will need to support production growth in 2021. There are areas in the Permian and Eagle Ford that have breakevens under \$3.00/MMBtu, but the volumes here will only serve to stabilize against natural declines in 2021.



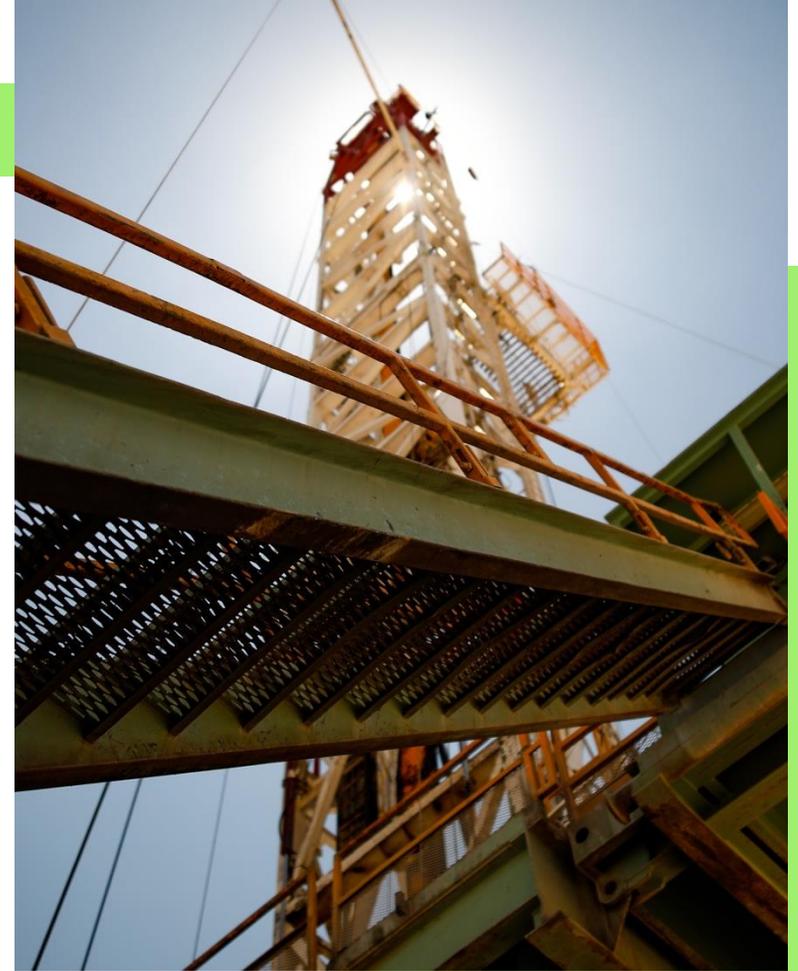
HH Breakeven (\$/MMBtu) @ 20% MARR & \$55.00/MMBtu



HH Breakeven (\$/MMBtu) @ 20% MARR & \$40.00/MMBtu



Haynesville



The Haynesville Shale

The Haynesville shale is a prolific dry natural gas play that stretches from East Texas into Northwest Louisiana.

It has access to many long-haul pipes traversing the region and serves local demand along the Gulf Coast. In addition, it is strategically proximate to several LNG export facilities.

With the discovery of shale gas and horizontal drilling, gas production from the Haynesville reached a peak of 10 Bcf/d in 2011.

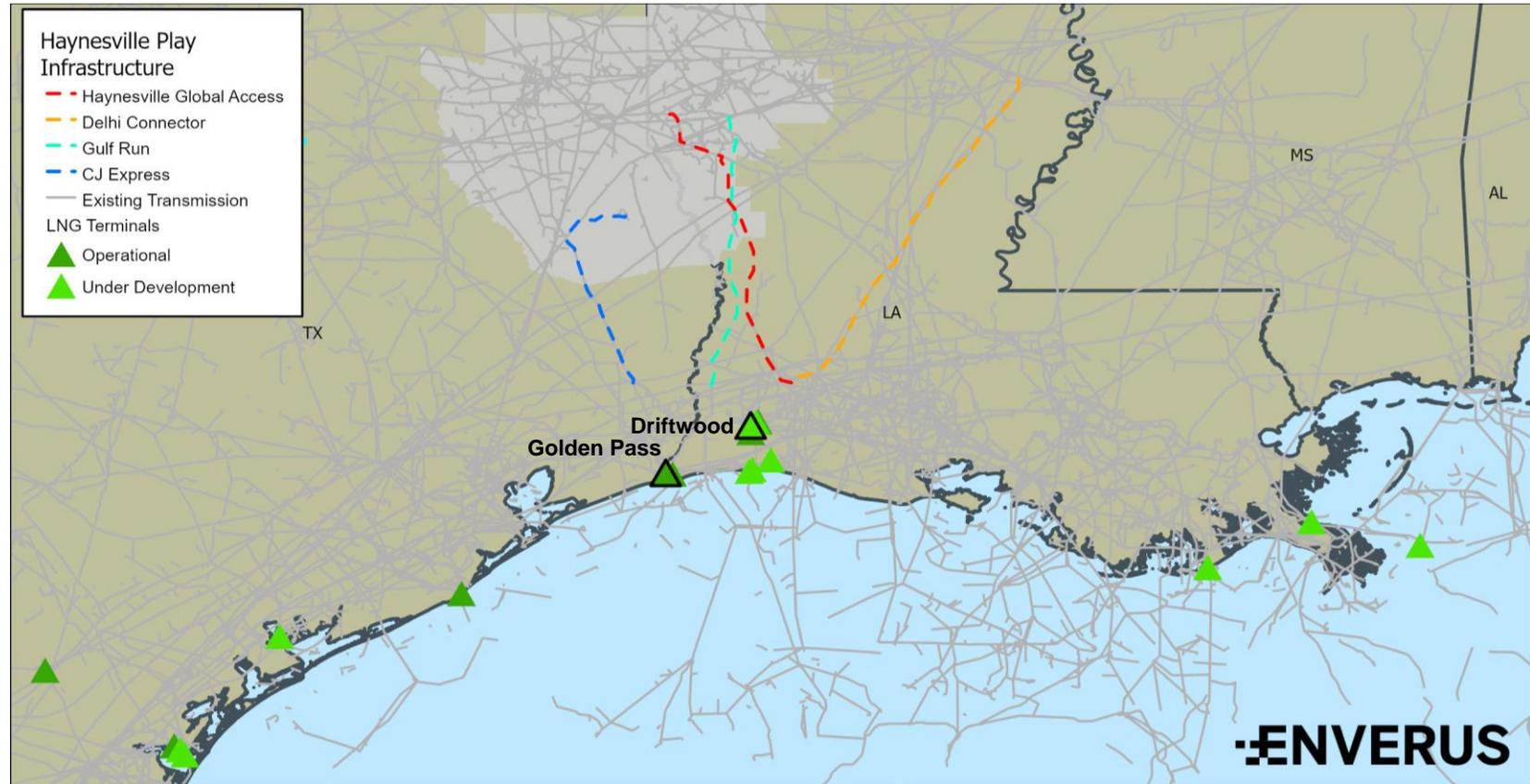
However, persistently low gas prices and a shift in favor to the Marcellus/Utica plays put downward pressure on the region.

By 2017, gas production from the Haynesville sat at only 5.7 Bcf/d.

As the market for LNG exports grows, so does a renewed interest in the play.

There are four pipeline expansions proposed to take gas to future LNG projects, namely Golden Pass and Driftwood.

Haynesville Natural Gas Infrastructure Map



Haynesville: Dry Gas Production Sample

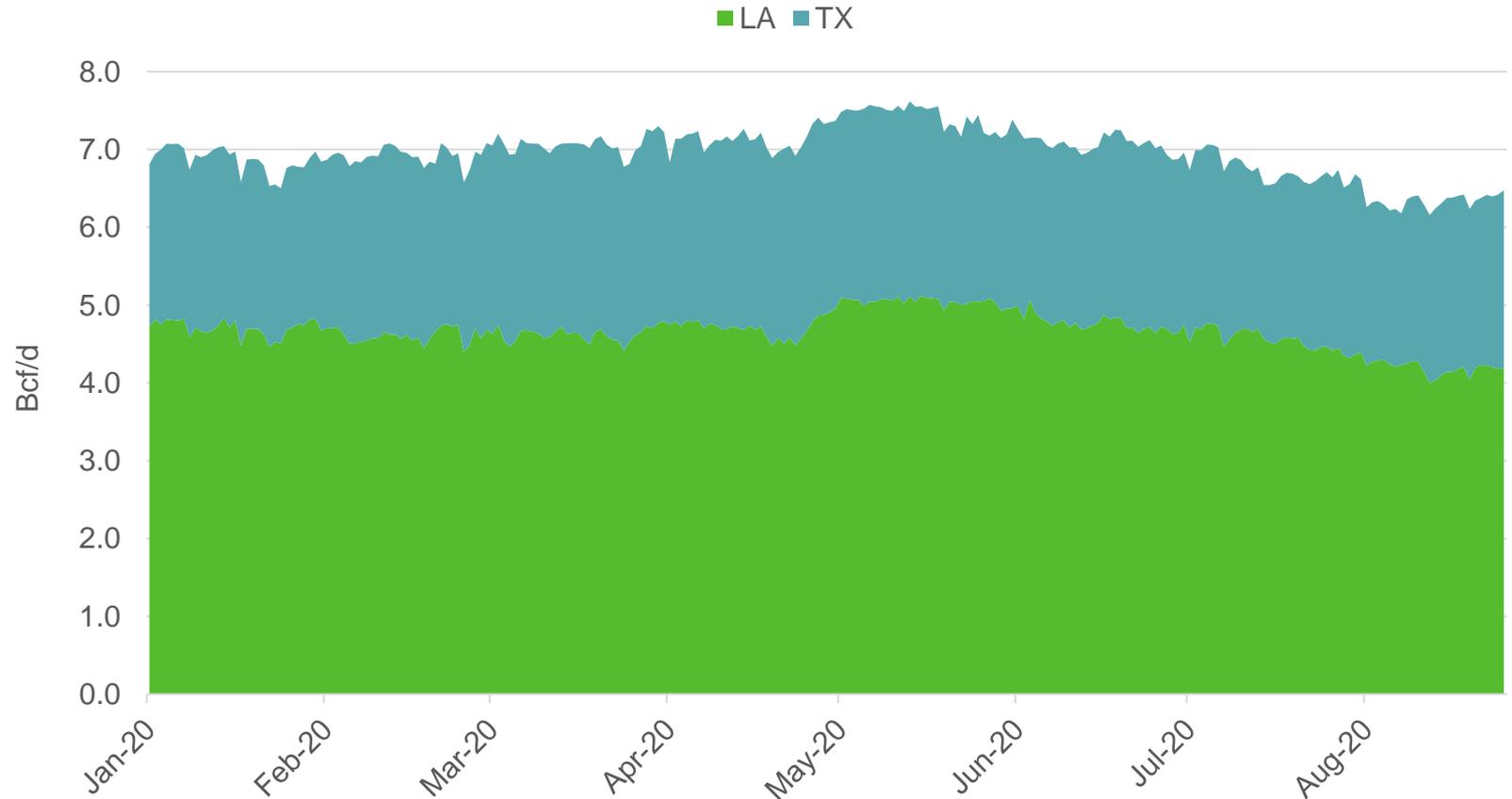


In 2020, while total US natural gas production started to decline in April, analysis of pipeline receipts show that Haynesville production continued to grow thru May.

The production sample represented in the chart includes only the Texas and Louisiana counties that belong to the Haynesville.

The region gained 0.6 Bcf/d from Jan-May. Production declines then followed along with most other plays. Falling to 6.3 Bcf/d, down 1.2 Bcf/d between May-Aug.

Haynesville Dry Gas Production Sample (Bcf/d)



Gas Production (Bcf/d)	TX	LA	Total
Jan 2020	2.2	4.7	6.9
May 2020	2.4	5.1	7.5
Aug 2020	2.1	4.2	6.3
May vs Jan 2020	+0.2	+0.4	+0.6
Aug vs May 2020	-0.3	-0.9	-1.2
Aug vs Jan 2020 (YTD)	-0.1	-0.5	-0.6

Haynesville: Production vs Takeaway Capacity



Dry natural gas production in the Haynesville is expected to grow by 5 Bcf/d over the next five years.

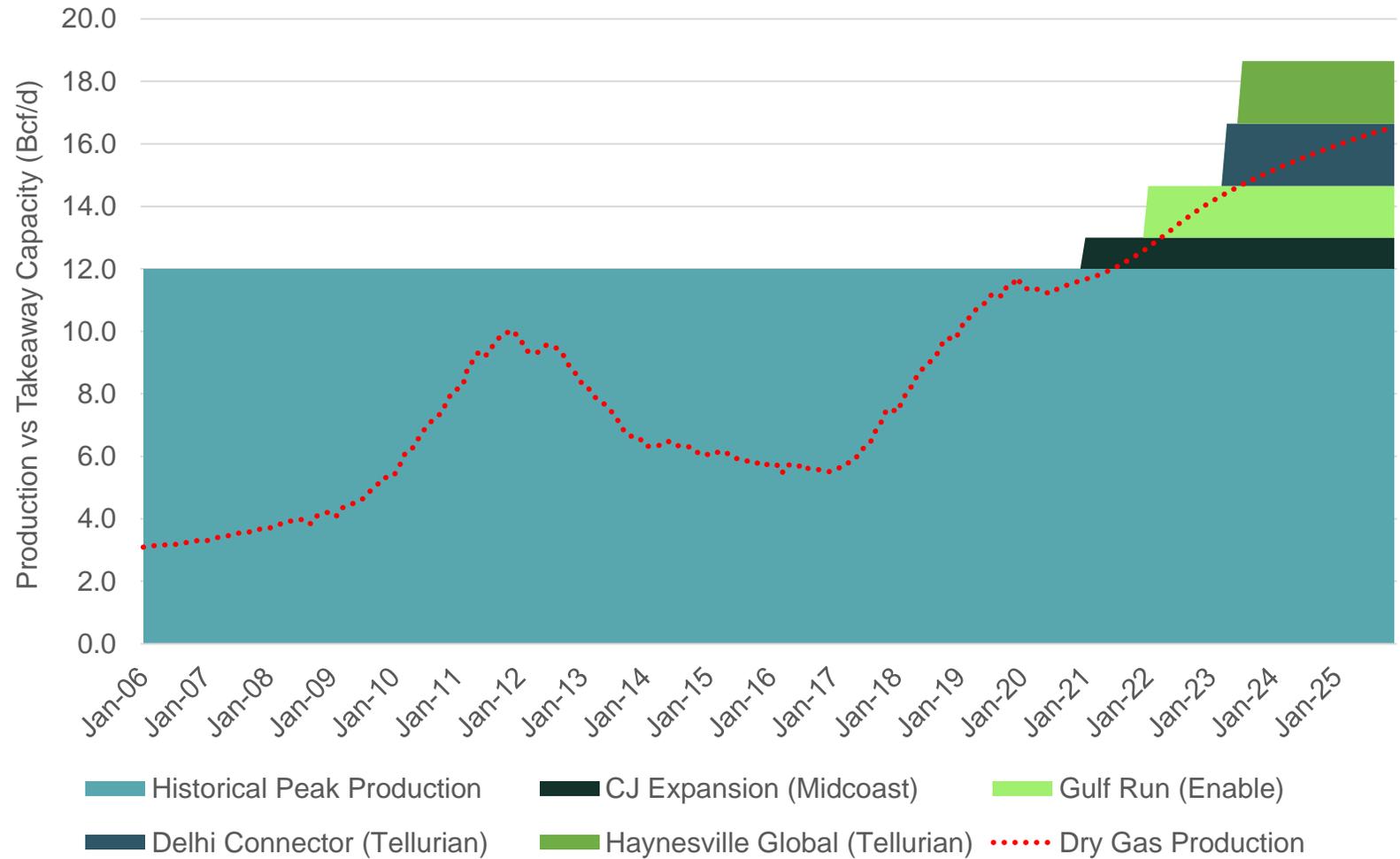
There are multiple interstate and intrastate pipelines in the area with a lot (if not most) of the gas reaching Perryville/Delhi in north Louisiana with subsequent access to long-haul pipelines.

Here Haynesville gas faces competition for takeaway capacity with Marcellus production.

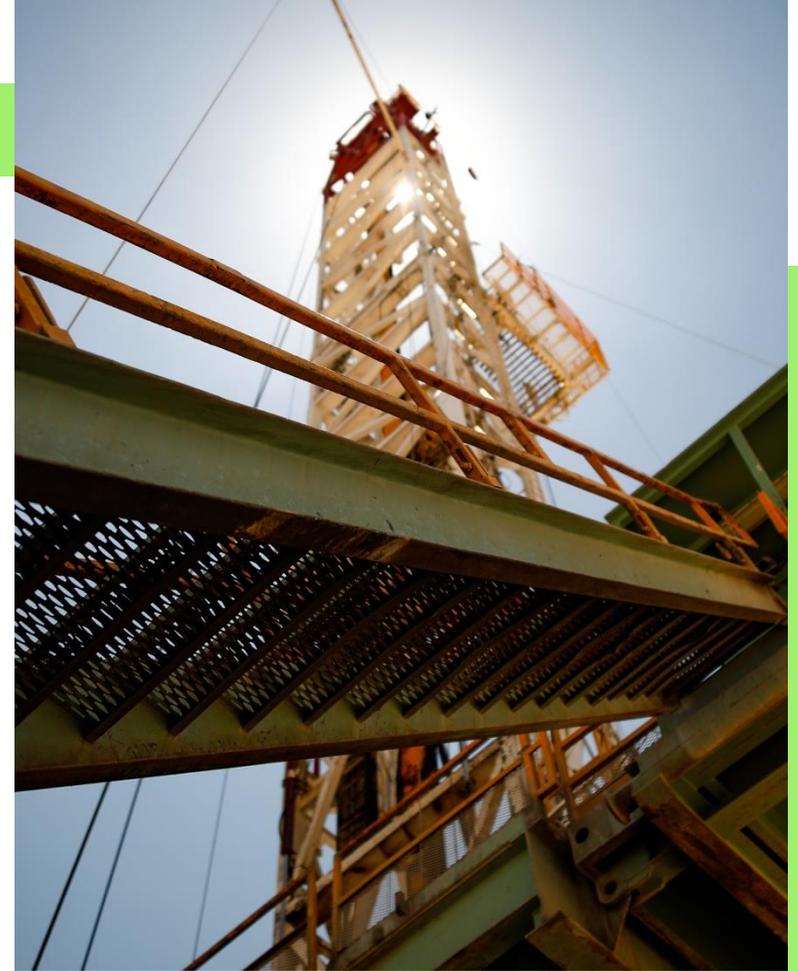
Therefore, Enverus believes additional takeaway capacity will be needed to accommodate the economically feasible production from the Haynesville.

The development of Midcoast's CJ expansion and Enable's Gulf Run pipeline are currently still moving forward.

Tellurian announced earlier this month the deferral of its two Haynesville projects (Delhi Connector and Haynesville Global) and expects to make a final investment decision in 2021.



Appalachian: Marcellus and Utica



Appalachian: Dry Gas Production vs Rigs

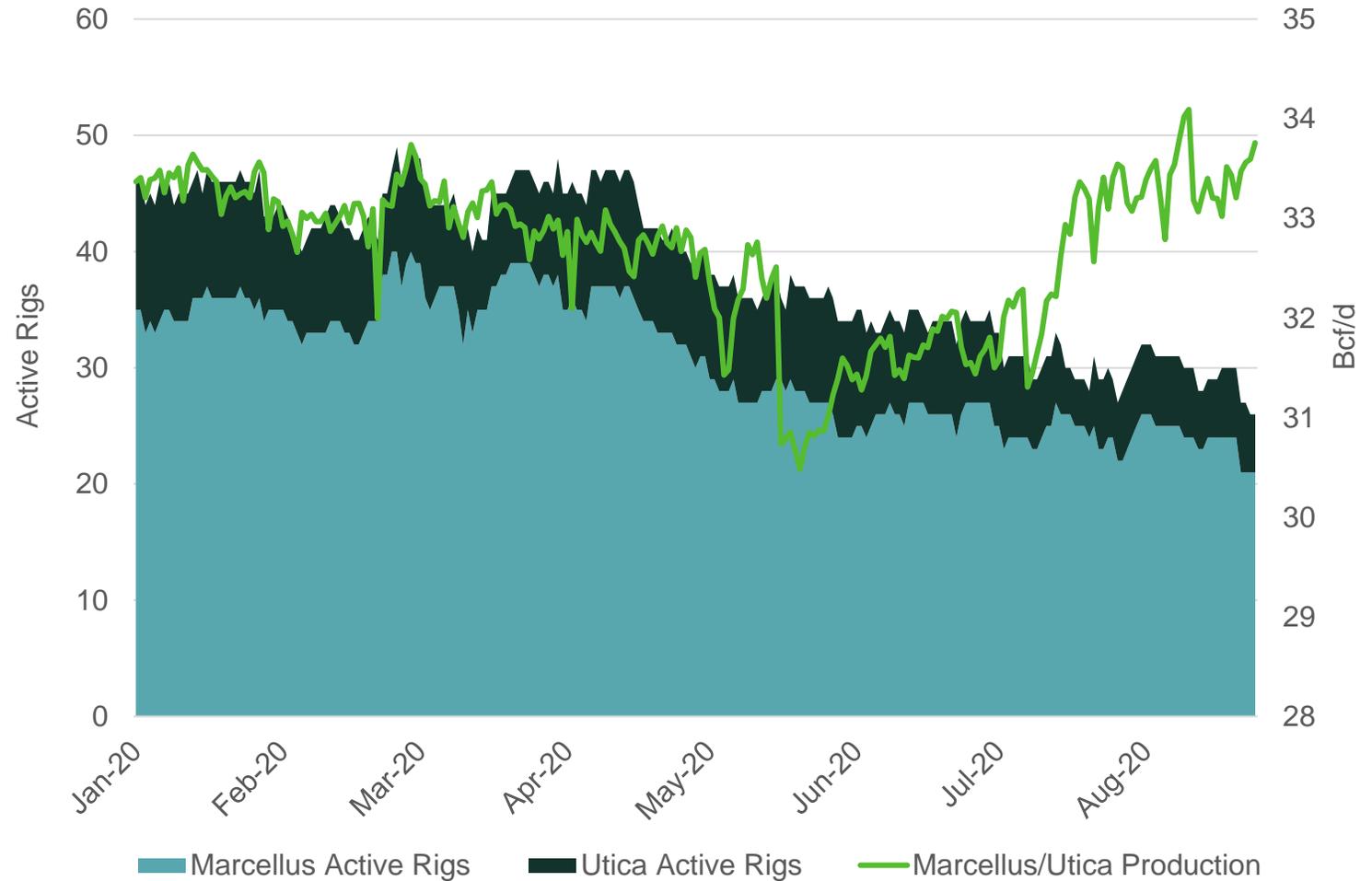


Despite production remaining strong out of the Marcellus and Utica, rig activity has seen a decline since mid-to-late April.

As of January 1, 2020, the Marcellus and the Utica combined had 46 active rigs. As of August 24, 2020, the two combined had 26 active rigs.

While production has stayed steady, albeit with minor hiccups, the economic downturn due to the COVID-19 pandemic did cause operators in the Marcellus and Utica to change their activity plans for 2020.

These plan changes called for less capital spending on drilling new wells and focusing on areas where they had already deployed capital and could bring production to market for a smaller expense than keeping rigs operating. The Appalachian operators turned to their DUC inventory to keep production out of the region at a steady pace.



Appalachian: Down Go the DUCs

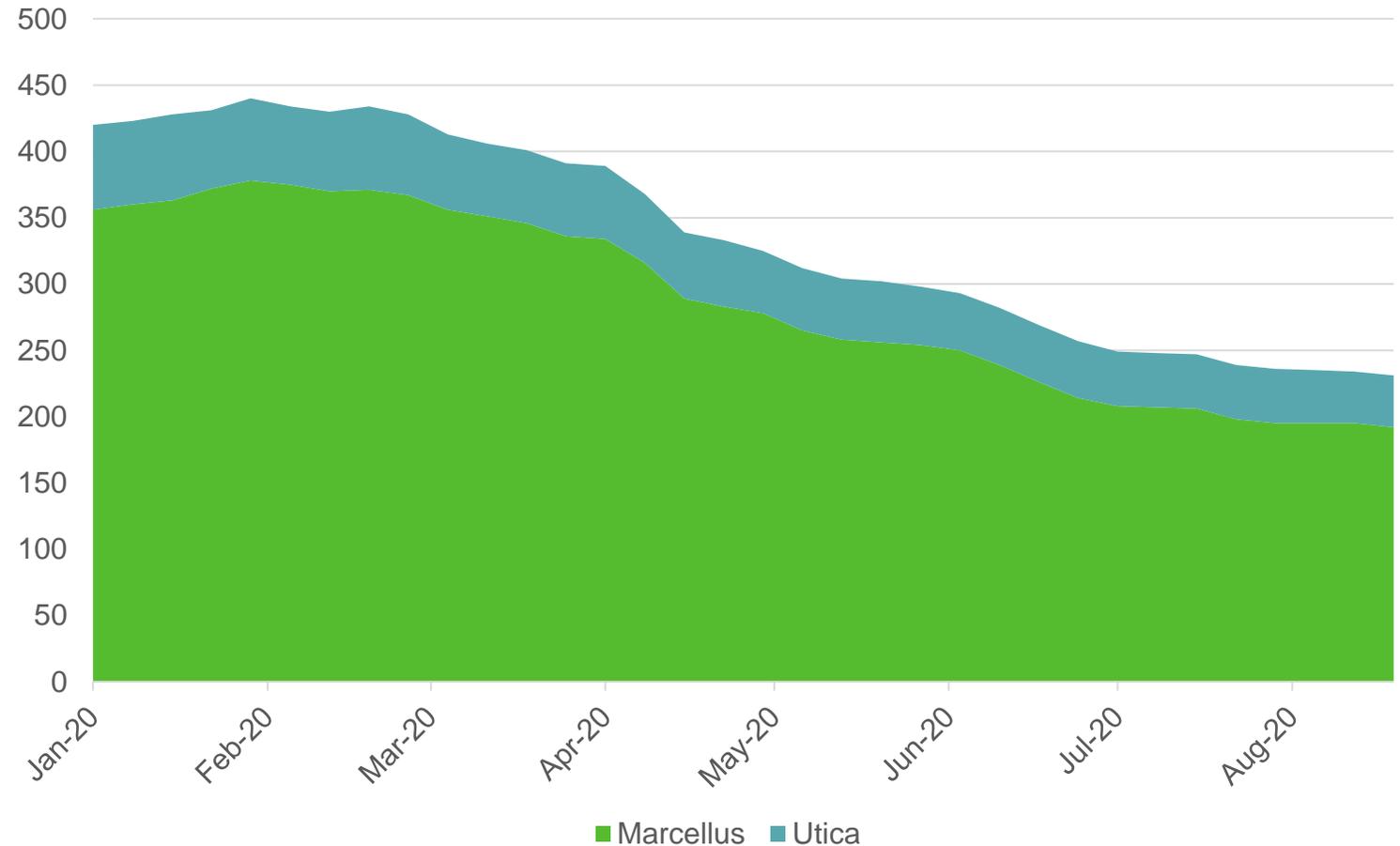
Based on Enverus's methodology, a DUC is a well that was drilled six or more months ago but has yet to be completed.

DUCs were on the rise to start in 2020, but as the pandemic took effect, operators adjusted their CAPEX plans and turned to completing DUCs in lieu of running rigs.

From the start of 2020 through August 19, 2020, the Marcellus and Utica had 189 DUCs completed. Some operators, like Cabot and Chesapeake, have nearly depleted their DUC inventory in the Appalachian.

Company	1/1/2020 DUC Count	8/19/2020 DUC Count	Delta
Range Resources	42	18	(24)
Cabot	26	3	(23)
CNX	36	17	(19)
EQT	83	65	(18)
Chesapeake	18	4	(14)
Chevron	24	13	(11)
Other	191	111	(80)
Total	420	231	(189)

Marcellus & Utica DUCs as of 8-25-2020



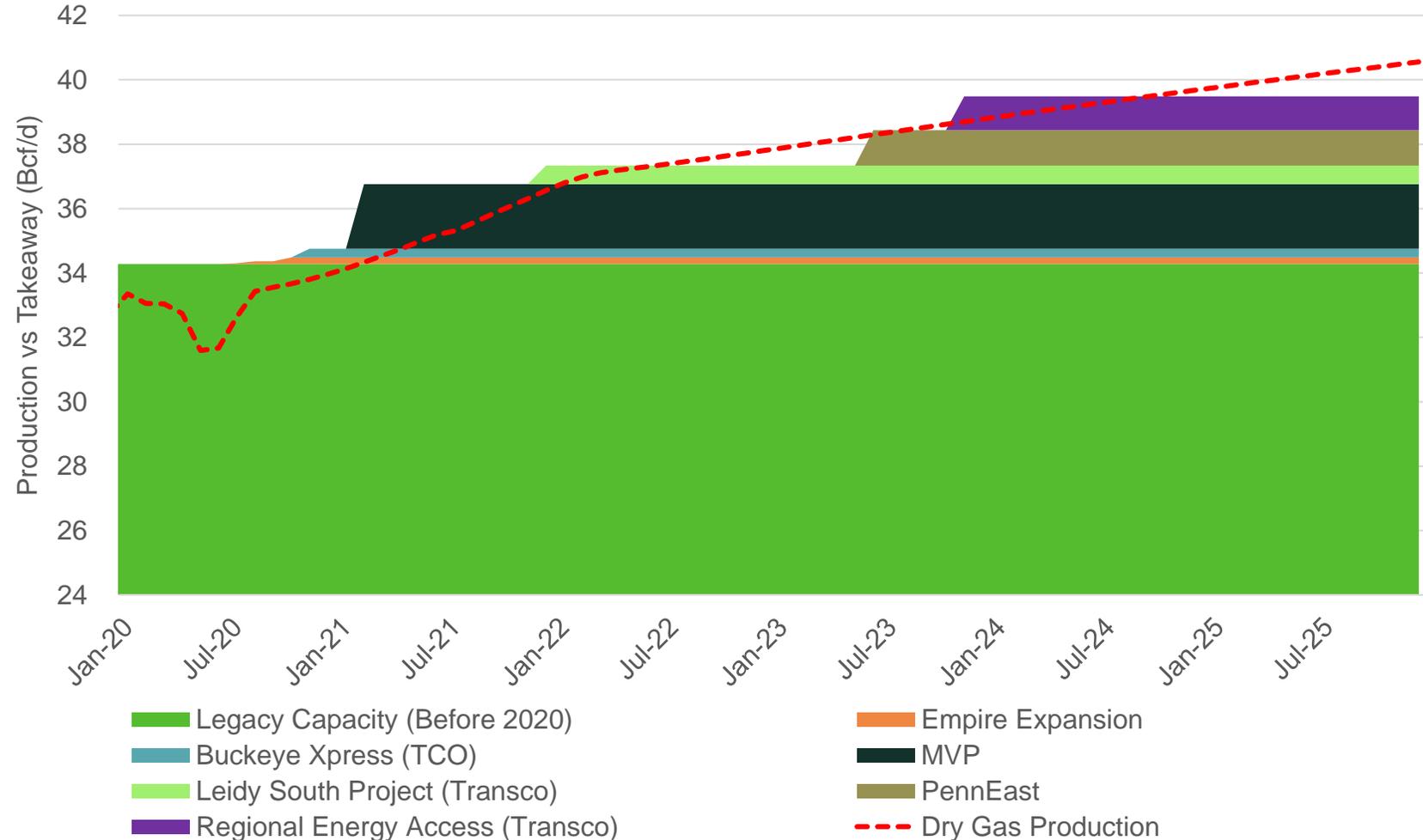
Appalachian: Production vs Takeaway Capacity



The Appalachian is the largest dry gas region in the country. Pipeline projects to export gas out of the region have been key in the development of assets in the region.

Mountain Valley (MVP) is a 2 Bcf/d pipeline currently under construction to ship Marcellus gas to the MidAtlantic region. MVP is expected to hit the market in early 2021. This pipeline will allow the Marcellus to continue to grow by allowing additional outlets for the gas, while also providing additional gas to a volatile Transco Zone 5 market area during peak demand times.

Should MVP meet the same fate as the Atlantic Coast Pipeline, which was ultimately cancelled in early July, the Appalachian could face a pipeline constraint as early as mid-2021.



CONTACT

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This is a preview of the full report.

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