Permian to Gulf Coast Midstream

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Introduction and Key Takeaways

- Production growth in the Permian basin is testing the limits of existing midstream and downstream infrastructure, requiring further capital investment in long-haul pipelines, gas processing plants, NGL fractionators, and coastal export terminals.

- This month's update of the *FundamentalEdge* report series presents an overview of all the infrastructure currently proposed between the Permian and the Gulf Coast across the three commodities: oil, gas, and NGLs.

- ***Crude oil*** production continues to rise in the Permian basin despite economic headwinds resulting from sub-$60/bbl WTI prices. Nevertheless, the pace of growth is at risk of slowing significantly if the low flat price environment persists. With additional long-haul pipeline capacity coming online in the second half of 2019, noncommitted shippers will likely find themselves squeezed out as spot arbs shut. As volumes are further increased to the Gulf Coast (and away from Cushing), additional export capacity will be required, and there is an acute need for new export facilities capable of fully loading VLCCs. A race to the finish has begun, with numerous onshore and at least seven offshore terminals currently proposed or in development.

- Although ***natural gas*** production is mostly a by-product of drilling for crude in the Permian basin, flaring is just not a long-term option since dry gas production is expected to increase by 50% (~5 Bcf/d) over the next five years. Market participants are also facing weak regional pricing, with Waha basis trading at levels more than $1.00/MMBtu under Henry Hub. Hence, at least five projects are currently proposed to alleviate this constraint. All projects will be transporting the gas east toward South Texas and Louisiana to feed LNG exports as well as growing power and industrial demand.

- ***NGL*** production out of the Permian is expected to continue to grow, with most of the production destined for the Gulf Coast. To allow for the extra production, a number of pipeline projects are under construction or in planning to transport the NGLs. As NGLs arrive at the Gulf Coast, they are then fractionated. Fractionation capacity has been running tight since mid-2018, resulting in numerous fractionation projects along the coast. The fractionation bottleneck was relieved slightly in early 2019, when two projects hit the market. However, with most projects scheduled to come on line in early 2020 and after, it is possible the bottleneck will reappear in late 2019 and early 2020.

Permian: Growing Long-Haul Pipeline Capacity

Capacity out of the Permian Basin will increase by just under 2.1 MMBbl/d this year.

Plains' Cactus II pipeline (670 MBbl/d) began line fill in July, with partial service in August.

Energy Transfer's Permian Express IV (120 MBbl/d) and the EPIC NGL pipeline (400 MBbl/d, temporarily in crude service) also have Q3 starts.

Phillips 66 plans to bring its 900 MBbl/d Gray Oak pipeline online in late Q4.

Long-haul capacity will see a 150 MBbl/d increase in 2020, when EPIC brings online its 550 MBbl/d dedicated crude oil pipeline (and subsequently takes its NGL pipeline out of crude service).

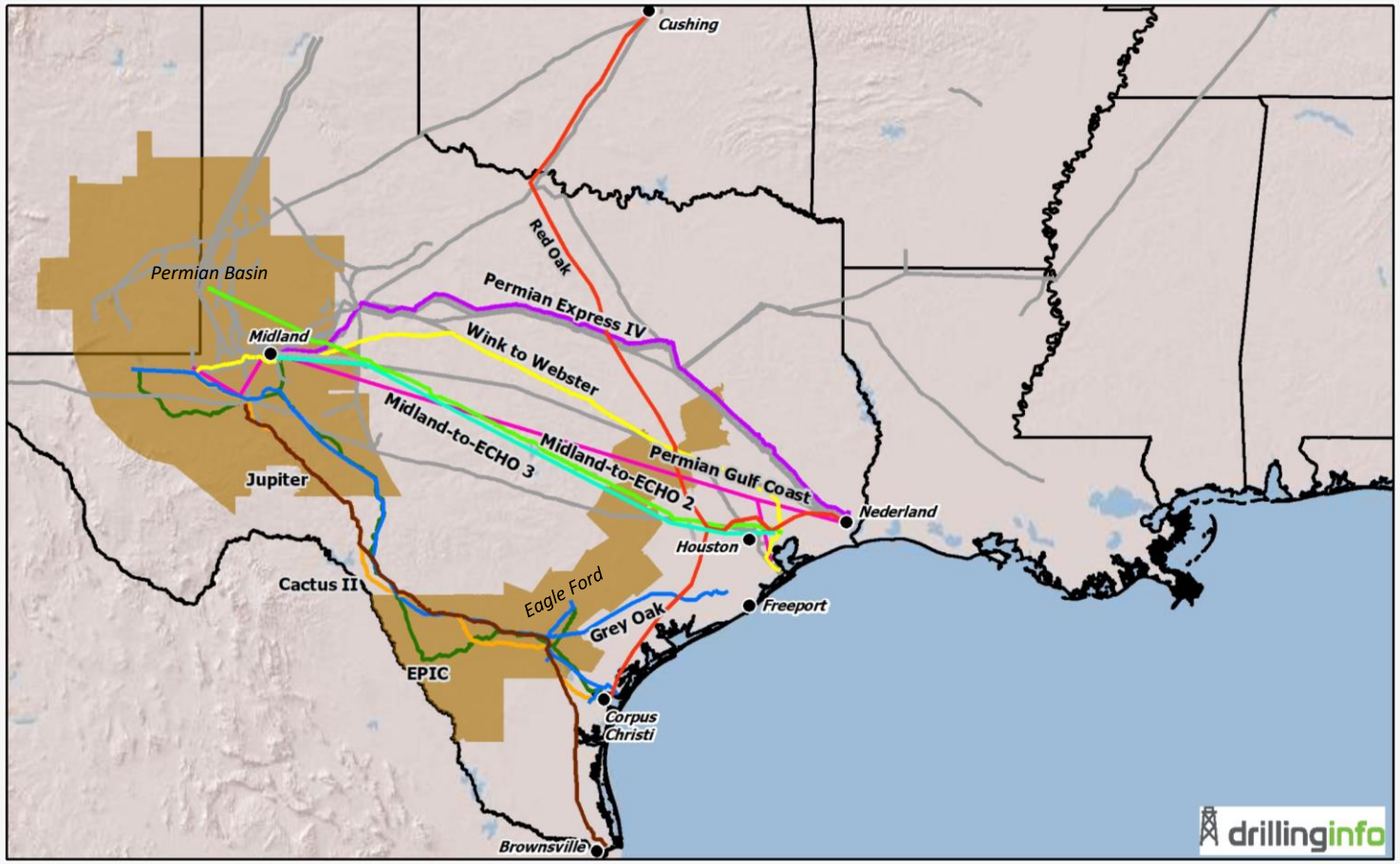
Four projects with 2021 startups (Wink-to-Webster, Midland-to-ECHO 3, Permian Gulf Coast, and Jupiter) are competing for shipper interest. It is unlikely all four will reach FID given individual system capacities of up to 1 MMBbl/d.

Permian Gulf Coast (600 MBb/d) is unlikely to proceed due to loss of key backers.

Phillips 66's Red Oak (400 MBbl/d) will provide a connection to Plains' Sunrise pipeline at Wichita Falls.

IMAGE 1

New Long-Haul Pipelines to Come Online August 2019 Through 2022



Gray-shaded pipelines indicate systems that commenced commercial operations on or before 7/31/19.

Permian: Pipeline Capacity Additions in the Offing

The Permian basin has suffered from lack of adequate takeaway capacity in 2018-2019, occasionally pressuring Midland differentials to large discounts versus Cushing.

As long-haul takeaway capacity is added in the coming months, Midland differentials are likely to gain support.

Cactus II, Permian Express IV, EPIC, and Gray Oak all have the backing of committed shippers. If overall basin supply is insufficient to fill those commitments, spot barrels could be bid away from noncommitted shippers on existing pipelines.

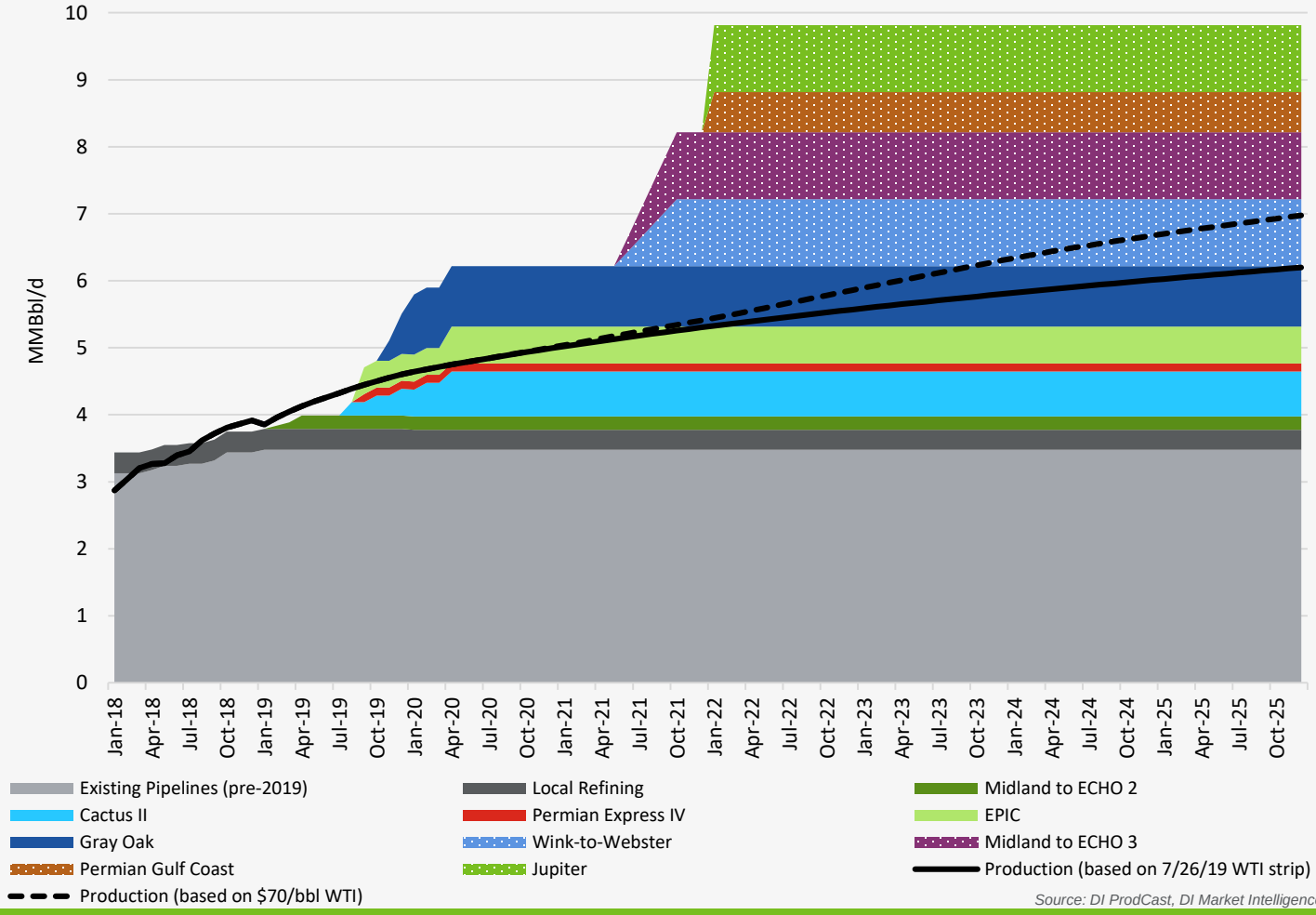
To remain competitive amid tightening differentials, walk-up tariffs are already being reduced.

Excess long-haul pipeline capacity is likely to develop in 2021-2022 if more than one of the proposed 1 MMBbl/d pipelines (i.e., Wink-to-Webster, Midland-to-ECHO 3, and Jupiter) come online.

In a prolonged $50-55/Bbl flat price environment, in-basin supply may not be enough for all committed shippers to fulfil their commitments. This is a recipe for tight differentials.

CHART 1

Permian Crude and Condensate Production Vs. Takeaway Capacity



Source: DI ProdCast, DI Market Intelligence

USGC: Existing Crude and Condensate Export Capacity

In 2019, Gulf Coast crude exports have not suffered from lack of loading capacity. With observed liftings over a sustained 30-day period as our metric, Gulf Coast terminals boast a combined capacity of just under 4.4 MMBbl/d.

The most active terminal, Enterprise's Houston Ship Channel terminal, has demonstrated ratable capacity of 625 MBbl/d and daily load rates well in excess of that.

Other key onshore facilities include Sunoco Logistics Nederland (420 MBbl/d), Phillips 66 Beaumont (300 MBbl/d), Moda Ingleside (300 MBbl/d), Seabrook Logistics Bayport (250 MBbl/d), and SemGroup Houston Ship Channel (250 MBbl/d).

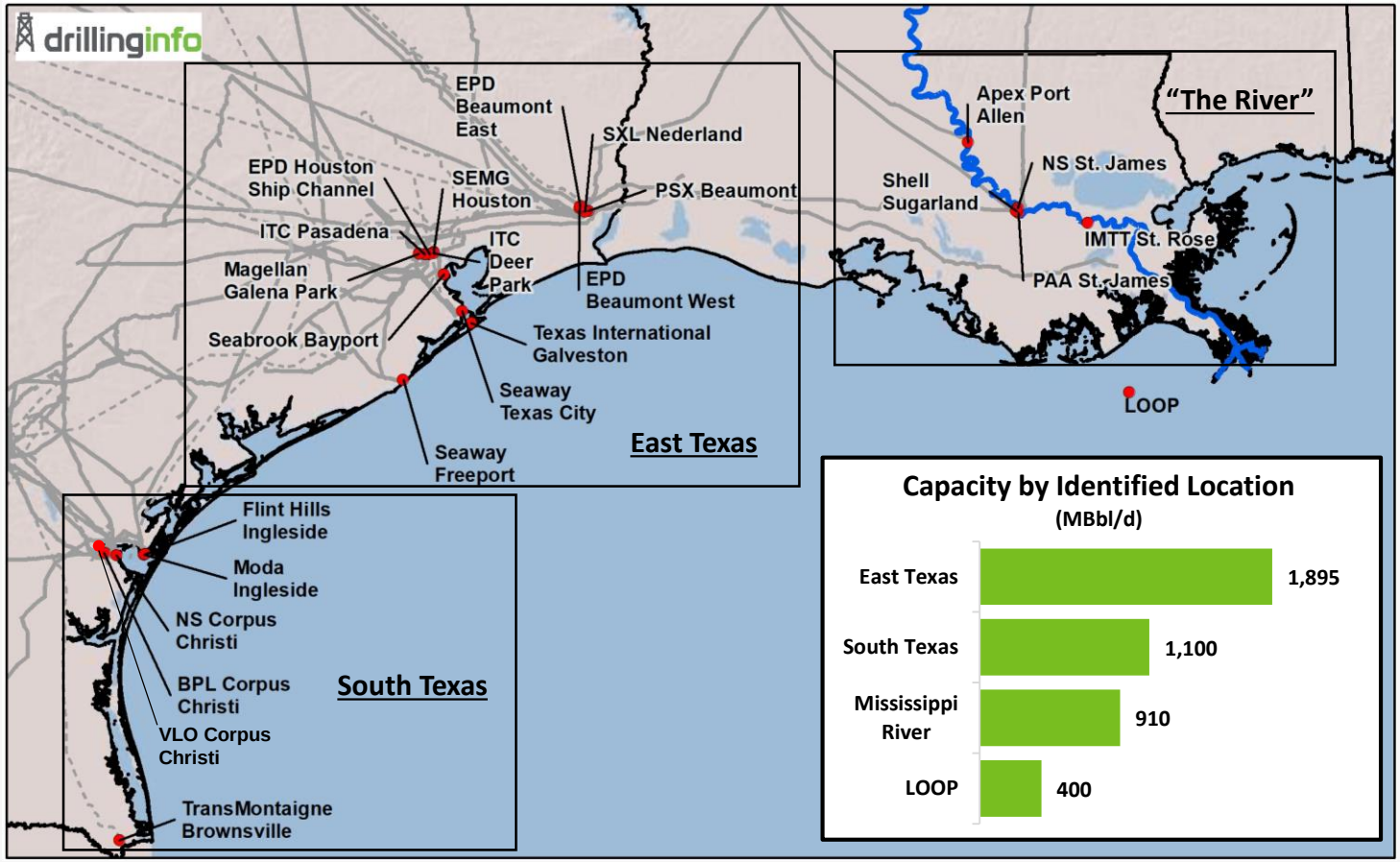
Despite the impressive performance of onshore export terminals so far, none of these facilities can fully load a VLCC.

LOOP is the only facility that can fully load a VLCC, demonstrating that it can load 6 VLCCs in a sustained 30-day period (400 MMBbl/d). Efficiency gains continue to be made.

Among onshore facilities, only Seaway Texas City and Moda Ingleside can receive and partially load VLCCs.

IMAGE 2

Key USCG Crude and Condensate Export Facilities (through July 2019)



Comments:

1) *Capacity is defined here as the highest 30-day moving average of observed daily liftings.*
2) *Plains All American Mobile terminal (not shown on map) has an observed ratable capacity of 40 MBbl/d but may be capable of higher rates.*

Permian Gas Production Constraints to Remain

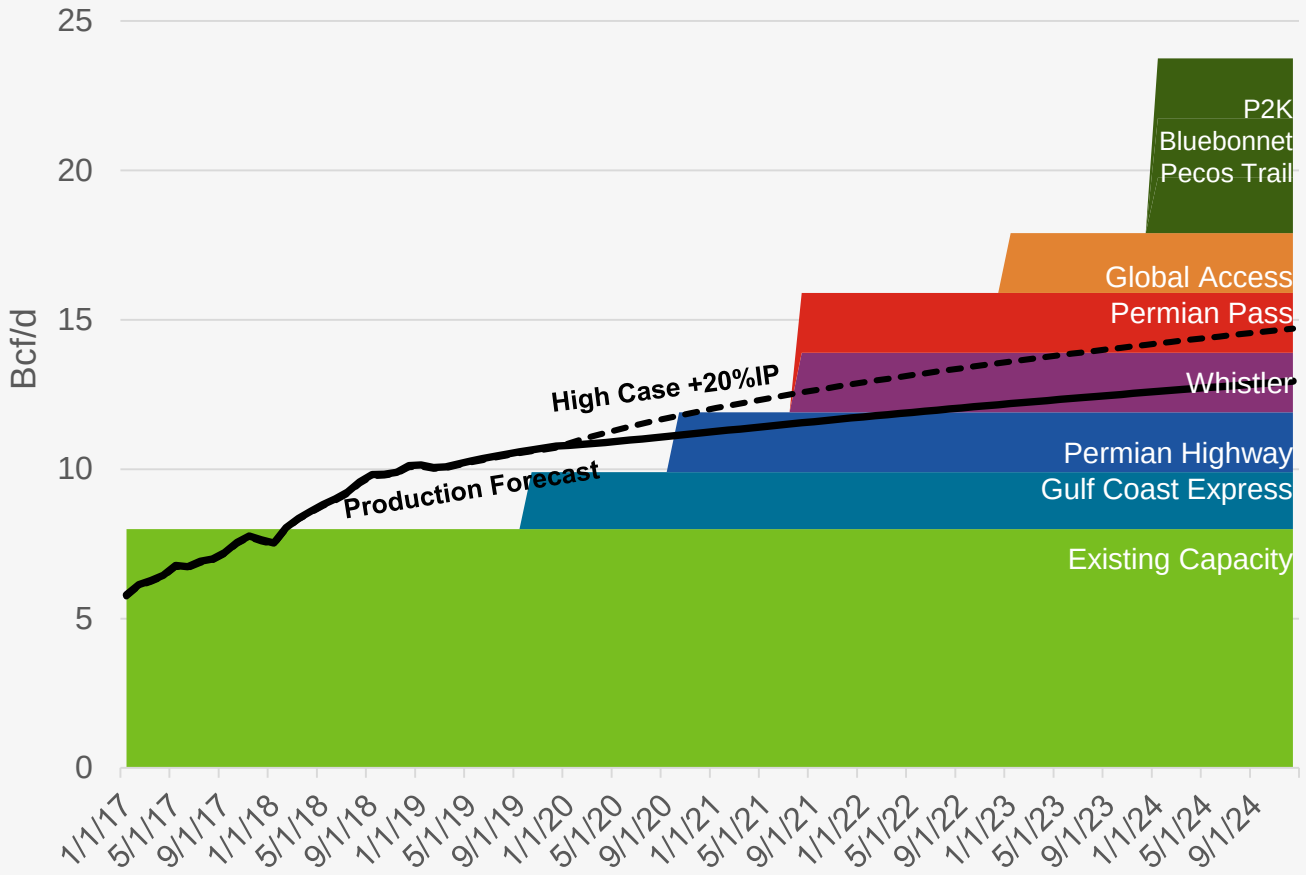
The Permian Basin has experienced fast production growth, which has challenged existing pipeline capacity to move gas to market.

Multiple projects have been proposed to relieve the current capacity constraint. In the meantime, the Waha location is experiencing negative prices.

DI expects the current bottleneck to be cleared by early 2022 once three of the proposed projects—Gulf Coast Express (1.98 Bcf/d), Permian Highway (1.9 Bcf/d), and Whistler (2.0 Bcf/d)—are placed in service.

CHART 2

Permian Gas Production vs. Takeaway

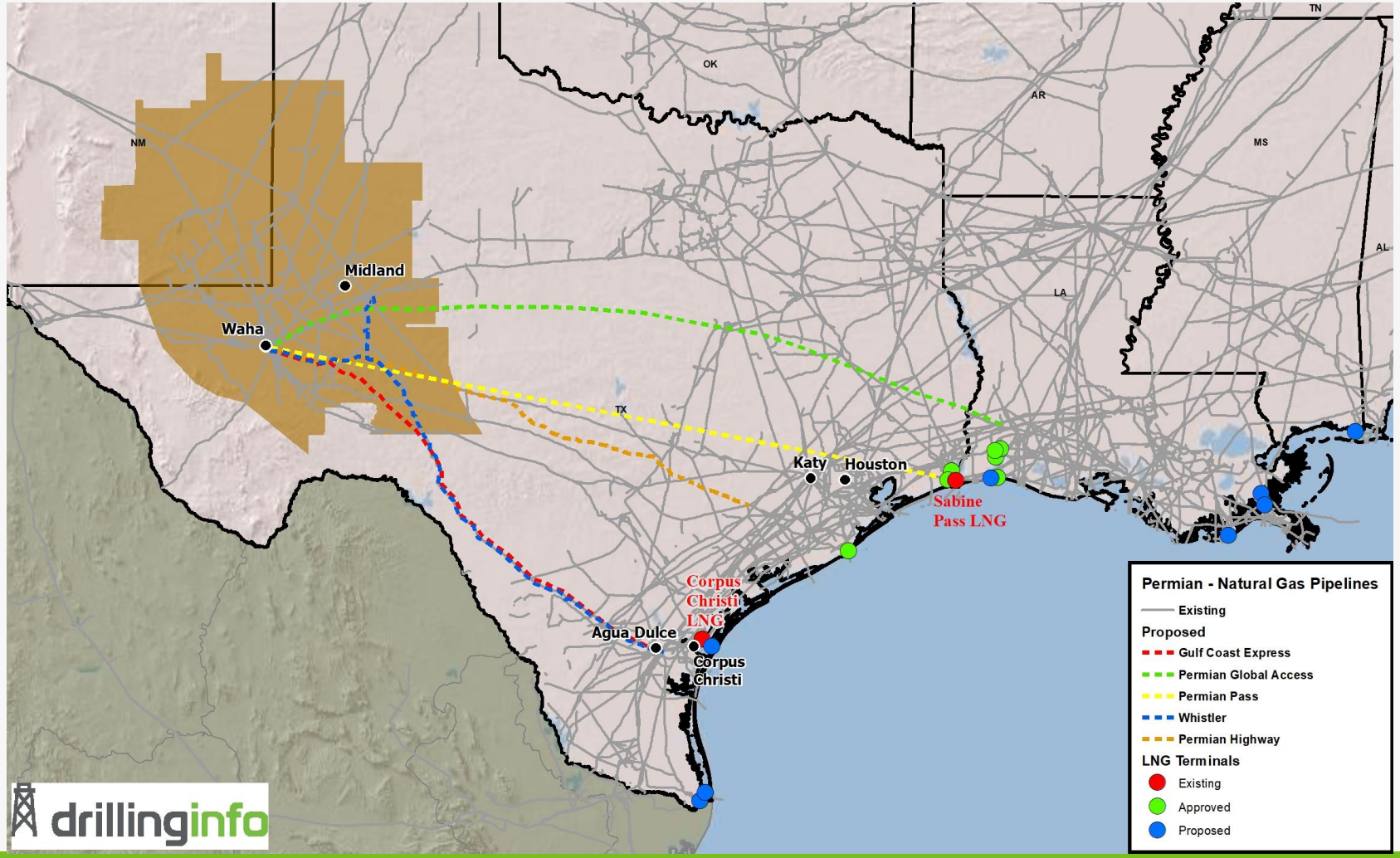


Source: DI ProdCast, DI Analysis

Natural Gas Infrastructure Map

IMAGE 5

Permian to Gulf Coast Infrastructure Map



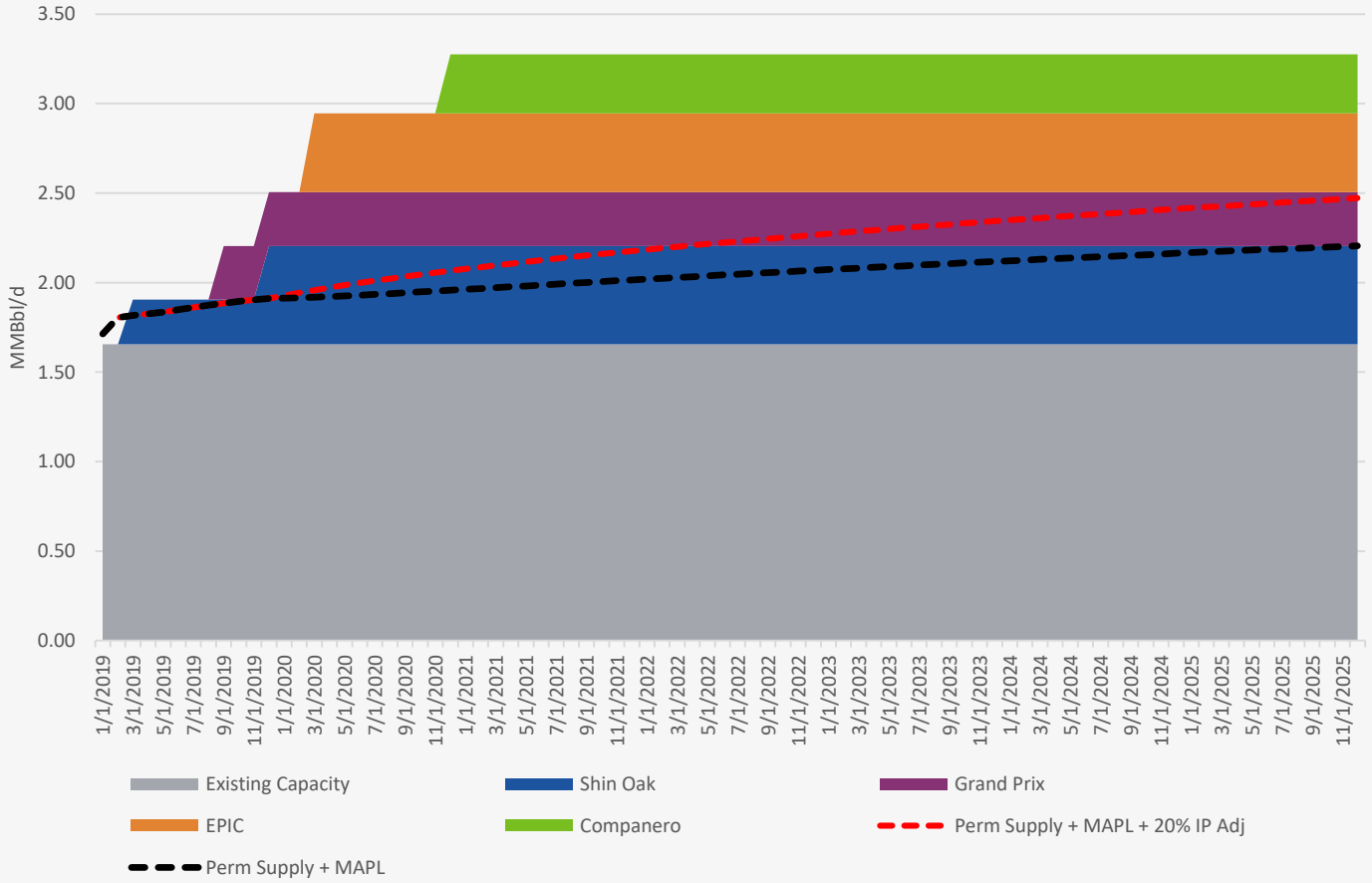
Permian Supply vs. Takeaway

Pipeline capacity out of the Permian was constrained to start 2019. Capacity still remains tight, even with the initial start-up of the Shin Oak pipeline.

As Shin Oak fully ramps up and Grand Prix comes online, the Permian will have excess takeaway capacity based on Drillinginfo's forecast of Permian NGL production.

CHART 4

US NGL Production By PADD



Source: DI ProdCast, Company Filings

Permian Y-Grade Pipeline Projects

There are four pipeline projects that will add export capacity from the Permian and deliver at the Gulf Coast: Shin Oak, Grand Prix, EPIC, and Companero.

Shin Oak is partially in service and is currently able to transport 250 MBbl/d of Y grade. The full capacity, 550 MBbl/d, is expected online by the end of 2019.

Grand Prix is expected online during 3Q19. This pipeline has 300 MBbl/d of takeaway capacity from the Permian but can deliver up to 450 MBbl/d to Mont Belvieu with the extension north into Oklahoma.

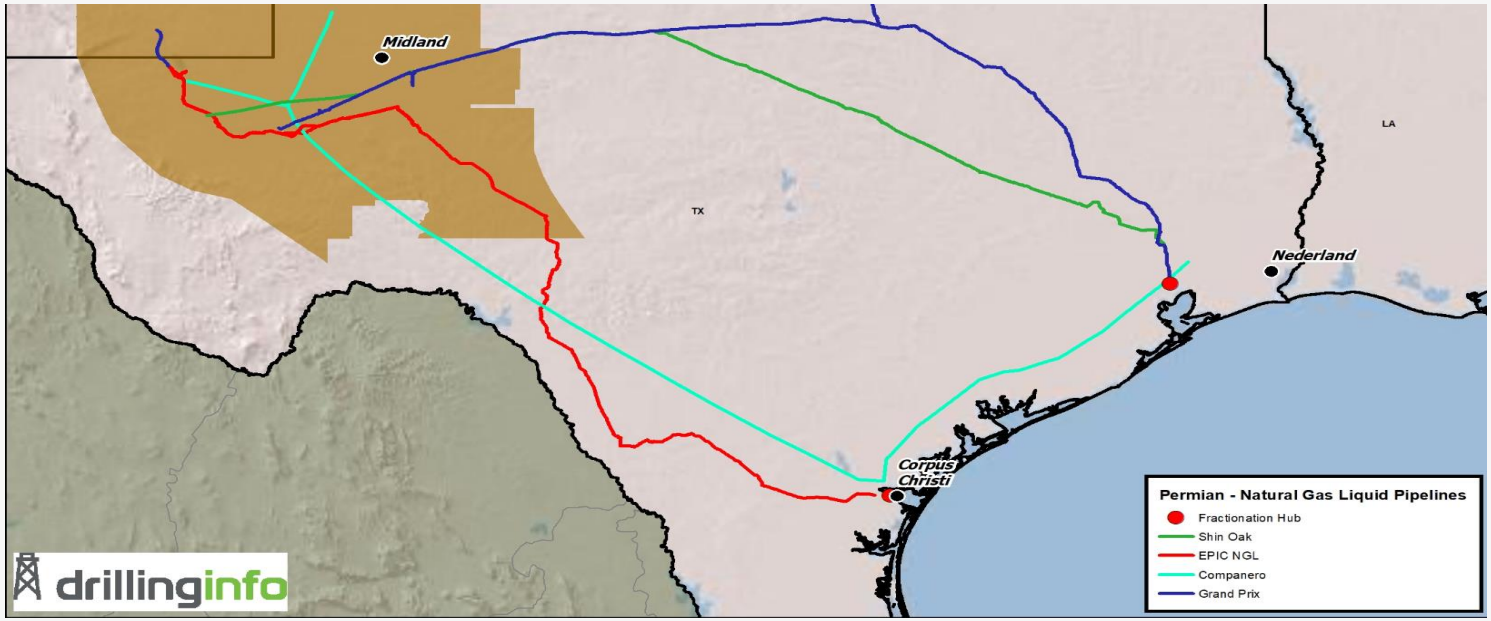
EPIC NGL Pipeline will be completed before 1Q20 but will transport crude to the Gulf Coast during 4Q19 and the start of 2020. This line will then be converted back to Y grade capacity when the EPIC fractionator along the coast comes online.

Companero pipeline is a proposed project that will transport up to 330 MBbl/d of Y grade. This pipeline is associated with fractionators being built near Corpus Christi by Permico.

TABLE 2

Permian to Mont Belvieu Pipeline Projects

Pipeline	Operator	Capacity (MBbl/d)	Status	In-Service Date	Shippers
Shin Oak Pipeline	Enterprise	250/550	Partially in service	4Q2019	Apache (200+ MBbl/d)
Grand Prix Pipeline	Targa	300	Under construction	3Q2019	Shipping volumes mainly from Targa processing plants in the Permian
EPIC NGL Pipeline	EPIC/Noble/Salt Creek Midstream	440	Under construction	1Q2020	BP, Salt Creek Midstream
Companero Pipeline	Permico	330	Announced	4Q2020	Not available



Source: Company Filings, DI Analysis

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