2023

DIRTY LITTLE SECRETS

MIDSTREAM IS GOING GLOBAL

EDITION 7: CONFIDENTIAL

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Executive Summary – Key Takeaways

Midstream is going global: demand across commodities is increasingly being driven by exports, and the biggest infrastructure questions relate to how to move US hydrocarbons to the water.

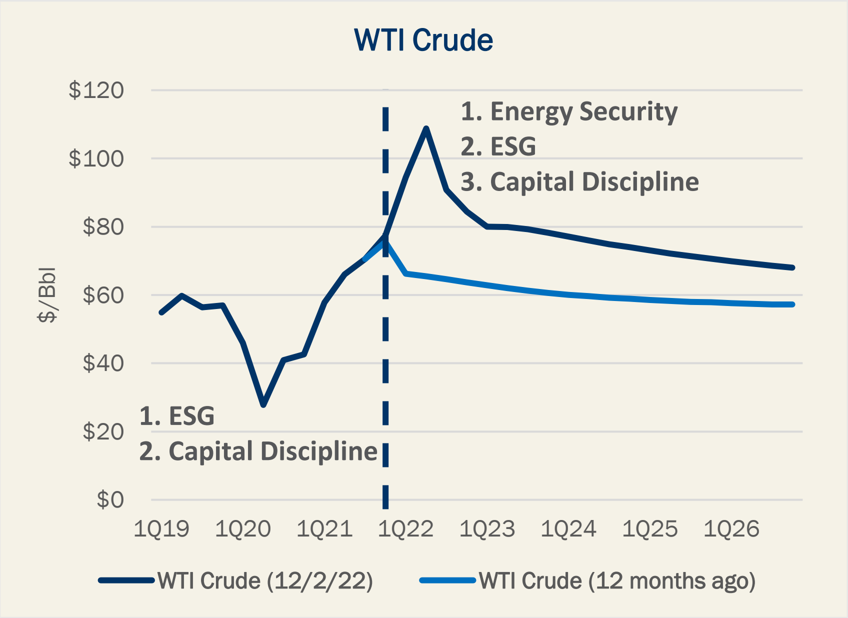
Until then, domestic markets are in for a bumpy ride:

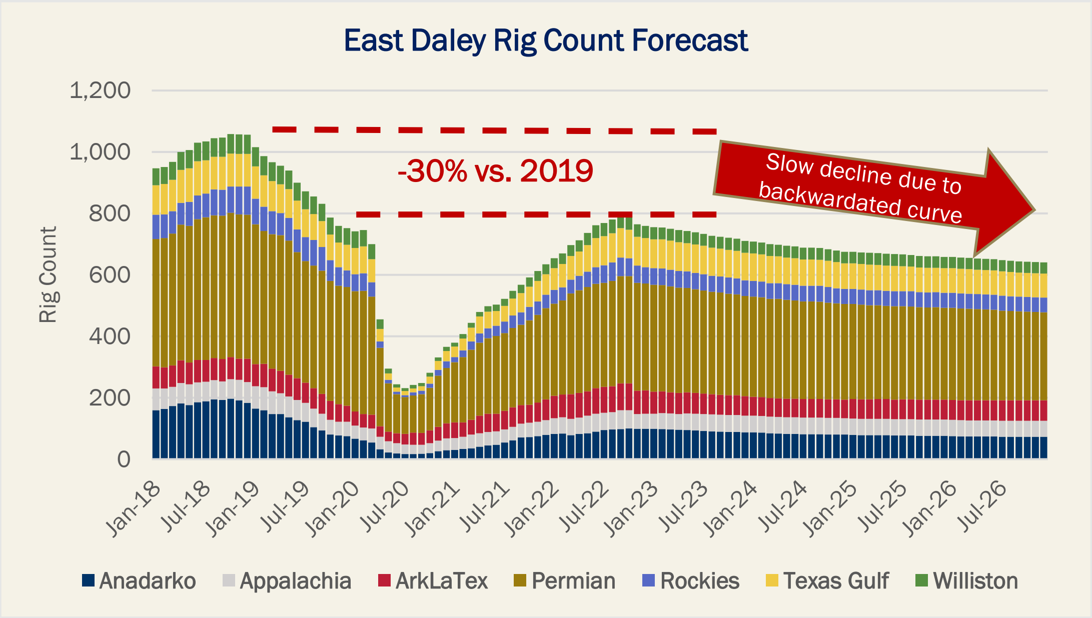
1. **GAS:** US LNG Demand is set to grow by over 17 Bcf/d from 2025-2030, but US supply is growing too fast in the near term. While exports will rule the day, supply growth will rule the hour. **<u>Unconstrained, US natural gas production would grow by 5 Bcf/d from YE22 to YE23.</u>**

2. **CRUDE:** Growing Permian crude production is filling up export-bound pipes, which will push spreads wider and pressure rates upward. We expect **<u>Gulf Coast-bound pipes to reach 90%+ utilization by YE25.</u>**

3. **NGLs:** New international petrochemical projects could offset a slowdown in domestic ethane demand growth and declining utilization rates due to recession fears. But first, the market will need to solve for fractionation constraints. Despite 700 Mb/d of new capacity coming online in 2023-2024, **<u>Mont Belvieu fractionators will remain at 95-100% utilization through 2026.</u>**

Spike in WTI to Drive Gas Oversupply in ‘23





Change from Jan-22 to Nov-22:

Williston +11
Eagle Ford +25
Rockies +14
Permian +37
ArkLaTex +11
Appalachia +4
Anadarko +23

Total +126

- The Russia-Ukraine war has added Energy Security to a conversation previously dominated by ESG and capital discipline. Energy Security without ESG and Capital Discipline does not work, nor does ESG and Capital Discipline without Energy Security.
- The industry has added significant rigs in response to sustained high oil prices. While some producers have guided to flat-to-moderate growth, others are guiding to double-digit annual growth for 2023.
- WTI has ranged from $80-$120/bbl since Russia’s invasion of Ukraine. We expect prices to remain in this range given continued Russia supply uncertainty and OPEC+ output cuts.
- Supportive fundamentals in oil will continue growth in associated gas production, leading to oversupply until more LNG demand ramps.

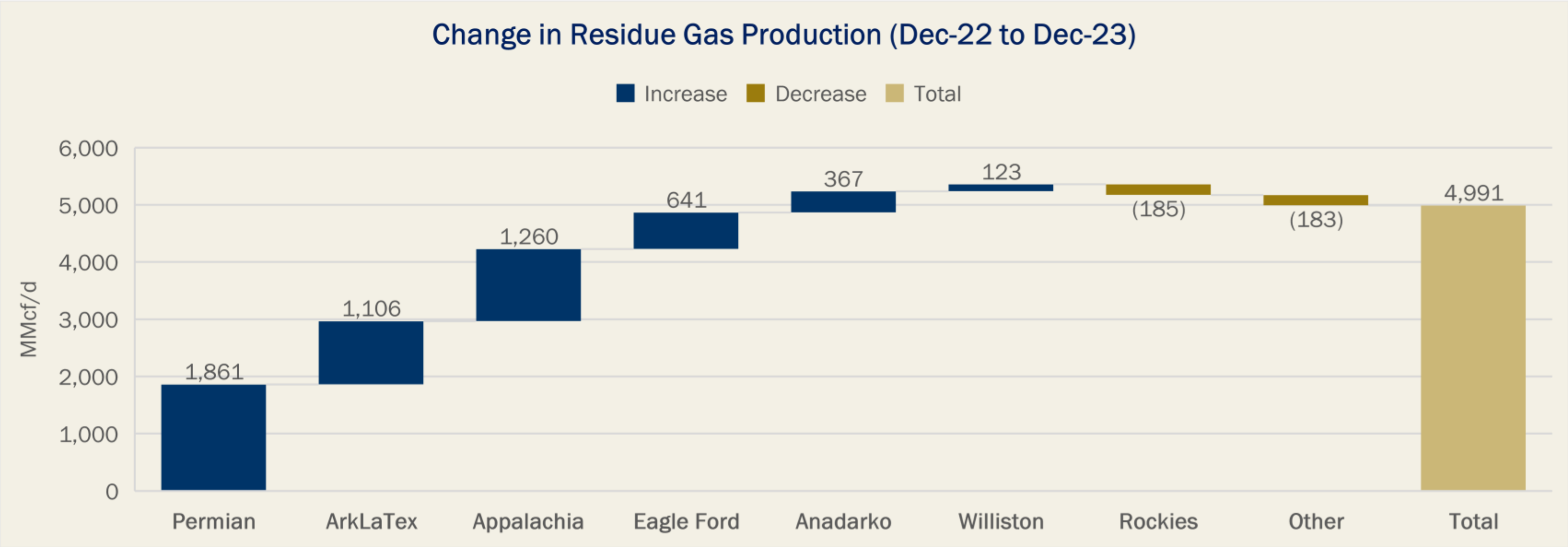
Sources: Bloomberg, Enverus, East Daley’s *Energy Data Studio*

[Please Don't] Drill Baby Drill

Residue Production by Basins (MMcf/d)			
Region	Dec-22	Dec-23	Delta
Permian	15,365	17,226	1,861
ArkLaTex	17,055	18,161	1,106
Appalachia*	33,709	34,969	1,260
Eagle Ford	6,696	7,337	641
Anadarko	8,090	8,457	367
Williston	2,364	2,486	123
Rockies	9,182	8,998	(185)
Other	7,007	6,824	(183)
Total	99,468	104,458	4,991

Rig Count by Region (MMcf/d)			
Region	Nov-22 (Actual)	Dec-23 (Forecast)	Delta
Permian	336	326	-10
Anadarko	102	87	-15
Eagle Ford	95	89	-6
ArkLaTex	85	64	-21
Appalachia	54	54	0
Williston	42	39	-3
Rockies	58	51	-7
All Others	11	10	-1
Total	791	721	-63

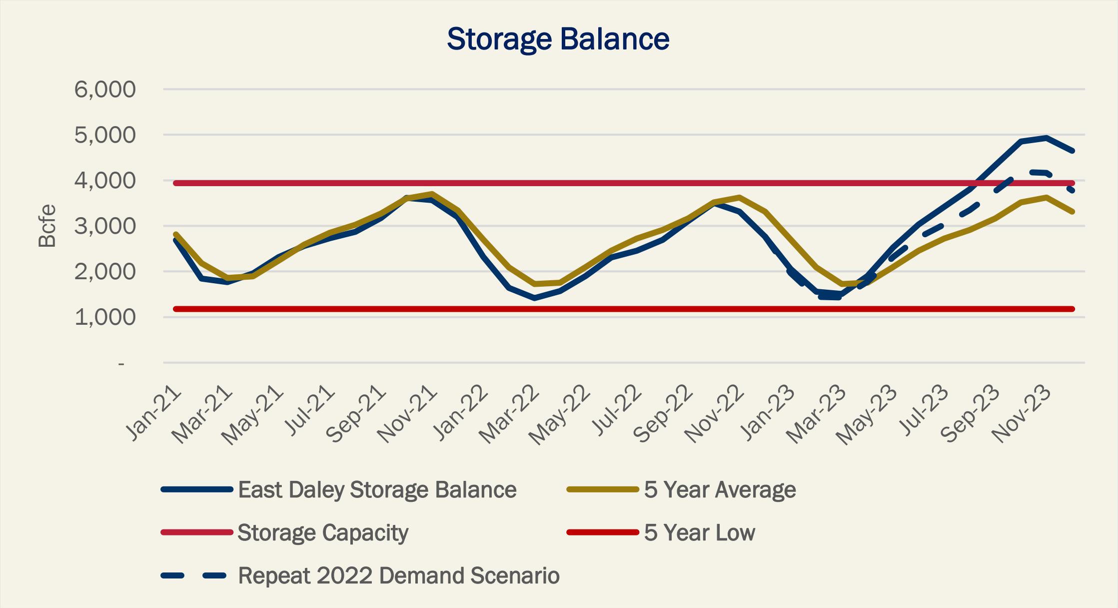
*Mild weather in Appalachia during 4Q22 has resulted in a smaller seasonal ramp in production, resulting in an overstated the exit-to-exit growth rate. We expect average 2022 to average 2023 growth in the region to be only 700 MMcf/d, driven by a late winter ramp. Even ex-MVP, the region still has ~1.0 Bcf/d of remaining egress capacity to absorb this growth.



- We forecast 5 Bcf/d of unconstrained gas production growth in 2023 (exit-to-exit), with 60% of growth coming from the Permian and ArkLaTex. This production growth in 2023 will occur despite rig attrition we expect throughout next year.
- With demand likely to go down after a record-breaking 2022, this production growth will oversupply the market and lead to above-average storage injections. Gas prices must decline to incentivize gas-focused producers to reduce drilling activity and balance the market.
- Assuming WTI Crude prices remain high, the basins with the most to lose are the ArkLaTex and Anadarko, while Appalachia production will remain stable due to firm transportation and low breakeven costs.

Sources: Enverus; East Daley's *Energy Data Studio, Basin Supply & Demand Forecasts*

A Difficult Balancing Act

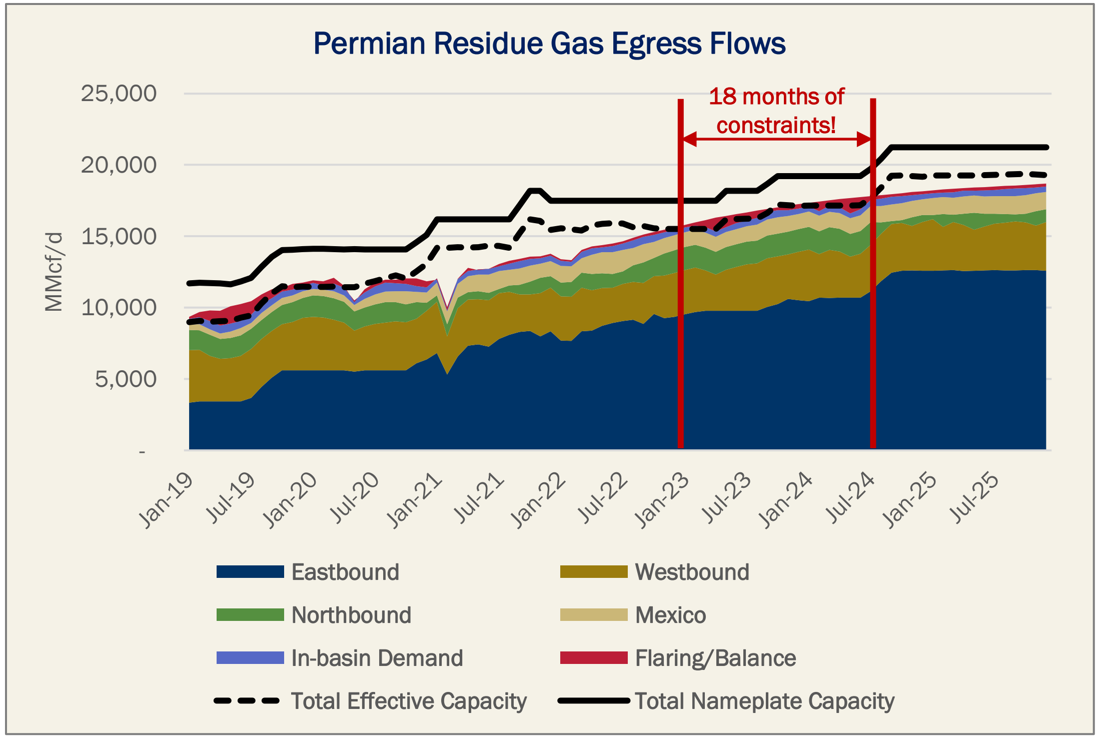


Rig Sensitivity Analysis by Basin					
Basin	Current 2023 Avg. Rig Forecast	% Rig Reduction	Change in Rig Forecast	Change in Wells Drilled	Change in Avg. FY23 Prod. (MMcf/d)
Permian	324	10%	-32	-54	(189,312)
ArkLaTex	69	10%	-7	-19	(281,589)
Anadarko	86	10%	-9	-13	(65,360)
Eagle Ford	90	10%	-9	-17	(108,720)
Northeast	53	10%	-5	-9	(344,855)
Total					**(989,836)**

- At the current growth rate, even after assuming another record year of demand, we expect supply to exceed effective working gas storage capacity of ~4.0 Tcf.
- If we see a repeat of 2022 demand, which includes the hottest summer on record, peak storage would be just above the maximum capacity. Our 2023 Base case assumes a regression to the mean for power and industrial demand.
- Without another year of record-shattering power demand, rig activity must decline and/or DUC inventory must substantially increase to balance the market. Reducing our current rig forecast by 10% would remove only 1 Bcf/d of production in 2023. The market needs to remove 4 Bcf/d to keep storage within the 5-year max.

Sources: East Daley's *US Macro Supply & Demand Forecast, Production Scenario Tools*

Permian Gas Takeaway — Help Is on the Way

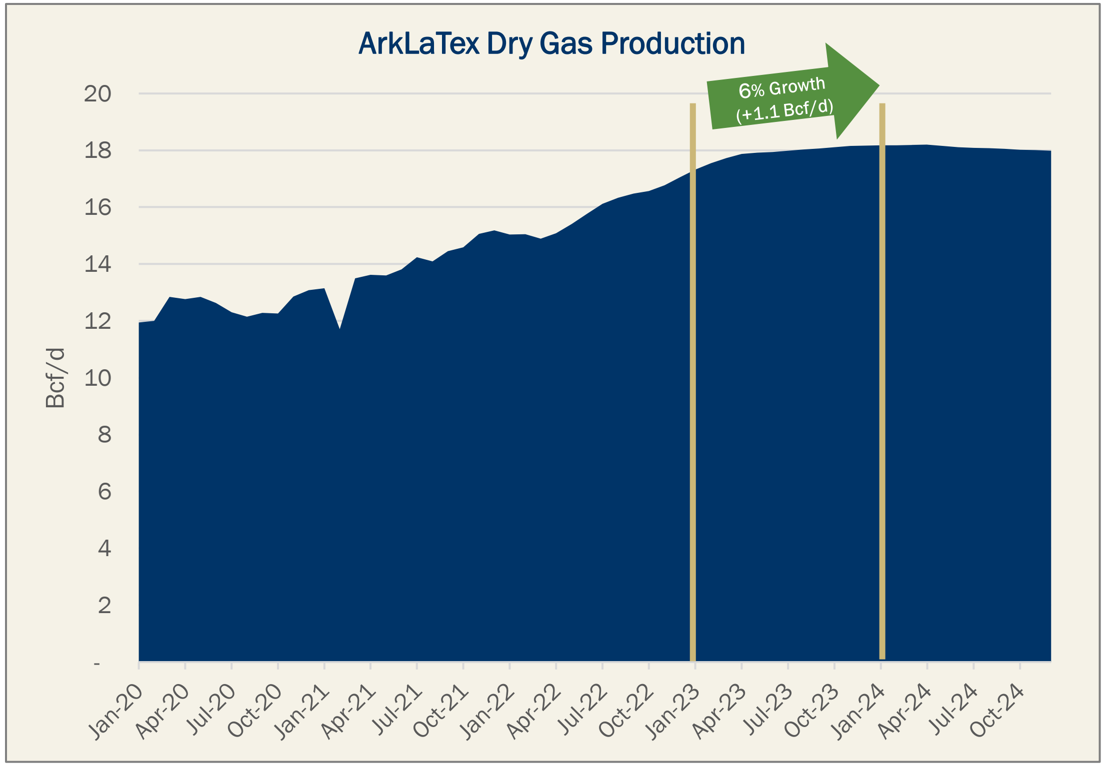


Permian Dry Gas Egress Increases				
Pipeline	Owner(s)	Capacity (MMcf/d)	Date (Fully Ramped)	Increase Type
Oasis (East)	Energy Transfer	60	Dec-22	Modernization
El Paso (West)	Kinder Morgan	684	May-23	Repair
PHP (East)	Kinder Morgan, Kinetik, Exxon	550	Oct-23	Compressor
Whistler (East)	MPLX, WhiteWater, West TX Gas, Stonepeak	550	Dec-23	Compressor
Matterhorn (East)	WhiteWater, EnLink, Devon, MPLX	2,000	Sep-24	Greenfield
Currently Planned		3,844		
GCX (East)	Kinder Morgan, Kinetik, DCP, Targa	500	~12 Months from FID	Compressor
Warrior (East)	Energy Transfer	1,500	~24 Months from FID	Greenfield
Total Potential Capacity		5,844		

- 1.8 Bcf/d of production growth will match the 1.8 Bcf/d of egress capacity growth (assuming El Paso Line 2000 re-start) through YE23. Supply growth will keep the Permian constrained until Matterhorn comes online in late 2024.
- Waha will continue to face downward price pressure as the basin remains constrained and producers are forced to flare gas to move crude to market.
- Any pipeline disruptions could result in a negative price for Waha gas.

Sources: East Daley's *Permian Basin Supply & Demand Forecast, Energy Data Studio*

ArkLaTex: A Closer Look at Supply Growth



Haynesville Pipeline Expansion Projects				
Project	Company	Capacity (MMcf/d)	ISD	Cost ($MM)
Columbia Louisiana Xpress	TC Energy	850	3Q22	472
Gulf Run	Energy Transfer	1,650	YE22	540
LEAP Expansion (Phase I)	DT Midstream	300	4Q23	180
LEAP Expansion (Phase II)	DT Midstream	400	1Q24	240 (est.)
LEAP Expansion (Phase III)	DT Midstream	200	3Q24	120 (est.)
Venice Extension & Gator Express	Enbridge	1,500	2023-2024	400
New Generation Gas Gathering	Momentum	1,700	2H24	1,000 (est.)
Louisiana Energy Gateway	Williams	1,800	4Q24	650
Louisiana Energy Pathway	Williams	364	4Q25	200
Line 200 & 300	Tellurian	4,600	2024-2026	1,280
	Total:	13,364		5,082
	Total Ex-TELL:	8,764		3,802

- We expect the ArkLaTex would grow by 1.1 Bcf/d from exit-2022 to exit-2023 unconstrained, driven by the Haynesville (800+ MMcf/d growth). Growth slows down in 2024 before climbing again as new LNG demand comes online post-2025.
- 2023 growth occurs despite a reduction in ArkLaTex rigs from 85 to 64 in our model, which further strengthens our view that the gas market will be oversupplied in 2023.
- The Top 5 producers in the basin easily exceed this growth on their own.

Sources: East Daley's *ArkLaTex Supply & Demand Forecast, Energy Data Studio*

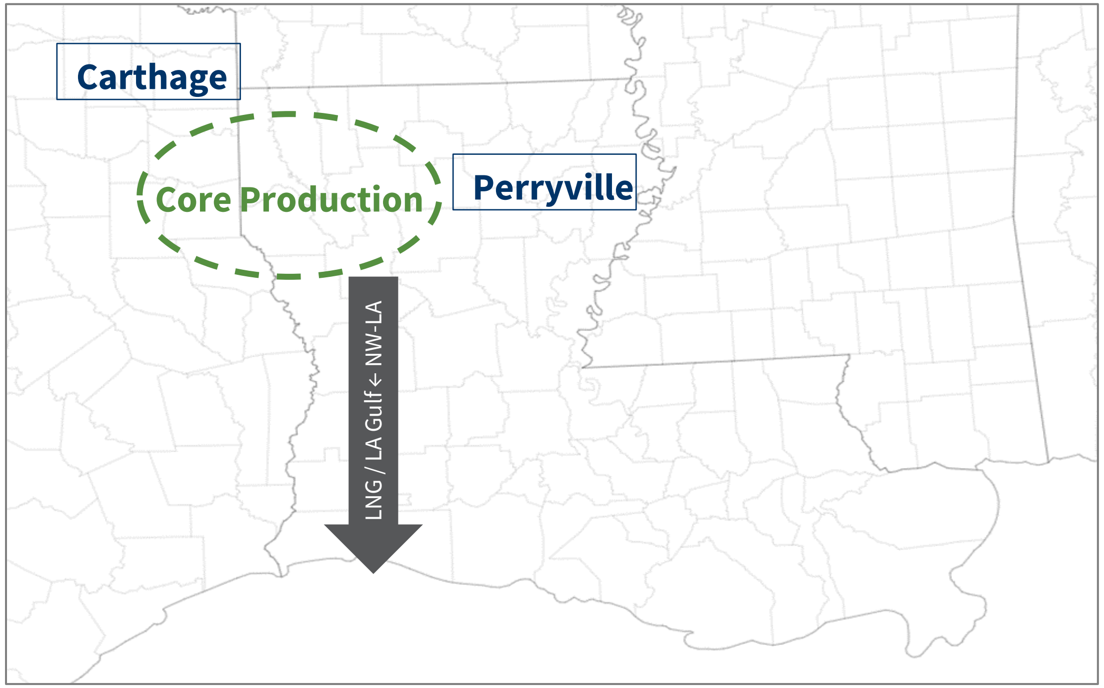
Something's Gotta Give — How About Producer Growth?

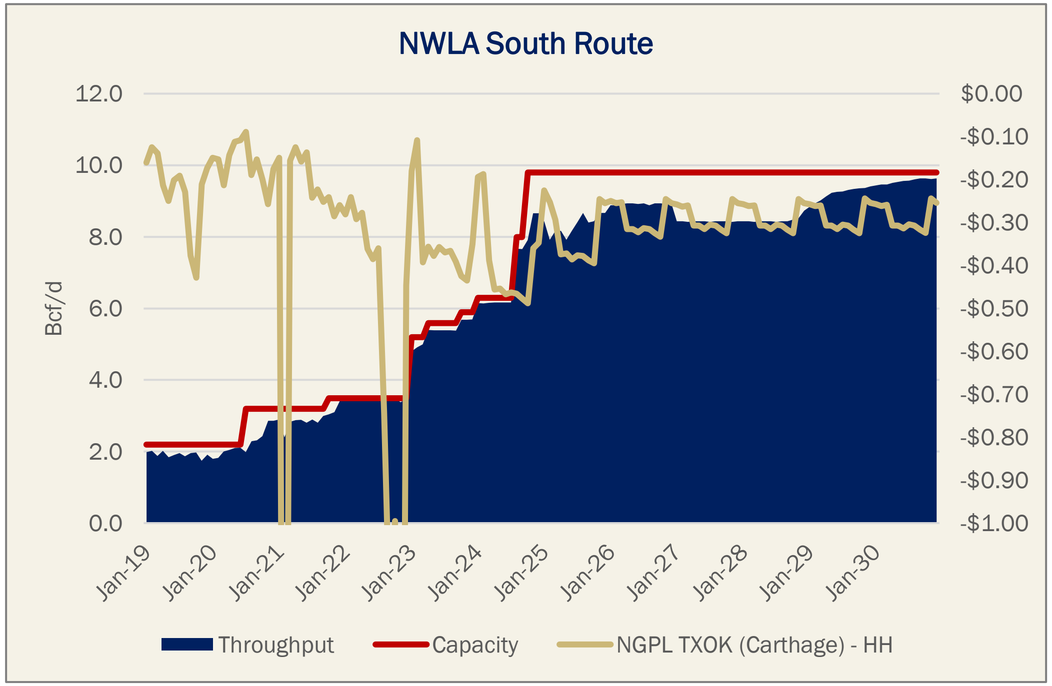
Top 5 Operators	Average 2022 Rigs	Dec-22 Production (MMcf/d)	Average 2023 Rigs	Exit to Exit '22-'23 Growth (MMcf/d)	Top Midstream System
Aethon Energy	14	2,707	11	560	Private - Aethon Ibex/Haynesville
Southwestern Energy	9	2,450	7	530	DTM - Blue Union, ET – ENBL Haynesville
Comstock Energy	7	2,331	7	491	ET – Louisiana
Chesapeake Energy	6	2,280	4	54	WMB - Louisiana/Magnolia, ET – ENBL Haynesville
Paloma Natural Gas	3	592	2	37	WMB - Louisiana/Magnolia
GEP Haynesville II	3	194	2	128	WMB - Louisiana/Magnolia
Total	**42**	**10,558**	**33**	**1,801**	

- The rigs in operation today will drive extensive growth. In order to balance the market and still meet Publics' stated growth plans, Privates will need to substantially reduce drilling activity.
- More realistically, both Publics and Privates will need to rein in production next year, either by reducing rig activity or by rebuilding DUC inventories.

Sources: Enverus; East Daley's *ArkLaTex Supply & Demand Forecast, Production Scenario Tools*

ArkLaTex Gas Takeaway – NW LA to LNG Corridor



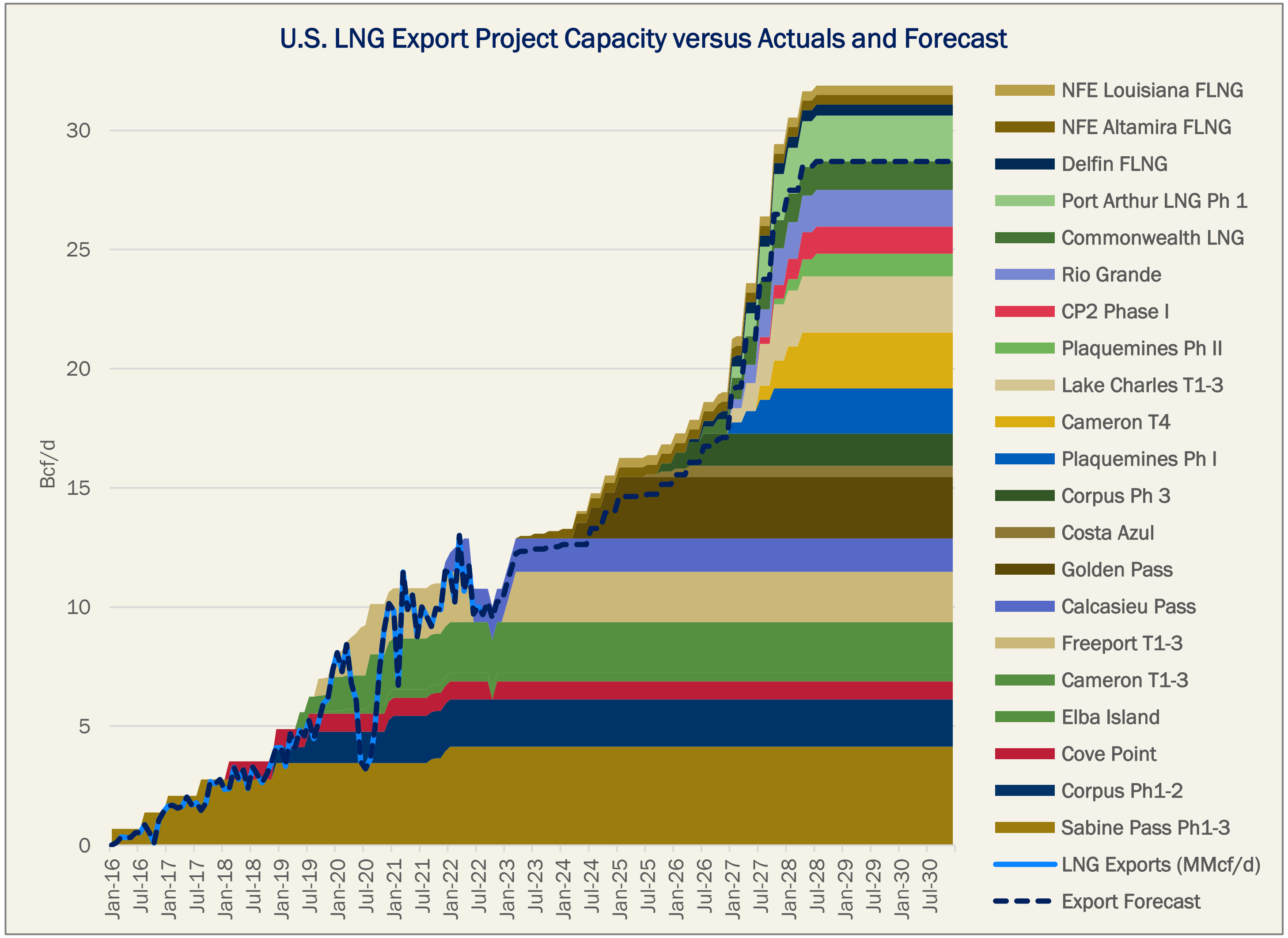


- NWLA - South route is the most favored out of the basin as it will directly feed LNG export demand.
- Most new greenfield projects (WMB’s LEG and Momentum's M6) follow this route.
- Long-term flows on this route increase to supply new LNG demand. We could see an additional bump in the near term as the East Texas/Carthage to Houston route becomes uneconomic.

Sources: East Daley’s *ArkLaTex Supply & Demand Forecast*

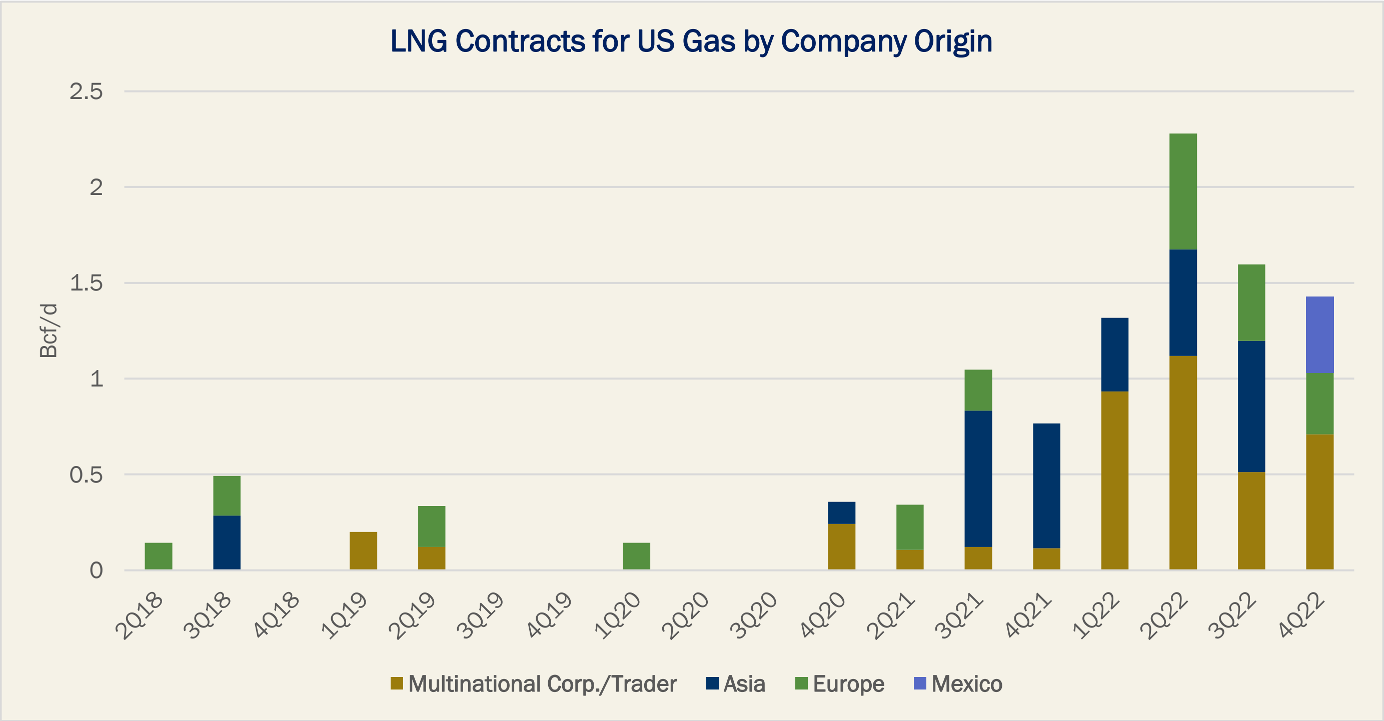
LNG Contracting Catching Fire

- LNG drives significant demand growth through 2030. We forecast 17.5 Bcf/d of LNG export capacity growth by 2029, bringing total US LNG capacity to almost 32.0 Bcf/d.
- Excluding floating LNG (FLNG) projects, we forecast Louisiana LNG projects capacity to grow by 12.9 Bcf/d to 21.2 Bcf/d, while Texas LNG capacity grows 2.9 Bcf/d to 7.3 Bcf/d.
- Another 1.3 Bcf/d of FLNG is also in progress, with construction times estimated at 1-2 years post-FID. If this is proven, there may be FLNG upside due to the faster timeline.
- By the end of the decade, LNG will make up ~25% of US natural gas demand.



Sources: East Daley's *US Macro Supply & Demand Forecast*

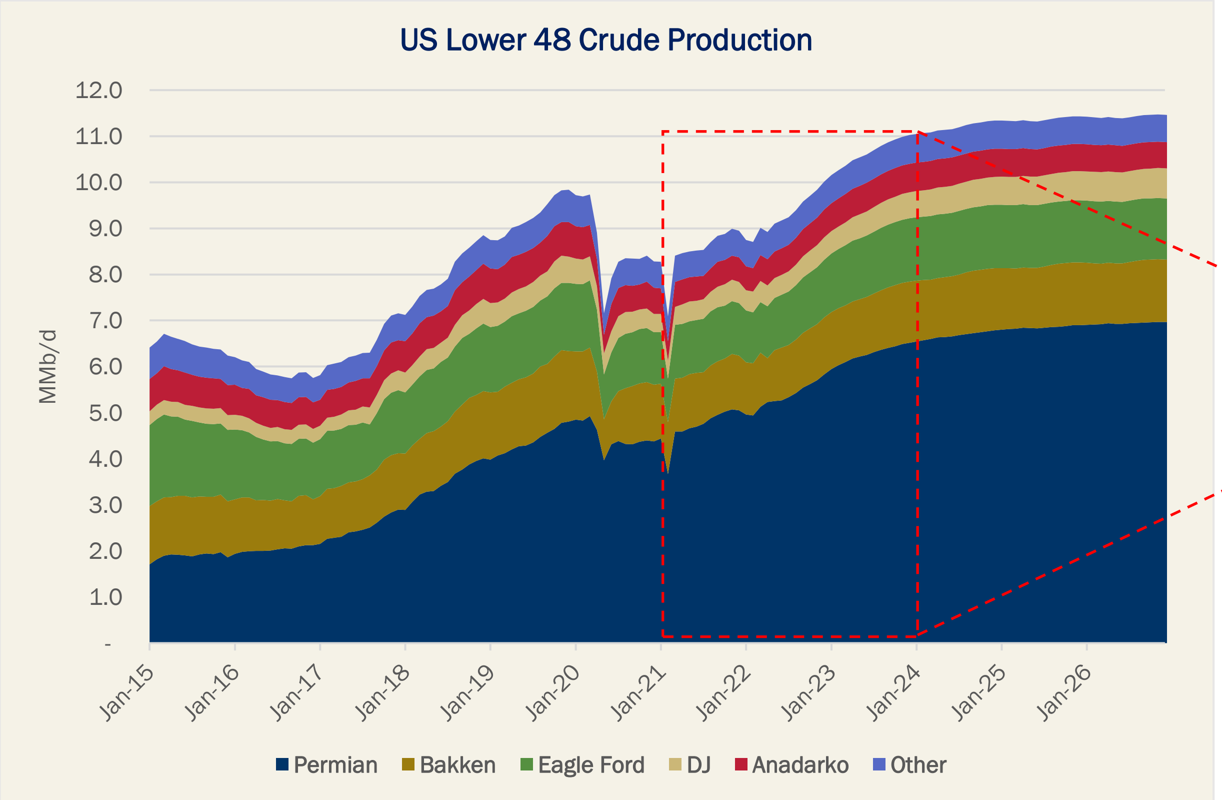
Buyers Line Up for US LNG

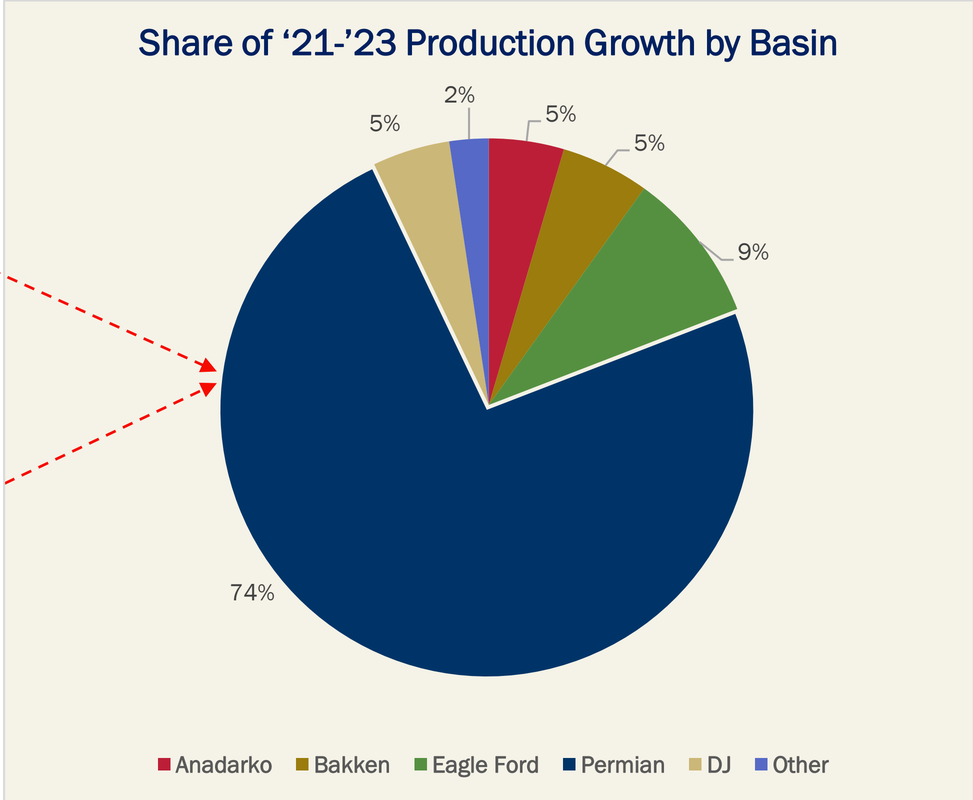


- Since the Russian invasion of Ukraine in February, 6.2 Bcf/d of new LNG SPAs have been signed. SPA volumes signed in 2022 exceed alll LNG contracting in the previous 4 years.
- In our LNG outlook, 68% (11.9 Bcf/d) of the incoming 17.5 Bcf/d of new capacity is already under contract. Another 2.4 Bcf/d of potential contracts have been announced under Heads of Agreements (HoA).
- Williams (WMB) is the first midstream company to enter the LNG sector as a potential buyer, signing an HoA for 0.4 Bcf/d from Sempra's (SRE) Cameron 4 and Port Arthur projects.

Sources: East Daley's *US Macro Supply & Demand Forecast*

Crude Production Recovering from Long-COVID

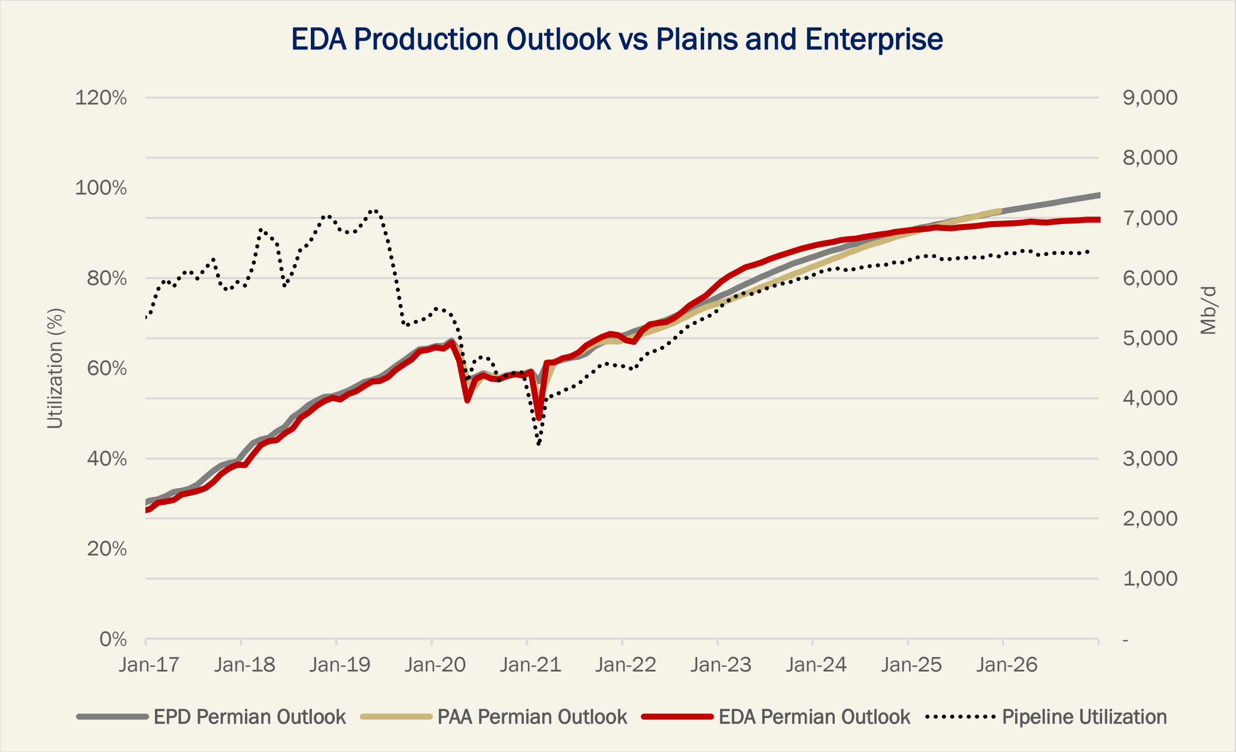




- Shale crude production will grow ~2.0 MMb/d from exit-2021 to exit-2023, surpassing record production levels set in December 2019.
- The Permian plays the key roll in this development, accounting for 74% of total growth. Other basins like the Eagle Ford, Rockies, Anadarko, and the Bakken make up the balance.

Sources: East Daley's *Crude Network Model*, *Production Scenario Tools*, *Energy Data Studio*

Short-Term Differences, Long-Term Agreement on Permian Crude Growth

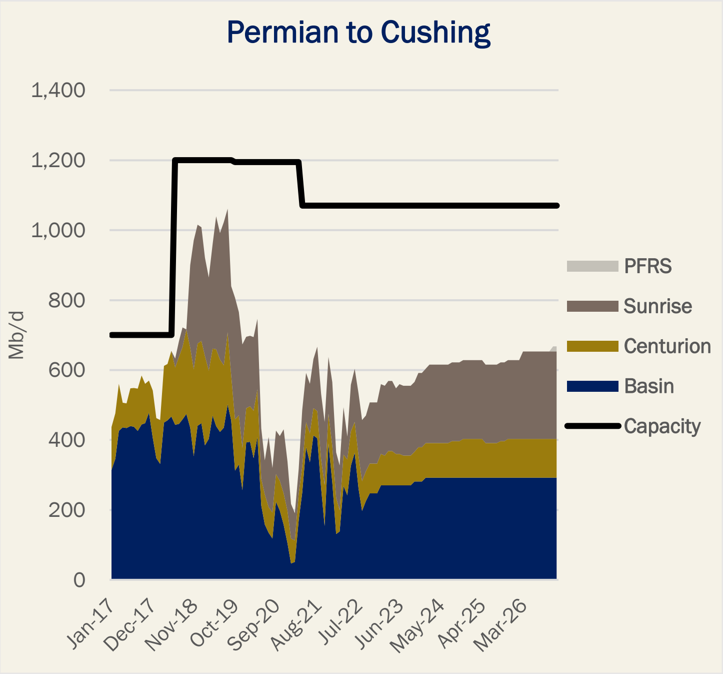


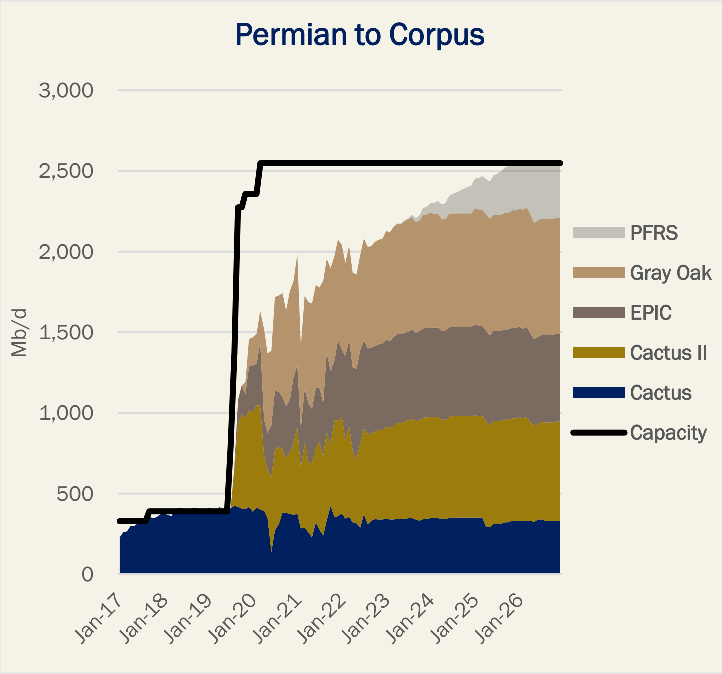
Production and Growth (EDA)				
Year	Avg. Prod. (Mb/d)	Exit (Mb/d)	Average Growth	Exit-Exit Growth
2020	4,472	4,377	0%	0%
2021	4,699	5,049	5%	15%
2022	5,353	5,826	14%	15%
2023	6,271	6,517	17%	12%
2024	6,672	6,785	6%	4%
2025	6,848	6,901	3%	2%
2026	6,940	6,969	1%	1%
2027	6,970	6,977	0%	0%

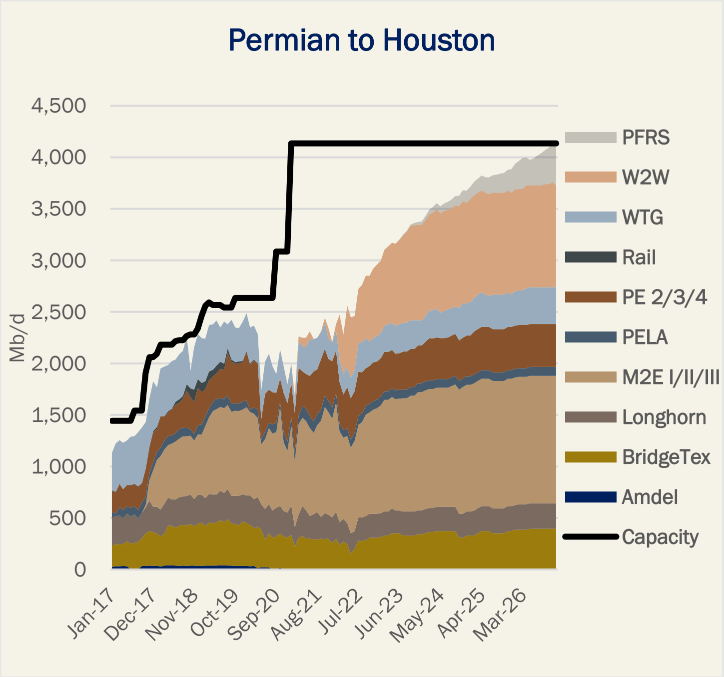
- EDA's Permian production forecast is near-term loaded, as well data indicates drilling efficiencies have increased significantly.
- Midstream operators Enterprise (EPD) and Plains All American (PAA) have a mostly similar view but vary on timing. EPD and PAA's short-term volume outlook is bearish relative to EDA, but their long-term outlook is more bullish.
- Declining rig count assumptions longer-term, which reflect the backwardated WTI curve, are the primary driver of the differing long-term forecast between EDA and EPD/PAA.

Sources: Enterprise Products Investor Presentation; Plains All American Investor Presentation; East Daley's *Crude Network Model*, *Production Scenario Tools*, *Energy Data Studio*

Where Will the Barrels End Up?



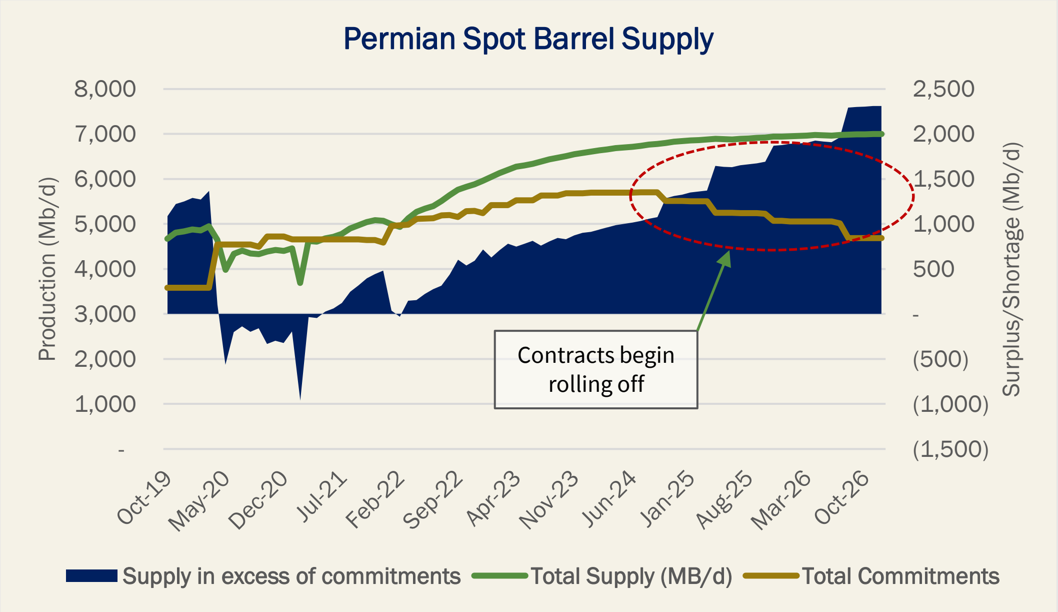


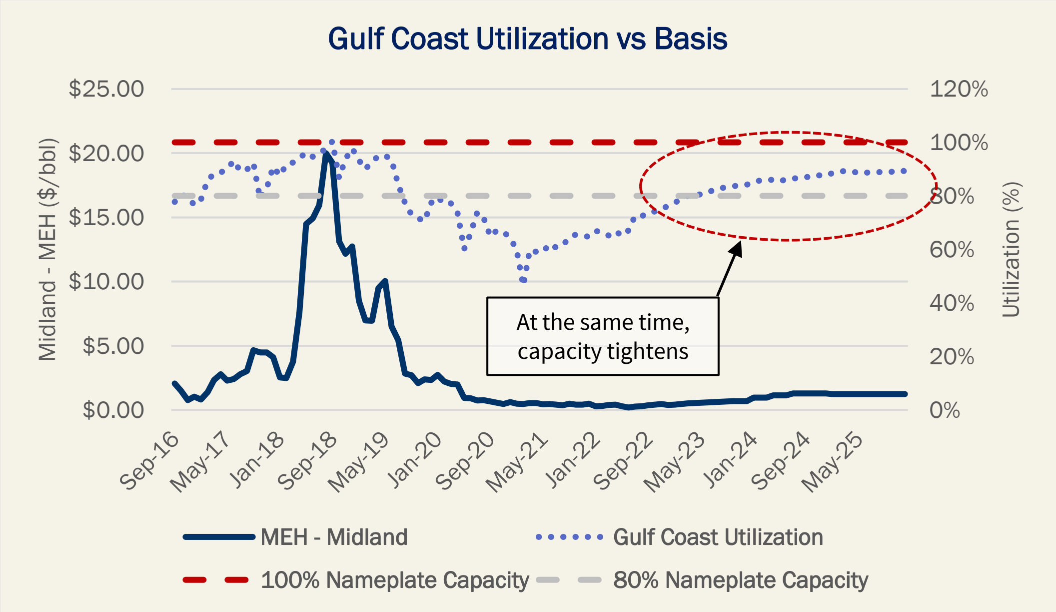


- Midcon refiners create some “sticky” demand for Permian-to-Cushing barrels, but premium pricing along the US Gulf Coast will incentivize marginal barrels to move to the water.
- Gulf Coast pipelines now average mid-70% utilization, and excess capacity has shrunk from 2.7 MMb/d since January 2021 to 1.6 MMb/d as of November 2022. By the end of 2025, EDA projects these pipes will hit 90% utilization.
- Under a Permian flat-rig scenario (“PFRS”), pipes fill much quicker. New or expanded infrastructure to Corpus or Houston would be needed, or Midland basis will collapse as the only way out is north to Cushing.

Sources: East Daley’s *Crude Network Model, Energy Data Studio*

Improving Tariff Rate Environment

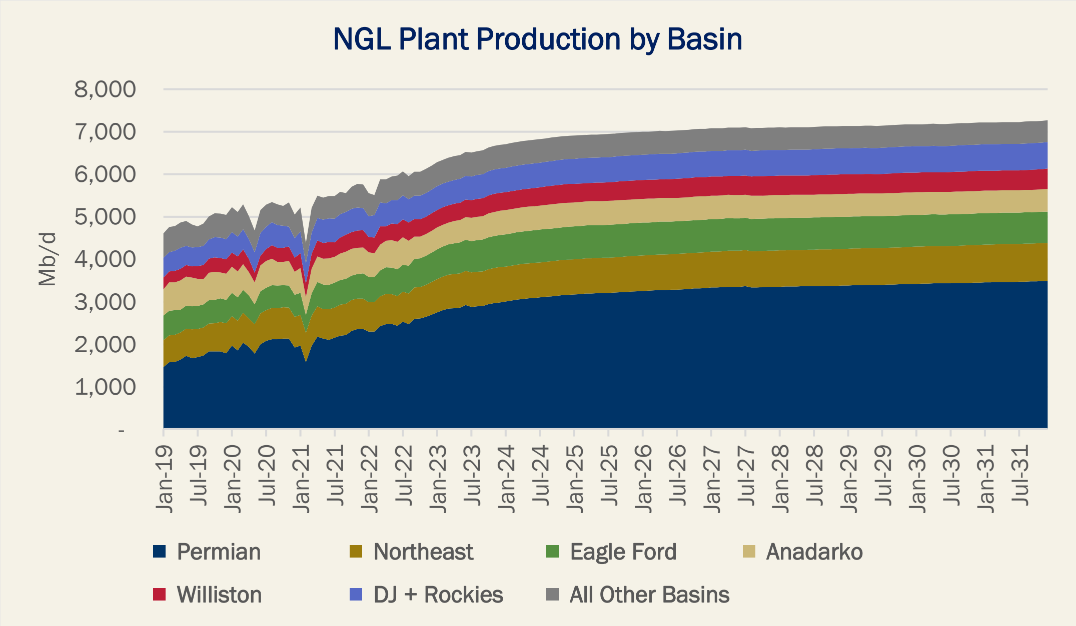


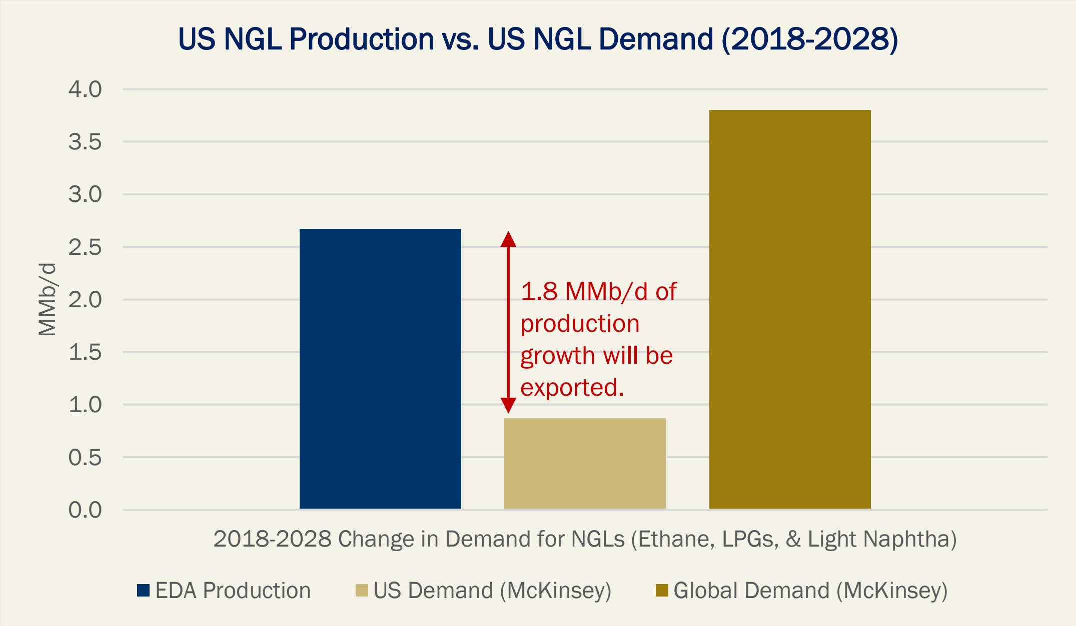


- Midstream operators should not sign new long-term capacity agreements under current conditions. Spreads remain tight in the near term, and short-term incentives have driven down the average transport rate.
- However, if supply is in line with EDA’s expectations, then rates have bottomed. In the next 2-3 years, we expect midstreamers will be able to recontract at higher rates as egress capacity tightens and spreads widen.
- Current holders of committed capacity should negotiate “blend-and-extend” terms before capacity gets too tight. Those without FT in the coming years will be forced to pay walk-up rates, which in most cases are adjusted annually at the maximum FERC index ceiling (~13.5%+ in mid-2023).

Sources: Bloomberg, East Daley’s *Crude Network Model*

If Gas and Crude Are Booming, so Are NGLs

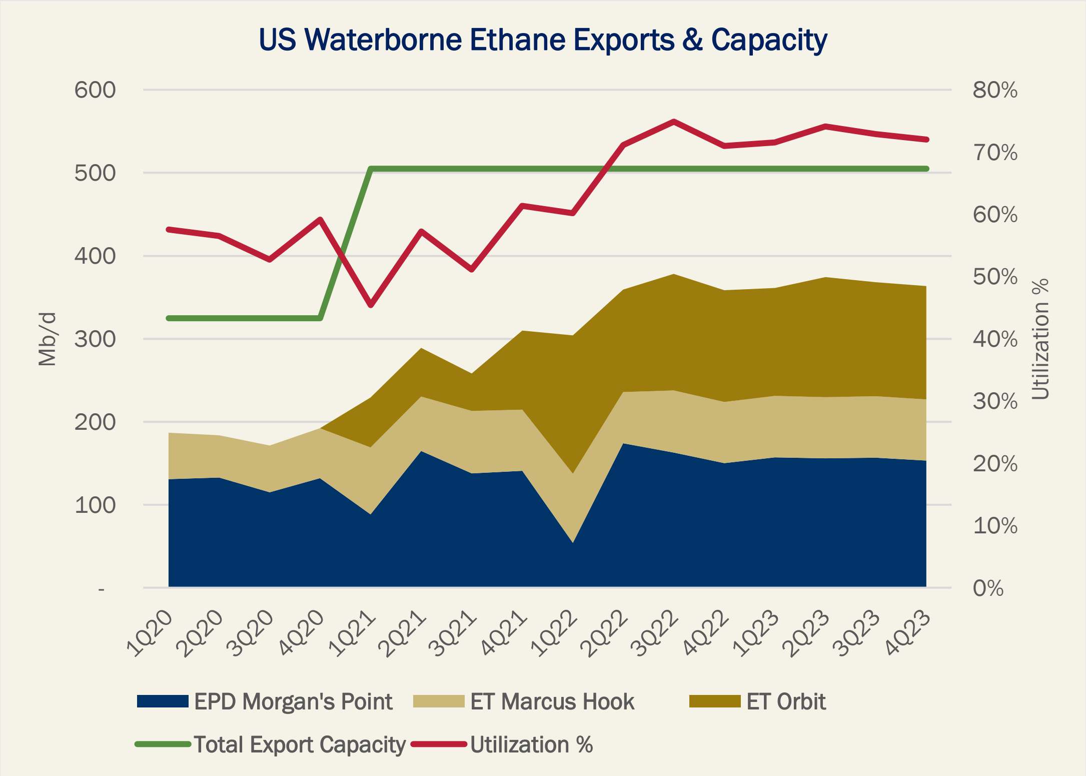


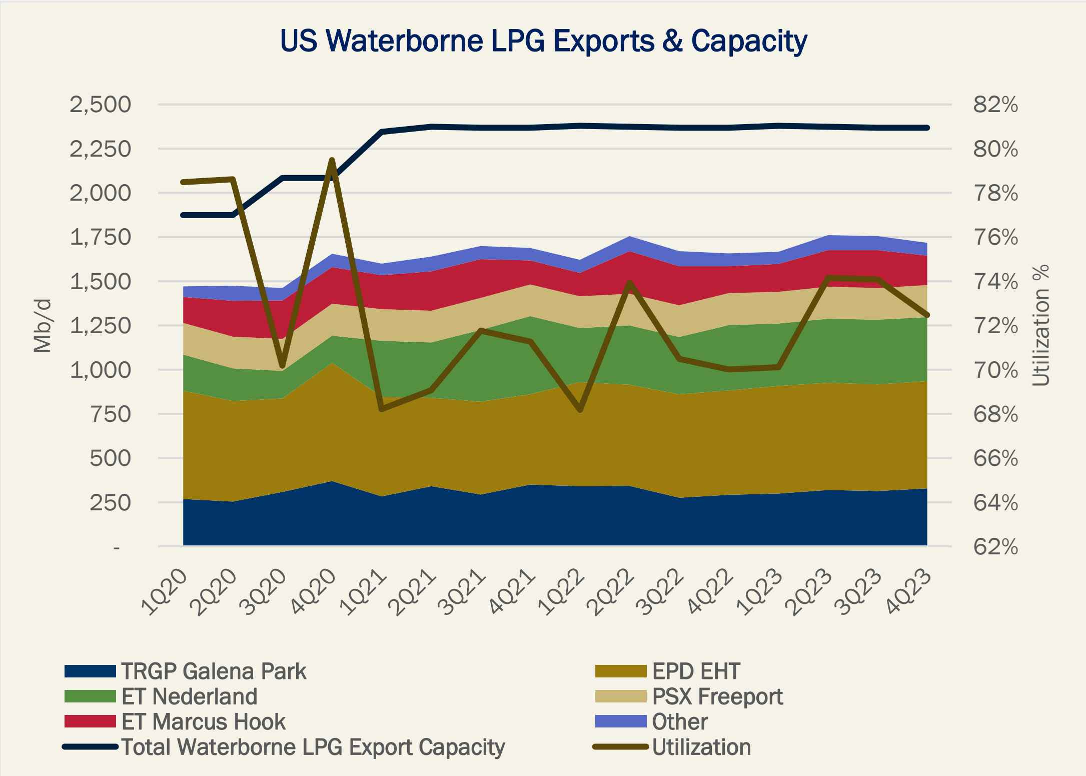


- NGL production is also growing rapidly on the back of strong Permian activity, higher ethane recovery, and as gas-to-oil ratios (GORs) increase across basins. However, growth plateaus post-2024 as we taper rigs due to the backwardated curve.
- McKinsey estimates US NGL demand will only grow by ~800 Mb/d from 2018-2028. Most of this demand growth has already crystalized from Shell's Pennsylvania cracker (2022) and Total/Baystar's Gulf Coast cracker (2021).
- With the lack of domestic demand growth, new supply will need to be exported and midstream players will need to ensure there is sufficient infrastructure to balance the market.

Sources: McKinsey Energy Insights; East Daley's *NGL Network Model, Purity Product Forecast, Energy Data Studio*

Export Capacity Is Waiting …

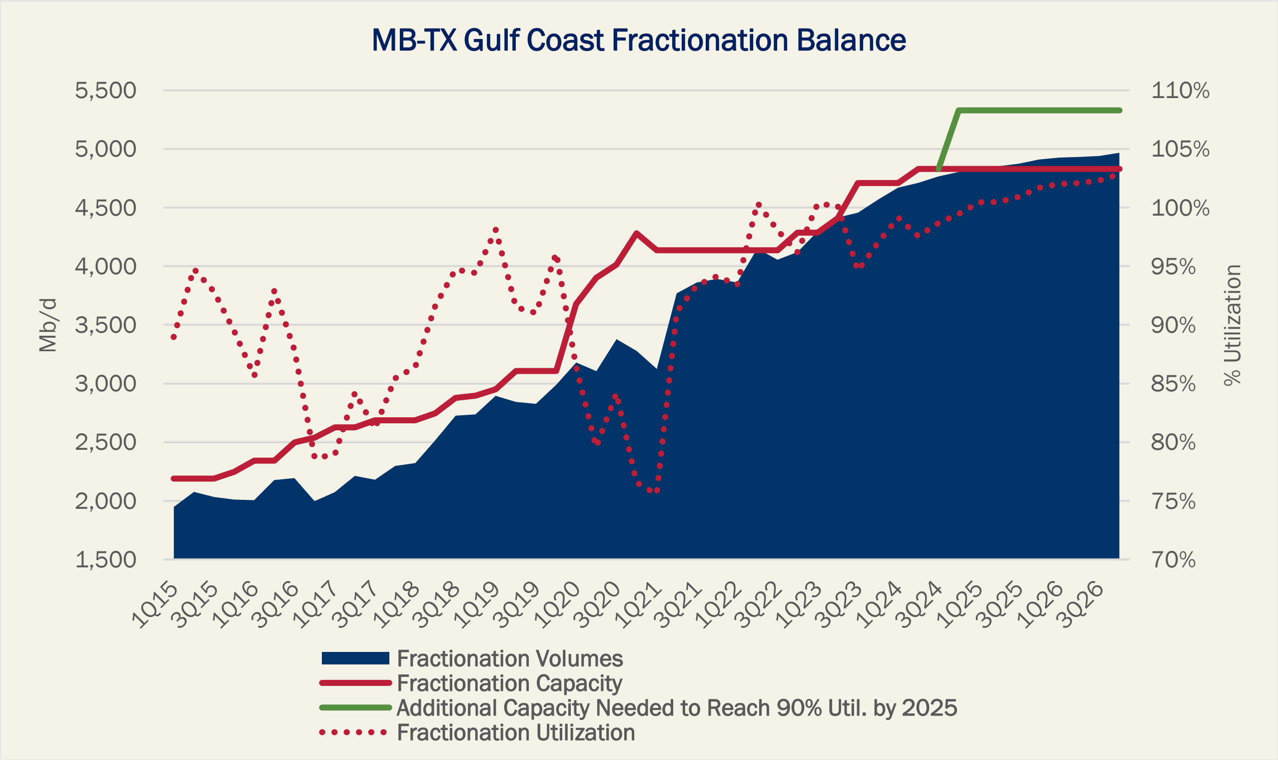




- NGL exports are dominated by a select few: Energy Transfer (ET), Enterprise (EPD), and Targa (TRGP).
- ET and EPD own all the existing waterborne ethane export facilities in the US. Those facilities still have ~127 Mb/d of capacity remaining.
- ET, EPD, and TRGP collectively own 2.1 MMb/d of LPG export capacity, with 669 Mb/d of capacity remaining.

Sources: East Daley's *NGL Network Model, Blueprint Financial Models*

… But You Can't Export if You Can't Frac

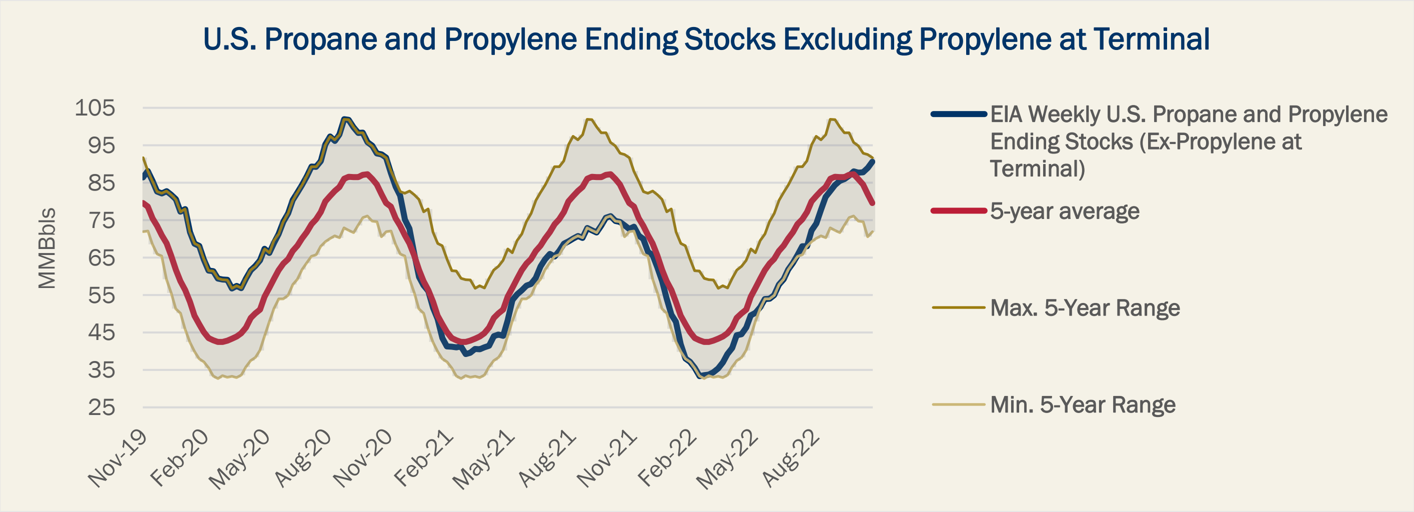


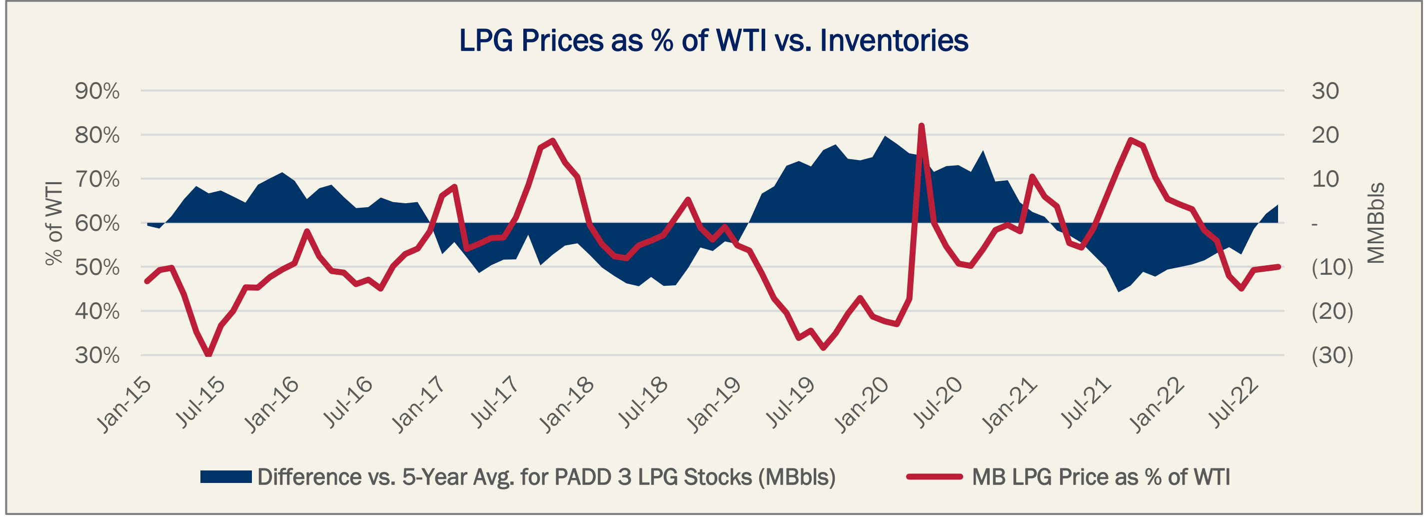
- While there is sufficient NGL export capacity remaining, there is little to no space available at the frac. Fracs have historically never run above 90% for a sustained period. At the current rate of production growth, utilization will remain between 95%-100% despite 700 Mb/d of new capacity hitting the market between 1H23-1H24.
- East Daley estimates at least 500 Mb/d of additional fractionation capacity will need to be announced to reach 90% utilization. These constraints may get worse during the winter as fracs will need to go through turnarounds after such high utilization.

Sources: East Daley's *NGL Network Model, Energy Data Studio*

Until Someone Gives a Frac, Expect Massive Y-Grade Storage Builds

- Another option for NGLs is to ramp up Y-Grade storage levels, while meeting any additional demand with purity product storage draws. We are already starting to see this as propane/propylene weekly inventories, which include estimates contained within Y-Grade, have shot up from 5-year lows to above the 5-year average in a matter of weeks.
- However, this stored Y-Grade will need to be fractionated at some point. Add in recession fears lowering petrochemical demand, domestic NGL prices may be pressured in the near-to-medium unless new export contracts are signed and fractionators built.
- A build-up in inventories will put pressure on prices. Historically, when inventories are above the 5-year average, the price of LPGs (Propane plus Butane) can fall to as low as 30% of WTI Crude, well below the current ratio of 45%.





Sources: Bloomberg, Energy Information Administration (EIA), East Daley's *The NGL Roundup*

Executive Summary – Conclusions

1. Gas prices must decline to incentivize gas-focused producers to curb production growth and balance supply and demand. The market needs to rebalance 4 Bcf/d to keep storage within the 5-year max, and gas-centric producers in the ArkLaTex and Anadarko are likely areas to adjust production.

2. Waha will continue to face downward price pressure as the basin remains constrained and producers are forced to flare gas to move crude to market. Any pipeline disruptions could result in a negative price for Waha gas, impacting Producers and Midstreamers exposed to in-basin prices.

3. Unless Permian producers limit growth to avoid flaring, the basin will account for the majority of US oil production growth through 2024, driven by sustained prices, producer efficiencies, and increasing international demand. Underutilized pipeline capacity built between 2019-2021 will fill, which will widen basis between hubs and put upward pressure on transportation rates out of the basin.

4. The current NGL commodity environment will impact gas producers with high exposure to NGL prices and Midstream G&P companies with POP and Keep-Whole contracts. Those exposed to NGL prices should lock in higher prices and hedge now, as recession fears and a storage glut will put additional pressure on prices going forward.

NATURAL GAS

SHORT-TERM PAIN FOR LONG-TERM GAIN

Key Takeaways – Natural Gas

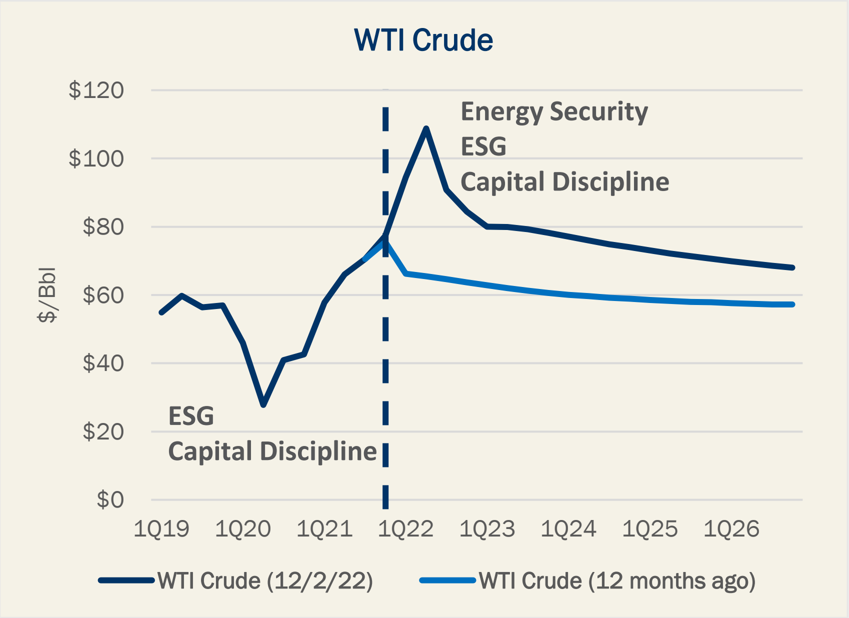
1. We forecast 5 Bcf/d of unconstrained gas production growth in 2023 (exit-to-exit), despite rig attrition year-over-year. Even if we have another record-breaking year for demand, this production growth will oversupply the market and lead to above-average storage injections.

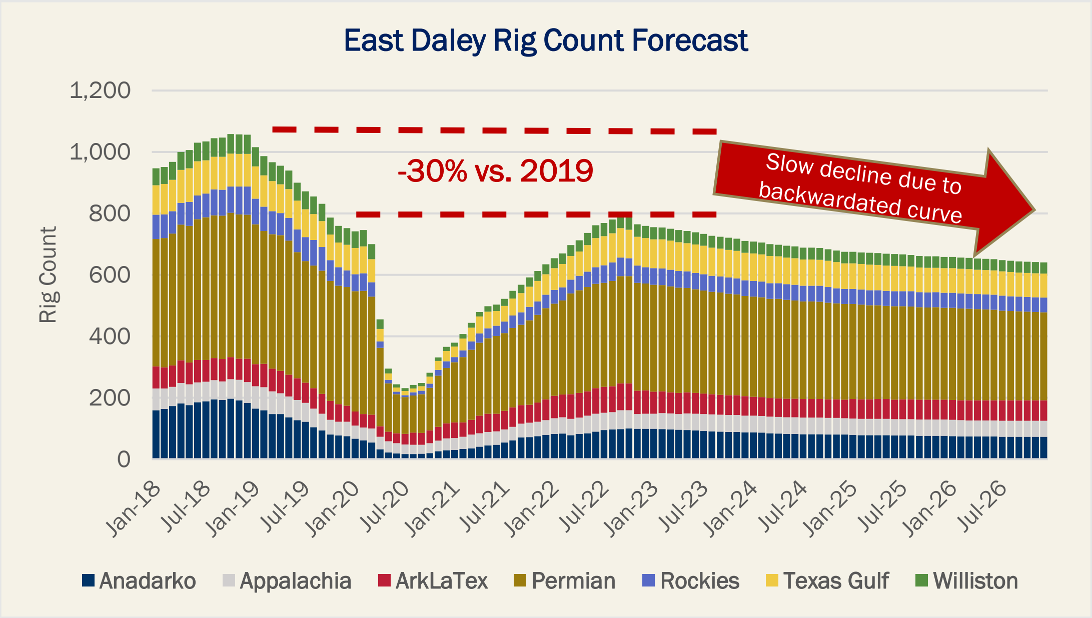
2. We expect Permian egress to remain constrained for ~18 months until the Matterhorn pipeline comes online in 4Q24. Waha will continue to face downward price pressure as the basin remains constrained and producers are forced to flare gas to move crude to market.

3. ArkLaTex production is most exposed when it comes to balancing the market due to producers' sensitivity to gas prices, egress constraints, and a lack of near-term LNG demand growth.

4. LNG drives significant demand growth through 2029, with export capacity growing by 17.5 Bcf/d to nearly 32.0 Bcf/d. We expect LNG demand will make up ~25% of total US natural gas demand. Although the short-term may be bumpy, the market should continue to strategize around the long-term trend of growing US LNG.

Spike in WTI to Drive Gas Oversupply in '23





Change from Jan-22 to Nov-22:

- Williston +11
- Eagle Ford +25
- Rockies +14
- Permian +37
- ArkLaTex +11
- Appalachia +4
- Anadarko +23

Total +126

- The Russia-Ukraine war has added Energy Security to a conversation previously focused on ESG and capital discipline.
- The industry has added significant rigs in response to sustained high oil prices. While some producers have guided to flat-to-moderate growth, others are guiding to double-digit annual growth for 2023.
- WTI has ranged from $80-$120/bbl since Russia's invasion of Ukraine. We expect prices to remain in this range given continued Russia supply uncertainty and OPEC+ output cuts.
- Supportive fundamentals in oil will continue growth in associated gas production, leading to oversupply until more LNG demand ramps.

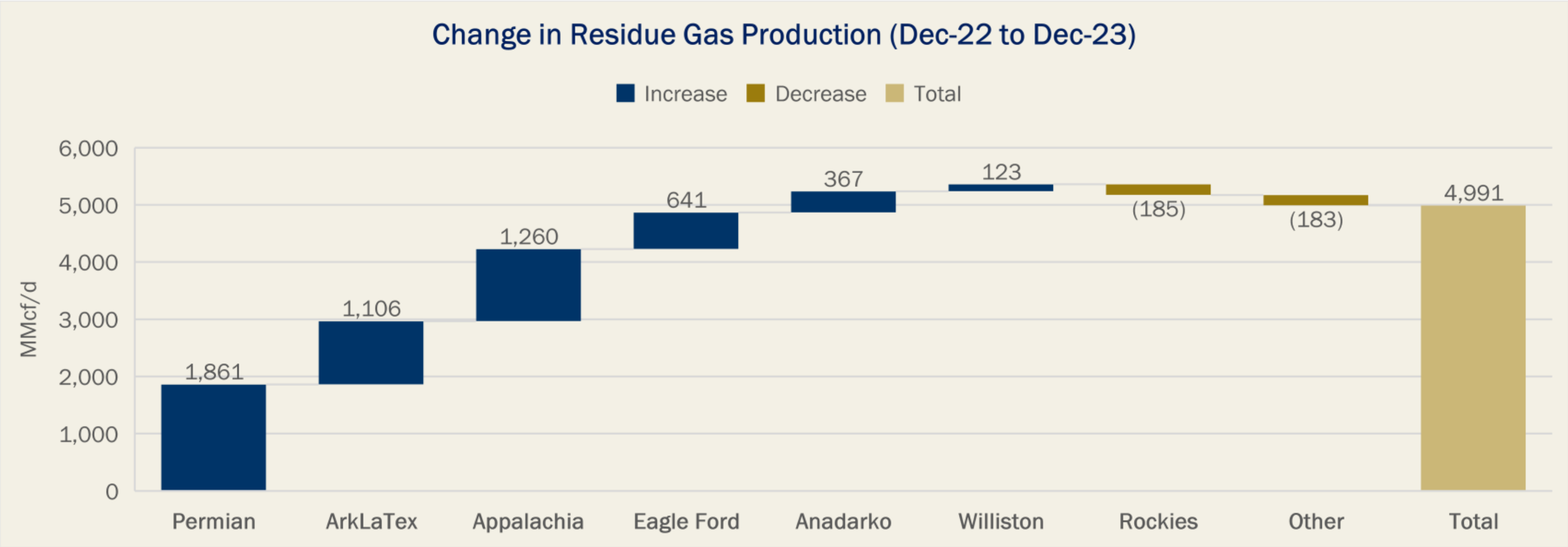
Sources: Bloomberg, Enverus, East Daley's *Energy Data Studio*

[Please Don't] Drill Baby Drill

Residue Production by Basins (MMcf/d)			
Region	Dec-22	Dec-23	Delta
Permian	15,365	17,226	1,861
ArkLaTex	17,055	18,161	1,106
Appalachia*	33,709	34,969	1,260
Eagle Ford	6,696	7,337	641
Anadarko	8,090	8,457	367
Williston	2,364	2,486	123
Rockies	9,182	8,998	(185)
Other	7,007	6,824	(183)
Total	99,468	104,458	4,991

Rig Count by Region (MMcf/d)			
Region	Nov-22 (Actual)	Dec-23 (Forecast)	Delta
Permian	336	326	-10
Anadarko	102	87	-15
Eagle Ford	95	89	-6
ArkLaTex	85	64	-21
Appalachia	54	54	0
Williston	42	39	-3
Rockies	58	51	-7
All Others	11	10	-1
Total	791	721	-63

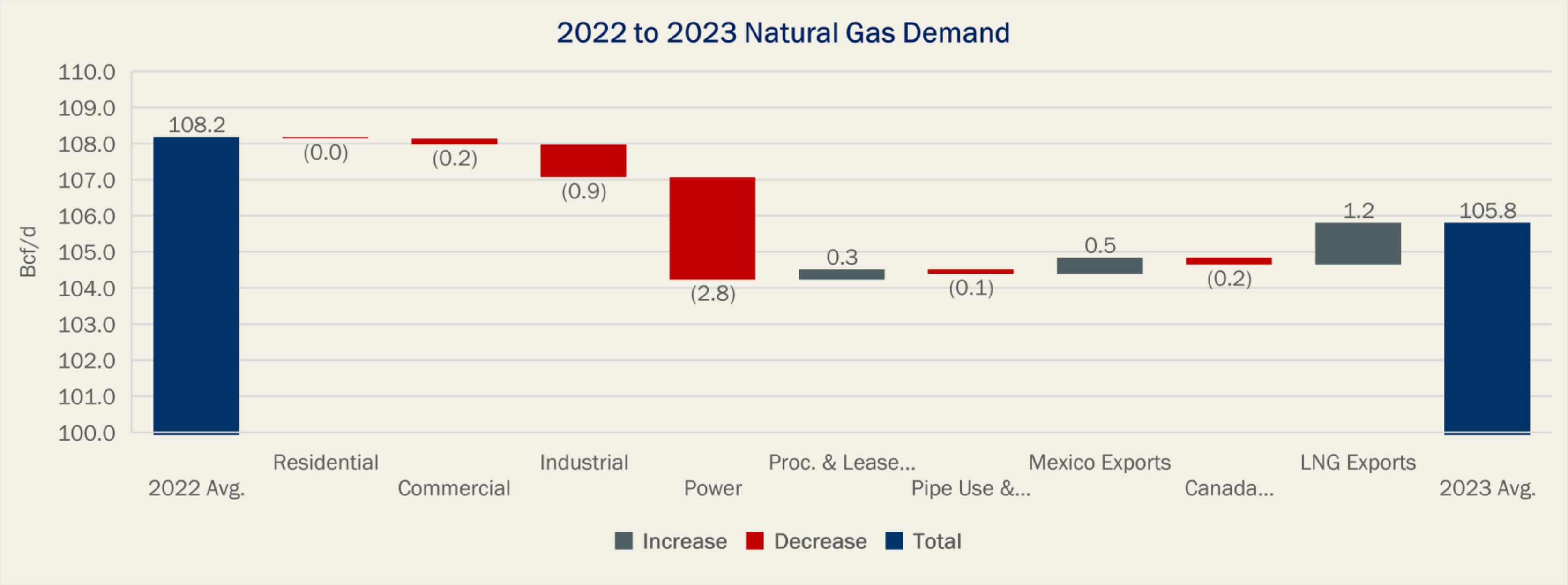
*Mild weather in Appalachia during 4Q22 has resulted in a smaller seasonal ramp in production, resulting in an overstated the exit-to-exit growth rate. We expect average 2022 to average 2023 growth in the region to be only 700 MMcf/d, driven by a late winter ramp. Even ex-MVP, the region still has ~1.0 Bcf/d of remaining egress capacity to absorb this growth.



- We forecast 5 Bcf/d of unconstrained gas production growth in 2023 (exit-to-exit), with 60% of growth coming from the Permian and ArkLaTex. This production growth in 2023 will occur despite rig attrition we expect throughout next year.
- With demand likely to go down after a record-breaking 2022, this production growth will oversupply the market and lead to above-average storage injections. Gas prices must decline to incentivize gas-focused producers to reduce drilling activity and balance the market.
- Assuming WTI Crude prices remain high, the basins with the most to lose are the ArkLaTex and Anadarko, while Appalachia production will remain stable due to firm transportation and low breakeven costs.

Sources: Enverus; East Daley's *Energy Data Studio, Basin Supply & Demand Forecasts*

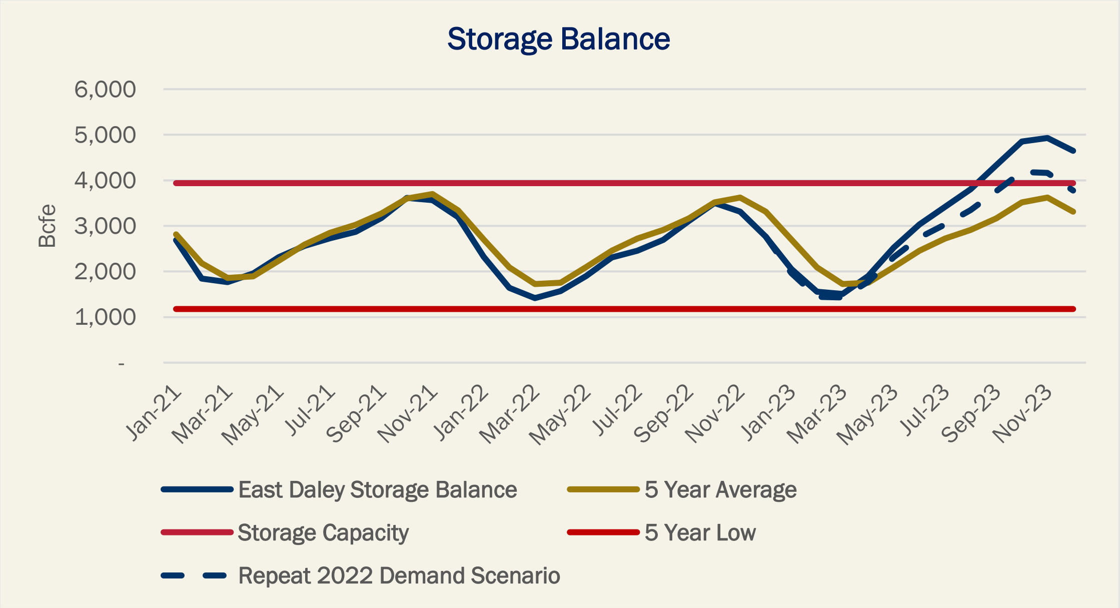
Another Record Year Needed to Absorb Supply



- Due to an extremely hot summer, electric power burn in 2022 was at its highest in 5 years. For 2023, we assume a normal summer, resulting in a 2.8 Bcf/d decline in natural gas demand.
- Industrials also hit a 5-year high for demand in 2022. According to the EIA's *Short-Term Energy Outlook* released in December, industrial demand will decline by 0.9 Bcf/d in 2023.
- LNG exports increase as Freeport ramps back up through 2023 after being offline since July 2022.
- Another hot summer and record industrial demand could cut into the oversupply and is a risk to our thesis.

Sources: East Daley's *US Macro Supply & Demand Forecast*

A Difficult Balancing Act



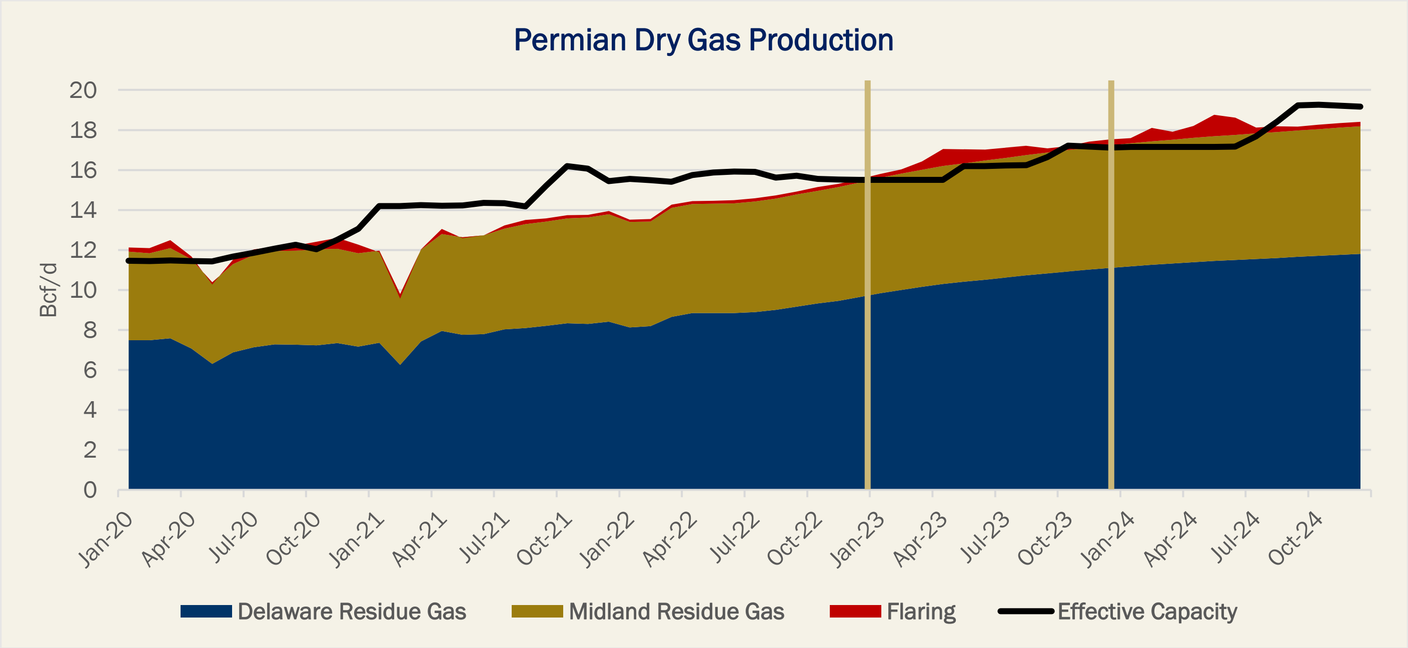
Rig Sensitivity Analysis by Basin

Basin	Current 2023 Avg. Rig Forecast	% Rig Reduction	Change in Rig Forecast	Change in Wells Drilled	Change in Avg. FY23 Prod. (MMcf/d)
Permian	324	10%	-32	-54	(189,312)
ArkLaTex	69	10%	-7	-19	(281,589)
Anadarko	86	10%	-9	-13	(65,360)
Eagle Ford	90	10%	-9	-17	(108,720)
Northeast	53	10%	-5	-9	(344,855)
Total					**(989,836)**

- At the current growth rate, even after assuming another record year in demand, we expect supply to exceed effective working gas storage capacity of ~4.0 Tcf.
- If we see a repeat of 2022 demand, which includes the hottest summer on record, peak storage would be just above the maximum capacity. Our 2023 base case assumes a regression to the mean for power and industrial demand.
- Without another year of record-shattering power demand, rig activity must decline and/or DUC inventory must substantially increase to balance the market. Reducing our current rig forecast by 10% would remove only 1 Bcf/d of production in 2023. The market needs to remove 4 Bcf/d to keep storage within the 5-year max.

Sources: East Daley's *US Macro Supply & Demand Forecast, Production Scenario Tools*

Permian: A Closer Look at Supply Growth

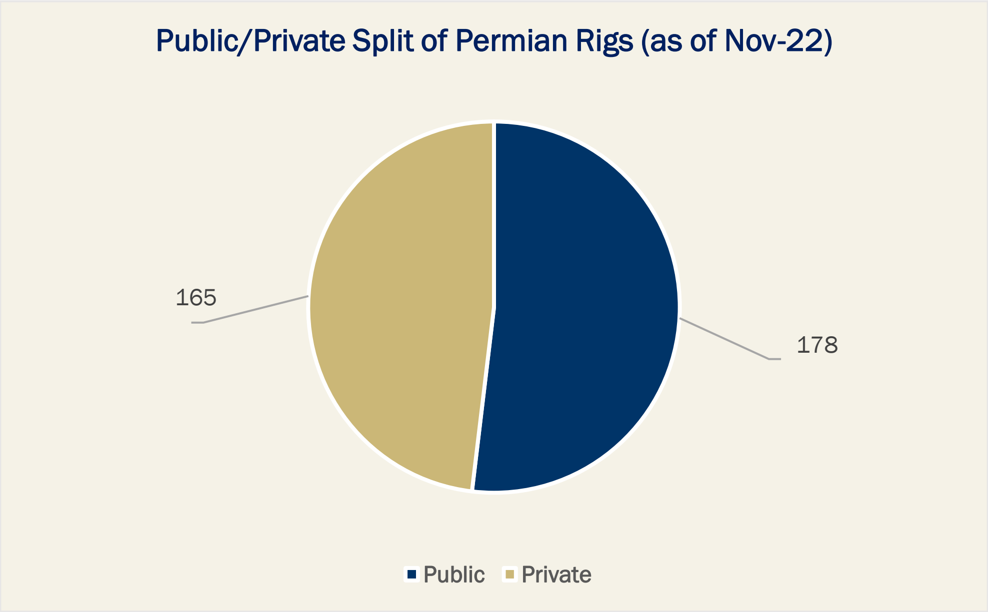


- We project ~1.9 Bcf/d (12%) of Permian gas growth exit-2022 to exit-2023, despite reducing rigs. The Delaware will drive 79% of that growth. This assumes the timely return of El Paso Line 2000 and in-service of the Whistler and PHP expansions.
- Gross gas production is currently split 75%-25% between public and private companies, though current rig activity represents a much more even split.
- We anticipate pipeline egress constraints to continue through 2024, resulting in more flaring and ~18 months of wide Waha basis until the Matterhorn pipeline comes online in 4Q24. Even if production growth slows, rejected ethane and reduced flaring could backfill any unutilized capacity.

Sources: East Daley's *Permian Basin Supply & Demand Forecast, Energy Data Studio*

Producers Driving Permian Growth

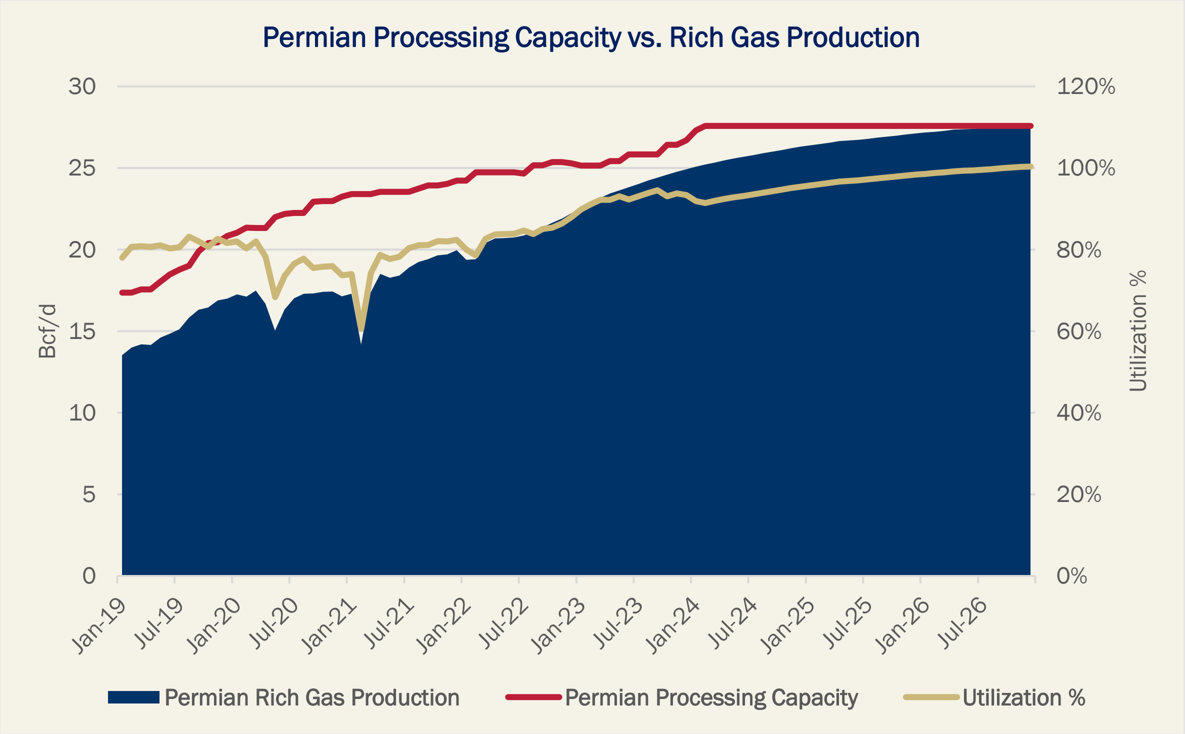
Expected Permian 2023 Growth Rates	
OVV	0%
PXD	0-5%
FANG	0-5%
DVN	0-5%
OXY	0-5%
COP	5-10%
XOM	10%
PR	10%
CPE	10%
MTDR	10%+
EOG	10%+
East Daley Forecast	***12%***
CVX	15%



- The producers in this table represent 155 of 343 total current Permian rigs (87% of Publics).
- Larger Permian private operators (Mewbourne, Endeavor, and CrownQuest) operate ~34 rigs today. Assuming they keep rig counts flat, we forecast their production will still increase by ~20%.
- The big limiting factor for the Permian is infrastructure rather than productive capacity.

Sources: Enverus; East Daley's *Permian Basin Supply & Demand Forecast, Production Scenario Tools, Midstream Activity Tracker*

Processing Expansions Reflect Production Growth

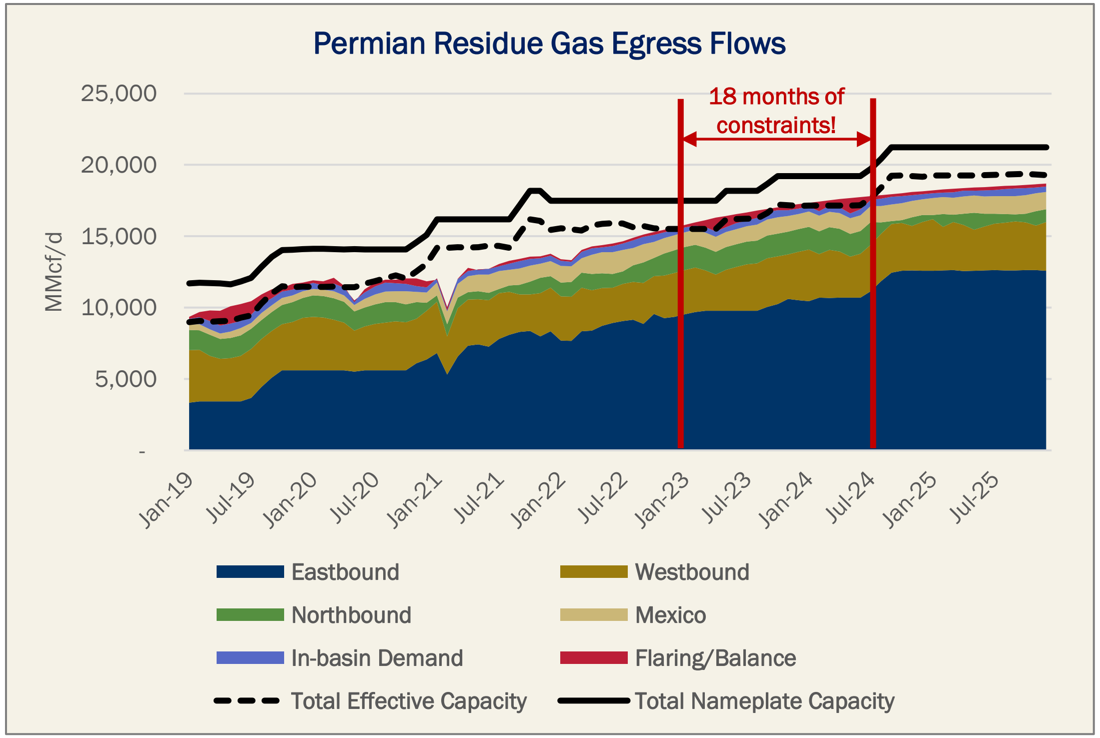


Company	Sub-Basin	Plant	Capacity	Est. ISD
Targa	Midland	Legacy II	275	2Q23
Targa	Midland	Greenwood	275	4Q23
Targa	Delaware	Midway	275	2Q23
Targa	Delaware	Sand Hills	(165)	2Q23
Targa	Delaware	Wildcat II	275	1Q24
Enterprise	Midland	Plant 6 (Navitas)	300	2Q23
Enterprise	Midland	Plant 7 (Navitas)	300	1Q24
Enterprise	Delaware	Mentone II	300	4Q23
Enterprise	Delaware	Mentone III	300	1Q24
Total			2,135	

- Someone must have read last year's *Dirty Little Secrets*, where we called out potential Permian processing constraints. Since then, Midstream has announced a slew of expansions that should keep processing capacity unconstrained until late 2025.
- The Midland is currently experiencing some G&P constraints, but substantial expansions are under way. Increasing interconnectivity between the two basins also helps alleviate processing constraints in the sub-basins.
- Targa (TRGP) and Enterprise (EPD) alone have announced 2.1+ Bcf/d of net additional processing capacity through 1Q24.

Sources: East Daley's *Permian Basin Supply & Demand Forecast, Energy Data Studio*

Permian Gas Takeaway — Help Is on the Way

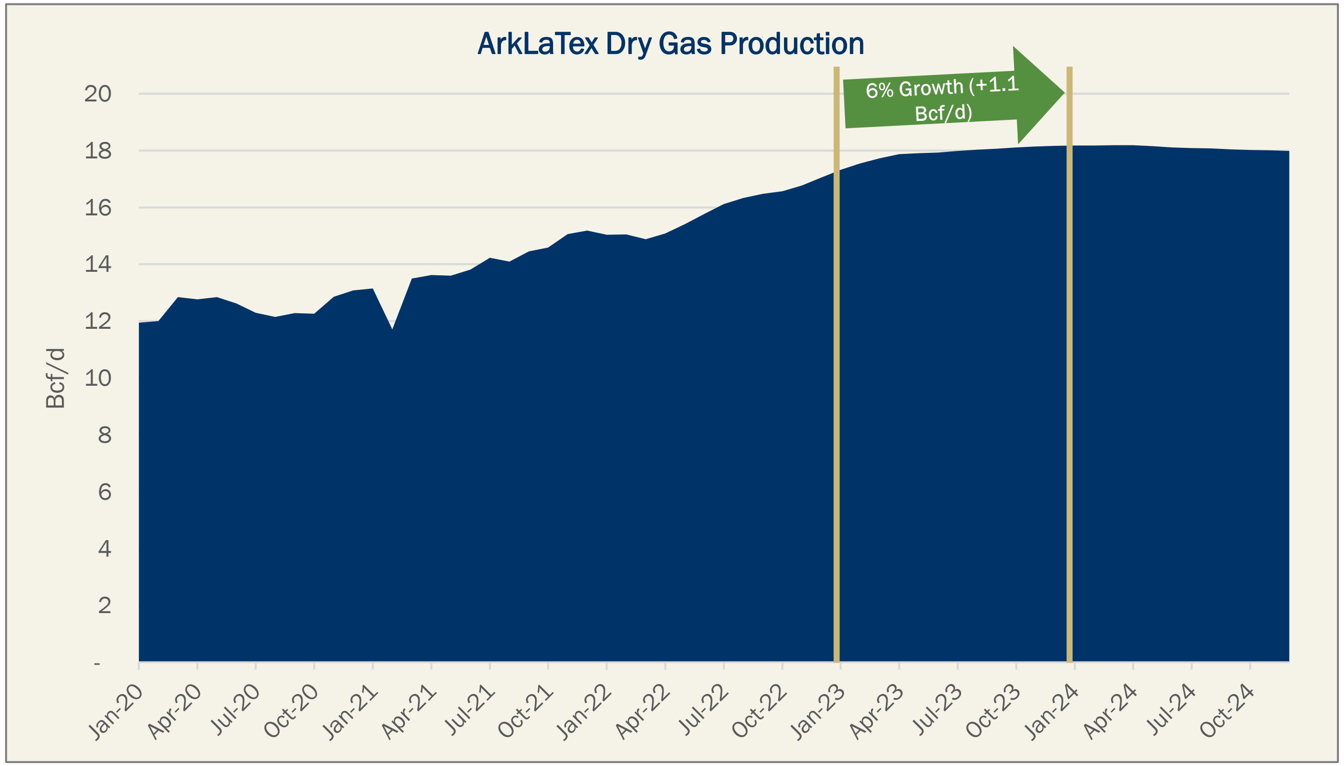


Permian Dry Gas Egress Increases				
Pipeline	Owner(s)	Capacity (MMcf/d)	Date (Fully Ramped)	Increase Type
Oasis (East)	Energy Transfer	60	Dec-22	Modernization
El Paso (West)	Kinder Morgan	684	May-23	Repair
PHP (East)	Kinder Morgan, Kinetik, Exxon	550	Oct-23	Compressor
Whistler (East)	MPLX, WhiteWater, West TX Gas, Stonepeak	550	Dec-23	Compressor
Matterhorn (East)	WhiteWater, EnLink, Devon, MPLX	2,000	Sep-24	Greenfield
Currently Planned		**3,844**		
GCX (East)	Kinder Morgan, Kinetik, DCP, Targa	500	~12 Months from FID	Compressor
Warrior (East)	Energy Transfer	1,500	~24 Months from FID	Greenfield
Total Potential Capacity		**5,844**		

- 1.8 Bcf/d of production growth will match the 1.8 Bcf/d of egress capacity growth (assuming El Paso Line 2000 re-start) through YE23. Supply growth will keep the Permian constrained until Matterhorn comes online in late 2024.
- Waha will continue to face downward price pressure as the basin remains constrained and producers are forced to flare gas to move crude to market.
- Any pipeline disruptions could result in a negative price for Waha gas.

Sources: East Daley's *Permian Basin Supply & Demand Forecast, Energy Data Studio*

ArkLaTex: A Closer Look at Supply Growth



- We expect the ArkLaTex would grow by 1.1 Bcf/d from exit-2022 to exit-2023 unconstrained, driven by the Haynesville (800+ MMcf/d growth). Growth slows in 2024, before climbing again as new LNG demand comes online post-2025.
- 2023 growth occurs despite a reduction of ArkLaTex rigs from 85 to 64 rigs in our forecast, which further strengthens our view that the gas market will be oversupplied in 2023.
- The Top 5 producers in the basin easily exceed this growth on their own.

Sources: East Daley's *ArkLaTex Supply & Demand Forecast, Energy Data Studio*

Something's Gotta Give — How About Producer Growth?

Top 5 Operators	Average 2022 Rigs	Dec-22 Production (MMcf/d)	Average 2023 Rigs	Exit to Exit '22-'23 Growth (MMcf/d)	Top Midstream System
Aethon Energy	14	2,707	11	560	Private - Aethon Ibex/Haynesville
Southwestern Energy	9	2,450	7	530	DTM - Blue Union, ET – ENBL Haynesville
Comstock Energy	7	2,331	7	491	ET – Louisiana
Chesapeake Energy	6	2,280	4	54	WMB - Louisiana/Magnolia, ET – ENBL Haynesville
Paloma Natural Gas	3	592	2	37	WMB - Louisiana/Magnolia
GEP Haynesville II	3	194	2	128	WMB - Louisiana/Magnolia
Total	**42**	**10,558**	**33**	**1,801**	

- In order to balance the market and still meet Publics' stated growth plans, Privates would have to substantially reduce drilling activity.
- More realistically, both public and private producers will need to rein in production next year, either by dropping rigs or by rebuilding DUC inventories.

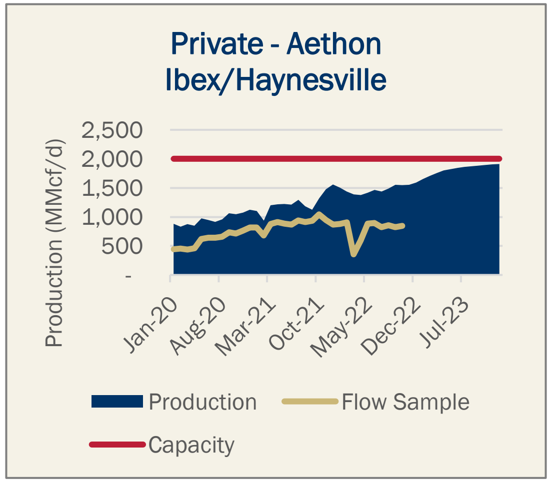
Sources: Enverus; East Daley's *ArkLaTex Supply & Demand Forecast, Production Scenario Tools, Midstream Activity Tracker*

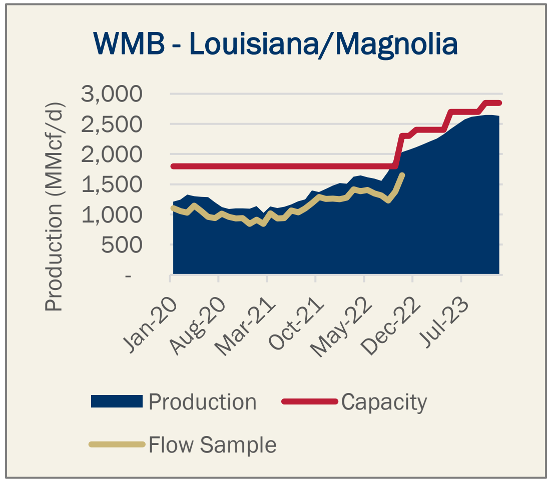
Haynesville, So Hot Right Now. Haynesville.

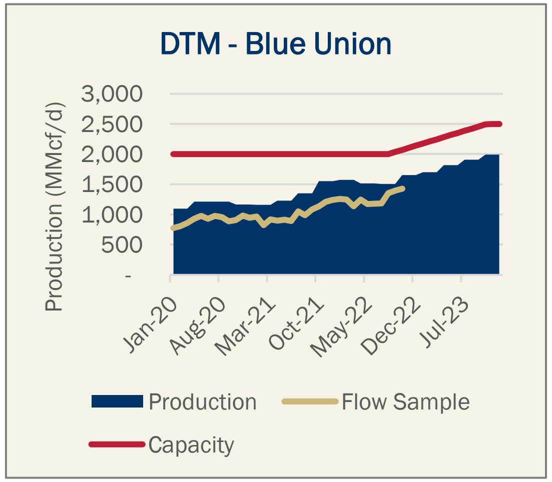
- Core Haynesville (Northwest Louisiana) will drive most of the ArkLaTex growth in 2023.
- Many of the major systems are backed by the most active producers and are running into constraints. Midstream companies will need to expand gathering capacity to keep pace with growth.
- Gathering expansions from Williams (WMB) and DT Midstream (DTM) also increase egress directly to the Louisiana LNG corridor.

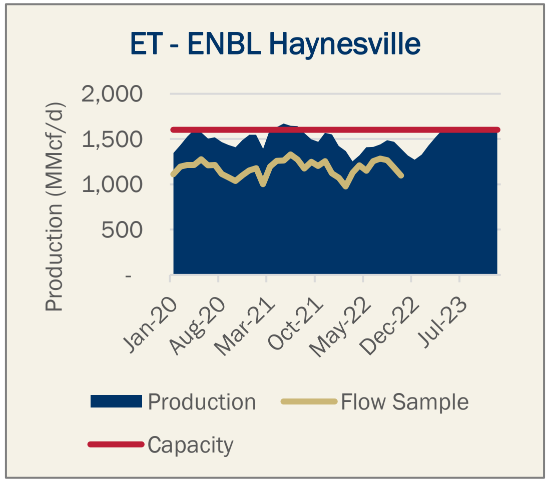
Haynesville Pipeline Expansion Projects

Project	Company	Capacity (MMcf/d)	ISD	Cost ($MM)
Columbia Louisiana Xpress	TC Energy	850	3Q22	472
Gulf Run	Energy Transfer	1,650	YE22	540
LEAP Expansion (Phase I)	DT Midstream	300	4Q23	180
LEAP Expansion (Phase II)	DT Midstream	400	1Q24	240 (est.)
LEAP Expansion (Phase III)	DT Midstream	200	3Q24	120 (est.)
Venice Extension & Gator Express	Enbridge	1,500	2023-2024	400
New Generation Gas Gathering	Momentum	1,700	2H24	1,000 (est.)
Louisiana Energy Gateway	Williams	1,800	4Q24	650
Louisiana Energy Pathway	Williams	364	4Q25	200
Line 200 & 300	Tellurian	4,600	2024-2026	1,280
	Total:	13,364		5,082
	Total Ex-TELL:	8,764		3,802





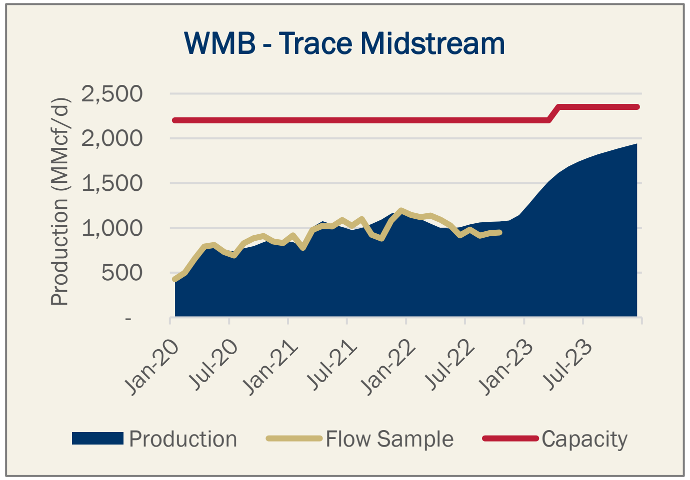


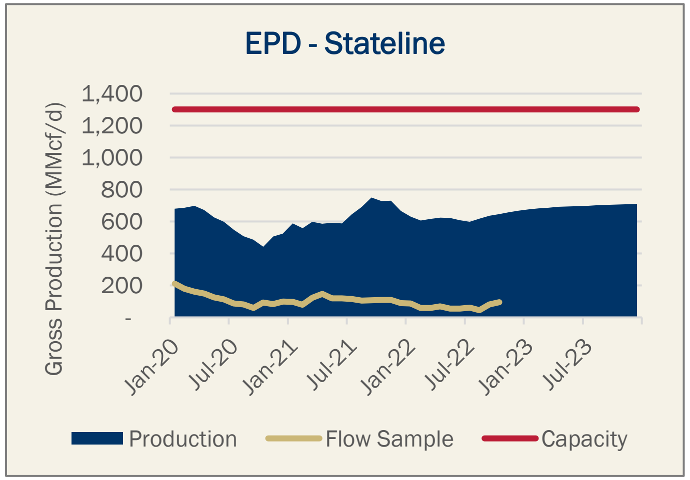


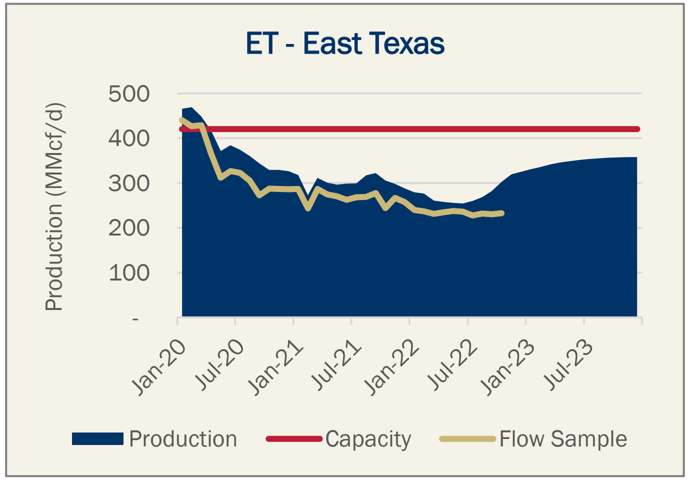
Sources: East Daley's *ArkLaTex Supply & Demand Forecast, Blueprint Financial Models*

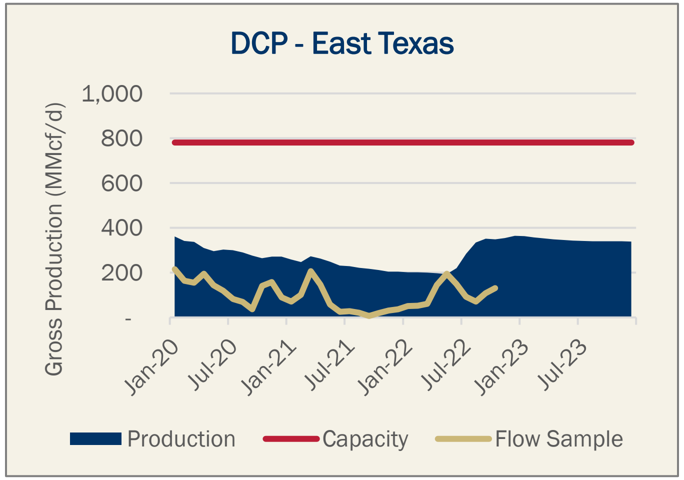
East Texas Systems Have Space

- East Texas will see less activity in 2023 due to producers targeting dry gas vs wet gas, lower IP rates, and the location of core acreage.
- Many of the gathering systems in East Texas have an opportunity to grow if NW LA systems fill, especially if they are dry gathering systems like Trace Midstream (now WMB).
- Comstock said it plans to shift rigs to East Texas in 2023 for capacity reasons, indicating this trend may already be starting.





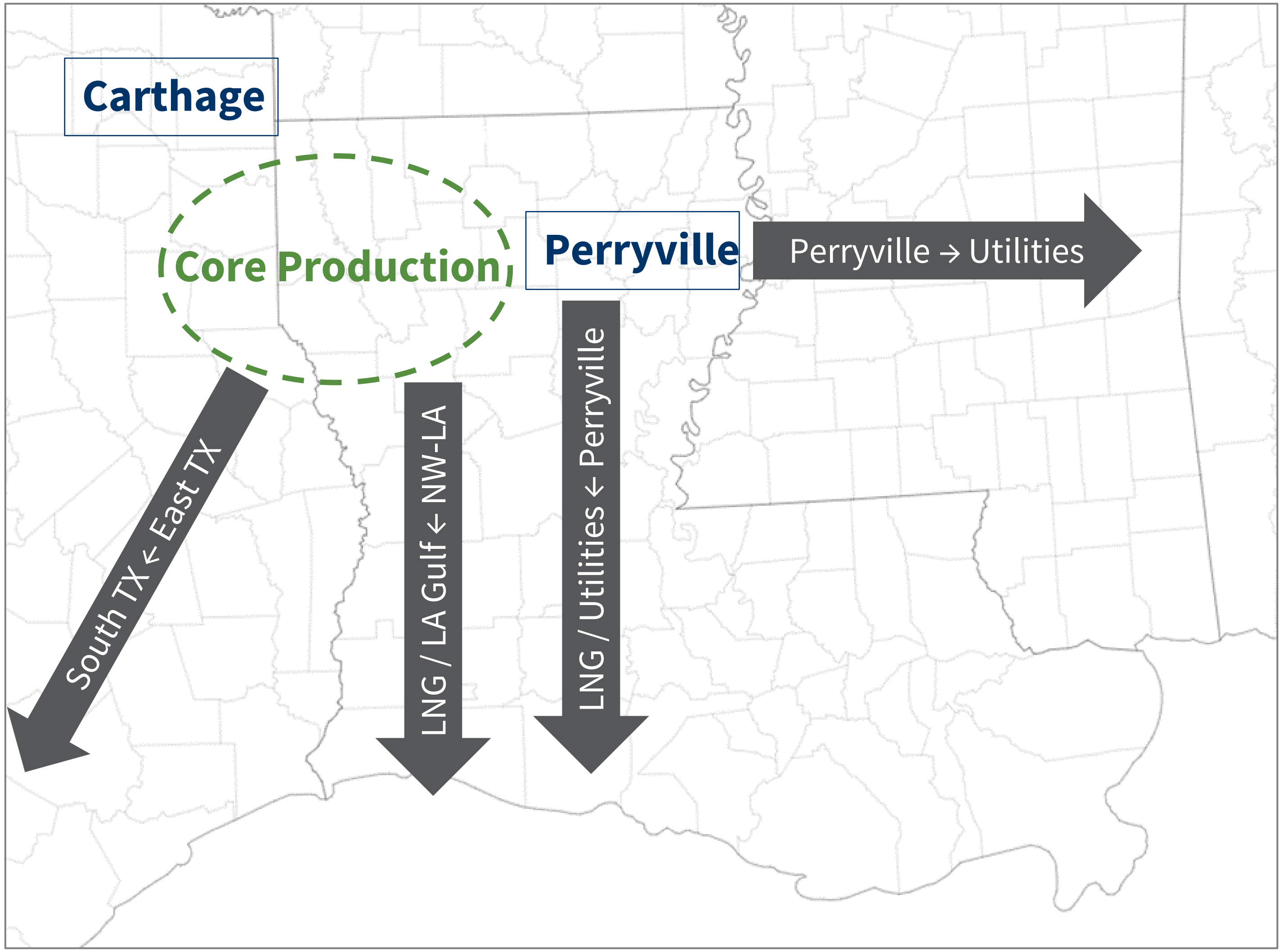




Sources: East Daley's *ArkLaTex Supply & Demand Forecast, Blueprint Financial Models*

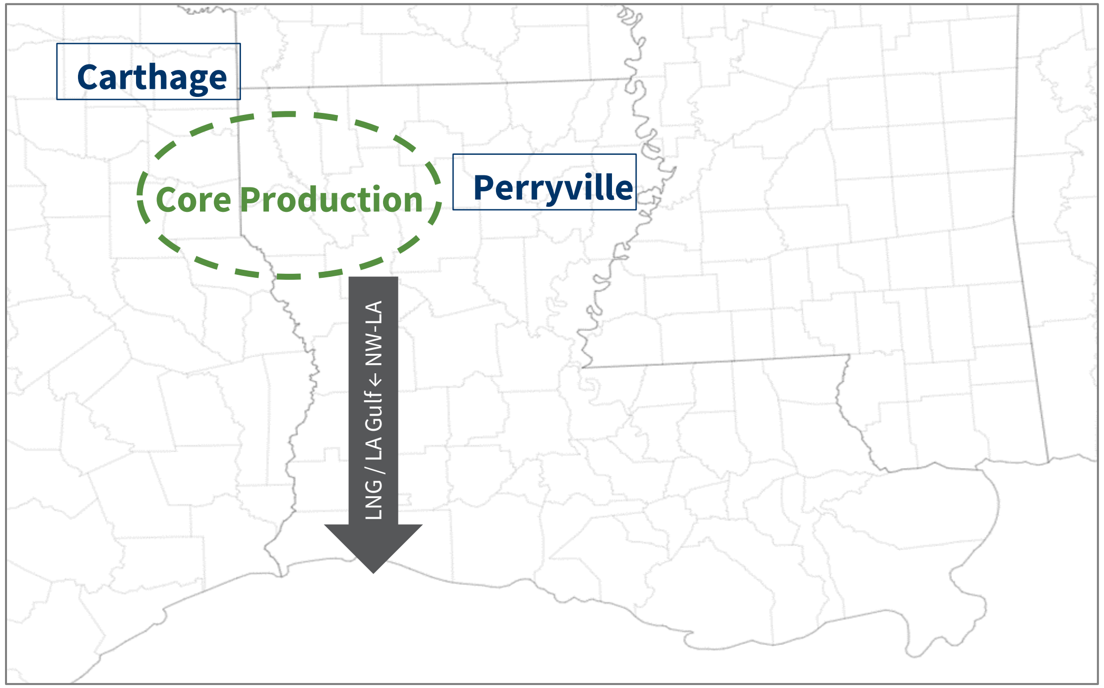
ArkLaTex Gas Takeaway – Solving the Puzzle

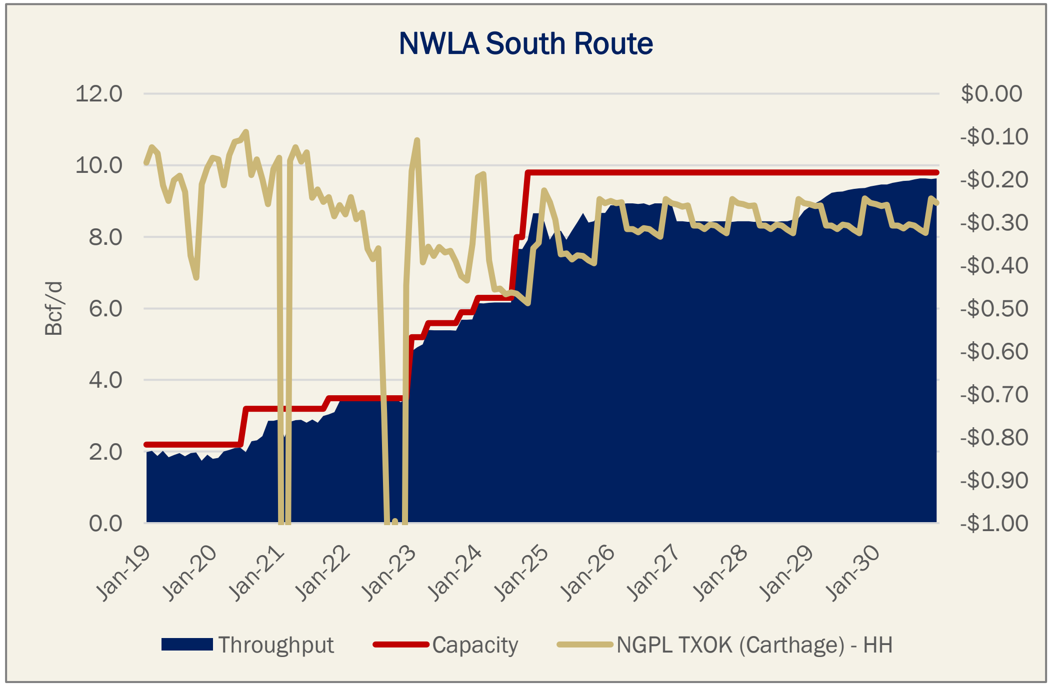
- The US LNG boom goes hand-in-hand with a boom in gas takeaway infrastructure from the ArkLaTex to export facilities. However, the pull in demand also has major implications for other egress routes.
- Most focus has been to ensure dry gas production in the Haynesville (NW-LA) can move south to the LNG corridor, with 8.7 Bcf/d of projects announced to address LNG growth.
- East Texas pipelines sending gas south to Texas risk oversupplying the Houston Ship Channel market, especially after Matterhorn comes online in 4Q24.
- Southeast and Florida utilities will need to compete with LNG facilities for gas, possibly putting upward pressure on gas prices in the region vs Henry Hub.



Sources: East Daley's *ArkLaTex Supply & Demand Forecast*

ArkLaTex Gas Takeaway – NW LA to LNG Corridor

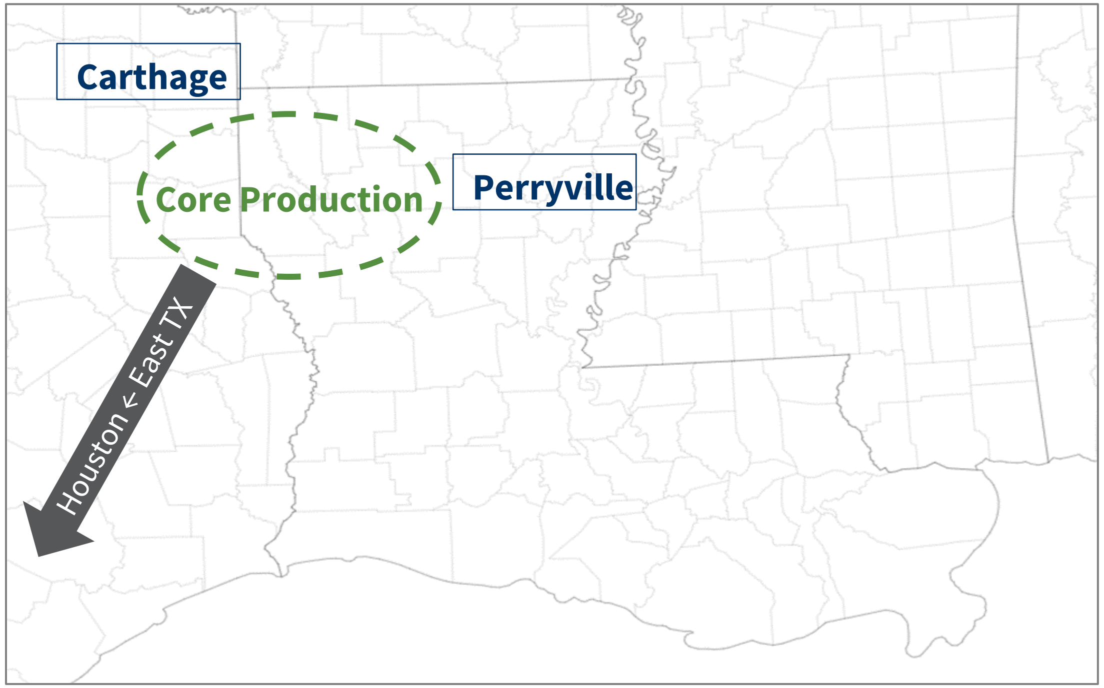


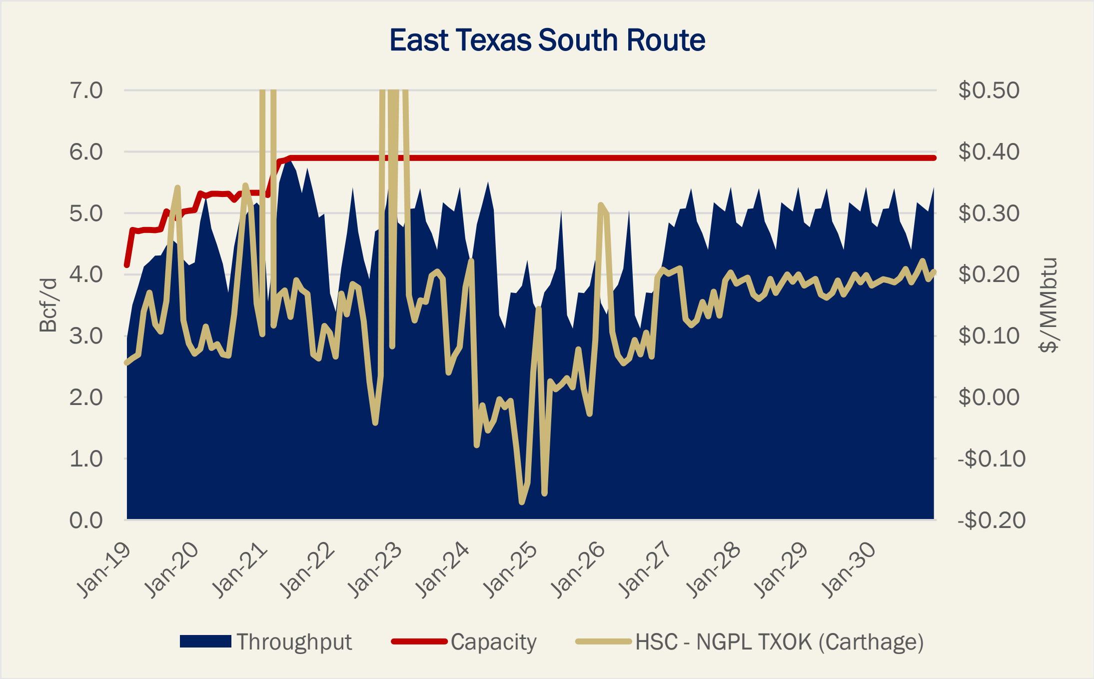


- NWLA - South route is the most favored out of the basin as it will directly feed LNG export demand.
- Most new greenfield projects (WMB's LEG and Momentum's M6) follow this route.
- Long-term flows on this route increase to supply new LNG demand. We could see an additional bump in the near term as the East Texas/Carthage to Houston route becomes uneconomic.

Sources: East Daley's *ArkLaTex Supply & Demand Forecast*

ArkLaTex Gas Takeaway – Carthage to Houston

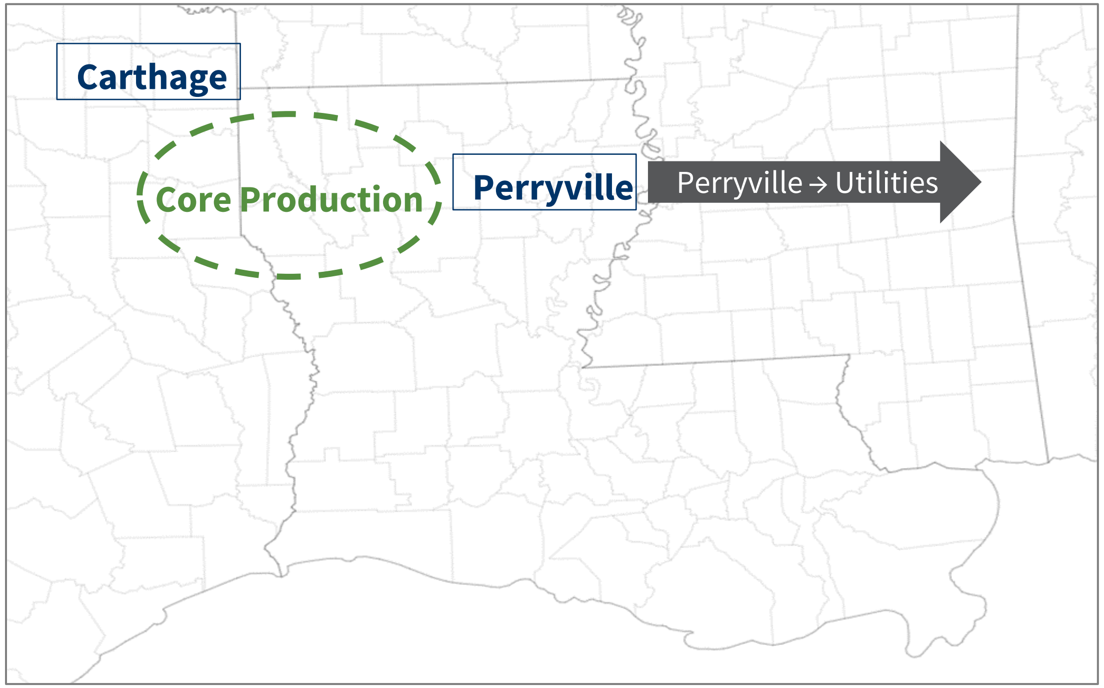


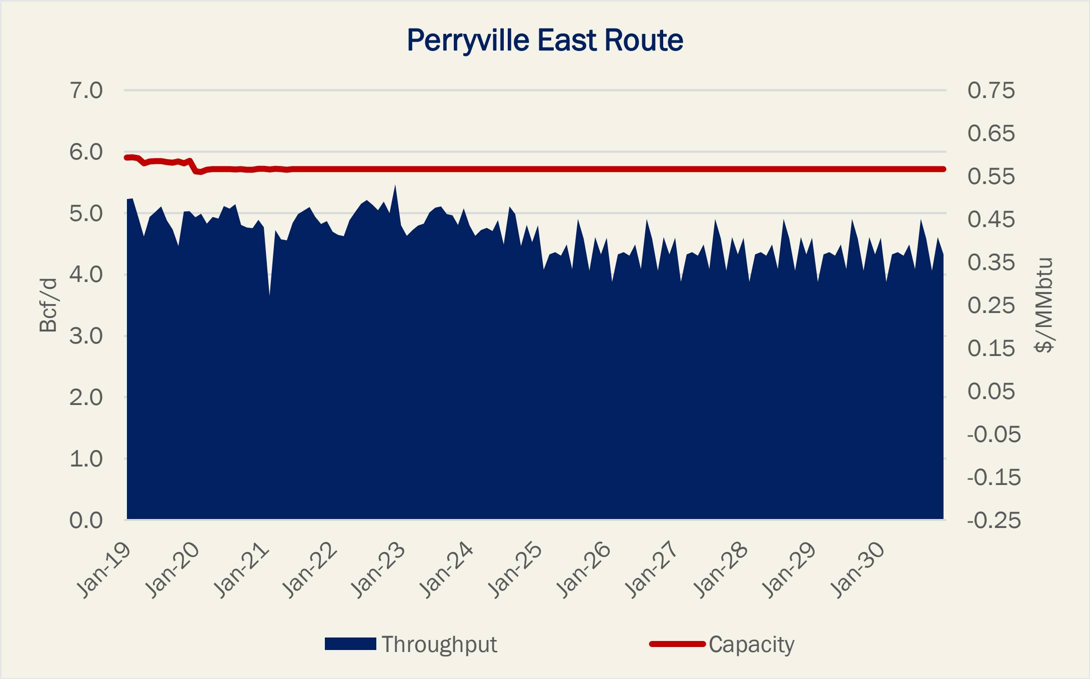


- East Texas southbound routes hit markets that already receive significant supply from the Permian (Katy/HSC).
- When Matterhorn comes online in 2024, spreads from Haynesville to Houston become uneconomic to send gas.
- This is the same time frame when new Haynesville south projects come online. East Daley assumes volumes shift from this route to the NW-LA South route shown on the map.

Sources: East Daley's *ArkLaTex Supply & Demand Forecast*

ArkLaTex Gas Takeaway – Perryville to the East

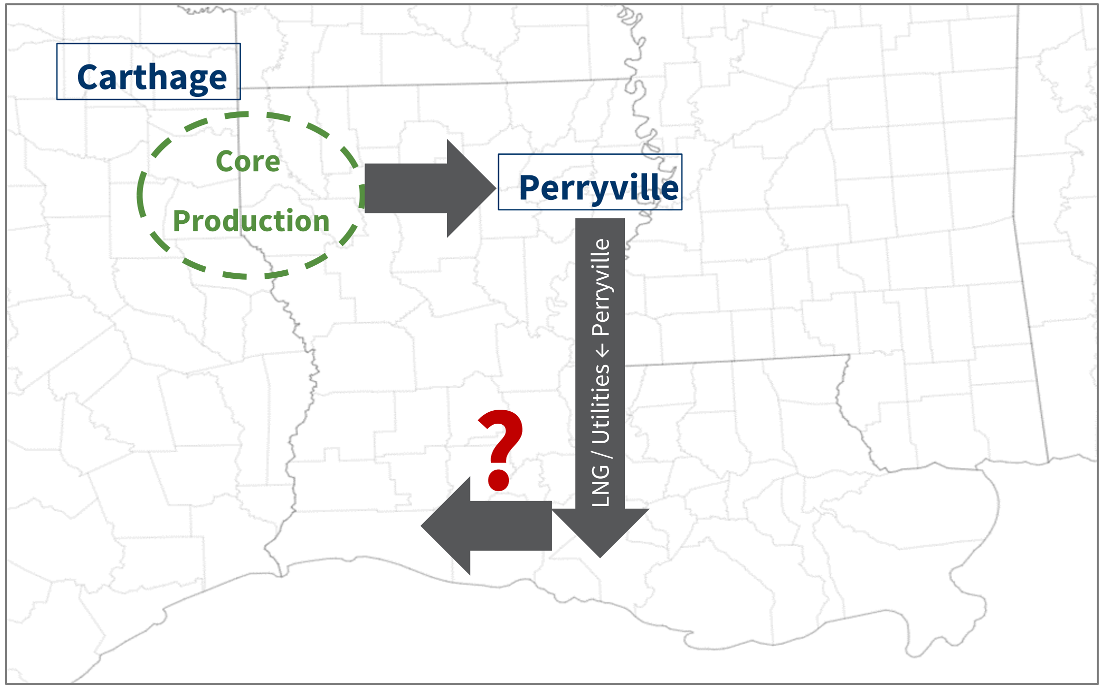


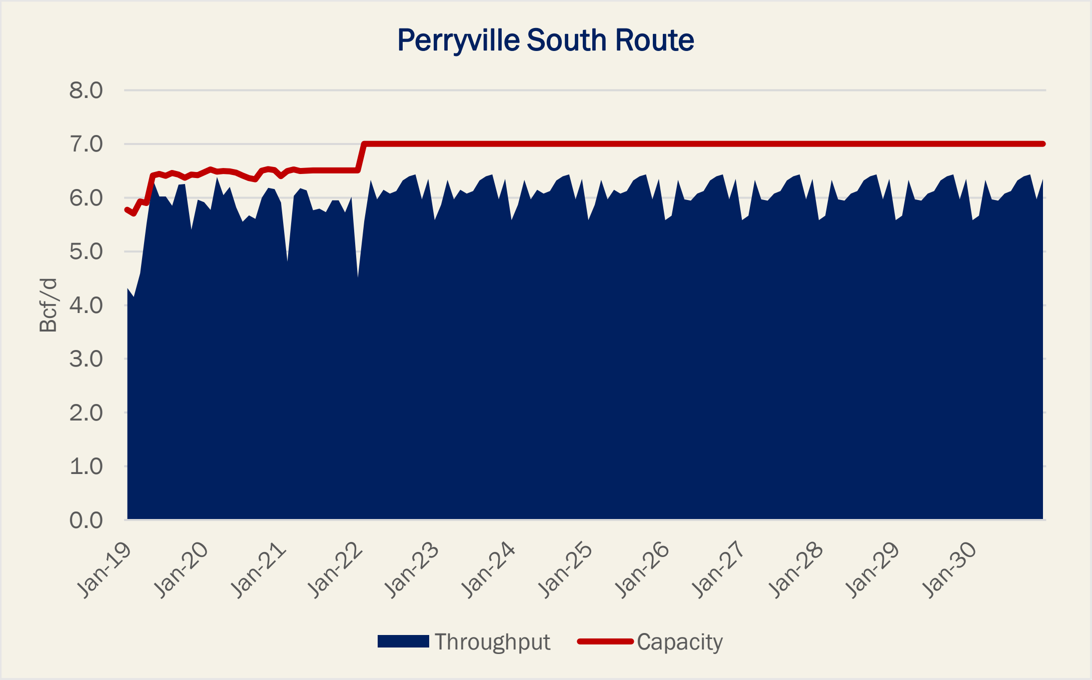


- Many pipelines (SONAT, TETCO, SESH) on the Perryville East route feed pipelines (Florida Gas) and utilities that cannot take significantly more gas, putting an effective cap on flows.
- In the future, the East route could lose flow to a more favorable southbound route to feed new LNG demand. Spreads to Florida and the Southeast (Transco Z4, Z5) could widen to incentivize continued flows and feed demand.

Sources: East Daley's *ArkLaTex Supply & Demand Forecast*

ArkLaTex Gas Takeaway – Perryville to the South

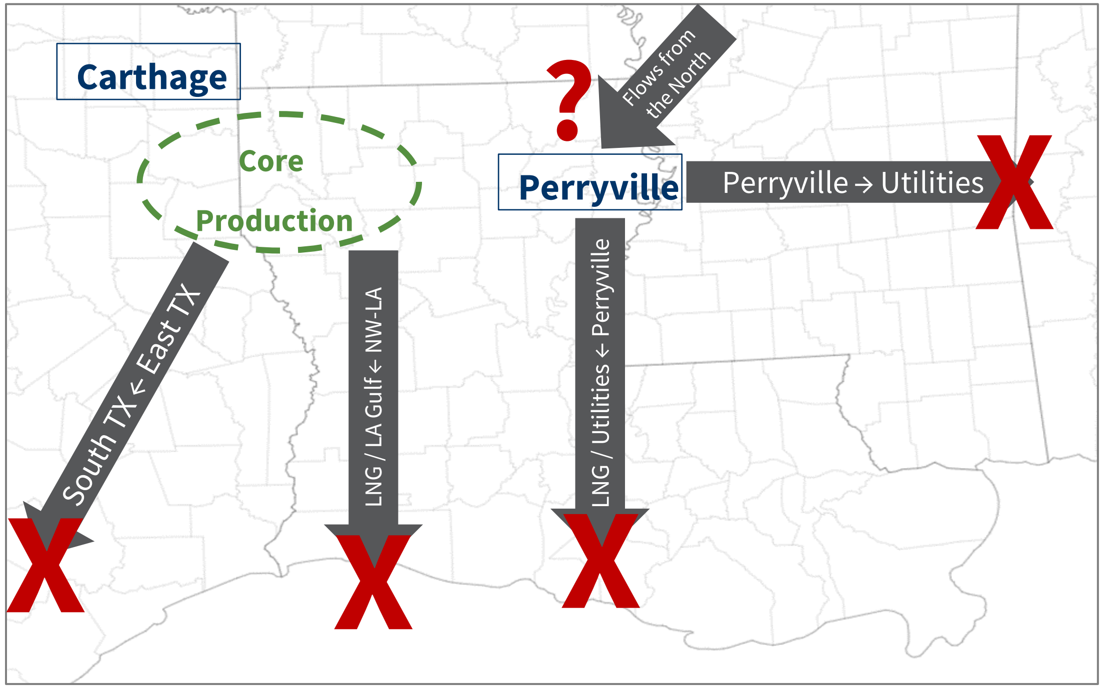


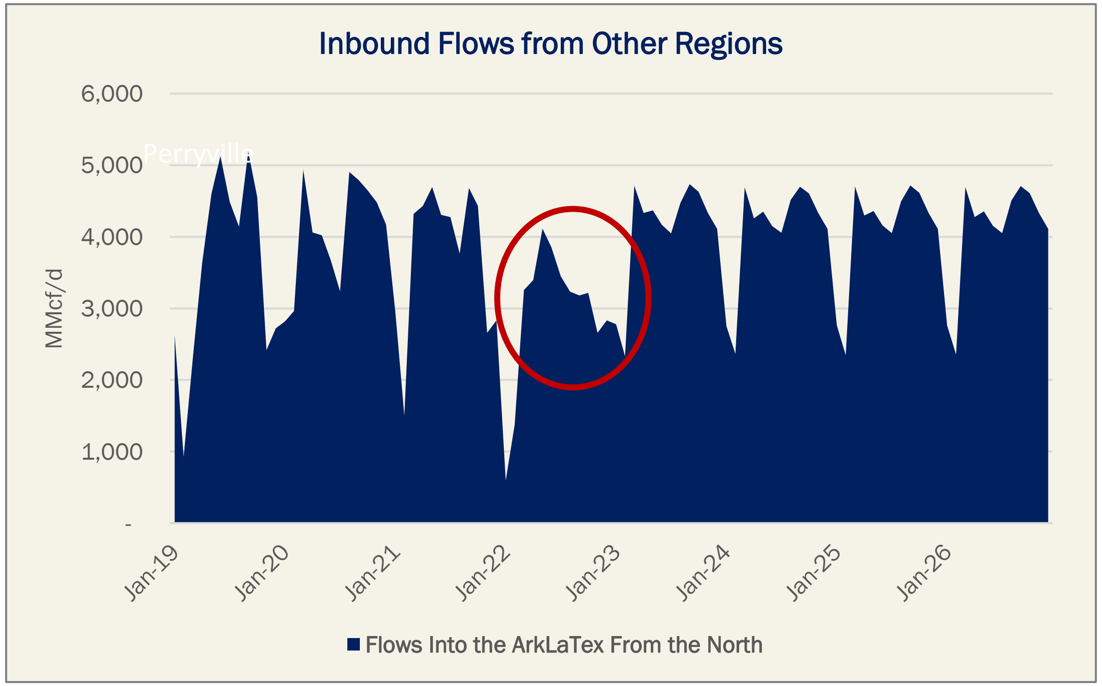


- Many pipelines on the Perryville South route flow from the Northeast (Columbia Gulf, ANR, and Tennessee Gas). Any expansions would be brownfield projects like the Louisiana Xpress expansion on Columbia Gulf in 2022. Most of these pipes feed utilities and LNG facilities that cannot take significantly more gas, putting an effective cap on flows.
- One way to maximize flows on this route could be to connect SE LA to SW LA. Currently, there is not enough demand terminating at the Perryville South rate to fully utilize those pipelines. Providing a direct outlet to LNG facilities located west could maximize flows on this route.
- There is sufficient space on pipes like Tiger to also move gas from the Haynesville to Perryville, so further demand at Perryville South could provide additional egress to the basin.

Sources: East Daley's *ArkLaTex Supply & Demand Forecast*

Northern Flows into the ArkLaTex: A Clog in the Toilet



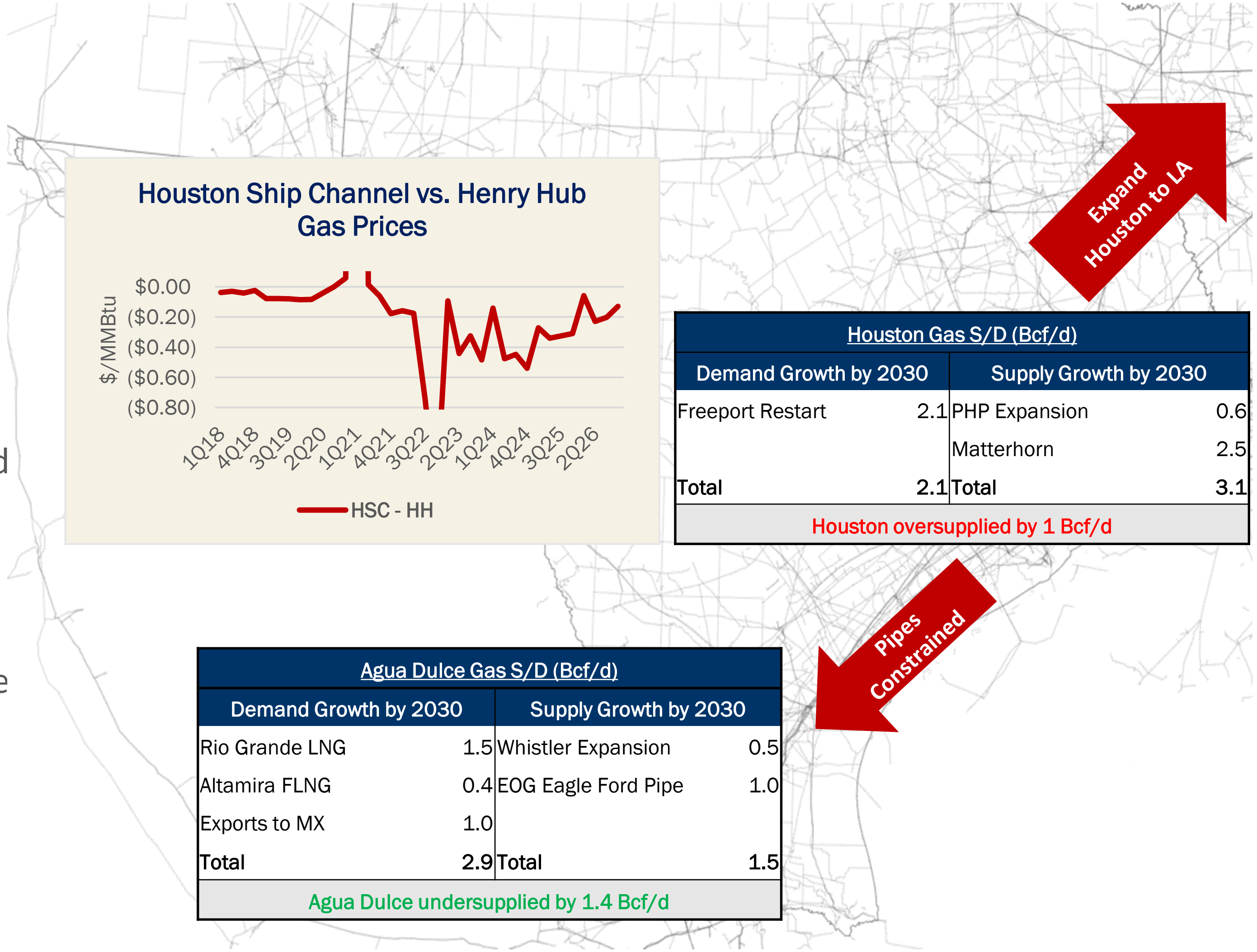


- Various pipelines from the Northeast and Midwest feed into the ArkLaTex, filling up some of the egress routes out of the basin.
- With egress options limited due to pipeline constraints (NW-LA to South), demand constraints (Perryville to the East and South), or discounted markets (ArkLaTex to South Texas), flows out of the basin have been pushing back on inbound supplies in 2022.
- We could see this trend continue as egress remains tight and Houston remains oversupplied in 2023.

Sources: East Daley's *ArkLaTex Supply & Demand Forecast*

Infrastructure Opportunity: Houston-Agua Dulce

- Houston is oversupplied and trades at a significant discount to Henry Hub through 2026 in the forward curve.
- Houston demand is unlikely to grow significantly. However, the Permian Highway expansion and new Matterhorn pipeline will supply 3.1 Bcf/d more gas, worsening the oversupply.
- On the other hand, Agua Dulce will be undersupplied. CCL3, Rio Grande LNG, Altamira FLNG, and exports to Mexico will add 4.3 Bcf/d of demand by 2030. However, the only announced new supply to the hub is from the Whistler expansion and EOG's proposed pipeline from the Eagle Ford.
- Expansions to existing pipes or a new pipeline between Houston and Agua Dulce could balance the market and be an easier solution to relieve Houston oversupply vs building an interstate pipeline to Louisiana.



Houston Gas S/D (Bcf/d)

Demand Growth by 2030		Supply Growth by 2030	
Freeport Restart	2.1	PHP Expansion	0.6
		Matterhorn	2.5
Total	2.1	Total	3.1
Houston oversupplied by 1 Bcf/d			

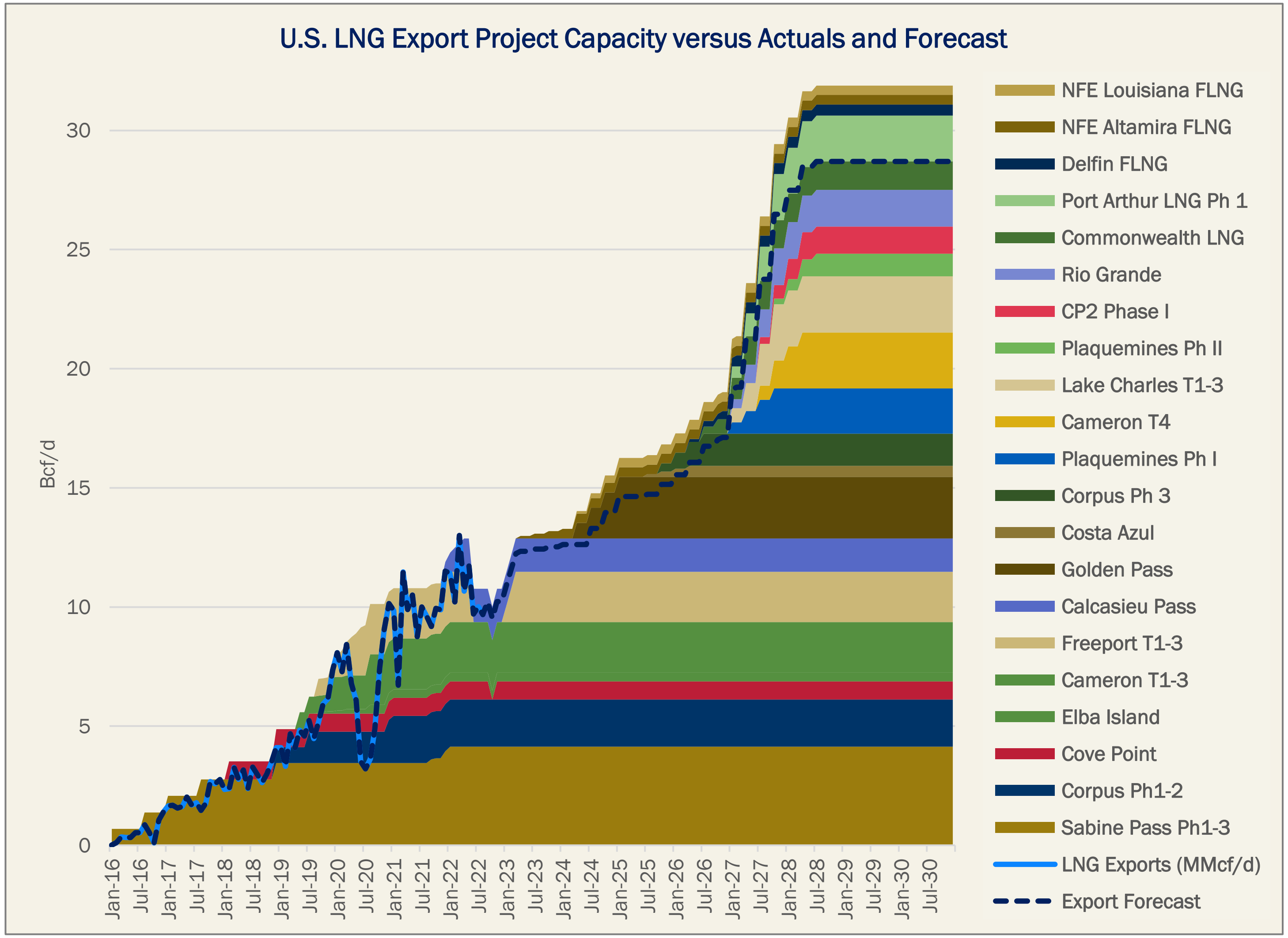
Agua Dulce Gas S/D (Bcf/d)

Demand Growth by 2030		Supply Growth by 2030	
Rio Grande LNG	1.5	Whistler Expansion	0.5
Altamira FLNG	0.4	EOG Eagle Ford Pipe	1.0
Exports to MX	1.0		
Total	2.9	Total	1.5
Agua Dulce undersupplied by 1.4 Bcf/d			

Sources: Bloomberg, East Daley's *ArkLaTex Supply & Demand Forecast*

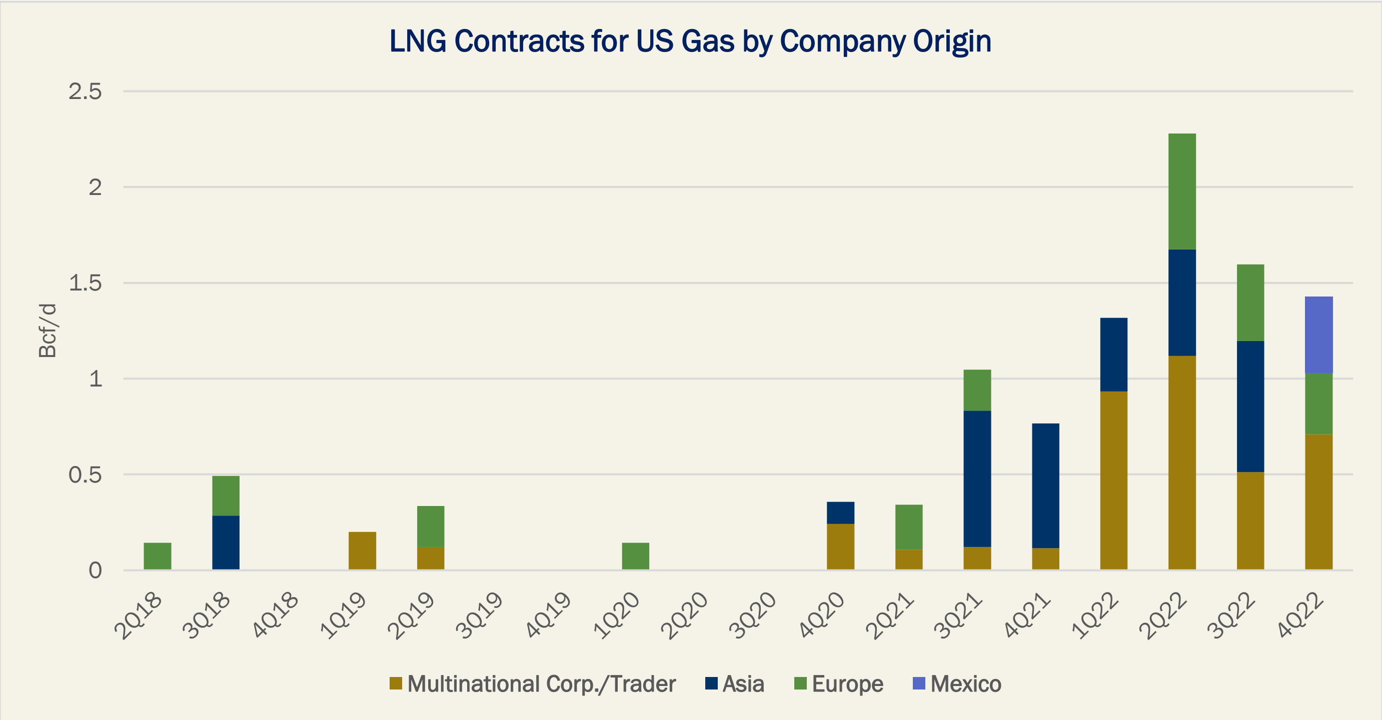
LNG Contracting Catching Fire

- LNG drives significant demand growth through 2030. We forecast 17.5 Bcf/d of LNG export capacity growth by 2029, bringing total US LNG capacity to almost 32.0 Bcf/d.
- Excluding floating LNG facilities (FLNG) projects, we forecast Louisiana LNG capacity to grow by 12.9 Bcf/d to 21.2 Bcf/d, while Texas LNG capacity grows 2.9 Bcf/d to 7.3 Bcf/d.
- Another 1.3 Bcf/d of FLNG projects are also in progress, with construction times estimated at only 1-2 years post-FID. If this is proven, there may be significant demand upside from FLNG due to the faster timeline.
- By the end of the decade, LNG will make up ~25% of US natural gas demand.



Sources: East Daley's *US Macro Supply & Demand Forecast*

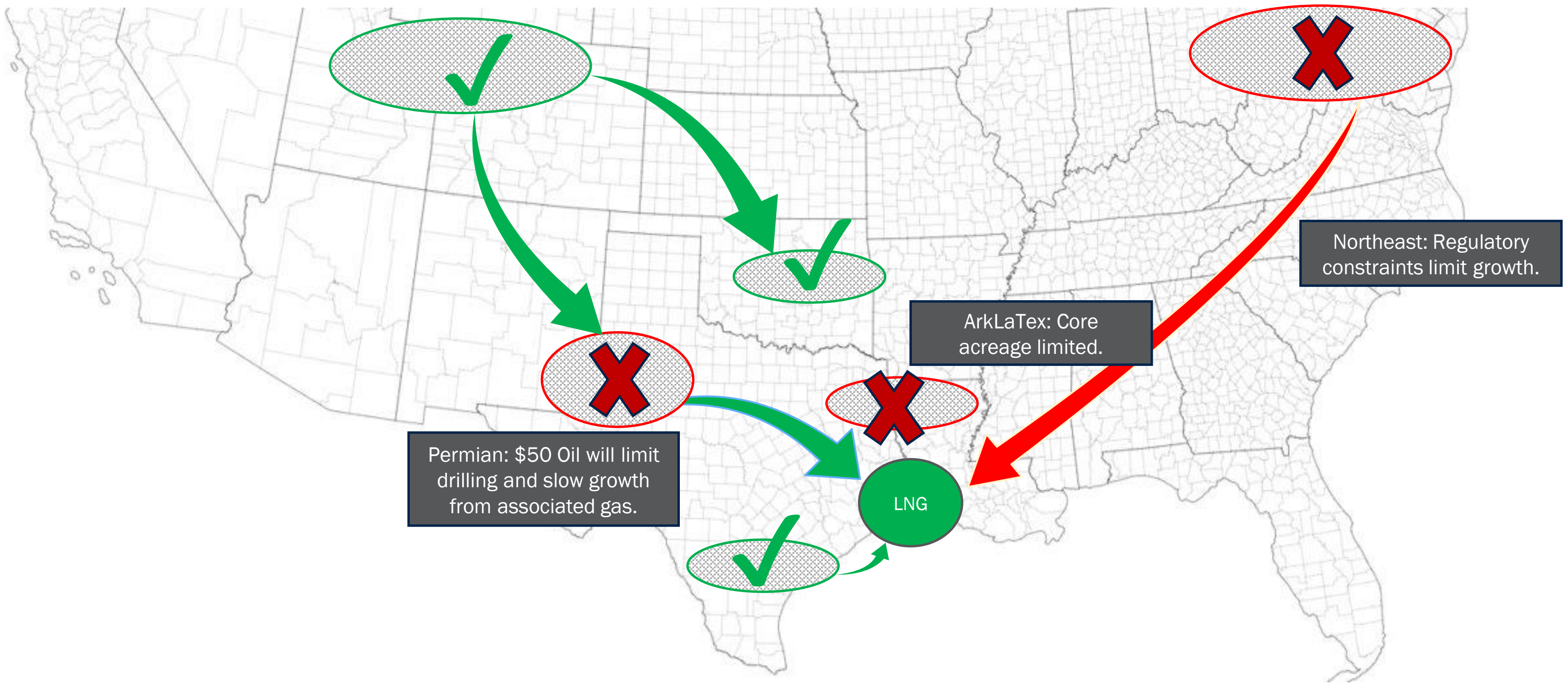
Buyers Line Up for US LNG



- Since the Russian invasion of Ukraine in February, 6.2 Bcf/d of new LNG SPAs have been signed. SPA volumes signed in 2022 exceed all LNG contracting in the previous 4 years.
- In our LNG outlook, 68% (11.9 Bcf/d) of the incoming 17.5 Bcf/d of new capacity is already under contract. Another 2.4 Bcf/d of potential contracts have been announced under Heads of Agreements (HoA).
- Williams (WMB) is the first midstream company to enter the LNG sector as a potential buyer, signing an HoA for 0.4 Bcf/d from Sempra’s (SRE) Cameron 4 and Port Arthur projects.

Sources: East Daley’s *US Macro Supply & Demand Forecast*

Tier 2 Gas Basins are a Hedge on Low Oil Prices



- Investors should look for opportunities to buy out-of-favor assets now before their value increases as market dynamics change.
- The Permian is currently in vogue, until it's not: If WTI falls below $50/bbl while LNG and power demand increase, more gas production will need to come from less active basins like the Rockies, Eagle Ford, and SCOOP/STACK.
- Higher-cost gas basins may be necessary to fill supply needs beyond the ArkLaTex.

Sources: East Daley Research

Conclusions – Natural Gas

1. Gas prices must decline to incentivize gas-focused producers to reduce drilling activity and balance the market. Reducing our current rig forecast by 10% would remove only 1 Bcf/d of production in 2023. The market needs to balance 4 Bcf/d to keep storage within the 5-year max. Gas-centric producers in the ArkLaTex will need to adjust their outlook lower.

2. Waha will continue to face downward price pressure as the basin remains constrained and producers are forced to flare gas to move crude to market. Any pipeline disruptions could result in a negative price for Waha gas, impacting Producers and Midstreamers exposed to in-basin prices.

3. Infrastructure has been focused on getting gas from producing basins to LNG markets. However, this pull in demand will create constraints between major gas hubs as well — Houston will be oversupplied once Matterhorn comes online, presenting an opportunity to send gas to undersupplied LNG facilities in South Texas.

4. Additional longer-term infrastructure opportunities exist as LNG becomes a more dominant source of demand, pulling on supply from a more diverse set of basins

CRUDE OIL

ROCK BOTTOM AND ONLY ONE WAY TO GO

Key Takeaways – Crude Oil

1. We believe transportation rates for Permian barrels have seen their lows as production growth fills excess capacity.

2. We are bullish Permian oil and forecast production will grow by 0.7 MMb/d to 6.5 MMb/d exit-2023.

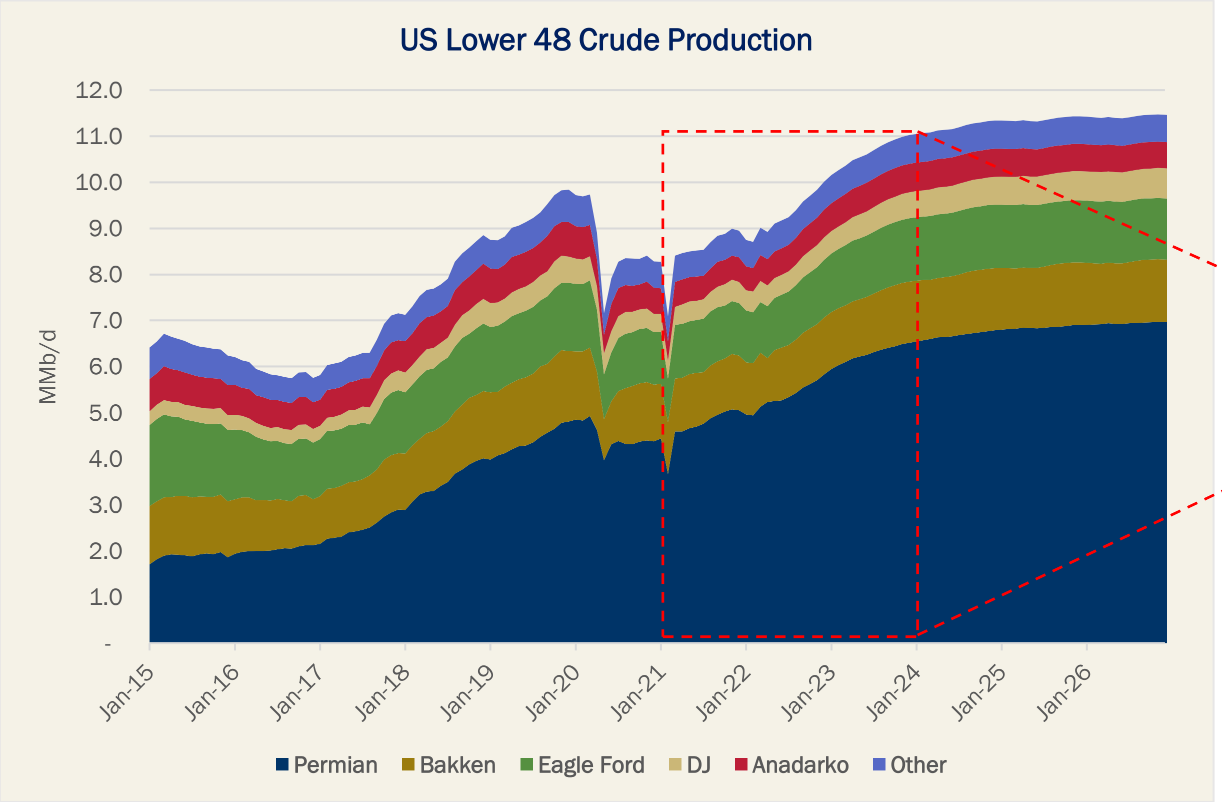
3. Gulf Coast-bound pipelines will hit 90% utilization in 2025, which will create opportunities to expand infrastructure.

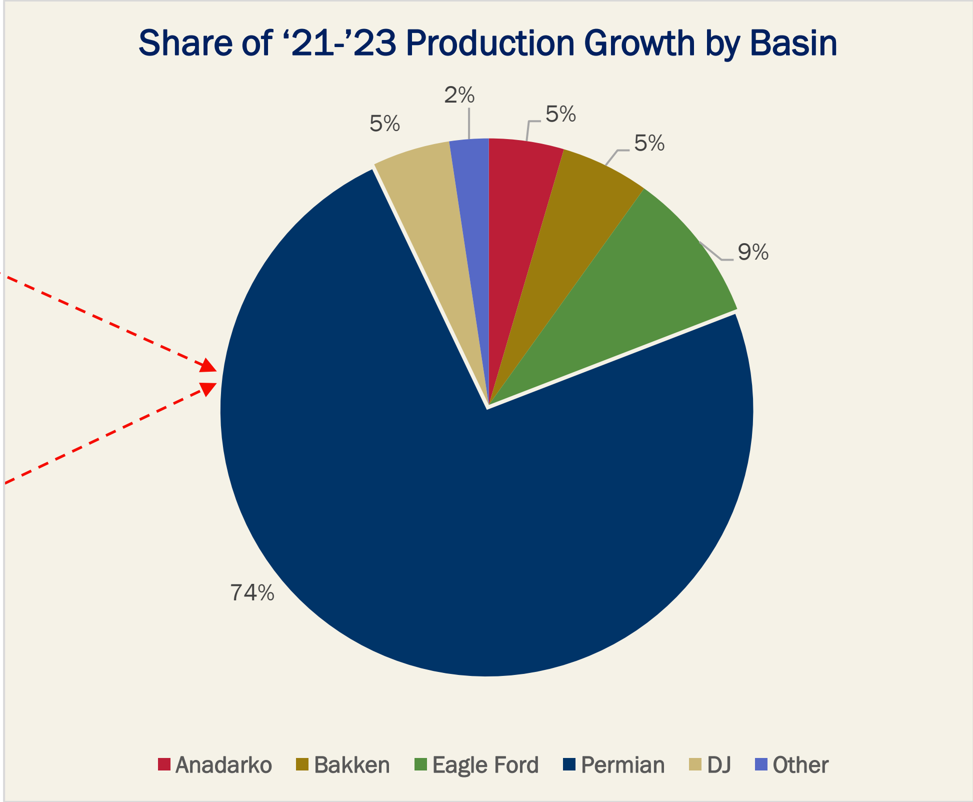
4. Pipelines will compete based on access to high-quality export terminals that can tap into growing international demand. OPEC expects global oil demand to grow by 12.9 MMb/d from 2021-2045.

5. Midstream will benefit from higher walk-up rates and contract renewals as pipeline capacity becomes scarce and spreads widen between Midland and Houston.

Sources:

Crude Production Recovering from Long-COVID

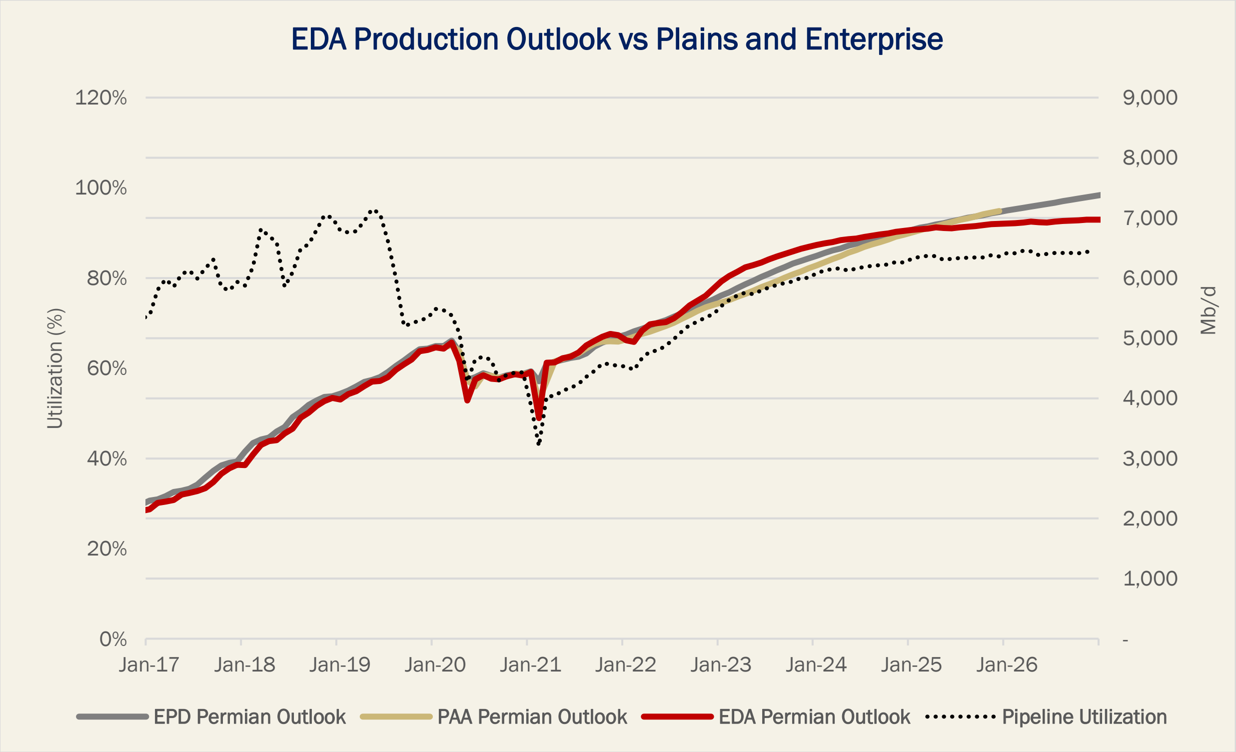




- Shale crude production will grow ~2.0 MMb/d from exit-2021 to exit-2023, surpassing record production levels set in December 2019.
- The Permian plays the key roll in this development, accounting for 74% of total growth. Other basins like the Eagle Ford, Rockies, Anadarko, and the Bakken make up the balance.

Sources: East Daley's *Crude Network Model*, *Production Scenario Tools*, *Energy Data Studio*

Short-Term Differences, Long-Term Agreement on Permian Crude Growth

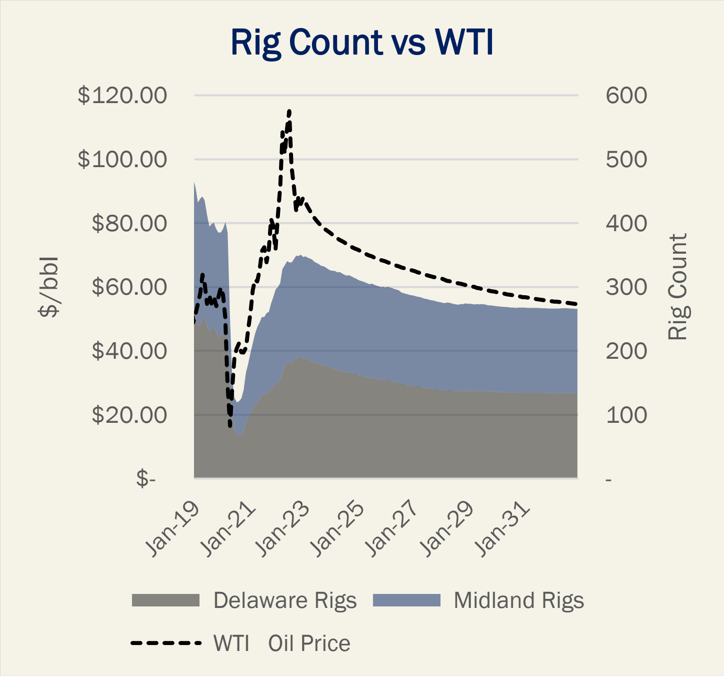


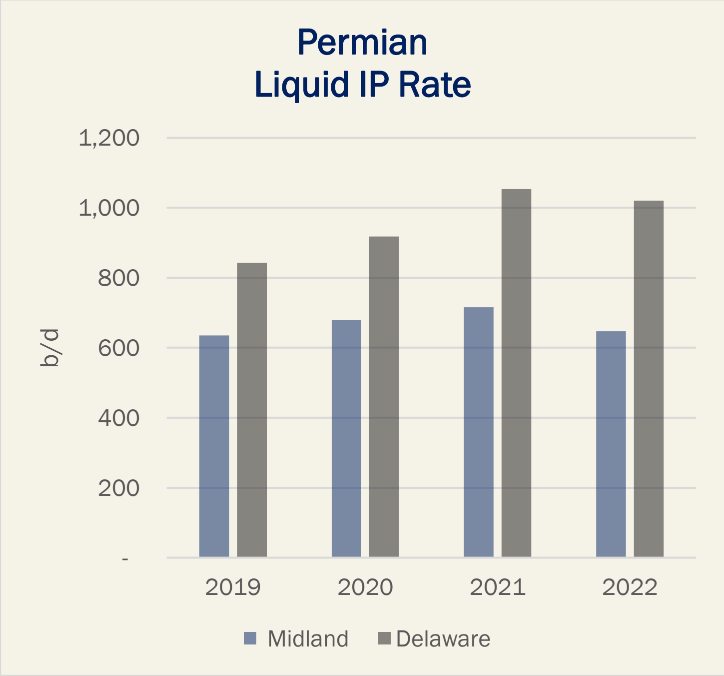
Production and Growth (EDA)				
Year	Avg. Prod. (Mb/d)	Exit (Mb/d)	Average Growth	Exit-Exit Growth
2020	4,472	4,377	0%	0%
2021	4,699	5,049	5%	15%
2022	5,353	5,826	14%	15%
2023	6,271	6,517	17%	12%
2024	6,672	6,785	6%	4%
2025	6,848	6,901	3%	2%
2026	6,940	6,969	1%	1%
2027	6,970	6,977	0%	0%

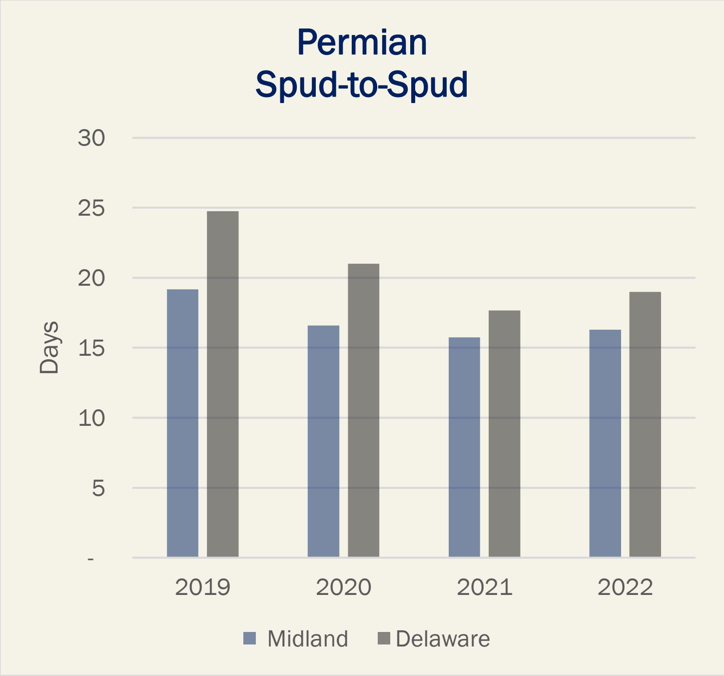
- EDA's Permian production forecast is near-term loaded, as well data indicates drilling efficiencies have increased significantly.
- Midstream operators Enterprise (EPD) and Plains All American (PAA) have a mostly similar view but vary on timing. EPD and PAA's short-term volume outlook is bearish relative to EDA, but their long-term outlook is more bullish.
- Declining rig count assumptions longer-term, which reflect the backwardated WTI curve, are the primary driver of the differing long-term forecast between EDA and EPD/PAA.

Sources: Enterprise Products Investor Presentation; Plains All American Investor Presentation; East Daley's *Crude Network Model*, *Production Scenario Tools*, *Energy Data Studio*

Doing More With Less: Efficiency Gains Drive Growth



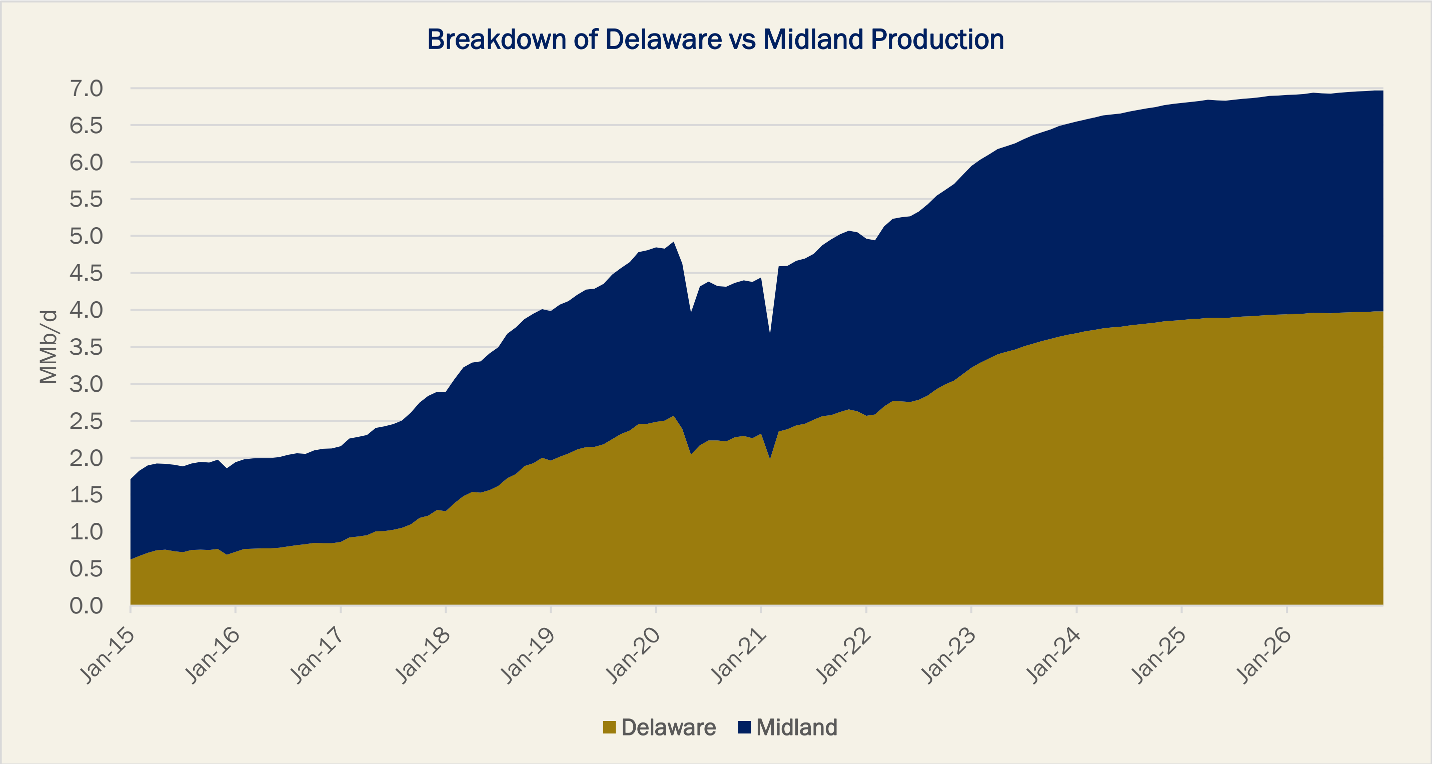




- Compared to 2019, producers have been operating at higher productivity. Well data shows that drill times have decreased, and longer laterals have led to increased oil IP rates.
- However, these efficiency gains may be hitting a wall as 2022 data shows slight declines in IP rates and a longer average drilling time per well. We assume diminishing efficiency gains, but further declines would pose a risk to our forecast.
- Delaware oil production will grow at a higher rate than the Midland due to higher rig counts and stronger IP rates.

Sources: Bloomberg, Enverus, East Daley's *Production Scenario Tools*

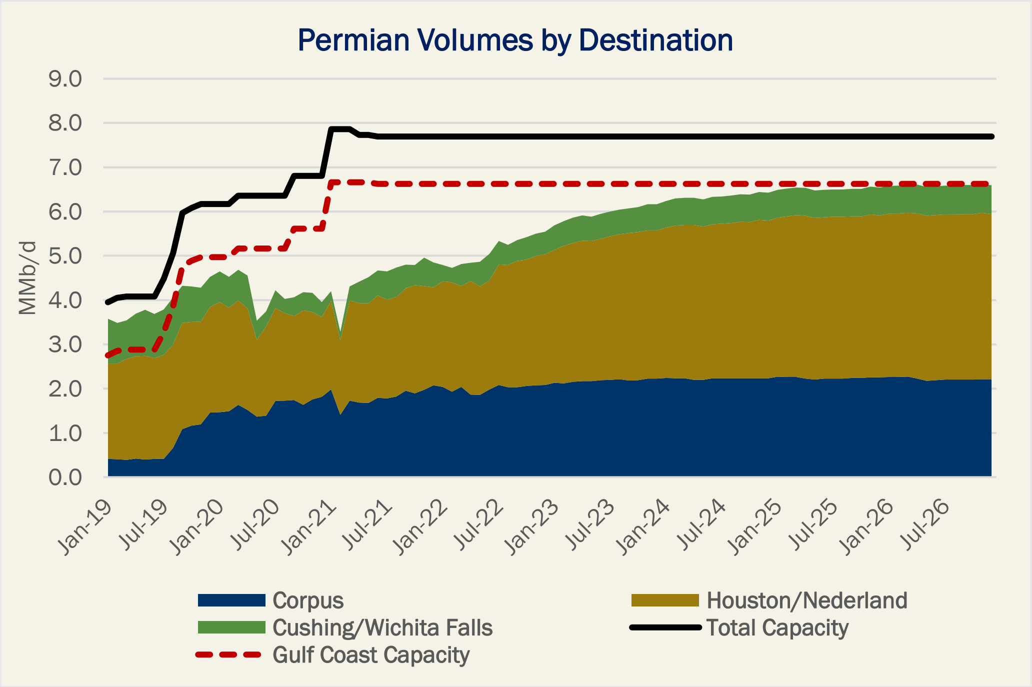
All Eyes on the Delaware

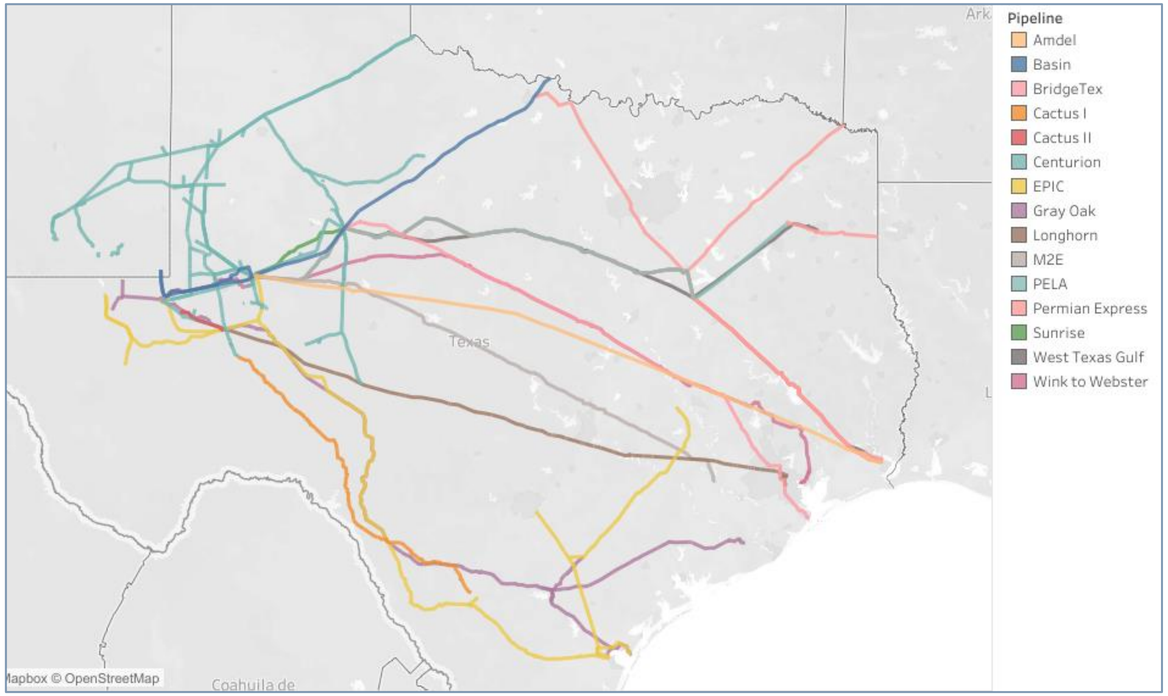


- We expect Delaware oil production to grow by 532 Mb/d and exit 2023 at 3.7 MMb/d, and the Midland to grow by 159 Mb/d to exit 2023 at 1.9 MMb/d.
- The Delaware will account for more than 70% of incremental oil production from the Permian.
- Pipelines offering direct connectivity to Wink and Orla are well-positioned to attract the marginal barrel.

Sources: East Daley's *Crude Network Model, Production Scenario Tools, Energy Data Studio*

…and Pipeline Utilization is Finally Increasing

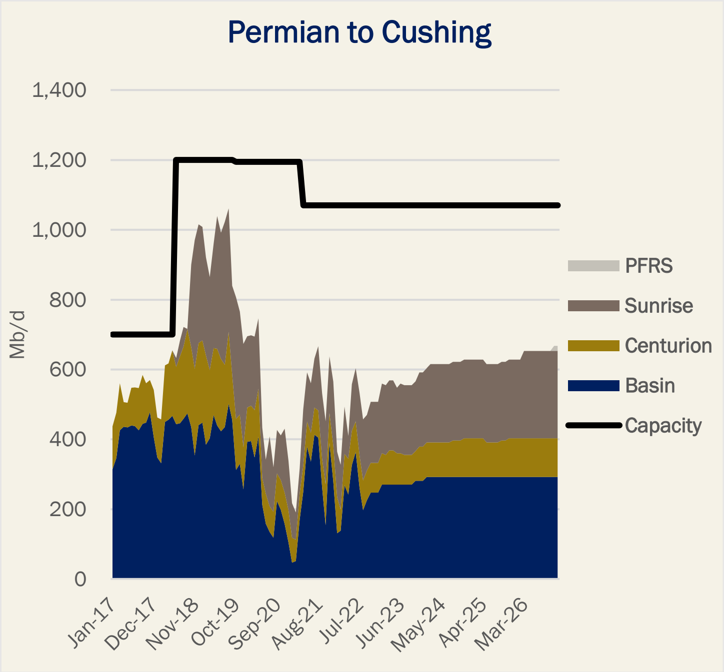


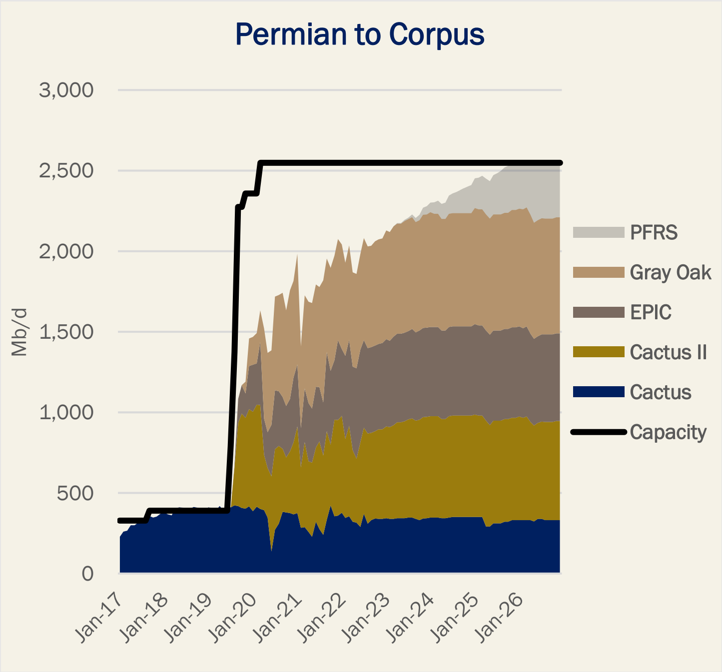


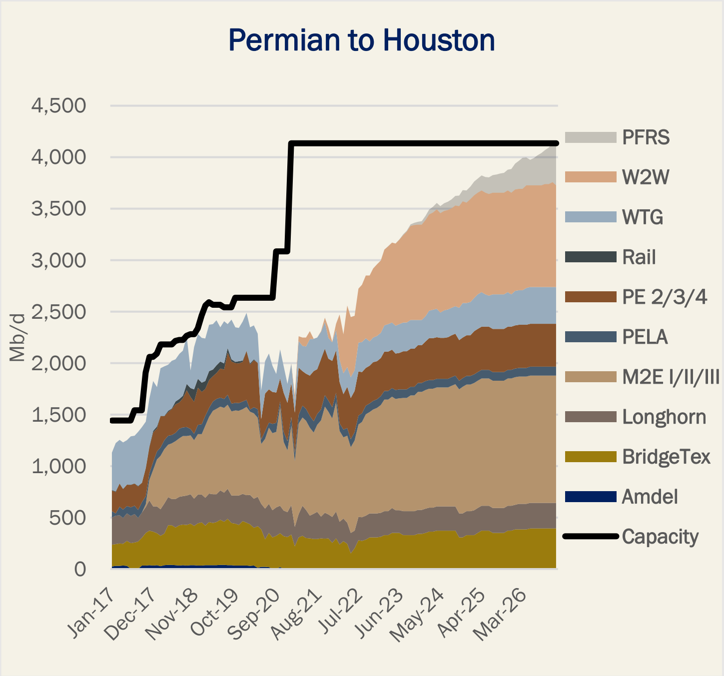
- The Permian has three primary egress outlets to clear supply: North (Cushing), South (Corpus Christi) and Southeast (Houston).
- The last major infrastructure buildout to the Gulf Coast displaced barrels headed north, drawing the incremental barrel away from Cushing.
- Between Houston and Corpus, Corpus was the clear winner for the marginal barrel. We predict Houston will catch up, driven mostly by a ramp in Wink-to-Webster commitments.

Sources: East Daley's *Crude Network Model, Energy Data Studio*

Where Will the Barrels End Up?



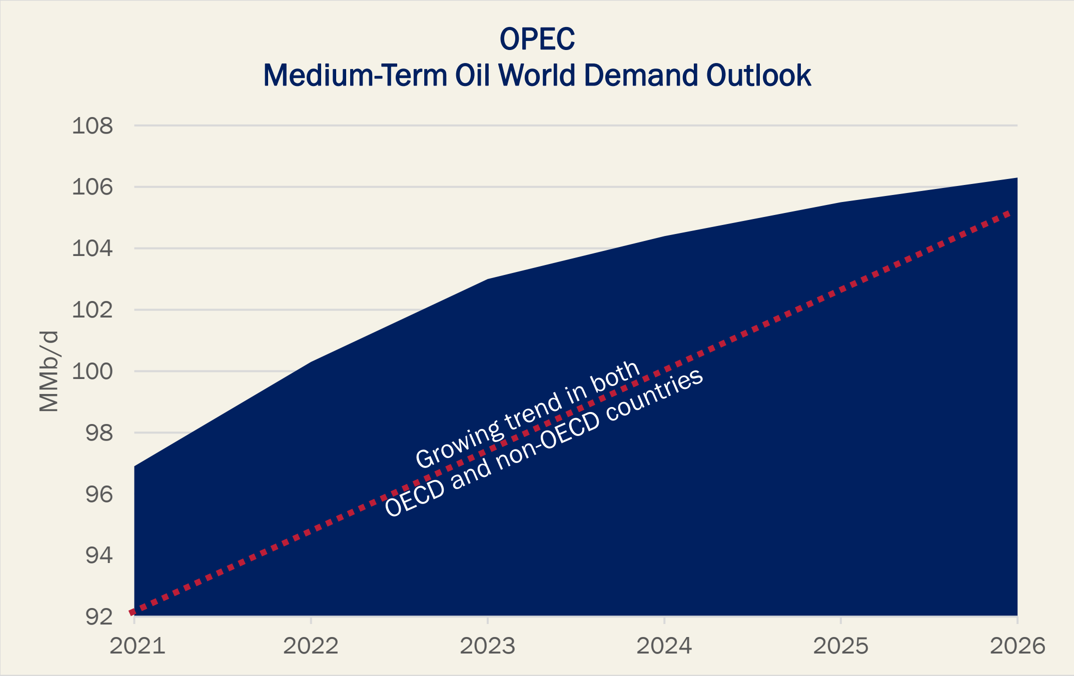


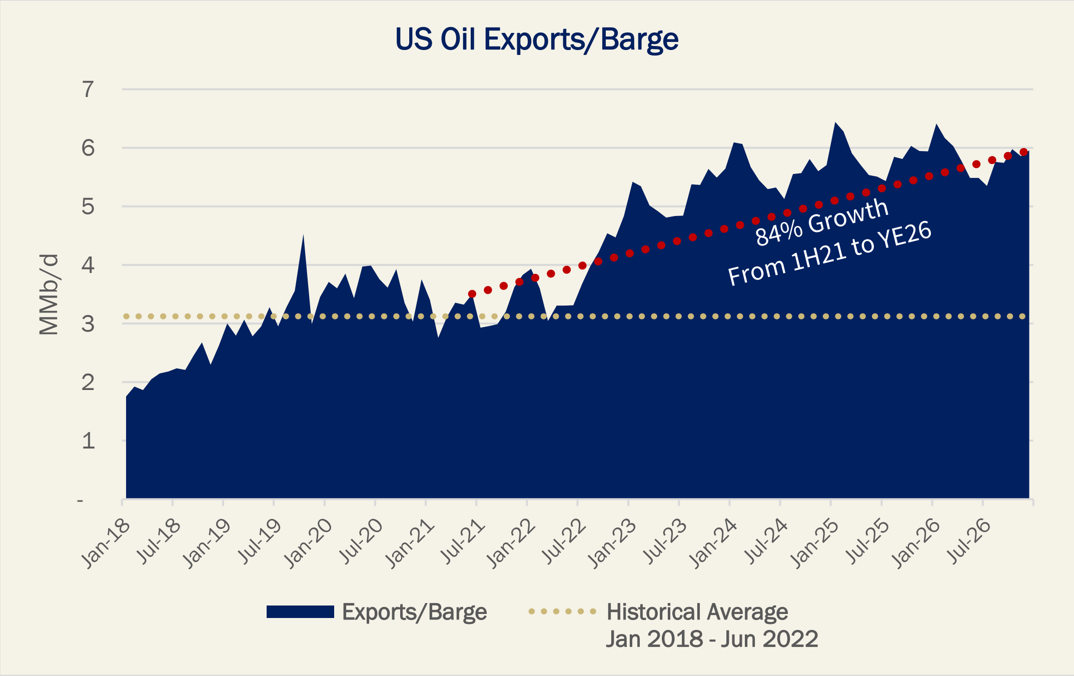


- Midcon refiners create some "sticky" demand for Permian-to-Cushing barrels, but premium pricing along the US Gulf Coast will incentivize marginal barrels to move to the water.
- Gulf Coast pipelines now average mid-70% utilization, and excess capacity has shrunk from 2.7 MMb/d since January 2021 to 1.6 MMb/d as of November 2022. By the end of 2025, EDA projects these pipes will hit 90% utilization.
- Under a Permian flat-rig scenario ("PFRS"), pipes fill much quicker. New or expanded infrastructure to Corpus or Houston would be needed, or Midland basis will collapse as the only way out is north to Cushing.

Sources: East Daley's *Crude Network Model, Energy Data Studio*

International Demand is the Driver for Long-Term Growth

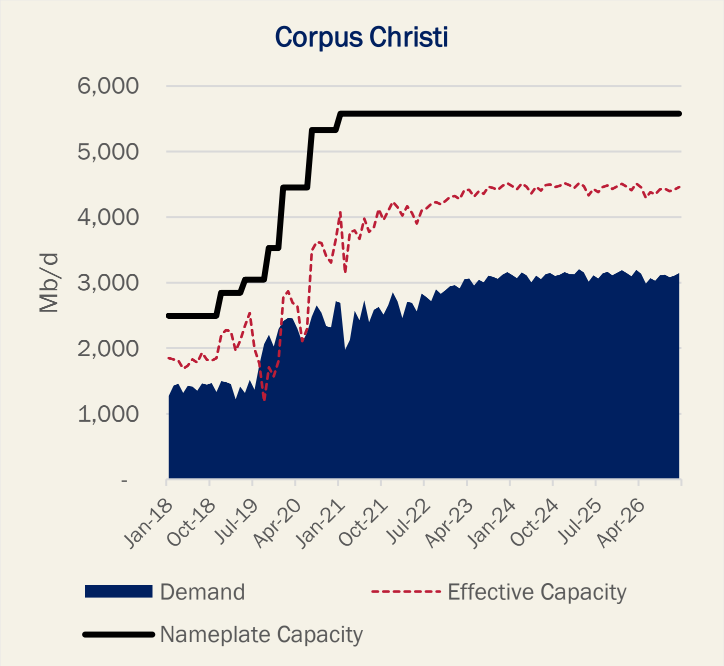


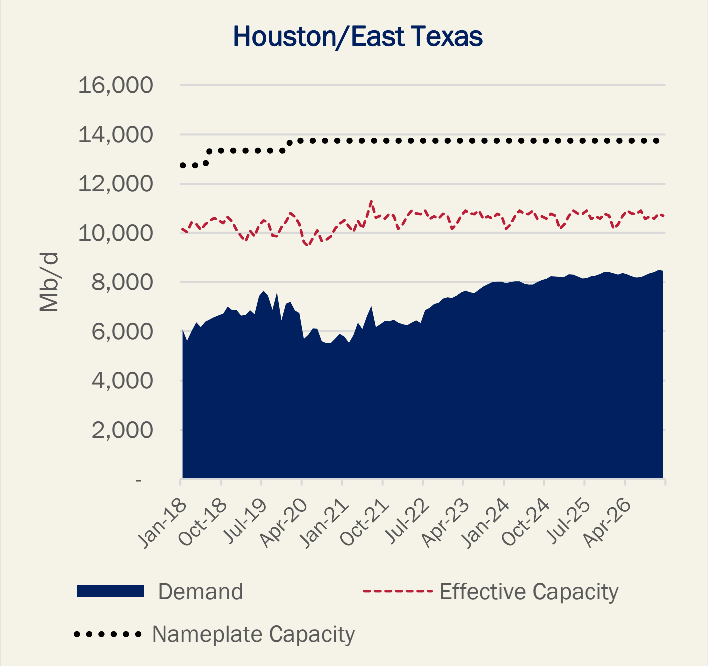


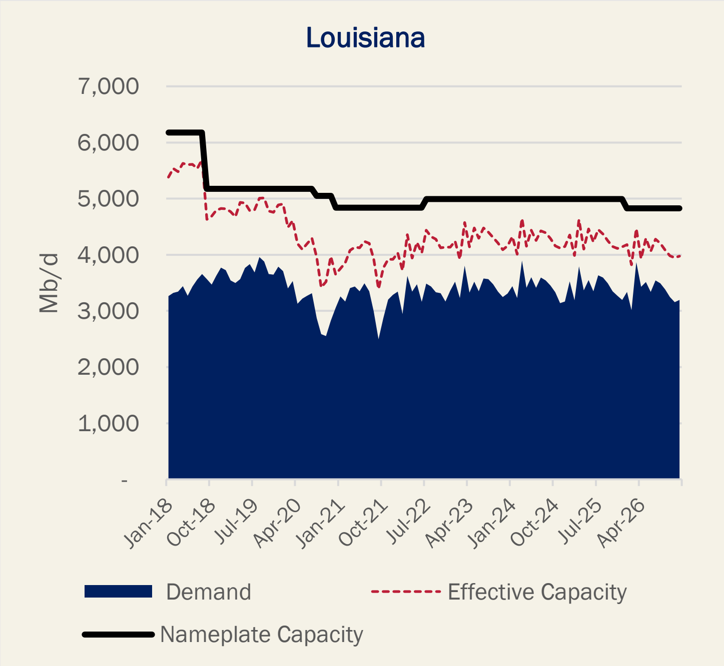
- US refining capacity has decreased by ~1 MMb/d since April '20 to 18 MMb/d. Additional supply will not match growth in US domestic demand.
- Additional US crude will ultimately find a home in international markets, making US Gulf Coast export docks an attractive position in our outlook, according to EDA's *Crude Network Model*.
- The US has substantial nameplate export capacity along the Gulf Coast. However, ship traffic, weather, reverse lightering, and the capacity of the inbound pipelines result in a lower effective capacity.

Sources: Organization of the Petroleum Exporting Countries (OPEC) *World Oil Outlook;* East Daley's *Crude Network Model, Energy Data Studio*

Which Market Wins?



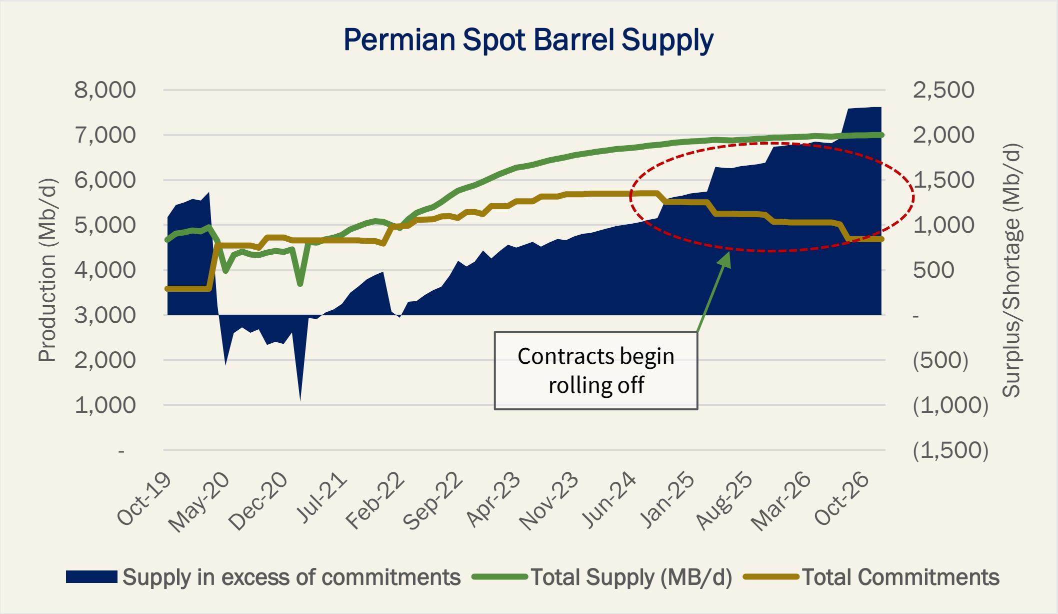


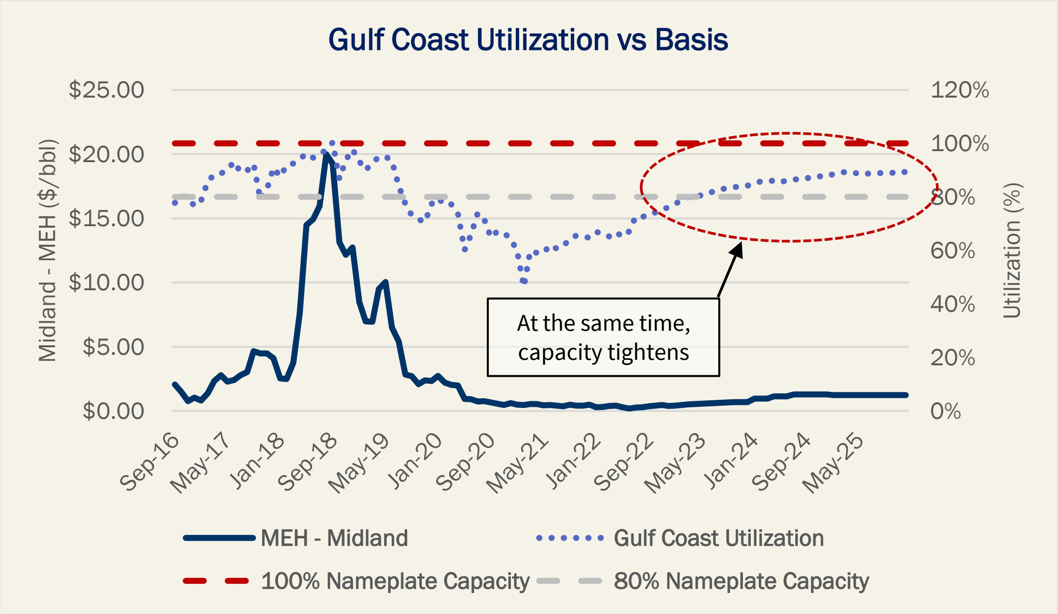


- Pipeline connectivity and competitive tolls should attract the marginal barrel, but less reverse lightering and congestion are positives as well. Ports like Enbridge Ingleside Energy Center and Flint Hills Ingleside (Corpus) or potential offshore export facilities will be primed to take more barrels.
- Enterprise Products (EPD) won conditional approval for the Sea Port Oil Terminal (SPOT), which would add 2 MMb/d of capacity to the Houston/East Texas market. SPOT will be capable of loading Very Large Crude Carriers (VLCCs), which could incentivize volumes to flow away from Corpus Christi as well as other competing terminals in the Houston E-TX region.

Sources: East Daley's *Crude Network Model, Energy Data Studio*

Improving Tariff Rate Environment

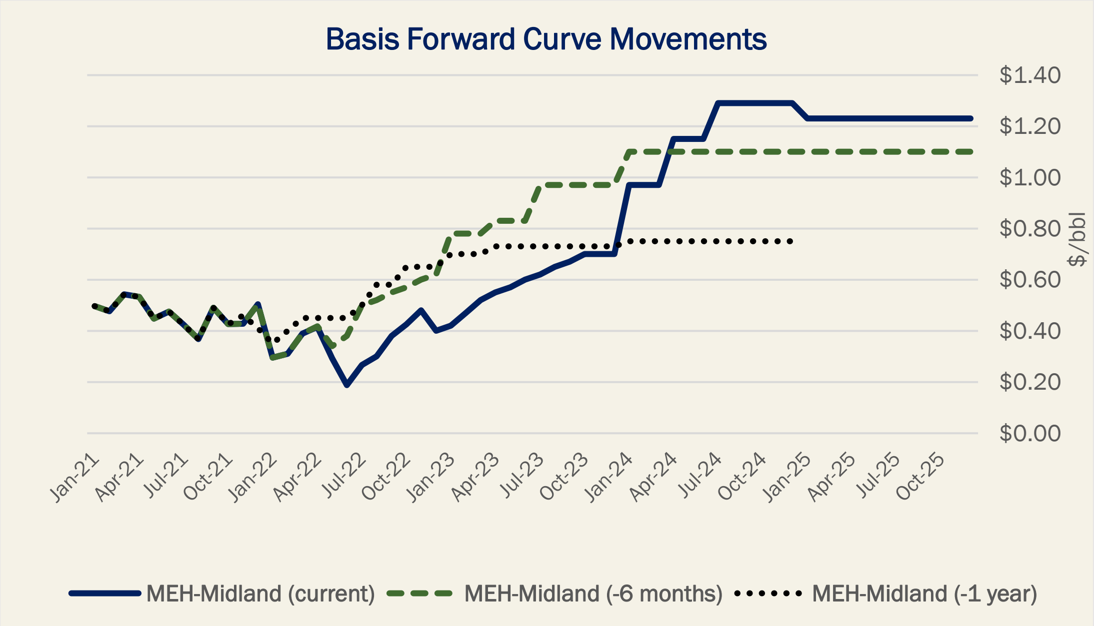


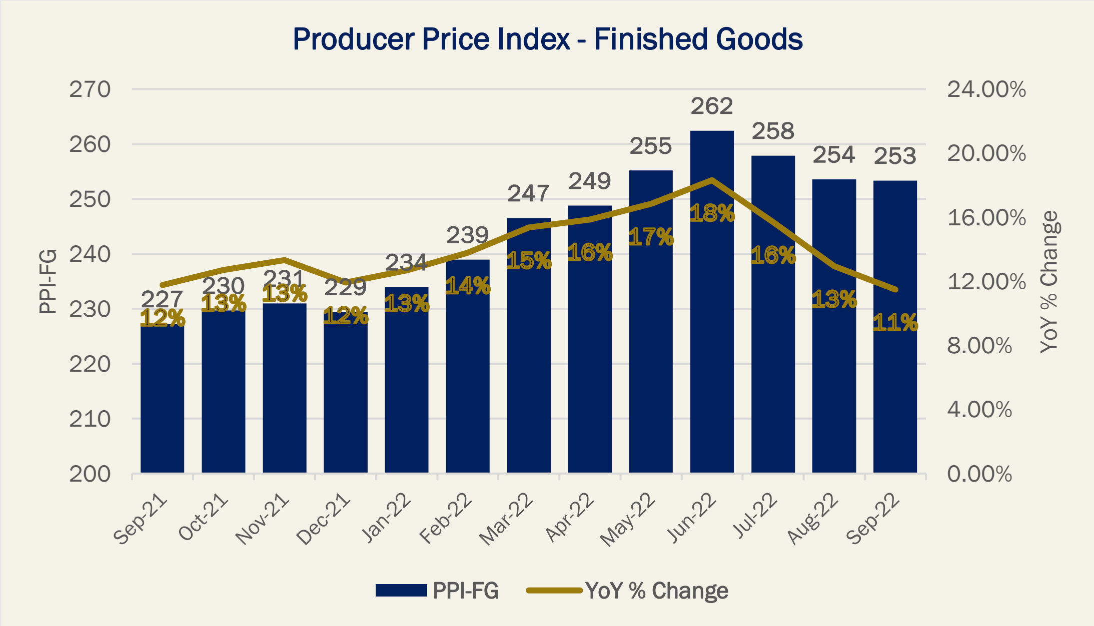


- Midstream operators should not sign new long-term capacity agreements under current conditions. Spreads remain tight in the near term, and short-term incentives have driven down the average transport rate.
- However, if supply is in line with EDA's expectations, then rates have bottomed. In the next 2-3 years, we expect midstreamers will be able to recontract at higher rates as egress capacity tightens and spreads widen.
- Current holders of committed capacity should negotiate "blend and extend" terms before capacity gets too tight. Those without FT in the coming years will be forced to pay walk-up rates, which in most cases are adjusted annually at the maximum FERC index ceiling (~13.5%+ in mid-2023).

Sources: Bloomberg, East Daley's *Crude Network Model*

A Winning Recipe: Widening Spreads and High Inflation





- Spreads have widened in the forward curves for Midland and Houston relative to a year ago, which will help crude marketing operations. We expect wider spreads ahead.
- Inflation-pegged tariff adjustments are on track to rise by a record ~13%+ for 2023 (FERC). This will primarily benefit spot rates, although committed rates will see a hike as well.
- Pipeline operators will likely end incentive rate programs as capacity begins to rationalize.
- With wider spreads, marketing earnings should increase. Shippers without firm transportation risk lower netbacks if they wait too long to secure capacity.

Sources: Bloomberg, Bureau of Labor Statistics (BLS), East Daley Research

Conclusions – Crude Oil

1. The Permian will account for most US oil production growth, driven by sustained prices, producer efficiencies, and increasing international demand.

2. Underutilized pipeline capacity built between 2019 and 2021 will fill. This will widen basis between hubs and put upward pressure on transportation rates out of the basin.

3. Permian pipeline operator PAA has the most exposure to Permian crude and is well positioned to capture upside through its network of intra-basin and long-haul assets. Competing midstream companies Enbridge (ENB) and EPD are also strengthening their positions via increased stakes in existing assets and plans for new offshore export facilities.

4. In the next 2 years, brownfield expansions on Permian-to-Gulf Coast infrastructure are probable ahead of pipes filling up. One contender is EPIC Crude, which is currently operating ~300 Mb/d below its design capacity of 900 Mb/d.

NATURAL GAS LIQUIDS (NGLs)

WHO GIVES A FRAC?

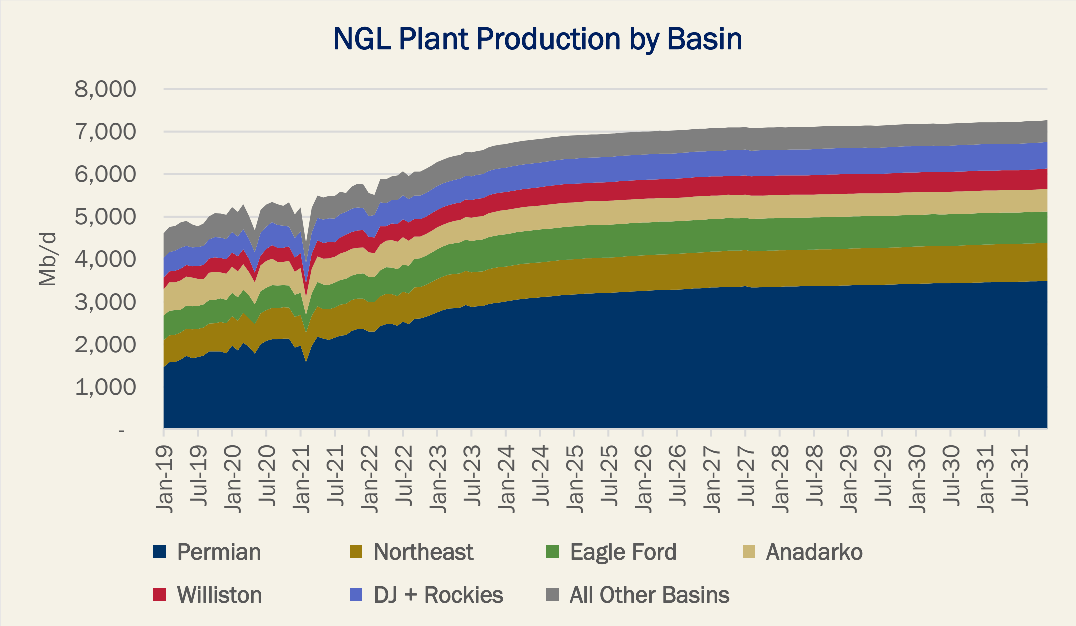
Key Takeaways – Natural Gas Liquids (NGLs)

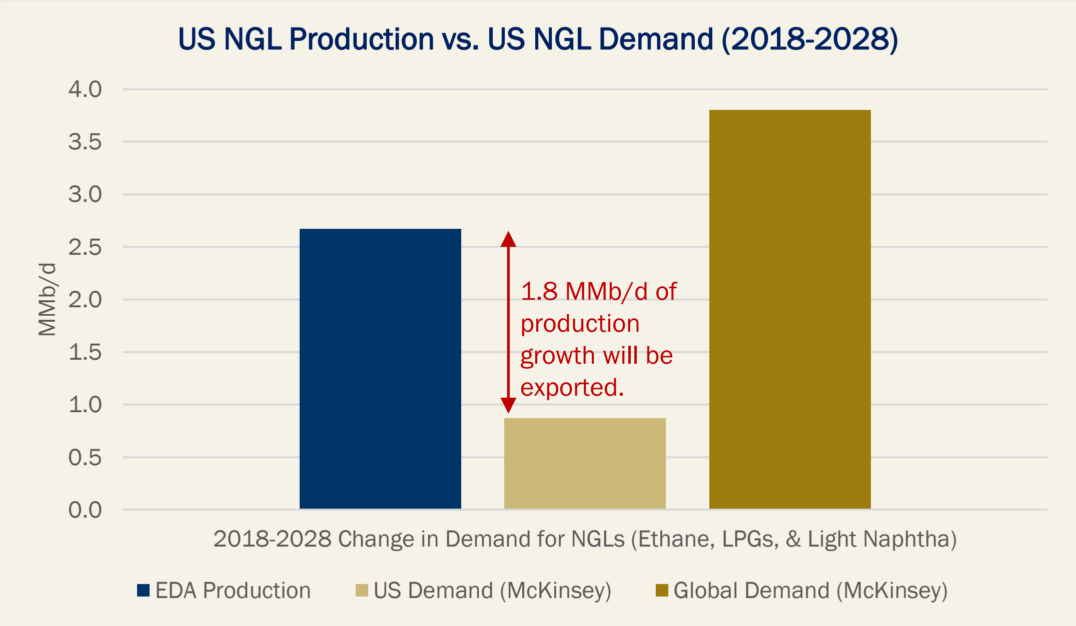
1. A “perfect storm” is brewing in NGL markets: a lack of domestic demand growth from new crackers, lower global petrochemical utilization rates due to recession fears, and a lack of fractionation capacity will lead to more ethane rejection and pressure NGL prices.

2. Given NGLs need to be fractionated for exports, higher export demand cannot balance NGL supply and demand until more fractionators are built. Midstreamers are already adding 700 Mb/d of frac capacity at Mont Belvieu and the Texas Gulf Coast through 2024, but that will not be enough to keep up with supply growth into the region.

3. Options to balance the market are limited:
   - Can’t reject ethane due to constraints on Permian gas egress
   - Limits to flaring wellhead gas due to ESG concerns
   - Producers will need to build Y-Grade inventories, putting longer-term pressure on NGL prices.

If Gas and Crude are Booming, so are NGLs

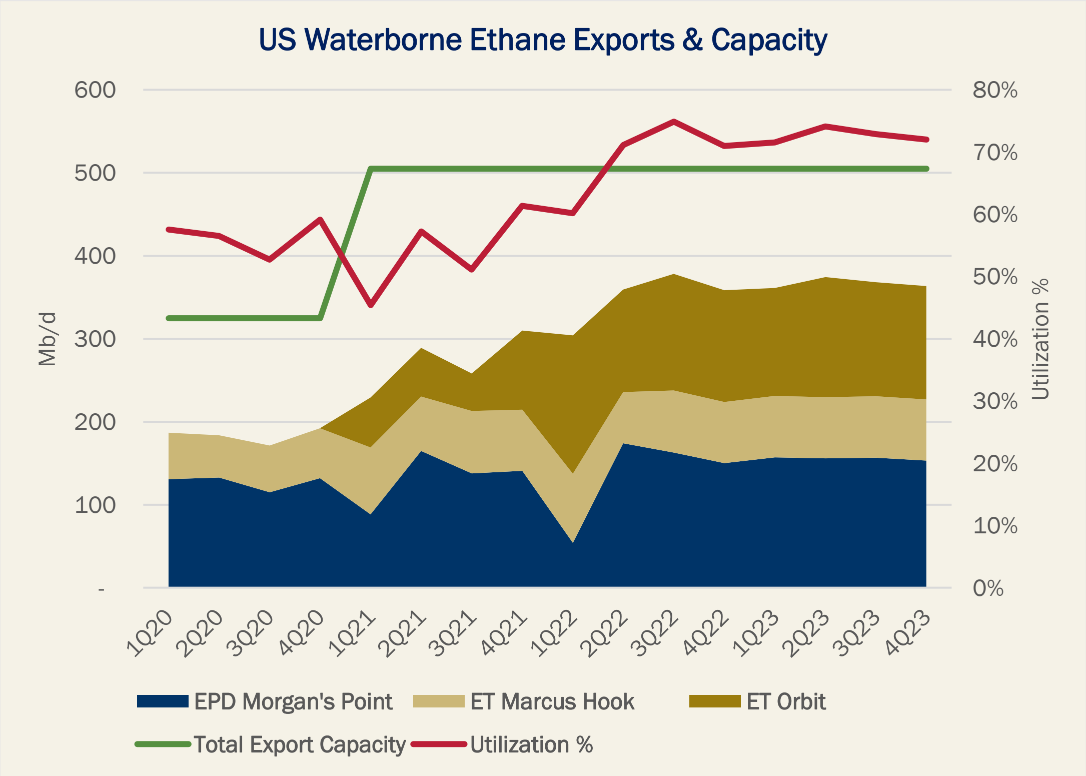


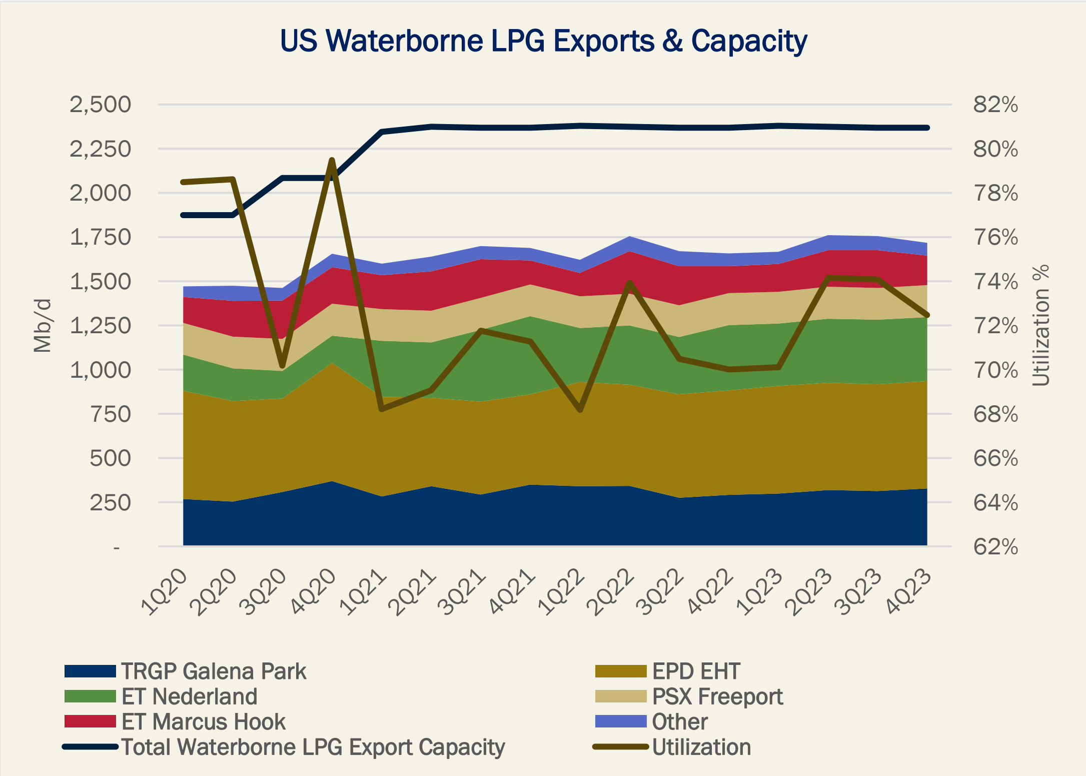


- NGL production is also growing rapidly on the back of strong Permian activity, higher ethane recovery, and as gas-to-oil ratios (GORs) increase across basins. However, growth plateaus post-2024 as we taper rigs due to the backwardated curve.
- McKinsey estimates US NGL demand will only grow by ~800 Mb/d from 2018-2028. Most of this demand growth has already crystalized, with the latest being Shell's Pennsylvania cracker (2022) and Total/Baystar's Gulf Coast cracker (2021).
- With the lack of domestic demand growth, new supply will need to be exported and midstream players will need to ensure there is sufficient infrastructure to balance the market.

Sources: McKinsey Energy Insights; East Daley's *NGL Network Model, Purity Product Forecast, Energy Data Studio*

Export Capacity is Waiting …

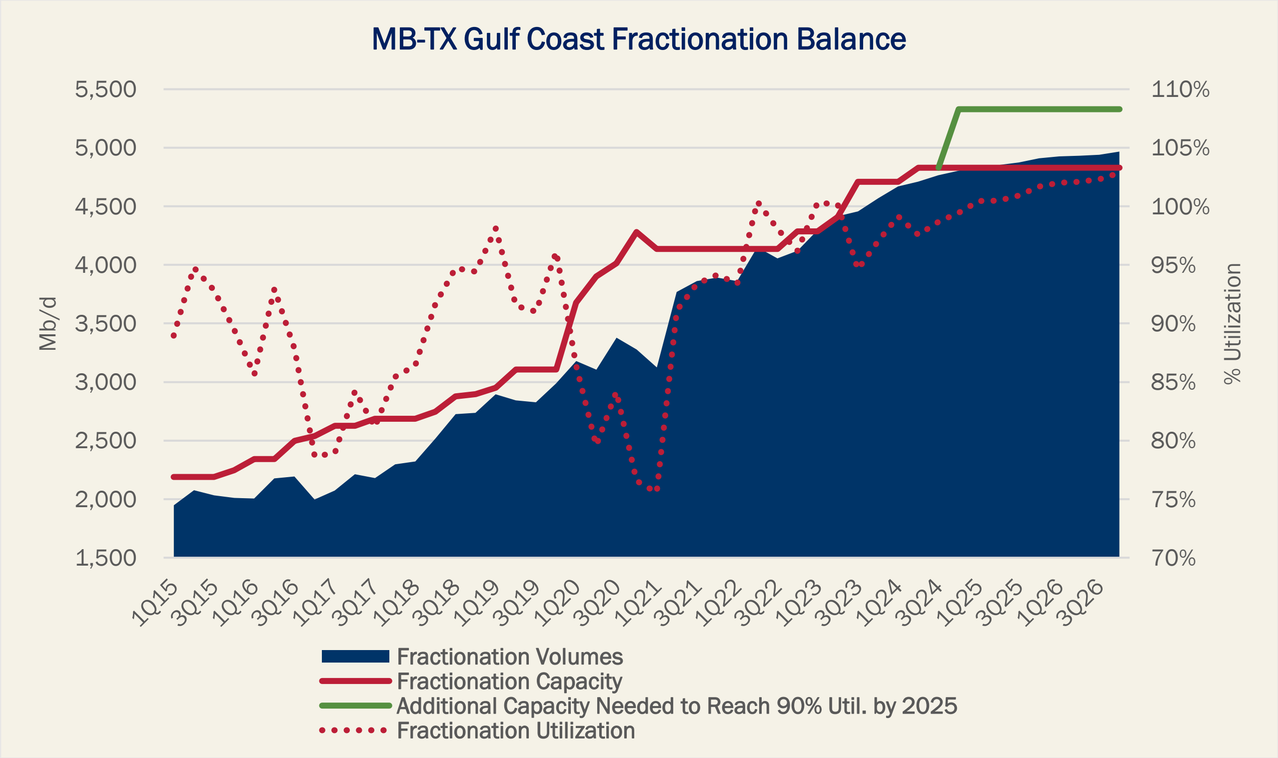




- NGL exports are dominated by a select few: Energy Transfer (ET), Enterprise (EPD), and Targa (TRGP).
- ET and EPD own all the existing waterborne ethane export facilities in the US. Those facilities still have ~127 Mb/d of capacity remaining.
- ET, EPD, and TRGP collectively own 2.1 MMb/d of LPG export capacity, with 669 Mb/d of capacity remaining.

Sources: East Daley's *NGL Network Model, Blueprint Financial Models*

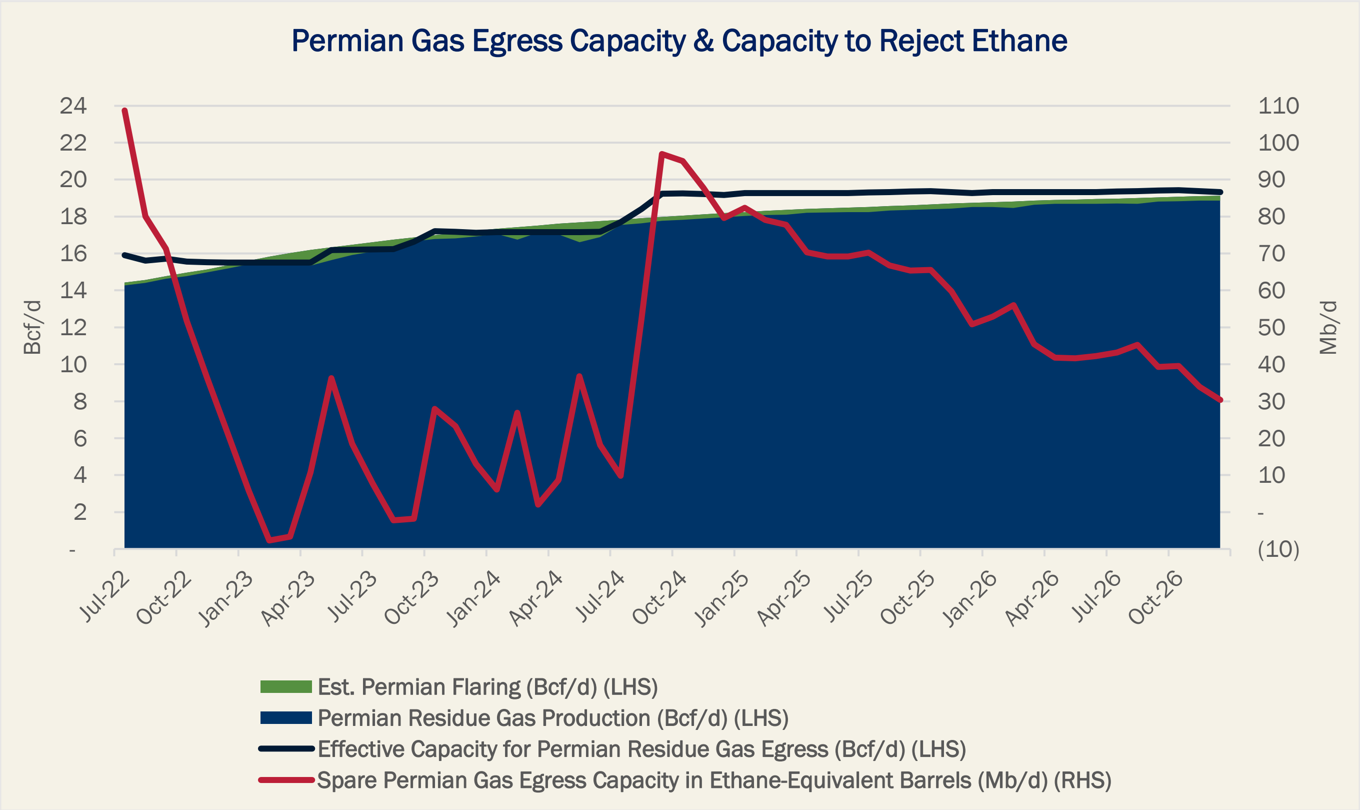
… But You Can't Export if You Can't Frac



- While there is sufficient NGL export capacity remaining, there is little to no space at the frac. Fracs have historically never run above 90% for a sustained period. At the current rate of production growth, utilization will remain between 95%-100% despite 700 Mb/d of new capacity hitting the market between 1H23-1H24.
- East Daley estimates at least 500 Mb/d of additional fractionation capacity will need to be announced to reach 90% utilization. These constraints may get worse during the winter as fracs will need to go through turnarounds after such high utilization.

Sources: East Daley's *NGL Network Model, Energy Data Studio*

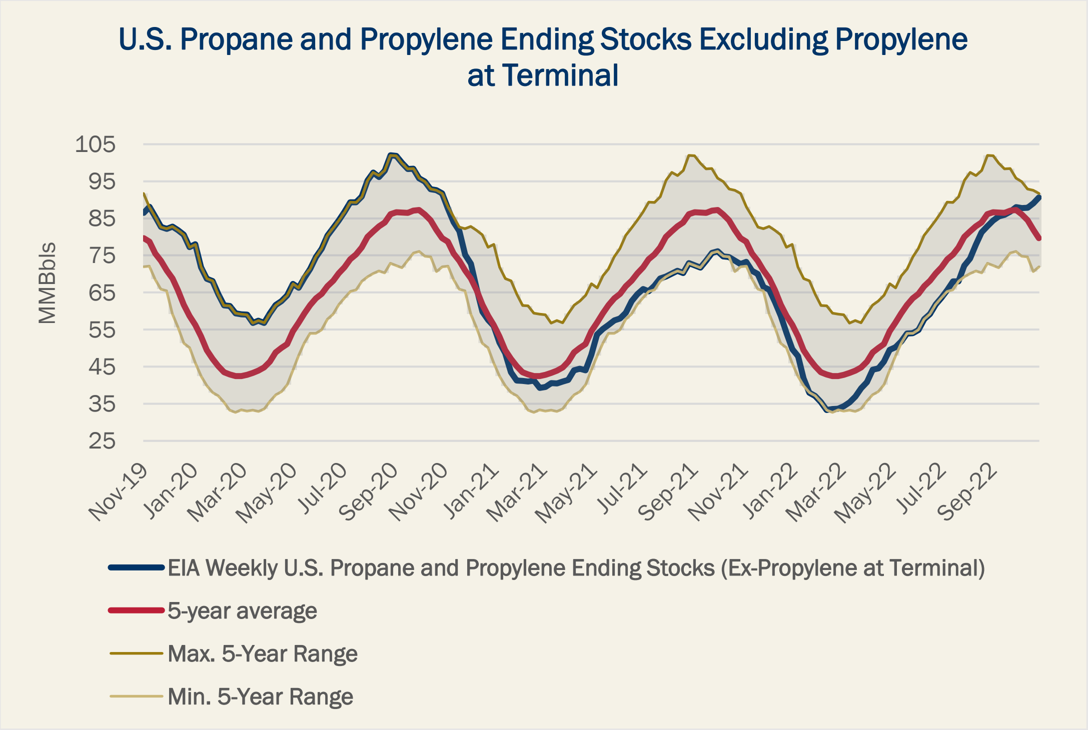
Ethane Rejection Incoming

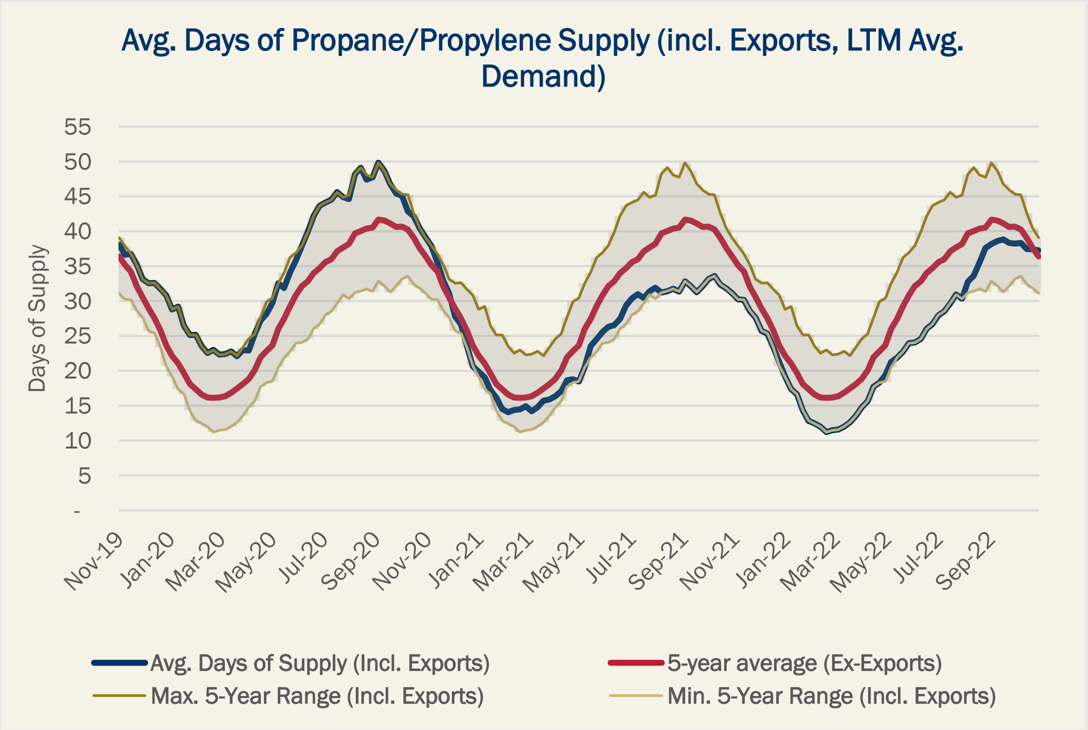


- One option to manage frac constraints could be to increase ethane rejection. However, Permian gas egress is constrained through most of 2024, so there is limited space for additional ethane in the gas stream.
- Producers will likely need to turn to flaring in order to manage both gas egress and NGL fractionation constraints.

Sources: East Daley's *Permian Basin Supply & Demand Forecast, NGL Network Model*

Until Someone Gives a Frac, Expect Massive Y-Grade Storage Builds

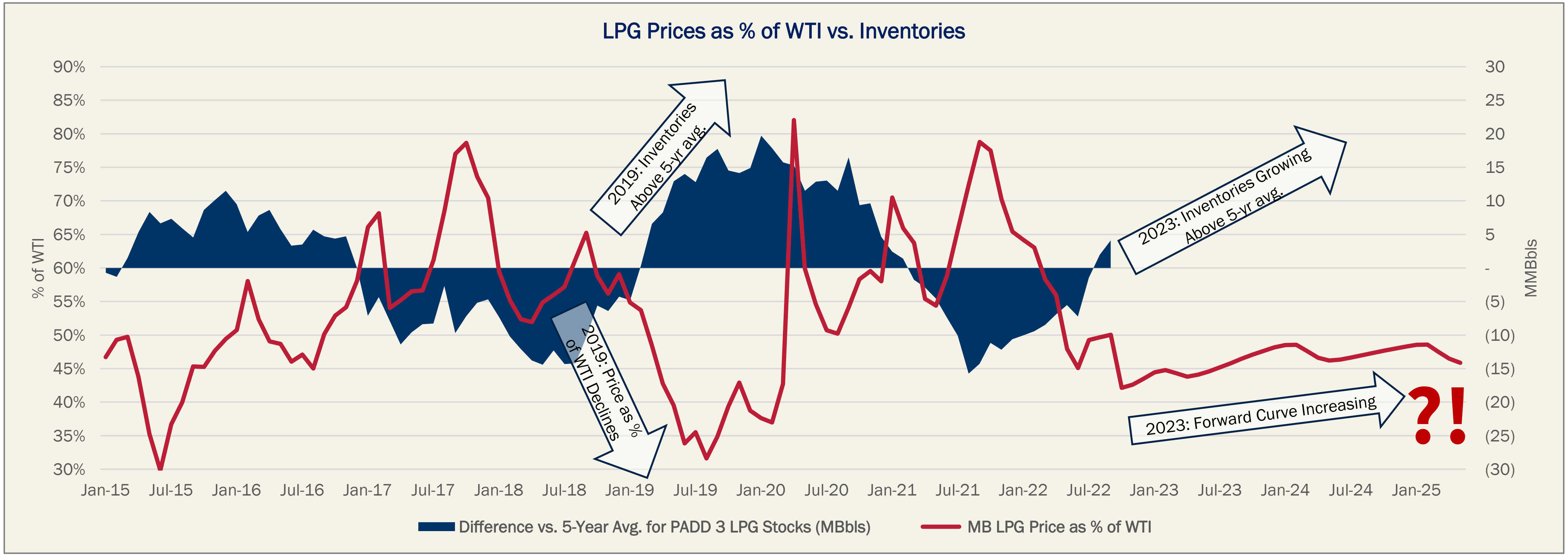




- Another option for NGLs is to ramp up Y-Grade storage levels, while meeting any additional demand with purity product storage draws. We are already starting to see this as propane/propylene weekly inventories, which include estimates contained within Y-Grade, have shot up from 5-year lows to above the 5-year average in a matter of weeks.
- However, this stored Y-Grade will need to be fractionated at some point. Add in recession fears lowering petrochemical demand, domestic NGL prices may be pressured in the near-to-medium unless new export contracts are signed and fractionators built.

Sources: Energy Information Administration (EIA), East Daley's *The NGL Roundup*

More Downside for NGL Prices, Especially LPGs



- Given fractionation constraints and a potential recession, NGLs and especially LPGs may enter a prolonged wave of above-average inventories.
- A build-up in inventories will put pressure on prices. Historically, when inventories are above the 5-year average, the price of LPGs (Propane plus Butane) can go as low as 30% of WTI. The current forward strip is only at 45-50%, presenting additional downside risk as inventories continue to climb.

Sources: Bloomberg, Energy Information Administration (EIA), East Daley's *The NGL Roundup*

Conclusions – Natural Gas Liquids (NGLs)

1. The current NGL commodity environment will impact gas producers with high exposure to NGL prices and Midstream G&P with Percent-of-Proceed (POP) and Keep-Whole contracts. Market participants exposed to NGL prices should lock in higher prices and hedge now, as recession fears and a storage glut will put pressure on prices.

2. Although many midstreamers already announced a suite of fractionation expansions, the market will need more to manage current Y-Grade production and eventually rising export demand. Producers without sufficient fractionation capacity will need a strategy for managing NGL production, whether it is committing to flaring, shutting-in wells, or obtaining storage space.

3. NGL-focused businesses benefit from vertical integration. In 2022, that meant bolstering G&P businesses to direct NGL barrels to long-haul pipelines and fractionators. Looking forward, these companies will want to look to export capabilities, especially with so few players currently in the market.

Questions?

Please reach out to sales@eastdaley.com