

Natural Gas Supply/Demand Outlook

Presentation to:
The Fertilizer Outlook and Technology Conference
Jacksonville, Florida

By:
John Harpole



November 14, 2018

Natural Gas Outlook

Presentation to:
2010 Fertilizer Outlook and Technology Conference
Savannah, Georgia

November 17, 2010

By:
John A. Harpole

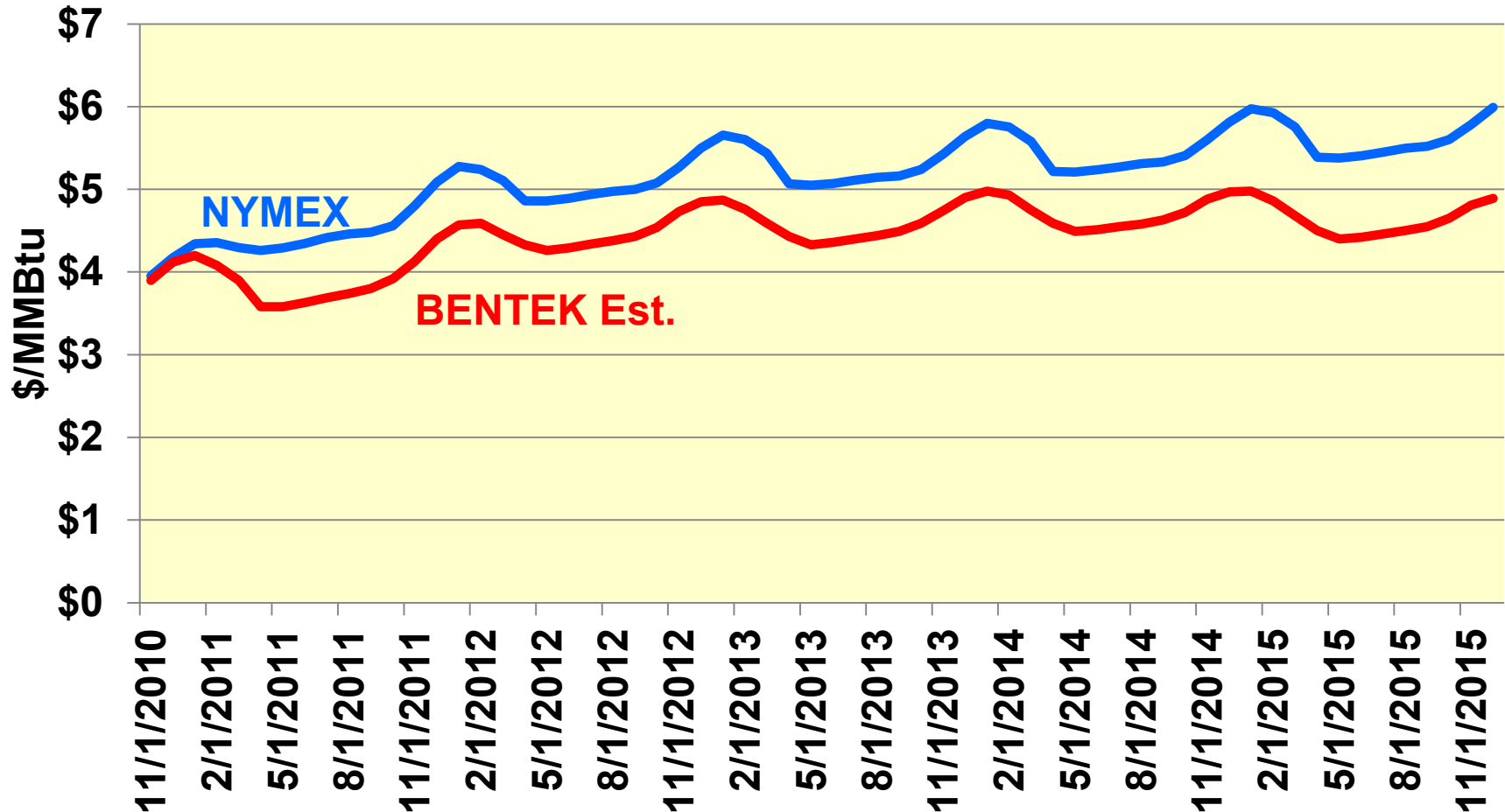


Fertilizer Industry vs. Natural Gas Industry



Source: http://www.search.com/reference/Lucy_van_Pelt

*Forecast from my 2010 speech: BENTEK Expects The Forward Curve To Fall Further



Circa 2010

What will impact natural gas prices during the next 5 years?

- Shale gas/productivity gains (We aren't exploring, we are manufacturing gas.)
- Lower EPA Air Standards (demand increase)
- Renewable Portfolio Standards (in an inexpensive gas environment?)
- Coal to gas conversion (demand increase)
- Demand in Mexico (potential demand increase)
- LNG exports from North America (China is waiting)

Natural Gas Outlook

Presentation to:
**2013 Fertilizer Outlook
& Technology Conference**
Tampa, Florida

By:
John Harpole



Mercator Energy_____

November 20, 2013

Conclusions from November 20, 2013

- U.S. continues to produce more gas, shale gas revolution was too successful, end-users will benefit
- During the next 3 years, supply will likely exceed demand
- Prices will remain in the \$3.50 to \$4.75 range, with short period above and below that band during adjustments
- Long term prices depend on demand growth. Without demand growth, supply will continue to be long and prices relatively low.
- A significant demand response can't occur for at least 3-5 years

The End of Scarcity?

Natural Gas Outlook

Presentation to:

The Fertilizer Outlook and Technology Conference
Jacksonville, FL

By:

John Harpole



Mercator Energy_____

November 11, 2015

Circa 2015

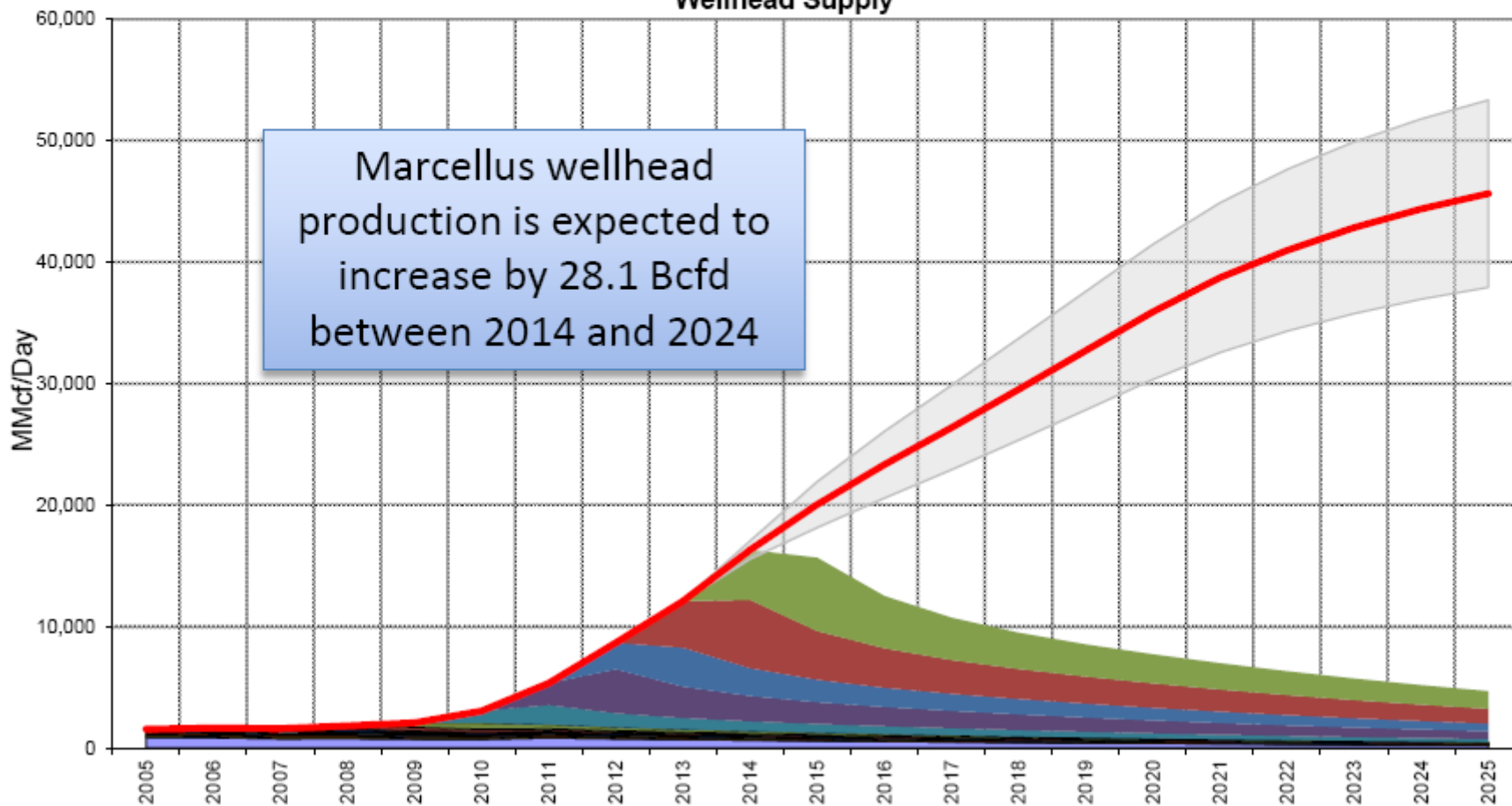
The Big Three Issues to Watch

1. Global Oil Price Recovery
2. Marcellus and Utica Shale Production
3. U.S. LNG Exports

Marcellus

Marcellus/Utica Area

Wellhead Supply

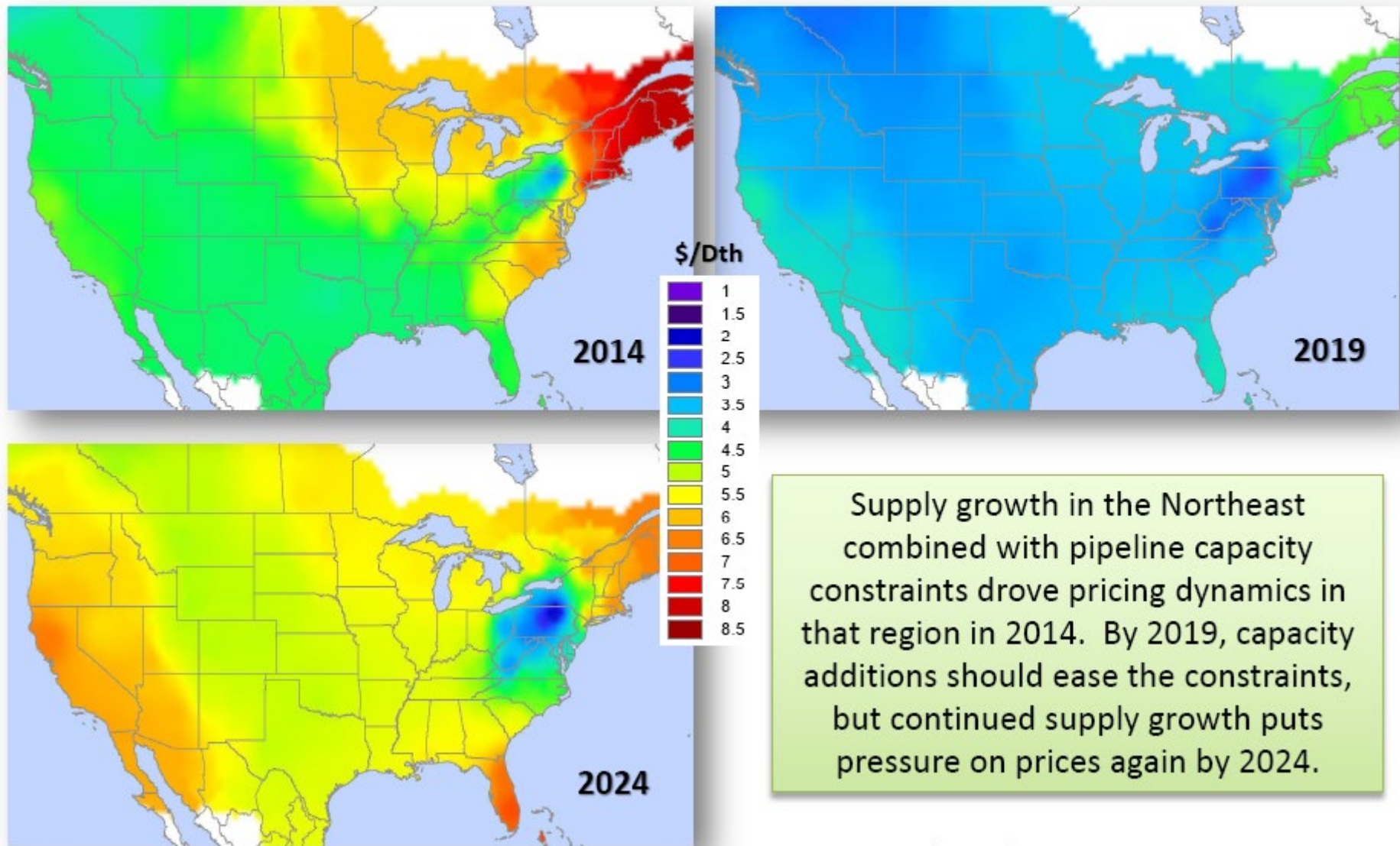


1990-2013: Wellhead total data from DI Desktop

2014-2025: Kinder Morgan forecast

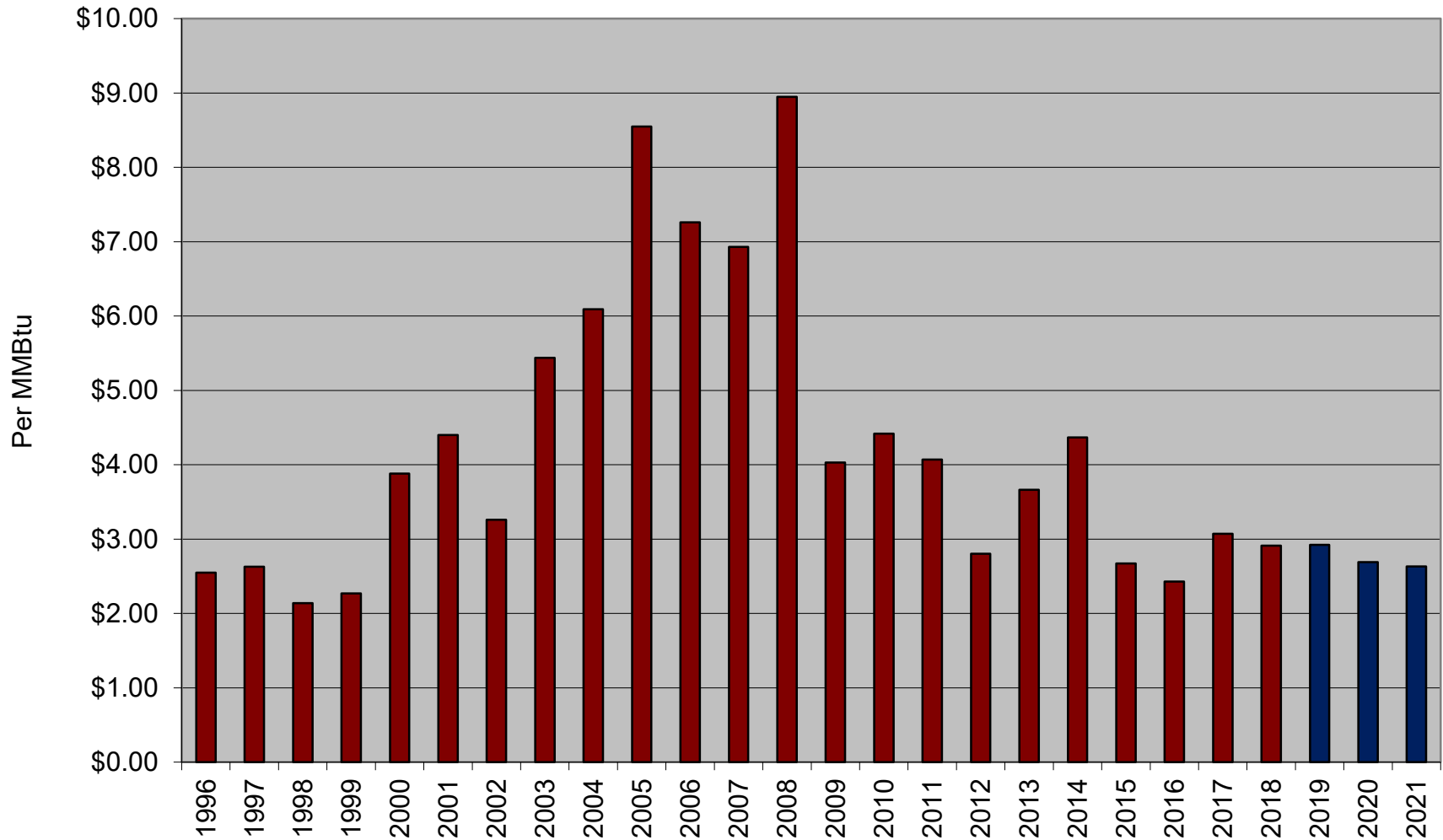
North American Price Expectations

Supply and Pipeline Constraint Impacts



Source: ICF International, KM analysis

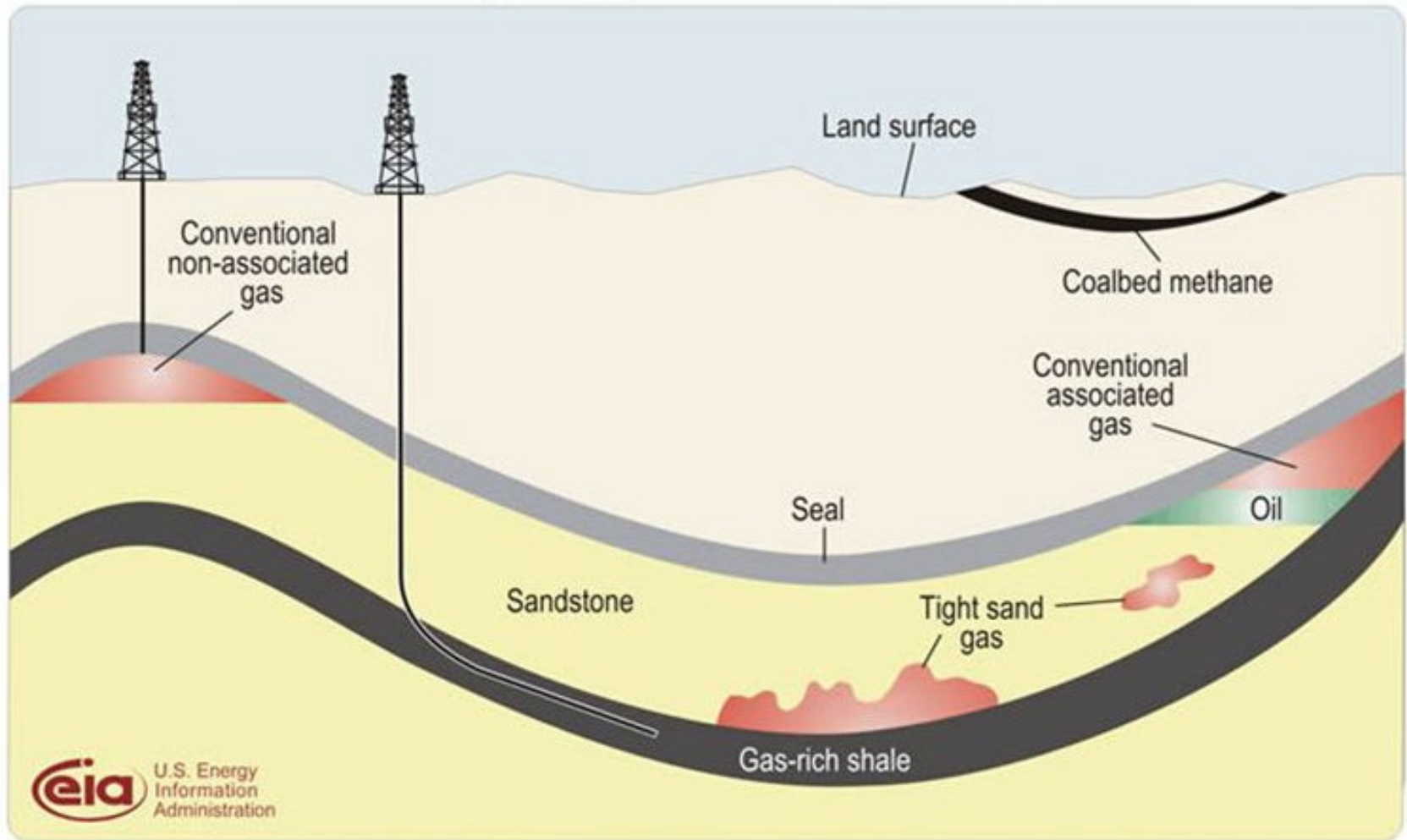
NYMEX Historical and Future Forecast



NYMEX – 1996- Nov 2018 - Average last 3 days of close as reported in Platts Gas Daily Report, Publication 2019-2021 Future Forecast as of 11/07/2018 reported by MarketView Software

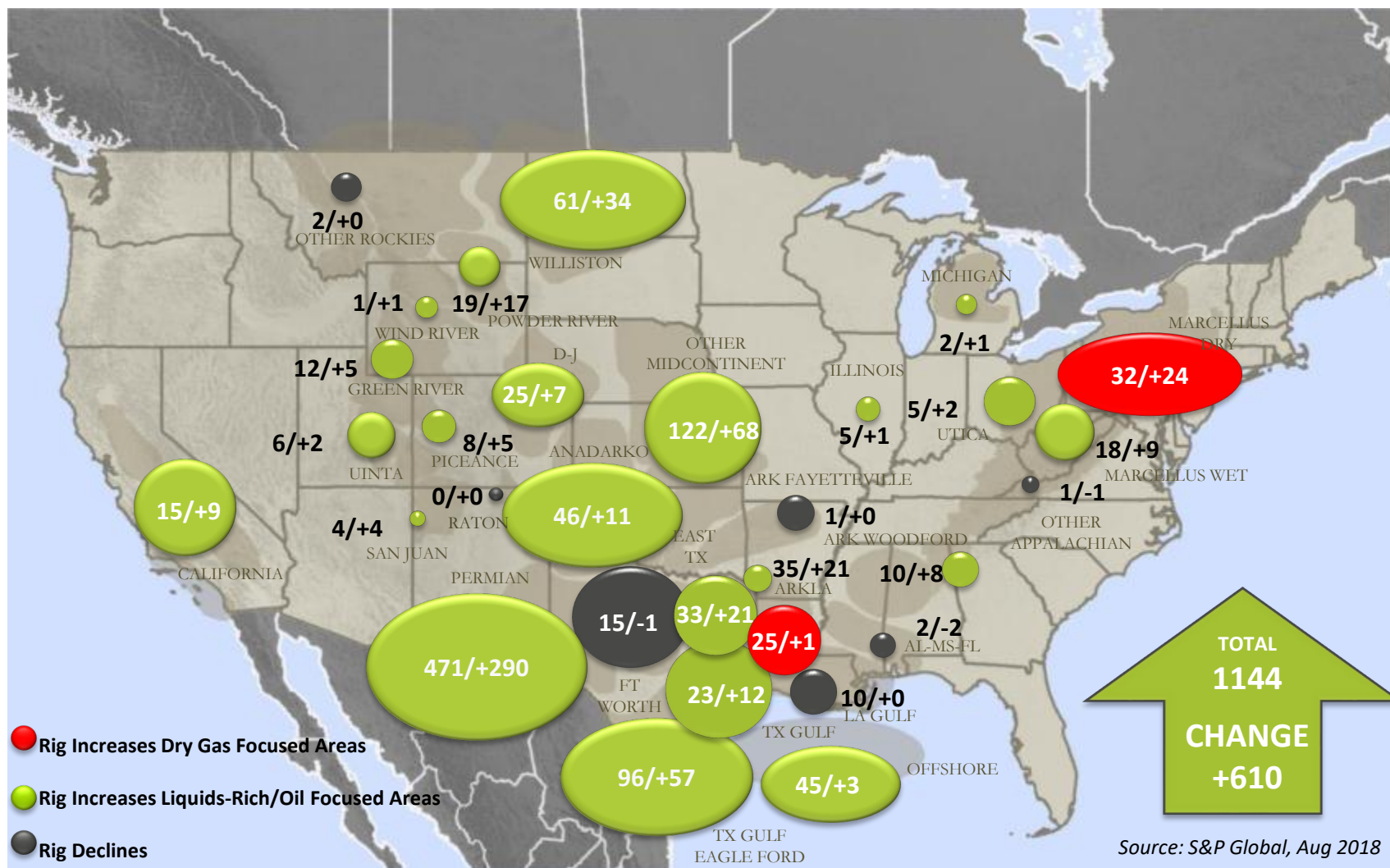
It is not a scarce resource anymore

Schematic geology of natural gas resources



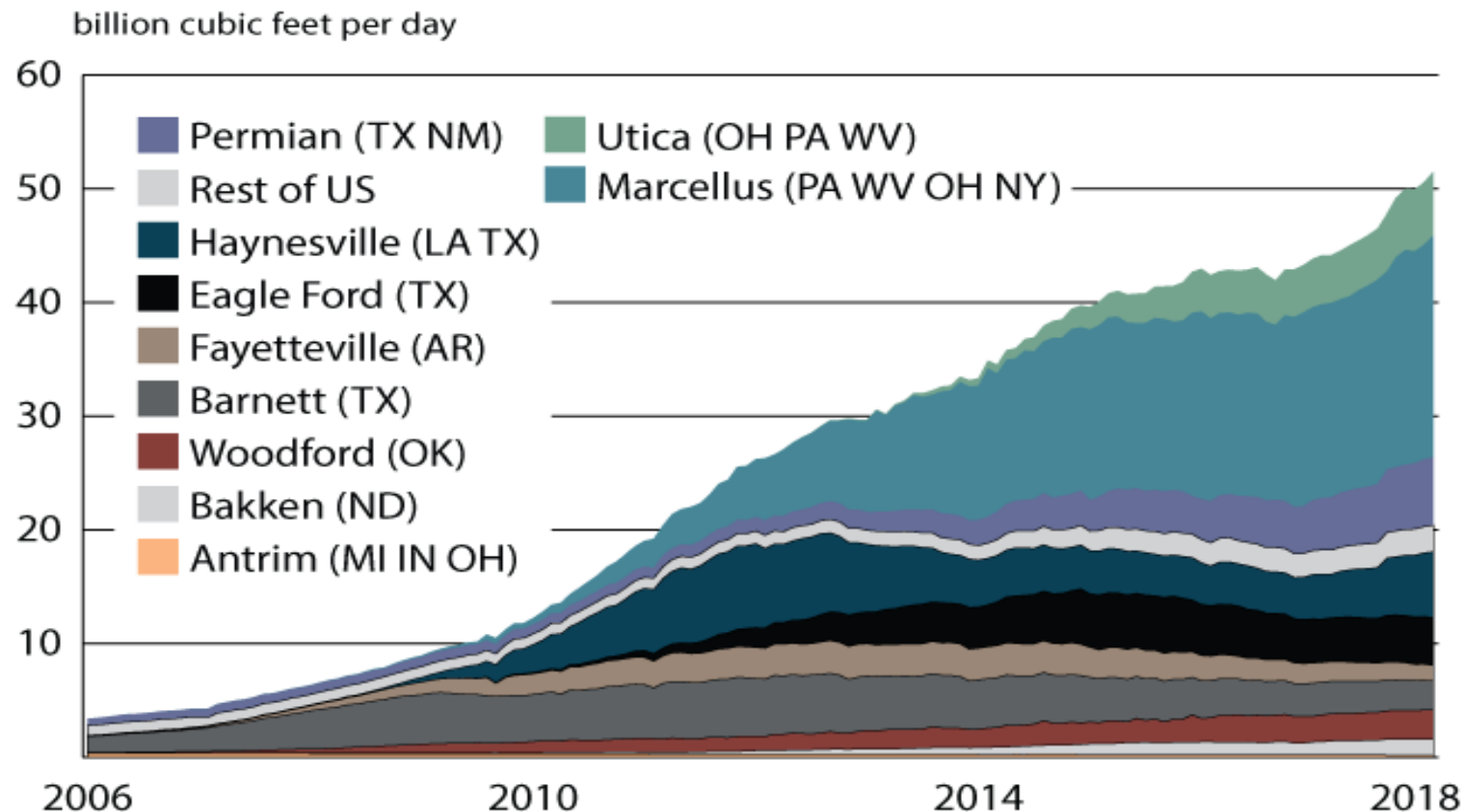
Source: US Energy Information Administration

US RIG COUNTS: Aug 2018 vs Aug 2016



Active rig count: Aug 3, 2018 / Change in rig count from Aug 5, 2016

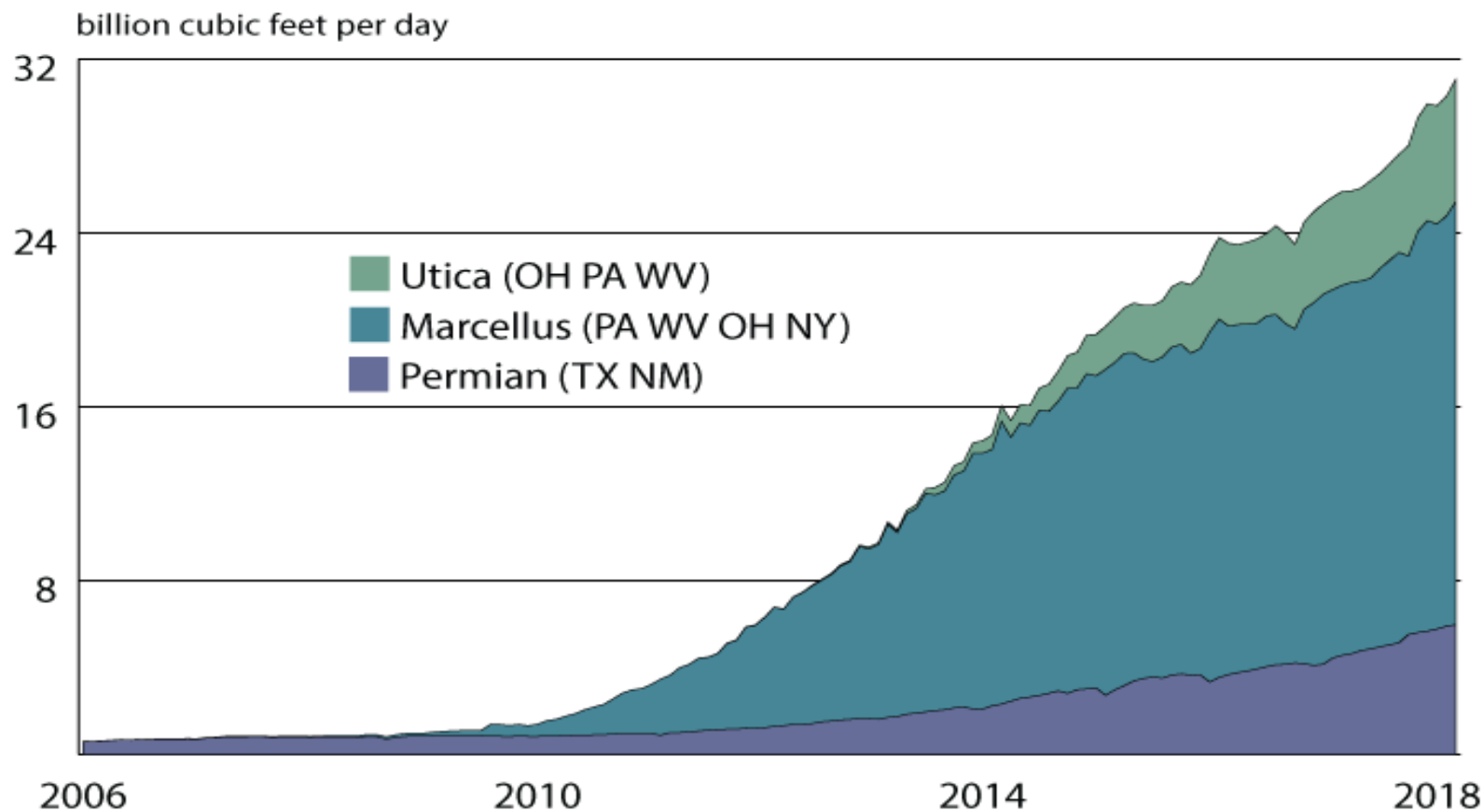
U.S. Dry Shale Gas Production



Source: EIA Natural Gas Weekly Update, 03 May 2018

©LNG Allies, 2018

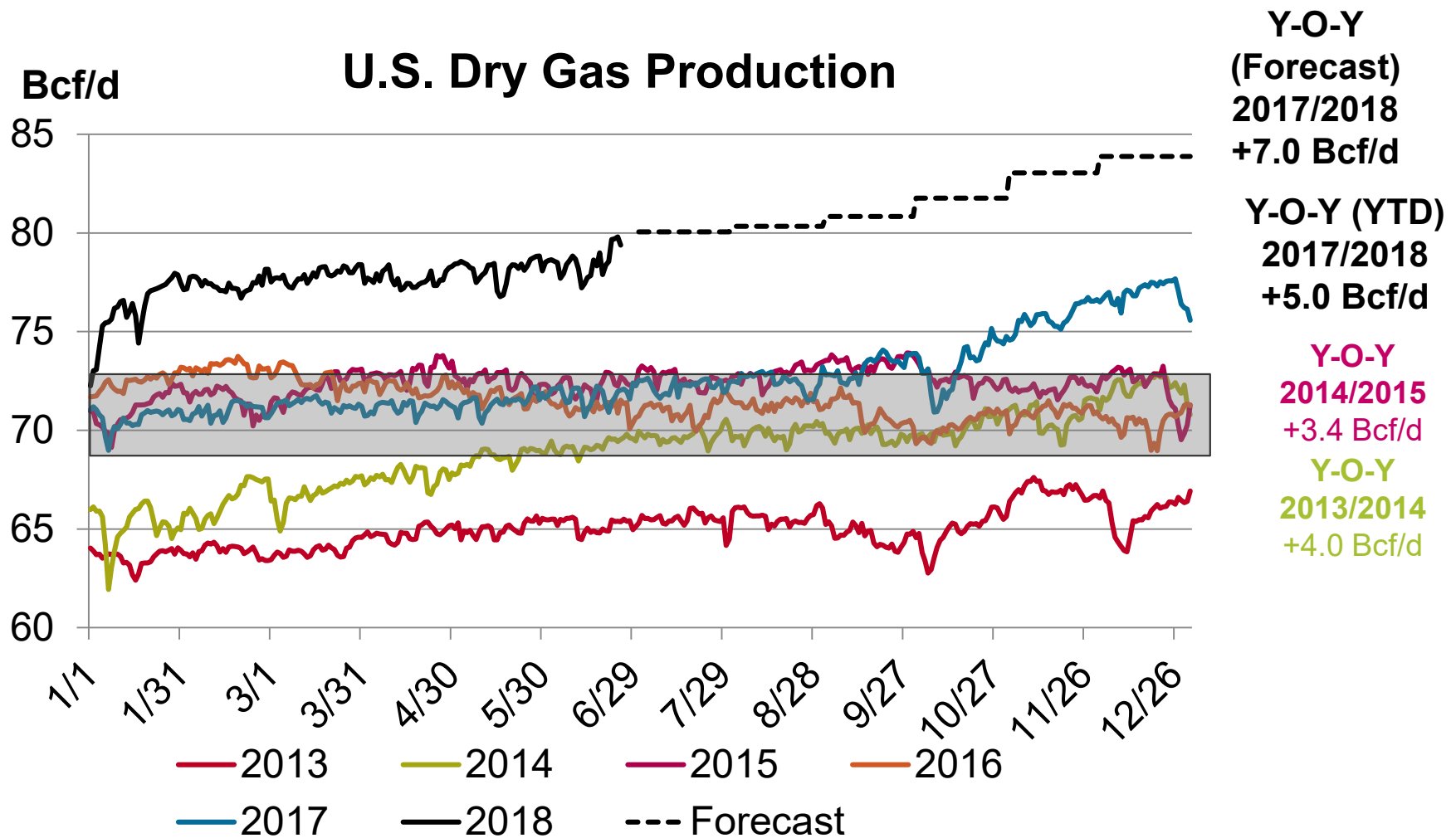
Permian, Marcellus, Utica Shale Gas Production



Source: EIA Natural Gas Weekly Update, 03 May 2018

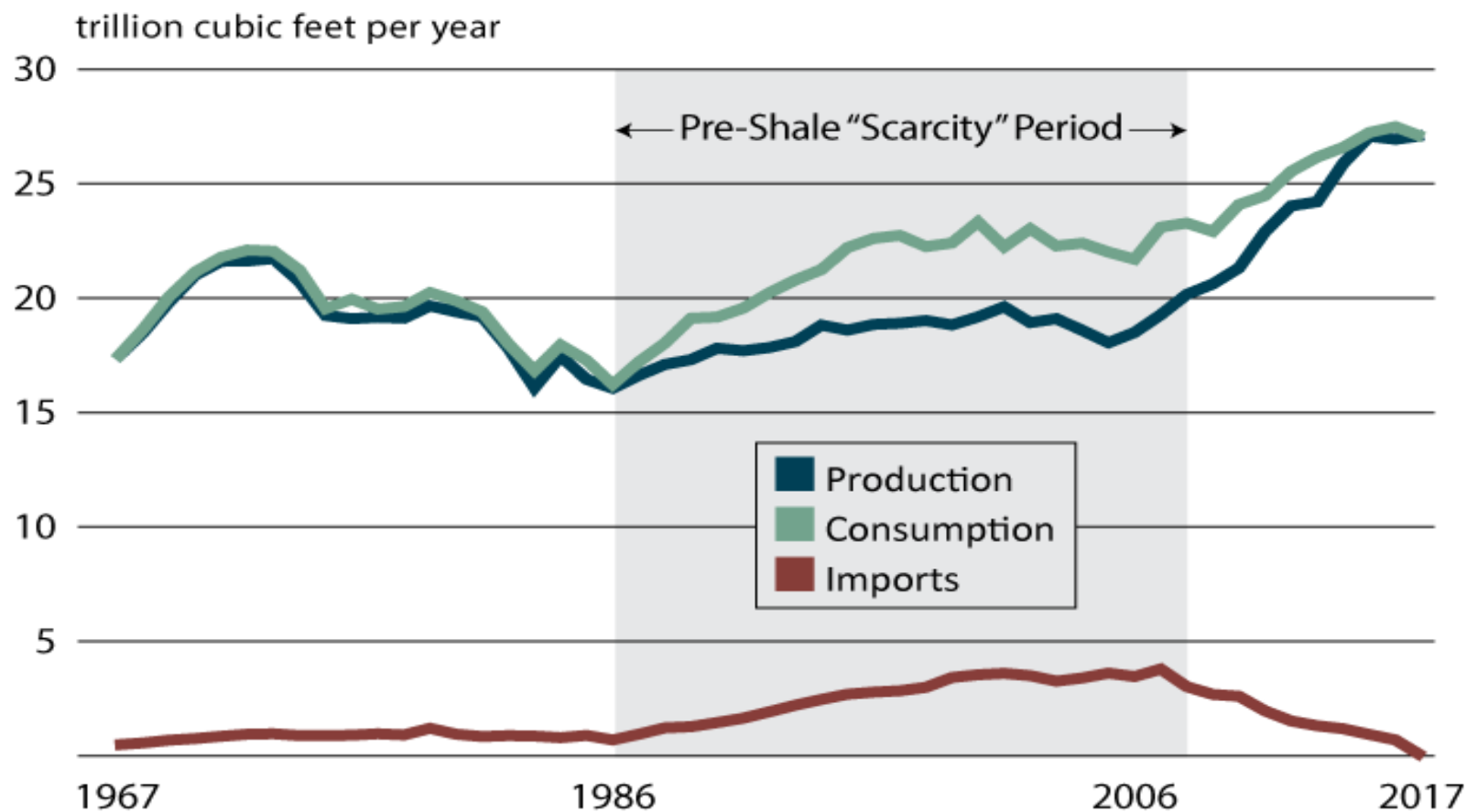
©LNG Allies, 2018

US supply growing again; largest year-over-year gain in history



Source: S&P Global Platts Analytics

U.S. Natural Gas Production, Consumption, Imports

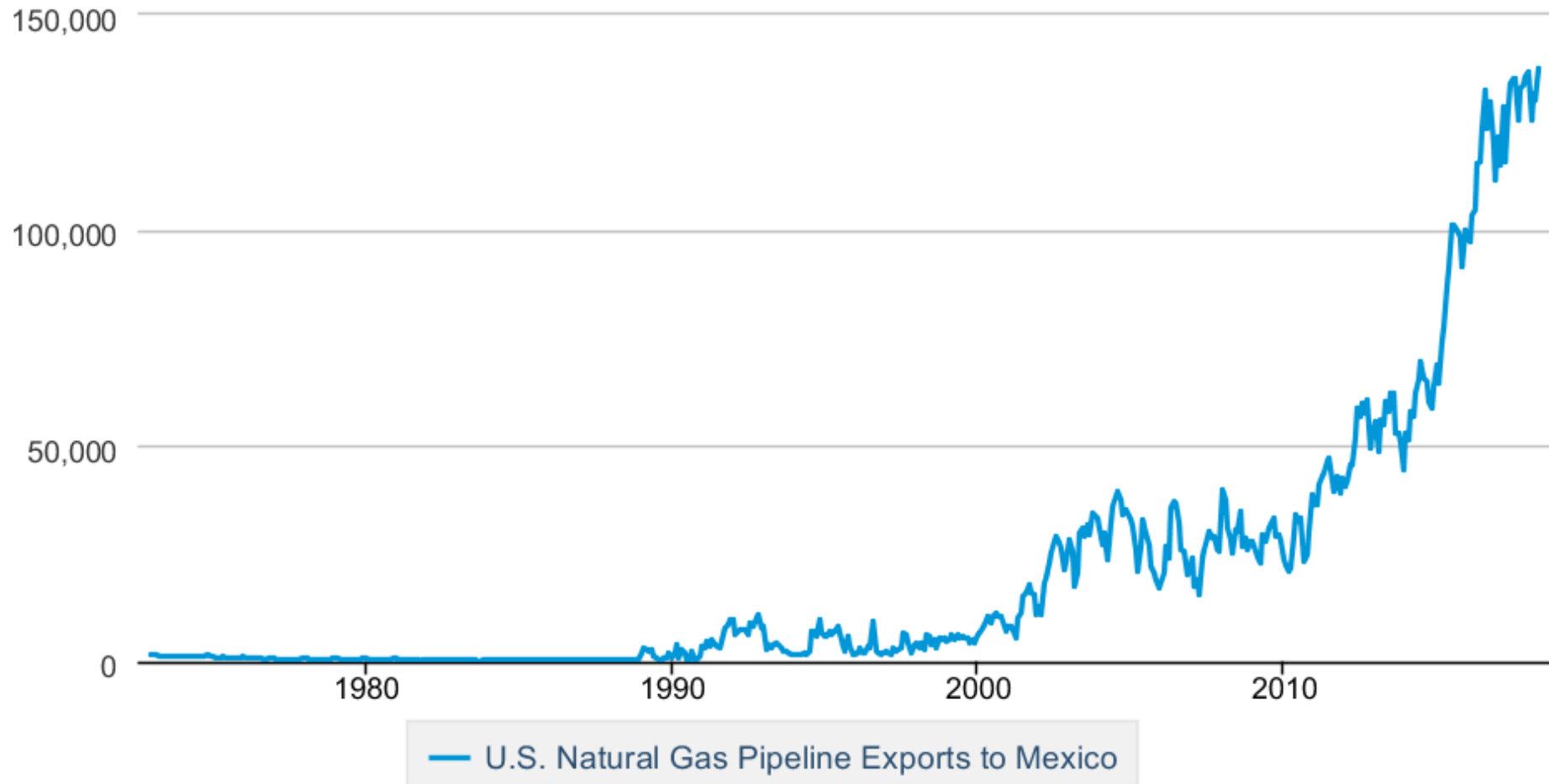


Source: EIA Annual Energy Outlook - 2018

©LNG Allies, 2018

U.S. Natural Gas Pipeline Exports to Mexico

Million Cubic Feet



Source: U.S. Energy Information Administration

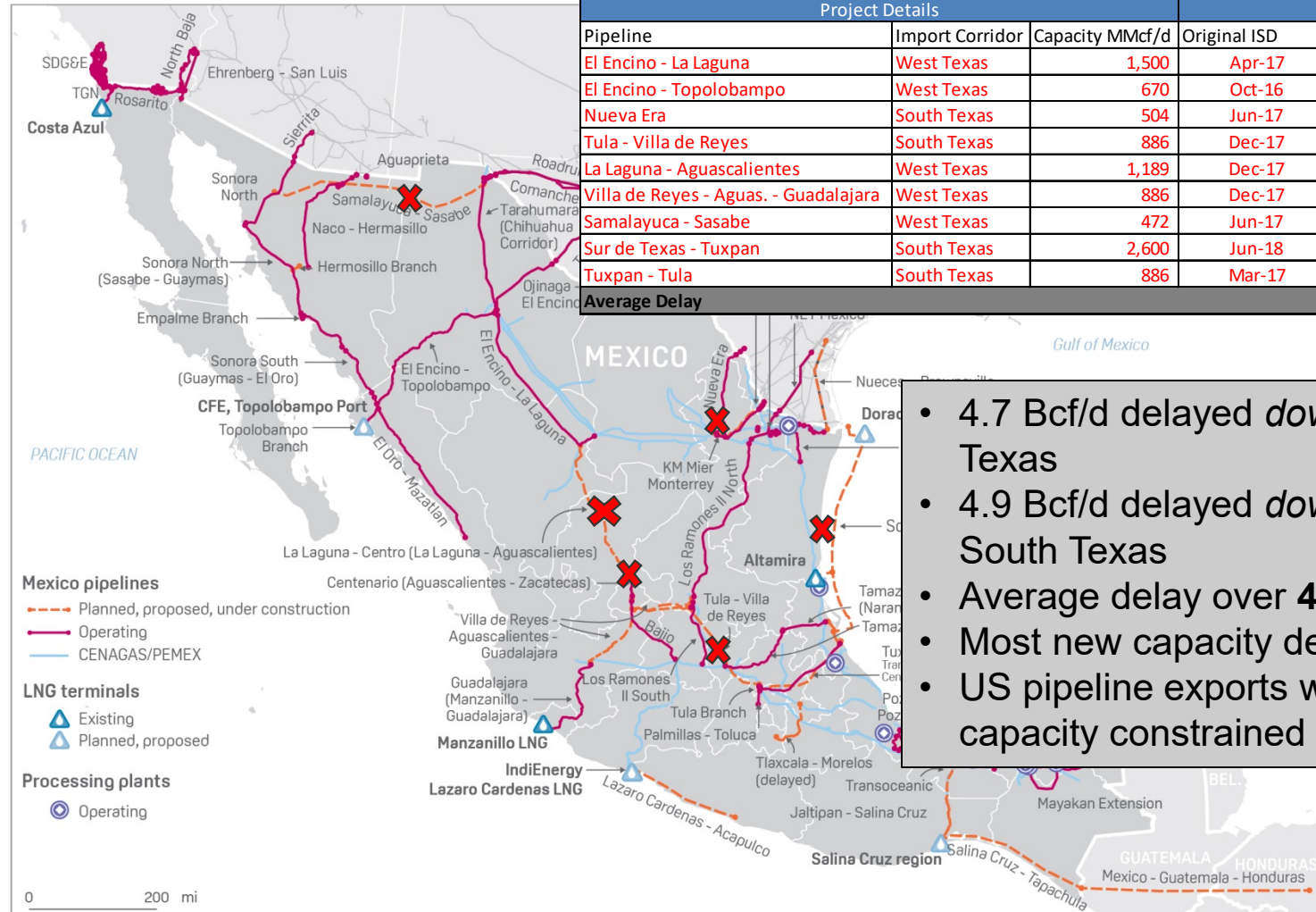


Source: www.eia.gov/dnav/ng/hist/n9132mx2m.thm accessed 08/20/2018

Major delays on Mexico's interior gas pipelines

MEXICAN NATURAL GAS PIPELINES

Mexican Pipeline Construction Tracker					
Project Details			Start Date Tracker		
Pipeline	Import Corridor	Capacity MMcf/d	Original ISD	Estimated Start 6/1/2018	Days Delayed
El Encino - La Laguna	West Texas	1,500	Apr-17	Mar-18	334
El Encino - Topolobampo	West Texas	670	Oct-16	Jun-18	608
Nueva Era	South Texas	504	Jun-17	Dec-18	548
Tula - Villa de Reyes	South Texas	886	Dec-17	Jul-18	212
La Laguna - Aguascalientes	West Texas	1,189	Dec-17	Nov-18	335
Villa de Reyes - Aguas. - Guadalajara	West Texas	886	Dec-17	Nov-18	335
Samalayuca - Sasabe	West Texas	472	Jun-17	Nov-18	518
Sur de Texas - Tuxpan	South Texas	2,600	Jun-18	Oct-18	122
Tuxpan - Tula	South Texas	886	Mar-17	Dec-19	1,005
Average Delay					460

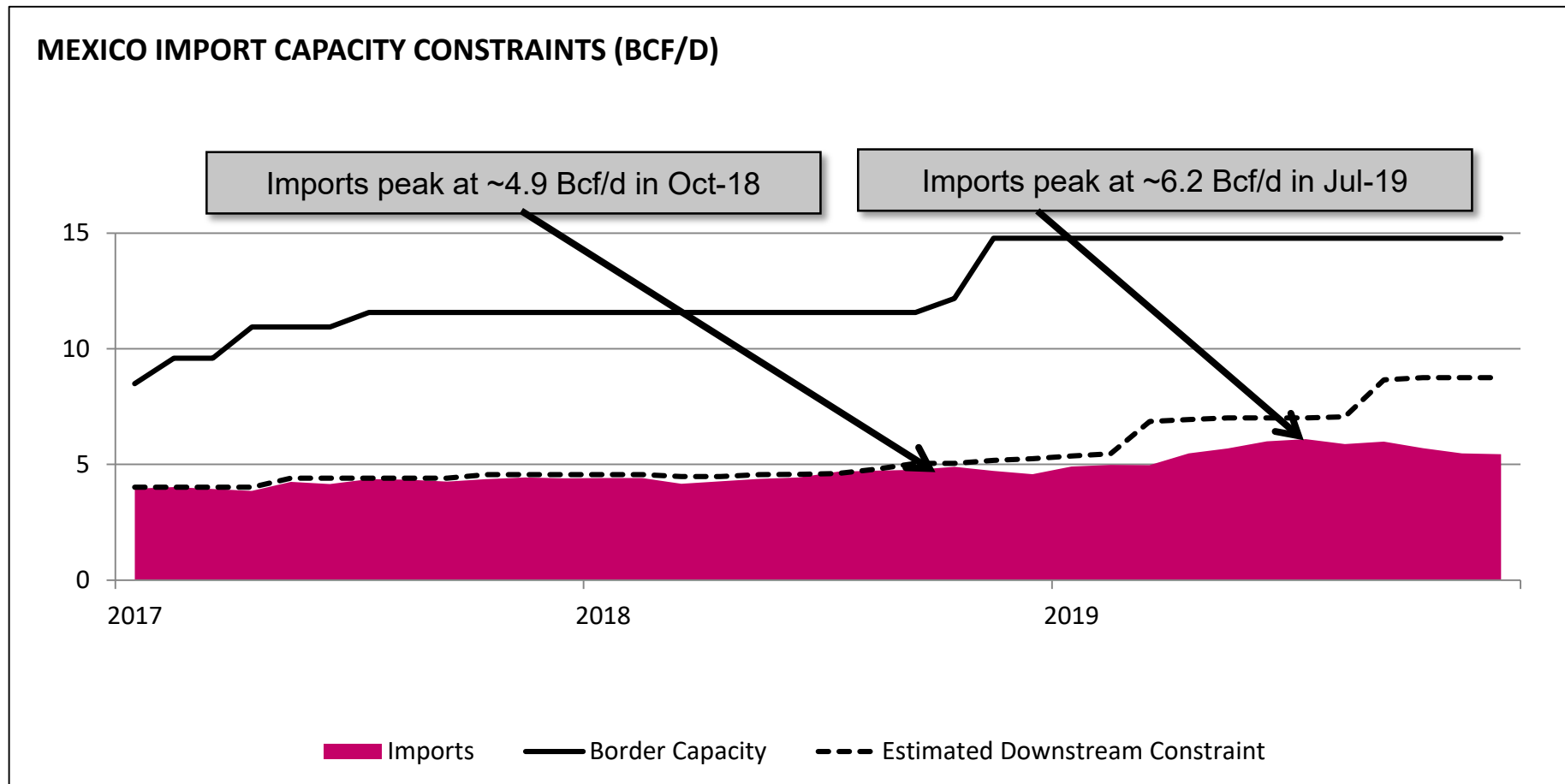


- 4.7 Bcf/d delayed *downstream* of West Texas
- 4.9 Bcf/d delayed *downstream* of South Texas
- Average delay over **400 days**
- Most new capacity delayed past 2018
- US pipeline exports will remain capacity constrained until 2019

Source: S&P Global Platts Analytics

Source: SENER, S&P Global Platts Analytics

Downstream constraints alleviated in 2019



Source: S&P Global Platts Analytics

Permitting Status of U.S. LNG Export Projects

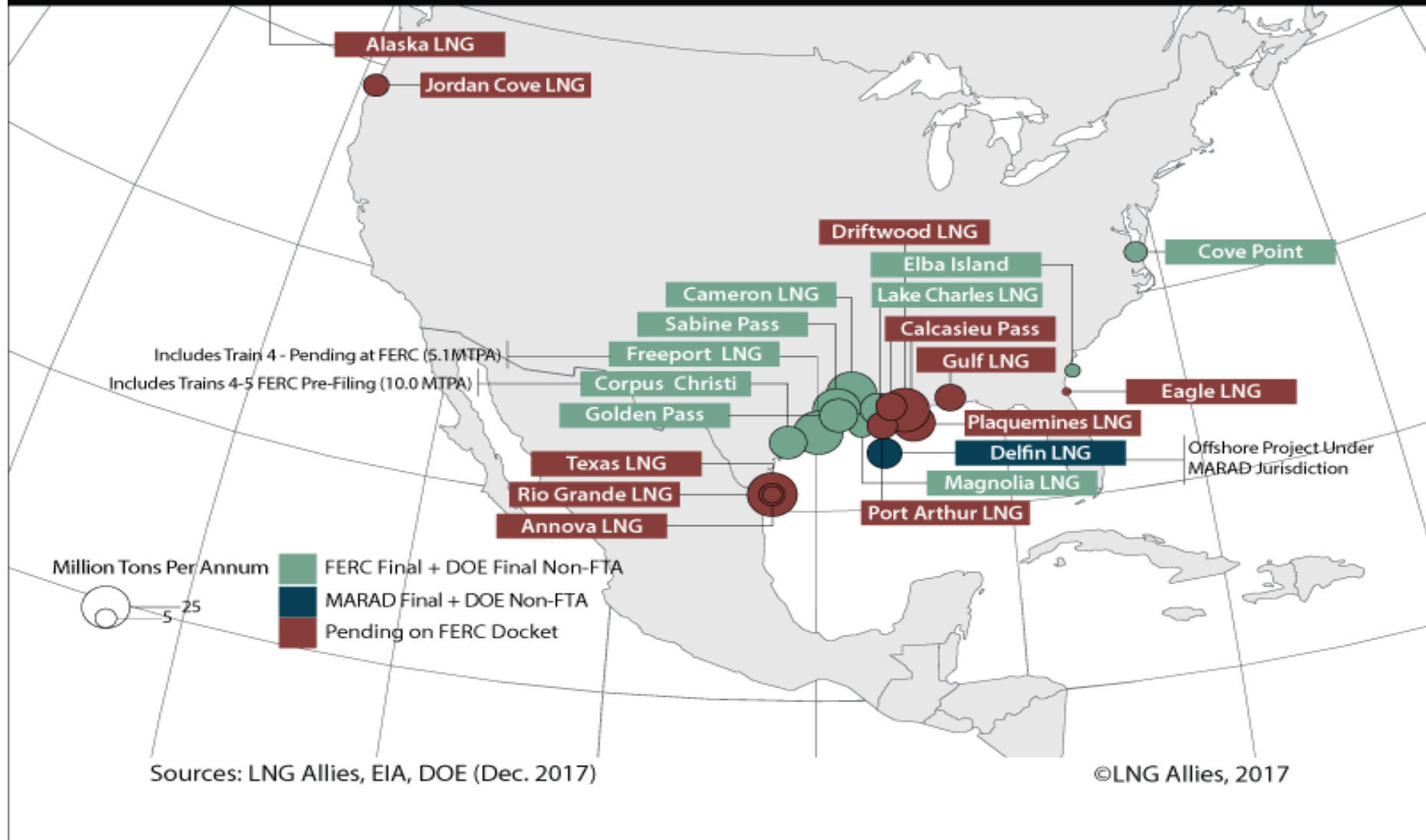
Project Stage	Projects	MTPA	Bcm/yr	Bcf/day
Operating / Under Construction	6	70.9	97.7	10.0
Fully Permitted (Major Projects)	4	68.9	95.0	9.7
Fully Permitted (Small Projects)	N/A	9.0	12.4	1.3
Formal FERC Review	11	146.9	202.6	20.9
FERC Pre-Filing	2	24.0	33.1	3.3
Total	23	310.7	428.5	44.0

Notes: (1) Projects = individual projects. (2) Additional trains for existing projects not included in the project count, but in the MTPA, Bcm/year, and Bcf/day totals (Sabine Pass #6, Corpus Christi #3, Cameron #4 #5, Freeport #4).

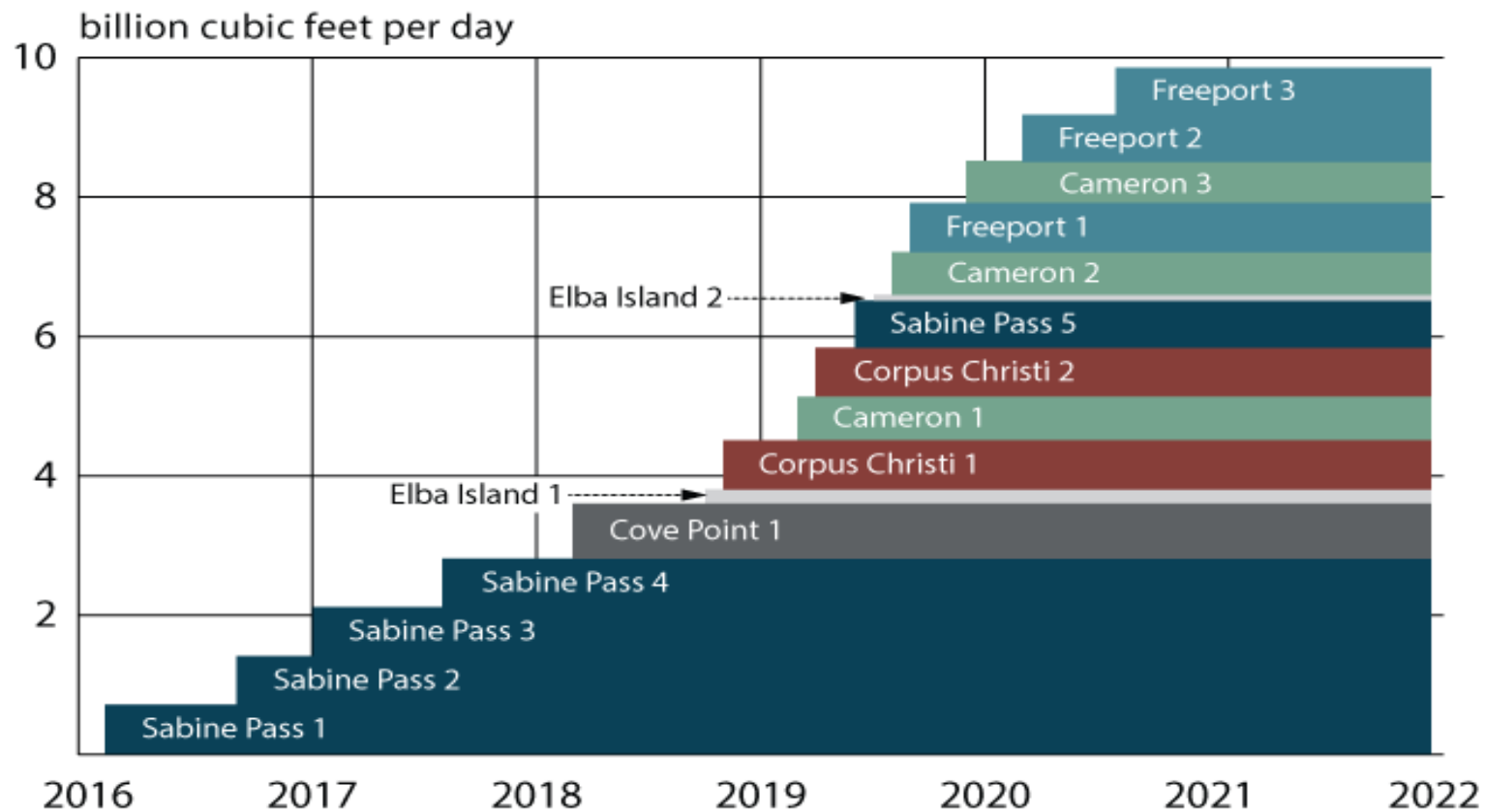
Source: Federal Energy Regulatory Commission & LNG Allies (17 April 2018)

©LNG Allies, 2018

Major U.S. LNG Export Projects - Existing & Proposed



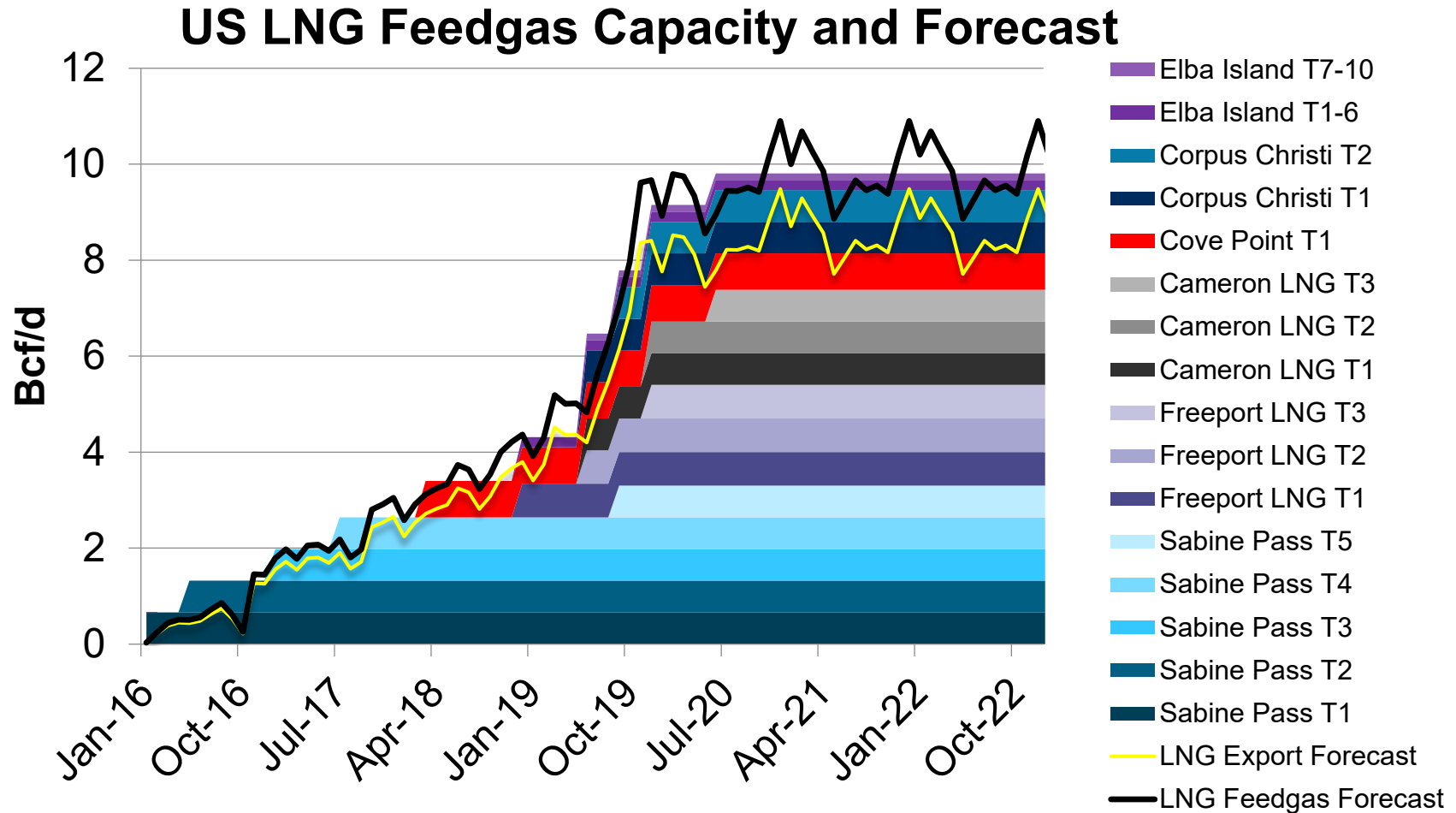
U.S. LNG Liquefaction Capacity Growth



Source: LNG Allies (Based on Trade Press & Company Data)

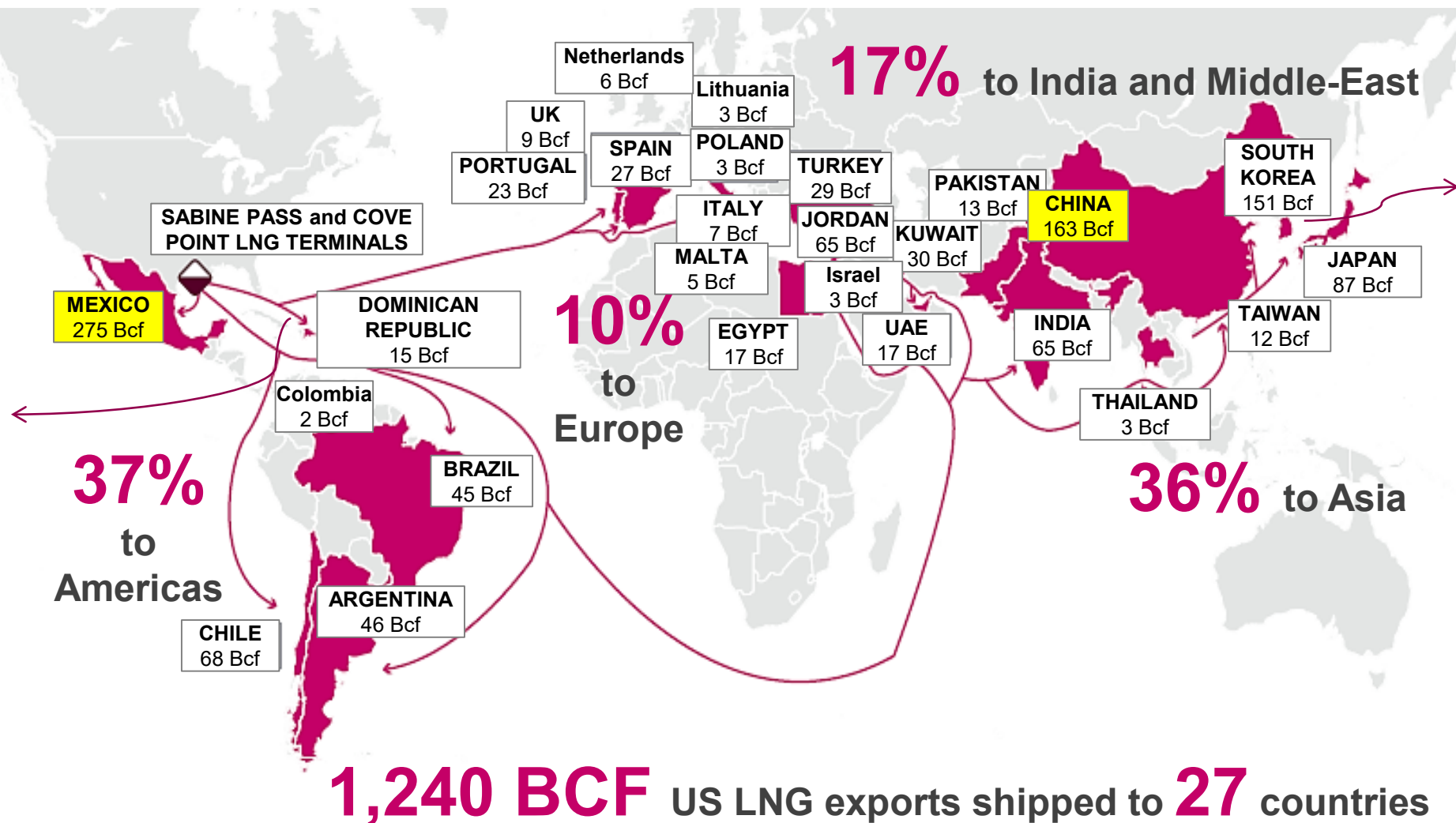
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High Utilization of US LNG Expected to Persist



Source: S&P Global Platts Analytics

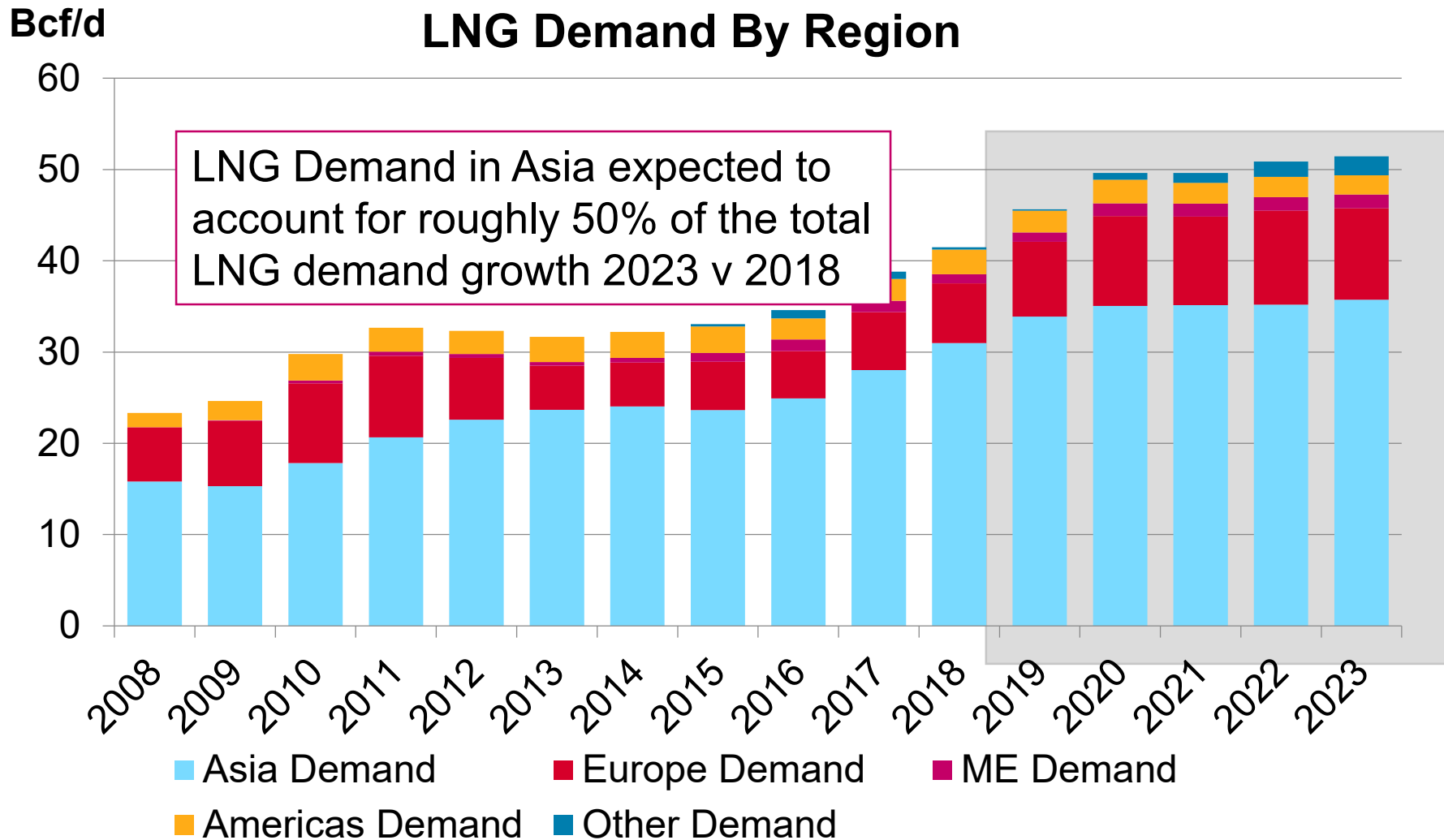
Latin America and Asia main markets US LNG



*Numbers may not add up to 100% due to rounding

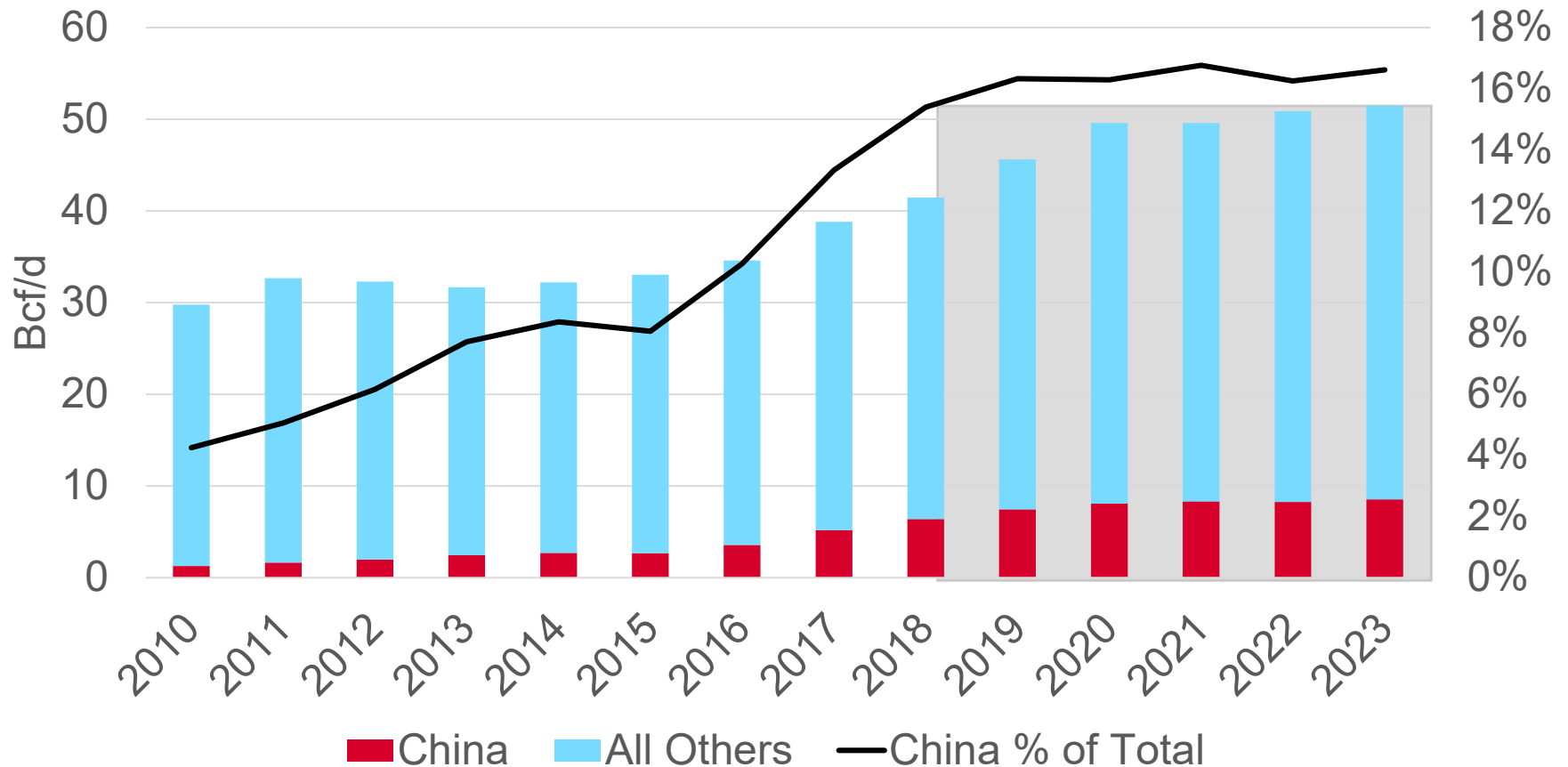
Source: S&P Global Platts Analytics

Asia Clearly Driving LNG Demand



Source: S&P Global Platts Analytics

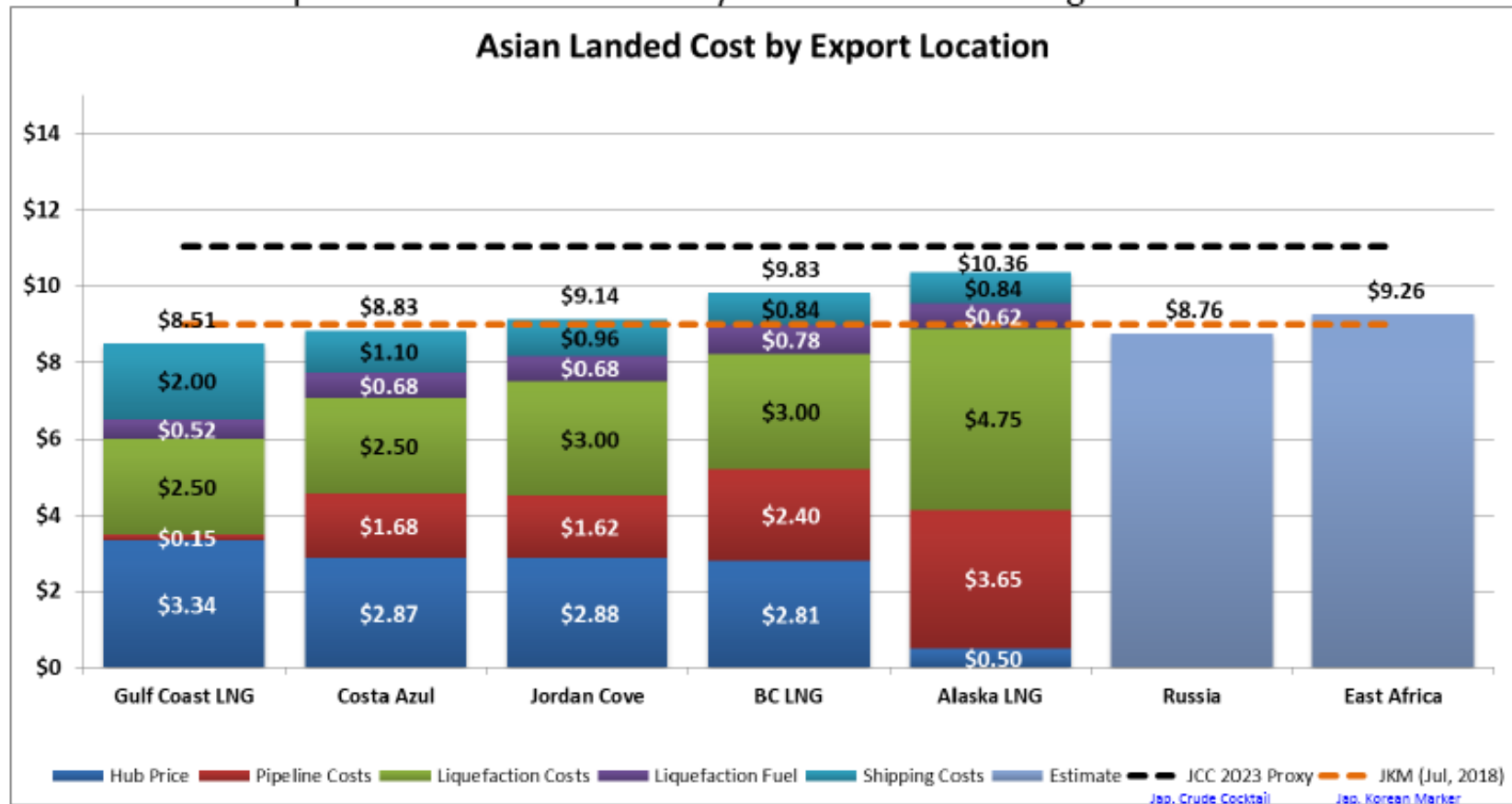
China almost 30% of growth in global LNG demand (2018 to 2023)



Source: S&P Global Platts Analytics

North America LNG Outlook

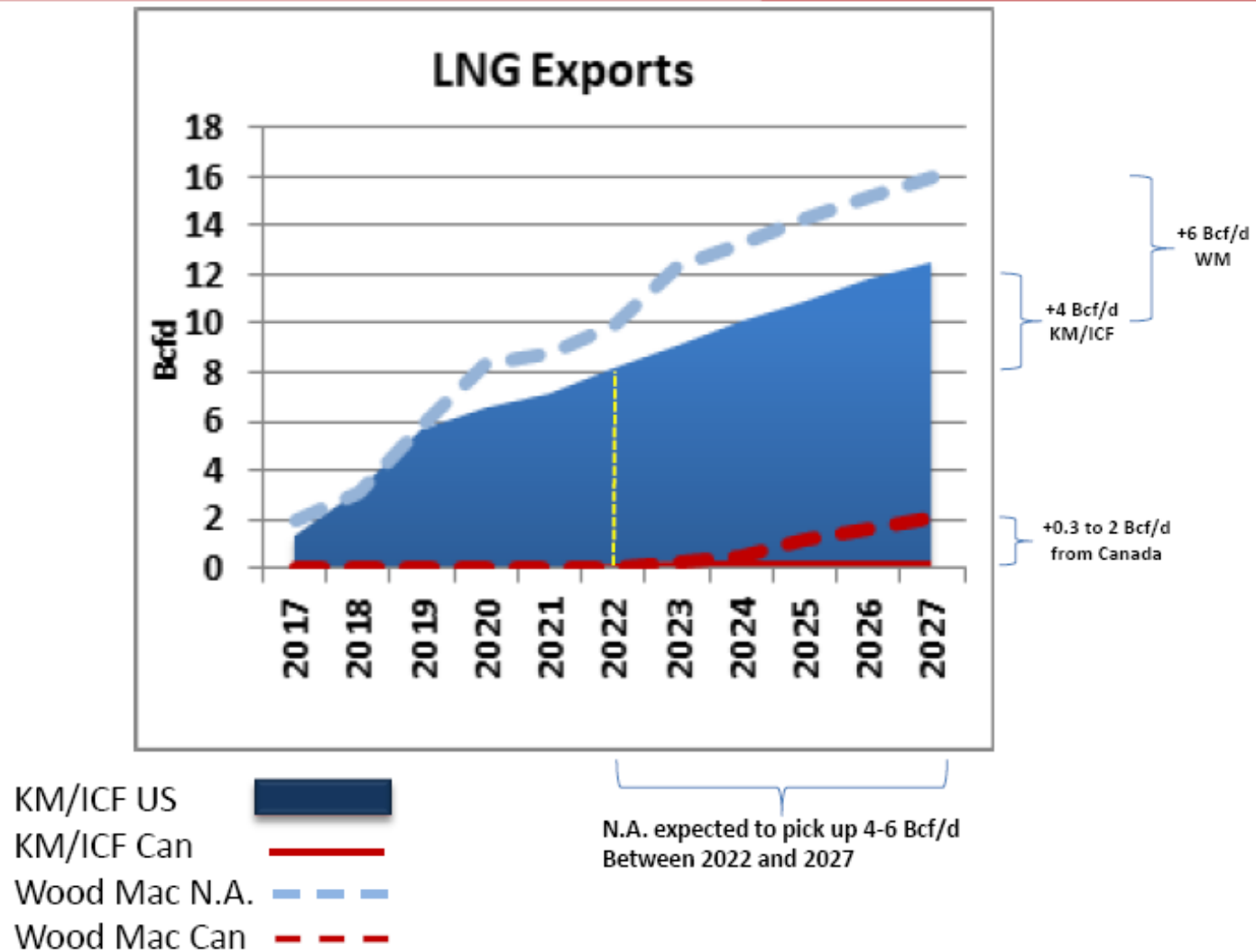
- North America LNG supply competitive with rest of world for delivery to Asia
- Deliveries to Europe are competitive but margins are thinner
- Cost competitiveness is not the only factor in determining market share



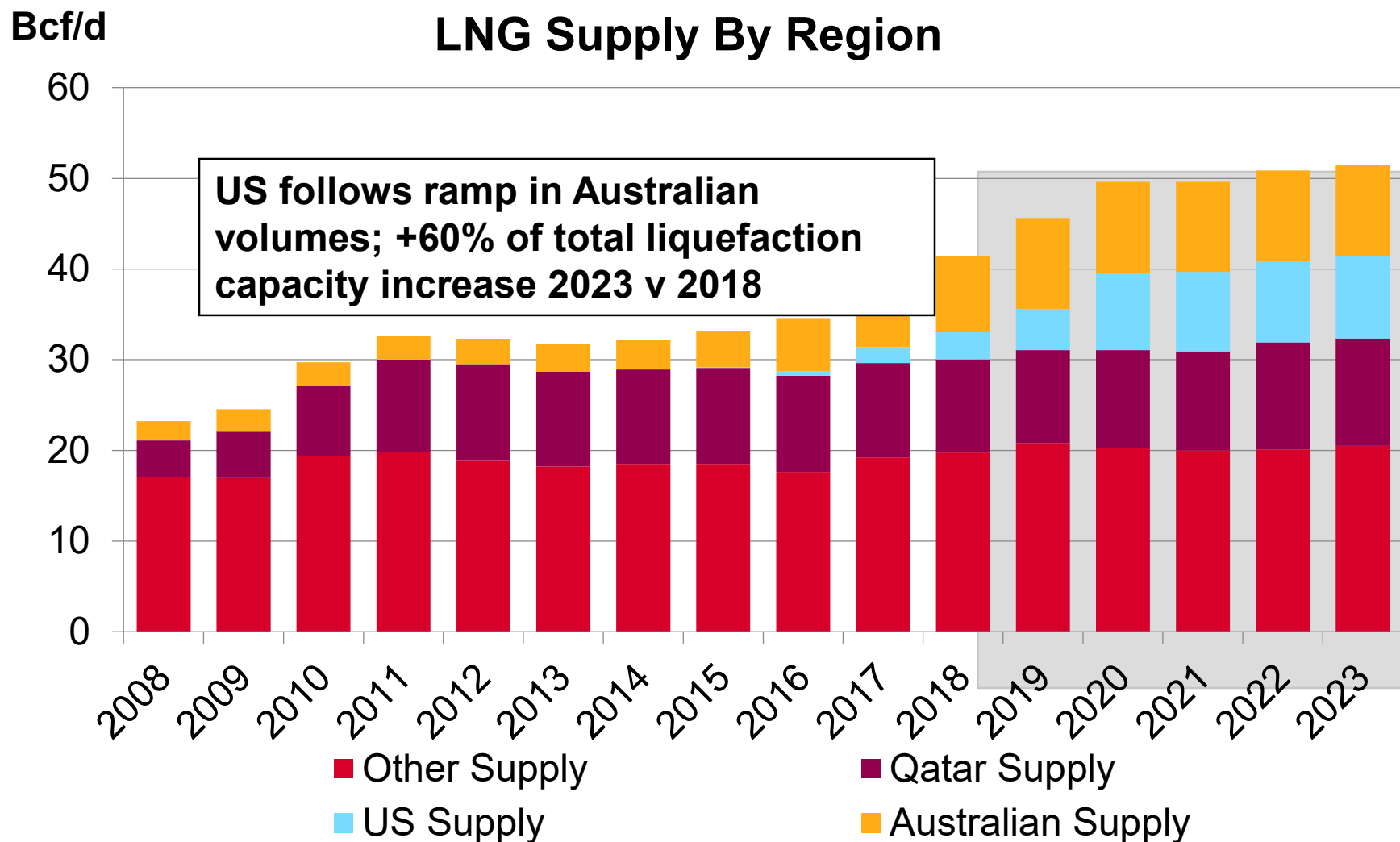
Note: Landed cost components are based on projected average 2023 prices.

SOURCE: Platts Gas/LNG Daily, KM Analysis

Projected Net North America LNG Exports

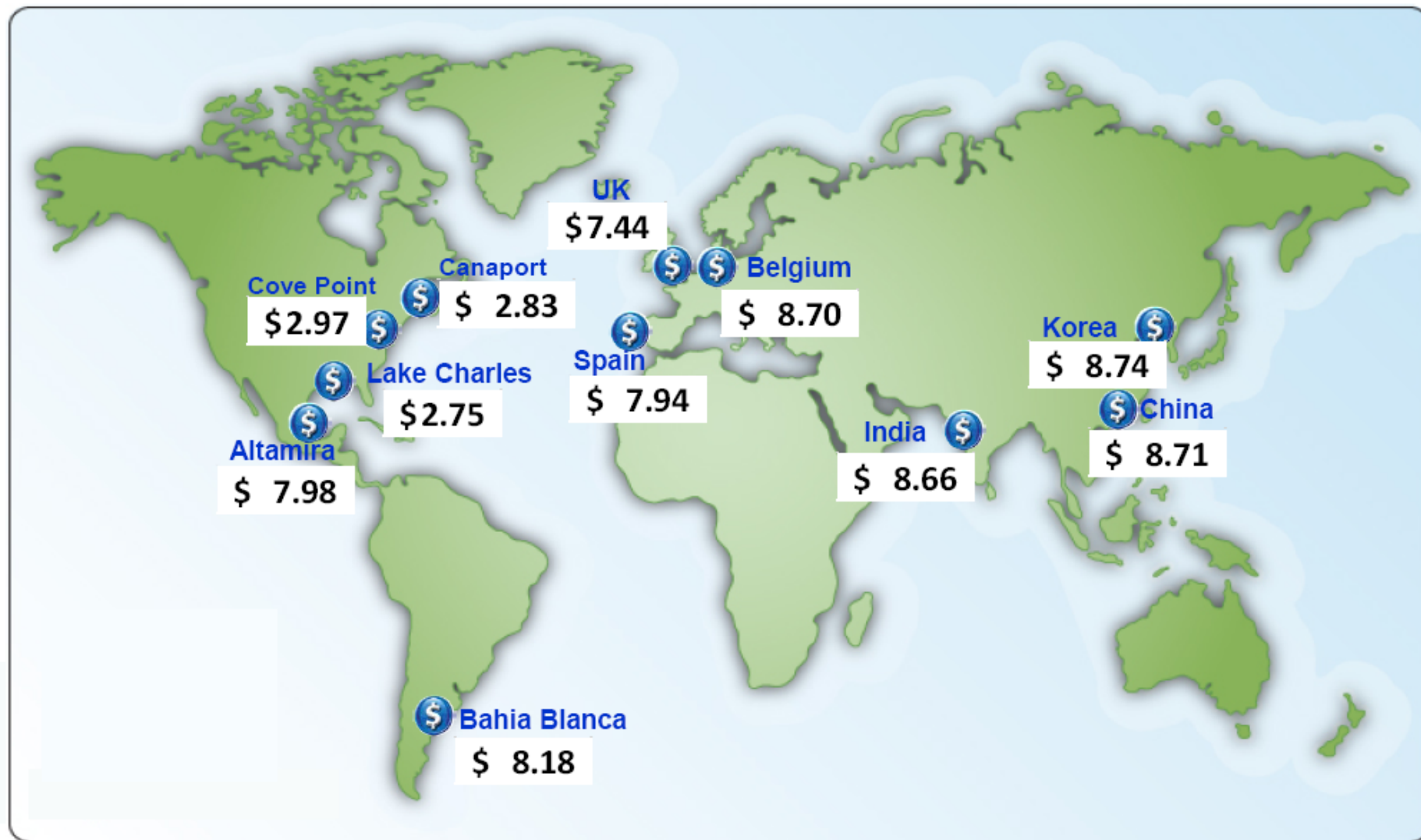


Global Supply Concentrate to Three Players



Source: S&P Global Platts Analytics

World LNG Estimated Landed Prices: May-18

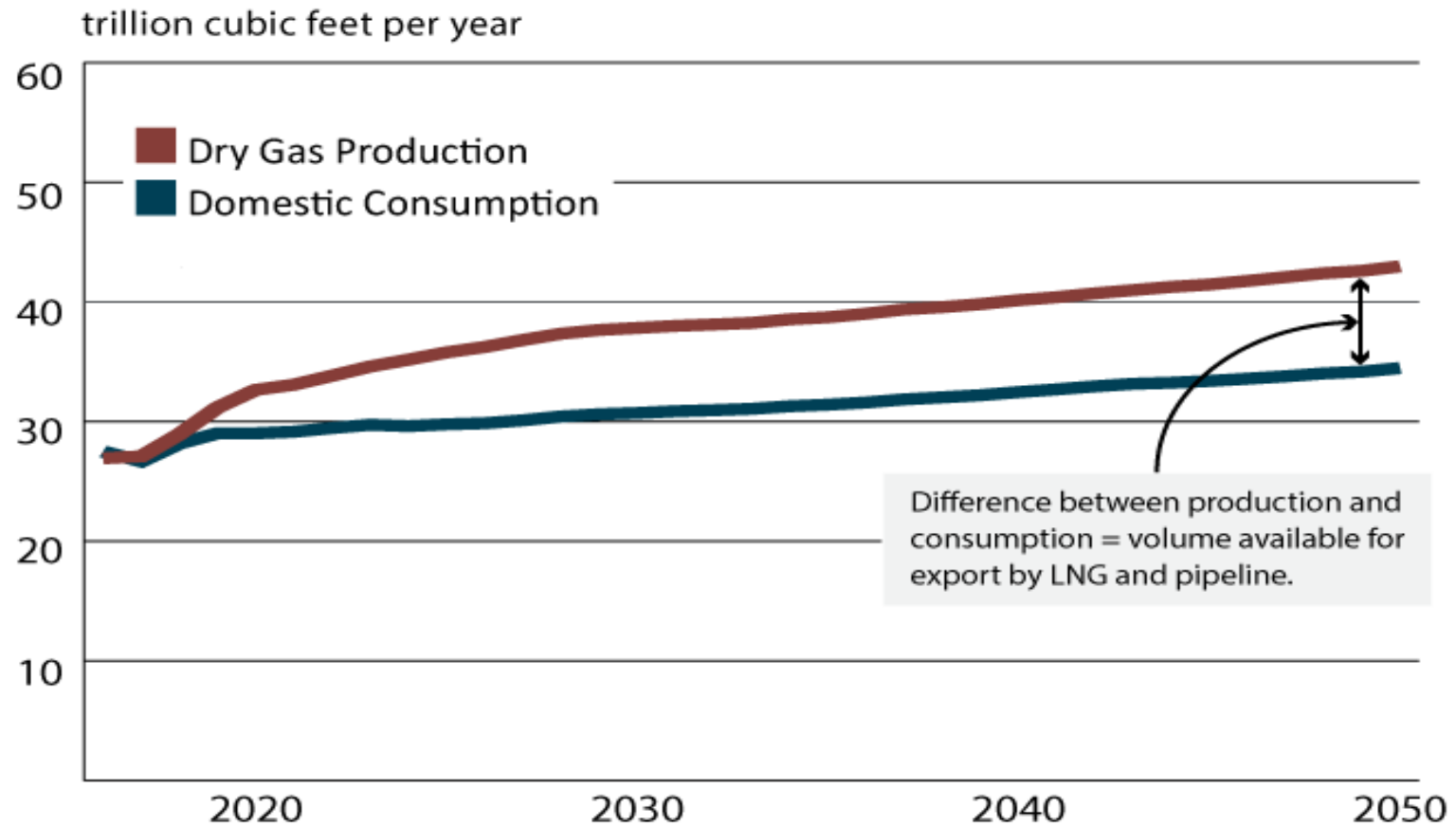


Source: Waterborne Energy, Inc. Data in \$US/MMBtu.

Note: Includes information and Data supplied by IHS Global Inc. and its affiliates ("IHS"); Copyright (publication year) all rights reserved. Prices are the monthly average of the weekly landed prices for the listed month. Landed prices are based on a netback calculation.

Updated: Jun-18

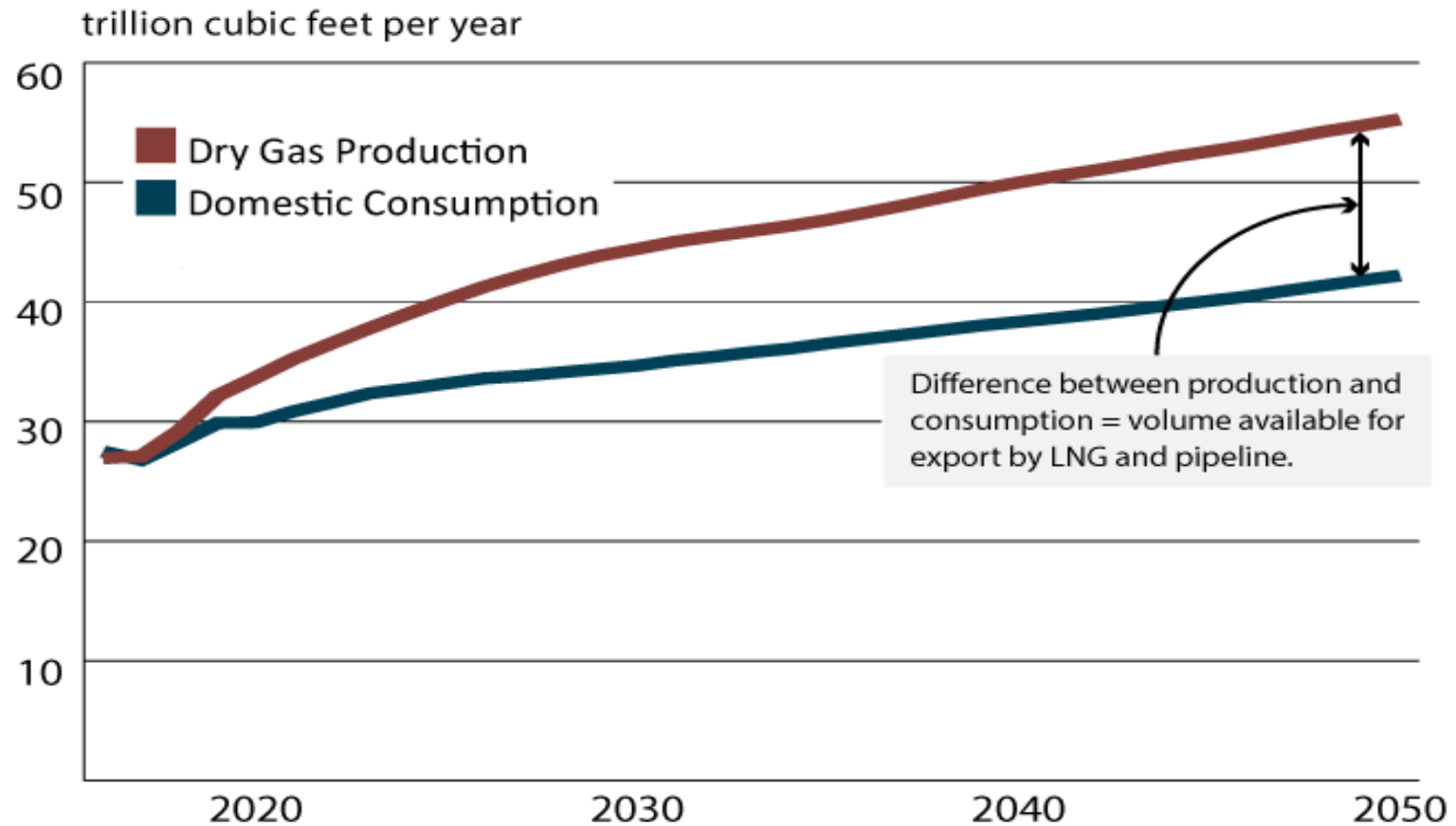
U.S. Natural Gas Production and Consumption



Source: EIA Annual Energy Outlook 2018 (Reference Case)

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U.S. Natural Gas Production and Consumption

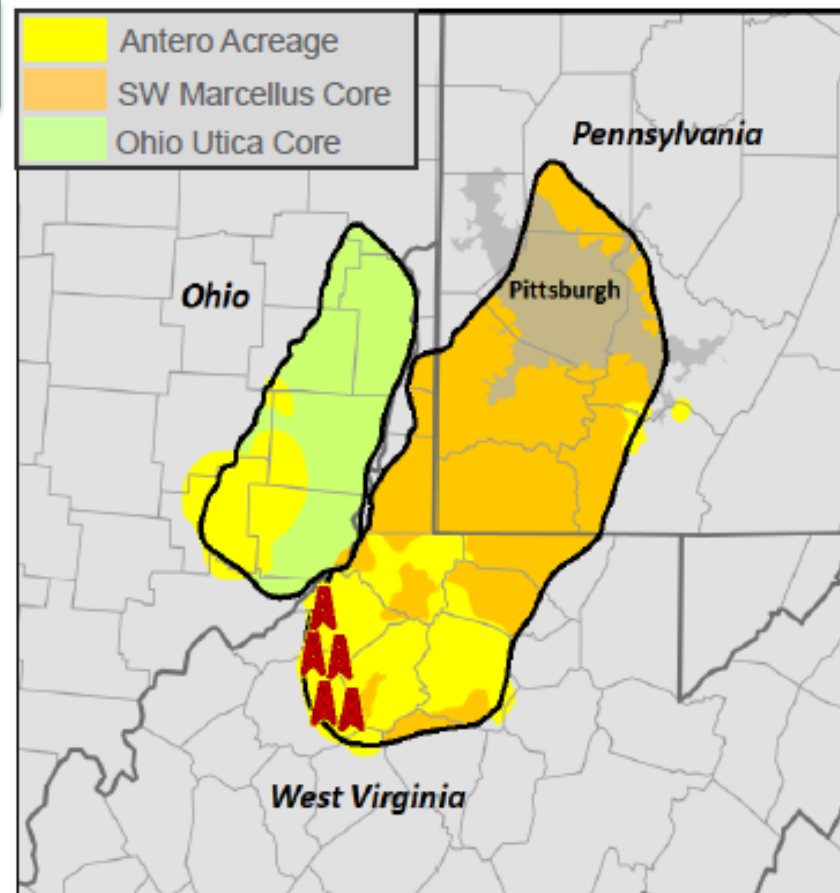


Source: EIA Annual Energy Outlook 2018 (High Oil & Gas Case)

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Antero Resources Profile

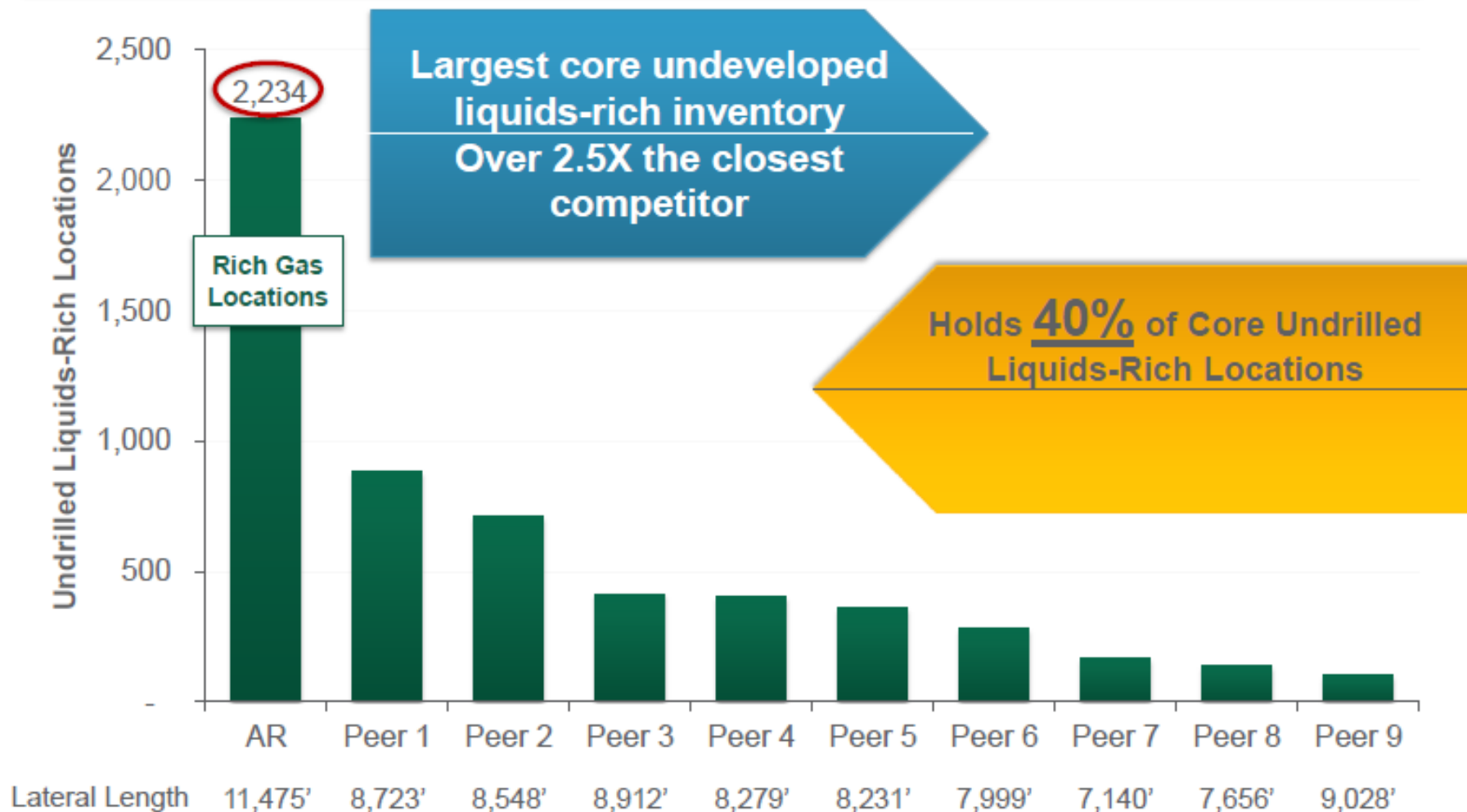
Market Cap.....	\$5.0B
Enterprise Value.....	\$9.0B
Corporate Debt Ratings.....	Ba2 / BB+ / BBB-
Stand-Alone Debt/Adj. EBITDAX	2.5x
Net Production (2018E).....	2.7 Bcfe/d
Liquids.....	130,000 Bbl/d
3P Reserves.....	54.6 Tcfe
C2+ NGLs ⁽¹⁾	2,131 MMBbls
Condensate.....	131 MMBbls
Net Acres.....	620,000
Core Drilling Locations.....	3,295
Hedge Mark to Market.....	\$1.2B
AR Midstream Ownership (53%)	\$2.9B



AR
LISTED
NYSE

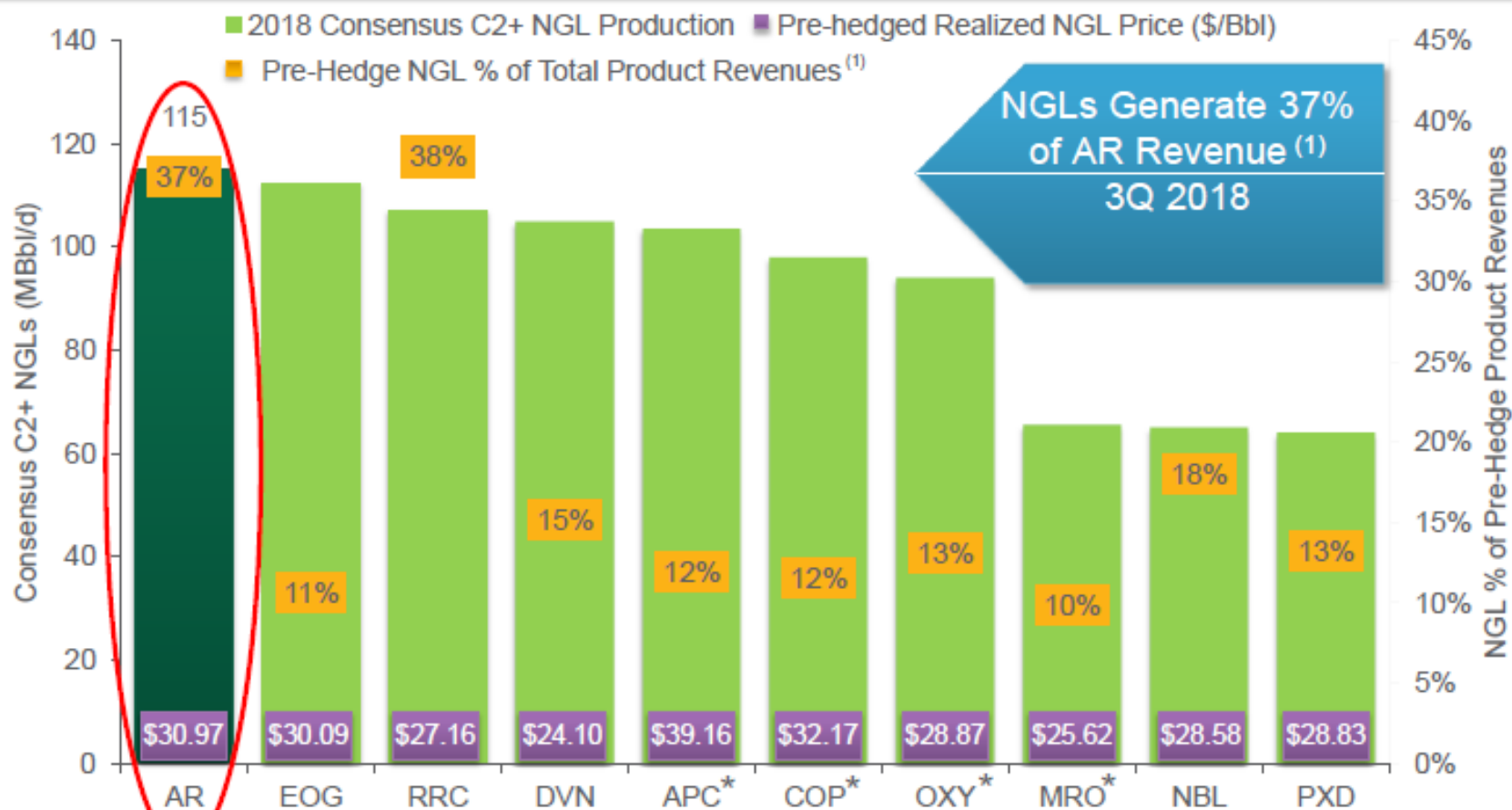
Note: Equity market data as of 10/31/18. Balance sheet data, hedge mark to market as of 9/30/18. Reserves as of 12/31/2017. Enterprise value excludes AM net debt. See 2018 Guidance in Appendix.
(1) C2+ 3P Reserves contain 1,318 MMBbls of C3+ NGLs and 812 MMBbls of ethane. Assumes approximately 31% ethane recovery leaving 1,608 MMBbls of ethane in the natural gas stream.

Largest Undrilled Core Liquids-Rich Inventory⁽¹⁾



⁽¹⁾ Based on Antero analysis of undeveloped acreage in the core of the Marcellus and Utica plays. Peers include Ascent, CHK, CNX, CVX, EQT, GPOR, HG, RRC and SWN.

Top NGL Producers in the U.S.



Antero Delivers Highest Exposure to Rising NGL Prices

Source: Bloomberg consensus, SEC filings and company press releases.

Note: Volumes represent consensus as of 10/31/2018. 3Q 2018 realized prices are weighted average including ethane (C2) where applicable. DVN, MRO, OXY and PXD percent revenue and realized prices represent 2Q 2018 actuals.

(1) 3Q 2018 actual NGL revenue percentage based on unhedged product revenue.

* Denotes consensus inclusive of international NGL production.

Appalachia: Geographic & Infrastructure NGL Advantaged

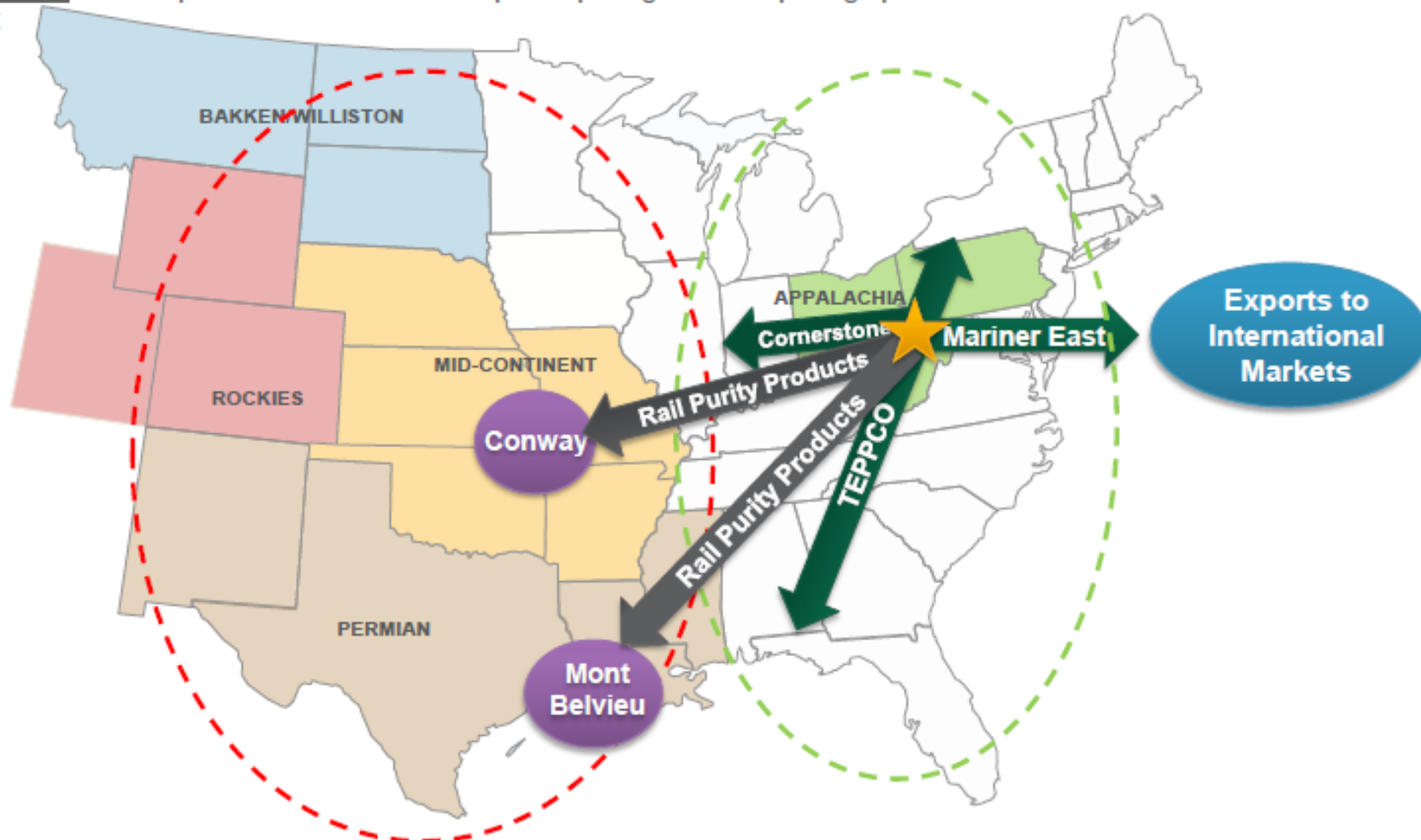


Permian, Rockies, Mid-Continent & Bakken

- ✗ Transport Y-grade for out-of-basin fractionation at Mont Belvieu and Conway
- ✗ Severely constrained fractionation, Y-grade transportation and NGL storage capacity
- ✗ Rapidly rising spot fractionation fees
- ✗ Midstream controls product destination and captures pricing uplift

Appalachia

- ✓ In-basin fractionation
- ✓ Transport marketable purity products out-of-basin
- ✓ Sufficient fractionation capacity
- ✓ Fixed fractionation fees
- ✓ Producer controls product destination and captures pricing uplift



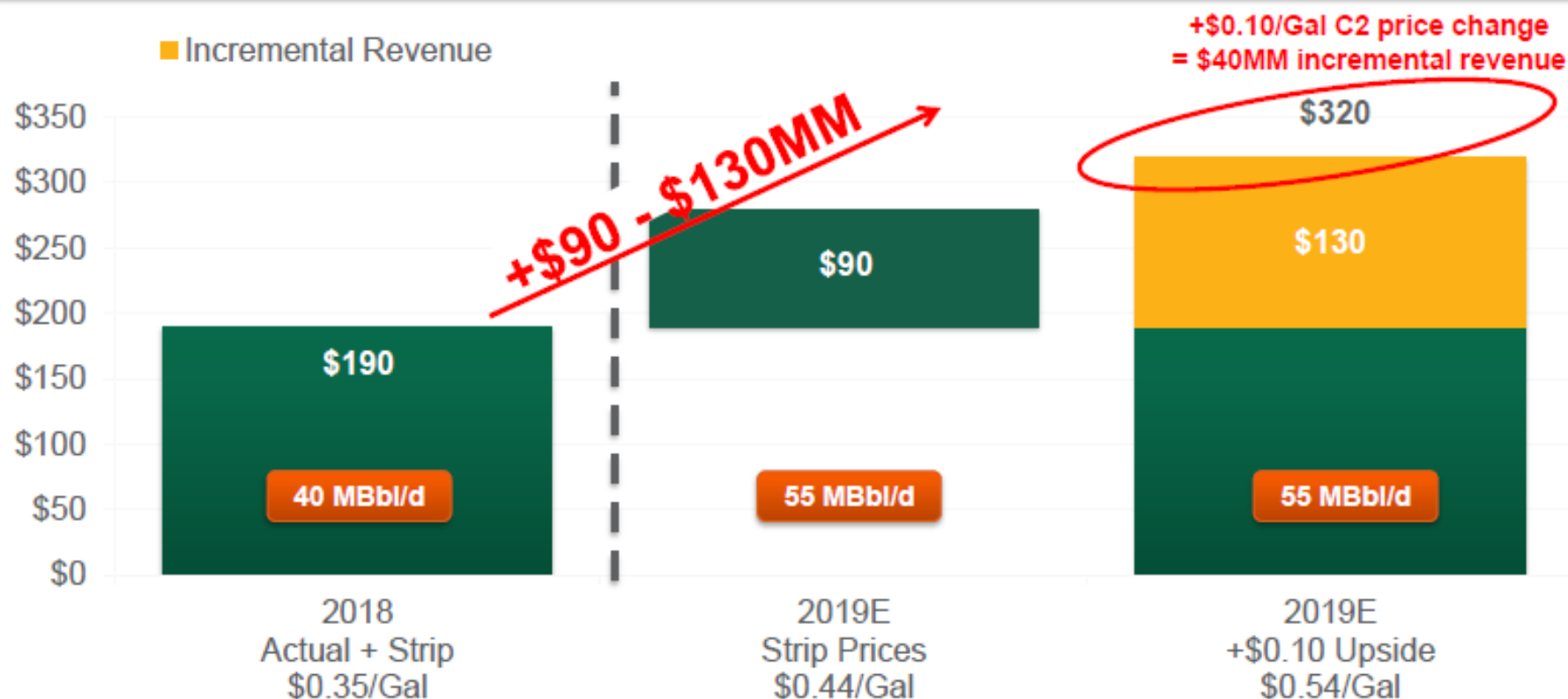
Antero's Ethane Exposure: All Upside



Antero's ethane has a natural gas pricing "floor" and purity ethane "ceiling"; increases in ethane purity prices are all upside

Antero's balanced approach to ethane sales results in 50% of contracts tied to purity ethane prices vs. natural gas value

Ethane Revenue Uplift (\$MM)



Ethane sensitivity: $+\$0.10/\text{gallon} \times 2019 \text{ production target} \times \sim 50\% \text{ exposure to Mt. Belvieu} = \sim \$40\text{MM incremental 2019 ethane revenue}$

Note: Forward prices use strip as of 9/30/2018. Ethane prices reflect realized price to Antero and assume \$(0.05)/gallon discount to Mt. Belvieu prices based on 2018 Antero guidance. 2019 volumes are assumptions only, based on ME2 in-service and an increase in de-eth capacity expected to come on-line in 4Q18.

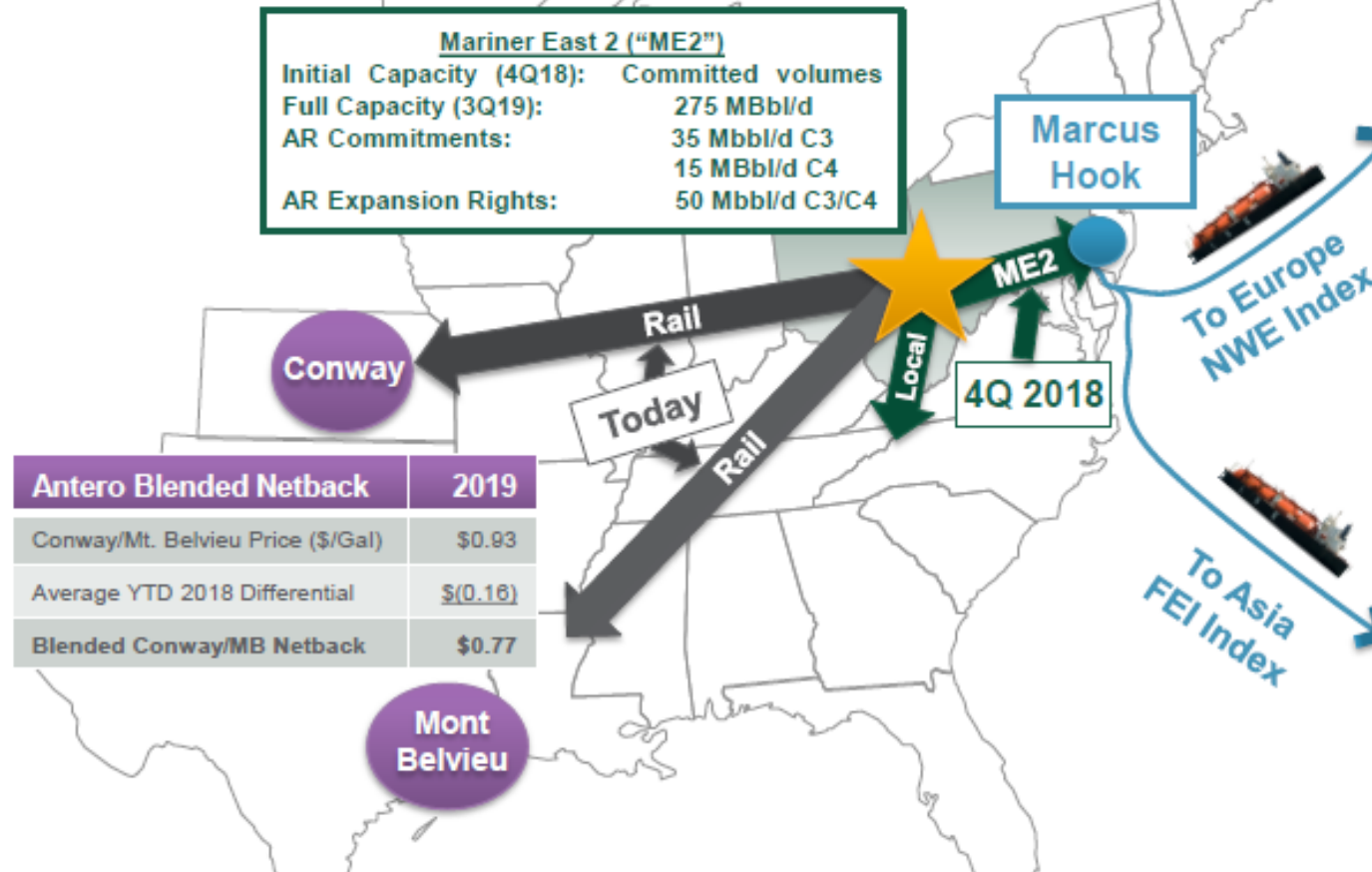
Antero's NGL Pricing Uplift from Mariner East 2

Mariner East 2 will allow AR to access international LPG markets and realize a ~\$5.88/Bbl uplift on its exported barrels

50,000 Bbl/d Mariner East 2 commitment equates to over \$107 MM of incremental annual cash flow

Domestic Markets

International Markets



Source: Poten Partners. Prices reflect blended price of propane and butane based on Antero's ME2 volume commitment.
 Note: Based on Baltic forward shipping rates and propane strip prices as of 09/30/18. Includes associated port and canal fees and charges.
 (1) Based on Wall Street research. Antero cost may be lower.

41% | 43% Lower Costs

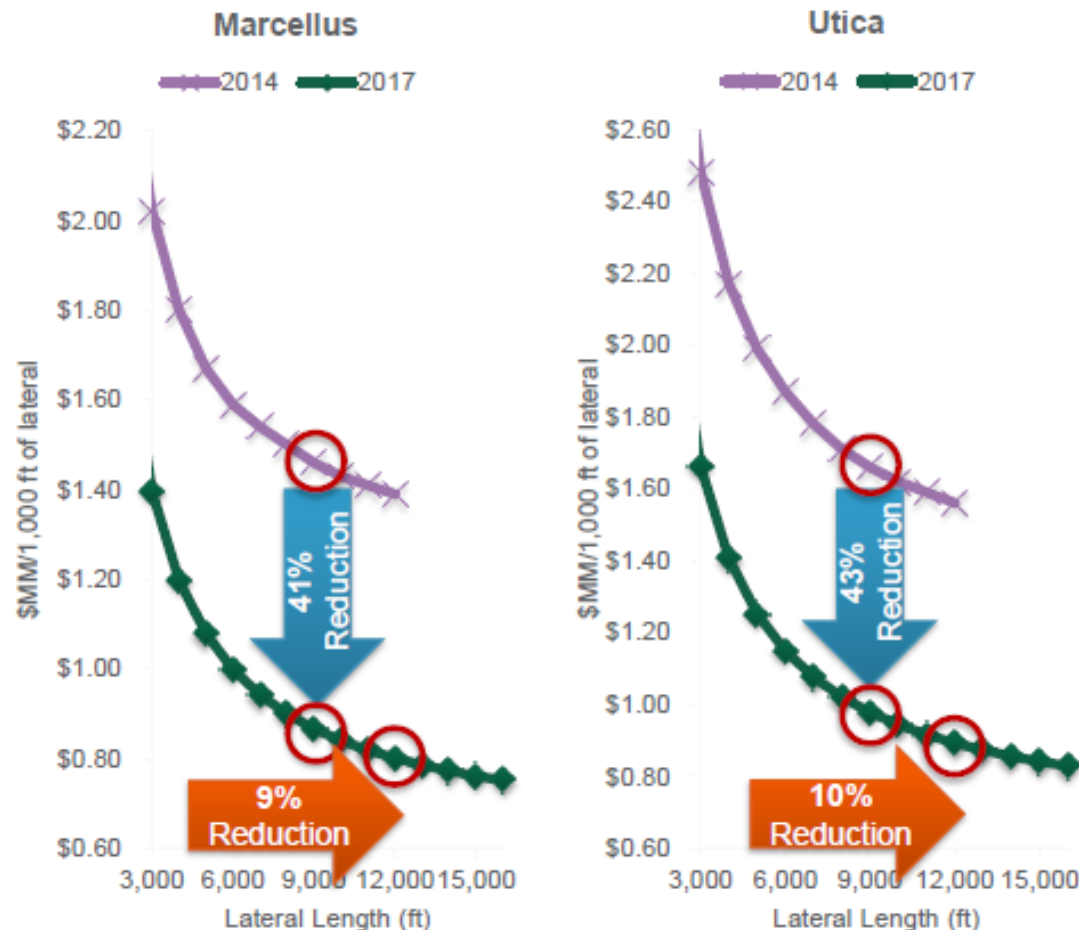
Marcellus | Utica reduction in well costs from 2014 to 2017 for a 9,000' lateral

- 54% from efficiencies
- 45% from service costs

9% | 10% Cost Benefit

Marcellus | Utica reduction in well cost per 1,000' lateral going from 9,000' to 12,000' laterals

Historical Well Costs

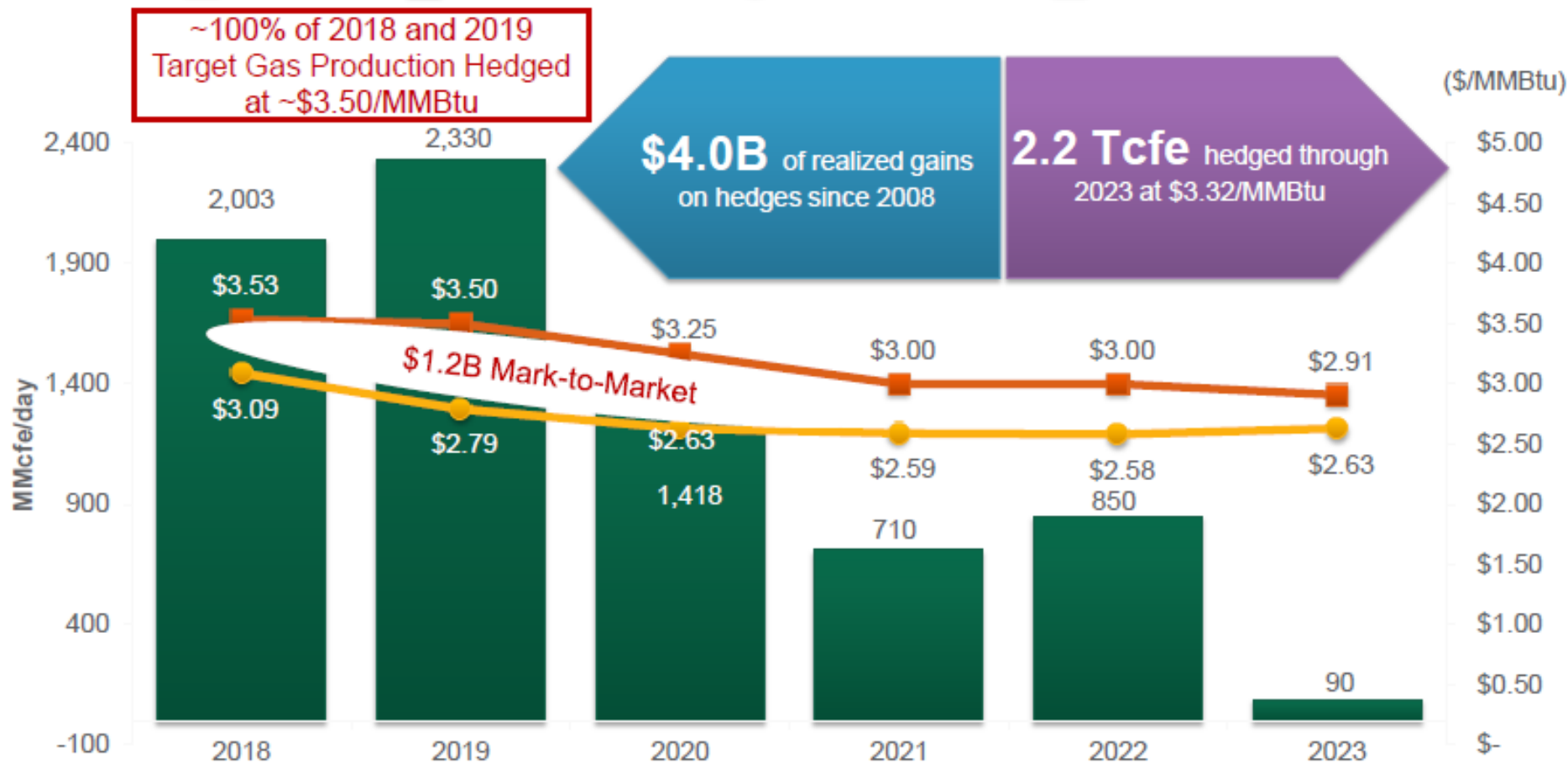


Note: Well costs reflect 2,000 pound per foot completions. See Appendix for further assumptions.

Well Hedged at High Prices Relative to Strip

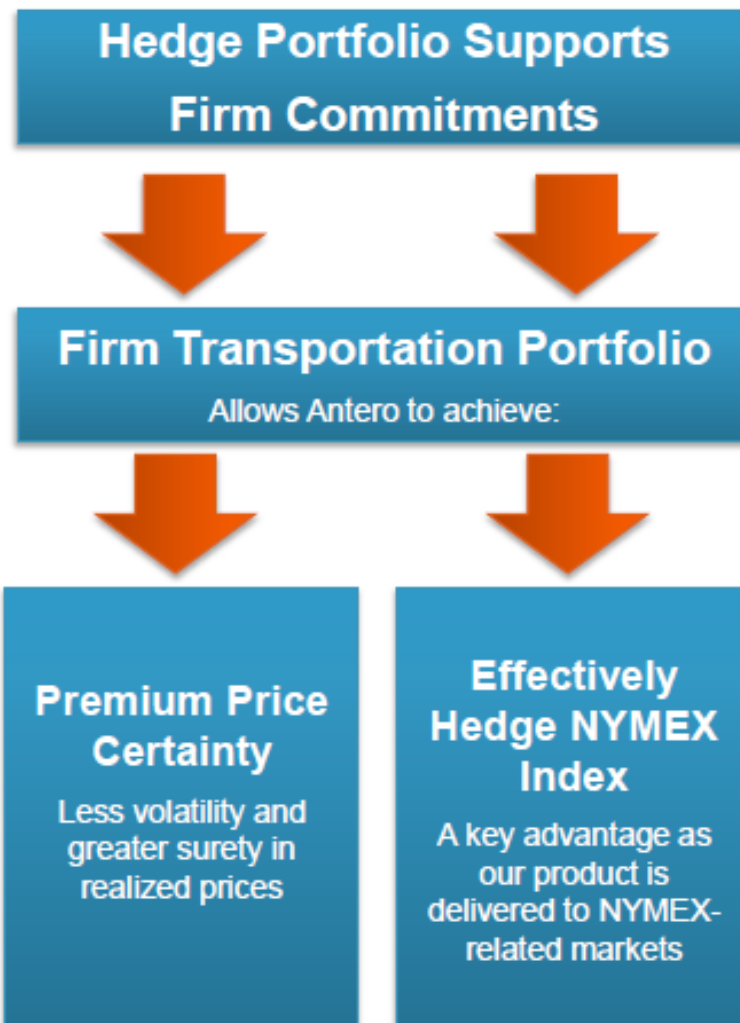
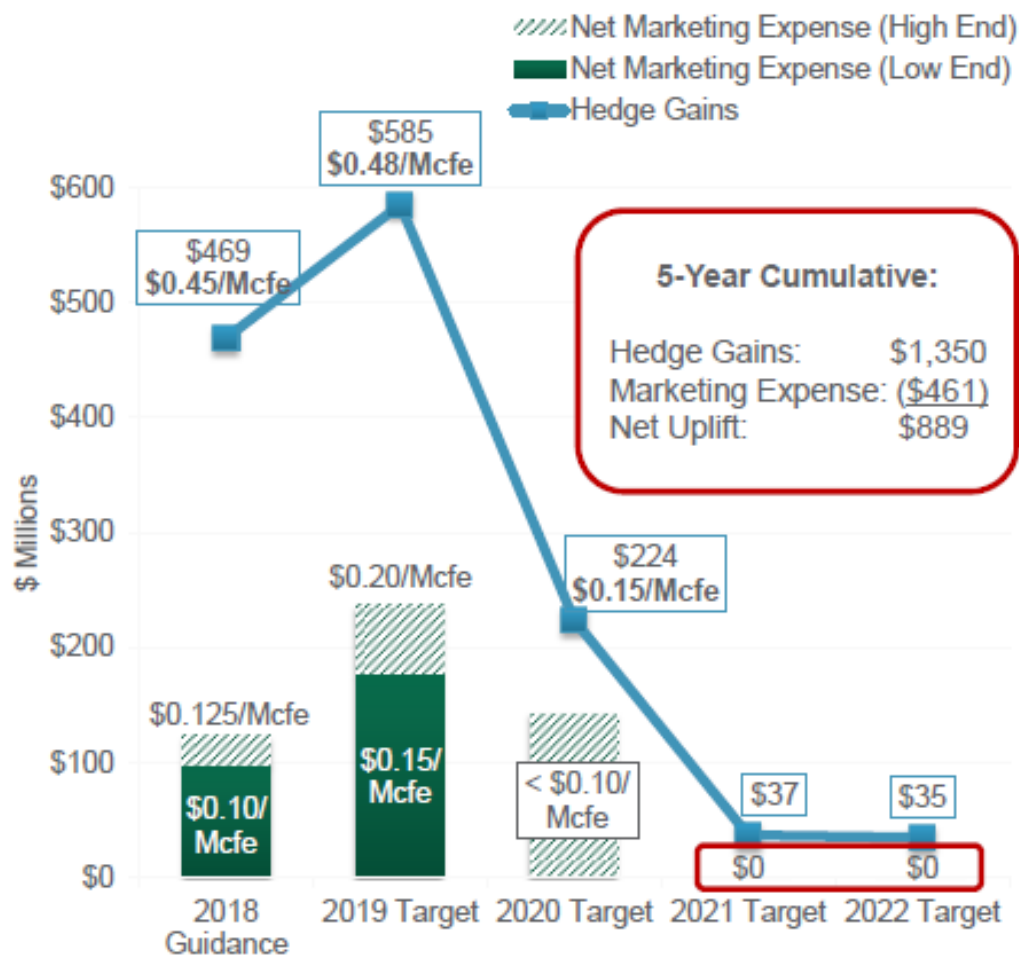
Commodity Hedge Position

Hedged Volume Average Index Hedge Price⁽¹⁾ Current NYMEX Strip⁽²⁾ Mark-to-Market Value⁽²⁾



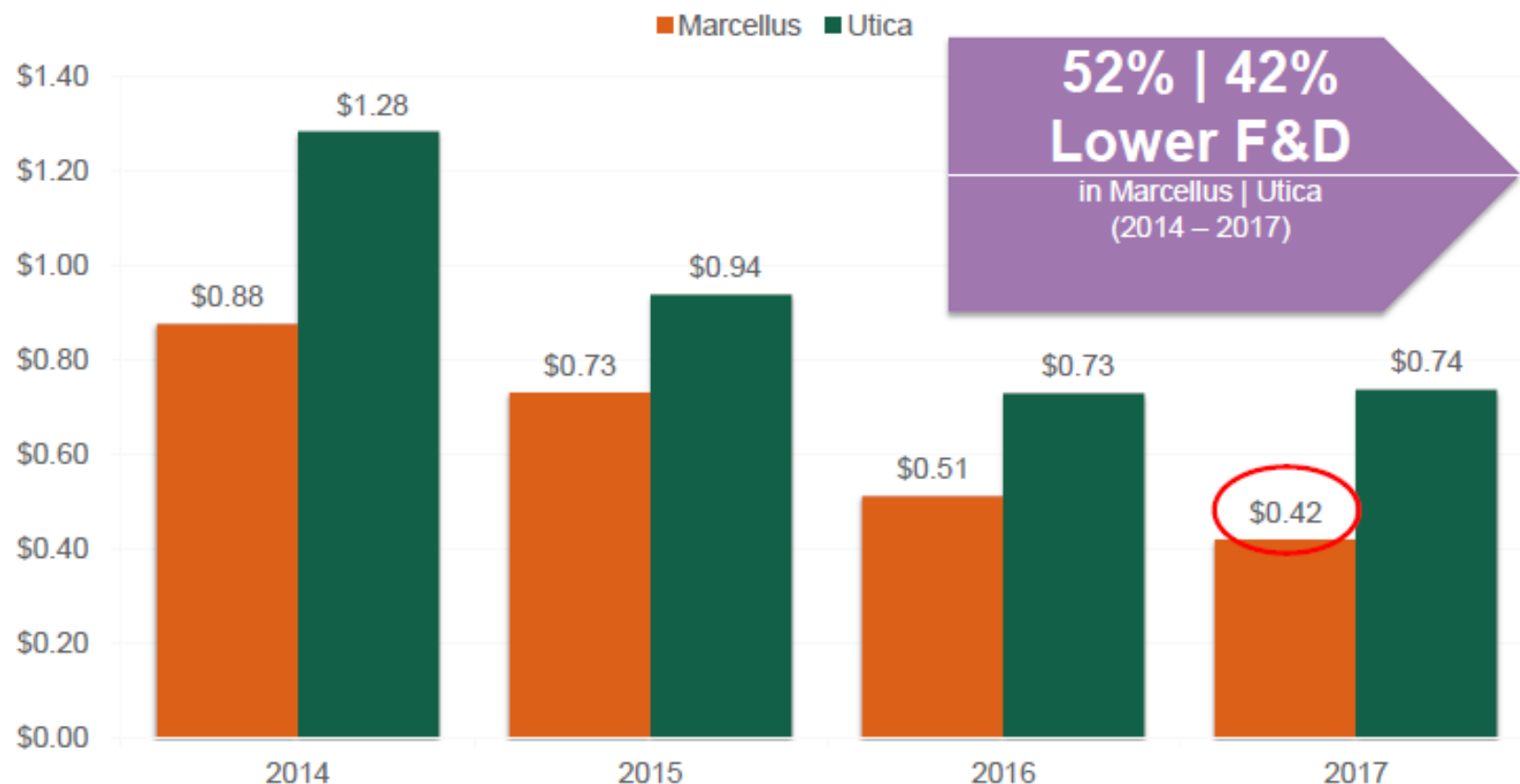
~\$1.2B Mark-To-Market Unrealized Gains Based On 9/30/2018 Prices

(1) Weighted average index price based on volumes hedged assuming 6:1 gas to liquids ratio. Includes 26,000 Bbl/d of propane hedged at \$0.76/gallon and 6,000 Bbl/d of oil hedged at \$50.00/Bbl for 2018 only.
 (2) As of 9/30/18.



Hedge Gains More than Offset Marketing Expense – Hedges Support FT Commitments

F&D Cost per Mcfe⁽¹⁾⁽²⁾



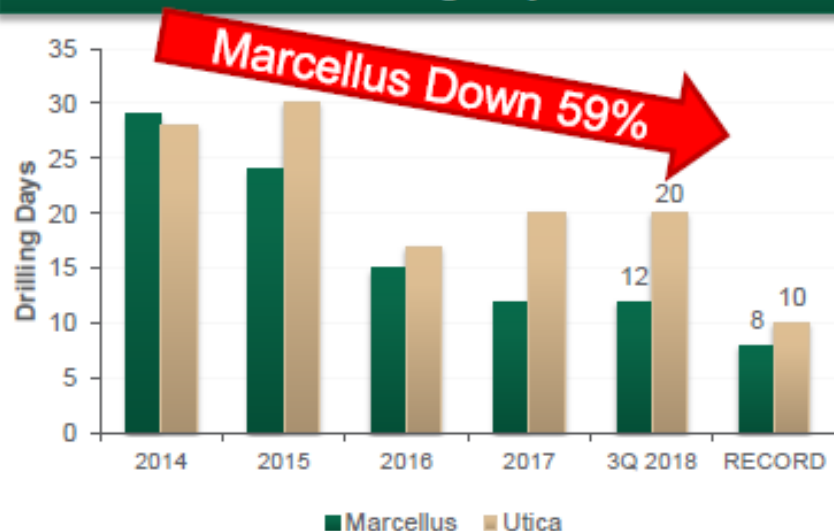
Dramatic Improvement in Operating Efficiencies, Lower Service Costs and Higher Well Recoveries Have Driven F&D Costs Materially Lower

(1) Ethane rejection assumed.

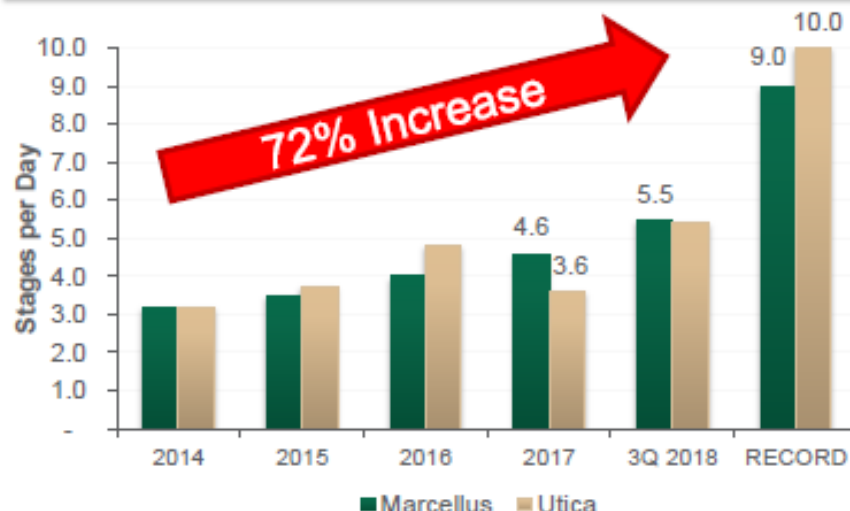
(2) F&D cost is defined as current D&C cost per 1,000' lateral divided by net EUR per 1,000' lateral assuming 85% NRI in Marcellus and 81% NRI in Utica. Please see "Antero Definitions" and "Antero Non-GAAP Measures" in the Appendix.

Drilling and Completion Efficiencies

Drilling Days



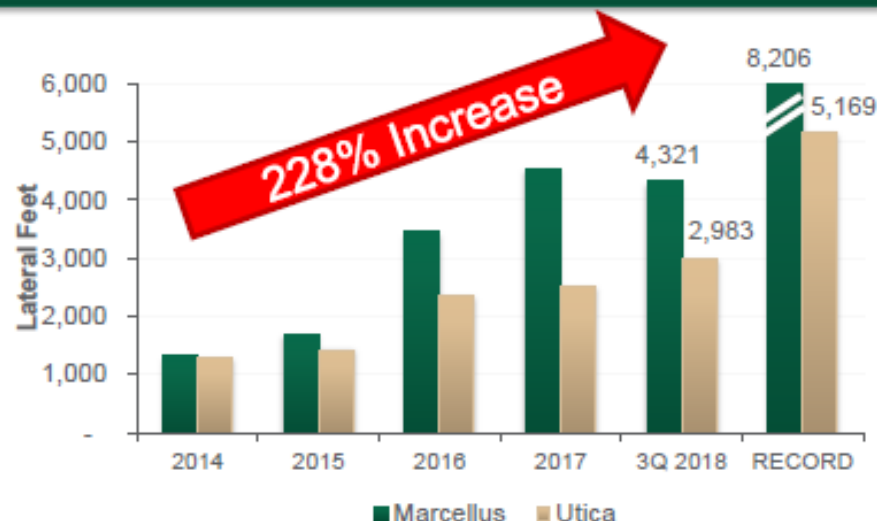
Completion Stages per Day



Average Lateral Length per Well

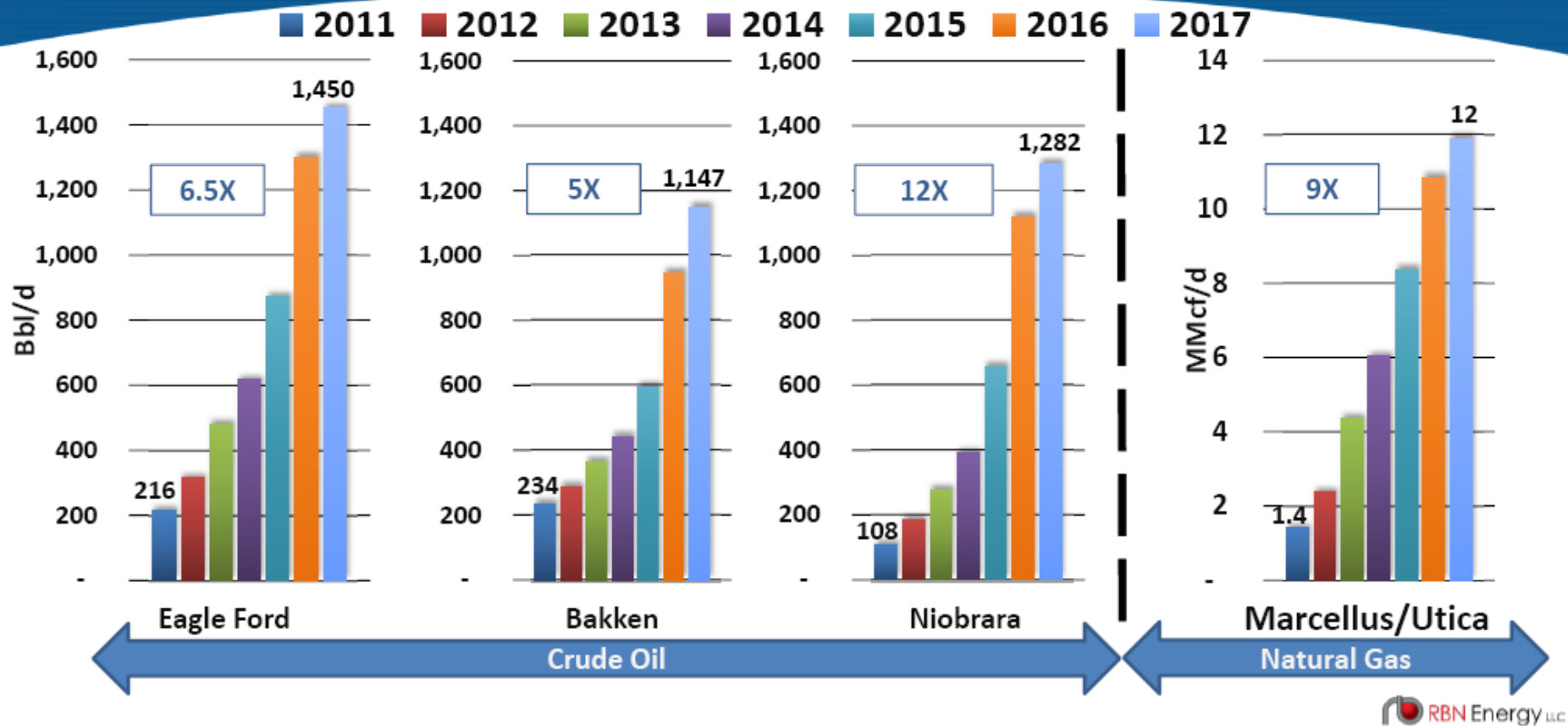


Average Lateral Feet per Day



Note: Utica 3Q 2018 results reflect YTD results, as Antero is not operating any rigs in the Utica during 2H18.
 Note: Percentage Increase and decrease arrows represent change in Marcellus data from 2014 to 3Q 2018.

Oil and Gas Production Added Per Rig



Source: *Midstream to Markets: Oil Markets: Out of the Woods?*, RBN Energy, The Energy Summit, August 23, 2017

Key Takeaways from 2010

- Shale gas/productivity gains (**We aren't exploring, we are manufacturing gas.**)
- Demand in Mexico (potential demand increase)
- LNG exports from North America (**China is waiting**)

Key Takeaways from 2015

The Big Three Issues to Watch:

- **Global Oil Price**
- **Marcellus and Utica Shale Production**
- **U.S. LNG Exports**

Key Takeaways

- Forecasted NorAm **production growth is highly dependent on global export markets**; more exports to Mexico and LNG (10.3 Bcf/d) than organic demand growth in Canada and US (5.7 Bcf/d); reductions in exports forecasted are balanced by reductions in production growth
- Global **demand for LNG continues growing**; expect a “second wave” of LNG liquefaction capacity
- Gas **infrastructure development is required** to connect supply centers with emerging demand
- You have heard “it’s about location, location, location.” Production is about efficiency, efficiency, efficiency.

The New “Metaphor” by Maytag



Contact Information

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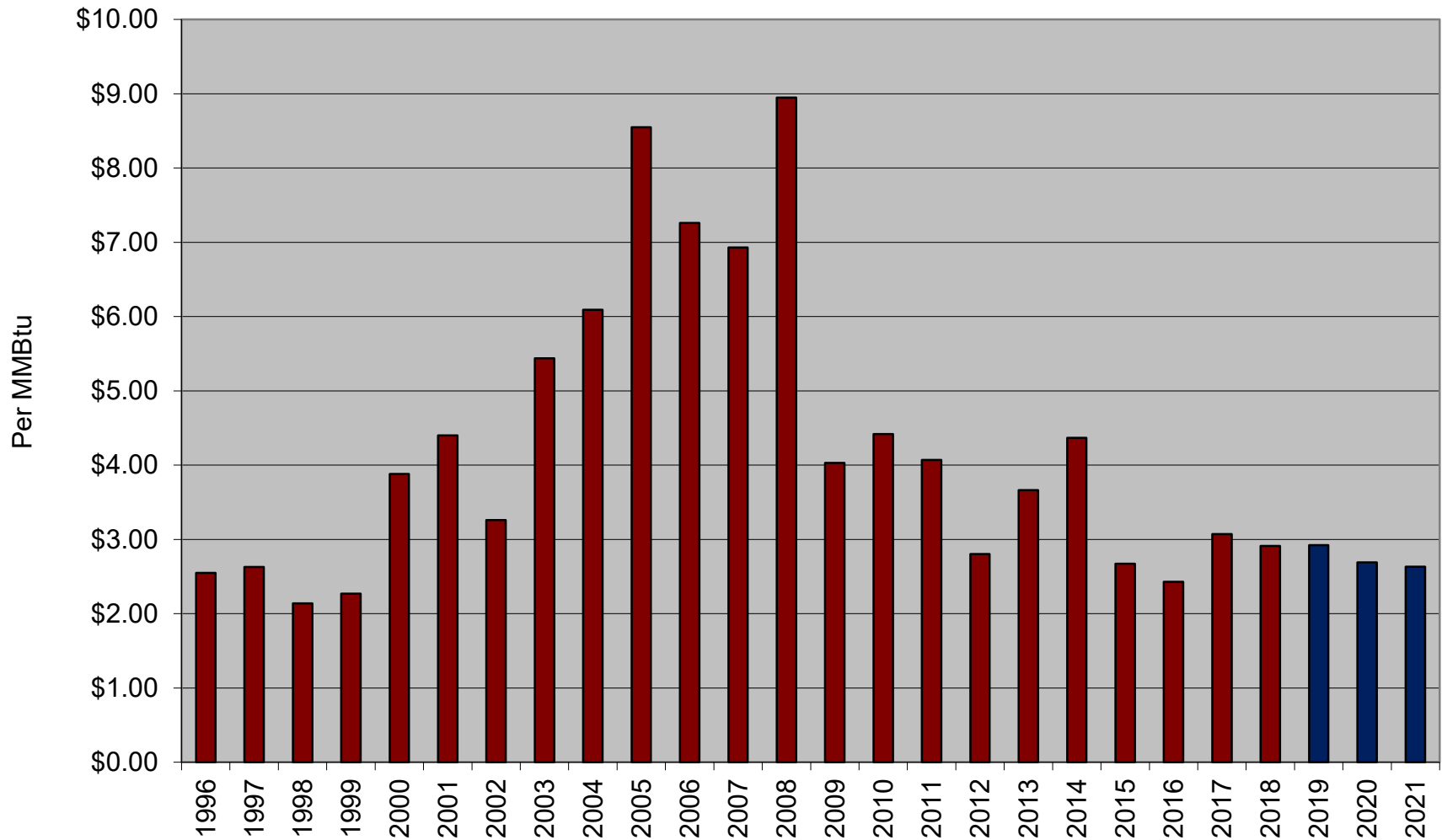
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NYMEX Historical and Future Forecast

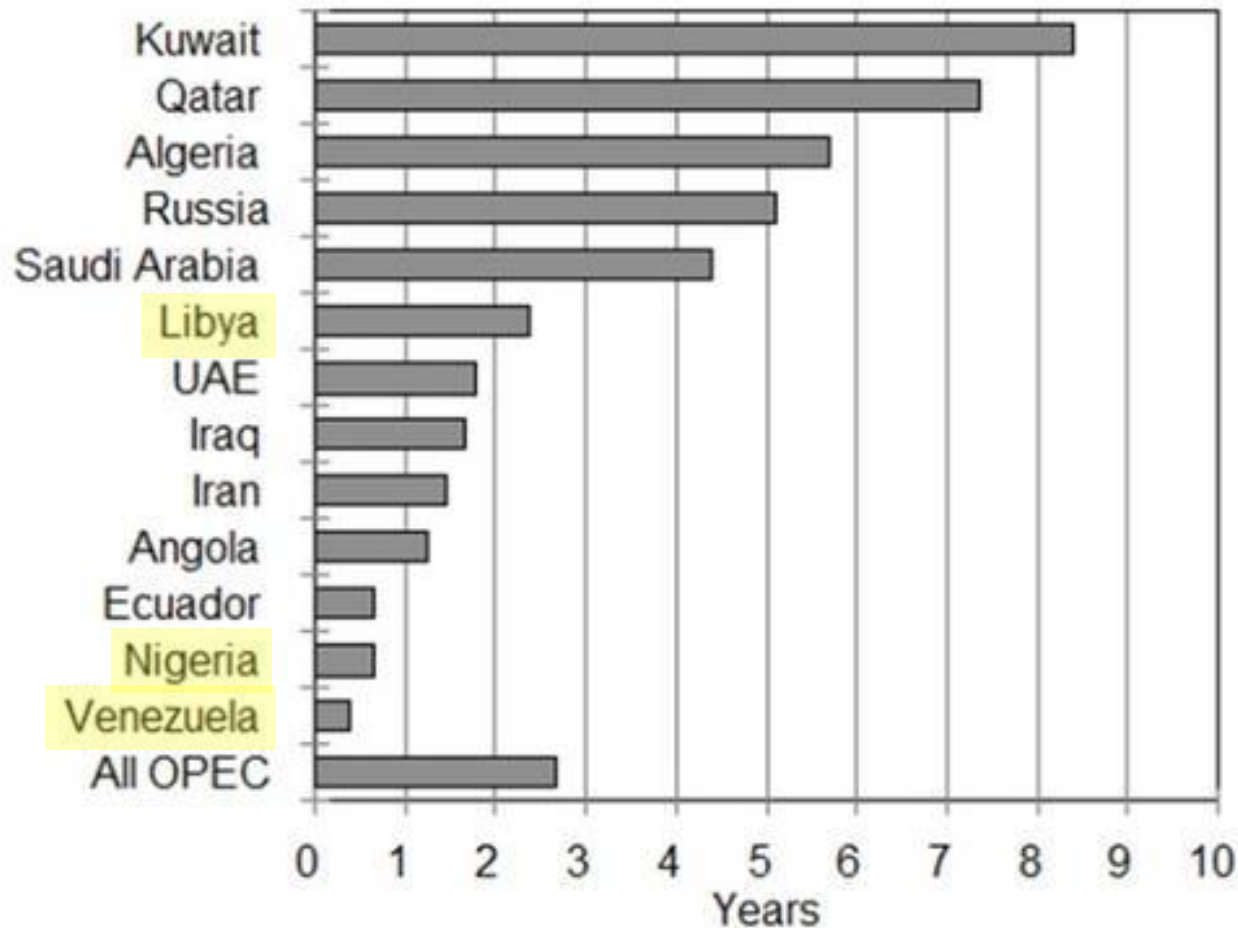


NYMEX – 1996- Nov 2018 - Average last 3 days of close as reported in Platts Gas Daily Report, Publication 2019-2021 Future Forecast as of 11/07/2018 reported by MarketView Software



Survival of the Fittest?

DURATION OF FOREIGN RESERVES @ \$50/BBL DEFICIT



*Circa 2014: Saudis have staying power; \$750 billion in foreign country reserves



Source: Oilprice.com, *The Saudi Arabian Oil Conspiracy and What it Might Mean for Your Portfolio*, The Motley Fool, Adam Galas, January 18, 2015

A Game of Chicken?

Nation	Oil price per barrel required to break even or balance budget
US producers	\$38-\$77
Qatar	\$58
Kuwait	\$59
UAE	\$90
Saudi Arabia	\$92
Angola	\$94
Russia	\$101
Iraq	\$116
Venezuela	\$117
Algeria	\$119
Ecuador	\$122
Nigeria	\$124
Iran	\$136

According to data compiled by Bloomberg, “prices have dropped below the level needed by at least 9 OPEC member states to balance their budgets.”

Source: Reuters, *The Saudi Arabian Oil Conspiracy and What it Might Mean for Your Portfolio*, The Motley Fool, Adam Galas, January 18, 2015

Survival of fittest as oil tumbles below \$65, Bloomberg News, December 1, 2014