U.S. Natural Gas and the Potential for LNG Export Growth

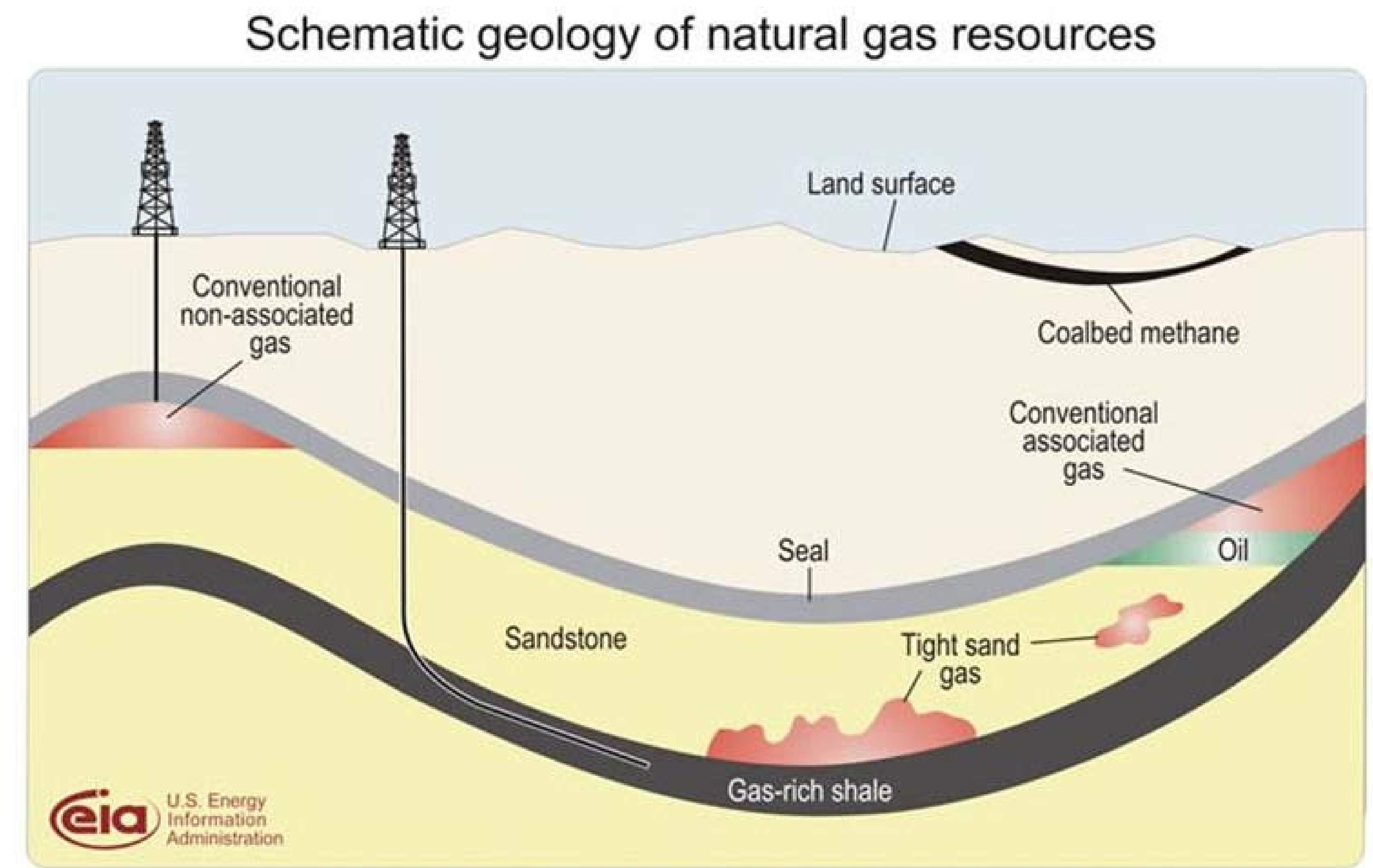
Presentation to:
2018 Wyoming Oil & Gas Fair

By:
John Harpole

Mercator Energy

September 12, 2018

It is not a scarce resource anymore



Source: US Energy Information Administration

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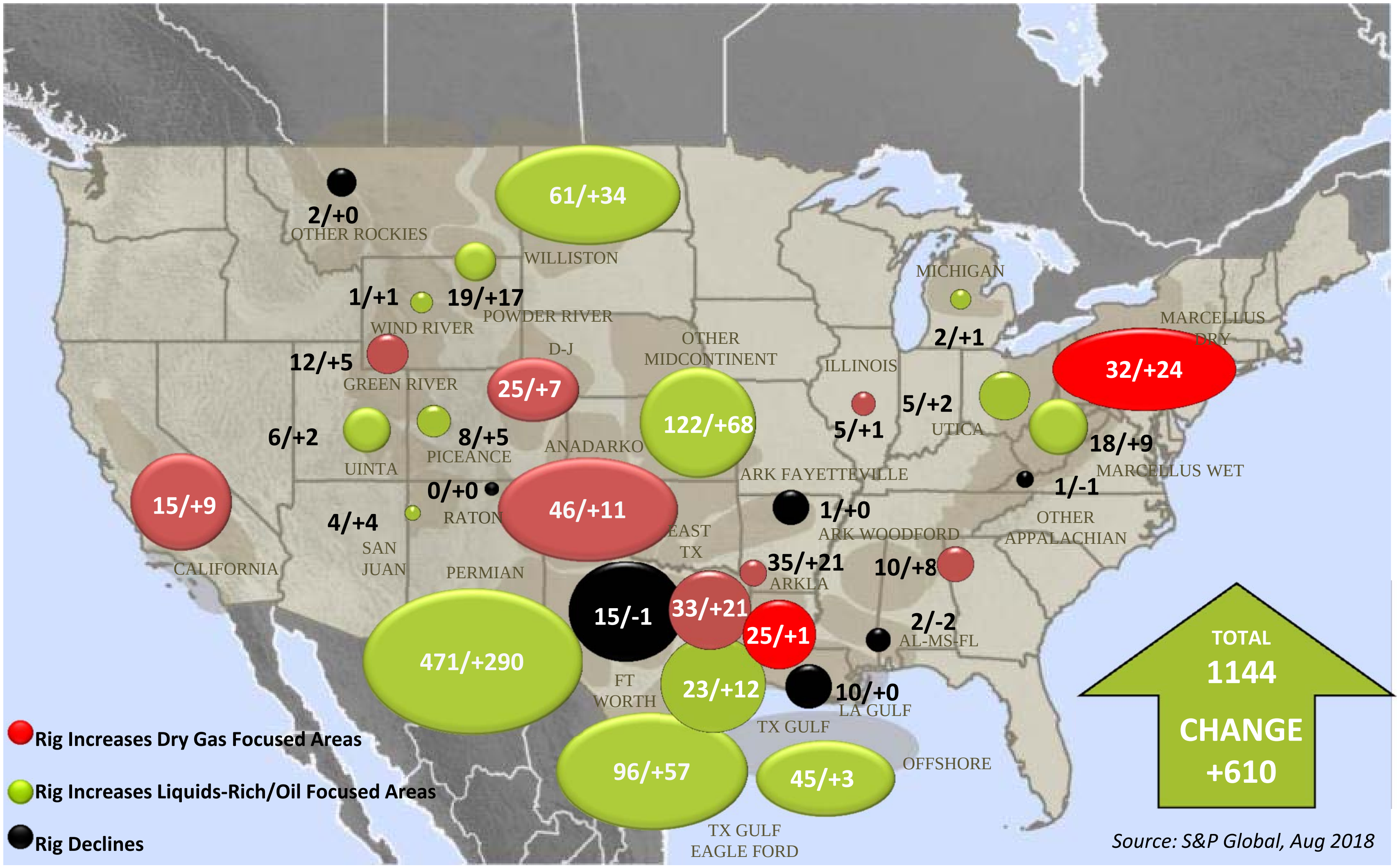
Source: U.S. Energy Information Administration based on data from various published studies. Canada and Mexico plays from ARI.
Updated: May 9, 2011

US RIG COUNTS: Aug 2018 vs Aug 2016



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

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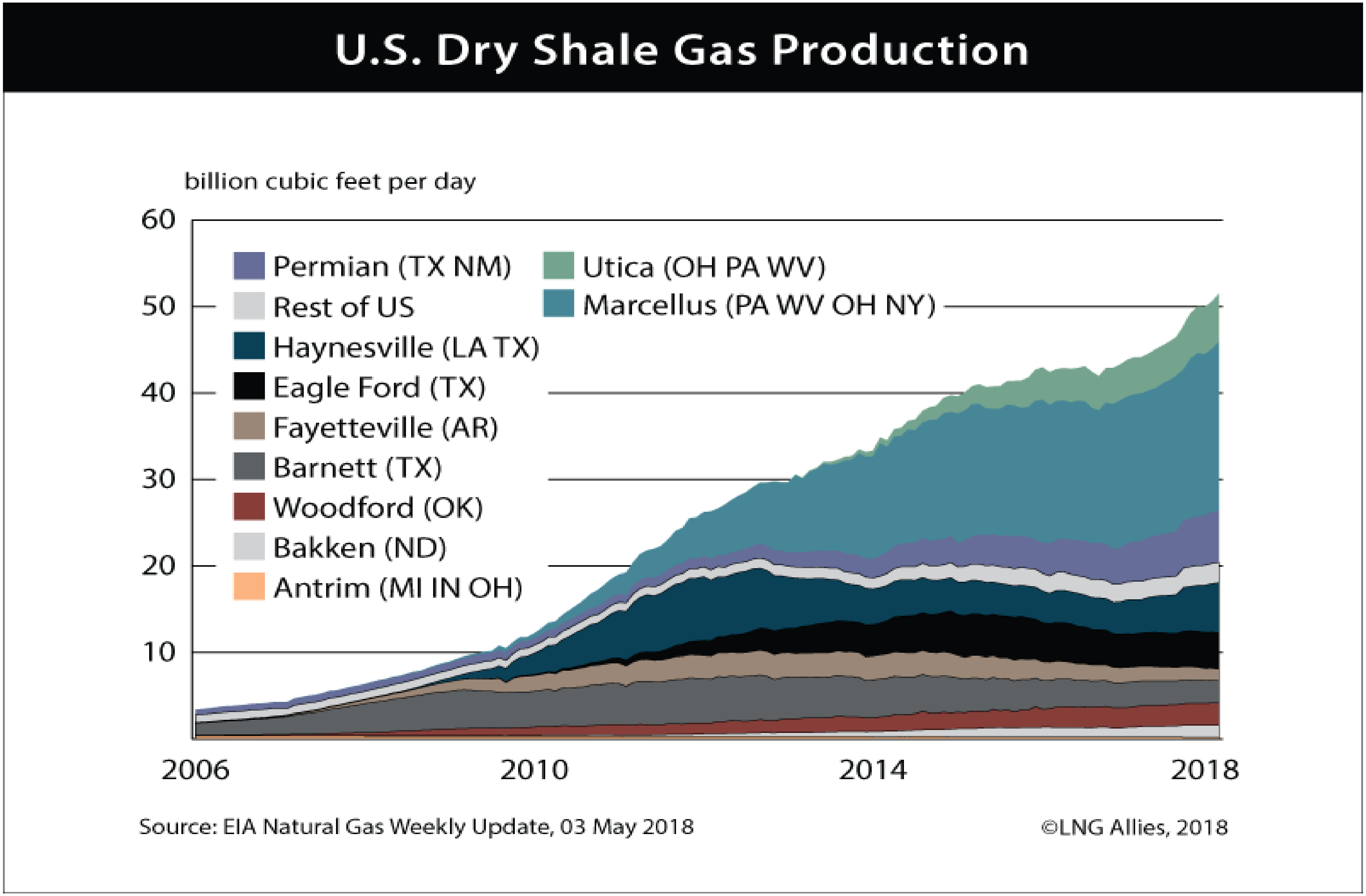
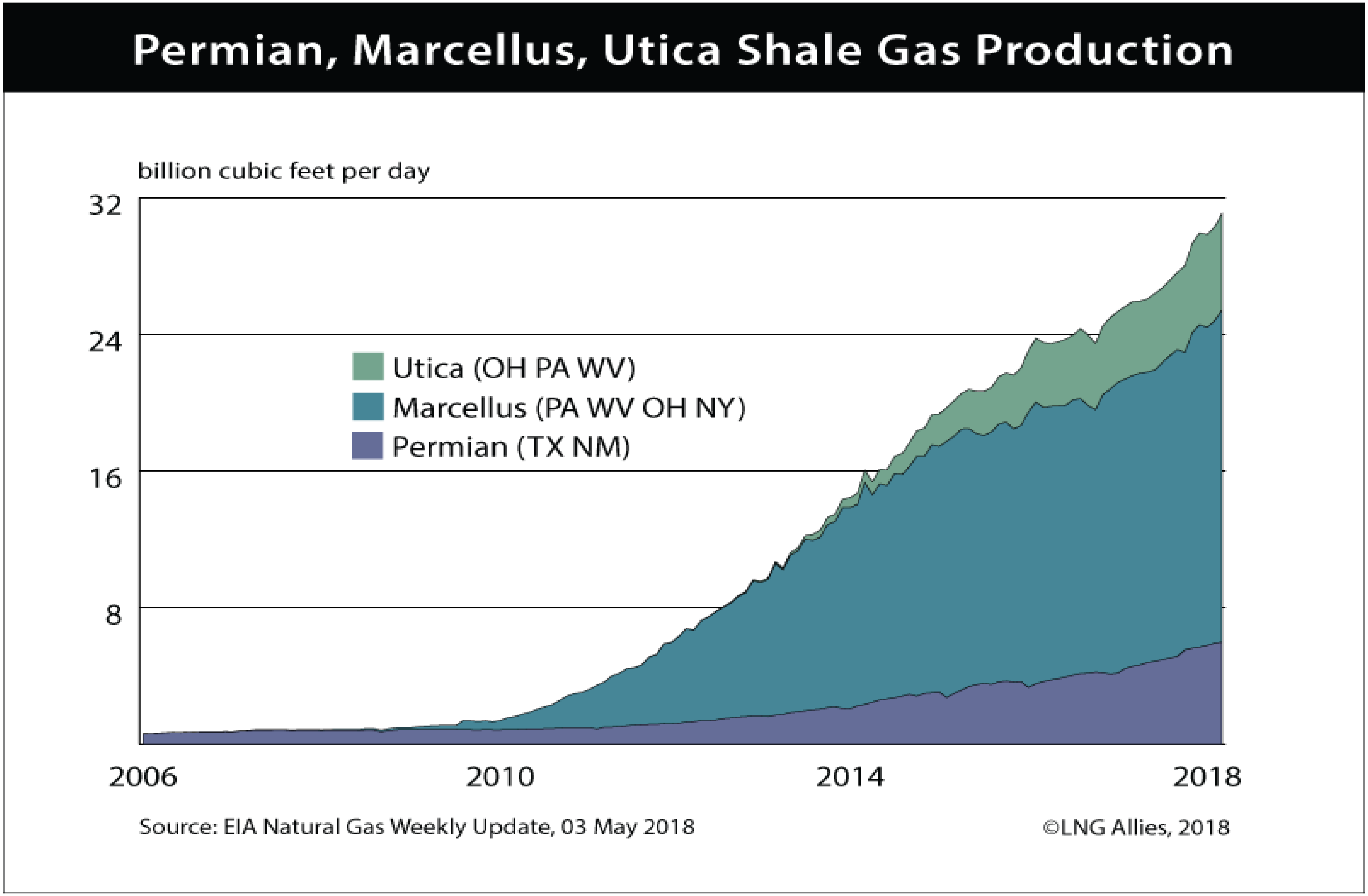
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018



Source: LNG Allies, The US LNG Association, www.lngallies.com



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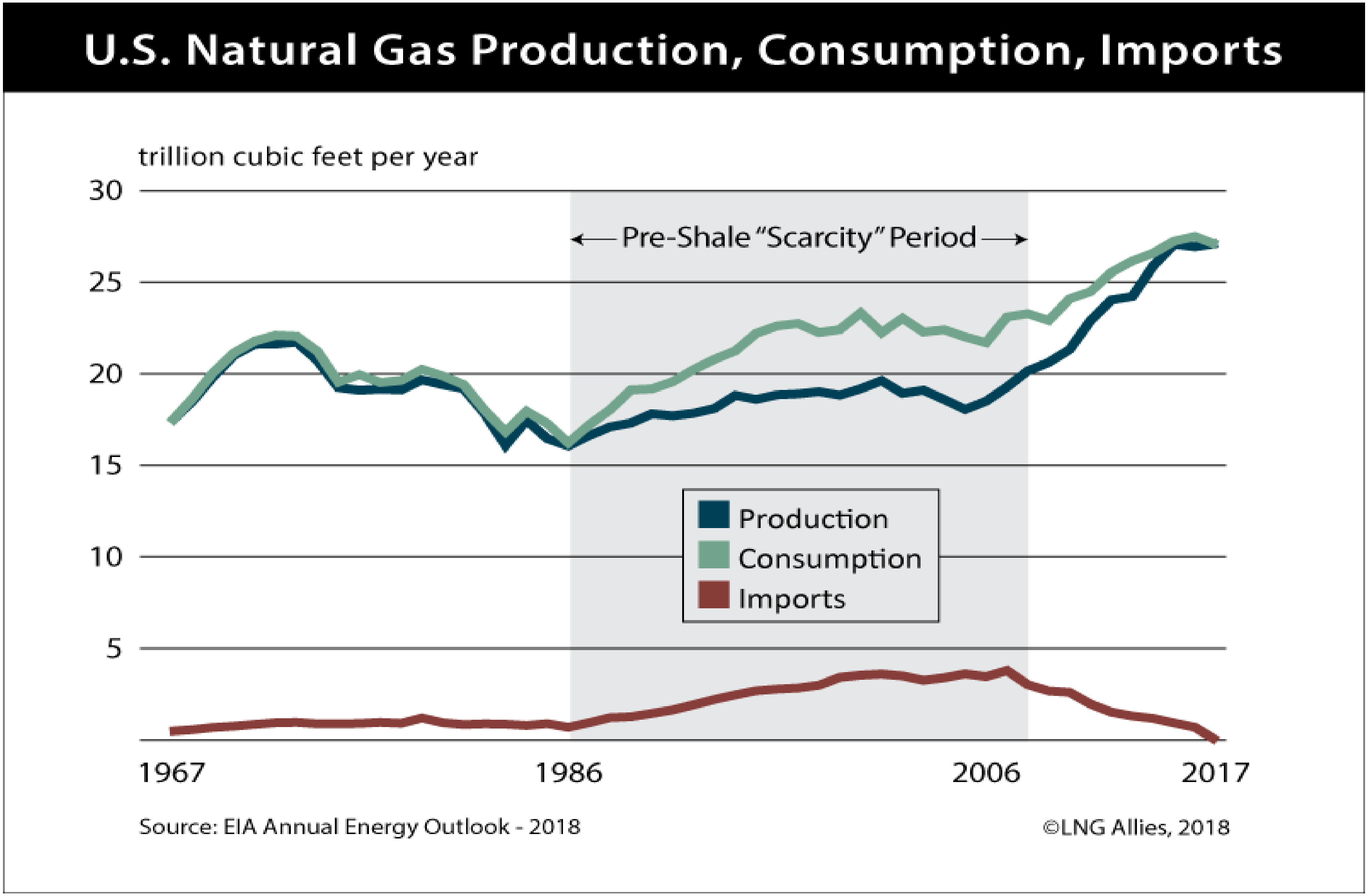

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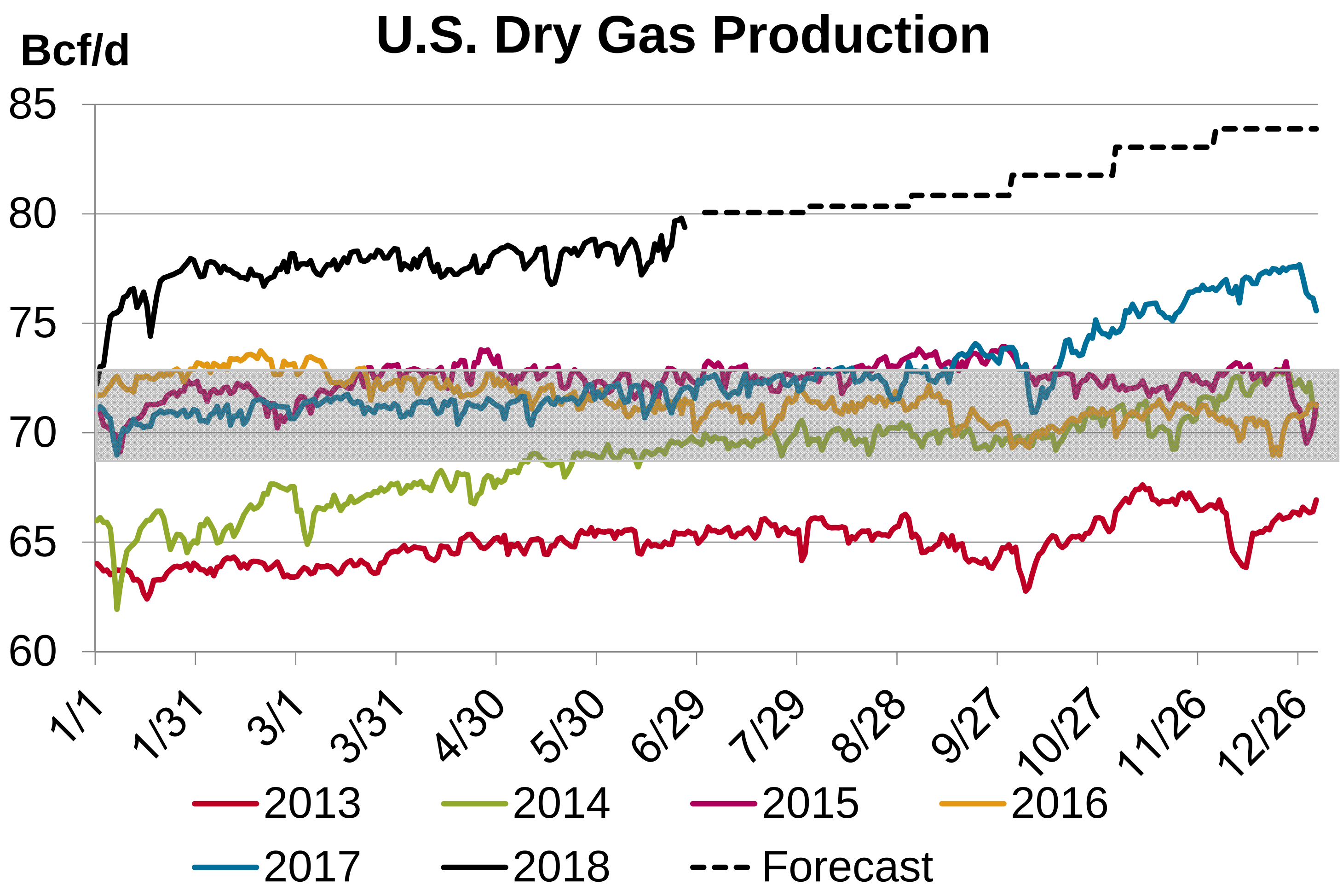
Source: LNG Allies, The US LNG Association, www.lngallies.com

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



Y-O-Y (Forecast) 2017/2018 +7.0 Bcf/d

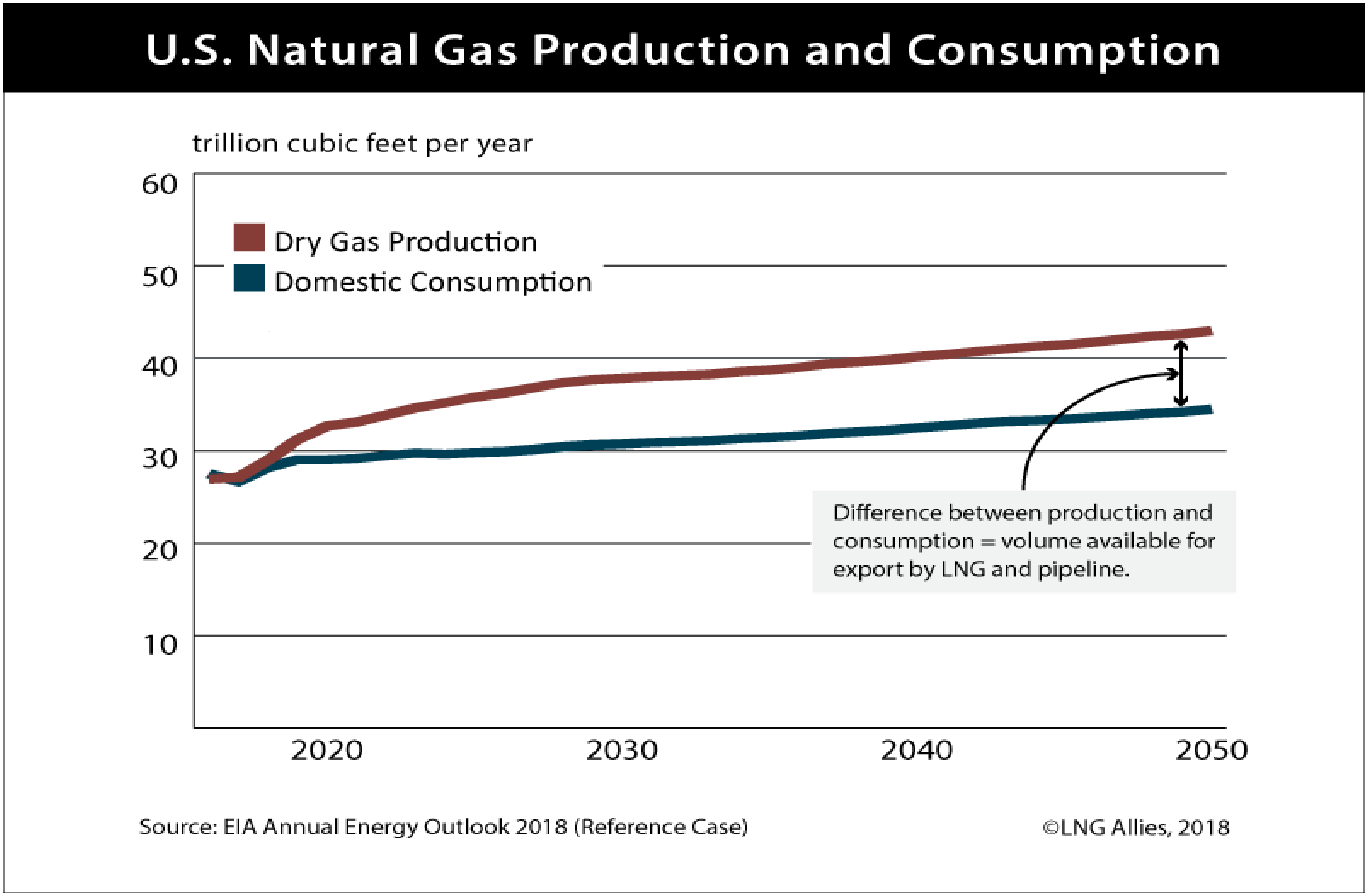
Y-O-Y (YTD) 2017/2018 +5.0 Bcf/d

Y-O-Y 2014/2015 +3.4 Bcf/d

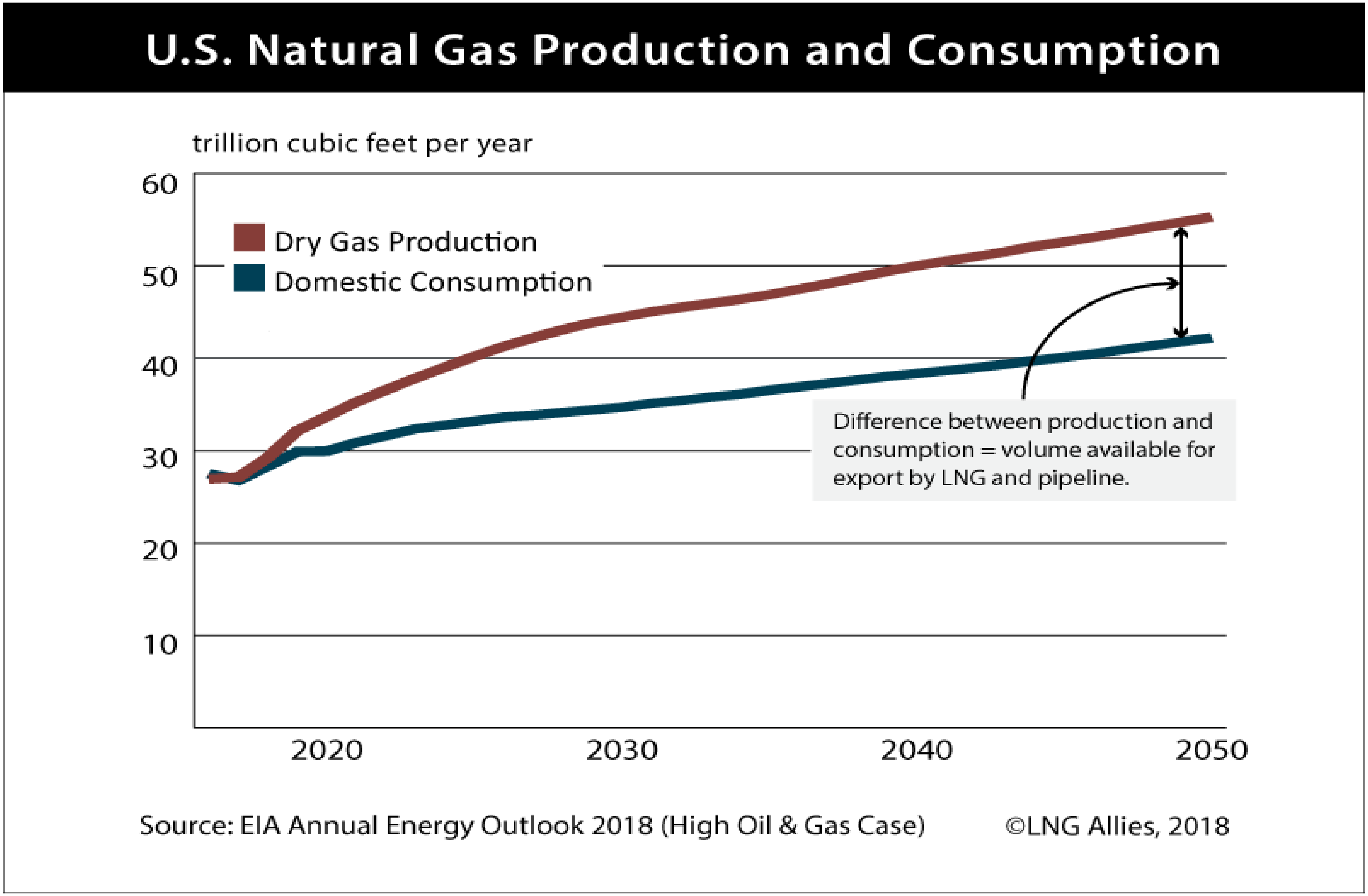
Y-O-Y 2013/2014 +4.0 Bcf/d

Source: S&P Global Platts Analytics

Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018



Source: LNG Allies, The US LNG Association, www.lngallies.com



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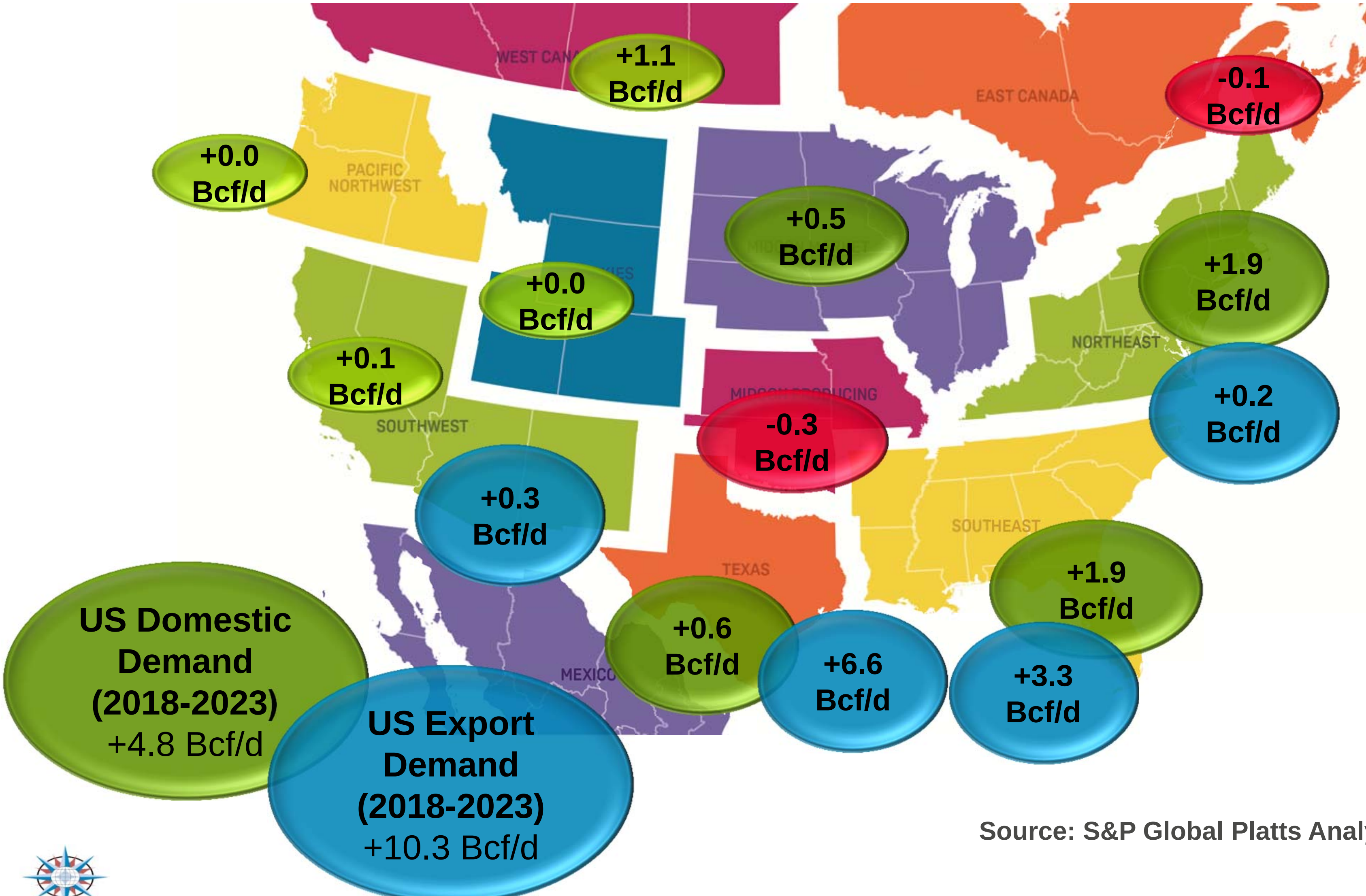
Source: LNG Allies, The US LNG Association, www.lngallies.com

Domestic demand growth slows, global demand drives price and production



Source: S&P Global Platts Analytics

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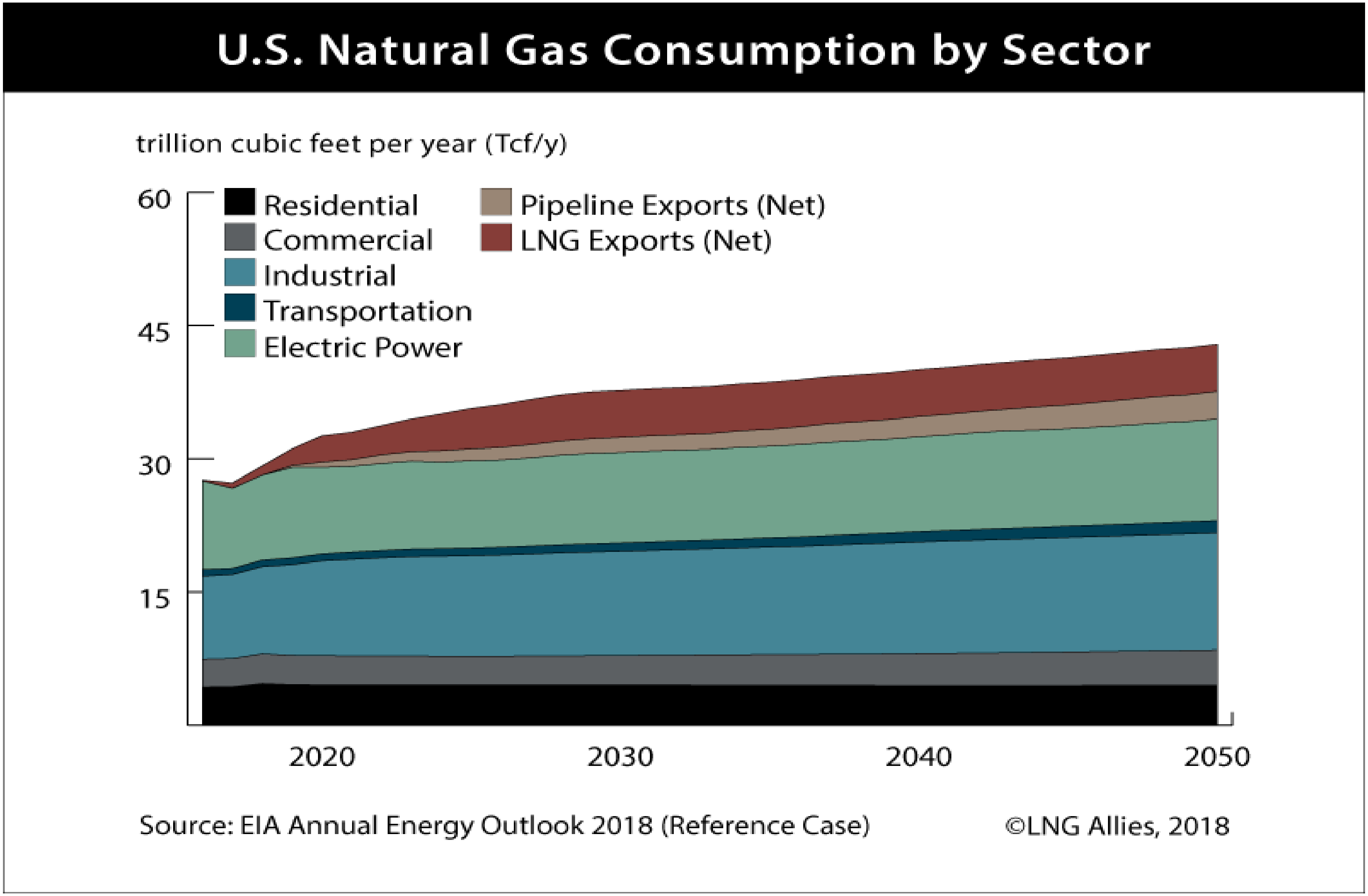
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018



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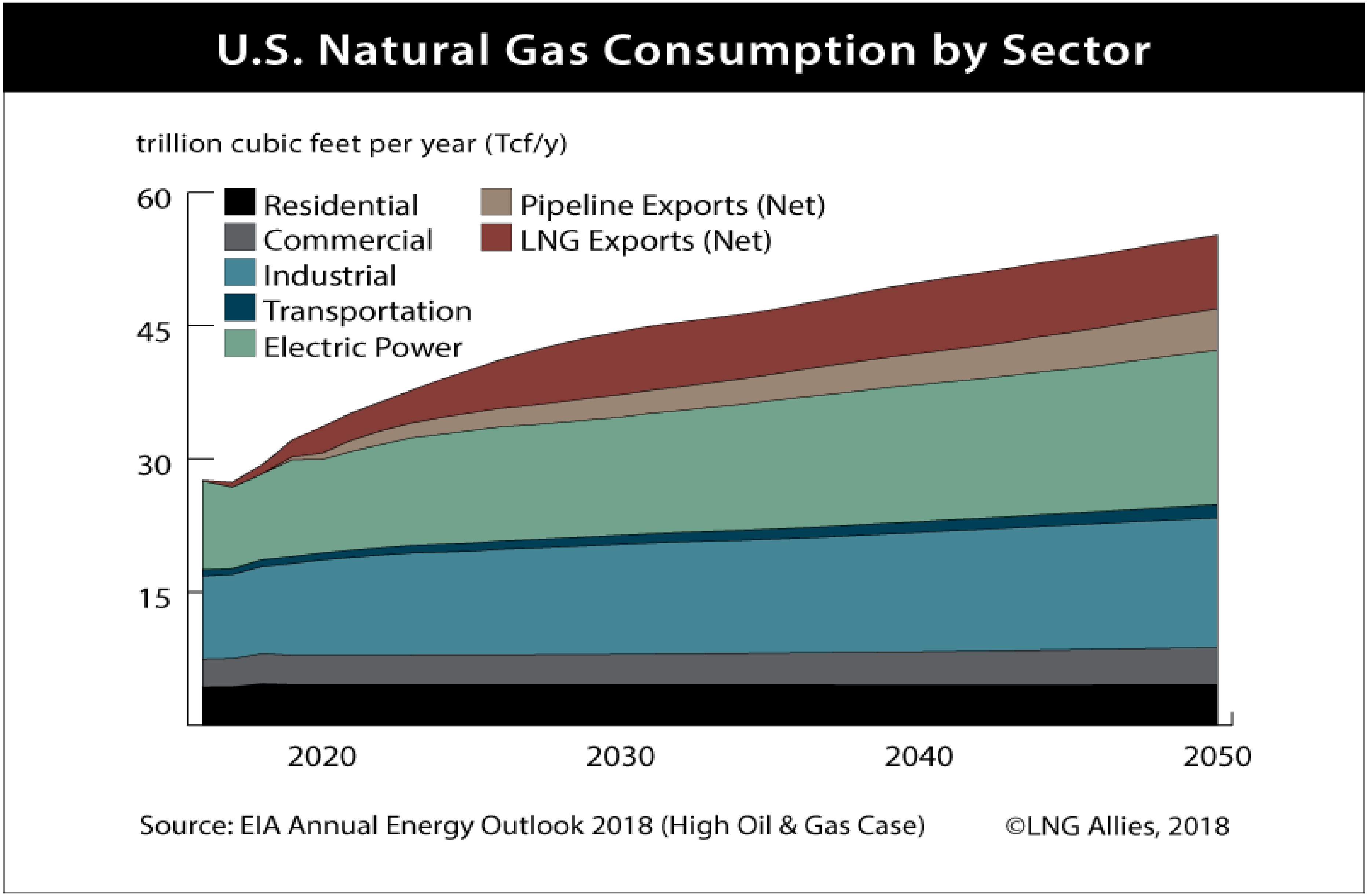
Source: LNG Allies, The US LNG Association, www.lngallies.com



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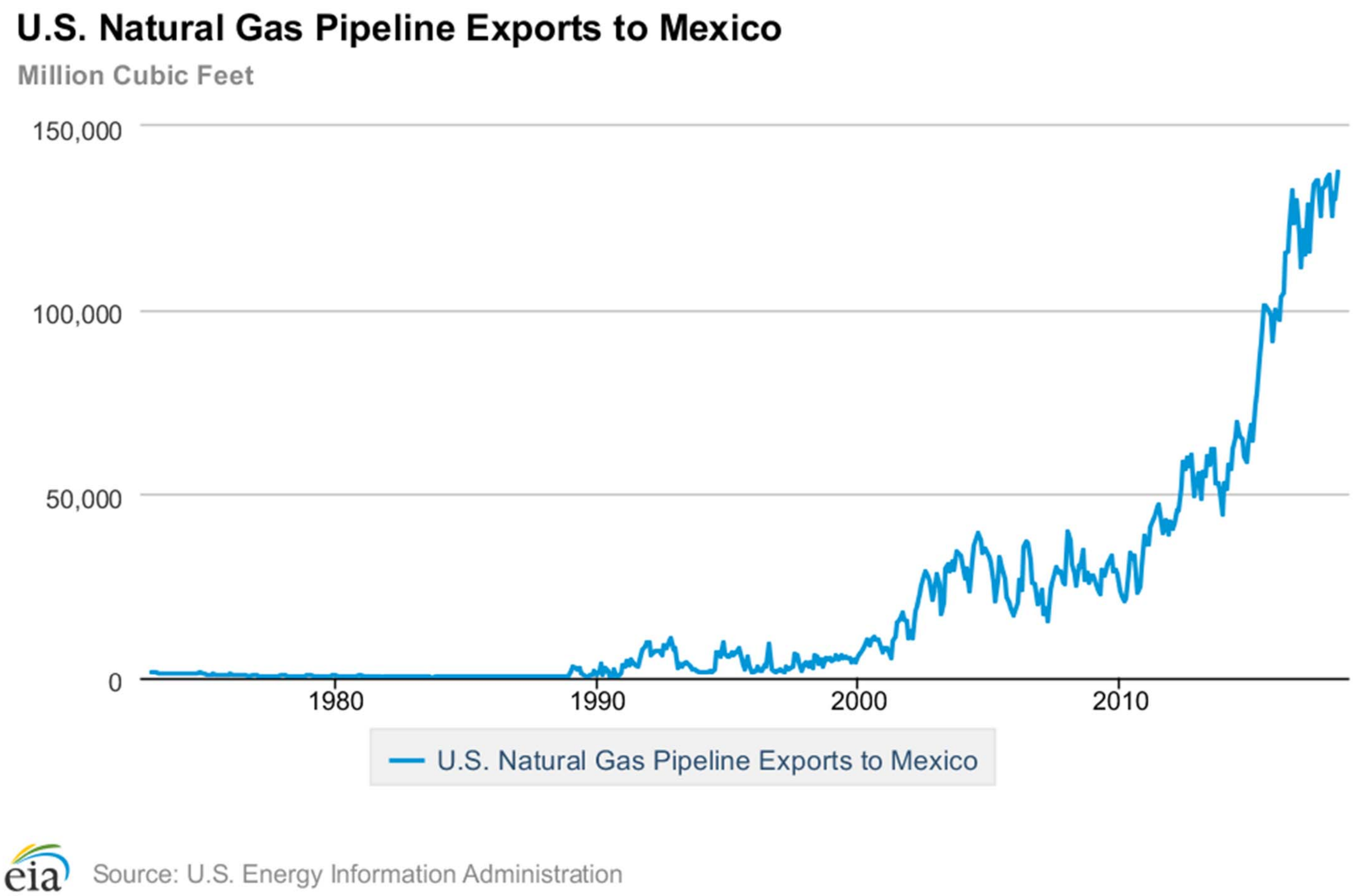

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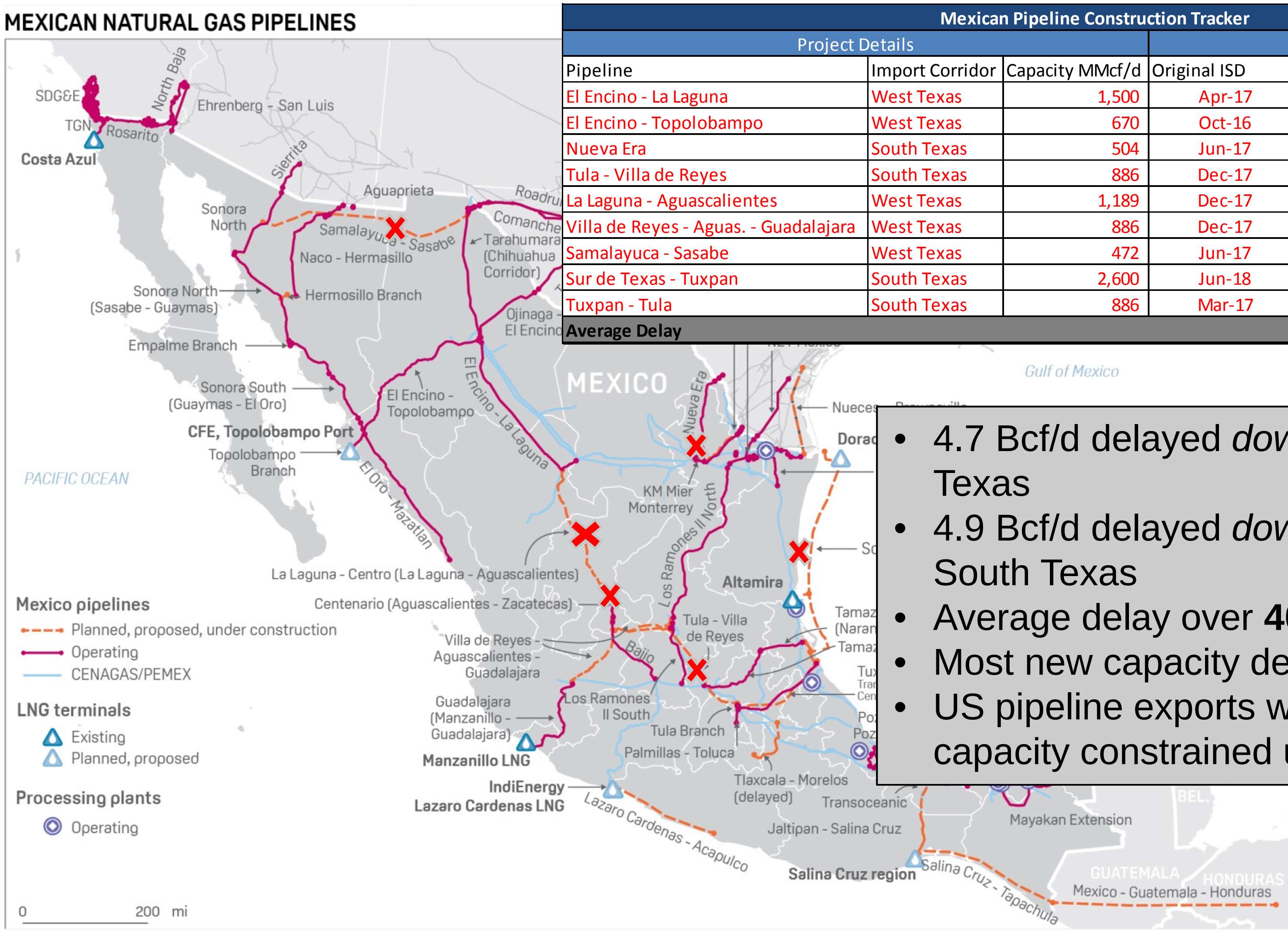
Source: www.eia.gov/dnav/ng/hist/n9132mx2m.thm accessed 08/20/2018

Major delays on Mexico’s interior gas pipelines



Source: S&P Global Platts Analytics

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: SENER, S&P Global Platts Analytics

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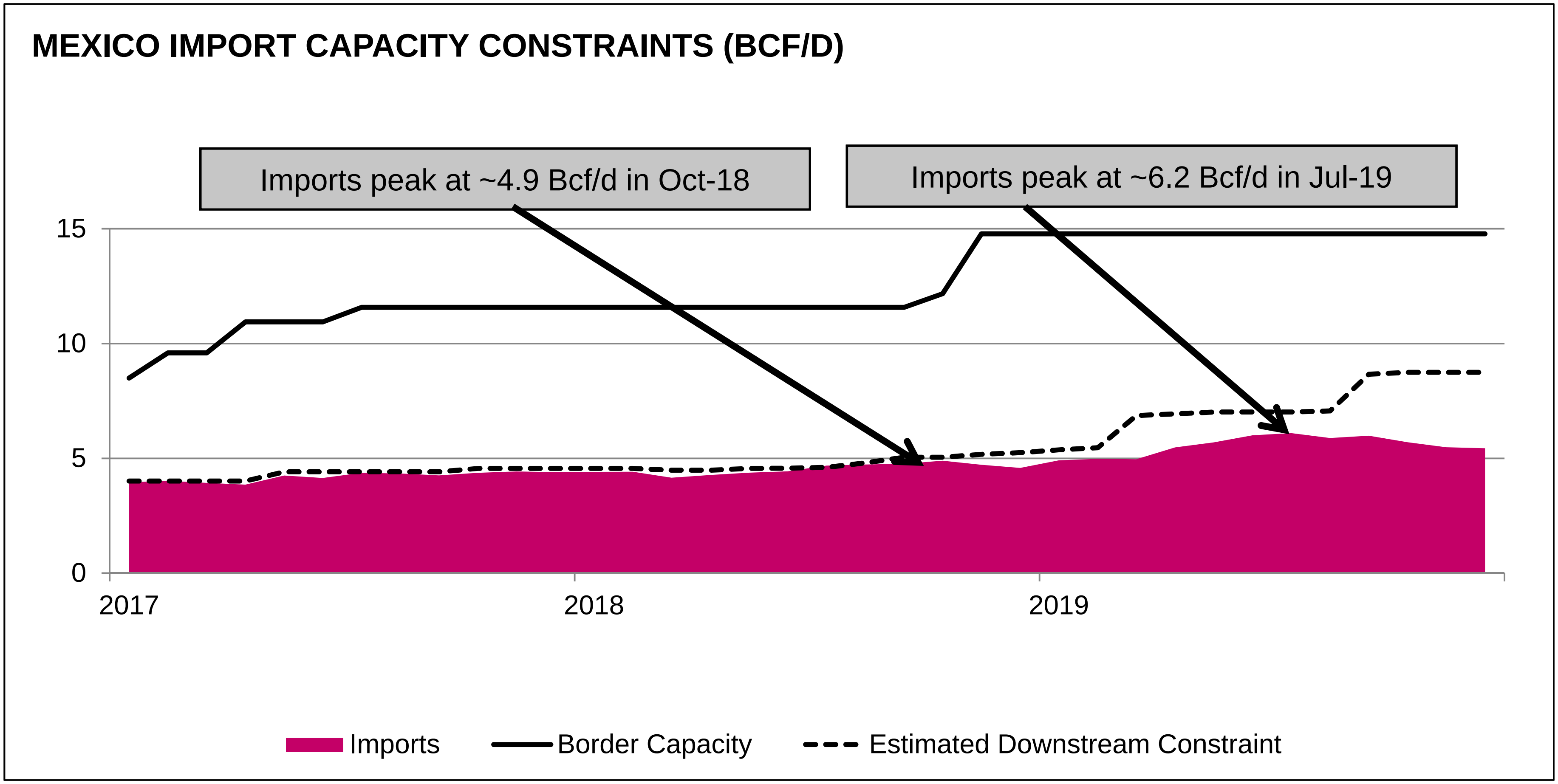
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Downstream constraints alleviated in 2019



Source: S&P Global Platts Analytics

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Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Permitting Status of U.S. LNG Export Projects

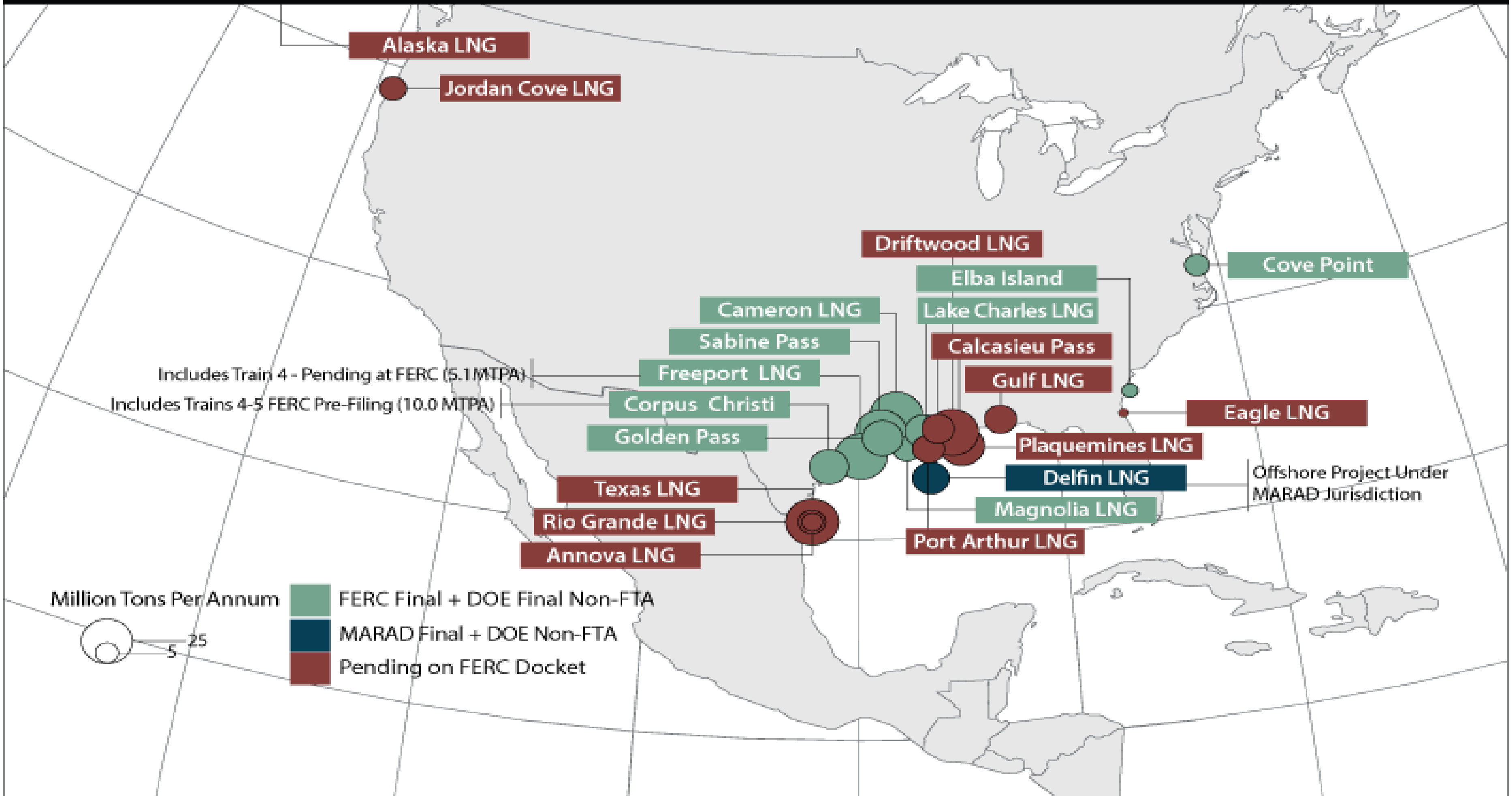
Project Stage	Projects	MTPA	Bcm/yr	Bcf/day
Operating / Under Construction	6	70.9	97.7	10.0
Fully Permitted (Major Projects)	4	68.9	95.0	9.7
Fully Permitted (Small Projects)	N/A	9.0	12.4	1.3
Formal FERC Review	11	146.9	202.6	20.9
FERC Pre-Filing	2	24.0	33.1	3.3
Total	**23**	**310.7**	**428.5**	**44.0**

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)

Source: LNG Allies, The US LNG Association, www.lngallies.com

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



Sources: LNG Allies, EIA, DOE (Dec. 2017)

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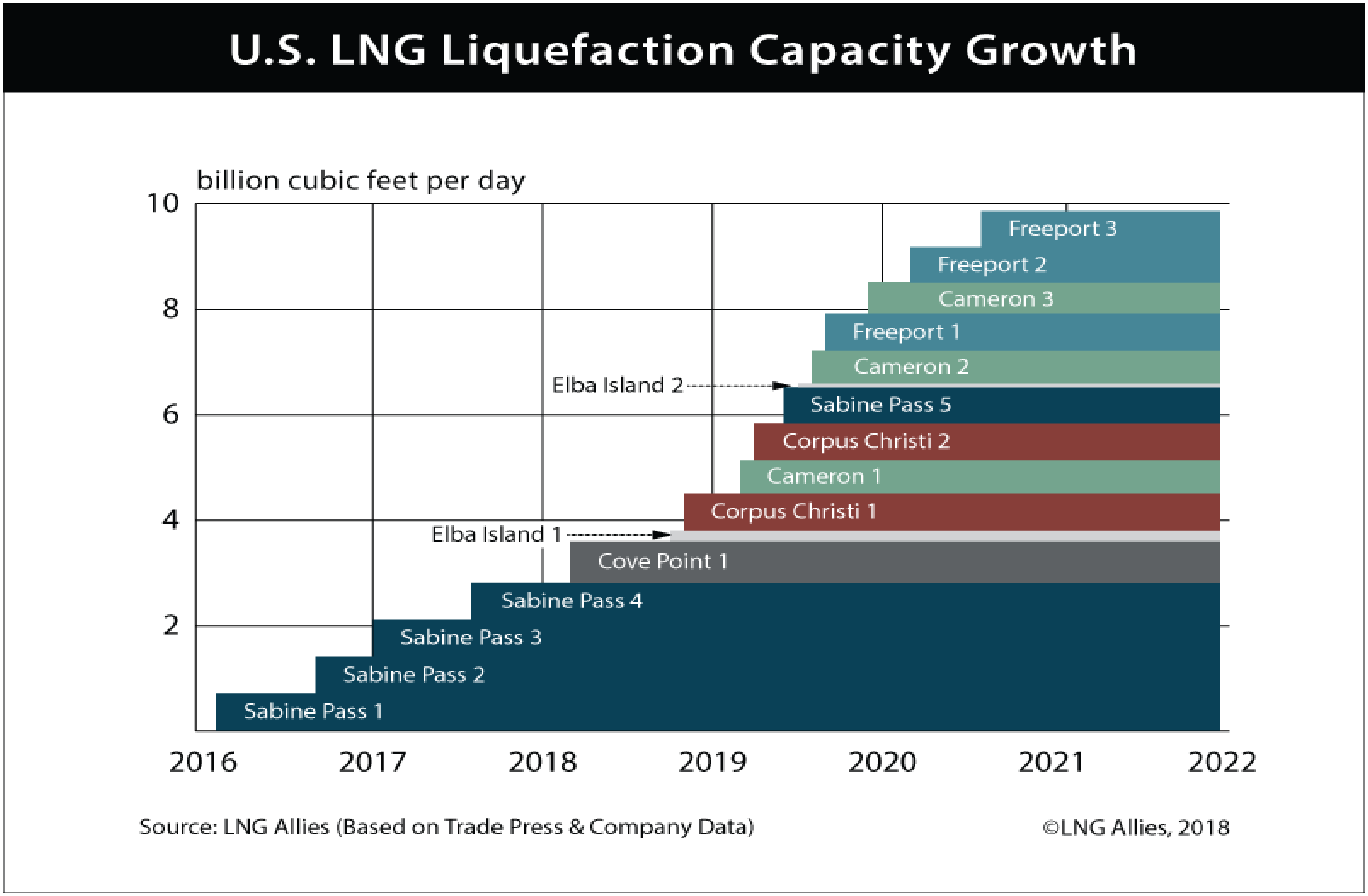
Source: LNG Allies, The US LNG Association, www.lngallies.com



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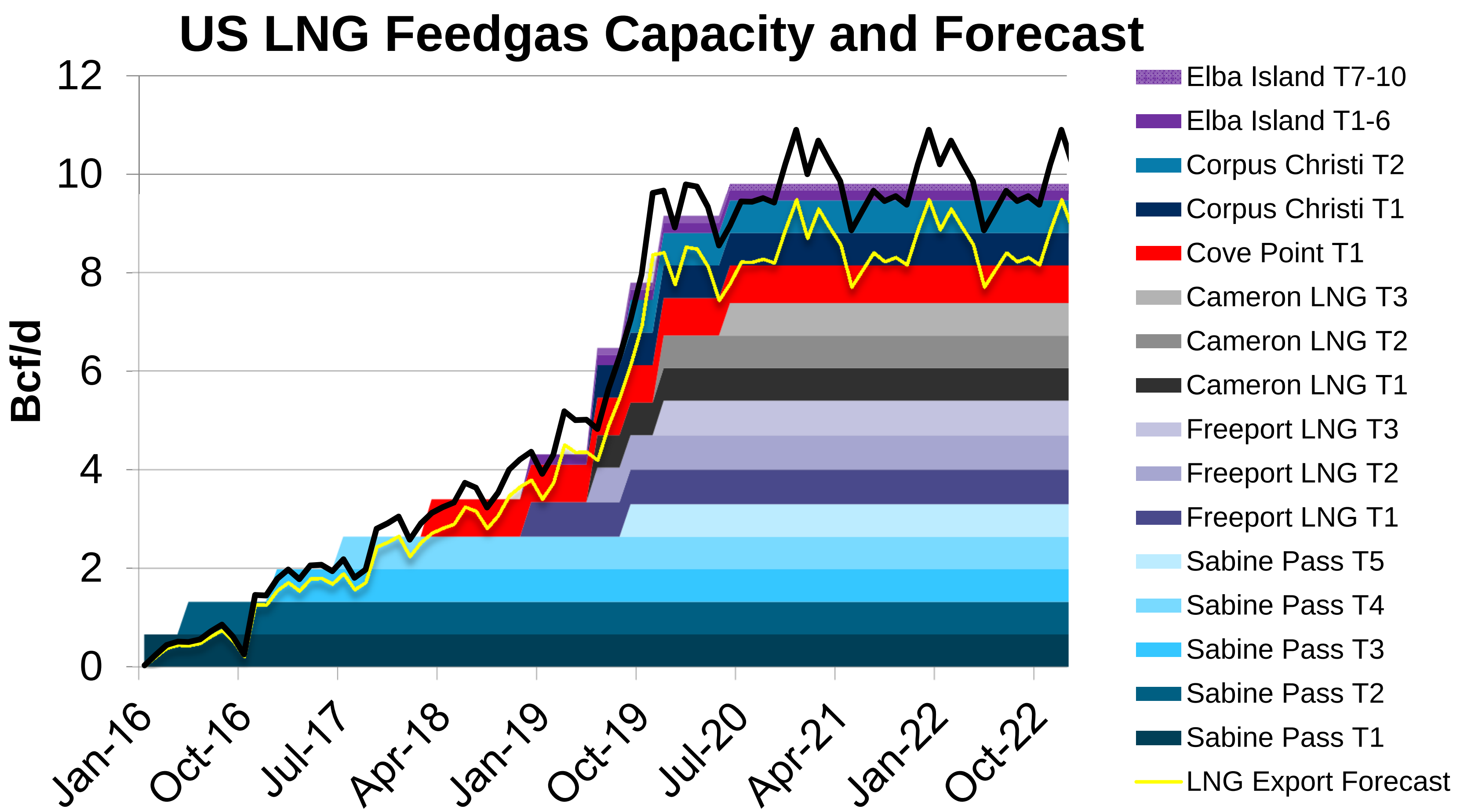
Source: LNG Allies, The US LNG Association, www.lngallies.com

High Utilization of US LNG Expected to Persist



Source: S&P Global Platts Analytics

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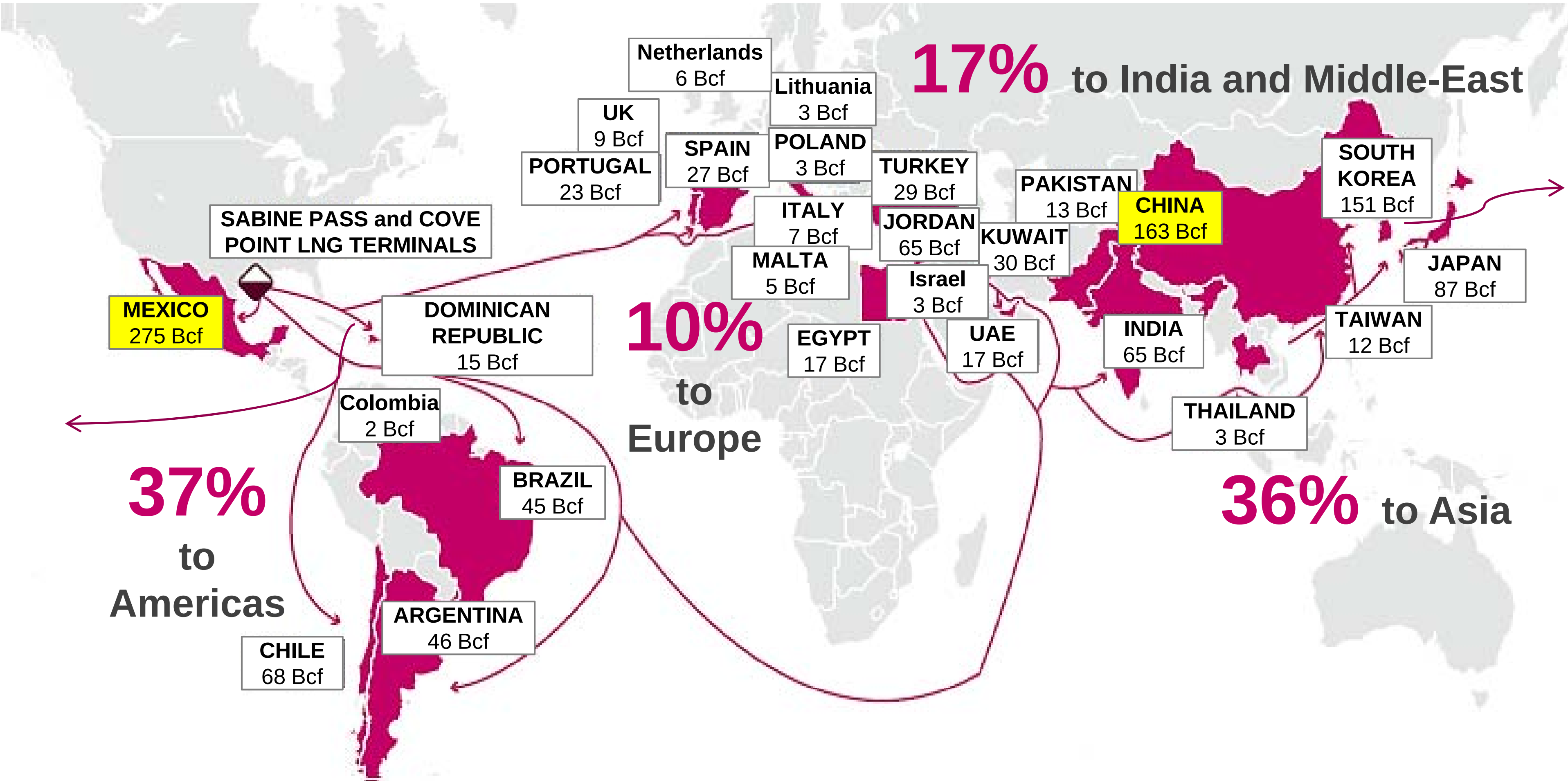
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Latin America and Asia main markets US LNG



1,240 BCF US LNG exports shipped to 27 countries

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

Source: S&P Global Platts Analytics

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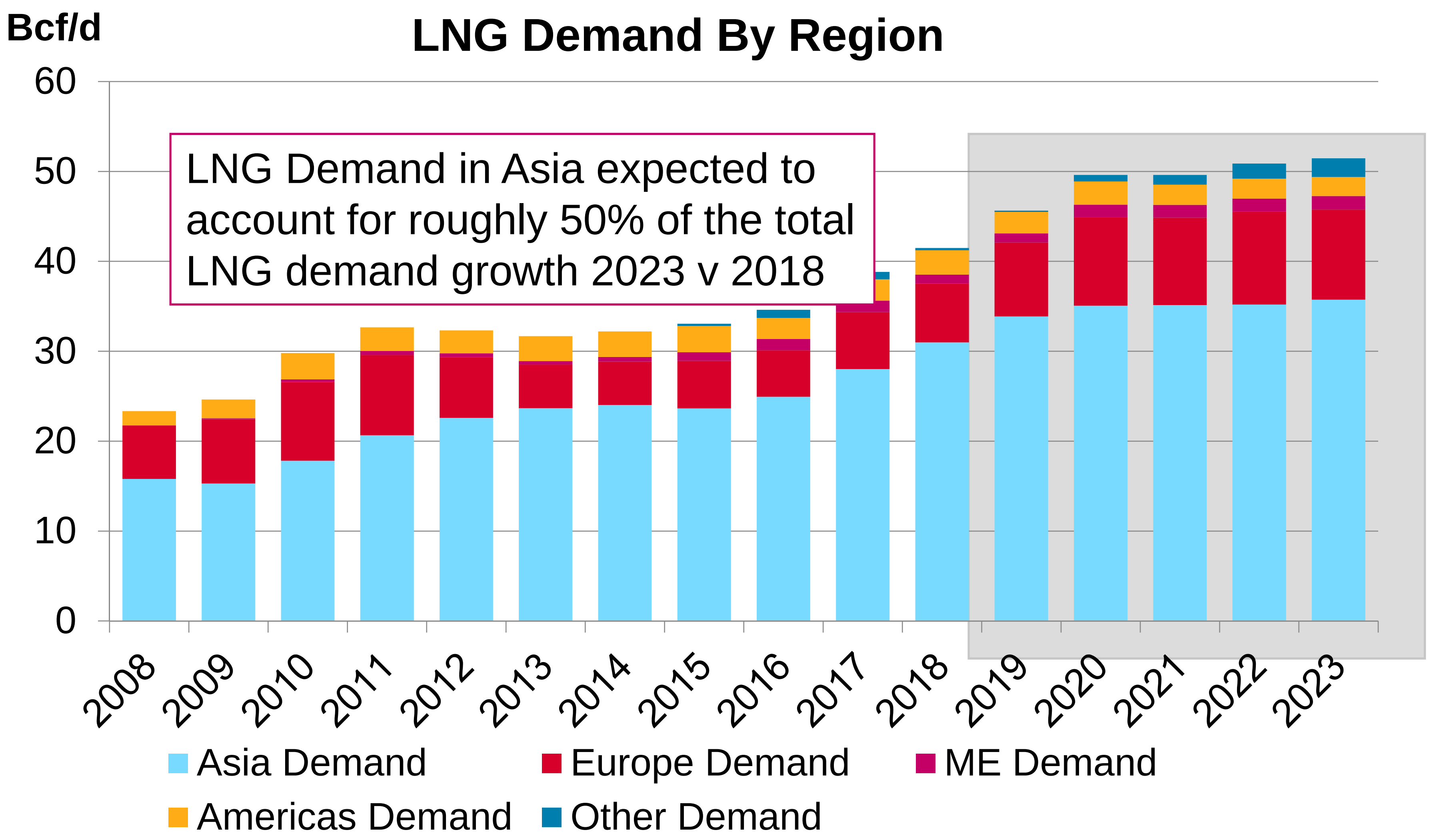
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Asia Clearly Driving LNG Demand



Source: S&P Global Platts Analytics

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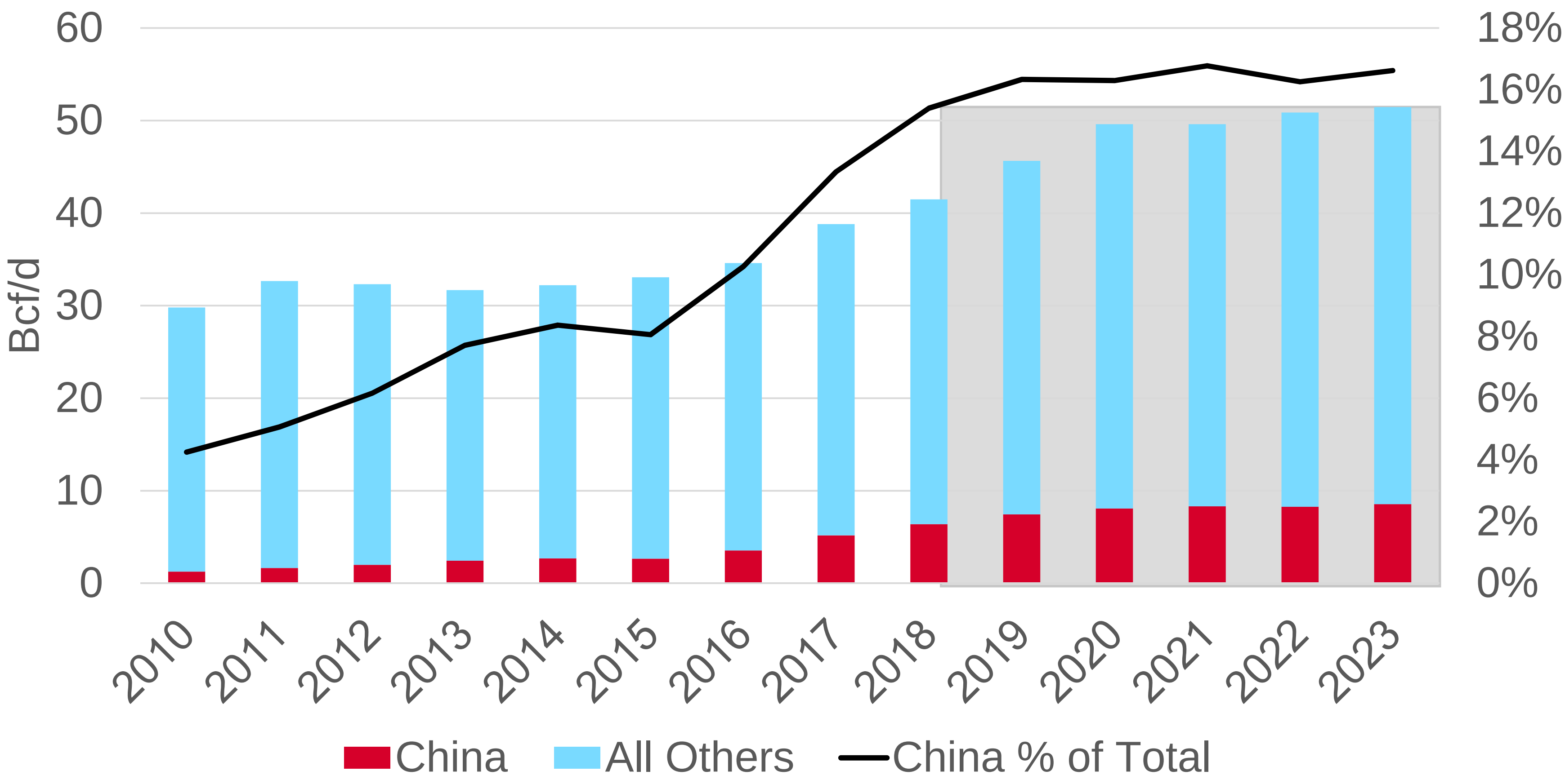
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

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



Source: S&P Global Platts Analytics

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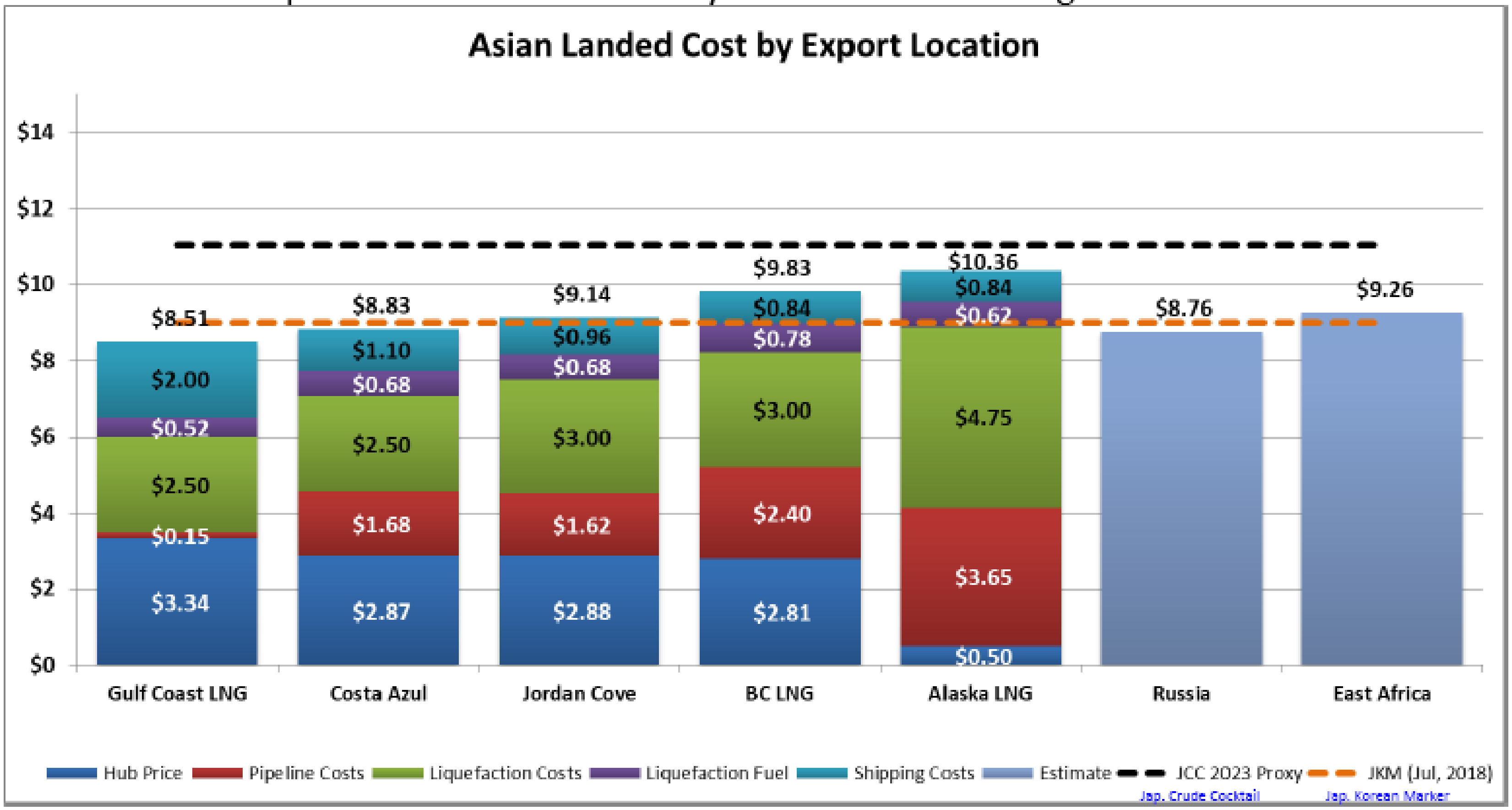
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

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

Source: Greg Ruben, KinderMorgan, Colorado Oil and Gas Association Trade presentation, August 21, 2018

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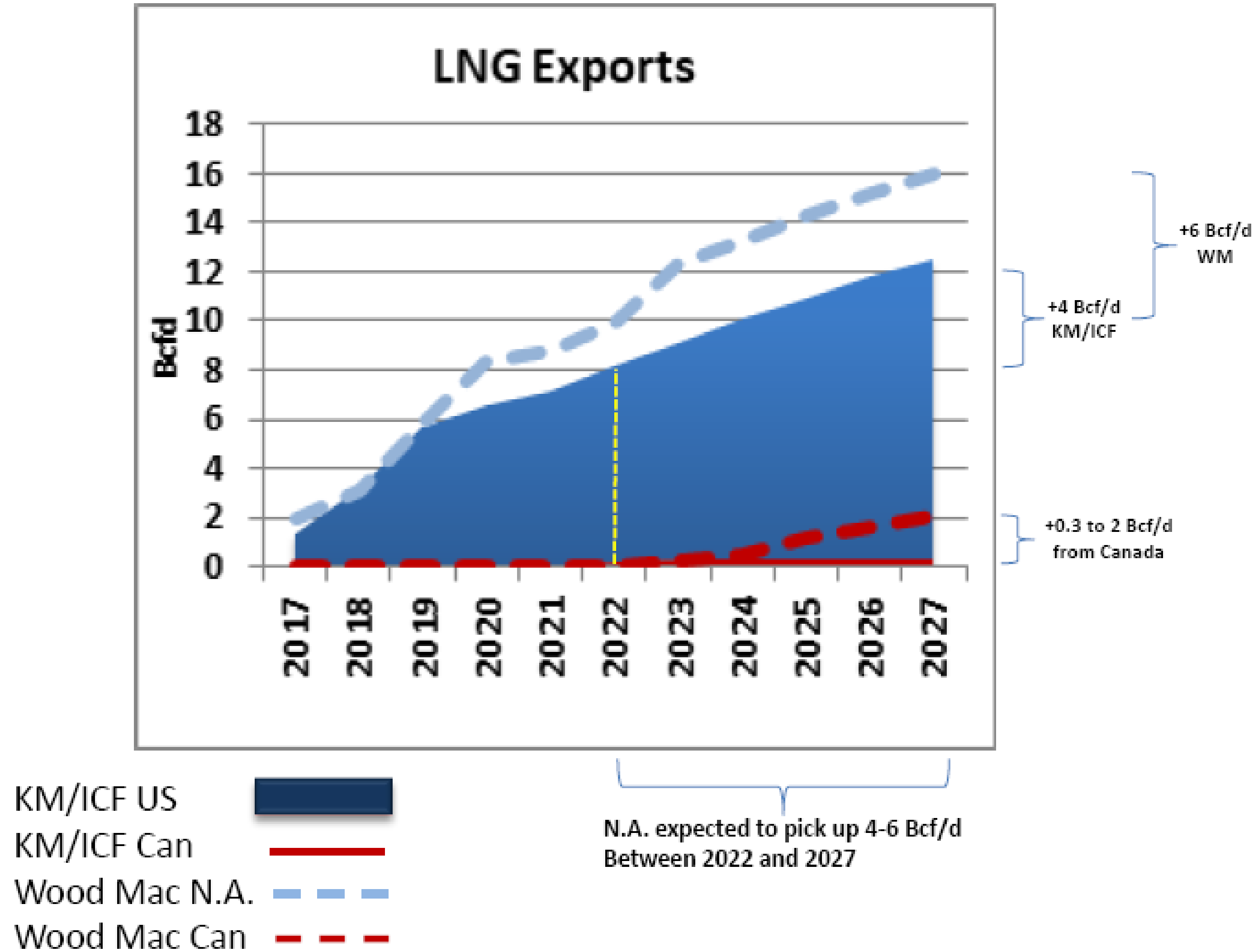
Projected Net North America LNG Exports



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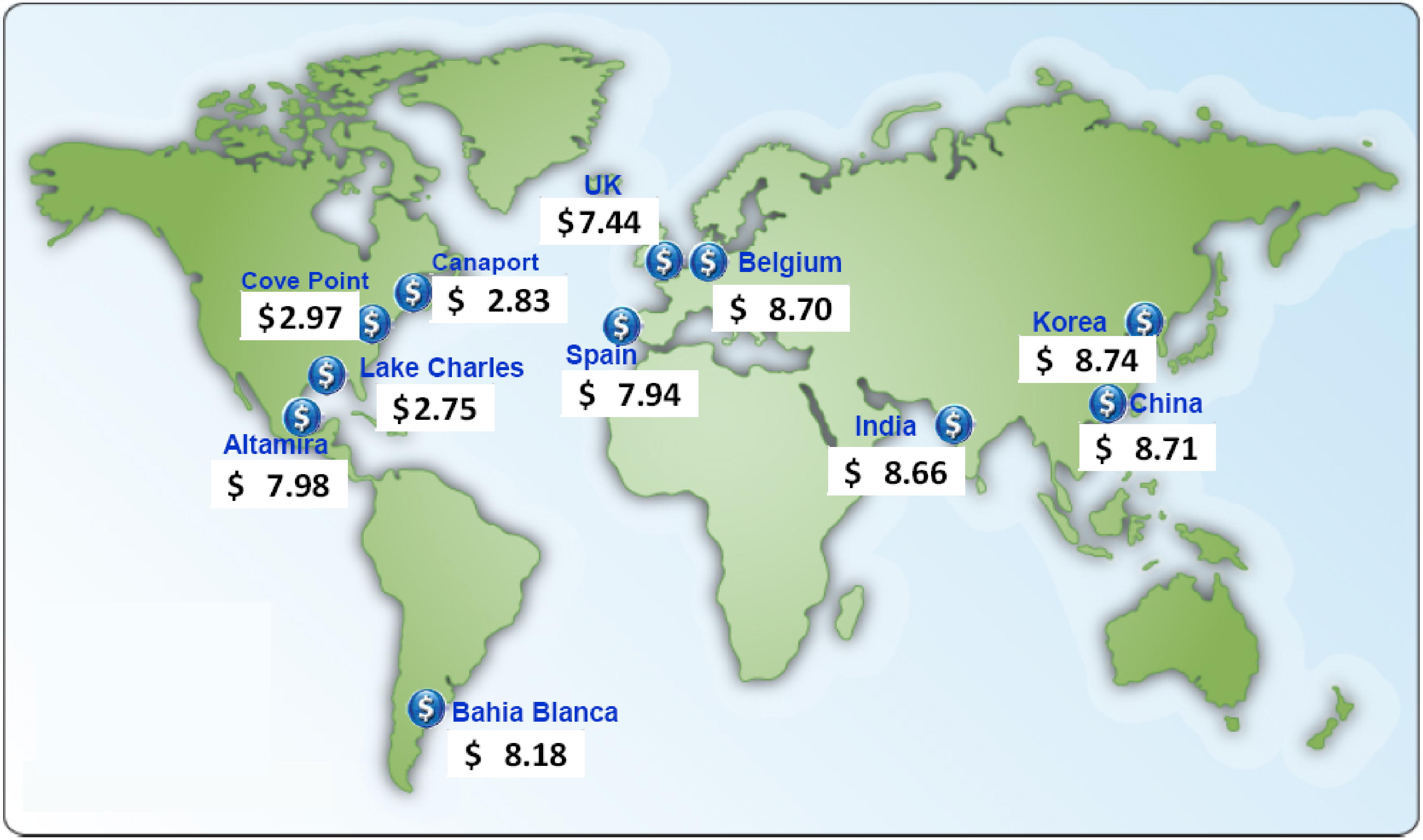
Source: Greg Ruben, KinderMorgan, Colorado Oil and Gas Association Trade presentation, August 21, 2018

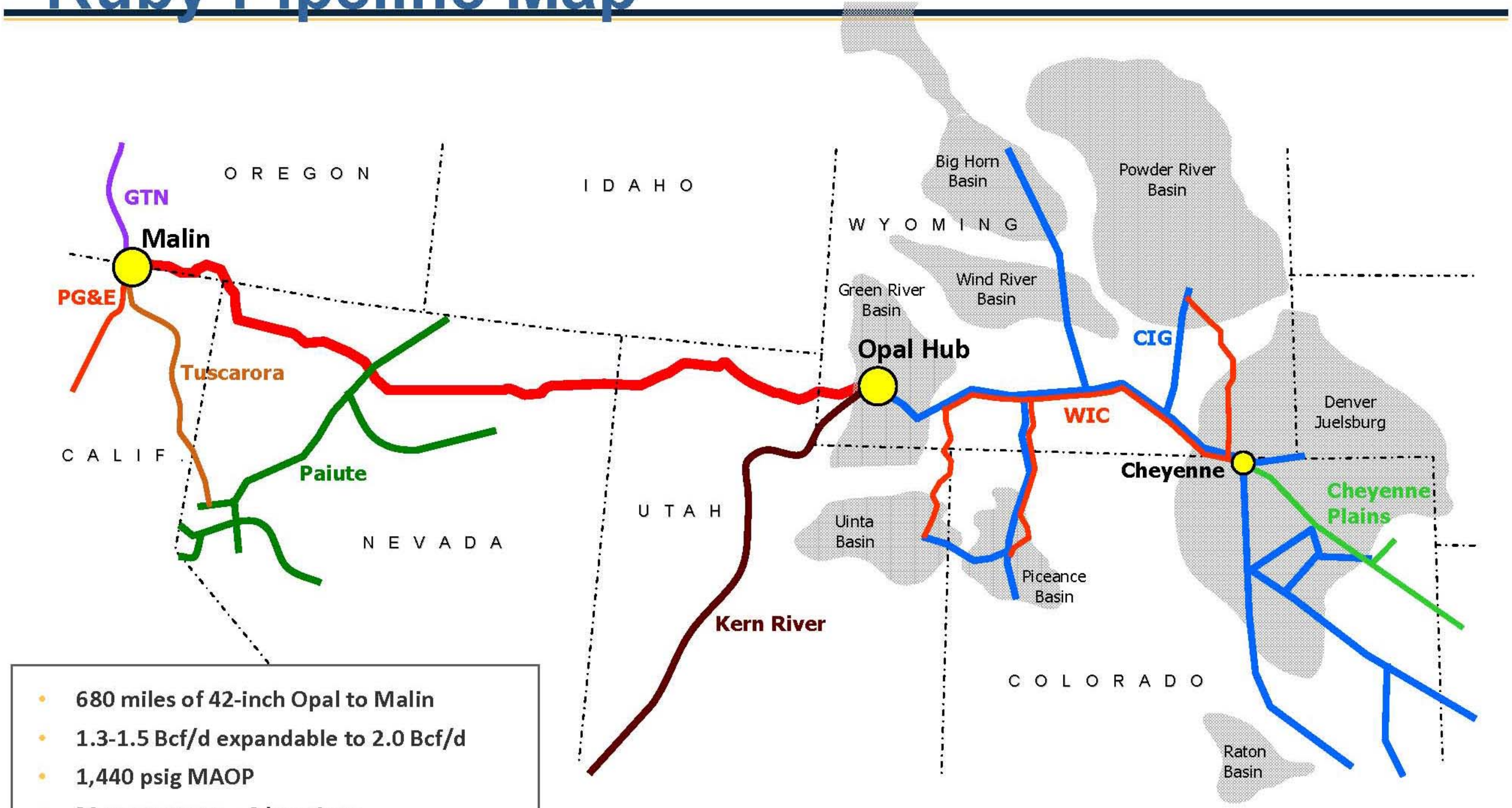
World LNG Estimated Landed Prices: May-18



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

Ruby Pipeline Map



- 680 miles of 42-inch Opal to Malin
- 1.3-1.5 Bcf/d expandable to 2.0 Bcf/d
- 1,440 psig MAOP
- Measurement – 8 locations
- 64%+/- Public Land
- 2 National Forests – Cache and Fremont

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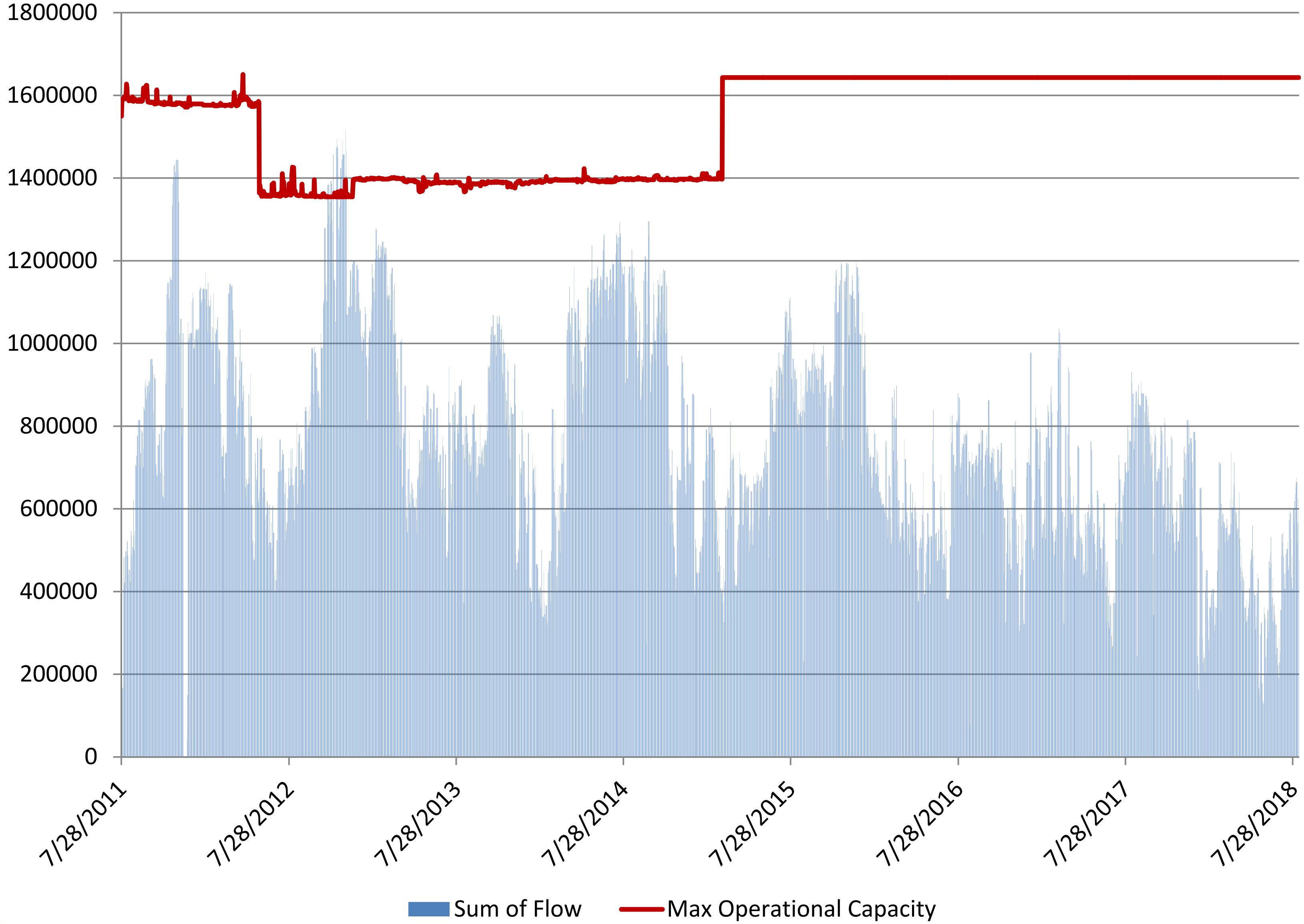
Ruby Capacity (west)



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Source: Bernadette Johnson, DrillingInfo

Uinta and Piceance to Pacific

Source: Veresen Corporate Presentation, November 2014

Pacific Connector Pipeline

Source: Oregon Green Energy Guide

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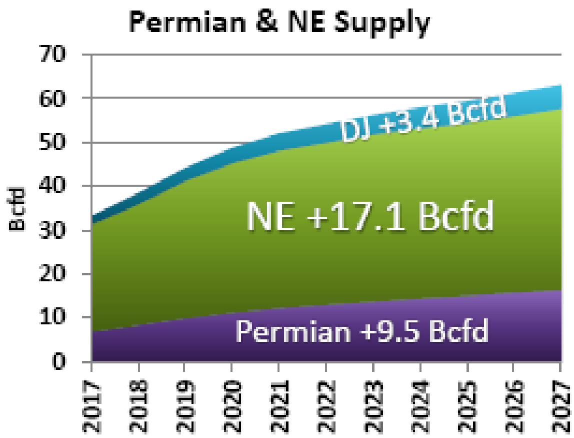
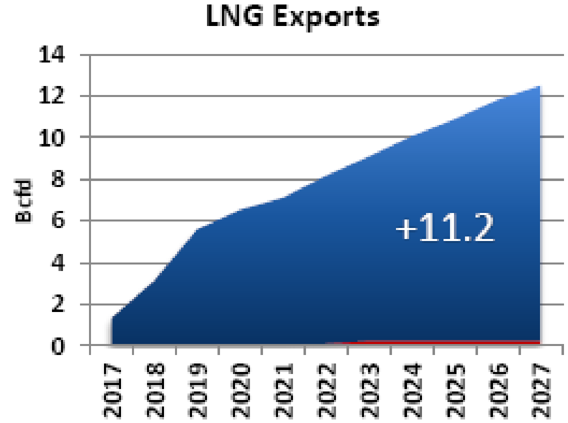
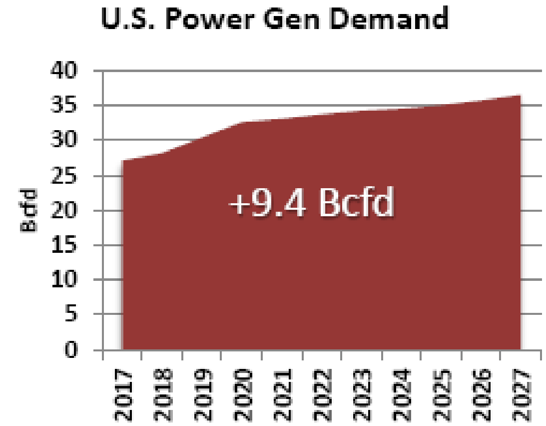
Key L/T Fundamental Trends



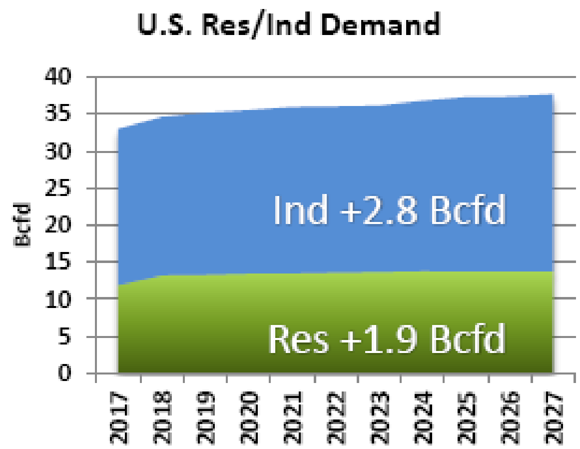
Continued supply increases



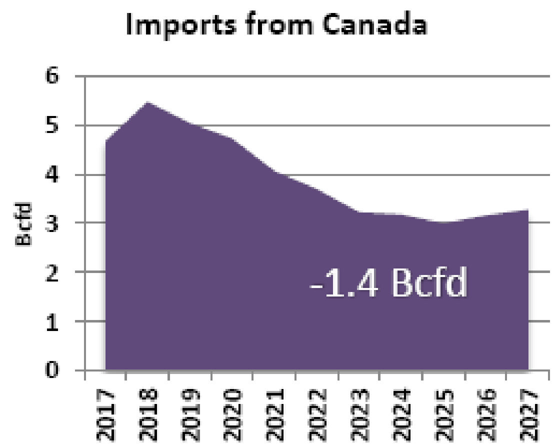
U.S. becomes net exporter



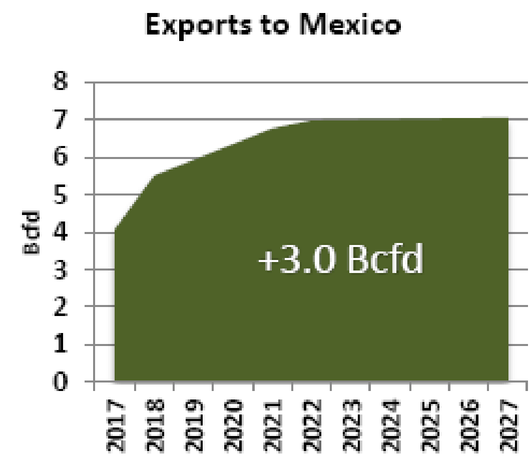
More Gas-fired generation



Industrial demand growth



Less Canadian Exports to U.S.



More U.S. Exports to Mexico

Source: ICF model with Kinder Morgan Assumptions

Key Takeaways

- Forecasted North American **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)
- 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
- U.S. natural gas producers are dependent upon export growth

Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Contact Information

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