Accessing New Markets for Rockies Natural Gas

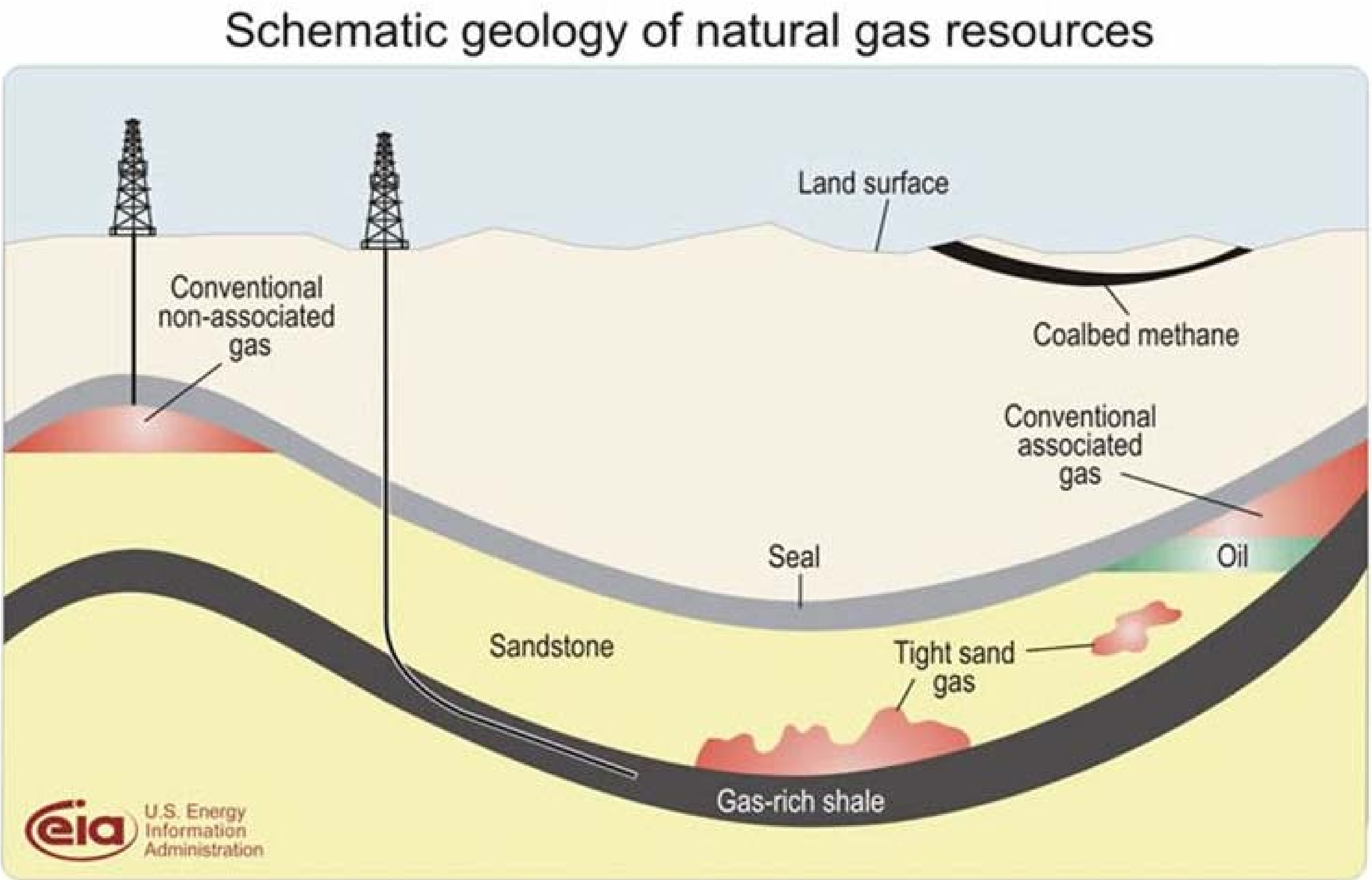
Presentation to:
2018 Uinta Basin Energy Summit

By:
John Harpole

Mercator Energy

August 30, 2018

It is not a scarce resource anymore

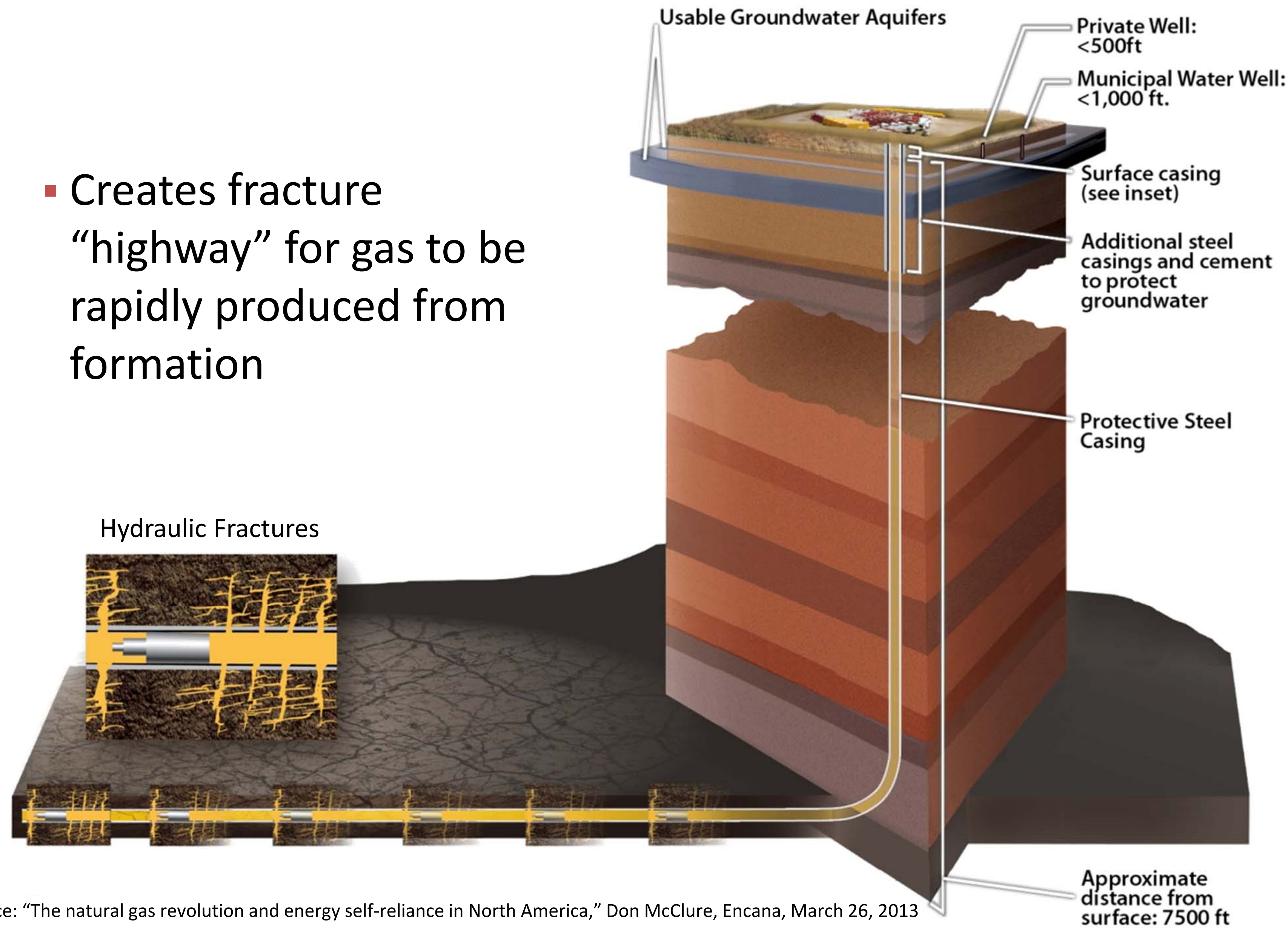


Source: US Energy Information Administration

Hydraulic Fracturing

Pumping fluid under high pressure to fracture formation

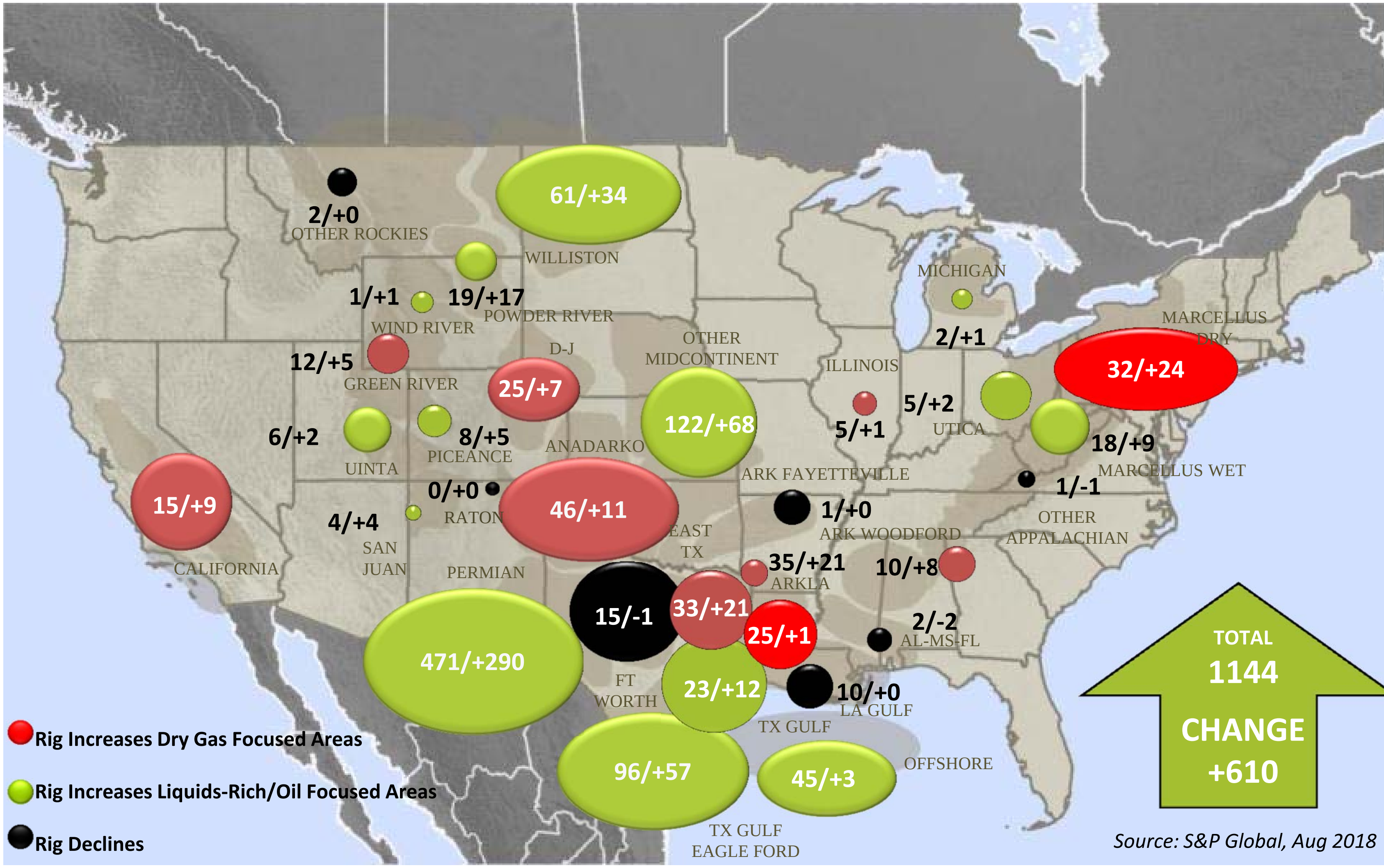
- Creates fracture "highway" for gas to be rapidly produced from formation



Source: "The natural gas revolution and energy self-reliance in North America," Don McClure, Encana, March 26, 2013

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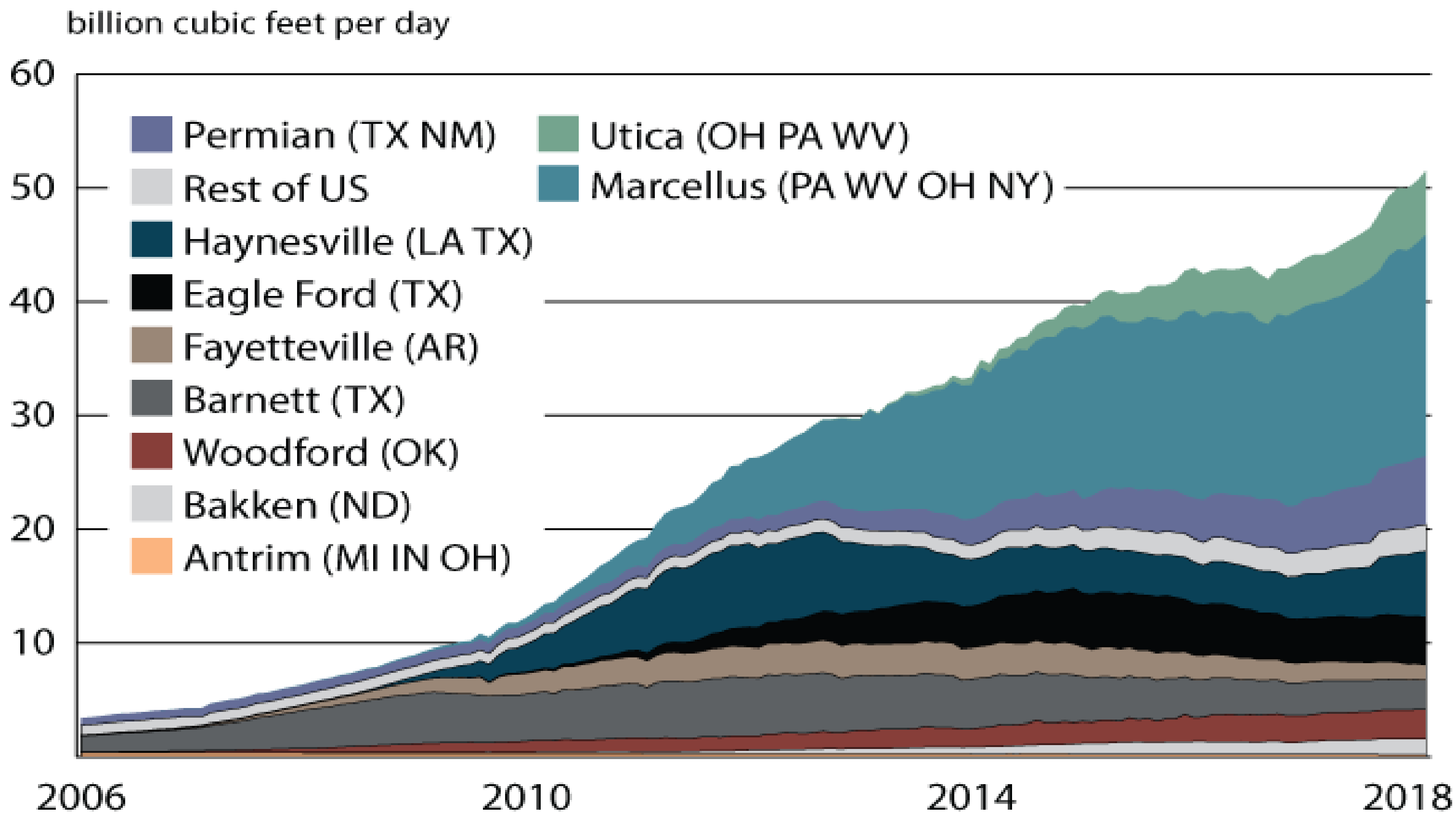
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

U.S. Dry Shale Gas Production



Source: EIA Natural Gas Weekly Update, 03 May 2018

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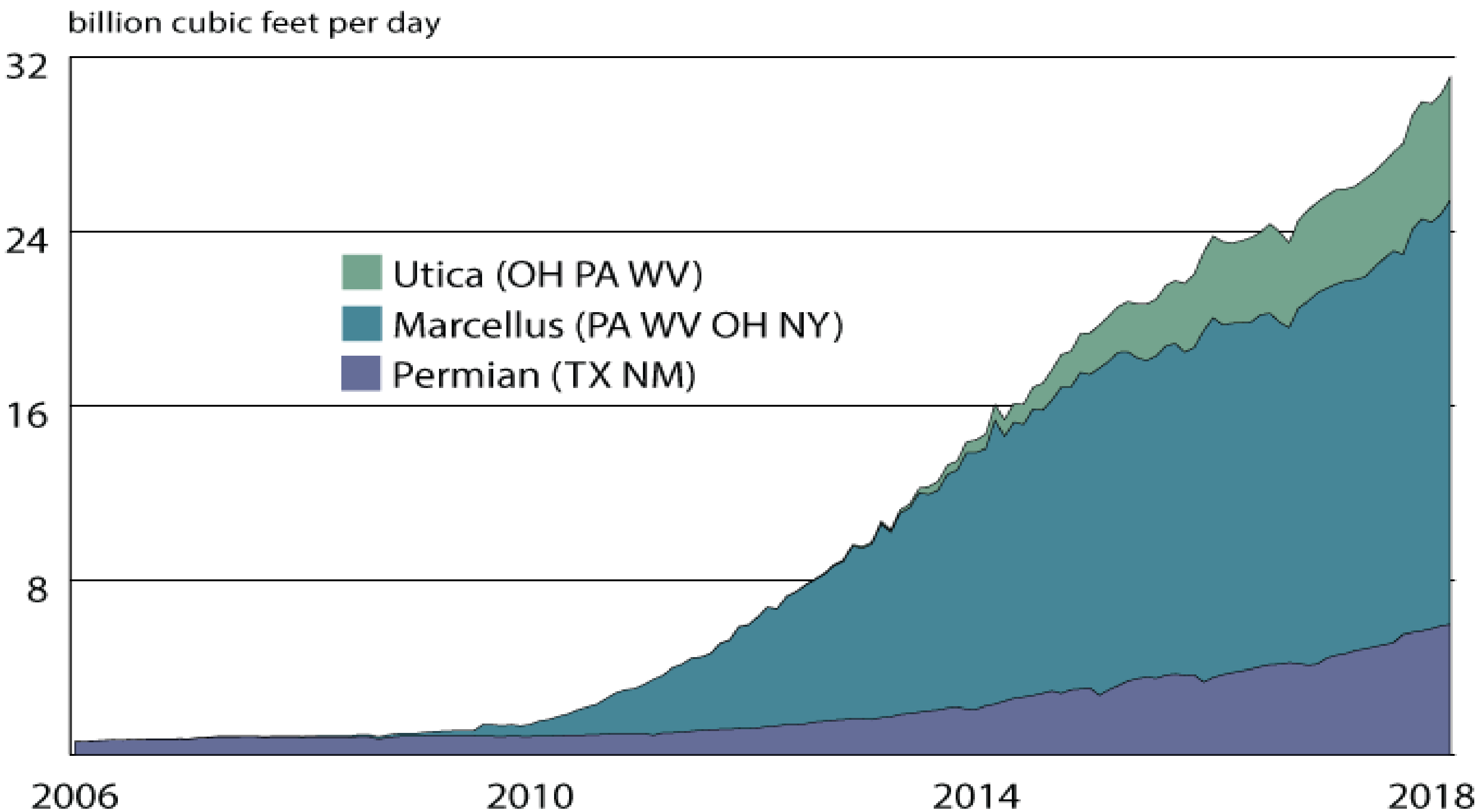
Source: LNG Allies, The US LNG Association, www.lngallies.com

Permian, Marcellus, Utica Shale Gas Production



Source: EIA Natural Gas Weekly Update, 03 May 2018

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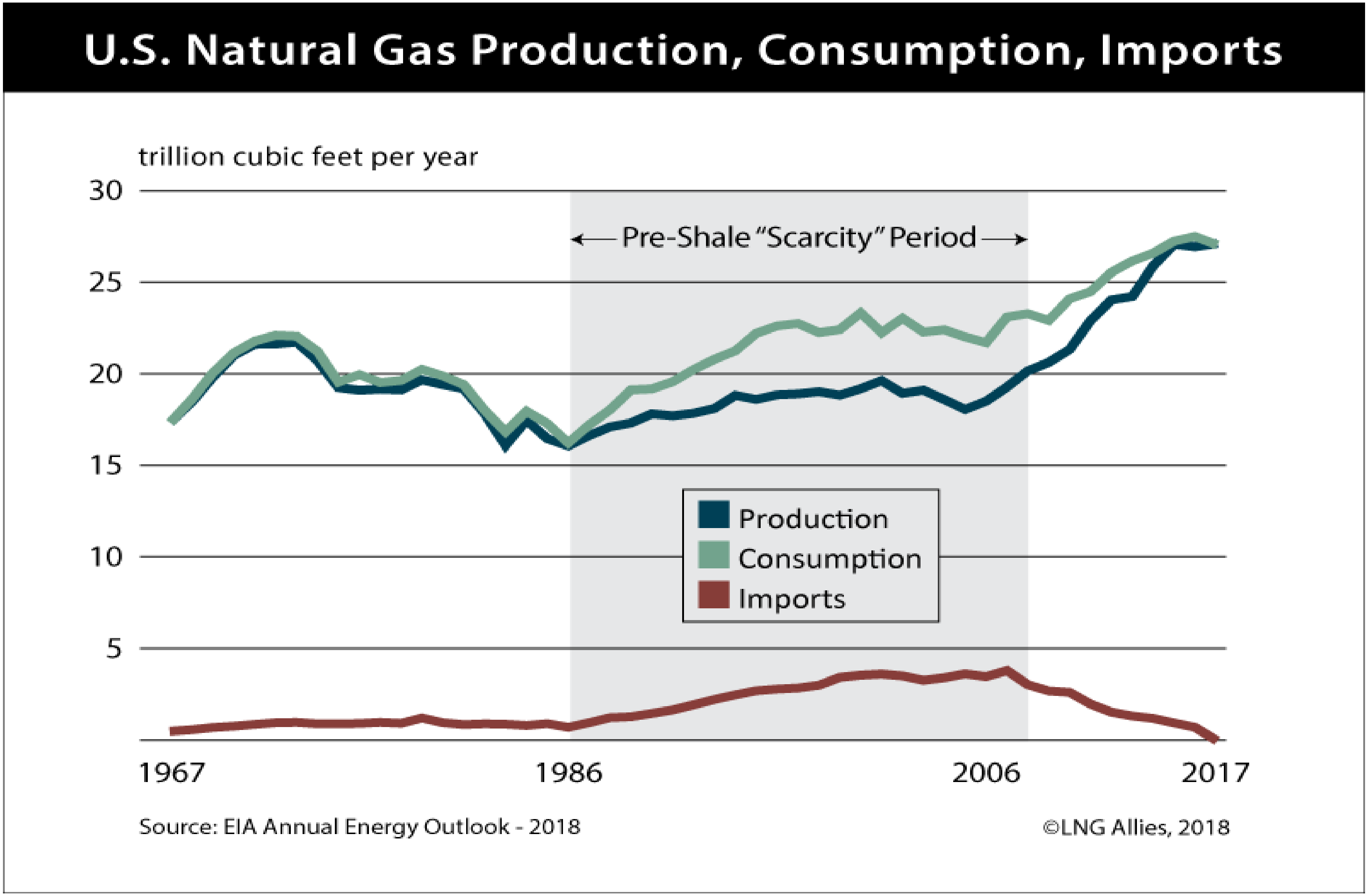
Source: LNG Allies, The US LNG Association, www.lngallies.com



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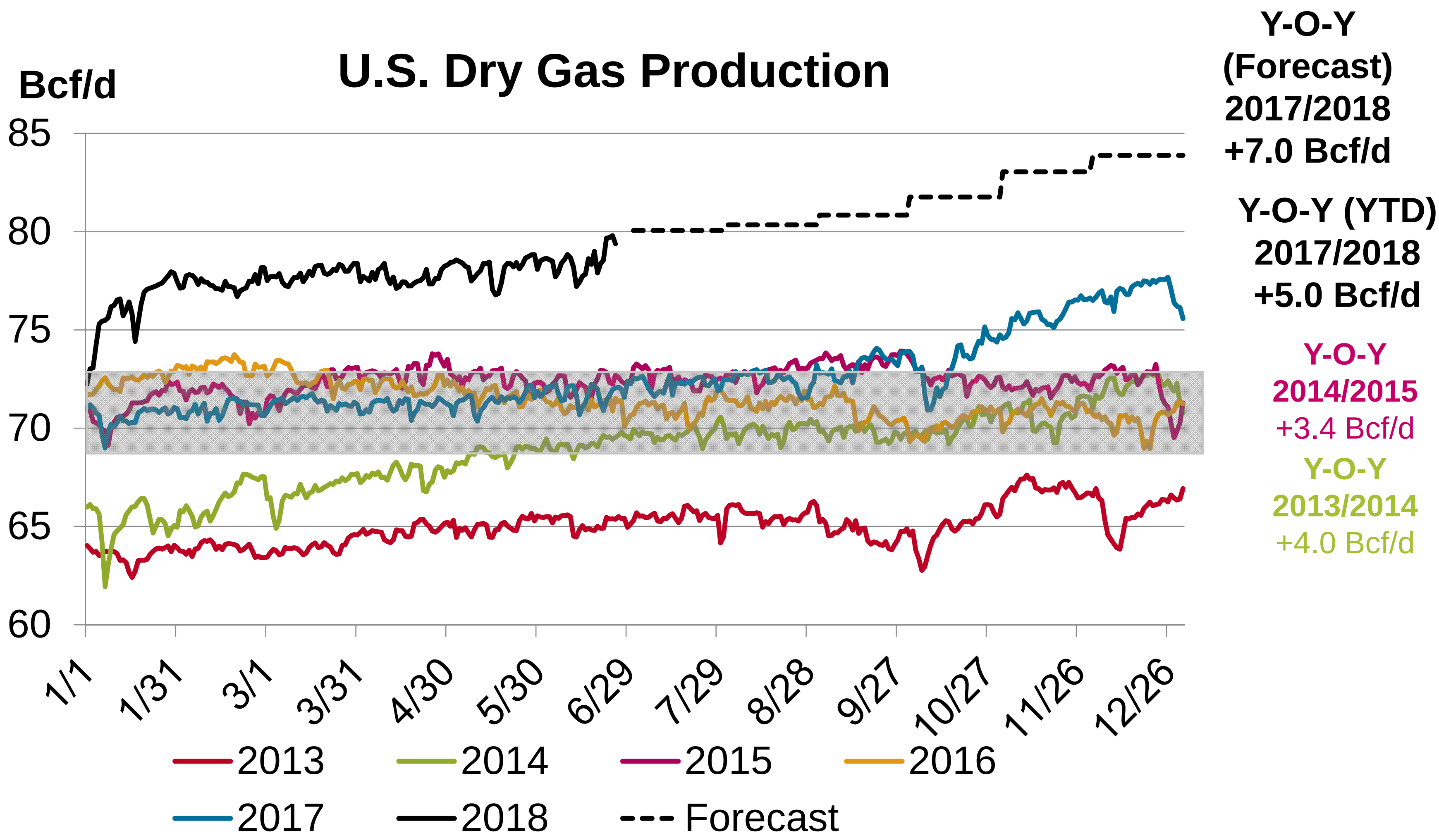
Source: LNG Allies, The US LNG Association, www.lngallies.com

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



Source: S&P Global Platts Analytics

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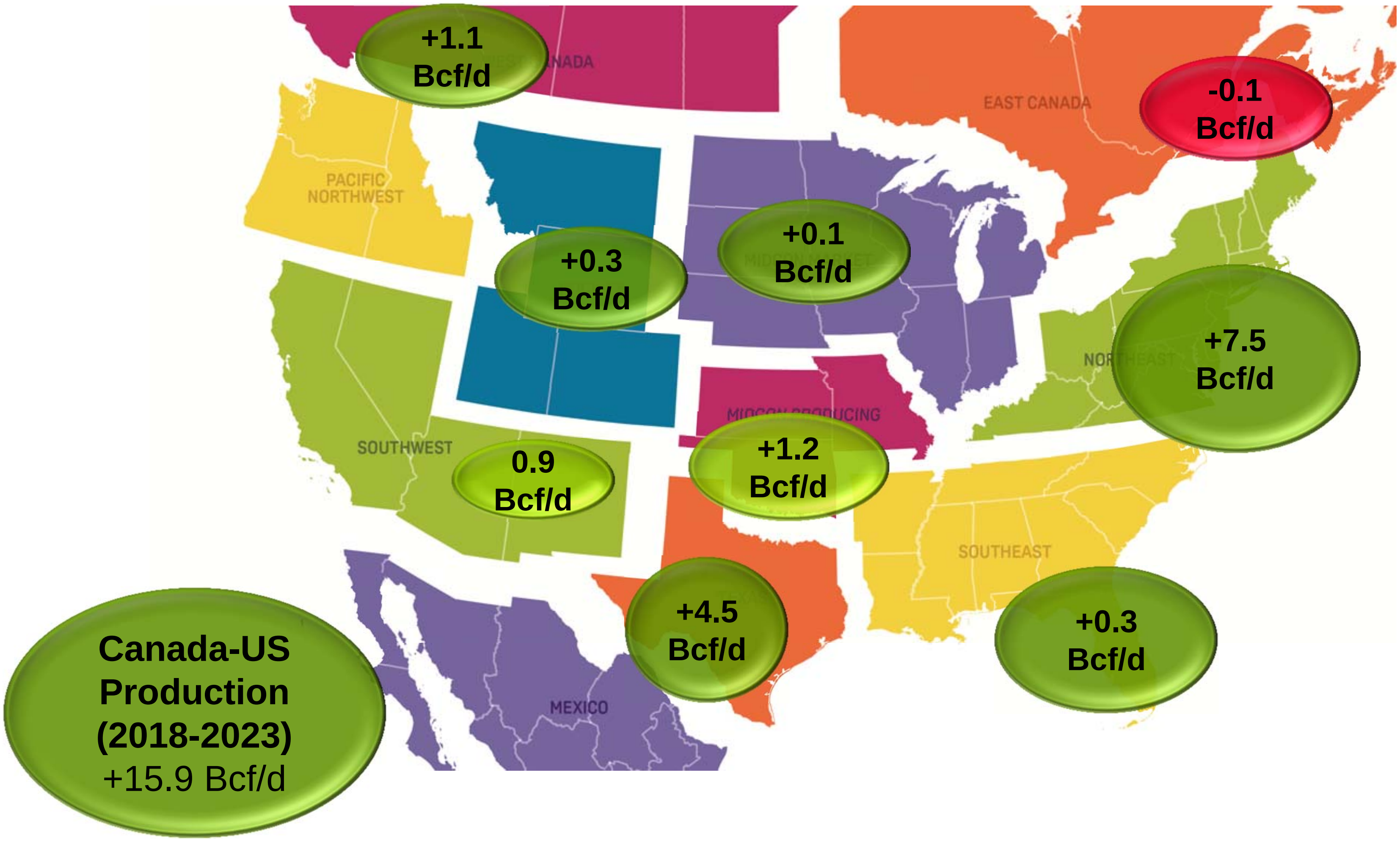
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Northeast continues to be largest driver of growth, associated gas grows on higher oil price



Source: S&P Global Platts Analytics

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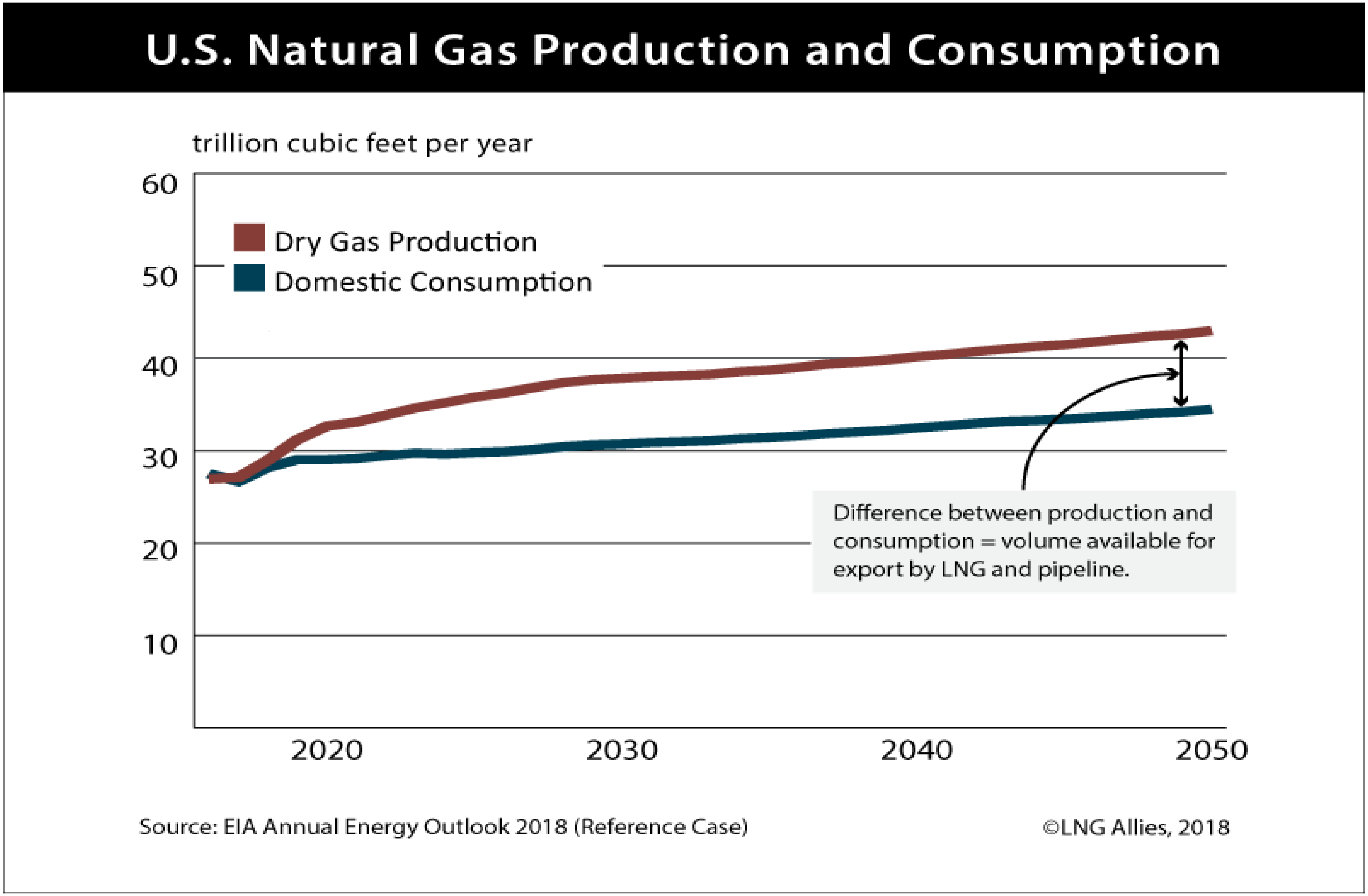
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018



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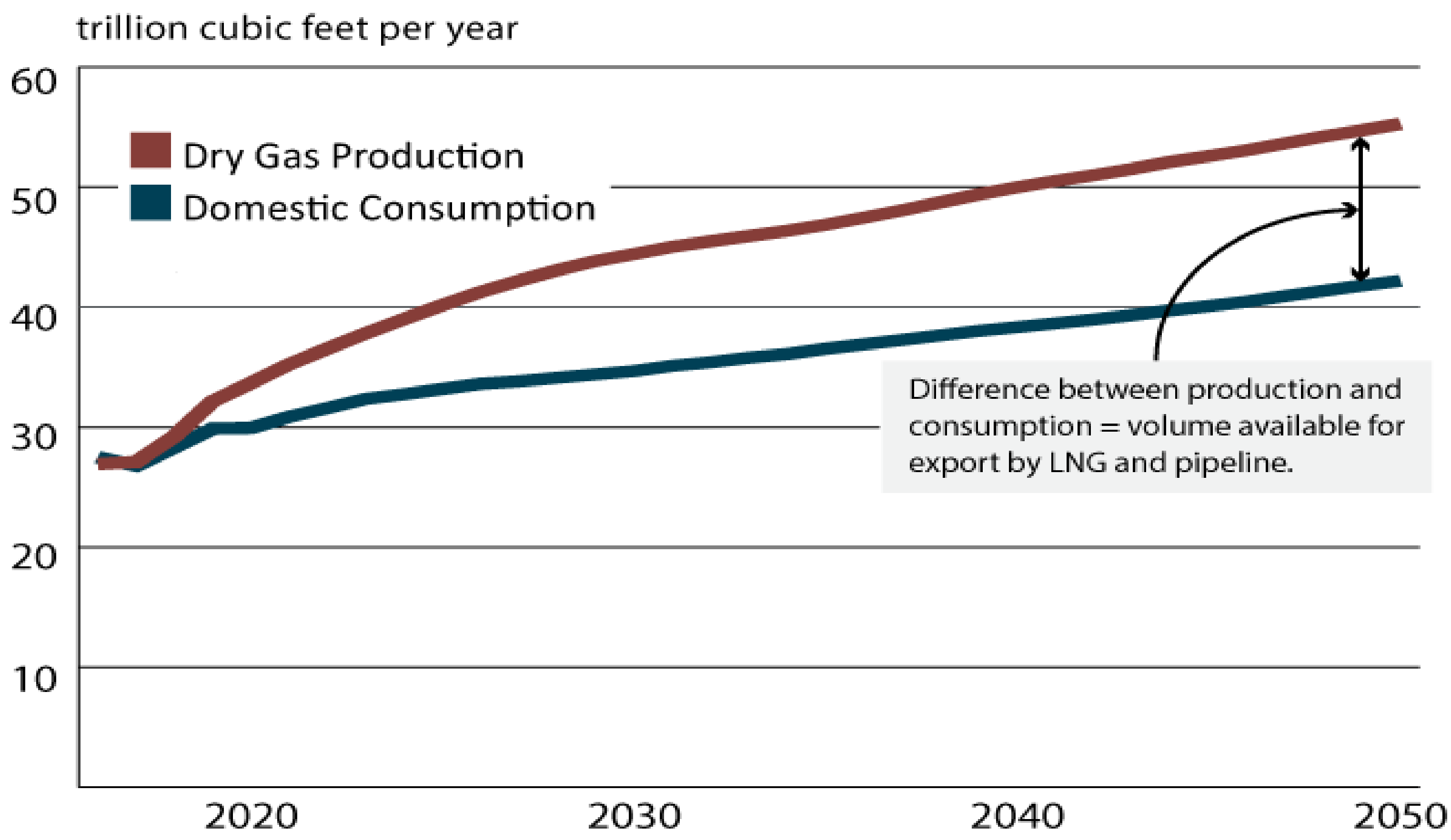
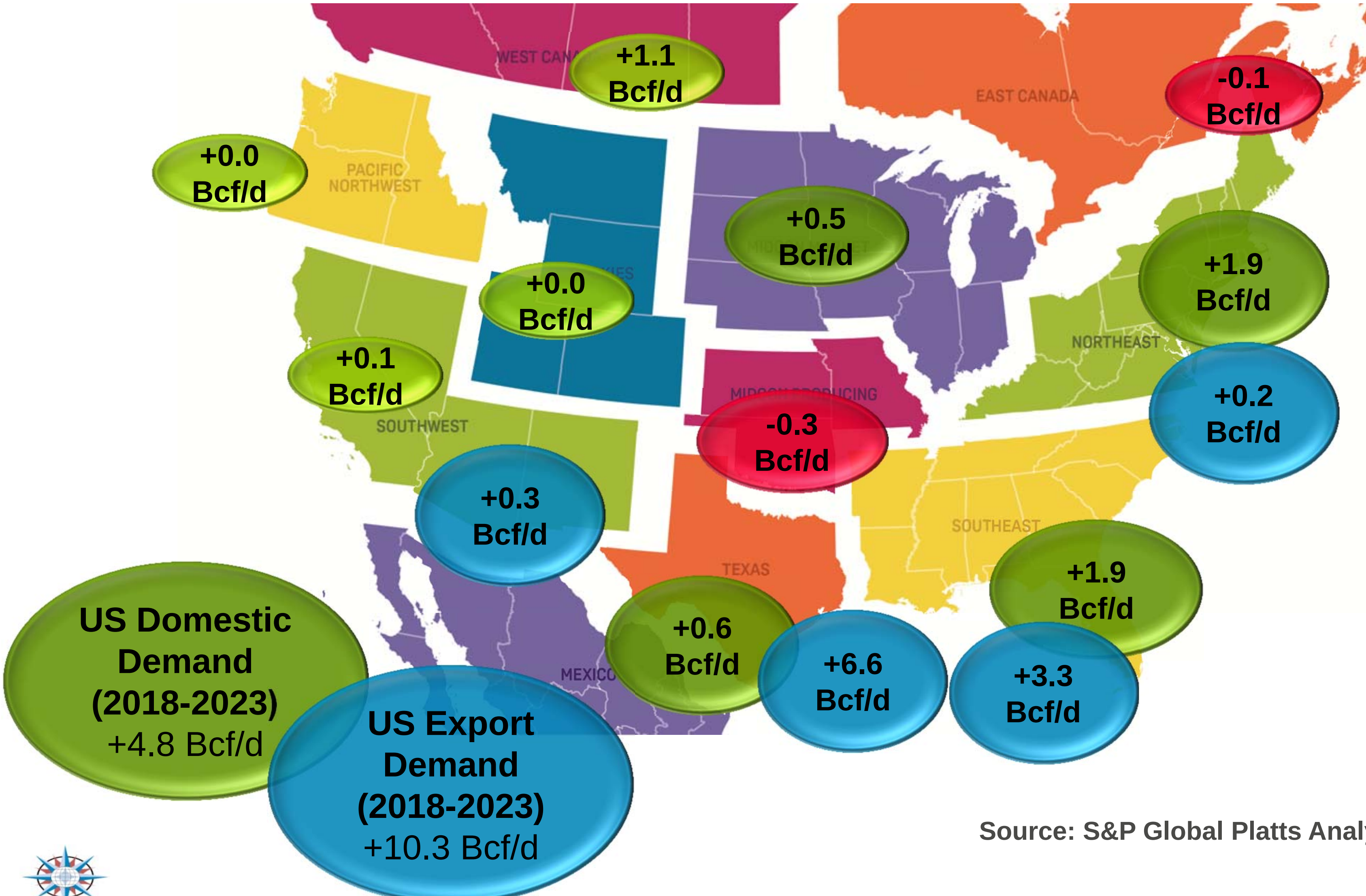
Source: LNG Allies, The US LNG Association, www.lngallies.com

U.S. Natural Gas Production and Consumption



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

Domestic demand growth slows, global demand drives price and production



Source: S&P Global Platts Analytics

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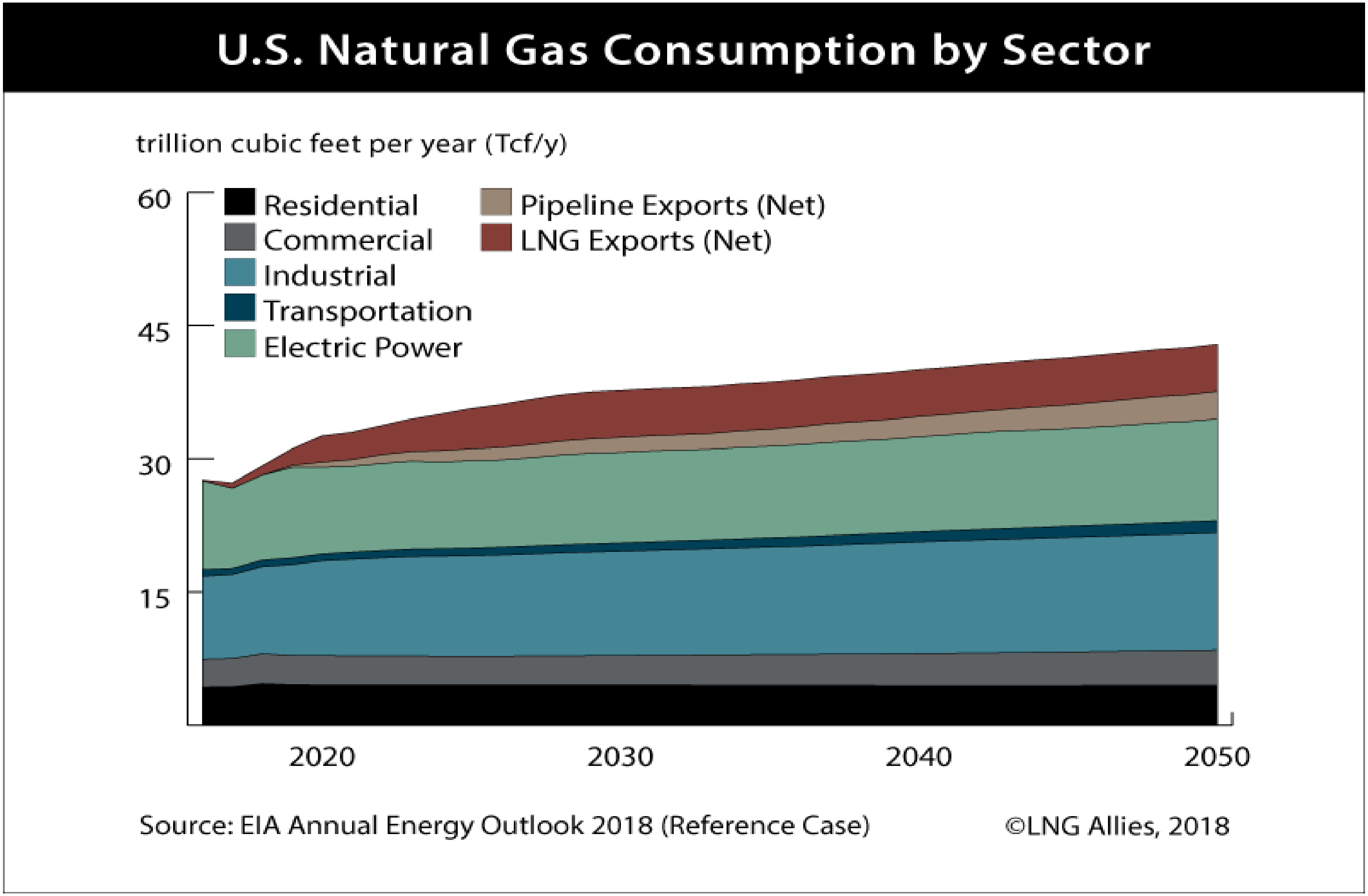
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018



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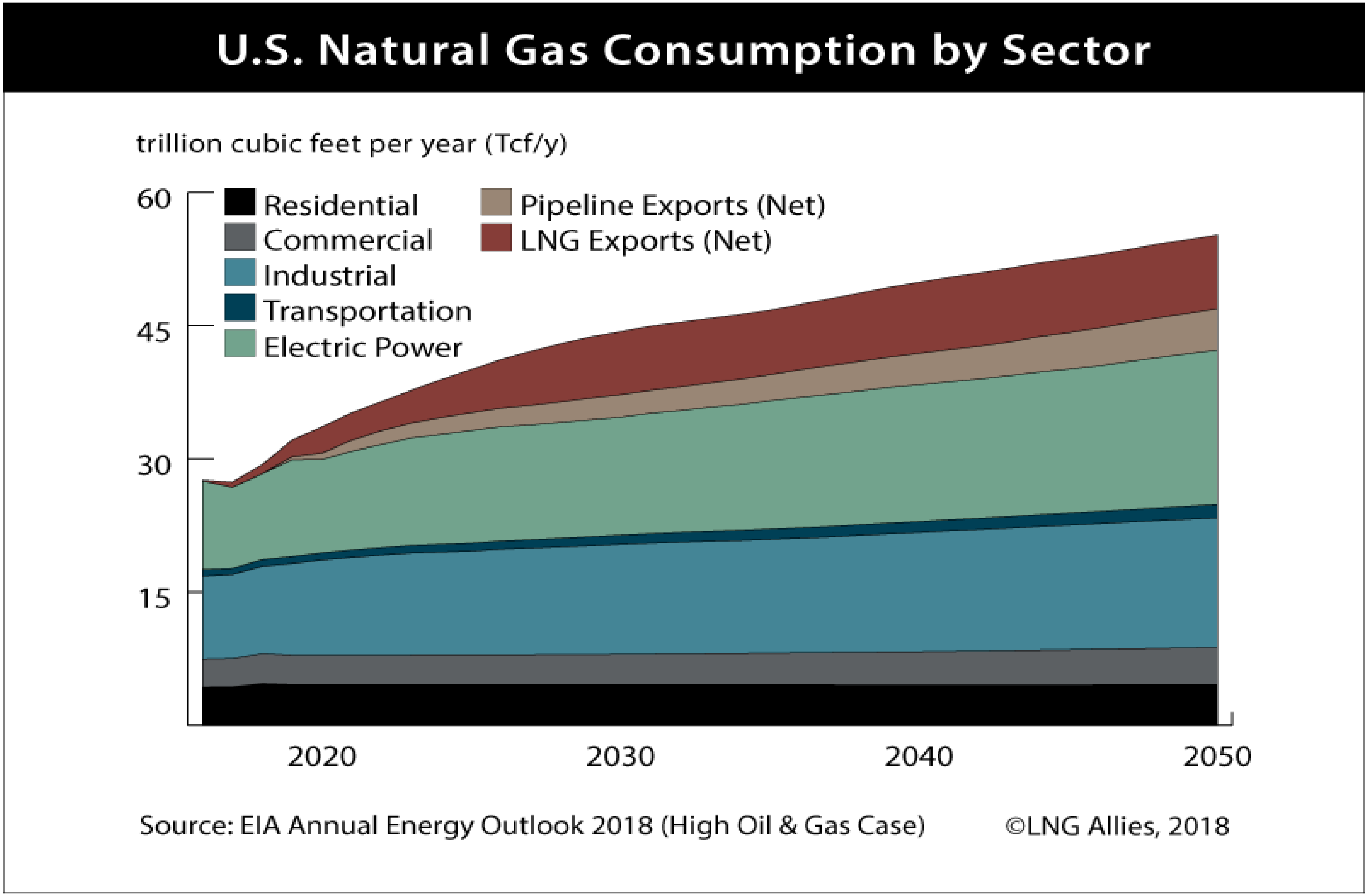
Source: LNG Allies, The US LNG Association, www.lngallies.com



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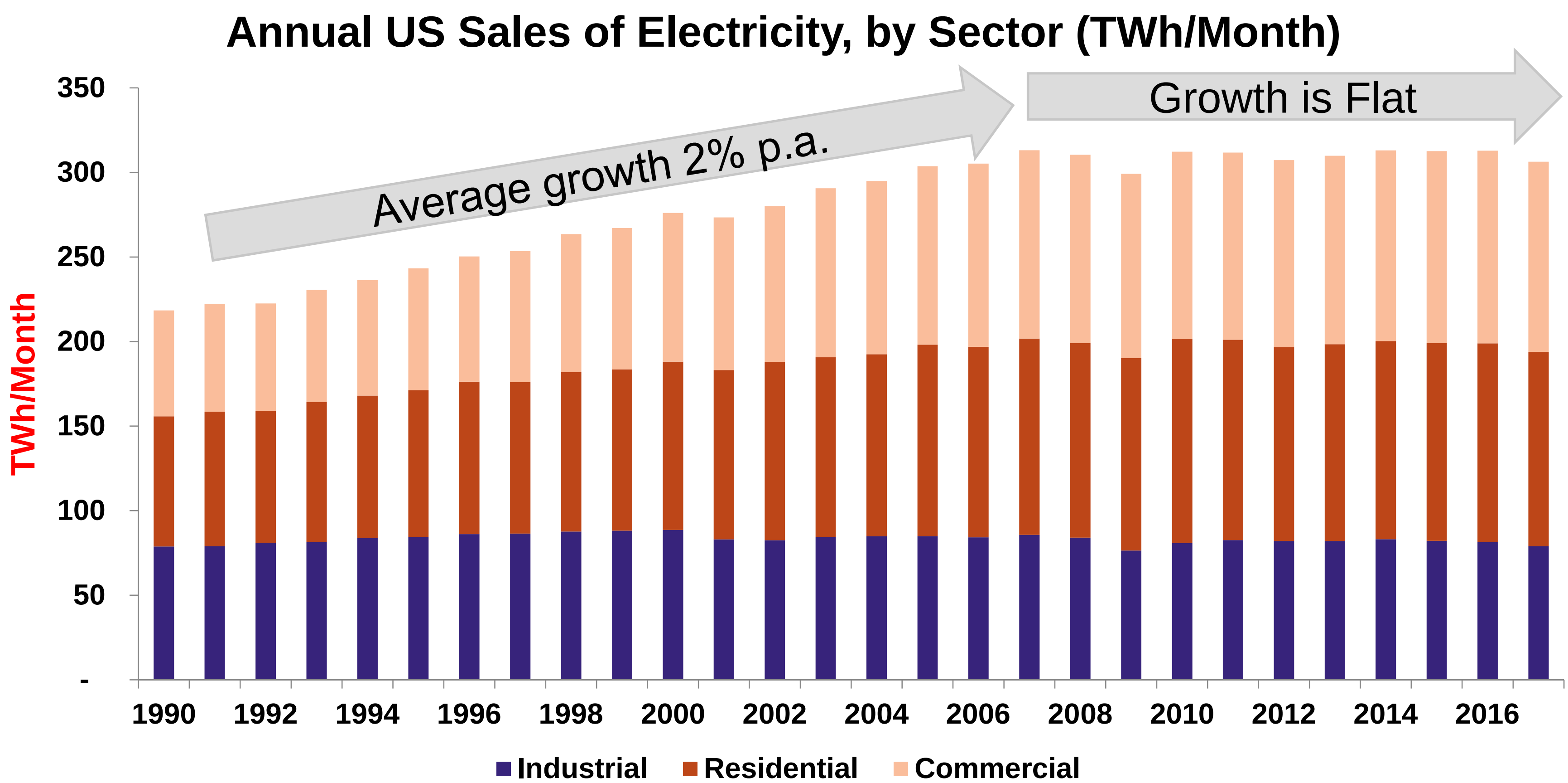
Source: LNG Allies, The US LNG Association, www.lngallies.com

Res-Com and Industrial Power Growth Plateaued

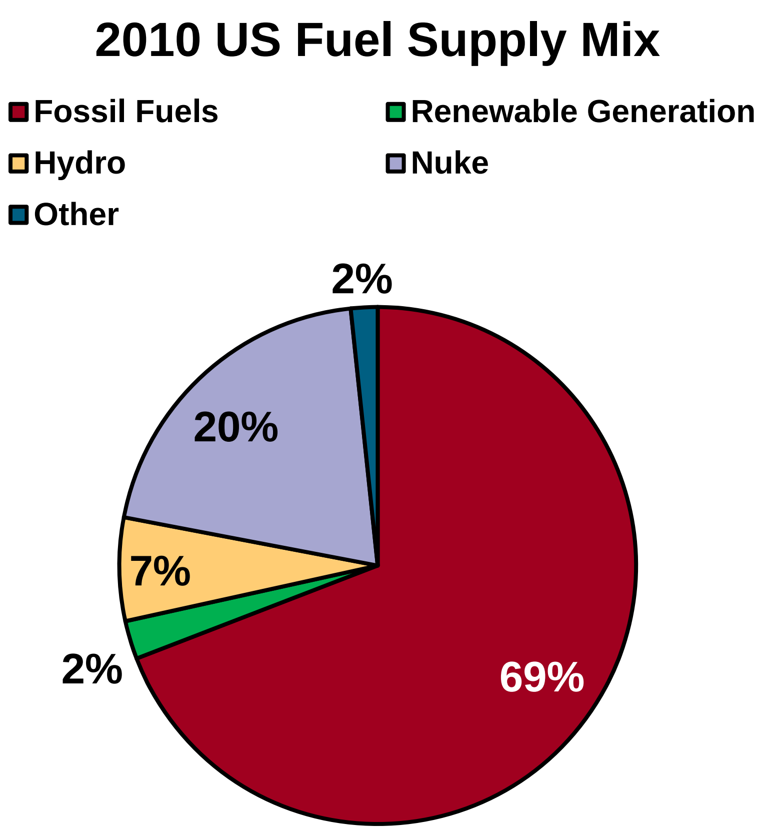


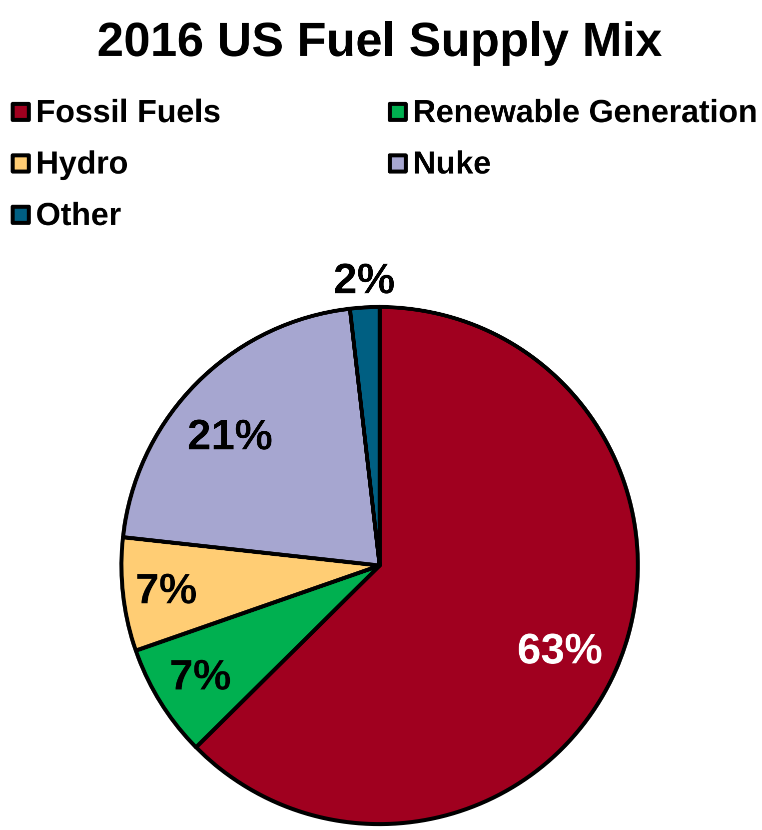
Source: S&P Global Platts Analytics

Source: EIA

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

Renewable generation eating into fossil fuel market share





Source: EIA

Source: S&P Global Platts Analytics

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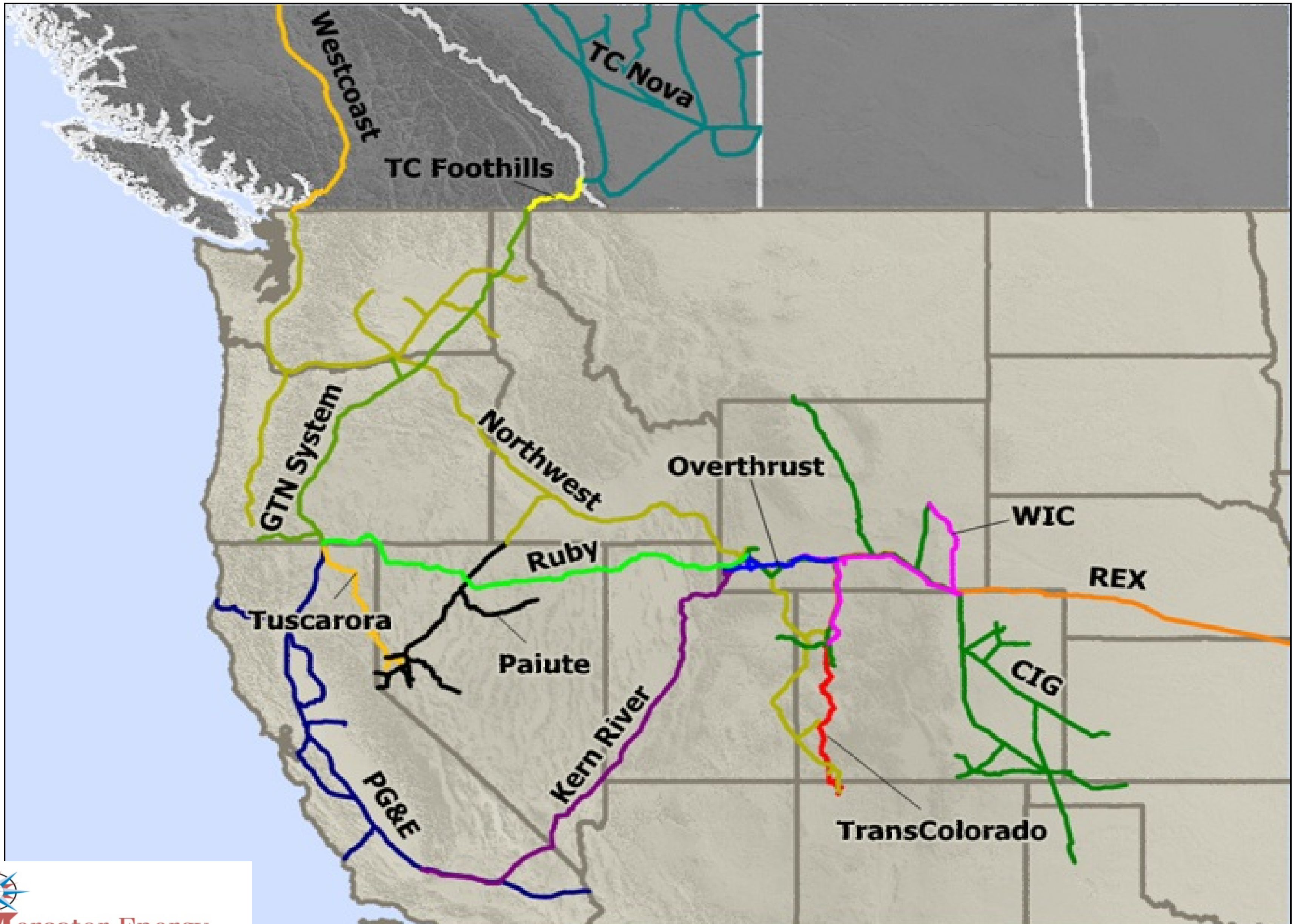
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Rockies Natural Gas Supply/Demand Trends

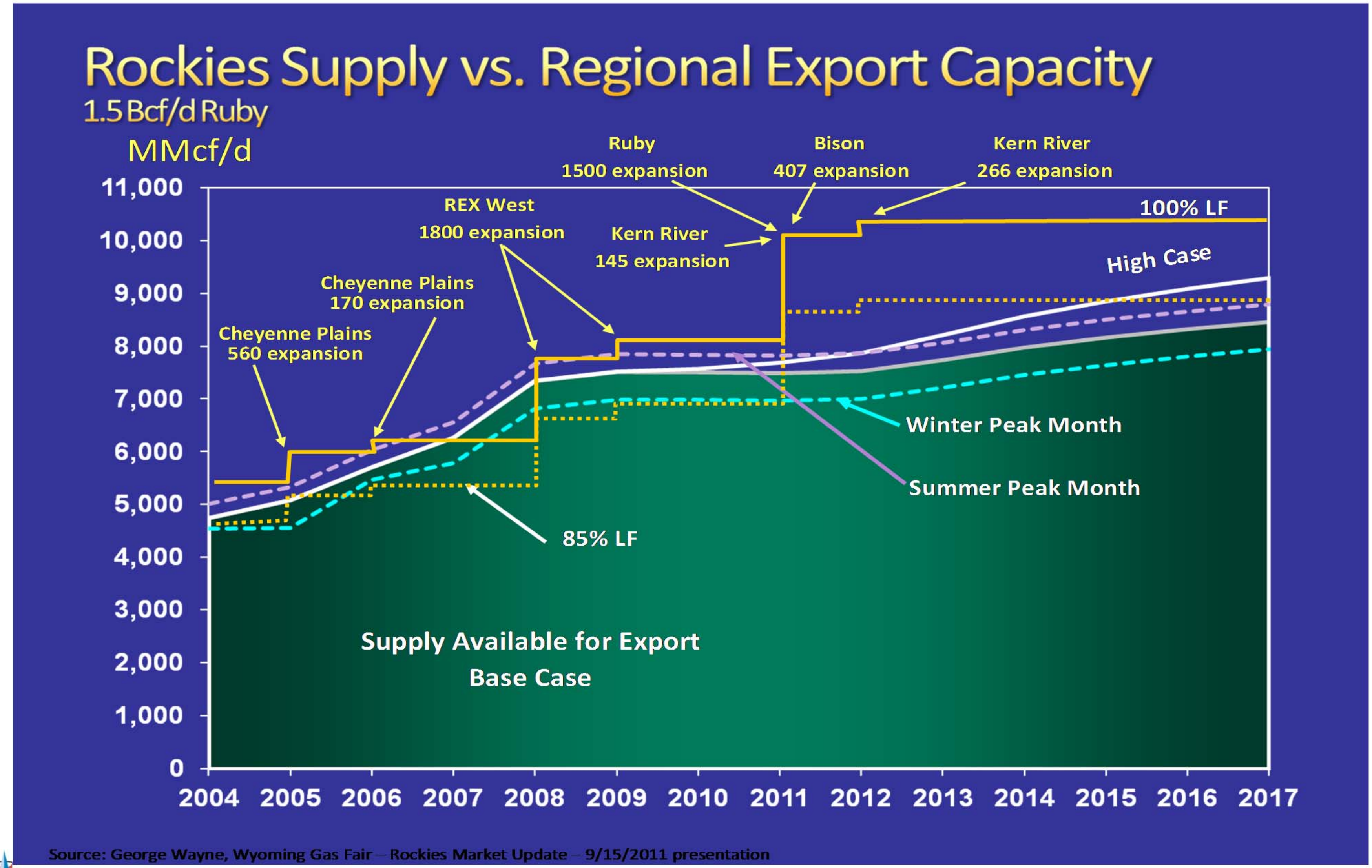
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Rockies Pipeline Infrastructure



Source: Bentek Rockies Observer

Rockies Supply vs. Regional Export Capacity



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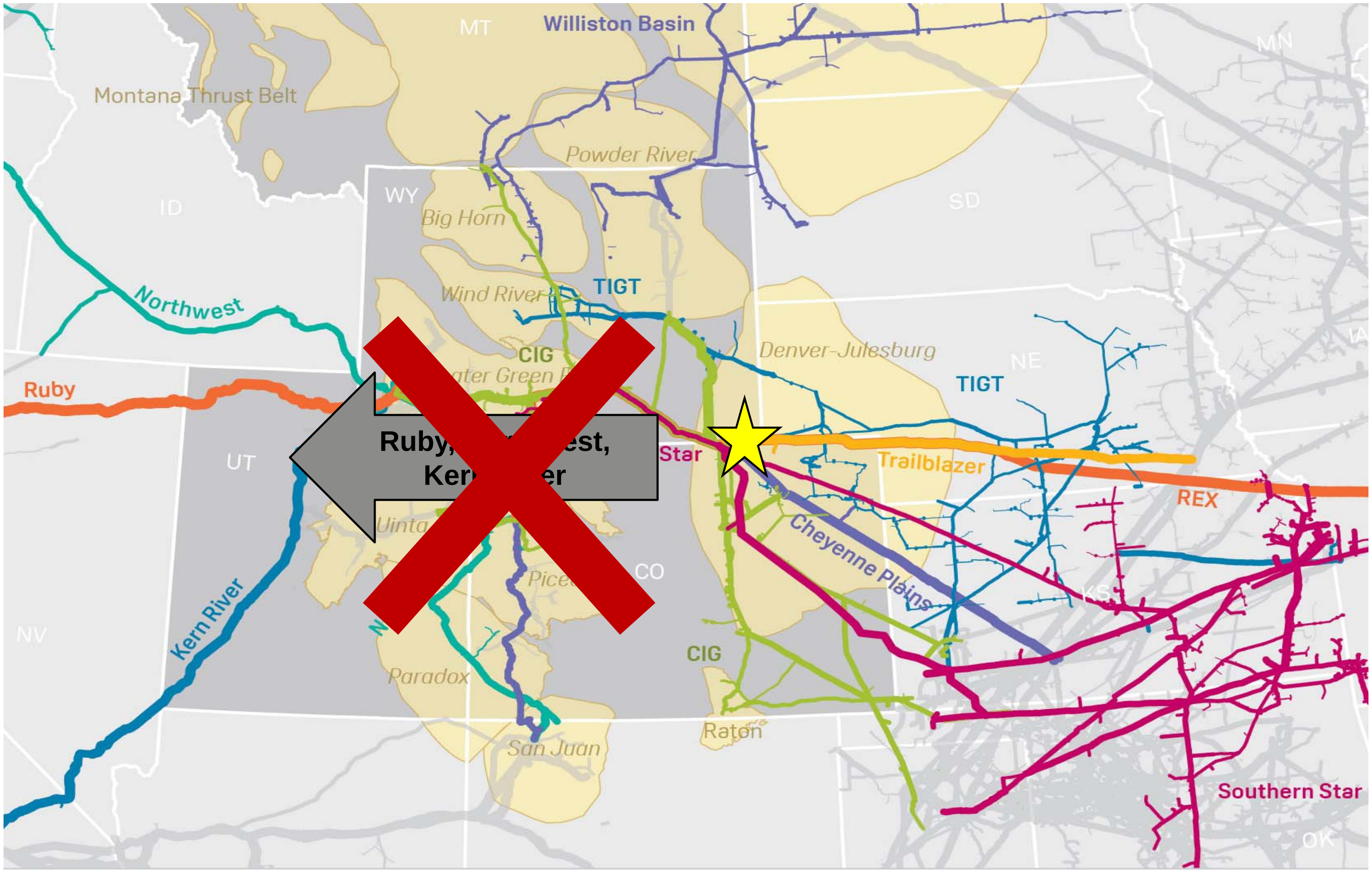
Source: George Wayne, Colorado Interstate Gas

Modest demand growth and West Canada inflows limit westbound flow increases



Source: S&P Global Platts Analytics

Exports are the Answer – By Pipe and LNG Carrier

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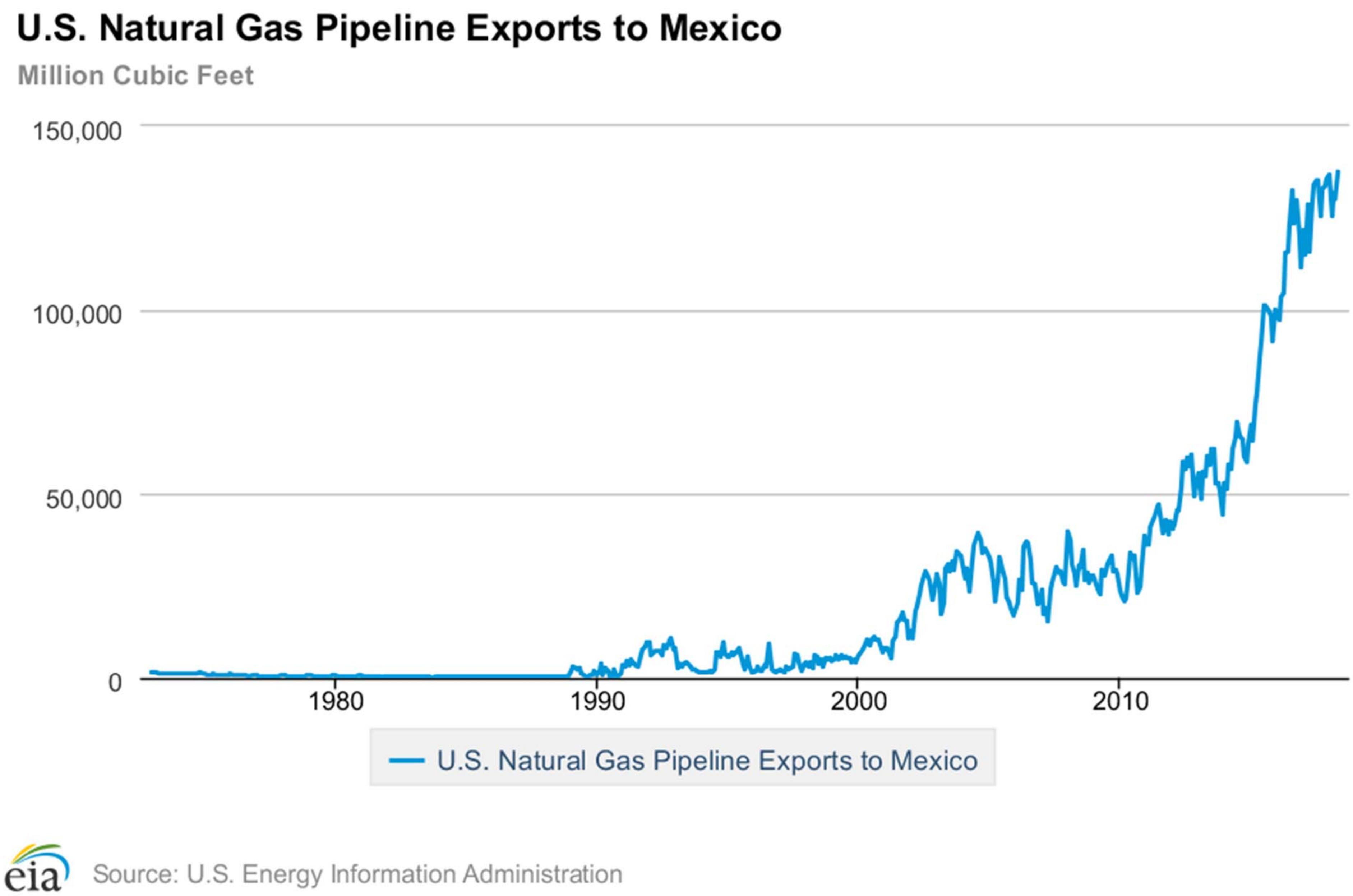

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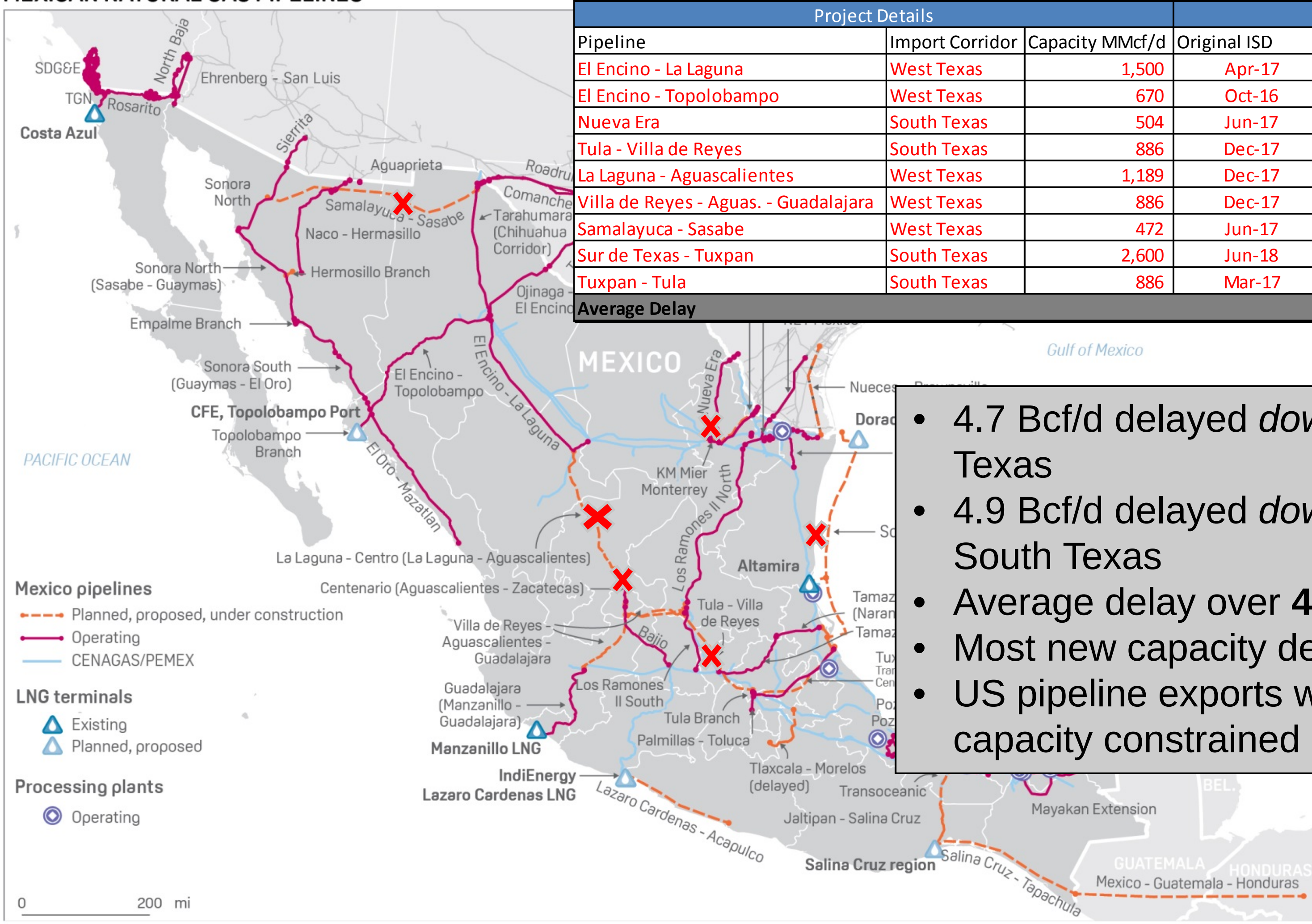
Source: www.eia.gov/dnav/ng/hist/n9132mx2m.thm accessed 08/20/2018

Major delays on Mexico's interior gas pipelines

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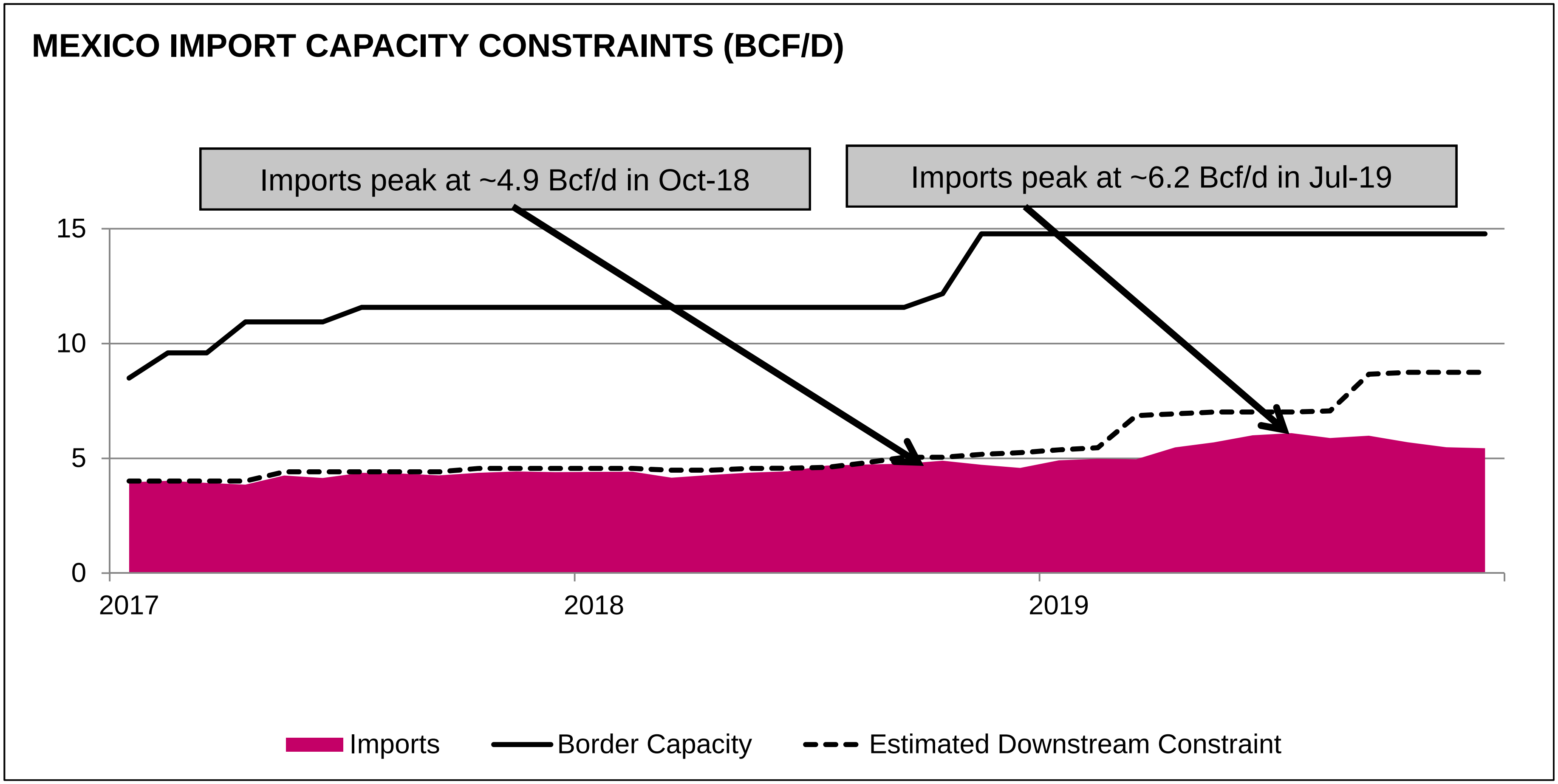
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Downstream constraints alleviated in 2019



Source: S&P Global Platts Analytics

Mercator Energy

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

Permitting Status of U.S. LNG Export Projects

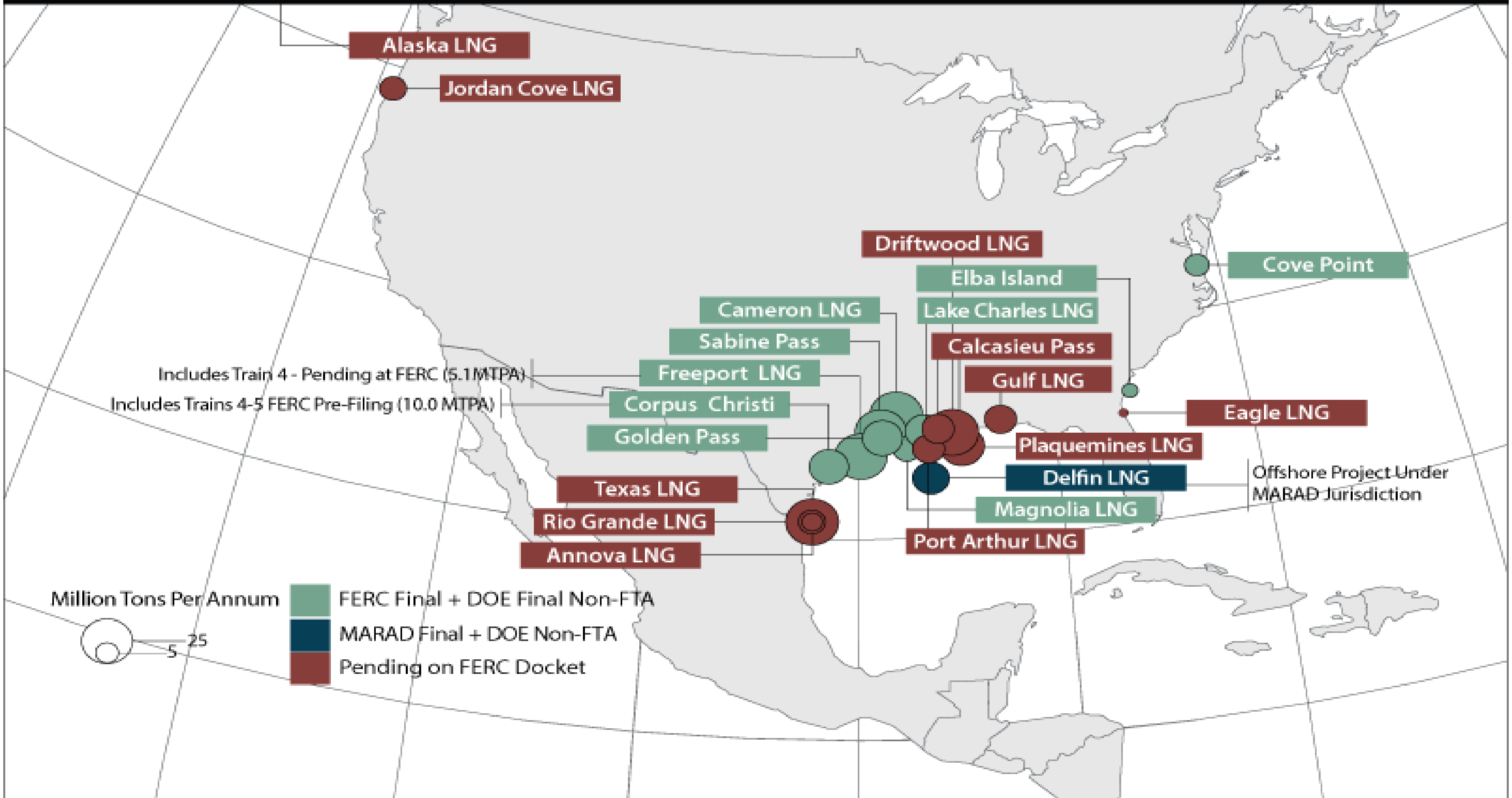
Project Stage	Projects	MTPA	Bcm/yr	Bcf/day
Operating / Under Construction	6	70.9	97.7	10.0
Fully Permitted (Major Projects)	4	68.9	95.0	9.7
Fully Permitted (Small Projects)	N/A	9.0	12.4	1.3
Formal FERC Review	11	146.9	202.6	20.9
FERC Pre-Filing	2	24.0	33.1	3.3
Total	**23**	**310.7**	**428.5**	**44.0**

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

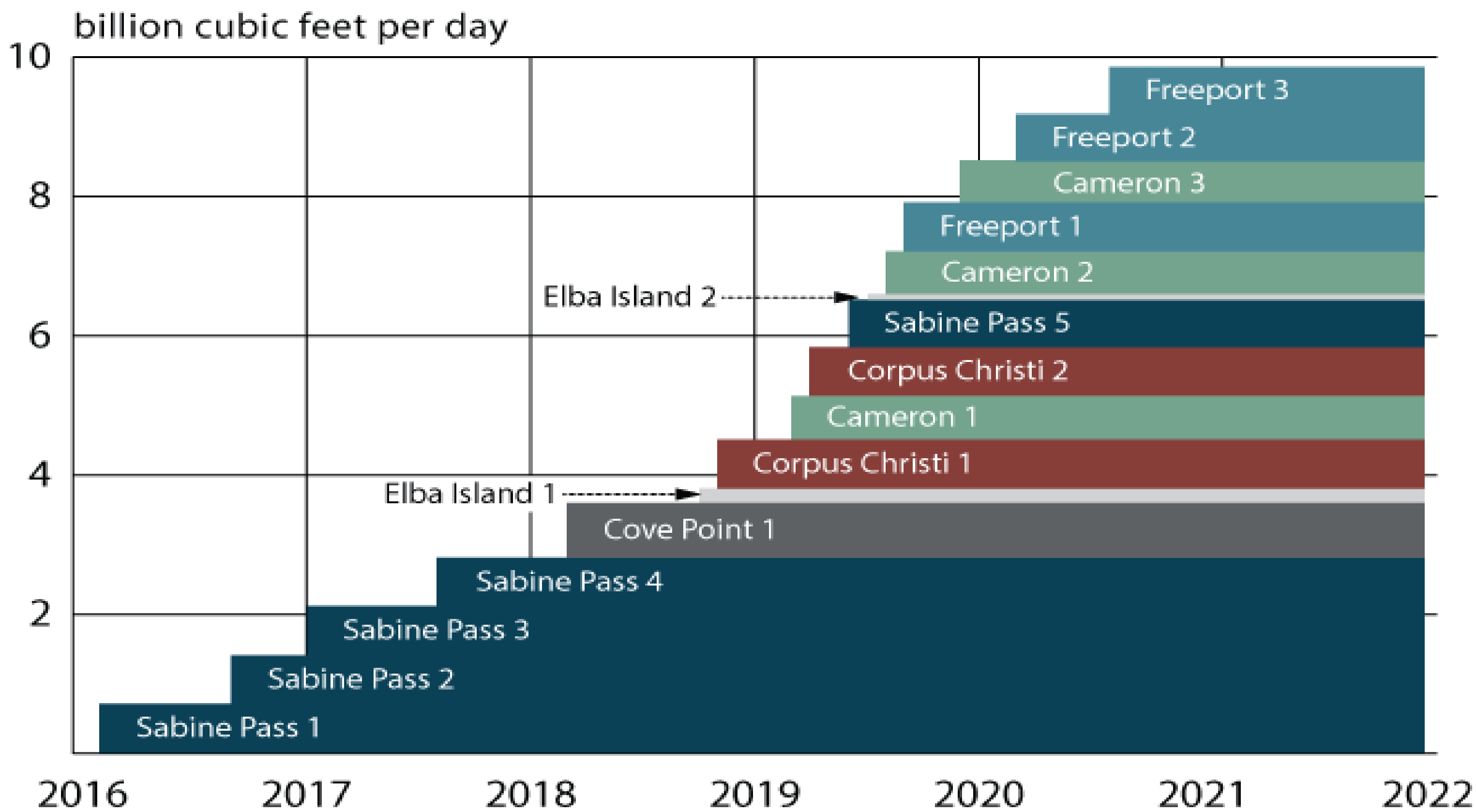
Major U.S. LNG Export Projects - Existing & Proposed



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

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

U.S. LNG Liquefaction Capacity Growth



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

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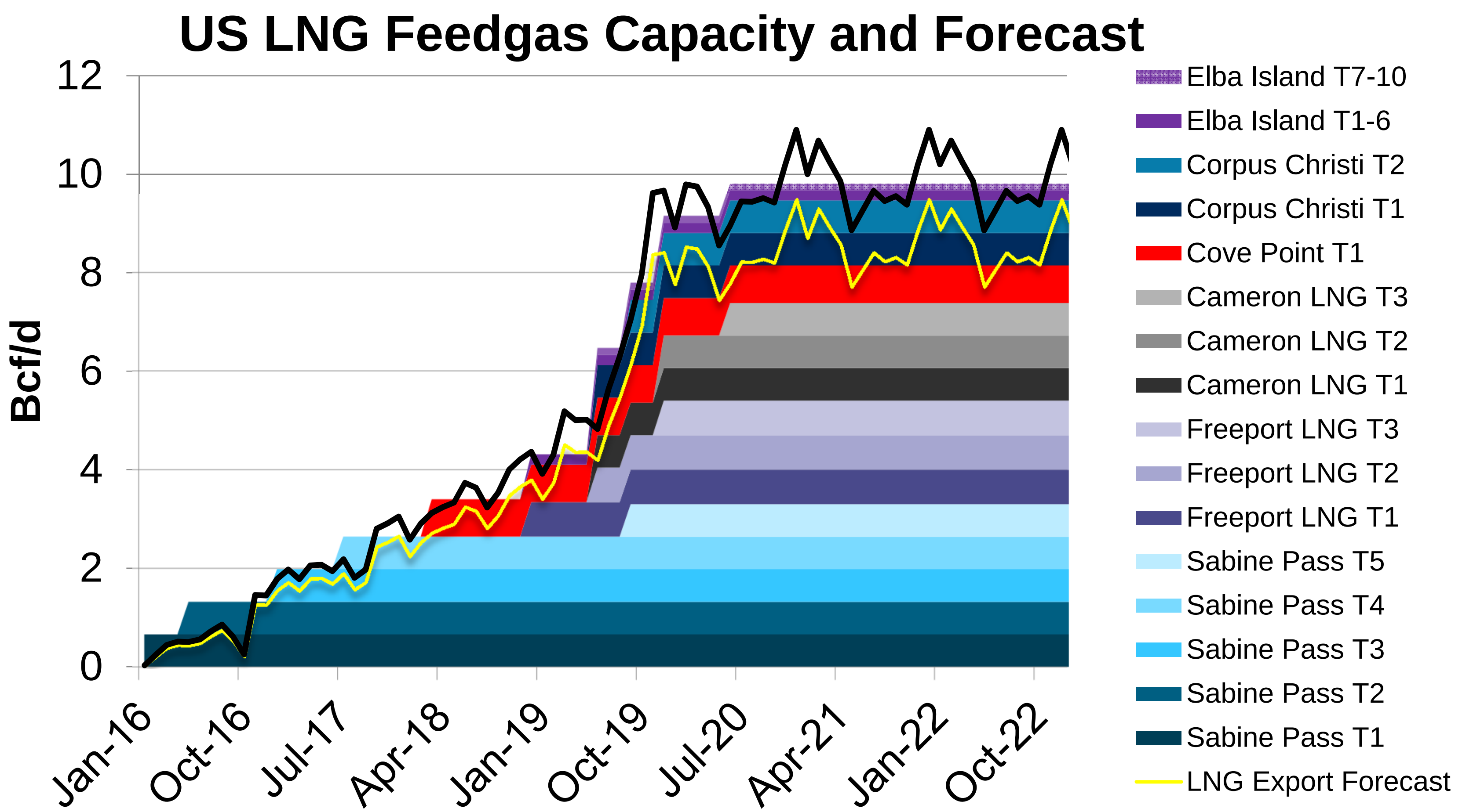
Source: LNG Allies, The US LNG Association, www.lngallies.com

High Utilization of US LNG Expected to Persist



Source: S&P Global Platts Analytics

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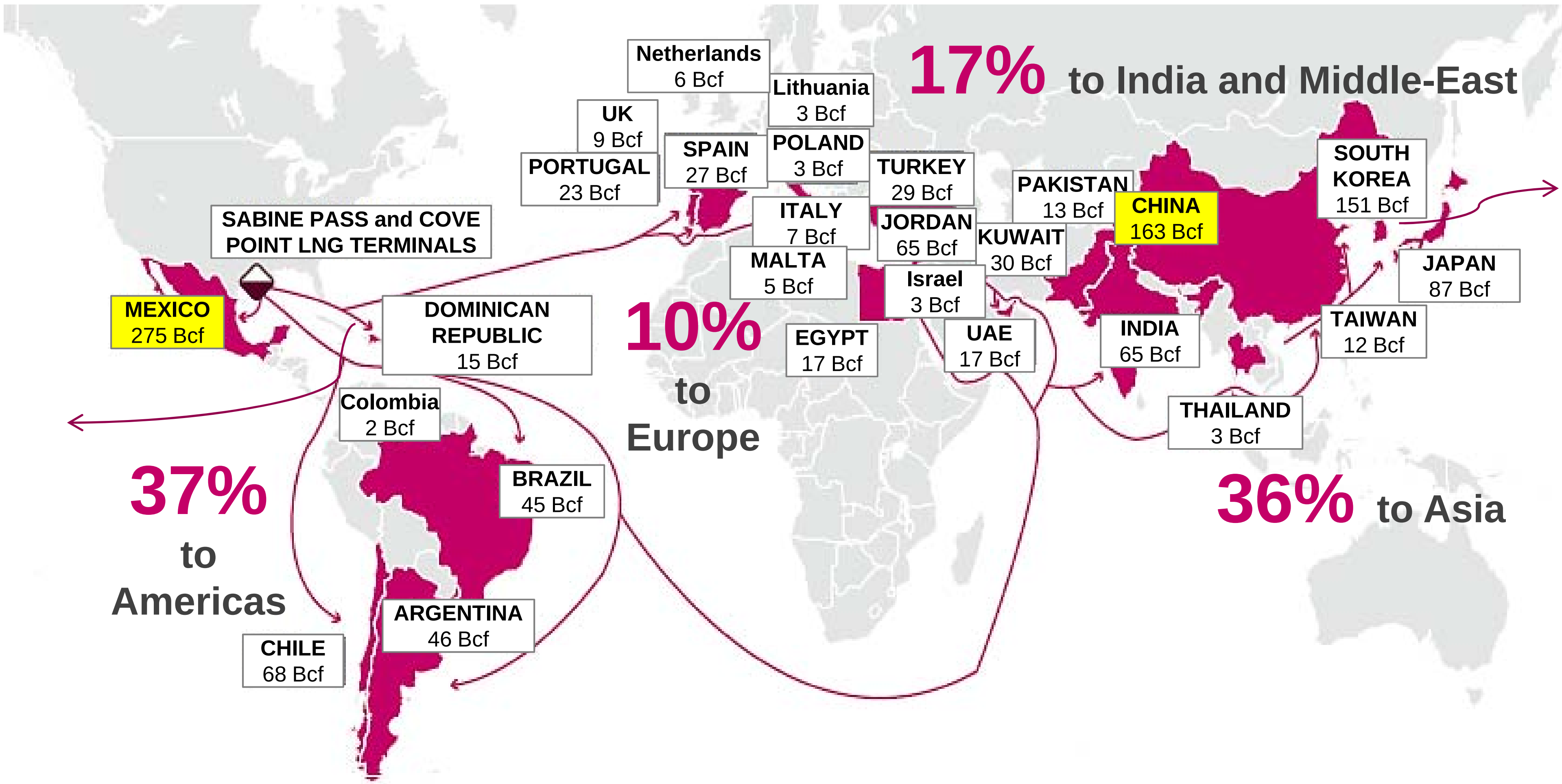
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

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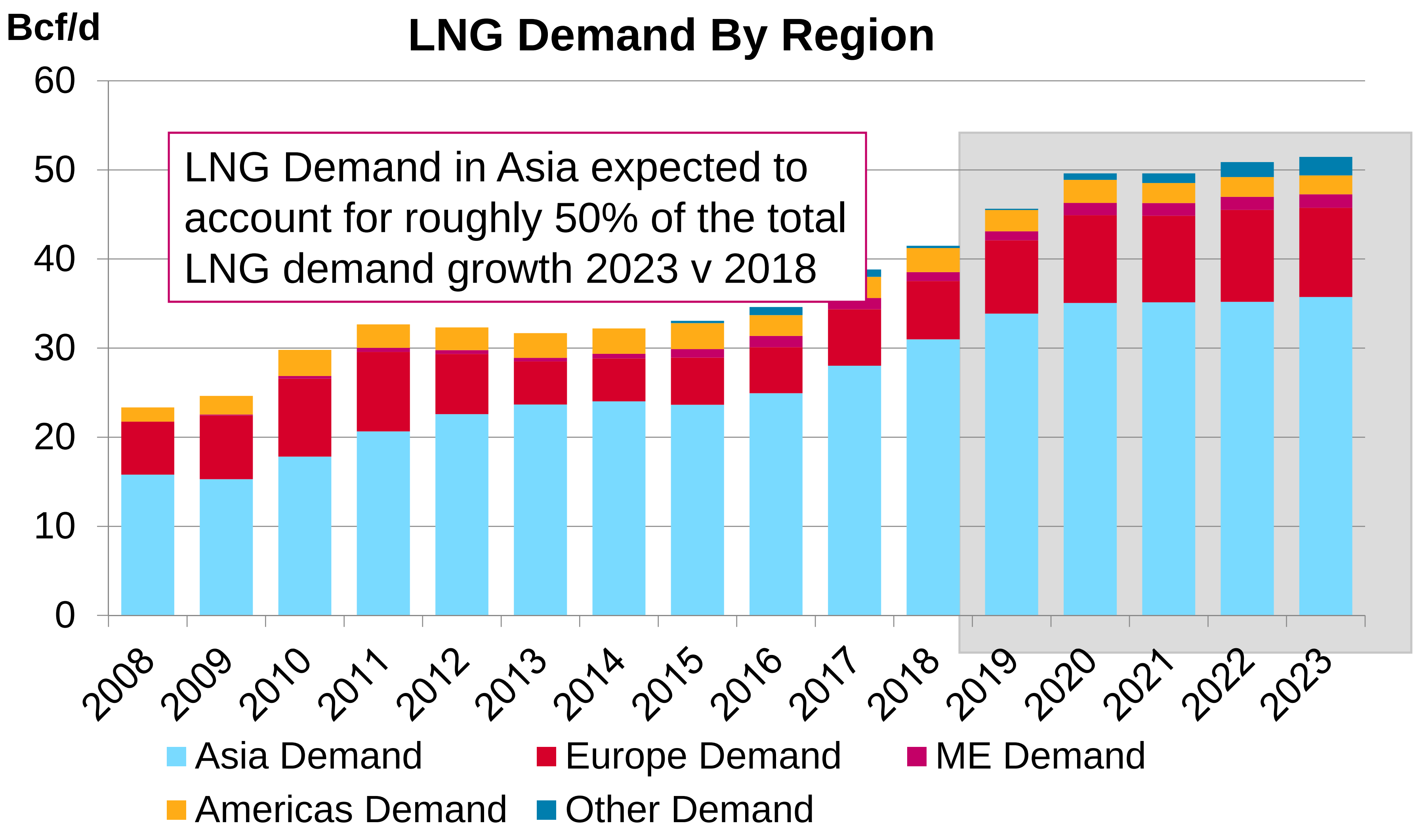
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Asia Clearly Driving LNG Demand



Source: S&P Global Platts Analytics

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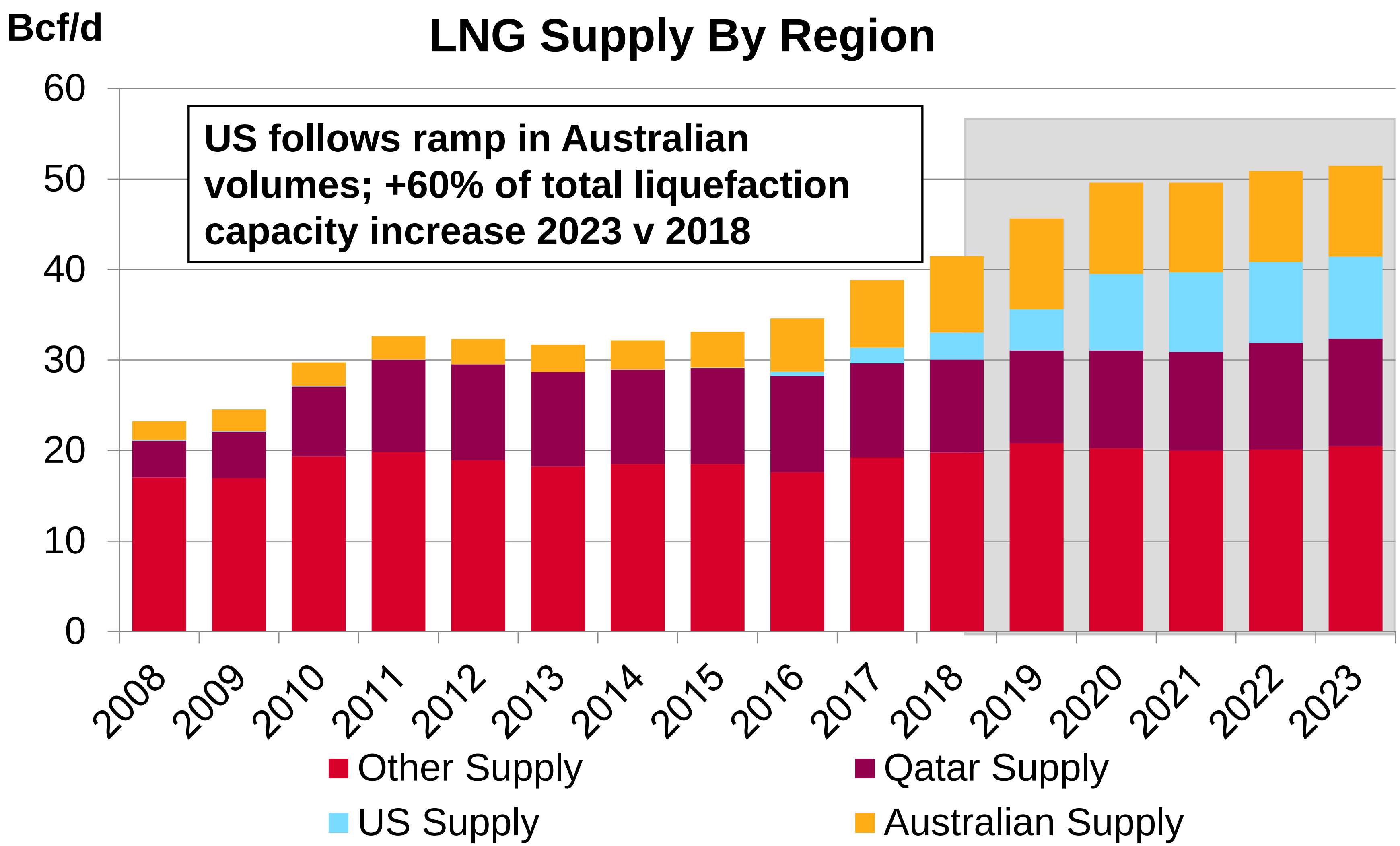
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Global Supply Concentrate to Three Players



Source: S&P Global Platts Analytics

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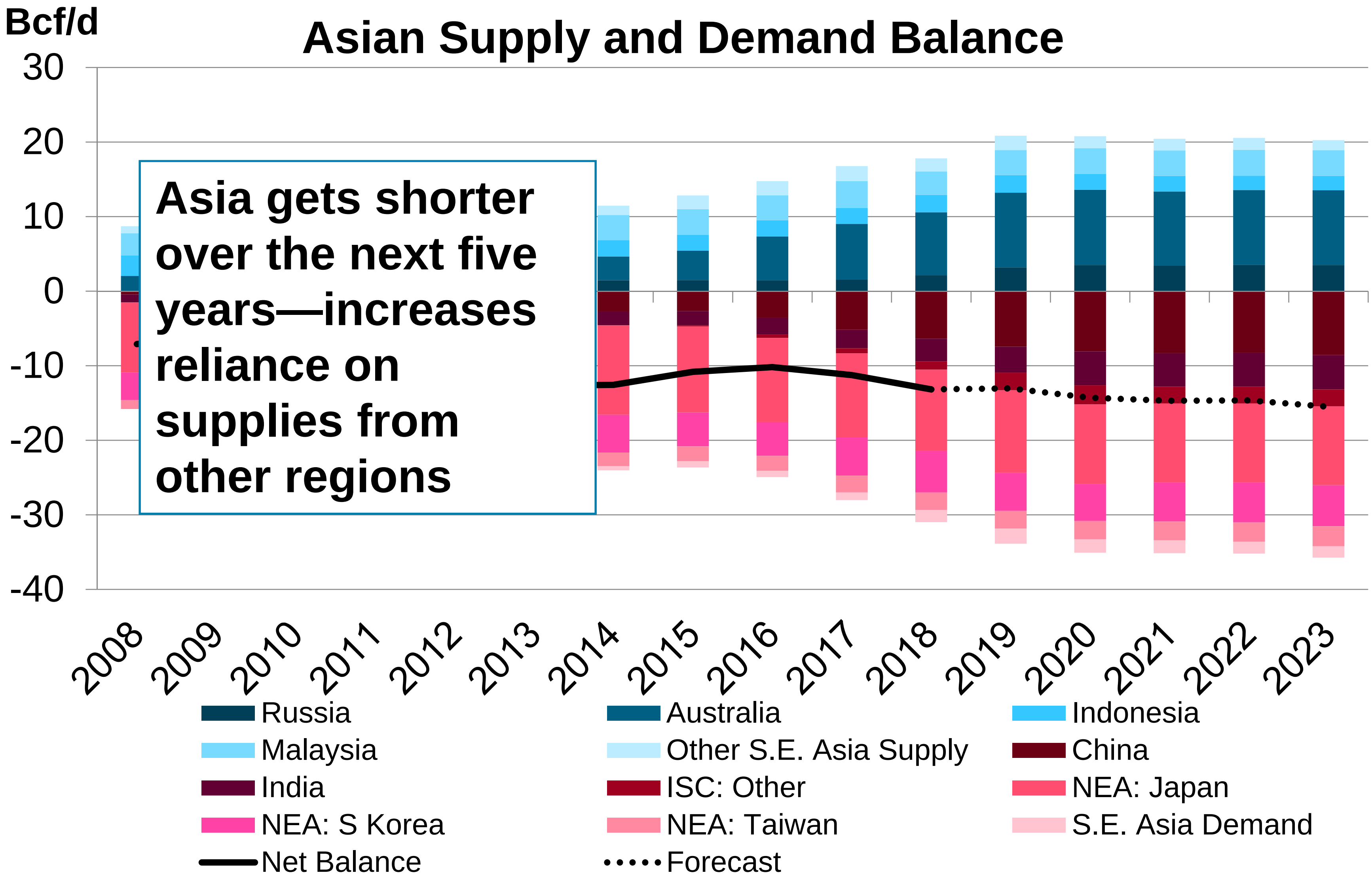
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Asian demand outpaces Asian supply



Source: S&P Global Platts Analytics

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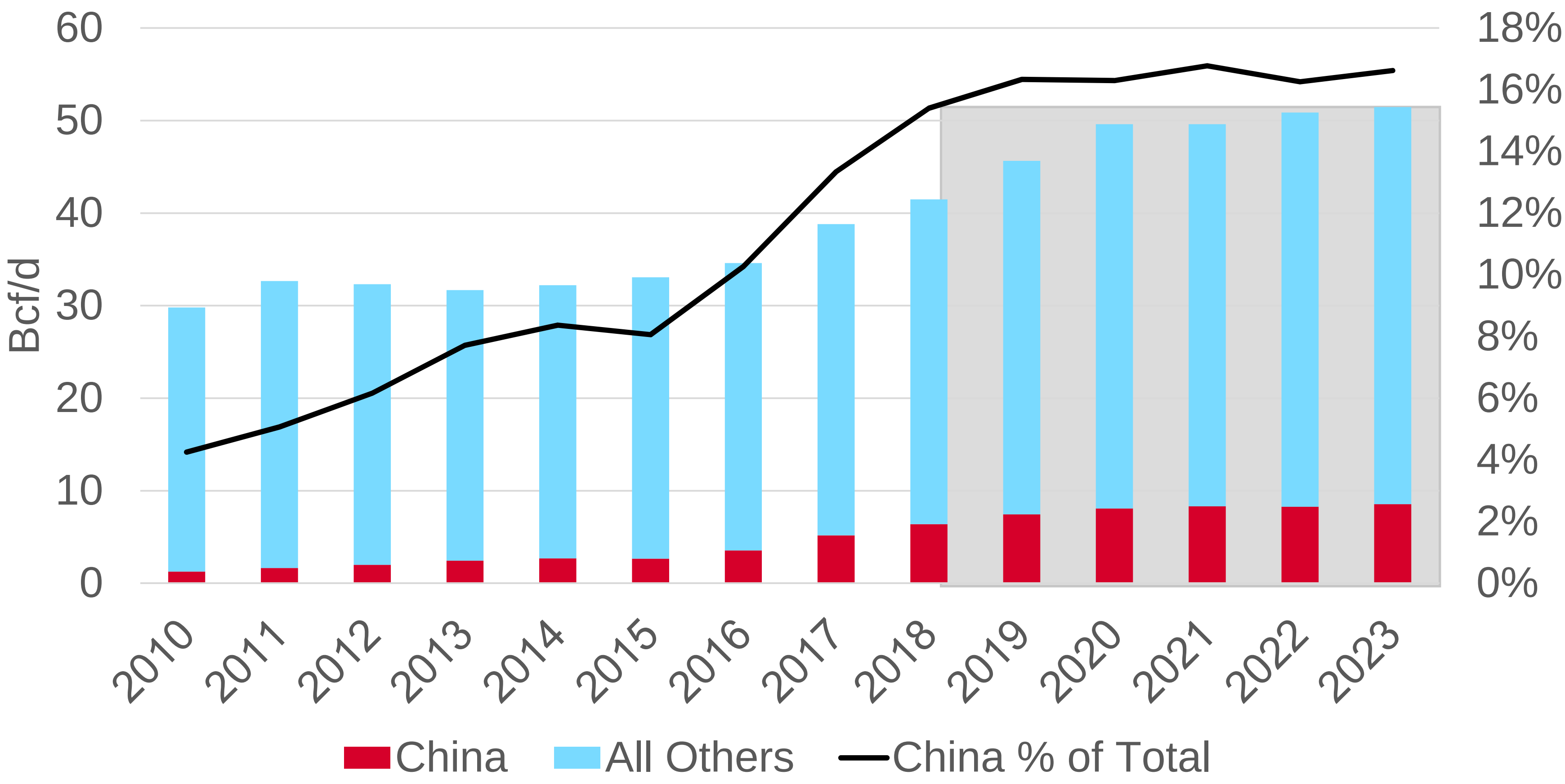
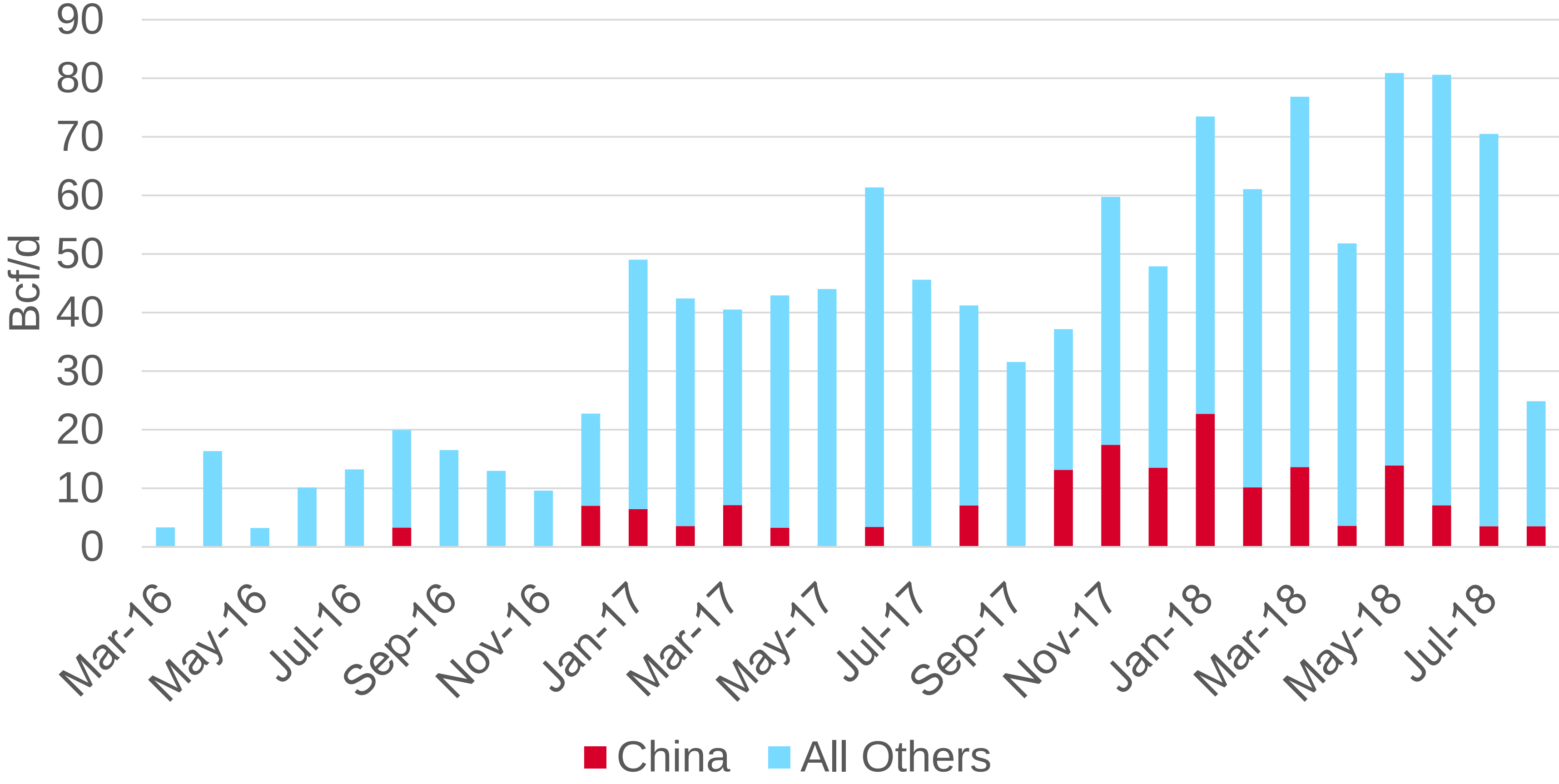
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

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



Source: S&P Global Platts Analytics

Evolution of US LNG Exports to China

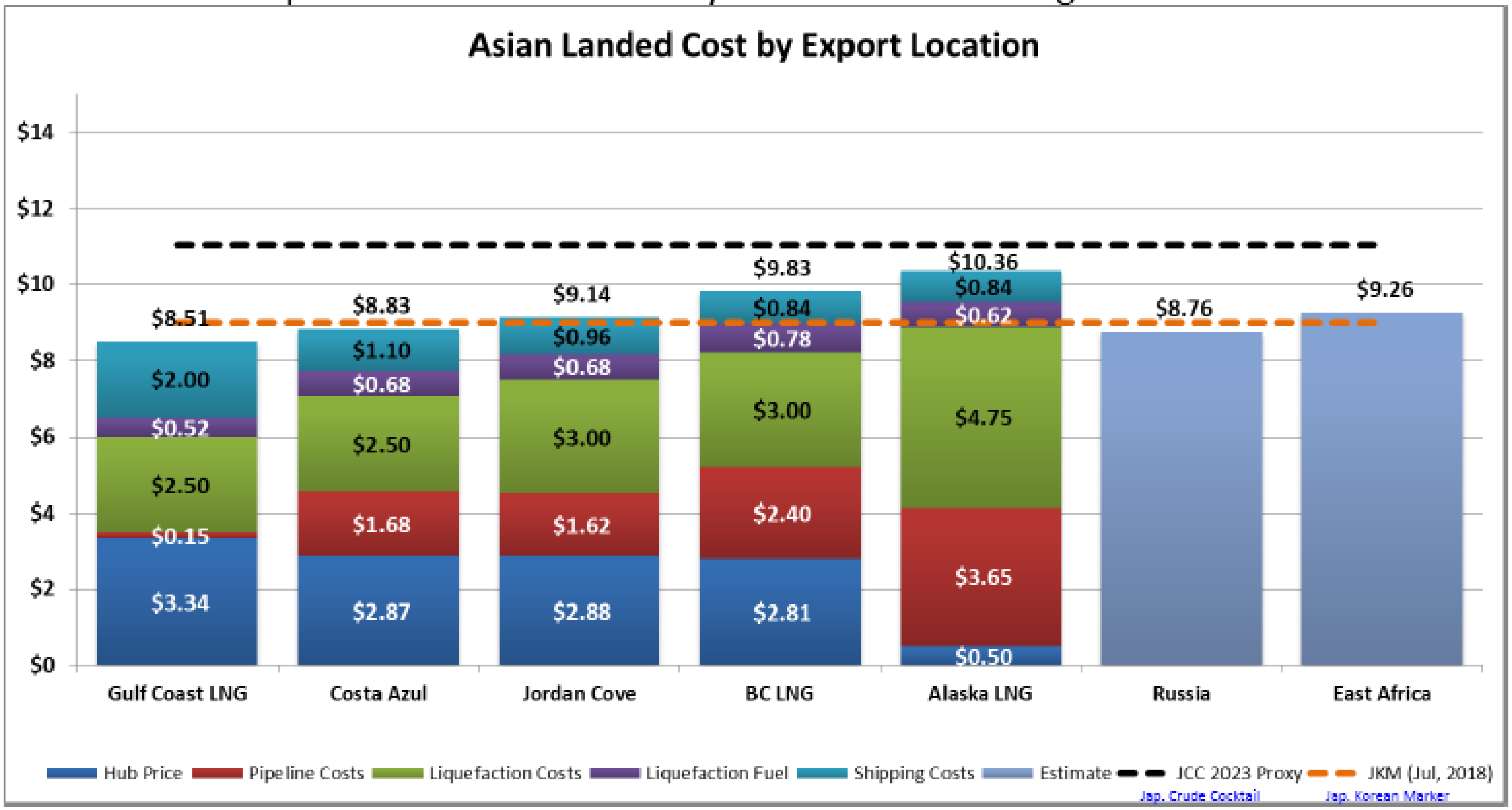


Source: S&P Global Platts Analytics

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

North America LNG Outlook

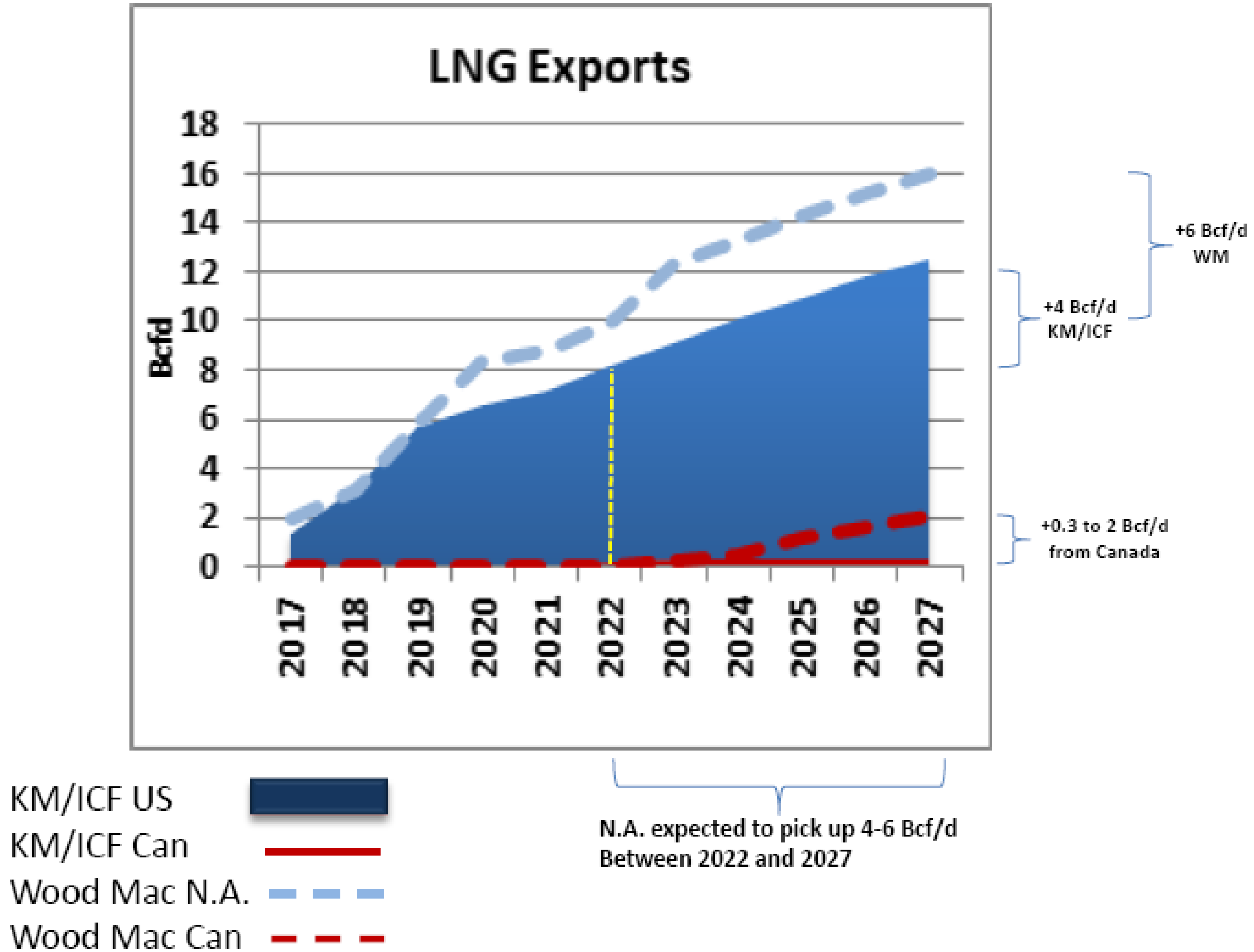
- North America LNG supply competitive with rest of world for delivery to Asia
- Deliveries to Europe are competitive but margins are thinner
- Cost competitiveness is not the only factor in determining market share



Note: Landed cost components are based on projected average 2023 prices.
SOURCE: Platts Gas/LNG Daily, KM Analysis

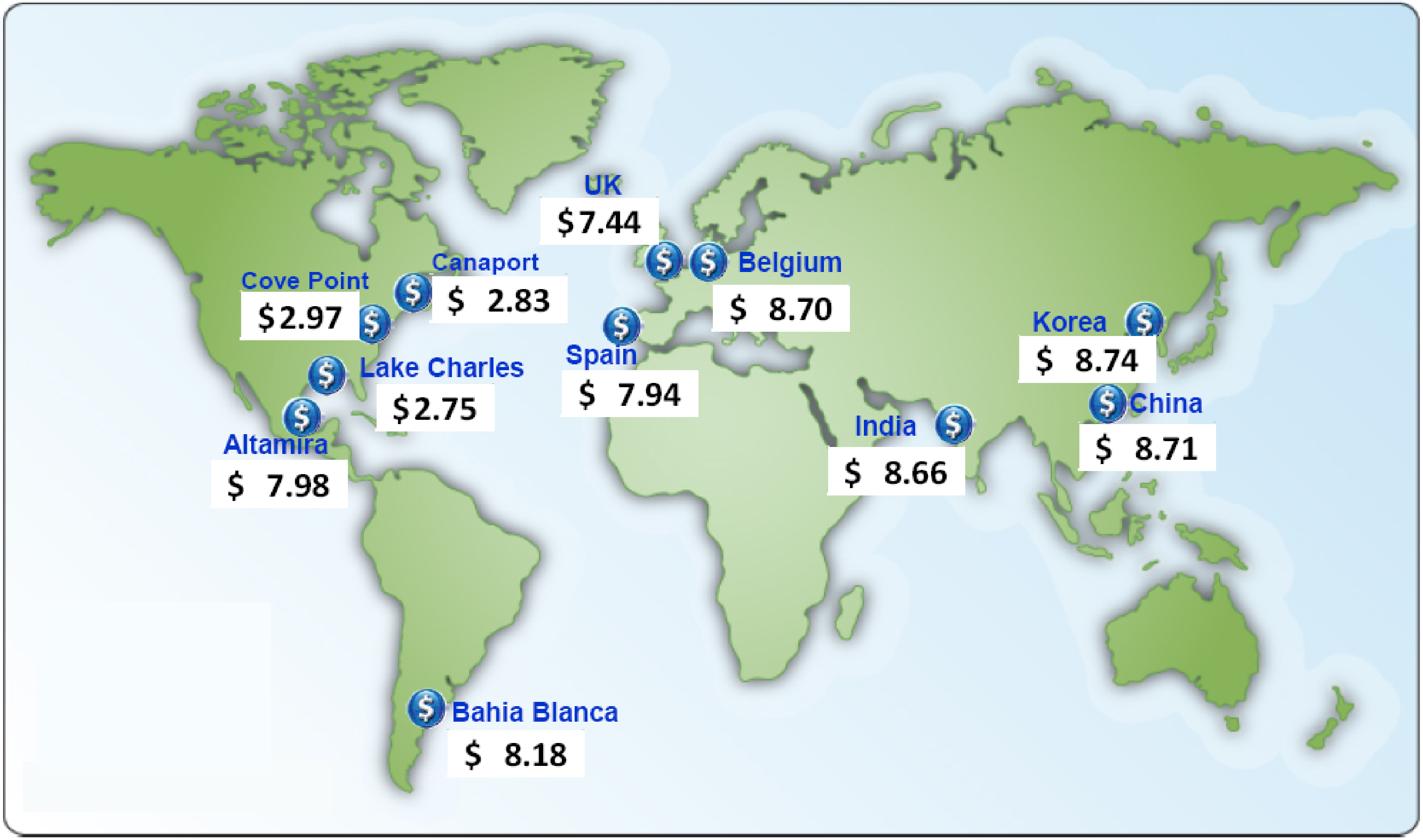
Source: Greg Ruben, KinderMorgan, Colorado Oil and Gas Association Trade presentation, August 21, 2018

Projected Net North America LNG Exports



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

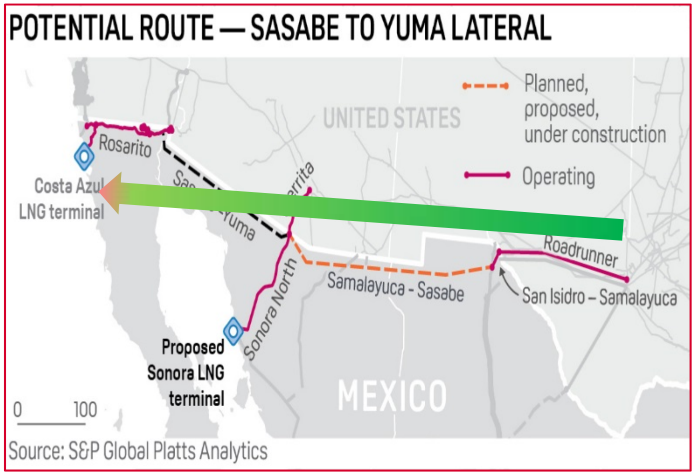
Upside for Rockies—West Coast LNG Exports

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

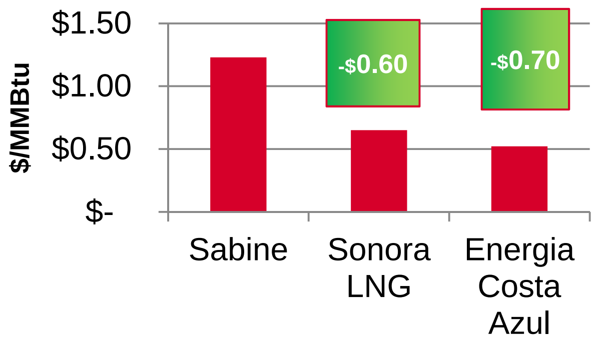
Will Mexico become an LNG exporter?

Energia Costa Azul:

- Multi-staged design
- Finial design capacity12.4 Mtpa (~1.7 Bcf/d) capacity
- Outlet for Permian Basin associated gas
- West Coast location with pre-existing infrastructure
- Avoids Panama Canal
- Regulatory process well underway
- Pipeline expansions needed (see map)



Shipping Cost Savings (2016 avg.)



Source: S&P Global Platts Analytics

Possible Expansions Needed:

- Expansion of El Paso's South Mainline?
- Expansion on Samalayuca – Sasabe?
- New Sasabe – Yuma pipeline?

Mexico could be part of the "second wave" of North American LNG export projects

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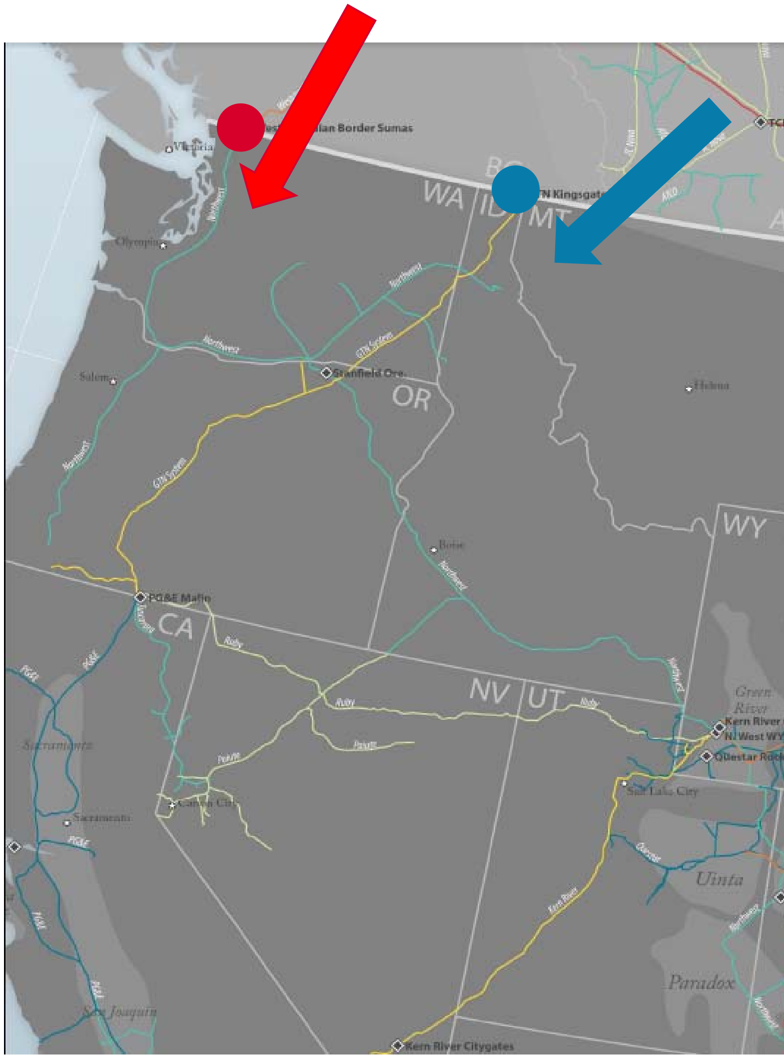
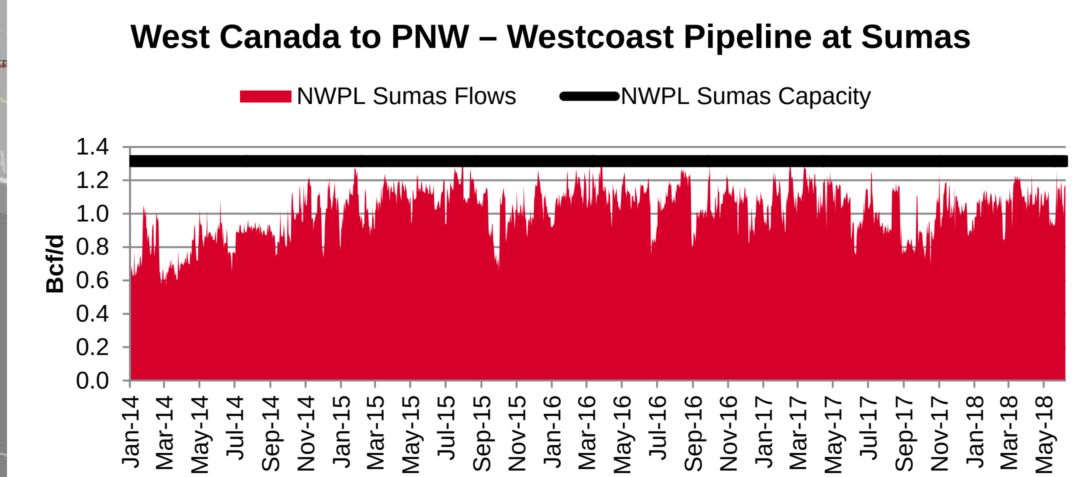
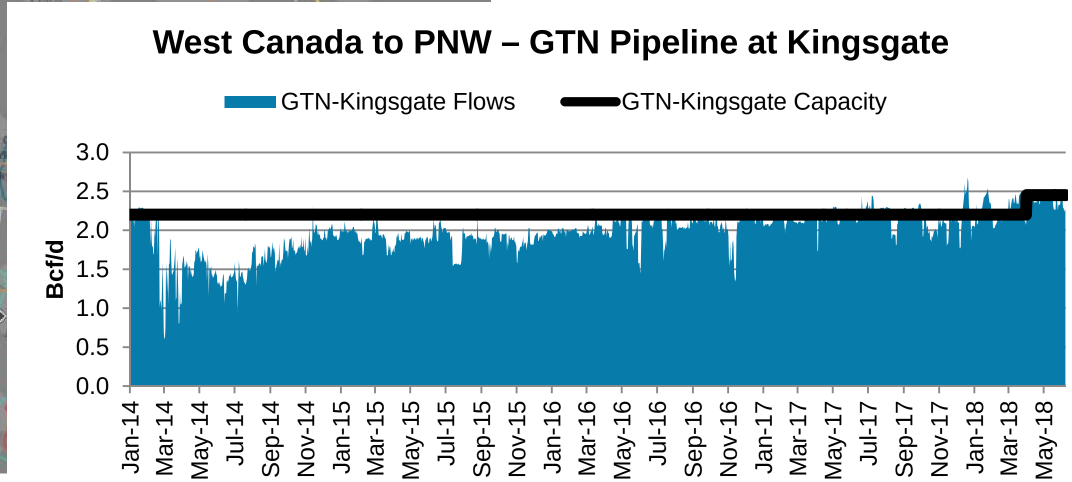
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

LNG exports from the west coast could open PNW market share for Rockies

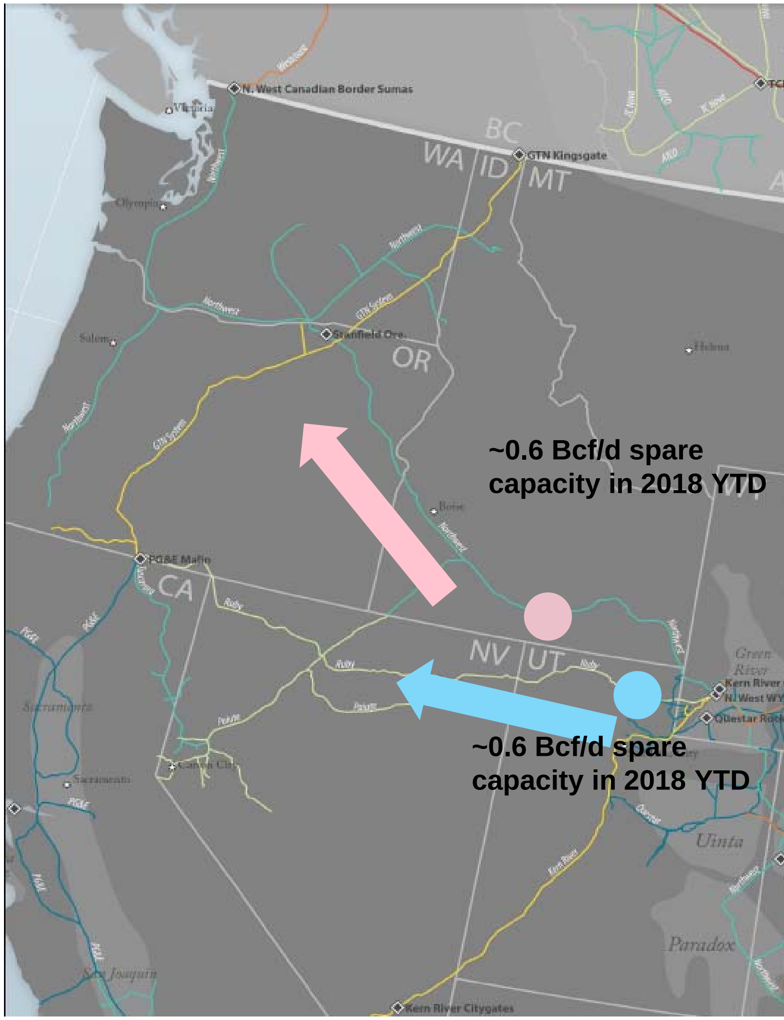


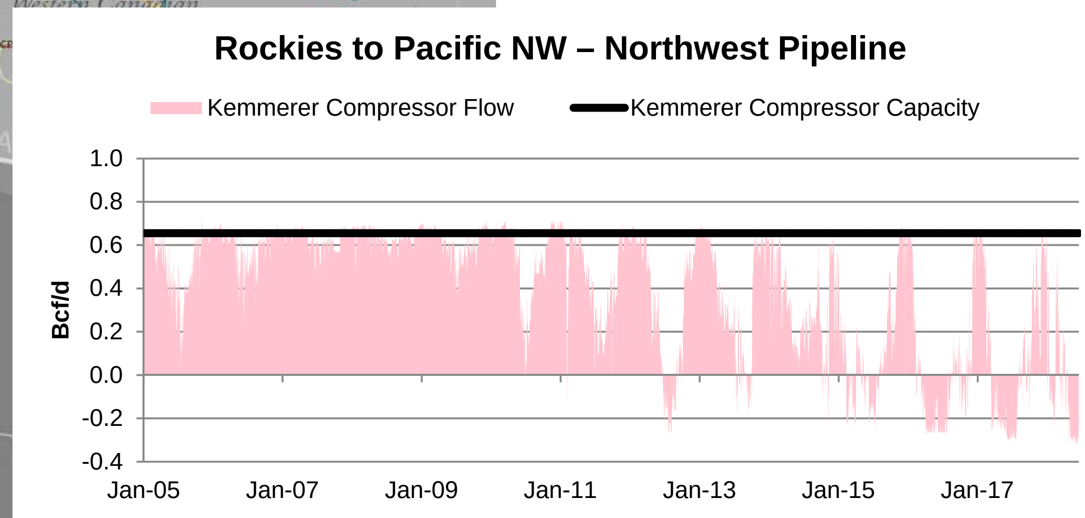


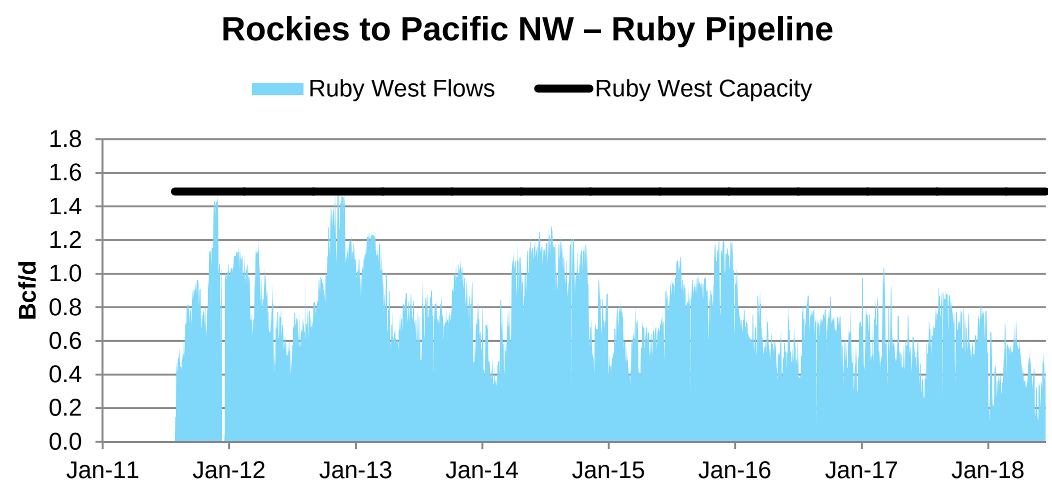


Source: S&P Global Platts Analytics

NWPL open capacity seasonally; Ruby has space







Source: S&P Global Platt Analytics

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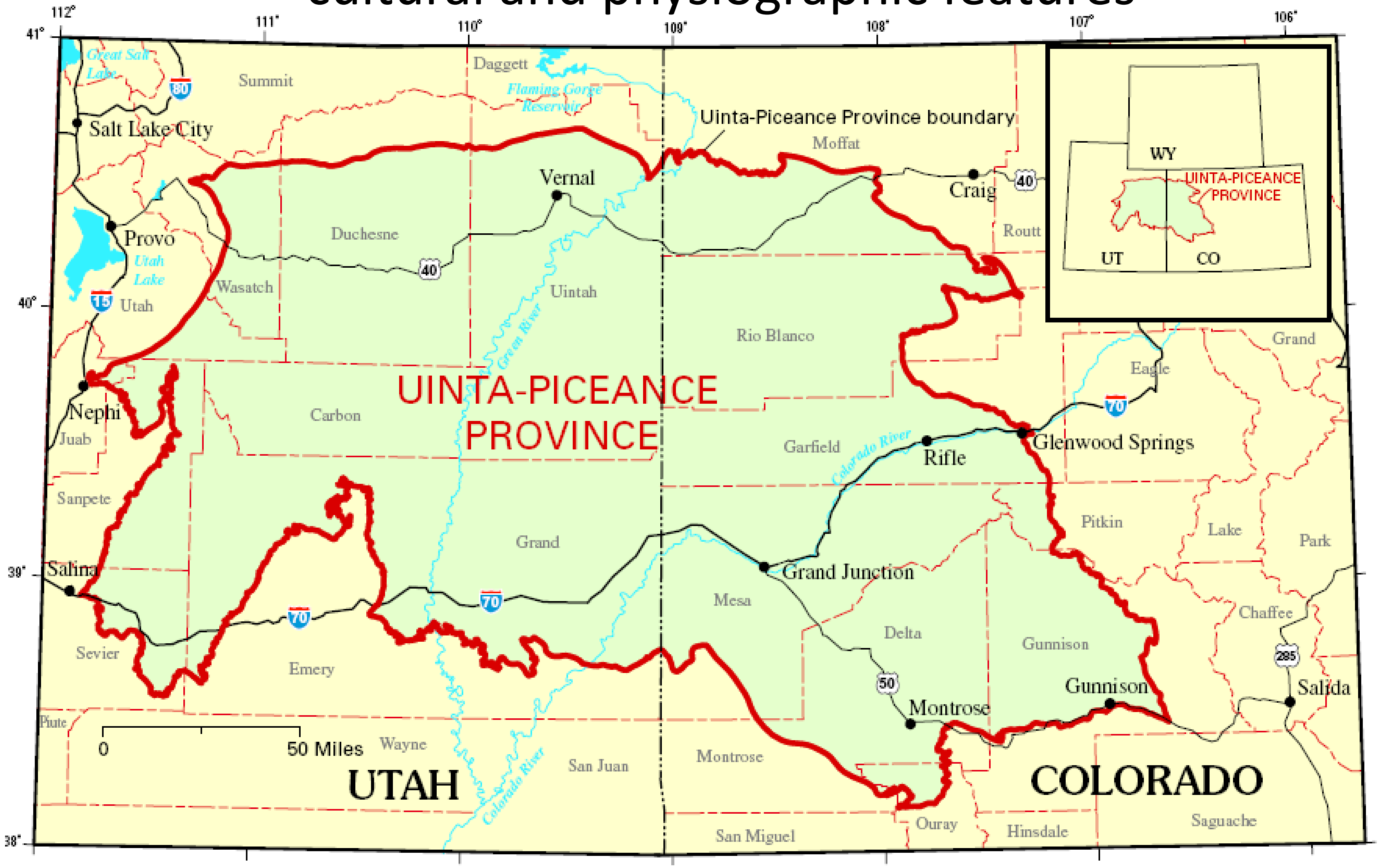
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

How do we get there?

Location of the Uinta-Piceance Province and associated cultural and physiographic features



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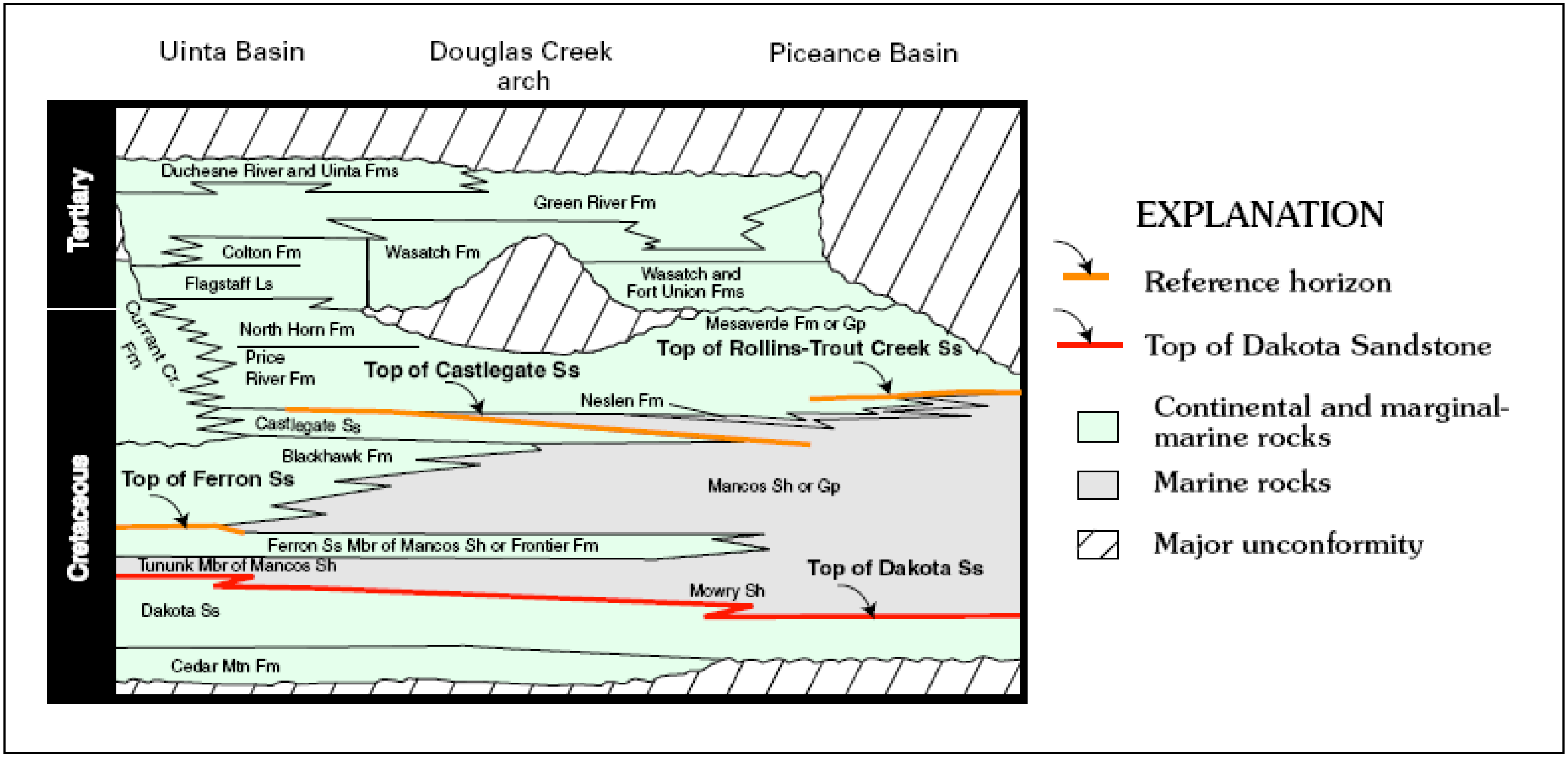
Source: Chapter 5 of *Petroleum Systems and Geologic Assessment of Oil and Gas in the Uinta-Piceance Province, Utah and Colorado,* R.F. Dubiel, USGS Geological Survey Digital Data Series DDS-69-B

Generalized stratigraphic chart of Cretaceous and younger rocks from west to east across the Uinta and Piceance Basins



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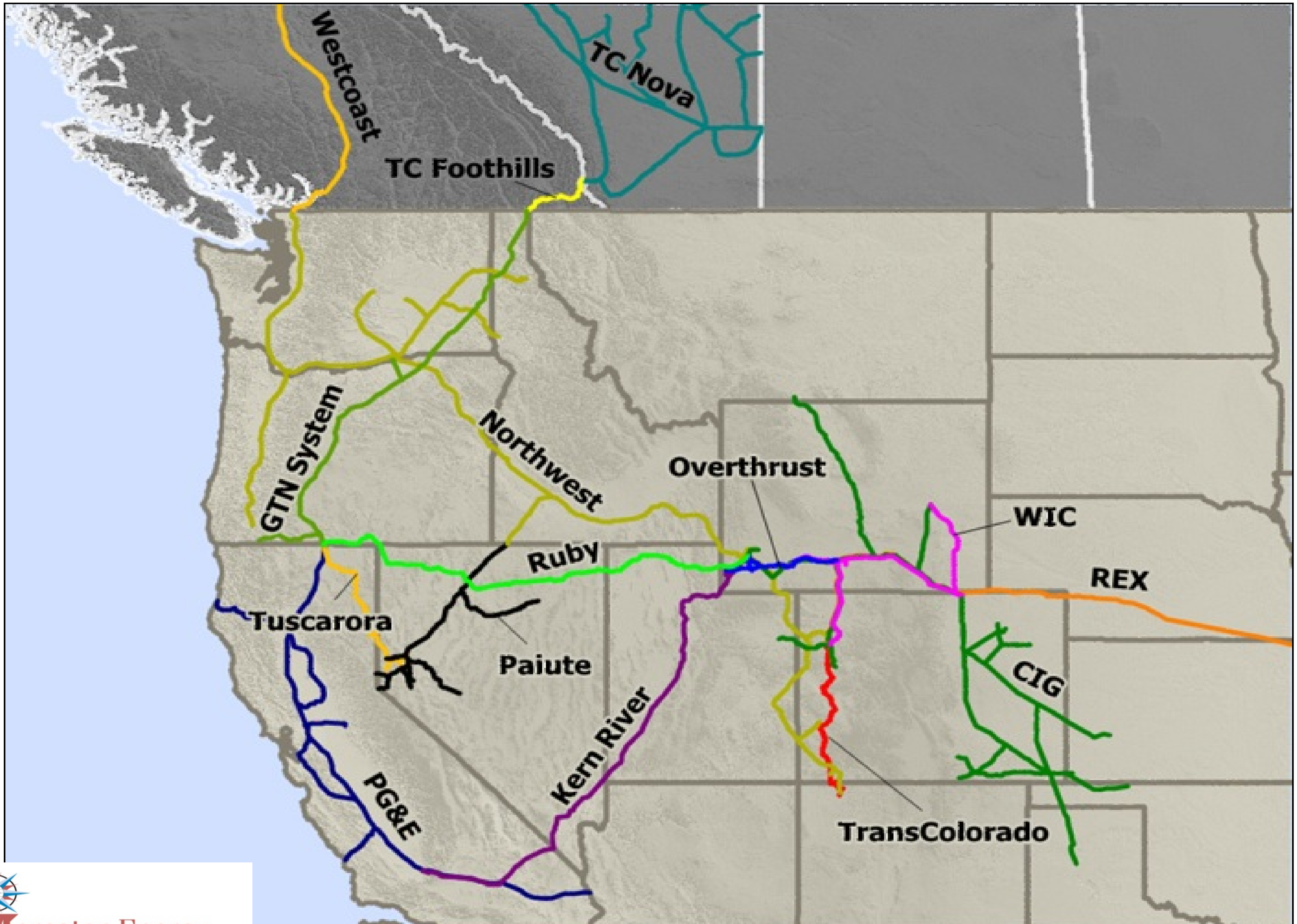
Source: Chapter 16 of *Petroleum Systems and Geologic Assessment of Oil and Gas in the Uinta-Piceance Province, Utah and Colorado,* Laura N.R. Roberts, USGS Geological Survey Digital Data Series DDS-69-B

Rockies Pipeline Infrastructure



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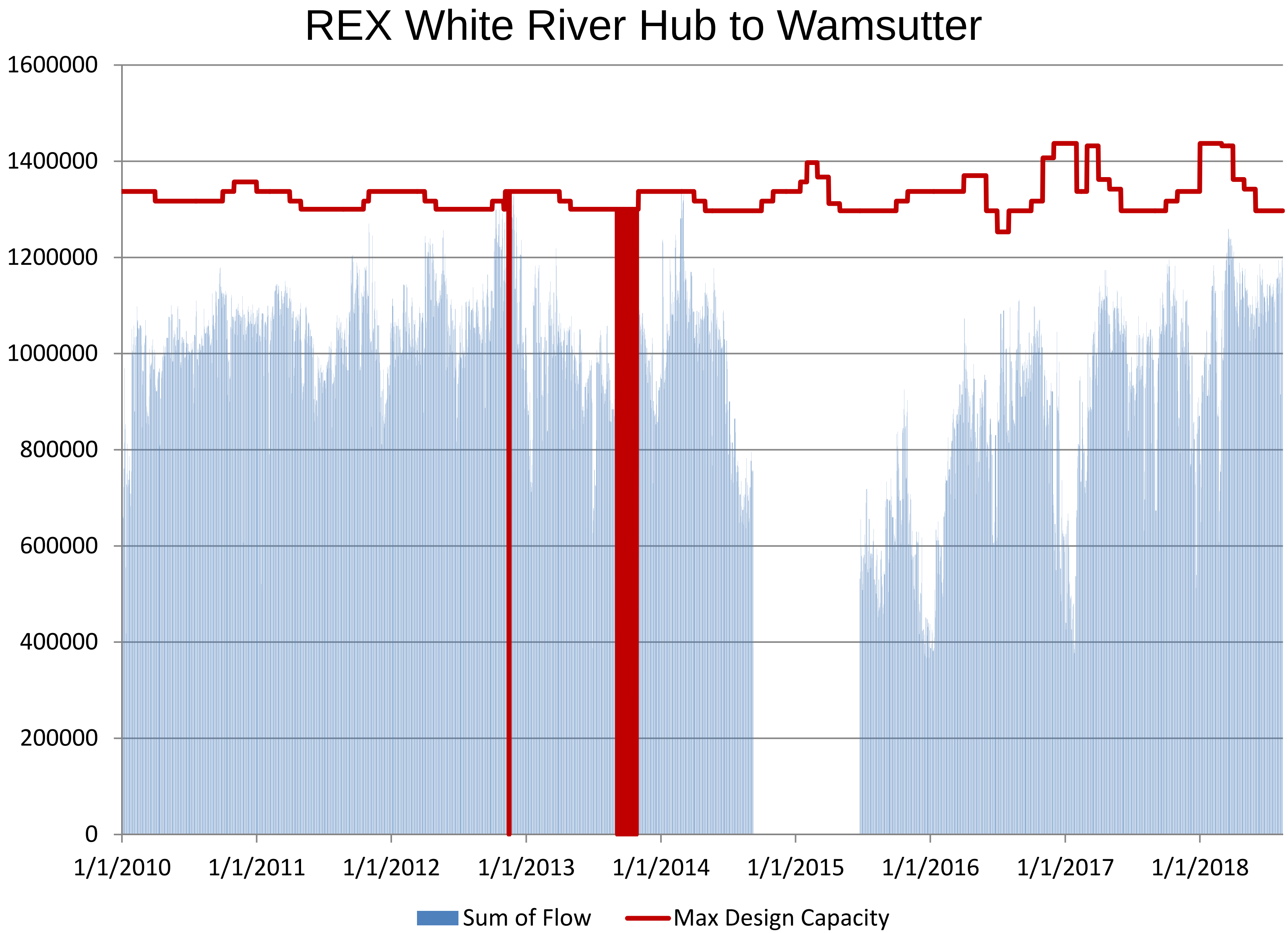
Source: Bentek Rockies Observer

REX(Entrega segment) Capacity



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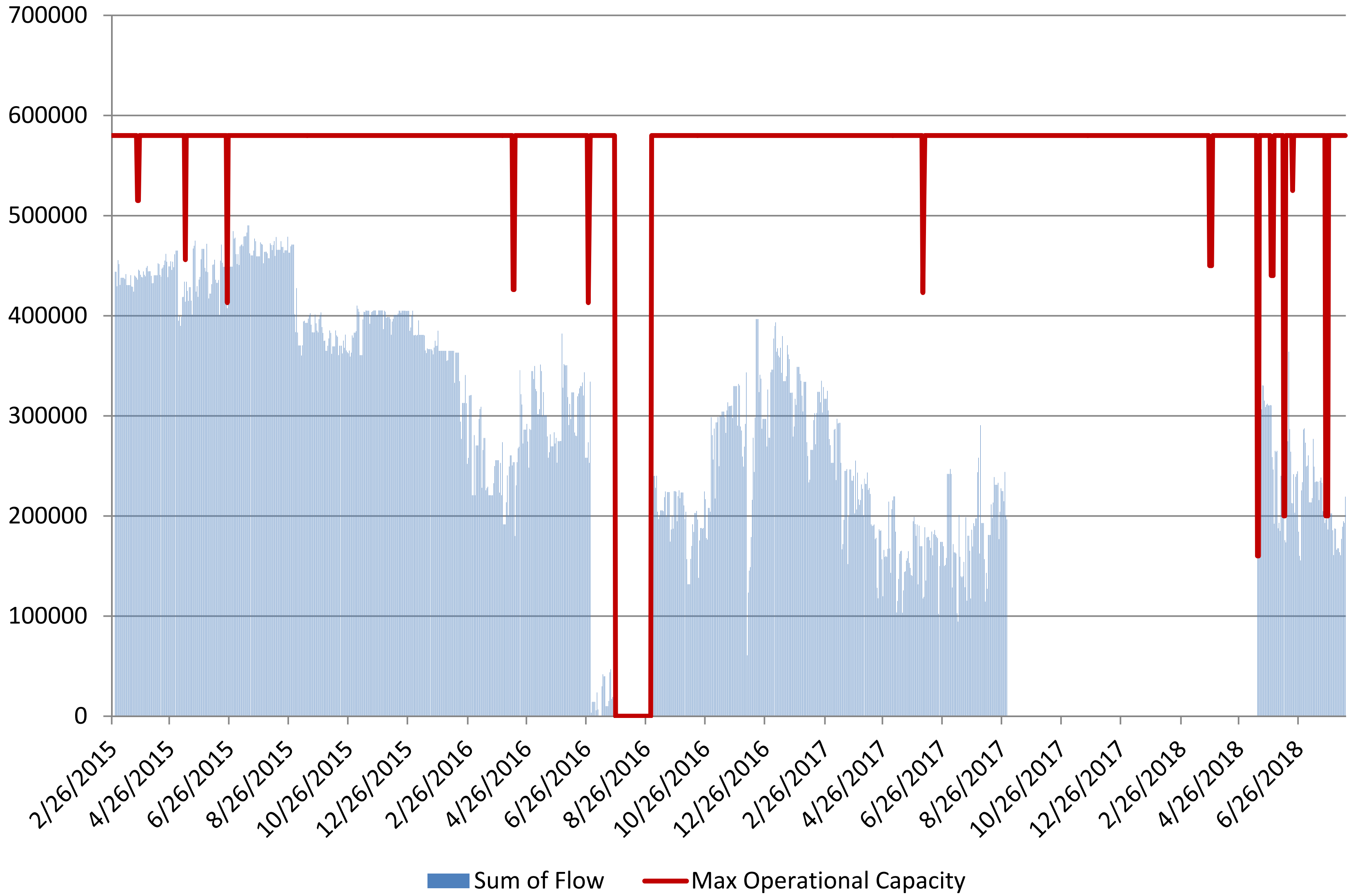
Source: Bernadette Johnson, DrillingInfo

WIC Capacity (north)



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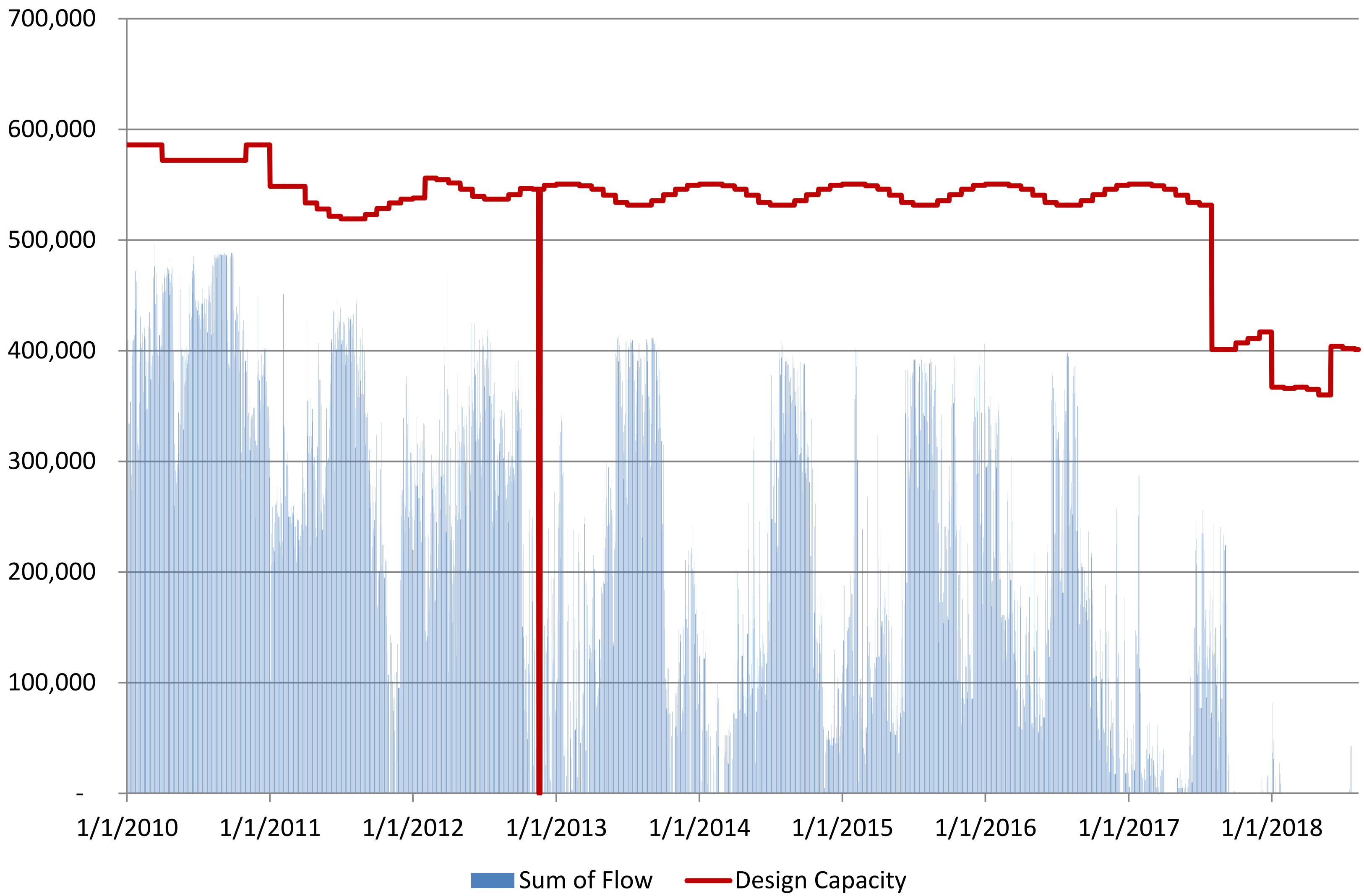
Source: Bernadette Johnson, DrillingInfo

TransColorado Capacity (south)



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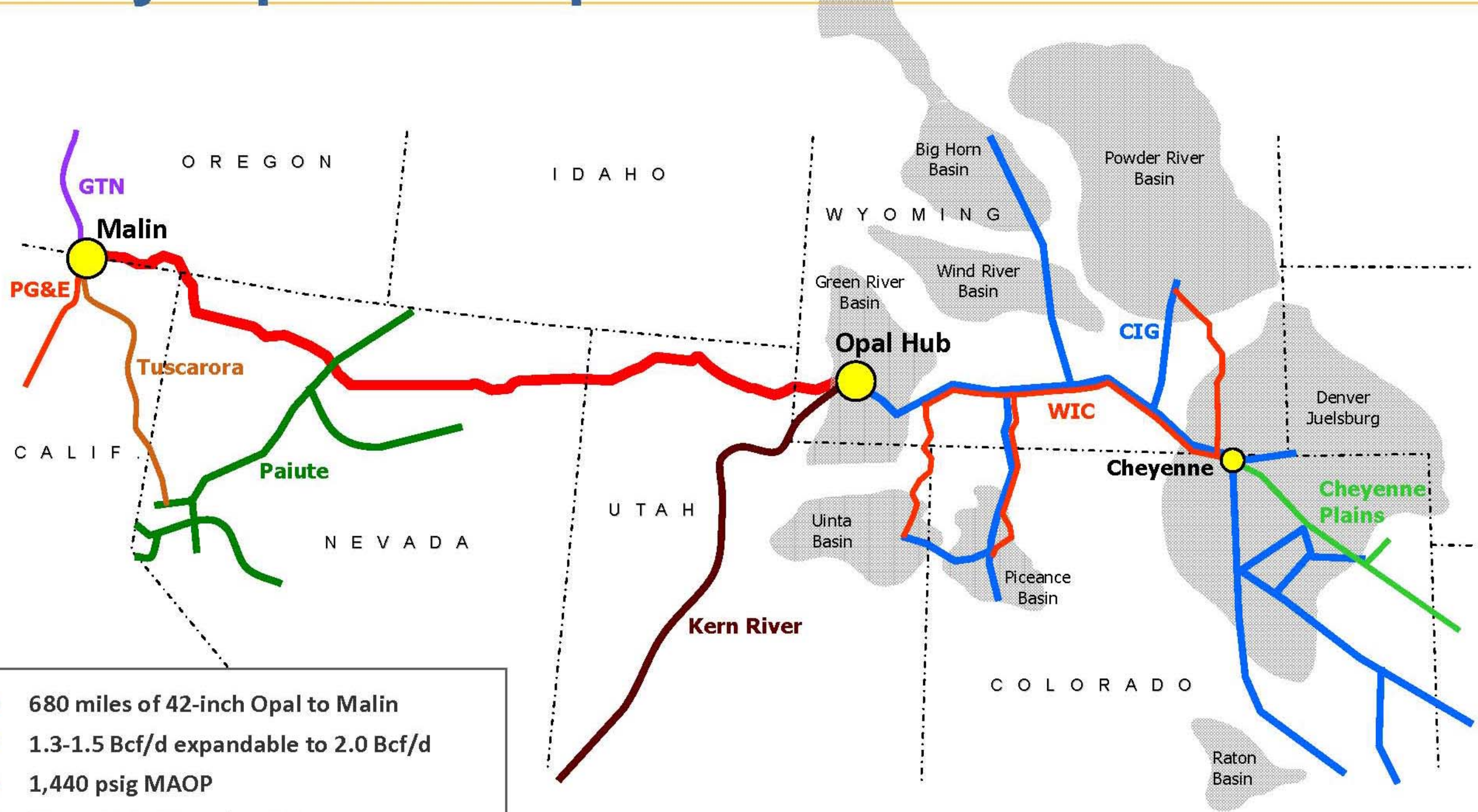
Source: Bernadette Johnson, DrillingInfo

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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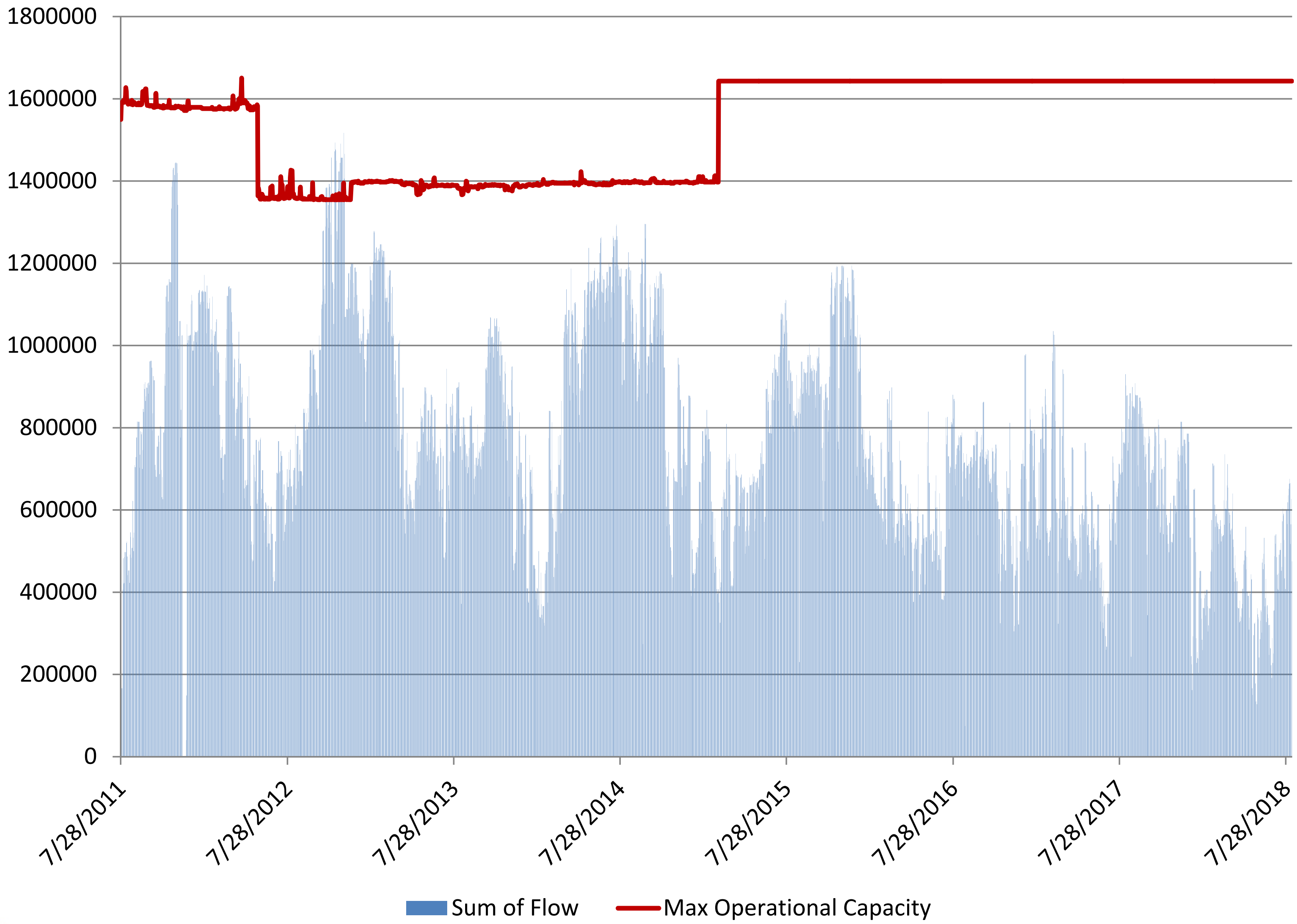
Ruby Capacity (west)



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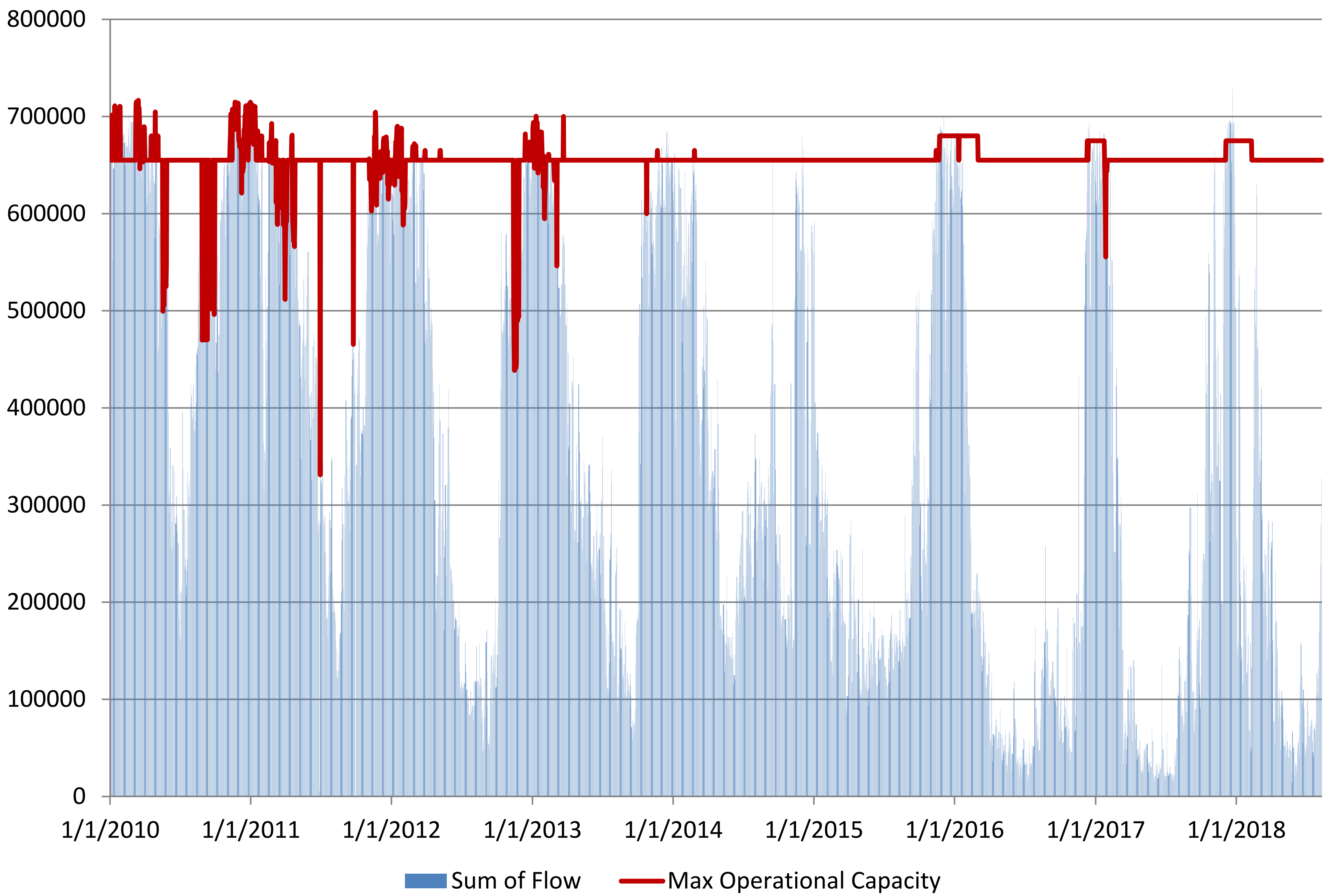
Source: Bernadette Johnson, DrillingInfo

Northwest Pipeline Capacity (west)



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Source: Bernadette Johnson, DrillingInfo

Uinta and Piceance to Pacific

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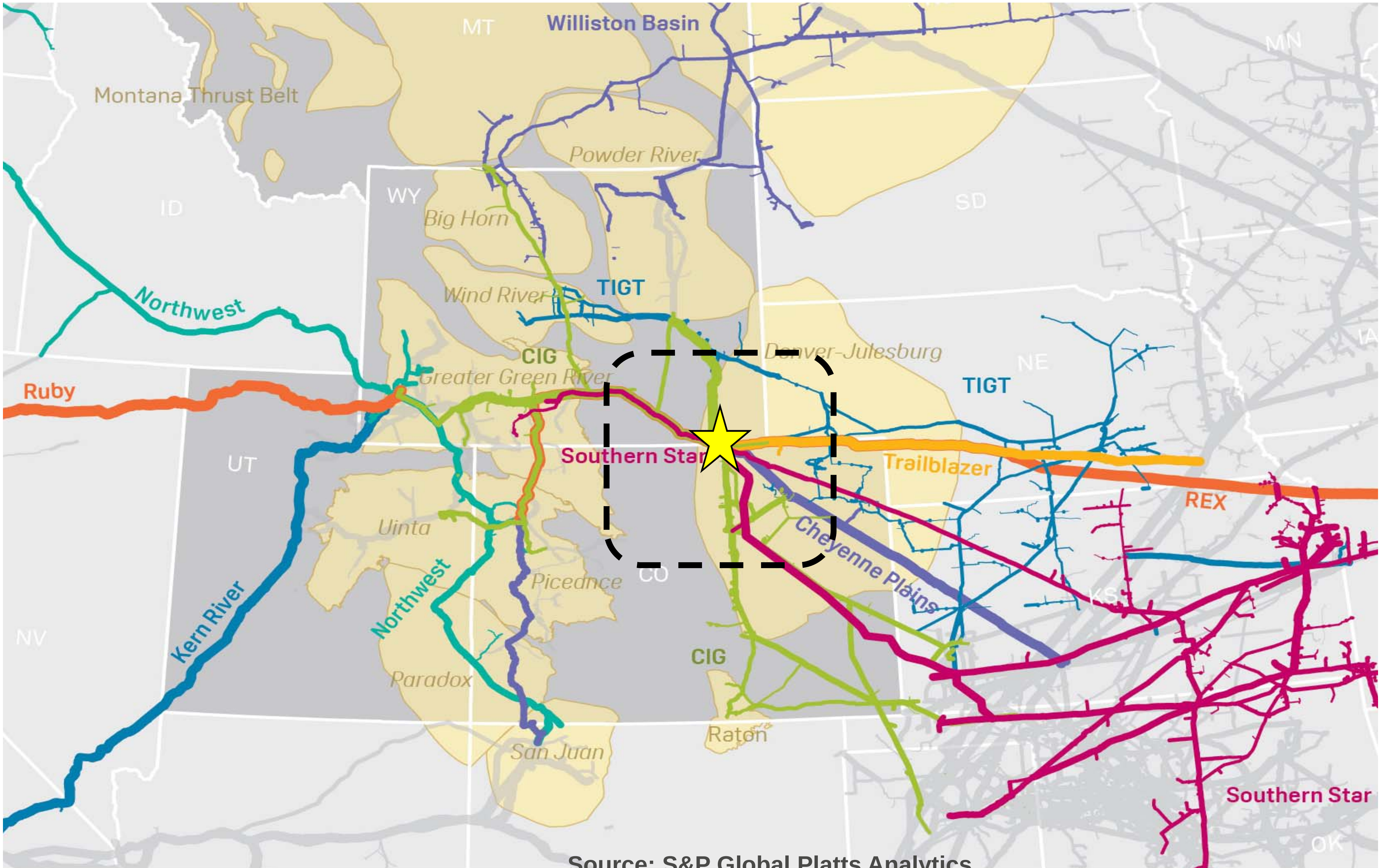
Source: Veresen Corporate Presentation, November 2014

Pacific Connector Pipeline

Source: Oregon Green Energy Guide

Intra-regional flows bumping up to constraints



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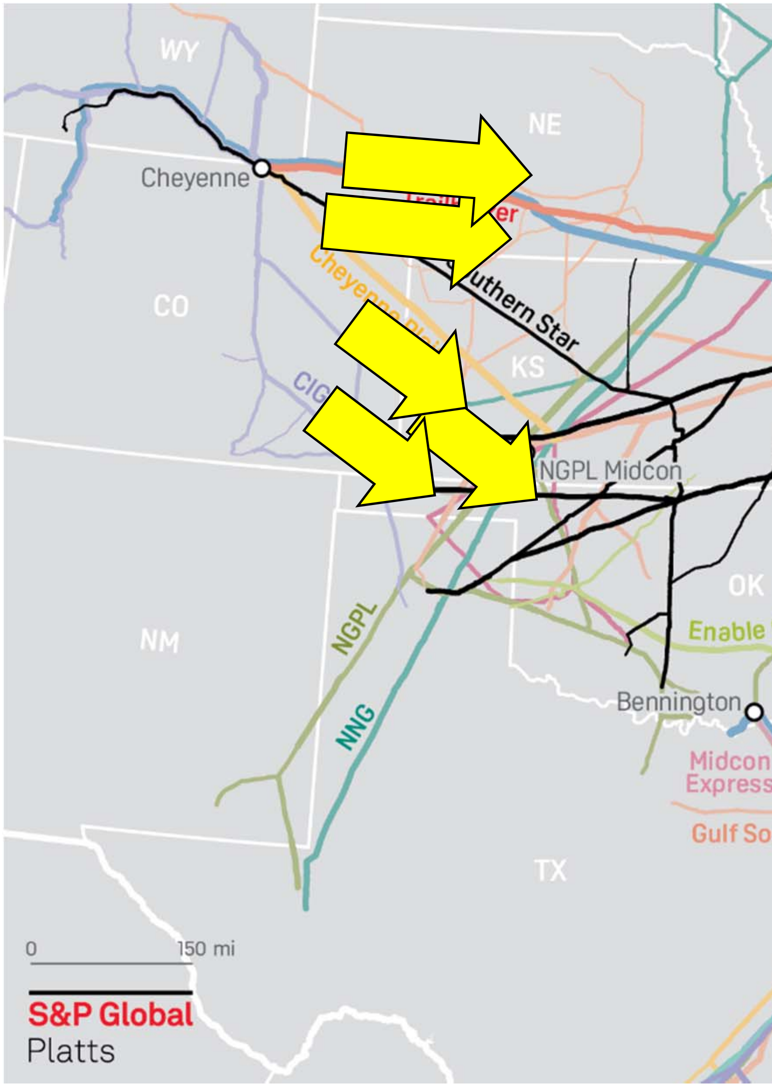
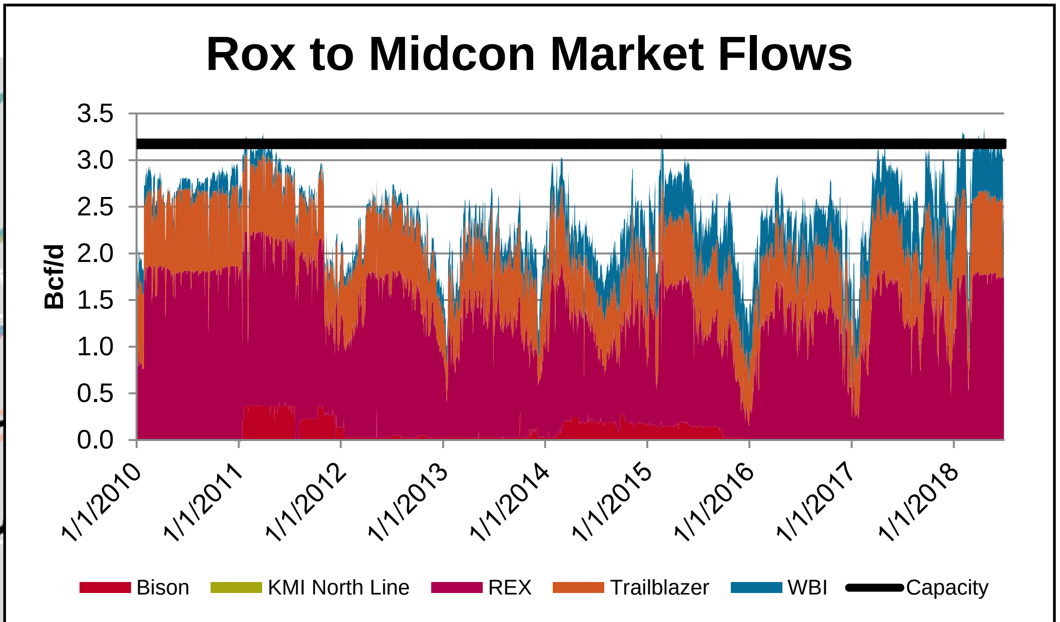
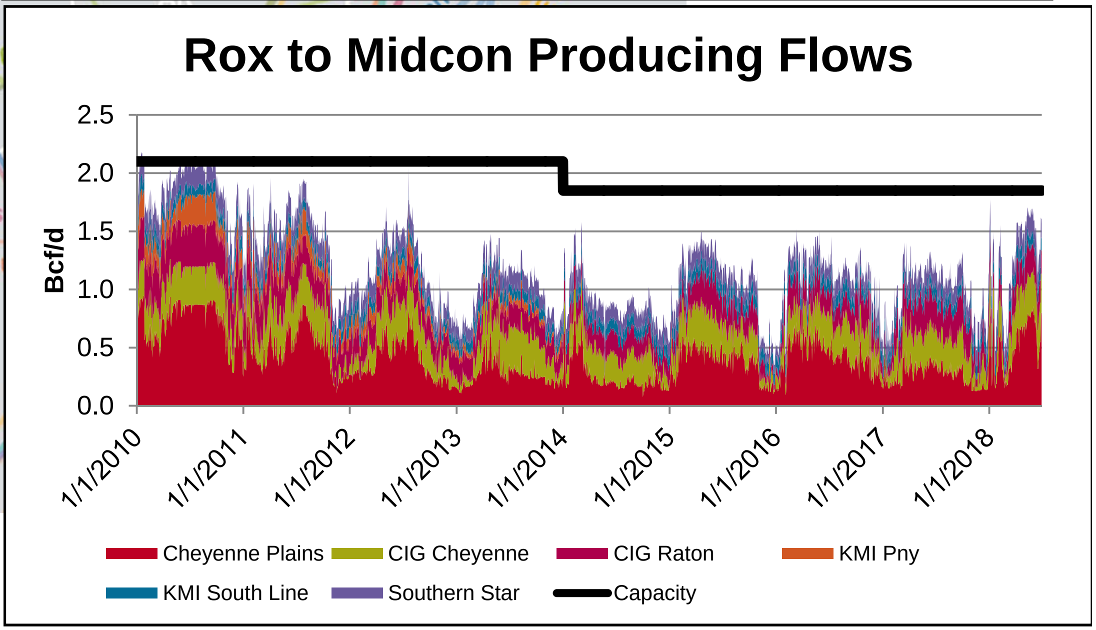
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Rockies eastbound flows approaching capacity



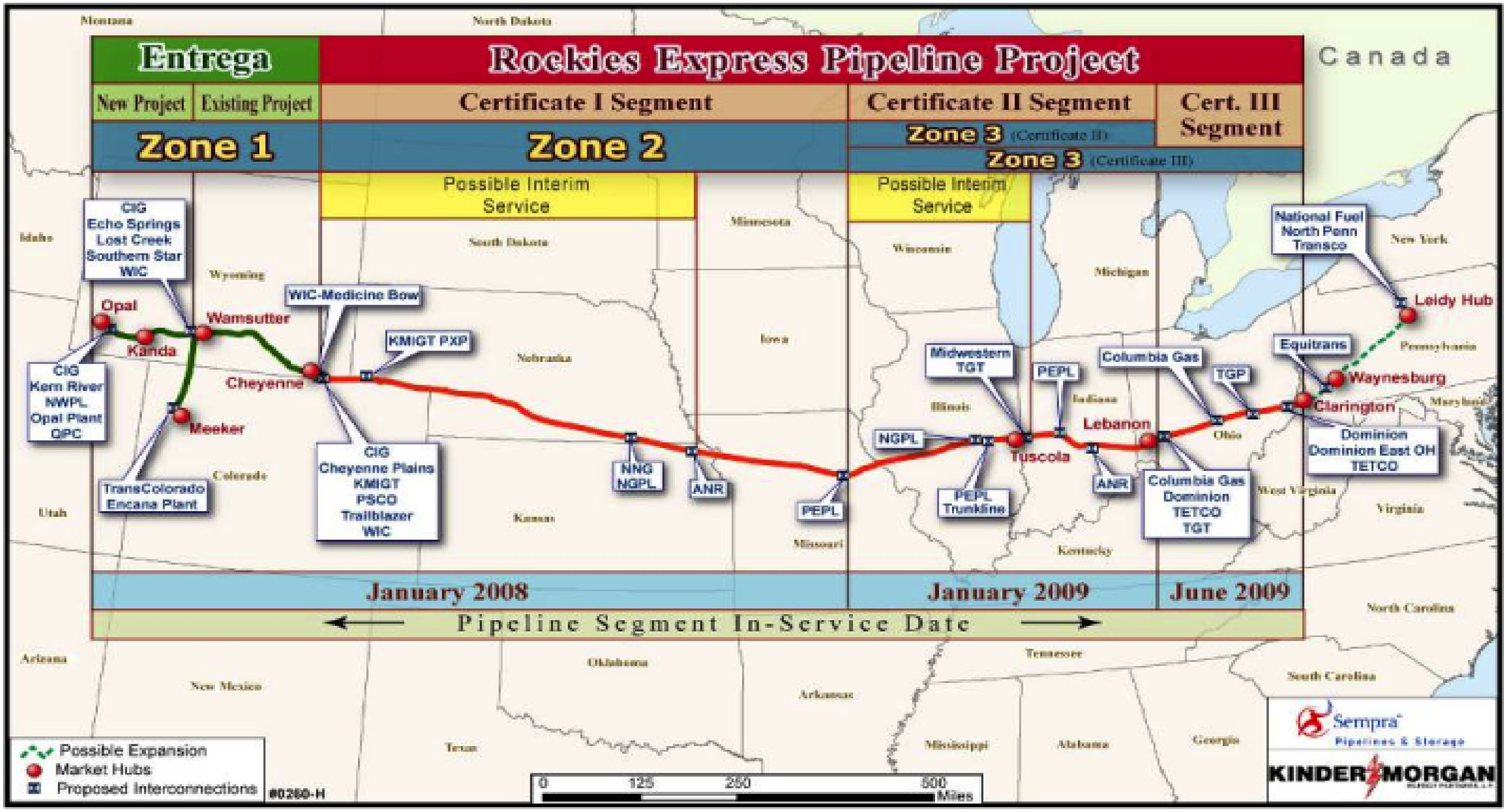




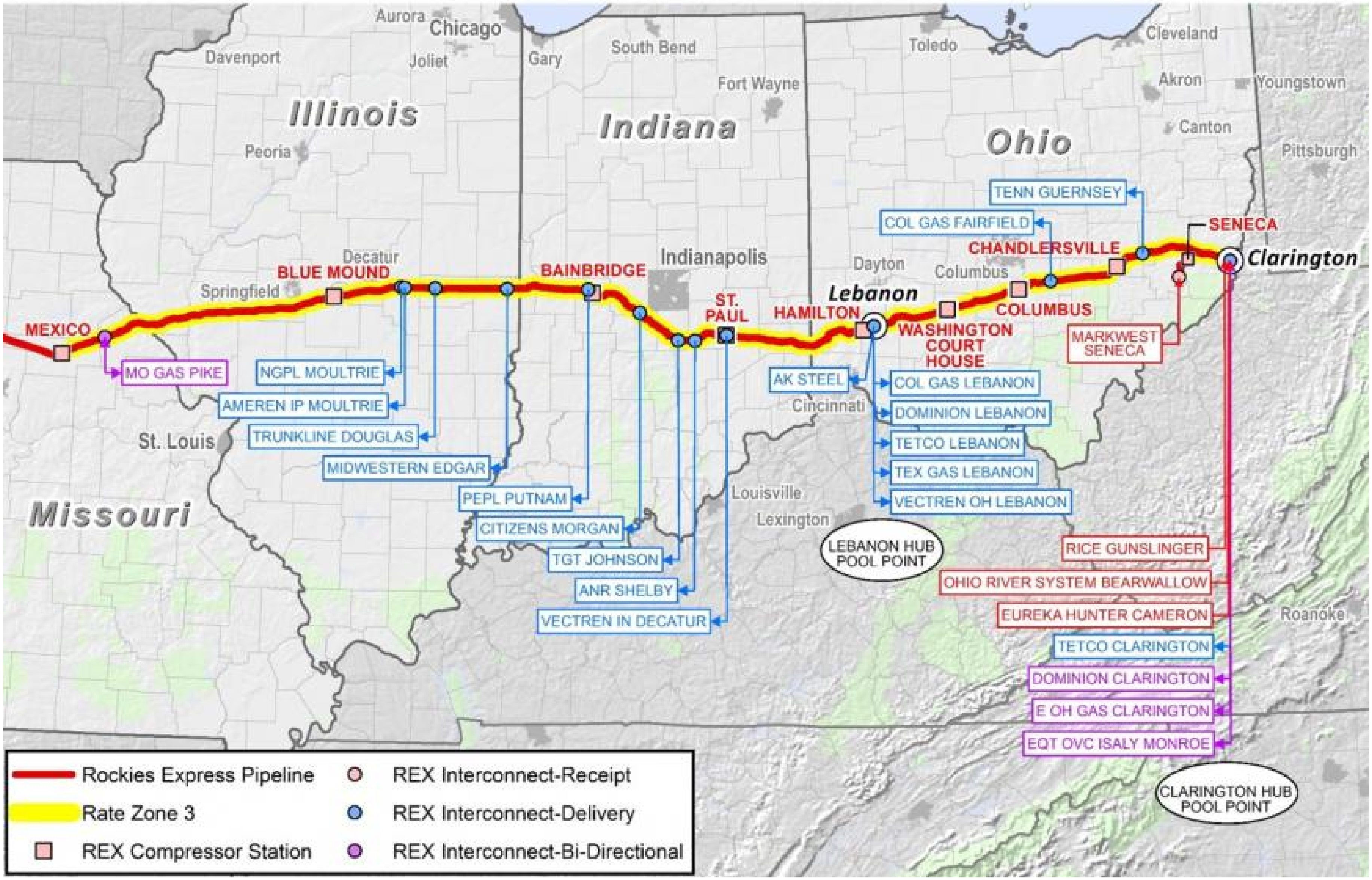
Source: S&P Global Platts Analytics

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

Rockies Express Pipeline



Rockies Express Pipeline – Zone 3



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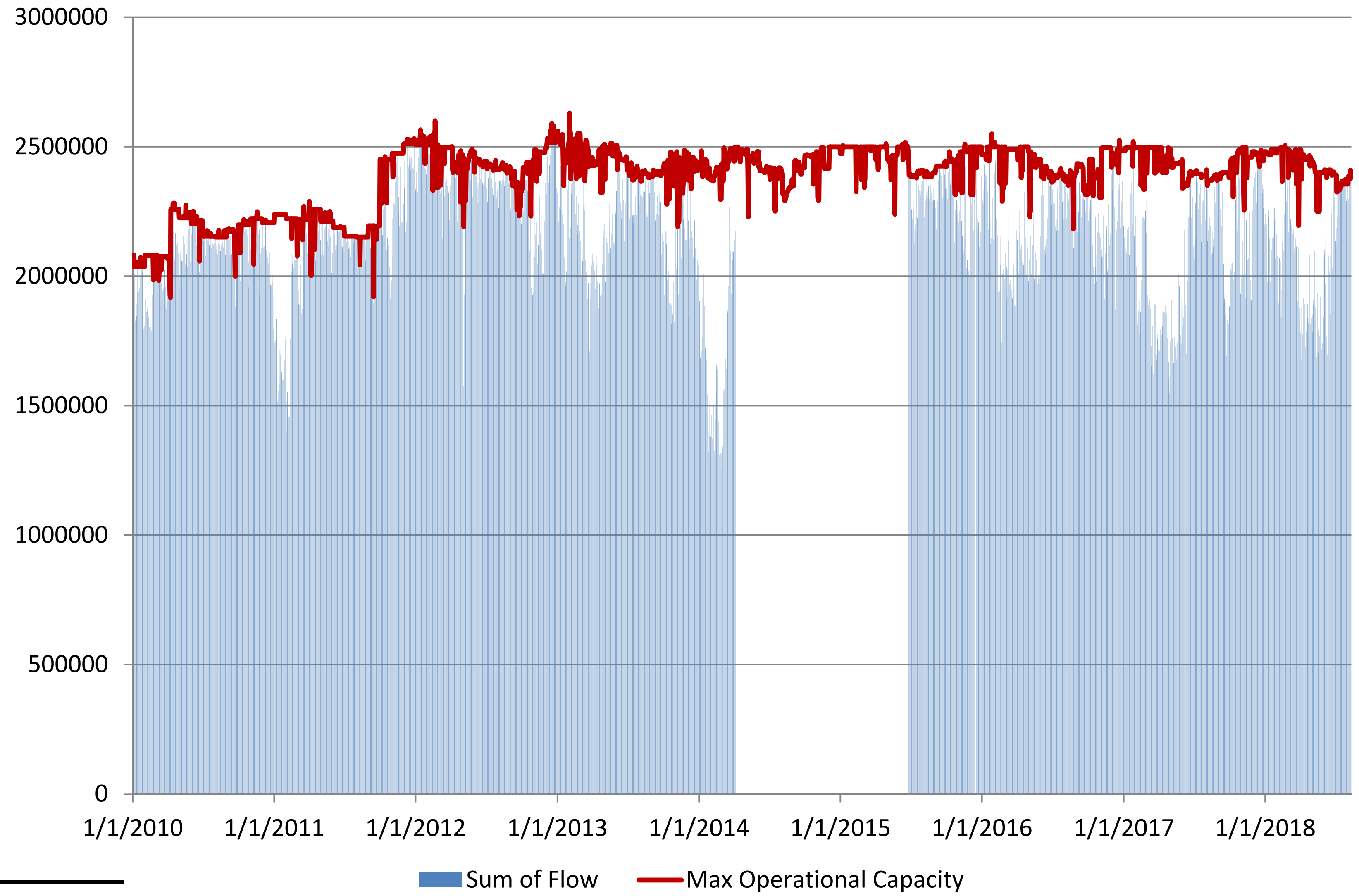
Source: *It's Been A Long Time Comin' – New REX Zone 3 Capacity And Northeast Gas Markets, Part 2,* Sheetal Nasta, RBN Energy, LLC, January 30, 2017

Kern River Capacity (west)



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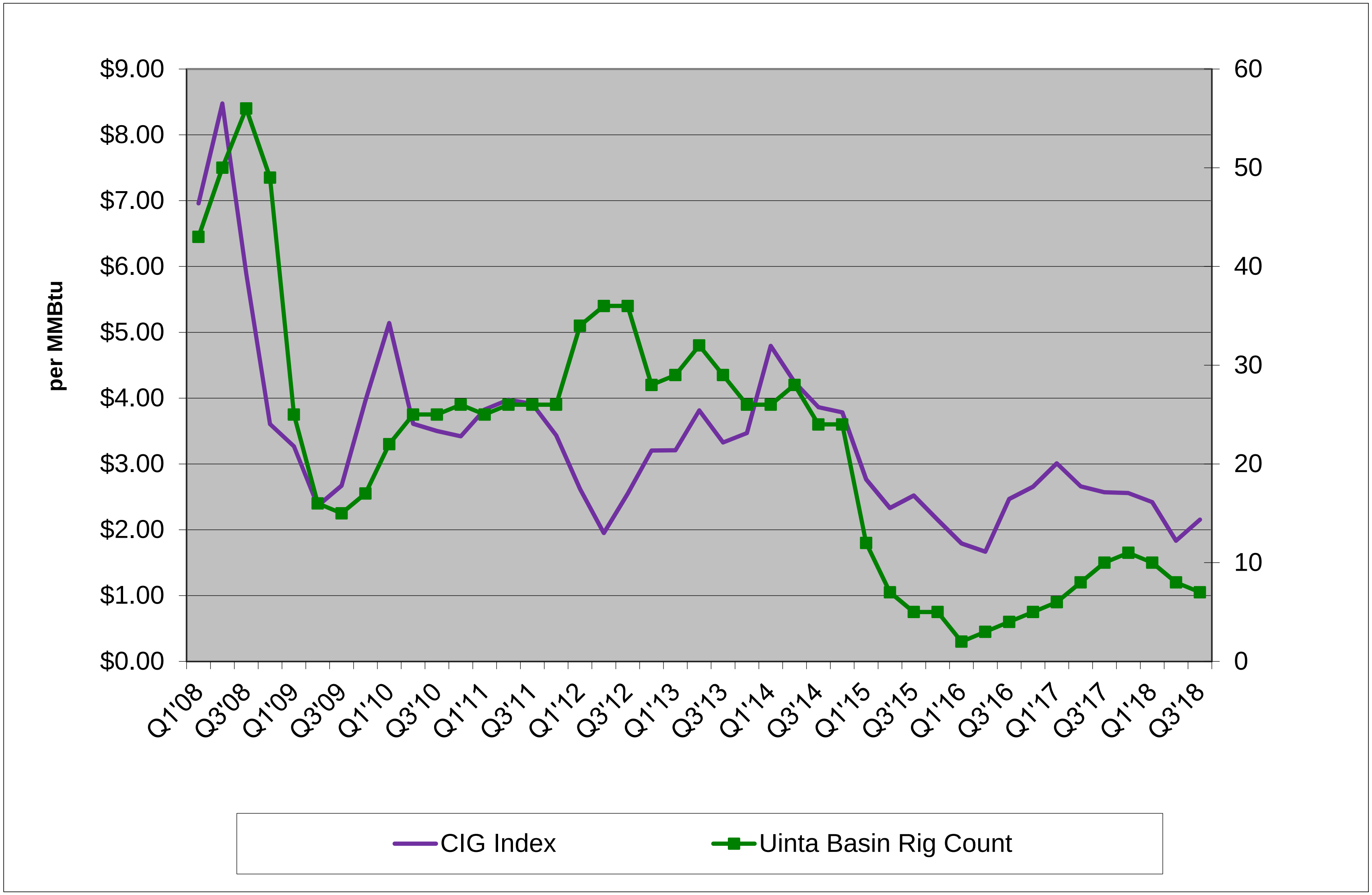
Source: Bernadette Johnson, DrillingInfo

Decline of Natural Gas Price Index and Uinta Basin Rig Count

2008-Current (By Quarter)



Source: Inside FERC's Gas Marketing Report, S&P Global Platts Publication and Tudor Pickering Holt & CO data

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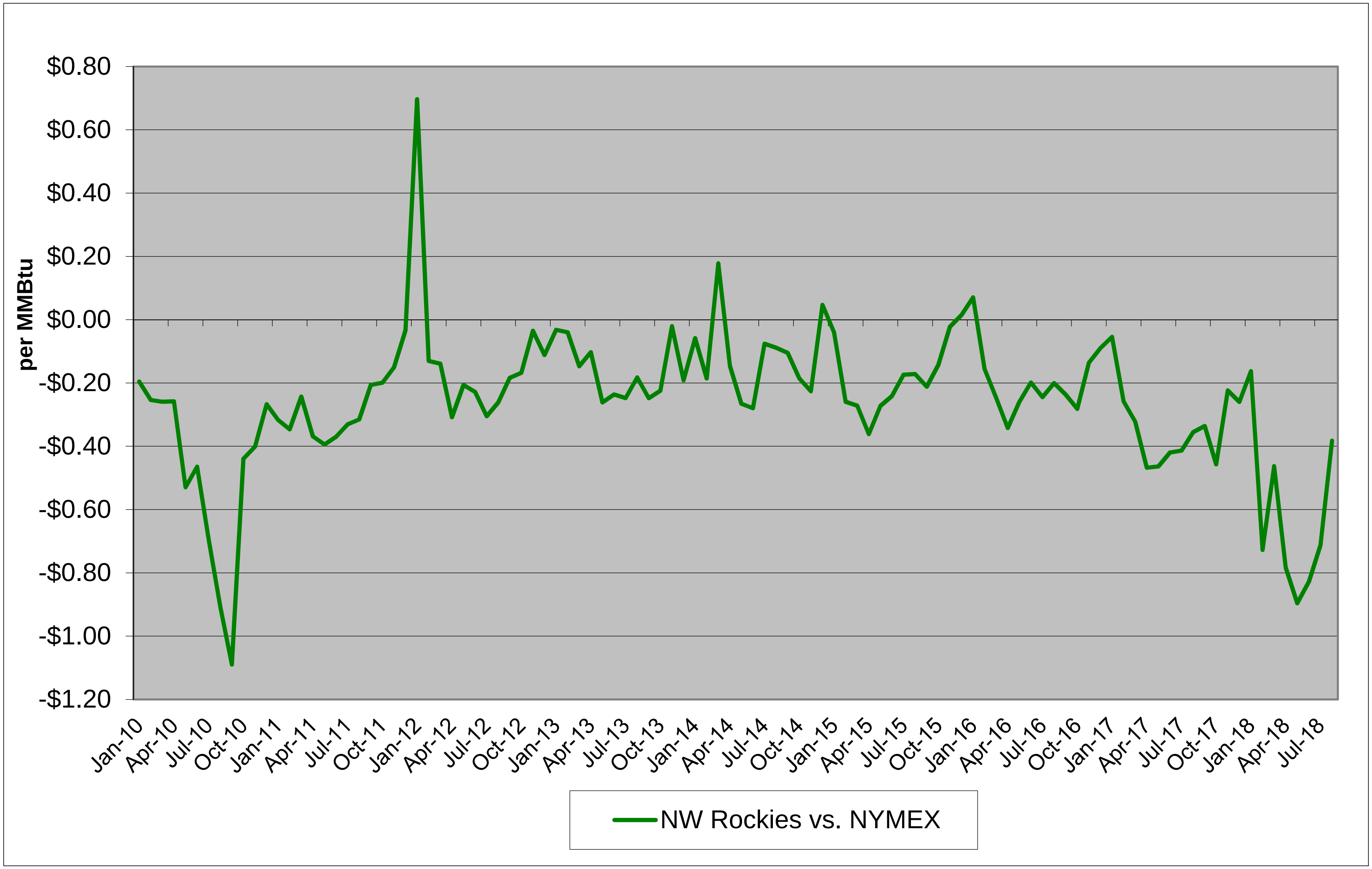
Basis Differential Between Northwest-Rockies and NYMEX 2010-Current



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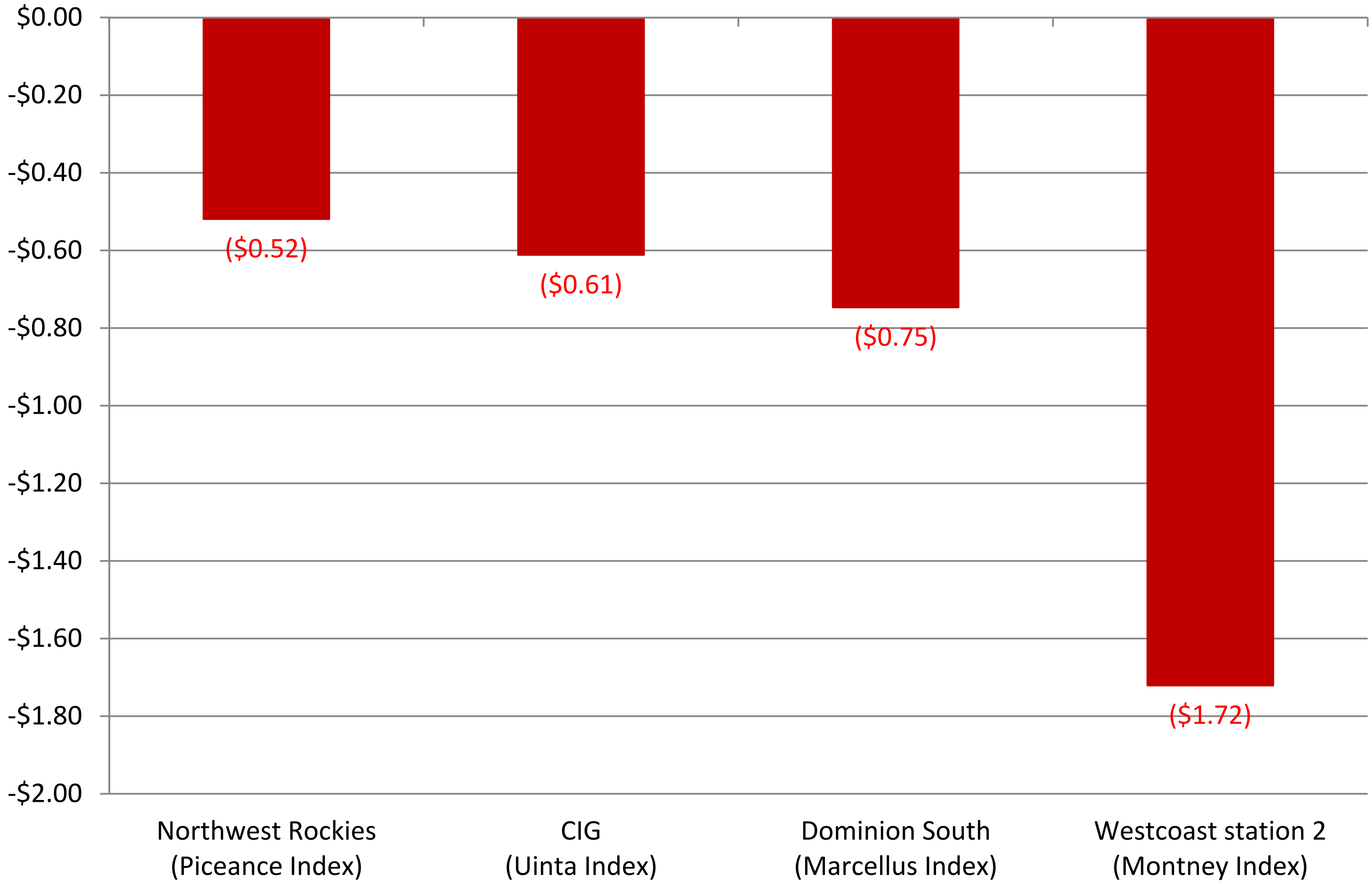
Source: Inside FERC's Gas Marketing Report, S&P Global Platts Publication

Uinta and Piceance Basin Price Superiority Last 12 months



Source: Inside FERC's Gas Marketing Report, S&P Global Platts Publication, September 2017 - August 2018 information as compared to NYMEX average of last 3 days

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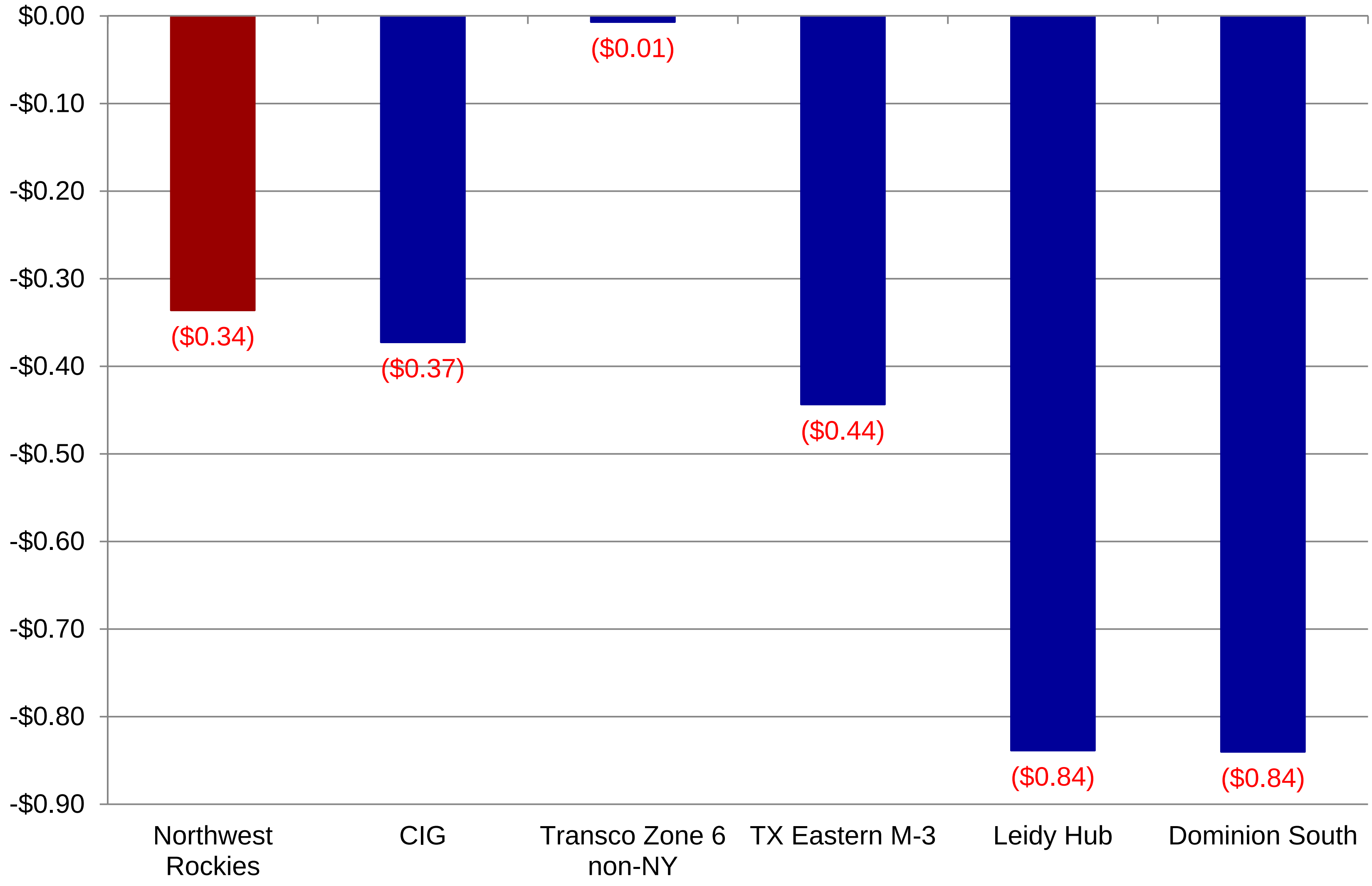
Average Basis Differential for 2017



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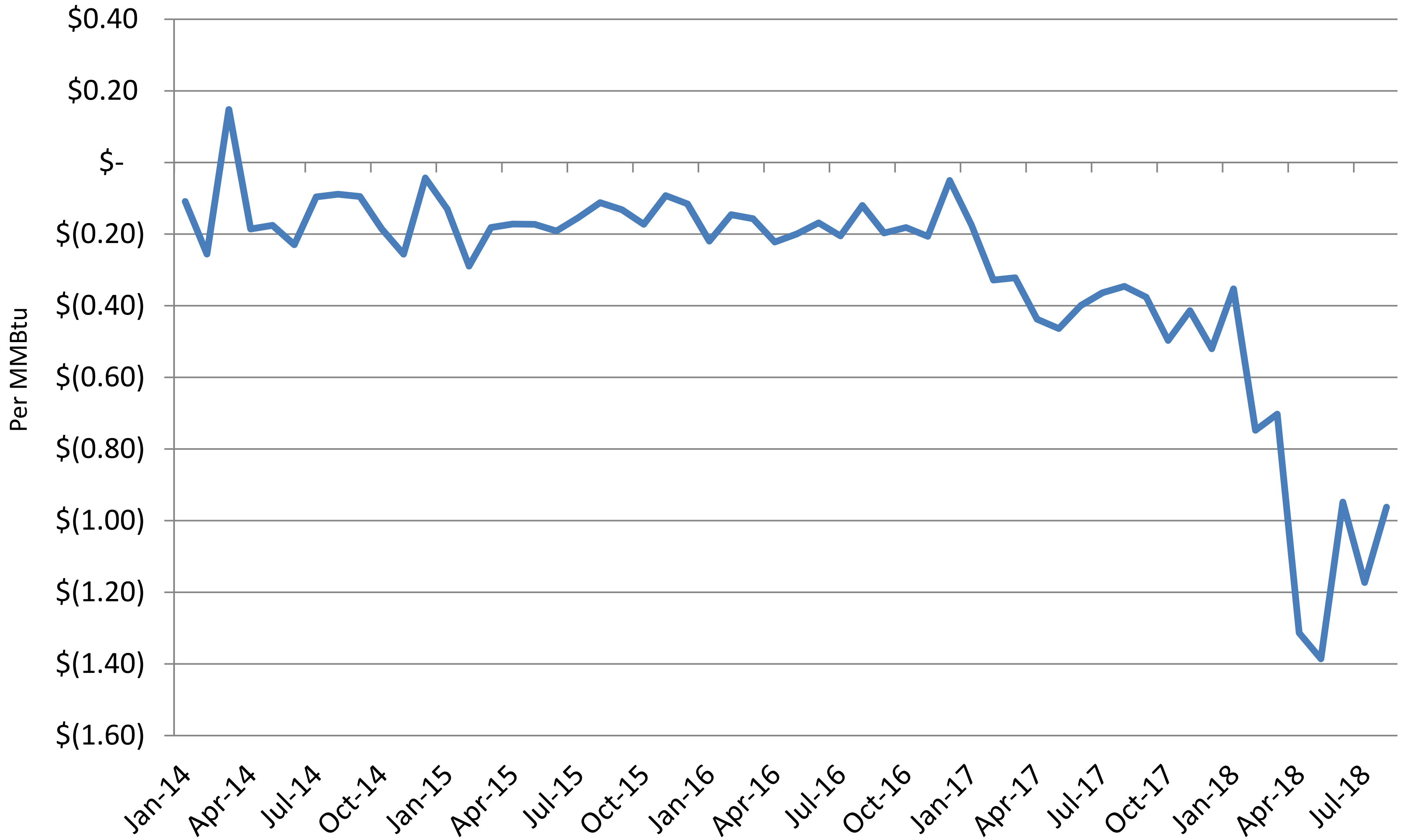
Source: Inside FERC's Gas Marketing Report, S&P Global Platts Publication

Waha Basis Differential 2014-Current



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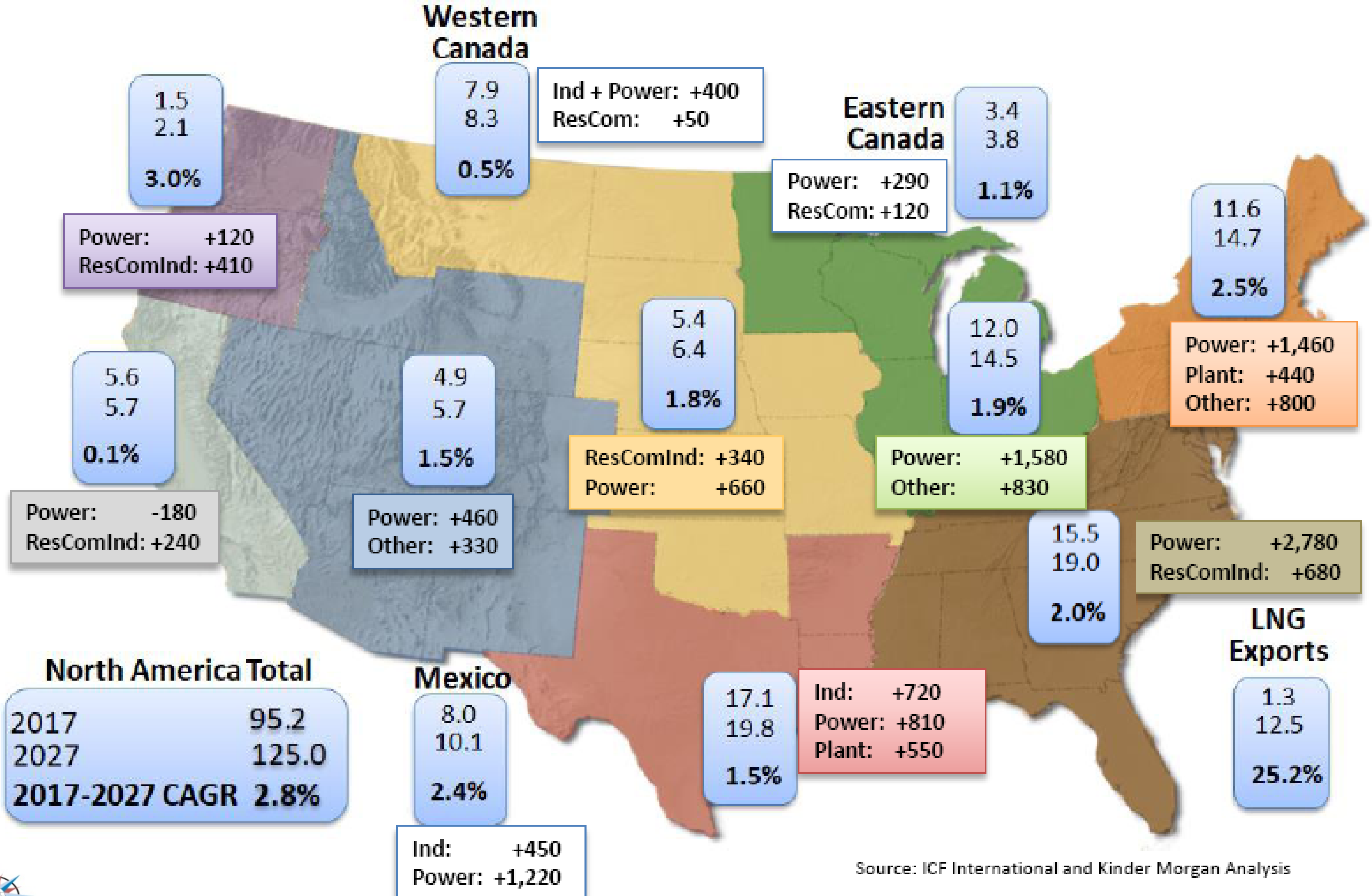
Source: Inside FERC's Gas Marketing Report and Gas Daily, S&P Global Platts Publications

North American Gas Demand

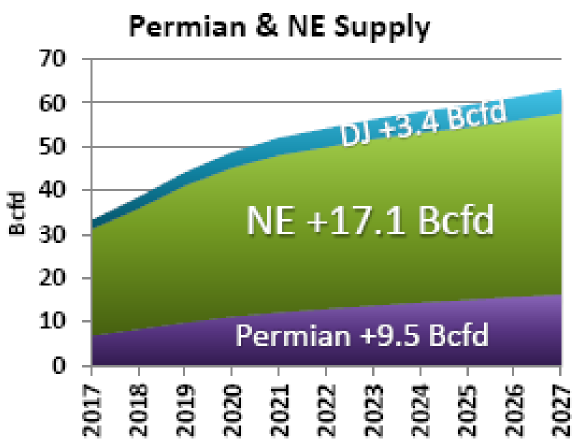
Including LNG Exports (2017-2027 Volumes in Bcf/d)



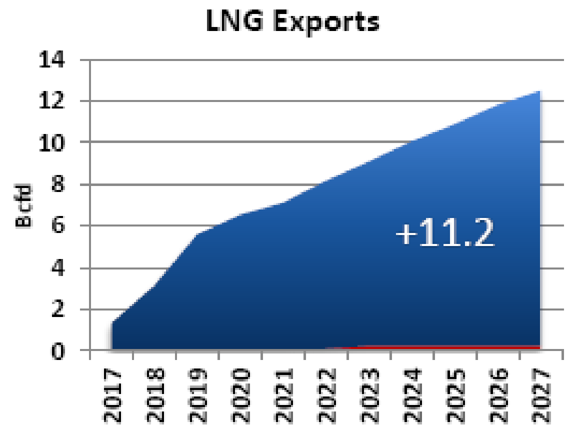
Source: Greg Ruben, KinderMorgan, Colorado Oil and Gas Association Trade presentation, August 21, 2018

KINDER MORGAN

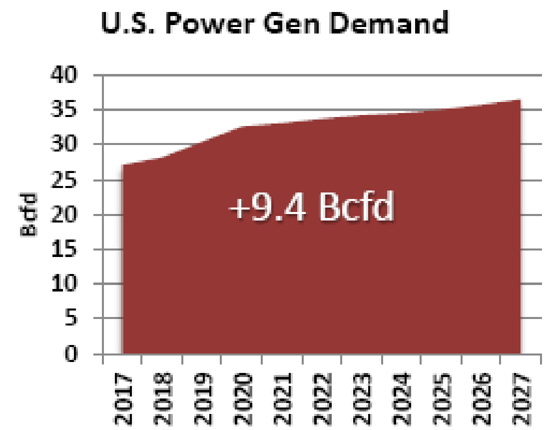
Key L/T Fundamental Trends



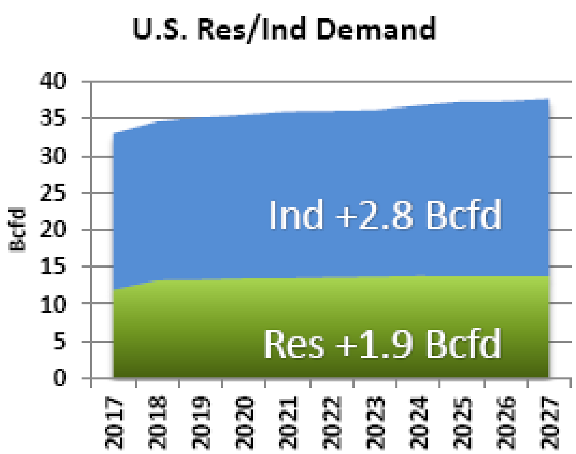
Continued supply increases



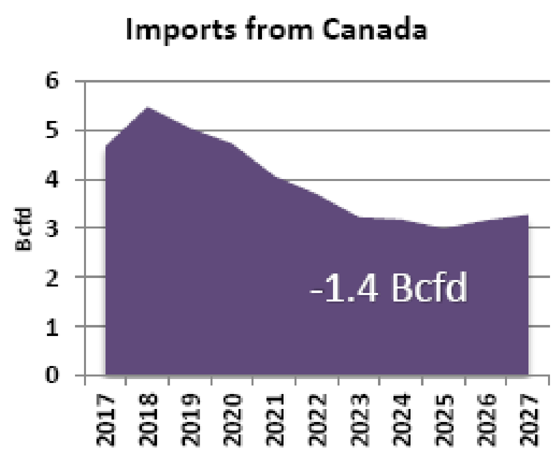
U.S. becomes net exporter



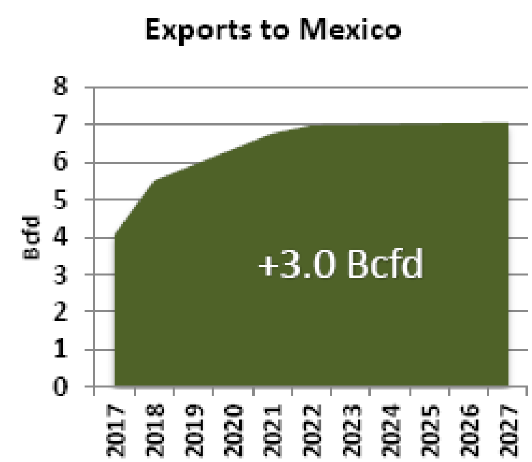
More Gas-fired generation



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 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
- Rockies production grows with DJ and GRO gains; short-term **infrastructure challenges for DJ associated gas**

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

Contact Information

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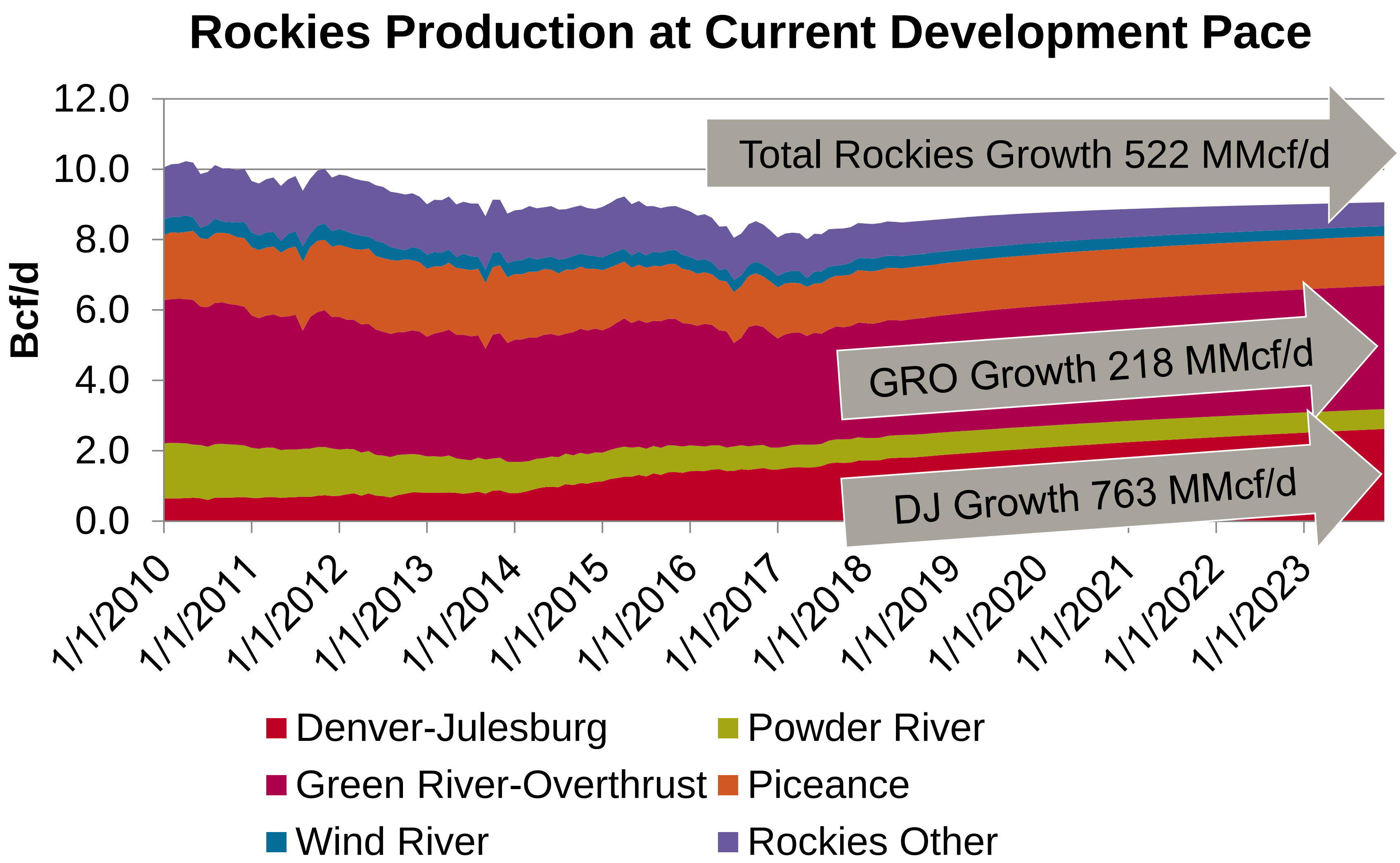
(303) 478-3233 (cell)

DJ, Powder River, Green River, Piceance and Wind River



Source: S&P Global Platts Analytics

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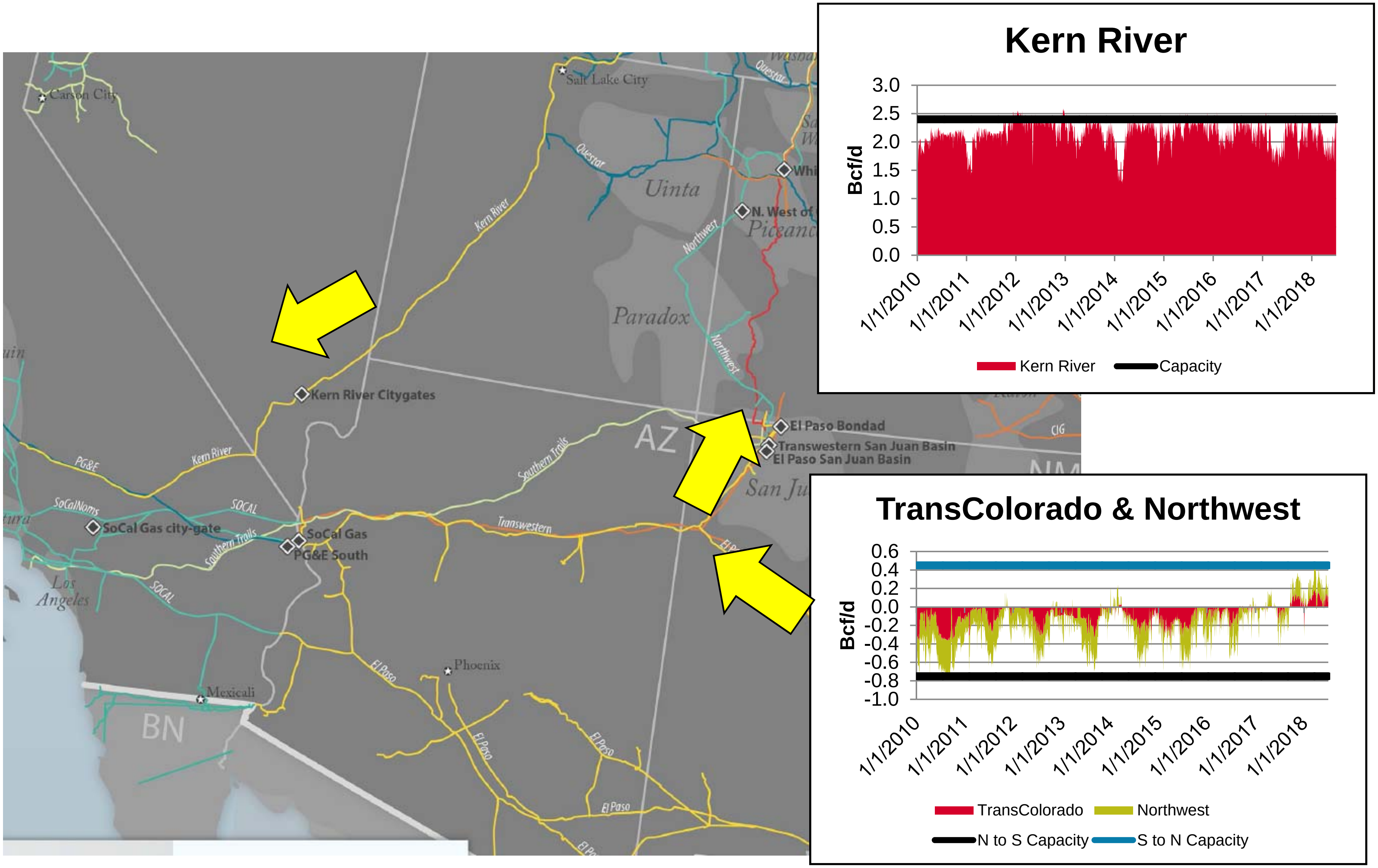
Source: Rick Allen, S&P Global Platts, *The Energy Summit – COGA 2018* presentation, August 22, 2018

Rockies to Southwest; displacement from Permian



Source: S&P Global Platts Analytics

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