Oklahoma's Place in the Evolving U.S. Energy Market*

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Abstract

As the U.S. energy market settles into the current commodity environment, producers are attempting to expand into less developed plays that provide not only favorable economics, but also future growth opportunities. The SCOOP and STACK plays of Oklahoma have seen a significant amount of attention in the last year, and the reported well results show they can be competitive with plays such as the Permian, Bakken, and Eagle Ford. Strong natural gas IP rates, in addition to liquids rich zones, have allowed for the emerging Oklahoma plays to grow production while neighboring regions have been in decline. Analysis of the SCOOP and STACK breakeven economics, well level production results, and U.S. supply and demand dynamics highlight Oklahoma's position in the overall oil and gas markets going forward.

Selected References

Ernst and Young, 2016, Energy Alert – National Electric System Development Program (PRODSESEN) 2016-2030, 32p. Website accessed October 26, 2016, http://www.ey.com/Publication/vwLUAssets/ey-energy-alert-prodesen-2016-2030/%24FILE/ey-energy-alert-prodesen-2016-2030.pdf.

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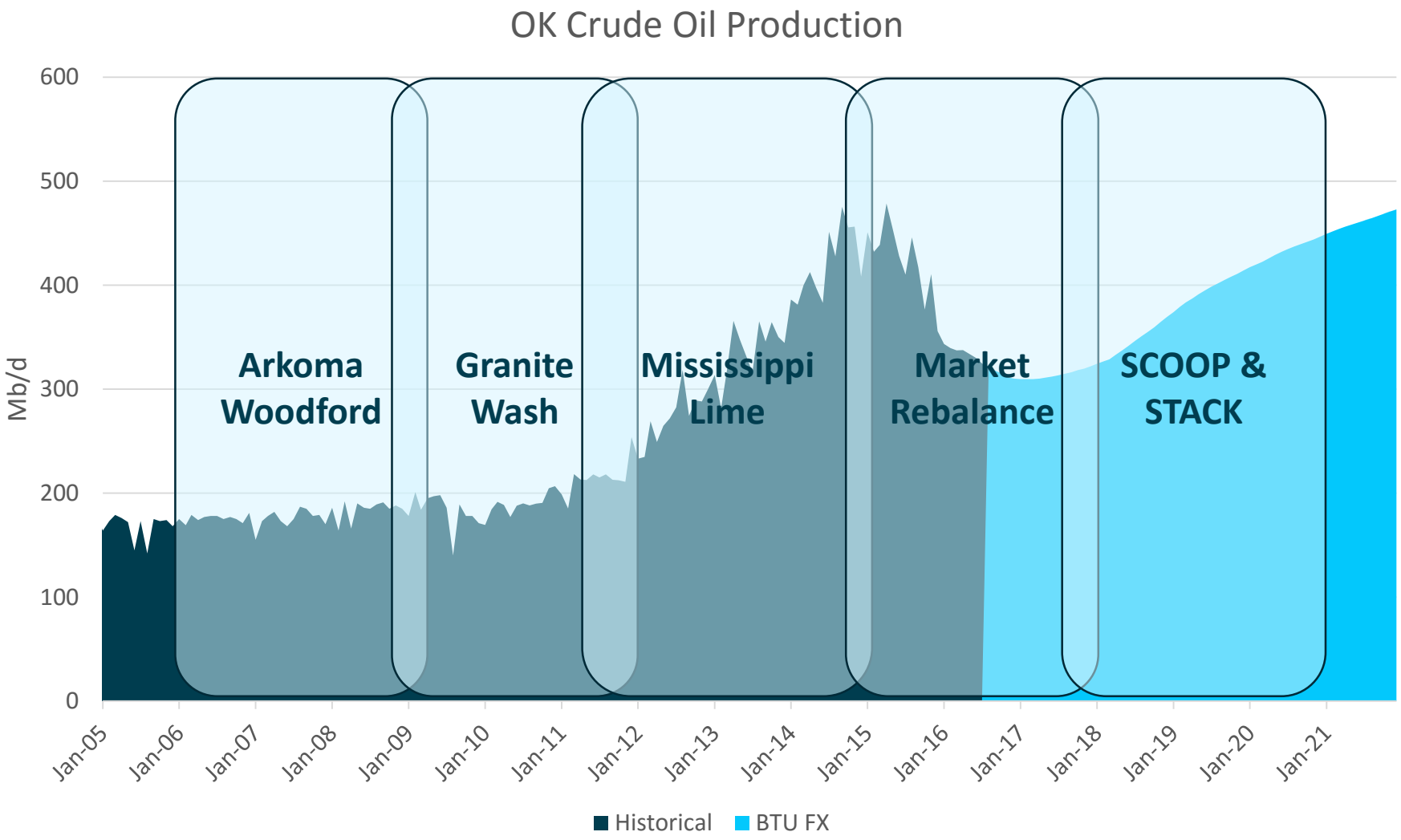
BTU Analytics

Oklahoma in the Evolving U.S. Energy Market

October 18, 2016

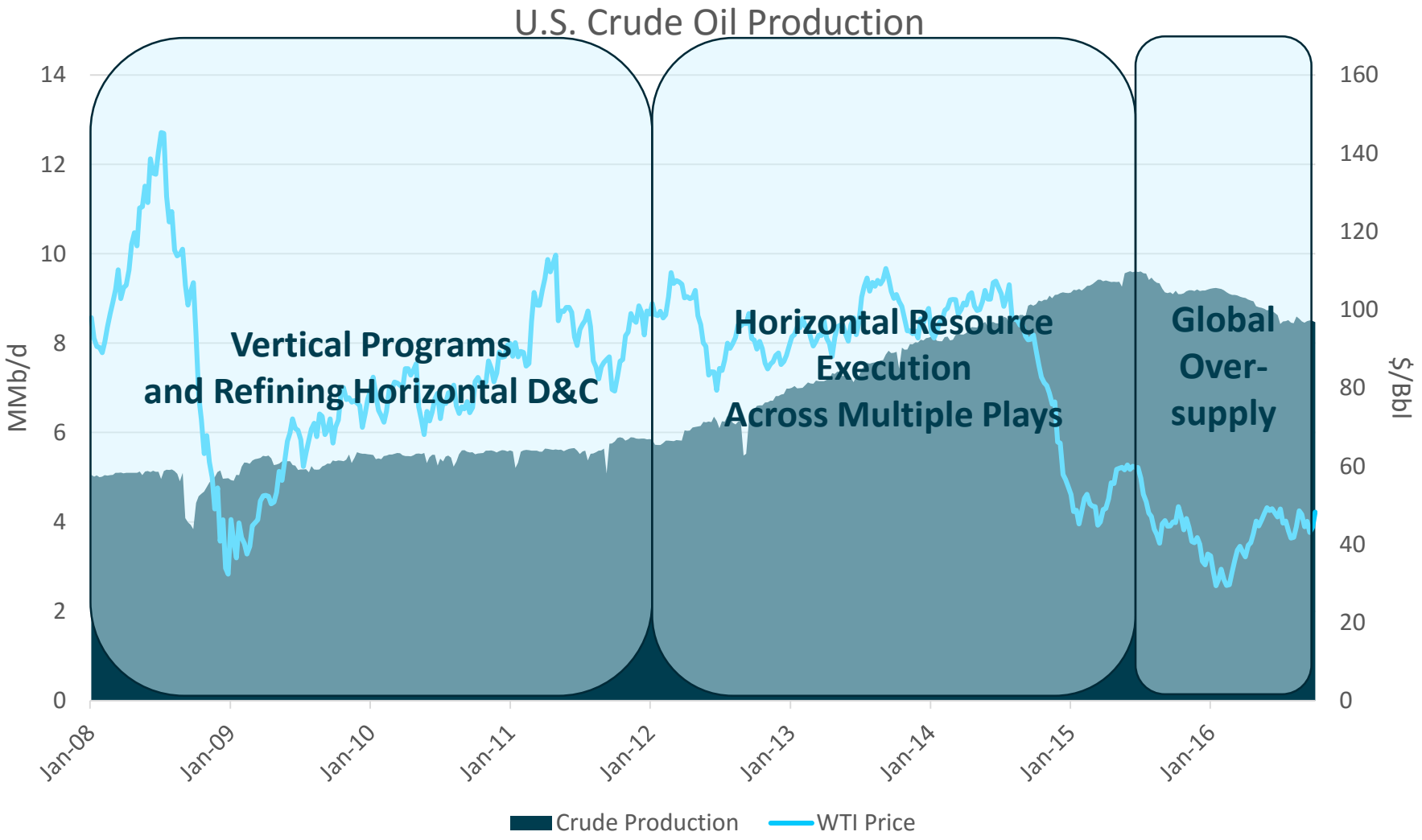
Jason Slingsby, Energy Analyst

Shifting Trends In Oklahoma



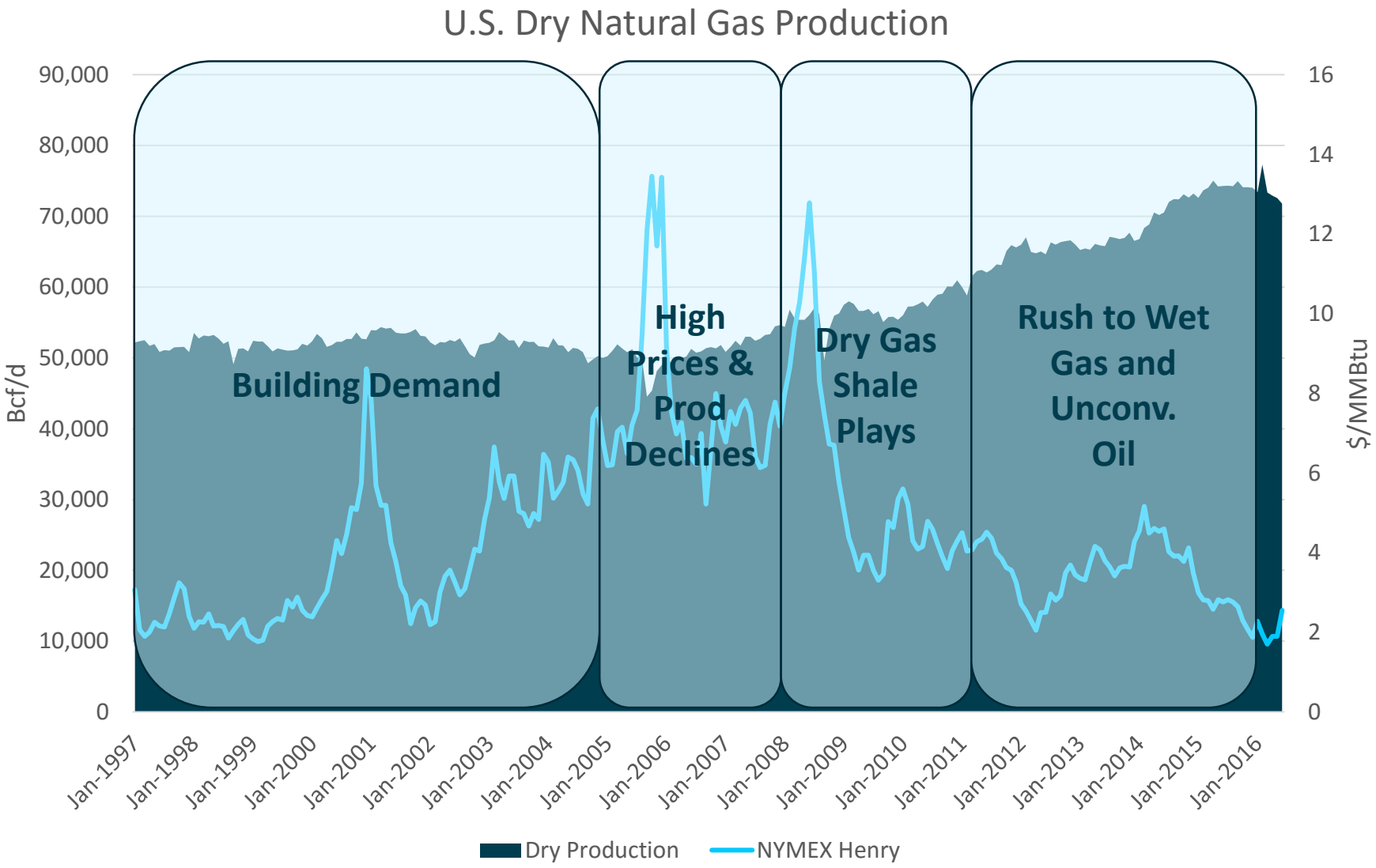
Source: BTU Analytics & EIA

U.S. Crude Oil Production Grew at 1.0 MMb/d Annually Over Past Three Years



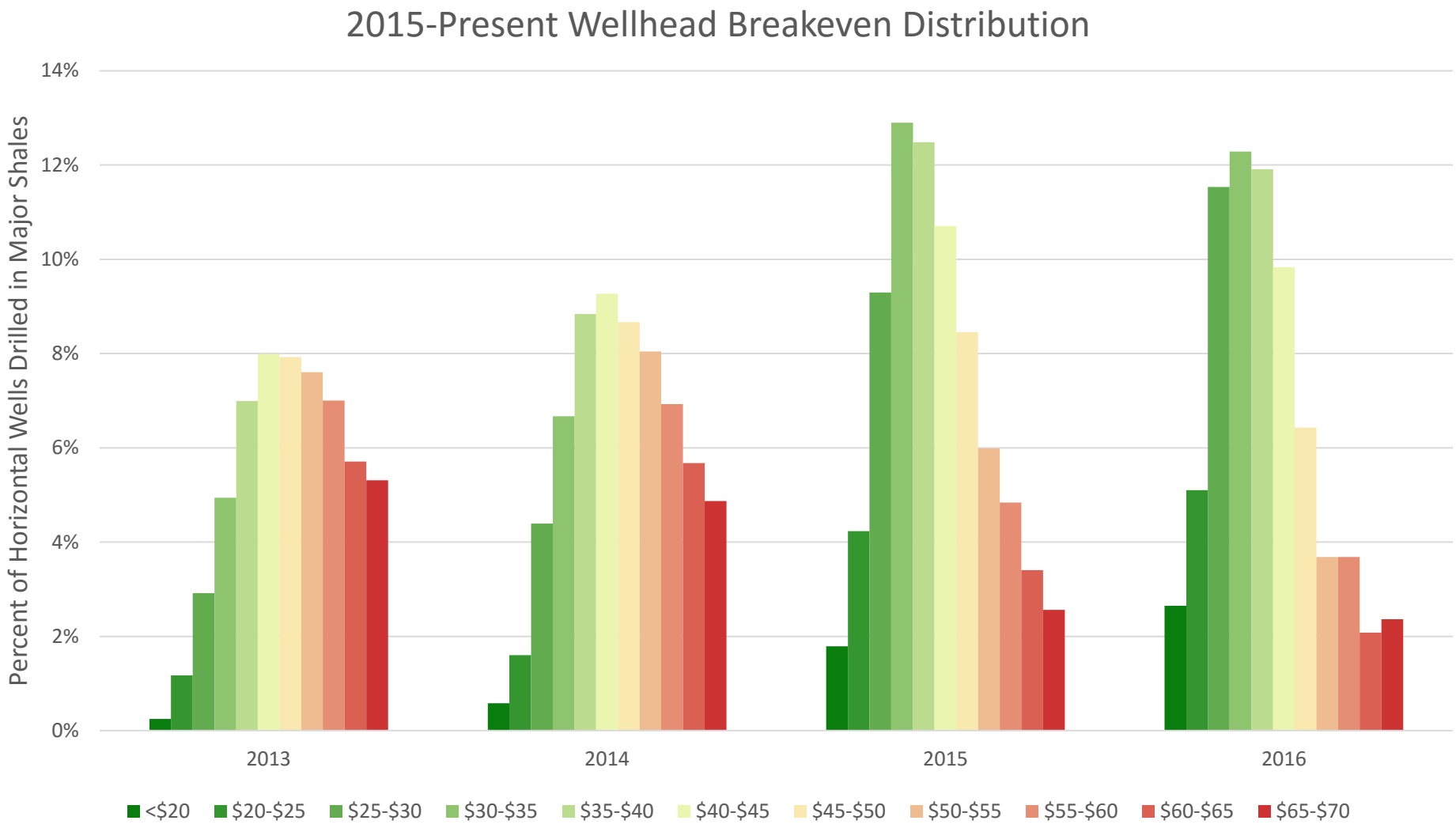
Source: BTU Analytics & EIA

Gas Production Continued to Grow Despite Lower Prices as Liquids Buoyed Returns



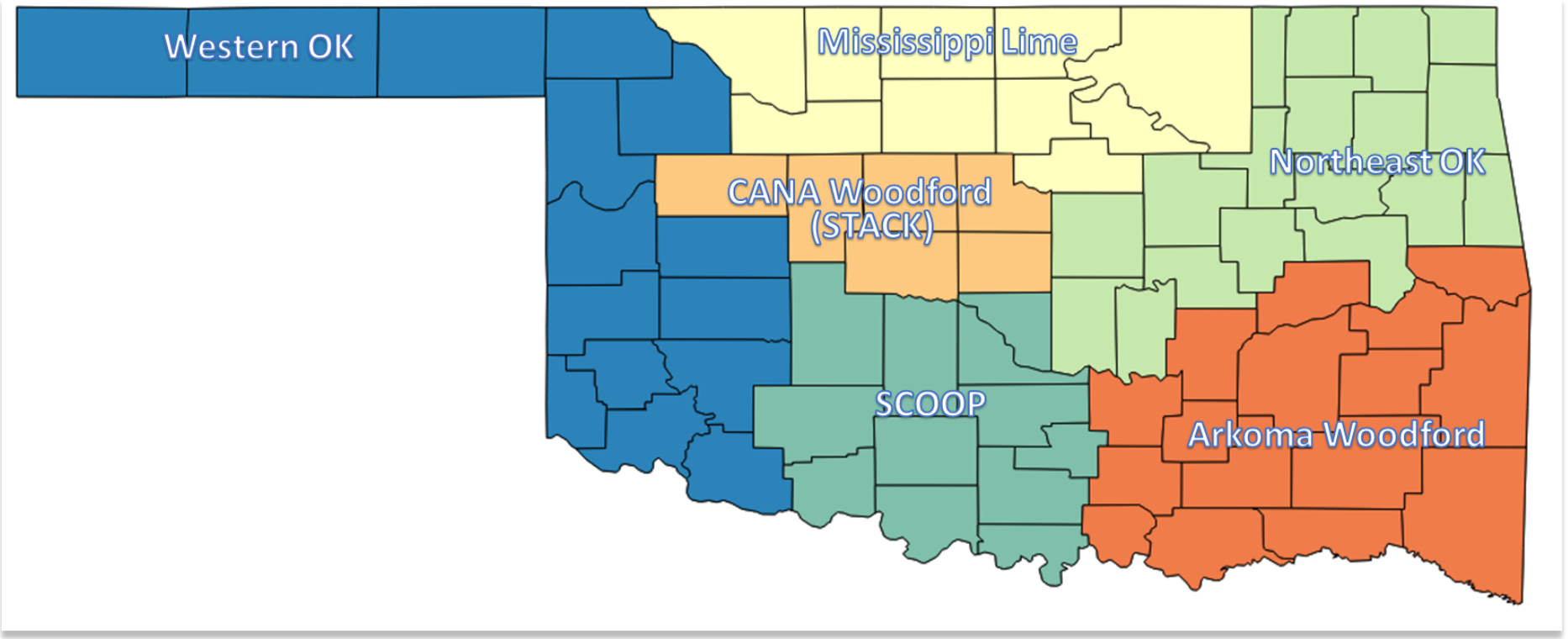
Source: BTU Analytics & EIA

Economics Are Improving Across the Board as Costs Managed and Productivity Drives Higher

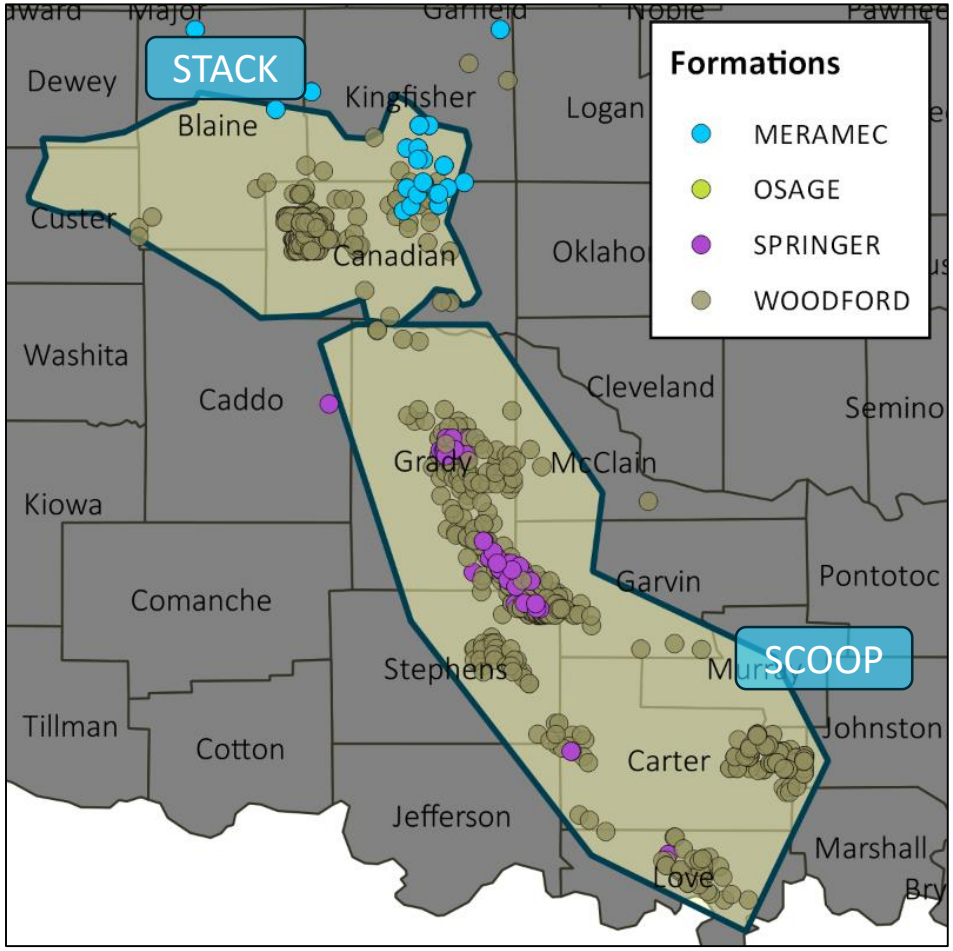


Note: 6/30/2016 Gas Strip. 10% discount rate, maximum observed IP rates for crude oil and wet gas over the first 12 months of production and first year decline rates for crude oil and wet gas if historical data is present. BTU Analytics' estimates for drilling and completion costs are based on reported well depth, lateral length, proppant use and operator. NGL prices are calculated based on the price of each purity product as a percent of the wellhead crude price. Gathering, processing, compression, fractionation and operating expenses are estimated for individual basins and plays. Royalty rates assumed to be 20% for all wells unless otherwise noted.

BTU Sublocations of Oklahoma



Early Drilling in the SCOOP and STACK has Indicated Strong Potential



Oil 30-Day Average IP Rate (B/d)

Year	Meramec	Osage	Springer	Woodford
2013	489	-	388	182
2014	688	-	386	231
2015	328	367	515	295

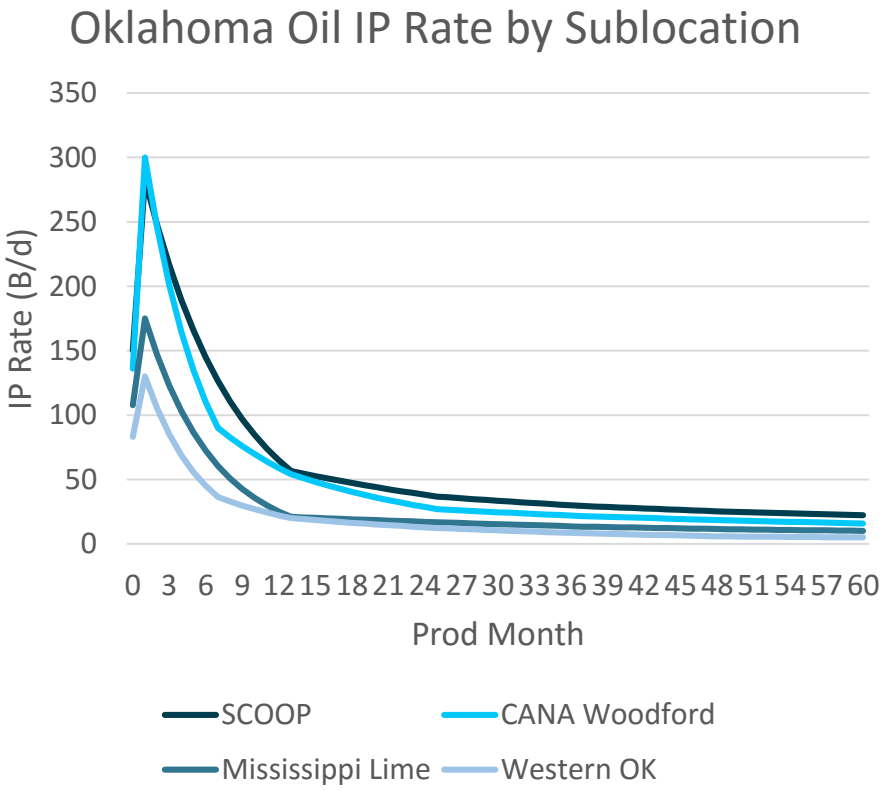
Gas 30-Day Average IP Rate (Mcf/d)

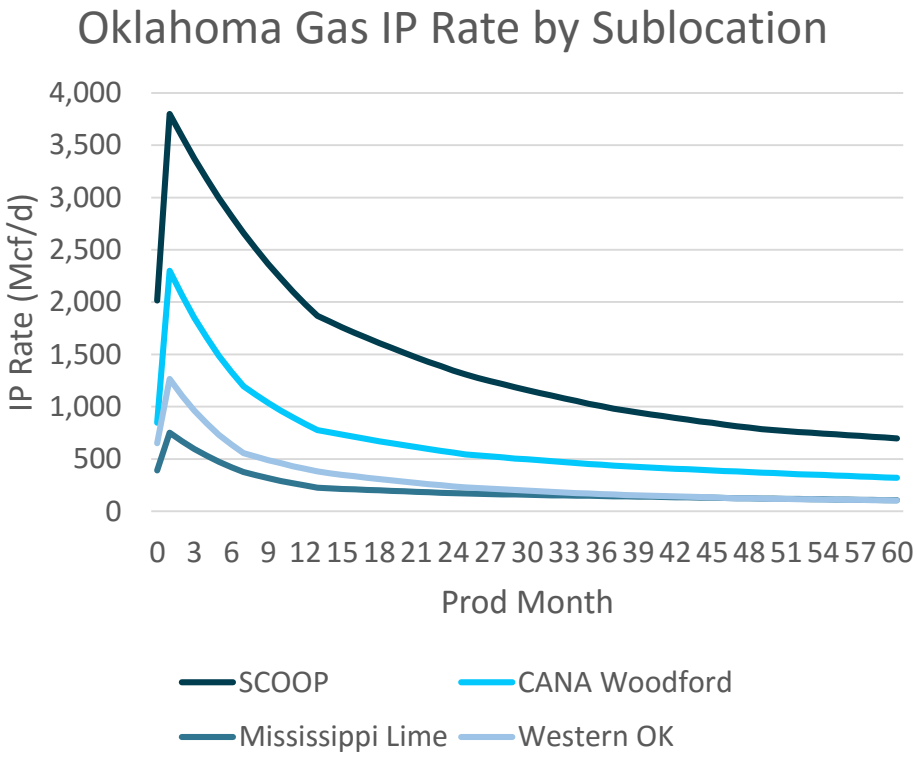
Year	Meramec	Osage	Springer	Woodford
2013	422	-	982	3,879
2014	900	-	1,205	3,562
2015	2,412	2,590	1,735	4,632

 # Horizontal Wells in Sample

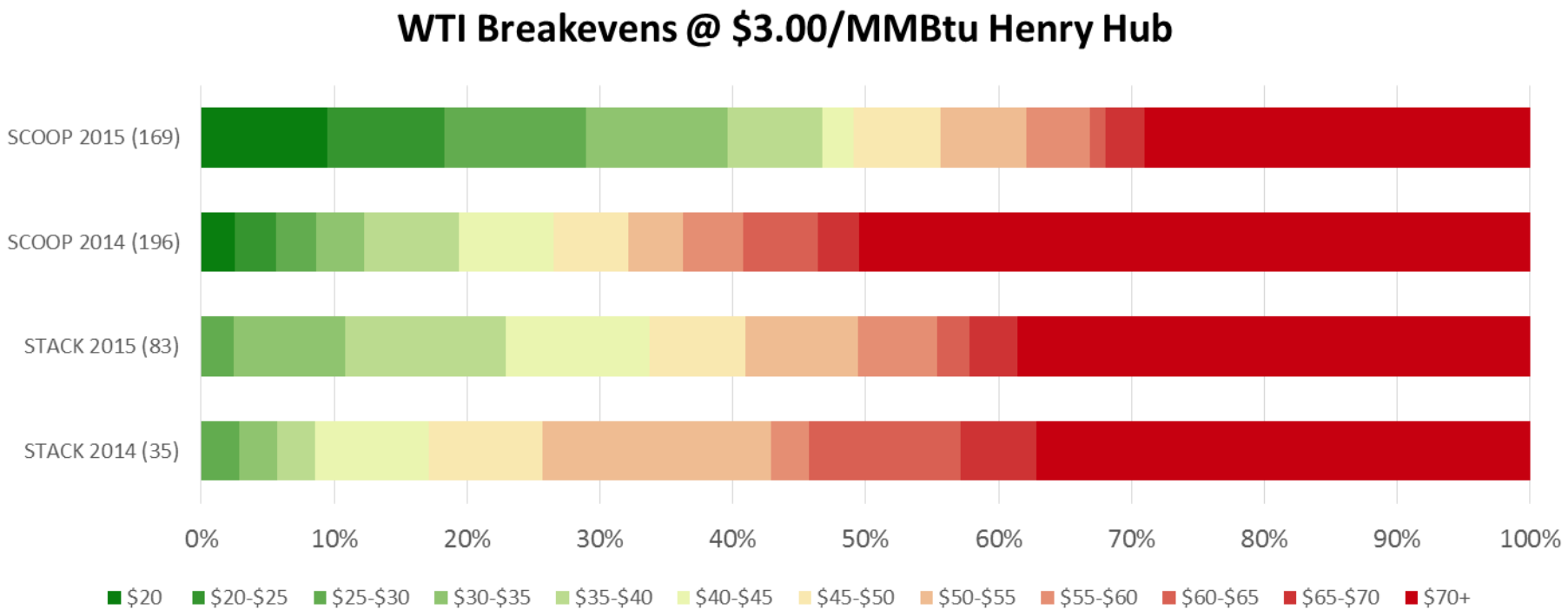
Year	Meramec	Osage	Springer	Woodford
2013	3	0	1	294
2014	12	0	19	201
2015	7	1	25	219

SCOOP and STACK IP Rates Much Stronger Than Legacy Oklahoma Regions, Help Drive Production Going Forward

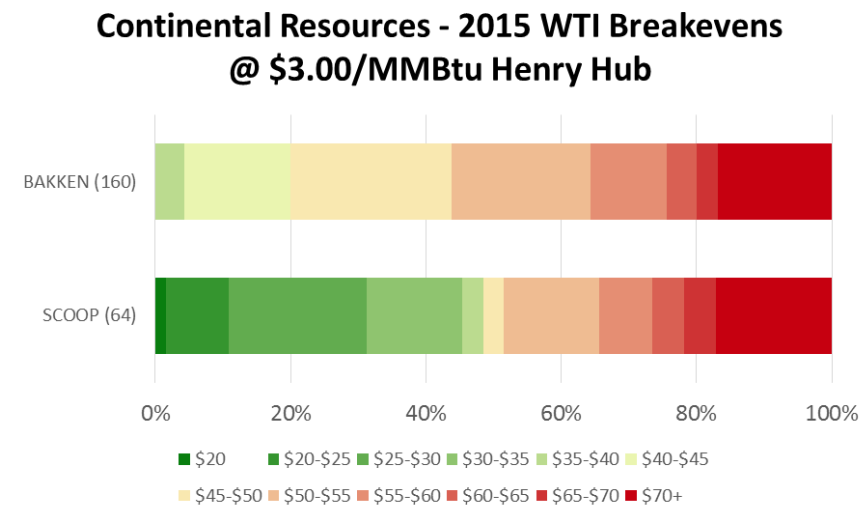


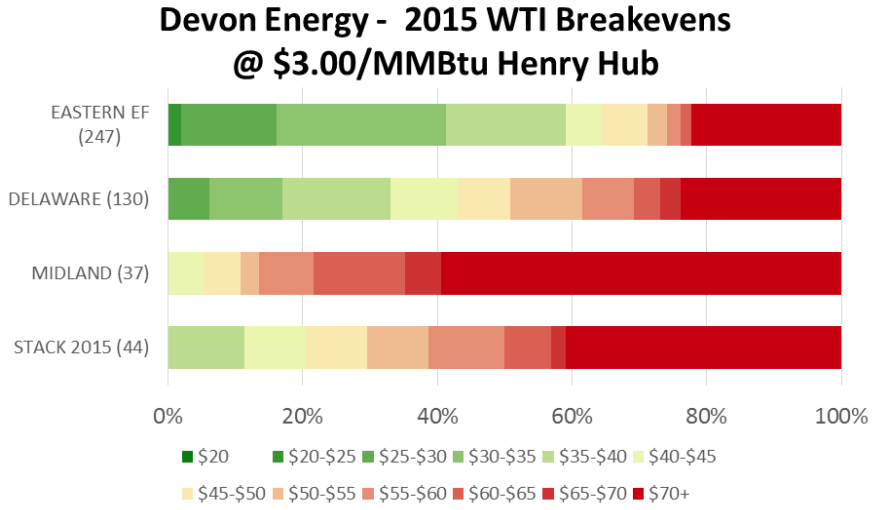


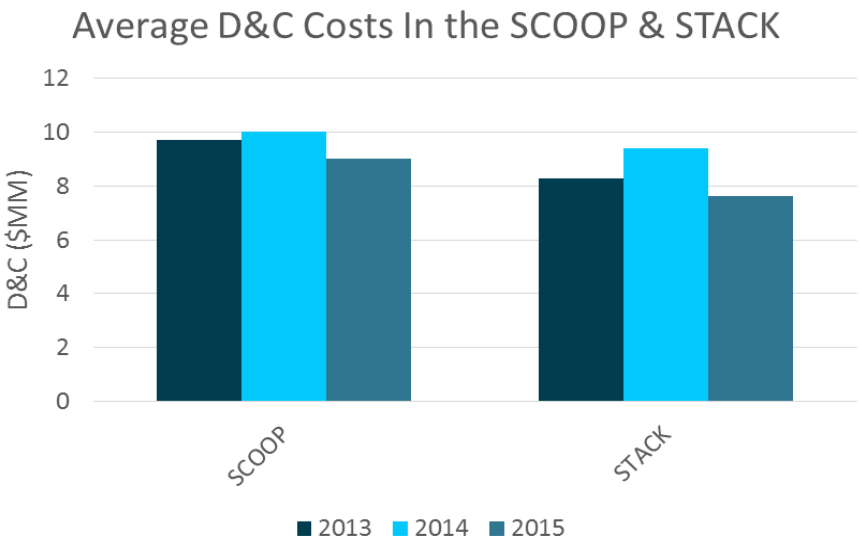
SCOOP and STACK Economics Improving Year Over Year



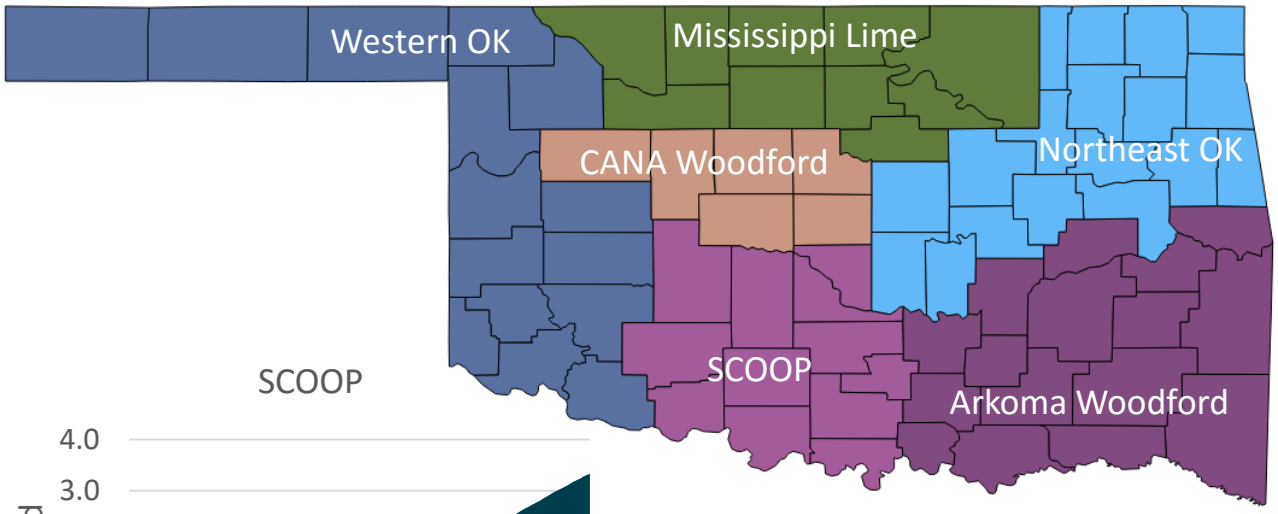
Producers Allocating Capital to SCOOP and STACK

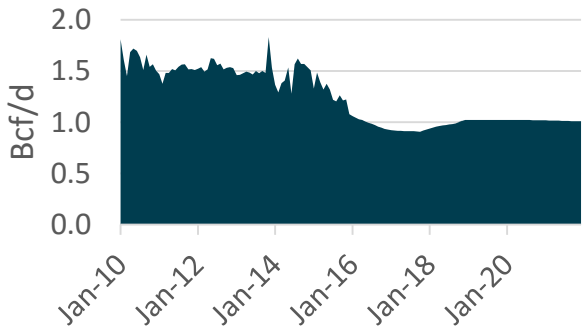


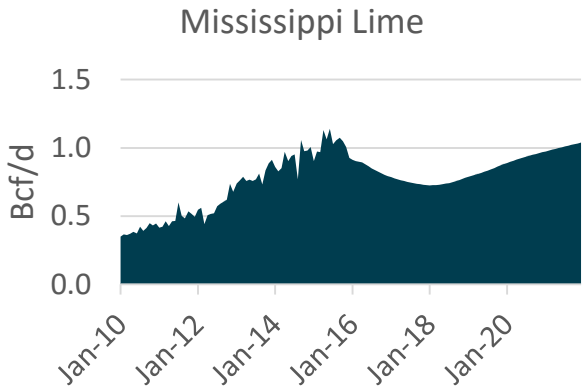


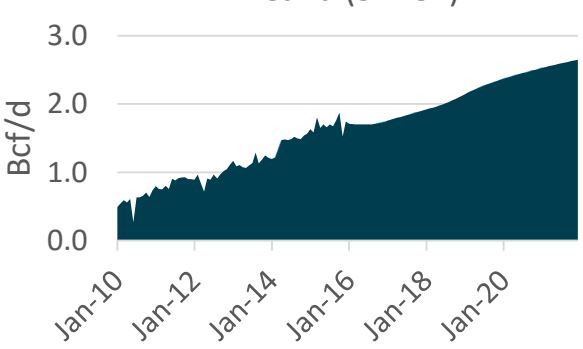


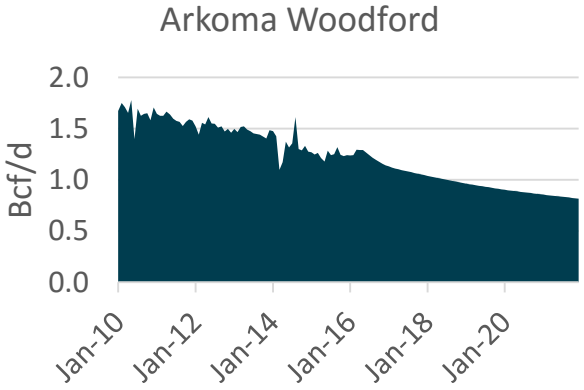
Revitalization of the Woodford in the SCOOP & Stack Plays Driving Production Higher as Natural Gas and Oil Prices Creep Higher. Optionality Remains in Granite Wash Plays of Western Oklahoma

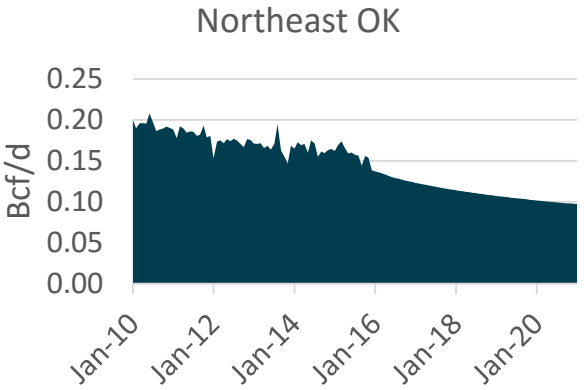






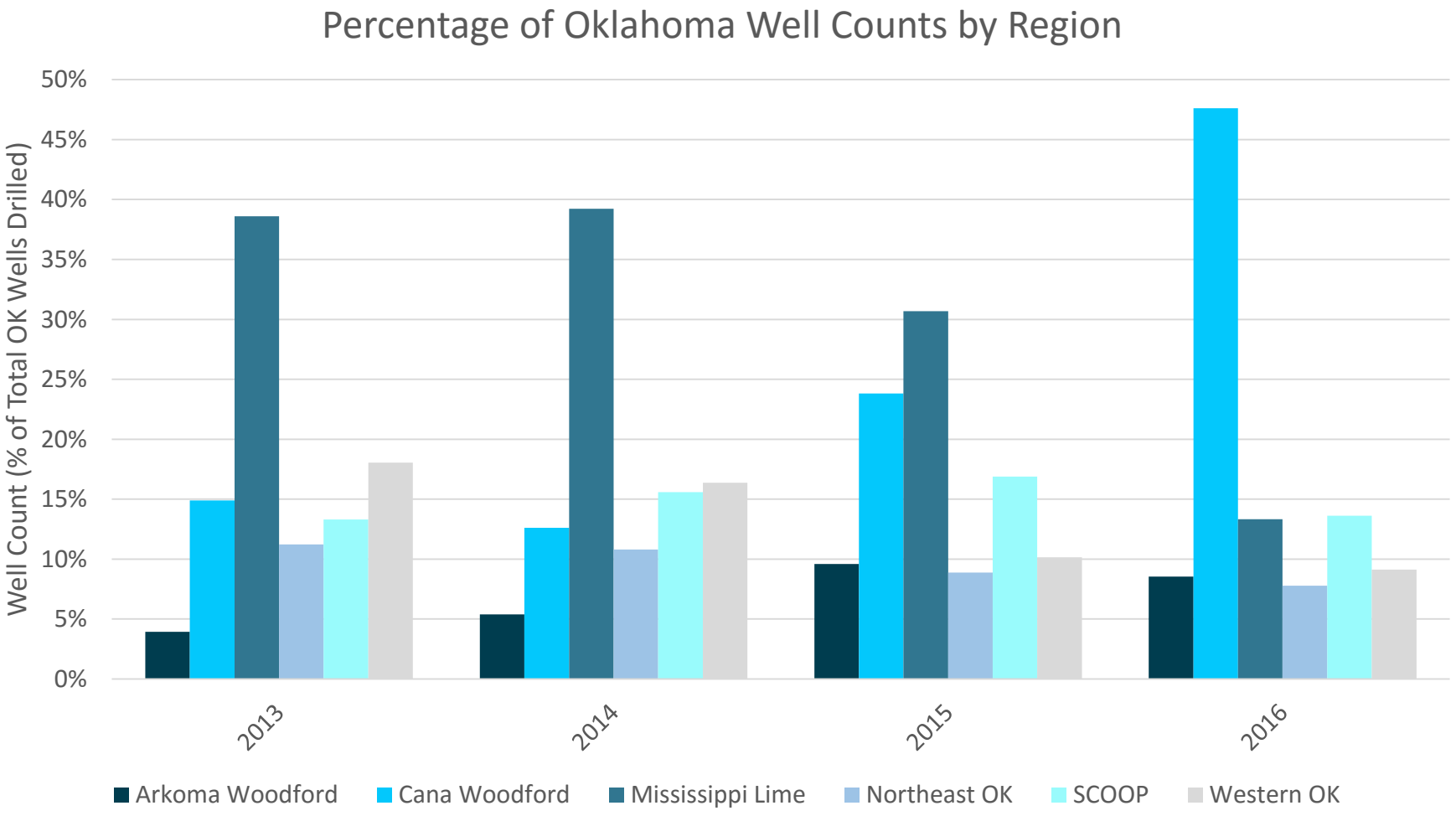




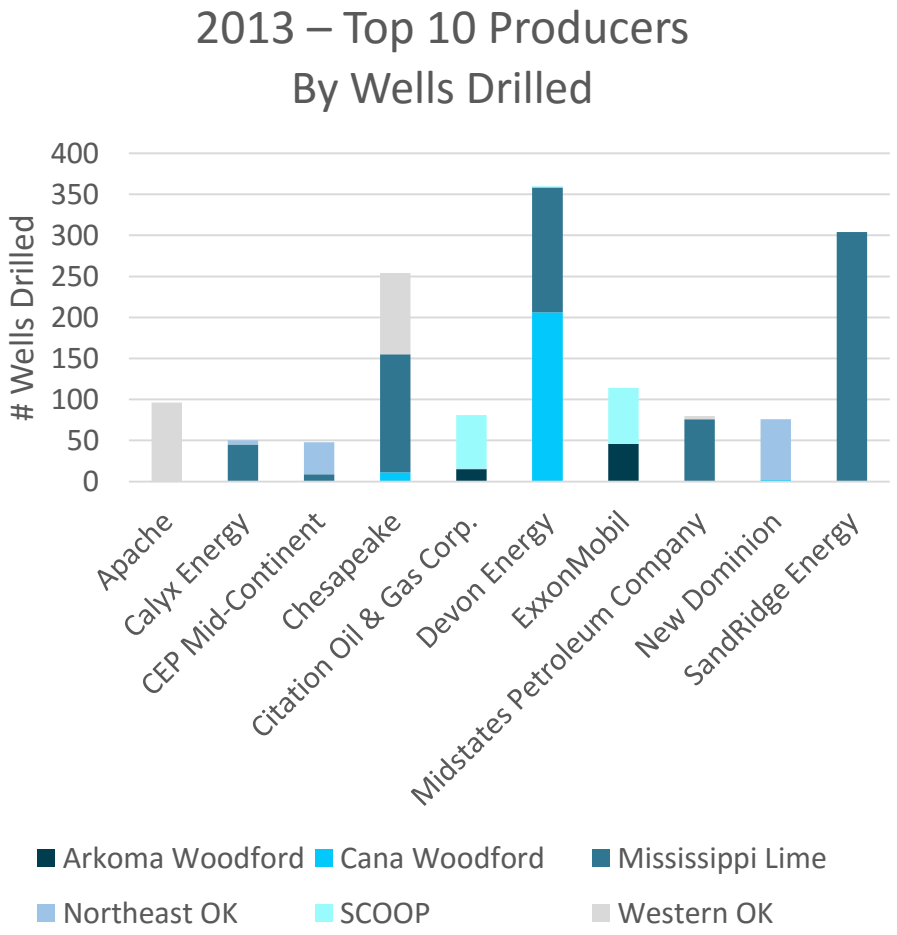


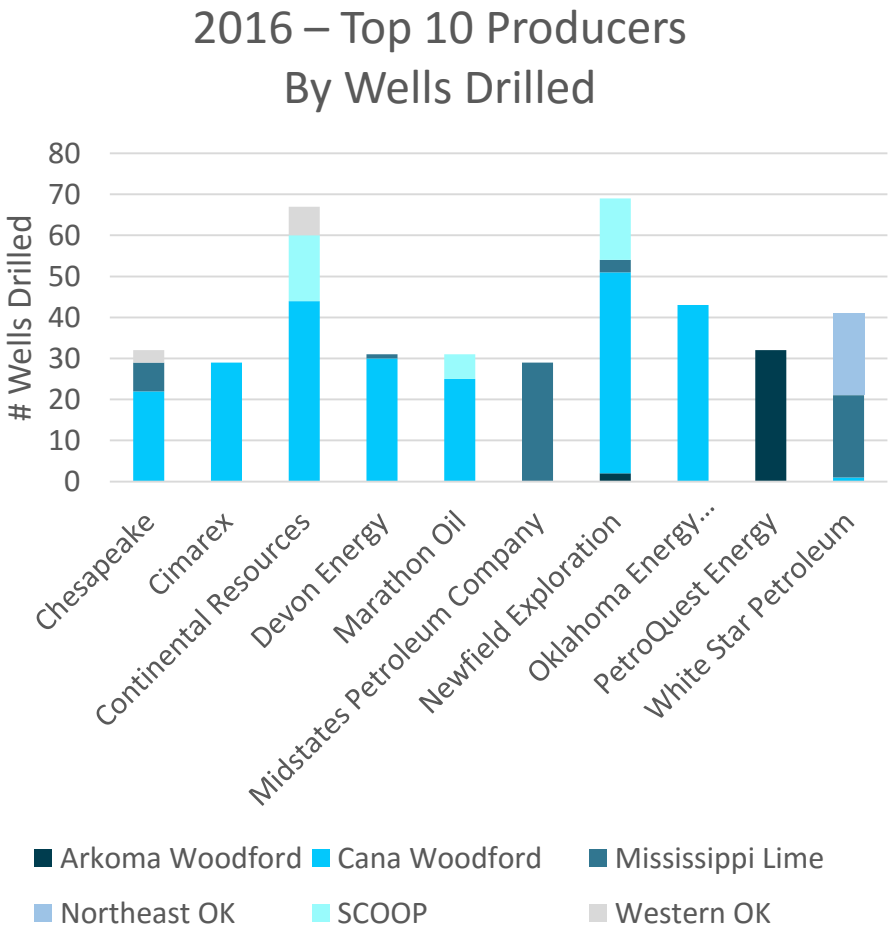
Source: BTU Analytics Upstream Outlook, Sept. 2016

Activity Shifting Towards the STACK as Mississippi Lime Activity Falls



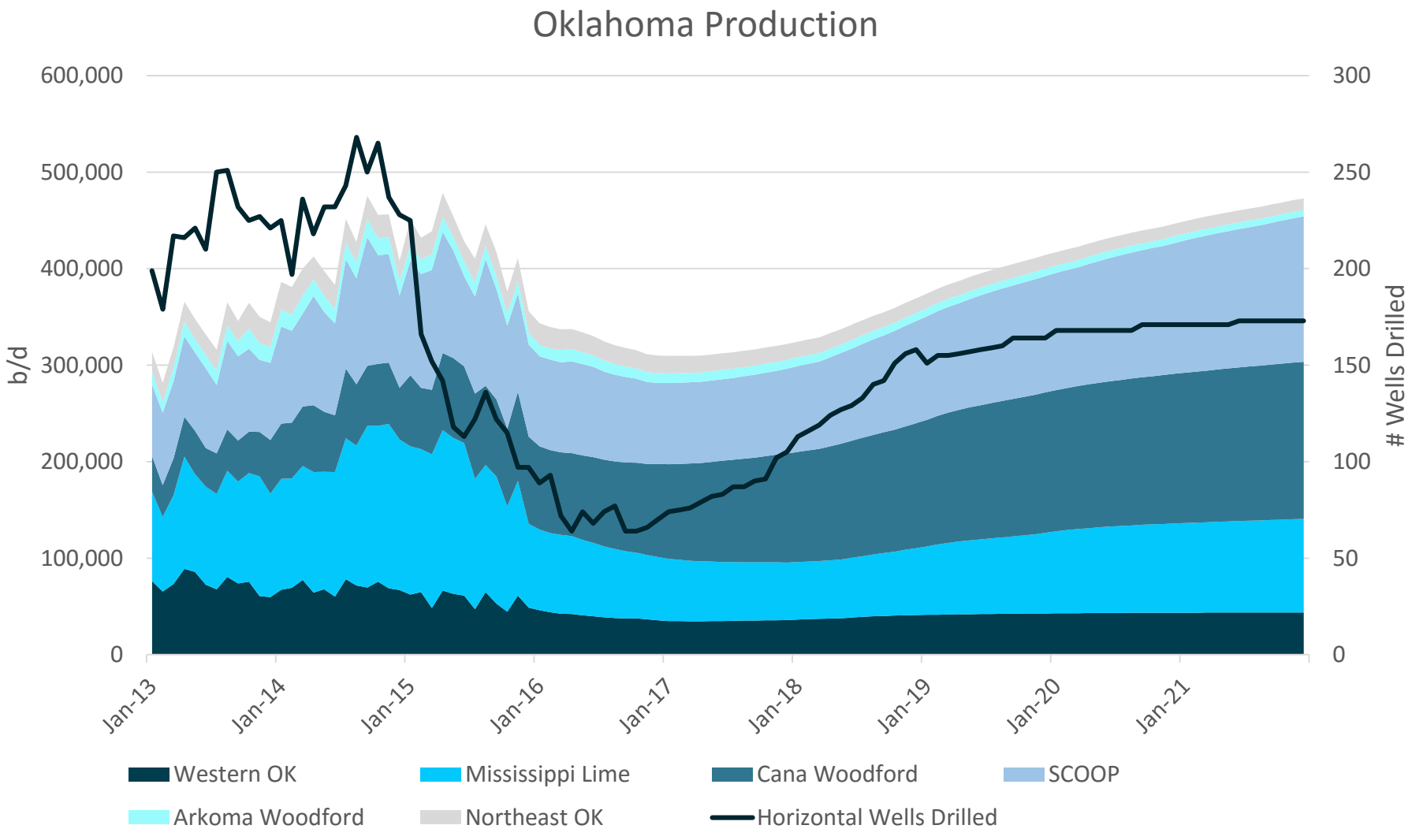
Change in Major Players As Newer SCOOP and STACK Plays Take Hold





Note: 2016 data as of 9/1/2016

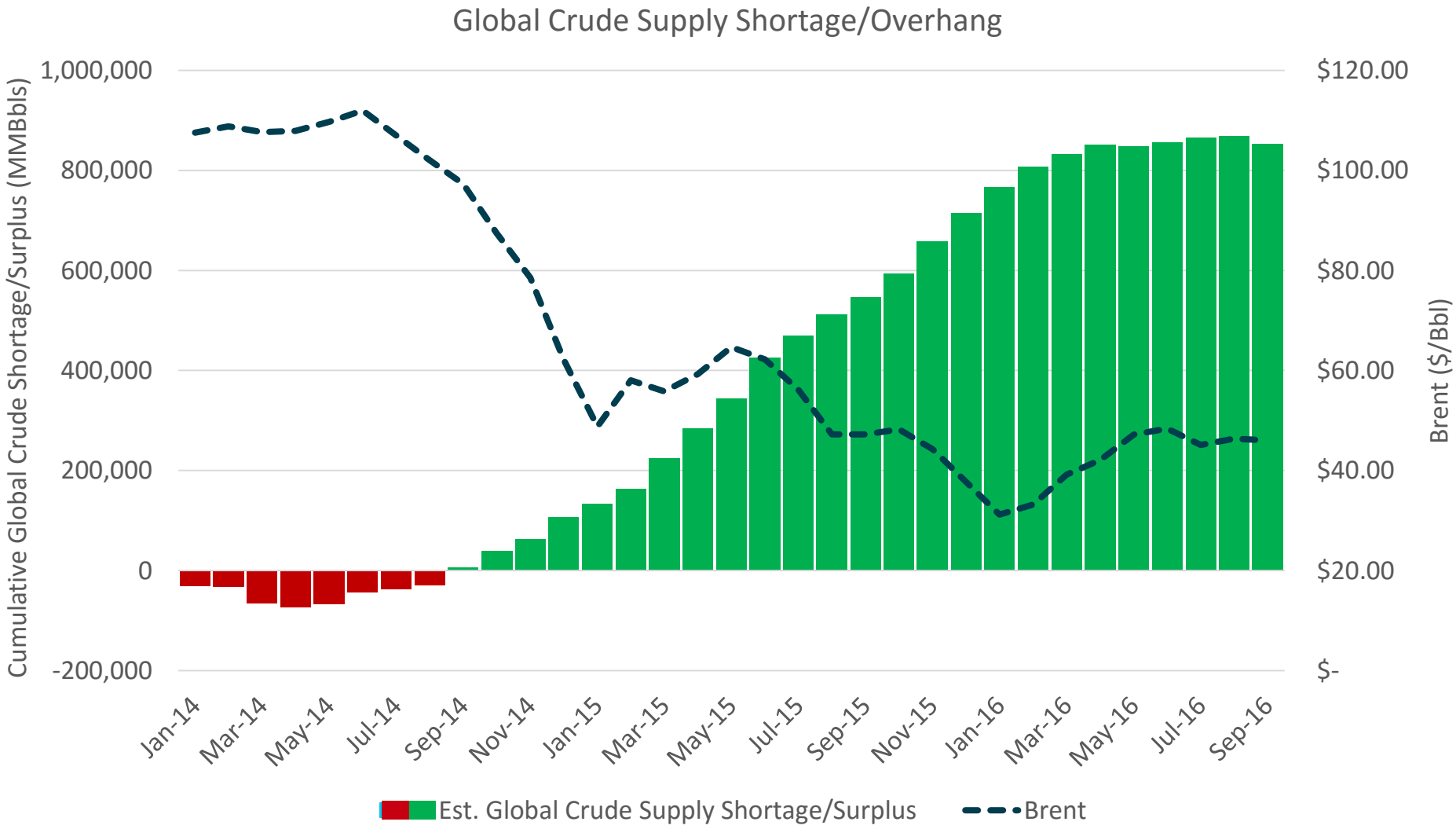
Drilling Doesn't Need to Return to Historical Levels to See Volume Growth as Operators Reduce Uneconomic Mississippi Lime Activity for SCOOP & Stack



Source: BTU Analytics Upstream Outlook, Sept. 2016

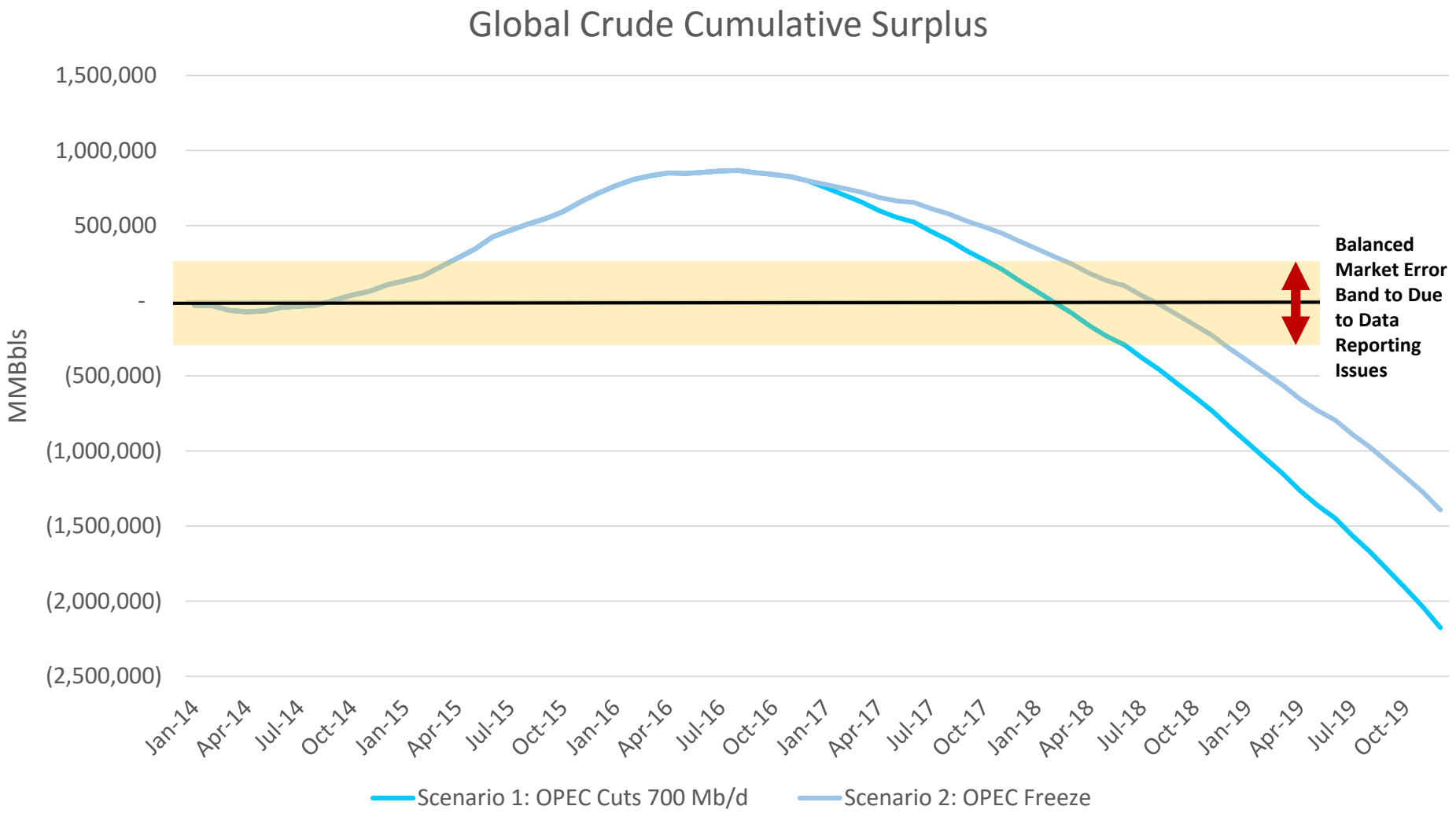
What Limits SCOOP/STACK Growth?

Cumulative Global Supply Overhang Grew Rapidly Due to Lack of Production Response to Price Signals



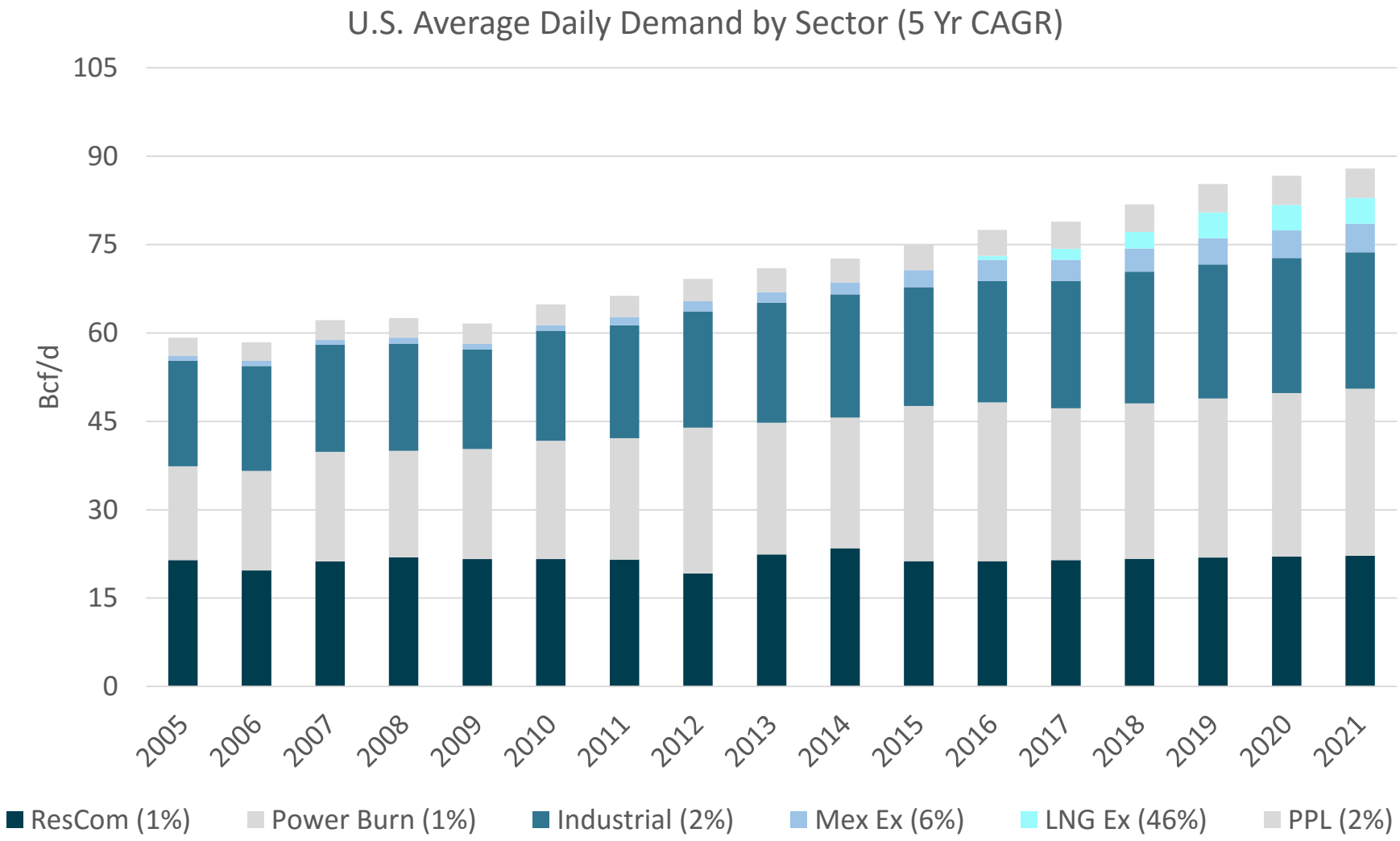
Source: BTU Analytics, IEA, Bloomberg

OPEC Freeze or Cuts Could Accelerate Market Re-Balancing and Provide Price Support in 2017/2018



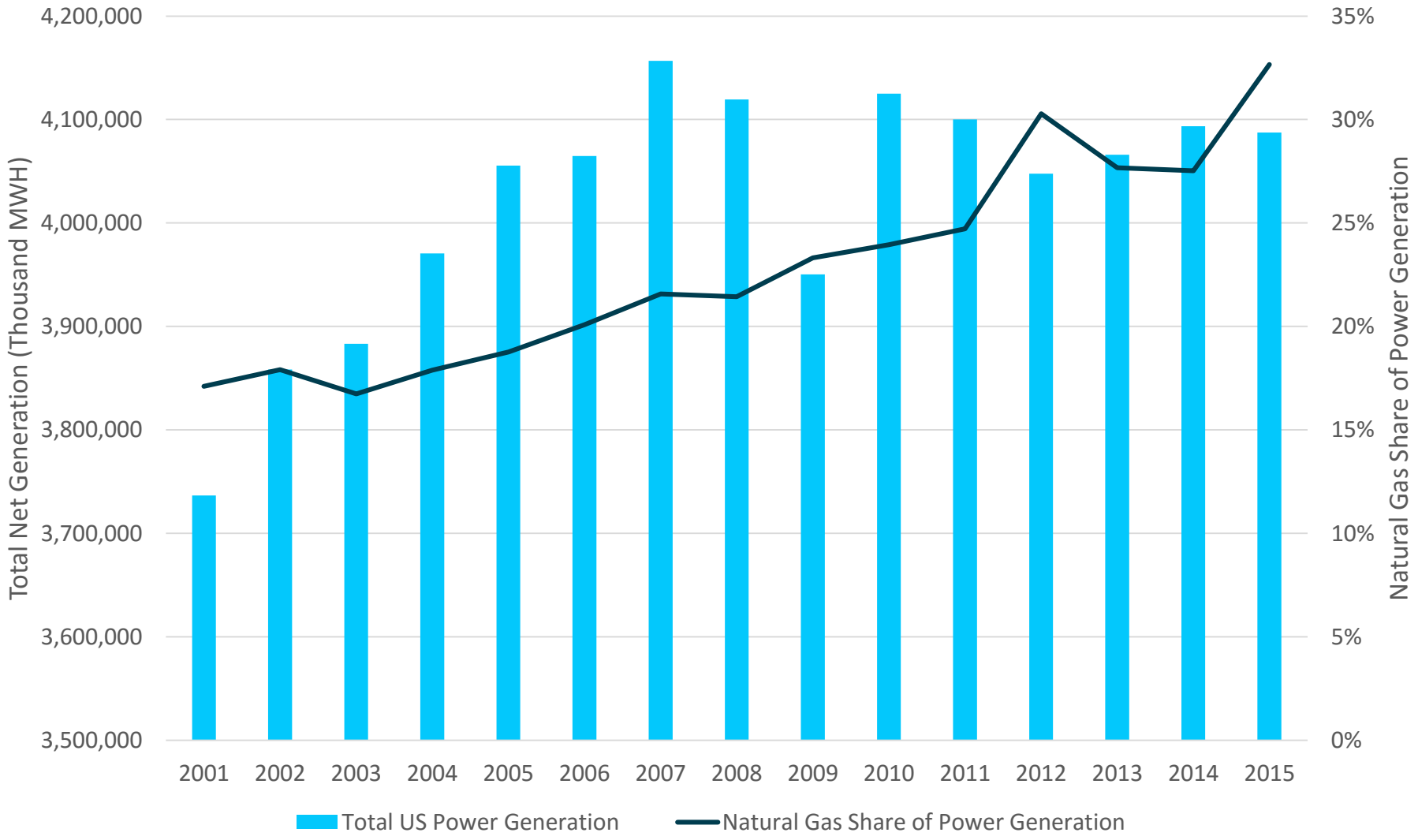
Source: BTU Analytics

BTU Analytics Expects 10.4 Bcf/d of Demand Growth By 2021



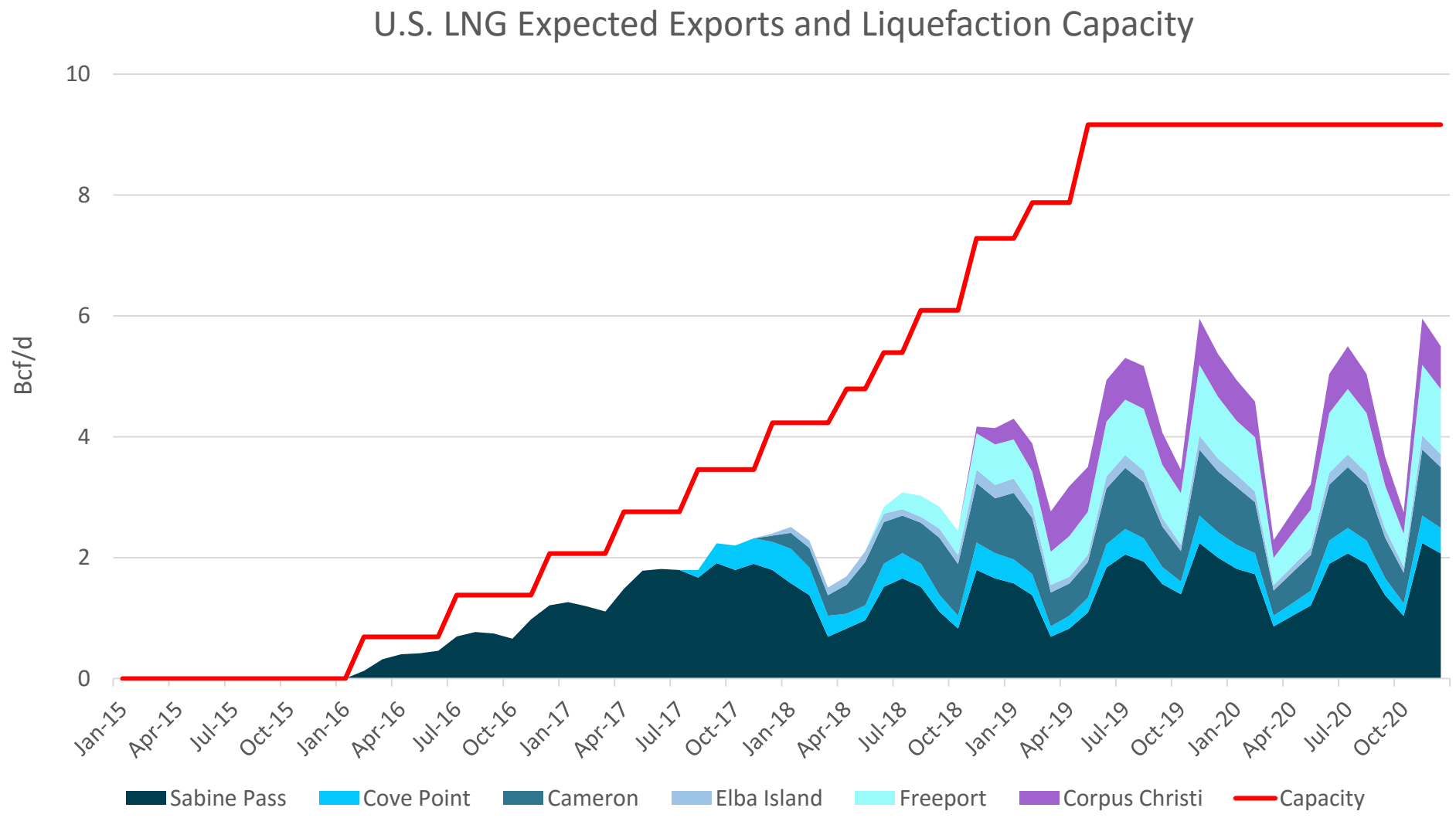
Source: BTU Analytics' Q3 Northeast Gas Quarterly

Natural Gas Has Displaced Coal from Generation Stack But Total Size of the Generation Pie Unchanged Since 2005



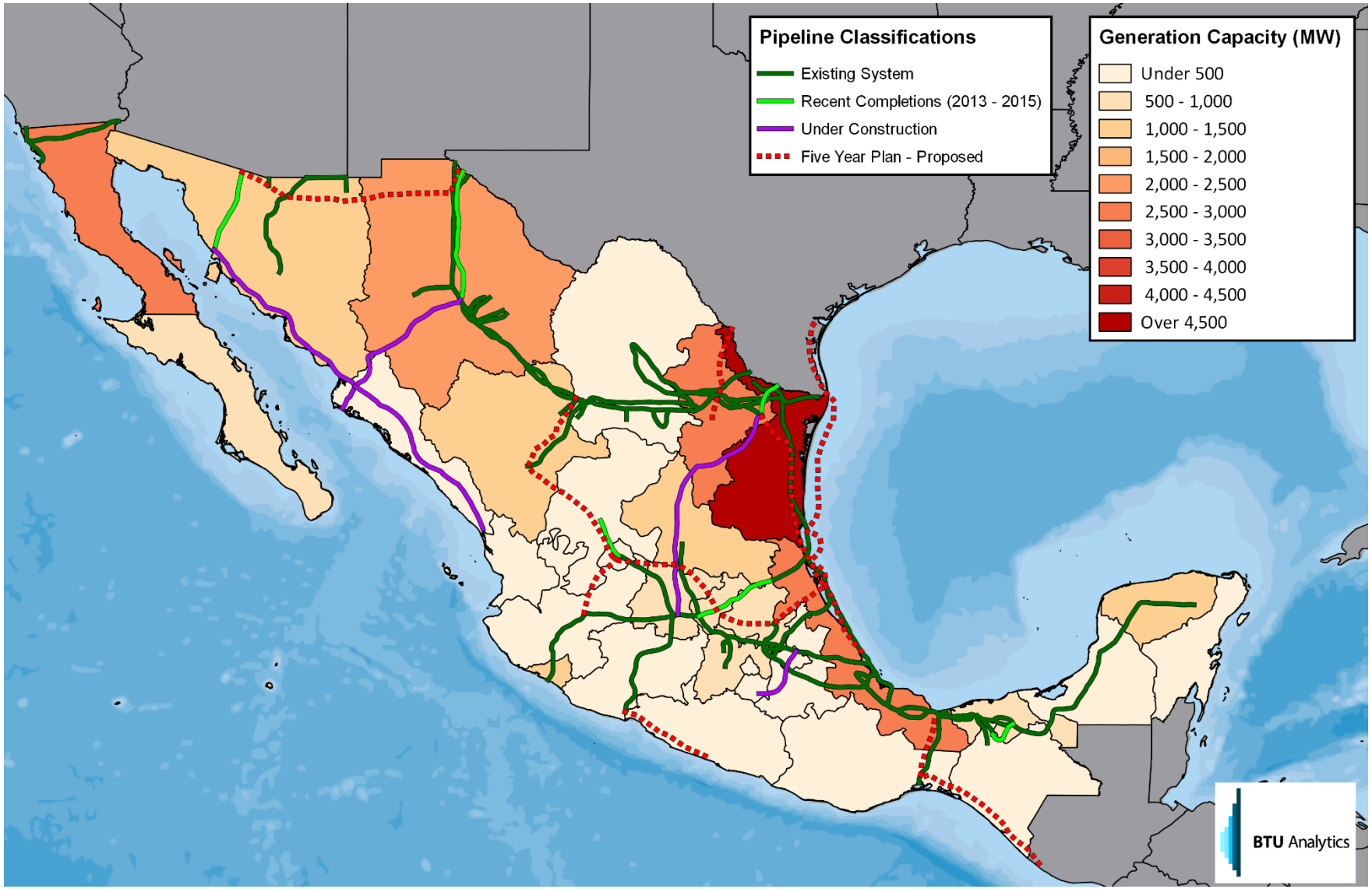
Source: BTU Analytics, EIA, Data as of Q1 2016

LNG Exports To Grow Over Time but Volatility in Exports Will Be Driven by Seasonal Spreads and Evolving Global Demand Dynamics



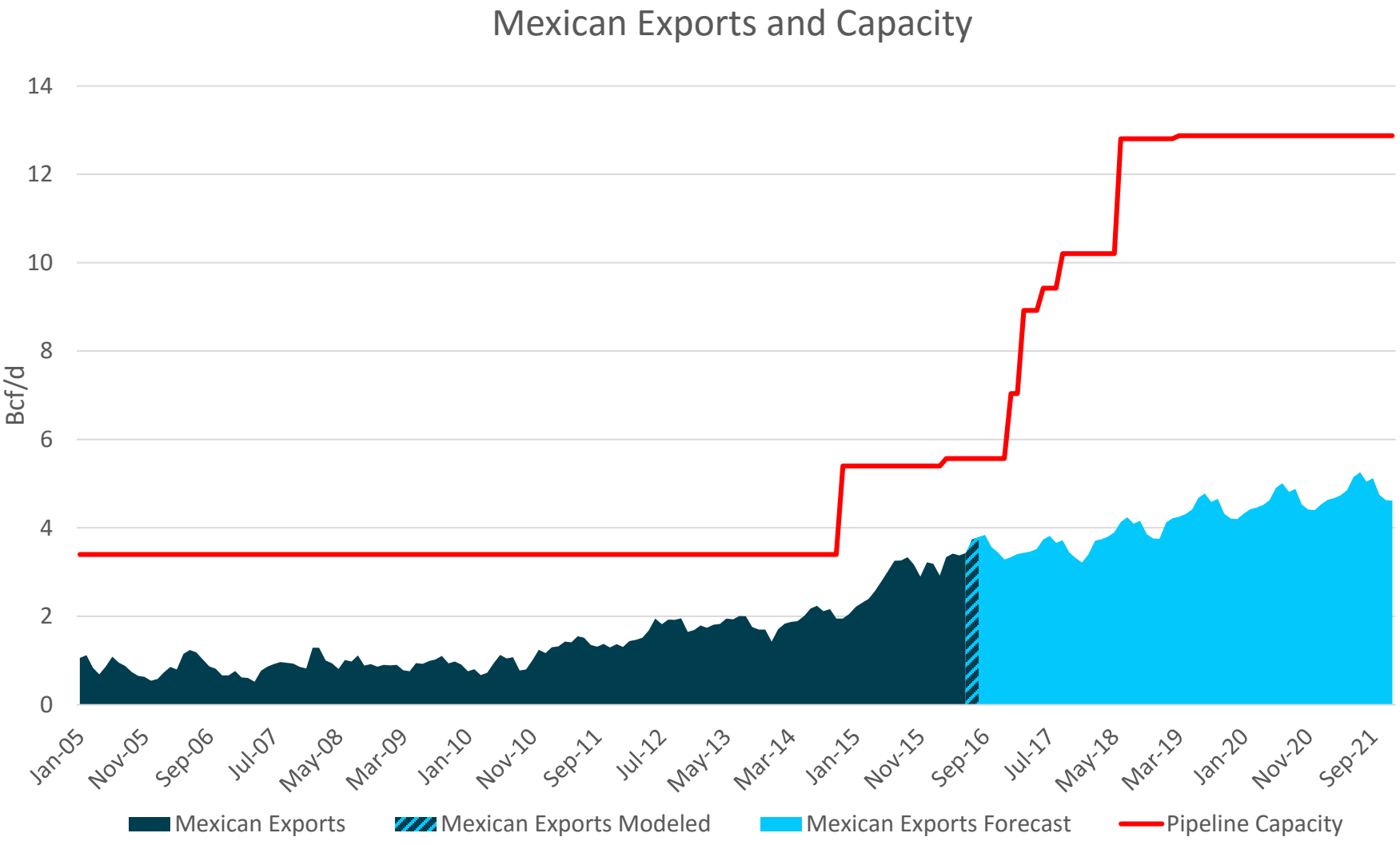
Source: BTU Analytics

New Infrastructure Provides New Access to Supply and Opens Up Under-Served Central and Southern Mexico Markets



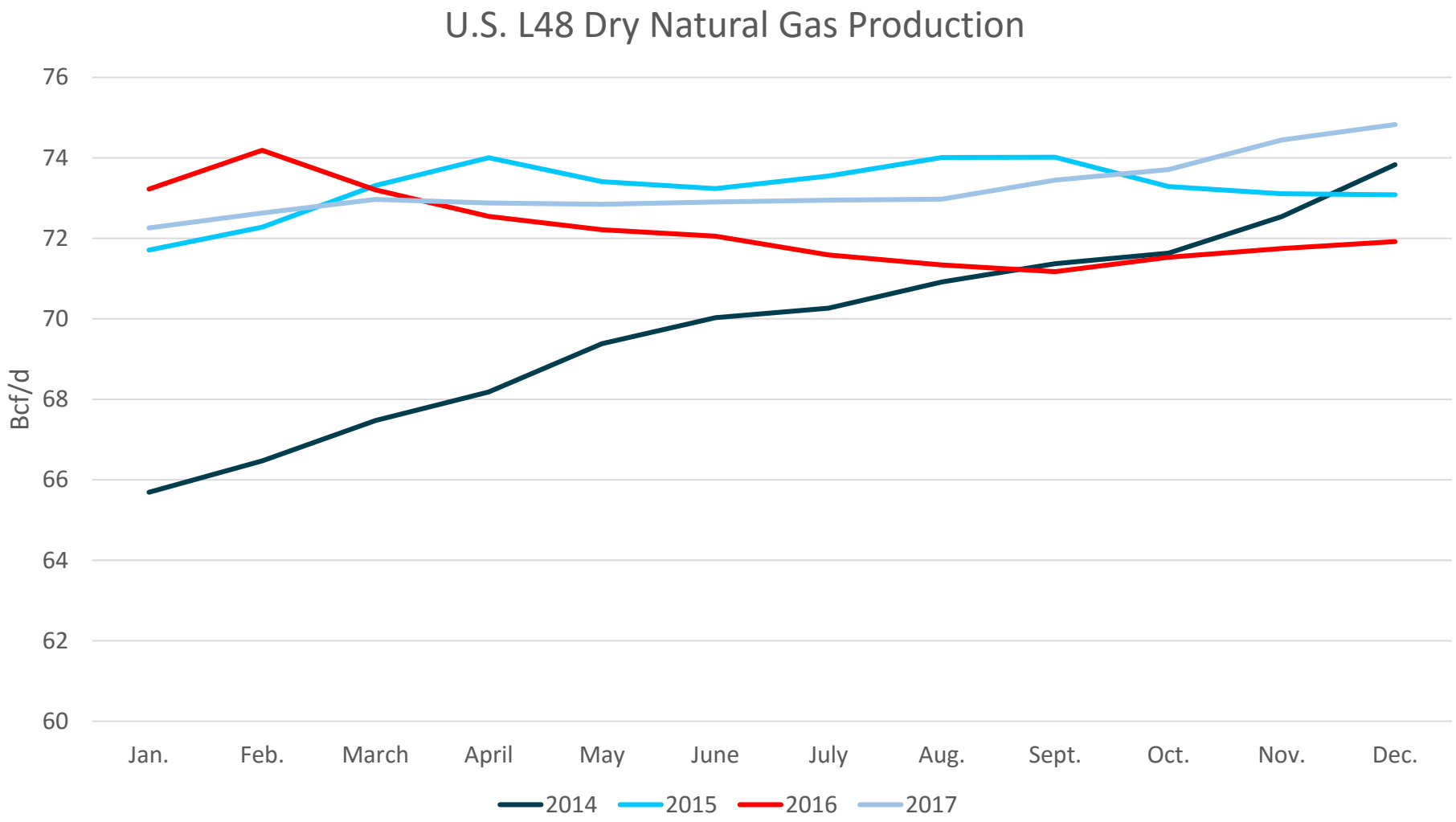
Note: Capacity includes internal combustion, gas turbine, and combined cycle power plants
Source: BTU Analytics, Secretaría de Energía *Plan Quinquenal 2015 – 2019* (2015) and *PRODESEN* (2015)

Mexican Export Capacity Far Exceeds Expected Demand In the Short Term as the Country Slowly Shifts to a Deregulated Energy Market and Prepares For Future Economic Growth and Fuel Substitution



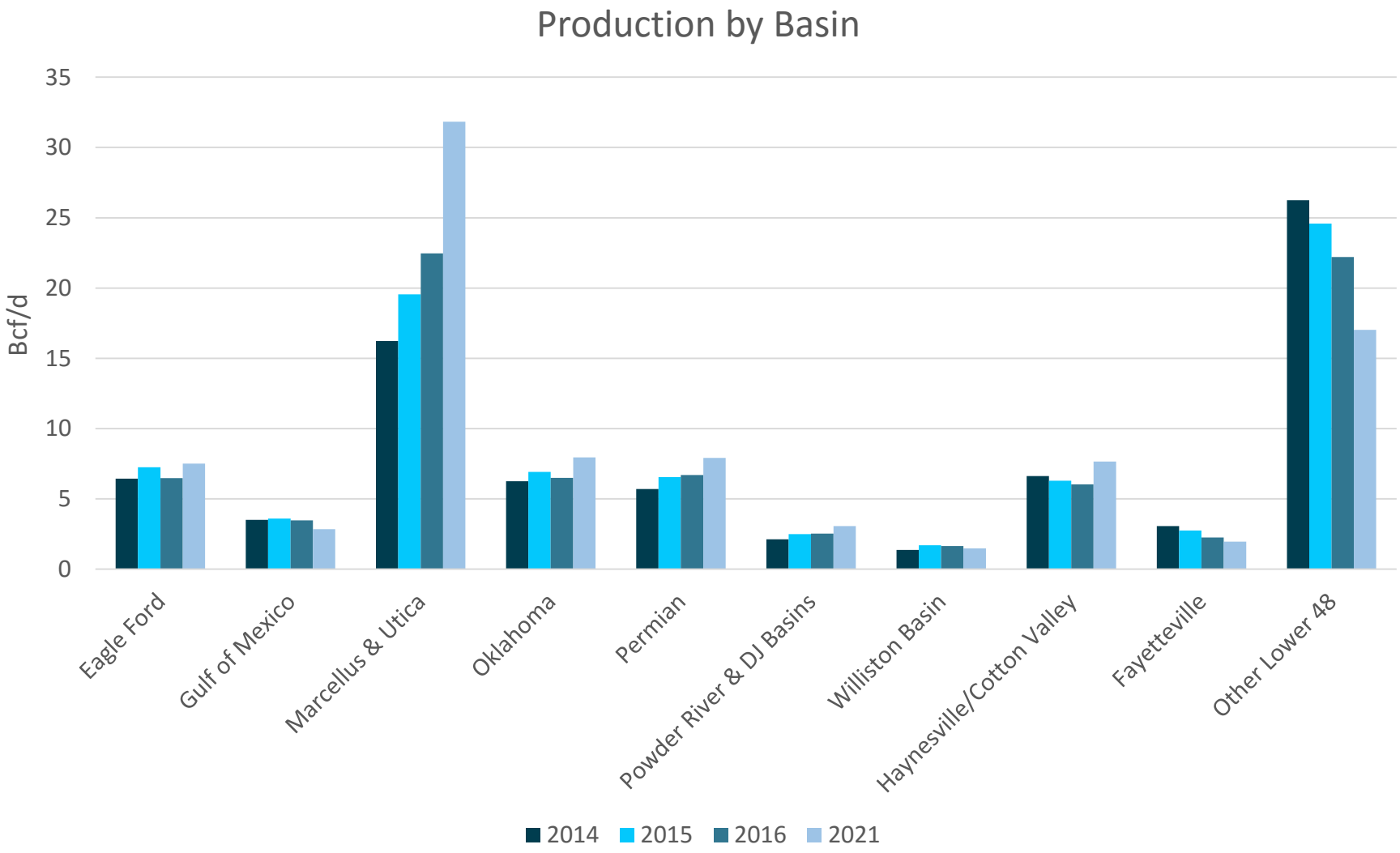
Source: BTU Analytics, 9/2016

Natural Gas Production Surged in 2014 but Persistent Cuts in Activity and Infrastructure Constraints in Northeast Have Led to U.S. Declines in 2016



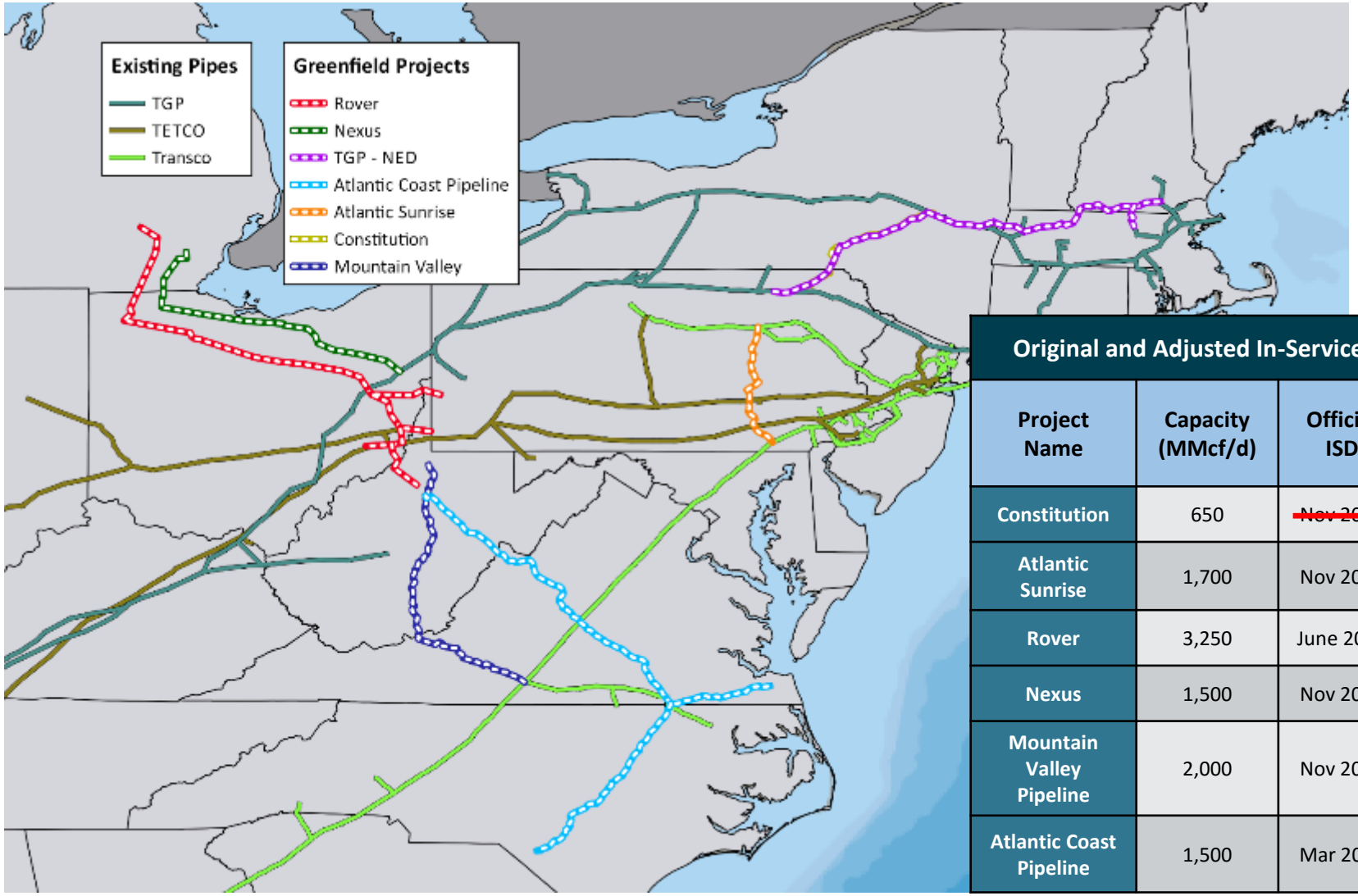
Source: BTU Analytics August 2016 Production Forecasts

Associated Gas Declines Expected to Reverse Course, But Looming Infrastructure from Marcellus & Utica to Keep Other Dry Gas Investment at Bay



Source: BTU Analytics August 2016 Production Forecasts

Greenfield Pipes Out of the Region Under Intense Environmental Pressure and Even Regional Pipelines Facing Challenges with Delays

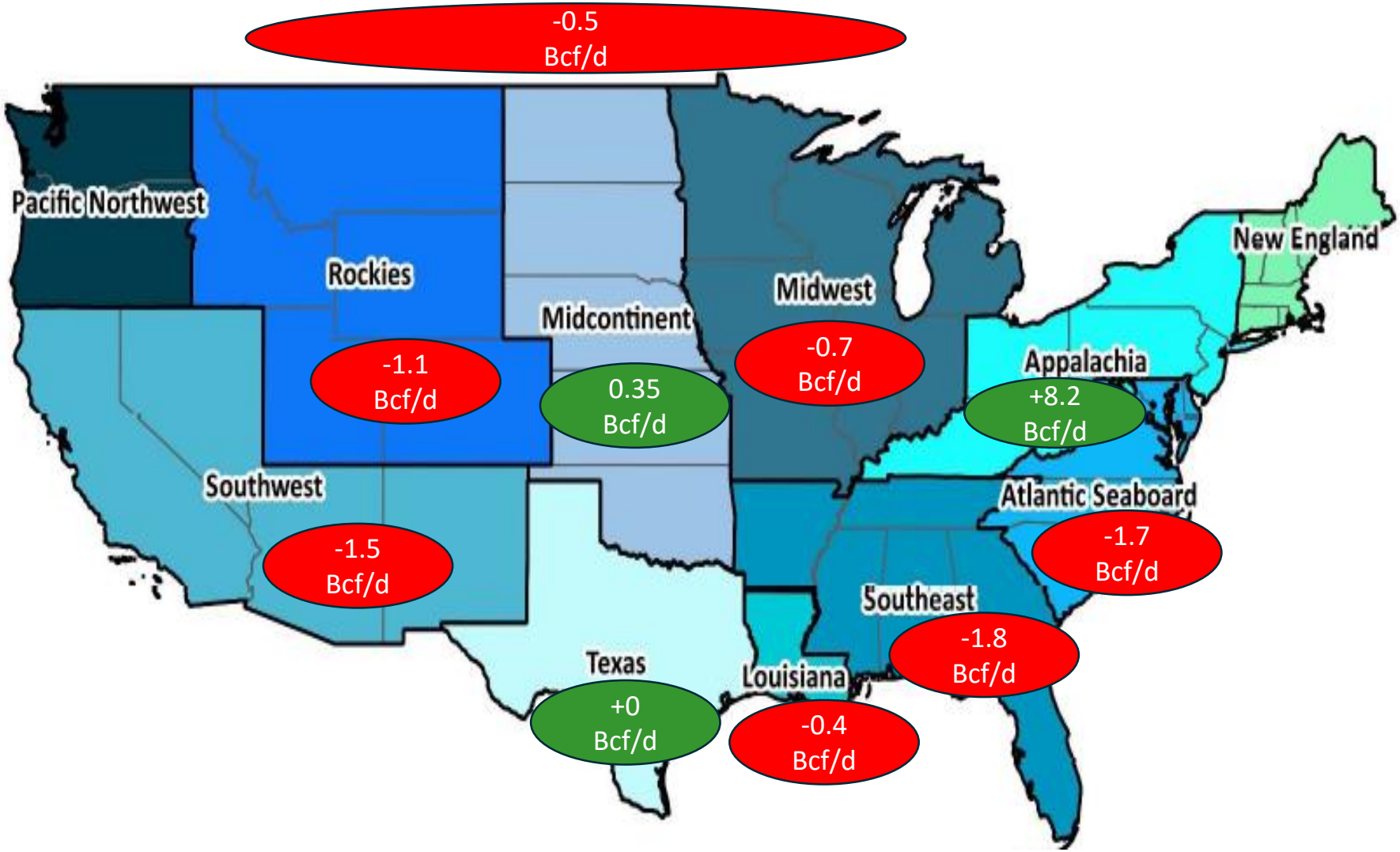


Original and Adjusted In-Service Dates (ISDs)

Project Name	Capacity (MMcf/d)	Official ISD	BTU Adjusted ISD
Constitution	650	~~Nov 2017~~	~~Nov 2017~~
Atlantic Sunrise	1,700	Nov 2017	Nov 2018
Rover	3,250	June 2017	Nov 2018
Nexus	1,500	Nov 2017	Nov 2019
Mountain Valley Pipeline	2,000	Nov 2018	Nov 2020
Atlantic Coast Pipeline	1,500	Mar 2019	Nov 2020

Source: BTU Analytics, Data as of April 2016

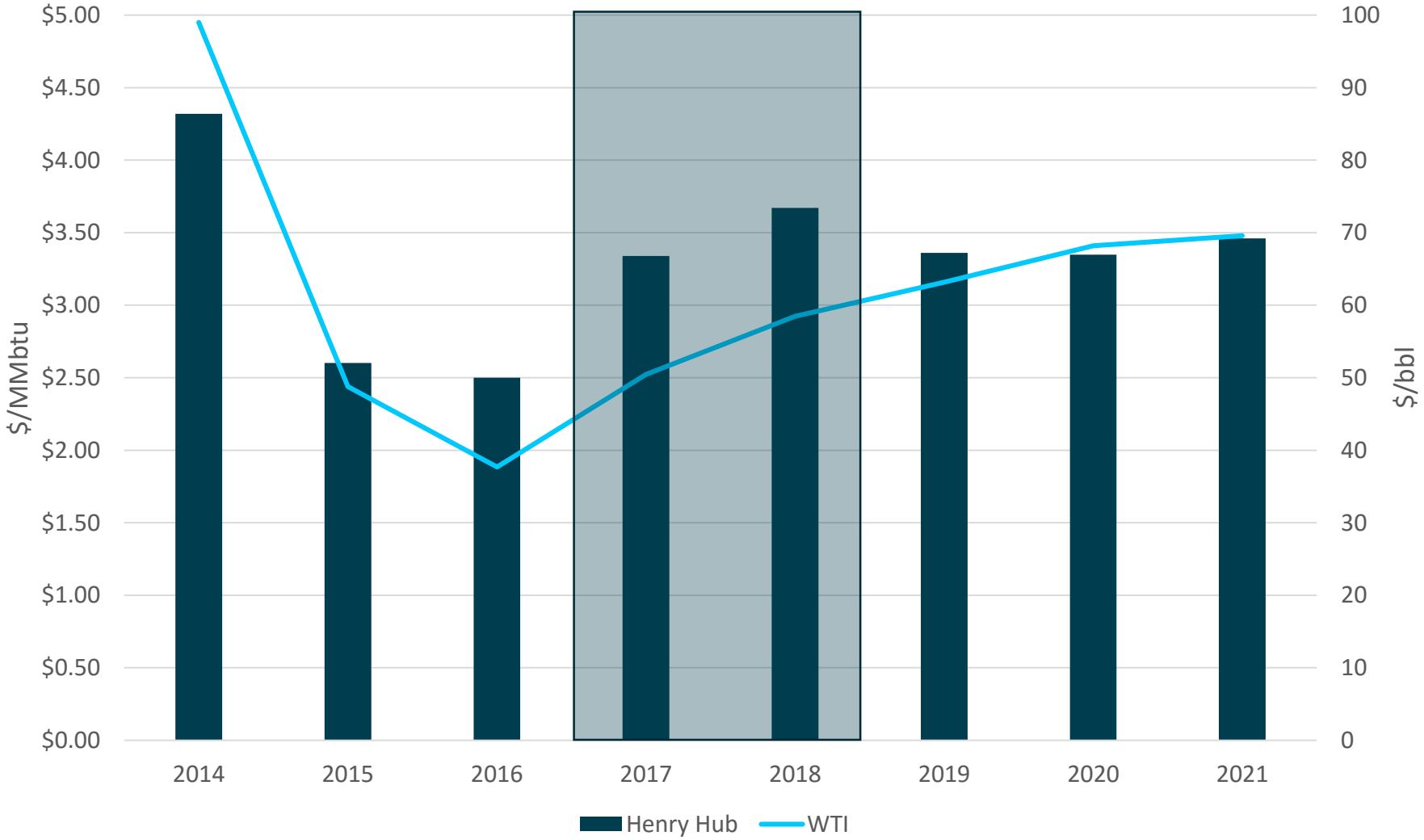
Regional Supply & Demand Balances Require New Gas Volumes to Reach Gulf Coast Market



Note: Balance Calculated as total production in the region subtracting total demand in the region not including inter-regional pipeline flows. Balance comparisons are 2016 to 2021

Source: BTU Analytics – Updated Dec 2015

Natural Gas Prices Recover Faster Than Crude With Long Run Price of $3.50 at $70 WTI



Source: BTU Analytics, Q3 Northeast Gas Quarterly and August Upstream Outlook

Key Takeaways

- New Oklahoma Activity is Being Driven by the SCOOP and STACK, Balancing Declines From Other Regions

- Economics Driven by Oil, but Formations Allow for Growth in Gas Production Possibly Adding 2 Bcf/d of Gas Supply From Oklahoma by 2021

- Natural Gas Demand Growth Has Arrived, Expecting 10.4 Bcf/d of Growth Through 2021, Primarily from LNG, Power and Exports to Mexico
  - Louisiana, Texas, Atlantic Seaboard and Appalachia Growing Most

- Natural Gas Prices to Climb to $3.20-$3.50/Mcf in 2017-2018 Based on Growing Demand and Constrained NE Supply; Longer Term Outlook Depends on Oil Prices -- $3.00-3.50/Mcf with Moderate Oil Price Recovery ($65-70 WTI)

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