

December 2016 Presentation Slides

Justin J Kringstad

Geological Engineer

Director

North Dakota Pipeline Authority

December 2016

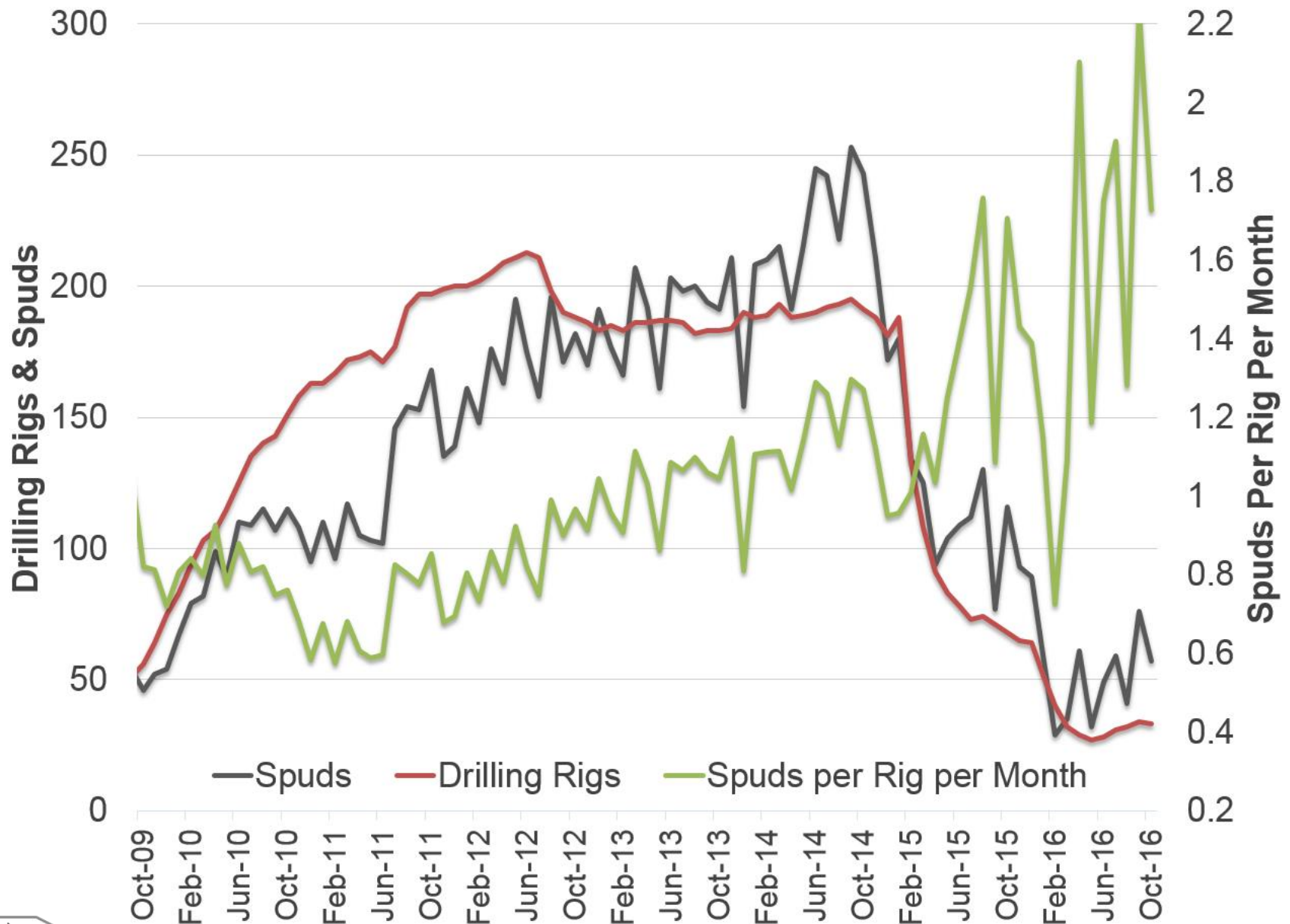


Presentation Outline

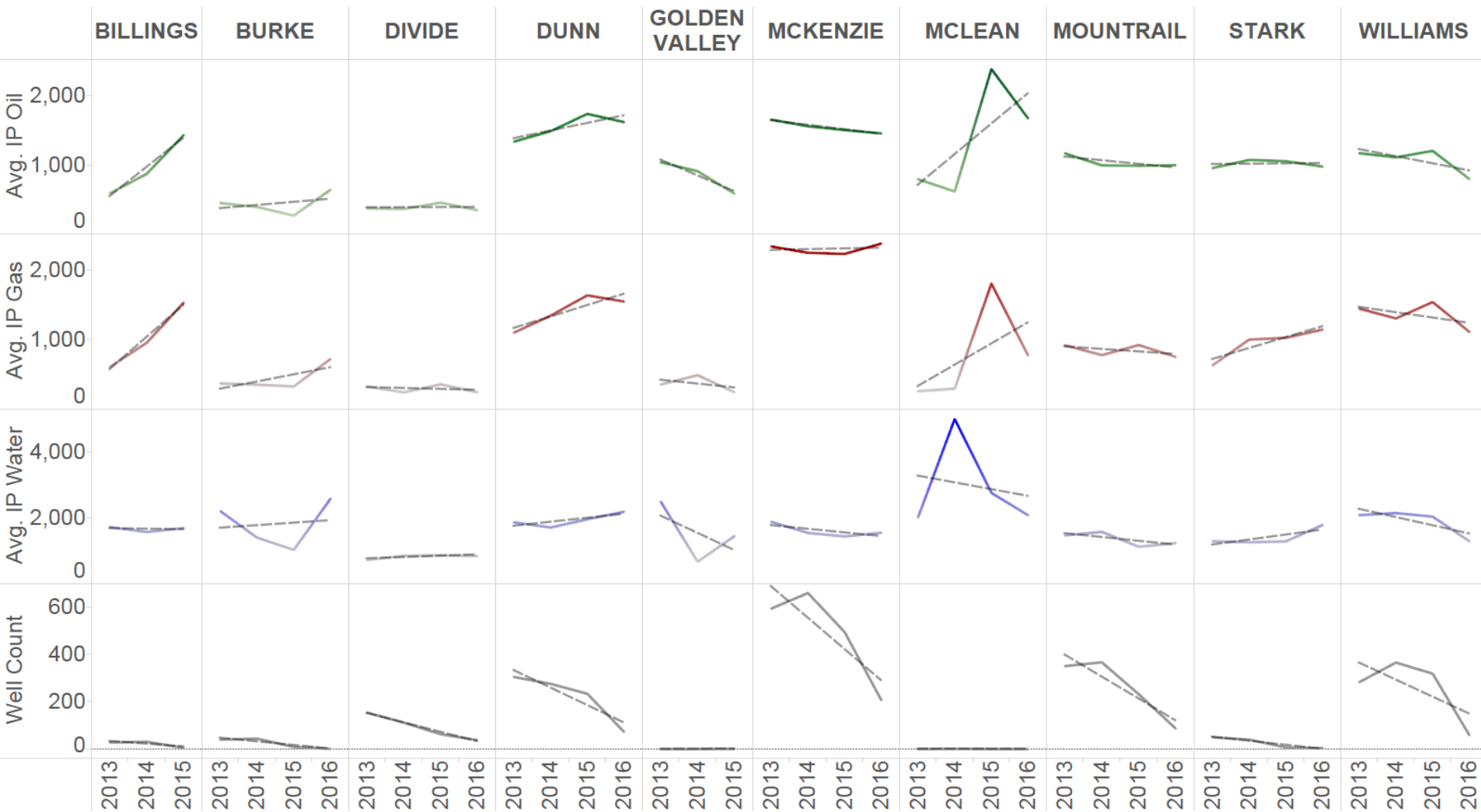
- Understanding current and future oil production
 - Activity
 - Drilling economics
 - Forecasts
- Williston Basin oil transportation dynamics
 - Interstate oil movements
 - Intrastate oil movements
- North Dakota natural gas production
 - Flaring and gas capture
 - Natural Gas Liquids



North Dakota Drilling Activity



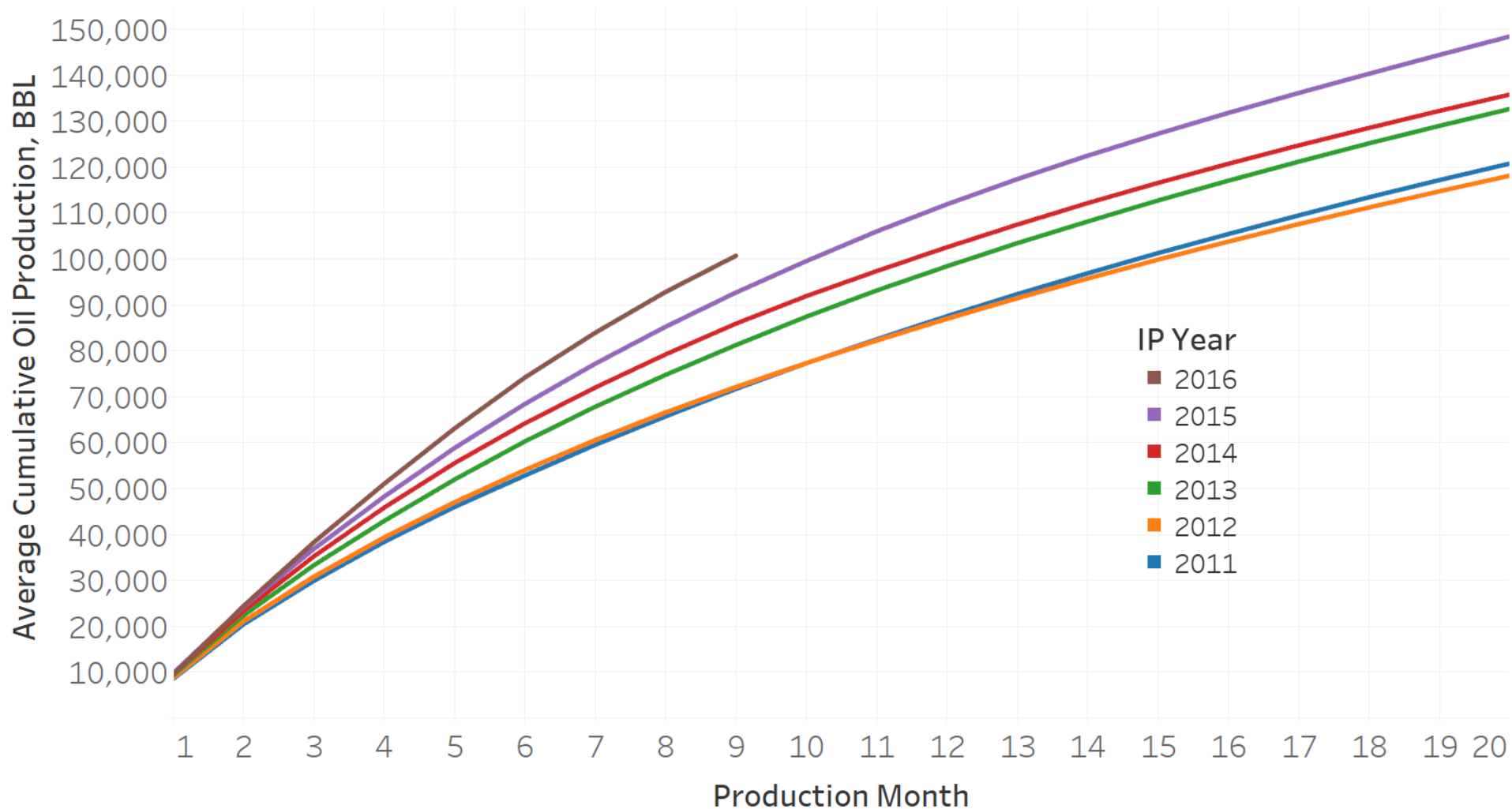
Bakken IP Rates



Initial Production (IP) Year – 2016 YTD Non-Confidential



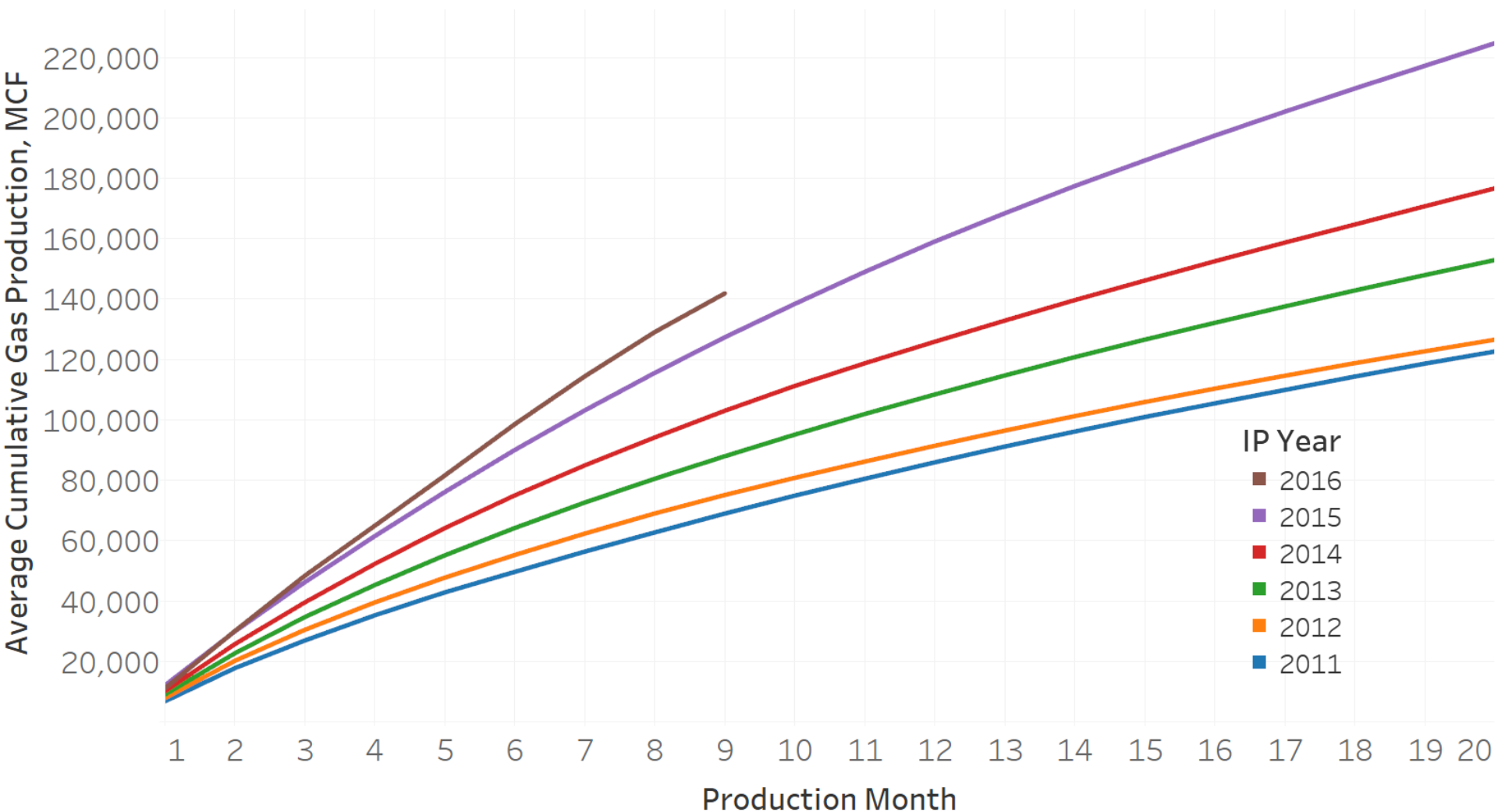
Improving Well Performance



Average BKN/TF Well Performance in Williams, McKenzie, Dunn, & Mountrail Counties (Minimum 1 bopd)



Improving Well Performance



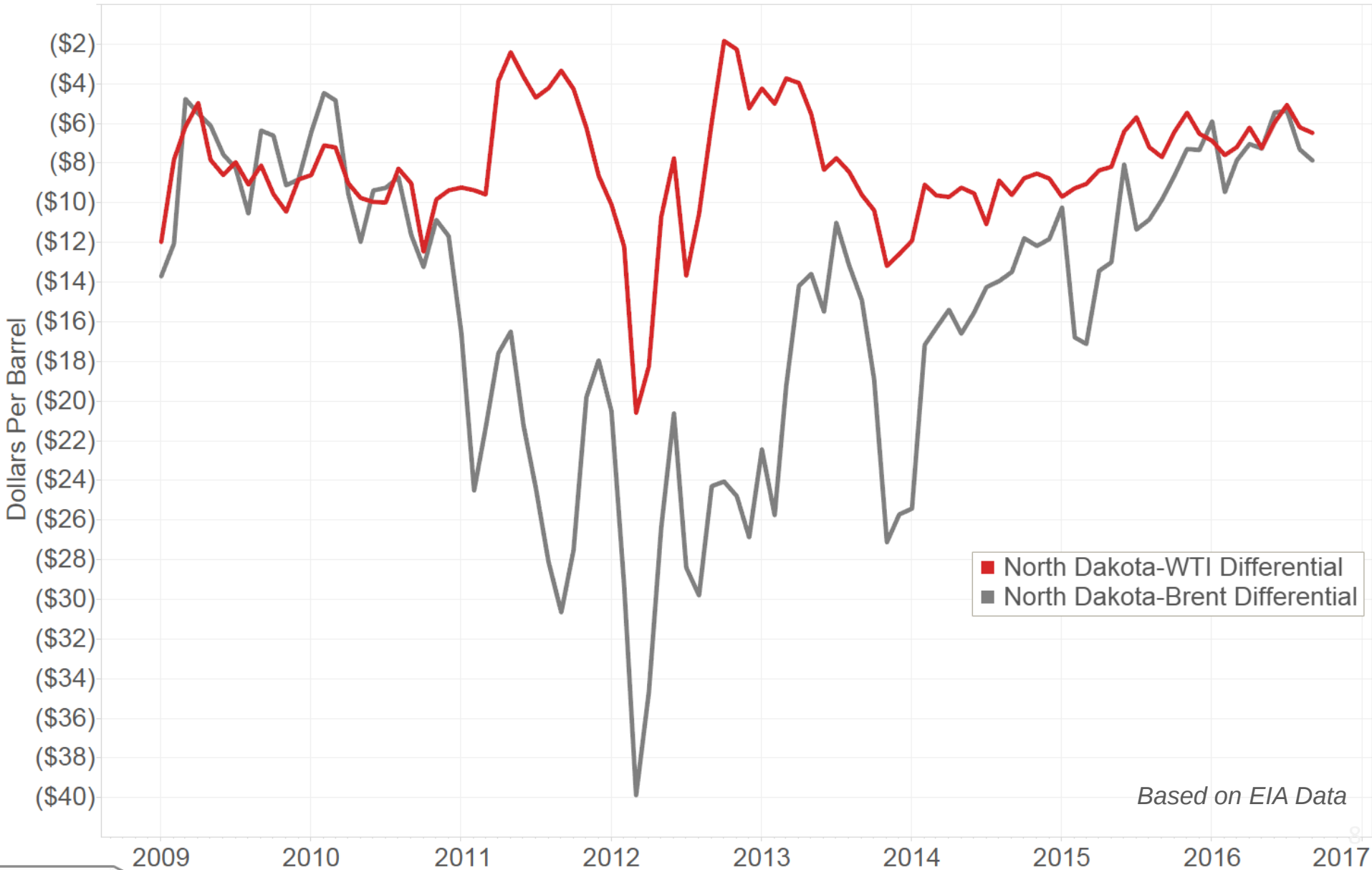
Average BKN/TF Well Performance in Williams, McKenzie, Dunn, & Mountrail Counties (Minimum 1 bopd)



A Quick Look at Bakken Drilling Economics...



North Dakota Oil Differential

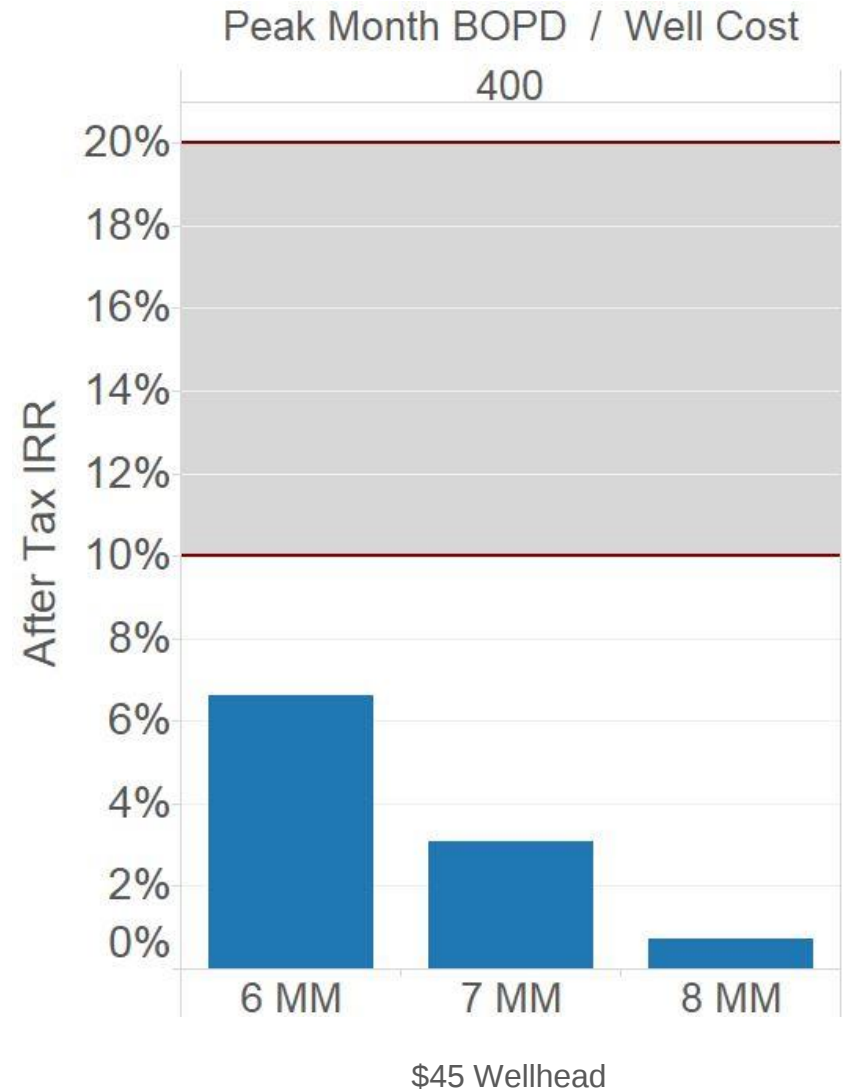
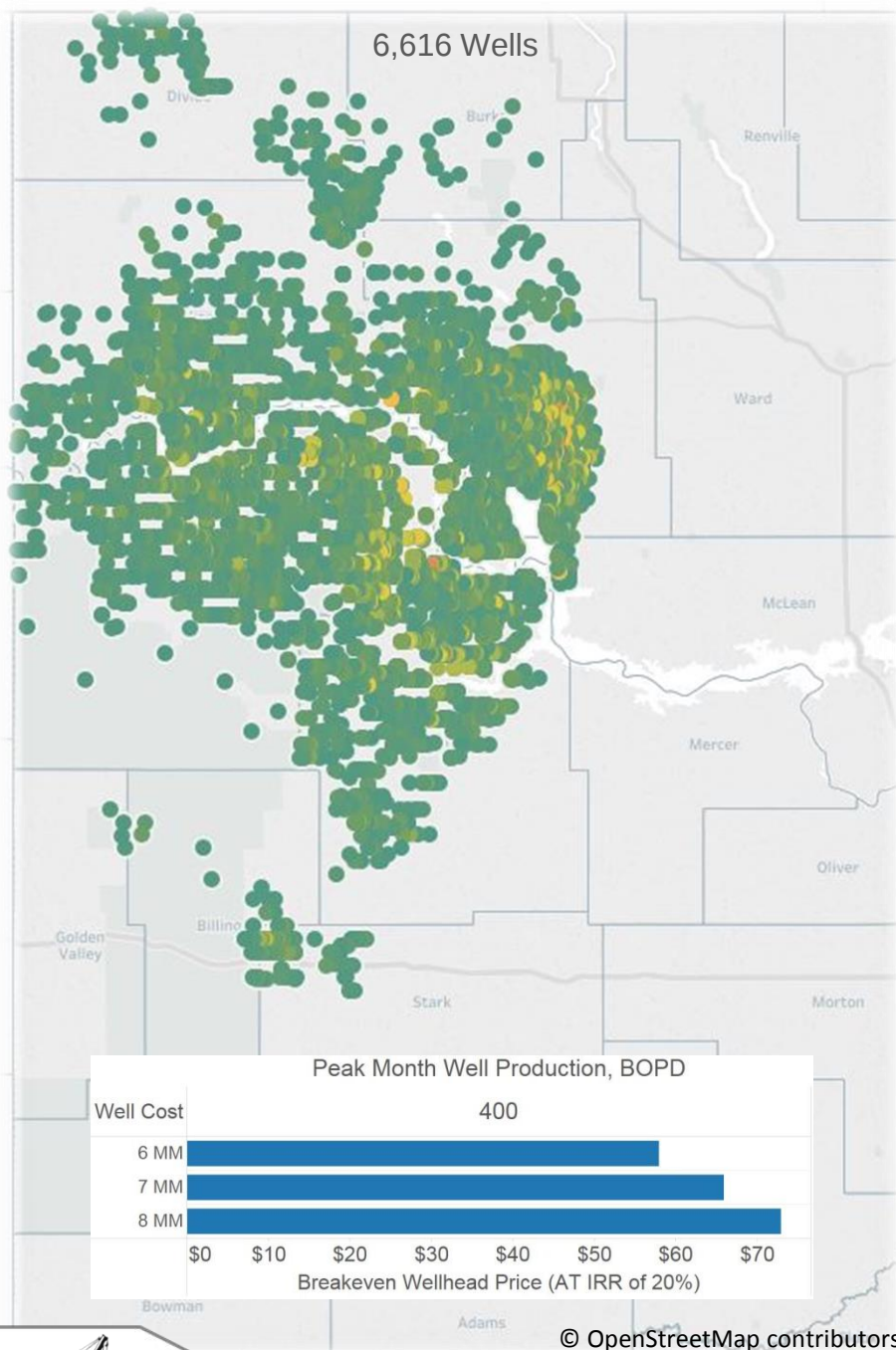


Key Economic Assumptions

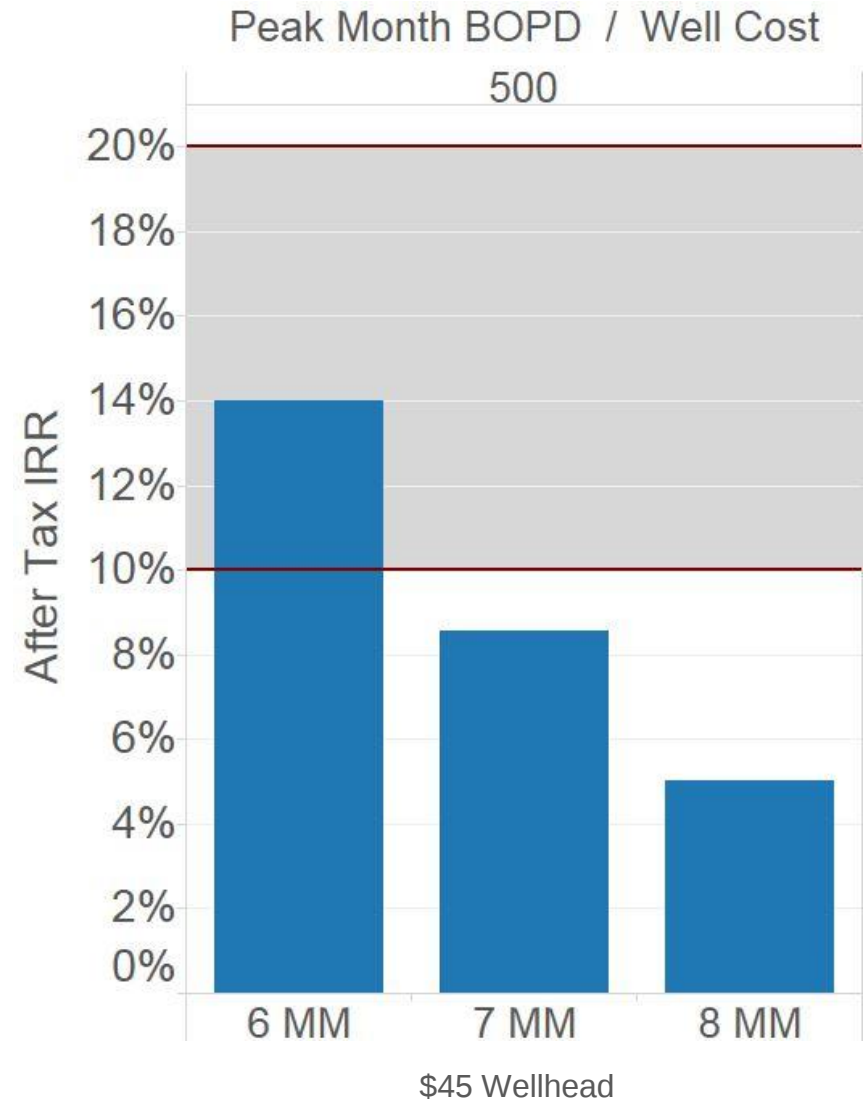
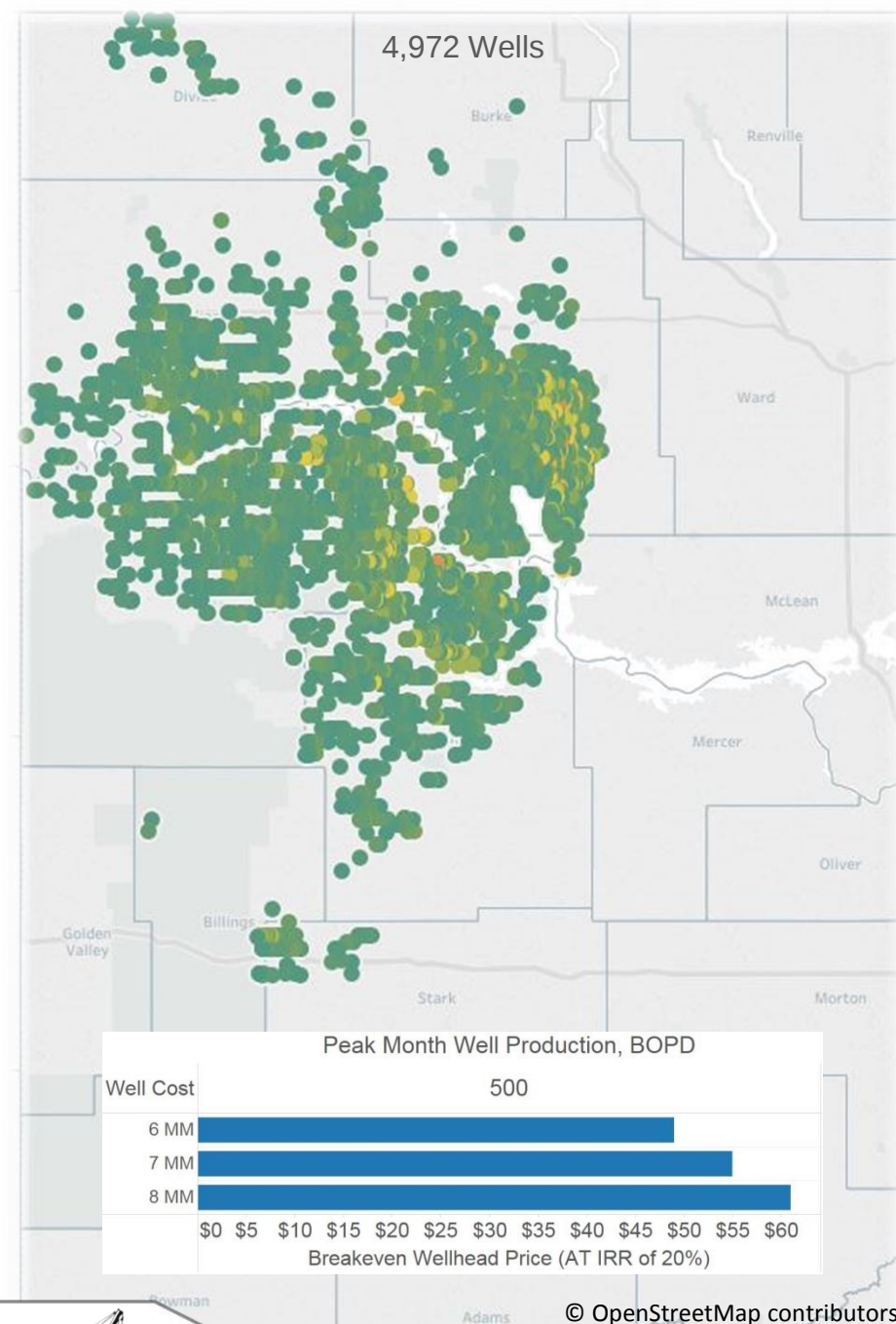
- \$6-\$8 Million Well Costs
- \$45/BBL & \$2.00/MCF Wellhead Pricing
- 1/6 Royalty
- Zero Flaring
- Assumed 10-20% IRR to drill (calculated after production taxes and royalties)
- No Tax Incentives Included
- Production rate is 30-day average
- All Bakken/Three Forks wells drilled in 2008+



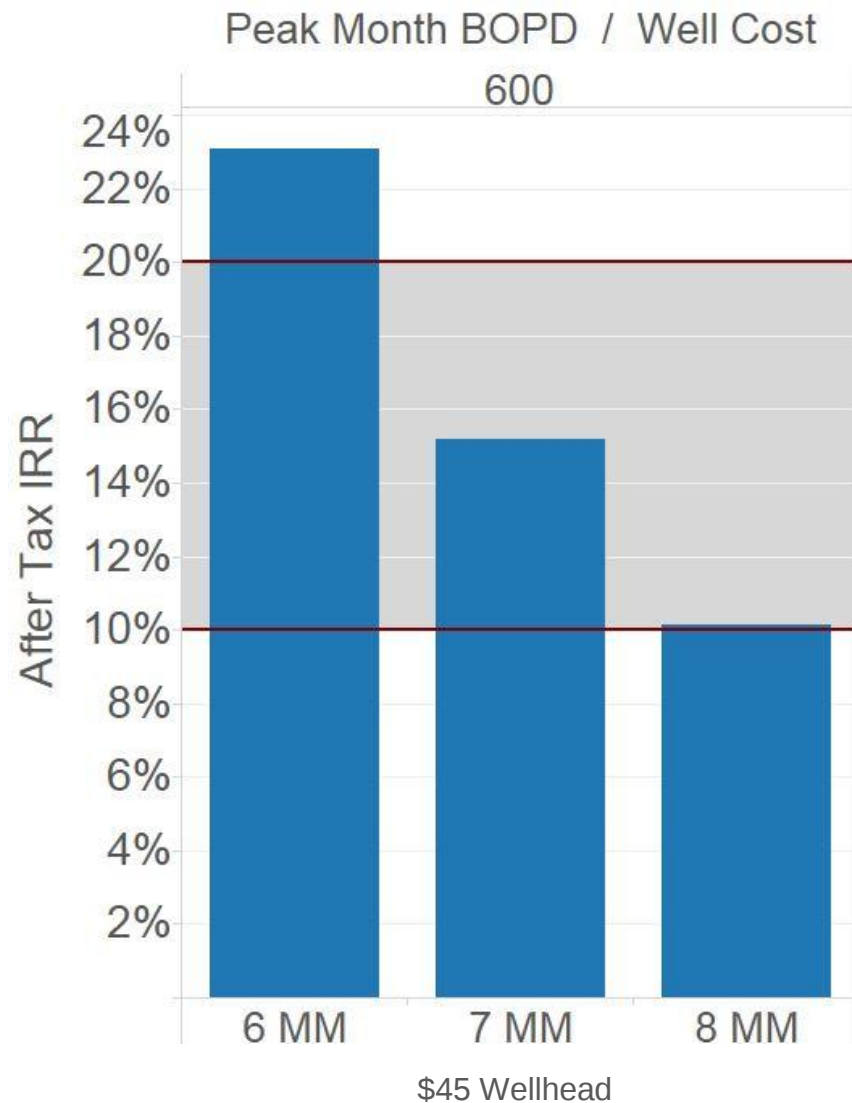
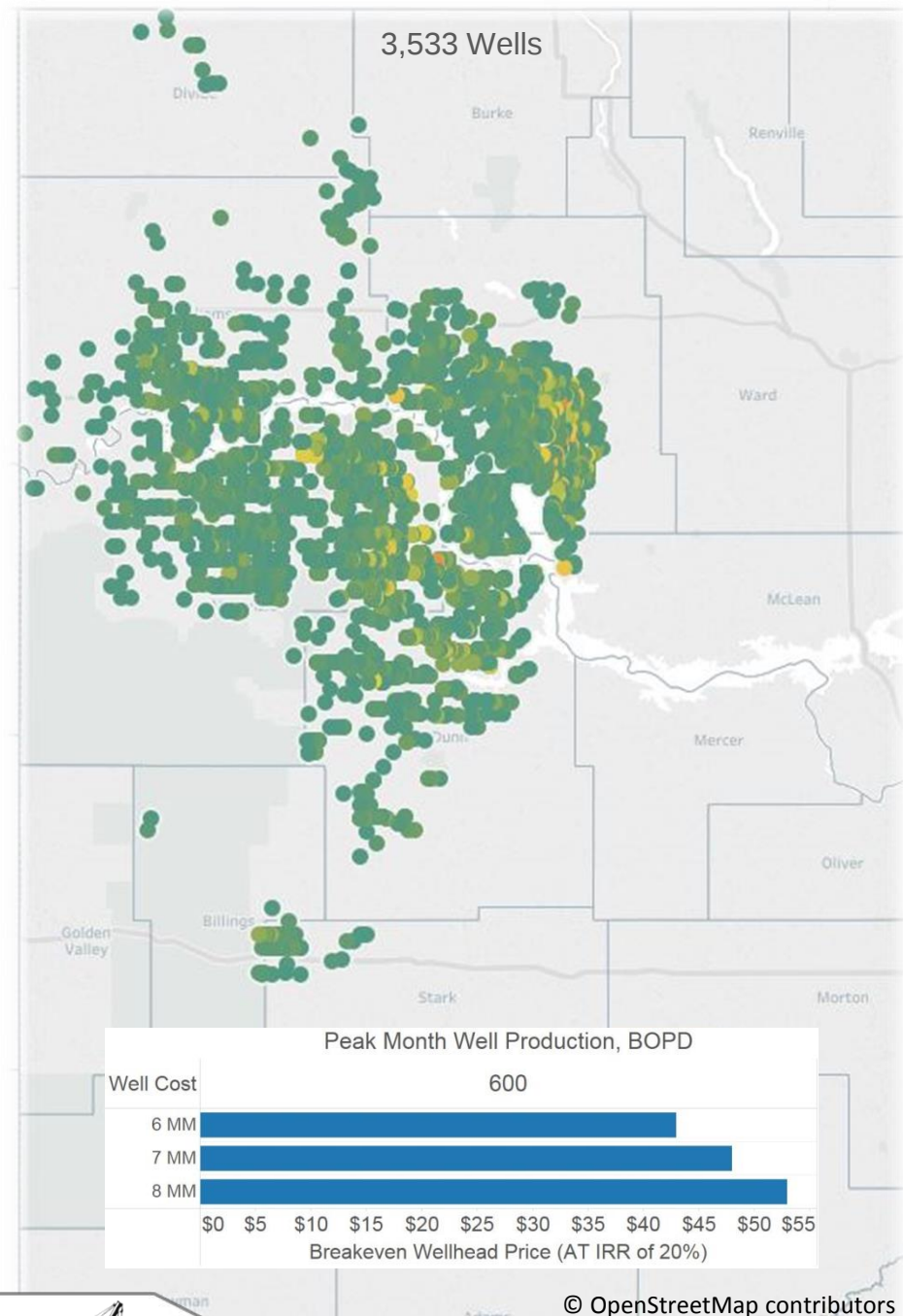
Peak Month Minimum 400 BOPD



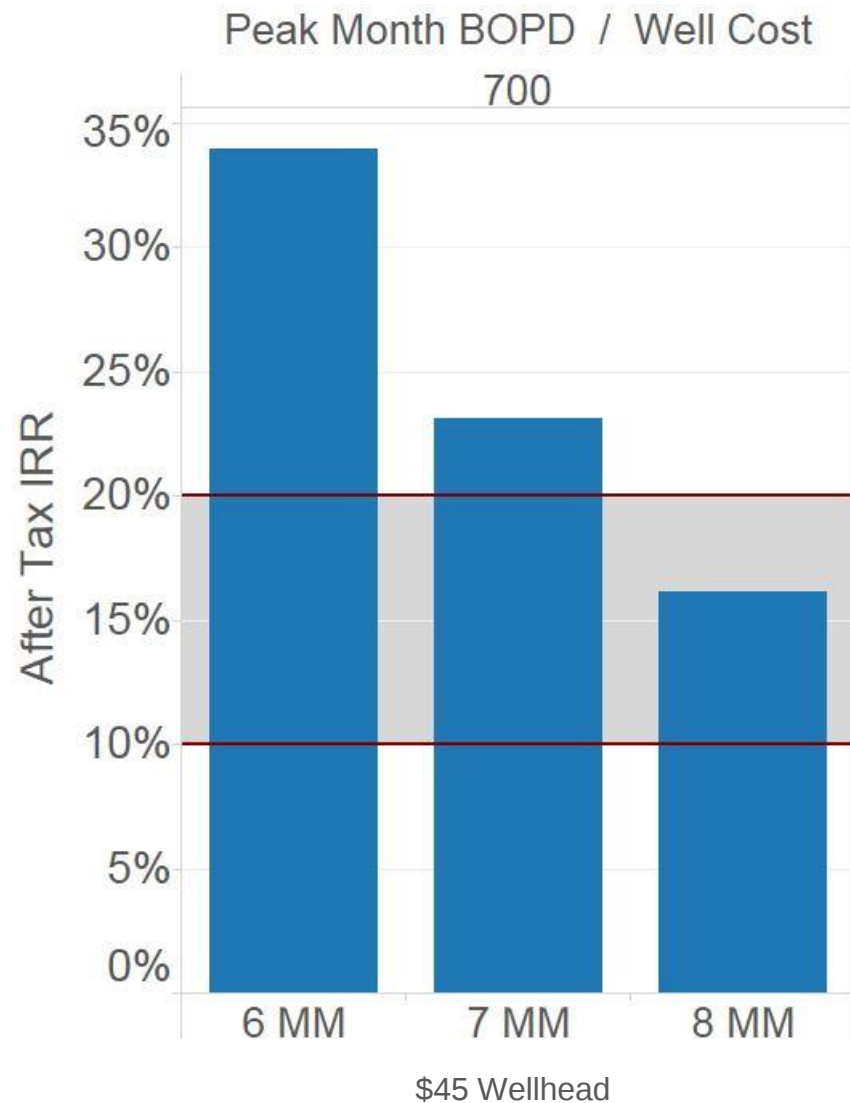
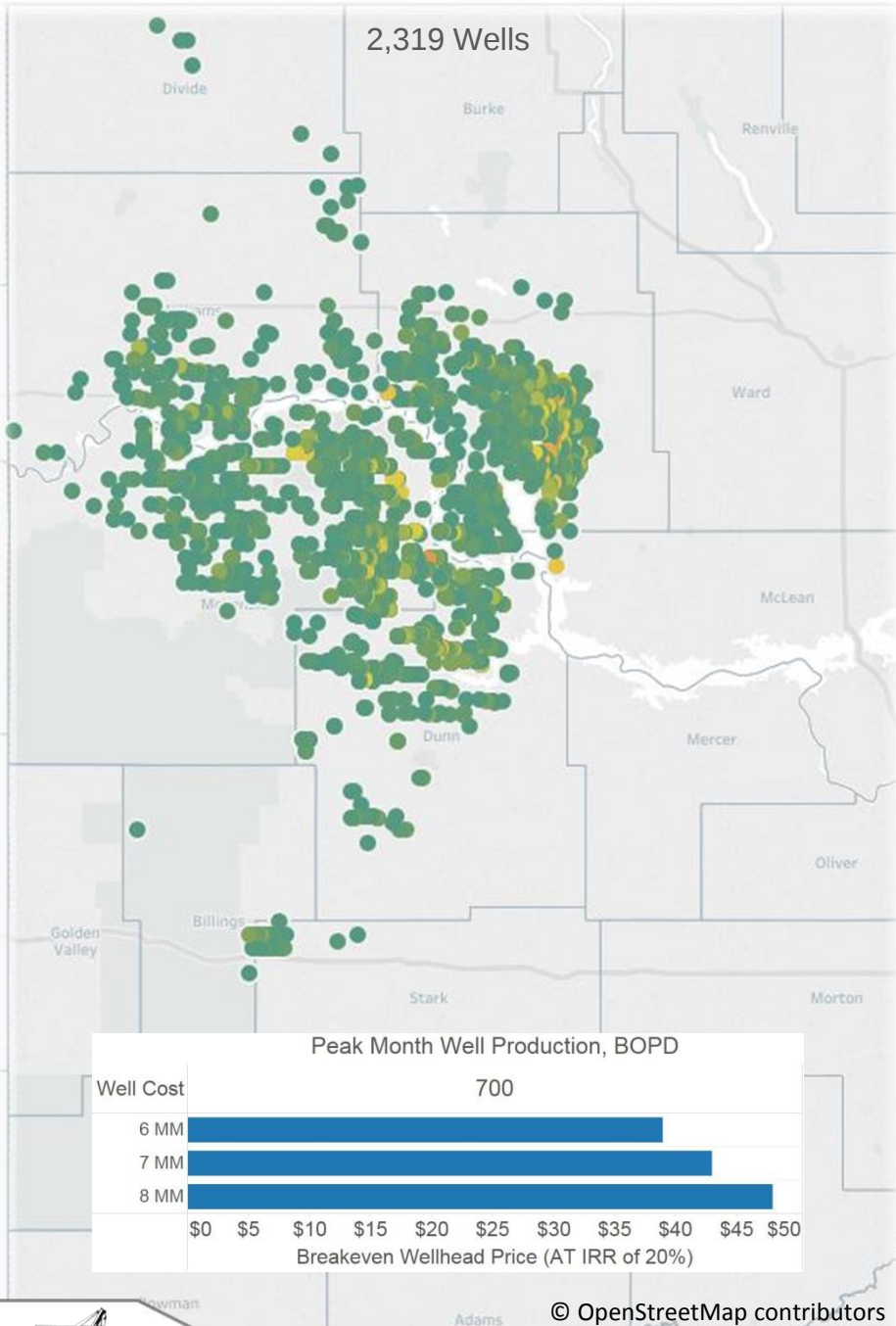
Peak Month Minimum 500 BOPD



Peak Month Minimum 600 BOPD



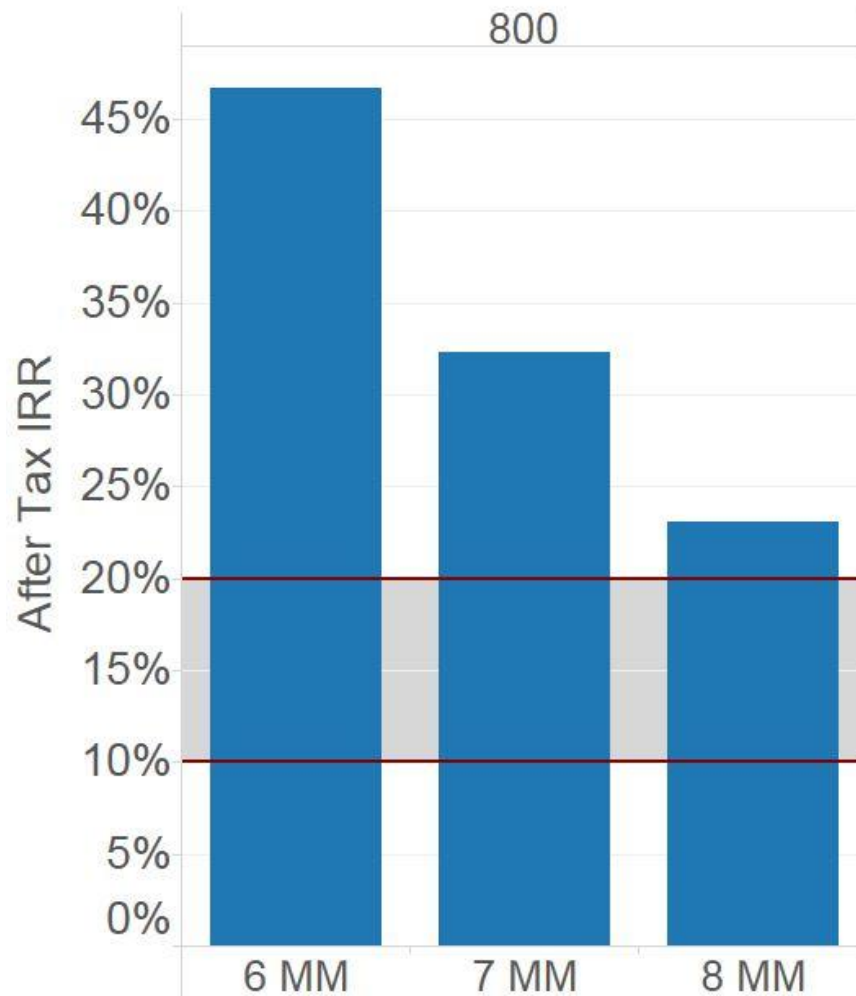
Peak Month Minimum 700 BOPD



Peak Month Minimum 800 BOPD

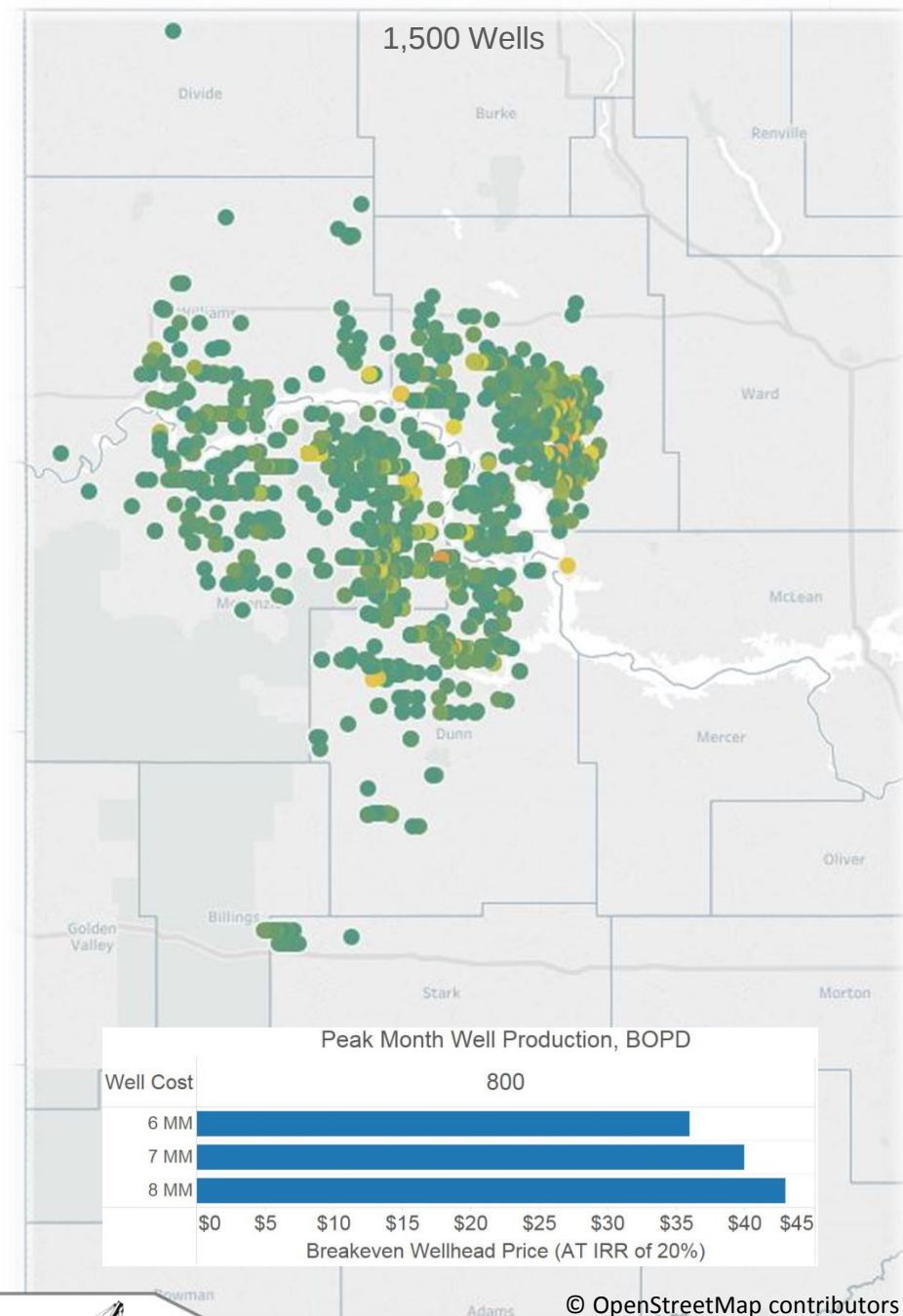
Peak Month BOPD / Well Cost

800



\$45 Wellhead

1,500 Wells



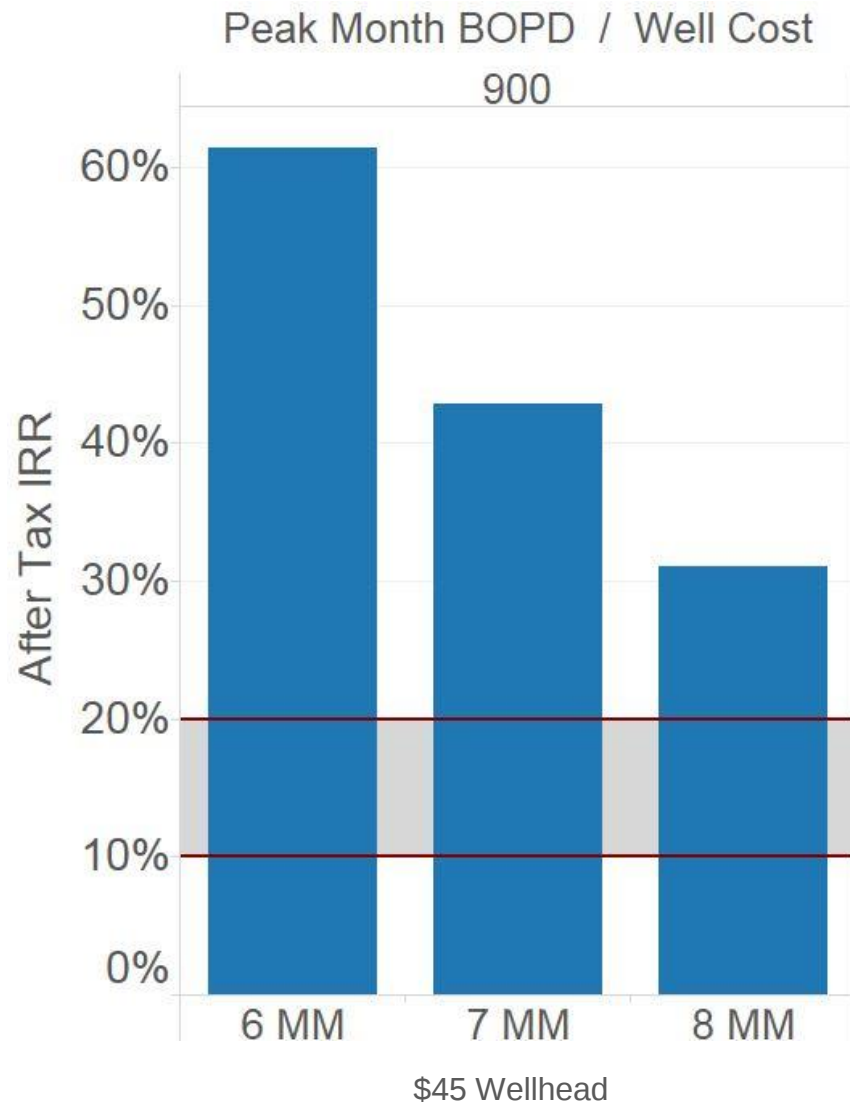
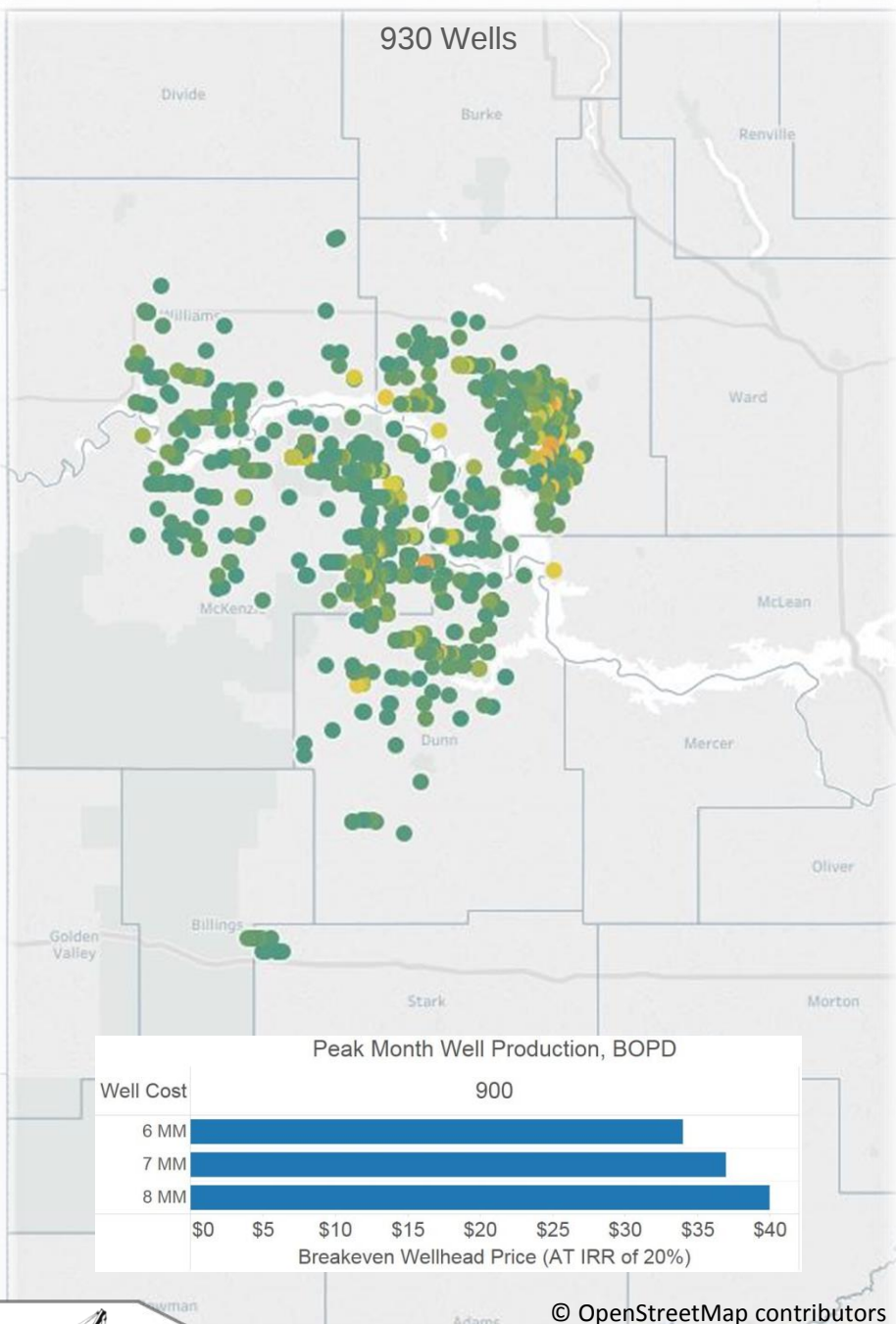
Peak Month Well Production, BOPD



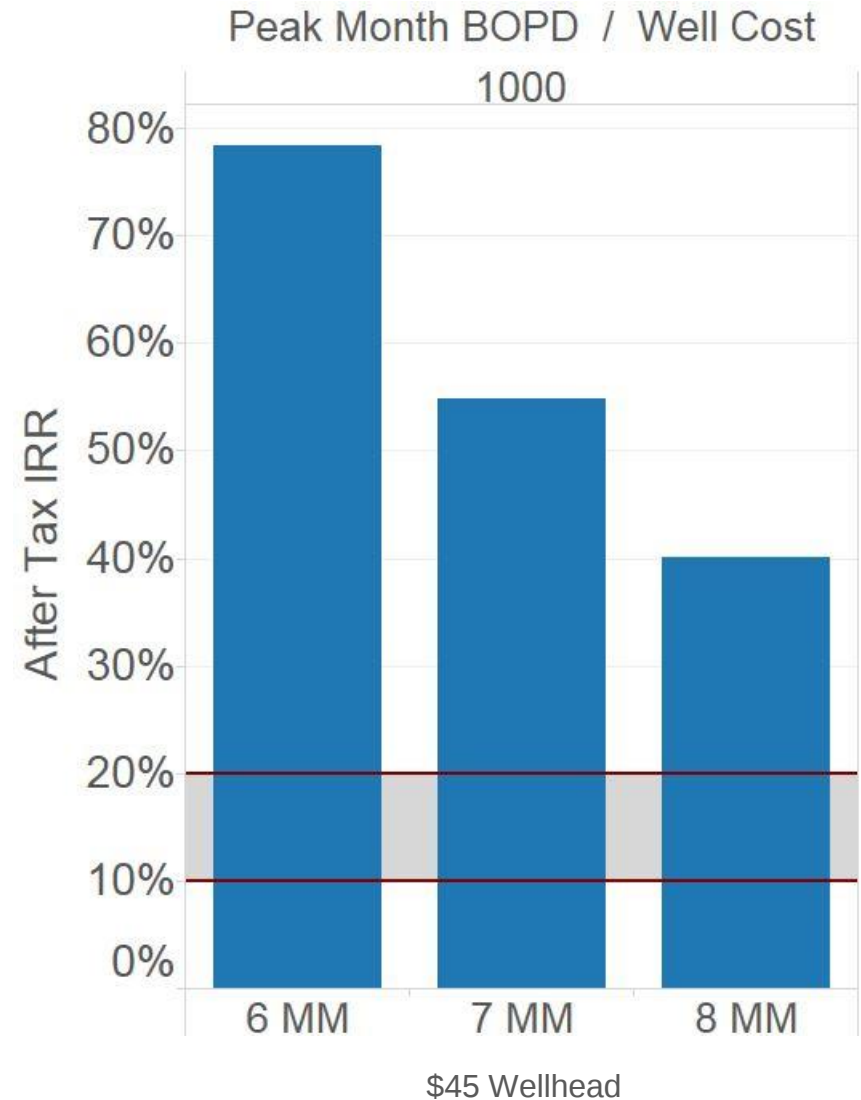
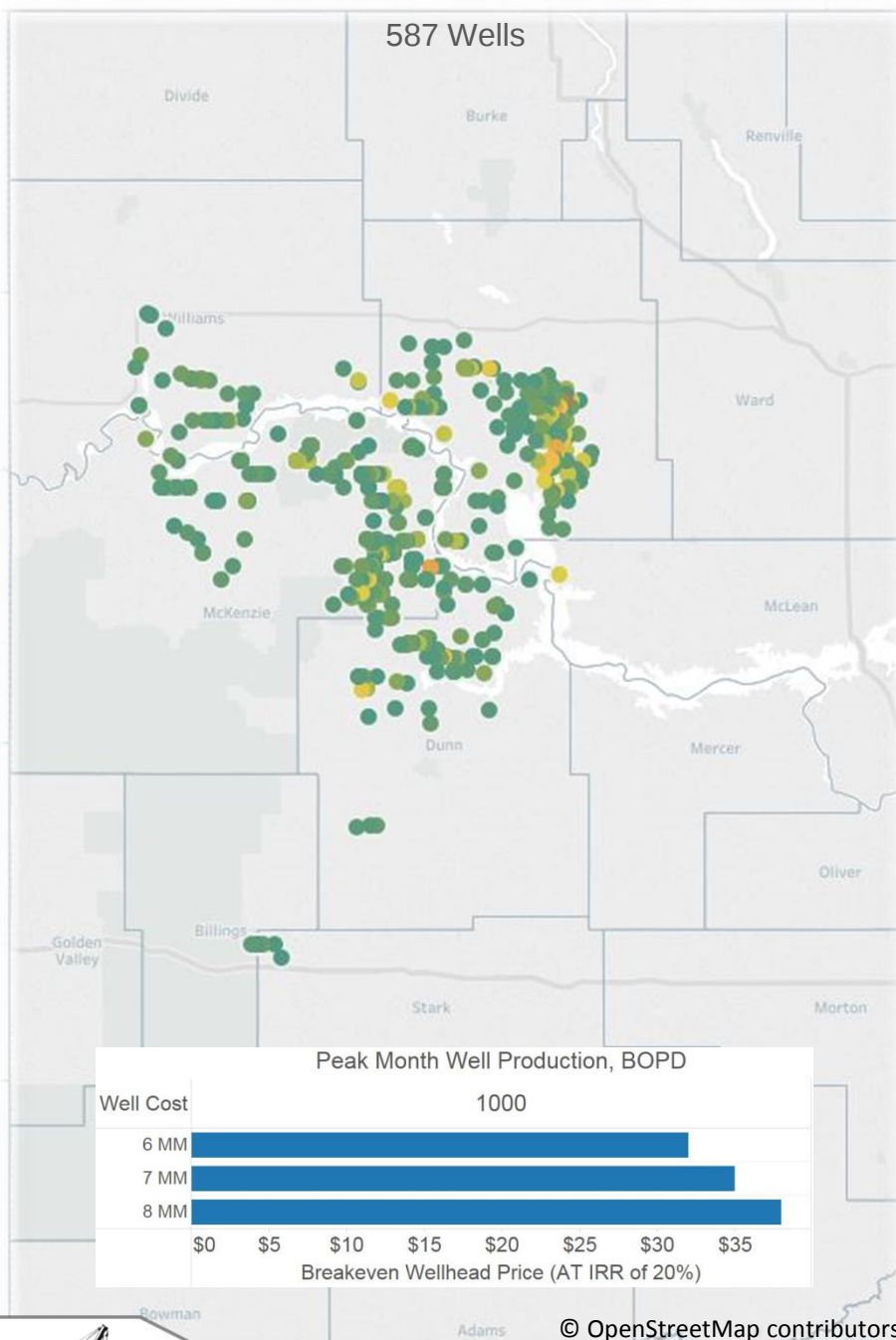
© OpenStreetMap contributors



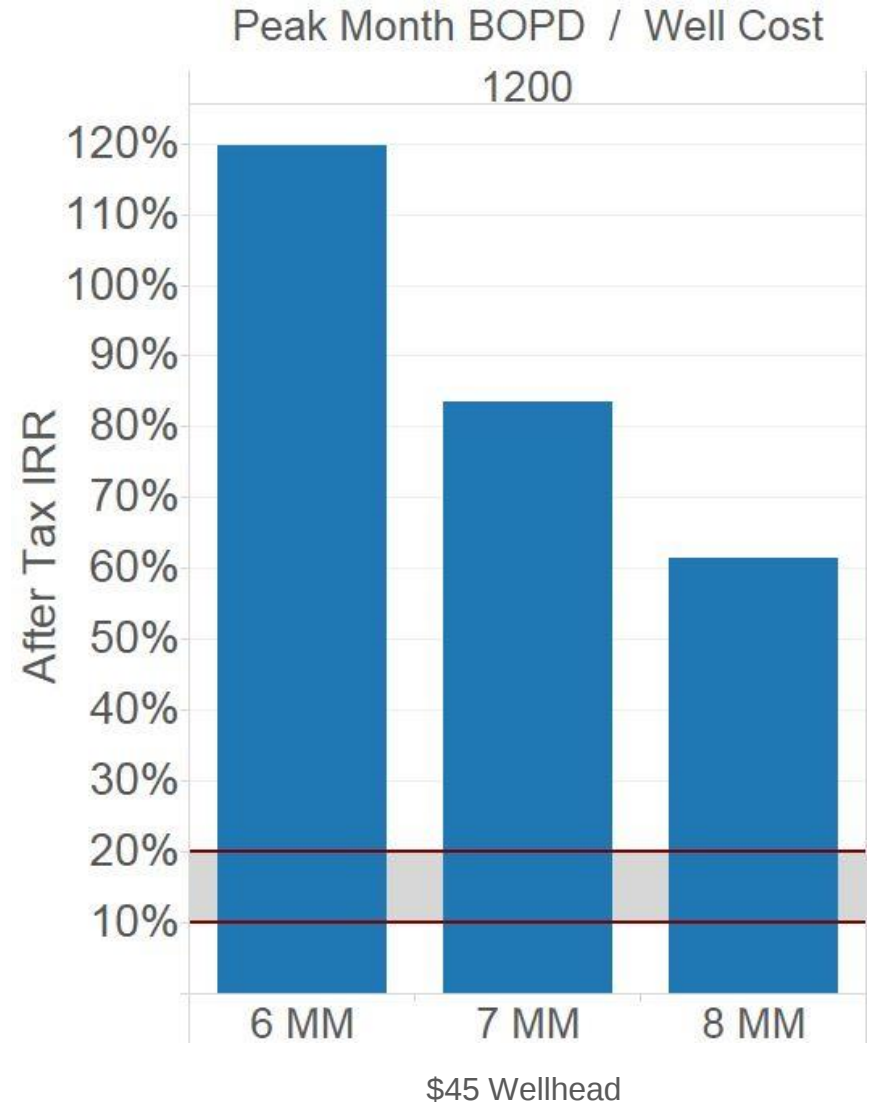
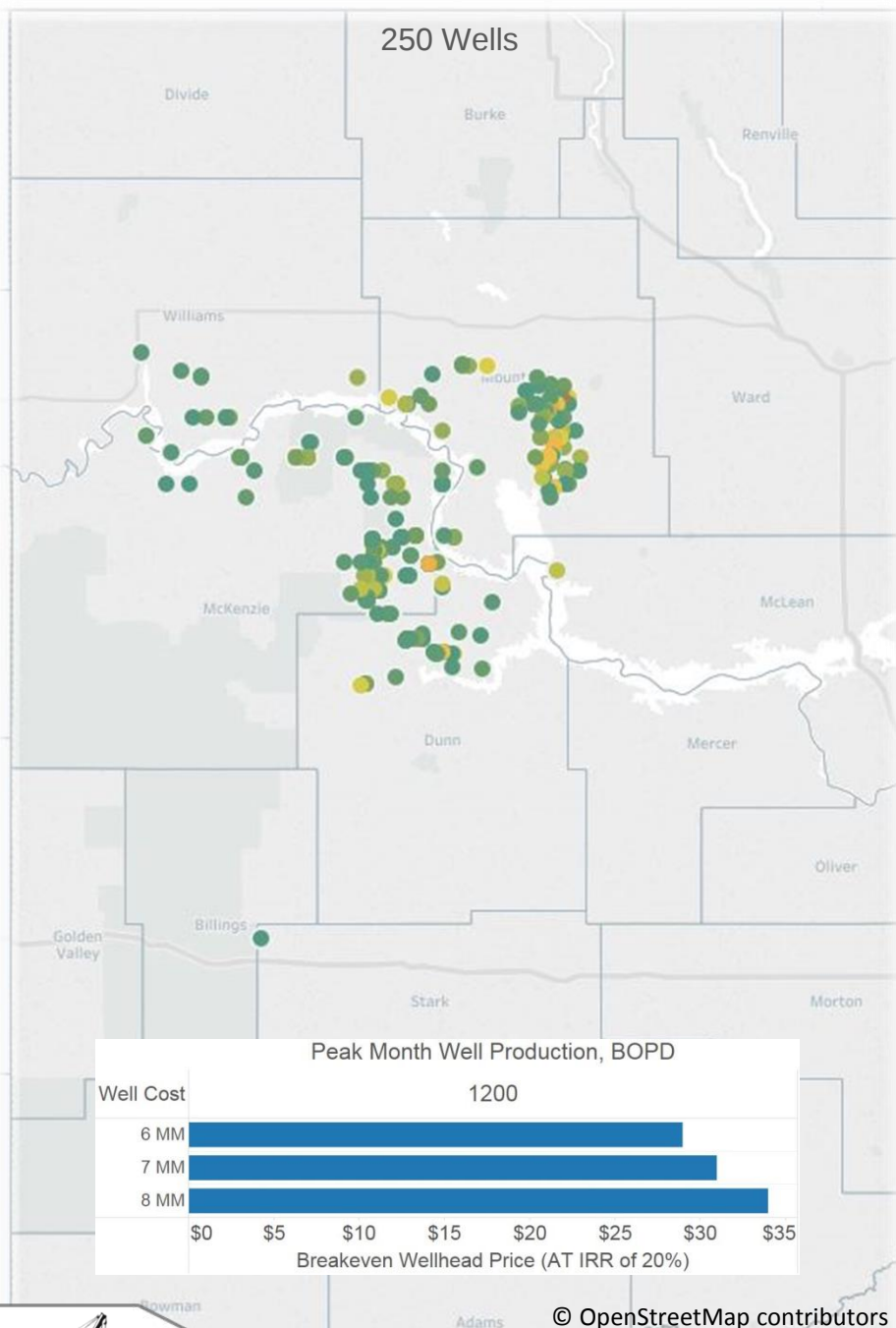
Peak Month Minimum 900 BOPD



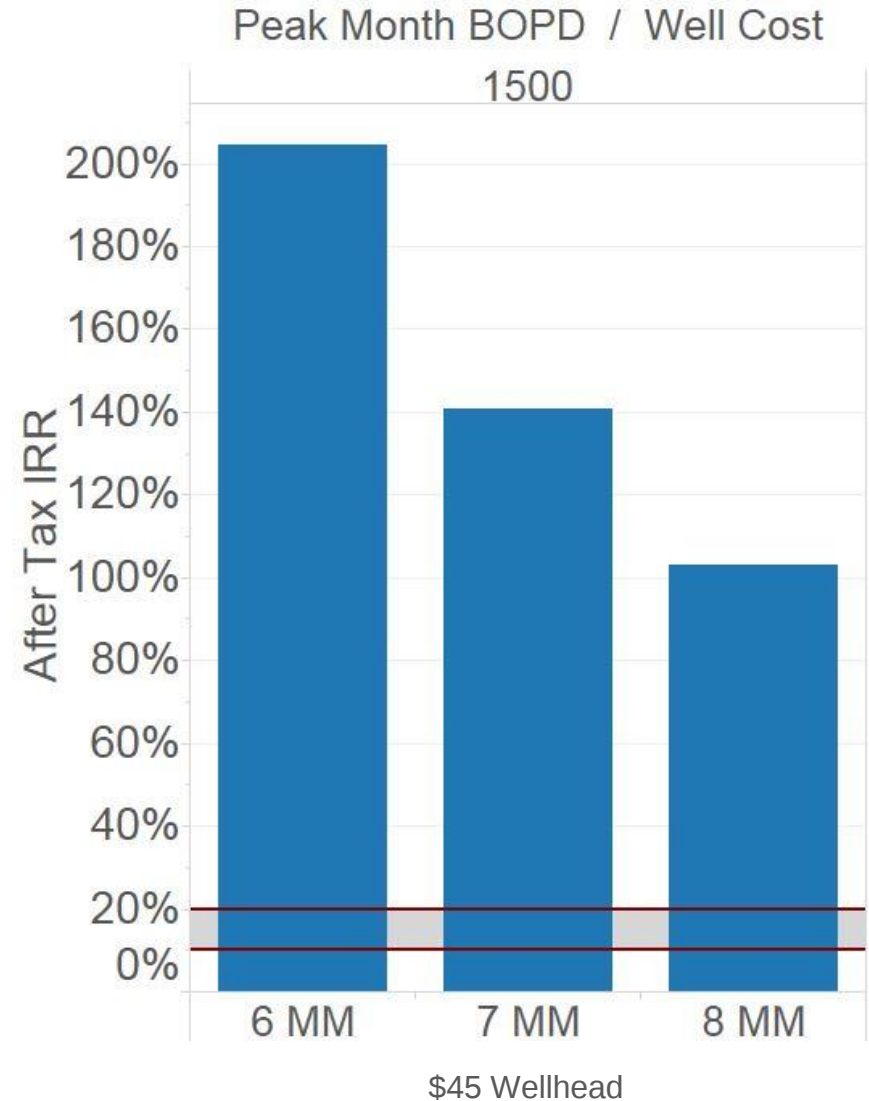
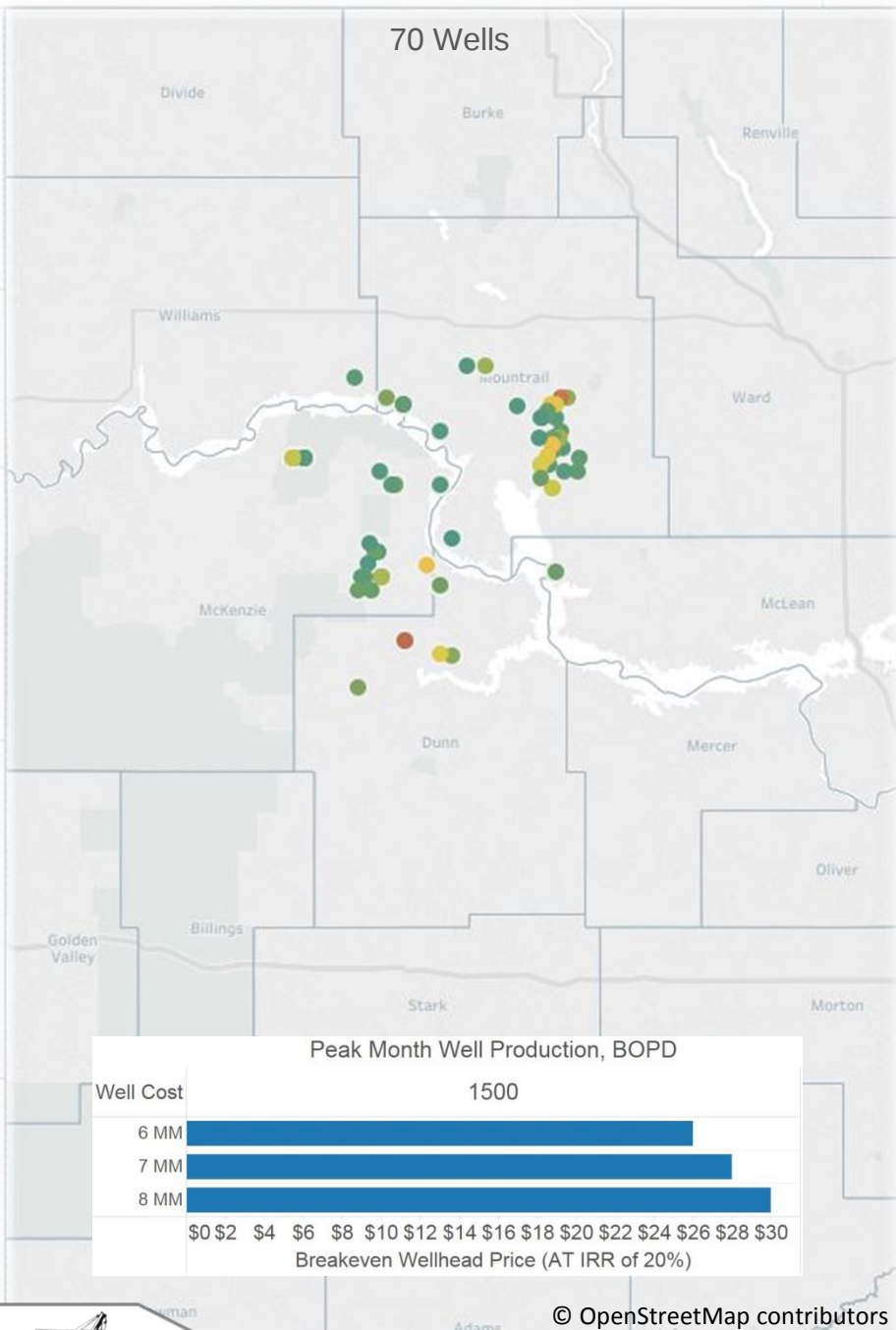
Peak Month Minimum 1,000 BOPD



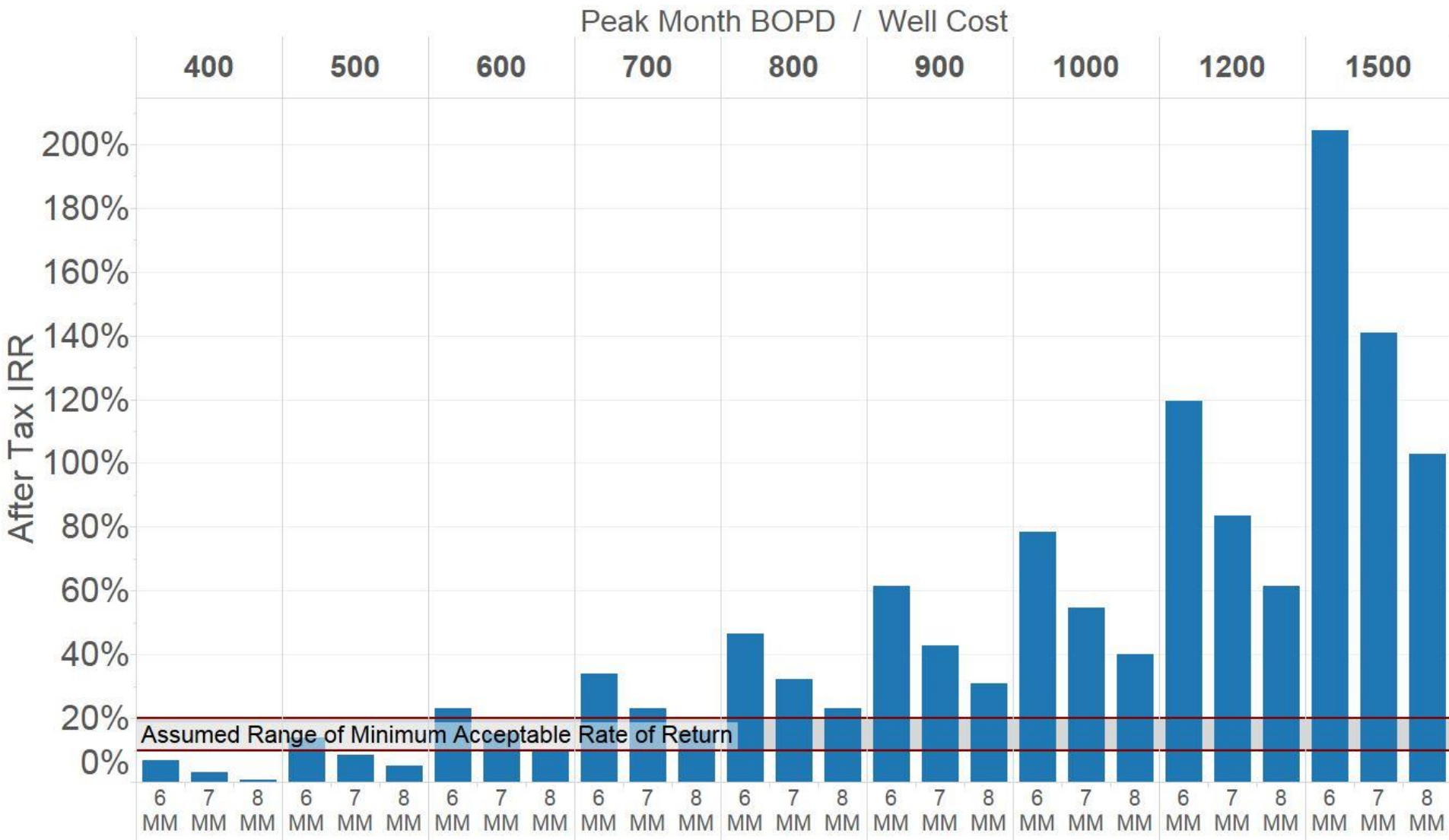
Peak Month Minimum 1,200 BOPD



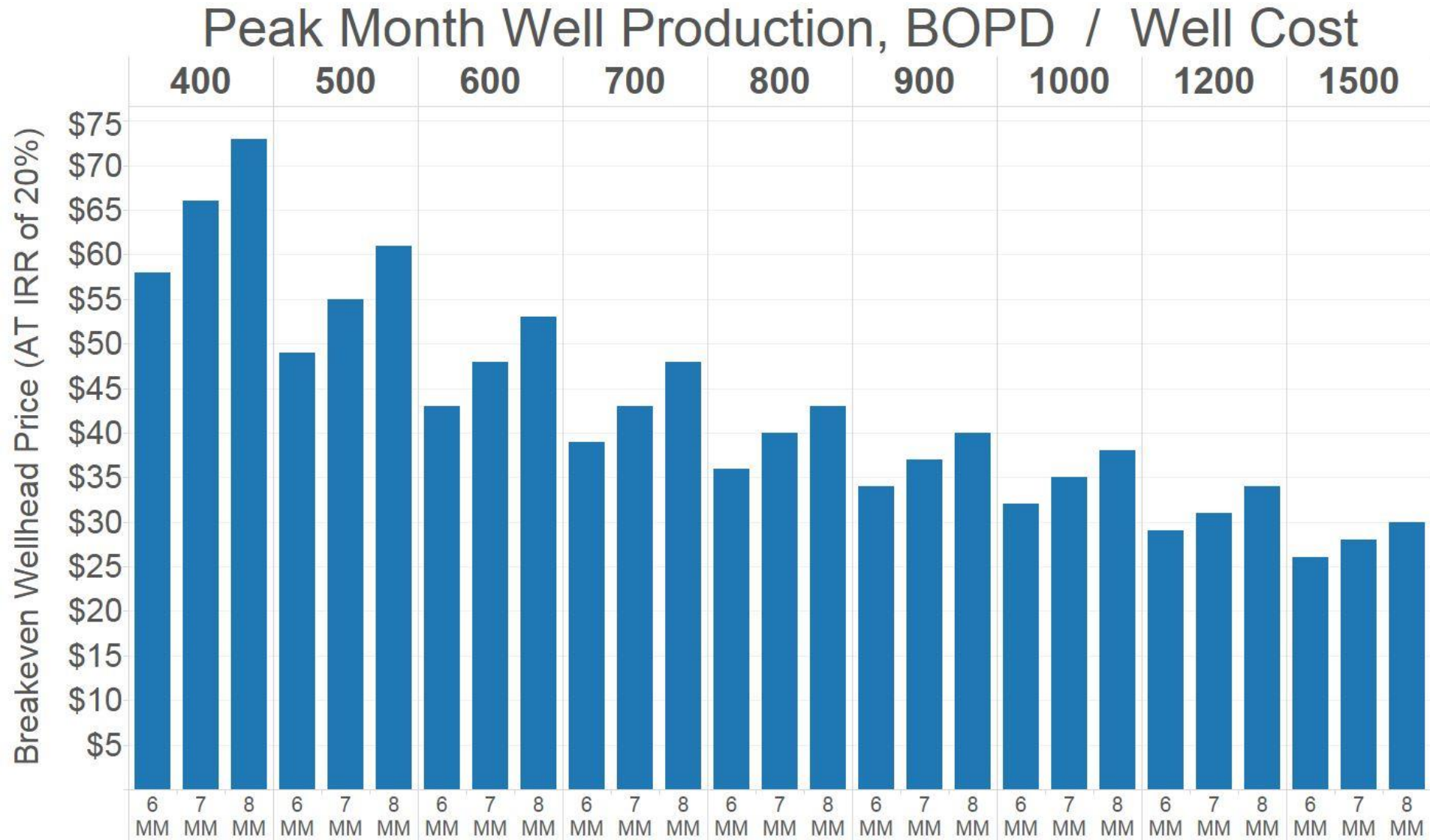
Peak Month Minimum 1,500 BOPD



Summary of \$45 Wellhead Oil



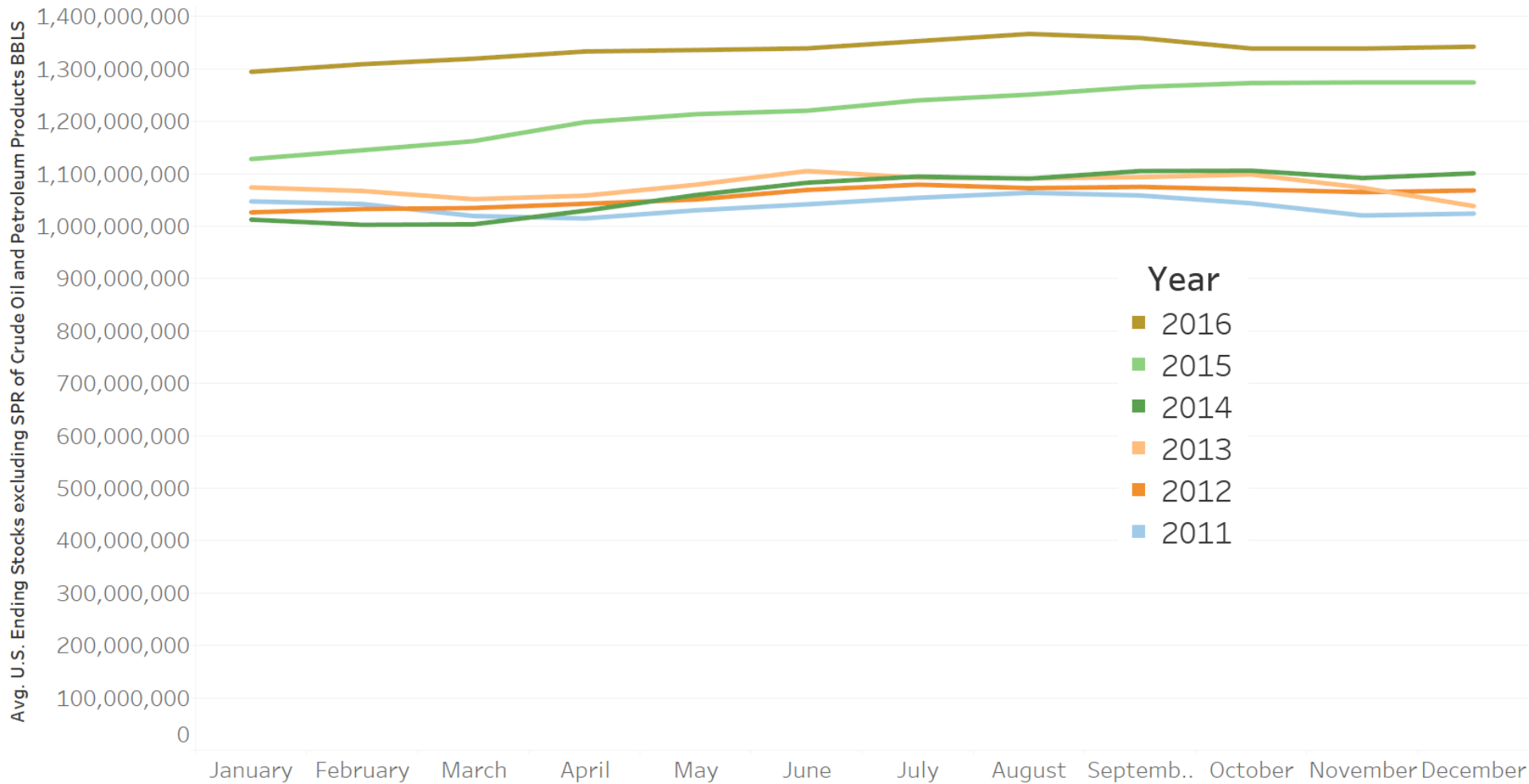
Breakeven Summary



Forecasting Future Activity...



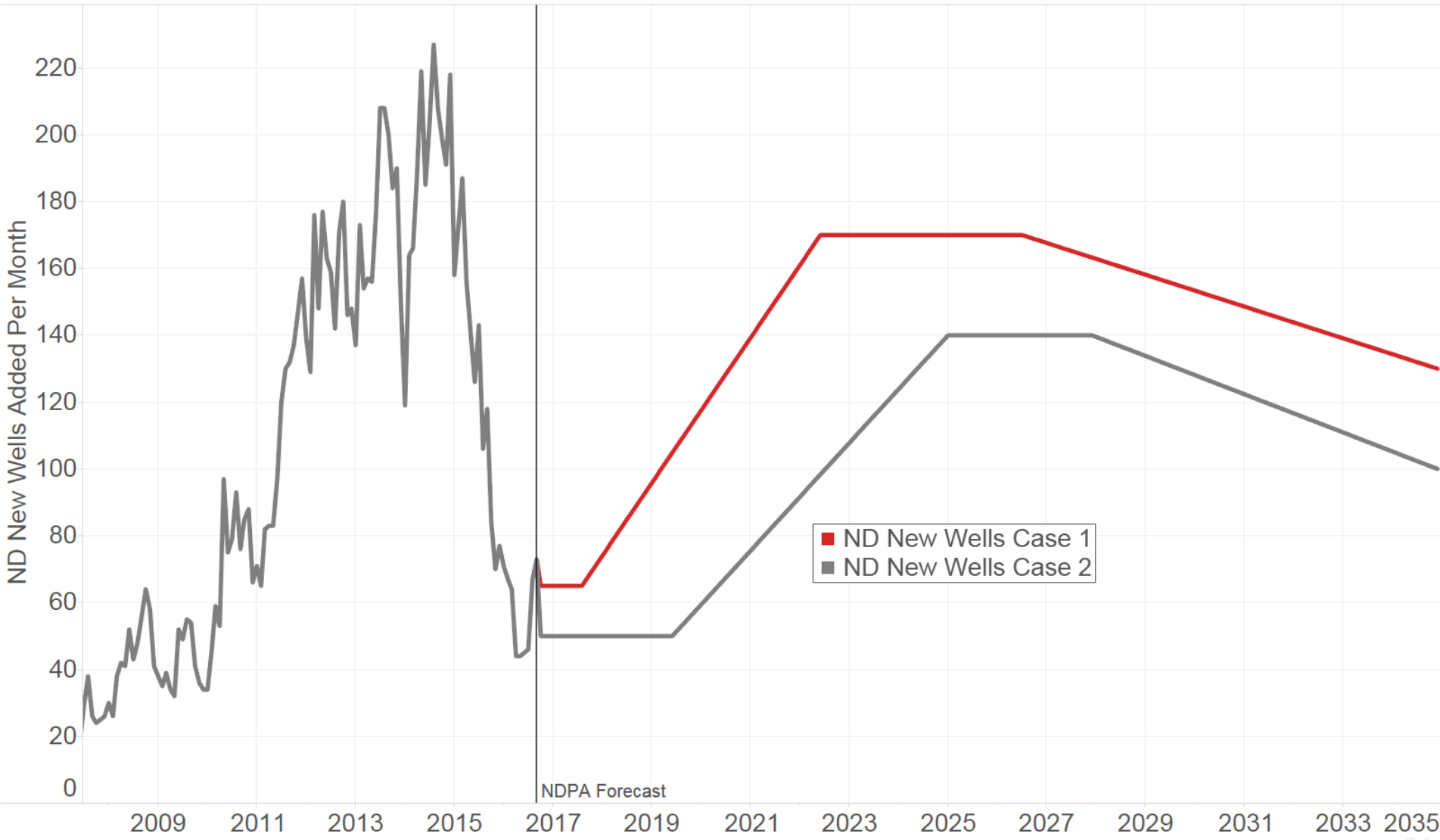
US Crude Oil Storage (Excl. SPR)



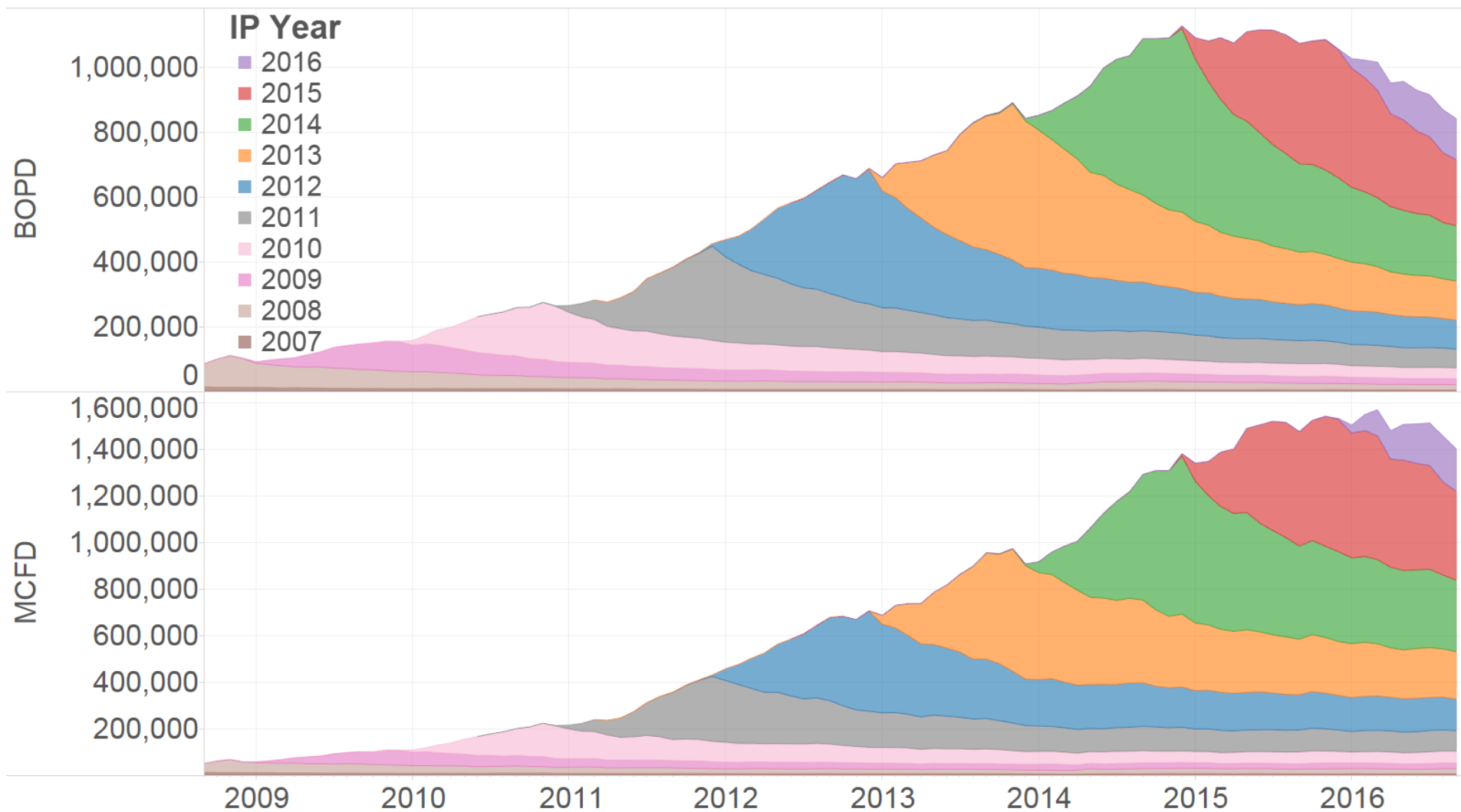
US Crude Oil Storage (Excl. SPR)



North Dakota Forecast Activity Assumptions



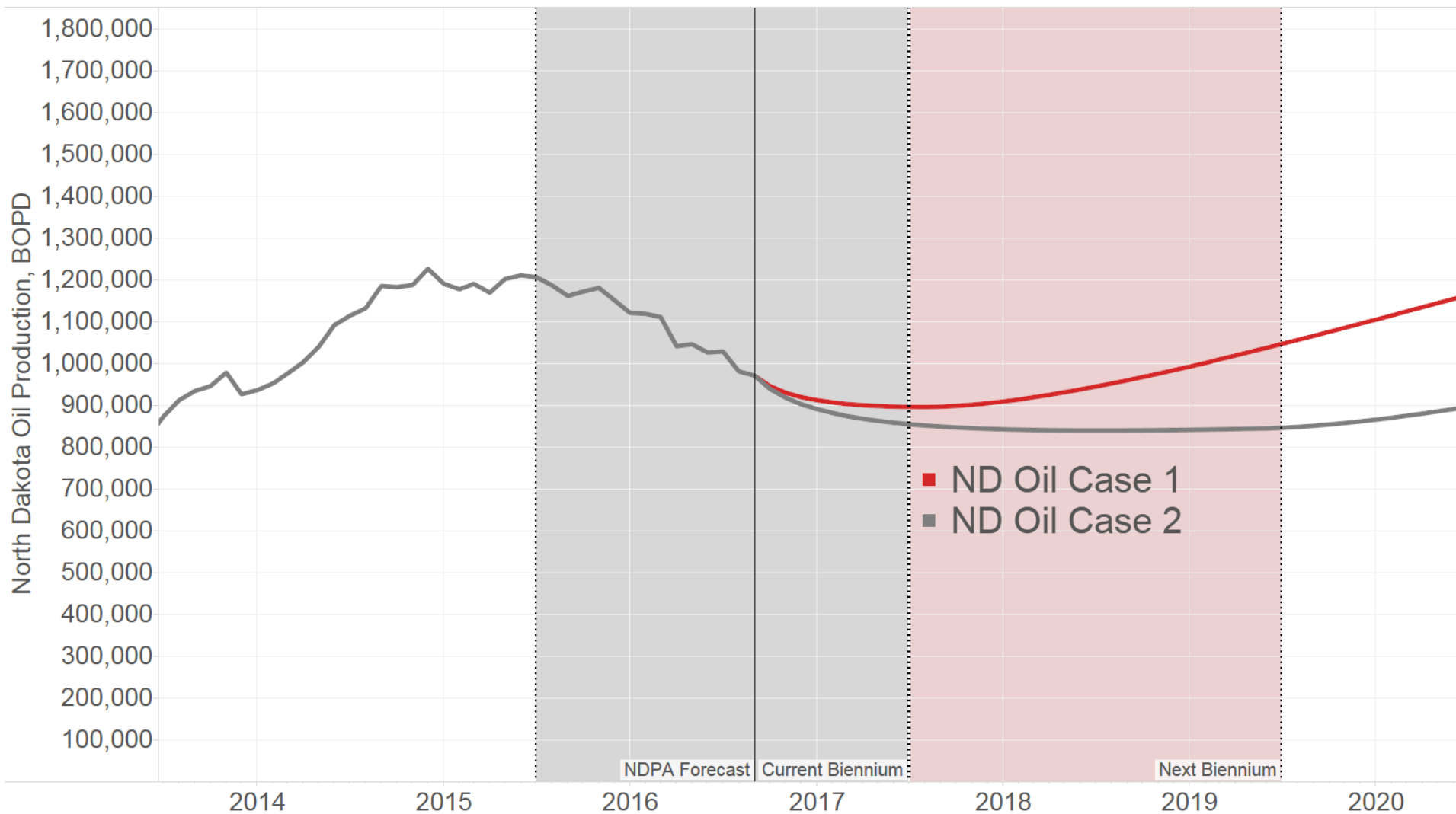
Base Production Declines*



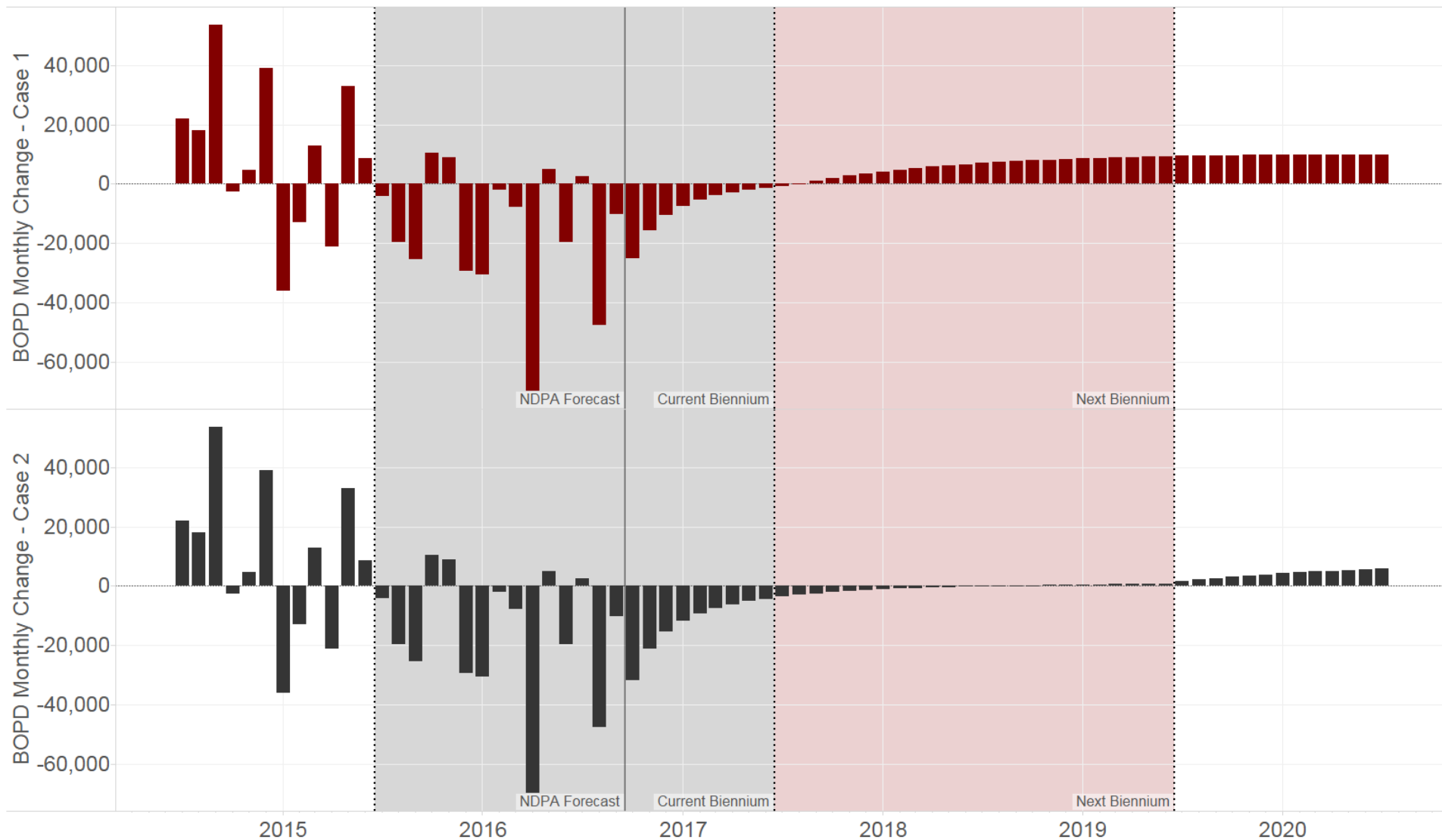
*Non-Confidential Bakken/Three Forks Production Only



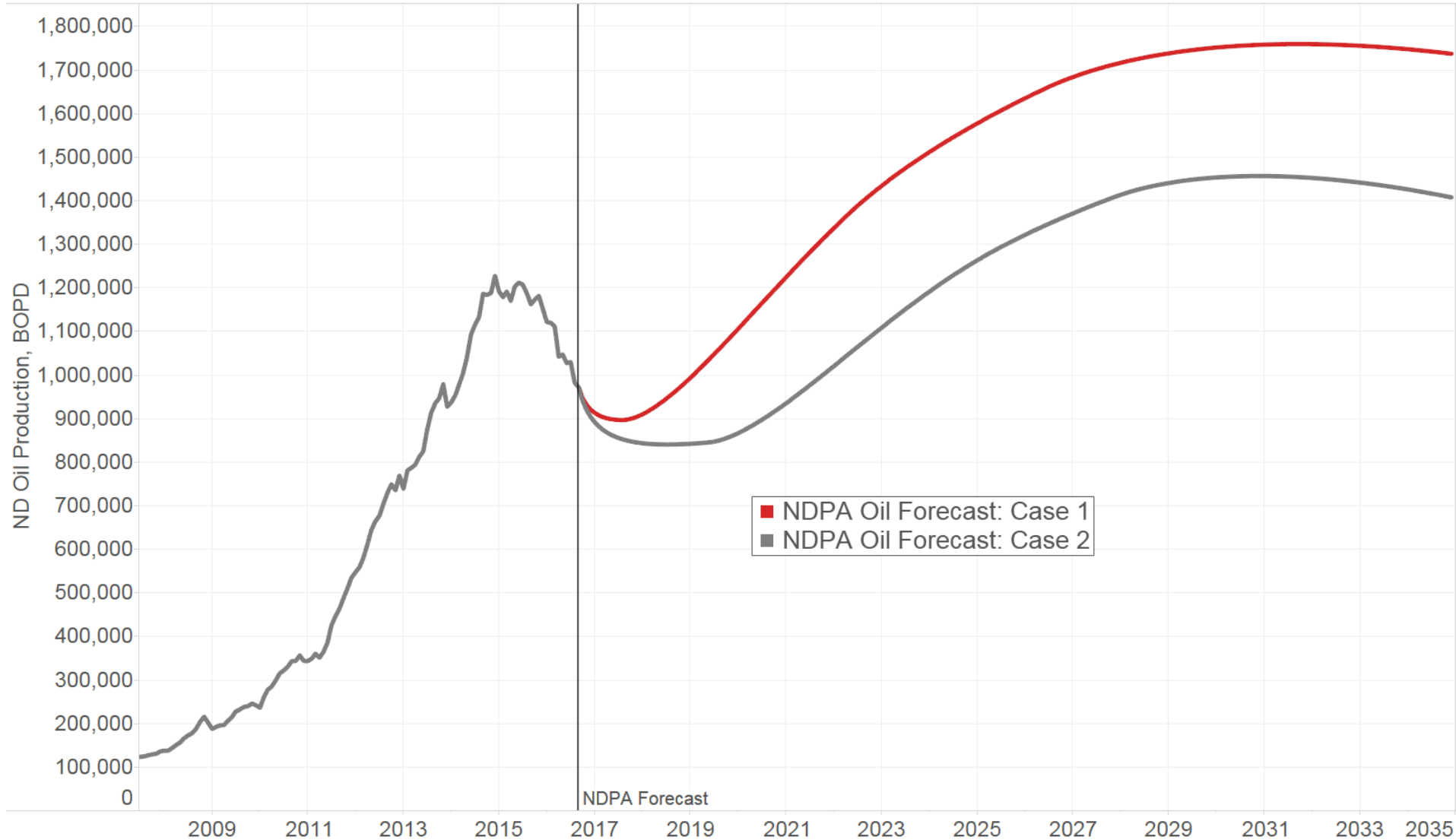
NDPA ND Oil Production Forecast



NDPA ND Oil Production Forecast



North Dakota Oil Production Forecast



Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.

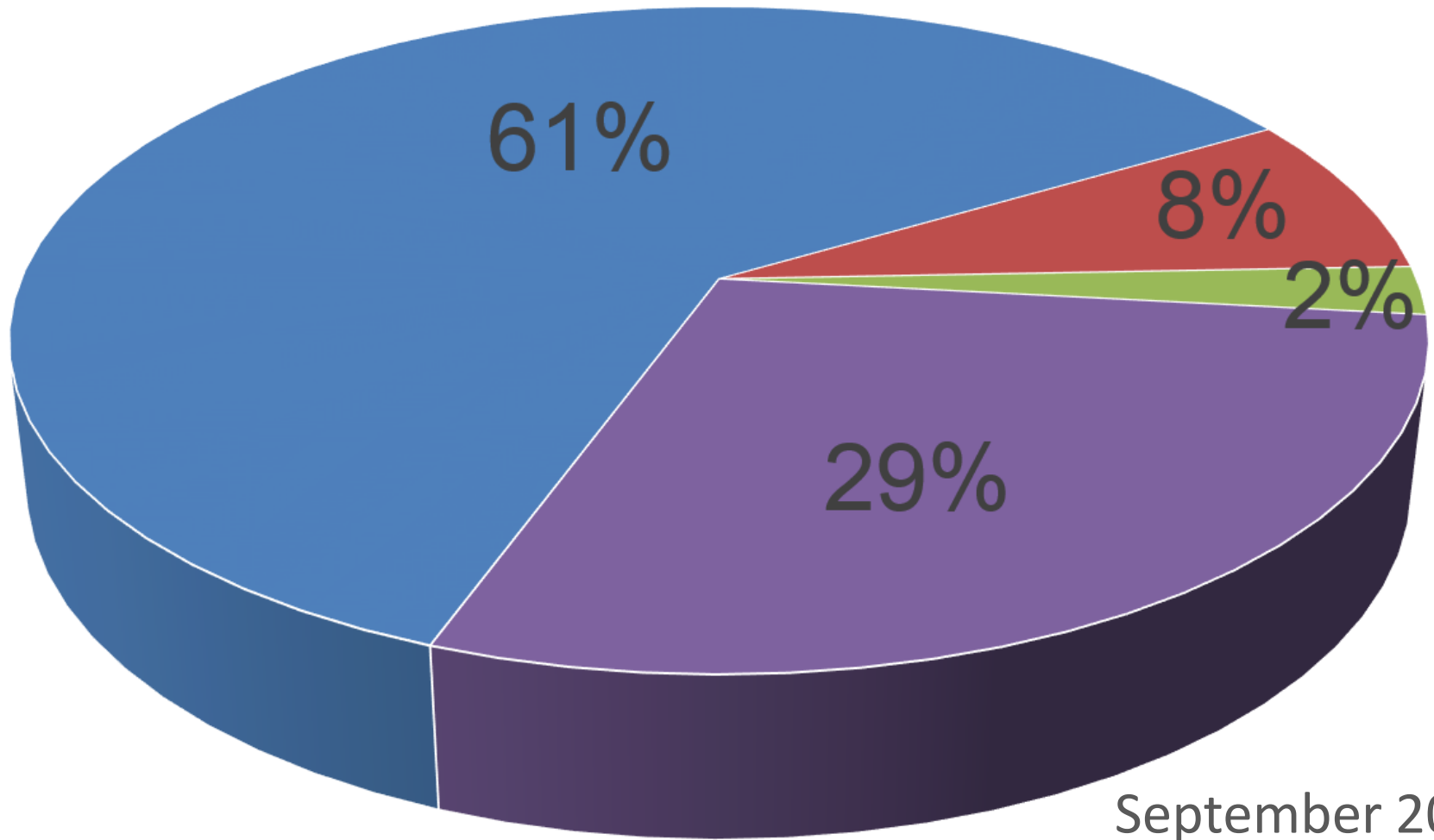


Presentation Outline

- Understanding current and future oil production
 - Activity
 - Drilling economics
 - Forecasts
- Williston Basin oil transportation dynamics
 - Interstate oil movements
 - Intrastate oil movements
- North Dakota natural gas production
 - Flaring and gas capture
 - Natural Gas Liquids



Estimated Williston Basin Oil Transportation



September 2016

■ Pipeline Export

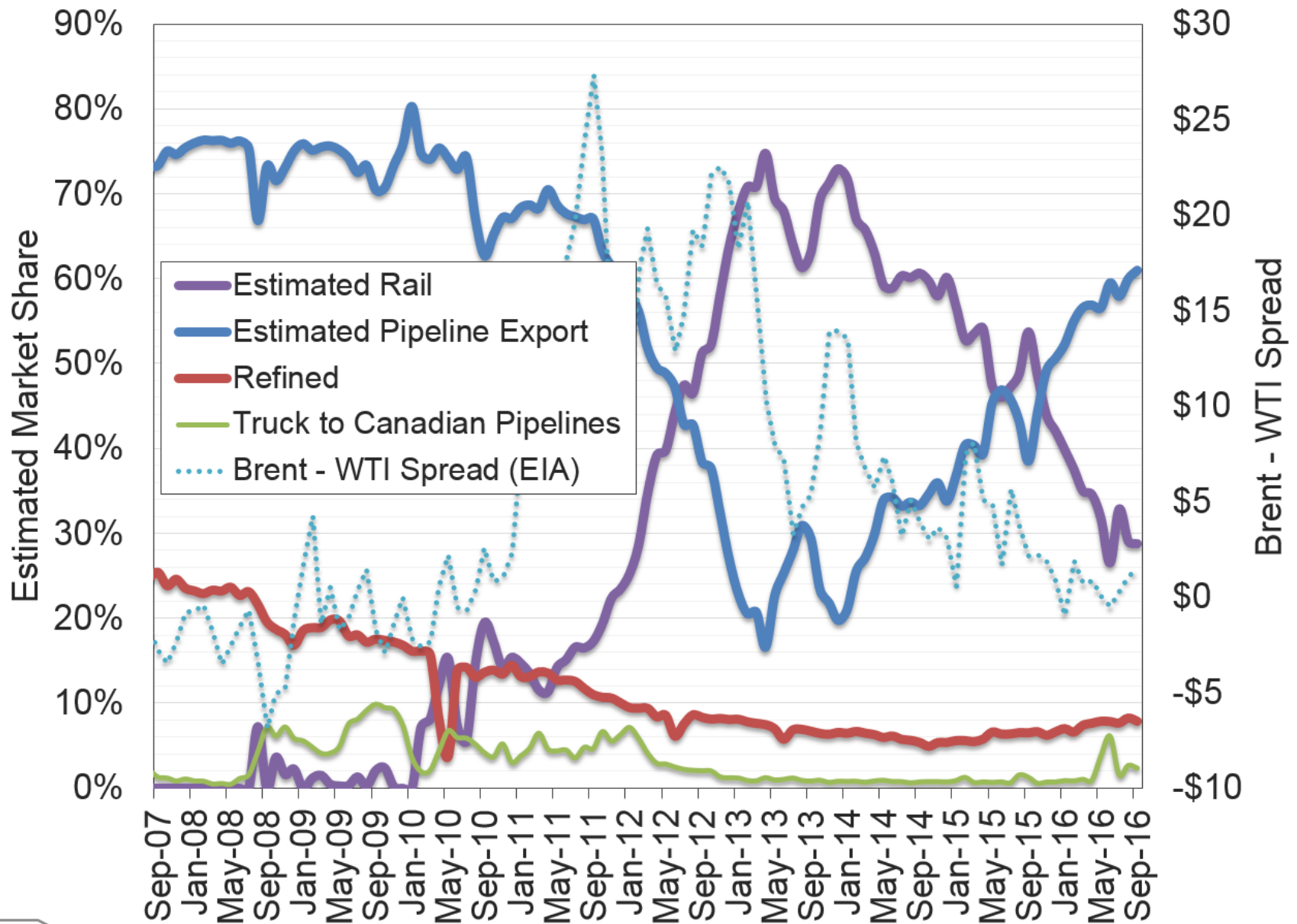
■ Refined

■ Truck to Canadian Pipelines

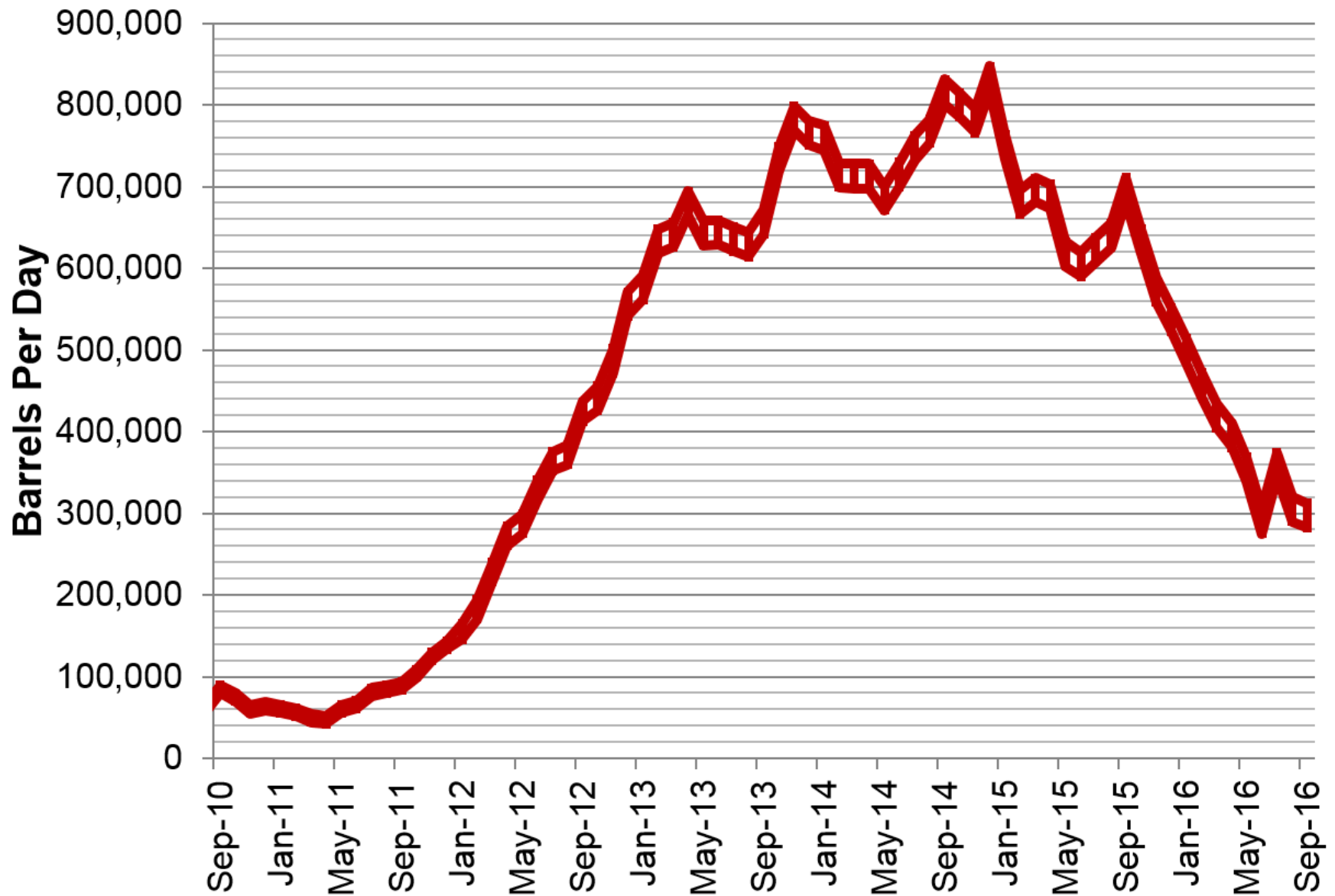
■ Estimated Rail



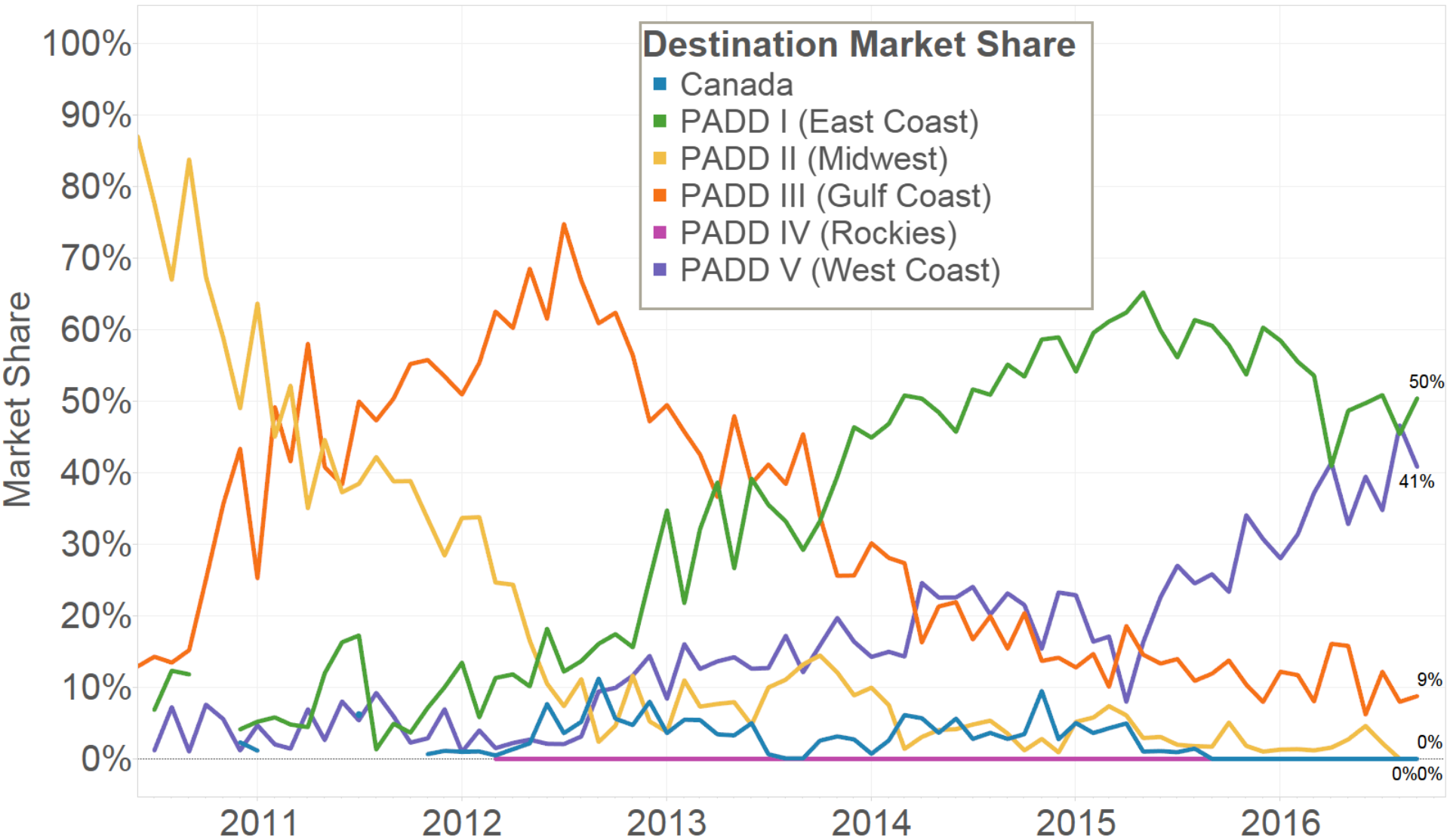
Estimated Williston Basin Oil Transportation



Estimated ND Rail Export Volumes



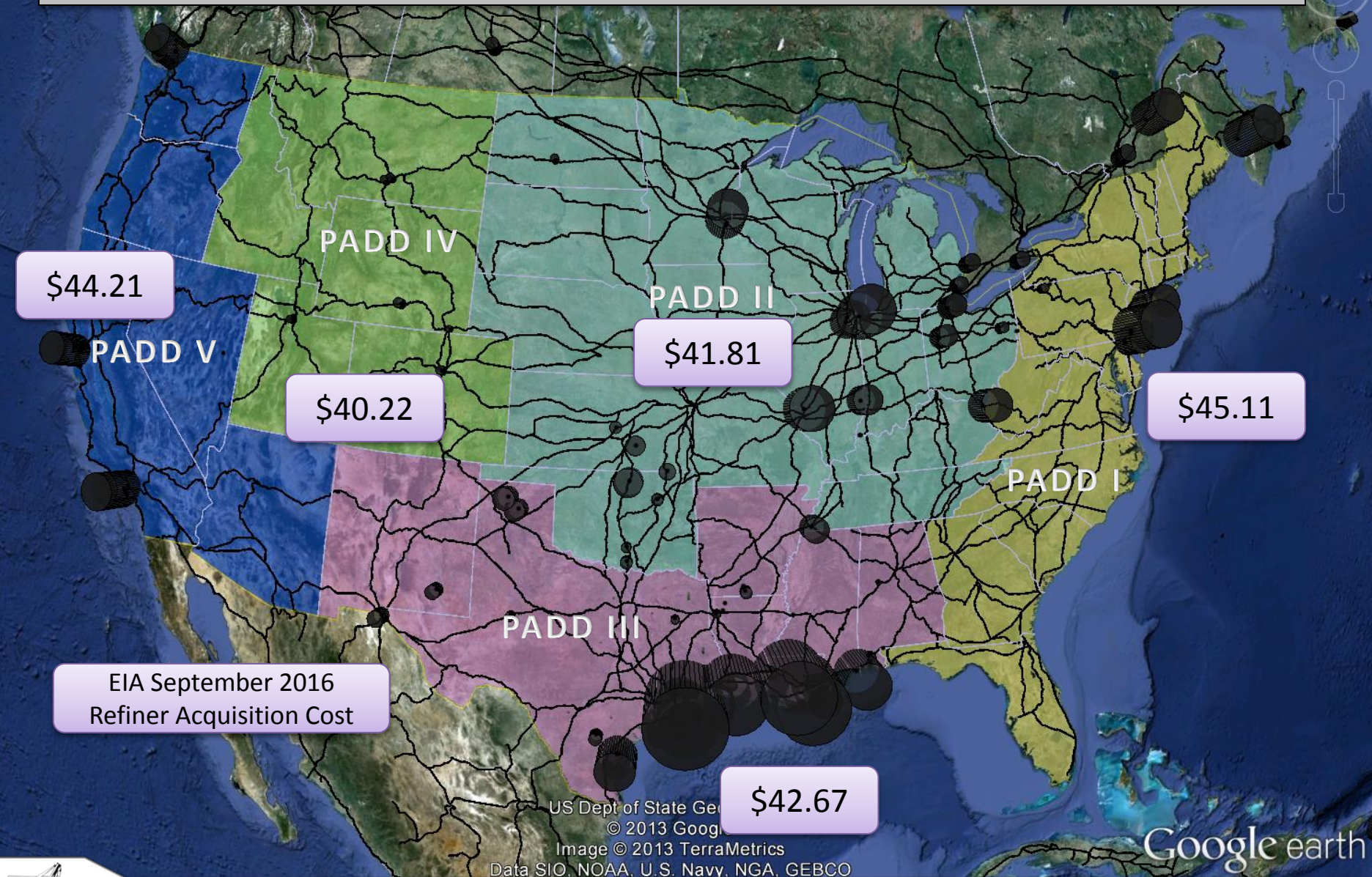
Rail Destinations Market Share (Sep. 2016)



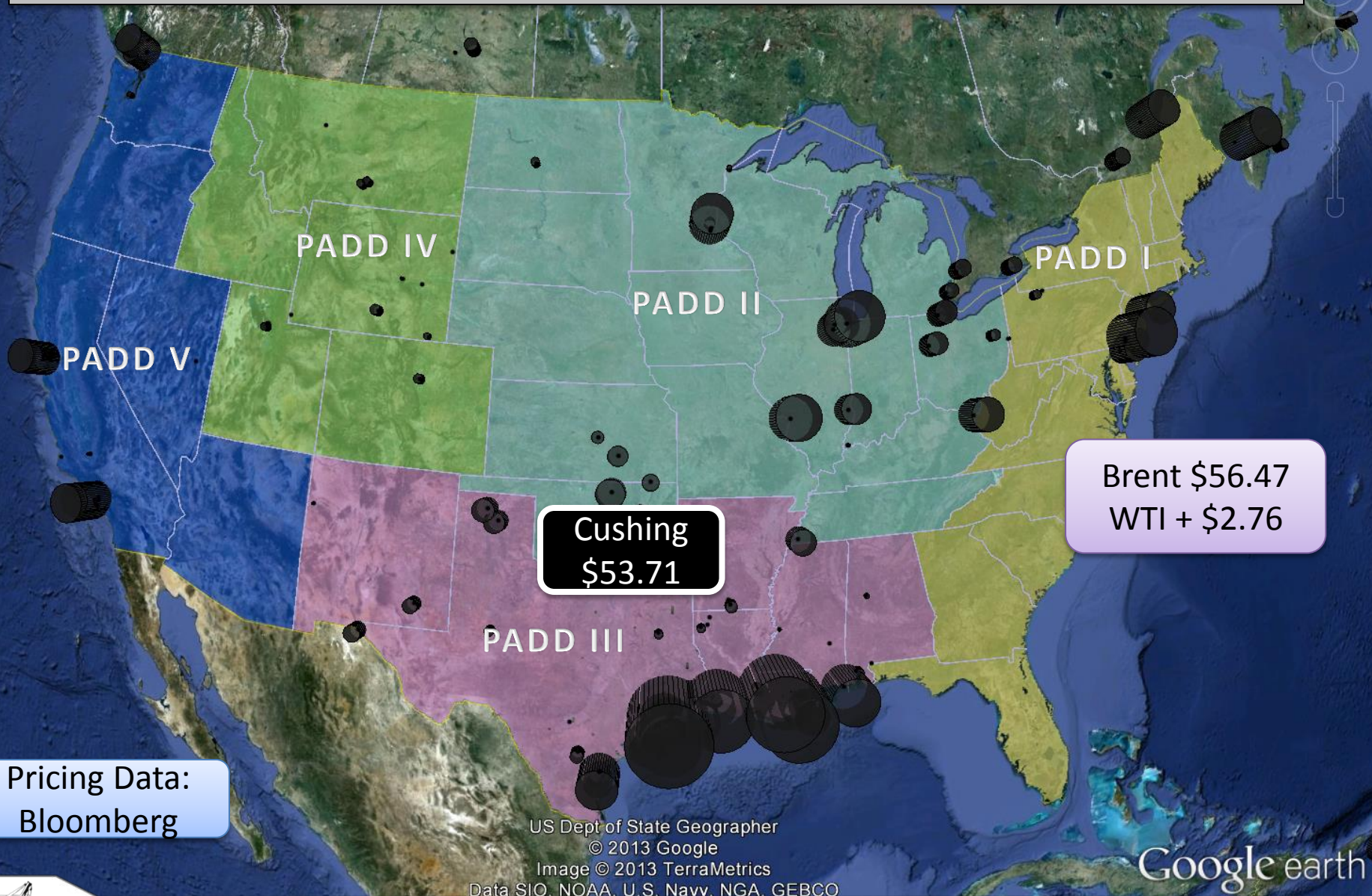
Data for Rail Destination Market Share Provided by the US Energy Information Administration



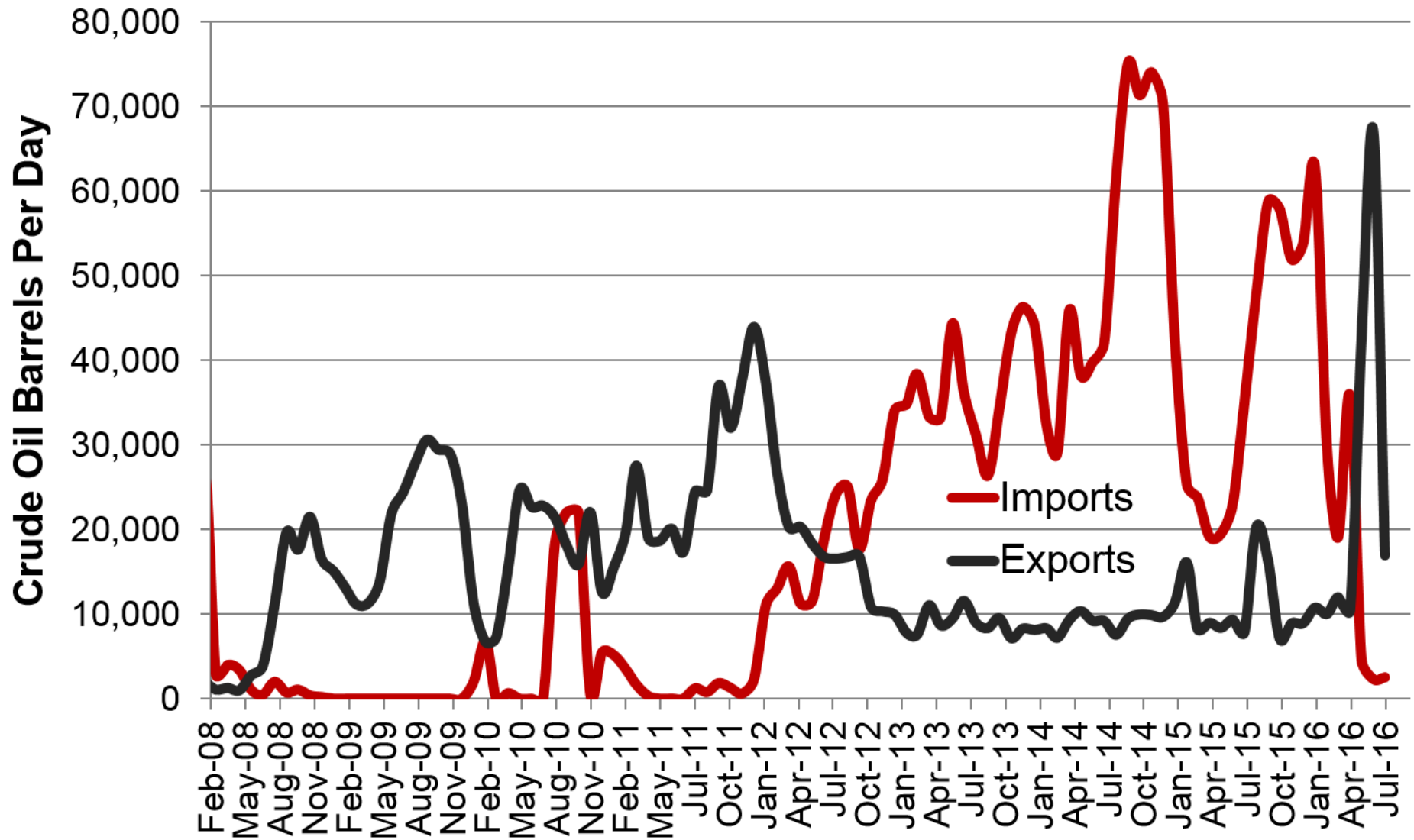
Major Rail Lines and Refineries



Crude Oil Prices – Dec 12, 2016



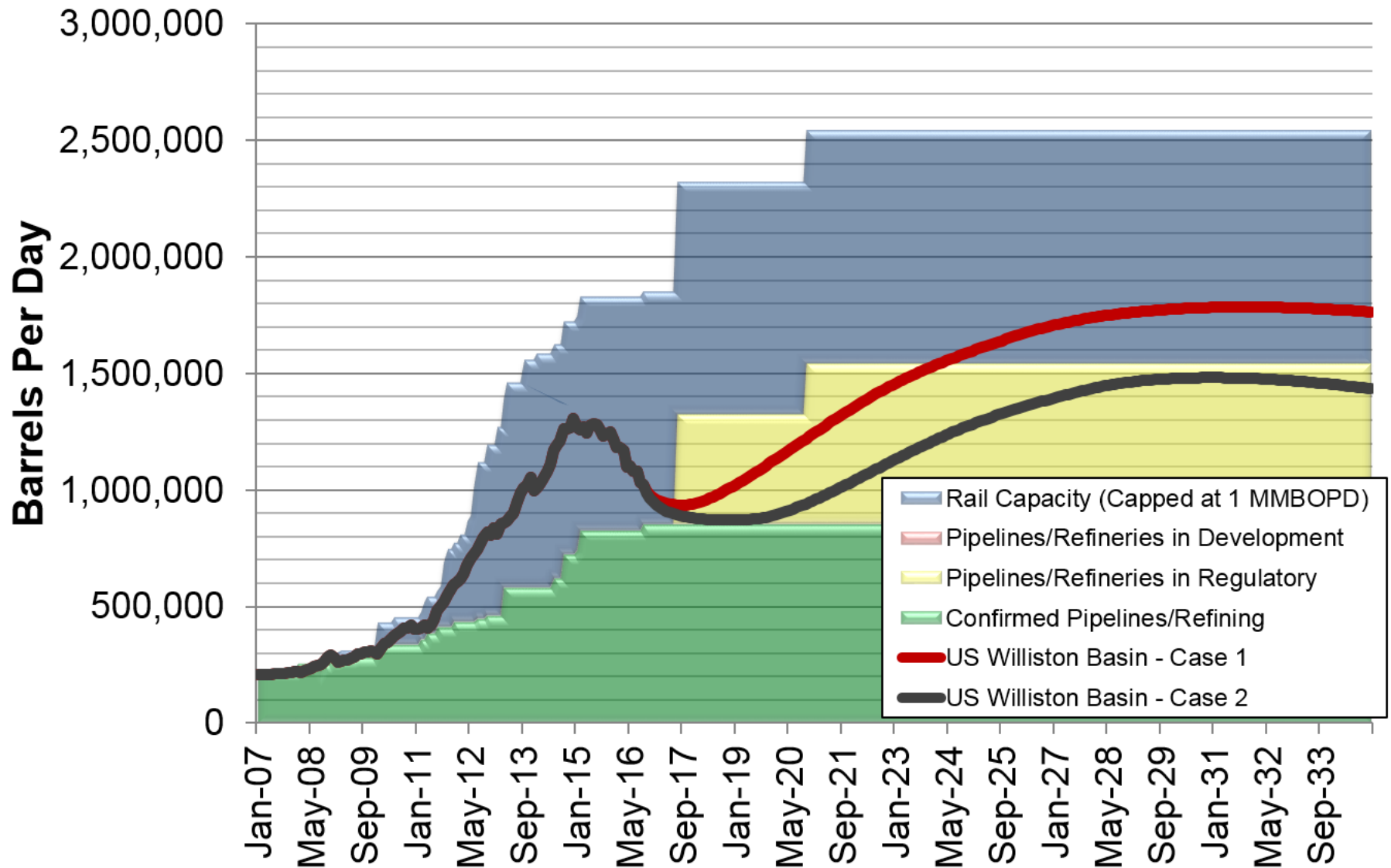
Williston Basin Truck Imports and Exports with Canada



Data for truck imports/exports chart is provided by the US International Trade Commission



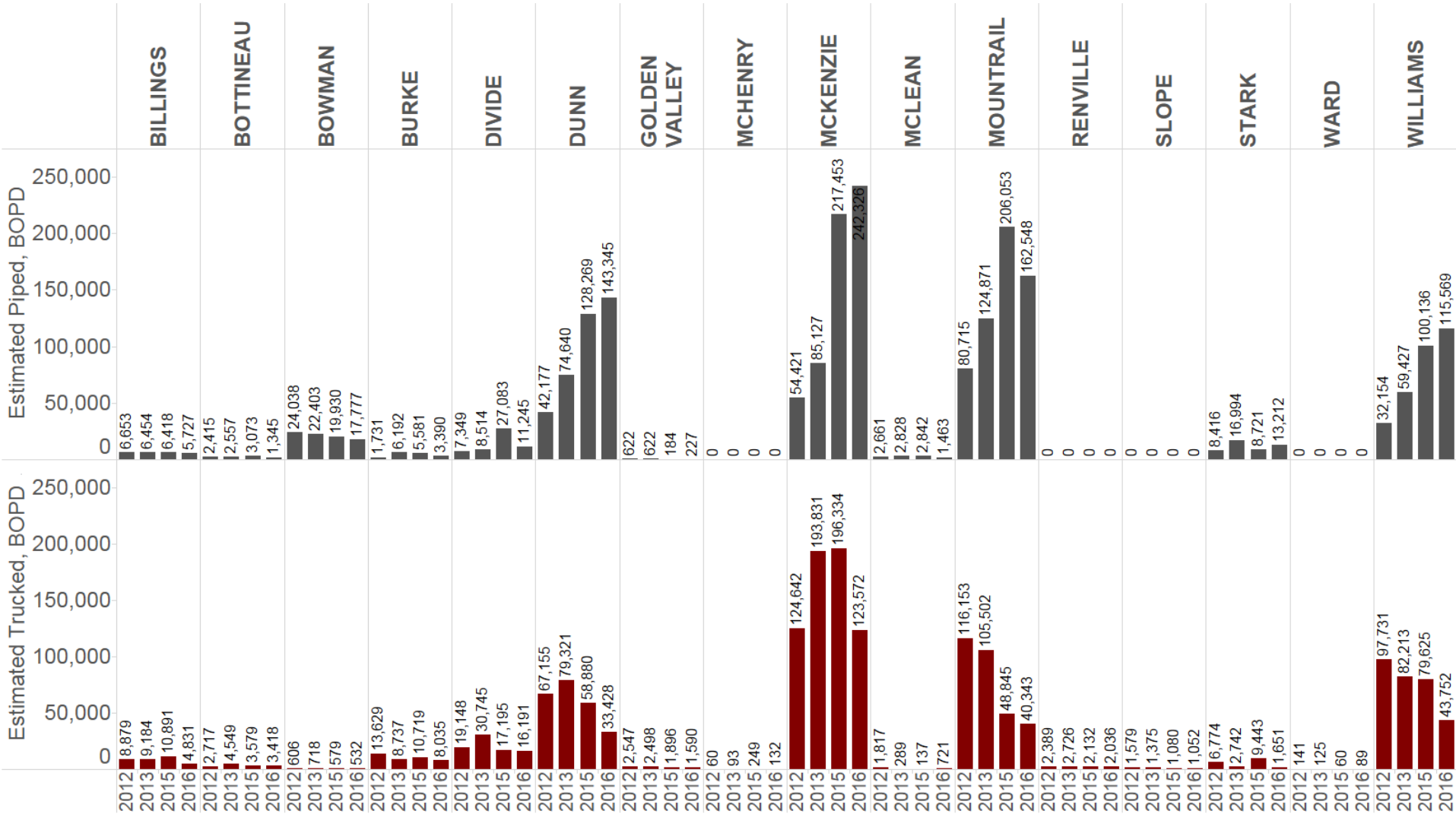
Williston Basin Oil Production & Export Capacity, BOPD



Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.

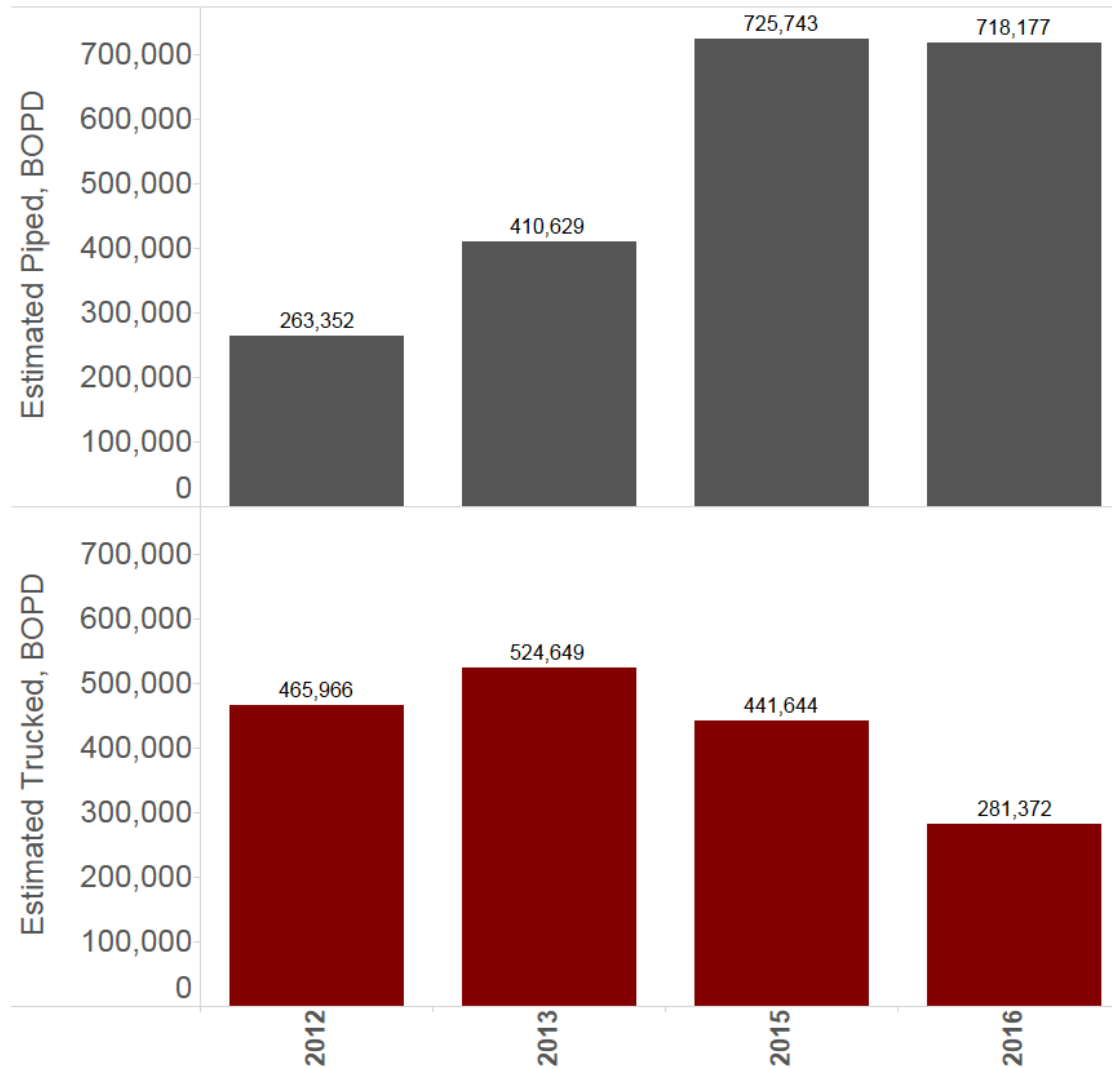


Evolution of Oil Gathering in ND

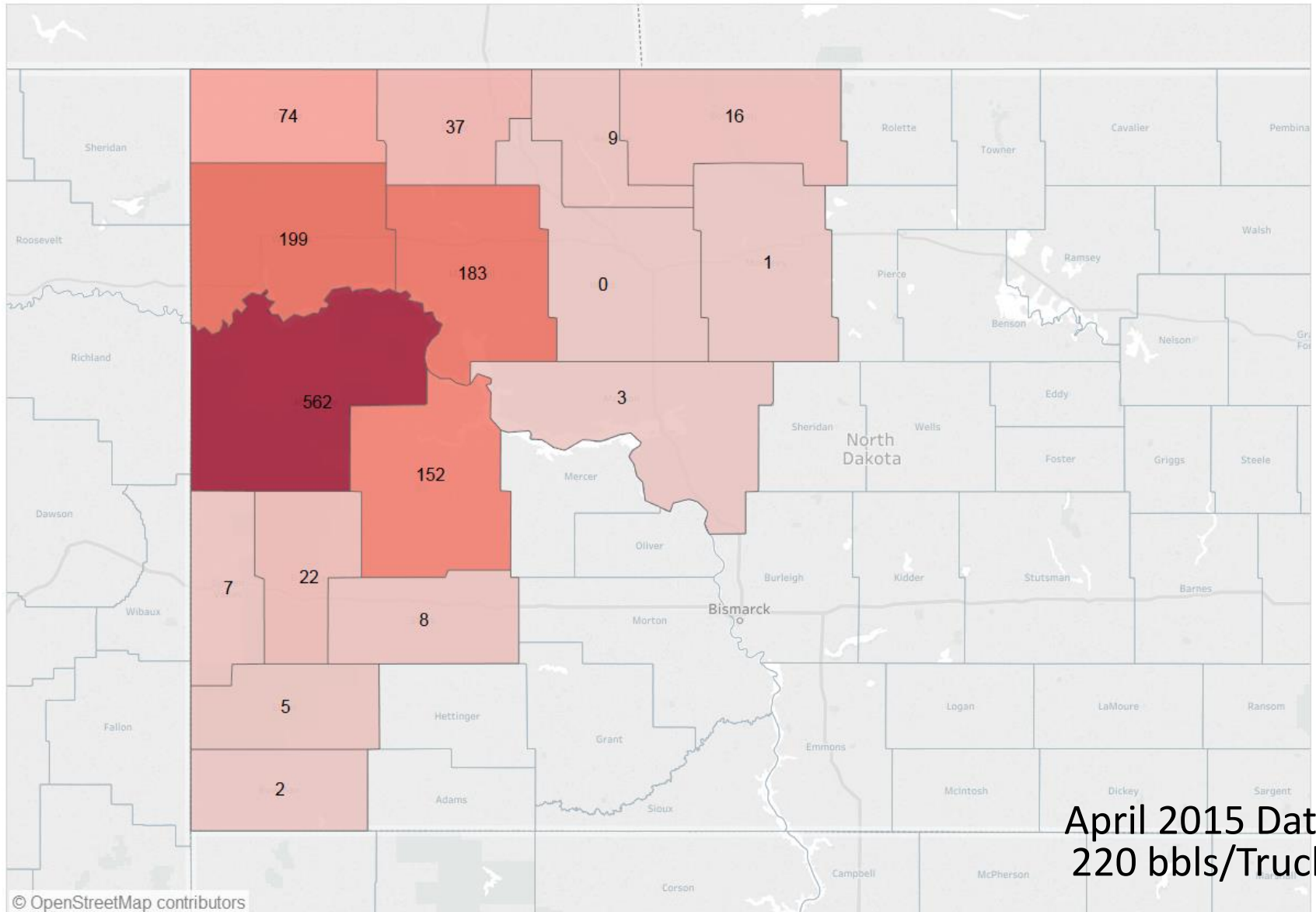


Evolution of Oil Gathering in ND

Statewide Totals



Estimated Loaded Oil Truckloads Per Day



April 2015 Data
220 bbls/Truck

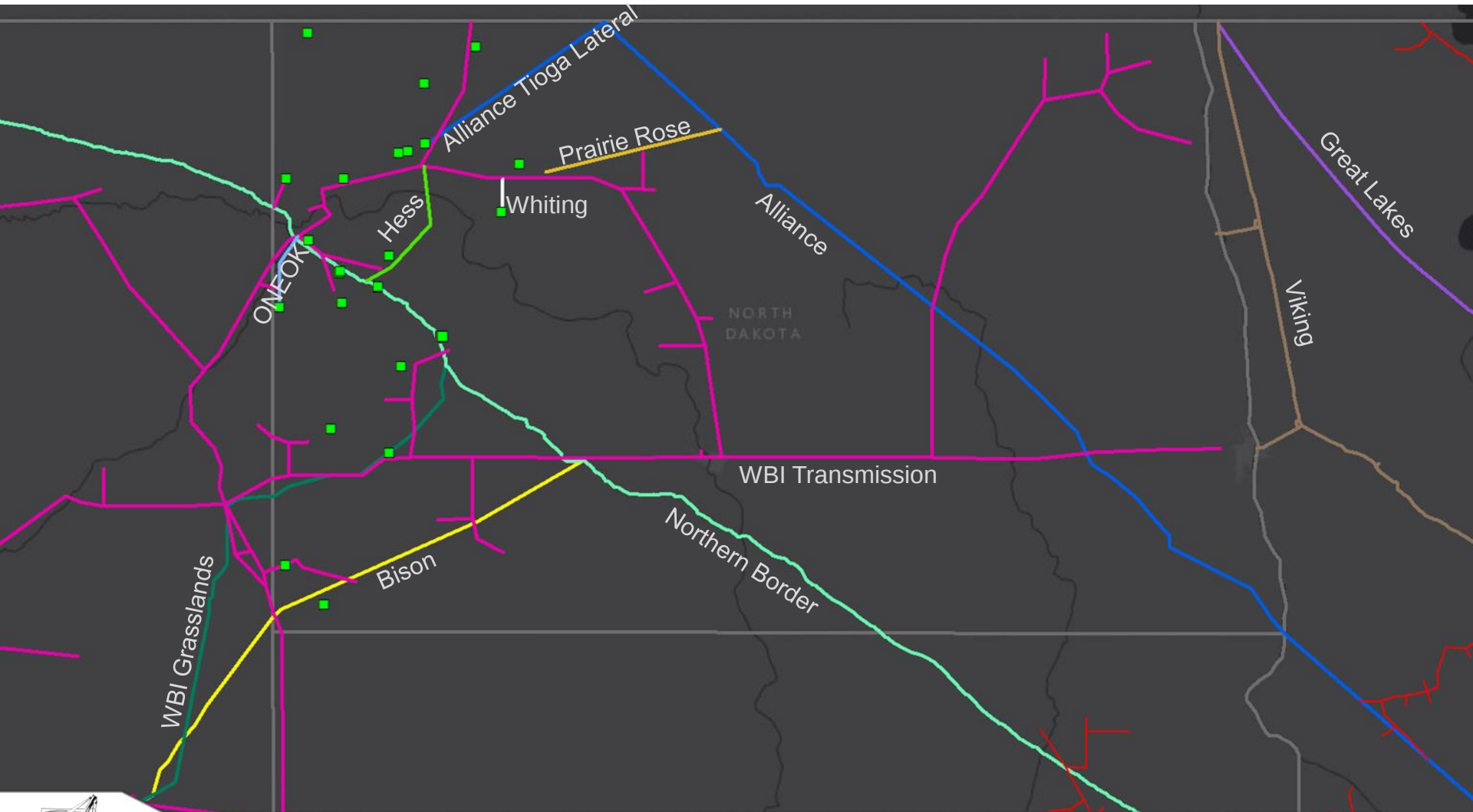


Presentation Outline

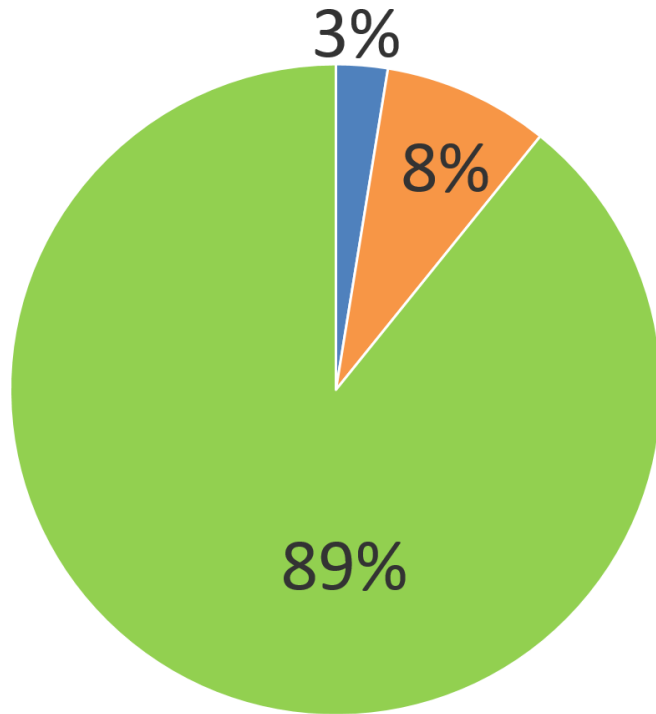
- Understanding current and future oil production
 - Activity
 - Drilling economics
 - Forecasts
- Williston Basin oil transportation dynamics
 - Interstate oil movements
 - Intrastate oil movements
- North Dakota natural gas production
 - Flaring and gas capture
 - Natural Gas Liquids



Major Gas Pipeline and Processing Infrastructure



Solving the Flaring Challenge



Statewide

GREEN – % of gas captured and sold
Blue – % flared from zero sales wells
Orange – % flared from wells with at least one mcf sold.

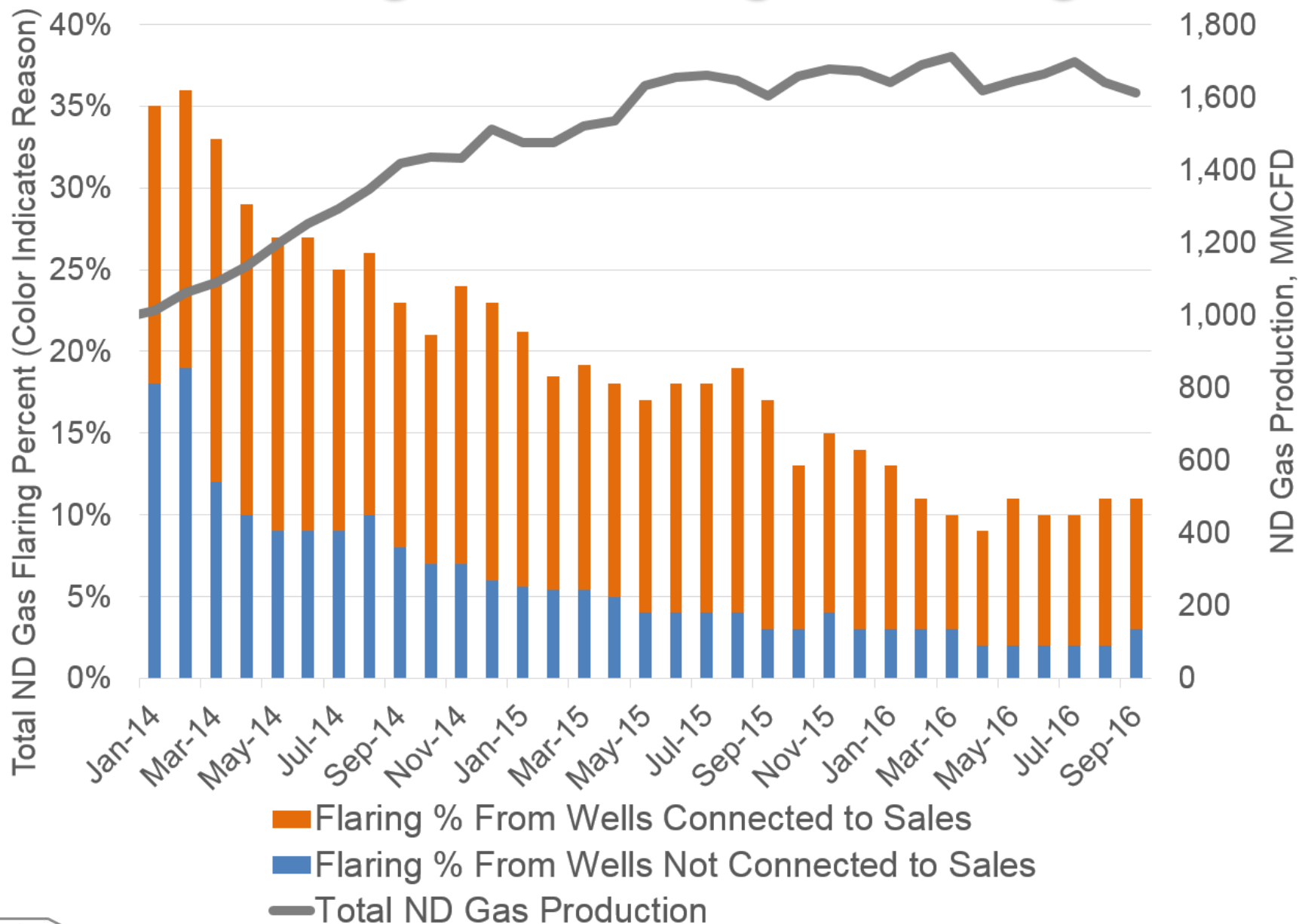
Simple Terms

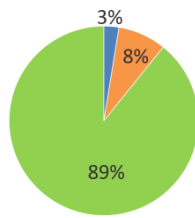
Blue – Lack of pipelines
Orange – Challenges on existing infrastructure

Sep 2016 Data – Non-Confidential Wells

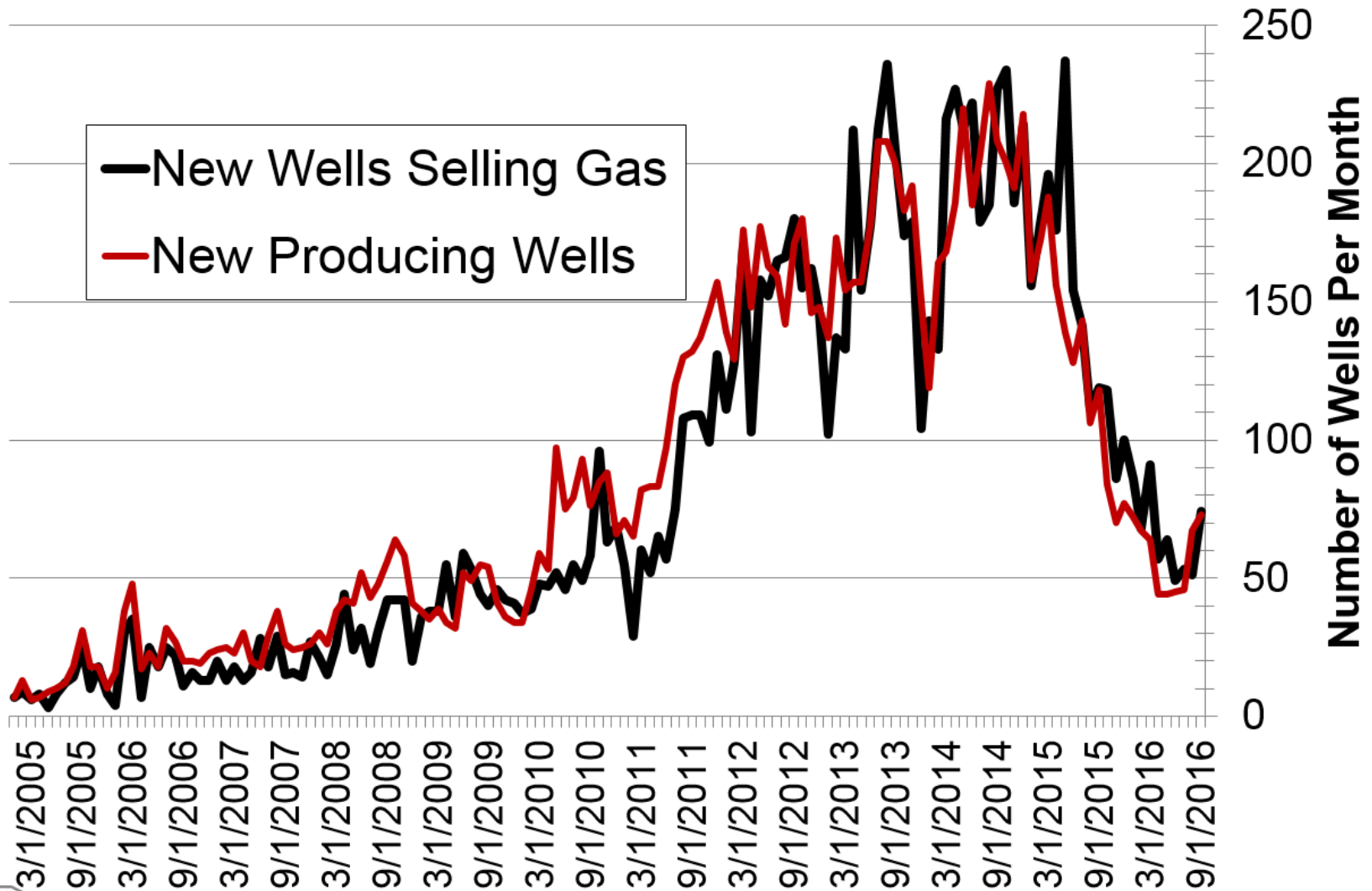


Solving the Flaring Challenge

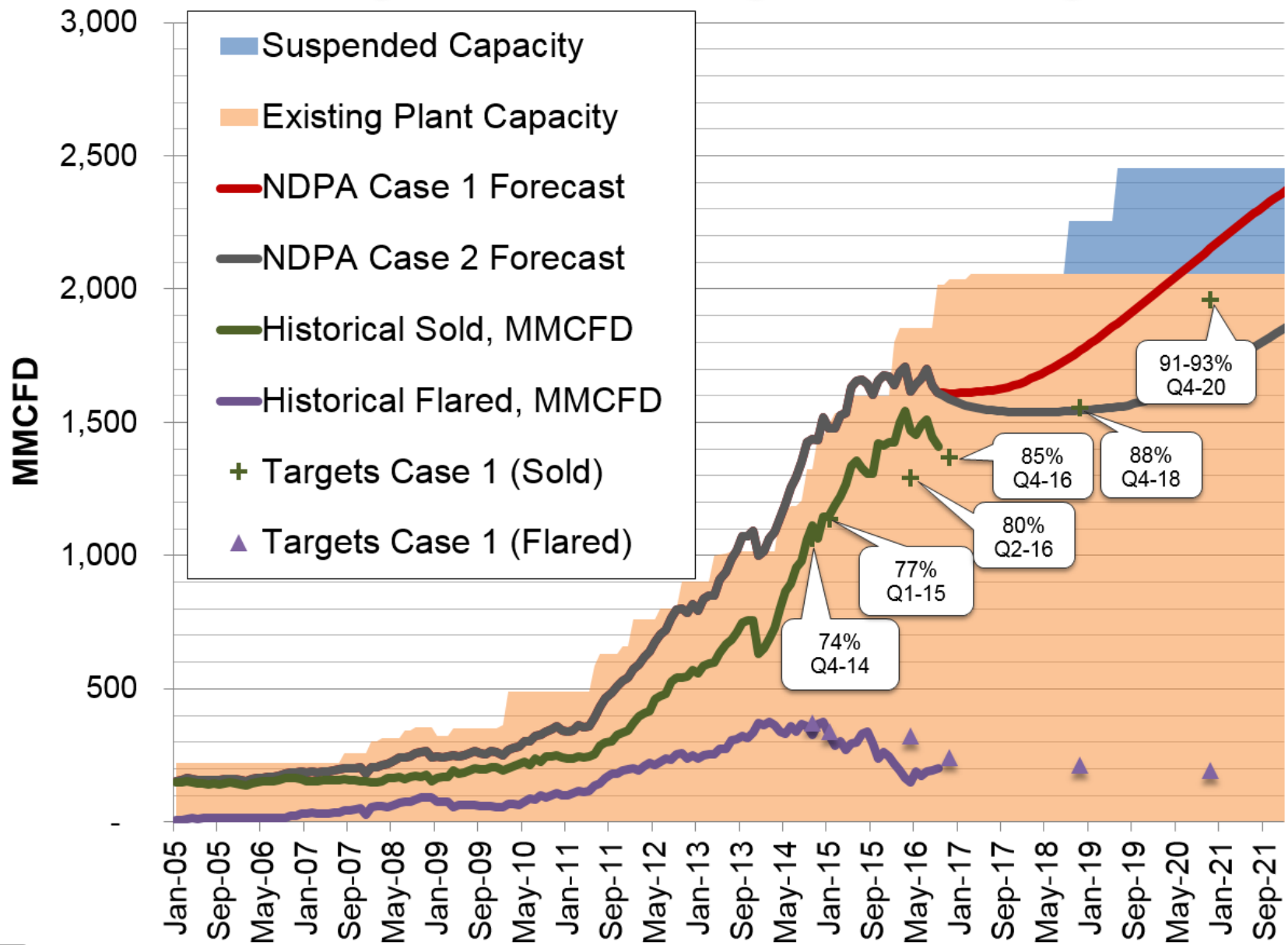




Capturing the 3% Faster Well Connections

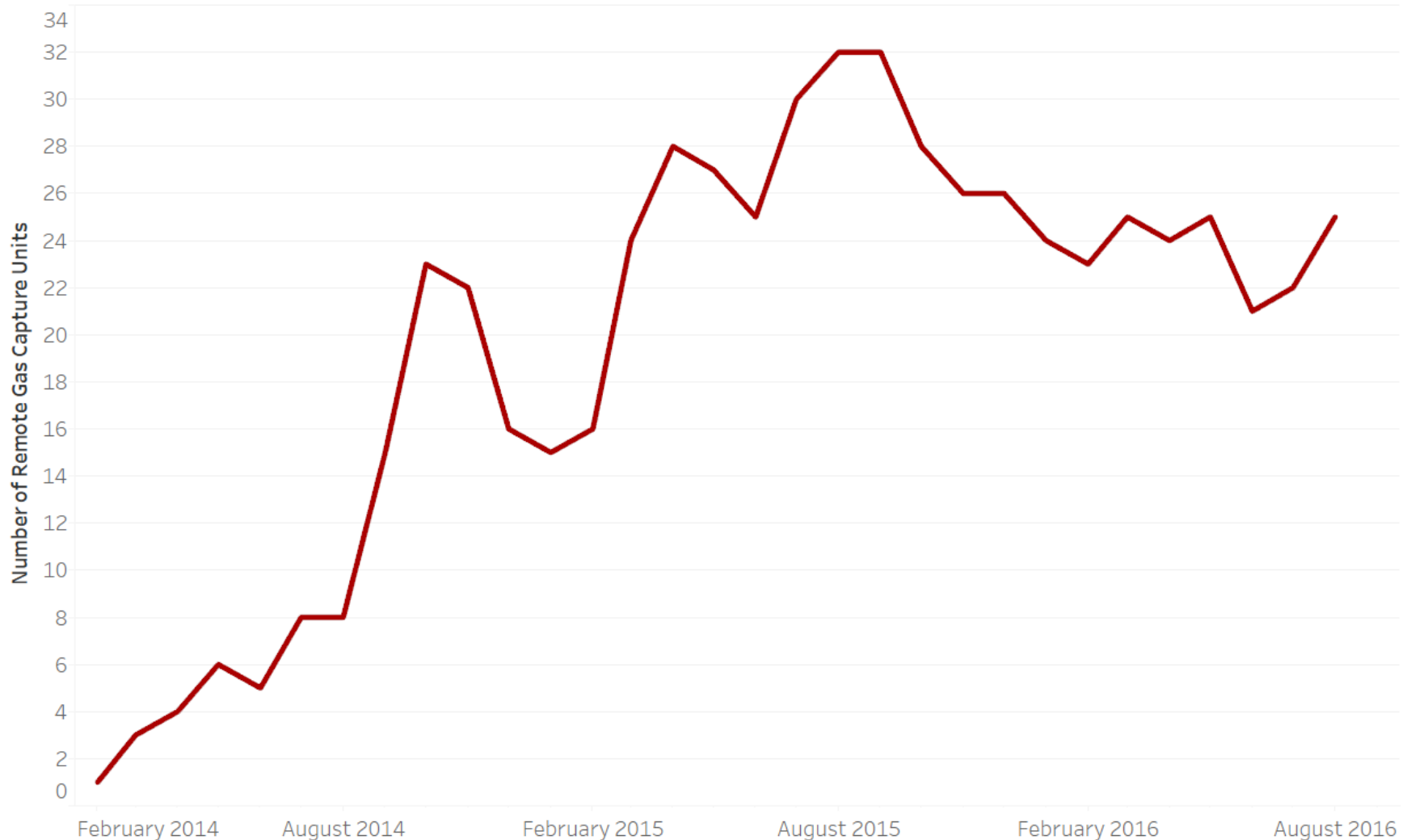


Solving the Flaring Challenge



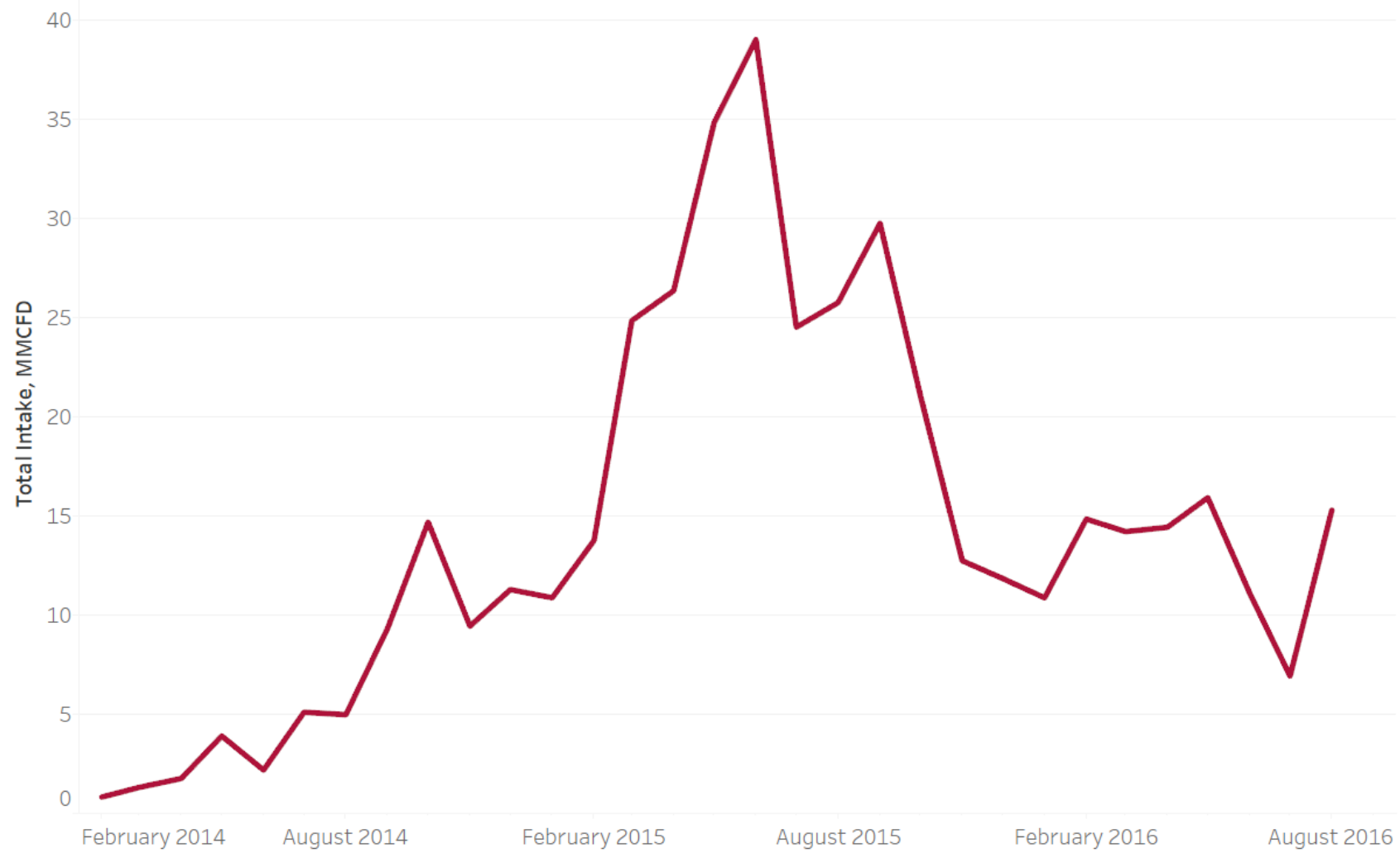
Wellhead Gas Capture – Locations

Number of Remote Gas Capture Units Reporting



Wellhead Gas Capture – Intake Volume

Remote Gas Capture Intake Volumes

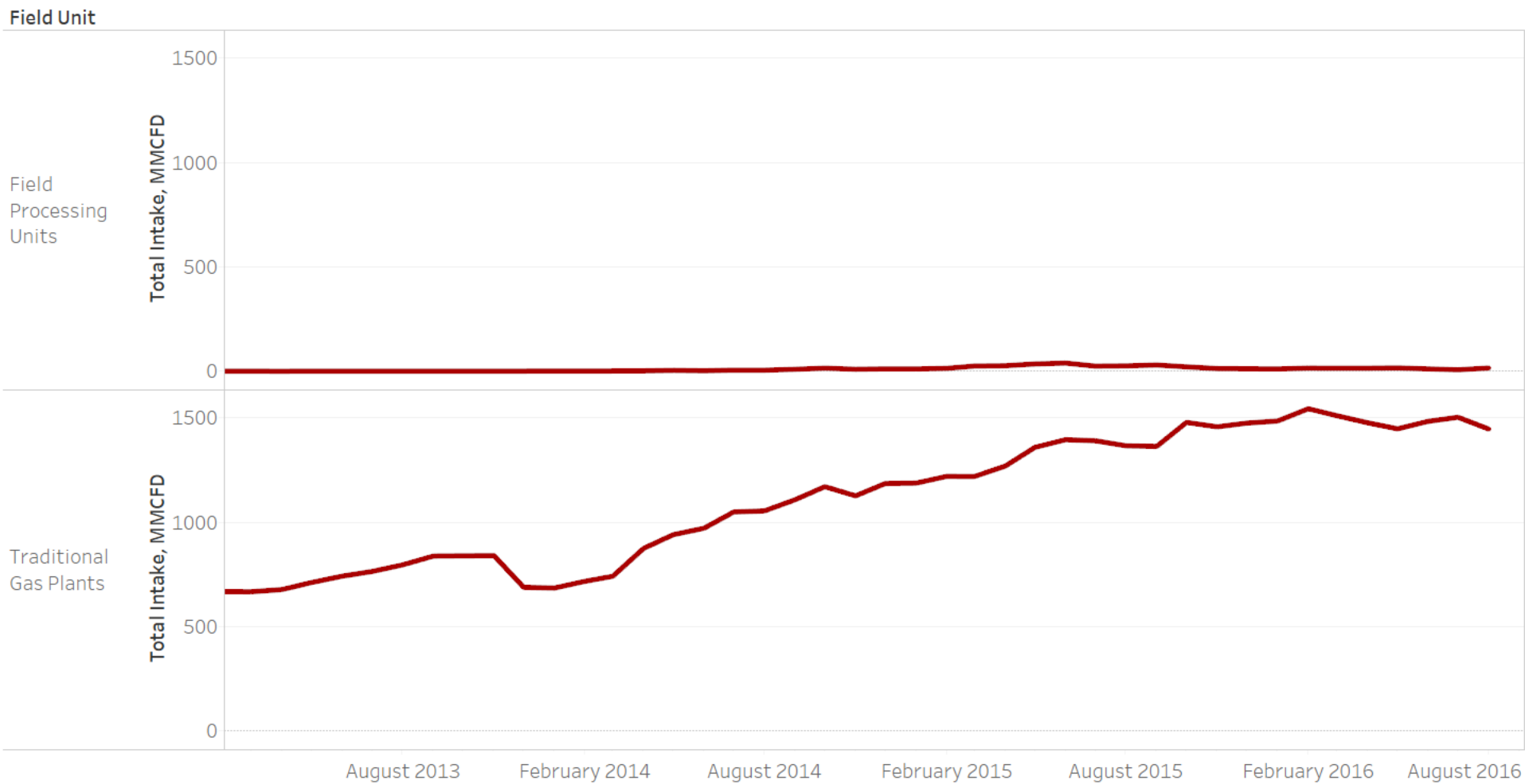


Wellhead Gas Capture – NGL Output

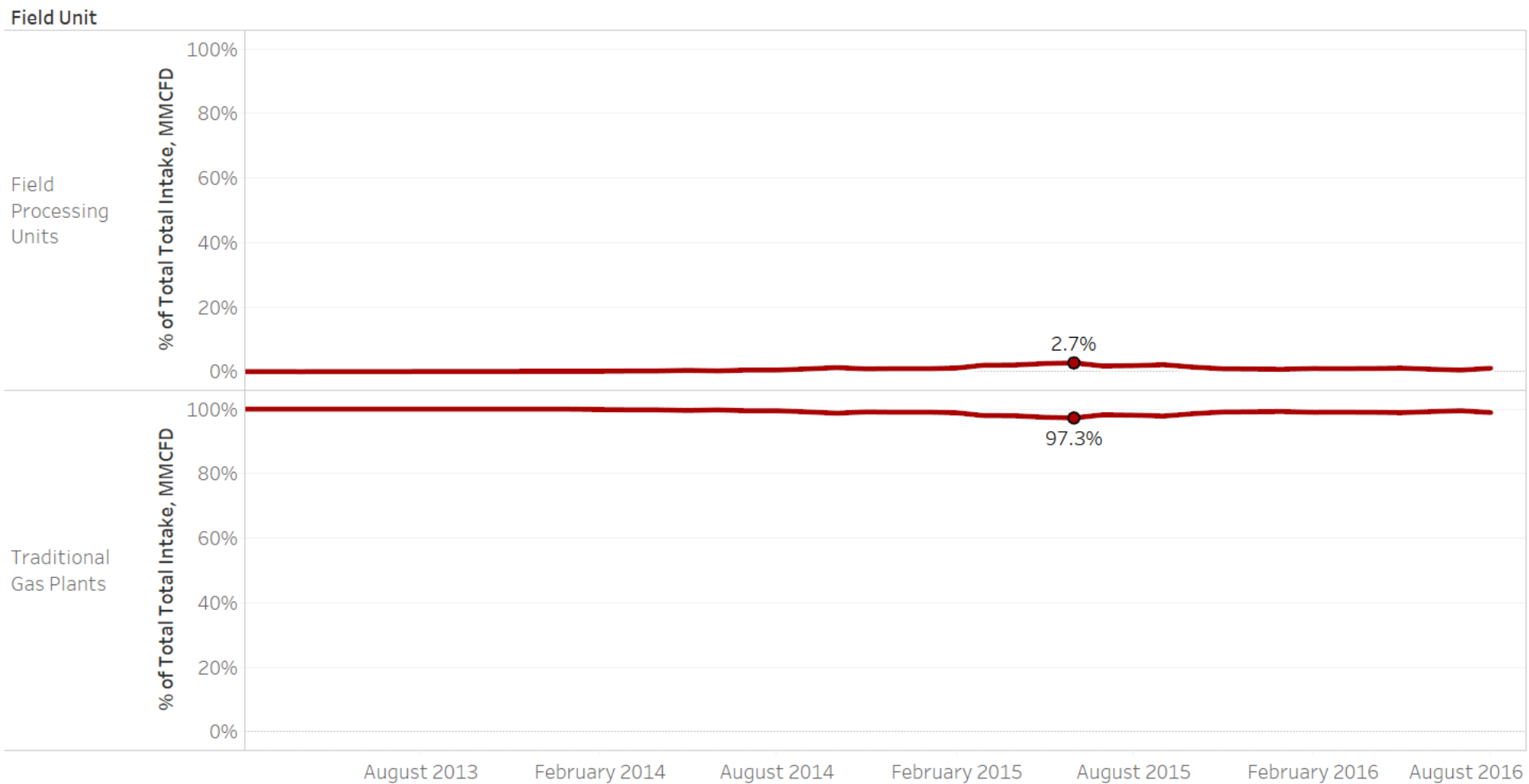
Remote Gas Capture NGL Output



Wellhead & Plant Gas Capture

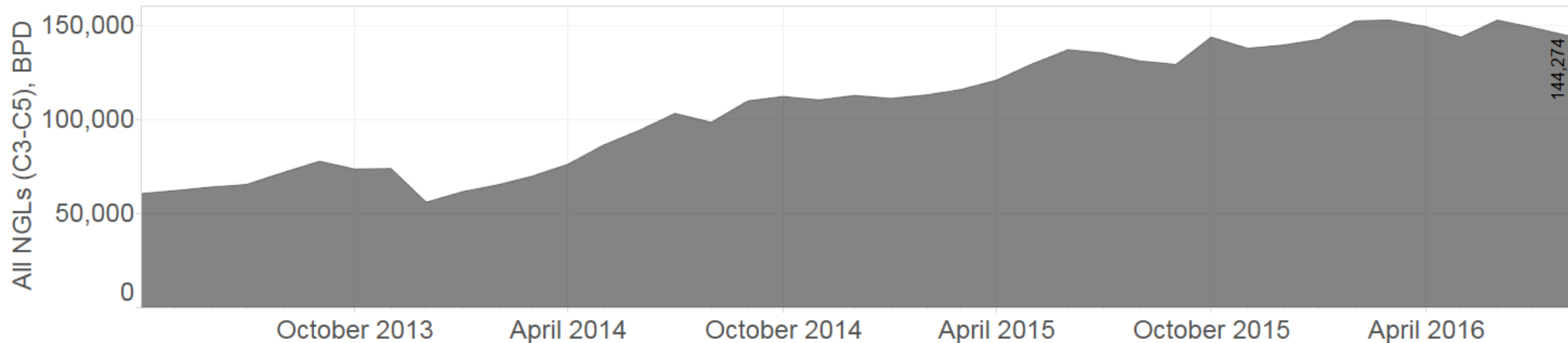


Wellhead & Plant Gas Capture

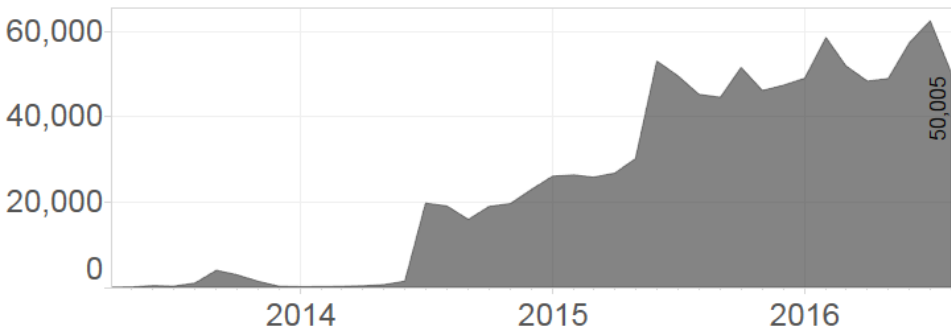


Plant Natural Gas Liquids - (Aug. 2016)

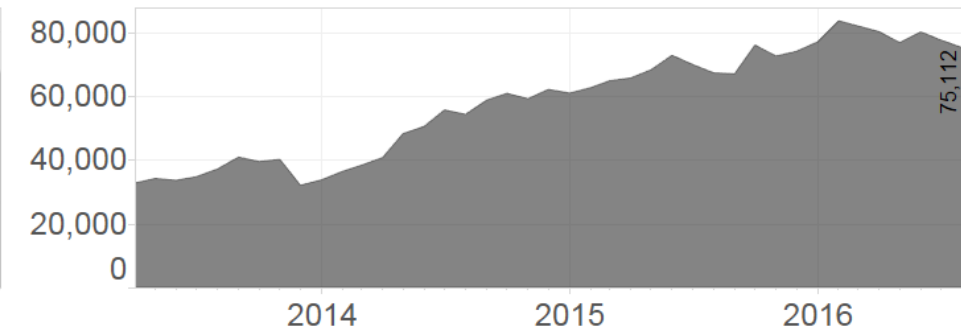
All NGLs, BPD



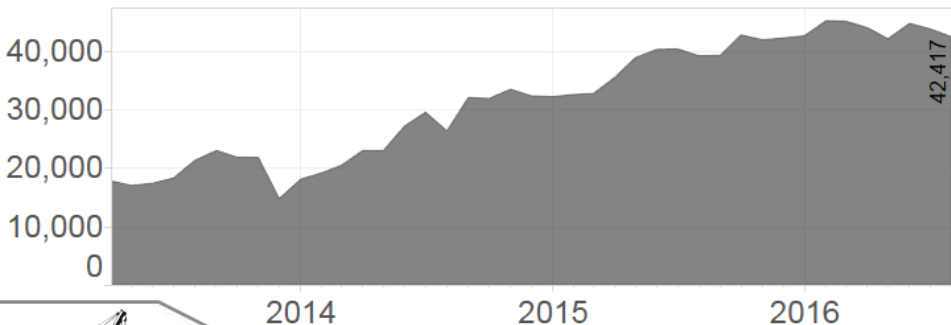
Ethane, BPD



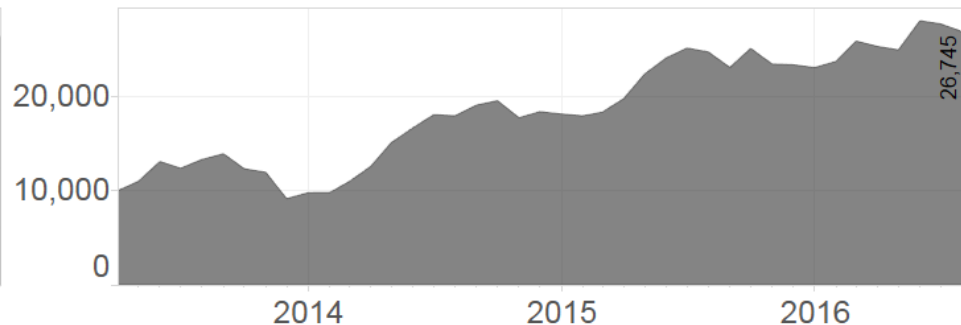
Propane, BPD



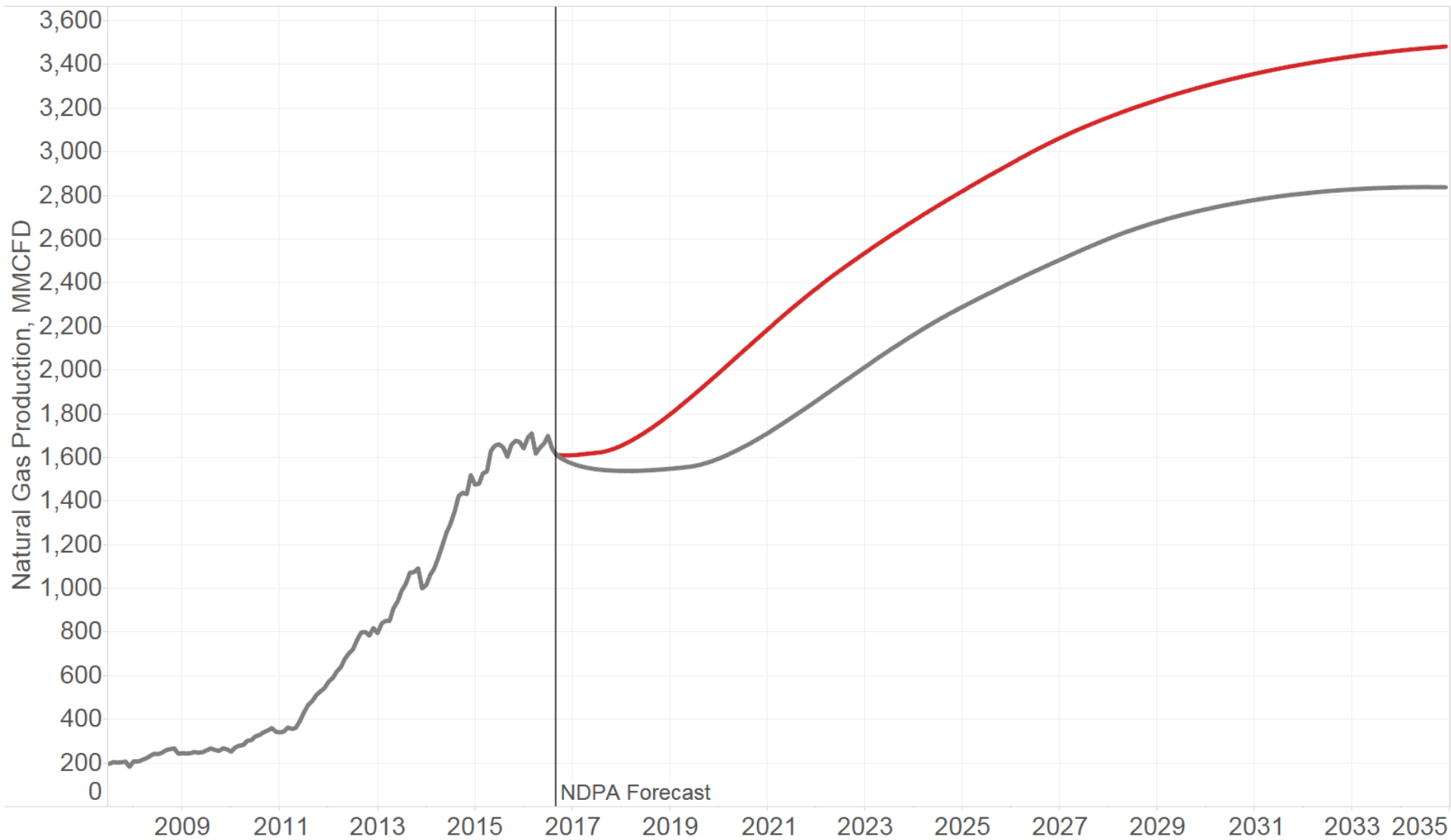
Butane, BPD



Natural Gasoline, BPD



NDPA ND Gas Production Forecast



Contact Information

Justin J. Kringstad, Director
North Dakota Pipeline Authority

600 E. Boulevard Ave. Dept. 405
Bismarck, ND 58505-0840

Phone: (701)220-6227

Fax: (701)328-2820

E-mail: jjkringstad@ndpipelines.com

Websites:

www.pipeline.nd.gov

www.northdakotapipelines.com



**Know what's below.
Call before you dig.**

