

American Petroleum Institute Dickinson Chapter

Justin J Kringstad

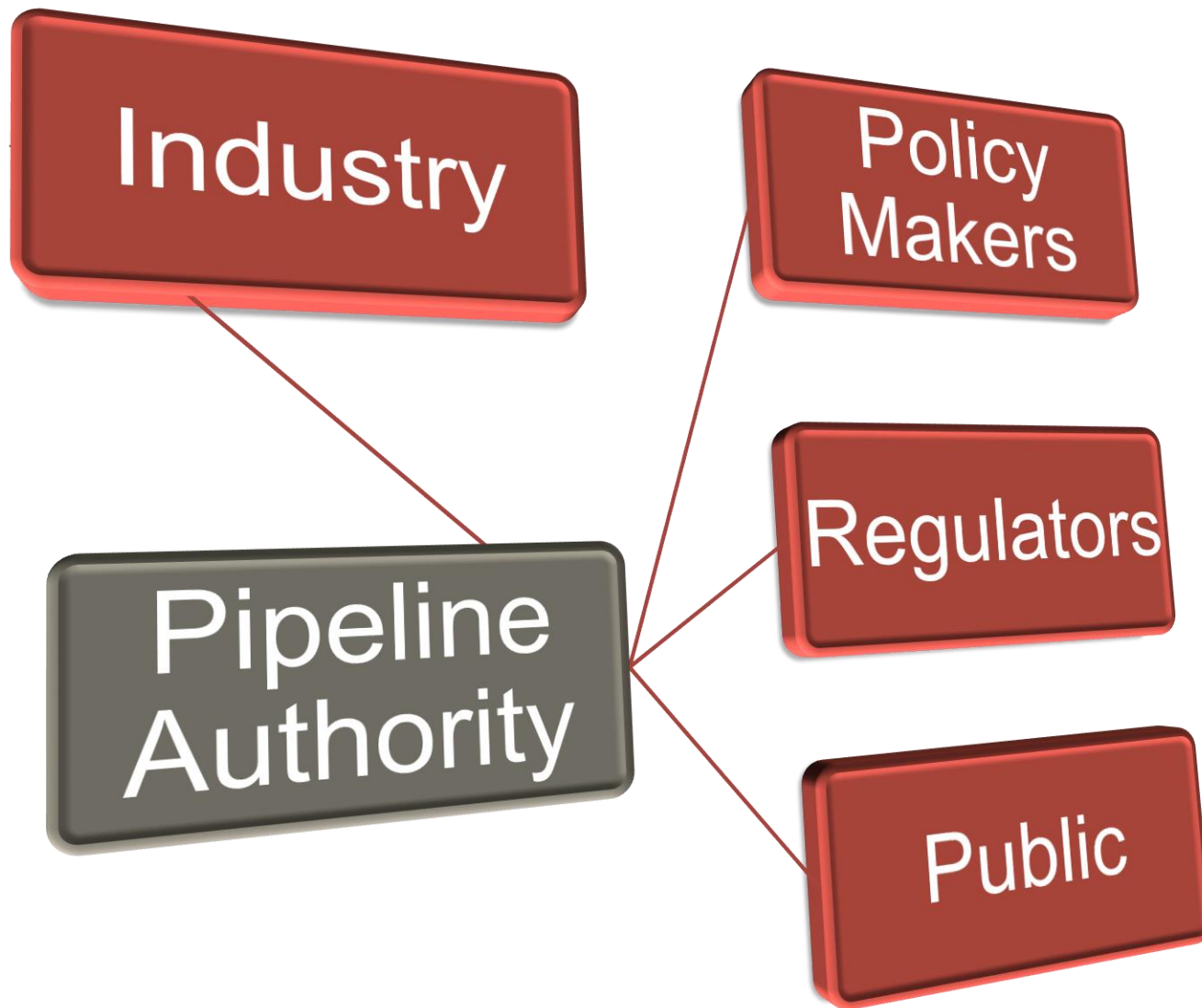
Geological Engineer

Director

North Dakota Pipeline Authority

February 27, 2018





Presentation Outline

- **Current oil transportation dynamics**
- Understanding current and future oil production
 - Pricing update
 - Activity
 - Oil forecasts
- North Dakota natural gas production
 - Flaring and gas capture
 - Natural gas liquids
- Pipeline construction update

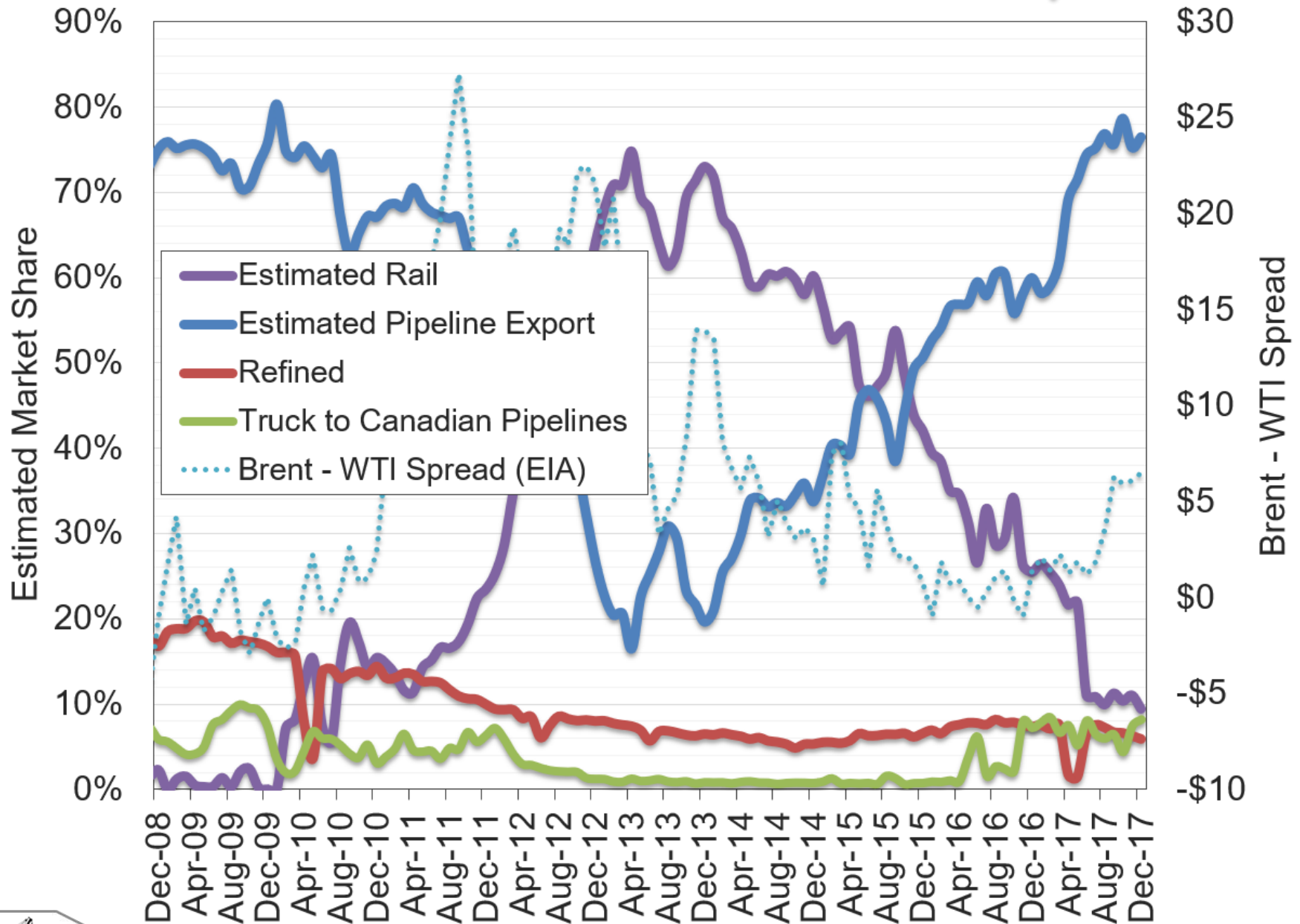


US Williston Basin Oil Production - 2017

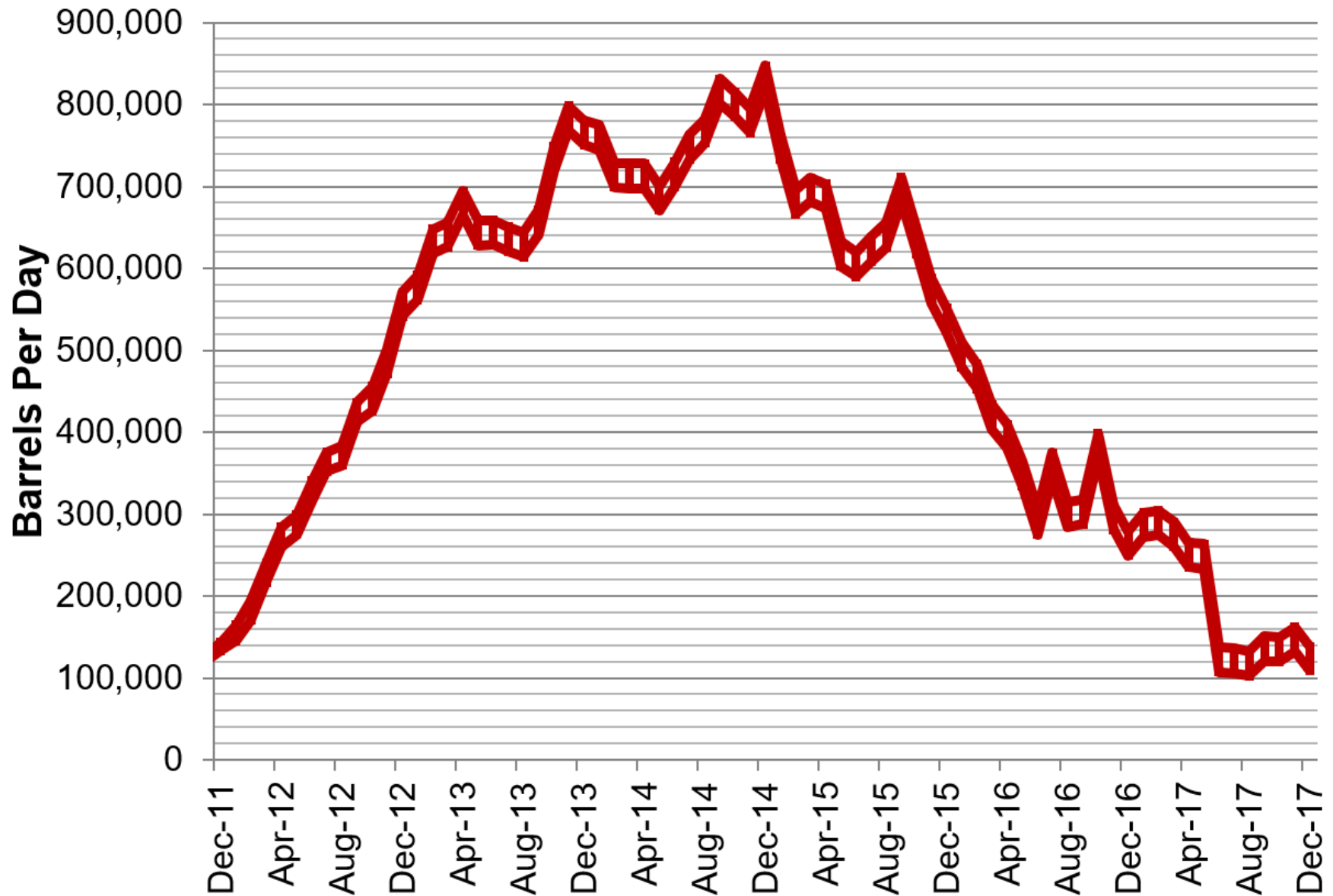
MONTH	ND	Eastern MT*	SD	TOTAL
January	983,826	52,727	3,553	1,040,106
February	1,034,177	53,959	3,718	1,091,854
March	1,025,839	52,901	3,705	1,082,444
April	1,050,837	52,437	3,768	1,107,041
May	1,040,659	52,980	3,389	1,097,028
June	1,032,942	52,947	3,563	1,089,451
July	1,048,570	51,767	3,529	1,103,866
August	1,089,277	51,090	3,565	1,143,932
September	1,107,464	51,240	3,568	1,162,272
October	1,183,810	49,460	3,616	1,236,885
November	1,196,976	48,746	3,449	1,249,170
December	1,181,319			



Estimated Williston Basin Oil Transportation



Estimated ND Rail Export Volumes

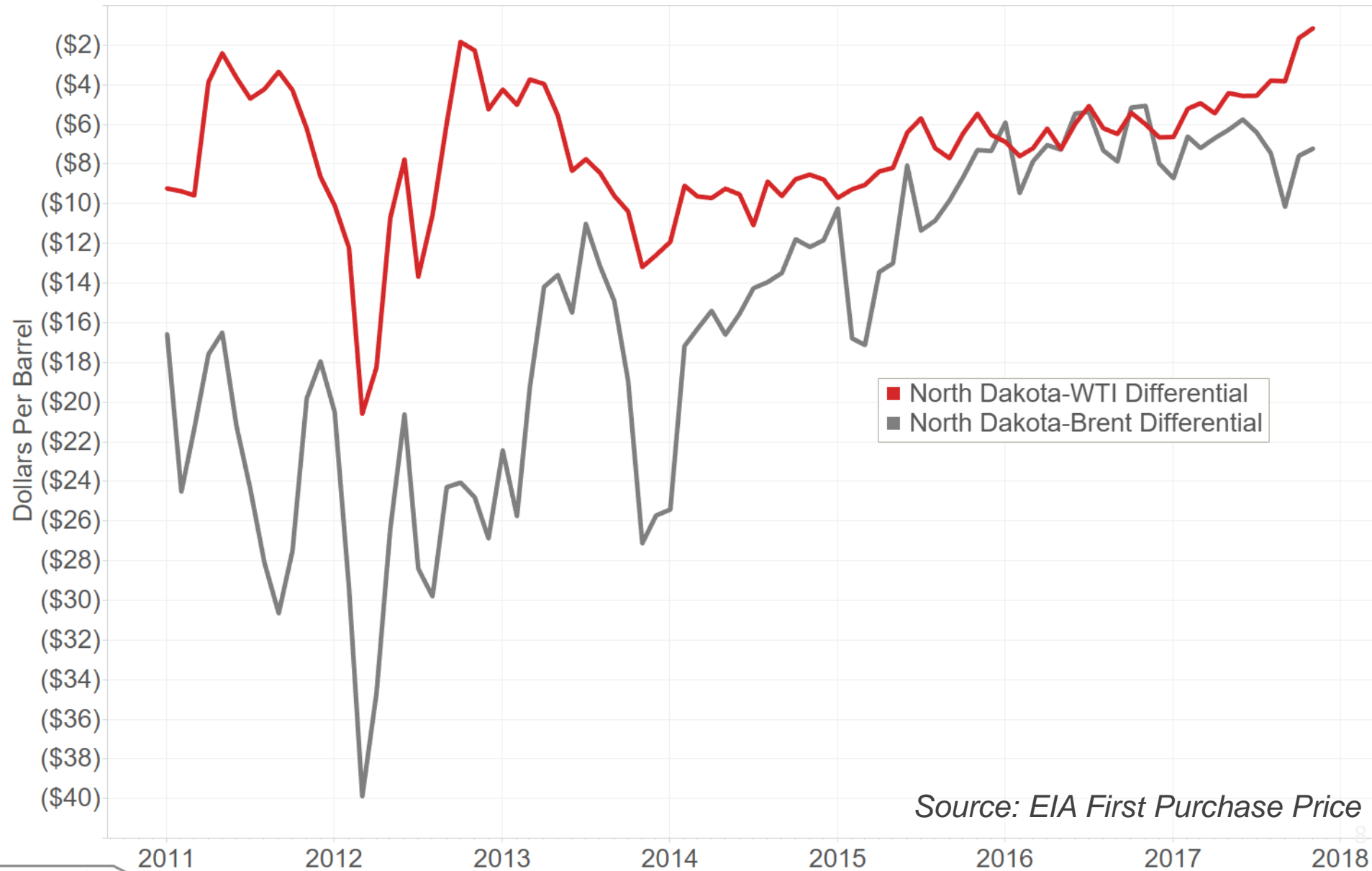


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North Dakota Oil Differential



Source: EIA First Purchase Price



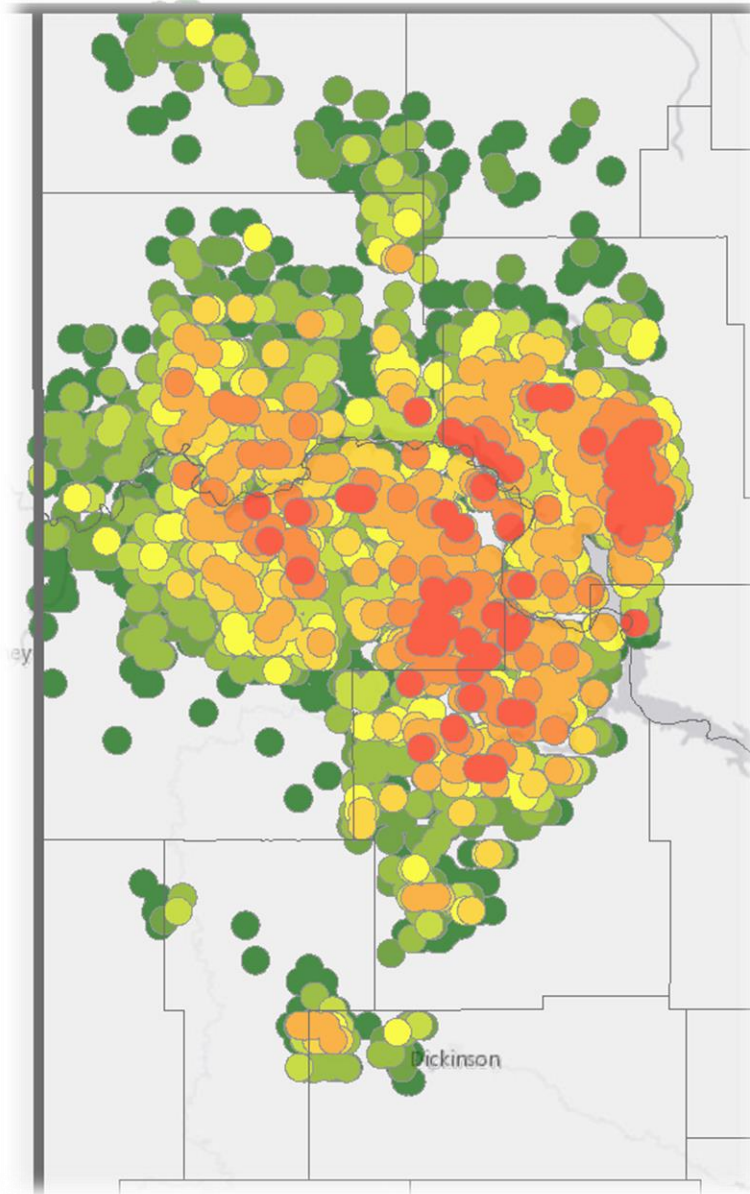
Bakken Breakeven Analysis

Important Considerations

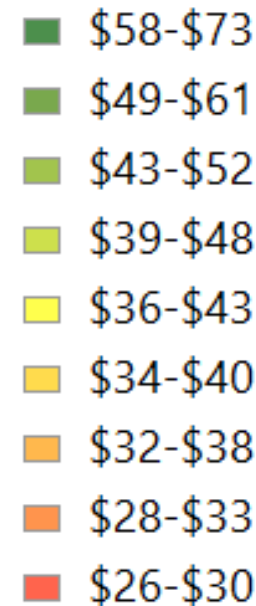
- Breakeven areas were determined by neighboring well performance and are expected to expand as new completion technology is applied in areas outside “the core.”
- Just because an area is considered “economic” **does not mean that it is the most economic** option for the industry participant(s). Competition for capital continues to exist inside and outside the region.



Bakken Breakeven Price Range (20% IRR)

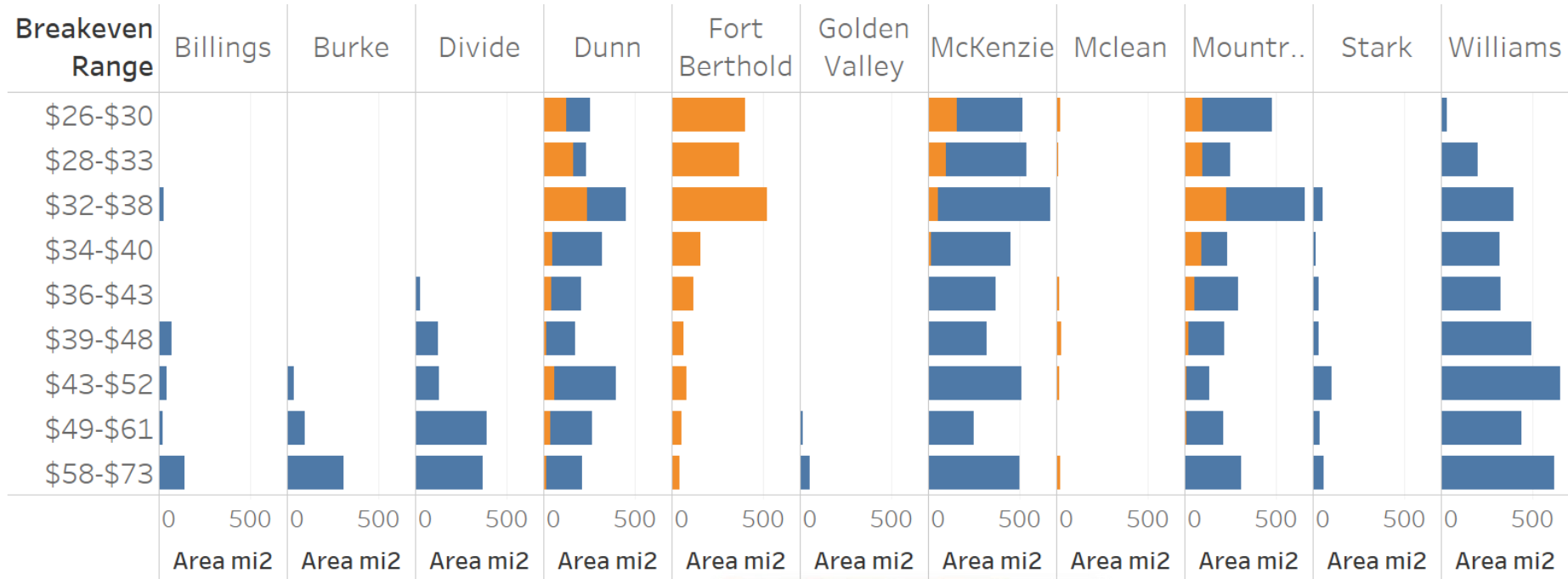


Bakken Breakeven Prices
\$6 - \$8 Million
Completed Wells Cost

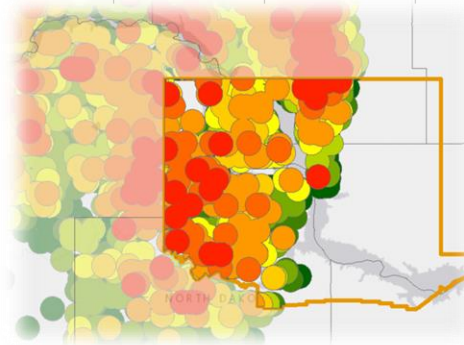


Bakken Breakeven Economics

County/Regional Analysis



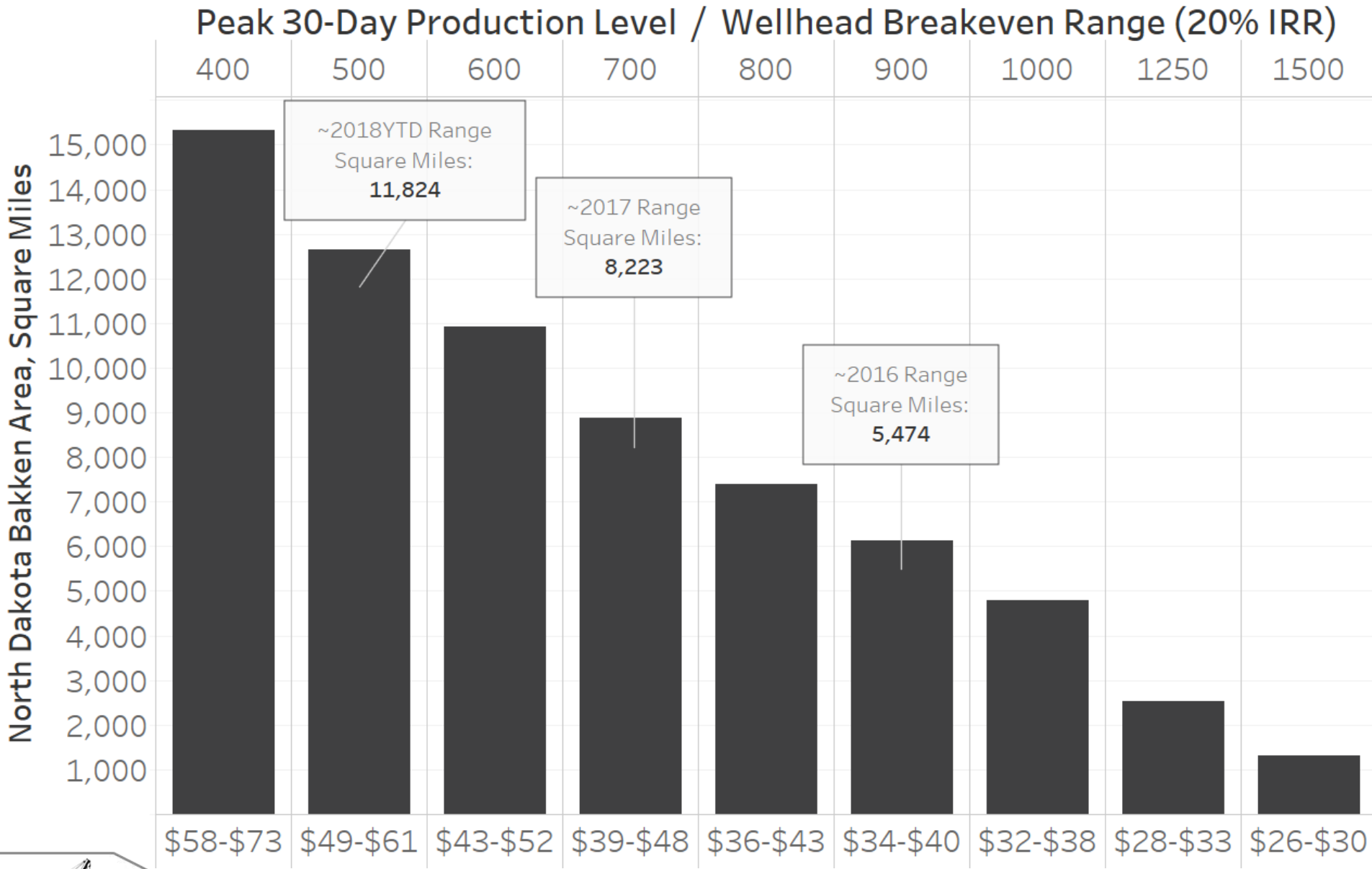
Ft. Berthold
 ■ Yes ■ No



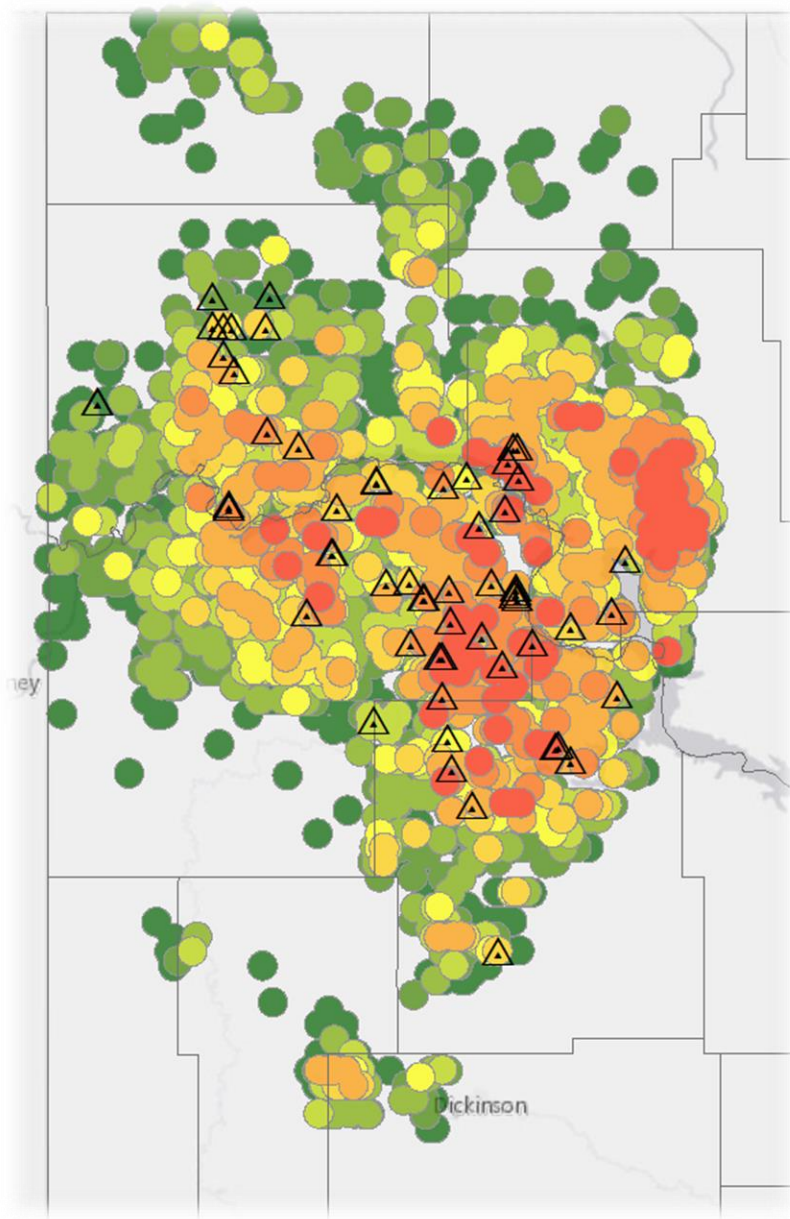
Breakeven Range Included: \$6mm, \$7mm, \$8mm Well Costs



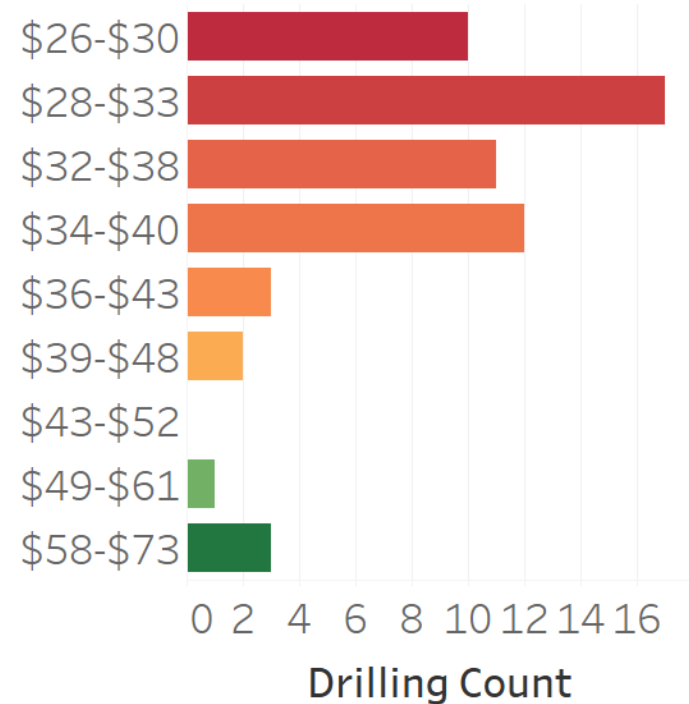
44% Economic Area Increase 2017 to 2018



Drilling Locations* – January 22, 2018



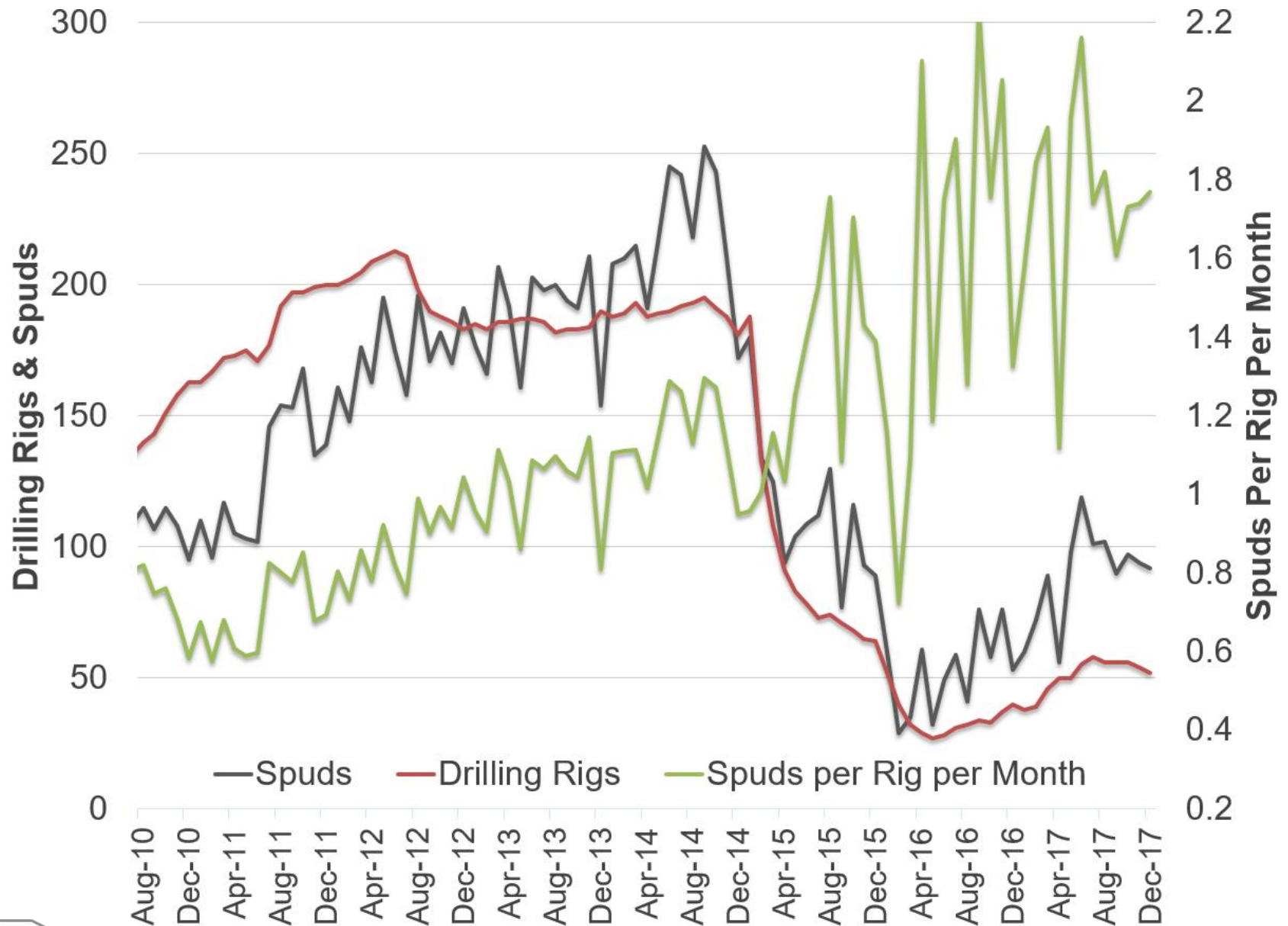
Bakken Breakeven Prices \$6 - \$8 Million



*Due to confidential status, the target production zone for many wells is unknown.



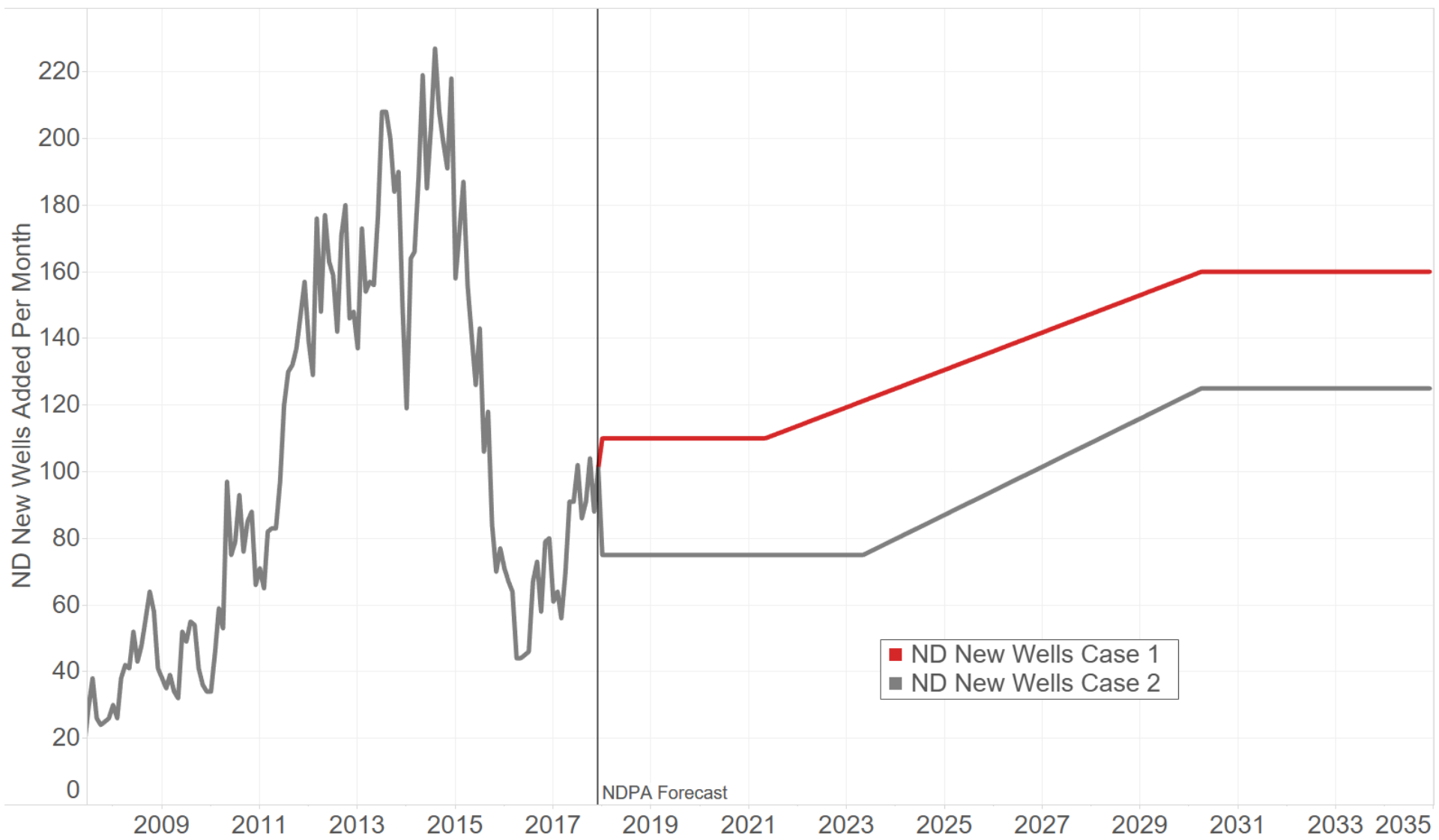
North Dakota Drilling Activity



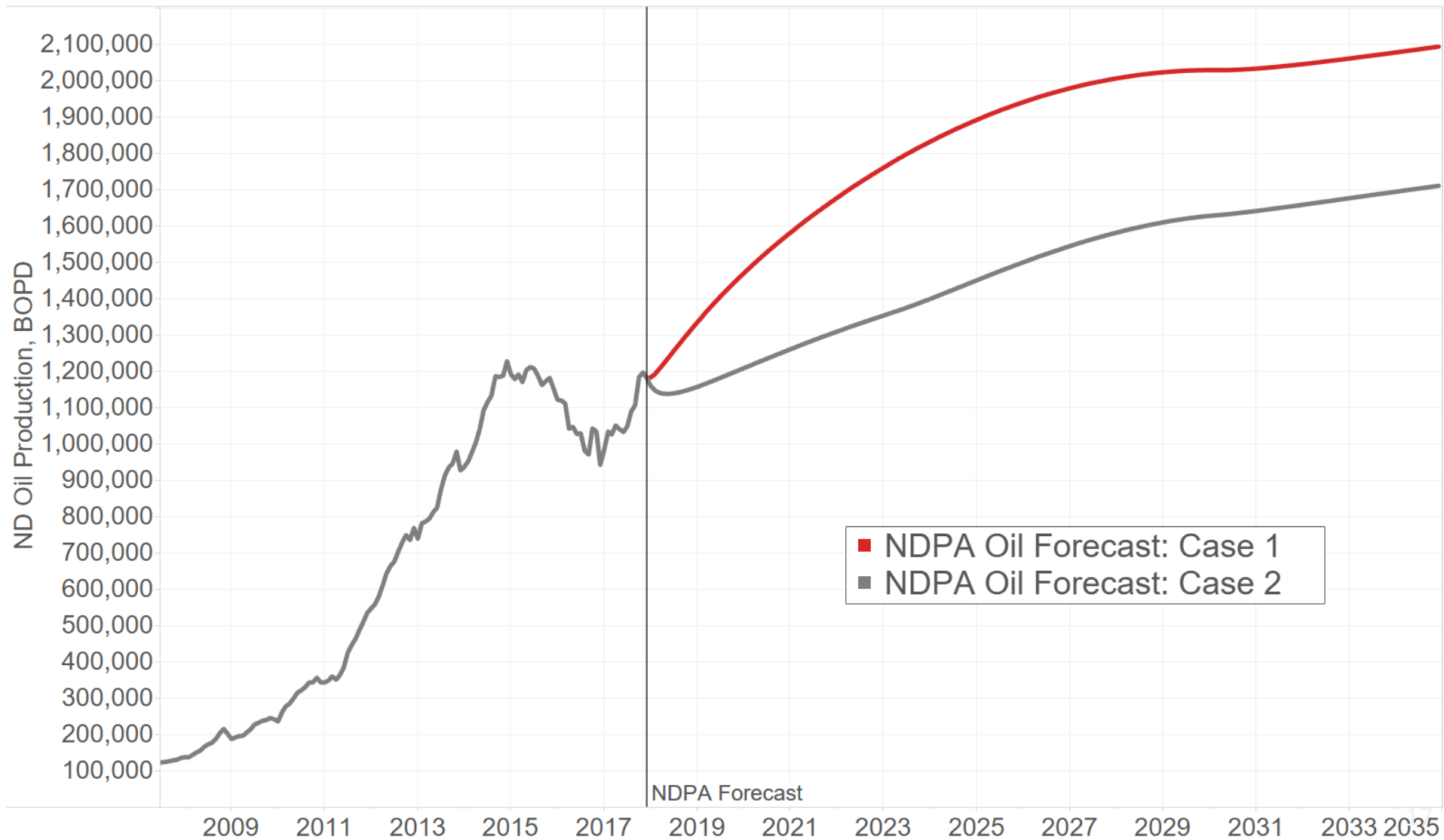
Forecasting Challenges: Activity vs. Price



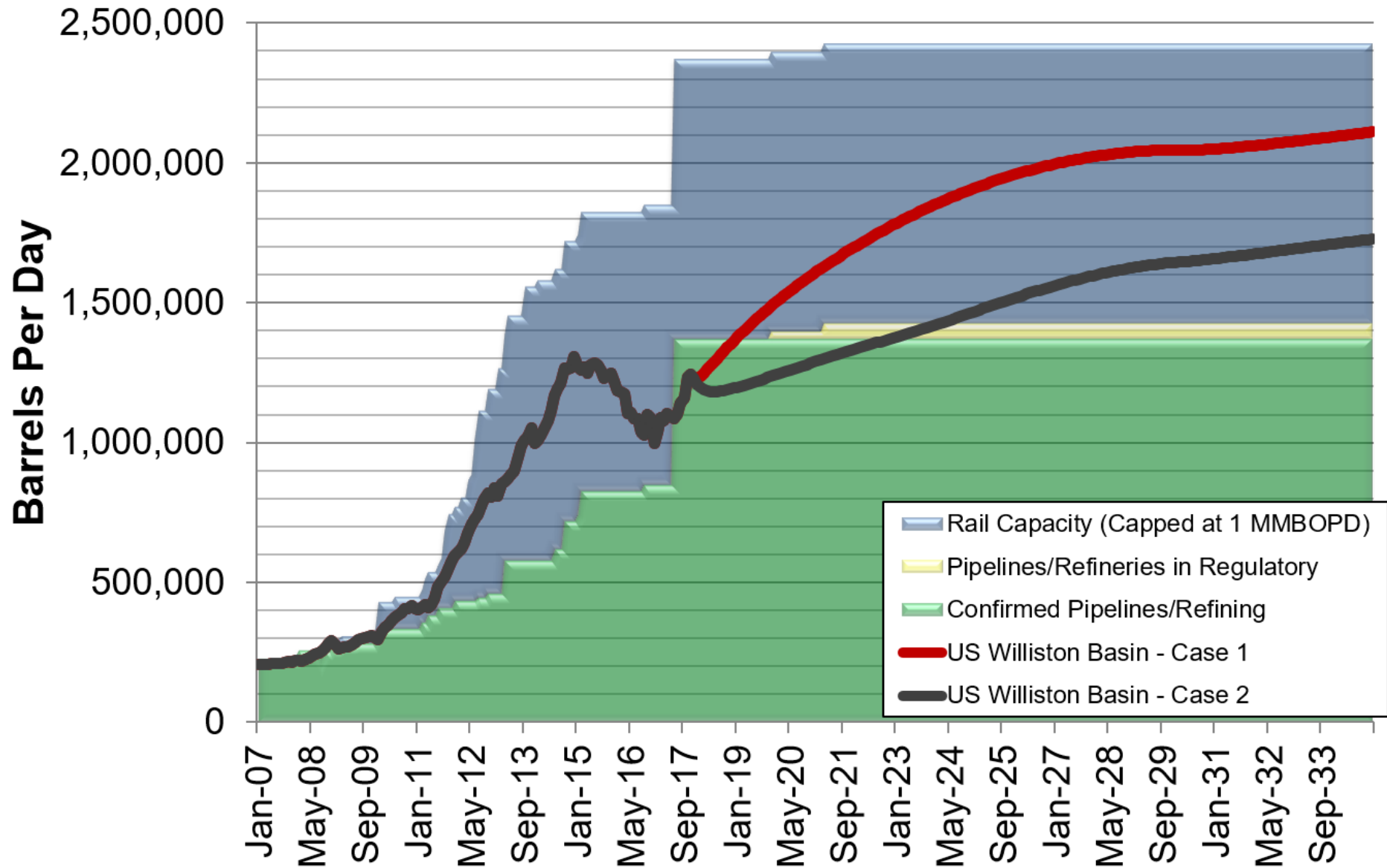
North Dakota Forecast Activity Assumptions



North Dakota Oil Production Forecast



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.

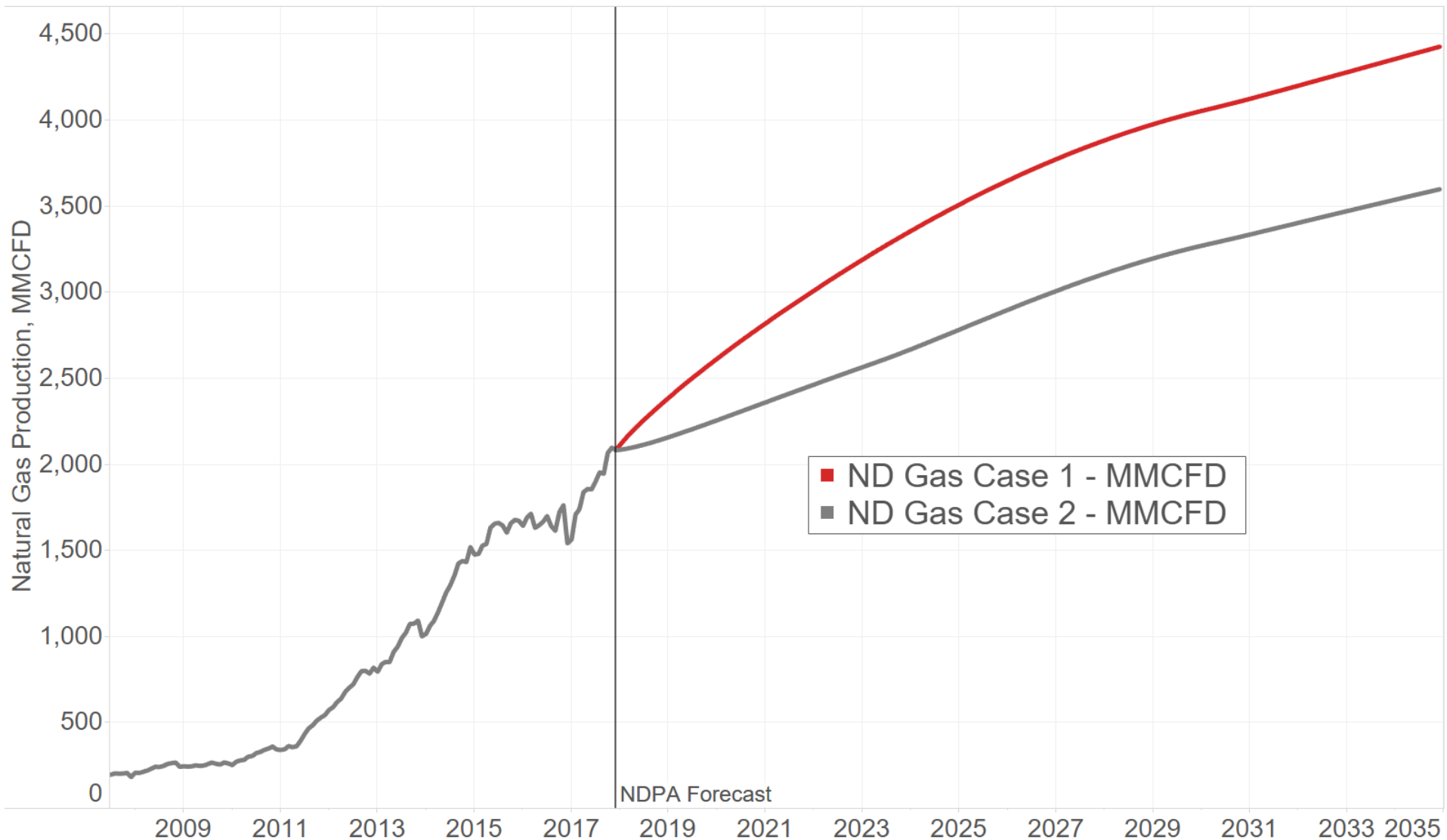


Presentation Outline

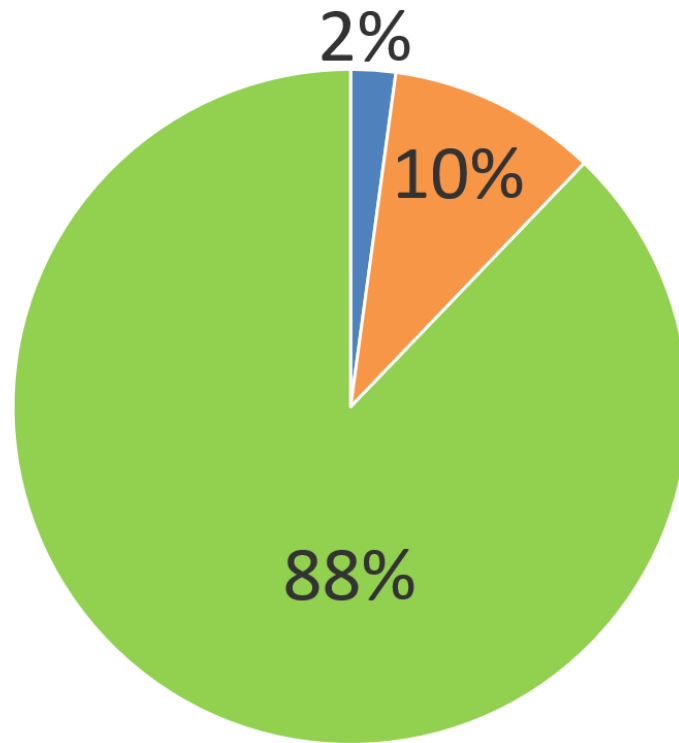
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- Pipeline construction update



NDPA ND Gas Production Forecast



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

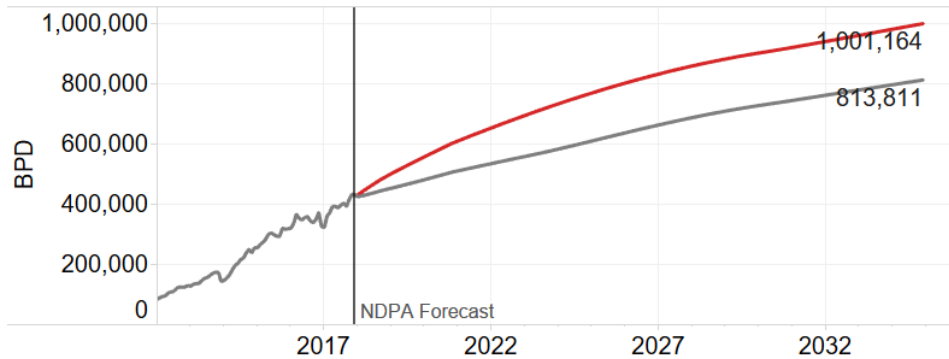
Blue – Lack of pipelines
Orange – Challenges on existing infrastructure

Dec 2017 Data – Non-Confidential Wells

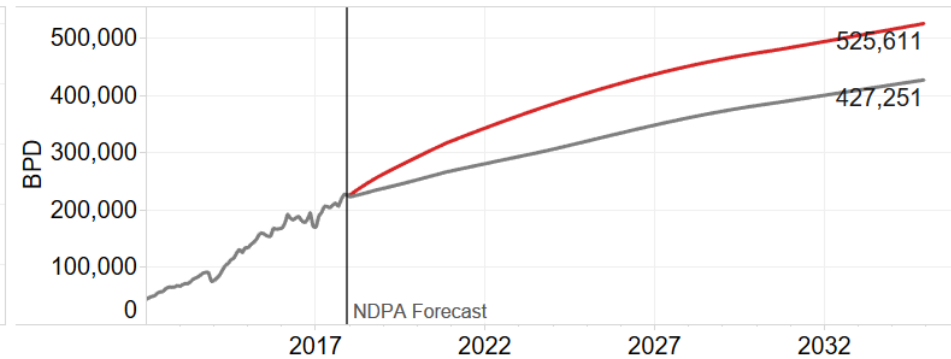


North Dakota Captured* NGL's

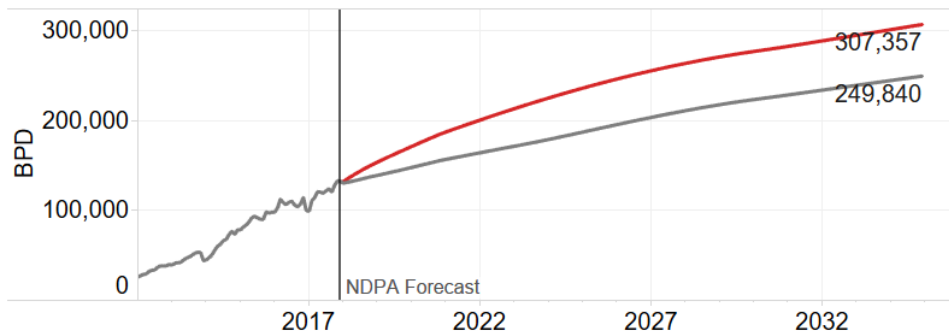
All Natural Gas Liquids



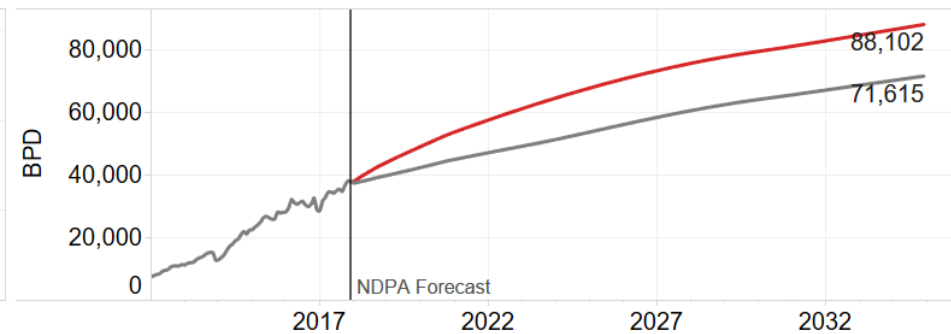
Ethane



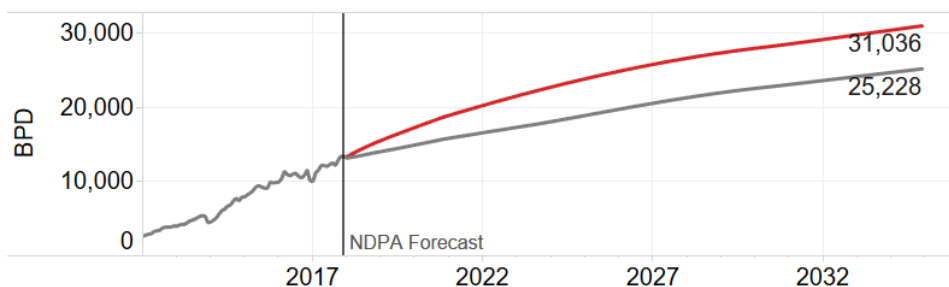
Propane



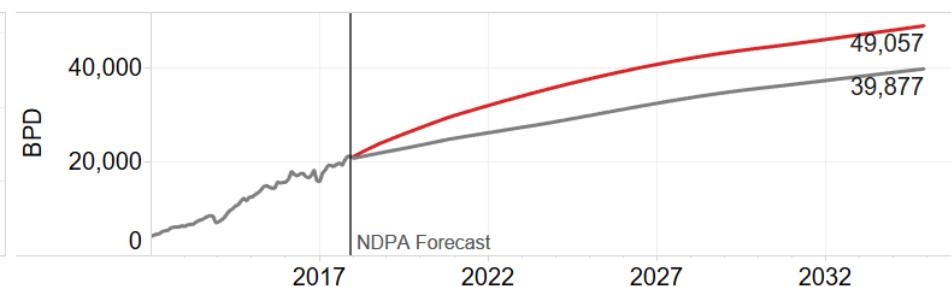
Butane



Isobutane



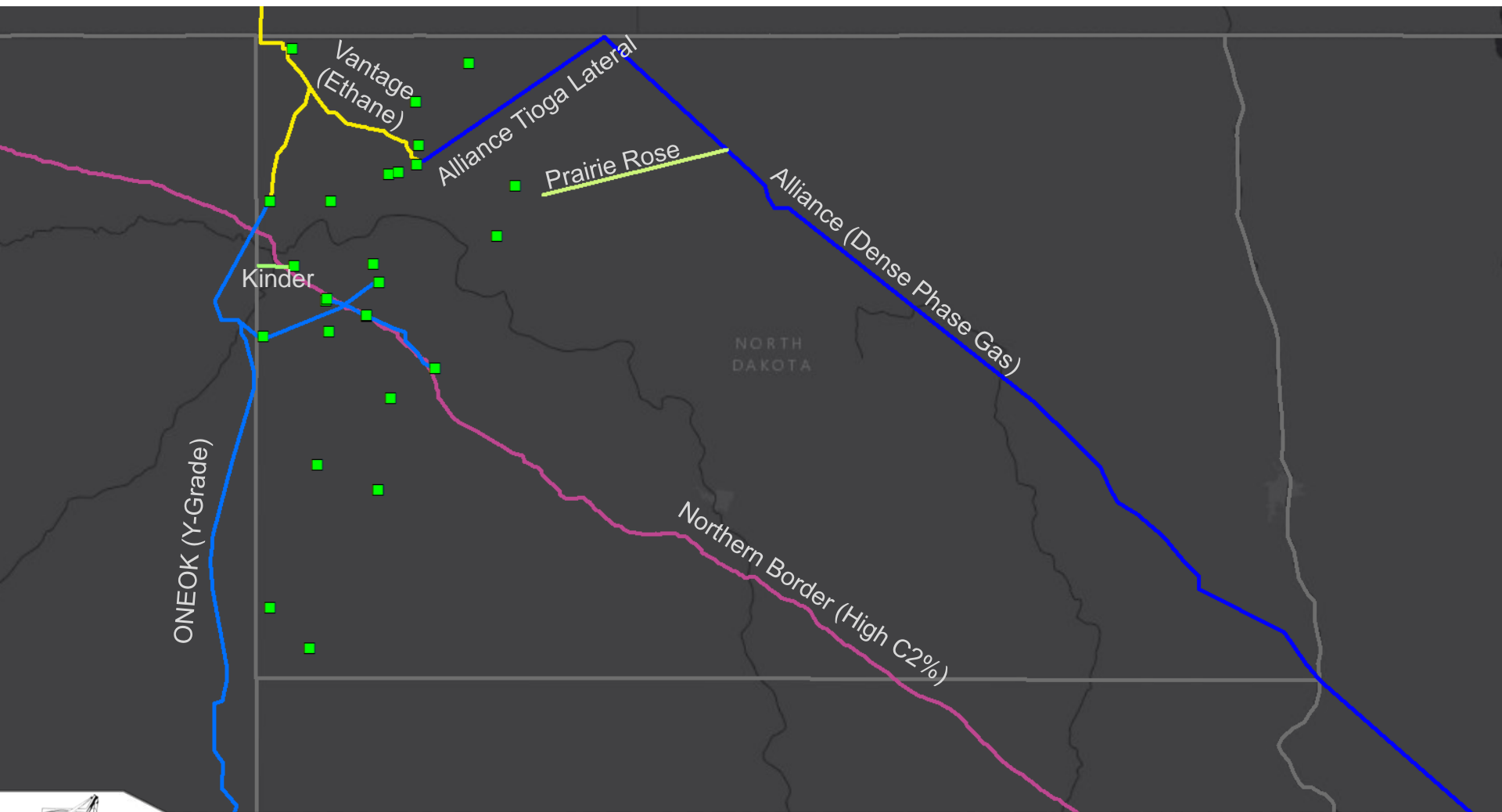
Natural Gasoline



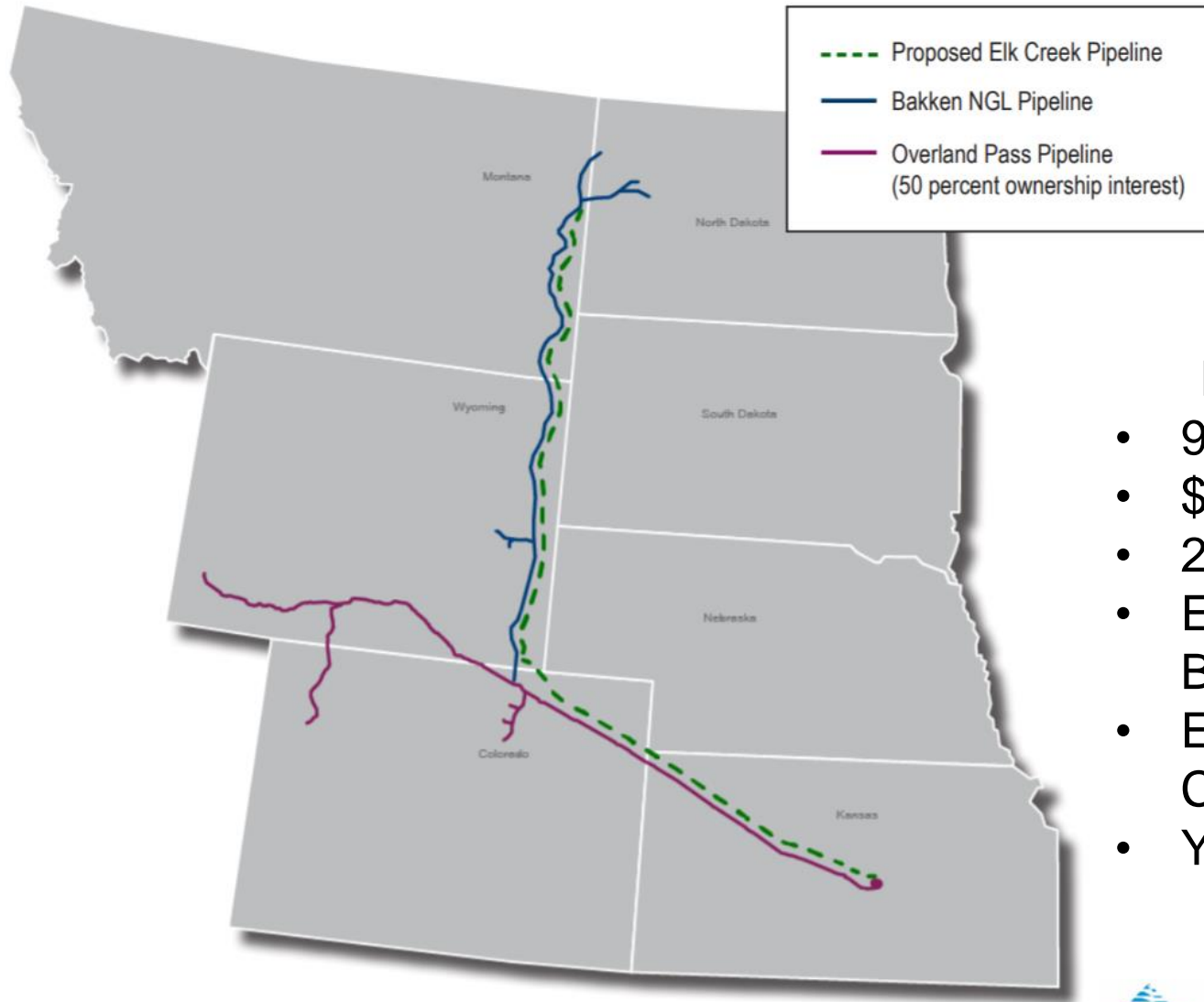
*Non-flared NGL's & Assumes 10 GPM



Major NGL Pipeline and Processing Infrastructure



ONEOK Elk Creek NGL Pipeline

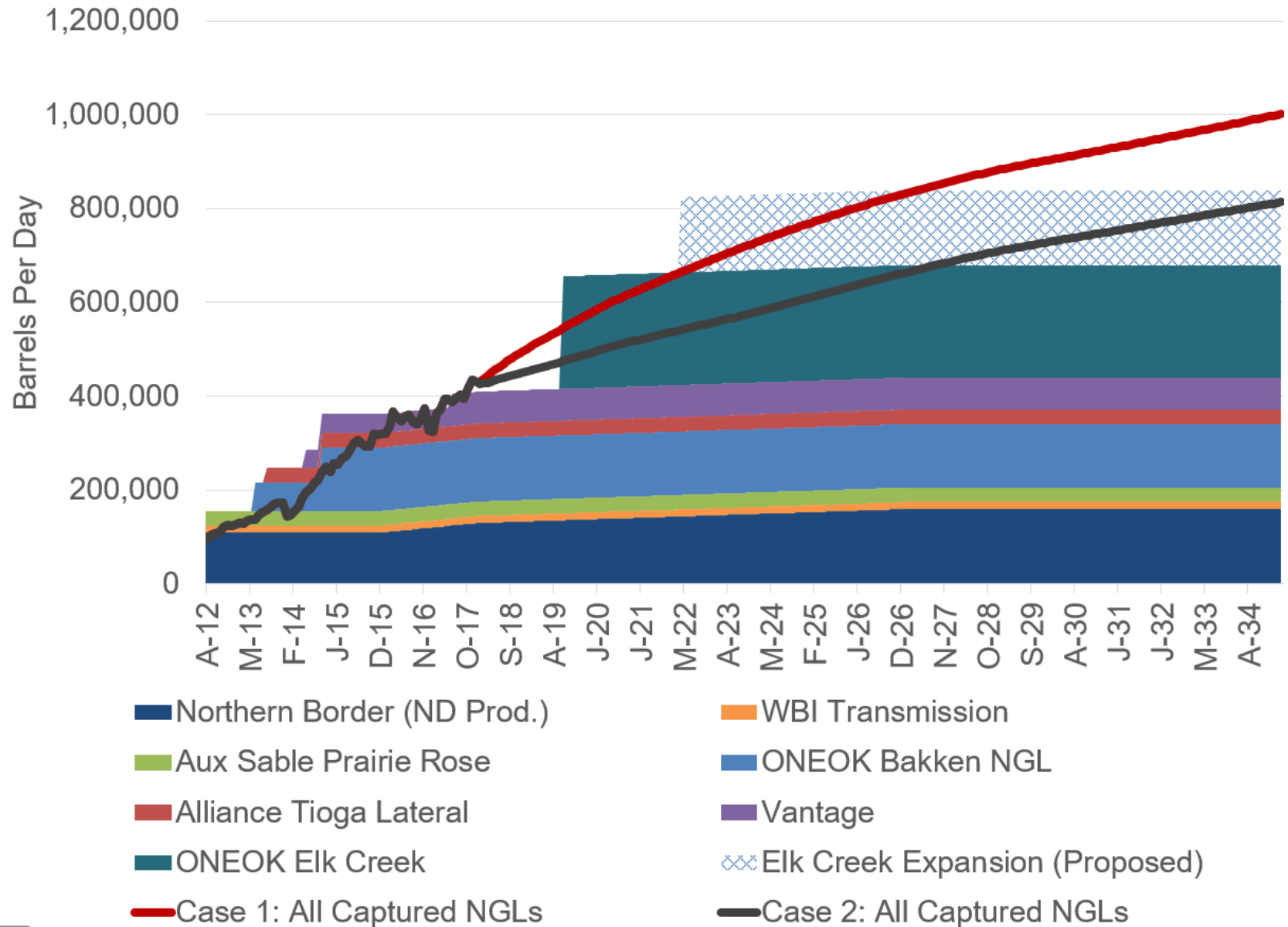


Project Highlights

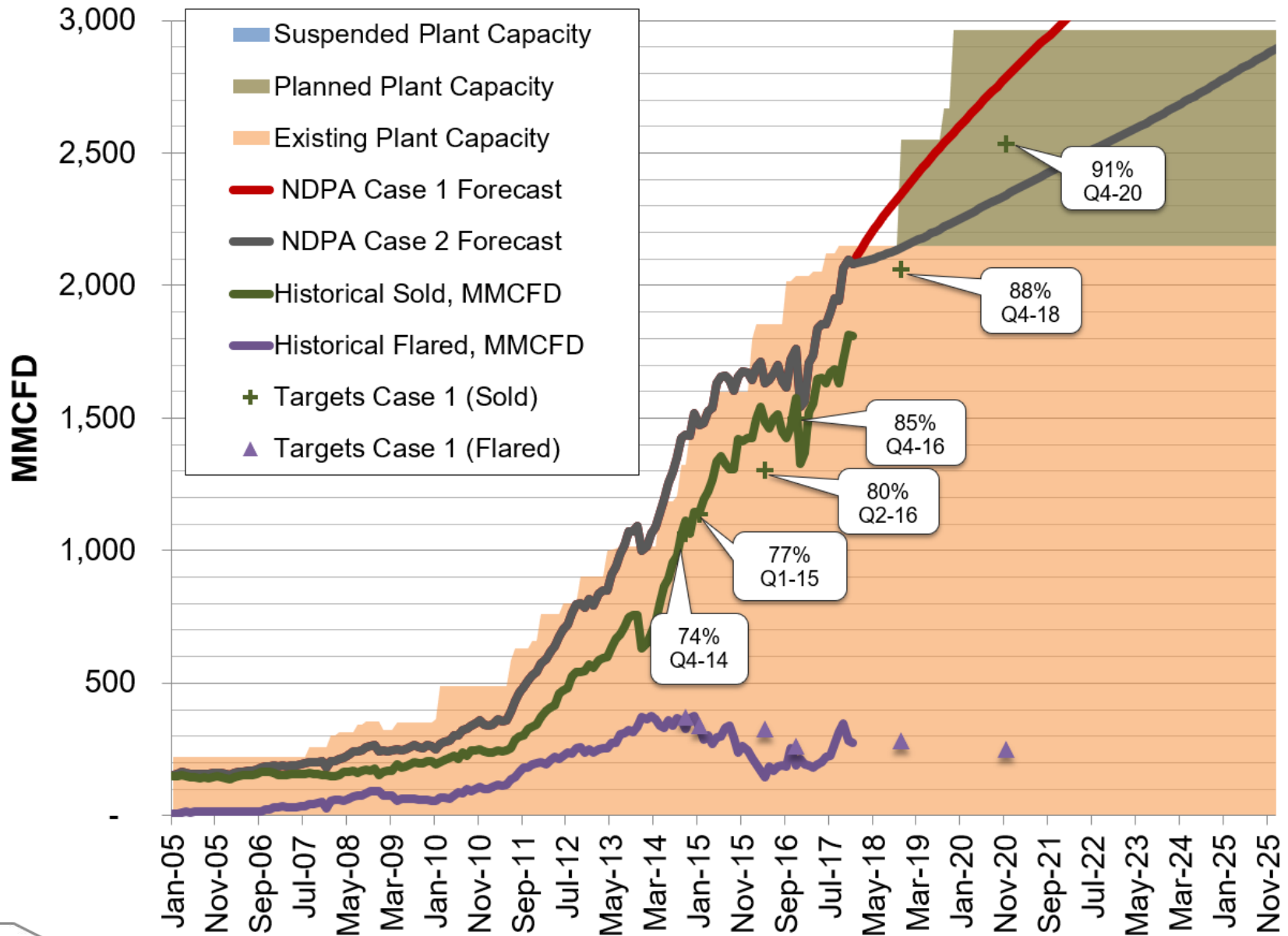
- 900 Miles - 20" Pipeline
- \$1.4 Billion
- 240,000 BPD Capacity
- Expandable to 400,000 BPD
- End of 2019 Proposed Completion
- Y-Grade Transportation



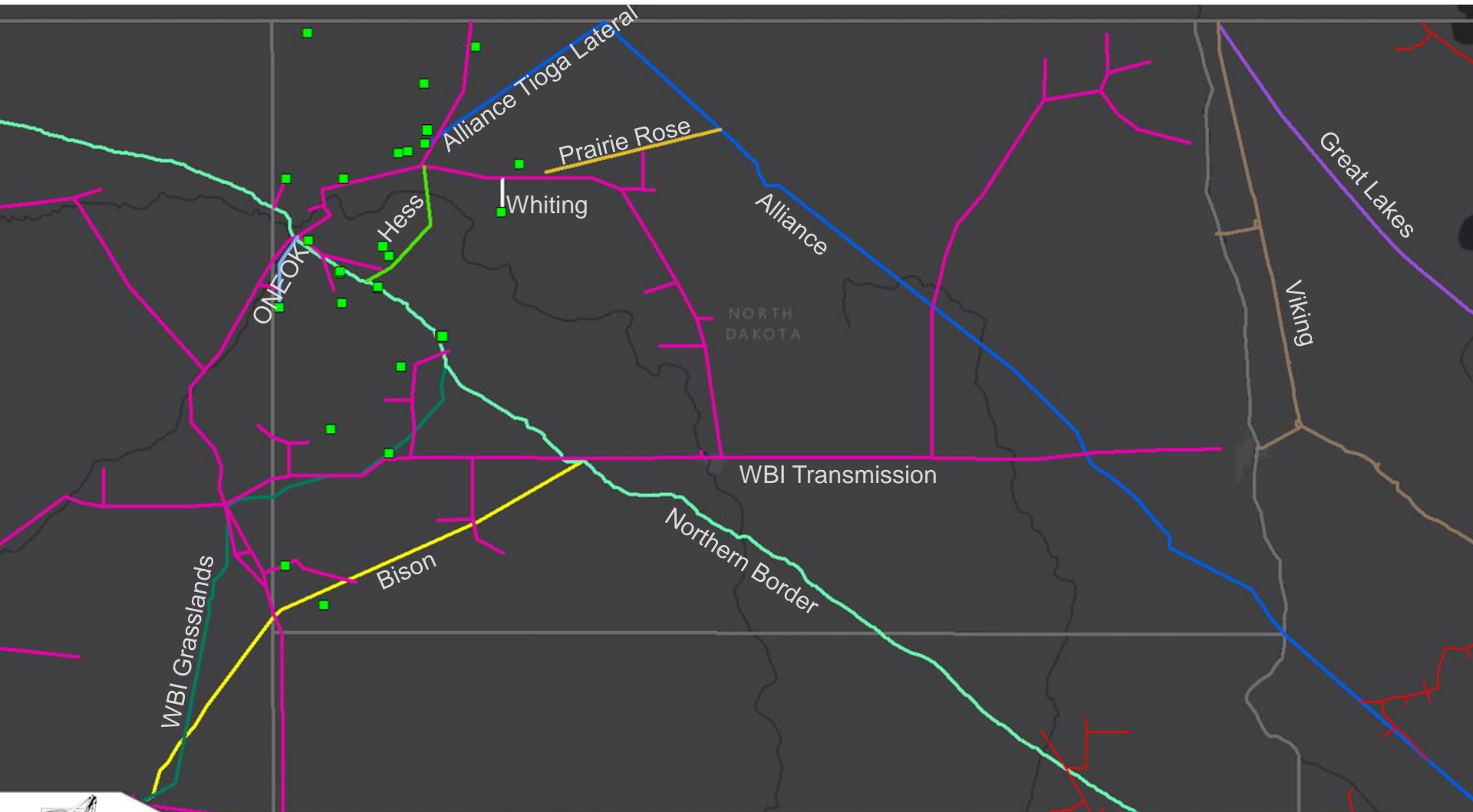
NGL Pipeline Takeaway Options



Solving the Flaring Challenge

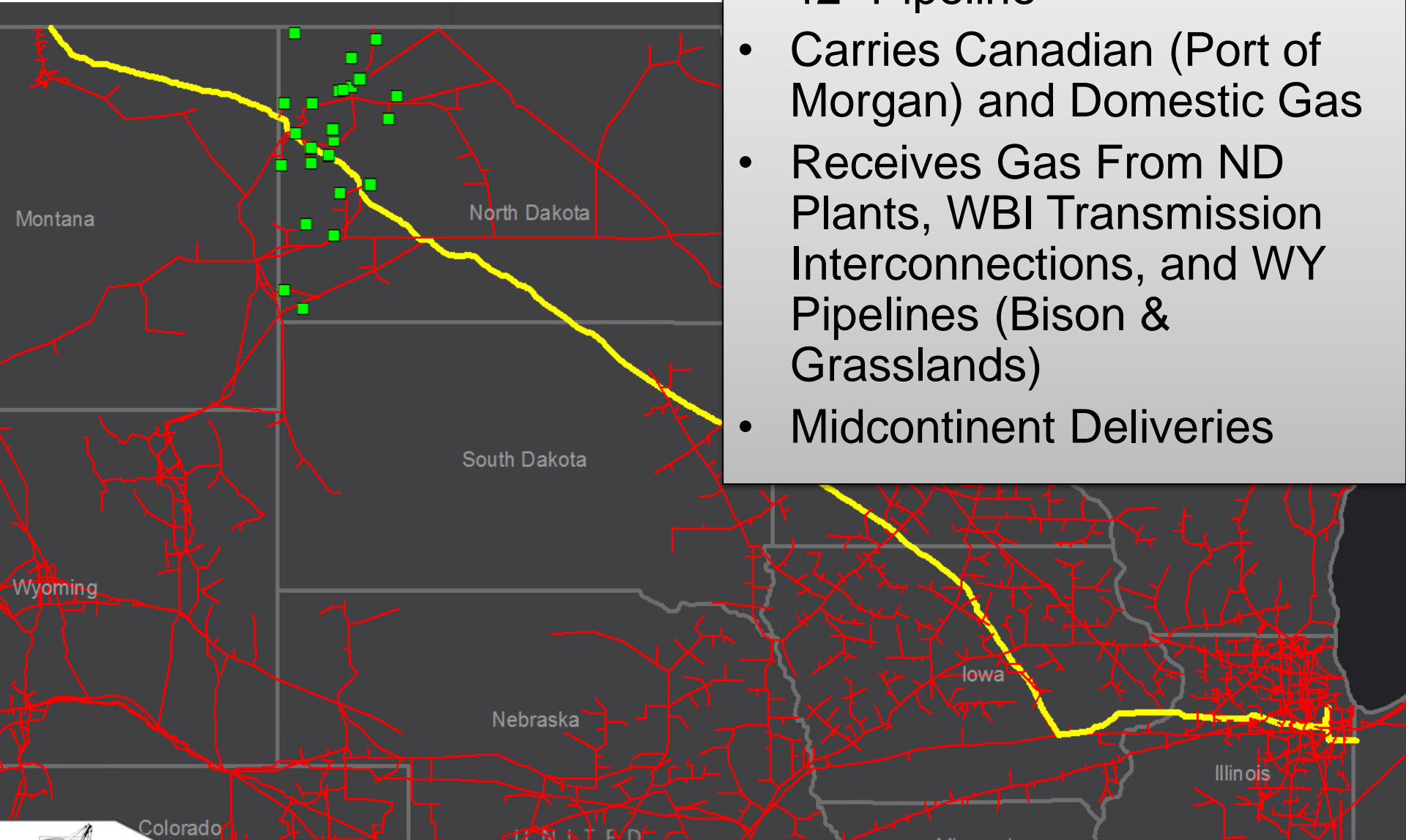


Major Gas Pipeline and Processing Infrastructure



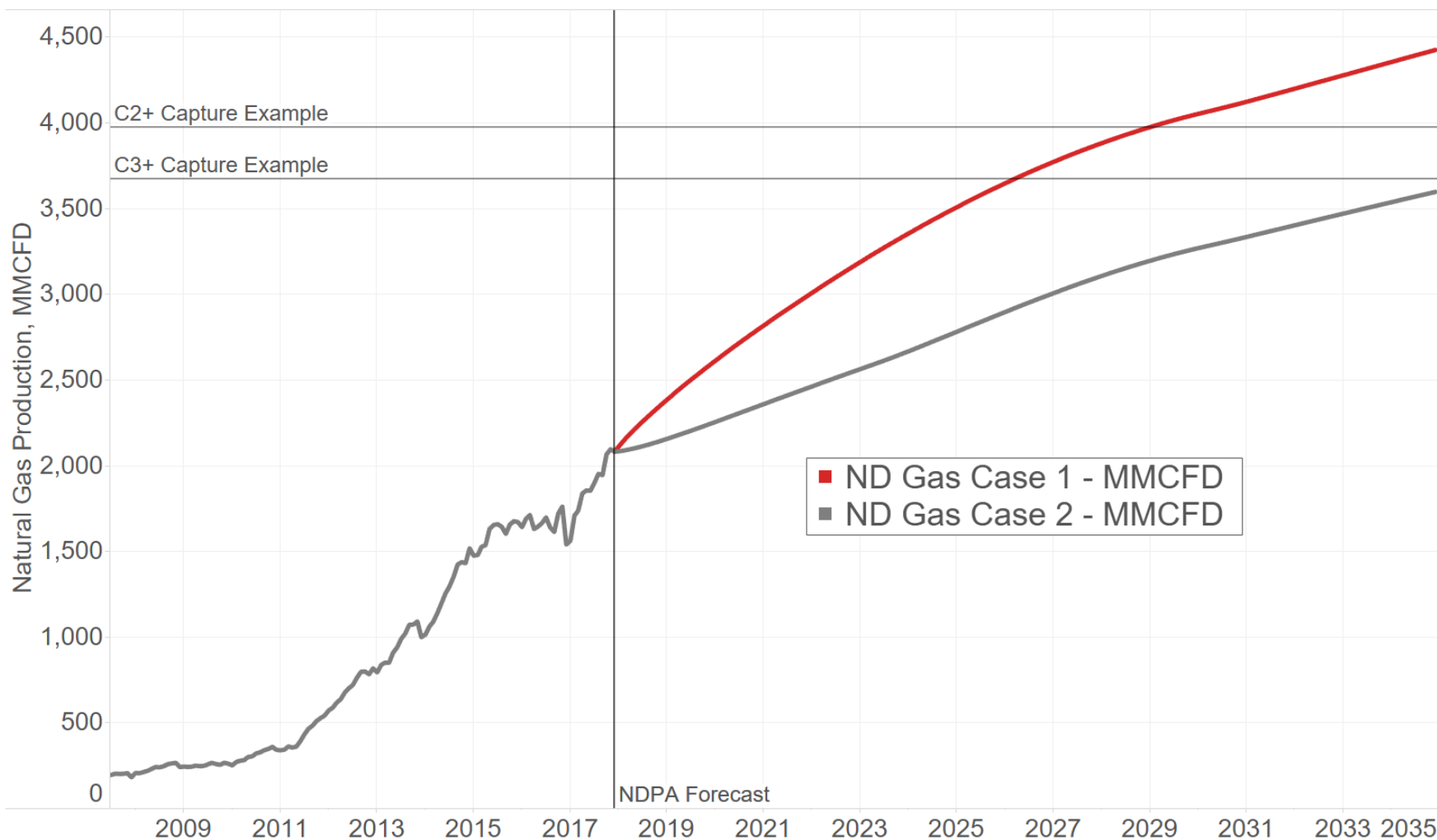
Northern Border Pipeline

- 42" Pipeline
- Carries Canadian (Port of Morgan) and Domestic Gas
- Receives Gas From ND Plants, WBI Transmission Interconnections, and WY Pipelines (Bison & Grasslands)
- Midcontinent Deliveries



Simplified Example NB Calculations

Conclusion: **IF** no other gas export options open and all other deliveries on other pipelines stay static, ND gas production could increase 1.58-1.88 BCFD (from Nov-17) before Northern Border is 100% Bakken production. BTU management becomes increasingly important for Bakken residue gas.

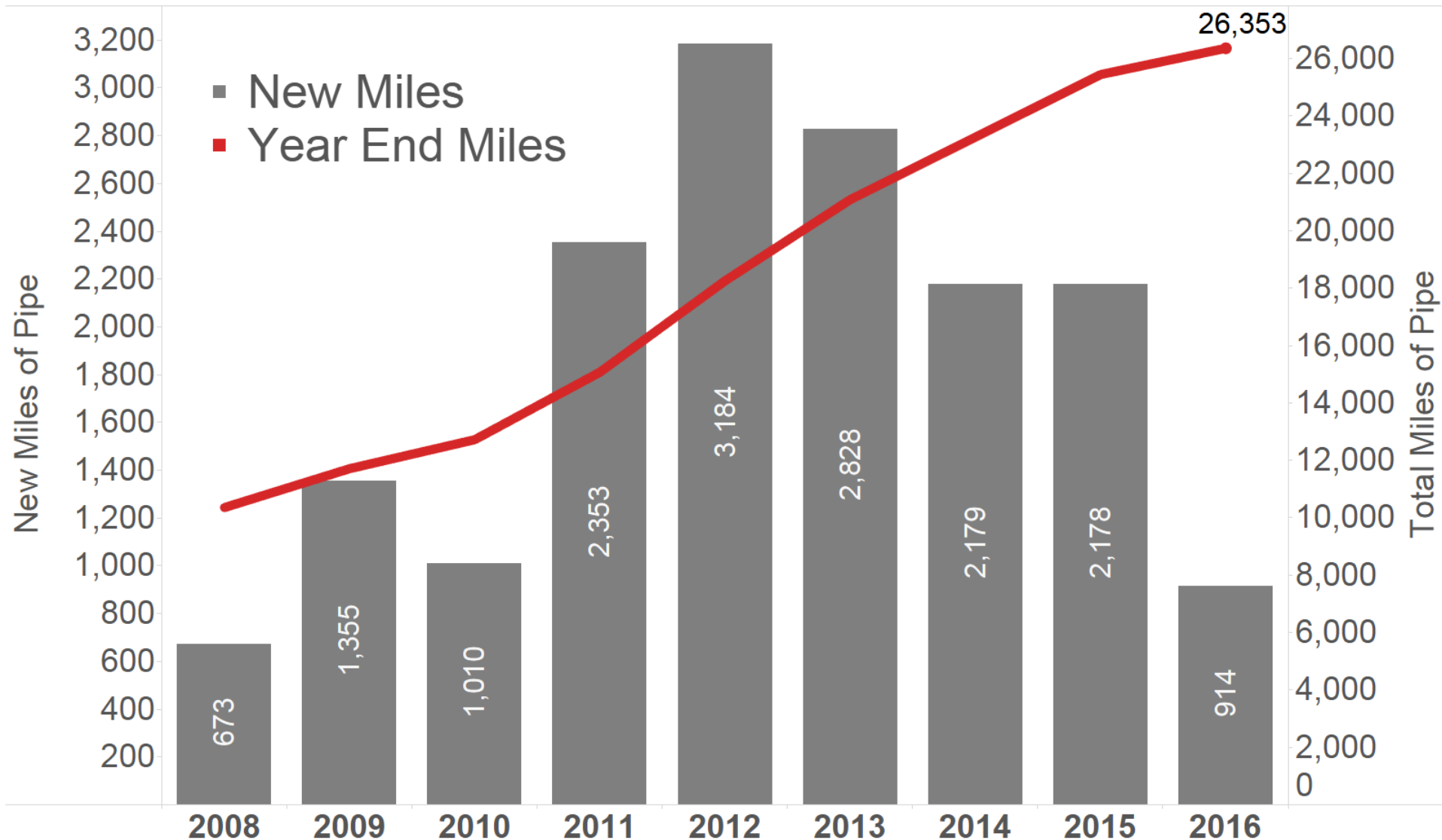


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- **Pipeline construction update**



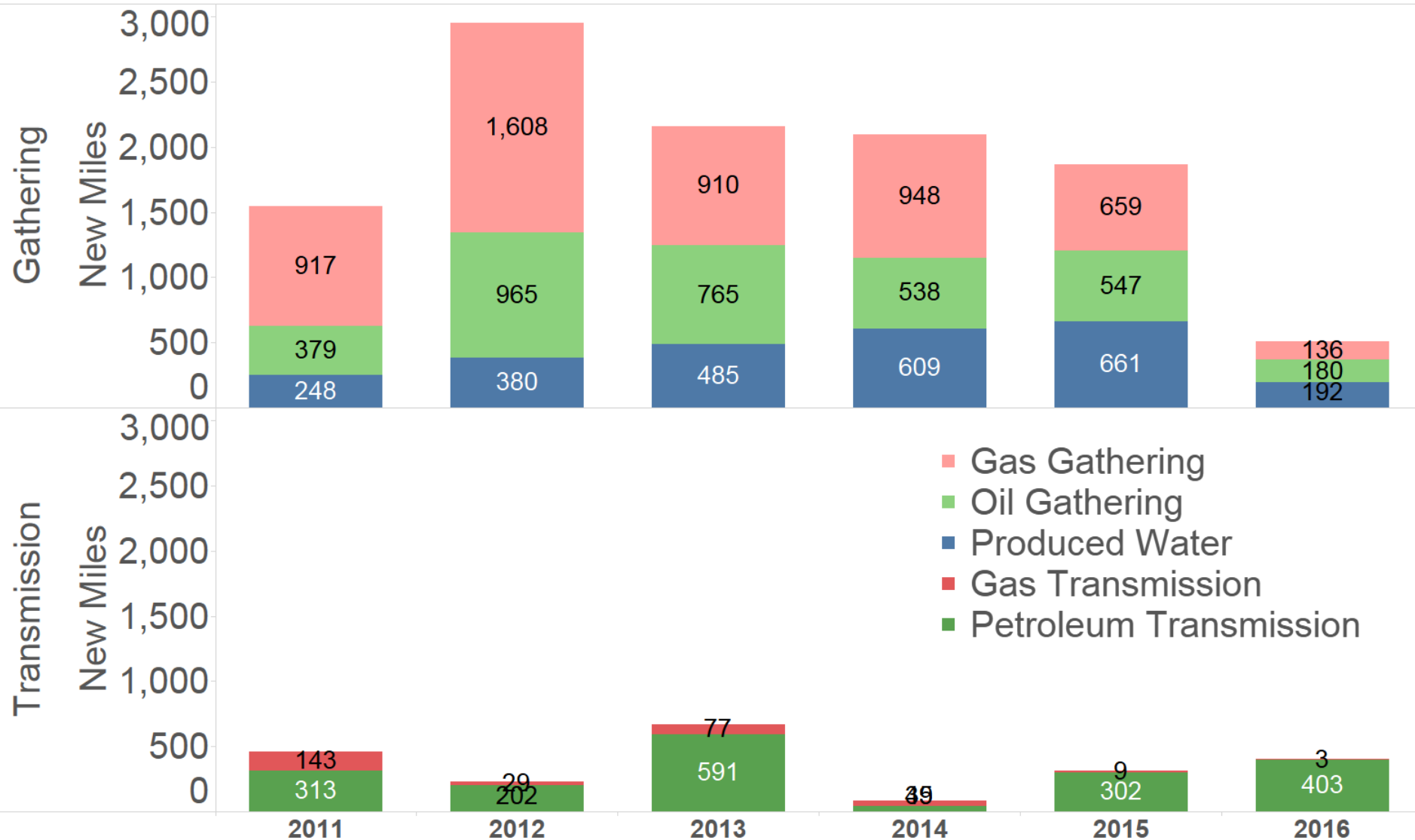
North Dakota Pipeline Construction



Sources: NDIC & PHMSA



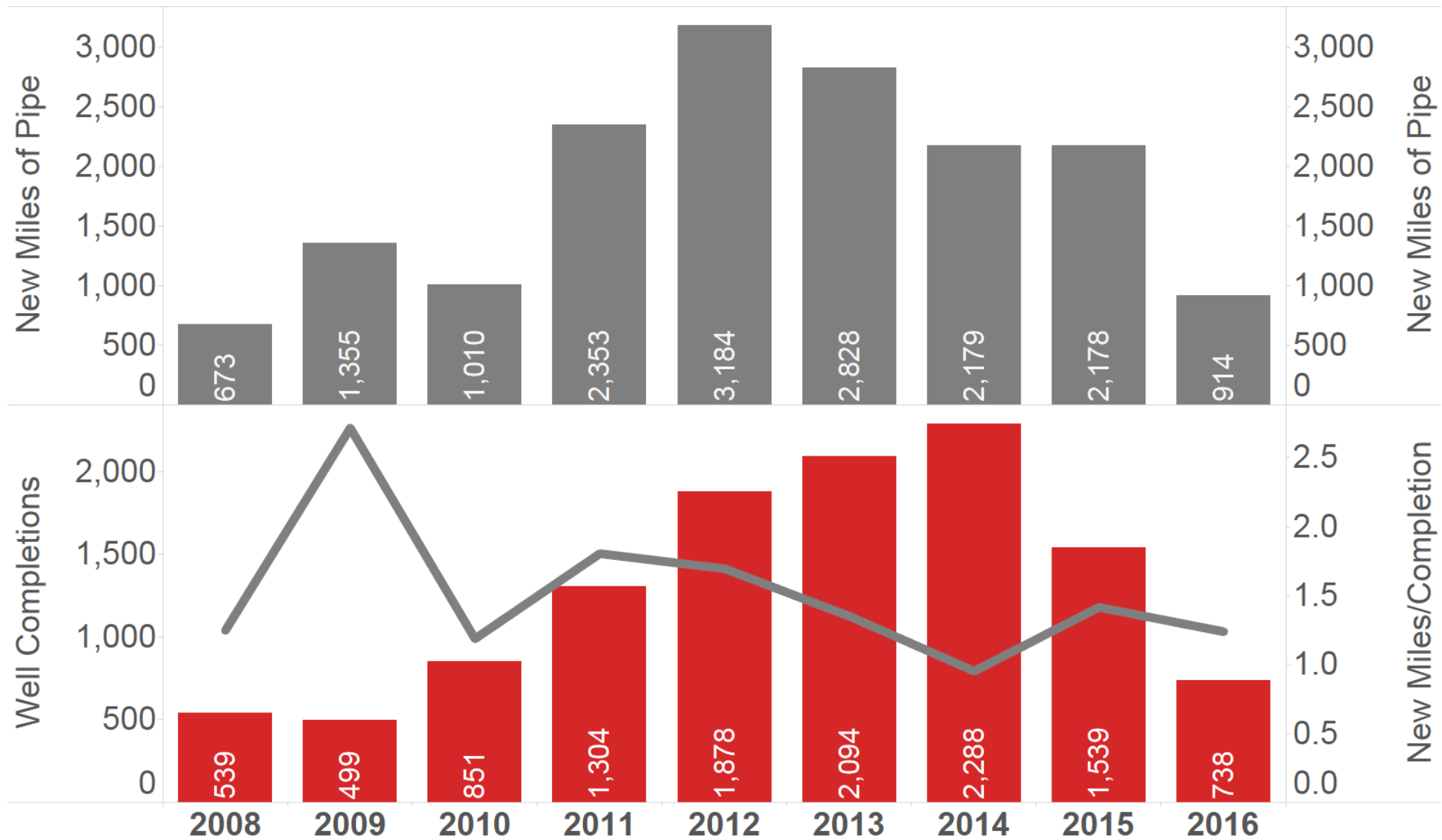
North Dakota Pipeline Construction

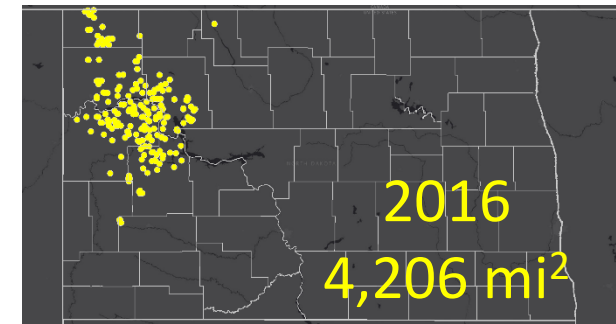
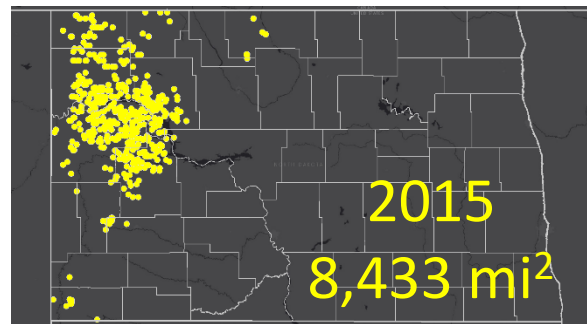
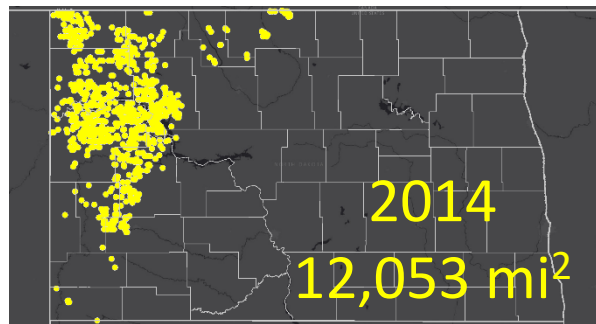
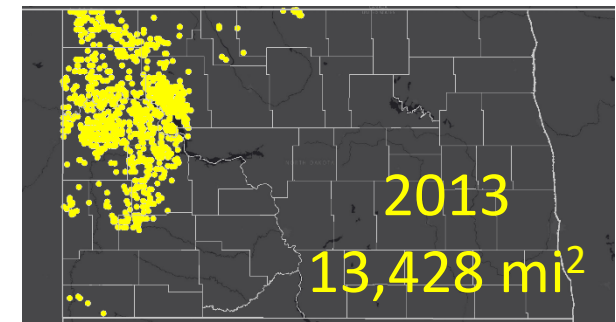
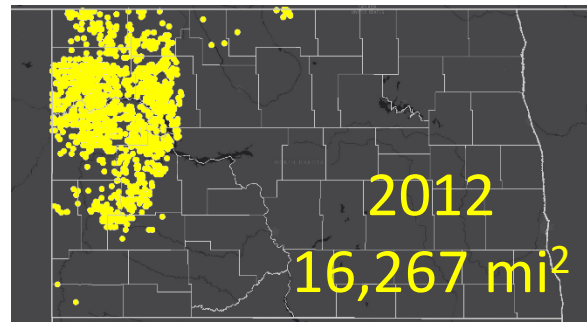
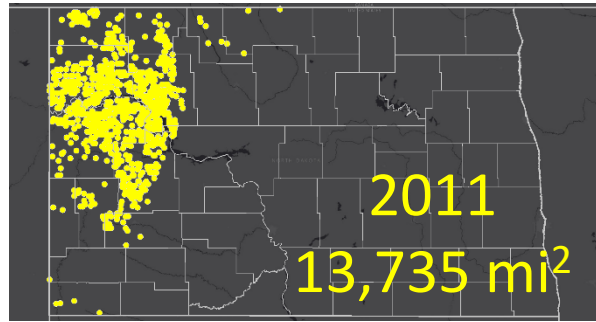
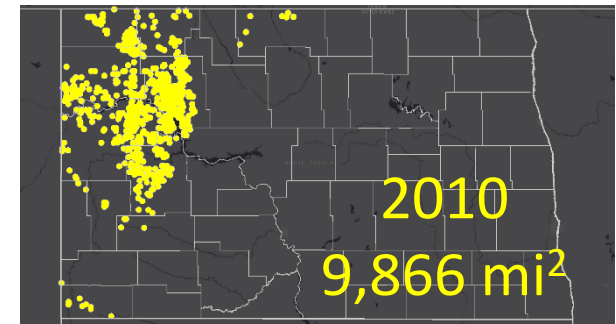
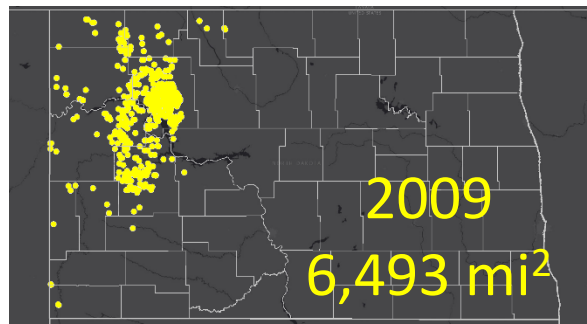
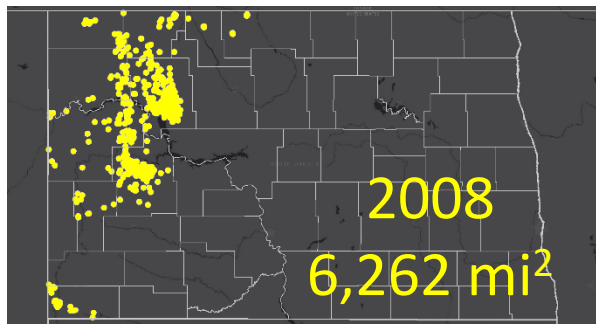


Sources: NDIC & PHMSA

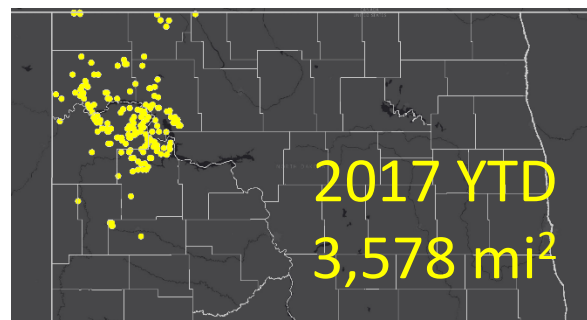


New Miles and Well Completions

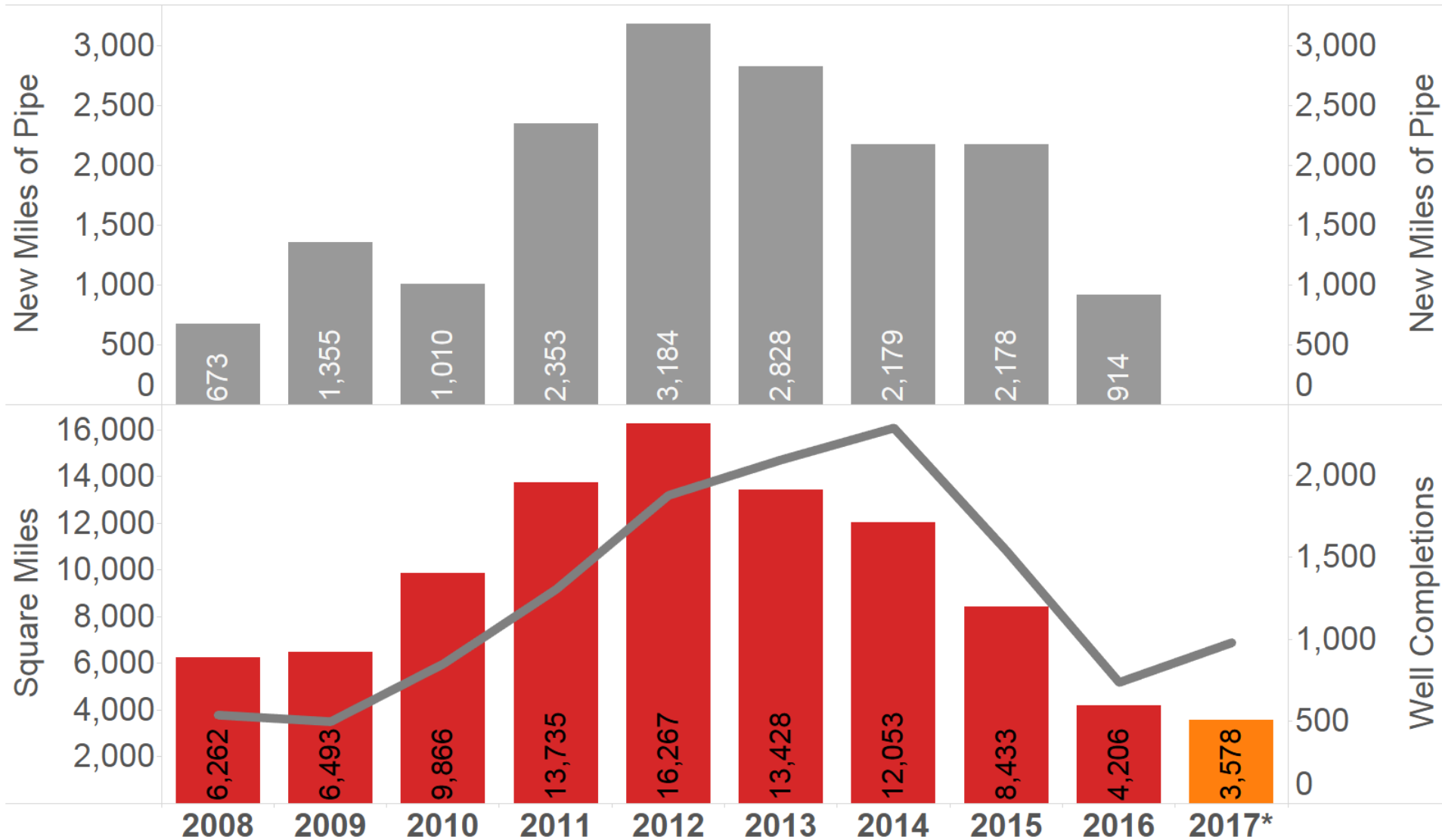




2 Mile Buffer Around New Wells By Year



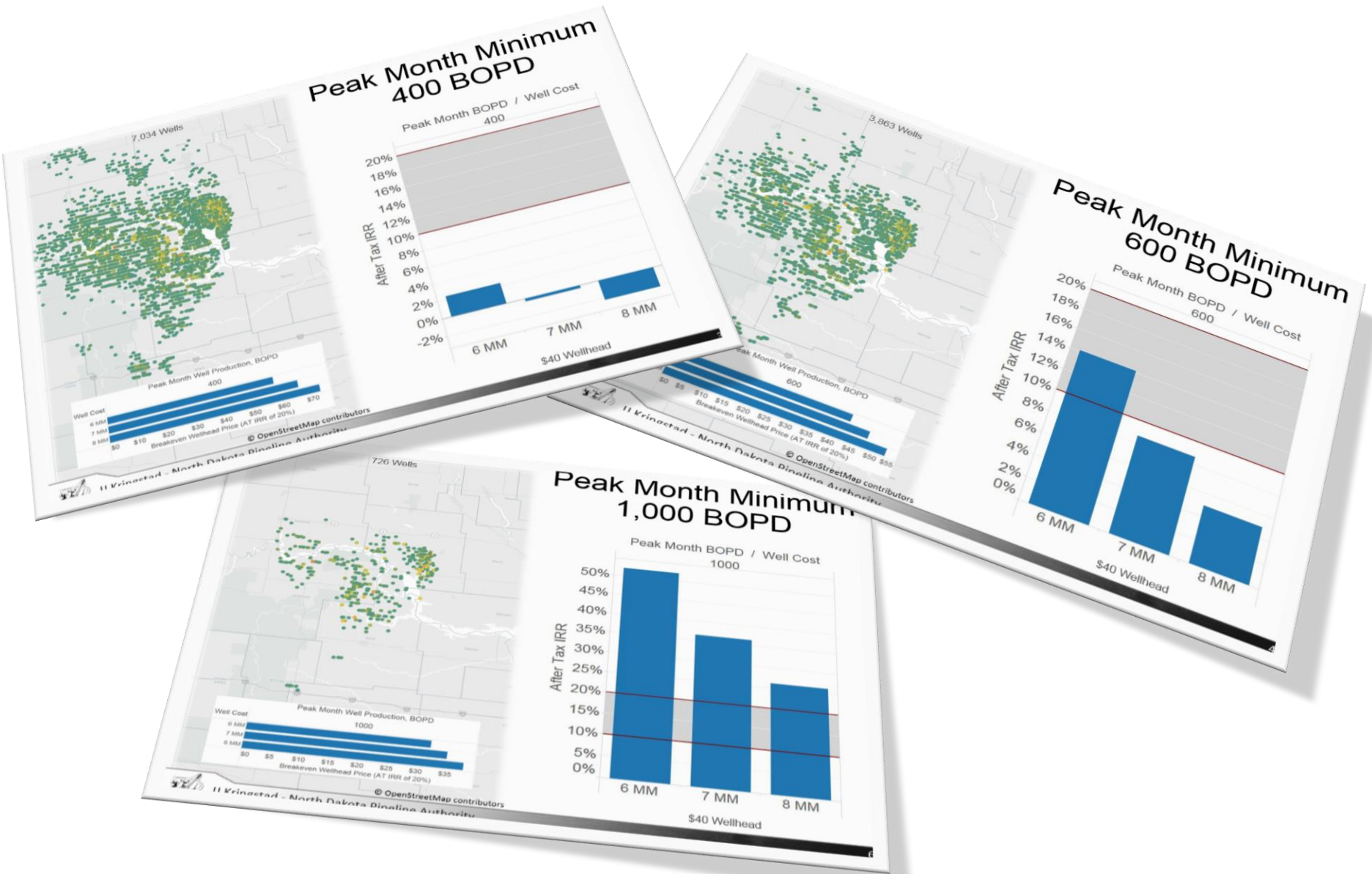
New Miles and Activity Footprint



*2017 Forecasted

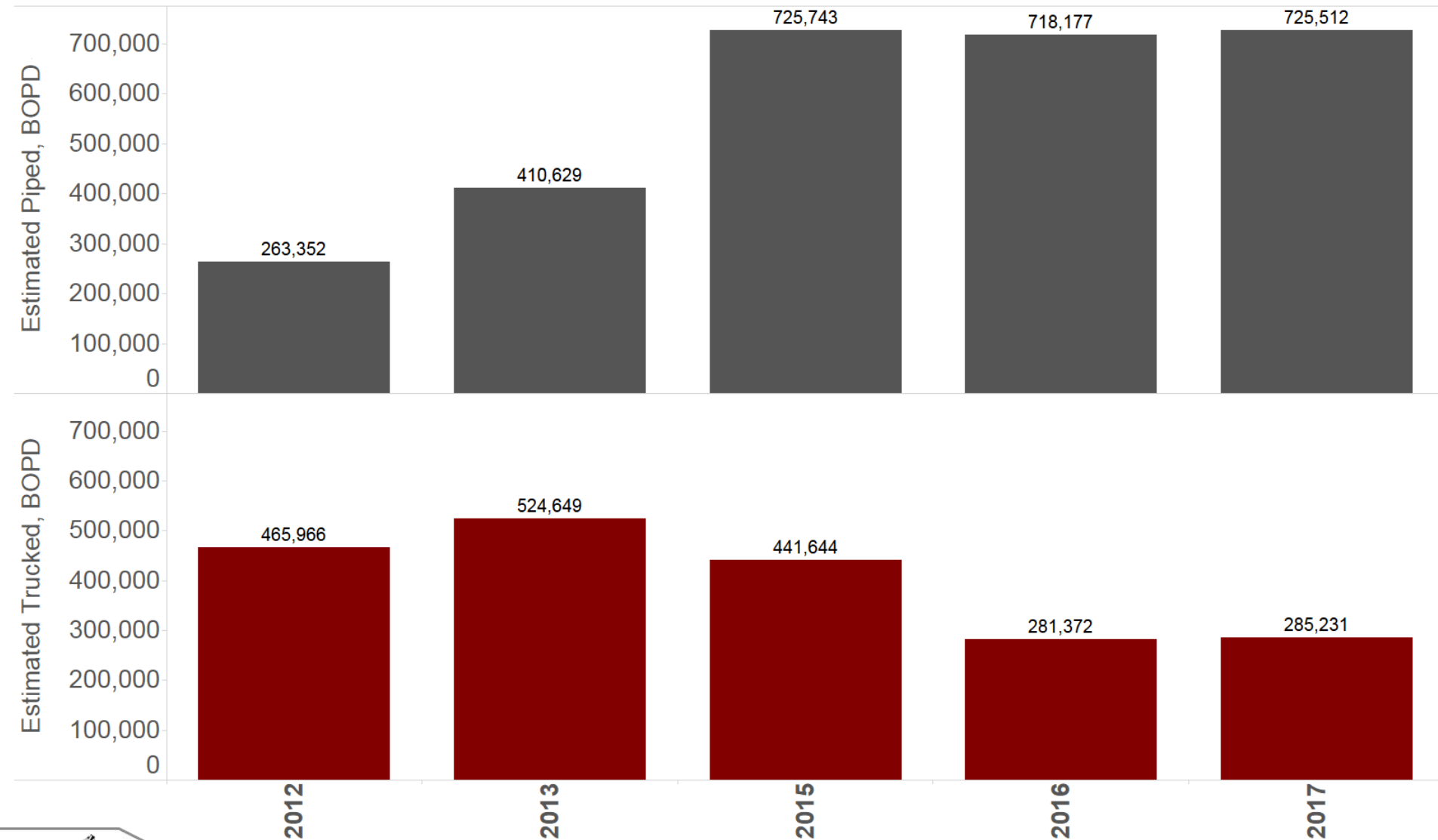


Predicting New Miles With Activity Footprint

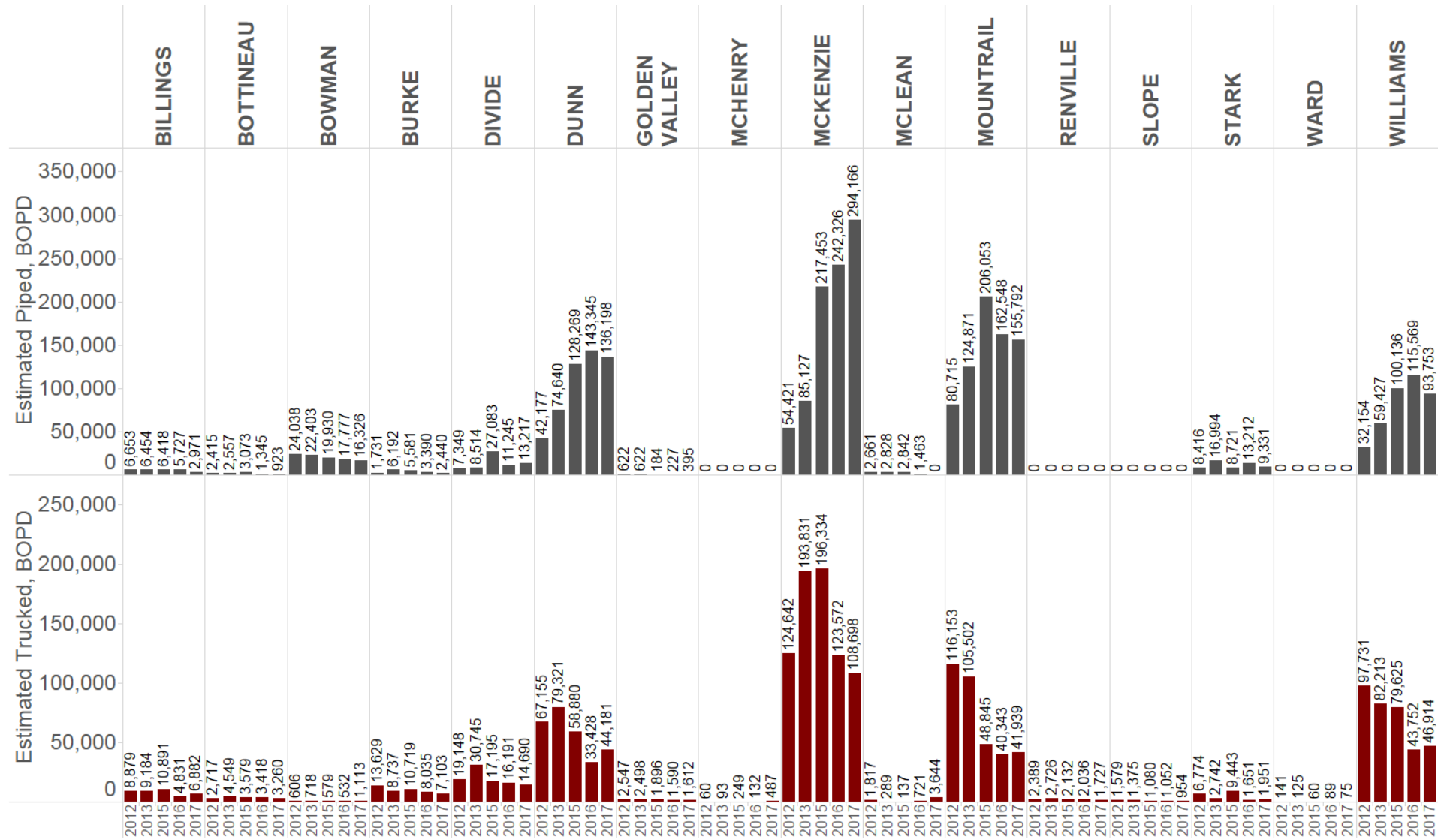


Evolution of Oil Gathering in ND

Statewide Totals



Evolution of Oil Gathering in ND



Contact Information

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North Dakota Pipeline Authority

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Bismarck, ND 58505-0840

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E-mail: jjkringstad@ndpipelines.com

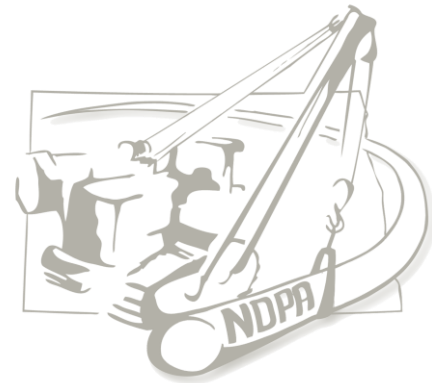
Websites:

www.pipeline.nd.gov

www.northdakotapipelines.com



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



Bakken Economics

Full Slide Deck

Justin J Kringstad

Geological Engineer

Director

North Dakota Pipeline Authority

Jan 16, 2018



Objective

Define where the Bakken/Three Forks system may be economic in the current oil price environment.

Method

Analyze past well performance across the region and estimate well economics for various production levels.

Disclaimer

The goal of this work is not to imply individual company actions or intentions. All view expressed are strictly that of Justin J. Kringstad.

Neither the State of North Dakota, nor any agency, officer, or employee of the State of North Dakota warrants the accuracy or reliability of this product and shall not be held responsible for any losses related to its use.

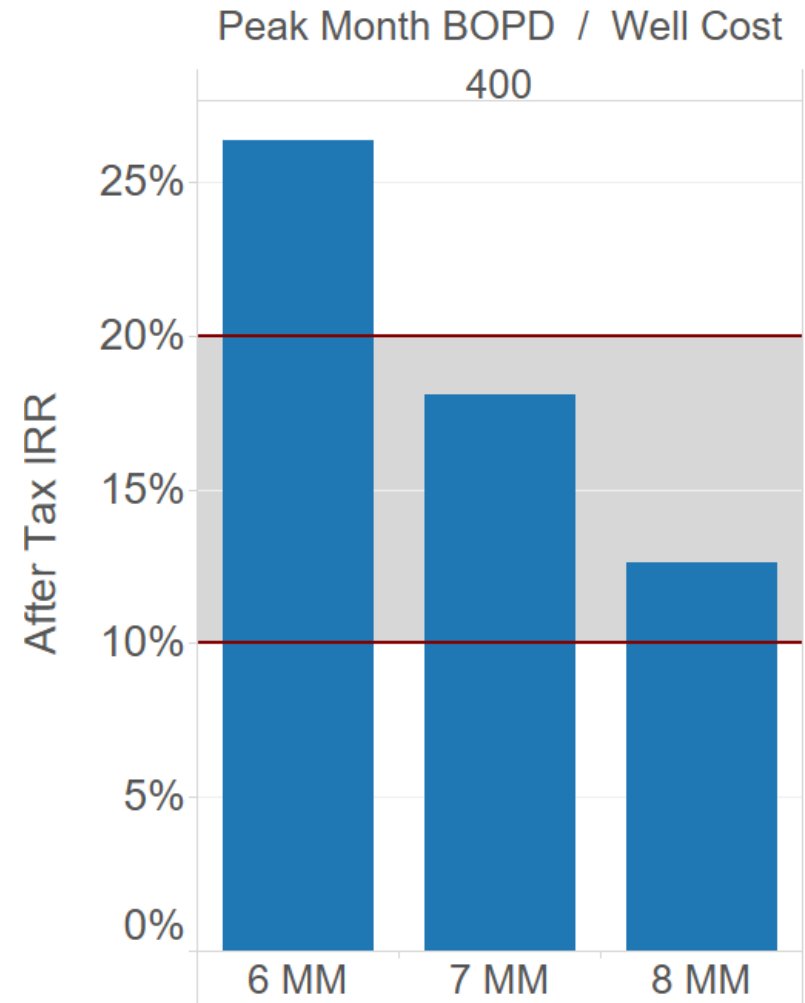
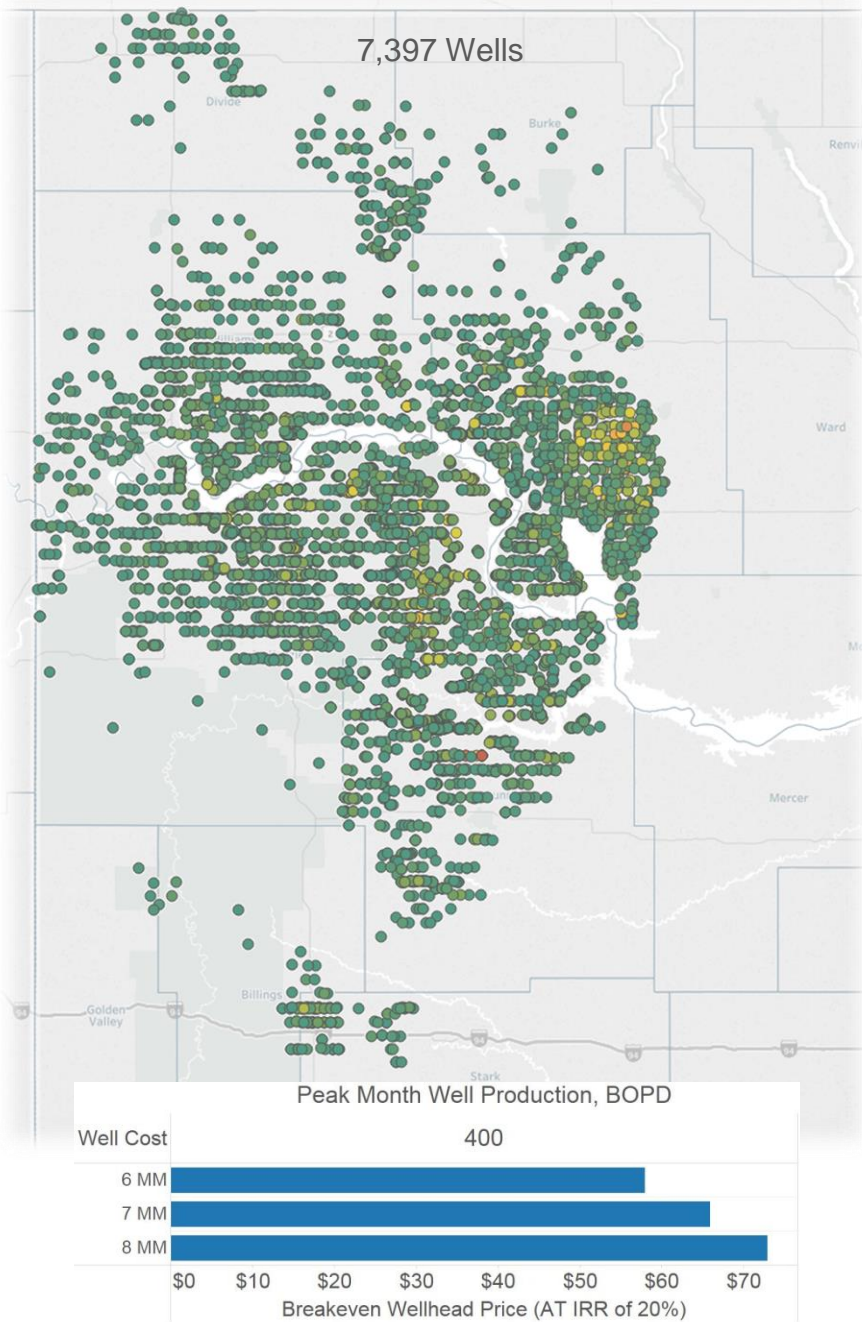


Key Economic Assumptions

- \$6-\$8 Million Well Costs
- \$59/BBL & \$5.00/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

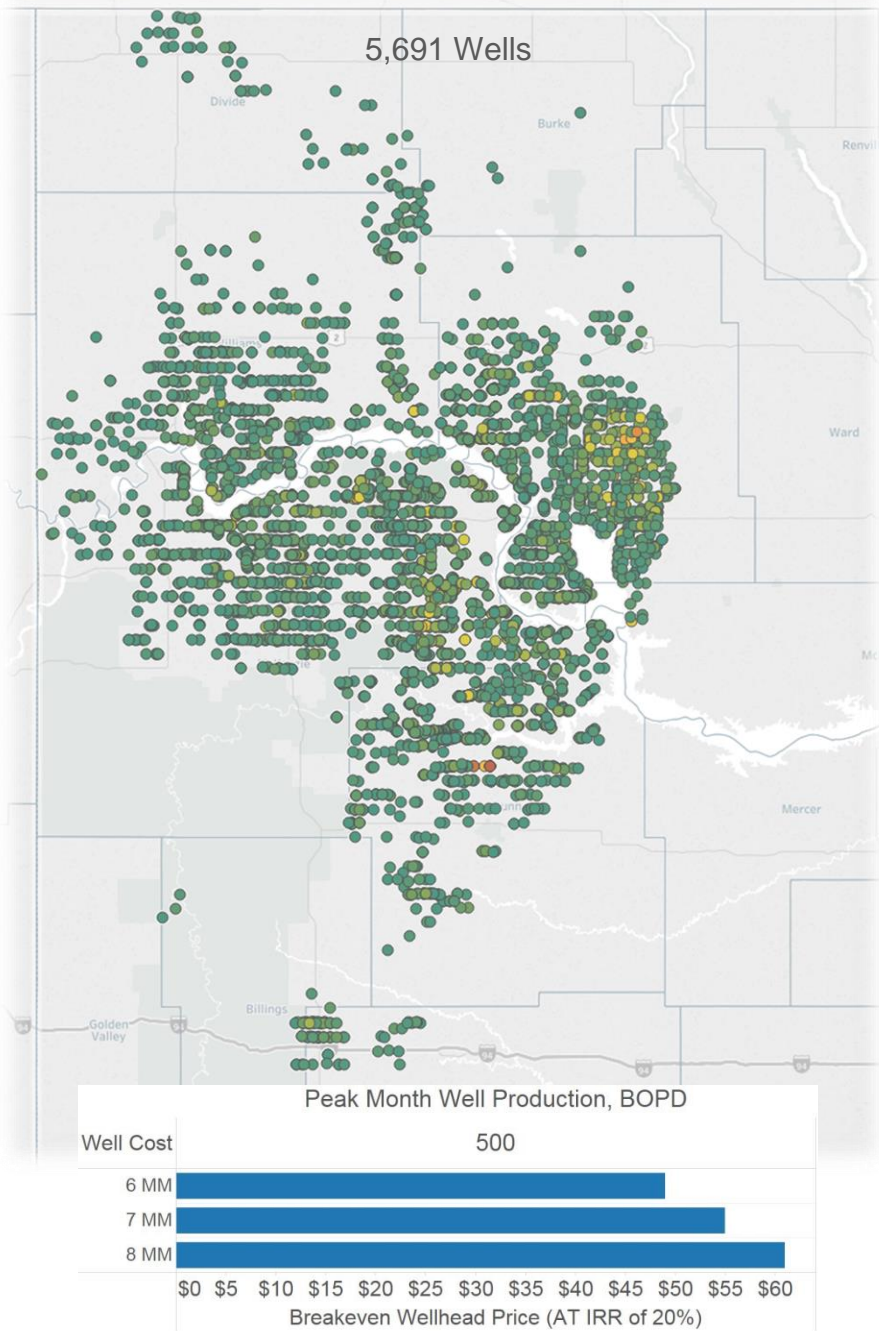


\$59 Wellhead

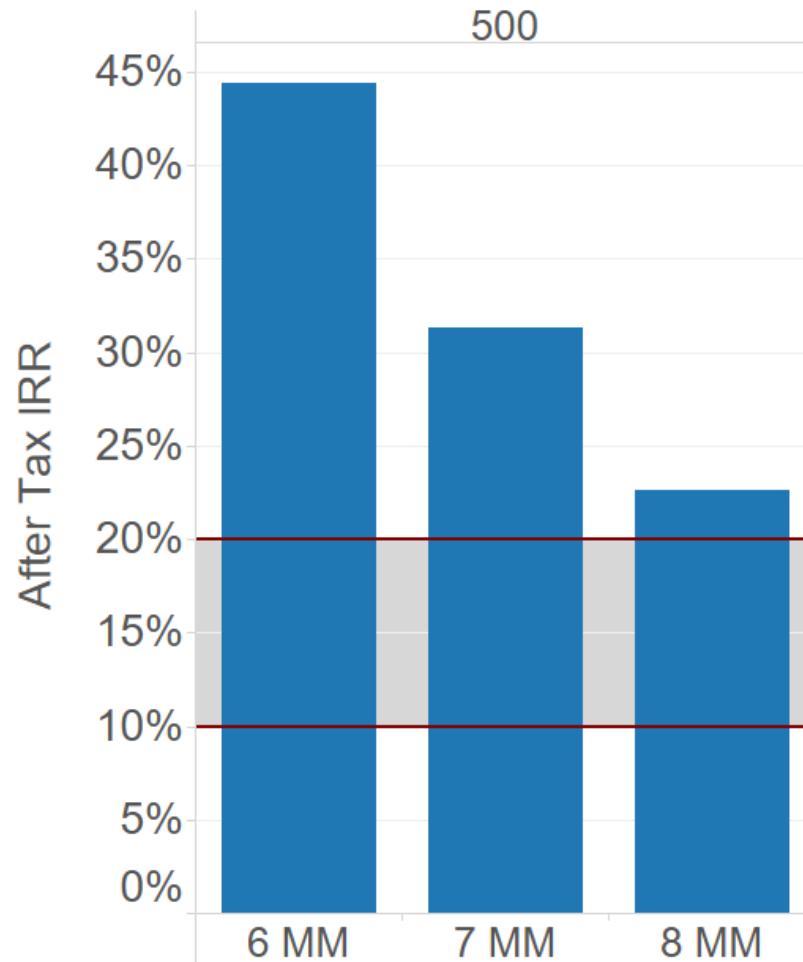
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Peak Month Minimum 500 BOPD



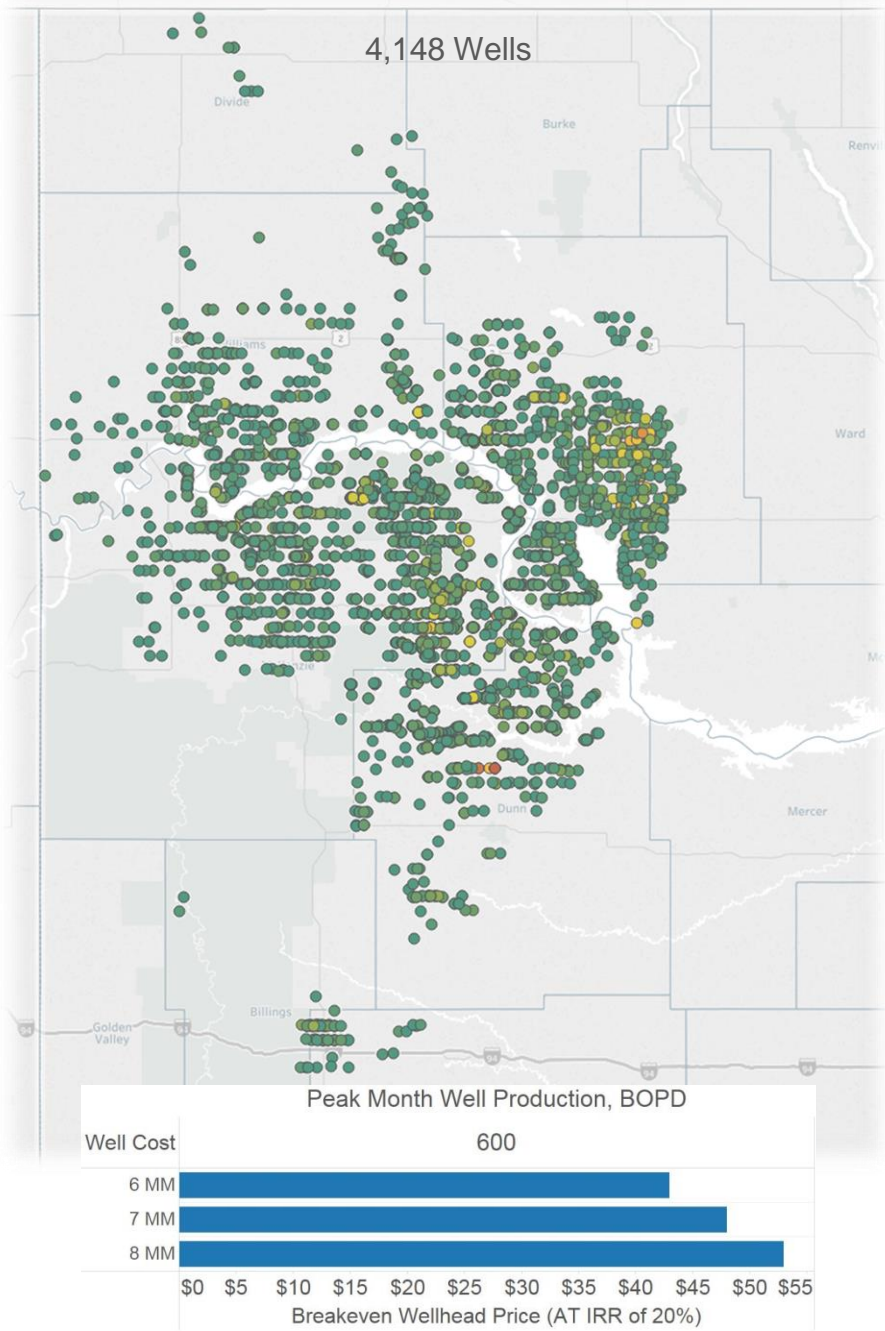
Peak Month BOPD / Well Cost
500



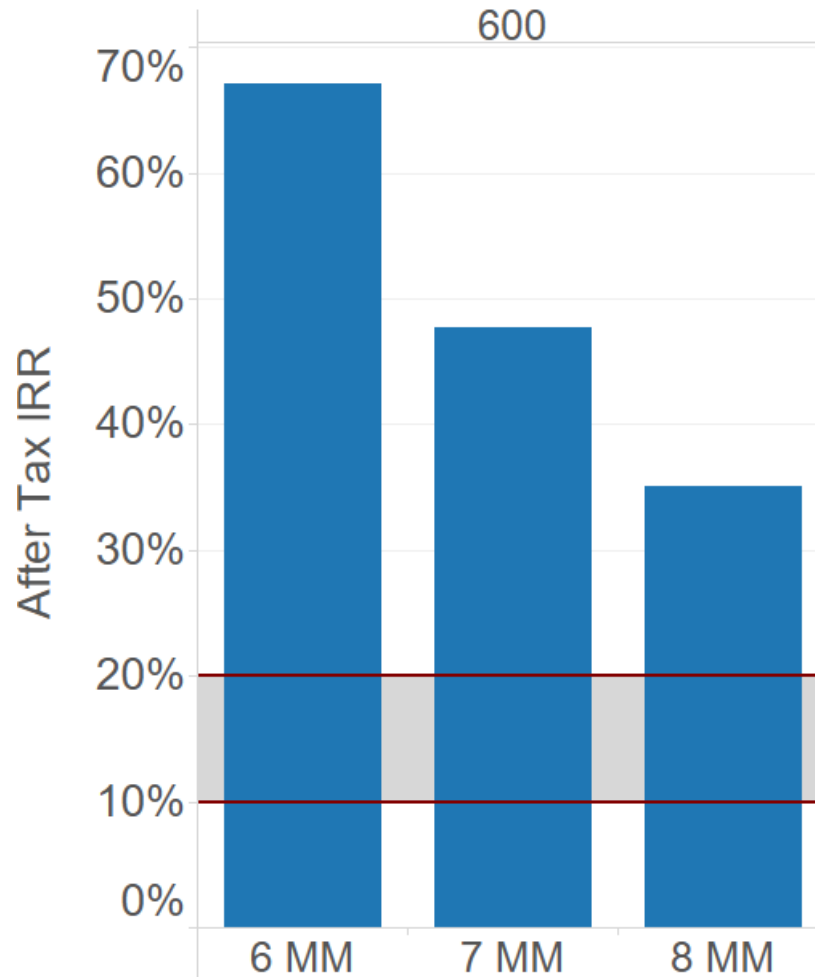
\$59 Wellhead



Peak Month Minimum 600 BOPD



Peak Month BOPD / Well Cost
600

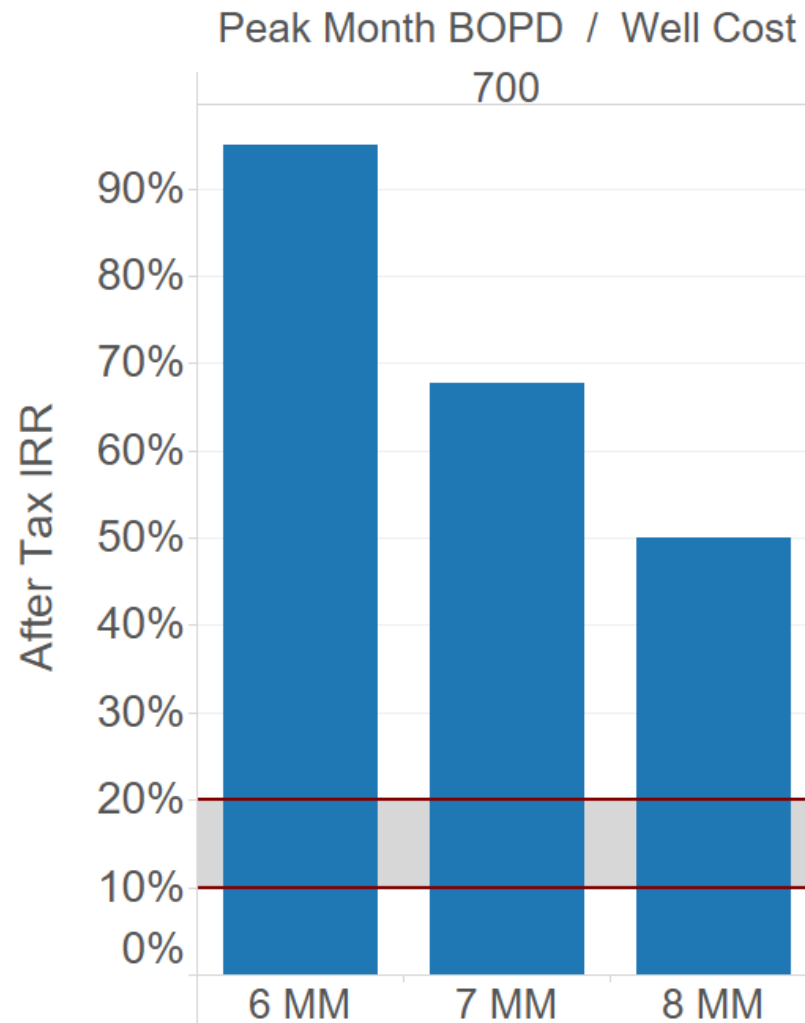
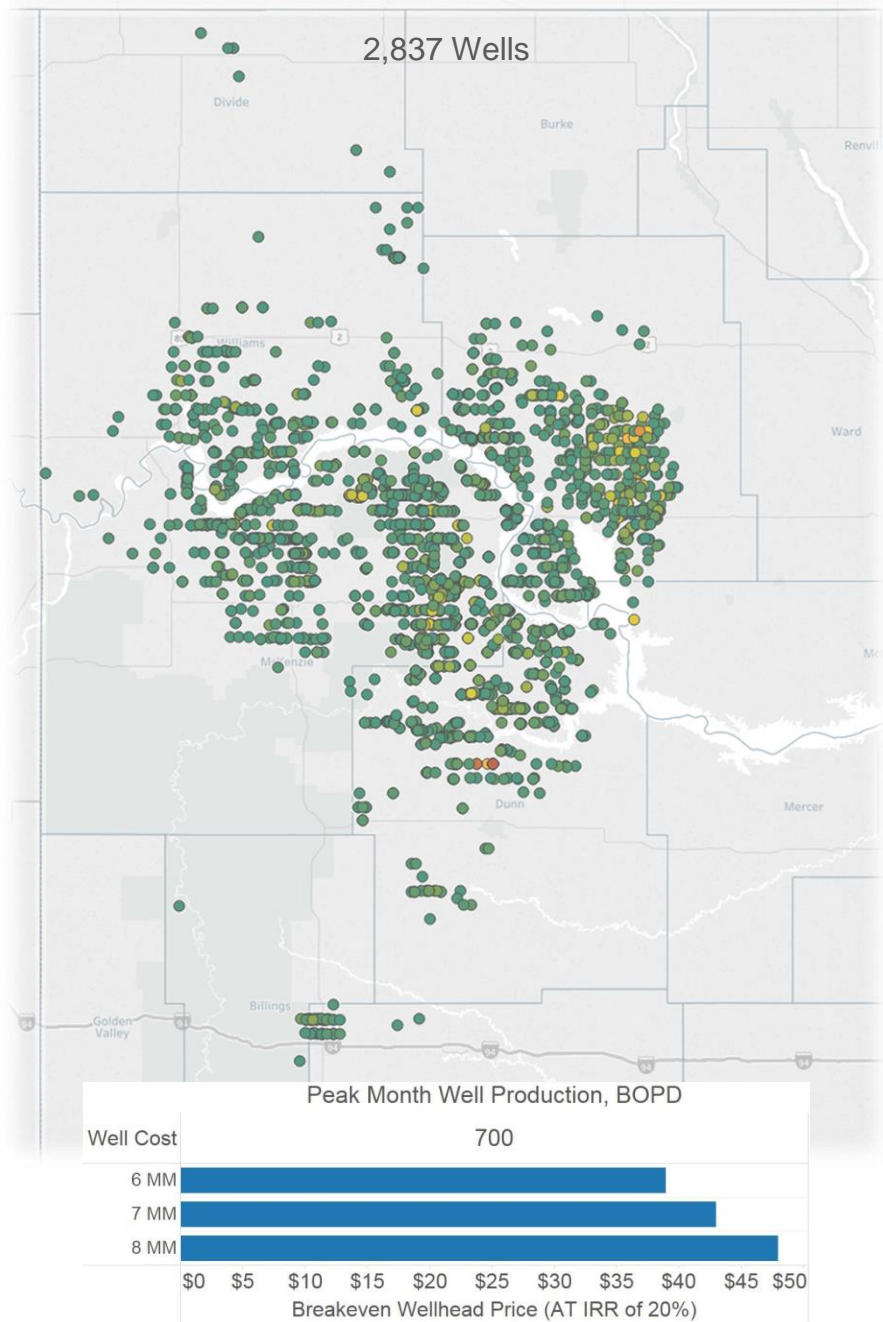


\$59 Wellhead

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Peak Month Minimum 700 BOPD

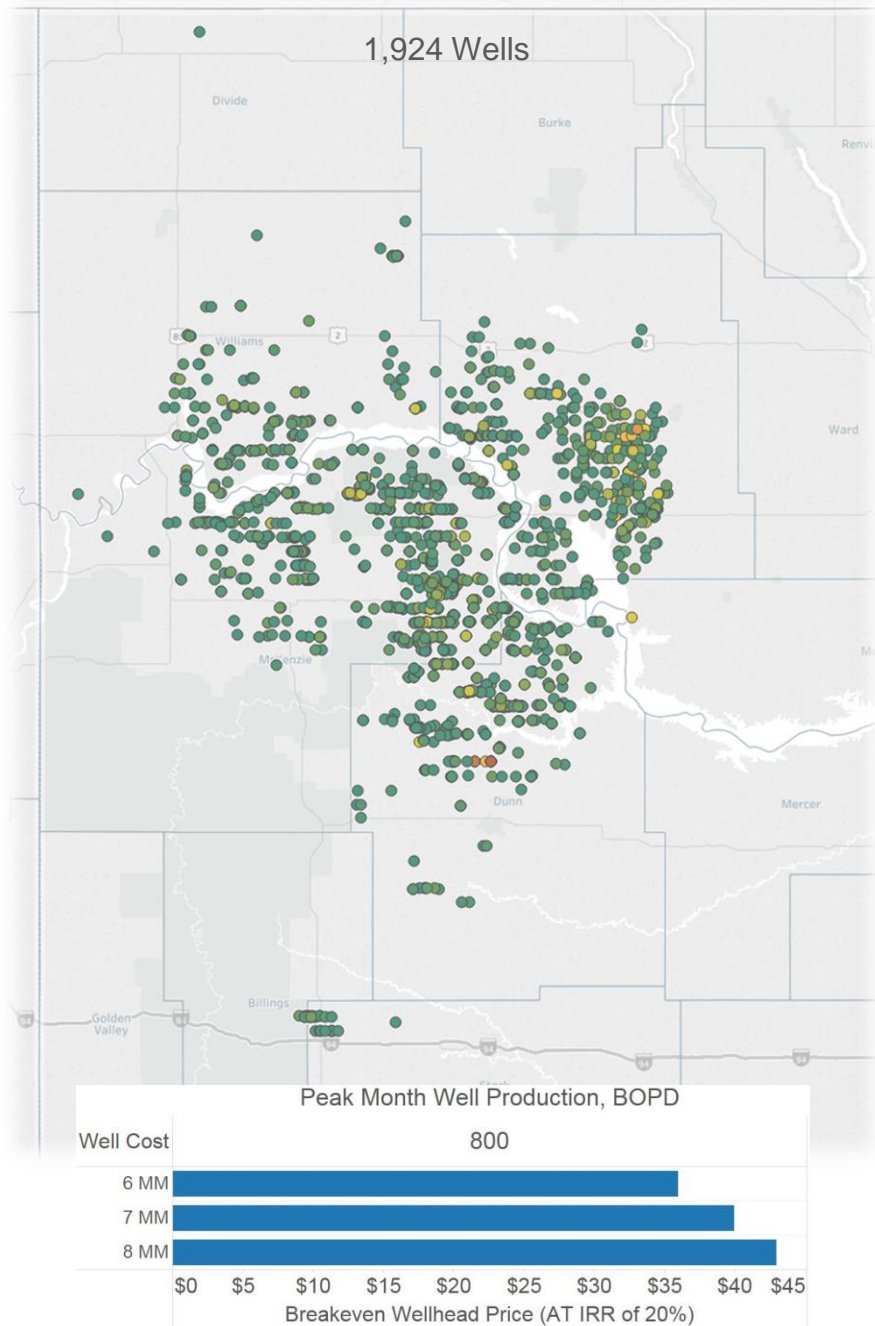


\$59 Wellhead

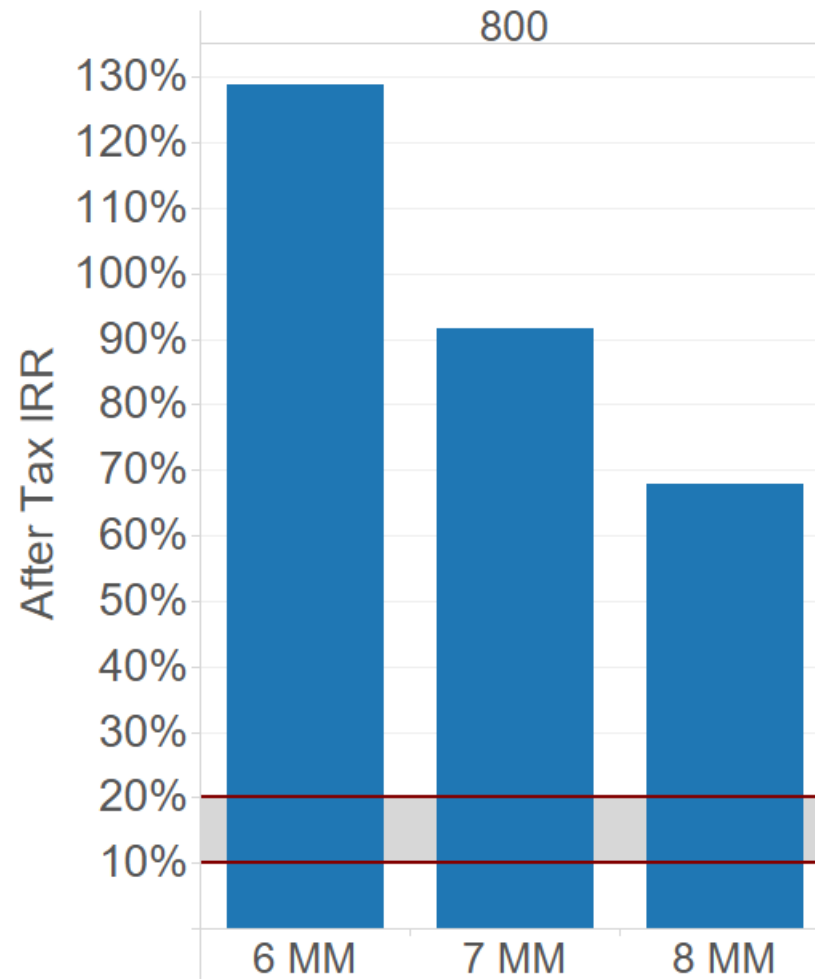
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Peak Month Minimum 800 BOPD



Peak Month BOPD / Well Cost
800

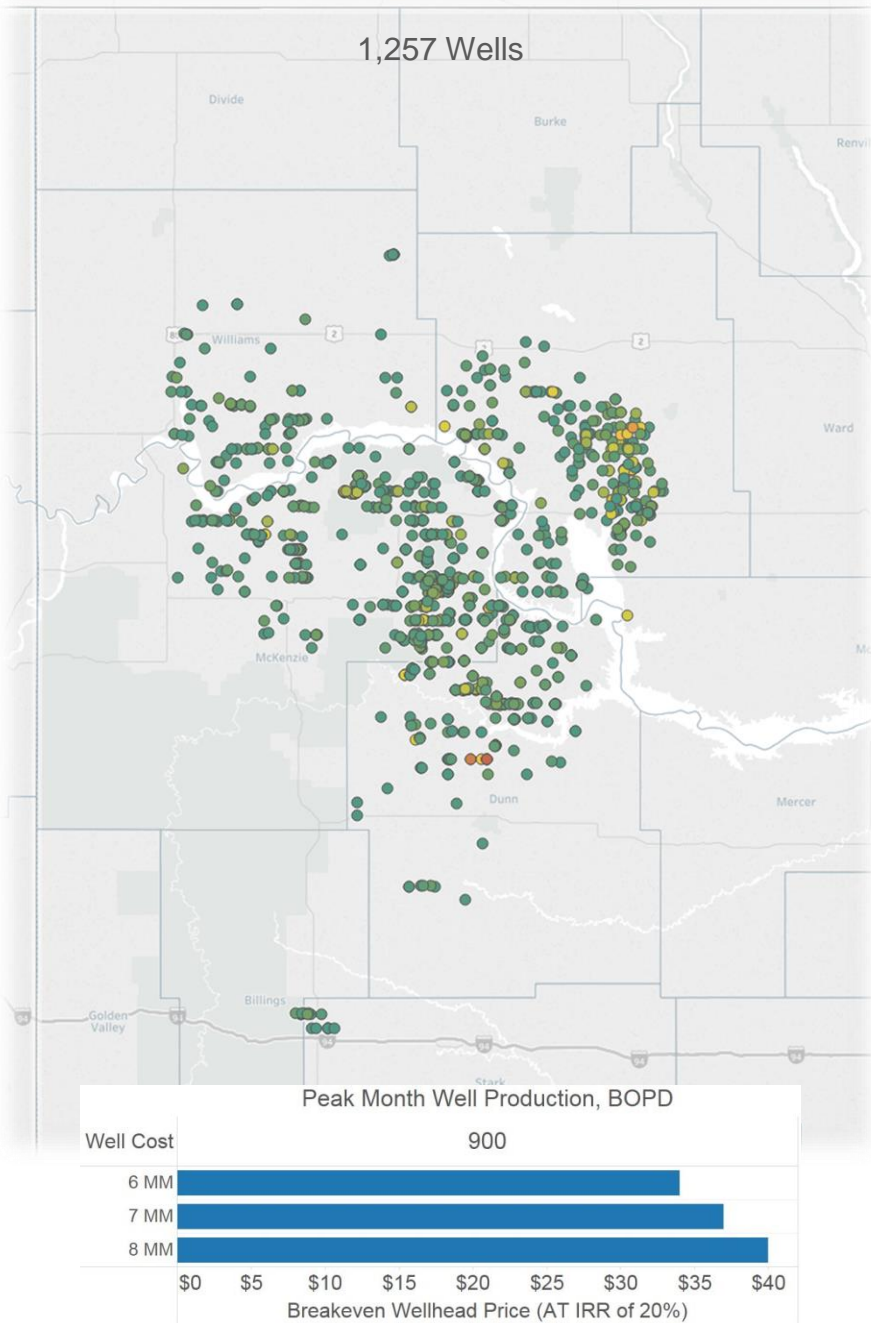


\$59 Wellhead

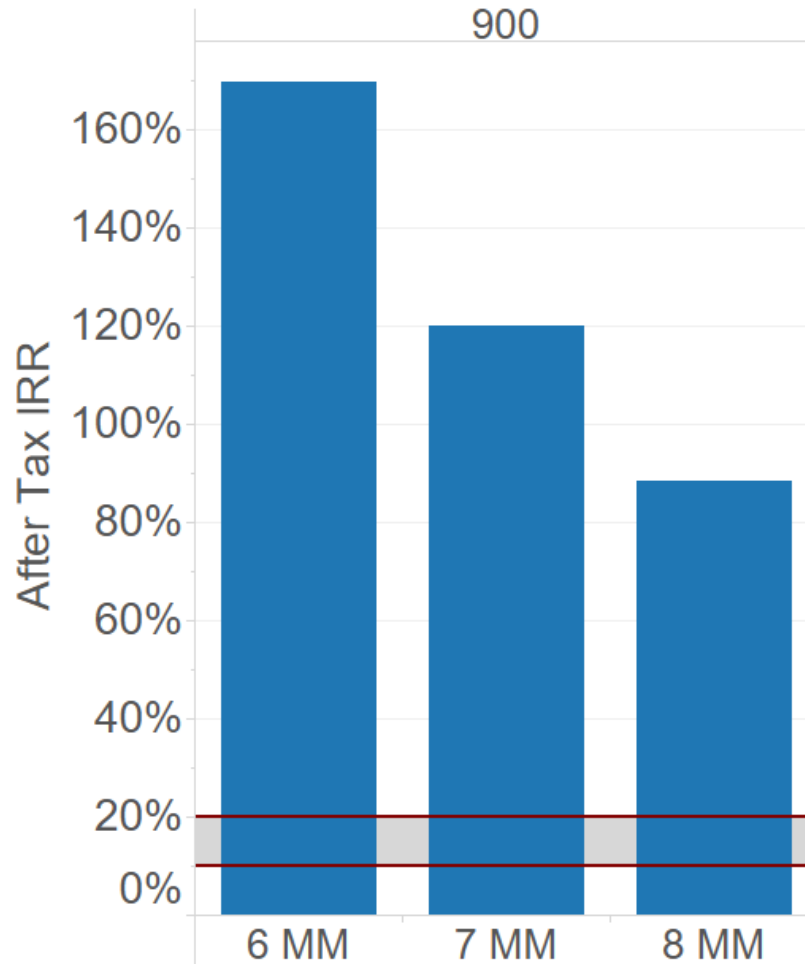
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Peak Month Minimum 900 BOPD



Peak Month BOPD / Well Cost
900

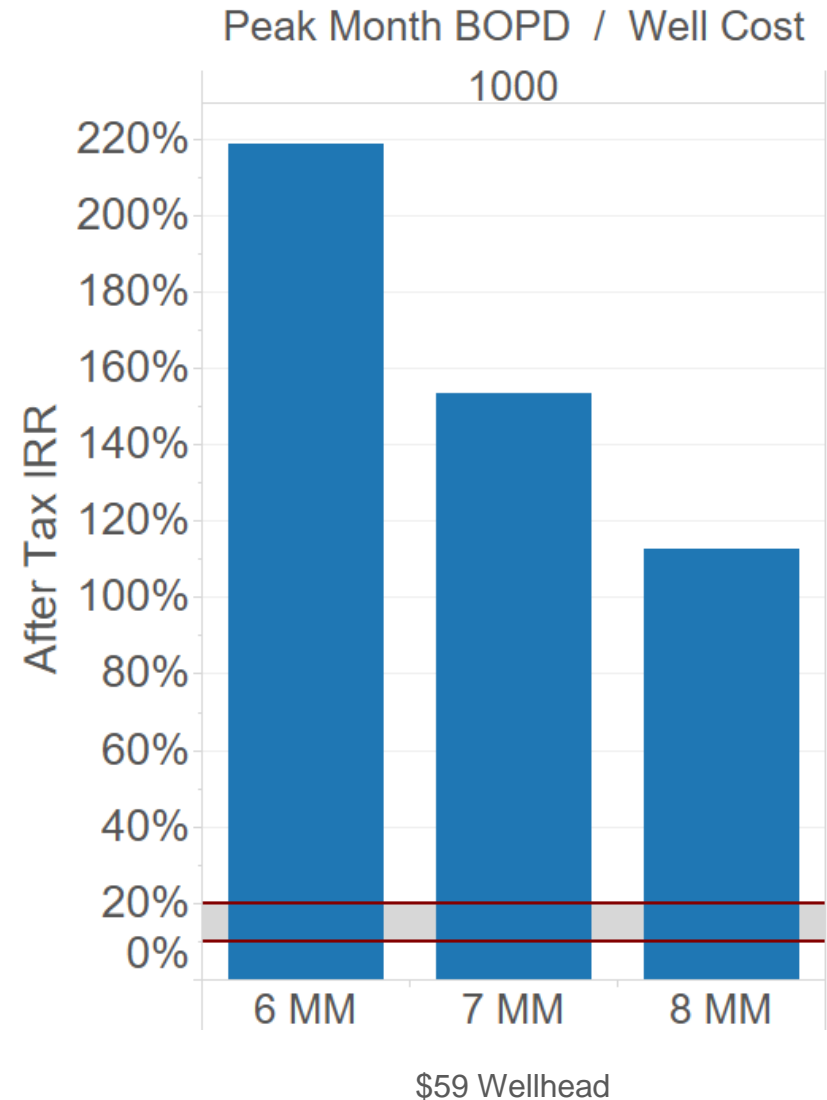
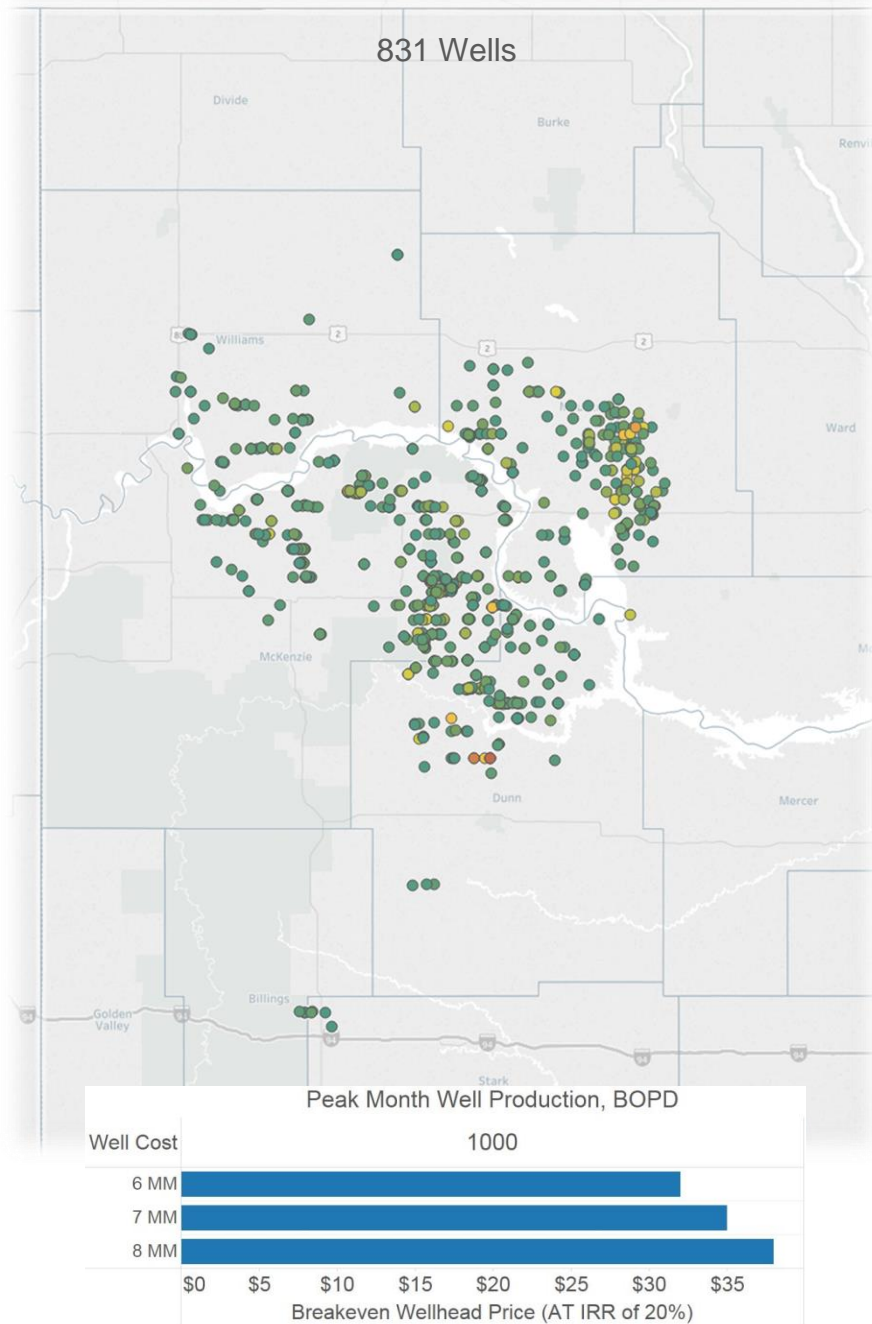


\$59 Wellhead

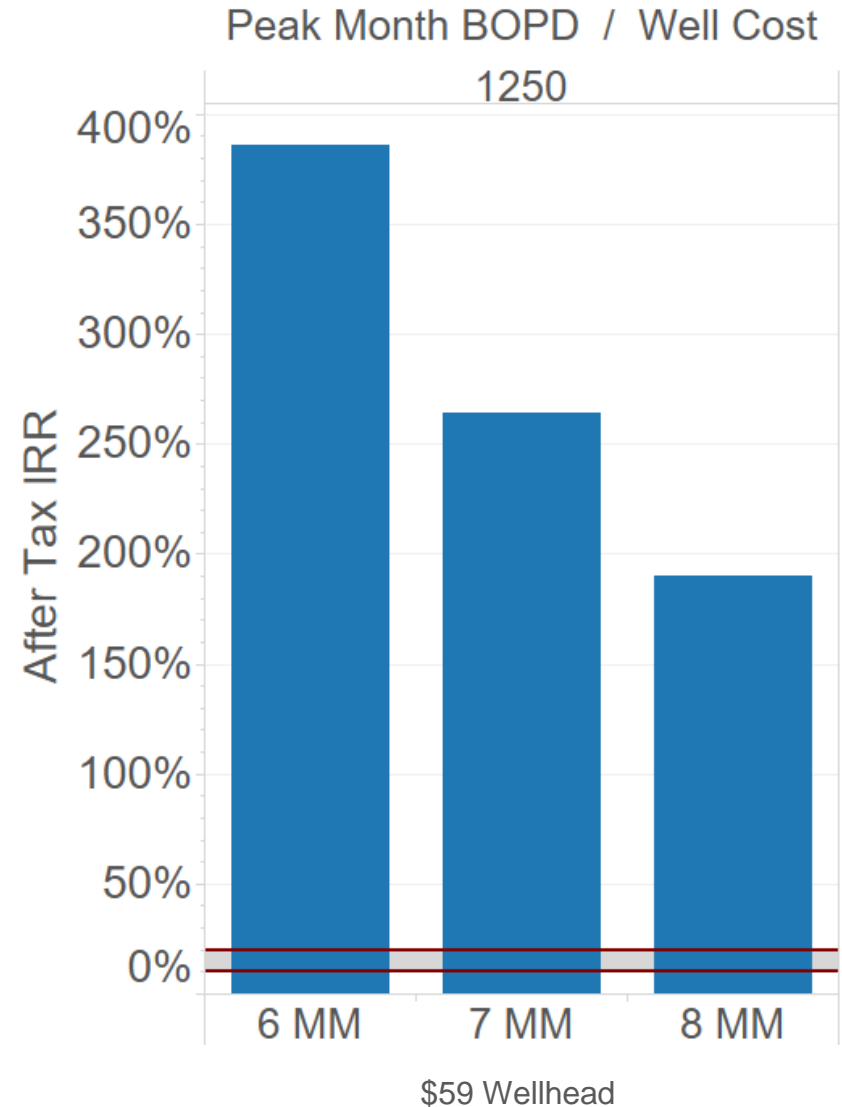
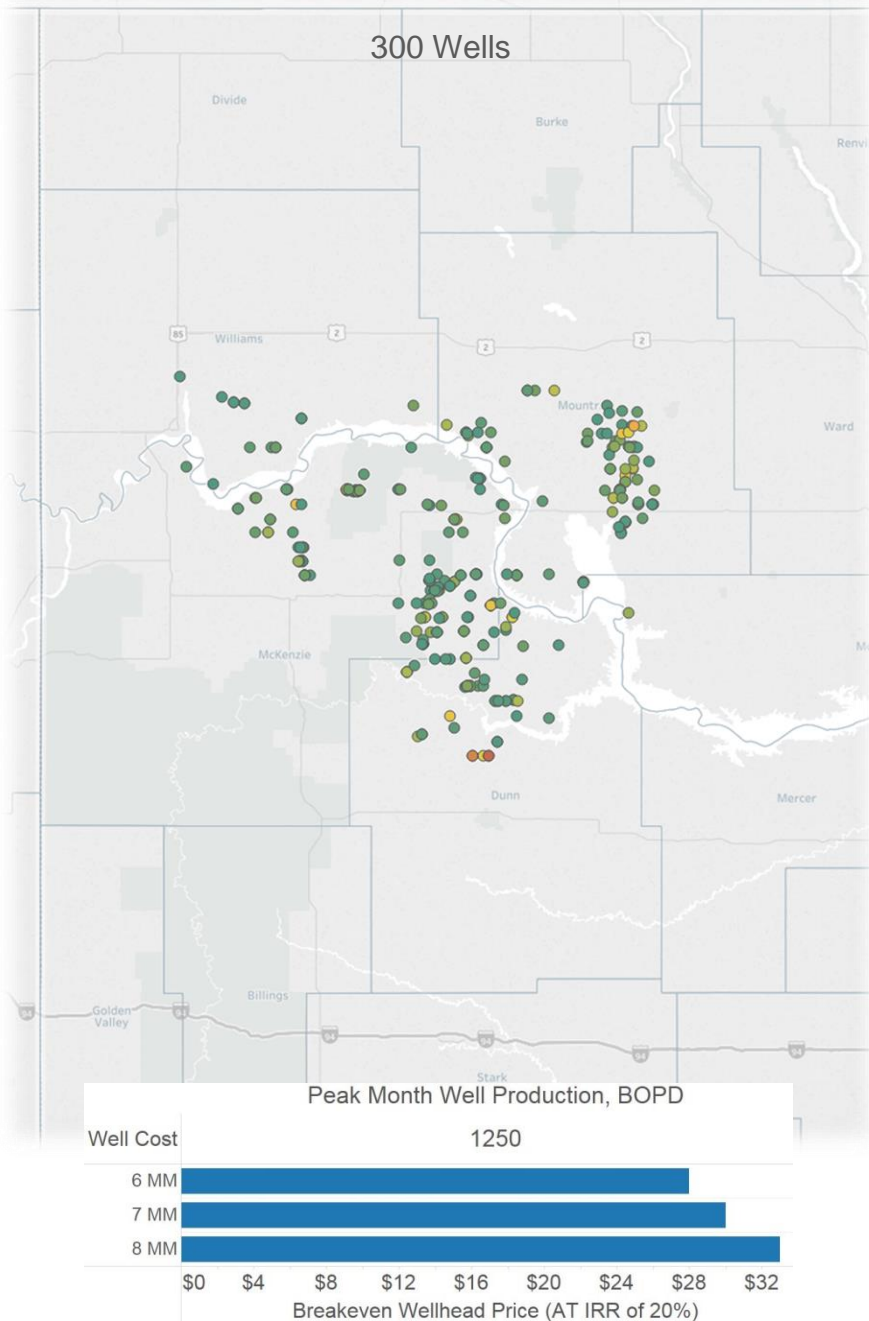
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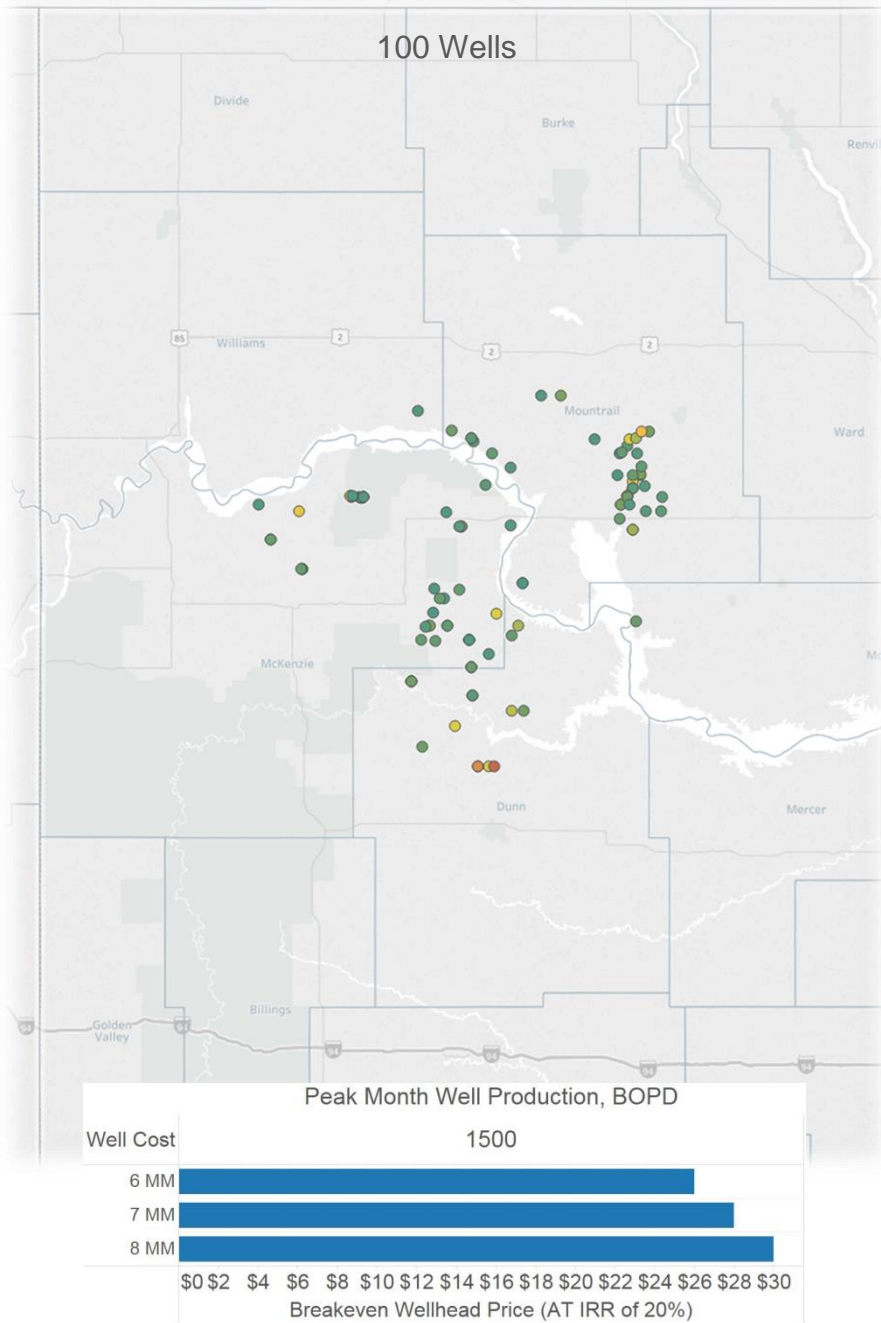
Peak Month Minimum 1,000 BOPD



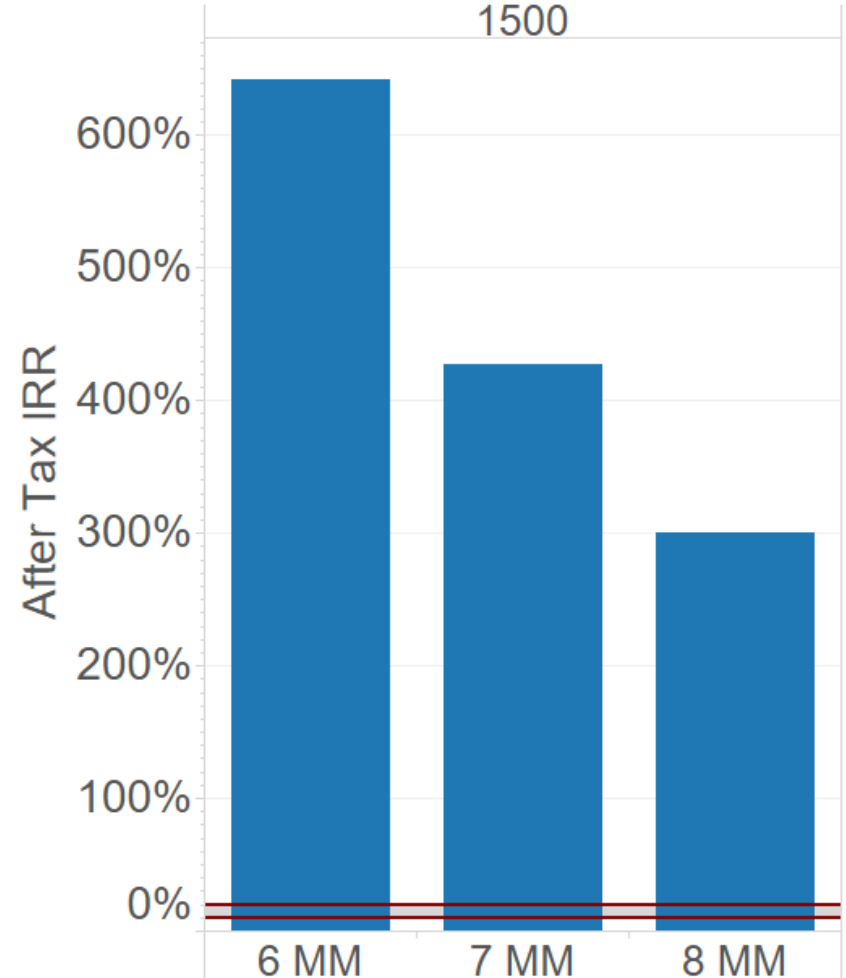
Peak Month Minimum 1,250 BOPD



Peak Month Minimum 1,500 BOPD



Peak Month BOPD / Well Cost
1500

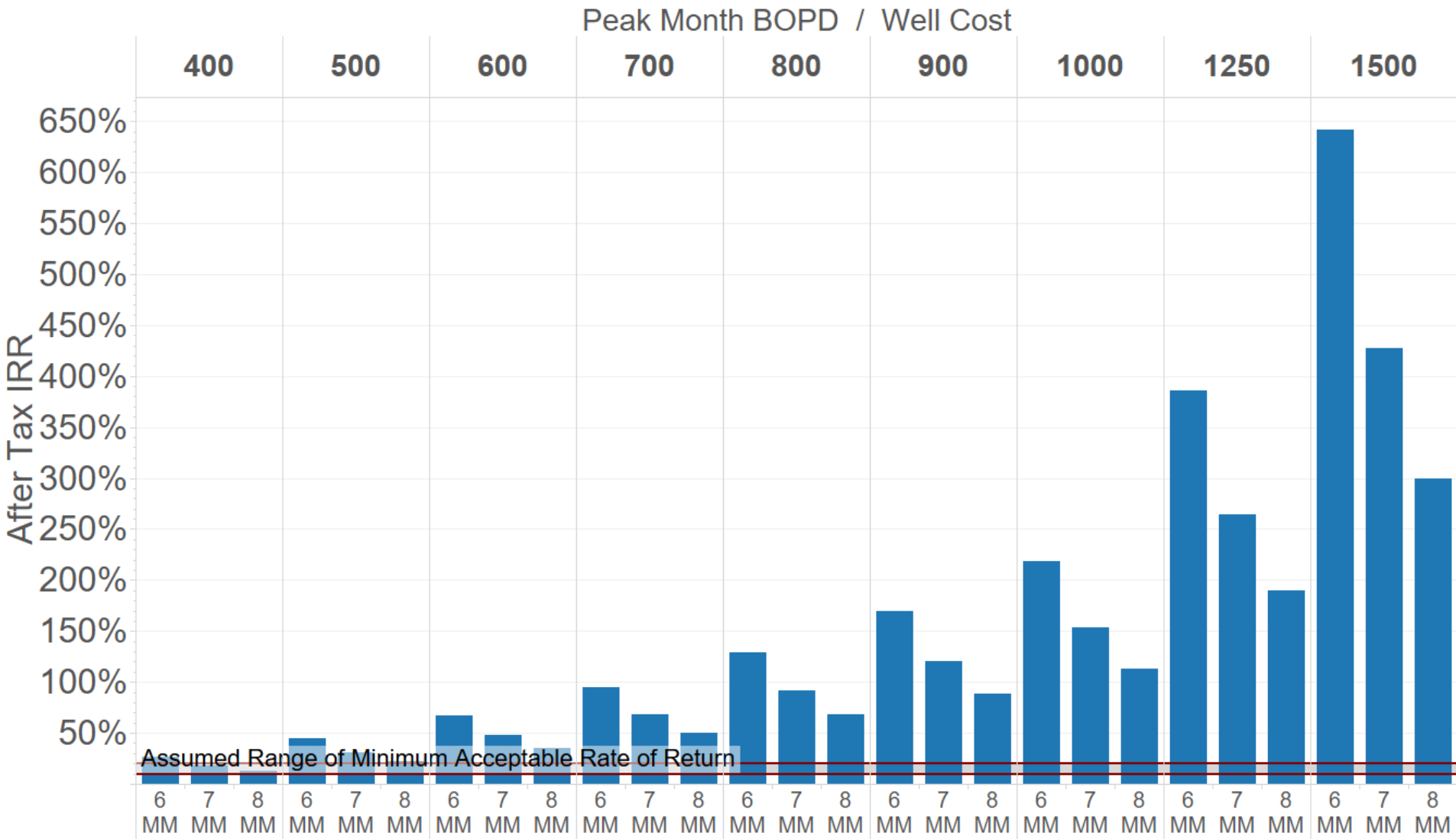


\$59 Wellhead

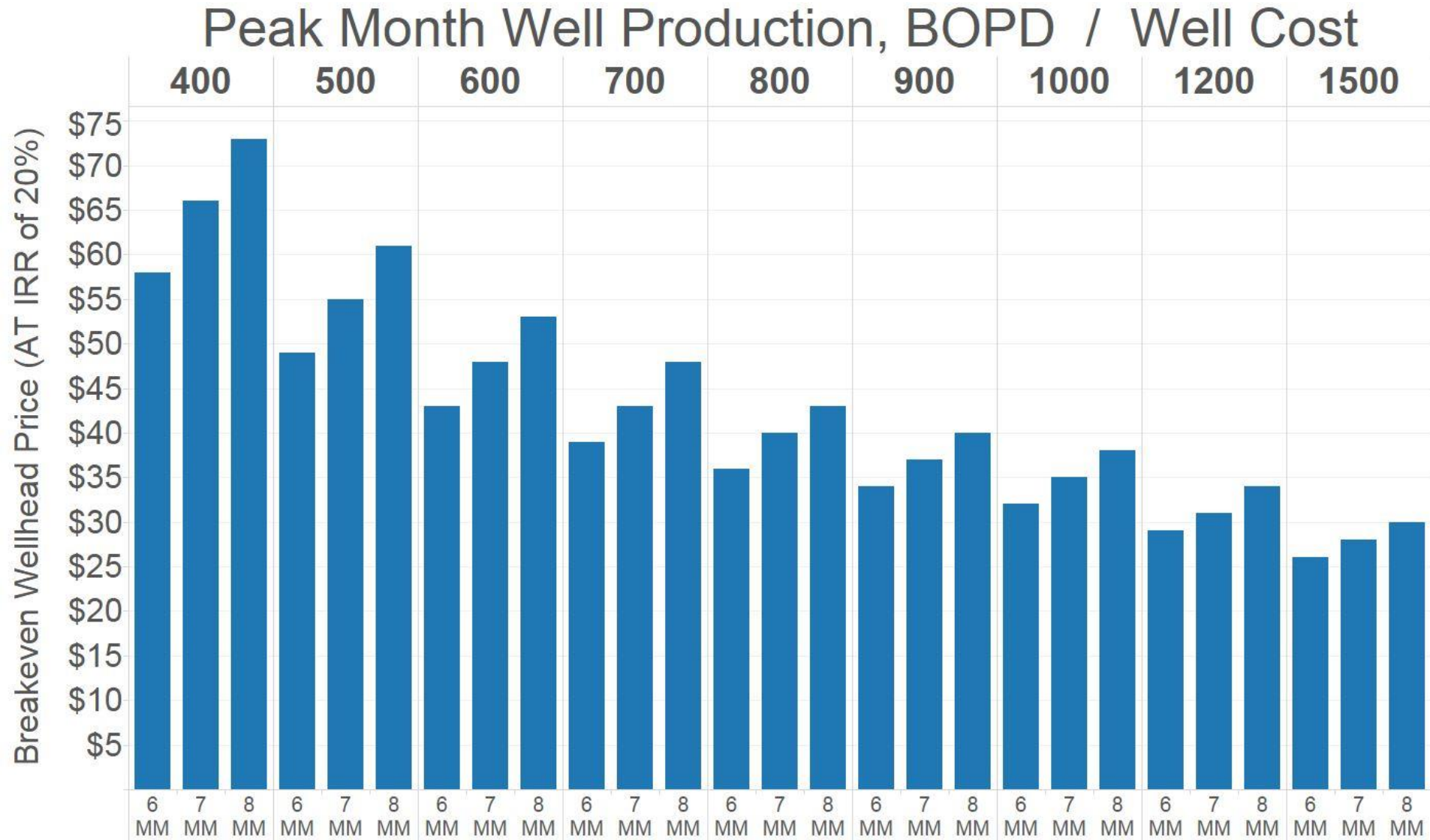
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Summary of \$59 Wellhead Oil



Breakeven Summary



Contact Information

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www.northdakotapipelines.com



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

