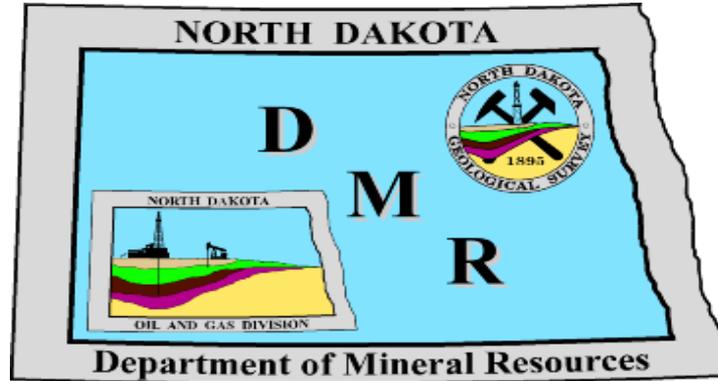


North Dakota Department of Mineral Resources



<http://www.oilgas.nd.gov>

<http://www.state.nd.us/ndgs>

600 East Boulevard Ave. - Dept 405

Bismarck, ND 58505-0840

(701) 328-8020 (701) 328-8000

Wells

14,457 active

1,830 conventional

12,627 Bakken/Three Forks

1,653 inactive

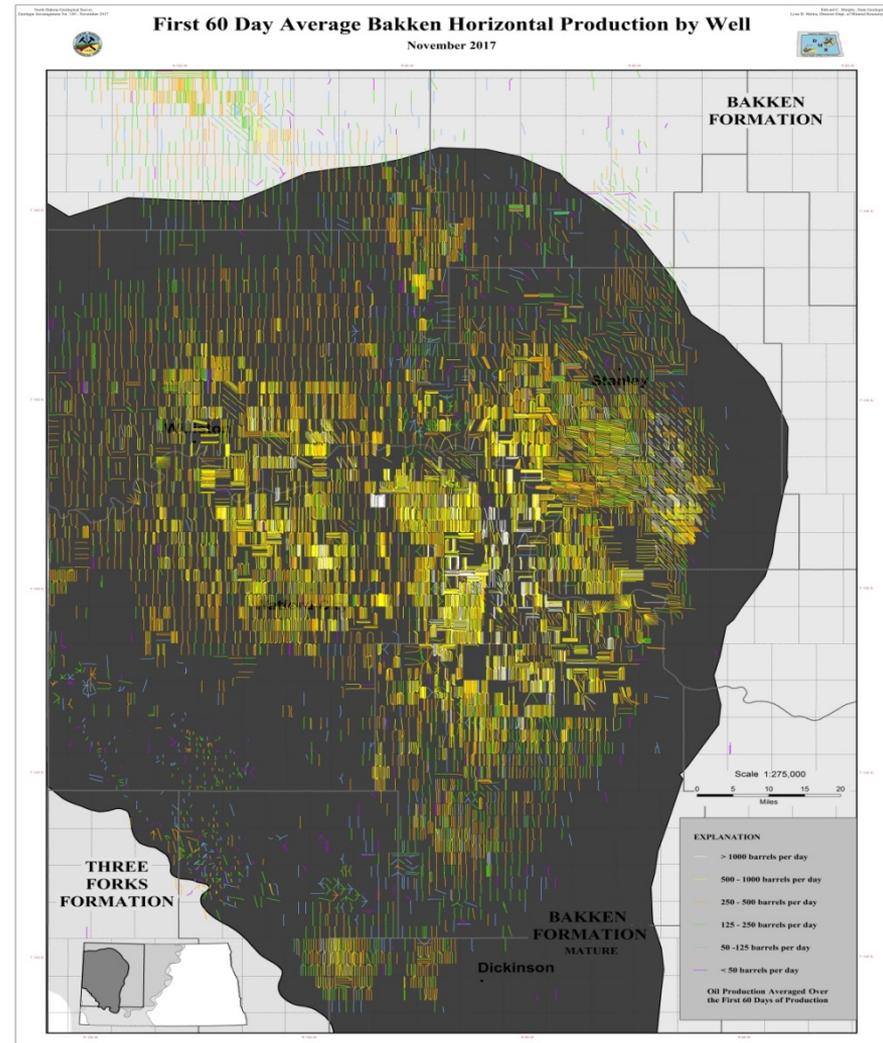
916 waiting on completion

1,888 permitted

13,451 increased density approved 04/17/18

32,022 total

55,000-65,000 estimated final



Impact Year End 2017

Wells drilled and completed - \$100 billion > \$330 billion to go

Wells drilled not yet completed - \$11 billion > \$1 billion

Natural Gas gathering and processing - \$13 billion > \$15 billion

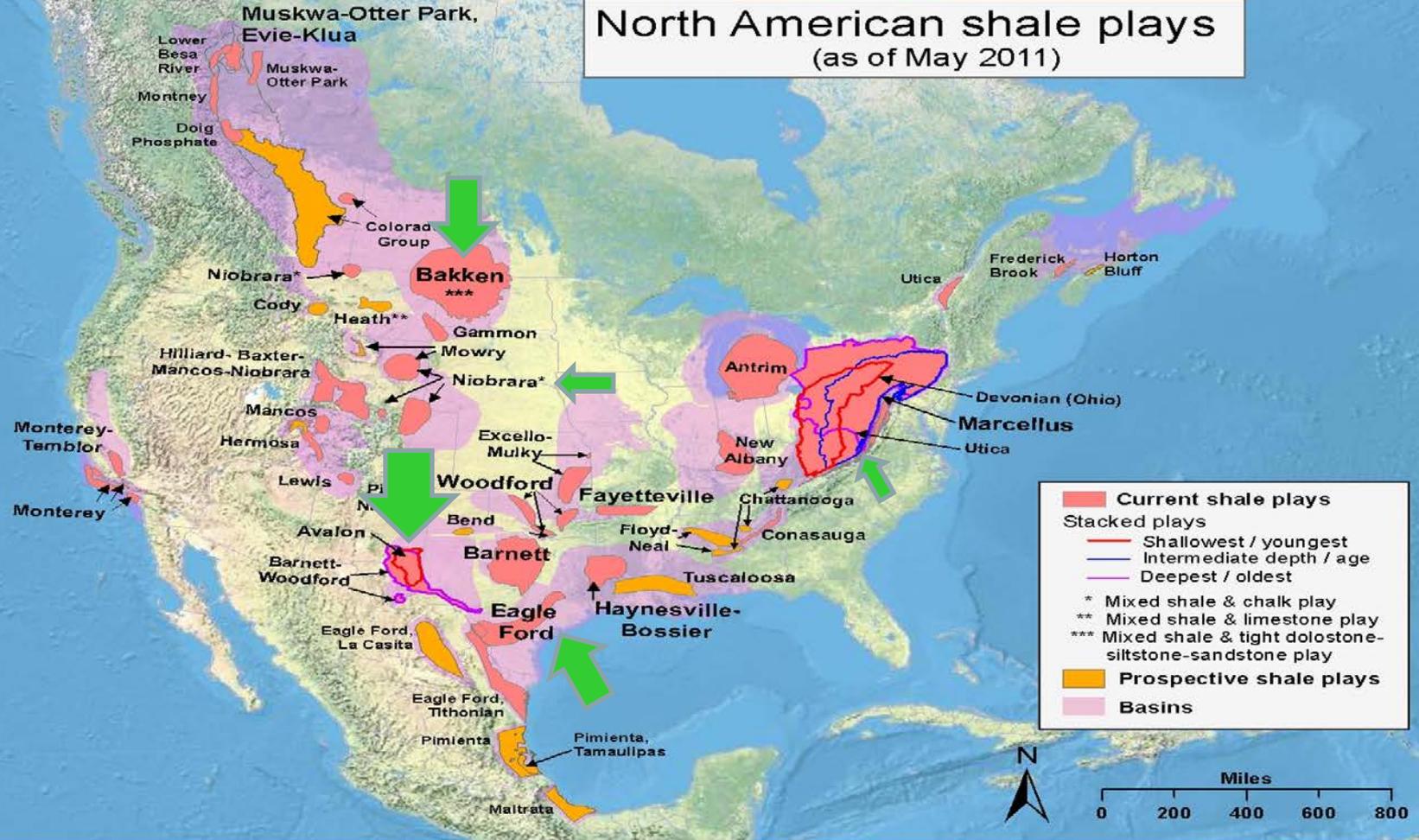
Rail and rail transportation facilities - \$1.25 billion

Crude Oil transmission pipelines - \$2 billion > \$2 billion

Total estimate - \$127 billion > \$348 billion to go = \$475 billion

This does not include investments in housing and infrastructure made by private firms and state-local-federal government.

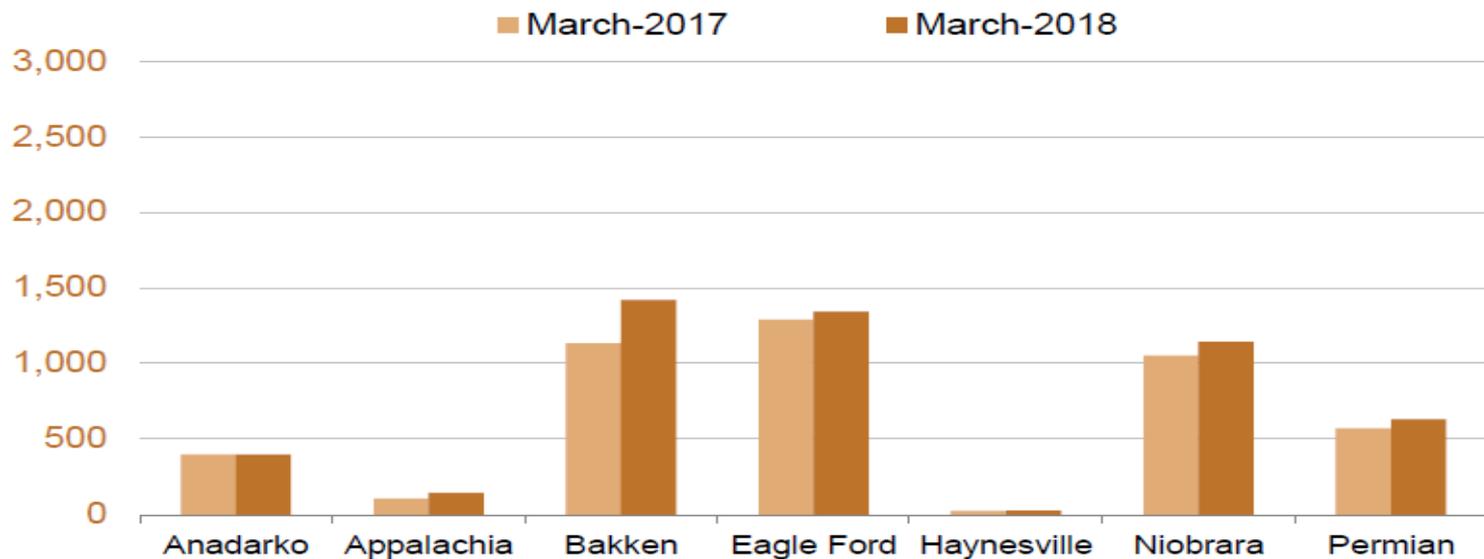
North American shale plays (as of May 2011)



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

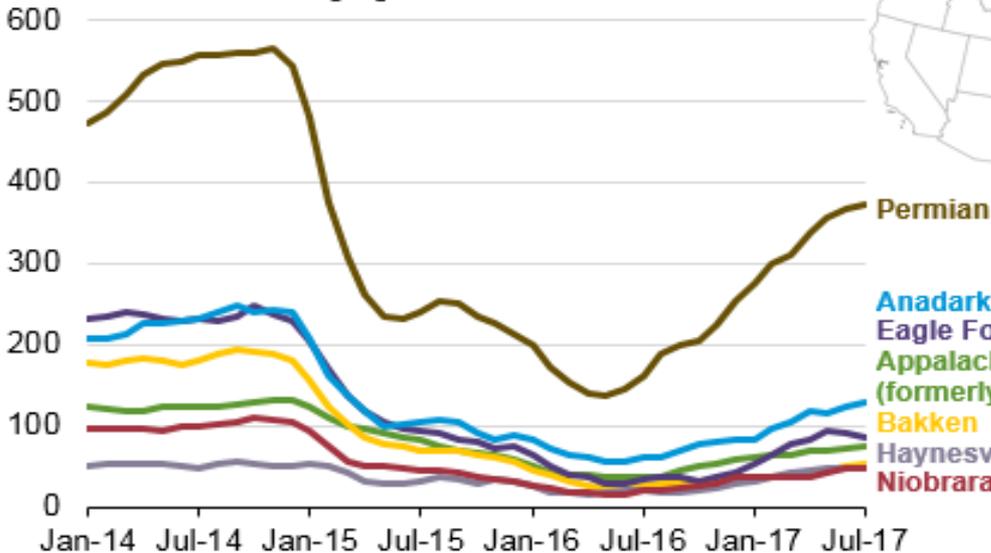
New-well oil production per rig

barrels/day



Rig count in EIA's *Drilling Productivity Report* regions

number of active drilling rigs



Drilling Rigs This Week

Permian 467

Anadarko 83

Appalachia 79

Eagle Ford 77

Bakken 65

Haynesville 54

Niobrara 24



Taxes

Permian – 3.75% to 7.5%

Anadarko – 7%

Eagle Ford – 7.5%

Appalachia – 0.2%

Bakken – 10%

Haynesville – 5% to 7.5%

Niobrara – 3% to 6%

Federal & Tribal Lands

Permian – <2%

Anadarko – <2%

Eagle Ford – <2%

Appalachia – <2%

Bakken – 9% to 30%

Haynesville – 2% to 9%

Niobrara – 36% to 48%

ND Potential unconventional oil

17 Source Rock formations

Spearfish 1

Charles 2

Tyler 1

Mission Canyon 2

Lodgepole 1 Bakken 2

Birdbear 1

Duperow 1

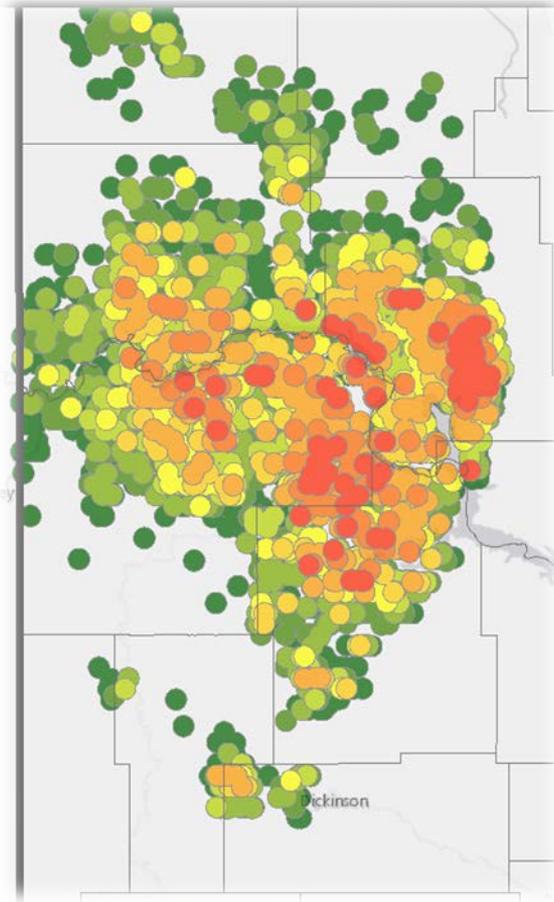
Winnipegosis 1

Stony Mountain 1

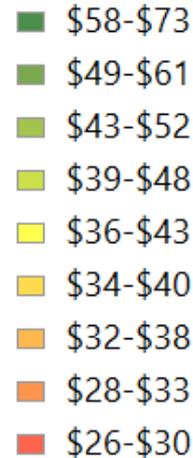
Red River 2 Winnipeg 1

Deadwood 1

Bakken Breakeven Price Range (20% IRR)



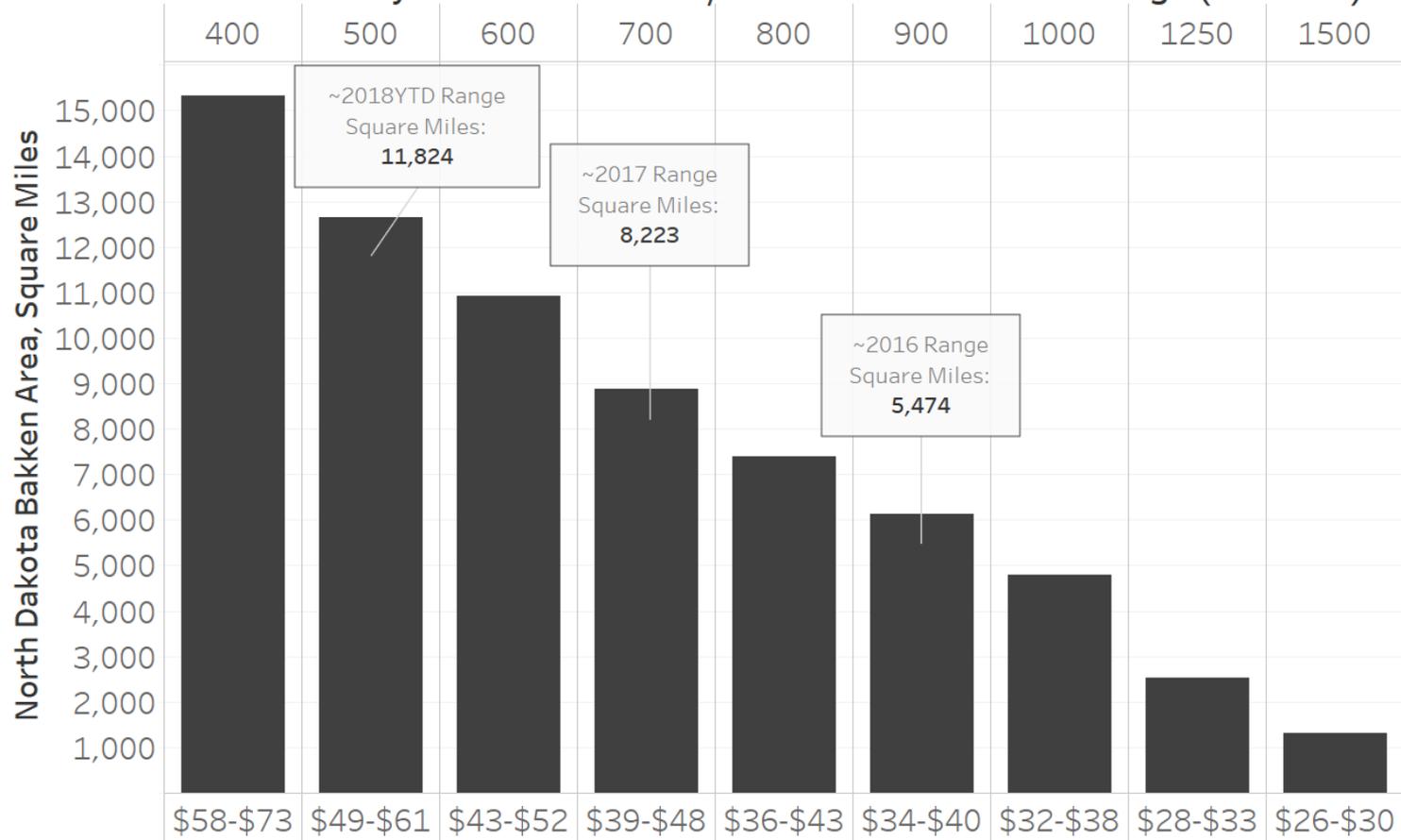
Bakken Breakeven
Prices
\$6 - \$8 Million
Completed Wells Cost

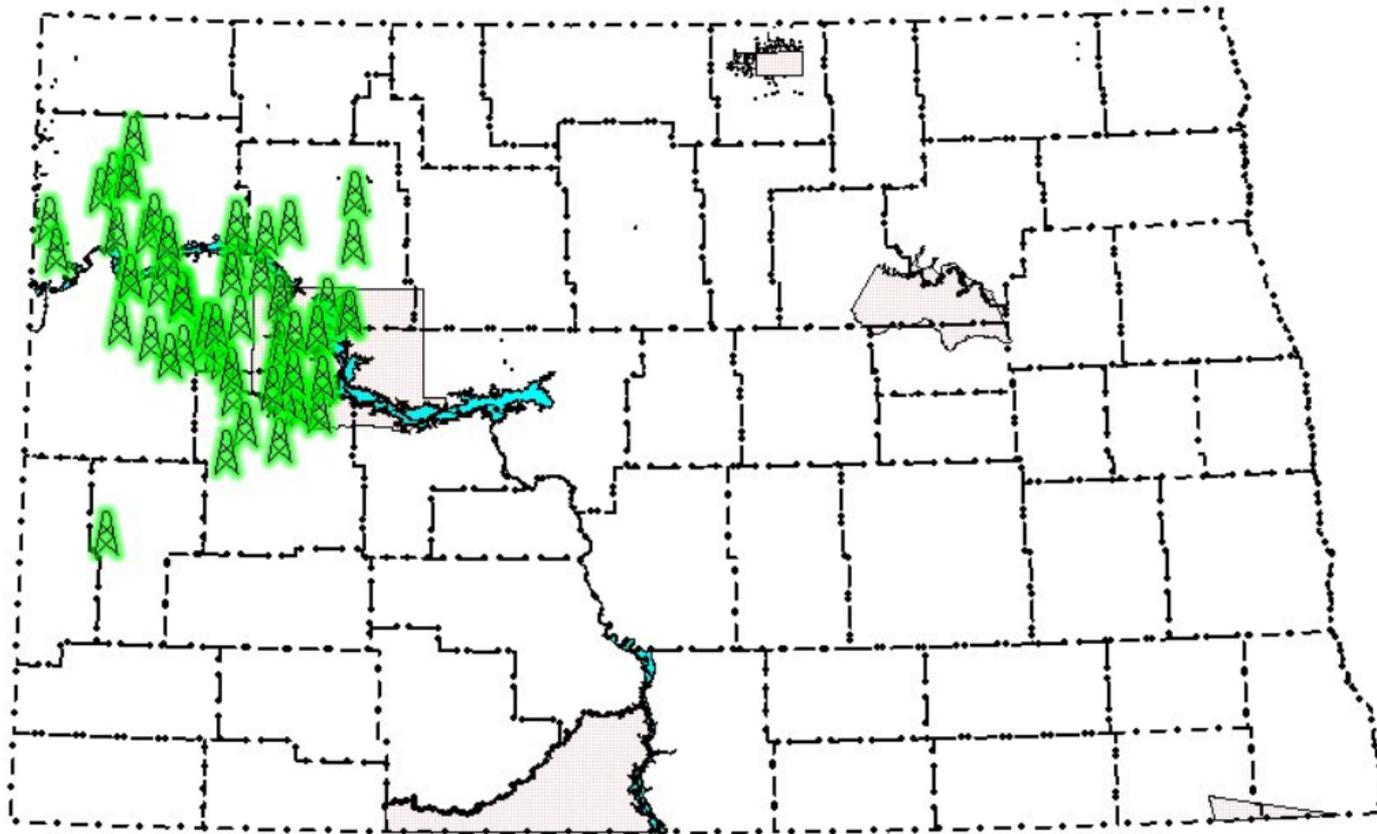


Background Map: Esri, HERE, DeLorme, MapmyIndia, ©
OpenStreetMap contributors, and the GIS user community

44% Economic Area Increase 2017 to 2018

Peak 30-Day Production Level / Wellhead Breakeven Range (20% IRR)

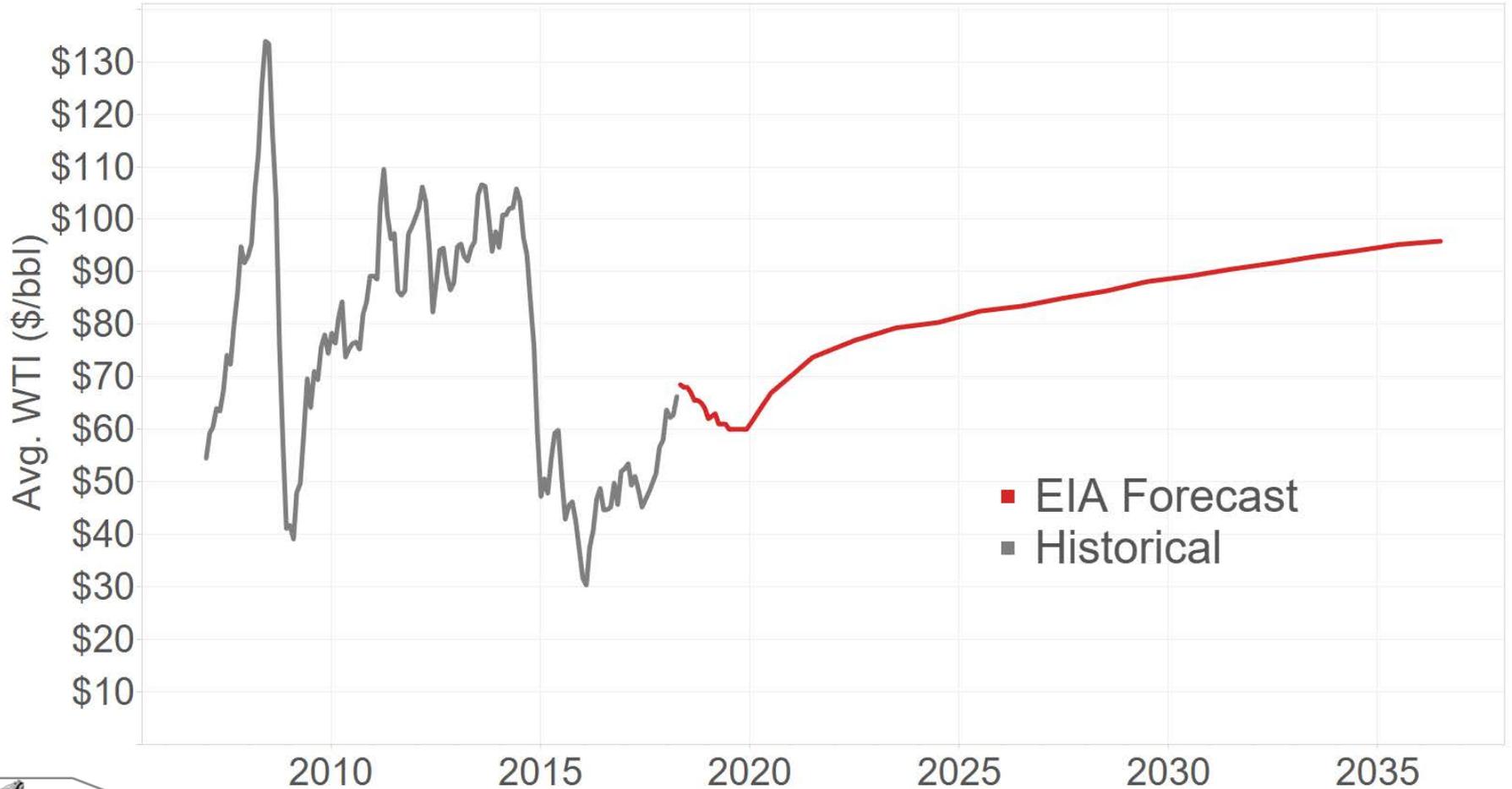




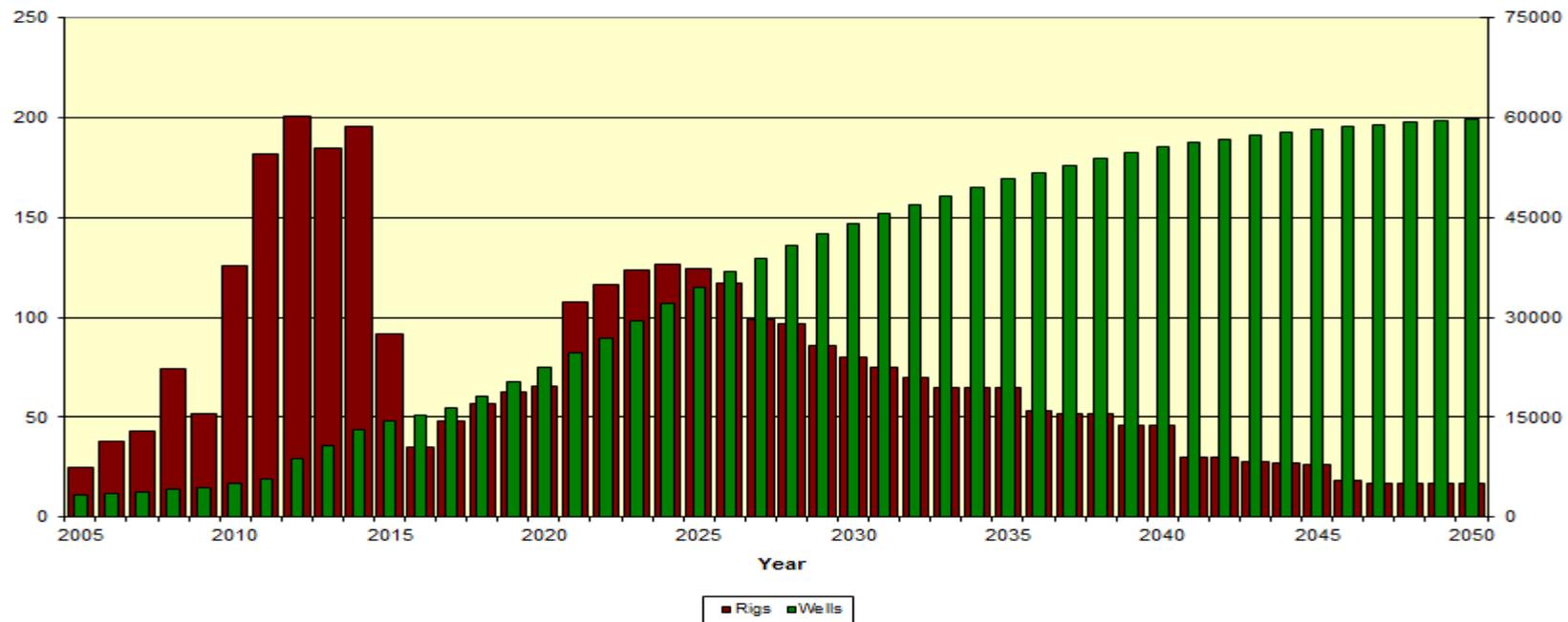
65 rigs drilling – May 2018

0 88mi

DOE-EIA Forecasted Oil Price



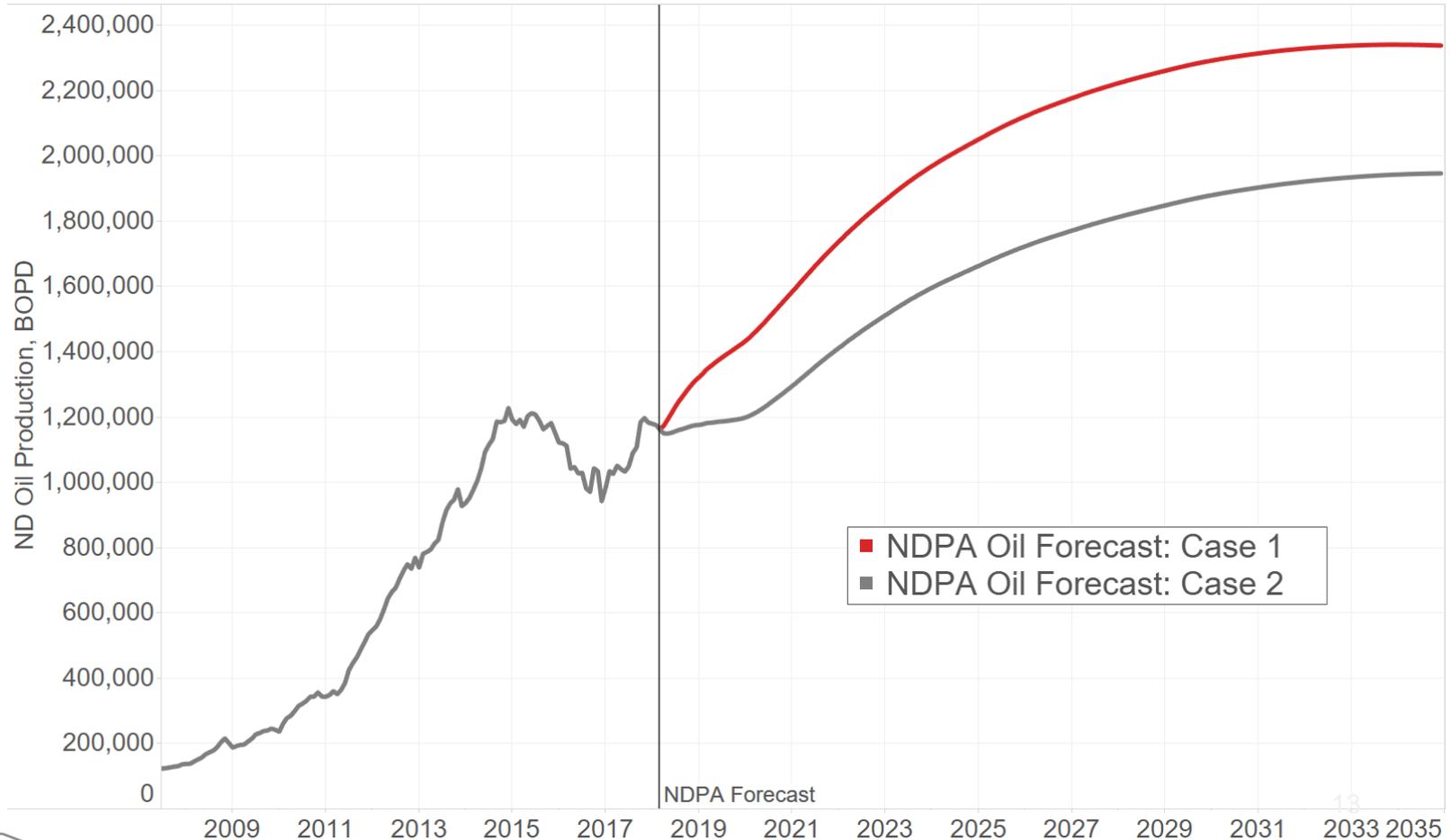
North Dakota Rigs and Wells



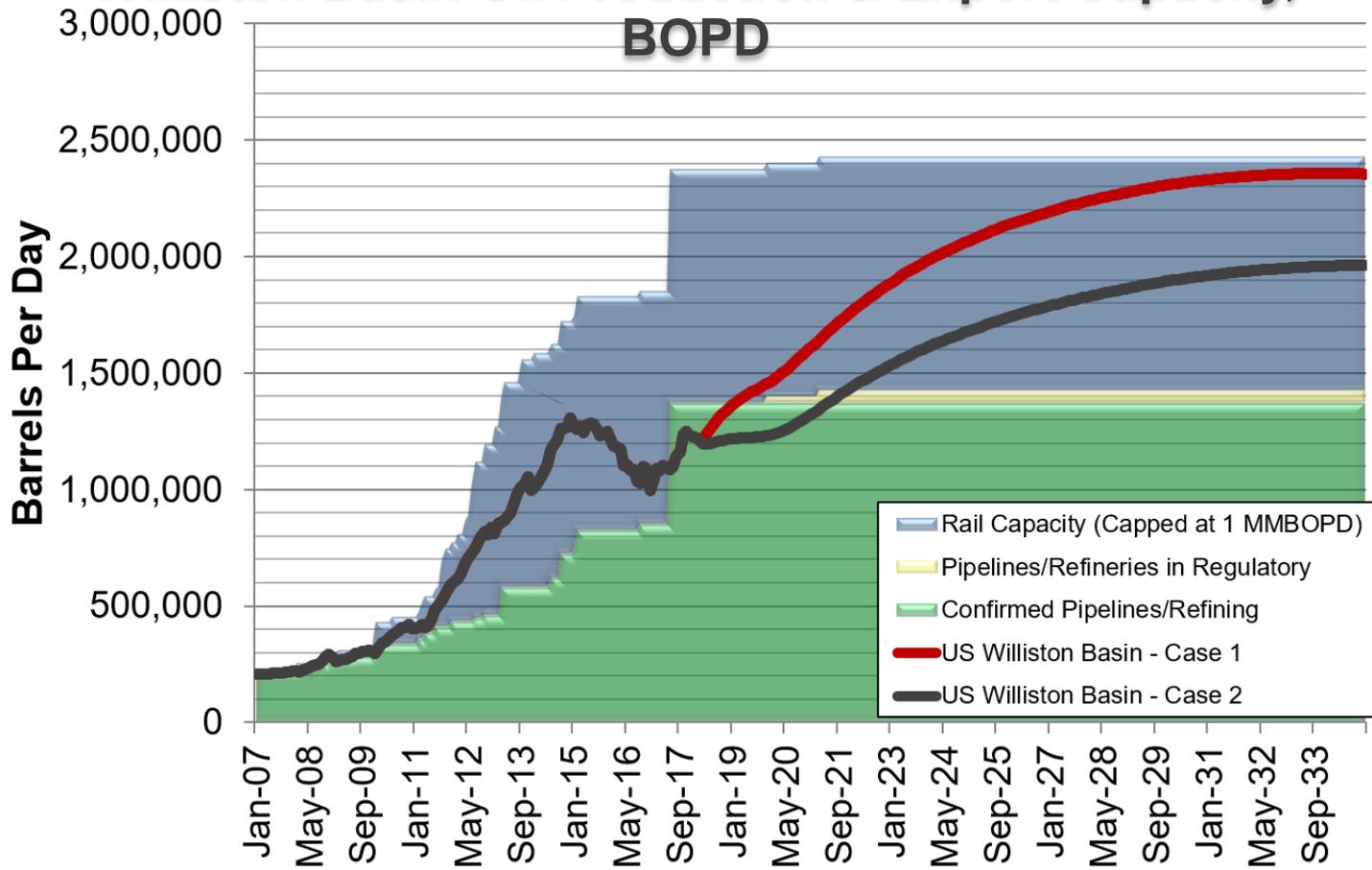
North Dakota Forecast Activity Assumptions



North Dakota Oil Production Forecast



Williston Basin Oil Production & Export Capacity, BOPD



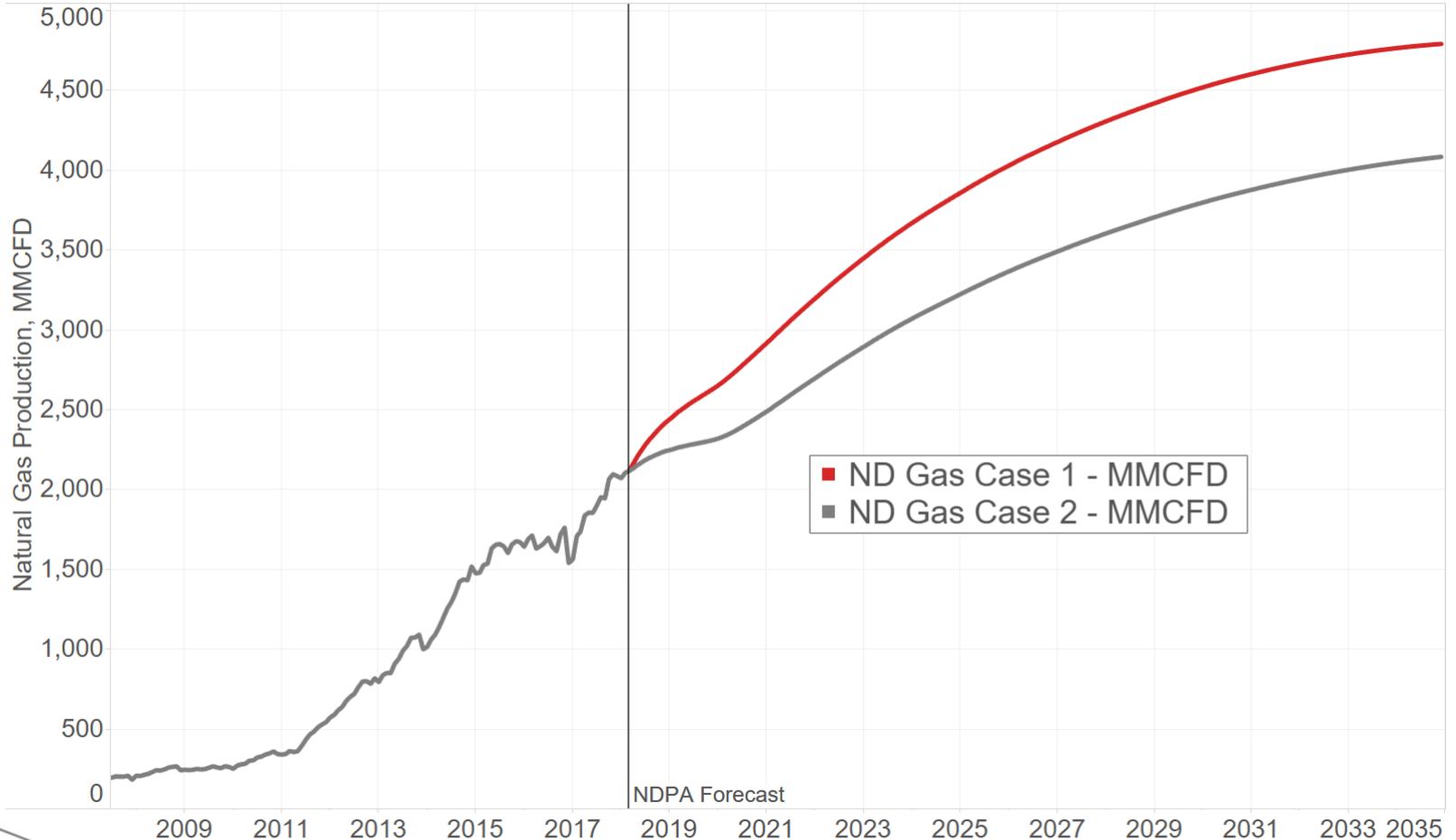
Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.



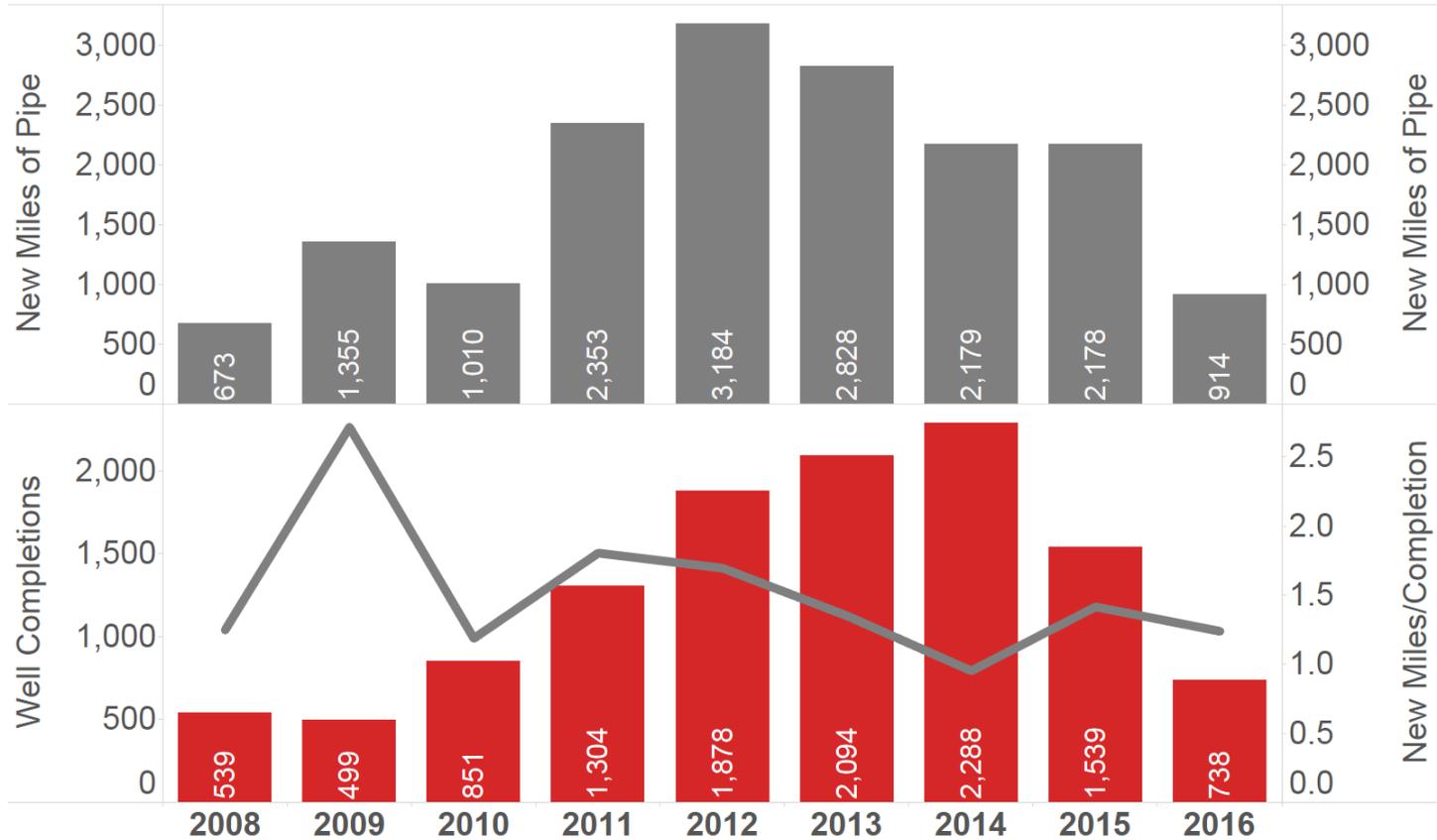
Statewide Bakken/Three Forks GOR



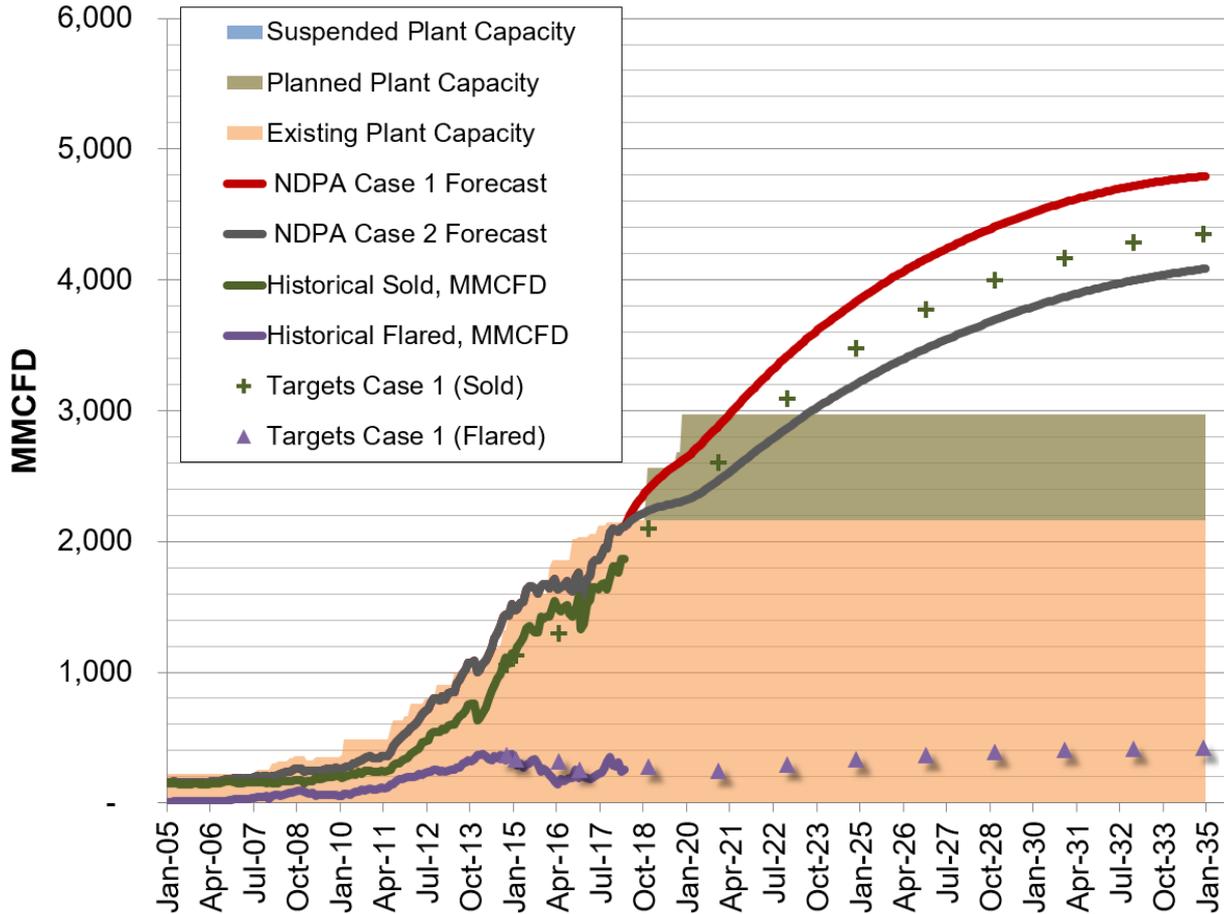
NDPA North Dakota Gas Production Forecast



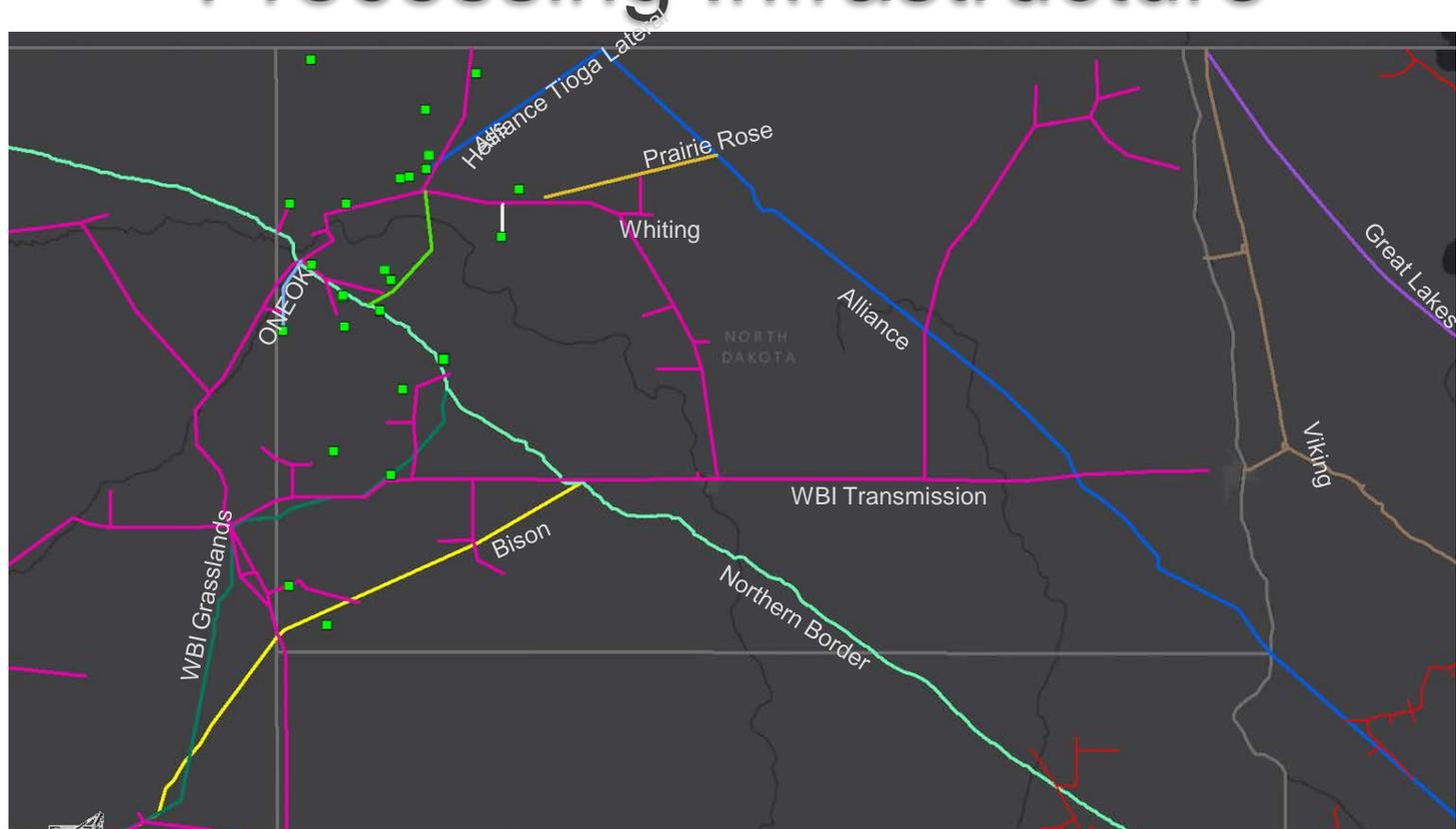
New Miles and Well Completions



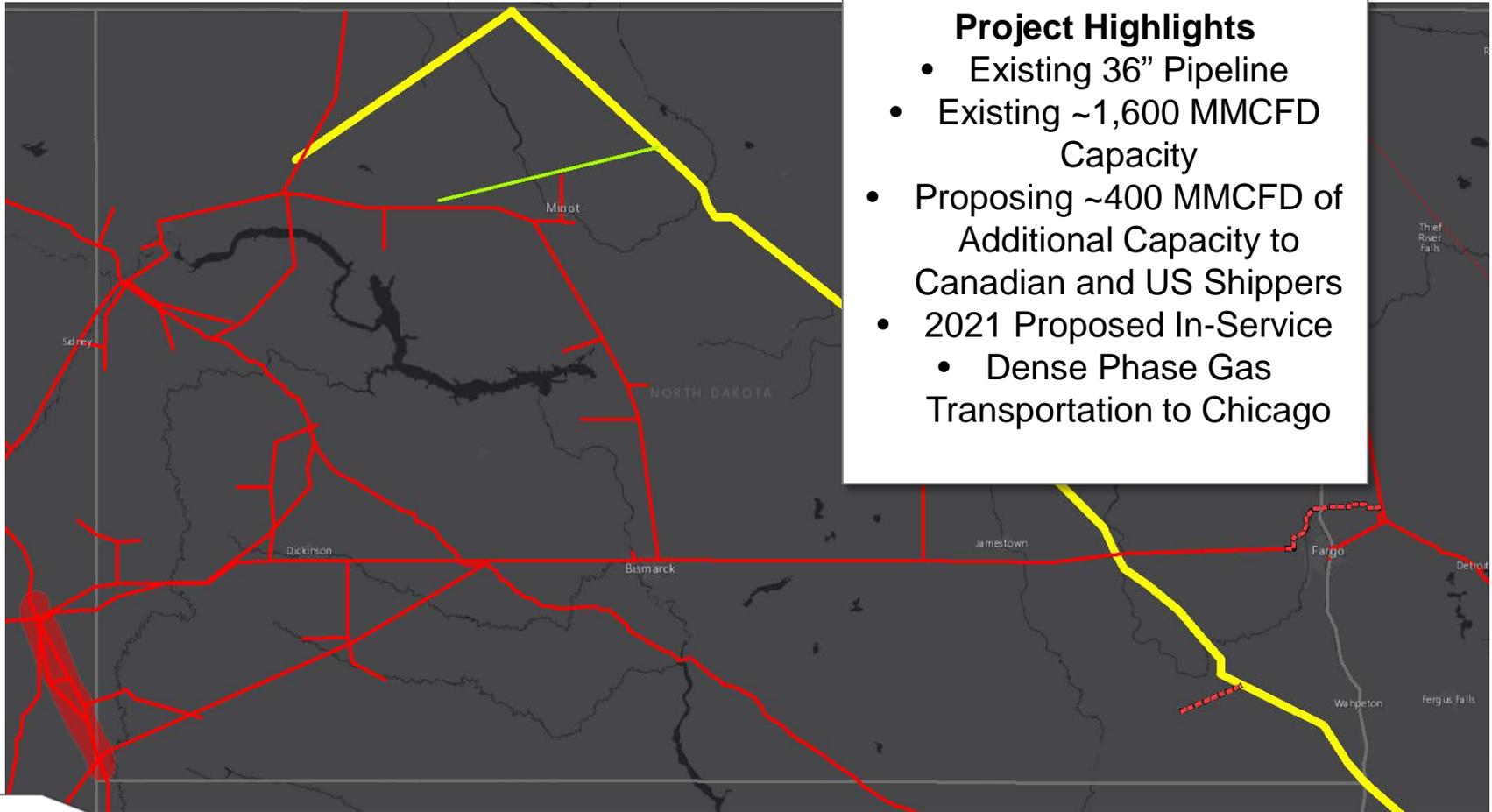
Solving the Flaring Challenge



Major Gas Pipeline and Processing Infrastructure



Alliance Pipeline Open Season

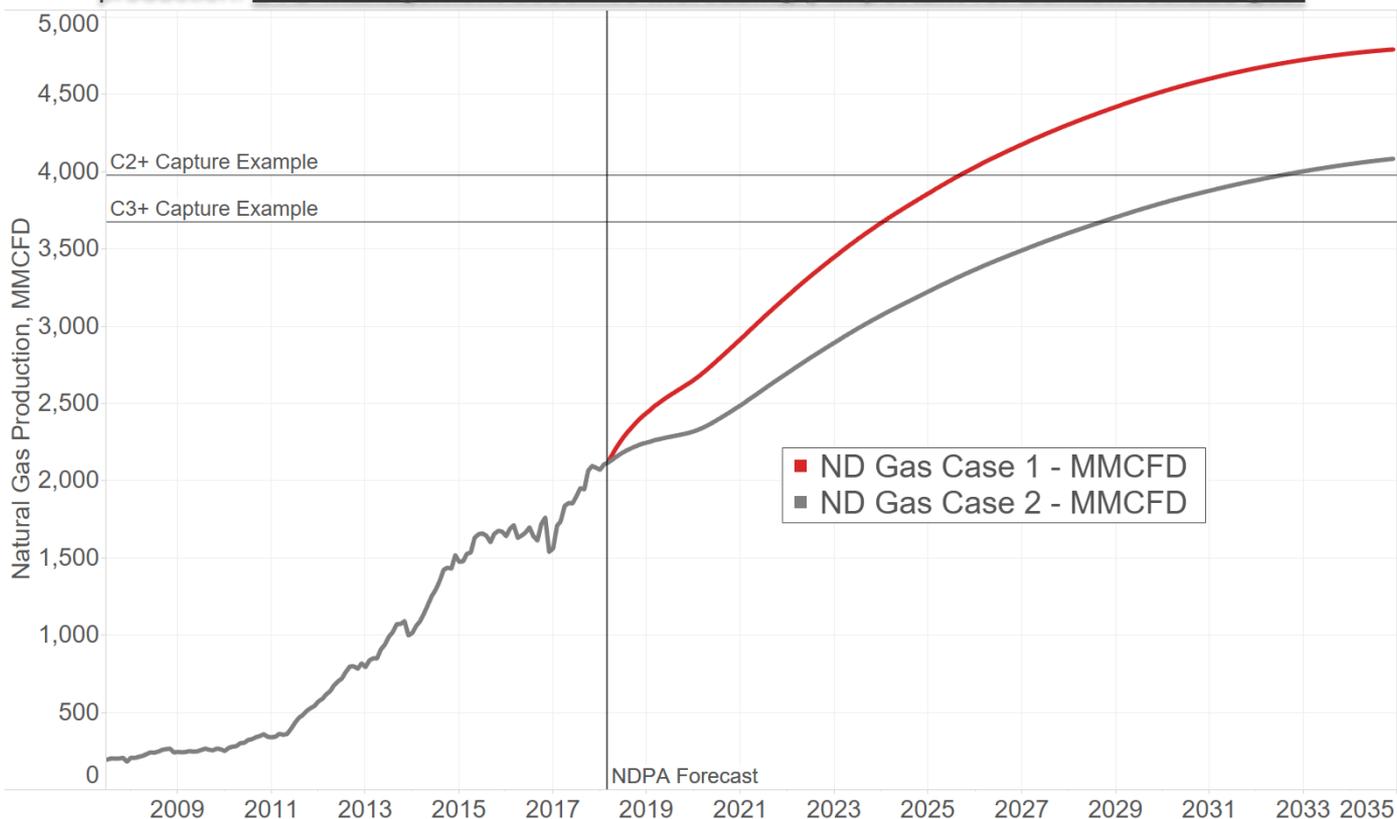


Project Highlights

- Existing 36" Pipeline
- Existing ~1,600 MMCFD Capacity
- Proposing ~400 MMCFD of Additional Capacity to Canadian and US Shippers
- 2021 Proposed In-Service
 - Dense Phase Gas Transportation to Chicago

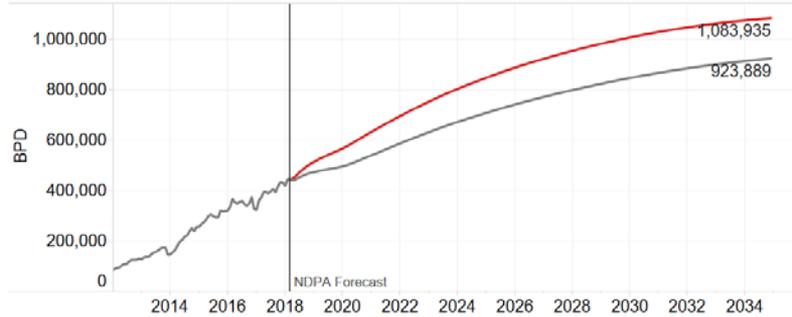
Simplified Example NB Calculations

Conclusion: **IF** no other gas export options open and all other deliveries on other pipelines stay static, ND gas production could increase 1.56-1.86 BCFD (from Mar-18) before Northern Border is 100% Bakken production. **BTU management becomes increasingly important for Bakken residue gas.**

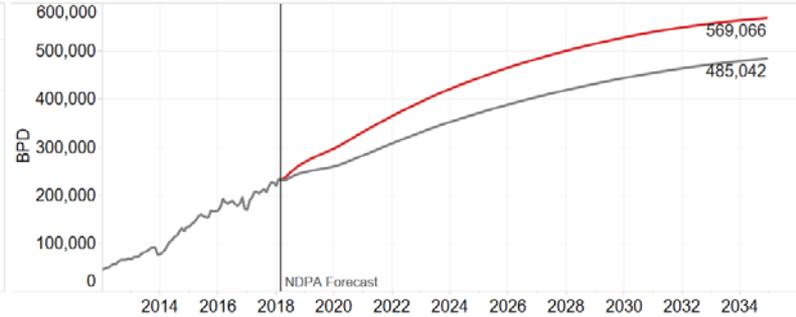


North Dakota Captured* NGL's

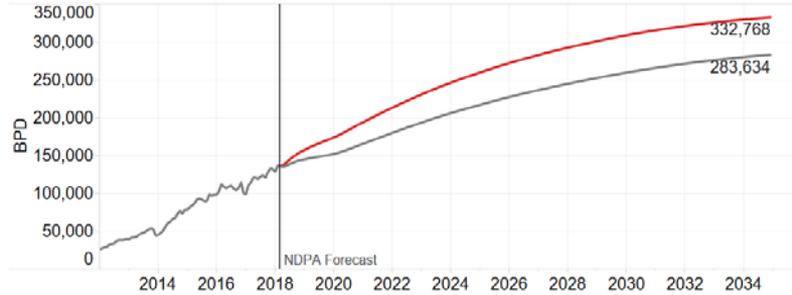
All Natural Gas Liquids



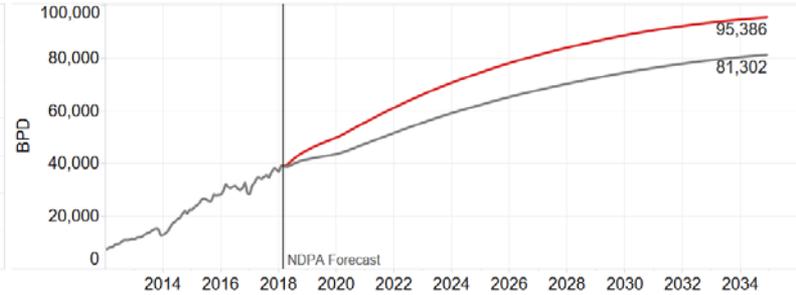
Ethane



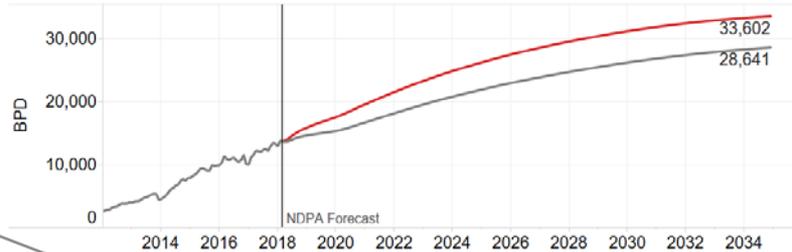
Propane



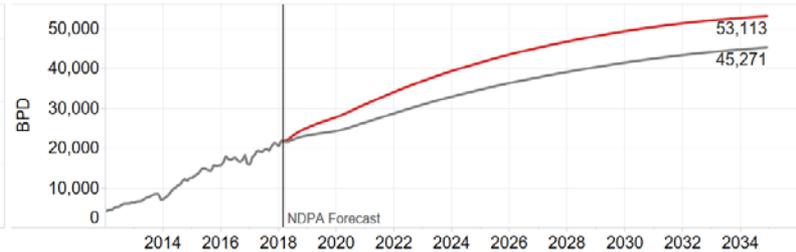
Butane



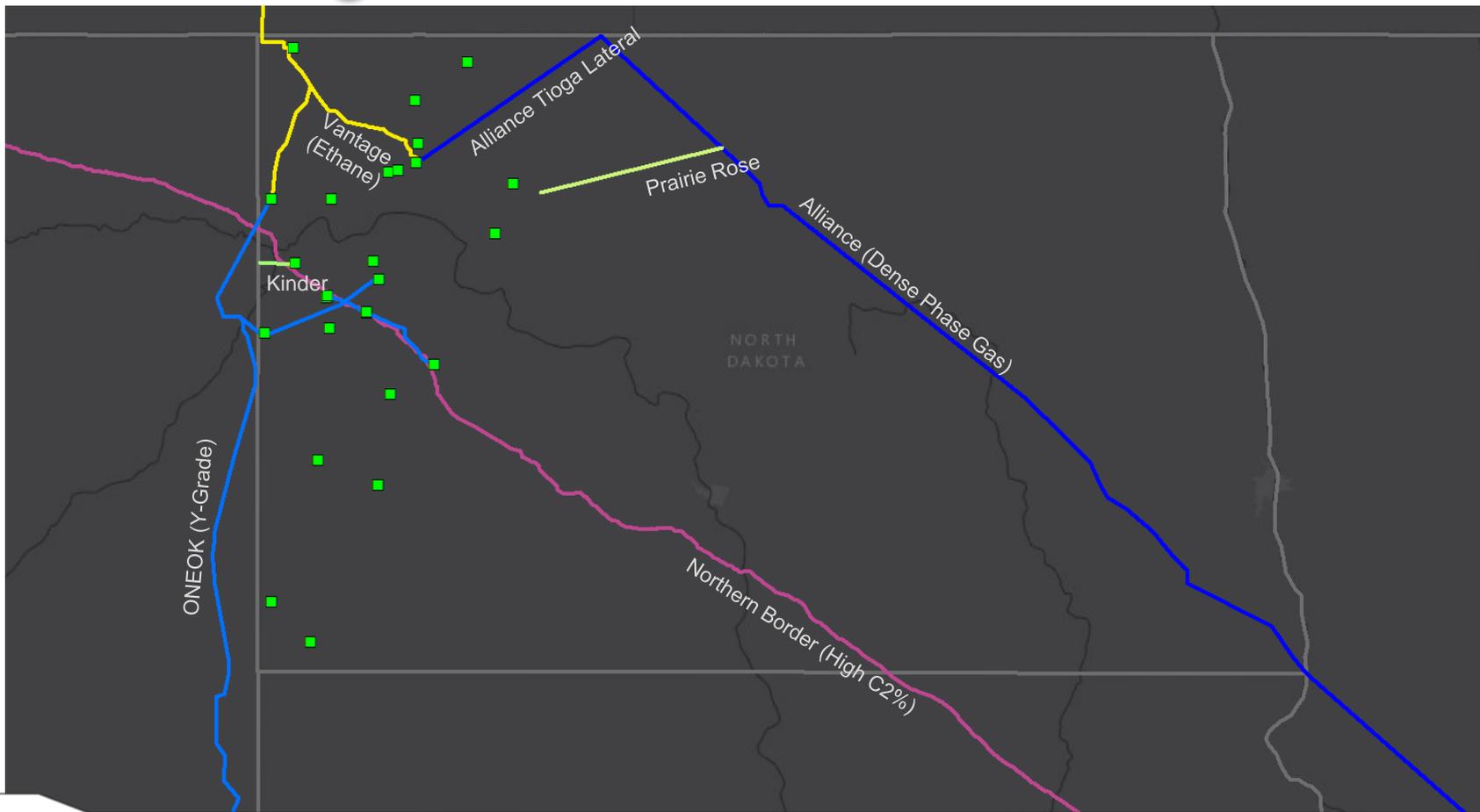
Isobutane



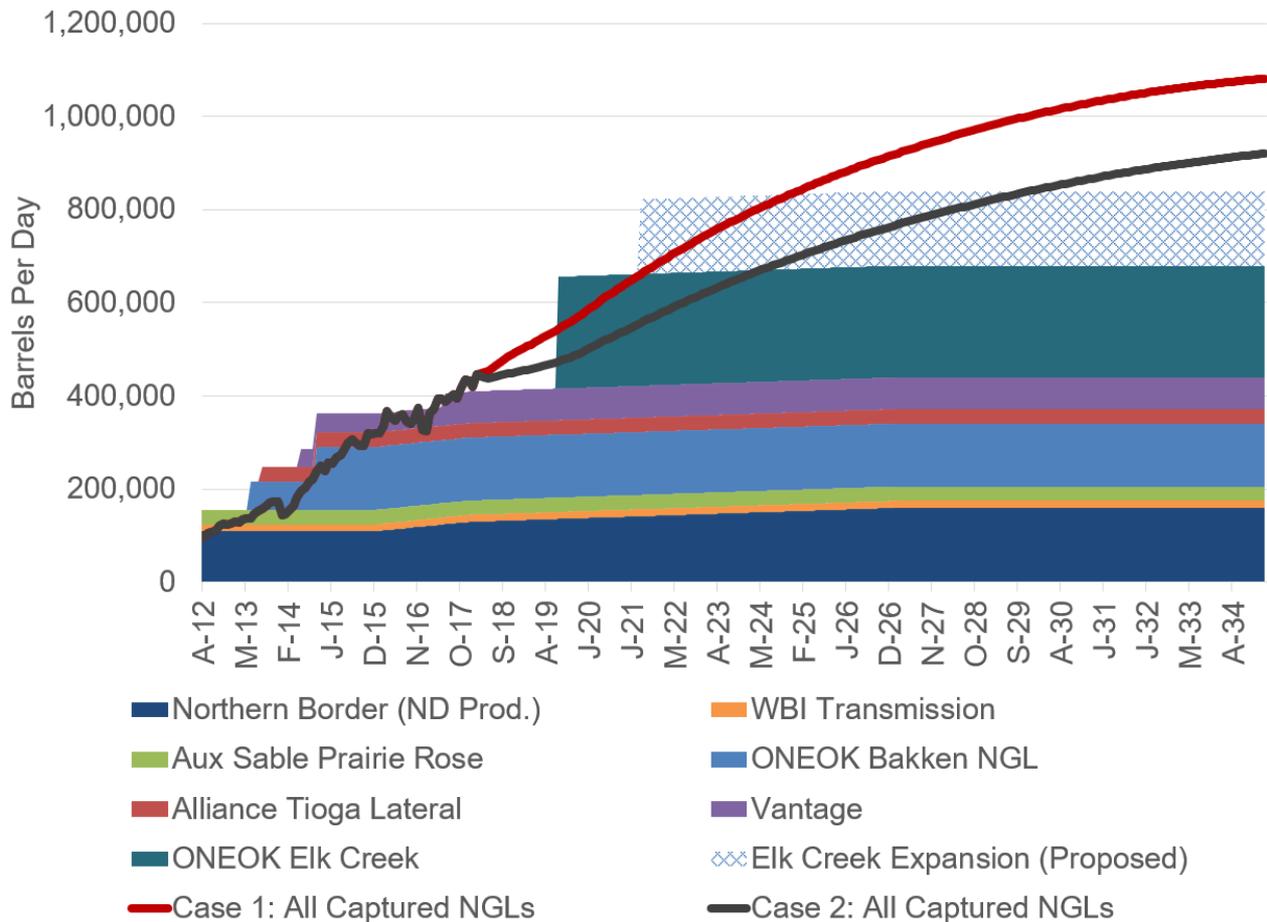
Natural Gasoline



Regional NGL Infrastructure

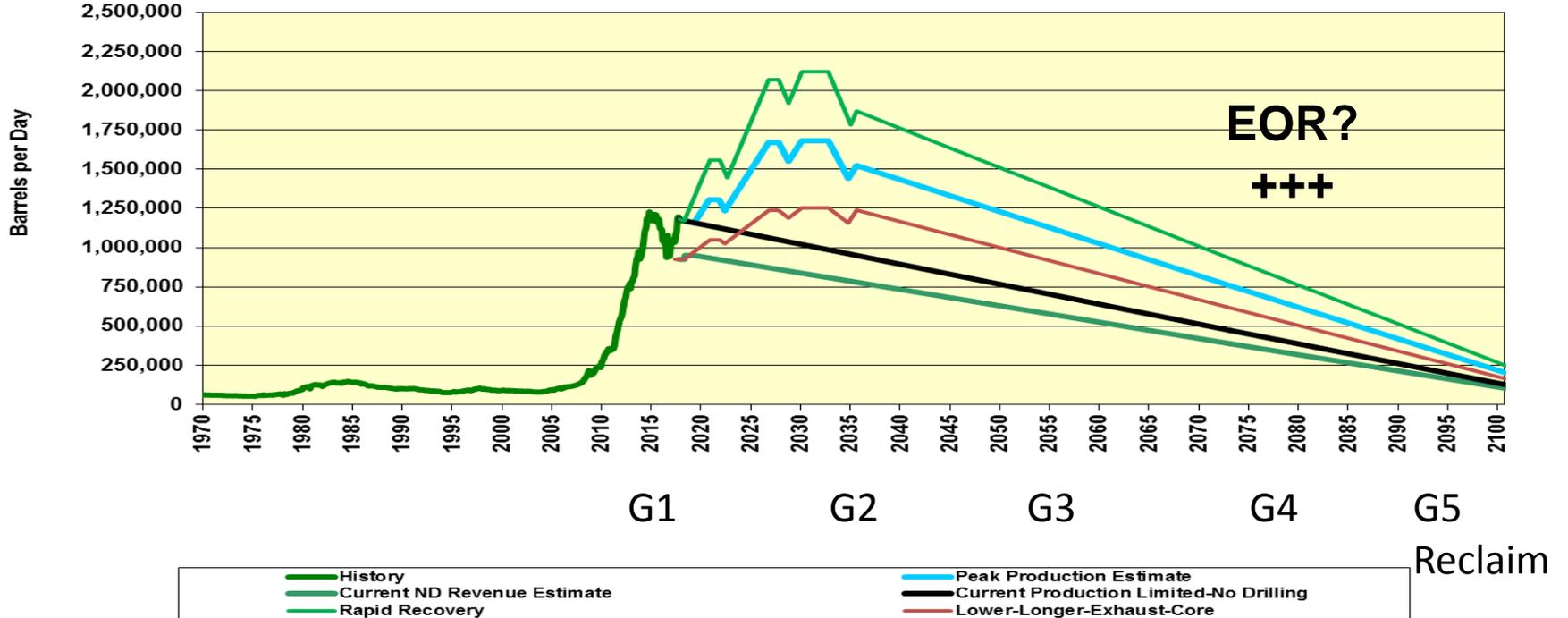


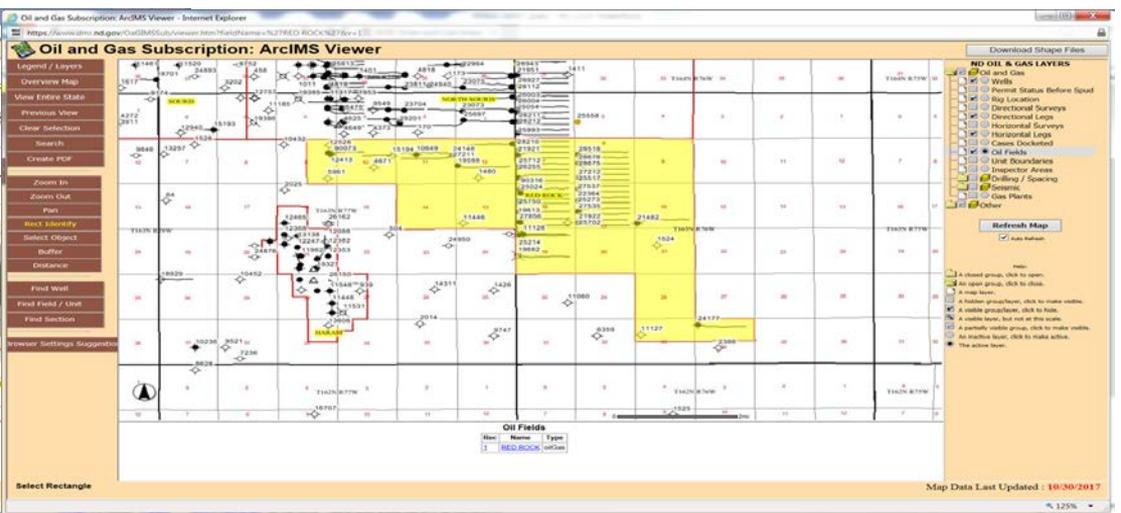
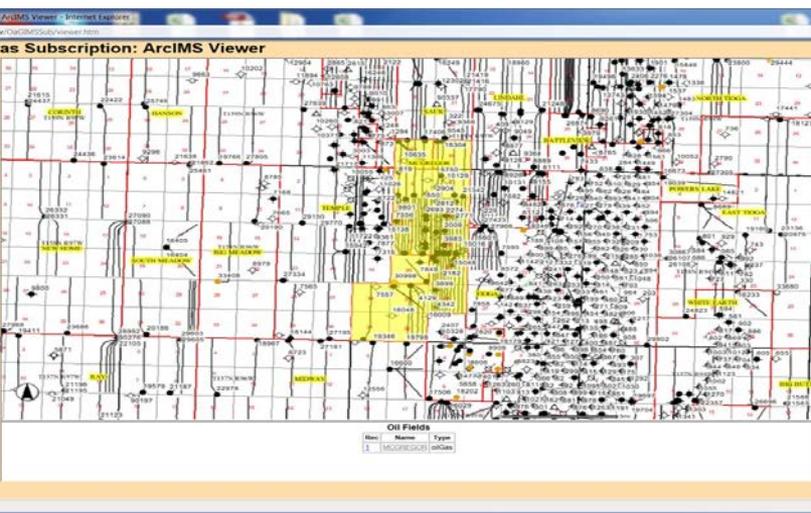
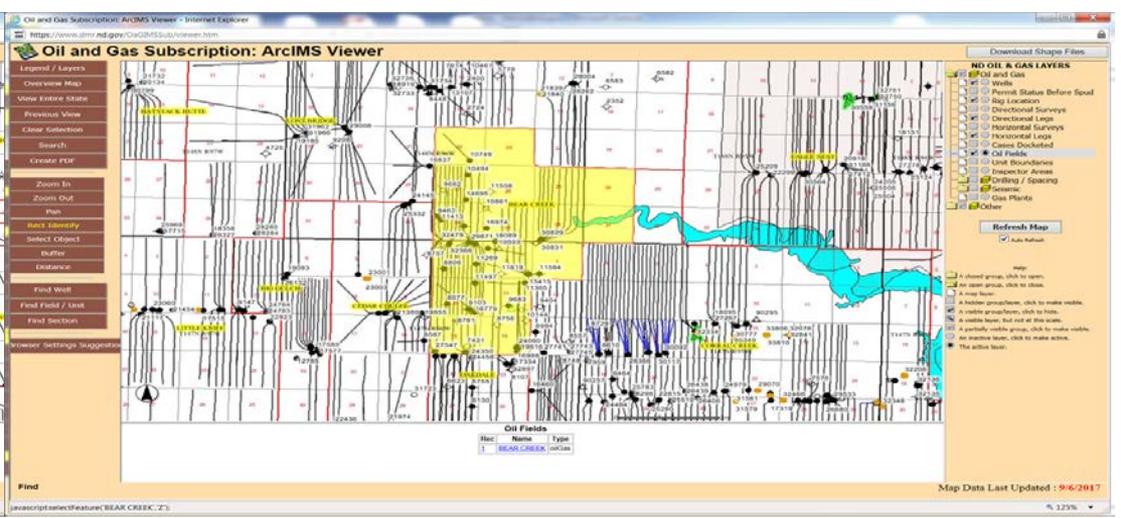
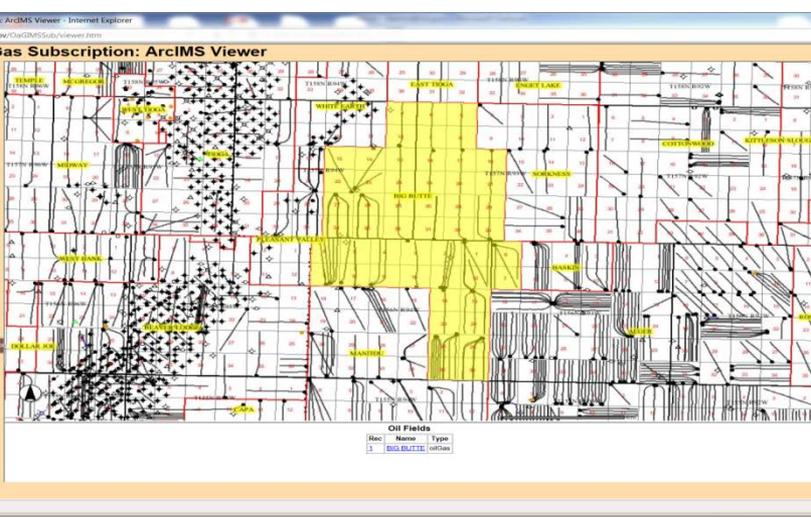
NGL Pipeline Takeaway Options



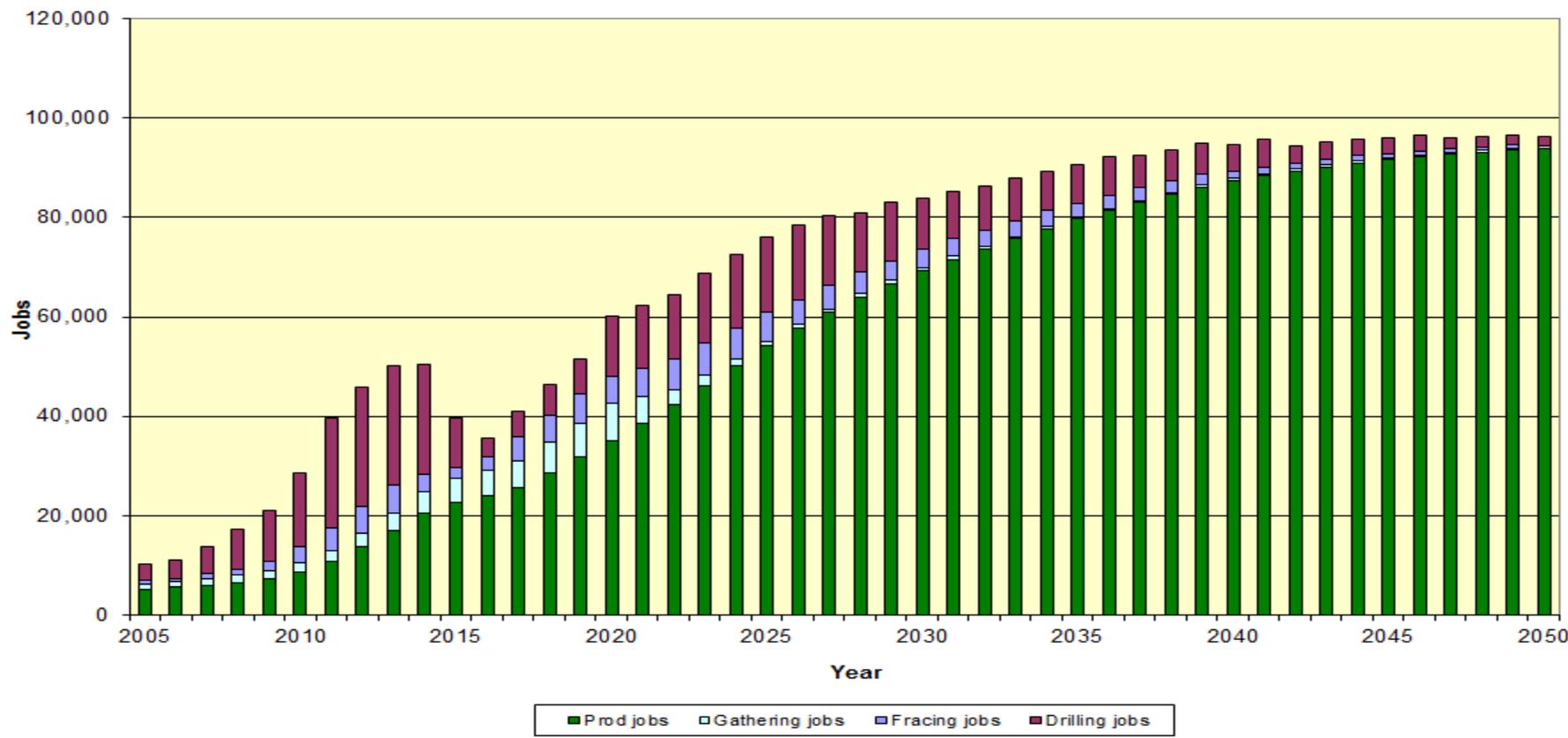


North Dakota Oil Production



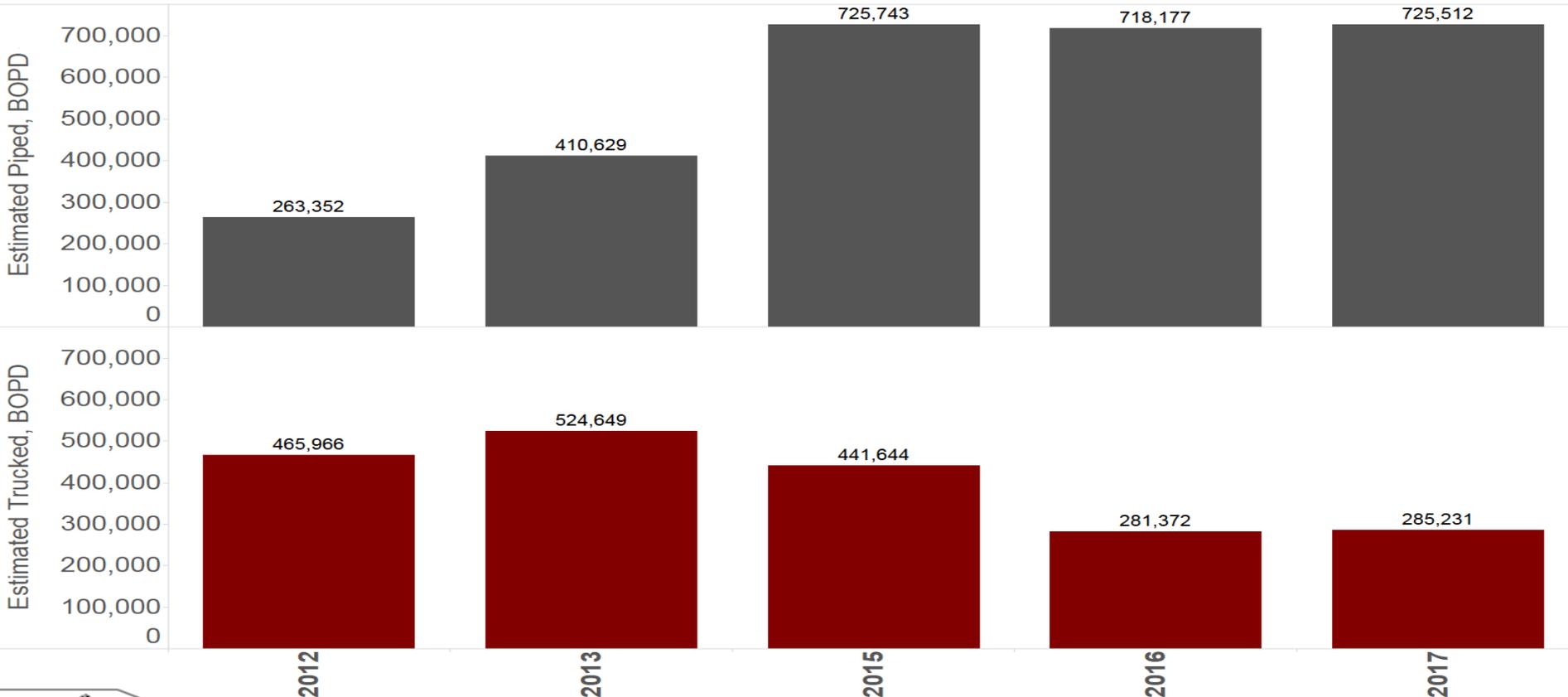


North Dakota Oil Industry Jobs

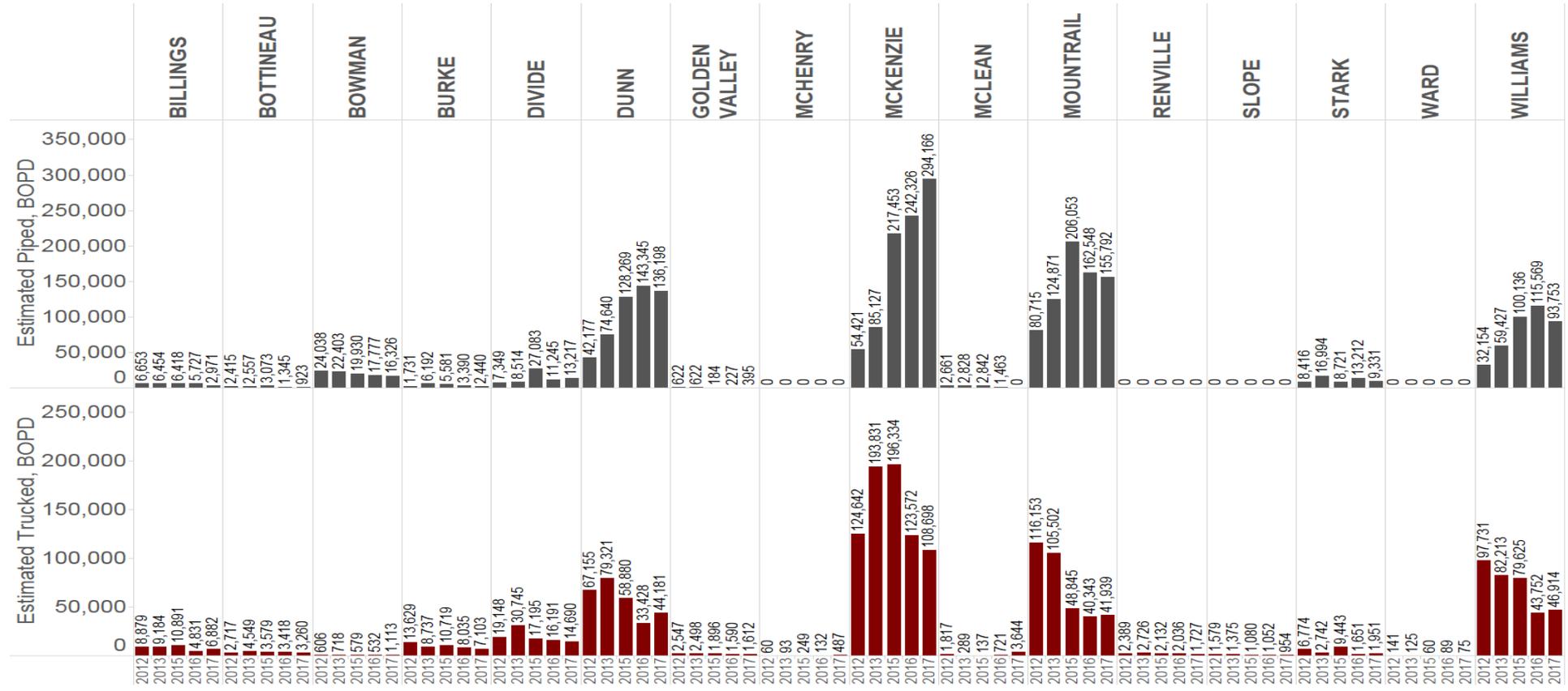


Evolution of Oil Gathering in ND

Statewide Totals

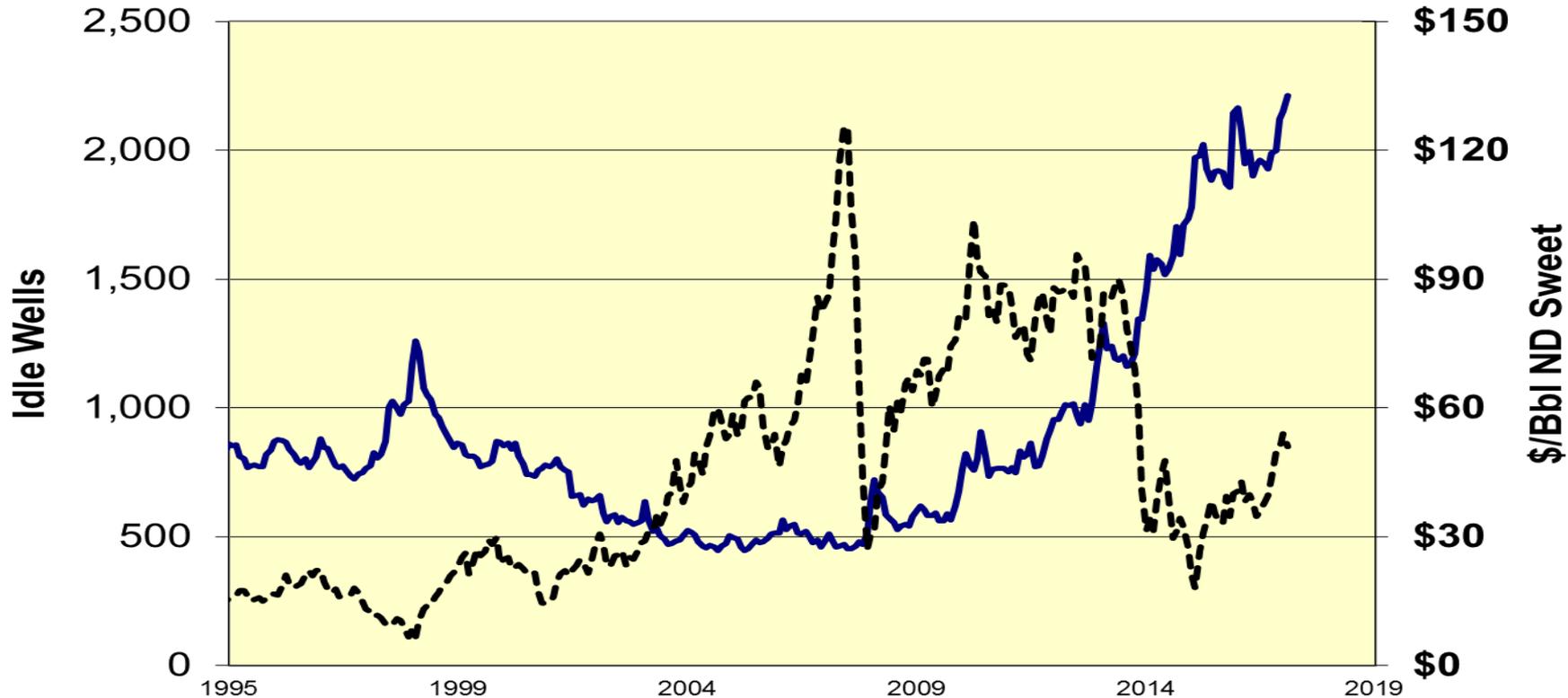


Evolution of Oil Gathering in ND

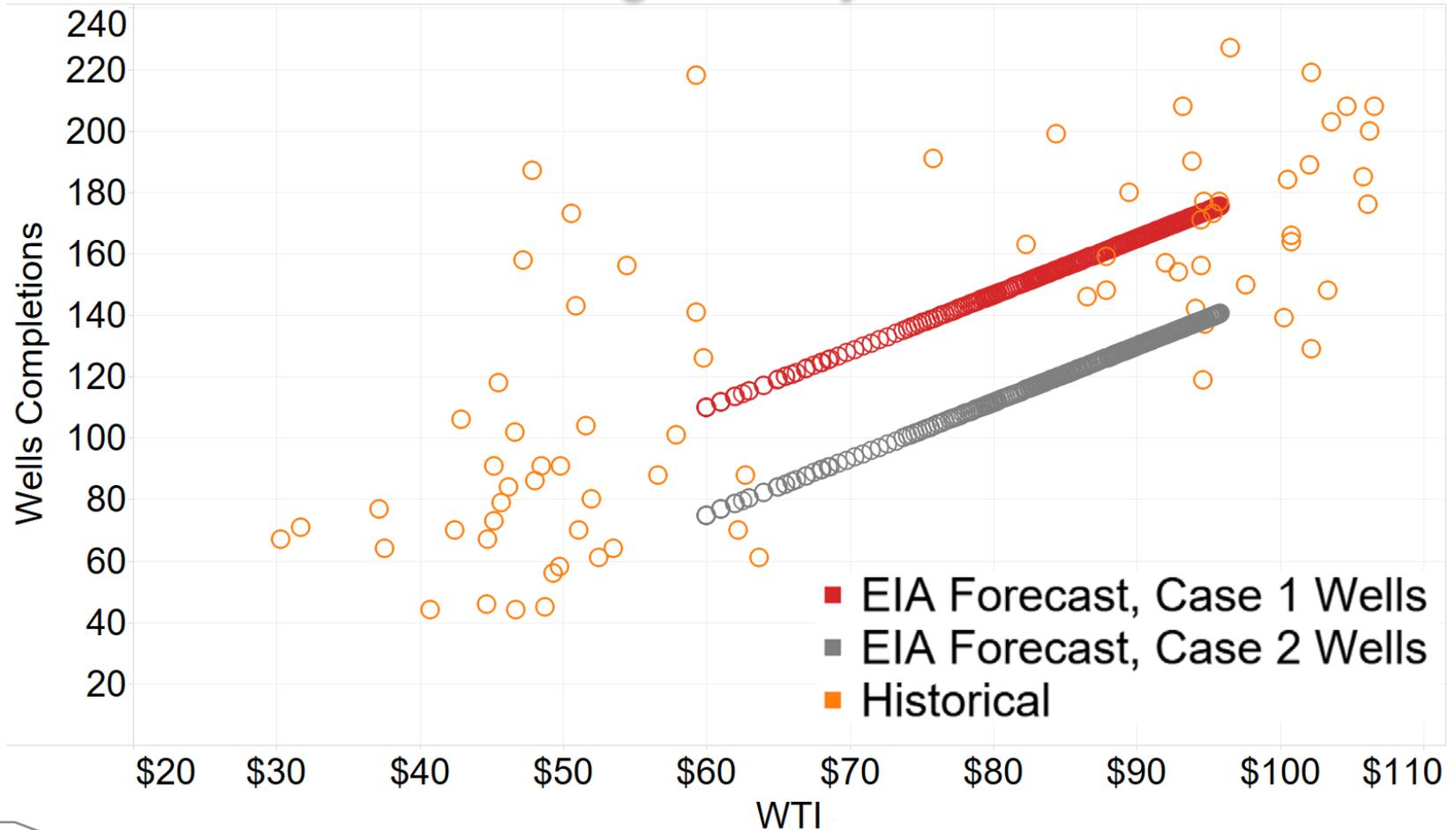




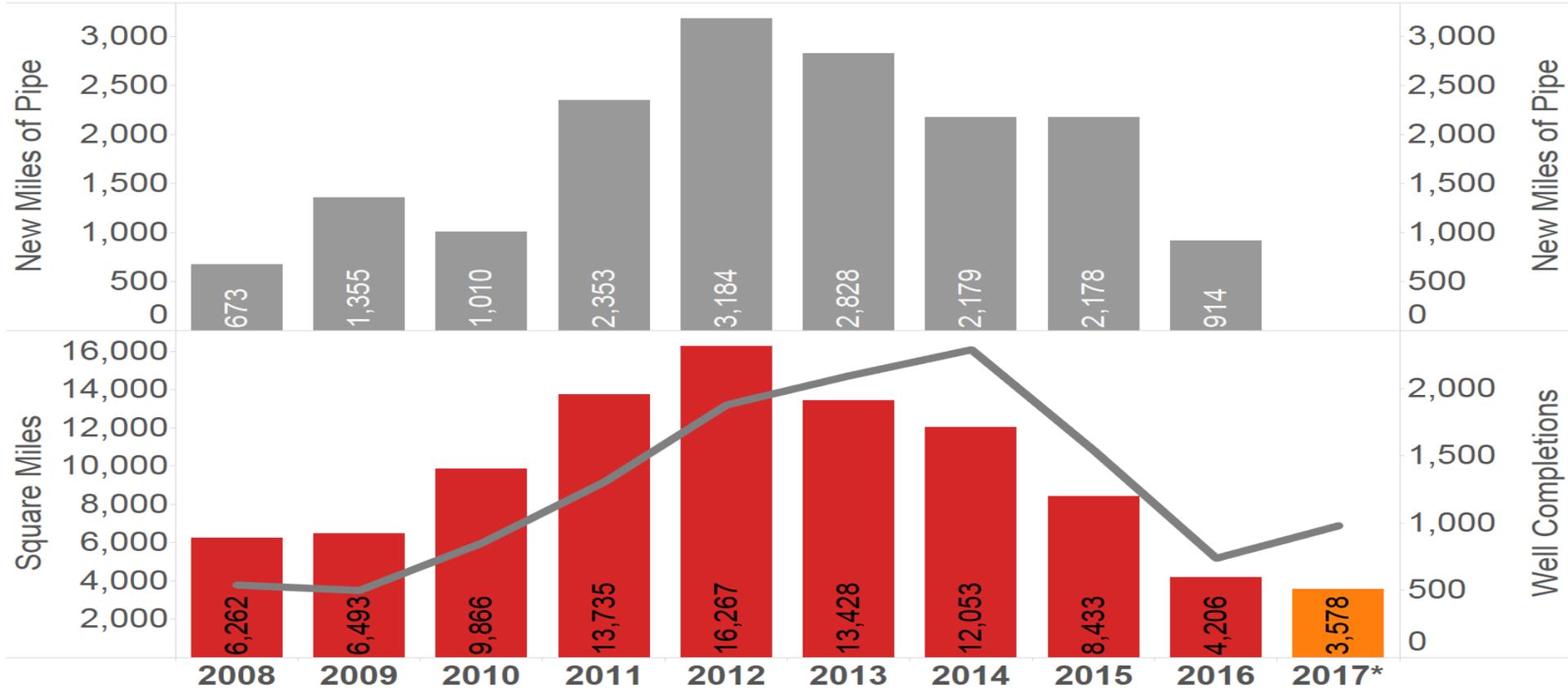
North Dakota Idle Wells



Forecasting Activity vs. Price



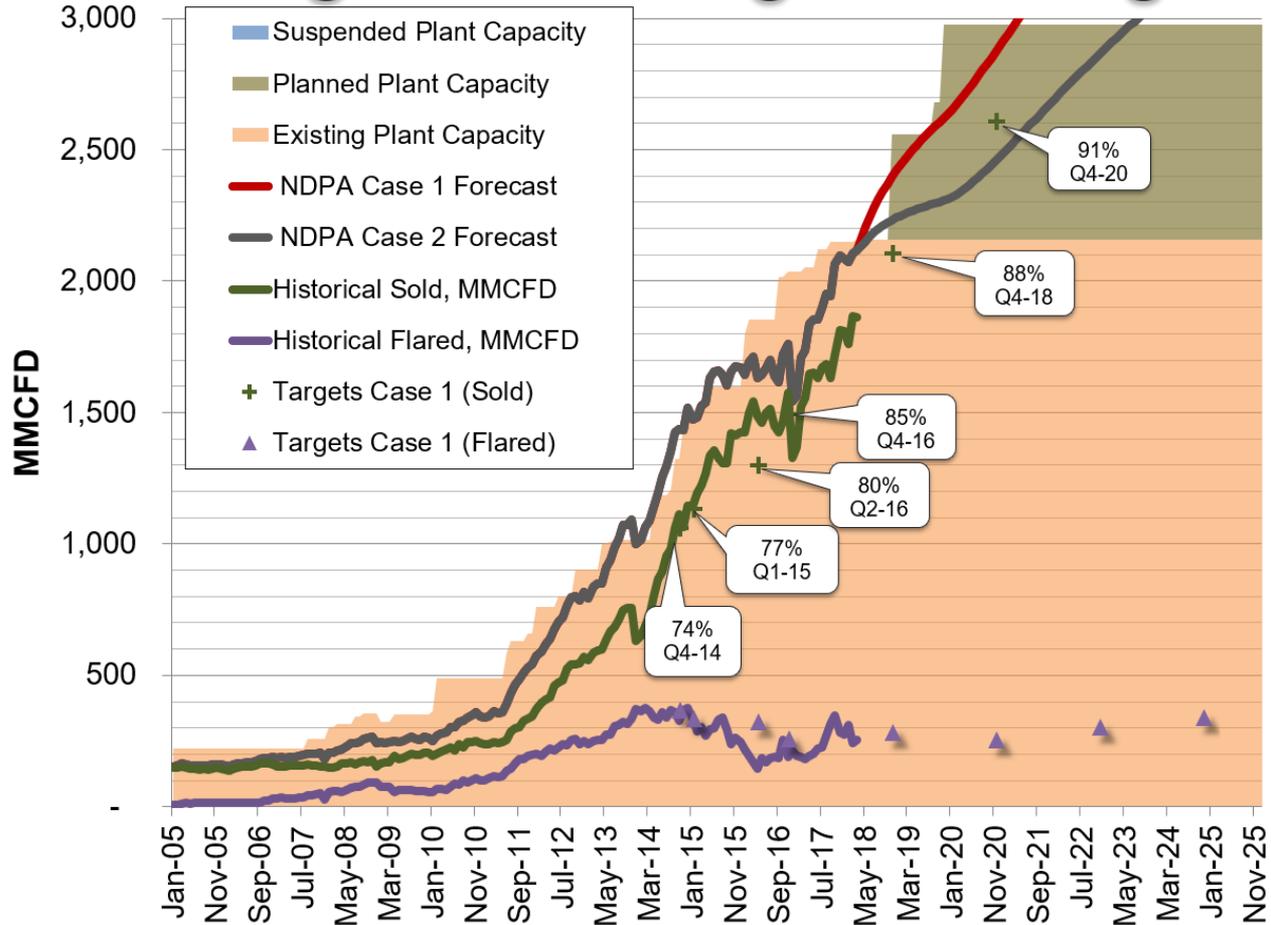
New Miles and Activity Footprint



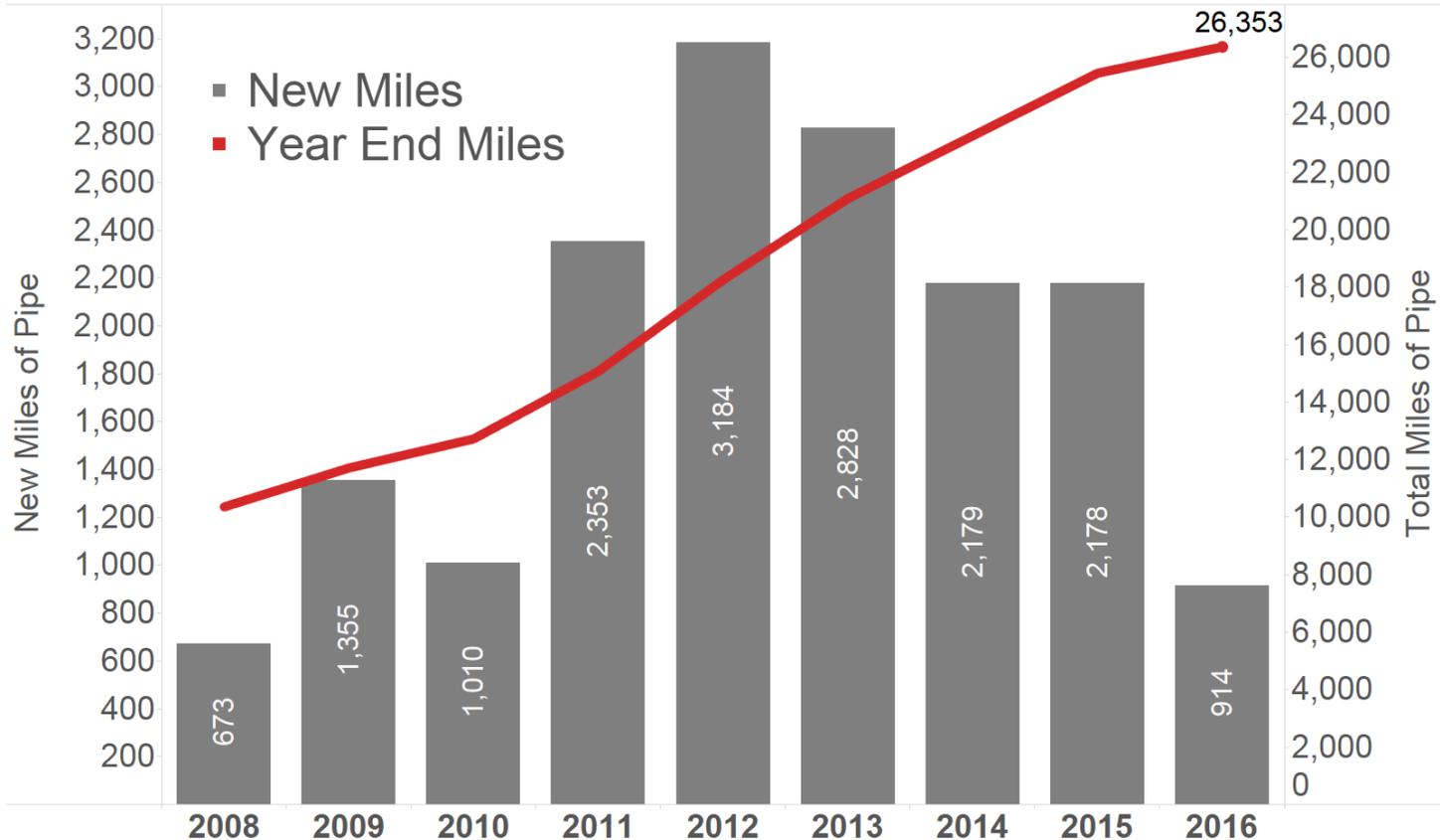
*2017 Forecasted



Solving the Flaring Challenge



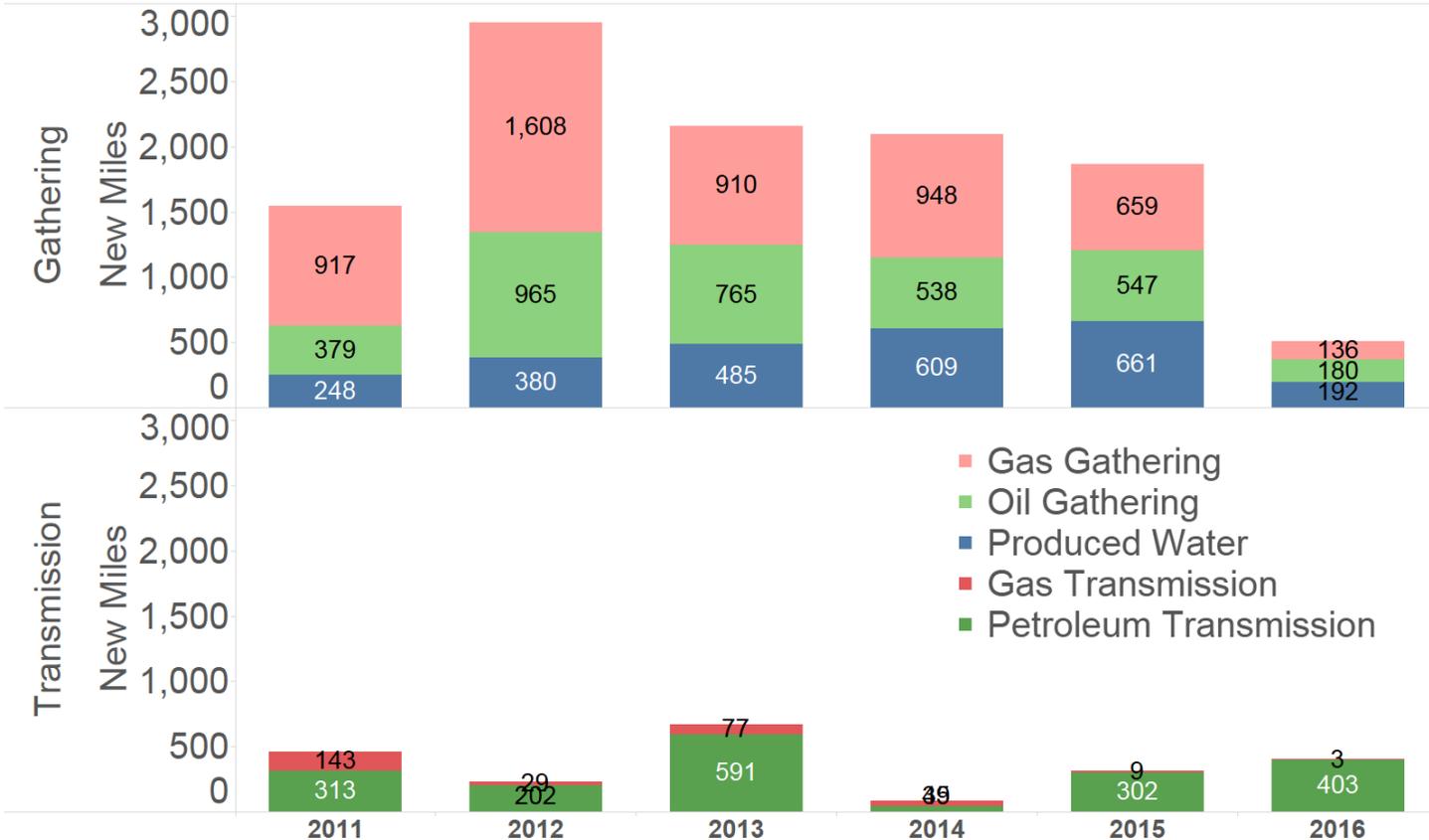
North Dakota Pipeline Construction



Sources: NDIC & PHMSA



North Dakota Pipeline Construction



Sources: NDIC & PHMSA

