

# CSA North Dakota/Bakken Tour

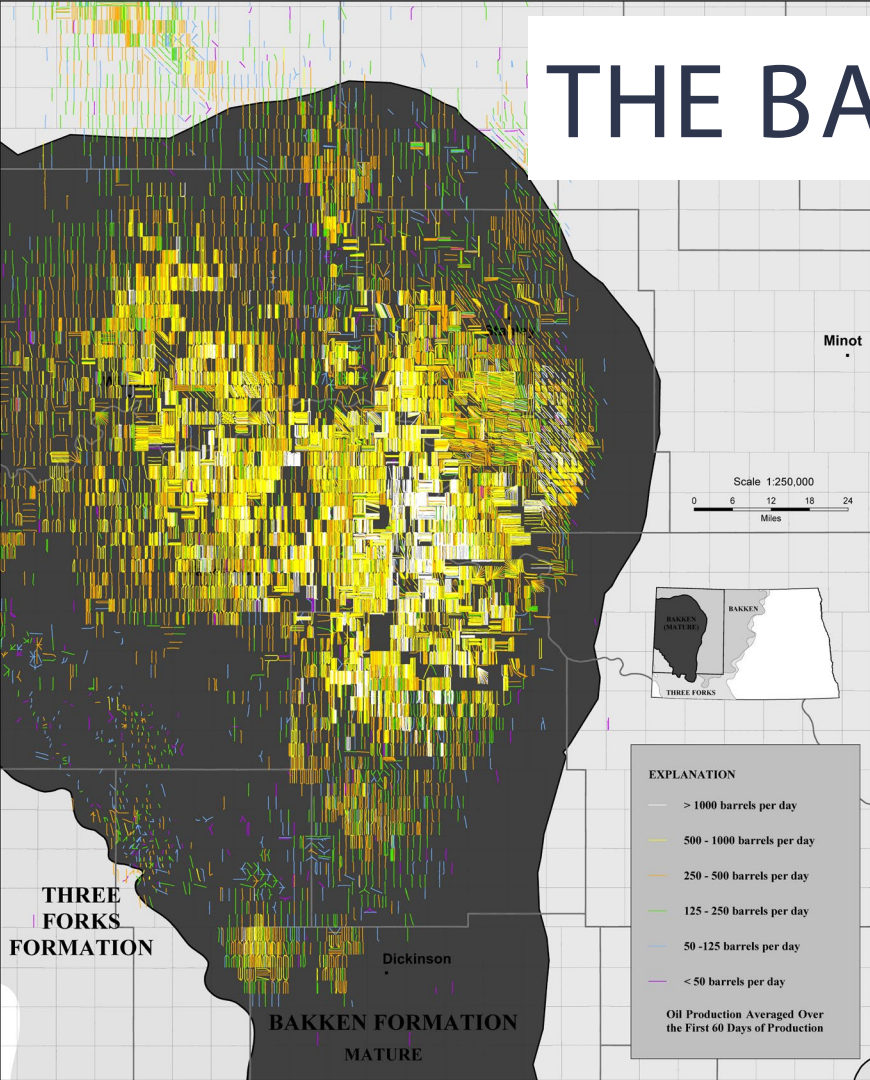
Ron Ness  
President, North Dakota Petroleum Council

Sept. 6, 2023 – Medora, ND



[www.NDOil.org](http://www.NDOil.org)

# THE BAKKEN



UPPER SHALE

MIDDLE MEMBER

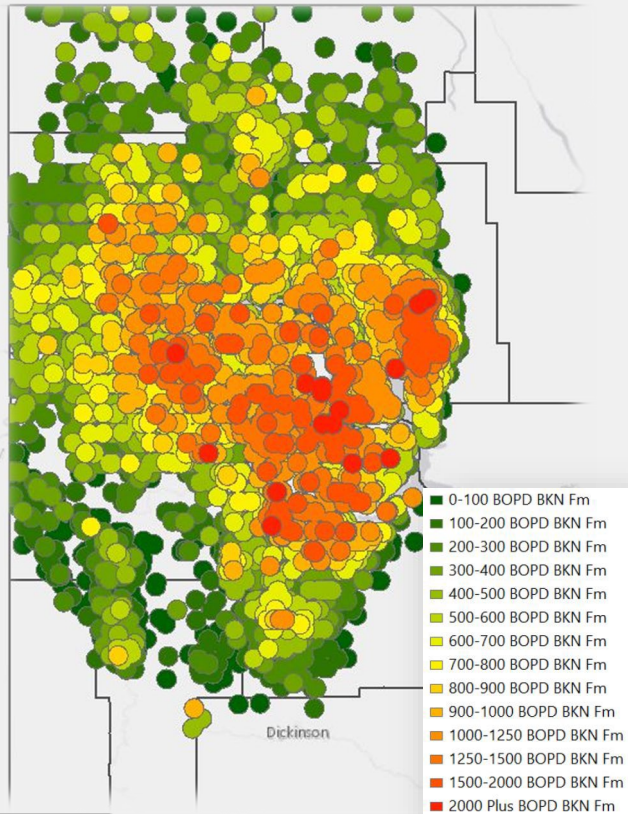
LOWER SHALE

THREE FORKS

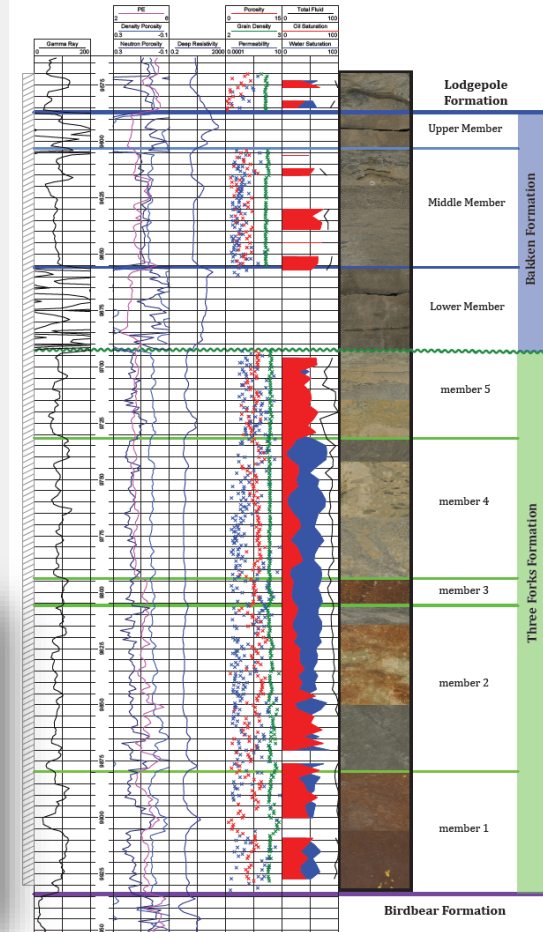
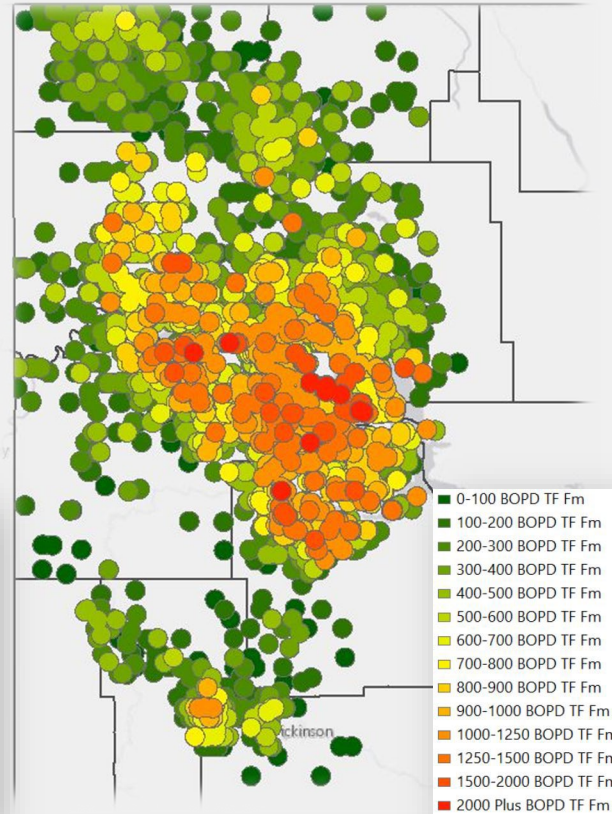


# Bakken & Three Forks Formations

## Bakken Formation

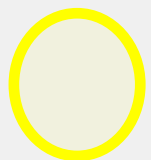


## Three Forks Formation

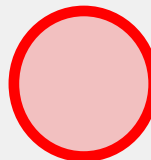




Core=Tier 1 > EOR  
80-85% developed  
+8,000 wells  
1-2% growth = 35 rigs = 8 years

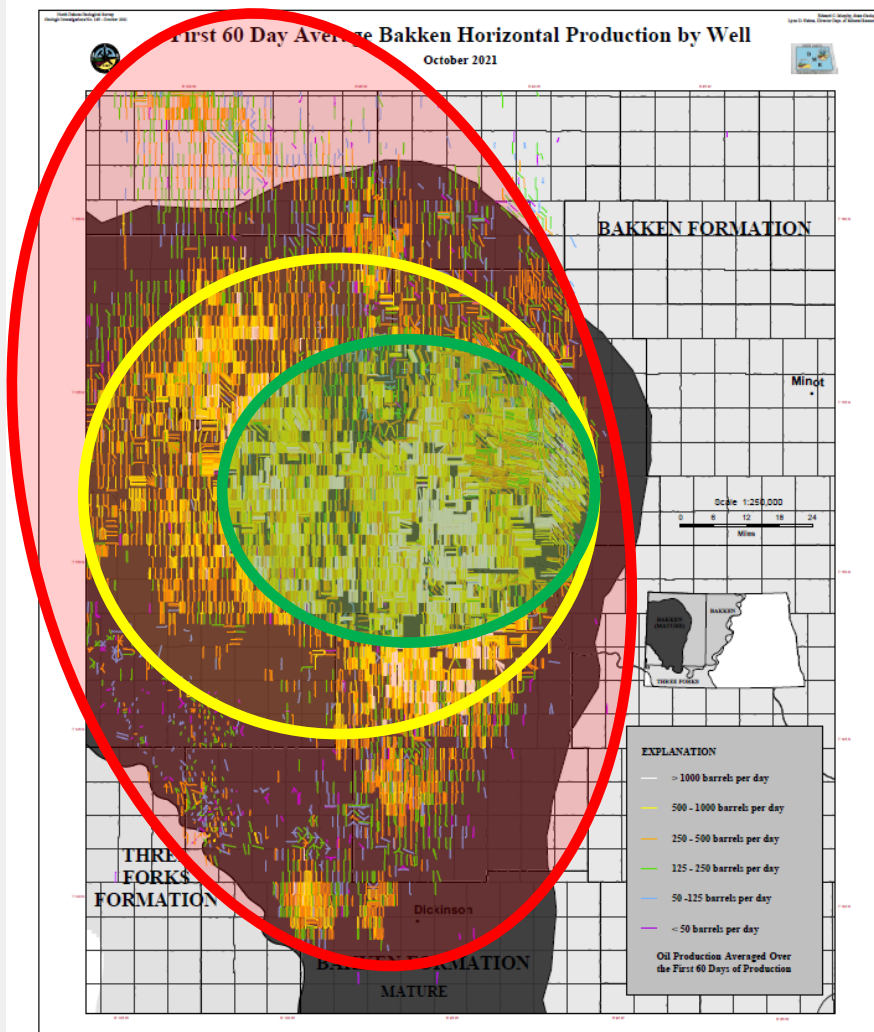


Tier 2 > 3 mi laterals  
50% developed  
+8,000 wells  
1-2% growth = 50 rigs = 6 years



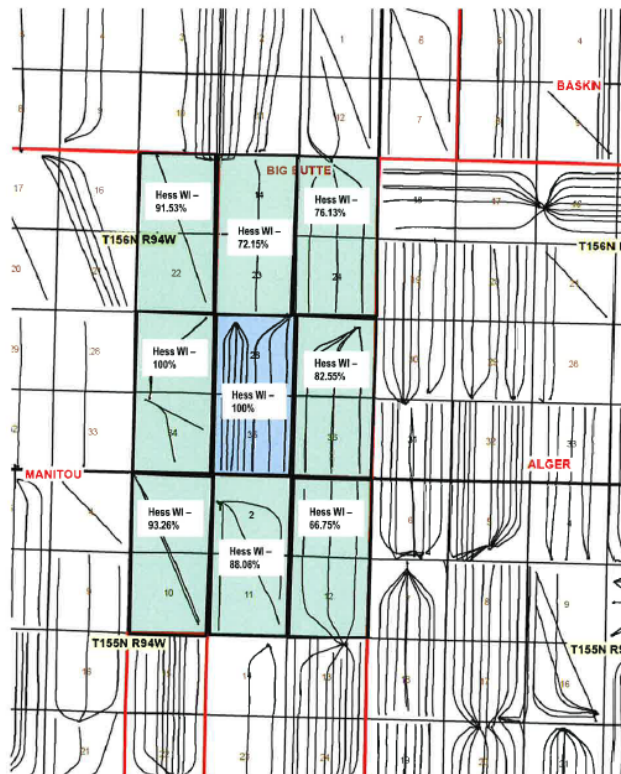
Tier 3 > 3-4 mi laterals  
25% developed  
+7,000 wells  
1-2% growth = 75 rigs = 4 years

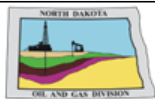
Total = 23,000 wells & 18 years  
Current 17,000 wells & 16 years



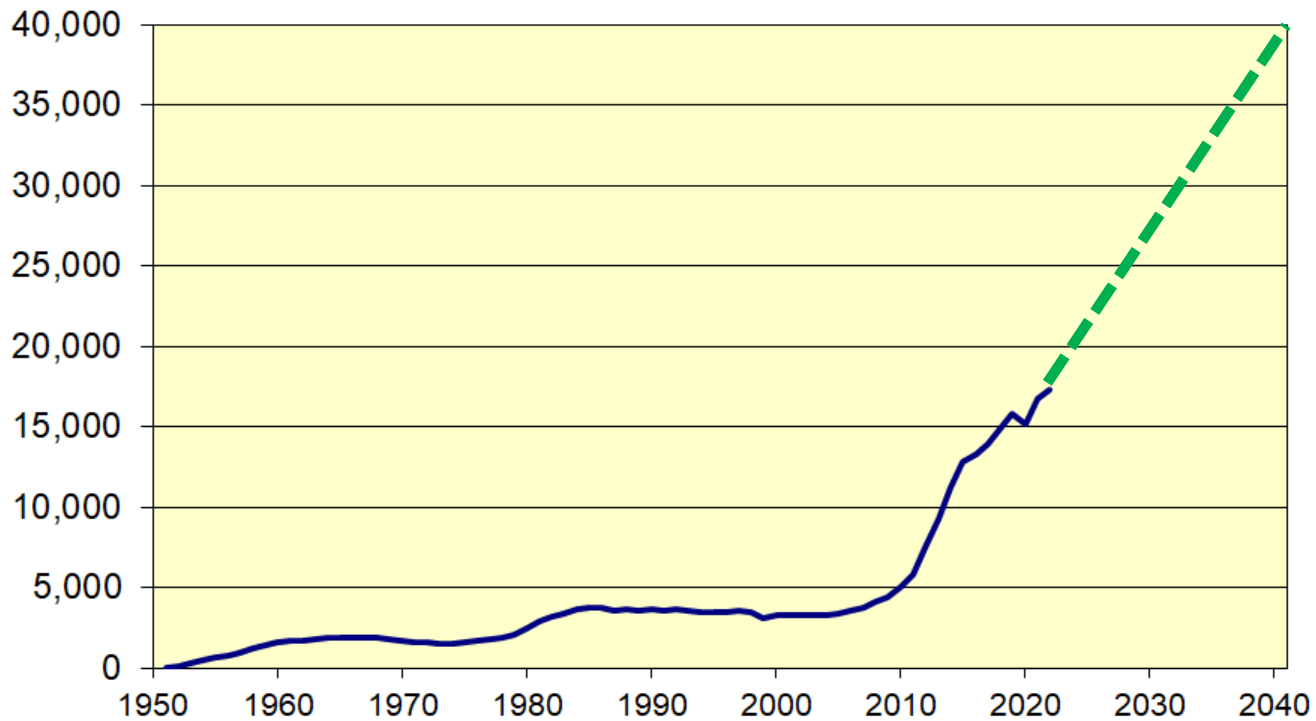


## Location Map – Hess WI



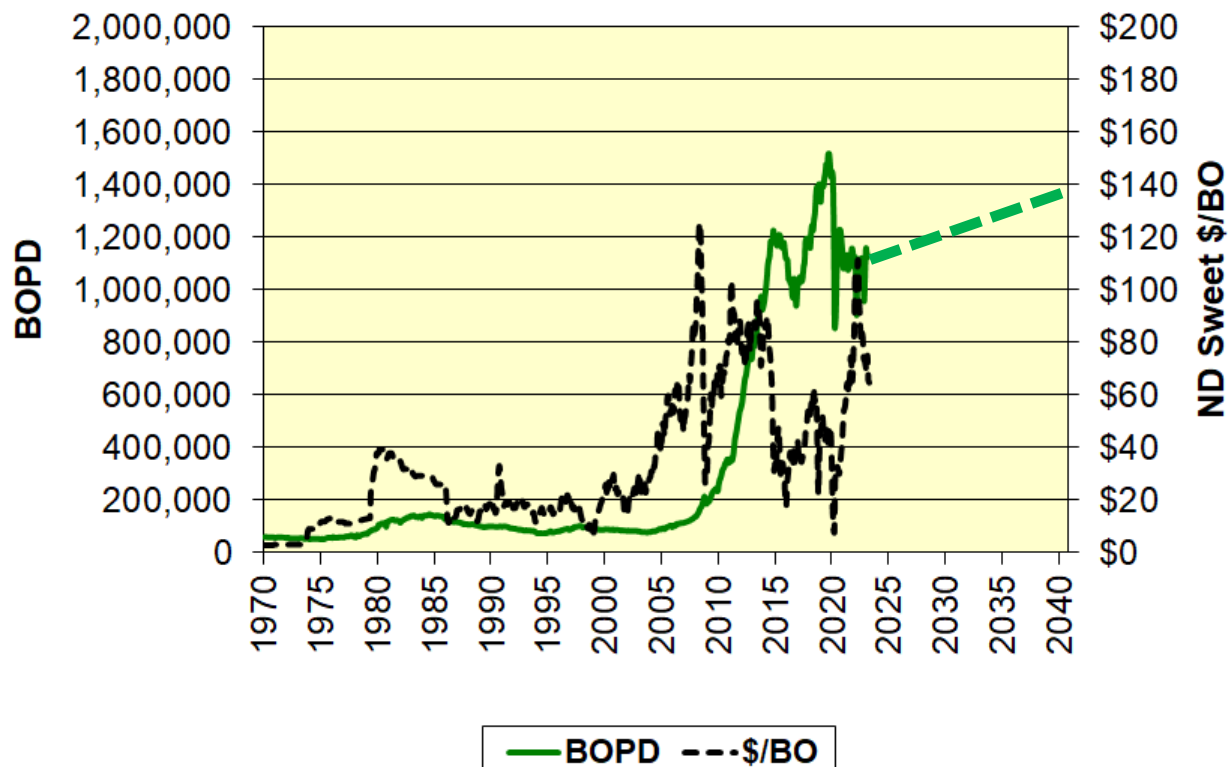


## North Dakota Wells Producing





## North Dakota Daily Oil Produced and Price





# ND PRODUCTION – May 2023



1,133,530 Barrels Per Day  
All-time high 1.52 million Nov 2019



3,156,374 MCF Per Day  
All-time high 3.18 million Sept 2022



17,913 Producing Wells  
NEW All-time high May 2023!

# OIL & GAS PRODUCTION IN NORTH DAKOTA



## 390.4 MILLION

BARRELS & 1 TRILLION CUBIC  
FEET OF GAS PRODUCED IN 2022.

AVERAGE DAILY PRODUCTION IN 2022



**1,069,722**  
BARRELS OF OIL



**2,937,063**  
MCF OF GAS

3RD LARGEST OIL-PRODUCING STATE

1  Texas

2  New Mexico

3  North Dakota

North  
Dakota  
is also a  
top 20 oil  
producer in  
the world.

	Country	Oil production 2022 (bbl/day) <sup>[1]</sup>
1	 United States	11,884,154
2	 Saudi Arabia (OPEC)	10,644,394
3	 Russia	10,278,370
4	 Canada	4,543,800
5	 Iraq (OPEC)	4,470,506
6	 China	4,089,997
7	 United Arab Emirates (OPEC)	3,467,870
8	 Iran (OPEC)	3,293,401
9	 Brazil	3,021,505
10	 Kuwait (OPEC)	2,825,724
11	 Kazakhstan	1,726,514
12	 Mexico	1,715,914
13	 Norway	1,704,297
14	 Qatar	1,321,192
15	 Nigeria (OPEC)	1,316,415



| 53% → state tax revenues from oil & gas

Put it in perspective:



For every dollar  
of revenue to the  
state -

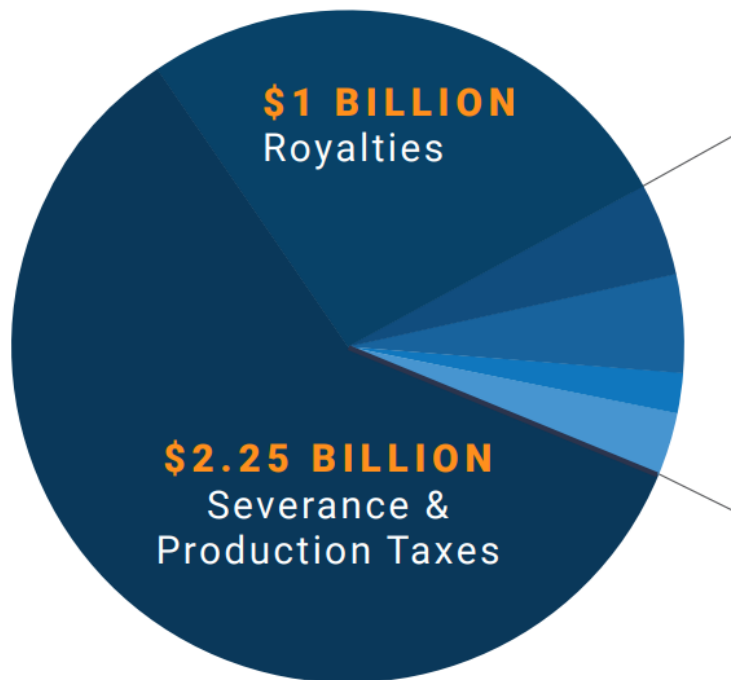


Fifty-Three  
Cents comes  
from oil & gas



# \$3.8 BILLION

## IN STATE AND LOCAL GOVERNMENT REVENUES



**\$172.2 MILLION**

Property

**\$180.8 MILLION**

Sales & Use Taxes

**\$69.3 MILLION**

Corporate & Personal  
Income

**\$112.3 MILLION**

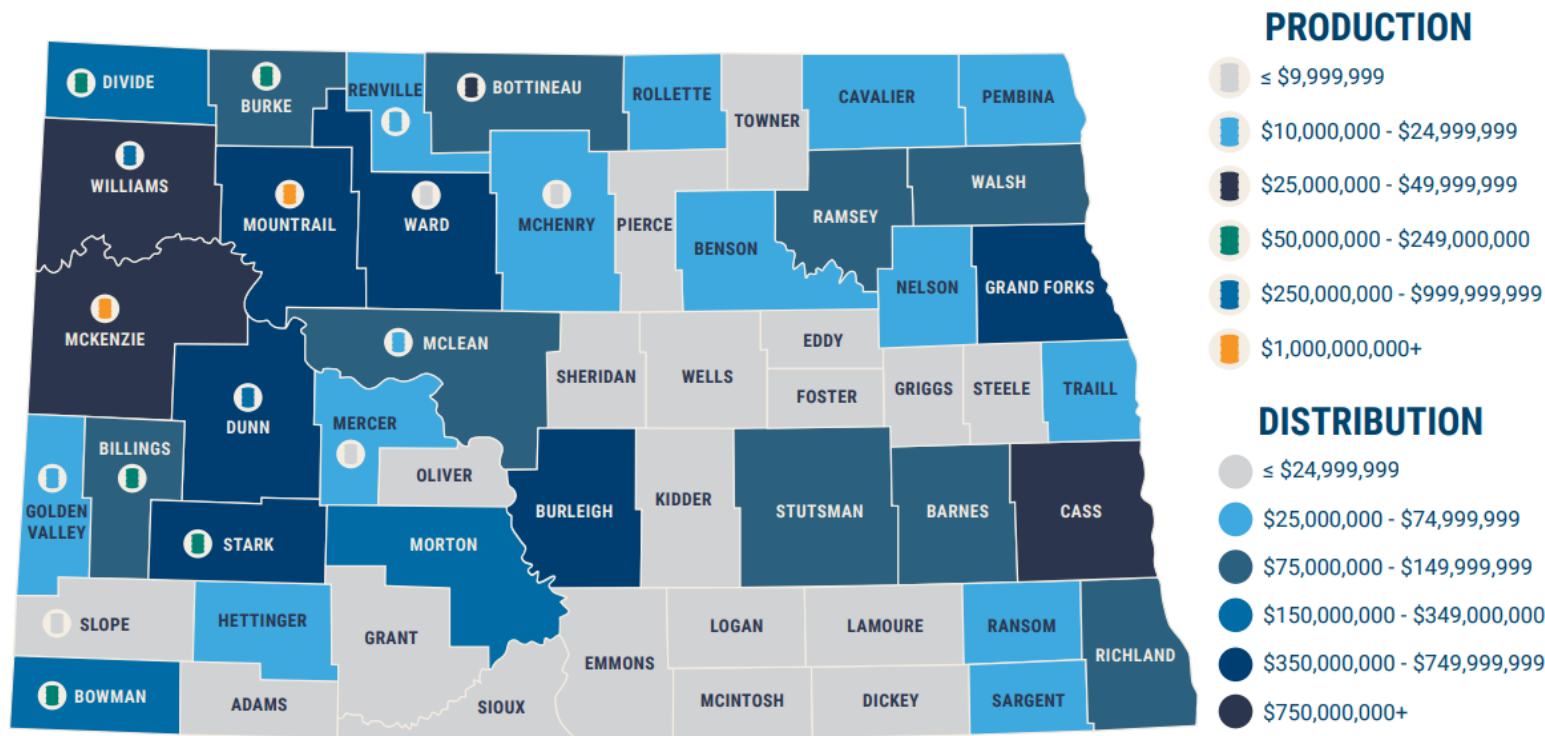
Other Taxes, Permits, Fees  
& Licenses

**\$1.8 MILLION**

Lease Bonuses

# STATEWIDE BENEFITS

WHERE DOES STATE OIL TAX COME FROM AND WHERE DOES IT GO?



# \$42.58 BILLION

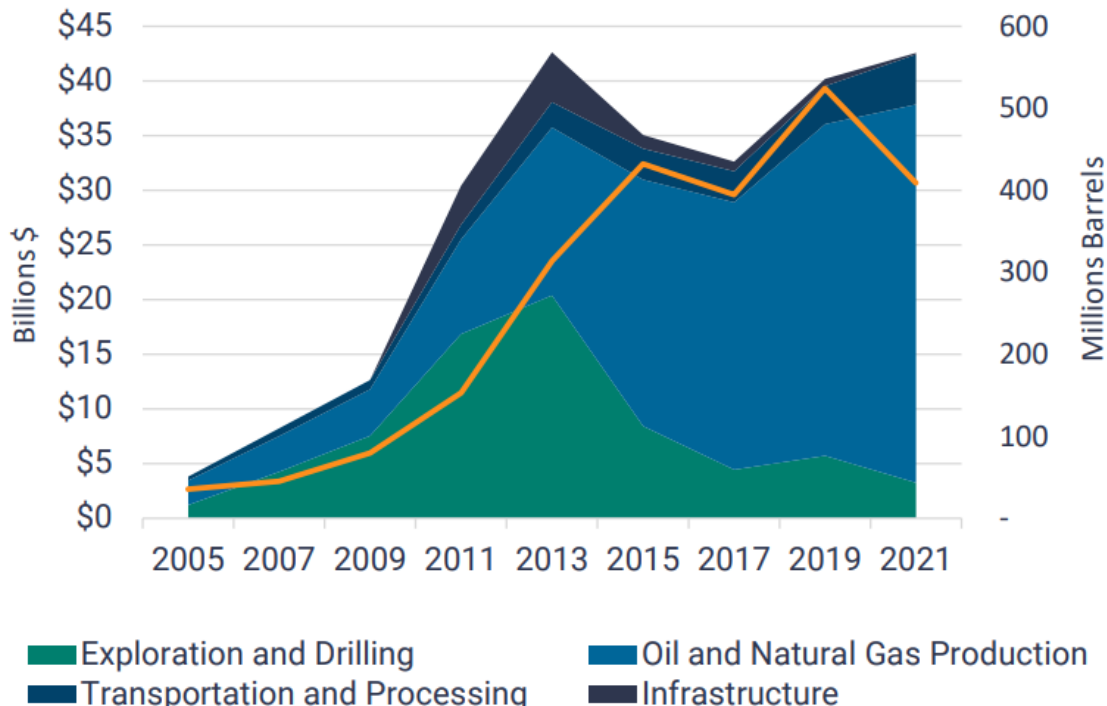
TOTAL ECONOMIC  
IMPACT IN 2021



30.8%

OF ND'S GROSS  
STATE PRODUCT

CAME FROM THE OIL  
& GAS INDUSTRY





14,200 DIRECT JOBS + 35,185 SECONDARY JOBS =

# 49,385 TOTAL JOBS

WITH A  
PAYROLL TOTALING **\$3.9 BILLION**

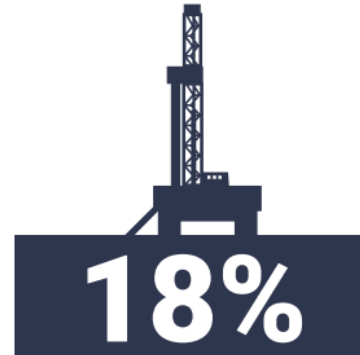
A MAJORITY OF JOBS ARE IN PRODUCTION, WHICH OFFER  
LONG-TERM JOBS & CAREERS FOR NORTH DAKOTANS.



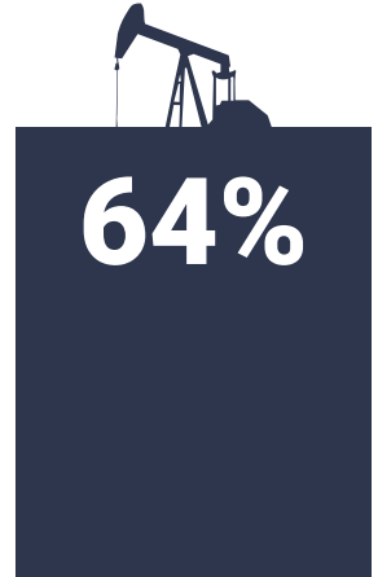
INFRASTRUCTURE  
DEVELOPMENT



PROCESSING &  
TRANSPORTATION

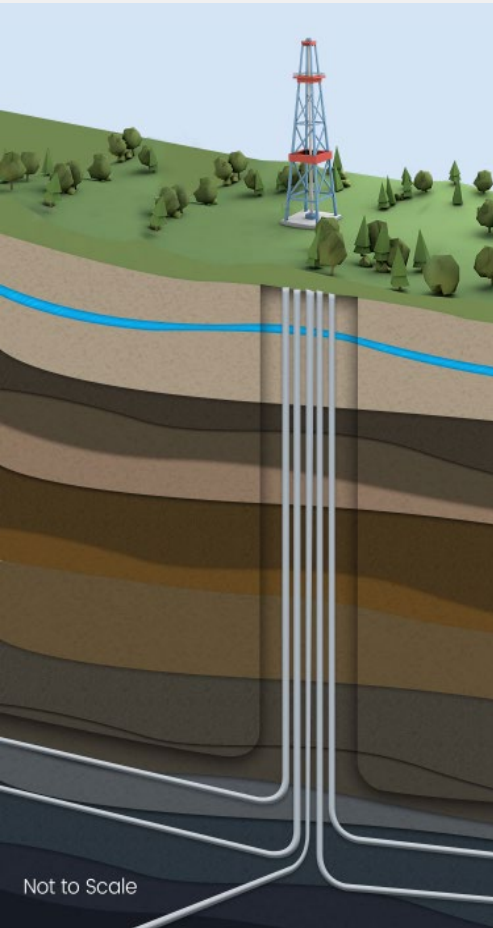


EXPLORATION & WELL  
DEVELOPMENT



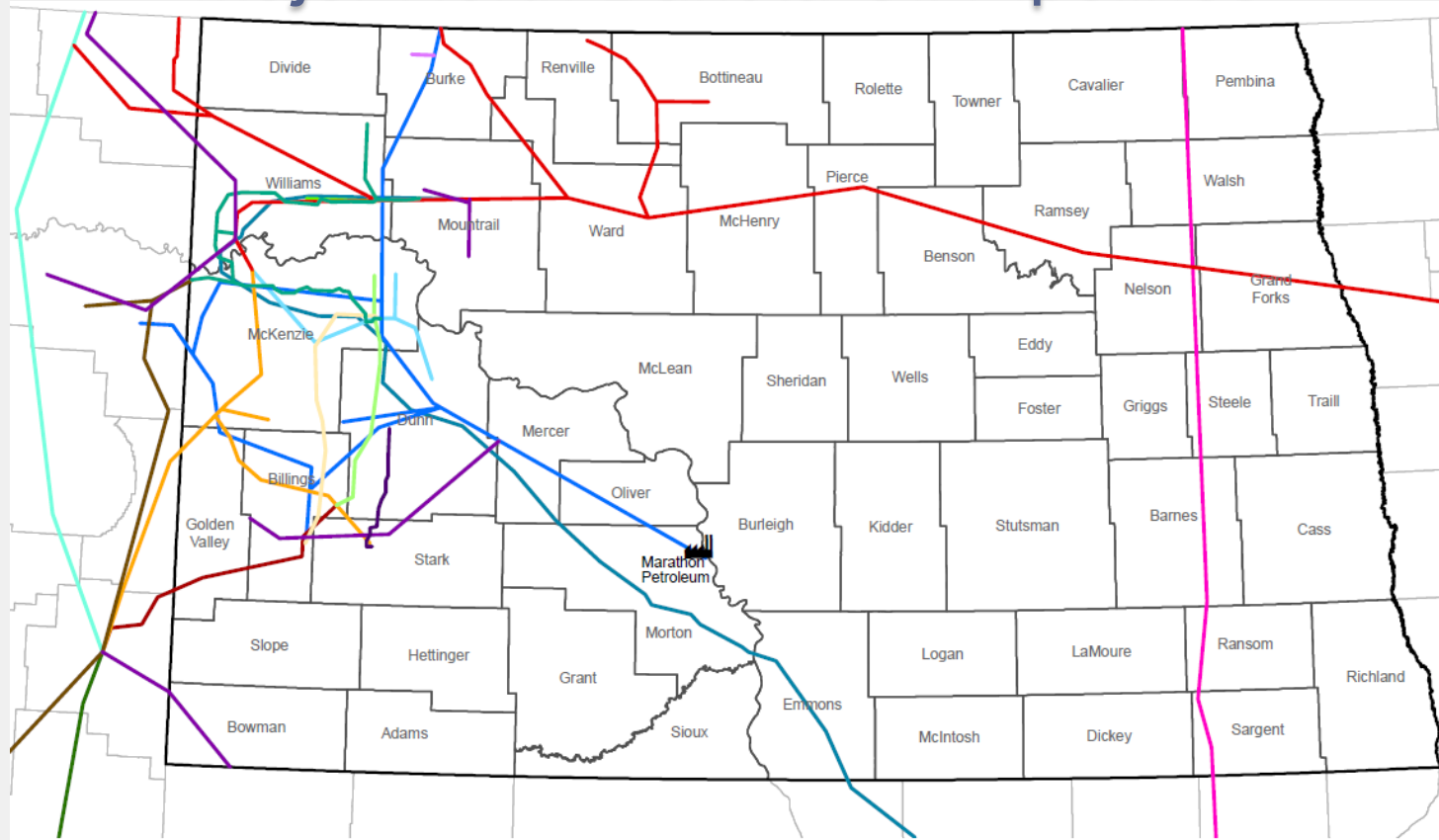
EXTRACTION &  
PRODUCTION

# WHERE WE'RE GOING IN THE FUTURE



- Putting Technology to Work in the Bakken:
- zero-emission Bakken wellsites
  - three-mile lateral
  - wellsite efficiency
  - gas capture
  - maximizing production

# Major North Dakota Oil Pipelines



- |                    |                 |               |            |                   |          |
|--------------------|-----------------|---------------|------------|-------------------|----------|
| Refinery           | Basin Transload | Butte         | Double H   | Hiland            | Bridger  |
| Bakken Oil Express | Belle Fourche   | Crestwood     | Enbridge   | Keystone Pipeline | Targa    |
| BakkenLink         | Bridger         | Dakota Access | Four Bears | Little Missouri   | Marathon |



# Bakken Market Connectivity – 2024+



## **New Egress Pipelines**

WBI Grasslands- 93,000 Dth/D

Bison – Up to 430,000 Dth/D

## **New Secondary Interconnecting Pipelines**

Cheyenne Plains

Public Service Co. of CO

CO Interstate Gas Co.

Southern Star Central

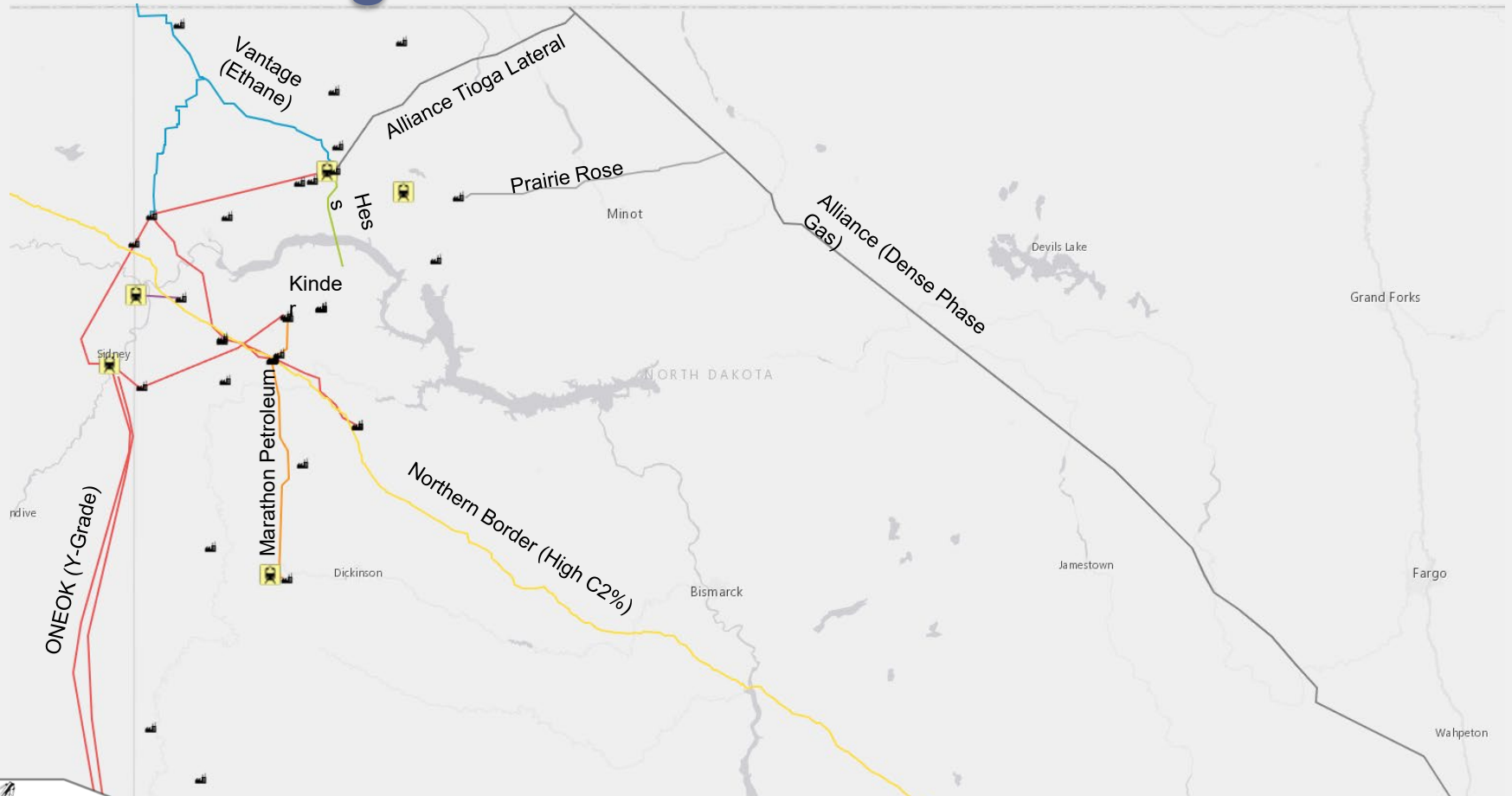
Trailblazer

Tallgrass

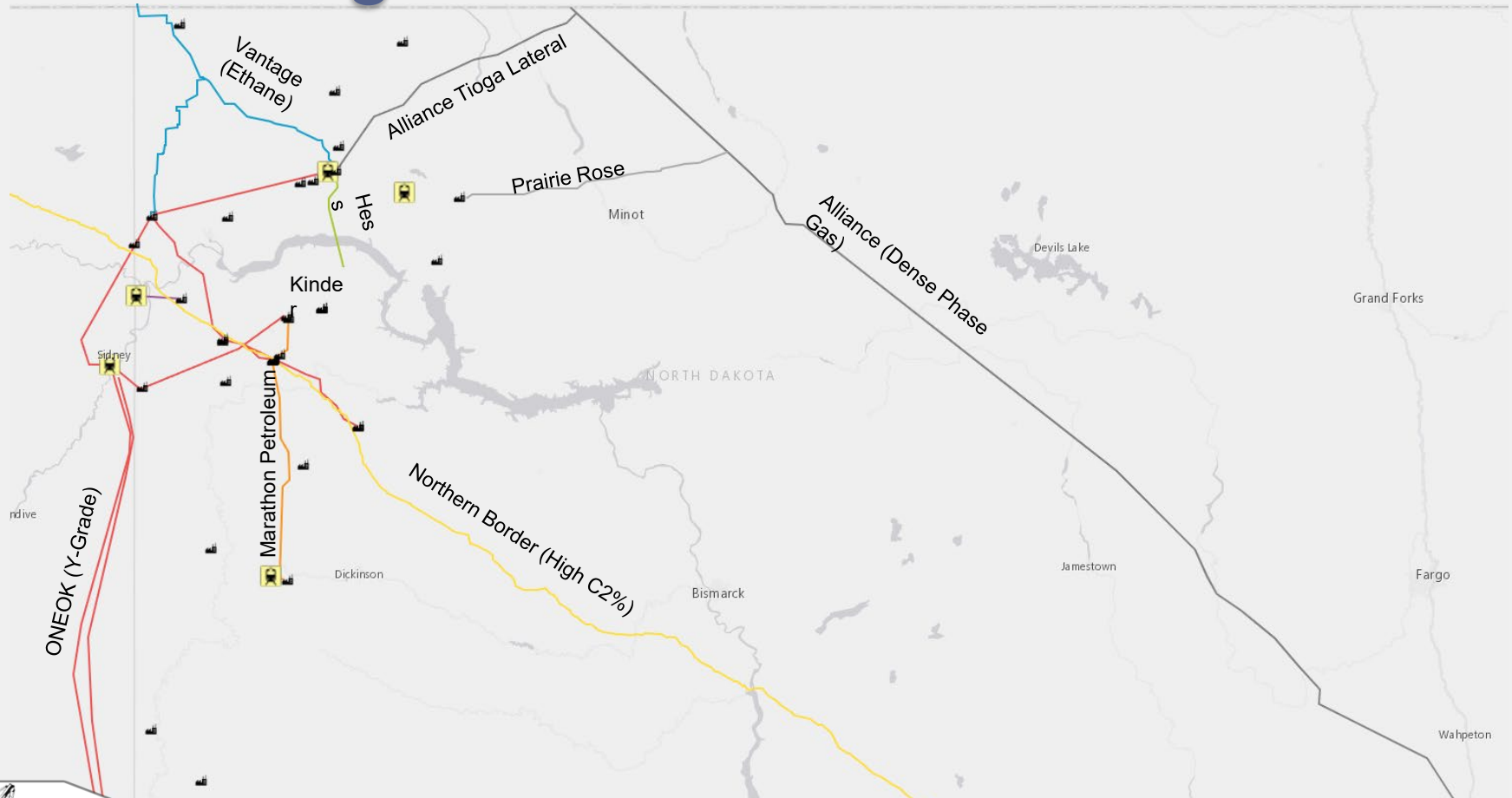
Rockies Express (REX)



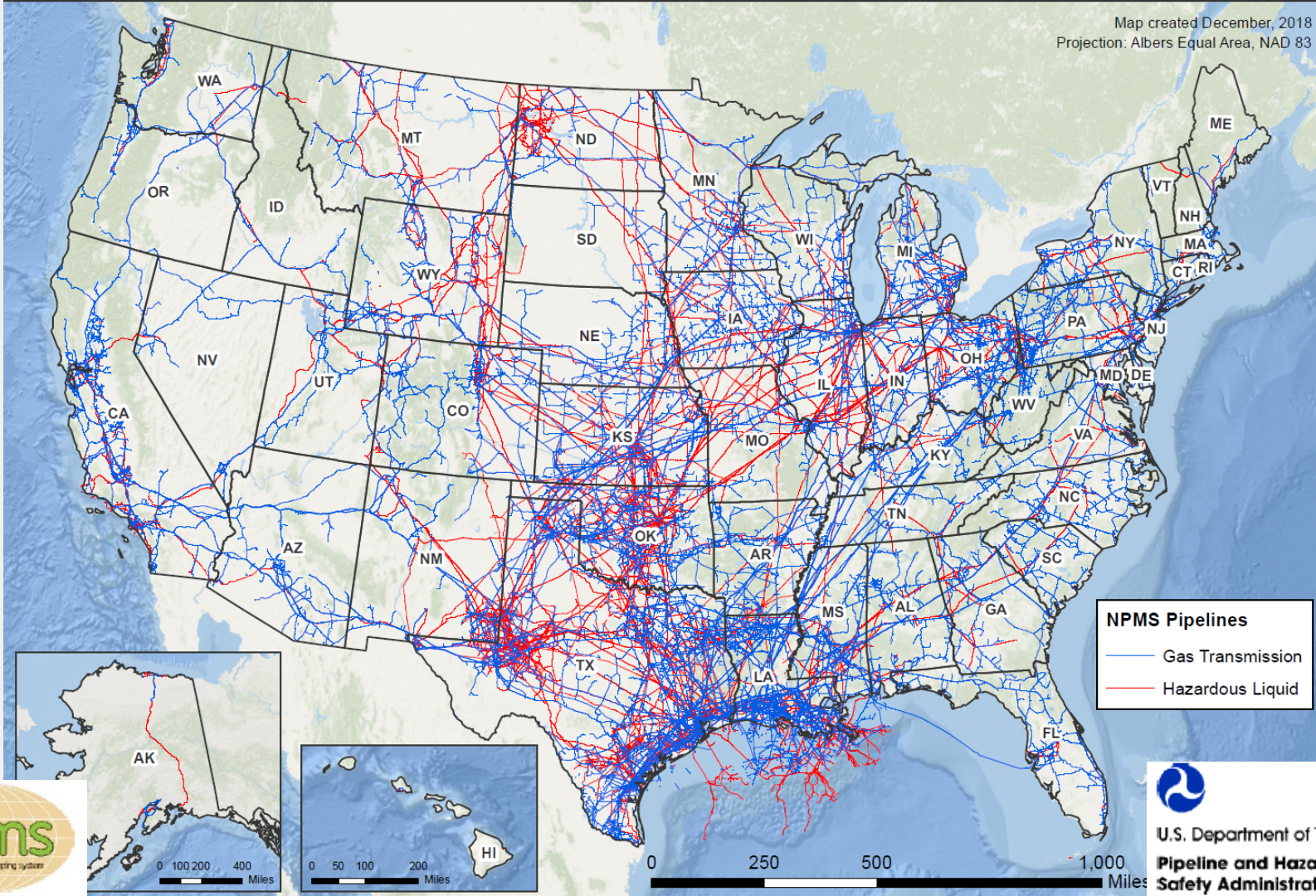
# Regional NGL Infrastructure



# Regional NGL Infrastructure







# BAKKEN GROW

GLOBAL RECRUITMENT OF OILFIELD WORKERS

## Uniting for Ukraine (U4U)

Humanitarian immigration allowing Ukrainians to start employment from day one upon entering the U.S. and they work for 2 years (with possible extensions)

Goals:	Recruit 25 workers from Ukraine by July 2023
Update:	10 Ukrainians placed with 4 pilot member companies in Minot and Dickinson with more coming to include Williston and Watford City

Sponsors needed to continue the program



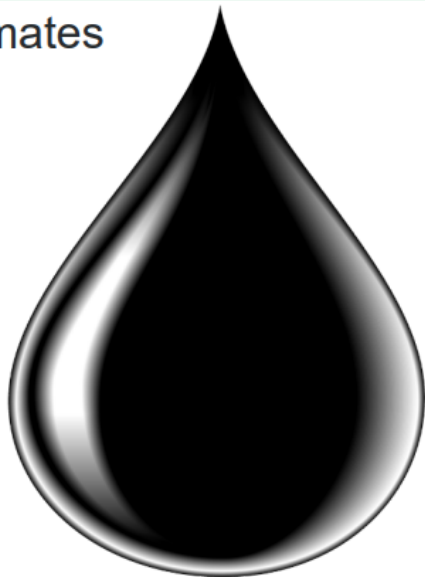
# BAKKEN EOR SIZE OF THE PRIZE

## OOIP Estimates



300 Bbbl

(Flannery and Kraus, 2006)



900 Bbbl

(Continental Resources, 2011)

## Technically Recoverable Reserve Estimates



24 Bbbl

(Continental Resource, 2011)



7.4 Bbbl

(USGS, 2013)



4.3 Bbbl

(USGS, 2021)

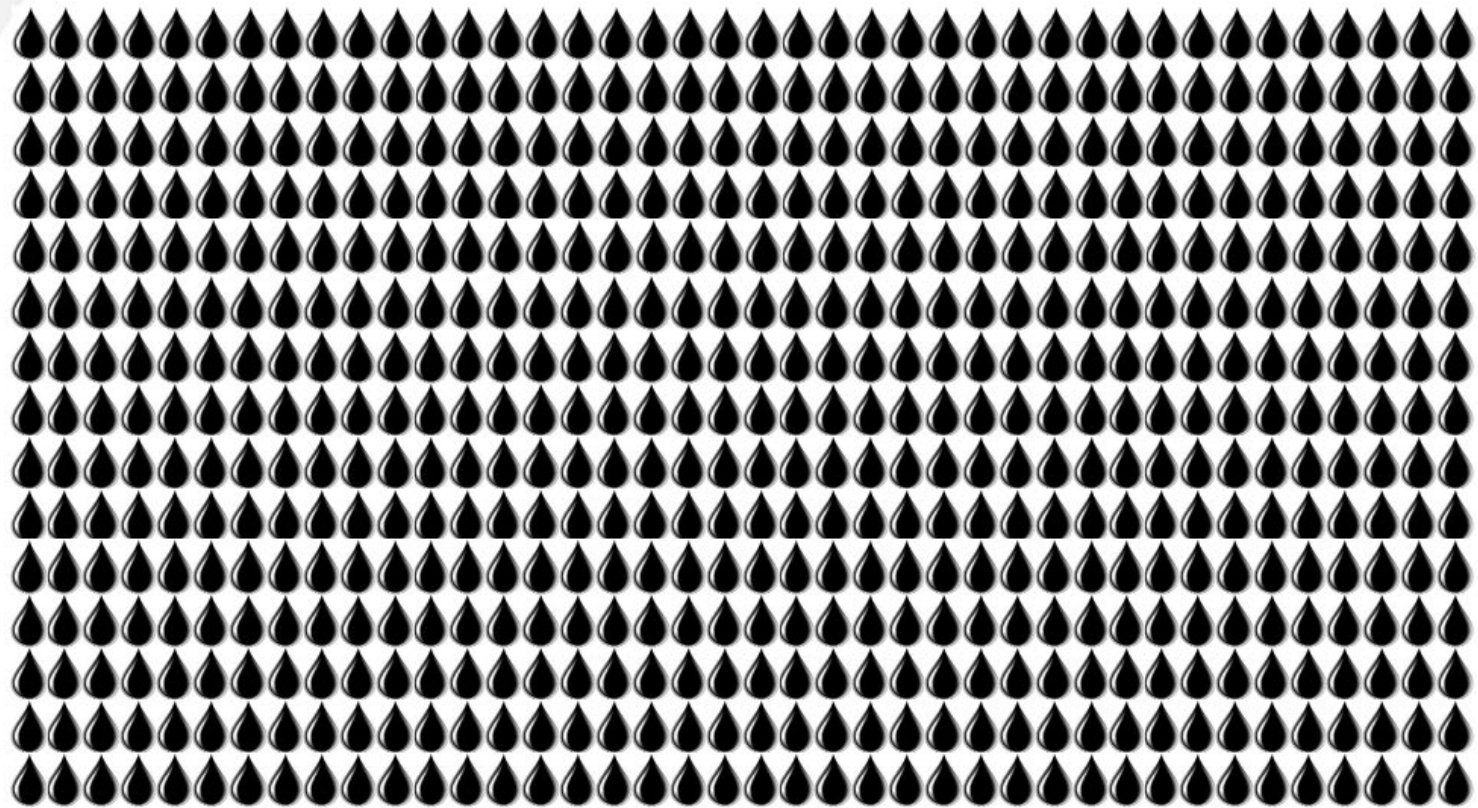
## Bakken and Three Forks Production to Date



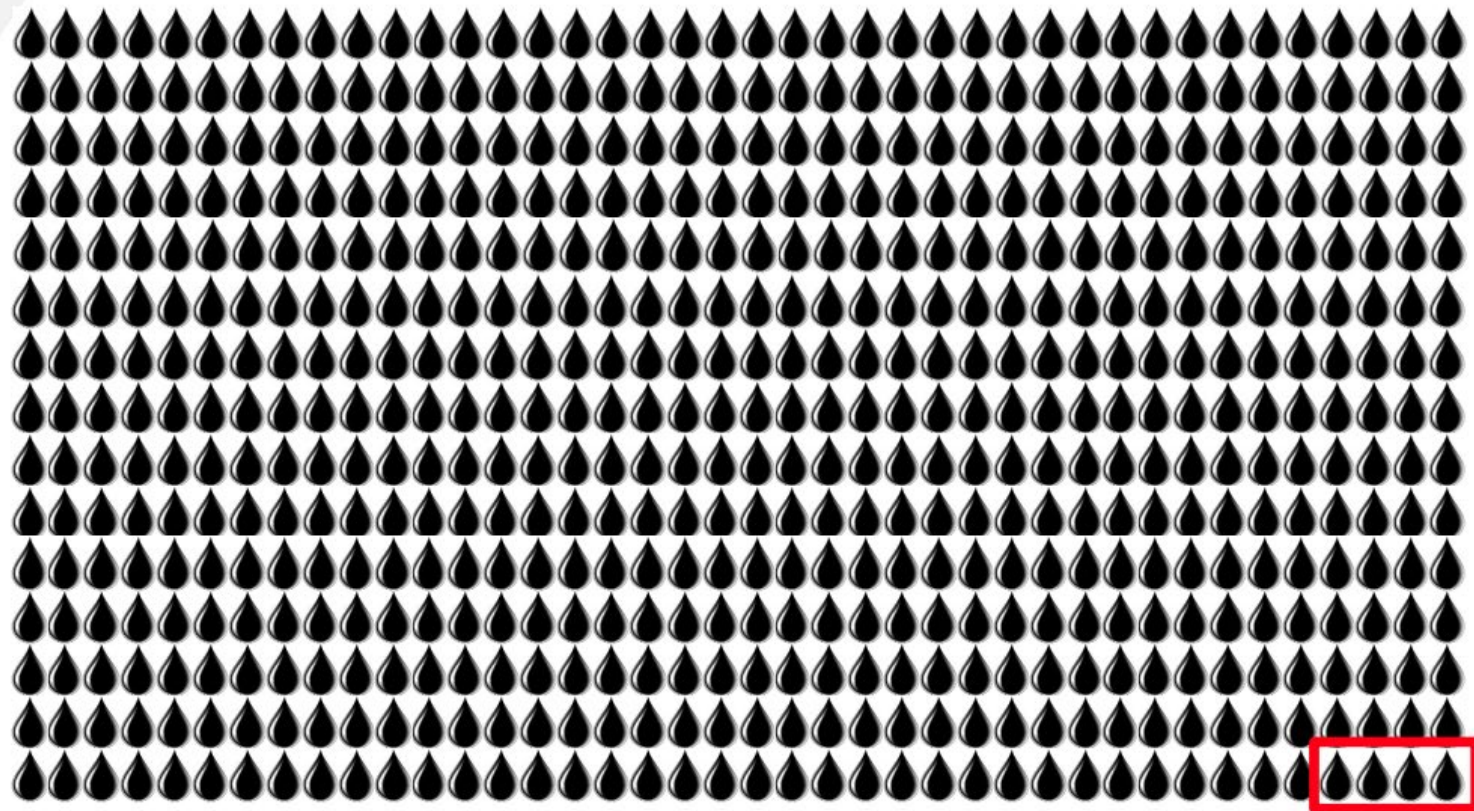
~4 Bbbl

(NDIC, 2022)

# BAKKEN OIL IN PLACE

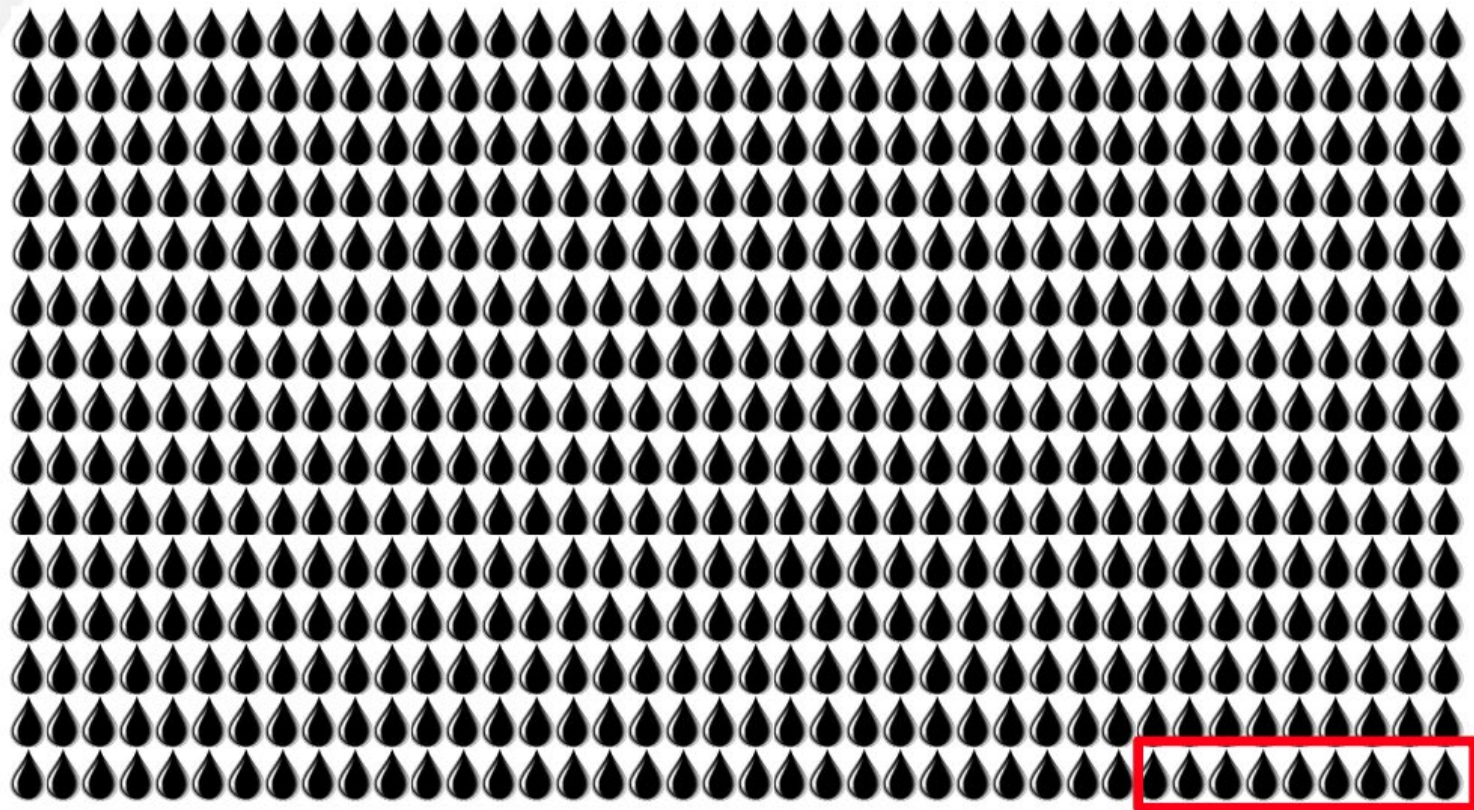


# BAKKEN OIL RECOVERY

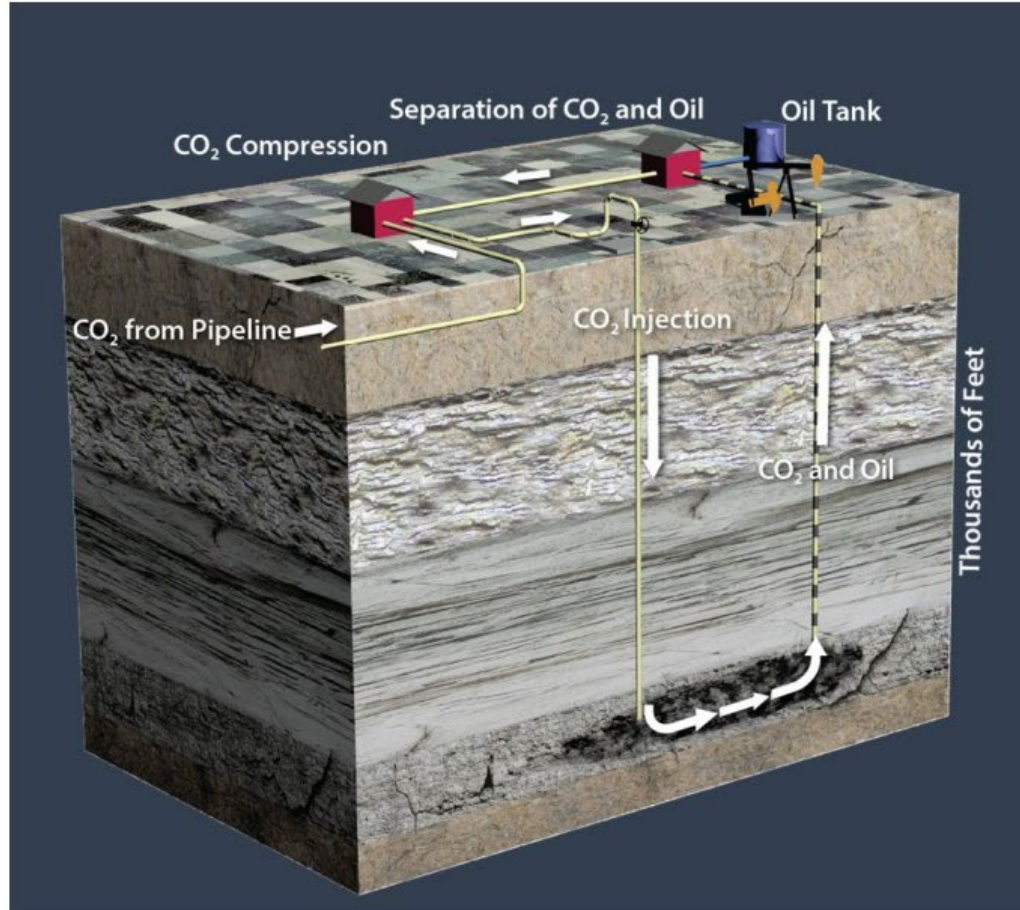




# BAKKEN OIL RECOVERY BY 2033



# ENHANCED OIL RECOVERY (EOR)





# EOR in North Dakota Legacy (conventional) Fields – Size of the Prize

Identified

201

Conventional Oil Fields

Requiring

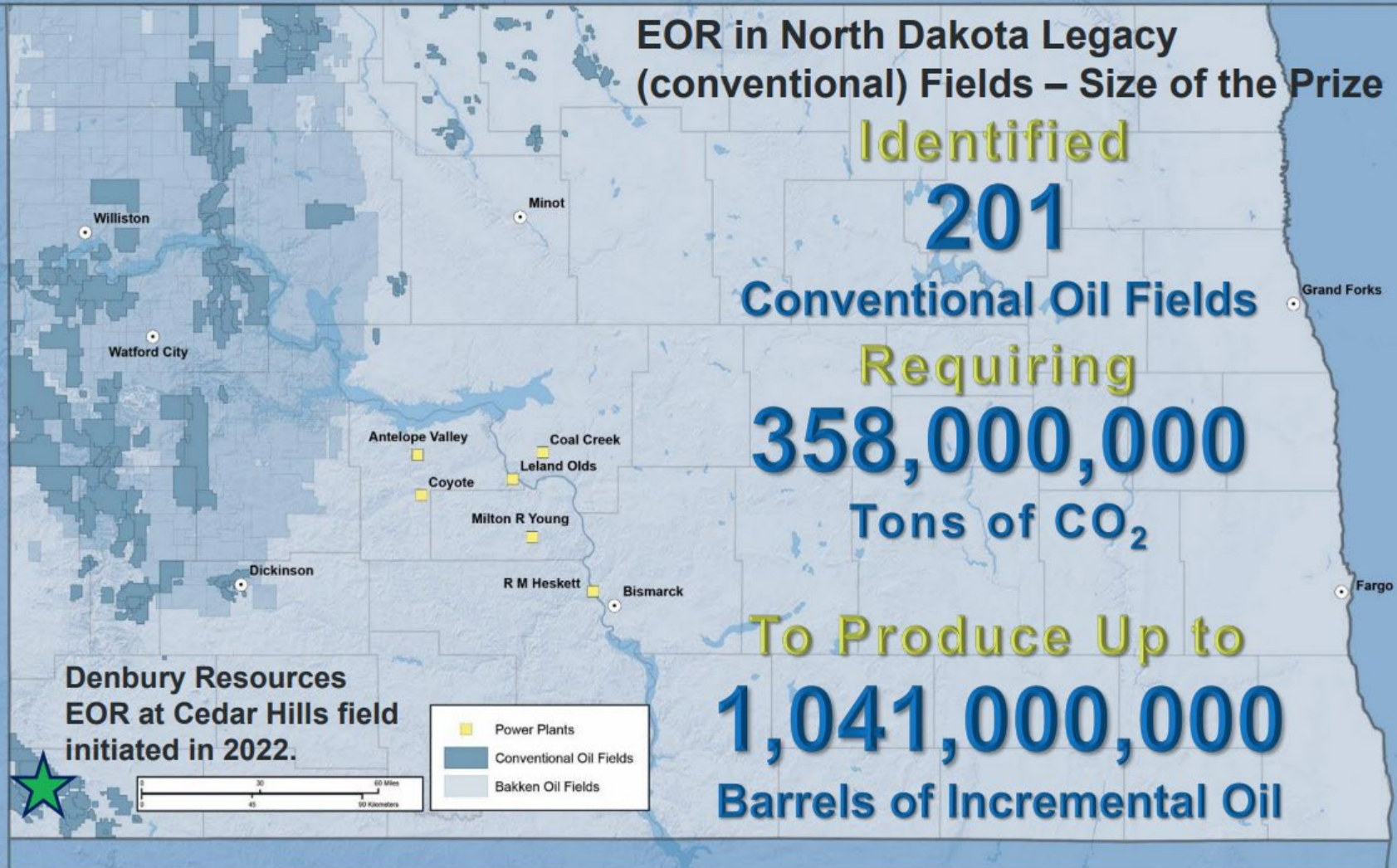
358,000,000

Tons of CO<sub>2</sub>

To Produce Up to

1,041,000,000

Barrels of Incremental Oil



# EOR in Bakken and Three Forks – Size of the Prize

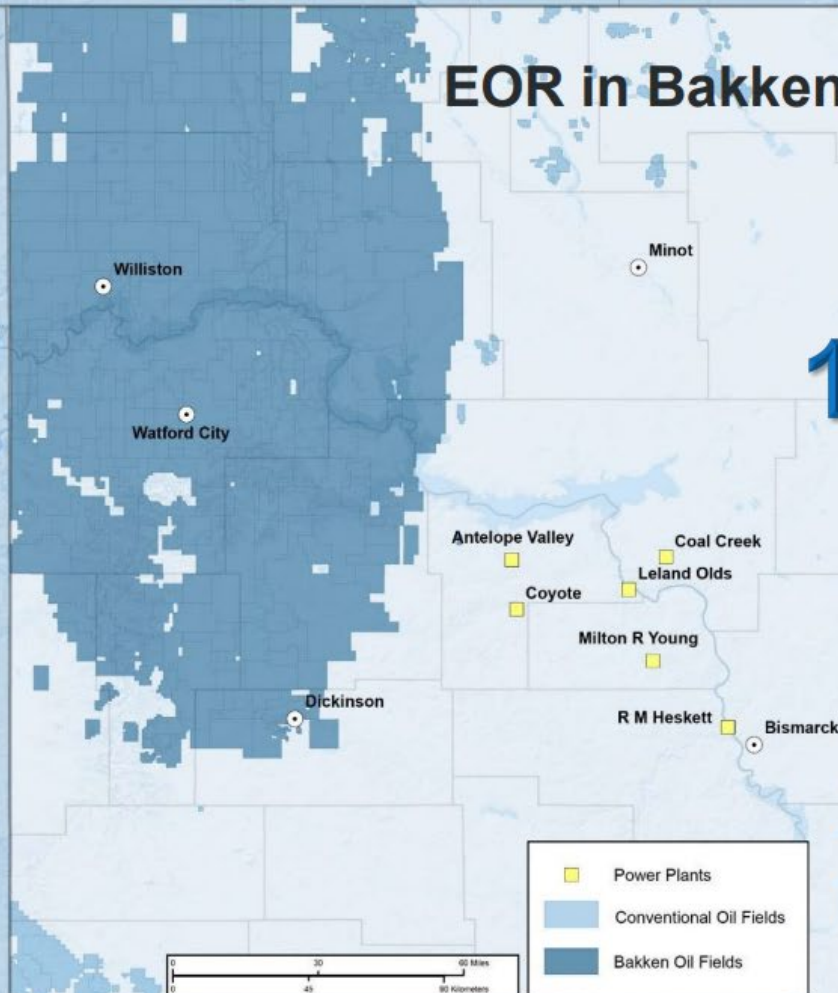
EOR in the  
Bakken Using

1.1 – 3.2 billion  
Tonnes of CO<sub>2</sub>

Could Produce  
Up to

3.2 – 7 billion  
Barrels of Incremental Oil

References: Kuuskraa and others, 2020, USEA/DOE-002415-20-01.  
Sorensen and others, 2015, URTeC: 2169871.





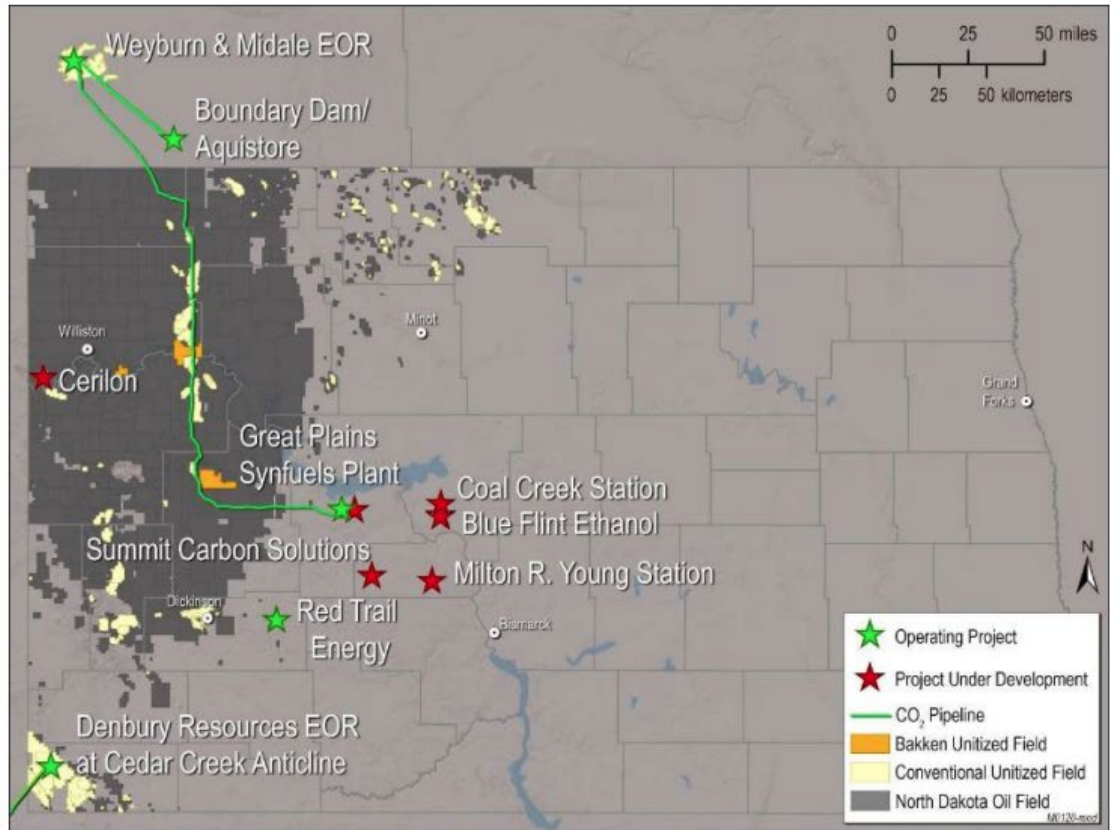
# North Dakota CCUS Activity

## Approved permits:

- Red Trail Energy
- Minnkota – Milton R. Young Station (two permits)
- Great Plains Synfuels Plant
- Blue Flint Ethanol

## Pending permits:

- DCC West Project LLC



**Fun fact: North Dakota has permitted over 100,000,000 metric tons of CO<sub>2</sub> storage!**

## Storage Potential in Deep Saline Formations

Tonnes/sq kilometer

>2,500,000

2,000,000–2,500,000

1,000,000–2,000,000

500,000–1,000,000

<500,000

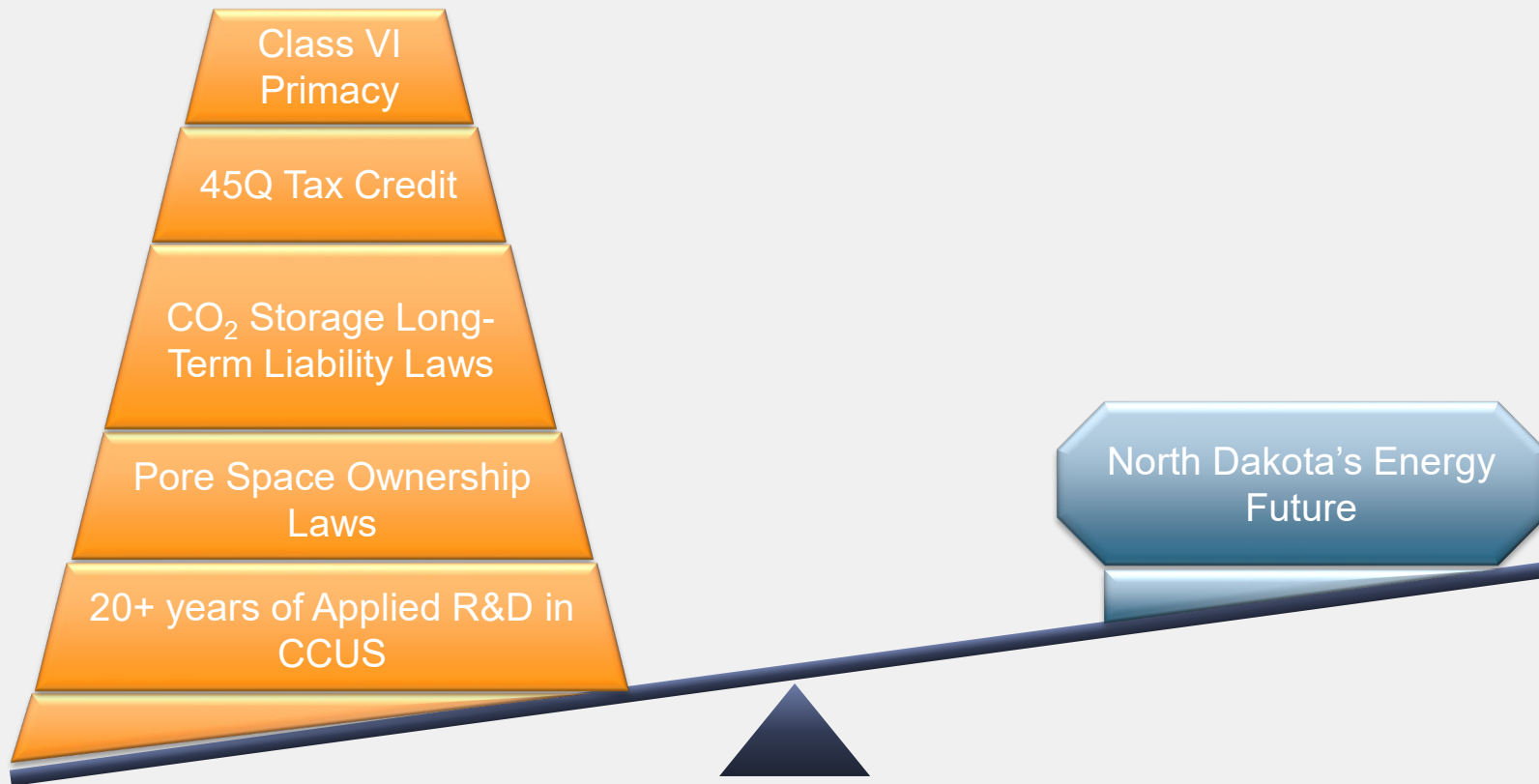
■ Power Plant

M0312

North Dakota has more than 100 billion tons of CO<sub>2</sub> storage potential, with the most promising areas near electrical generation.



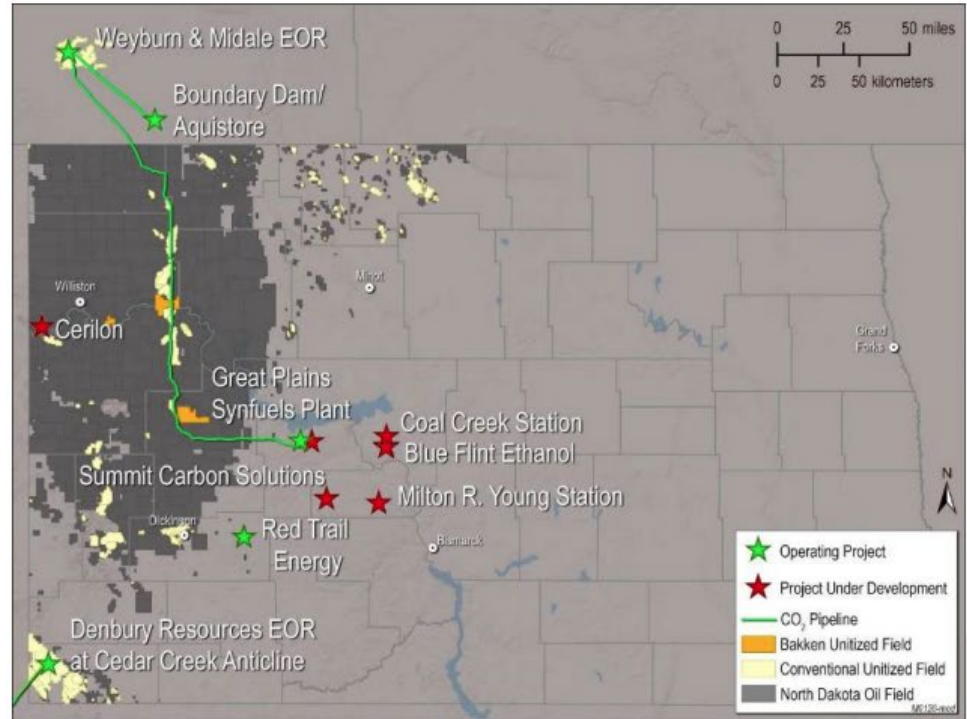
# NORTH DAKOTA'S LEVERAGE





# But... North Dakota Does Not Have Enough CO<sub>2</sub>

- ND stationary sources produce ~30 million tons CO<sub>2</sub>/yr.
- Conventional EOR produces about 2 barrels of oil/ton CO<sub>2</sub>.
- If all our CO<sub>2</sub> was used for EOR, we could expect ~165,000 bbl/d or ~60 million bbl/yr or 50–100 years to produce the next 3–7 billion barrels!
- We need 5 times more CO<sub>2</sub> to replace primary production!



## Active and Developing CCUS Projects in the PCOR Partnership Region

- Active Capture
- ▼ Active Injection
- Developing Capture
- ▼ Developing Injection
- CO<sub>2</sub> Pipeline
- - - Proposed CO<sub>2</sub> Pipeline





# Oil and Gas : ArcIMS Viewer

Legend / Layers

Overview Map

View Entire State

Previous View

Clear Selection

Search

Create PDF

Zoom In

Zoom Out

Pan

Rect Identify

Select Object

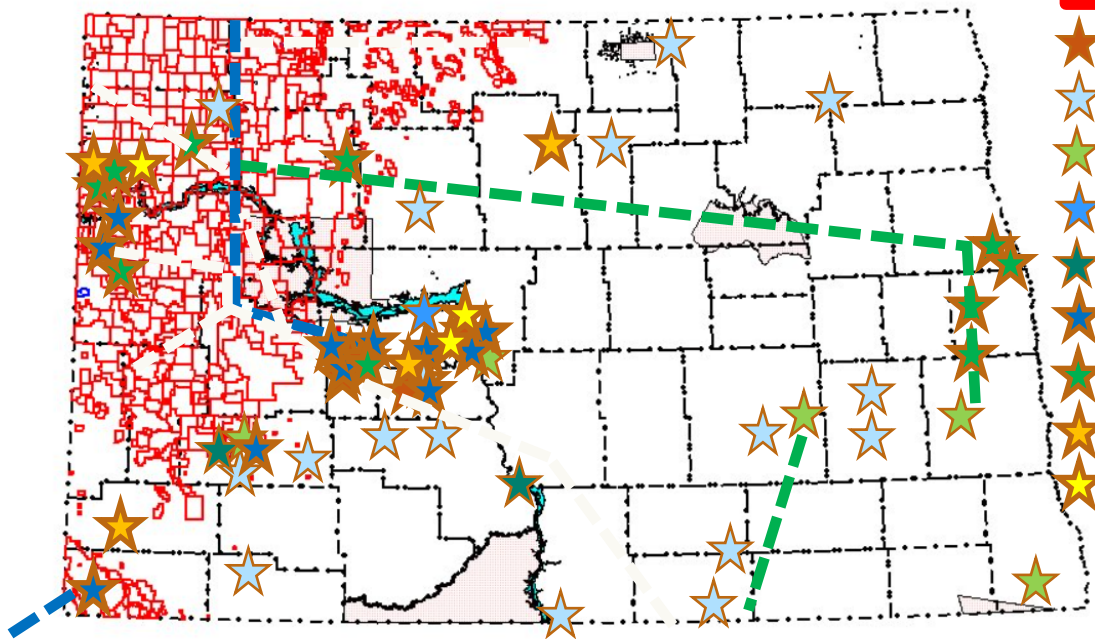
Buffer

Distance

Find Well

Find Field / Unit

















Find Section

Browser Settings  
Suggestion**ND Energy Landscape >2030**

-  Oil & Gas
-  Coal-ElecGen
-  Wind Farm
-  Ethanol
-  Hydro
-  Refinery
-  CCUS
-  NG / Industrial
-  Minerals
-  Data Center

Download Shape










**ND OIL & GAS LAYERS**

-  Oil and Gas
-  Wells
-  Permit Status Before S
-  Rig Location
-  Directional Surveys
-  Directional Legs
-  Horizontal Surveys
-  Horizontal Legs
-  Cases Docketed
-  Oil Fields
-  Unit Boundaries
-  Inspector Areas
-  Drilling / Spacing
-  Seismic
-  Gas Plants
-  Other

Refresh Map

☒ Auto Refresh

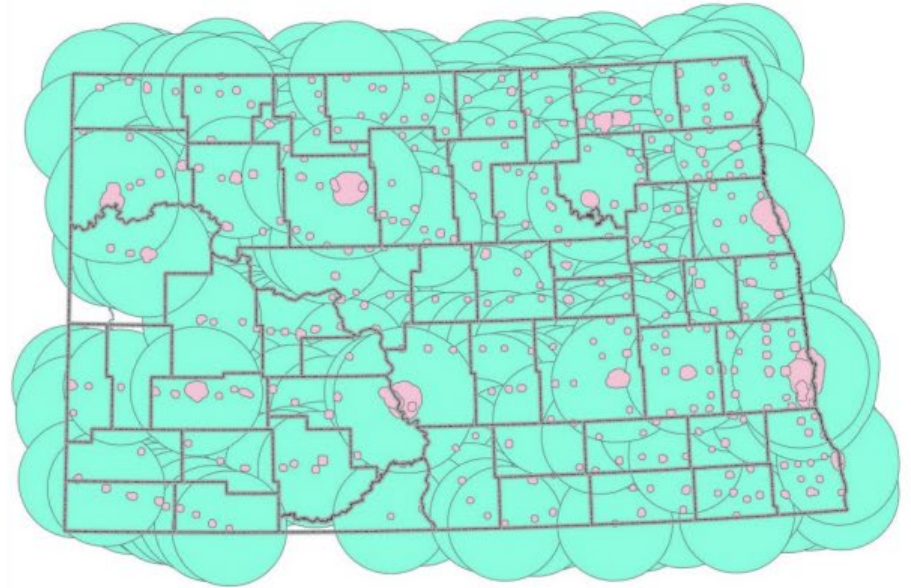
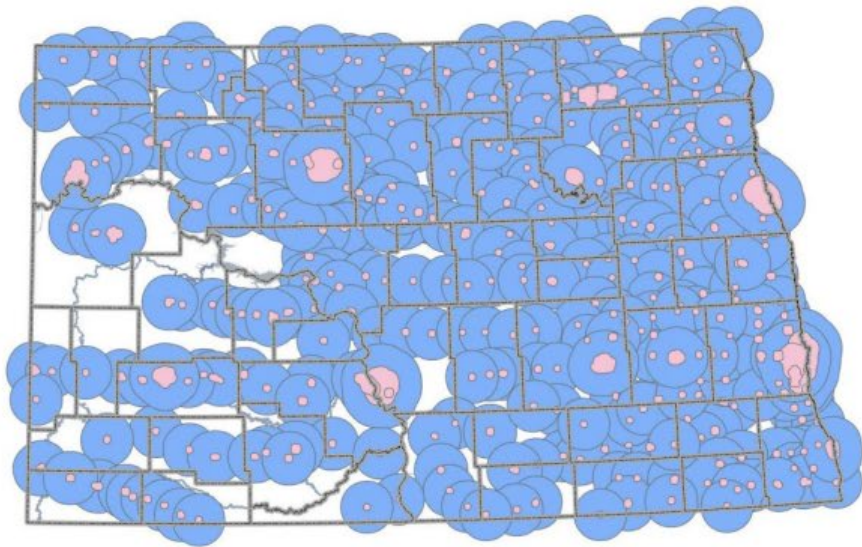
Help:

-  A closed group, click to open.
-  An open group, click to close.
-  A map layer.
-  A hidden group/layer, click to make visible.
-  A visible group/layer, click to hide.
-  A visible layer, but not at this scale.
-  A partially visible group, click to make visible.
-  An inactive layer, click to make active.
-  The active layer.

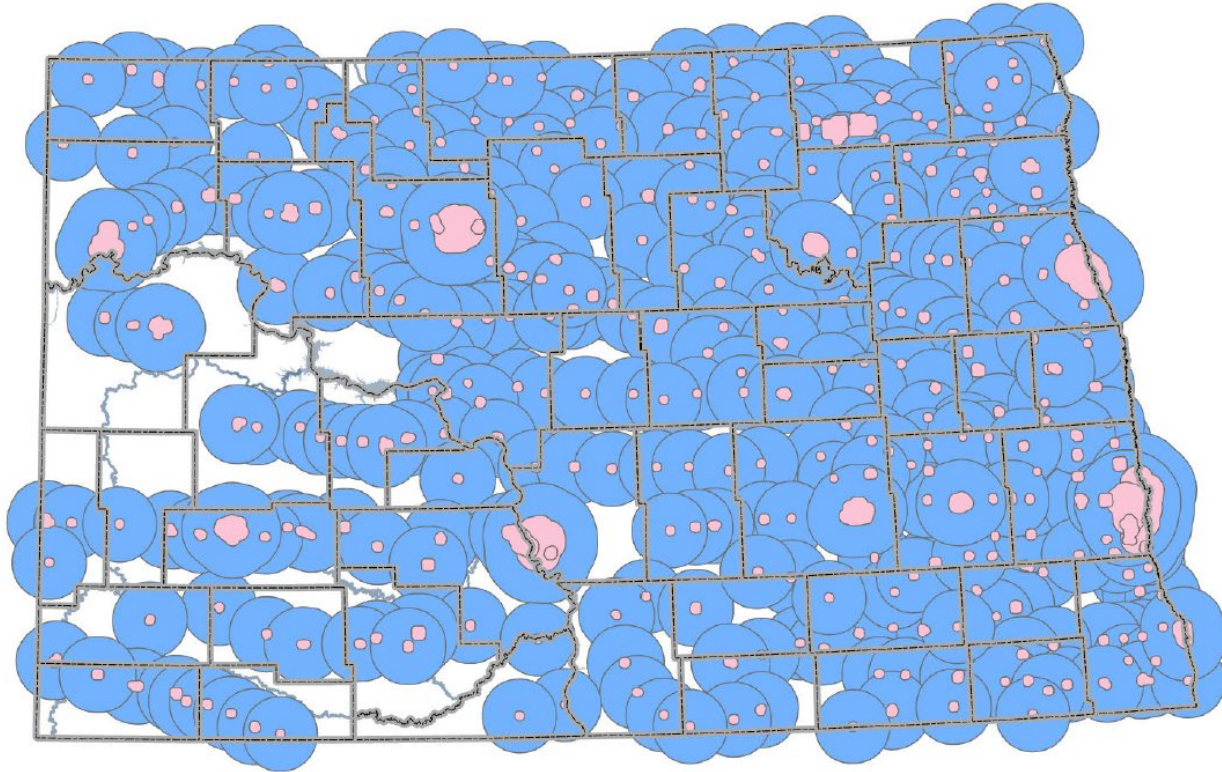
Zoom In

Map Data Last Updated : 1/24/

# Implications of Extraterritorial Zone Buffers



## Extraterritorial Jurisdiction + 10 miles





# BAKKEN NOW

WILLISTON  
BASIN  
PETROLEUM  
CONFERENCE

13-16 MAY 2024

SAVE  
THE  
DATE



TRADE SHOW • EXPERT PRESENTATIONS • NETWORKING



# QUESTIONS?



[www.NDOil.org](http://www.NDOil.org)