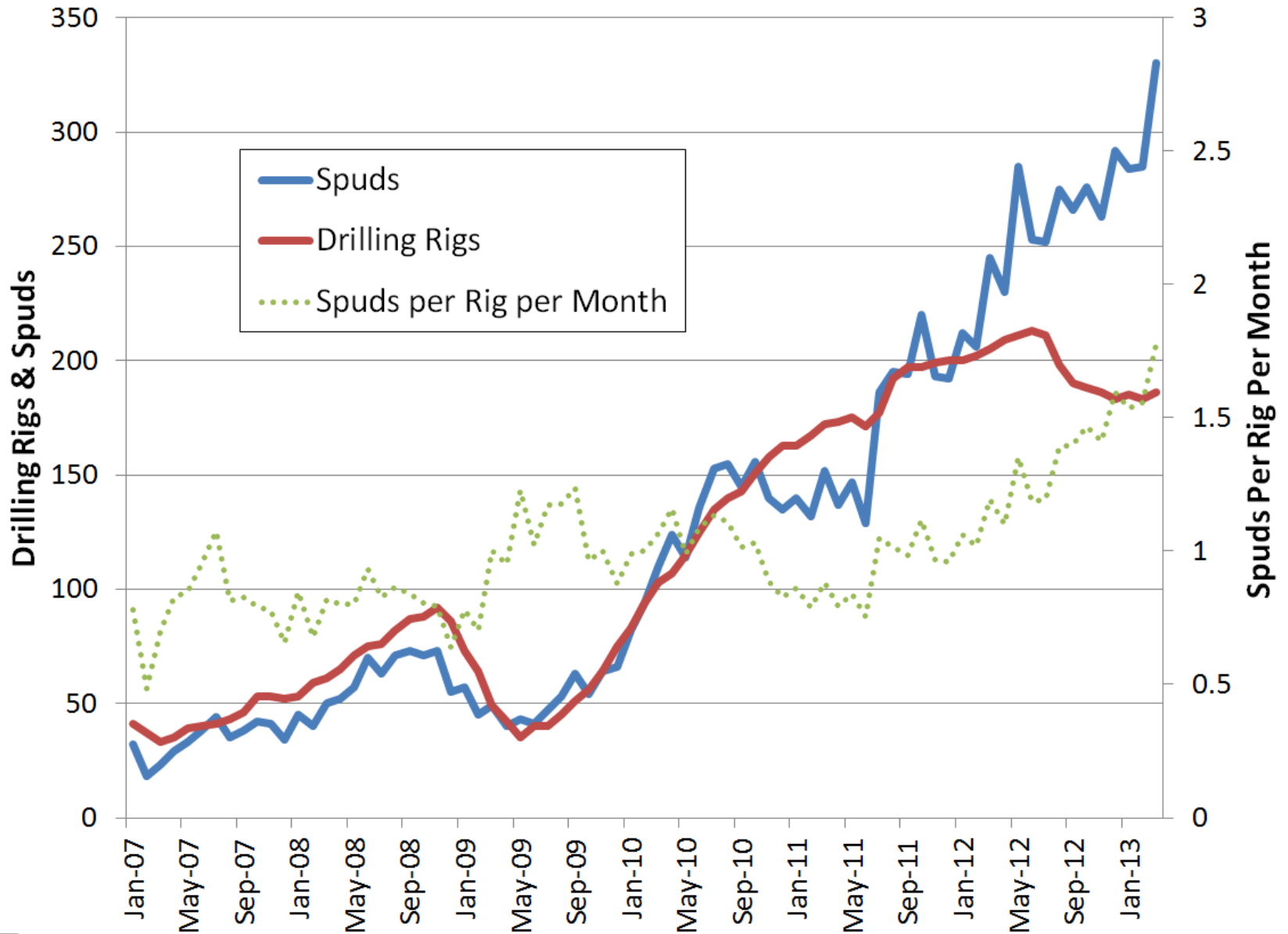# North Dakota Oil & Gas Research Council
North Dakota Pipeline Authority
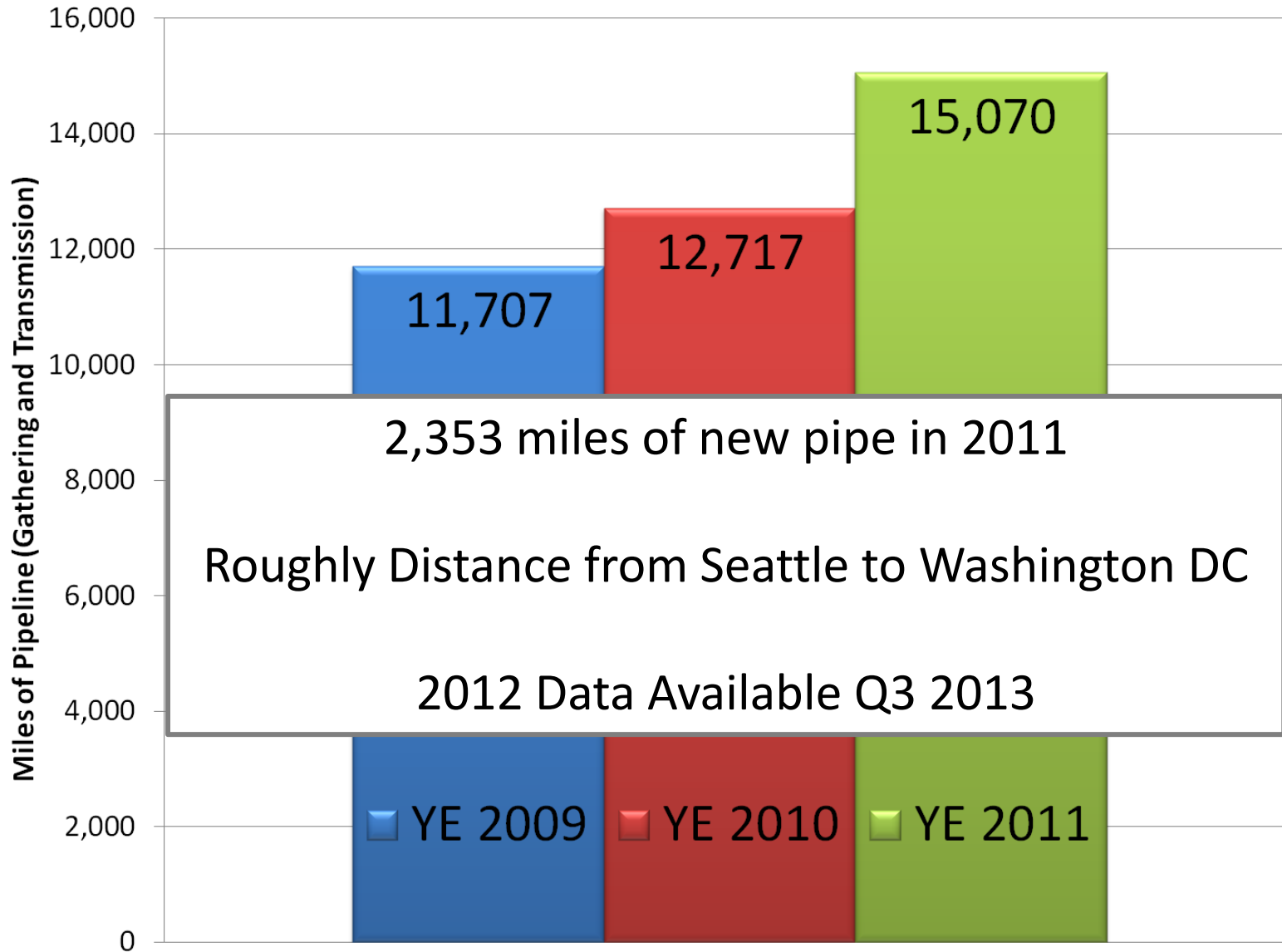## Justin J. Kringstad
May 23, 2013 – Bismarck, ND

ND Drilling Stats

North Dakota Pipeline Miles

2,353 miles of new pipe in 2011

Roughly Distance from Seattle to Washington DC

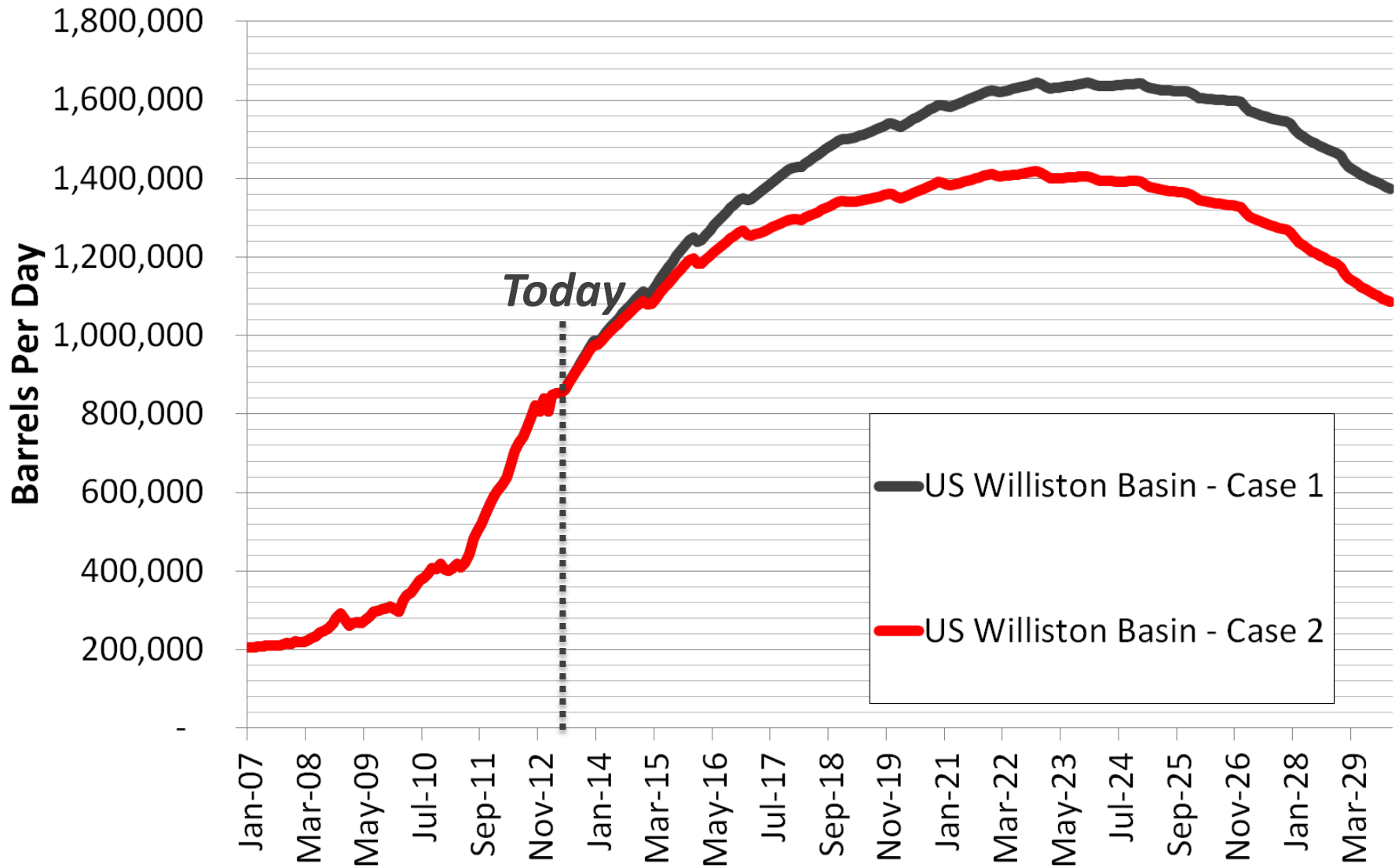2012 Data Available Q3 2013

Crude Oil

Understanding production potential

Understanding current transportation dynamics and potential transportation constraints

Understanding current and future market conditions

Forecasting Williston Basin Oil Production, BOPD

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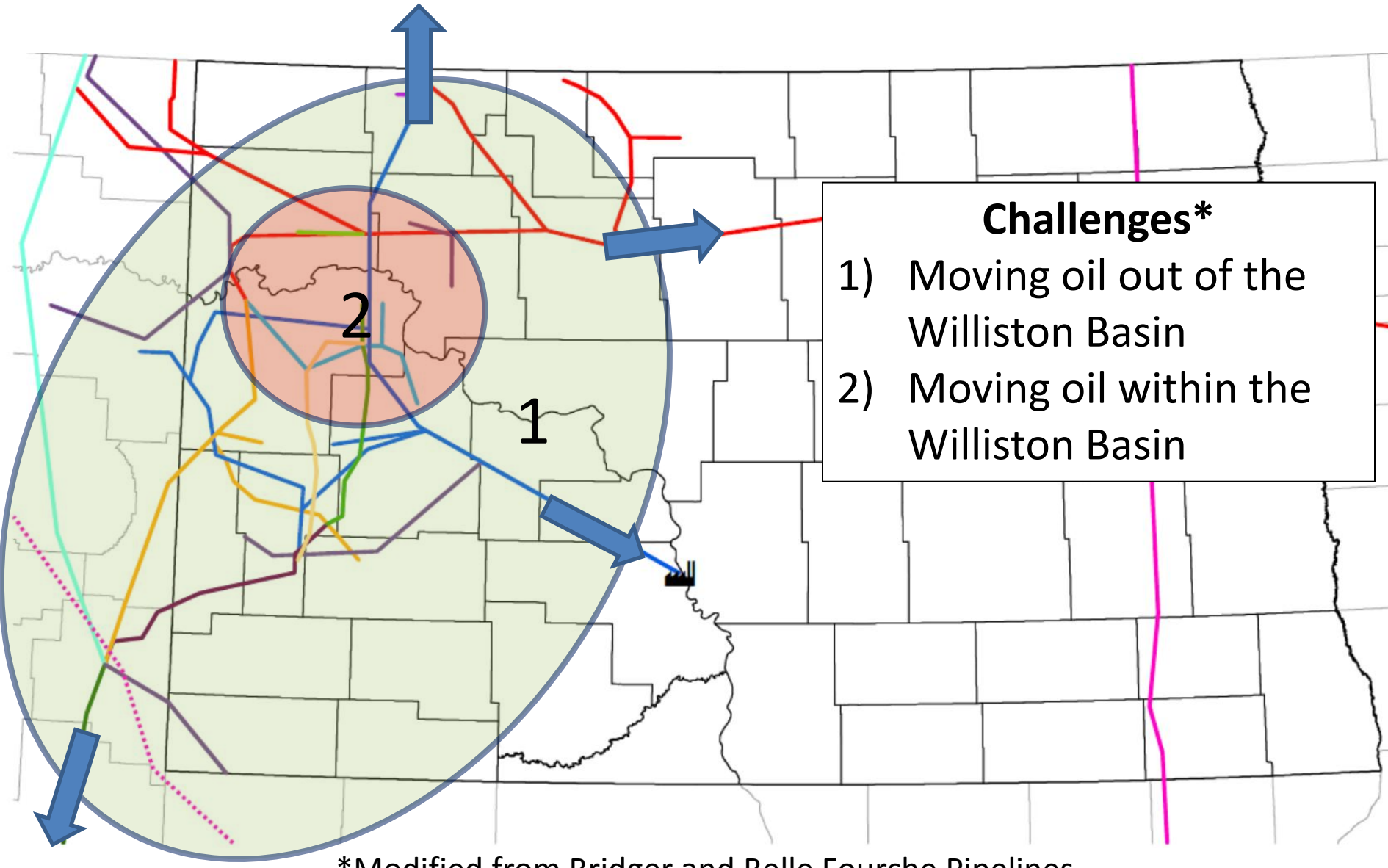
Crude Oil

Understanding production potential

Understanding current transportation dynamics and potential transportation constraints
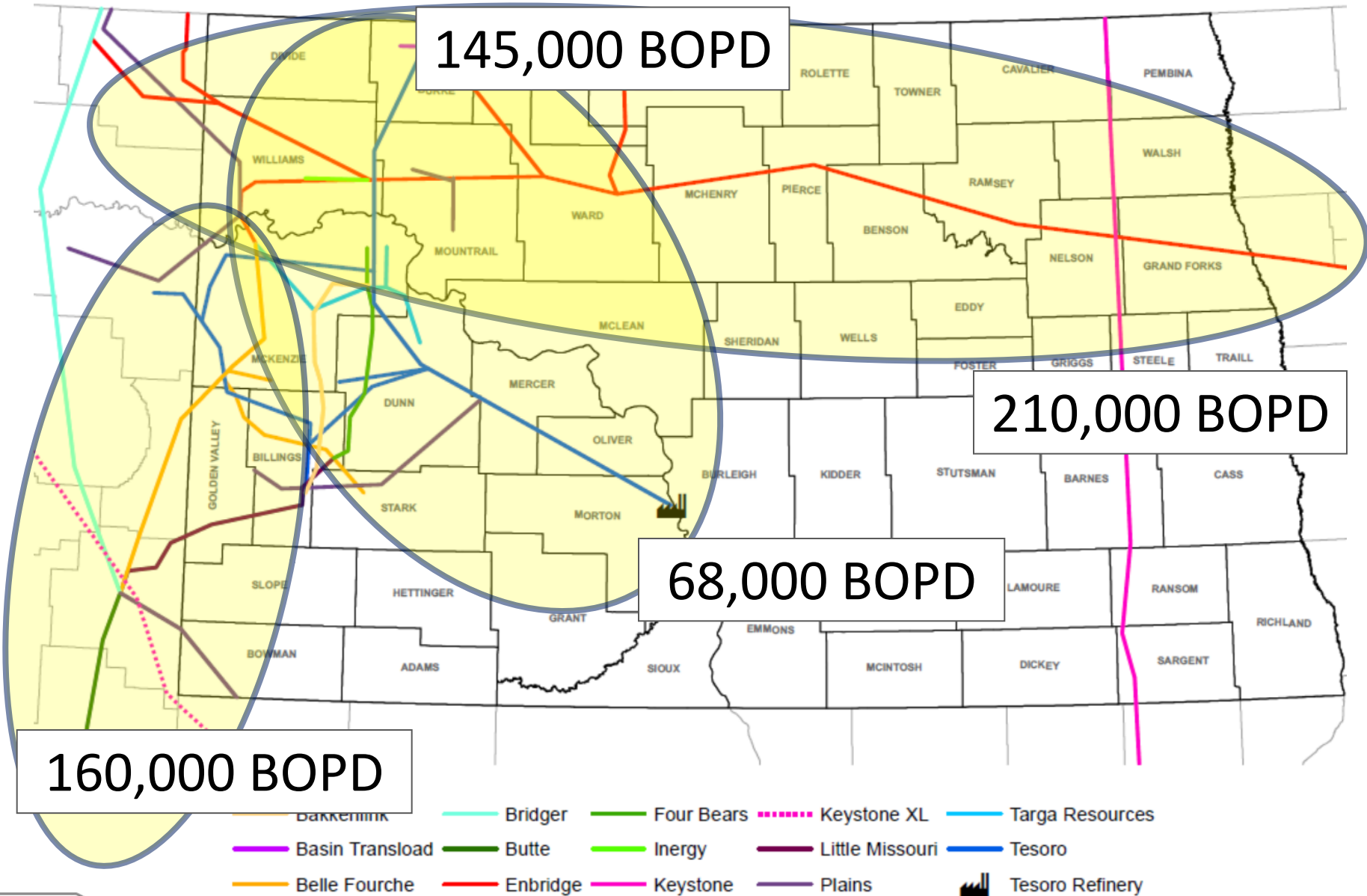
Understanding current and future market conditions

North Dakota Crude Oil Pipelines

Challenges*
1) Moving oil out of the Williston Basin
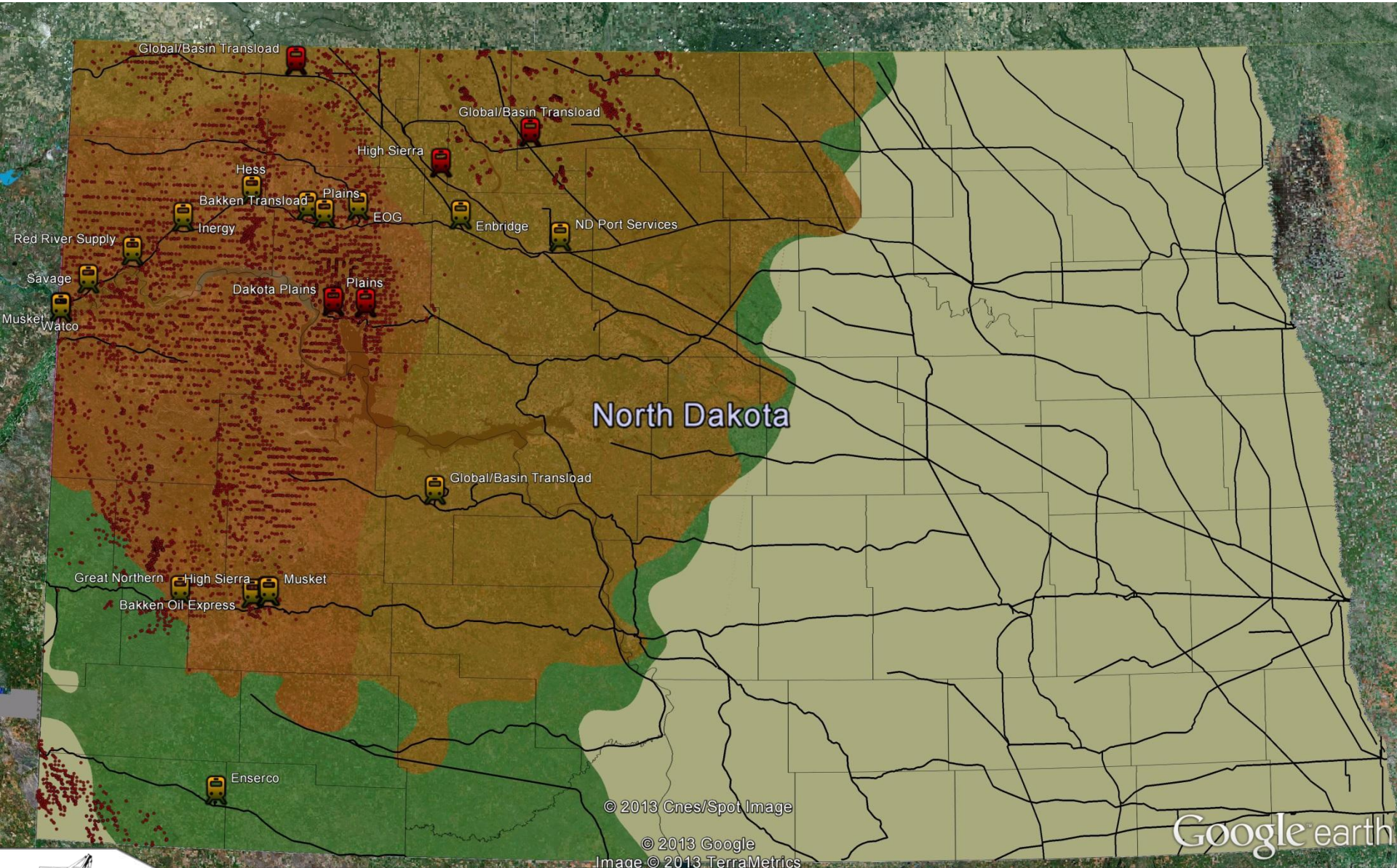2) Moving oil within the Williston Basin

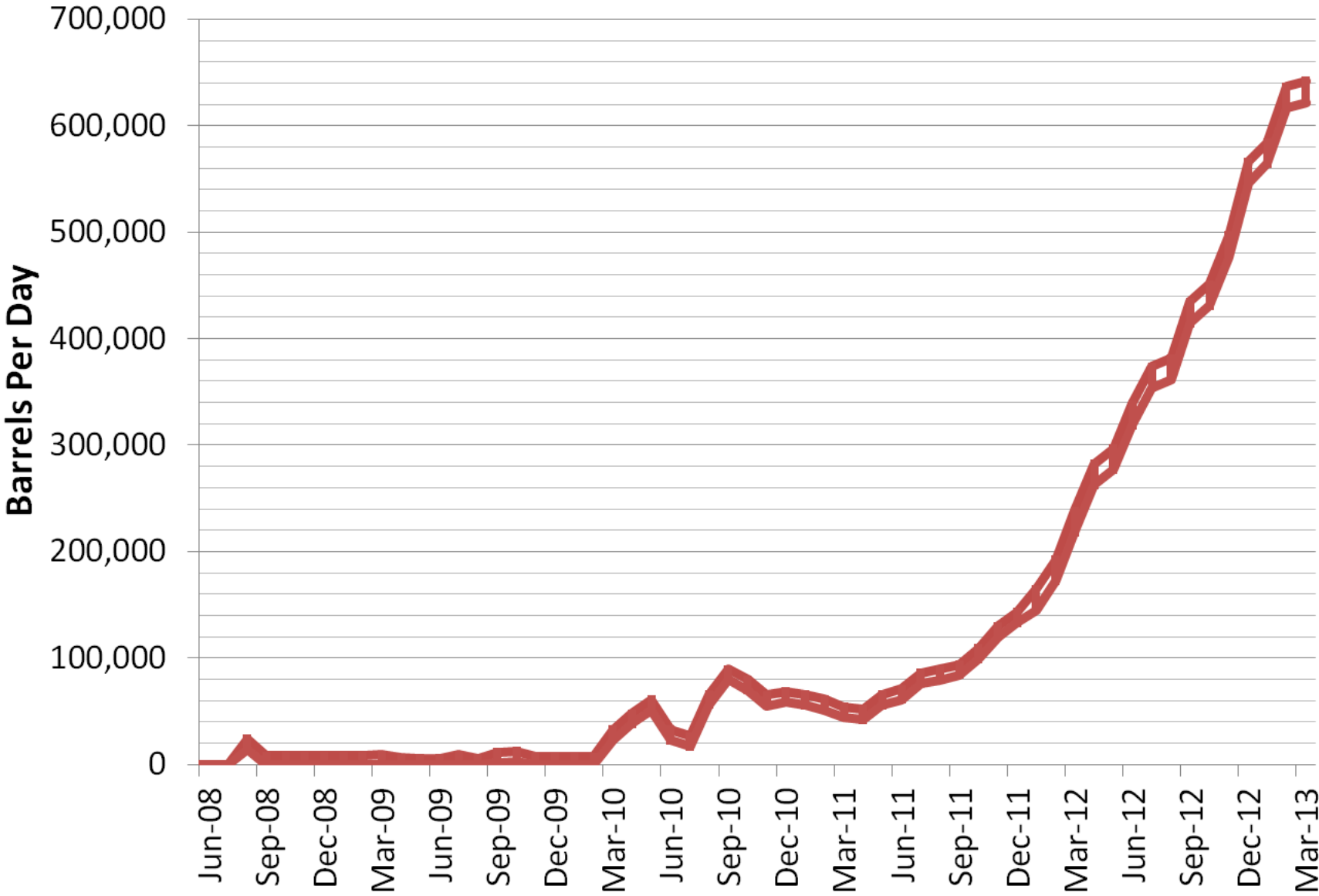*Modified from Bridger and Belle Fourche Pipelines

North Dakota Crude Oil Pipelines

Oil Loading Rail Facilities

Estimated ND Rail Export Volumes

Estimated Williston Basin Oil Transportation

1%

8%

20%

71%

March 2013

■ Pipeline Export ■ Tesoro Refinery

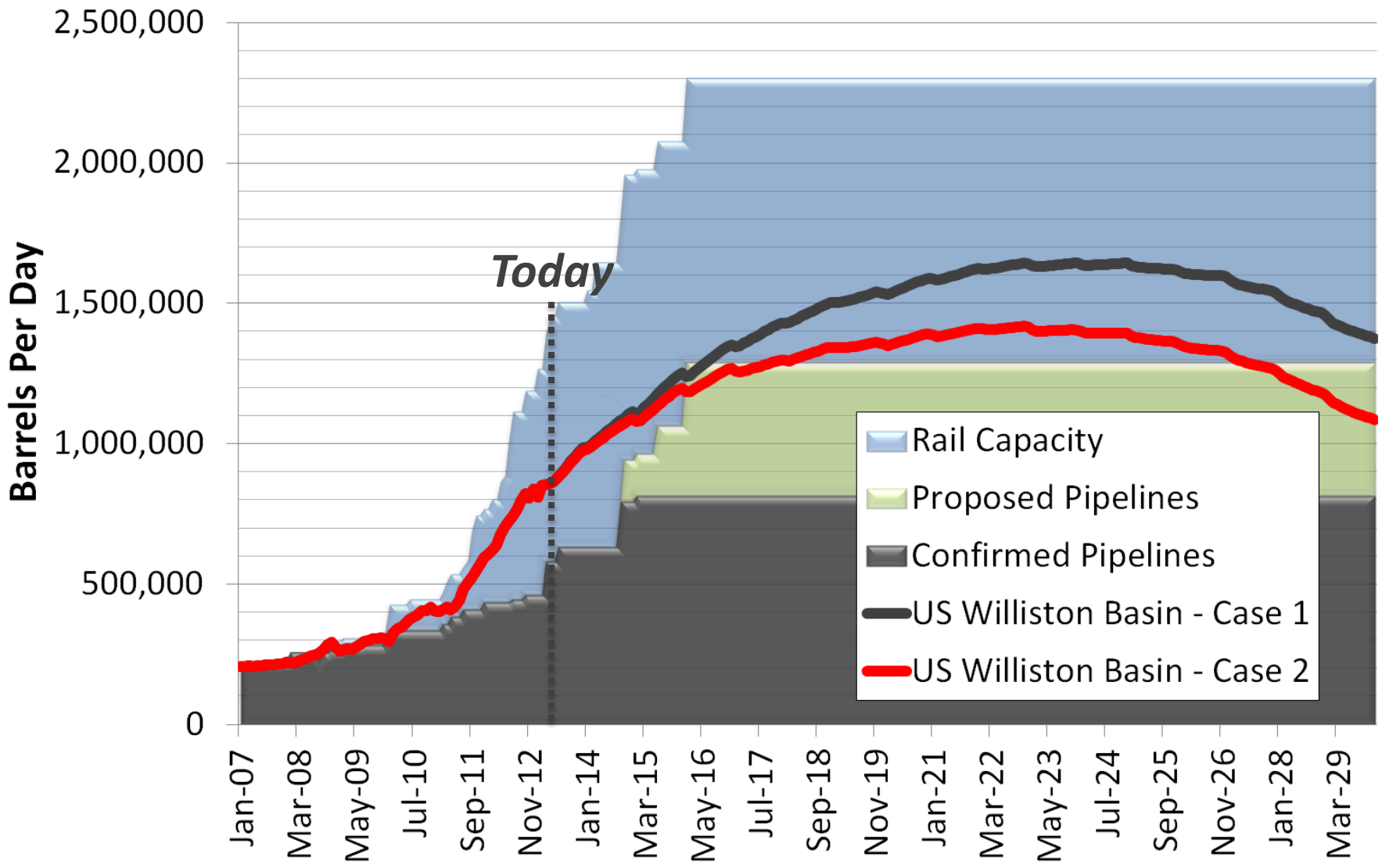■ Truck to Canadian Pipelines ■ Estimated Rail
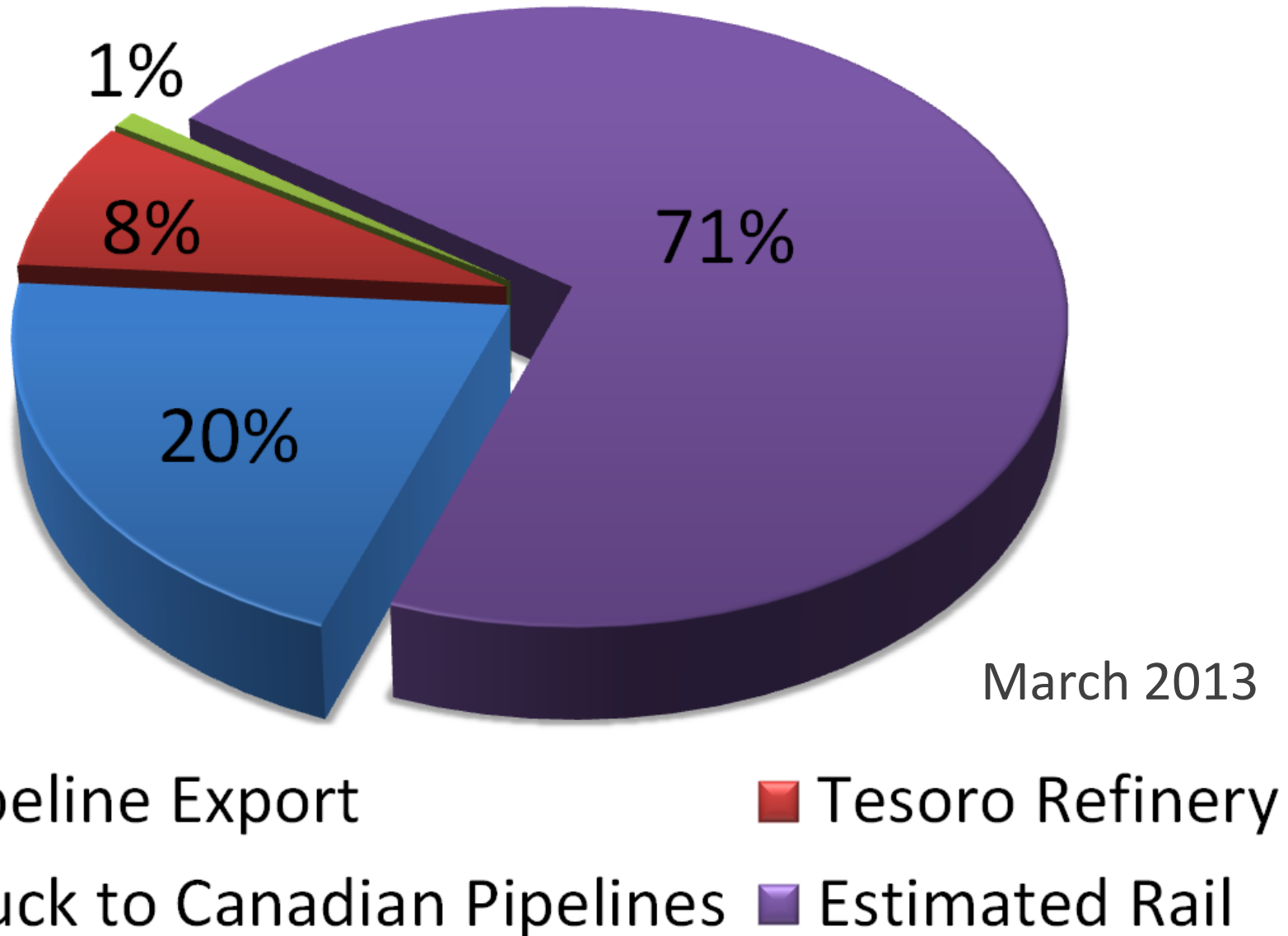
US Williston Basin Oil Transport*
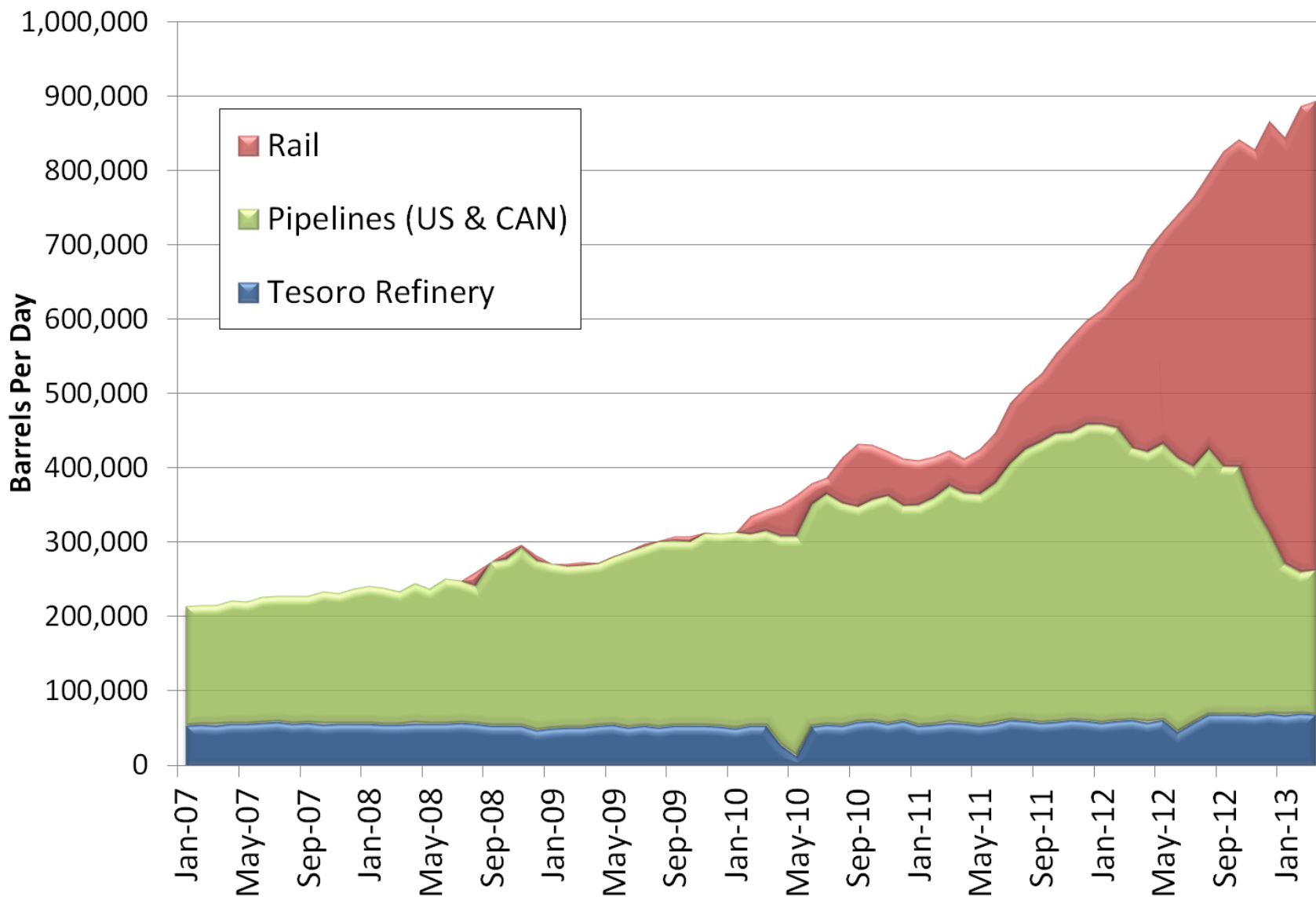
Some data based on estimates or assumptions

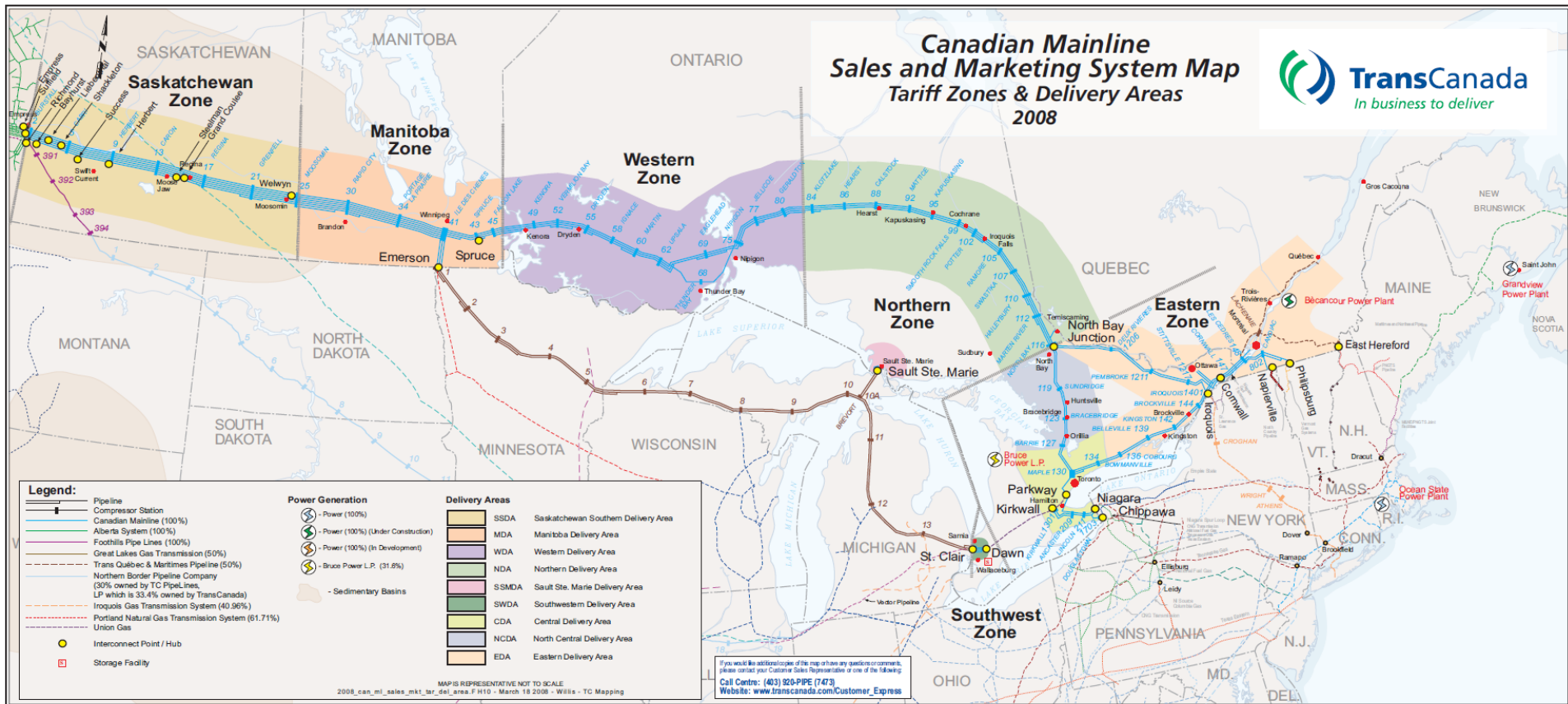# Williston Basin Oil Production & Export Capacity, BOPD

Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
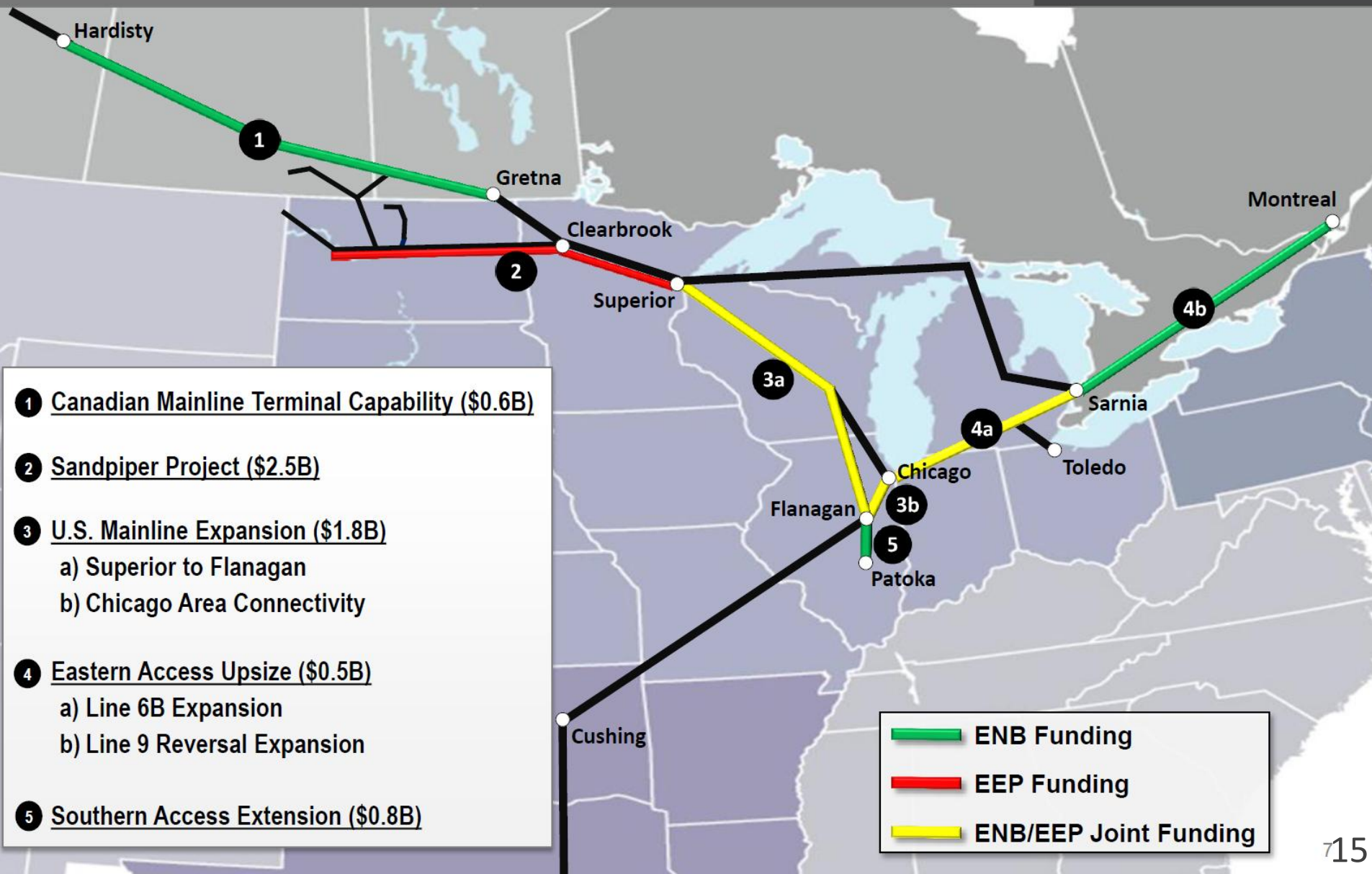
TransCanada Open Season
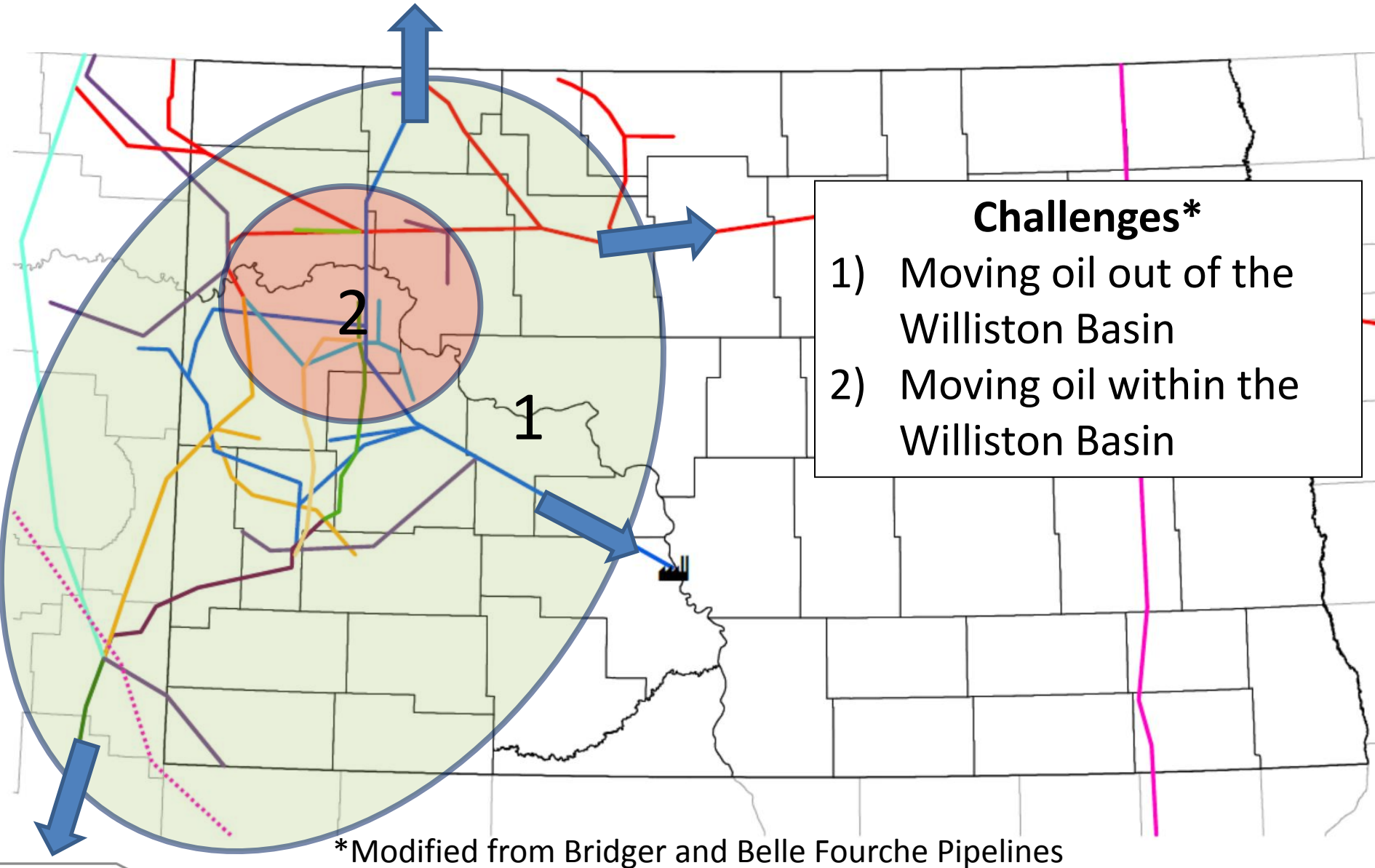## April 15-June 17 Up to 850 mbpd
Proposed In-Service 2017/18
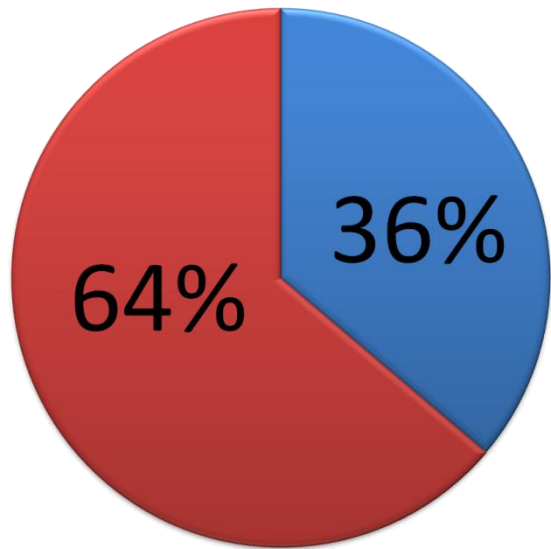
$6.2 Billion – Light Oil Market Access

ENBRIDGE

Map labels: Hardisty, Gretna, Clearbrook, Superior, Montreal, Sarnia, Toledo, Chicago, Flanagan, Patoka, Cushing

1. Canadian Mainline Terminal Capability ($0.6B)

2. Sandpiper Project ($2.5B)

3. U.S. Mainline Expansion ($1.8B)
   a) Superior to Flanagan
   b) Chicago Area Connectivity

4. Eastern Access Upsize ($0.5B)
   a) Line 6B Expansion
   b) Line 9 Reversal Expansion

5. Southern Access Extension ($0.8B)

ENB Funding
EEP Funding
ENB/EEP Joint Funding

North Dakota Crude Oil Pipelines

Challenges*
1) Moving oil out of the Williston Basin
2) Moving oil within the Williston Basin

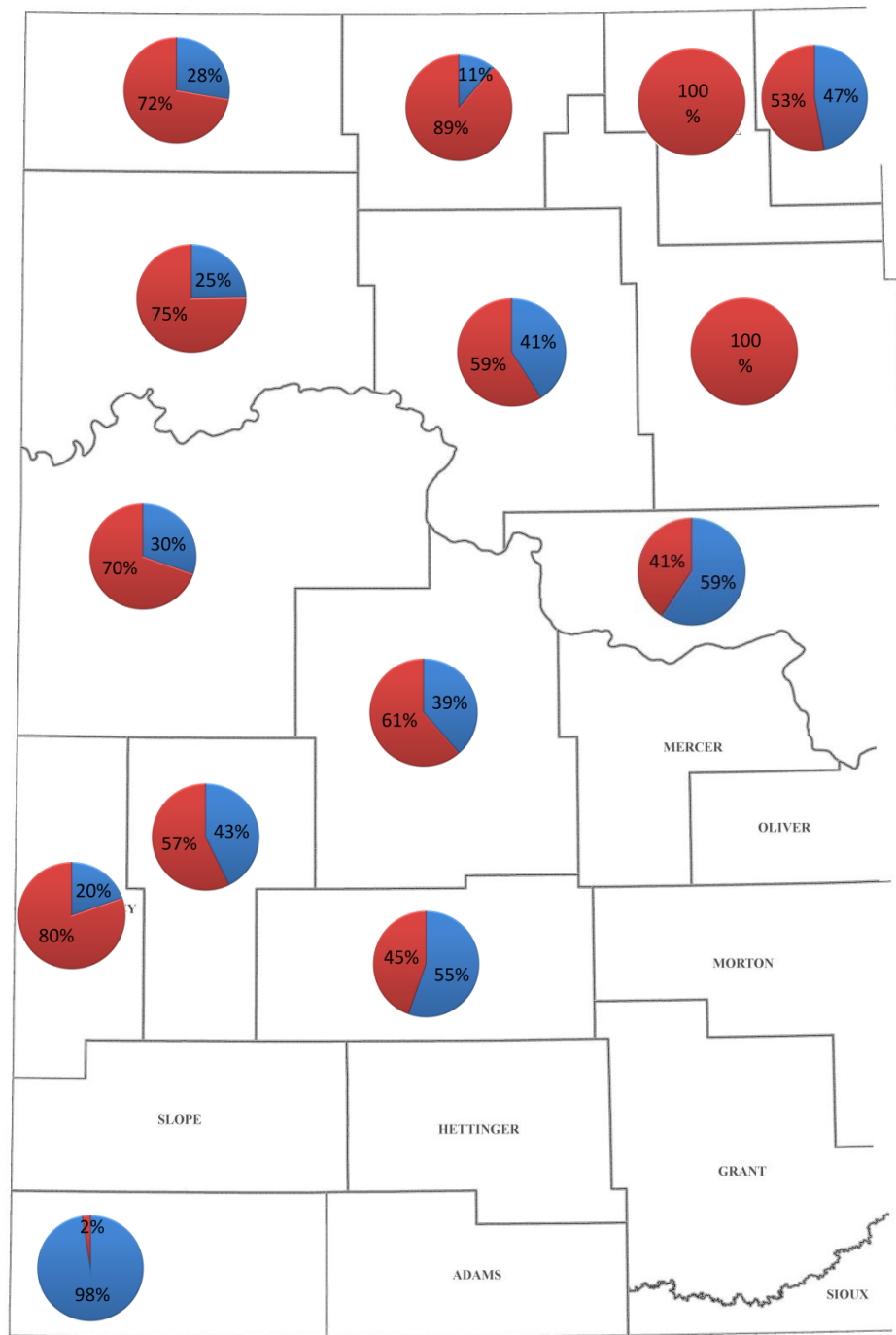*Modified from Bridger and Belle Fourche Pipelines

ND Crude Oil Gathering

Red – Trucked
Blue – Pipeline

All ND Production

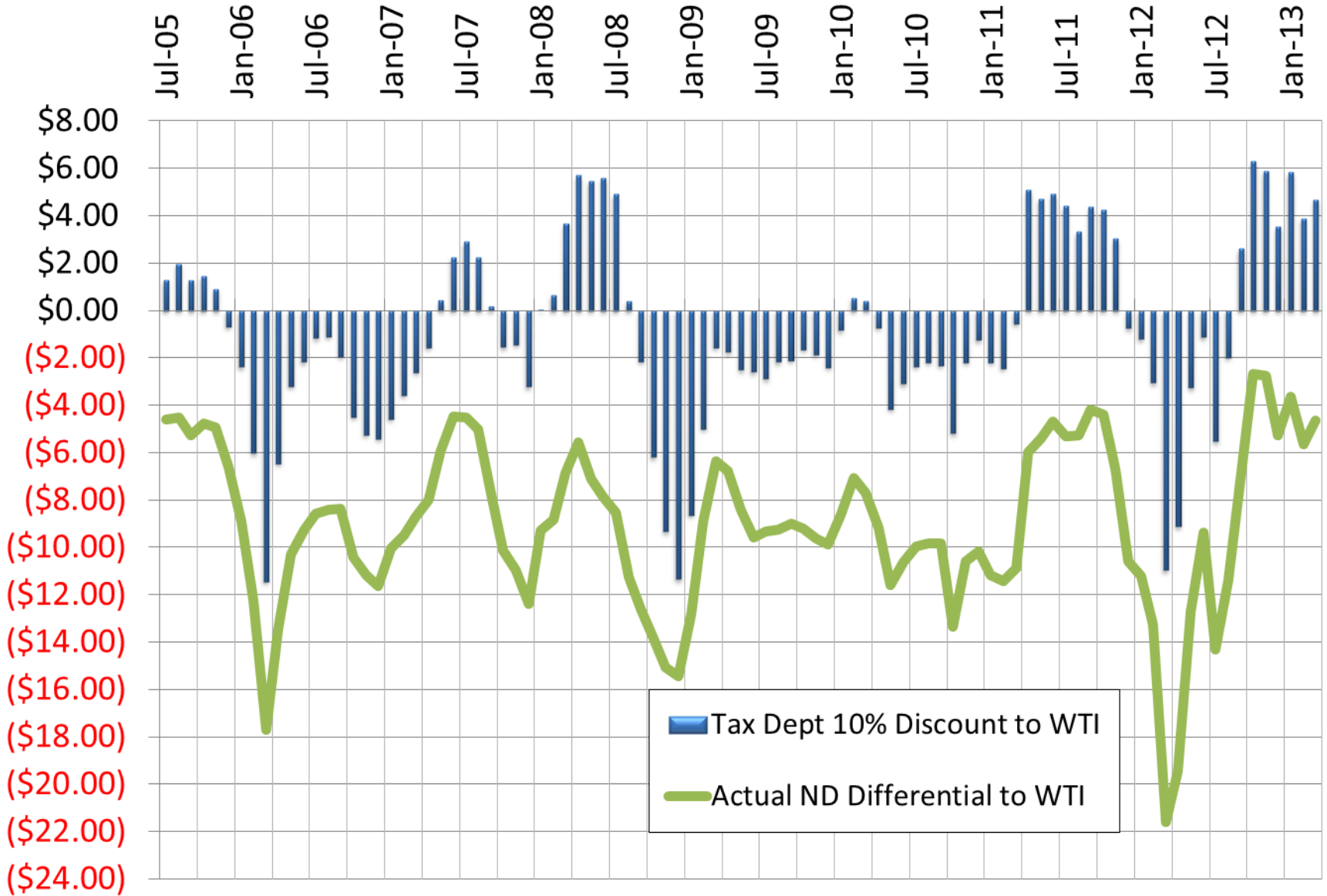Sep 2012 Estimates – Some data incomplete or unavailable

Crude Oil

Understanding production potential

Understanding current transportation dynamics and potential transportation constraints

Understanding current and future market conditions

ND Oil Pricing

Legend:
- Tax Dept 10% Discount to WTI
- Actual ND Differential to WTI

Crude Oil Prices – May 15, 2013

Clearbrook*
$89.95
WTI - $3.25
*Bloomberg

PADD IV

PADD II

PADD I

PADD V

Brent $102.36
WTI + $9.16

Cushing
$93.20

Brent $102.36
WTI + $9.16

PADD III

Brent $102.36
WTI + $9.16

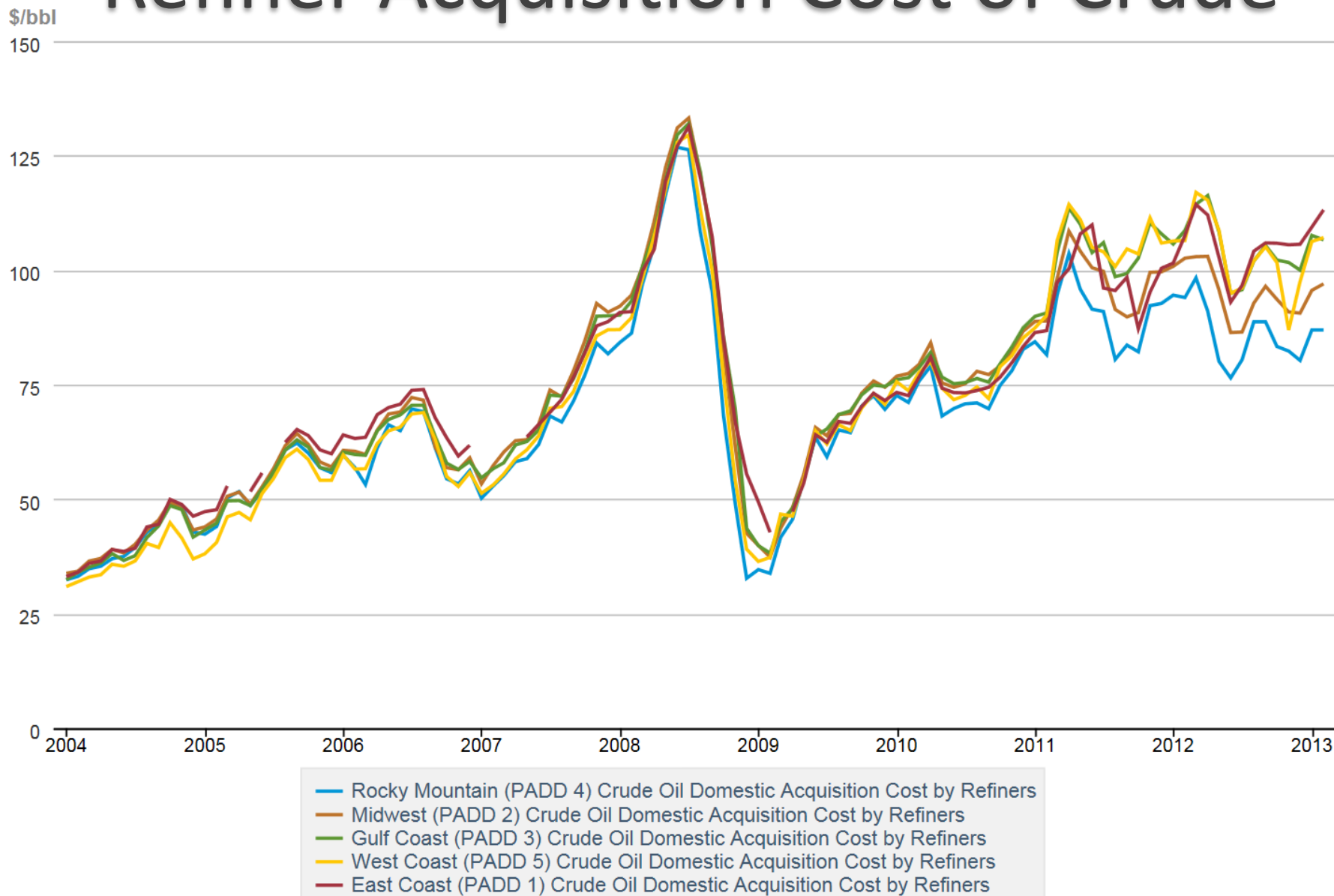US Dept of State Geographer
© 2013 Google
Image © 2013 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google earth

Refiner Acquisition Cost of Crude
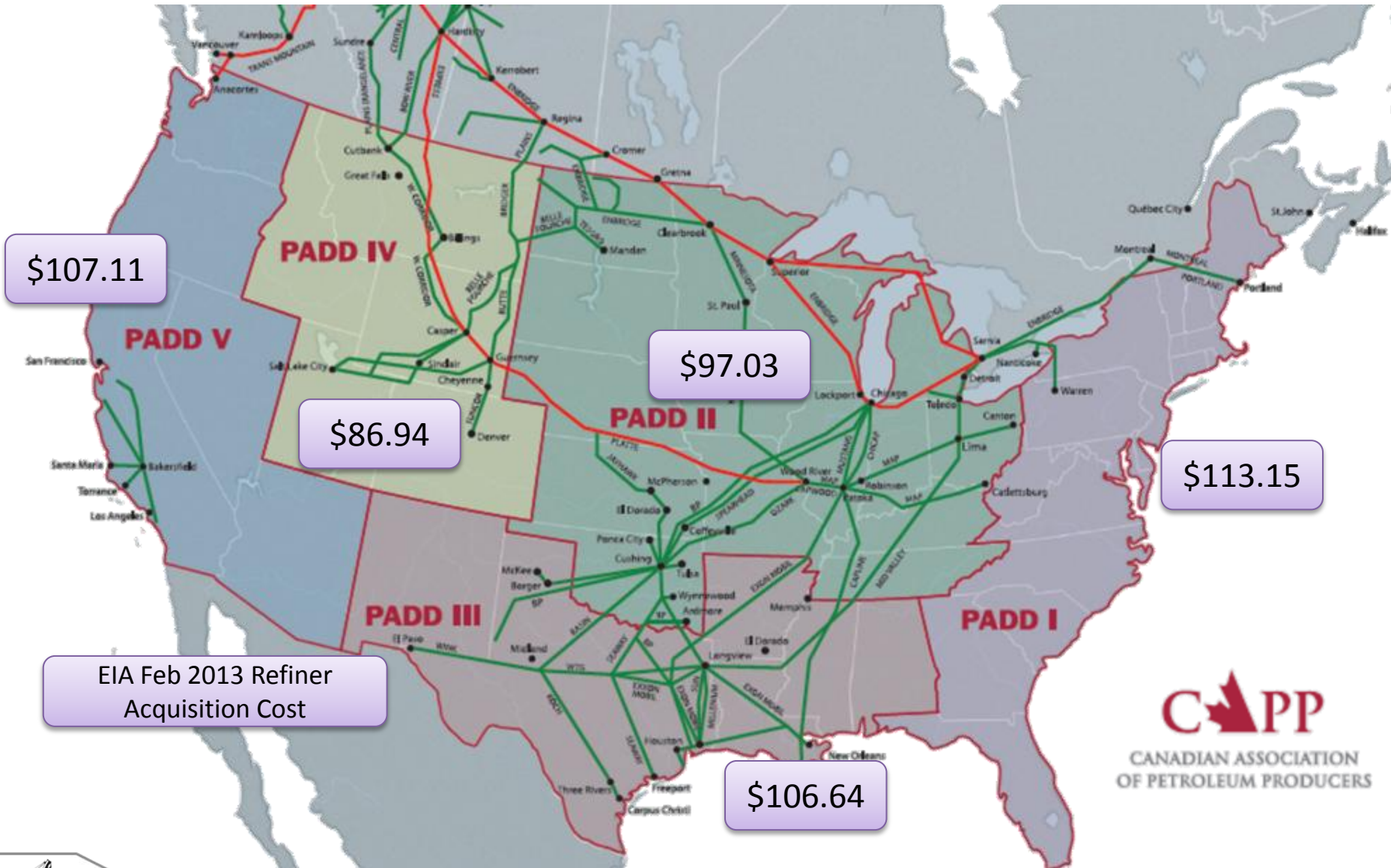

Source: U.S. Energy Information Administration

Major Pipelines and Refining Centers

$107.11

$97.03

$86.94

$113.15

EIA Feb 2013 Refiner Acquisition Cost

$106.64

C🍁PP

CANADIAN ASSOCIATION
OF PETROLEUM PRODUCERS

Major Rail Lines and Refineries

$107.11

PADD IV

PADD V

PADD II

$97.03

$113.15

$86.94

PADD I

PADD III

EIA Feb 2013 Refiner
Acquisition Cost

$106.64

US Dept of State Geo
© 2013 Goog
Image © 2013 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
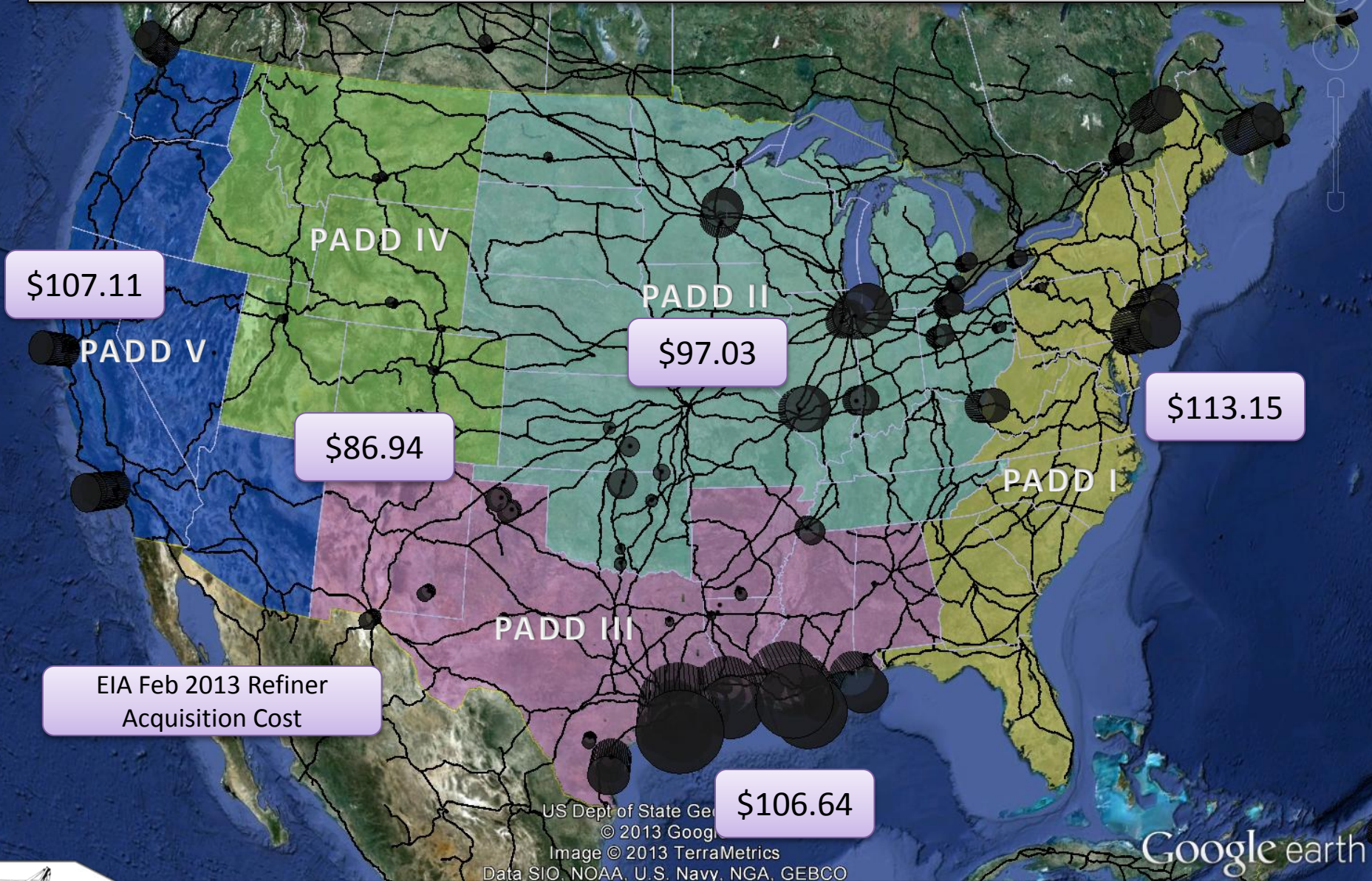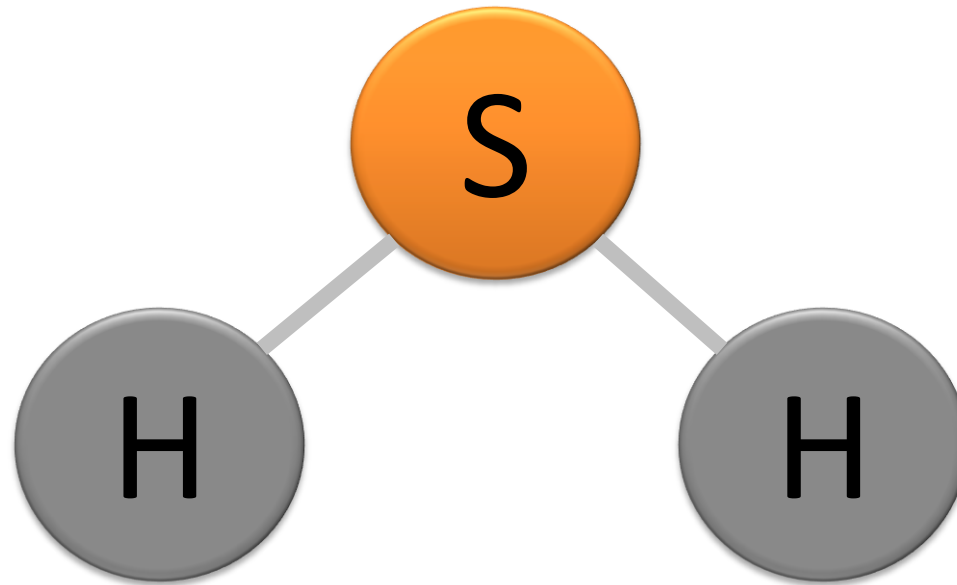
Google earth

US Shale Plays and Refineries
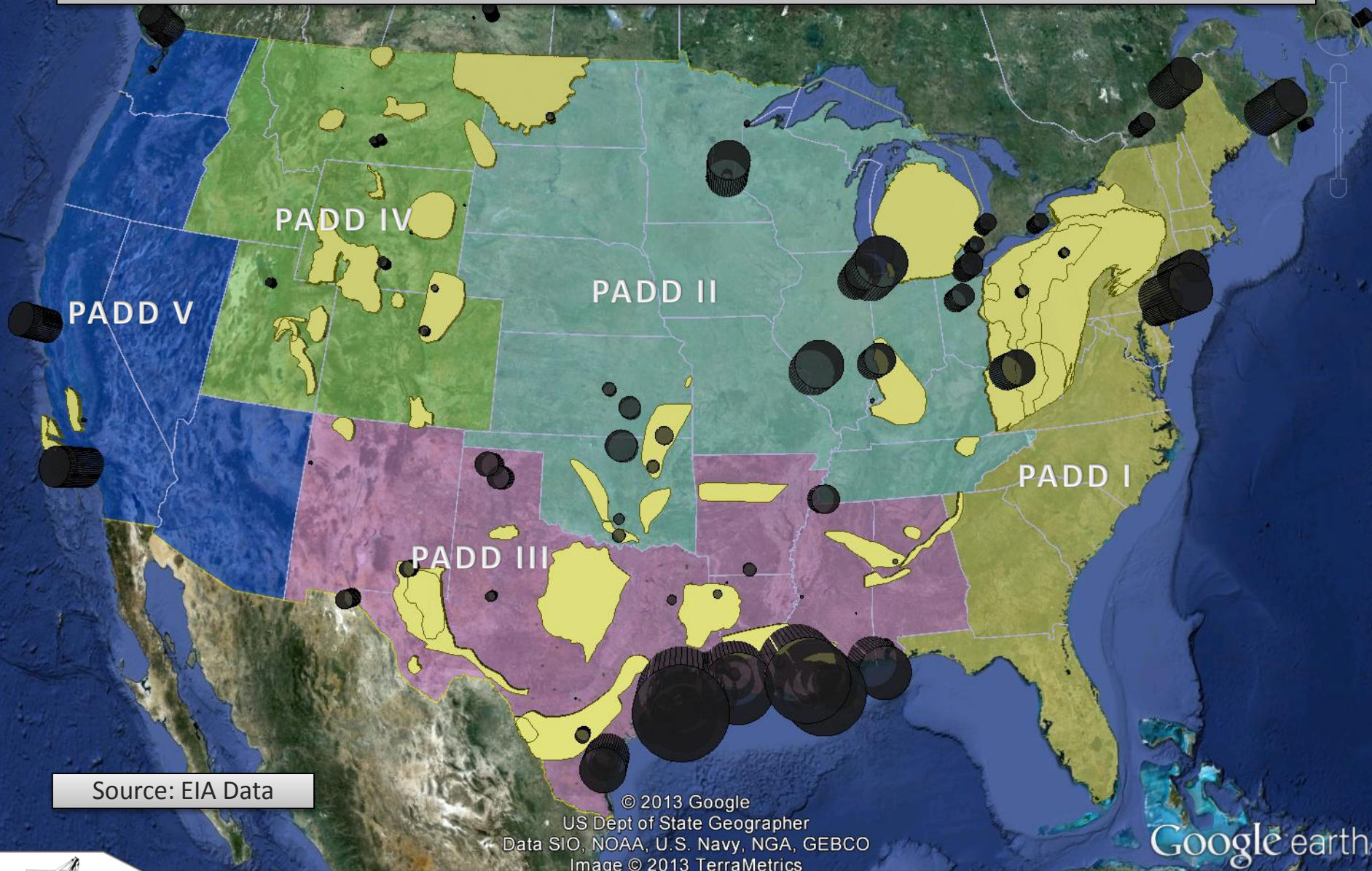
Source: EIA Data

© 2013 Google
US Dept of State Geographer
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
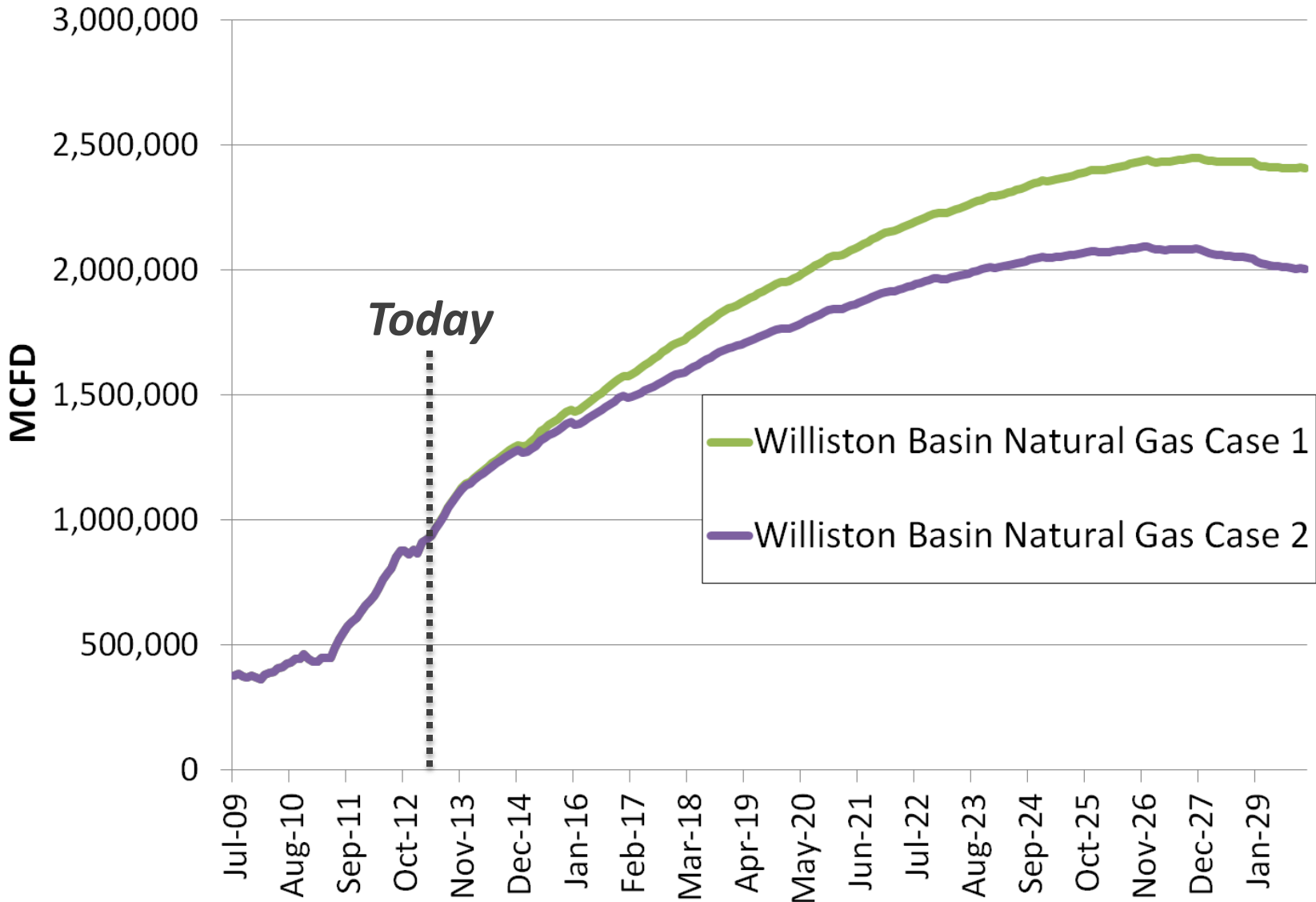Image © 2013 TerraMetrics

Google earth
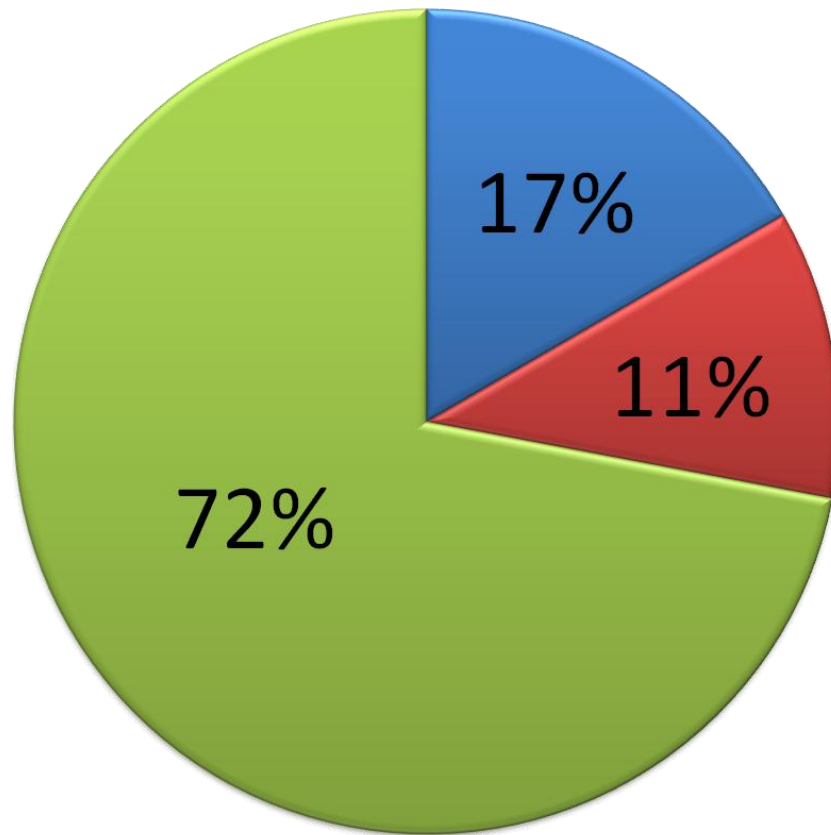
Hydrogen Sulfide

Natural Gas

Forecasting Williston Basin Gas Production

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

Solving the Flaring Challenge

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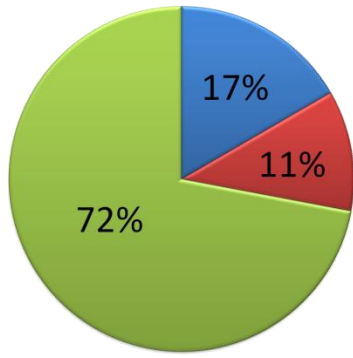Blue – % flared from zero sales wells

Simple Terms
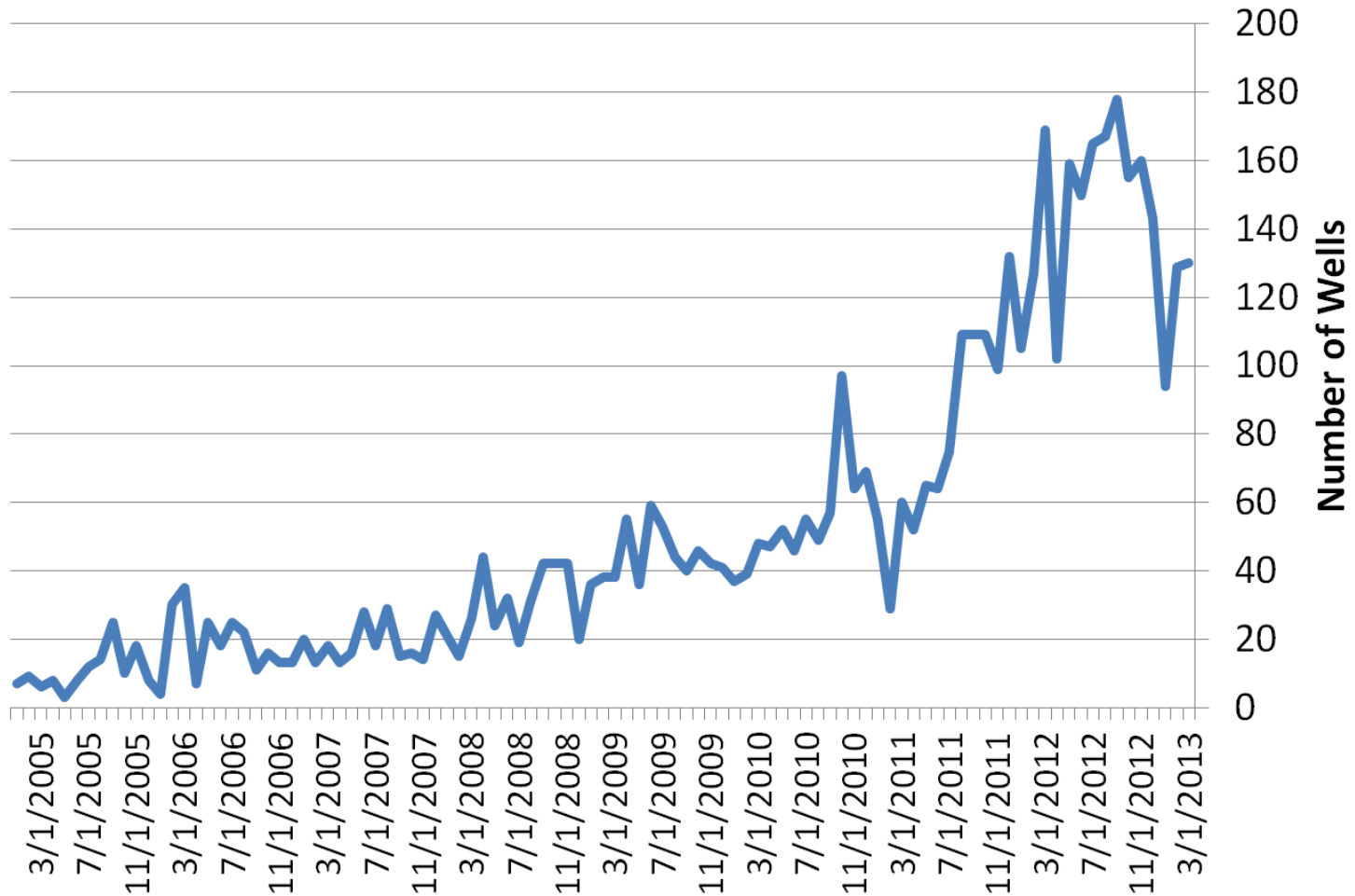Red – Challenges on existing infrastructure
Blue – Lack of pipelines

Statewide

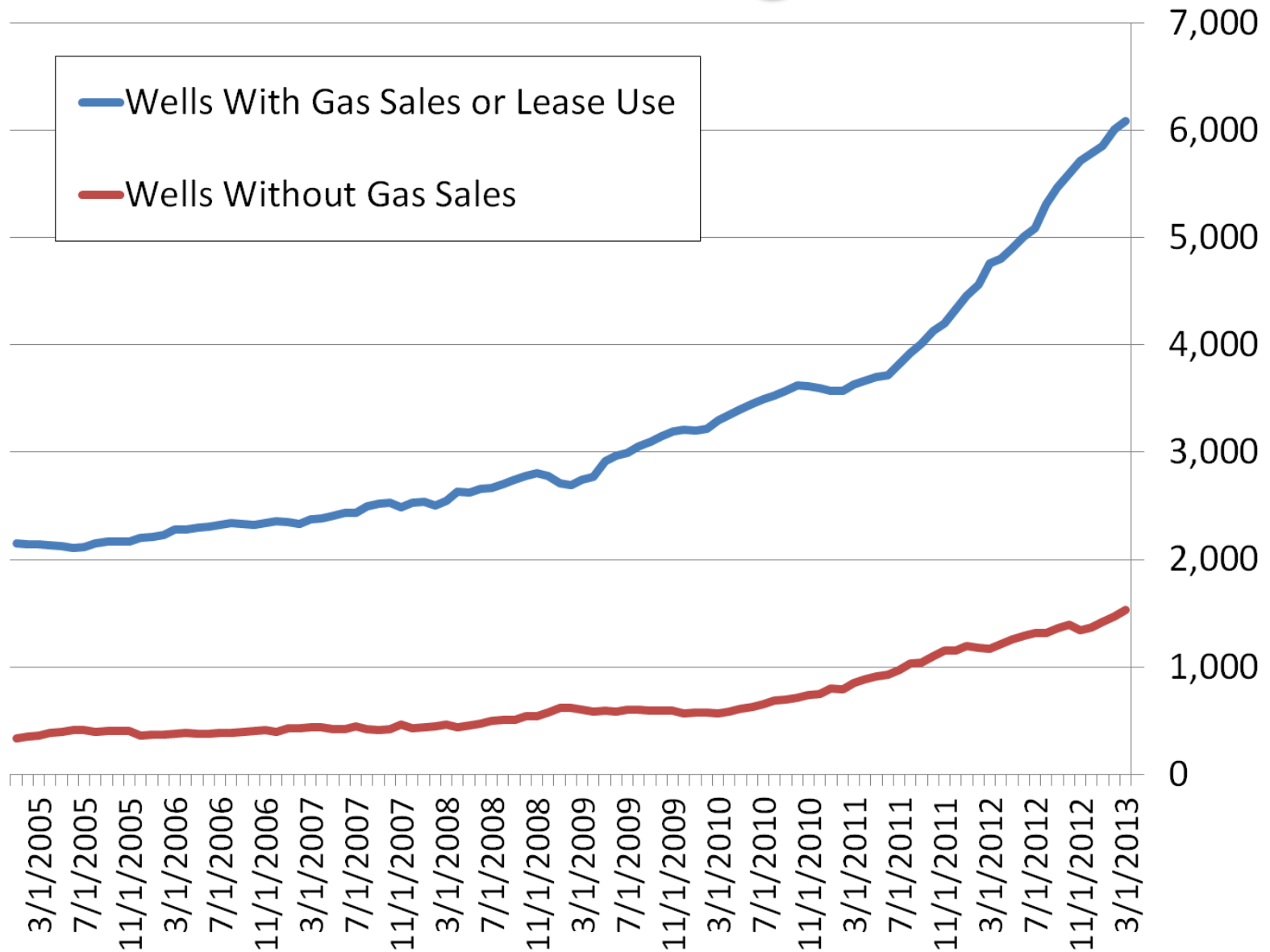March 2013 Data – Non-Confidential Wells

Capturing the 17%
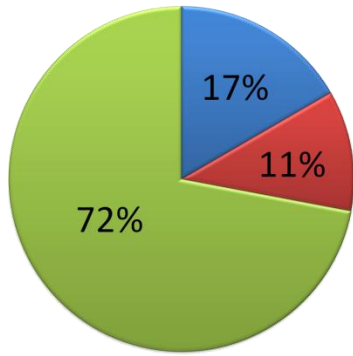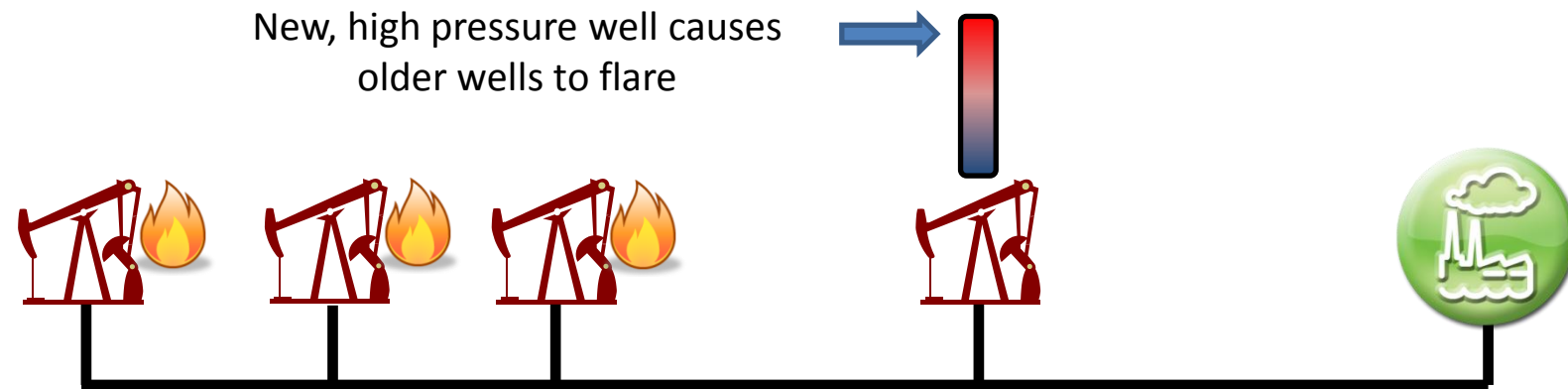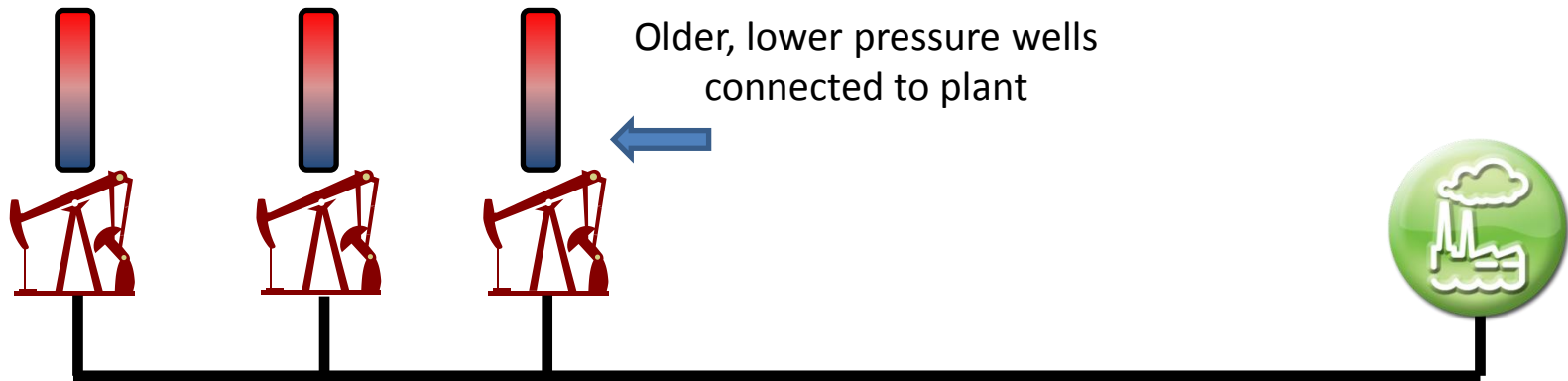## Faster Well Connections

ND Gas Gathering Statistics
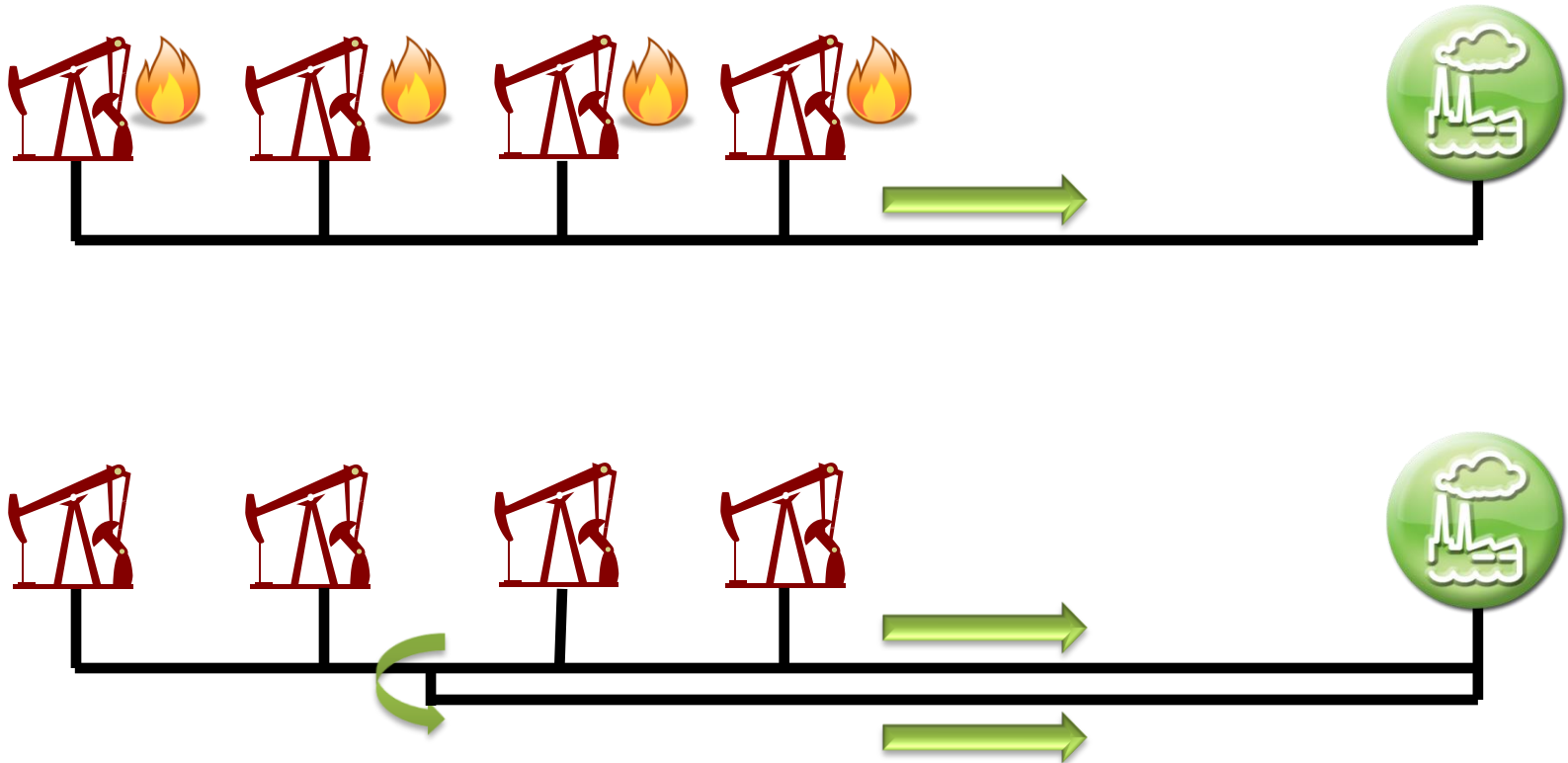
Capturing the 11%
Additional Compression

17%

11%

72%

Older, lower pressure wells connected to plant

New, high pressure well causes older wells to flare
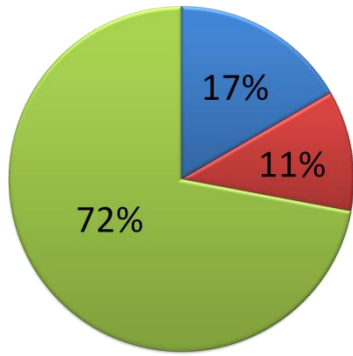
Capturing the 11%
Looping Existing Pipelines
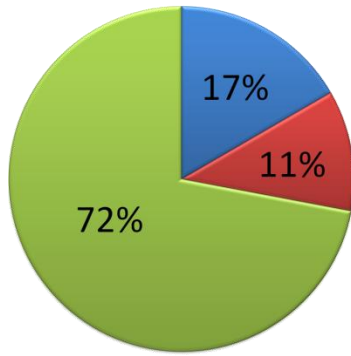
Capturing the 11%
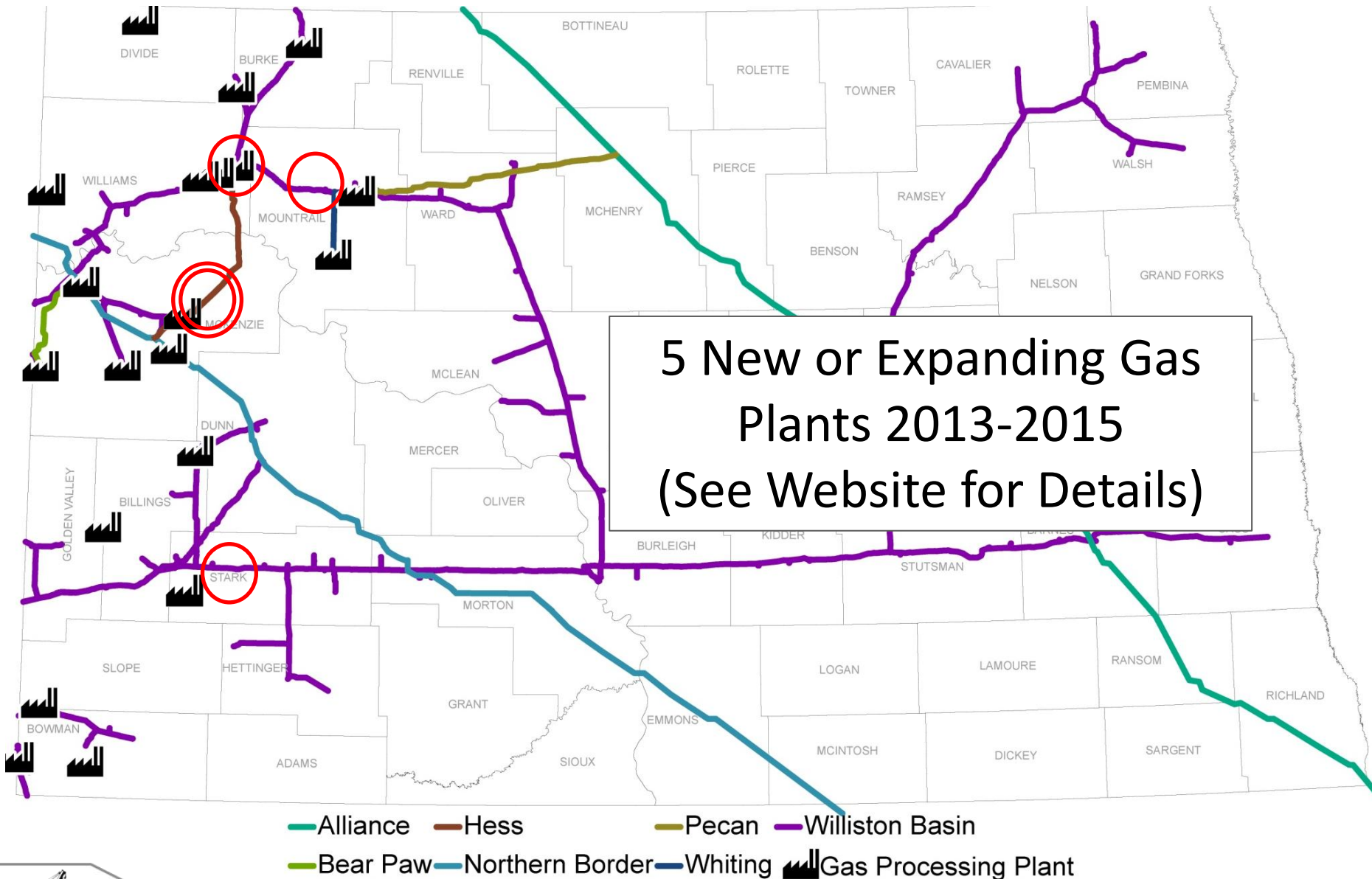## Frequent Pigging

17%

11%

72%

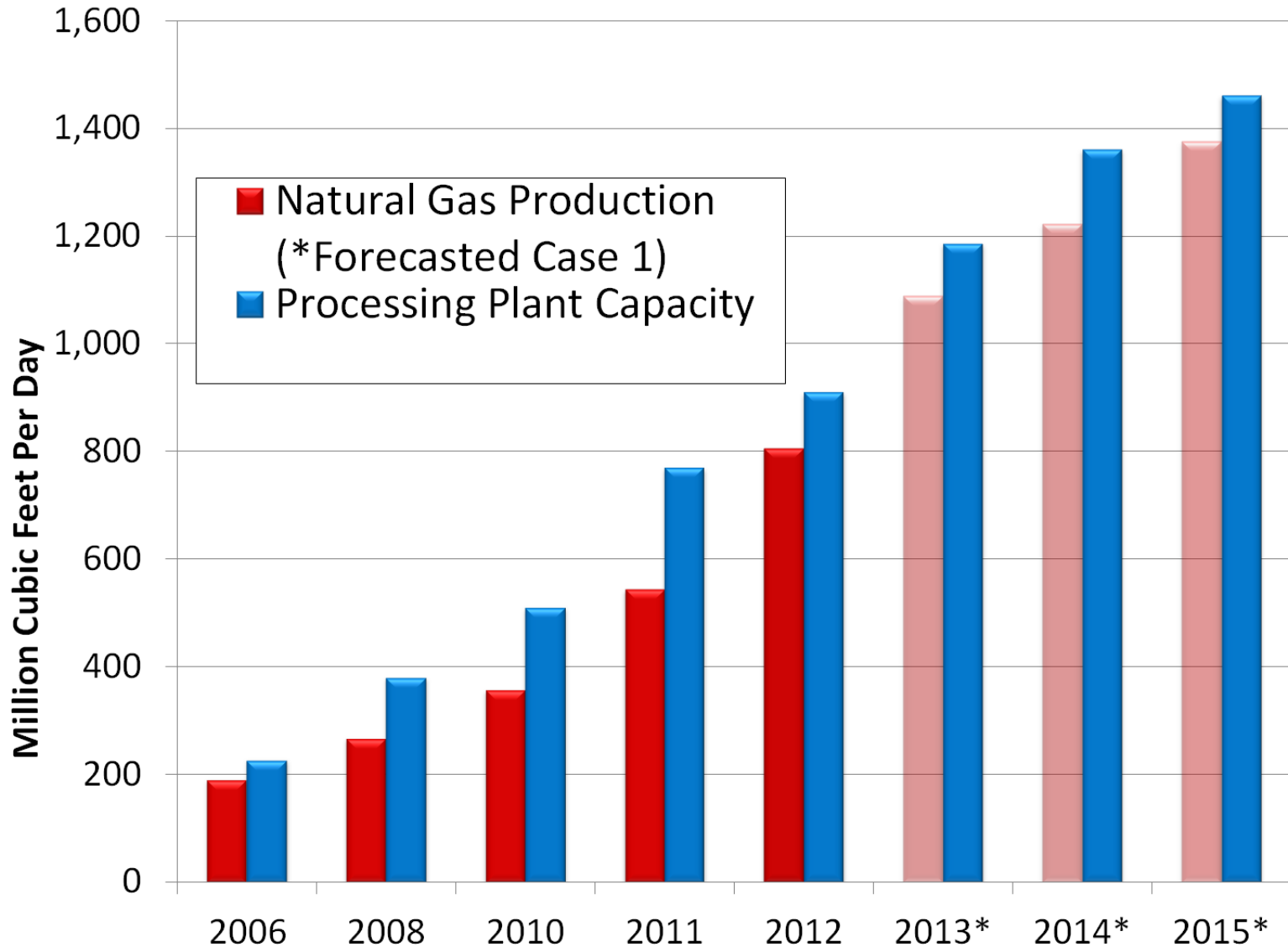NGL buildup in gathering pipelines reduces area for gas to flow

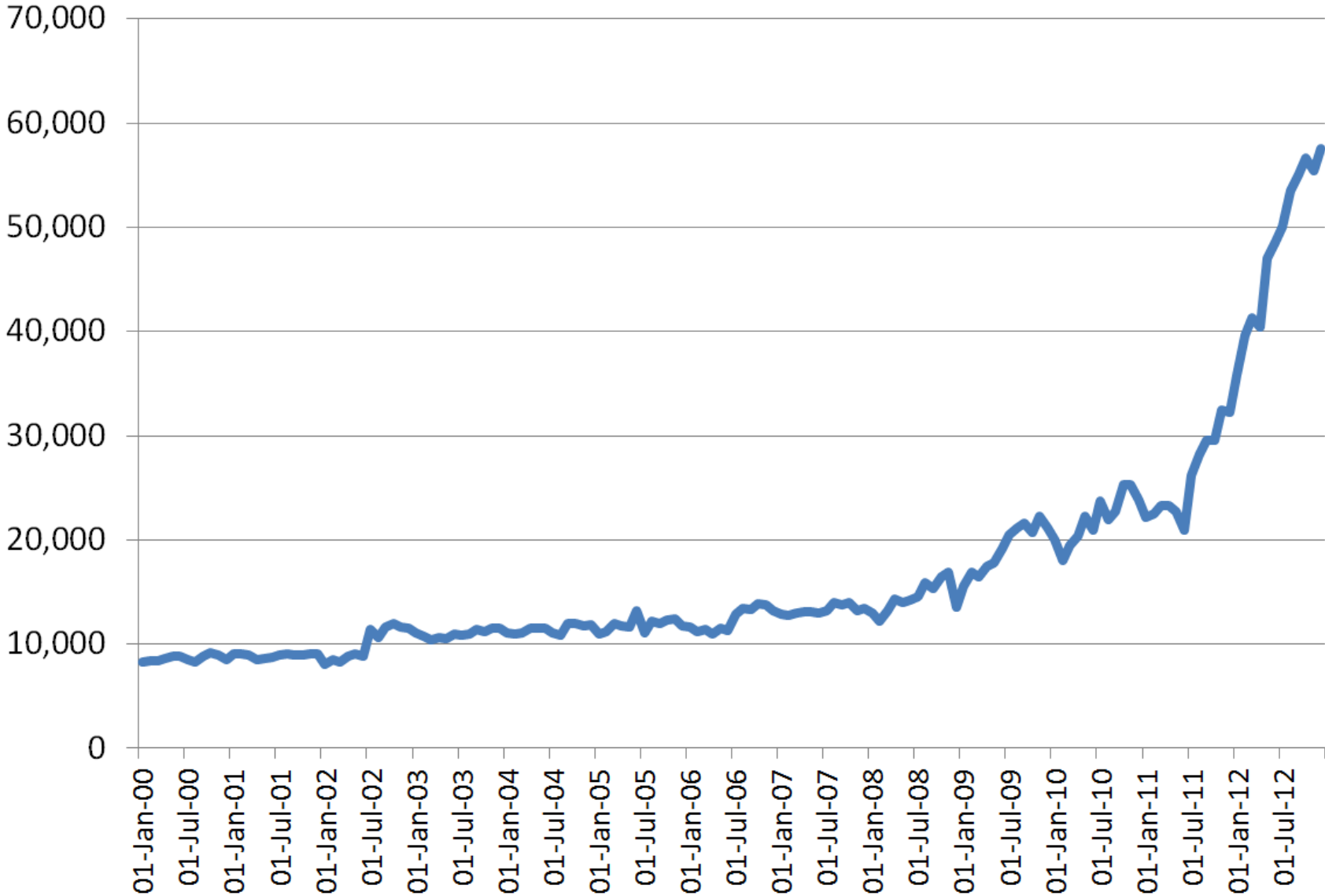*More of an issue in winter months due to lower ground temperature causing more liquids to drop out*

Natural Gas Processing & Transmission

5 New or Expanding Gas Plants 2013-2015 (See Website for Details)

ND Gas Plant Capacity
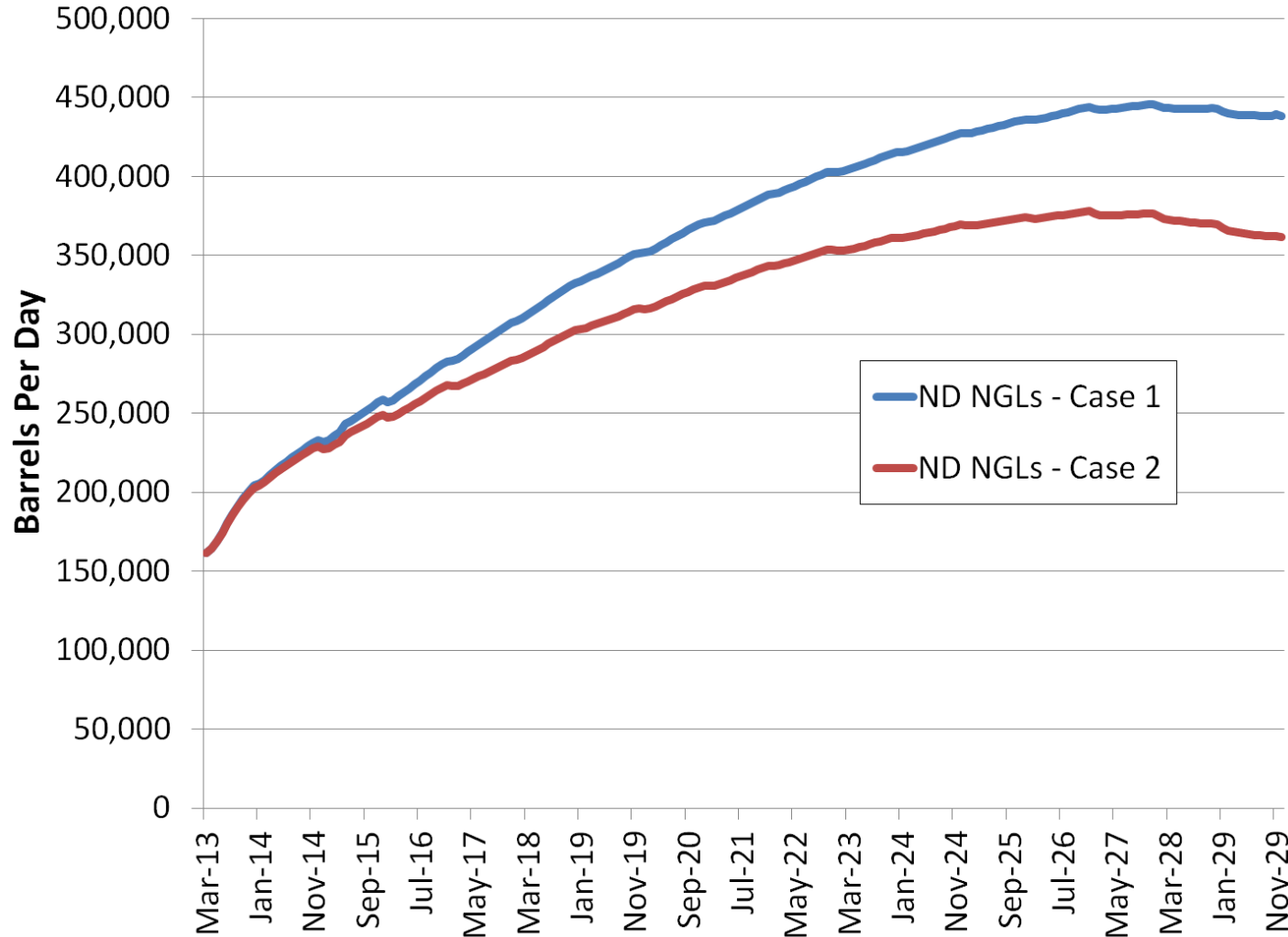
ND NGL Production, BPD

ND NGL Production Potential

Assumptions

- No Flaring
- 8 Gal/MCF
- All liquids extracted

Legend:
- ND NGLs - Case 1
- ND NGLs - Case 2

Y-axis: Barrels Per Day (0 to 500,000)

X-axis: Mar-13, Jan-14, Nov-14, Sep-15, Jul-16, May-17, Mar-18, Jan-19, Nov-19, Sep-20, Jul-21, May-22, Mar-23, Jan-24, Nov-24, Sep-25, Jul-26, May-27, Mar-28, Jan-29, Nov-29

ND NGL Production & Pipelines

Vantage*
(Ethane)

Tioga Lateral*

Aux Sable

Alliance
(Dense Phase)

Hiland

ONEOK
(Y-Grade)

New Frontier*

*Under Construction/Planned

© 2013 Google
Image © 2013 TerraMetrics
© 2013 Cnes/Spot Image

Google earth
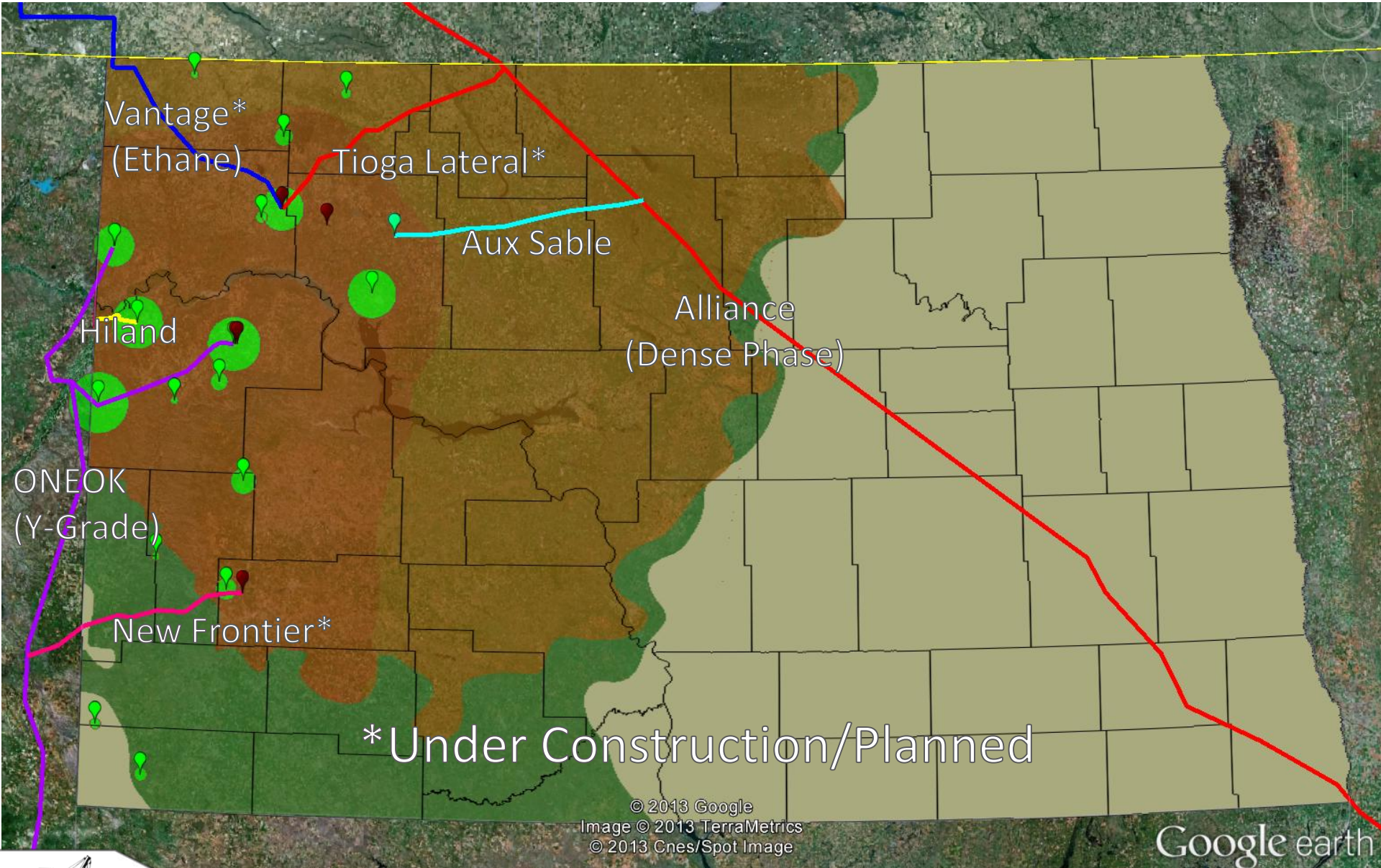
Produced Water Infrastructure

Red – Producer Owned SWD

Green – Independent SWD

Blue Circle – SWD Volume
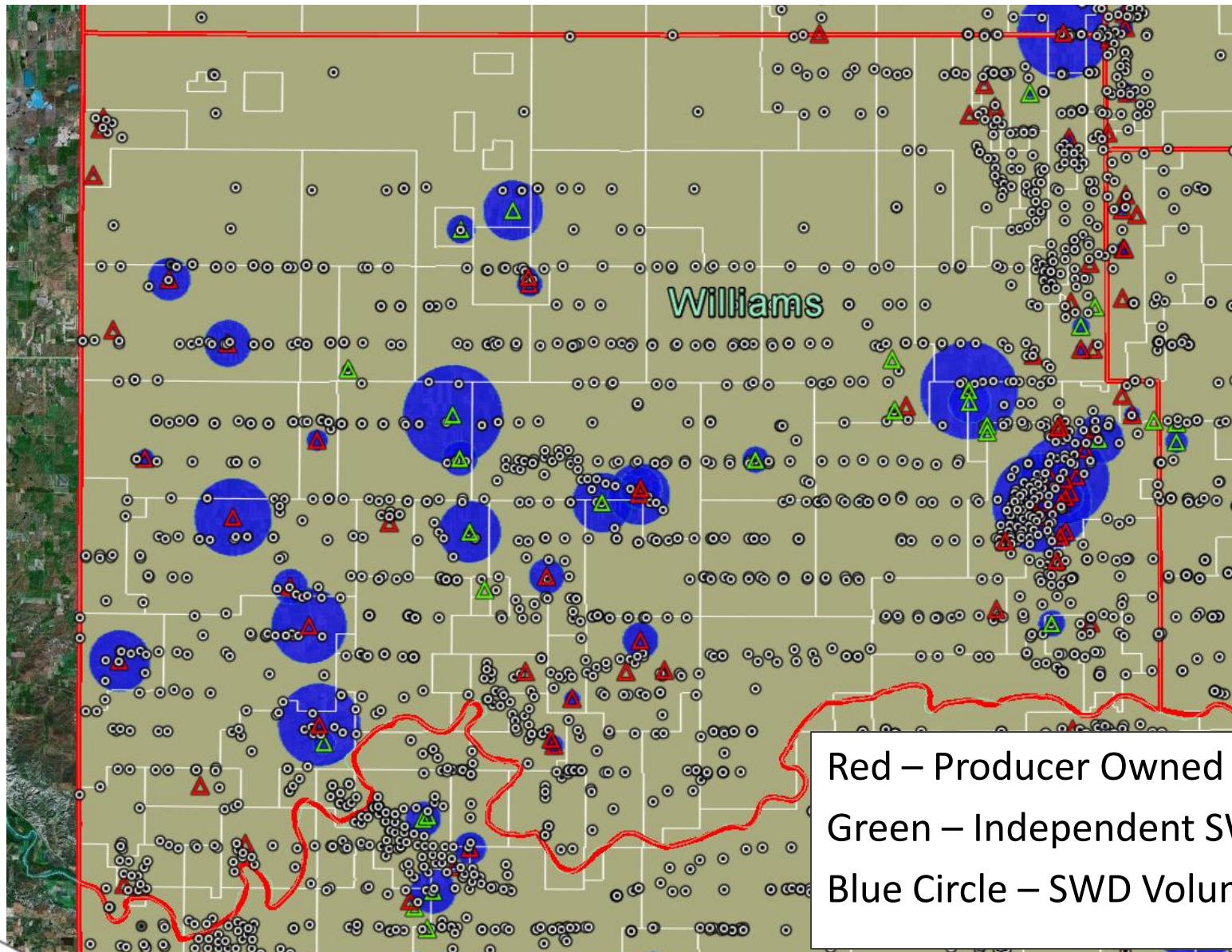
Contact Information

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www.northdakotapipelines.com