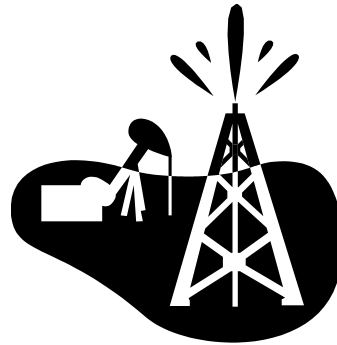
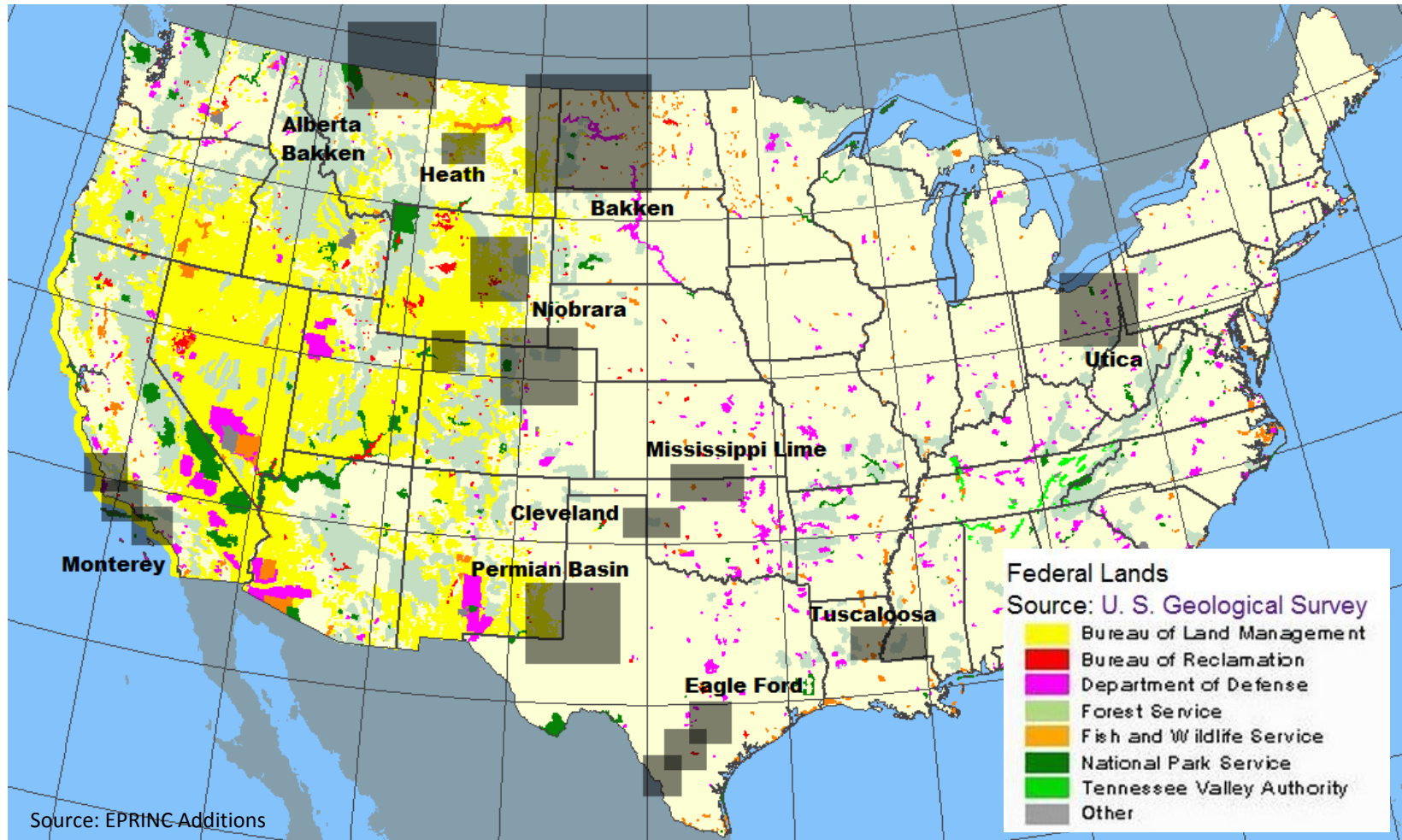


Bakken Production, Infrastructure, and Implications

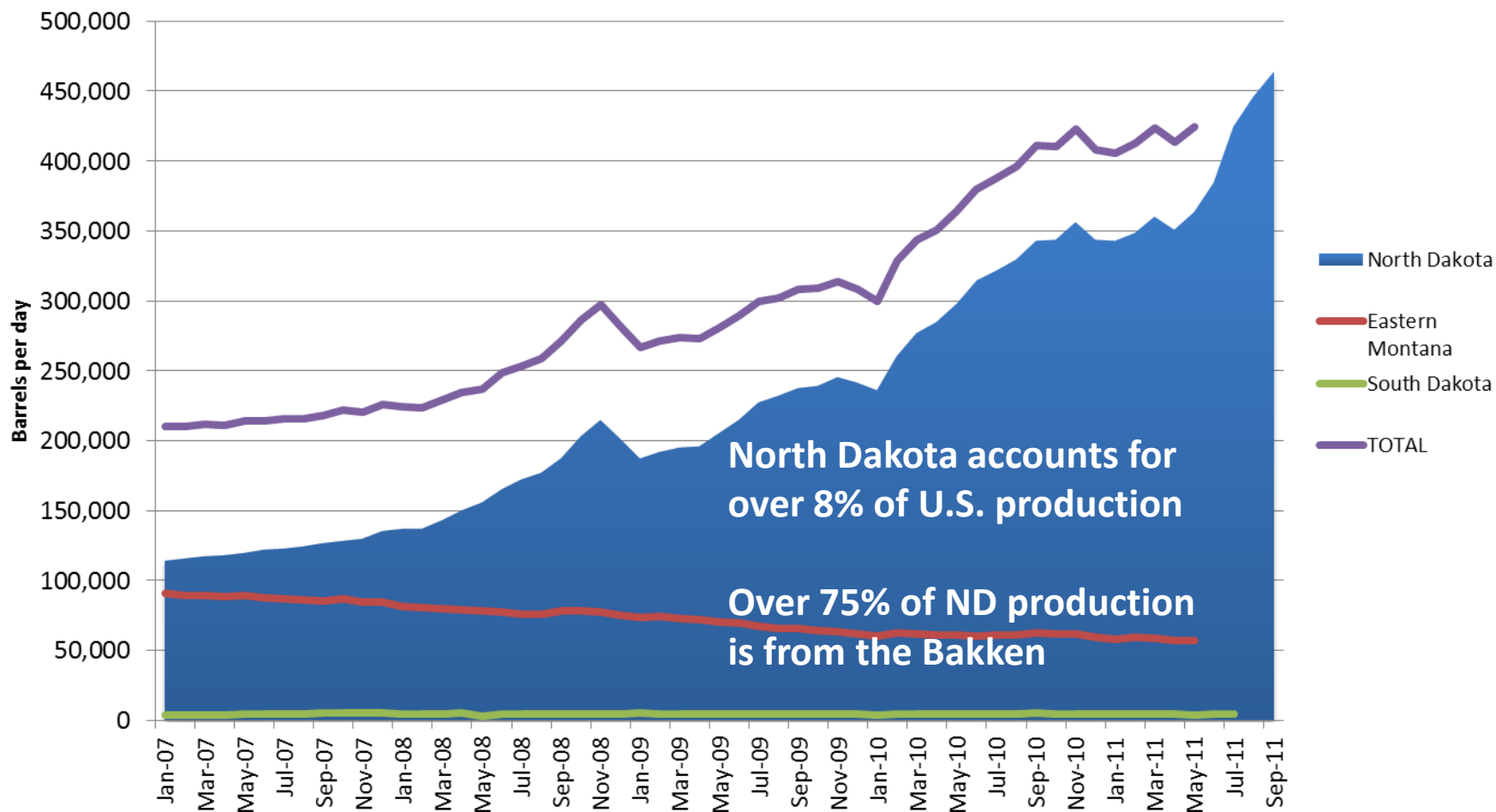


Ben Montalbano, Senior Research Analyst
Energy Policy Research Foundation, Inc. (EPRINC)
CSIS
December 7th, 2011

US Shale Oil Plays



Williston Basin Production

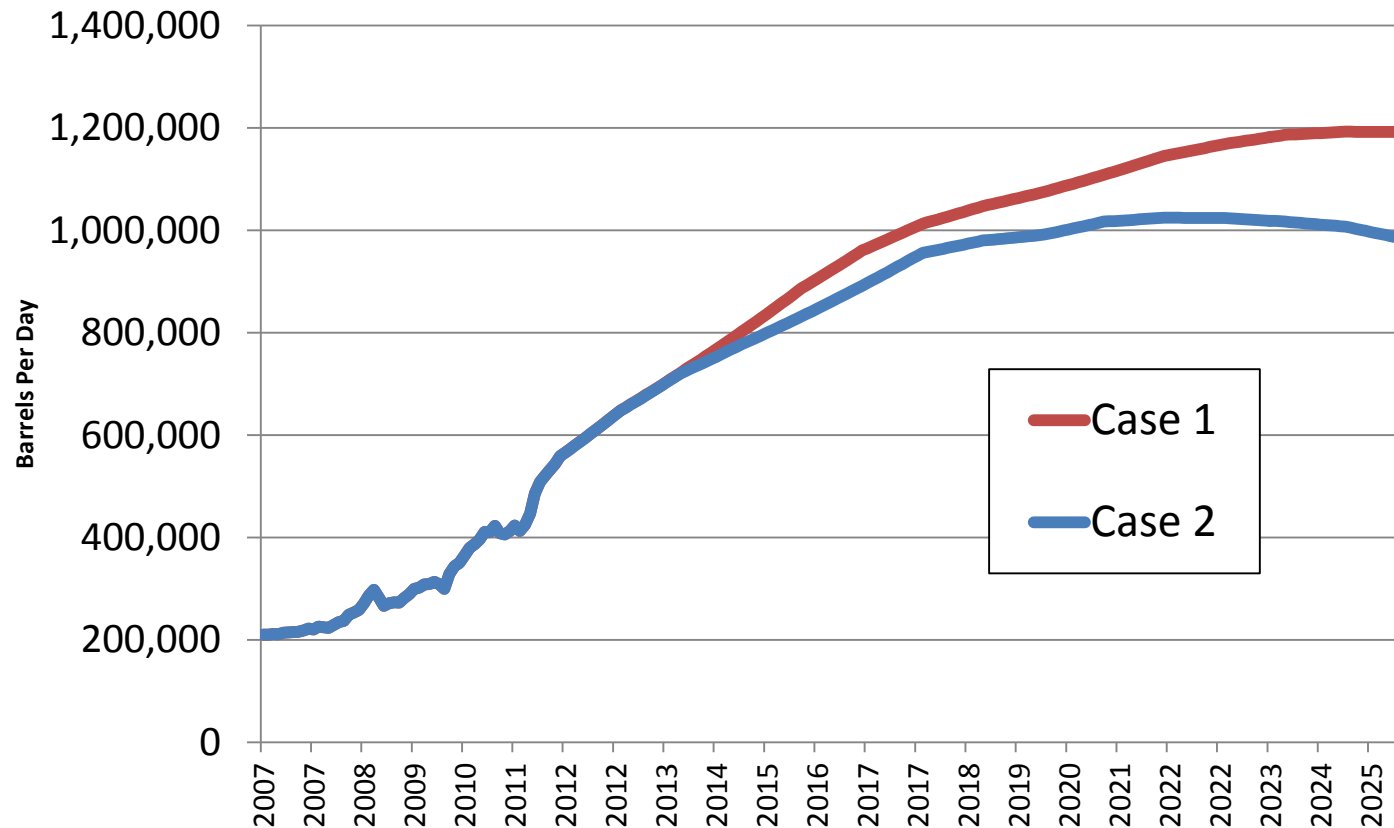


Source: NDPA

Reserve Estimates.....

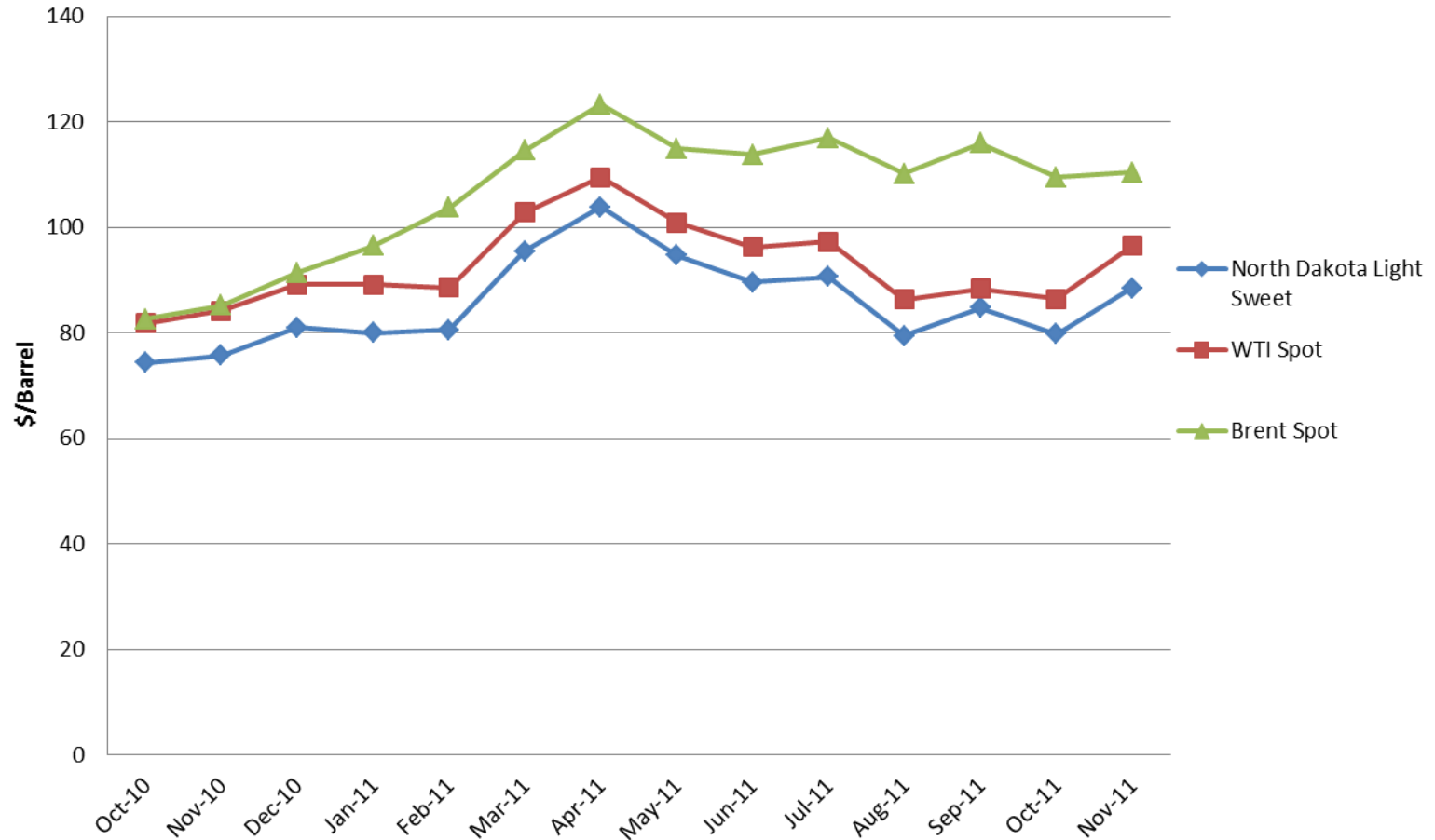
Bakken Reserve Estimates	Barrels
1995 USGS	151 million
2008 USGS	4.3 billion
2010 NDIC	Add 1.9 billion (Three-Forks Addition)
January 2011 ND State Officials	11 billion (North Dakota alone)
Continental Resources	20 billion
....Pending USGS Update	???? billion

Forecasting Williston Basin Production



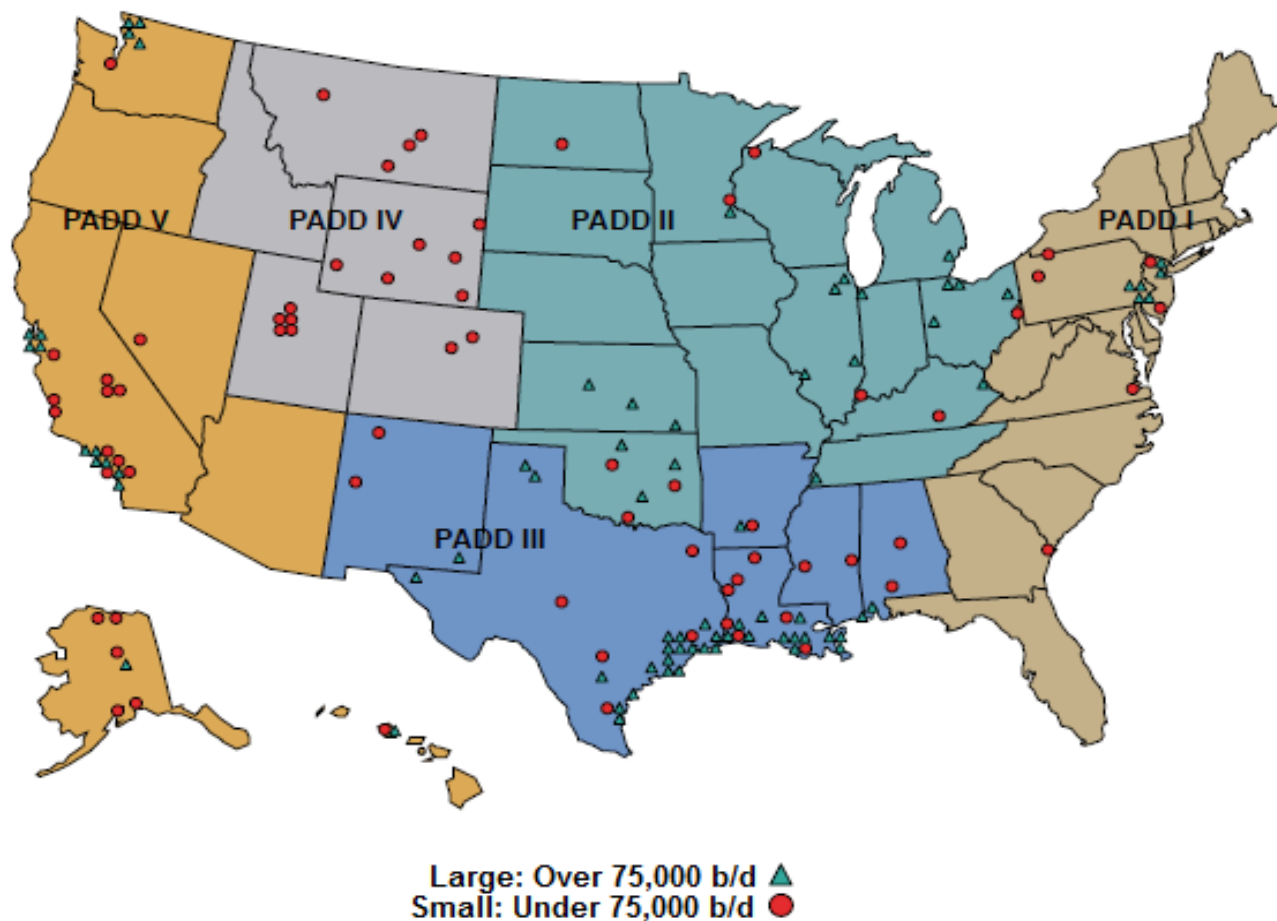
Source: NDPA

North Dakota Crude Discounted



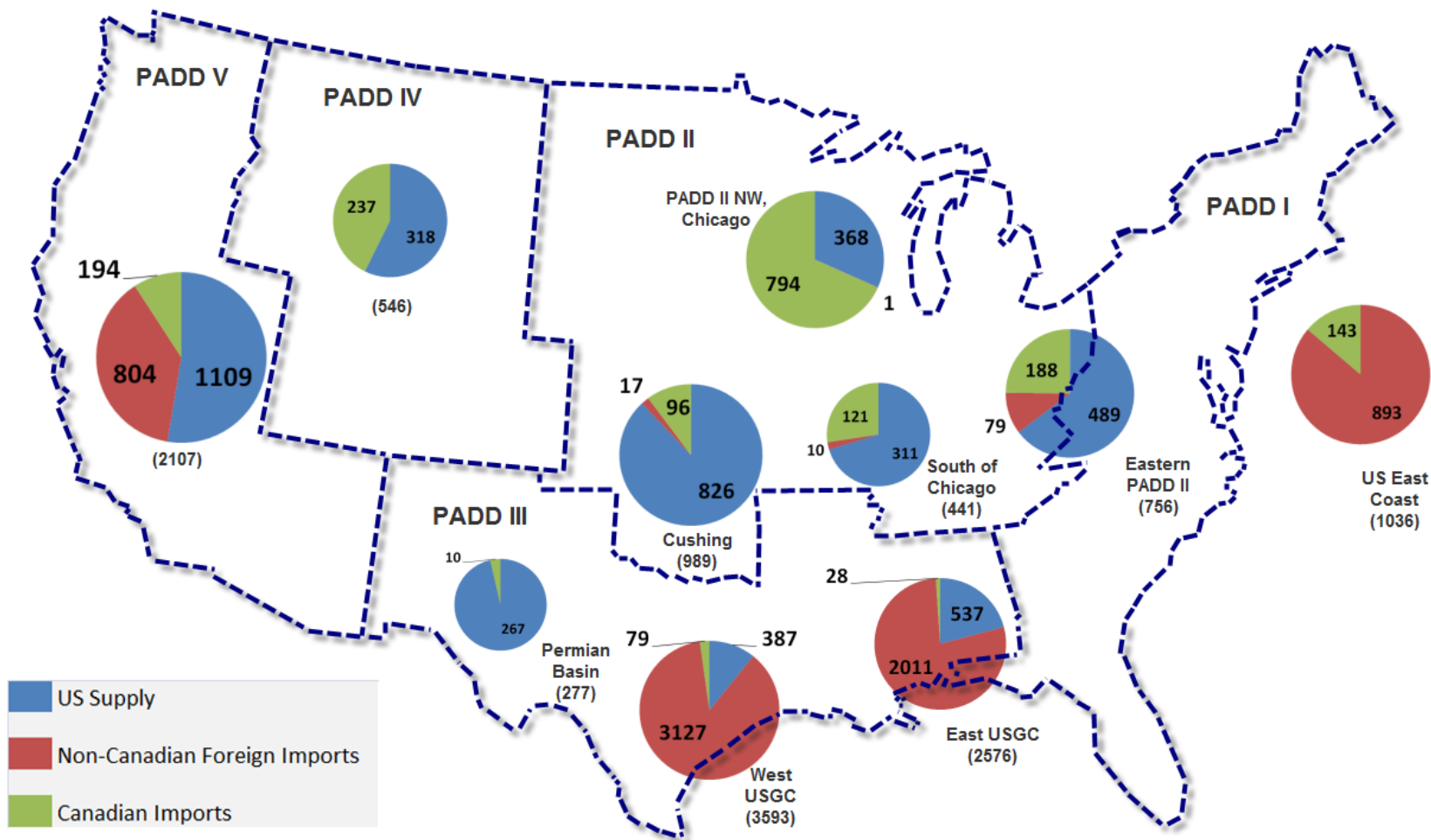
Source: Flint Hills, EIA

PAD Districts and Refinery Locations



Source: Info. From CME Group and Purvin and Gertz Study

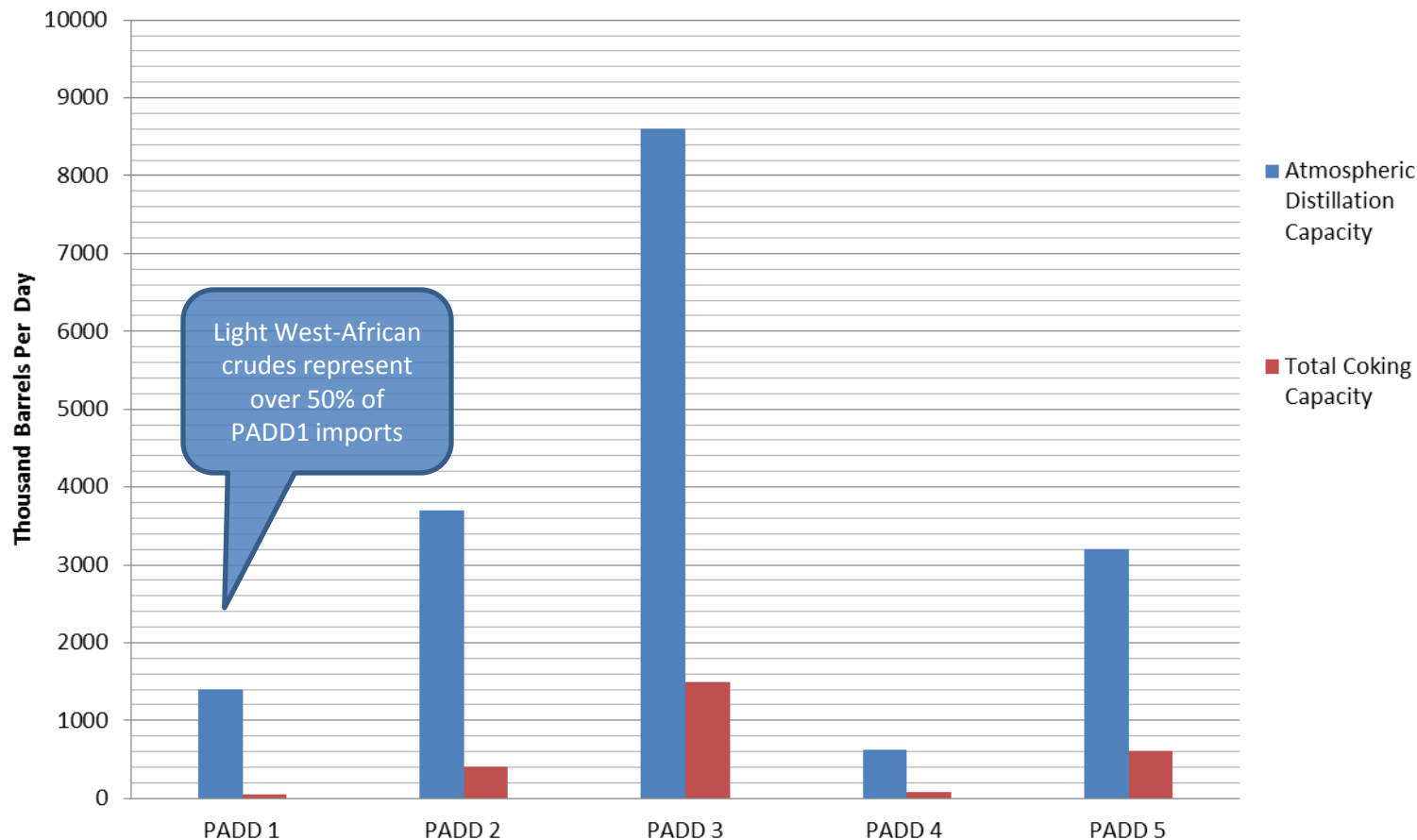
North American Supply – The North->South Shift



Source: EPRINC rendition from Enbridge. Enbridge; Enbridge used EIA and NEB Data and Enbridge Estimates (with some averages)

Crude Disposition by Region 2010 (MB/D)

Total Coking Capacity vs. Atmospheric Crude Distillation Capacity by PADD



Source: EIA

Infrastructure

Pipeline, Rail, Refinery, and Truck

Current Estimate Williston Basin (ND, Eastern Montana, SD)



Pipeline: 355,000 b/d



Refinery: 58,000 b/d



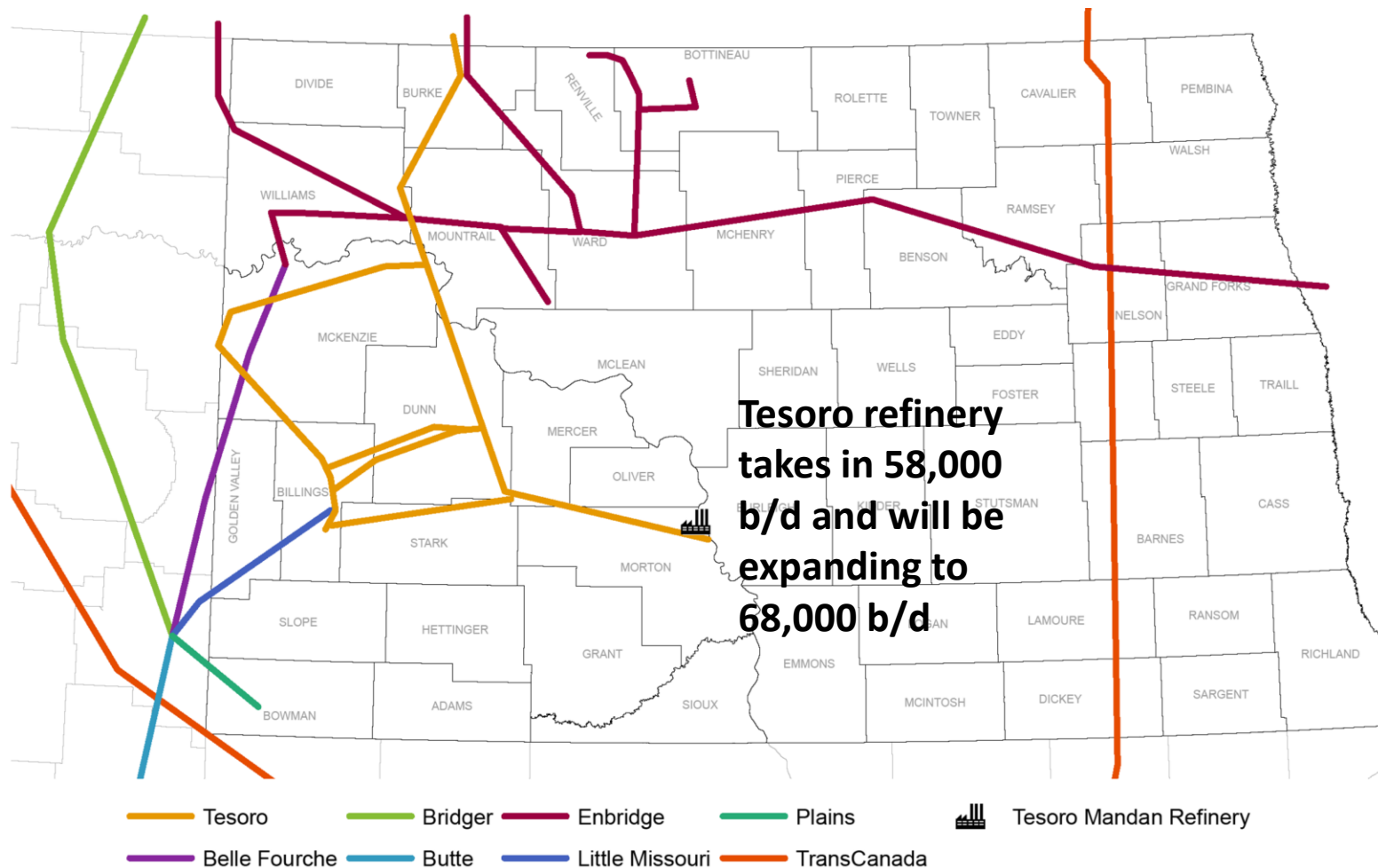
Rail: 95,000 b/d

Truck: 25,000 b/d



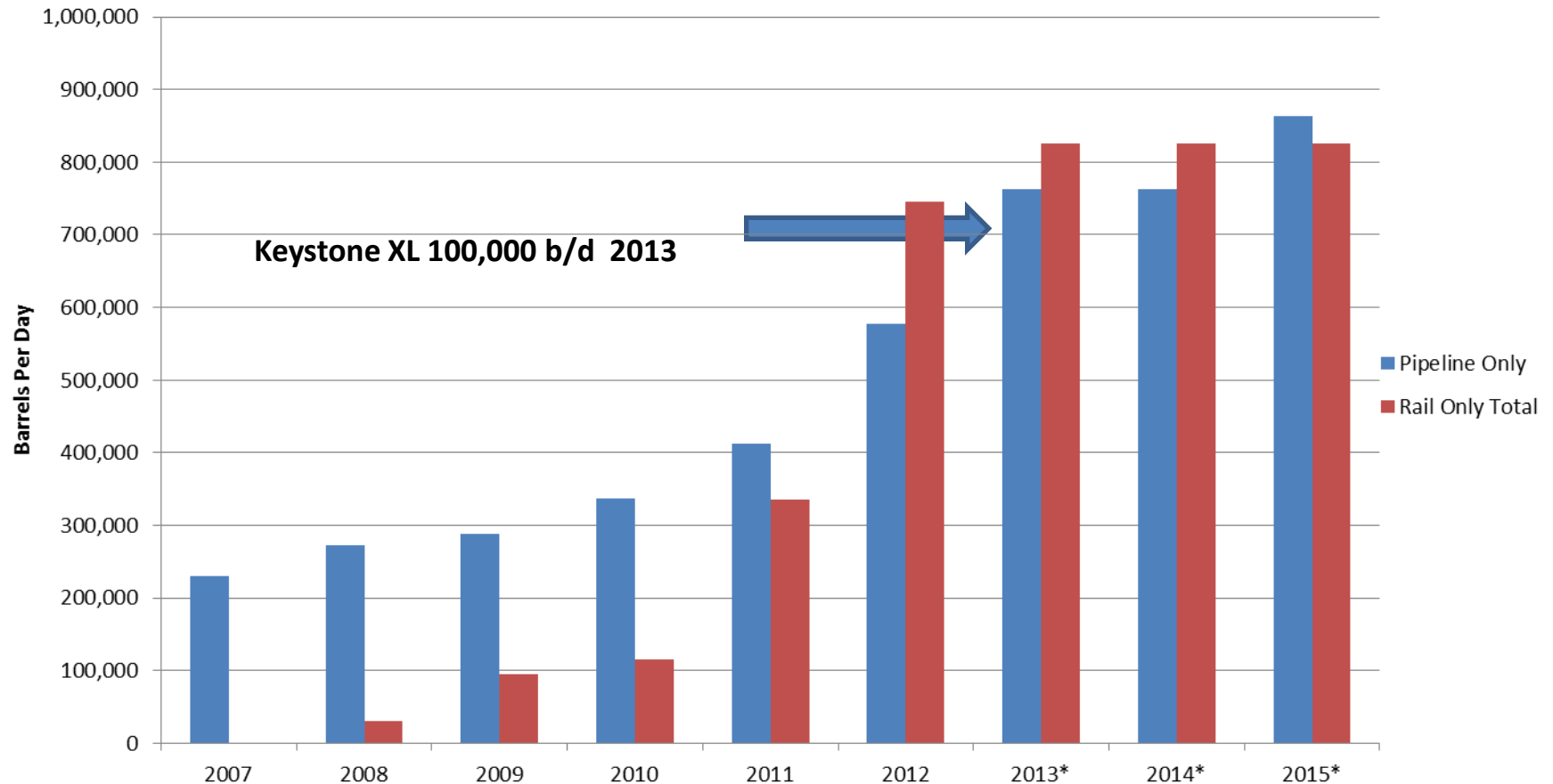
Source: North Dakota Pipeline Authority,
EPRINC Calculations

North Dakota Crude Oil Pipelines



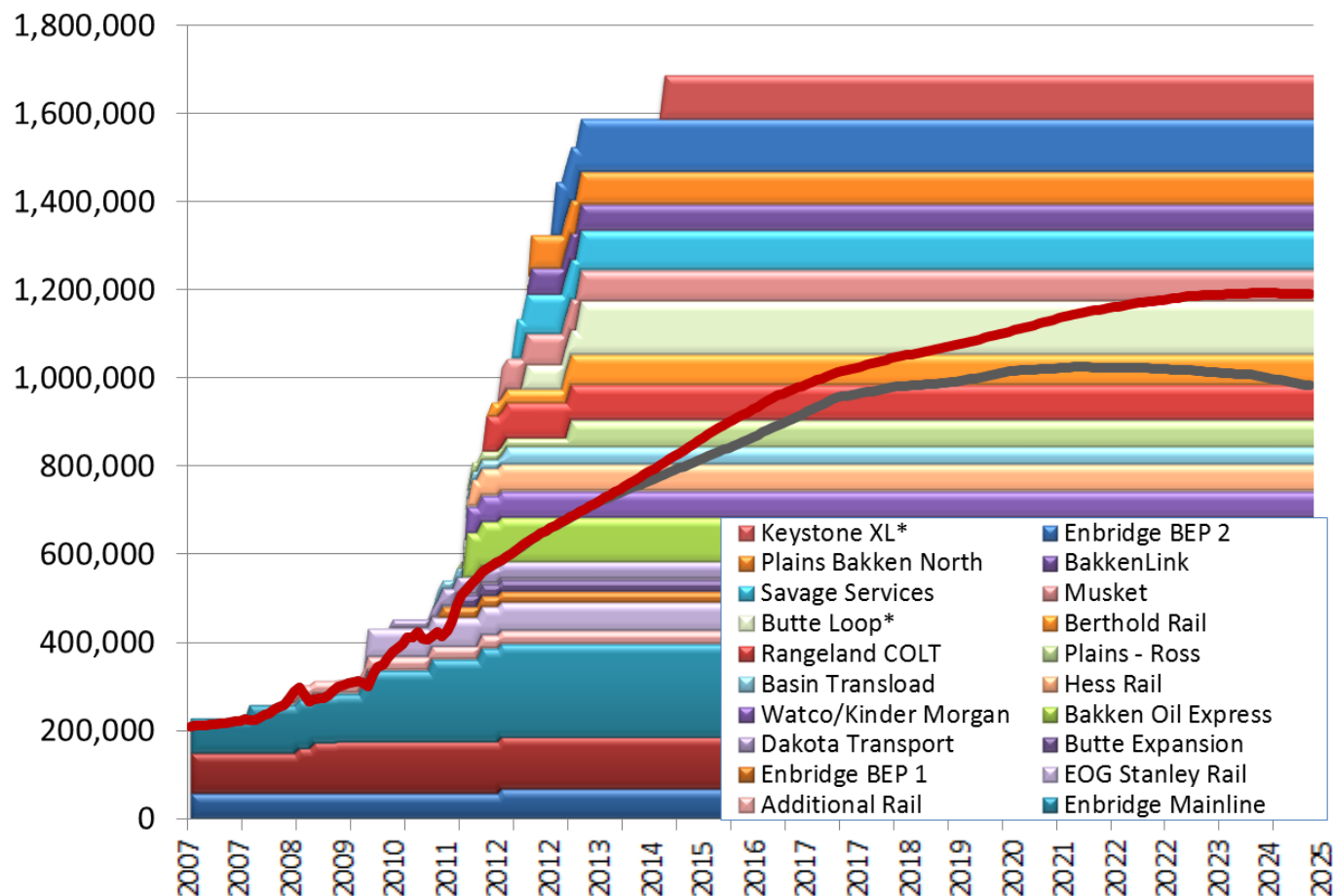
Source: North Dakota Pipeline Authority

Pipeline and Rail Take-Away Capacity



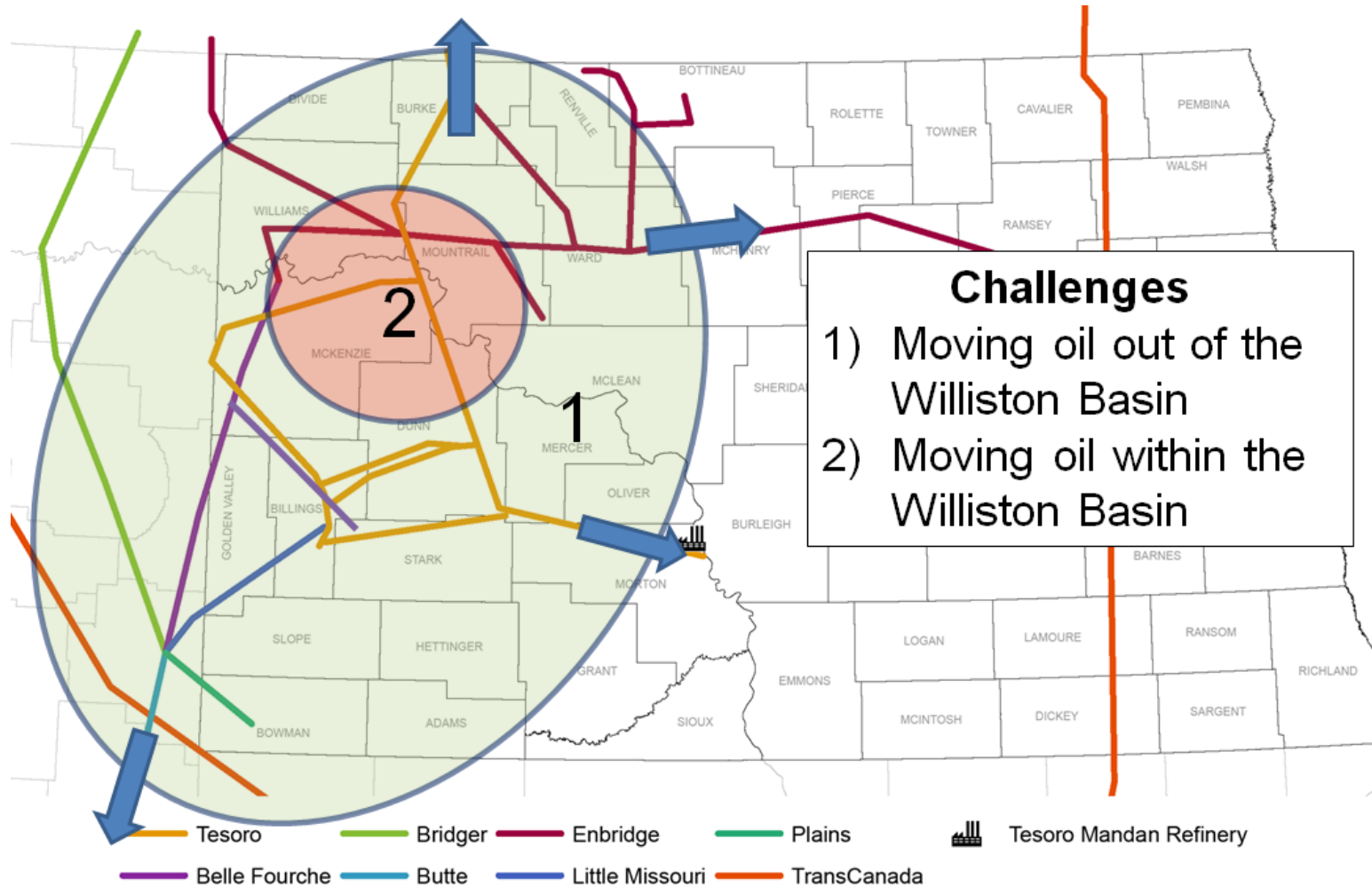
Source: North Dakota Pipeline Authority,
Included Planned Projects

Projected Williston Basin Production and Export Capacity

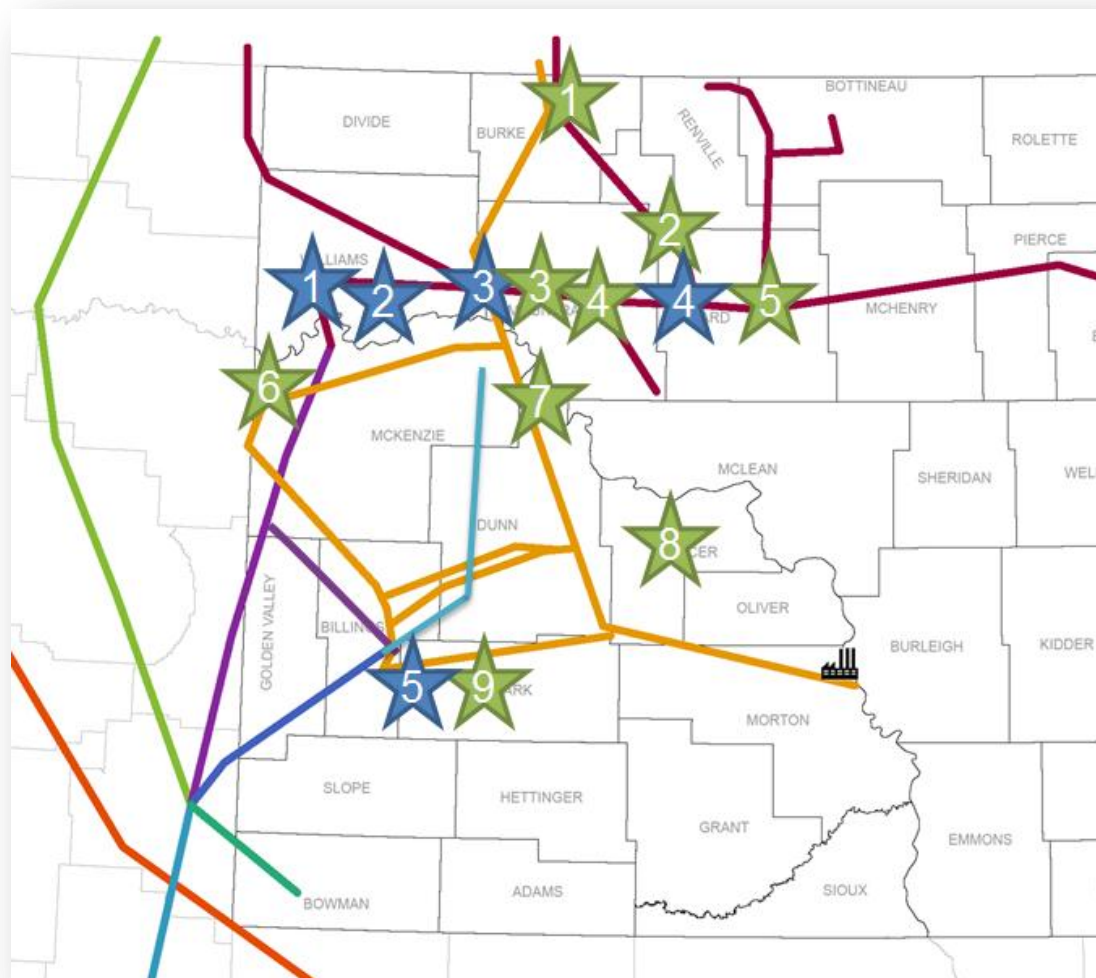


Source: North Dakota Pipeline Authority,
Included Planned Projects

Challenges



Existing and Planned Rail Projects



★ Existing

- 1) Stampede
- 2) Donnybrook
- 3) Ross – Plains
- 4) Stanley – EOG
- 5) Minot – ND Port Services
- 6) Dore
- 7) New Town – Dakota Transport Solutions
- 8) Zap – Basin Transload
- 9) Dickinson – BOE

★ Planned

- 1) Trenton – Savage
- 2) Epping – Rangeland
- 3) Tioga – Hess
- 4) Berthold – Enbridge
- 5) Fryburg – Great Northern

Natural Gas Flaring

What are people saying about ND flaring?

In North Dakota, Flames of Wasted Natural Gas Light the Prairie

The New York Times

Sep 27, 2011

N. Dakota gas flaring raises energy, pollution concerns

USA TODAY

Green

A Blog About Energy and the Environment

September 27, 2011, 7:34 AM

Flames Light the Prairie and Warm the Planet

By CLIFFORD KRAUSS

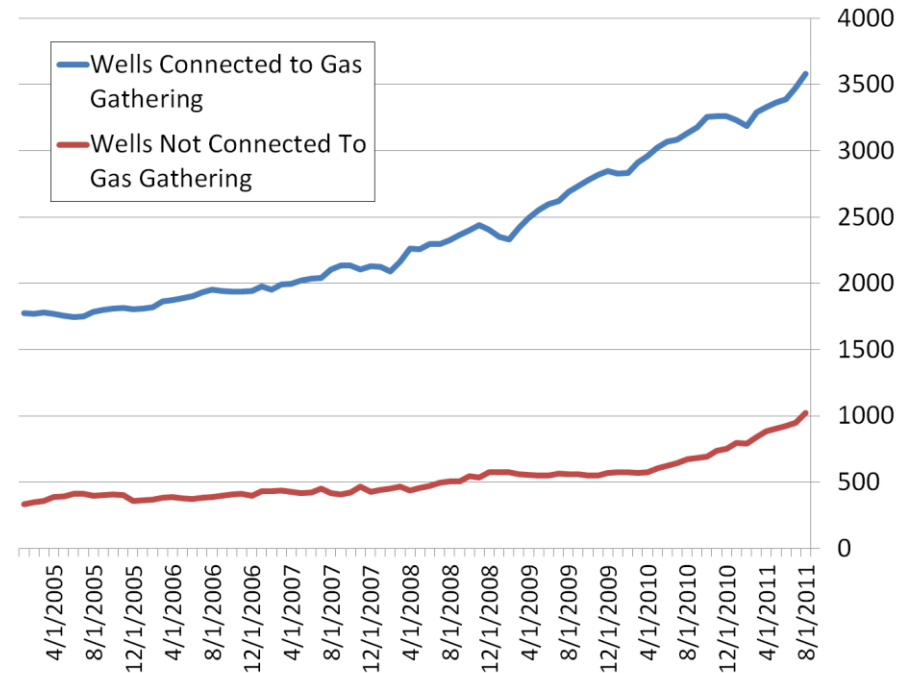
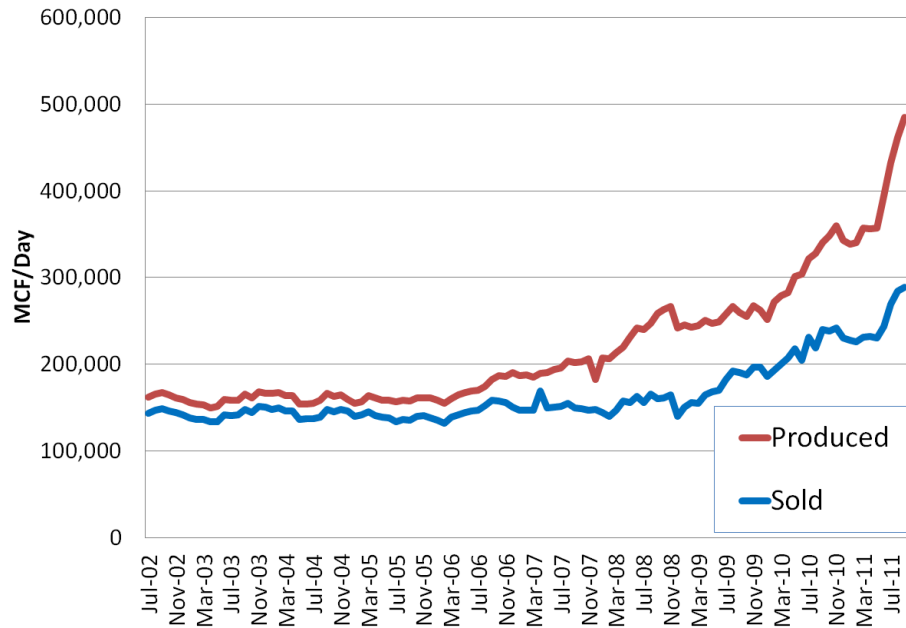
Natural Gas is a Burning Issue

Wasting gas when we are energy starved

Ken Silverstein | Oct 05, 2011

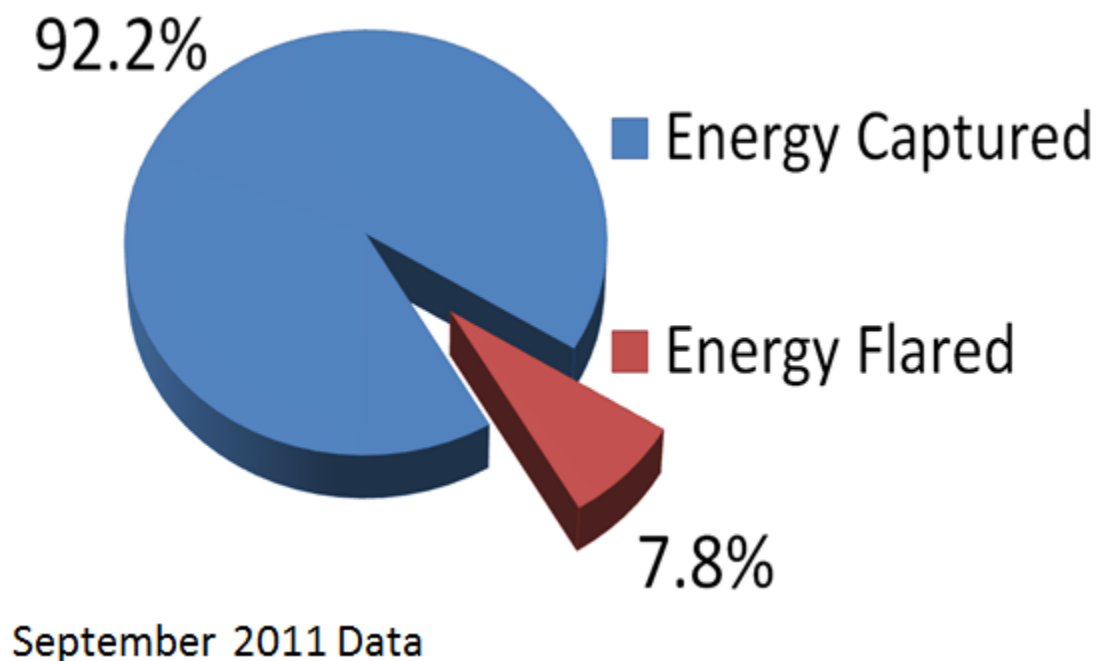
energybiz

North Dakota Flaring



Source: North Dakota Pipeline Authority

>90% of energy production captured



Hold on...why so much flaring?

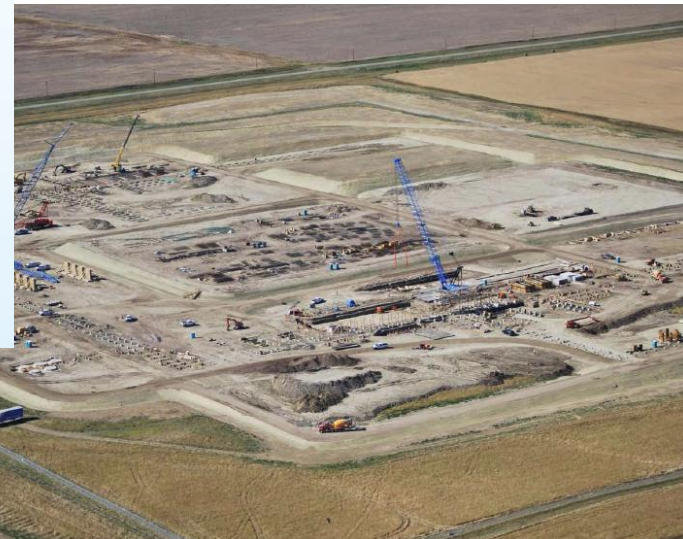
1. **Feasibility and economic viability of immediately getting gas to market. NG must be transported via pipeline.** Most of these wells will in time will be hooked up to gas processing facilities; however, there are some pre-Bakken boom wells in North Dakota that are decades old and so far from any other existing well or facility that small amounts of flaring will continue.
2. **Severe North Dakota weather limits construction season.**
3. **Construction of gathering and processing facilities carried out by 3rd parties, not individual operators.**
4. **Size and Maturity of the Play.** New play with rapid development (partially because of leasing requirements) and spread across over 15,000 sq. miles continually seeing better well completion and higher production rates.
5. **Valuable natural gas which has a high liquid/NGL cut (wet gas),** must be processed to remove NGLs before dry gas (methane) can be sent to market.
6. Over \$3 billion is being invested by the industry for gathering and processing in the next few years. **Significant gathering and processing growth** has taken place over the past several years, but has simply been unable to keep up with such strong production growth...lag in gathering, compression, and processing infrastructure...older facilities were not built to handle current volumes.

Infrastructure Expansions Underway

ONEOK Compression Projects

Approved and in various stages of construction

Facility	Location	Capacity	Target In-Service
• Garden Creek Compressor Station	McKenzie County	30 MMcfd	In Service
• Stateline Compressor Station	Williams County	25 MMcfd	In Service
• Lodgepole/16" Trunkline	Dunn/Stark Counties	10 MMcfd	In Service
• Blue Buttes Units 5&6	McKenzie County	10 MMcfd	October 2011
• Alexander Booster Expansion	McKenzie County	5 MMcfd	October 2011
• Charlson Compressor Station	McKenzie County	30 MMcfd	November 2011
• Cherry Creek Compressor Station	McKenzie County	30 MMcfd	December 2011
• Epping Compressor Station	Williams County	15 MMcfd	January 2012
• Twin Valley Compressor Station	McKenzie County	30 MMcfd	March 2012
• Epping Station Expansion	Williams County	15 MMcfd	2Q 2012
• Cooperstown Station Expansion	McKenzie County	10 MMcfd	2Q 2012
• Tree Top Station Expansion	Billings County	5 MMcfd	3Q 2012
• Bear Den Compressor Station	McKenzie County	30 MMcfd	3Q 2012
• Alamo Compressor Station	Williams County	<u>15 MMcfd</u>	3Q 2012
Total Capacity of Field Compression Expansions-		260 MMcfd	



Source: Oneok Partners North Dakota
Natural Gas Flaring Webinar Nov 2011

Bakken and Three Forks Natural Gas

