The North American Oil Market – Wyoming in Context

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Energy Policy Research Foundation, Inc. (EPRINC)
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About EPRINC

- [www.eprinc.org](http://www.eprinc.org)
- Oil and Gas Journal
- Embassy Series
- Presentations at Imperial College London, Colombia University, Wyoming Pipeline Authority
- Department of Energy – Quadrennial Energy Review
- Department of Defense
North American Oil Production

Canadian Crude Oil Production
U.S. Field Production of Crude Oil Mbbl/d

Source: EIA

U.S. 8.5 mbd
Canada 3.7 mbd
July North America = 12.2 mbd
Permit Activity

Source: HPDI Sept 2014, Past 90 Days
Jan 2014 EPRINC’s Forecast for Major U.S. Shale Plays

EPRINC forecasts over 2 mbd by 2020

2020
- U.S. 10 mbd
- Canada 5.1 mbd

Source: HPDI data with EPRINC forecast estimates
CAPP’s Canadian Crude Oil Forecast

Total Imports, Production, Canadian Imports

Canadian Imports 2.7 mbd or 38%

Source: EIA
U.S. Imports from Abroad Steadily Decline
Drilling Activity and Production
U.S. Rig Count

Source: Baker Hughes
State Rig Count

Source: HPDI Sept 2014, Baker Hughes
Shale Oil Play Production

Source: HPDI May 2013, EIA, NDPA
Importance of Technology

- Drilling advances and efficiencies, but still need to think about overall well performance
- Geology ➔ Rock characteristics and depositional environment
- NOT all shales are created equal
- Advances in monitoring and microseismic imaging
- Integrating disciplines
- Production focus
- Ability to alter EURs of wells
Drilling Advances

Source: Triangle Petroleum Corporation, Presentation
Bakken Product Markets and Take-Away Denver Jan 31-Feb 1 2012

Source: Continental Resources March Investor Presentation, Permission granted
A Deeper Understanding

Infrastructure and Pricing
North Dakota Crude Oil Transport

January 2012 Estimates

- Pipeline Export: 58%
- Tesoro Refinery: 10%
- Truck to Canadian Pipelines: 25%
- Estimated Rail: 7%

March 2014 Estimates

- Estimated Pipeline Export: 66%
- Tesoro Refinery: 1%
- Truck to Canadian Pipelines: 27%
- Estimated Rail: 6%

July 2014 Estimates

- Estimated Pipeline Export: 60%
- Tesoro Refinery: 1%
- Truck to Canadian Pipelines: 33%
- Estimated Rail: 6%

Source: North Dakota Pipeline Authority
July 2014 Williston Basin Crude Transportation

Williston Basin Production: 1.2 mbd
North Dakota: 1,110,642 b/d
South Dakota: 4,800 b/d
Eastern Montana: 74,000 b/d

Tesoro Refinery: 68,000 b/d
Truck to Canadian Pipeline: 9,800 b/d
Rail: 740,000 b/d
Pipeline: 414,000 b/d

Source: NDPA, EPRINC Estimates
Pipeline Capacity Ample

- Plenty of pipeline capacity now, but if more crude should move back to pipe (continued rail concerns regarding Dec regulation uncertainty) could see prices further decline in Clearbrook and in Wyoming

Source: EPRINC’s article in Oil and Gas Journal March 2014
U.S. Crude Oil Exports

- All exports of crude oil from the U.S. are to CANADA
- Canada imported a total of 331,000 b/d (oil and refined products) from the U.S. in Jan 2013
- 110,000 b/d from ND alone

Source: EIA
Pipeline Choke Points

Source: EPRINC Choke Point Map using Hart ArcGIS Mapping software
2014 vs. 2013

Source: CAPP Crude Oil Forecast June 2013
All Canadian Pipeline Export Options are Full

- **Kinder Morgan’s** Transmountain line off BC coast - currently 300,000 b/d capacity- planned expansion up to 800,000 b/d (early 2017)
- **(Now Spectra)** Platte line to Wood River 280,000 b/d-full
- **Enbridge** mainline system currently transporting over 1.5 mbd with potential capacity around 2.5 mbd—Northern Gateway off BC coast planned 525,000 b/d, several other planned expansions, light oil access +400,000 b/d to eastern U.S. and Canada
- **TransCanada’s** Keystone 581,000 b/d-full—XL would add 700,000 b/d, Energy East Pipeline Project 500 to 800k

Source: Canadian Energy Pipeline Association
Supply vs. Take-Away Capacity is Risky at Best

Regional Pricing Disparities

Source: Map from AFPM, Flint Hills, EIA, CME Group, and estimates
Source: EIA, Flint Hills, CME Group,, Bloomberg
Williston Basin Rail Estimates

Source: NDPA
Daily Crude by Rail Shipment in U.S. and Canada

Source: AAR; Crude and petroleum product includes liquefied gases, asphalt, fuel oil, lubricating oil, jet fuel, etc. U.S. operations exclude U.S. operations of CN and CP. Canadian operations include CN and CP and their U.S. operations. One carload holds 30,000 gallons (or 714.3 barrels).
Wyoming Highlights
Wyoming Pipelines

Source: CAPP, ArcGIS Hart Energy
Wyoming’s Play in Crude by Rail

Source: Wyoming Pipeline Authority Base Map
Powder River Basin Revitalized

Powder River Basin oil production by formation (January 2000-March 2014)
thousand barrels per day

Source: U.S. Energy Information Administration and Drillinginfo, Inc.
Oil and Gas Wells – Start 2008

Source: HPDI
Oil and Gas Wells – 2014 ONLY

Source: Wyoming Pipeline Authority Base Map
Refineries
Where light sweet Bakken and heavy (blended bitumen) needs to go...

Source: AFPM map, EIA data for graph
Canadian vs. Total Foreign Imports by PADD

**PADD I**
- East Coast (PADD 1) Total Foreign Imports
- East Coast (PADD 1) Imports from Canada

**PADD II**
- Midwest (PADD 2) Total Foreign Imports
- Midwest (PADD 2) Imports from Canada

**PADD III**
- Gulf Coast (PADD 3) Total Foreign Imports
- Gulf Coast (PADD 3) Imports from Canada

**PADD IV**
- Rocky Mountain (PADD 4) Total Foreign Imports
- Rocky Mountain (PADD 4) Imports from Canada

**PADD V**
- West Coast (PADD 5) Total Foreign Imports
- West Coast (PADD 5) Imports from Canada

Source: EIA Data
Bakken Quality Comparison

Source: Continental Resources March Investor Presentation, Permission granted
Refinery Expansions and Adjustments

• Not really about the Bakken
• To accommodate rising volumes of light sweet crude and condensate from the Eagle Ford and the Utica:
  • Flint Hills and Valero in the Gulf making expansions this year and the next; Marathon near Utica (around 200,000 b/d plus)
  • Phillips 66 has plans but not explicit

• Some more opportunity driven expansions in North Dakota, Montana, and Texas in 2015 (around 60,000 b/d), topping plants etc.
• Only one condensate splitter active to date in Gulf – BASF/Total
  • Kinder Morgan and Trafigura under construction in Gulf – 2014/2015
  • Several proposed projects in the Gulf
“The nature of the oil we're producing may not be well-matched to our current refinery capacity,’ Mr. Moniz said Tuesday after an energy conference in Seoul. The administration is studying the issue, though government officials declined to comment on its scope or timing. The statements, paired with similar comments by senior Obama counselor John Podesta last week, mark a notable policy shift inside the administration over the past six months.”
Geology of the Eagle Ford = Varying Liquid Grades

Source: Momentum Oil and Gas LLC, DUG Eagle Ford Conference Presentation Oct 2011; EOG Investor Presentation Feb 2014;
Those differences are impacting prices

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Sept 16, 2014
WTI $94.75
Brent $99.04
Regional Discounts Matter with High Cost Production

Source: ITG Investment Presentation Nov 2012
Cash Flow of the Shalers

Ups and Downs of the Shale Boom

While some companies are generating more cash than they are spending in the hunt for oil and gas, others haven’t been as fortunate. Cash from operations minus capital expenditures:

**CASH-FLOW NEGATIVE**
- **Antero Resources**
  - $2.1 B
  - Operates in Appalachia; spends more than it generates.

- **Chesapeake Energy**
  - $3.0 B
  - Shale-boom leader took on too much debt.

**CASH-FLOW POSITIVE**
- **Eog Resources**
  - $3 billion
  - Turned corner with switch to oil from gas.

- **Anadarko Petroleum Corporation**
  - $1.2 B
  - Gets a boost from oil output in Africa, Alaska.

Source: WSJ, April 20, 2014, Russel Gold Theo Francis “The New Winners and Losers America’s Shale Boom”
Regulatory Uncertainty
In North Dakota, Flames of Wasted Natural Gas Light the Prairie

U.S. Delays Decision on Pipeline Until After Election

Helms says EPA could halt fracking in oil patch

Concerns rise about environmental impacts of Lac-Megantic train disaster

Radioactive Waste Is North Dakota’s New Shale Problem

emitte lucem et veritatem
Issues and Regulatory Concerns

- Rail Safety
- Pipeline and Rail Spills
- Flaring
- Water: Spilling, disposing, fracking usage
- Oil prices/costs/discounts
- Infrastructure delays
- Regulatory uncertainty: midstream companies trying to forecast crude exports etc.
- Waste disposal
- Environmental Concerns
Water Issues

“The analysis suggests that a likely contributing factor to the increase in earthquakes is triggering by wastewater injected into deep geologic formations. This phenomenon is known as injection-induced seismicity, which has been documented for nearly half a century, with new cases identified recently in Arkansas, Ohio, Texas and Colorado.”
Crude by Rail Accidents

- July 6, 2013, a run-away train crashed and exploded in Lac-Mégantic, Quebec, killing 47 people and destroying parts of the town.
- November 8, 2013, about 12 cars derailed in a unit train of 90 cars carrying crude oil near Aliceville, Alabama (45 miles SW Tuscaloosa). Nobody was injured, but three of the cars exploded.
- December 30, 2013, a train hauling grain derailed near Casselton,(SE) ND hitting a 106 car unit train of crude oil which caused 18 crude tank cars to derail causing a massive explosion and fireball.
- January 7, 2014, a Canadian National train jumped tracks in Plaster Rock, New Brunswick. 15 cars derailed and caught fire. The train was carrying propane and crude oil from Western Canada.
- January 20, 2014, a CSX train derailed in Pennsylvania on a railroad bridge and close a busy expressway (Schuylkill), but did not leak any crude oil.
- April 30, 2014, oil tanks cars on CSX derailed and caught fire in Lynchburg, VA (3 of 15 cars that derailed caught fire). Nobody was injured by 300 people were evacuated temporarily.

Many Entities Involved

Issues
- labeling
- volatility
- rail safety
- tank car strength

Groups Involved
- producers
- truckers
- shippers
- marketers
- refineries
- railroads
- tank car manufacturers
New York Moratorium

- NY’s Albany County placed a moratorium on crude oil processing expansions in the Port of Albany until health investigations and environmental impacts could be assessed.
- Global Partners and Buckeye in Albany hub.
- Global had received permits to double facility in 2012.
- In January Gov Cuomo signed order for top bottom safety review of crude by rail and water and writes letter to Obama.