Industrial Commission Update

Justin J Kringstad
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Director
North Dakota Pipeline Authority

January 24, 2018
## US Williston Basin Oil Production - 2017

<table>
<thead>
<tr>
<th>MONTH</th>
<th>ND</th>
<th>Eastern MT*</th>
<th>SD</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td>January</td>
<td>983,840</td>
<td>52,727</td>
<td>3,553</td>
<td>1,040,120</td>
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<td>February</td>
<td>1,034,148</td>
<td>53,959</td>
<td>3,718</td>
<td>1,091,825</td>
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<td>March</td>
<td>1,025,932</td>
<td>52,901</td>
<td>3,705</td>
<td>1,082,537</td>
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<td>April</td>
<td>1,050,892</td>
<td>52,437</td>
<td>3,768</td>
<td>1,107,096</td>
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<tr>
<td>May</td>
<td>1,040,658</td>
<td>52,980</td>
<td>3,389</td>
<td>1,097,027</td>
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<td>June</td>
<td>1,032,921</td>
<td>52,947</td>
<td>3,563</td>
<td>1,089,430</td>
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<tr>
<td>July</td>
<td>1,048,560</td>
<td>51,767</td>
<td>3,529</td>
<td>1,103,856</td>
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<td>August</td>
<td>1,089,289</td>
<td>51,041</td>
<td>3,565</td>
<td>1,143,894</td>
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<td>September</td>
<td>1,107,345</td>
<td>51,184</td>
<td>3,568</td>
<td>1,162,096</td>
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<tr>
<td>October</td>
<td>1,183,810</td>
<td>49,385</td>
<td>3,611</td>
<td>1,236,806</td>
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<tr>
<td>November</td>
<td>1,194,920</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>December</td>
<td></td>
<td></td>
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</table>
Estimated Williston Basin Oil Transportation

November 2017

- Pipeline Export: 75%
- Refined: 6%
- Truck to Canadian Pipelines: 11%
- Estimated Rail: 8%
Estimated Williston Basin Oil Transportation

- Estimated Rail
- Estimated Pipeline Export
- Refined
- Truck to Canadian Pipelines
- Brent - WTI Spread (EIA)

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Estimated ND Rail Export Volumes

Barrels Per Day

- Nov-11
- Mar-12
- Jul-12
- Nov-12
- Mar-13
- Jul-13
- Nov-13
- Mar-14
- Jul-14
- Nov-14
- Mar-15
- Jul-15
- Nov-15
- Mar-16
- Jul-16
- Nov-16
- Mar-17
- Jul-17
- Nov-17
Data for Rail Destination Market Share Provided by the US Energy Information Administration
Crude Oil Prices – Jan. 23, 2018

Cushing $64.45

Brent $69.90

WTI + $5.45

Pricing Data: Bloomberg & CME (LLS-Argus)

LLS (Argus) WTI + $4.58

Brent $69.90 WTI + $5.45
Solving the Flaring Challenge

Statewide

87%

11%

2%

**GREEN** – % of gas captured and sold

**Blue** – % flared from zero sales wells

**Orange** – % flared from wells with at least one mcf sold.

**Simple Terms**

**Blue** – Lack of pipelines

**Orange** – Challenges on existing infrastructure

Nov 2017 Data – Non-Confidential Wells

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Solving the Flaring Challenge

- Flaring % From Wells Connected to Sales
- Flaring % From Wells Not Connected to Sales
- Total ND Gas Production


Total ND Gas Flaring Percent (Color Indicates Reason)

ND Gas Production, MMCFD
Solving the Flaring Challenge

- New Wells Selling Gas
- New Producing Wells
Major NGL Pipeline and Processing Infrastructure

- Alliance Tioga Lateral
- Prairie Rose
- Alliance (Dense Phase Gas)
- Northern Border (High C2%)
- ONEOK (Y-Grade)
- Vantage (Ethane)

Kinder

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ONEOK Elk Creek NGL Pipeline

Project Highlights
- 900 Miles - 20” Pipeline
- $1.4 Billion
- 240,000 BPD Capacity
- Expandable to 400,000 BPD
- End of 2019 Proposed Completion
- Y-Grade Transportation
NGL Takeaway Options With Truck & Rail

Bars Per Day

Northern Border (70 mbpd)
Aux Sable Prairie Rose
Alliance Tioga Lateral
ONEOK Elk Creek
Purity Truck/Rail & Rail

WBI Transmission
ONEOK Bakken NGL
Vantage
Elk Creek Expansion (Proposed)
Case 1: All Captured NGLs
Case 2: All Captured NGLs
Bakken Economics

Breakeven Analysis

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January 24, 2018
North Dakota Oil Differential

ND Wellhead Discount to WTI & Brent

ND Wellhead - WTI
ND Wellhead - Brent
North Dakota Impact of Smaller Discount

- 2016 Weighted Average Discount: $7.71
- June-November 2017 Wt. Average Discount: $4.67
- $3.04/BBL Improvement Post DAPL Commercial In-Service

- 200,408,597 Taxable Barrels In June-November 2017
- Wt. Avg. Tax Rate in June-November 2017: 9.74%

**Six Month Revenue Impact**
- 9.74% x 200,408,597 x $3.04 =

$59.2 Million Additional State Revenue
When Compared to Avg. 2016 Discount

Does Not Include Royalty Owner
and Industry Revenue Impact
Objective
Define where the Bakken/Three Forks system may be economic in various price scenarios.

Method
Analyze past well performance across the region and estimate well economics for various production levels.

Disclaimer
The goal of this work is not to imply individual company actions or intentions. All view expressed are strictly that of Justin J. Kringstad.

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Bakken Breakeven Analysis
Important Considerations

• Breakeven areas were determined by neighboring well performance and are expected to expand as new completion technology is applied in areas outside “the core.”

• Just because an area is considered “economic” does not mean that it is the most economic option for the industry participant(s). Competition for capital continues to exist inside and outside the region.
Bakken Breakeven Price Range (20% ATIRR)

Bakken Breakeven Prices
$6 - $8 Million
Completed Wells Cost
- $58-$73
- $49-$61
- $43-$52
- $39-$48
- $36-$43
- $34-$40
- $32-$38
- $28-$33
- $26-$30

Background Map: Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Bakken Breakeven Economics
County/Regional Analysis

Breakeven Range Included: $6mm, $7mm, $8mm Well Costs
44% Economic Area Increase 2017 to 2018

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

$58-$73
$49-$61
$43-$52
$39-$48
$36-$43
$34-$40
$32-$38
$28-$33
$26-$30

~2018YTD Range Square Miles: 11,824
~2017 Range Square Miles: 8,223
~2016 Range Square Miles: 5,474
Key Economic Assumptions

• $6-$8 Million Well Costs
• $59/BBL & $5.00/MCF Wellhead Pricing
• 1/6 Royalty
• Zero Flaring
• Assumed 10-20% IRR to drill (calculated after production taxes and royalties)
• No Tax Incentives Included
• Production rate is 30-day average
• All Bakken/Three Forks wells drilled in 2008+
Drilling Locations* – January 22, 2018

Bakken Breakeven Prices
$6 - $8 Million

*Due to confidential status, the target production zone for many wells is unknown.
Forecasting Challenges: Activity vs. Price

Year:
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017

Well Completions vs. Spuds vs. WTI Price
North Dakota Forecast Activity Assumptions

ND New Wells Added Per Month

- ND New Wells Case 1
- ND New Wells Case 2

NDPA Forecast

[Graph showing trends in ND New Wells Added Per Month from 2009 to 2035]
North Dakota Oil Production Forecast

- NDPA Oil Forecast: Case 1
- NDPA Oil Forecast: Case 2

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