ND Petroleum Production and Transportation Dynamics

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Geological Engineer
Director
North Dakota Pipeline Authority

April 19, 2016
Presentation Outline

• Understanding current and future oil production
  – Activity
  – Forecasts
  – Drilling economics

• Williston Basin oil transportation dynamics
  – Interstate oil movements
  – Intrastate oil movements

• North Dakota natural gas production
  – Flaring and gas capture
29 Rigs and 628 NC Wells:
April 15, 2016 (Non Confidential NC Wells Only)
North Dakota Drilling Activity

Drilling Rigs & Spuds

Spuds Per Rig Per Month

- Spuds
- Drilling Rigs
- Spuds per Rig per Month

North Dakota Drilling & Completions

- September 2015
- July 2015
- May 2015
- March 2015
- January 2015
- November 2014
- September 2014
- July 2014

IP Test Date:
- Oct 1, 14
- Jan 1, 15
- Apr 1, 15
- Jul 1, 15
- Oct 1, 15
- Jan 1, 16
- Apr 1, 16
Understanding Current Production Dynamics
Non-Confidential Spud to Initial Production Timeline
North Dakota Oil Production Forecast

Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
Forecast Cumulative Prod. & EUR Estimates

- CLR 2014 P10
- CLR 2014 P50
- USGS 2013 P5
- USGS 2013 P50
- 7% Recovery of 2010 ND DMR Maximum OOIP (ND Only)
- 7% Recovery of 2010 ND DMR Most Likely OOIP (ND Only)

Case 1
Case 2

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North Dakota Oil Differential

Based on EIA Data

North Dakota-WTI Differential
North Dakota-Brent Differential

Based on EIA Data

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Key Economic Assumptions

- $6-$8 Million Well Costs
- $35/BBL & $3.00/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+
Peak Month Minimum
400 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

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Breakeven Wellhead Price (AT IRR of 20%)
Peak Month Minimum 500 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

$35 Wellhead
Peak Month Minimum
600 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

600

20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%

$35 Wellhead

6 MM
7 MM
8 MM

Well Cost

Breakeven Wellhead Price (AT IRR of 20%)
Peak Month Minimum 700 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

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Breakeven Wellhead Price (AT IRR of 20%) $35 Wellhead

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Peak Month Minimum
800 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

$35 Wellhead

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Peak Month Minimum
900 BOPD

Peak Month BOPD / Well Cost
900

After Tax IRR

Breakeven Wellhead Price (AT IRR of 20%)

$0 $5 $10 $15 $20 $25 $30 $35 $40

6 MM
7 MM
8 MM

$35 Wellhead

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Peak Month Minimum 1,000 BOPD

Peak Month Well Production, BOPD

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<th>Well Cost</th>
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Breakeven Wellhead Price (AT IRR of 20%)
Peak Month Minimum 1,200 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

$35 Wellhead

Breakeven Wellhead Price (AT IRR of 20%)

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Peak Month Minimum 1,500 BOPD
Summary of $35 Wellhead Oil

Peak Month BOPD / Well Cost

After Tax IRR

Assumed Range of Minimum Acceptable Rate of Return
Breakeven Summary

Peak Month Well Production, BOPD / Well Cost

Breakeven Wellhead Price (AT IRR of 20%)

<table>
<thead>
<tr>
<th>Production (BOPD)</th>
<th>400</th>
<th>500</th>
<th>600</th>
<th>700</th>
<th>800</th>
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Months: 6, 7, 8
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Estimated Williston Basin Oil Transportation

- Pipeline Export: 51%
- Refined: 7%
- Truck to Canadian Pipelines: 41%
- Estimated Rail: 1%

February 2016
Estimated ND Rail Export Volumes

Barrels Per Day

Rail Destinations Market Share (Jan 2016)

Data for Rail Destination Market Share Provided by the US Energy Information Administration

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Crude Oil Prices – Apr. 14, 2016

Cushing $41.27

Brent $43.65
WTI + $2.38

Pricing Data: Bloomberg
Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.
Energy Transfer Partners: Dakota Access

- Successful Open Season During the First Half of 2014
- 450,000 BOPD Capacity to Patoka, IL (30"")
- Expandable Up To 570,000 BOPD if Shipper Demand Exists
- Target In-service Date: Late 2016

Map Source: Energy Transfer Partners
Patoka, IL Crude Hub

Map Source: PHMSA National Pipeline Mapping System
Energy Transfer Crude Oil Pipeline

Map Source: Energy Transfer Partners
North Dakota Pipeline Company LLC - formerly known as Enbridge Pipelines (North Dakota) LLC

- **Open Season Dates:** November 26, 2013 – January 24, 2014
- **225,000 BOPD ND Capacity to Clearbrook, MN (24”)**
- **375,000 BOPD Clearbrook, MN to Superior, WI (30”)**
- **Target In-service Date:** 2019
TransCanada: Upland Pipeline

- Successful Open Season During 2014
- Initial Capacity 220,000 BOPD (Expandable to 300,000 BOPD)
- Target In-service Date: 2020
- Energy East Project Capacity 1.1 MMBOPD

Map: NEB – NDPA Upland Addition
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Evolution of Oil Gathering in ND Statewide Totals

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated Piped, BOPD</th>
<th>Estimated Trucked, BOPD</th>
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<tr>
<td>2012</td>
<td>263,352</td>
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<td>2013</td>
<td>410,629</td>
<td>524,649</td>
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<td>2015</td>
<td>725,743</td>
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Solving the Flaring Challenge

Statewide

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

February 2016 Data – Non-Confidential Wells
Contact Information

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www.northdakotapipelines.com