Natural Gas Study

WILLISTON BASIN

The Williston Basin:
Greasing the Gears for Growth in North Dakota
The Williston Basin Is Benefiting From the Significant Shift in Natural Gas Dynamics as a Result of:

- A Realignment of Producer Investment Criteria Toward Oil and NGL Plays.
- Reduction in Production From Neighboring, Less Economic Producing Basins.

While Still Early, Current Data Suggests the Basin Could Yield Higher Future Gas and NGL Volumes Due to a Rising Gas to Oil Ratio (GOR).

Strong Drilling Economics, a Rising GOR and Greater Efficiency Will Increase the Future Output From the Basin. Under BENTEK’s Base Case Scenario, Oil Production Will Climb to 2.2 MMB/d and Gross Gas Production Will Top 3.0 Bcf/d by the end of 2022.
Basin Conclusions (Continued)

- Oil Prices and Oil Infrastructure Takeaway Capacity Are Primary Drivers of the Strong Economics in the Region and Will Ultimately Drive Growth.
- Given Growth Expectations, Significant Midstream Investment Will Be Required To Capture Natural Gas and NGL Value in the Basin.
- Williston Basin Economics Enable Producers in the Region to Sufficiently Compete on Price with Upstream Natural Gas Supply In the Rockies and Canada for Space Out of the Region on Existing Infrastructure.
Natural Gas Supply Growth is Changing The US Energy Landscape

- US Dry Production
- US Consumption
- Canadian Imports/LNG/Storage

Source: EIA
Commodity Price Disparities Are Shifting Producer Behavior

- Higher Relative Oil and NGL Prices Incentivize Producers to Redirect Resources Toward Assets With a Higher BTU Content.

- Driving Capital into the Williston Basin and Reducing Competition For Space on Existing Infrastructure Moving Gas Out of the Area.

- Low Natural Gas Prices Are Forcing Producers to Reevaluate Economics and Investment in Conventional and Even Unconventional Lean Gas Assets.

Source: ICE, EIA
Bakken Earns Above Average Returns

Price Assumptions:
- Gas = 12 month forward average curve for each regional pricing point as of June, 2012 (price range $2.45-$2.86/Mcf)
- Oil = 6 month average WTI +/- differential as of June, 2012 (price range $84.40-$100.43/barrel)
- NGLs = weighted average $/barrel based on current Mt. Belvieu prices and the typical composition in each region (range $23.79-$45.22/barrel)
Plays With High Returns Attract Drilling Rigs

Rig Increases Dry Gas Focused Areas

Rig Increases Liquids-Rich/Oil Focused Areas

Rig Declines

Source: Rig Data, BENTEK, June 2012

Active rig count: June 15, 2012 / Change in rig count from Jan. 1, 2010
Williston Basin Forecasts
Williston ND Horizontal Oil Type Curve Converges

30-day IP rate: 400 b/d
EUR: 459,000 bbls

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Well Life: 25 years
Older ND Wells Suggest a Flat Gas Type Curve

30-day IP rate: 340 Mcf/d
EUR: 669,000 Mcf

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ND Model EURs Inline with Producers Expectations

Model
Oil: 459,000 Bbls
Gas: 111,500 Boe
Total: 570,500 Boe

CLR: 603 Mboe

Whiting:
450-900 Mboe
(Sanish)

Oasis:
450-750 Mboe
(Middle Bakken)
Stronger Gas Oil Ratio (GOR) Expected For ND Horizontal Oil Wells
Base Case - Level of Activity Remains At Current Levels For the Next 10 years

Reserve Requirement: 22 Billion Boe

CLR: 24 Billion Boe Technically Recoverable Oil and Gas
High Case Scenario-Consistently Tests Oil Takeaway Capacity, Stressing Prices and Producers

Reserve Requirement: 28 Billion Boe

ND: 2,880  MT: 665
Williston Growth Can Be Maintained at Low Prices

**Williston IRR Sensitivities: Oil IP Rates/Oil Prices**

Oil Price
- $50/bbl
- $60/bbl
- $70/bbl
- $80/bbl
- $90/bbl
- $100/bbl
- $110/bbl

Oil IP Rate (B/d)
$50 Oil Challenges Fringe Economics

Other counties with active rigs that see reduced activity include: Bowman, Roosevelt, Richland, Golden Valley, Burke.
Low Case – Driven By Low Oil Prices

Reserve Requirement: 13 Billion Boe
Comparison of Oil Production Based on Various Scenarios

- **High Case**: Consistently Tests Oil Takeaway Capacity, Stressing Prices and Producers.

- **Base Case**: Provides Strong Consistent Growth For the Basin Without Straining Takeaway Capacity Until Around 2022.

- **Low Case**: Suggests a Significant Pullback in Activity Due to Falling Oil Prices.
North Dakota Gross Gas Production Set To Climb

North Dakota Gross Gas Production
Bring Gas Supply to Market
New Processing and Midstream Infrastructure Needed to Meet Growing Gas Production in the Williston Basin

- ONEOK Garden Creek
- Plains Ross Plant
- New Frontier Midstream
- HESS Tioga Plant Expansion
- ONEOK Stateline II
- ONEOK Stateline I

545 MMcf/d of Planned Processing Expansions Over Next Two Years
Source: BENETEK Energy July 2012 Report
Open Capacity Leaving N. Dakota Is Tight

- Northern Border and Alliance Serve As the Primary Routes to Transport Gas From the Region.
- Each Have Limited Open Mainline Capacity to Carry Additional Williston Supply.
Inlet Flows Currently Losing Market Share

- Declining PRB Production and Increased Competition For Space Has Resulted in Reduced Flows on Bison.
- Canadian Inflows Into Northern Border Have Remained Relatively Strong, But Have Experienced Displacement in the Past and Now.
North Dakota Pipeline Authority
North Dakota Petroleum Council Annual Meeting
September 20, 2012 – Medora, ND
North Dakota Type Curves*

*Based on the July 2012 BENTEK Natural Gas Study
September 2012 Forecast Assumptions

Drilling Rigs

- **North Dakota - 1**
- **North Dakota - 2**
- **Montana**
September 2012 Forecast Assumptions

Completed Wells

- North Dakota - 1
- North Dakota - 2
- Montana - 1
Production curve for the Bakken and Three Forks, US Williston Basin.
Source: BENTEK Energy July 2012 Report
Only horizontal wells shown on map
1980’s-90’s Bakken Development

[Graph showing data trends for Bakken well development, with labels for GOR, MCFPD, BOPD, and WTR, and a specific noted well from 1987.]
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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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.
North Dakota NGL Potential

Assumptions
- No Flaring
- 8 Gal/MCF
- All liquids extracted
Case 1: ND NGL Potential*

*Using NGL breakdown from the July 2012 BENTEK Natural Gas Study
Moving Future NGL Volumes

Transportation Options

• Trucking Regionally
• Rail Transportation
• Vantage Pipeline (Ethane)
• ONEOK Bakken Pipeline (Y-Grade)
• Alliance Pipeline (Rich Gas)
• New Pipeline Infrastructure??
Gas – Oil Ratio (GOR) Increasing Over Time

Horizontal Well Completed in Target Reservoir
Gas – Oil Ratio (GOR) Increasing Over Time

- Youngest - Original Reservoir Pressure
- Oldest – Entire Reservoir Below Bubble Point

High Reservoir Pressure

Bubble Point Pressure

Low Reservoir Pressure
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