Bakken 2.0: Efficiencies in Production, Costs and Workforce

Kari Cutting, NDPC October 2018
EIA Announces U.S. Now World’s Largest Crude Oil Producer

Monthly Crude Oil Production (Jan 1996 - Aug 2018)

Source: EIA, September 2018.
U.S. now net exporter of Natural Gas

Source: U.S. Energy Information Administration
Imports of Petroleum

4-Week Avg U.S. Net Imports of Total Petroleum Products

Source: U.S. Energy Information Administration
Bakken Production Hits New Record In July 2018

Average Daily Crude Oil Production by Country
(Year to Date 2018)

Million Barrels of Oil Per Day

- Russia
- Saudi Arabia
- United States
- Iraq
- Iran
- Canada
- China
- United Arab Emirates
- Kuwait
- Brazil
- Nigeria
- Kazakhstan
- Mexico
- Norway
- Angola
- Qatar
- Venezuela
- Algeria
- Bakken
- Oman
- Libya
- United Kingdom
- Colombia
- Azerbaijan
- Indonesia

Bakken 1.27 Million Bopd

*Data as of 3Q18 (latest available international data). "Petroleum Liquids" includes Crude Oil and Condensate. Source: EIA.*
Monthly Gas Production

2,400,174 BCF/day*

*As of July 2018
Bakken a world-class resource

With a LOT of oil left
Oil and Gas Prices

CLJ15 - Crude Oil WTI (NYMEX)

- CL*1: 49.40
- Vol: 976012

March 2014 to January 2015, price trend showing a decline.
Bakken Performance Better Than Ever…Thanks To Technology

Updated Type Curve Highlights

- 1,200 MBoe EUR
- Capex: $8.4MM
- ~175% ROR\(^{(1)}\) at $70 WTI
- ~7 month payout\(^{(1)}\)
- $16MM PV-10 per well\(^{(1)}\)
- ~$3.5MM incremental first-year cash flow per well vs. 2Q17’s 980 MBoe type curve\(^{(2)}\)
- ~90,000 barrels of additional oil per well first year\(^{(2)}\)

The Rocks Did Not Change!

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1. ROR, PV-10 & payout are based on $70 WTI and $3.00 Henry Hub with $8.4 MM of Capex. Pre-tax rate of return (ROR) is based on projected cash flow and time value of money; costs include completed well cost, production expense, severance tax and variable operating costs.
2. Compared to 2017’s 980 MBoe type curve and based on $70 WTI price; cash flow per well is on a gross basis.
New-well oil production per rig
barrels/day

- **March-2017**
- **March-2018**

Bar chart showing production in barrels/day for the following regions:
- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian

Websites:
- [www.northdakotaoilcan.com](http://www.northdakotaoilcan.com)
- [www.ndoil.org](http://www.ndoil.org)
The 2.0 million barrel per day Challenge
North Dakota 'just won the geology lottery.' Oil exec estimates the Bakken reserves hold 30 to 40 billion barrels of recoverable oil
By **Patrick Springer** on Sep 24, 2018 at 6:25 p.m.

US Geological Survey To Reevaluate Bakken Oil Reserves
By **Zainab Calcuttawala** - Dec 11, 2017, 10:00 PM CST
Challenges

- Workforce
- Crude Oil Transportation
- Natural Gas Infrastructure
Ship, baby, ship! Calls come for US to export oil

Full Steam Ahead
The ban on U.S. oil exports is dead and the first cargoes have arrived in Europe. What's next for producers and how much growth will exports provide in the long run?

By LESLIE HAINES WITH DARREN BARBEE AND GREG HAAS

Maiden Bakken oil cargo to Asia ships out, with more to come
China imported over 400,000 b/d of US crude oil in May 2018 - over 100,000 b/d than Canada, now the #2 destination for US crude.

Source: EIA
CRUDE BY RAIL
NDIC Conditioning Order

- NDPC requested:
  - Variance for Bakken crude transported by pipelines that have at least as stringent vapor pressure requirement. 80% moving by pipeline.
  - Commingled crude to be tested at point where enters rail or truck transportation
  - 60,000 data points generated since 2015
  - Only 1 in 1,000 (60) higher than 13.7 psi
  - Coldest months of the year
  - NDPC requested annual testing in coldest months of the year.
Dakota Access Pipeline

Pipeline to stretch through 4 states

The 1,172-mile Dakota Access Pipeline would connect oil-rich areas of North Dakota to Illinois, where the crude oil could then be transported to refineries on the Gulf Coast or East Coast.

Sources: CNN, Energy Transfer Partners, US Census Bureau
Investing in NatGas Infrastructure

$18 billion invested since 2006

- 1,250 miles of pipeline
- 125,000 HP for 650 MMcf/d of field compression

Gathering

- 450 MMcf/d new and expanded gas plants
- 50,000 Bbls/d NGL fractionation

Processing

- 75,000 Bbls/d NGL pipeline capacity
- 20 miles residue gas pipeline

Takeaway
Impact Year End 2017

Wells drilled and completed - $100 billion > $330 billion to go
Wells drilled not yet completed - $11 billion > $1 billion
Natural Gas gathering and processing - $13 billion > $15 billion
Rail and rail transportation facilities - $1.25 billion
Crude Oil transmission pipelines - $2 billion > $2 billion

Total estimate - $127 billion > $348 billion to go = $475 billion

This does not include investments in housing and infrastructure made by private firms and state-local-federal government.
Workforce Constraints

• 15,000 jobs (listed)
• Easily 30,000 jobs available
• Wide range, not particularly one skill over another
• High paying, good benefits, family supporting jobs.
Total industry jobs now & future

North Dakota Oil Industry Jobs

Year

2005 2010 2015 2020 2025 2030 2035 2040 2045 2050

0 20,000 40,000 60,000 80,000 100,000 120,000

Prod jobs Gathering jobs Fracing jobs Drilling jobs
Quality of Life:

• The BOOM is over, steady growth ahead!
  – Safer highway infrastructure
    • Passing lanes
    • Round-a-bouts
    • Truck bypasses

• Housing market tightening
  – Need for developers/builders
    • Williston, Minot, Dickinson, Watford City
Thinking About Investor Pressure

Wall Street Tells Frackers to Stop Counting Barrels, Start Making Profits
The shale-oil revolution produces lots of oil but not enough upside for investors

By Bradley Olson and Lynn Cook
Updated Dec. 13, 2017 6:09 p.m. ET

Frackers Burn Cash to Sustain U.S. Oil Boom
Many U.S. drillers have increased spending, but not production forecasts, pointing to possible slowdown

The drilling boom has increased demand for materials like sand and water that are used in hydraulic fracturing, driving up prices.
PHOTO: CALLAGHAN OHARE/BLOOMBERG NEWS

By Rebecca Elliott and Bradley Olson
Aug. 12, 2018 9:00 a.m. ET

Source: WSJ
Questions?
Million Barrel Club

Monthly production remains above 1 million bopd

1,269,366 barrels

of oil per day*

*as of July 2018