North Dakota Oil & Gas Producing Counties

10th Annual Meeting
September 9, 2015

Dr. Loren C. Scott
www.lorencscottassociates.com
Energy Prices

Our Forecast in Early September
Fig. 6: Oil Prices

<table>
<thead>
<tr>
<th>Year</th>
<th>Average</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>$100</td>
<td></td>
<td></td>
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<tr>
<td>2015</td>
<td>$95</td>
<td>$85</td>
<td>$85</td>
</tr>
<tr>
<td>2016</td>
<td>$90</td>
<td>$85</td>
<td>$120</td>
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</tbody>
</table>
Want clear evidence of global warming?
Positive proof of global warming.
HIS - Shale plays Responsible for:

U.S. oil production up 85% since 2008---
highest growth of any country in world
over that period
Impact on Imports of Crude Oil

- **2015e:**
  - U.S. Production: 9.4 mmb/d
  - U.S. Imports: 7.2 mmb/d (43%)

- **2008:**
  - U.S. Production: 5.0 mmb/d
  - U.S. Imports: 9.8 mmb/d (66%)

- Guess who lost 2 mmb/d in sales to U.S.?
Each shale play is different

Technology not as easily transferable
North Dakota’s Bakken Field: A Hard Rock Shale

- 2003: 10,000 b/d produced
- 2015: 1,200,000 b/d produced---120-fold increase
- ND surpassed Alaska as 3rd largest source of domestic oil in 3/12
Tuscaloosa Marine Shale: A Clayey Shale
Result: Different Plays

Different Breakeven Prices
Breakeven Oil Prices by Play
(Rodgers Oil & Gas Consulting)

- Monterey (CA) $36
- Eagle Ford (TX) $49
- Bakken (ND) $50
- Granite Wash (OK) $57
- Niobrara (CO) $66
- Tuscaloosa (MS) $69
- Tuscaloosa (LA) $92
Declining Breakeven Prices

- Fracking costs down 32% over last year
  - The “Shoveling Down Effect”
- Drilling costs down 20%
- Time to drill well:
  - Anadarko
    - 2009: 18 days
    - 2015: 7.5 days
  - EOG (Bakken)
    - 2012: 22.7 days
    - 2015: 7.1 days
- Completion:
  - EOG (Bakken)
    - 2012: $10.5 mm
    - 2015: $8.2 mm
- Plus more output per well
Daily Output Per Well

Oil and natural gas production per rig by shale play
January 2007 to March 2014
bbl/d
500
400
300
200
100

Mcf/d
7,000
6,000
5,000
4,000
3,000
2,000
1,000

Jan-07  Mar-08  May-09  Jul-10  Sep-11  Nov-12  Jan-14
Marcellus  Haynesville  Niobrara  Eagle Ford  Bakken  Permian
Breakeven Within Each Play: These Are Averages

- Monterey (CA) $36
- Eagle Ford (TX) $49
- Bakken (ND) $50
- Granite Wash (OK) $57
- Niobrara (CO) $66
- Tuscaloosa (MS) $69
- Tuscaloosa (LA) $92
# Breakeven Within Plays: Bakken

<table>
<thead>
<tr>
<th>County</th>
<th>BE</th>
<th>County</th>
<th>BE</th>
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</thead>
<tbody>
<tr>
<td>Dunn</td>
<td>$29</td>
<td>BOT-REN</td>
<td>$52</td>
</tr>
<tr>
<td>McKenzie</td>
<td>$30</td>
<td>Burke</td>
<td>$62</td>
</tr>
<tr>
<td>Williams</td>
<td>$36</td>
<td>Divide</td>
<td>$73</td>
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<tr>
<td>Stark</td>
<td>$37</td>
<td>BOW-SLP</td>
<td>$75</td>
</tr>
<tr>
<td>Mountrail</td>
<td>$41</td>
<td>McLean</td>
<td>$77</td>
</tr>
<tr>
<td>Billings</td>
<td>$44</td>
<td>Only 6 rigs outside green in 2/15</td>
<td></td>
</tr>
</tbody>
</table>
We’re not exaggerating the edges...
LAST NIGHT A MOVIE THEATER WAS ROBBED OF A $1000 DOLLARS

THE THIEVES TOOK ONE LARGE BAG OF POPCORN, A COMBO MEAL AND A BOX OF MILK DUDS
Weird Bakken Effect on Oil Prices
Oil Price Trends

The graph shows the price trends of Brent and WTI crude oil from January 2012 to October 2013. The price is measured in dollars per barrel ($/bbl). The Brent crude oil price fluctuates between 70 and 140$/bbl during this period, while the WTI crude oil price fluctuates between 70 and 110$/bbl.
Oil Price Trends

[Graph showing the price trends of Brent and WTI crude oil from Jan-12 to Oct-13]
Desire to Export Oil

- Key to recent price decline
- Export of petroleum illegal since 1970s (Swaps now allowed with MX)
- Export of petroleum products is legal
What is a “product”?

Is a field-level $500K to $5mm facility to strip off volatile propane and butane so condensate can safely flow through pipelines make it a “product”?
Why have oil prices declined?

Why did they drop so quickly?
Was it rising U.S. Production?
Quick drop: Look to Saudis
Saudis & OPEC

Is it a desire to enforce discipline within OPEC---a’ la 1982?
Or a desire to maintain market share?
Main restraint on consistently lower oil prices:

“Let's have a meeting!”
Kill the Edges:

Impact on U.S. production will be swift.

Bakken oil production already peaking
Typical Bakken Well Production

Steep Declines:
- 65% 1st year
- 35% 2nd year
- 15% 3rd year
- 10% thereafter

Source: ND Dept of Mineral Resources
Production Trends: Shales Plays

Permian Powerhouse

Oil output is still growing in the Permian Basin, unlike other U.S. shale fields

Source: Energy Information Administration
Oil production levels off

Source: Oil and Gas Journal; Baker Hughes.
Oil Production

• By August, oil production from shale areas will have fallen for 4\textsuperscript{th} month in a row (EIA forecast)
The “W” in Oil Prices Plunge

Nominal price, $, weekly


Oil Price

$44.94

Natural Gas Price *

$2.80
Responses to Latest Price Decline

The rig count
Responses to Latest Price Decline

• **BP**: Reducing spending from $26 billion to $20 billion
• **Shell**: laying off 6,500 & reducing capital budget by $7 billion
• **Chevron**: eliminating 1,500 jobs & cutting spending by $1 billion
• **ConocoPhillips**: cutting spending from $16.5 billion to $11 billion
Responses to Latest Price Decline

• **Woods McKenzie**: Oil companies have canceled or delayed $200 billion in projects since mid-2014
  – 50% in deepwater projects
  – 30% in Canadian oil sands

• **Oil Service Companies**
  – Less work to do with fewer rigs
  – Plus “shoving down”
Where Is Price Going?

- **Demand Side: Credit Suisse**

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD</td>
<td>-1.0%</td>
<td>0.9%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Emerging</td>
<td>3.0%</td>
<td>2.5%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Total</td>
<td>1.0%</td>
<td>1.7%</td>
<td>1.6%</td>
</tr>
</tbody>
</table>
Where Is Price Going?

- Supply Side: Countervailing Moves
  - US Down
  - OPEC pressures down?
  - Iran???

  - Treaty?
  - In December putting out to auction 45 properties to show international exploration companies
  - Bump production from 3.1 to 5.7 mmb/d
What Is the “Market” Saying

• Futures market is in “contango”
  – Spot August 28, 2015 = $45.22
  – Future June 2016 = $50.52
  – Future December 2016 = $52.79
Oil Prices

Average 2015 $55  2016 $55  2017 $60
Low         2015 $30        2016 $30        2017 $30
High        2015 $90  2016 $90  2017 $90

Price per Barrel


POA  POAH  POAL
When you get discouraged…

Remember our responses to crises
1865

Price

$.23

Whale Oil
Price

Whale Oil

S
S

D
1867

Price

Whale Oil

$1.45

$.23
1859: Oil Discovered

Price

$1.45

$.23

Whale Oil

S

S

D

D
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