Revisiting Bakken Well Economics

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Objective
Define where the Bakken/Three Forks system is economic in a lower oil price environment.

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

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Key Economic Assumptions

• $6-$8 Million Well Costs
• $40/BBL & $3.50/MCF Wellhead Pricing
• 1/6 Royalty
• Zero Flaring
• Minimum 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 Well Production, BOPD

<table>
<thead>
<tr>
<th>Well Cost</th>
<th>Peak Month Well Production, BOPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 MM</td>
<td>400</td>
</tr>
<tr>
<td>7 MM</td>
<td></td>
</tr>
<tr>
<td>8 MM</td>
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</tbody>
</table>

Breakeven Wellhead Price (AT IRR of 20%)

- $0 $5 $10 $15 $20 $25 $30 $35 $40 $45 $50 $55 $60 $65 $70

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Peak Month Minimum
500 BOPD

Peak Month Well Production, BOPD

Well Cost

6 MM
7 MM
8 MM

$0 $5 $10 $15 $20 $25 $30 $35 $40 $45 $50 $55 $60

Breakeven Wellhead Price (AT IRR of 20%)

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4,115 Wells

$40 Wellhead

After Tax IRR

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

Peak Month BOPD / Well Cost

500
Peak Month Minimum
600 BOPD

Peak Month Well Production, BOPD

Well Cost

600

$40 Wellhead

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Peak Month Minimum 700 BOPD

Peak Month BOPD / Well Cost

Well Cost

<table>
<thead>
<tr>
<th>Well Cost</th>
<th>6 MM</th>
<th>7 MM</th>
<th>8 MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 - $5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$10 - $15</td>
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<td>$20 - $25</td>
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<td>$30 - $35</td>
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<tr>
<td>$40 - $45</td>
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</tbody>
</table>

Breakeven Wellhead Price (AT IRR of 20%)

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Peak Month Minimum
800 BOPD
Peak Month Minimum 900 BOPD

Peak Month Well Production, BOPD

<table>
<thead>
<tr>
<th>Well Cost</th>
<th>Peak Month</th>
<th>BOPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 MM</td>
<td>300</td>
<td>900</td>
</tr>
<tr>
<td>7 MM</td>
<td>300</td>
<td>900</td>
</tr>
<tr>
<td>8 MM</td>
<td>300</td>
<td>900</td>
</tr>
</tbody>
</table>

Breakeven Wellhead Price (AT IRR of 20%)

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

After Tax IRR

- 6 MM: 45%
- 7 MM: 40%
- 8 MM: 35%

$40 Wellhead
Peak Month Minimum 1,000 BOPD

Peak Month BOPD / Well Cost

After Tax IRR

<table>
<thead>
<tr>
<th>Well Cost</th>
<th>After Tax IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 MM</td>
<td>55%</td>
</tr>
<tr>
<td>7 MM</td>
<td>50%</td>
</tr>
<tr>
<td>8 MM</td>
<td>45%</td>
</tr>
</tbody>
</table>

Breakeven Wellhead Price (AT IRR of 20%)

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

Peak Month Well Production, BOPD

438 Wells
Peak Month Minimum
1,200 BOPD
Peak Month Minimum
1,500 BOPD

Peak Month Well Production, BOPD

Well Cost | 1500
---|---
6 MM | $0 $2 $4 $6 $8 $10 $12 $14 $16 $18 $20 $22 $24 $26 $28
7 MM | $0 $2 $4 $6 $8 $10 $12 $14 $16 $18 $20 $22 $24 $26 $28
8 MM | $0 $2 $4 $6 $8 $10 $12 $14 $16 $18 $20 $22 $24 $26 $28

Breakeven Wellhead Price (AT IRR of 20%)
Summary of $40 Wellhead Oil
800 BOPD Well Example

- $7 MM Well
- $40/bbl oil and $3.50/mcf gas
- AT IRR = 23%
- AT NPV (10) = $2.13 MM
- Simple Payback = 3.3 Years
Arguments

• Well economic assumptions too optimistic or conservative
  – Jump to lower or higher well performance footprints

• Some rigs are not drilling Bakken/Three Forks wells
  – No economics were run on wells in other formations
Peak Month: 100-300 BOPD*

*Low production wells also occur in areas deemed “Core” or “Hot Spot”.

Risk is still present in most areas.

Mapped wells drilled 2012-2014
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