Tight Oil Production Trends in a Low Price Environment

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by
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Outline

• Effects low prices are having on U.S. oil production
• EIA’s short-term outlook for production
• Reasons why U.S. output may be more resilient than otherwise thought
U.S. oil supply: reasons for reduced output in the short term

- Oil price decline
- Reduced operating cash and capital expenditures
- Falling rig counts
- Corresponding decline in well completions
- Global competition, rising world output
Operating cash, capital expenditure, drops among onshore producers

Year-over-year change

Source: Evaluate Energy
Rig count mirrors price drop, lagged by two to four months

Source: Baker Hughes, Federal Reserve Bank of St. Louis
Reported well completions are falling as rig count dwindles

Well completions

Source: EIA estimates
U.S. oil and natural gas production jobs showing month-over-month declines

Gap between global oil production and consumption signals increasing competitive landscape

Global oil production
million barrels per day

Forecast

Stock change
million barrels per day

Source: EIA, Short-Term Energy Outlook, June 2015

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Production Trends & Outlook
Delays of several months between drilling, well completion, production, and administrative reporting

Marked differences in reporting lag and frequency of reports among the states

Recurring revisions months or years ago
Estimated U.S. tight oil production was 4.6 million barrels/day in May 2015
48% of total U.S. oil production
Sum of seven DPR regions show production from new completions beginning to trail legacy declines starting in May 2015

Total month-to-month change
thousand barrels per day

Source: EIA Drilling Productivity Report, June 2015
January 2015 STEO had Lower 48 y/y growth in 2015 of 502,000 bbl/d and in 2016 210,000 bbl/d.

U.S. monthly crude oil production
million barrels per day


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June 15, 2015
June 2015 STEO shows U.S. Lower 48 y/y growth in 2015 of 720,000 b/d and a decrease in 2016 of 160,000 bbl/d.

U.S. monthly crude oil production
million barrels per day

Source: EIA, Short-Term Energy Outlook (STEO) June 2015

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Resiliency of U.S. production
U.S. oil supply: reasons for rebound in US output

- Quality of rig fleet
- Growth in initial production rates
- Increase in well completions
- Falling costs
- Continued capital availability
- Ability to compete in global oil market
Horizontal rig share rapidly increasing as vertical/directional rigs laid down at a faster rate

<table>
<thead>
<tr>
<th>Rig Type</th>
<th>Running Rigs October 2014</th>
<th>Running Rigs May 2015</th>
<th>% Chg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td>1,351</td>
<td>687</td>
<td>- 49%</td>
</tr>
<tr>
<td>Vertical / Directional</td>
<td>574</td>
<td>202</td>
<td>- 65%</td>
</tr>
<tr>
<td>Total</td>
<td>1,925</td>
<td>889</td>
<td>- 54%</td>
</tr>
</tbody>
</table>

*Source: Baker Hughes*
Increasing well productivity will help shore up production numbers

• Analysis of 85,000 wells drilled from 2012 to 2014
  – By vintage
  – Horizontal, Vertical, Directional wells
  – All U.S. onshore regions

• Average initial production (IP) rates increasing as the number of horizontally-drilled wells increases
Permian shows rapid 30-day IP rate increases as share of horizontal wells grows from 13% to 33% of wells drilled in 2014

Initial production (first full month)
Barrels per day per well

Source: EIA analysis of DrillingInfo data
High IP rates driven by “core” Bakken counties

Barrels per day

Source: EIA analysis of DrillingInfo data for 2014 wells
Inventory of “drilled but uncompleted” wells may add to production

- Estimated 2,000 - 4,000 DUC wells in the Lower 48
  - Equivalent to 6-10% of the 40,000 wells in 2014
  - Predominantly located in the Eagle Ford, Bakken, and Permian

- Depending on actual DUC number and average well productivity thereof, hundreds of thousands of barrels per day could come online if all wells completed over the next 20 months

- Stabilization of oil price makes added completions likely
  - As prices have stabilized, there is a much greater incentive for operators to get wells completed to generate cash flow
  - 1-year drilling permits may help facilitate Bakken well completions
Bakken uncompleted well count growing as well completions decline

Source: North Dakota Department of Mineral Resources, EIA Estimates
Potential scenario of well completions and added production
Oil industry supplier cost reductions beginning to manifest in producer price indices

<table>
<thead>
<tr>
<th>Cost Index</th>
<th>Oct. 2014</th>
<th>May 2015</th>
<th>% Chg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frac Sand</td>
<td>102.2</td>
<td>87.6</td>
<td>-14.3%</td>
</tr>
<tr>
<td>Drilling</td>
<td>113.9</td>
<td>93.1</td>
<td>-18.3%</td>
</tr>
<tr>
<td>Support</td>
<td>100.8</td>
<td>99.5</td>
<td>-1.3%</td>
</tr>
</tbody>
</table>

Onshore producers have not had problems raising cash, but still have a high stock of debt

Select financial measures for 38 U.S. onshore producers

Source: Evaluate Energy
U.S. onshore companies are competitive on costs

Dollars per barrel of oil equivalent

Source: Evaluate Energy, EIA Analysis
Summary

- Low oil prices are adversely affecting the U.S. onshore oil sector
- EIA’s short-term production outlook anticipates decline in tight oil production
- Rig quality, well productivity improvements, and falling costs will help U.S. oil sector be more resilient amid period of low prices than otherwise thought
For more information

• U.S. Energy Information Administration home page | www.eia.gov

• Annual Energy Outlook | www.eia.gov/forecasts/aeo

• Short-Term Energy Outlook | www.eia.gov/forecasts/steo

• International Energy Outlook | www.eia.gov/forecasts/ieo

• Today In Energy | www.eia.gov/todayinenergy

• Monthly Energy Review | www.eia.gov/totalenergy/data/monthly

• State Energy Portal | www.eia.gov/state
Supplemental slides
Horizontal/Directional rig share rapidly increasing as vertical rigs laid down

Source: Baker Hughes
Eagle Ford shows slower 30-day IP growth as share of horizontal wells annually comprise 9 of every 10 wells drilled

Source: EIA Estimates, DrillingInfo Data
All other regions show steady IP increases as share of horizontal wells grows from 34% in 2012 to 42% of wells drilled in 2014.

Source: EIA Estimates, DrillingInfo Data
Virtually all wells in Bakken are horizontally drilled, with average 30-day IP rate more than doubling since 2012

Source: EIA Estimates, DrillingInfo Data
Eagle Ford IP rates indicate greater heterogeneity across counties

Barrels per day

Source: EIA Estimates, DrillingInfo Data
Analysis of Eagle Ford well activity shows increasing proportion of wells drilled or completed but yet to produce

Source: DrillingInfo April 2014 and 2015
Risk premiums have declined since crude prices stabilized, but remain higher than other sectors

Source: Bloomberg
Contributing Factors to U.S. Tight Oil Production

• Technical expertise and experience
• Extensive transportation capacity
• Price responsiveness of producers
• Availability of capital
• Regulatory stability
• Learning-by-doing efficiencies gained by drilling thousands of tight oil wells