Developments in U.S. Energy Markets and the Implications for Future Growth

Leadership Maryland Breakfast Program
February 19, 2014
Dramatic changes in the energy sector

FINANCIAL TIMES
January 7, 2014 11:17 pm
US oil boom drives trade deficit to four-year low
By James Politi in Washington and Ed Crooks in New York

TIME U.S.
ENERGY REVOLUTION
How the U.S. Energy Boom is Changing America’s Place in the World
New report sees America’s energy riches upending the geopolitical order
By Denver Nicks @DenverNicks | Feb. 07, 2014 | 0
Dramatic changes in the energy sector

THE WALL STREET JOURNAL.
BUSINESS
U.S. Is Overtaking Russia as Largest Oil-and-Gas Producer
By RUSSELL GOLD and DANIEL GILBERT
Updated Oct. 2, 2013 8:10 p.m. ET

The New York Times
BUSINESS DAY
U.S. Oil Production Keeps Rising Beyond the Forecasts
JAN. 24, 2014
Dramatic changes in the energy sector

Shale Gas Will Fuel a U.S. Manufacturing Boom

Chemical producers abandoned the U.S. in droves. Cheap natural gas is luring them back.

By Kevin Bullis on January 9, 2013
Key results from the EIA 2014 Annual Energy Outlook

- Growing domestic production of natural gas and oil continues to reshape the U.S. energy sector
  - Crude oil approaching 1970 high of 9.6 million barrels per day
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• Strong growth in domestic natural gas production supports increased exports of both pipeline and liquefied natural gas
• With strong growth in domestic oil and gas production, U.S. dependence on imported fuels falls sharply
• Improved efficiency of energy use and a shift away from carbon-intensive fuels keep U.S. energy-related carbon dioxide emissions below their 2005 level through 2040
Outline for today’s presentation

• Quick background on U.S. energy sector
• Unconventional oil and natural gas
  • What is unconventional oil and natural gas?
  • What is fracking?
  • Environmental issues
  • Changes in U.S. energy production and reserves in recent years and the long-term outlook
• Impact on the economy
  • Manufacturing sector
  • Labor markets
• Maryland: To frack or not to frack …
Shift among fossil fuel consumption in recent years

Source: EIA, AER Energy Perspectives, MER
Primary energy consumption by source and sector

(Quadrillion BTU, 2011)

<table>
<thead>
<tr>
<th>Source</th>
<th>Quadrillion BTU</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Petroleum</td>
<td>35.3</td>
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<tr>
<td>Natural Gas</td>
<td>24.8</td>
<td>26%</td>
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<tr>
<td>Coal</td>
<td>19.7</td>
<td>20%</td>
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<tr>
<td>Renewable Energy</td>
<td>9.1</td>
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<tr>
<td>Nuclear Electric Power</td>
<td>8.3</td>
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Primary energy consumption by source and sector

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Source:
- Petroleum\(^1\) 35.3 (36%)
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Sector:
- Transportation 27.0 (28%)
- Industrial\(^5\) 20.3 (21%)
- Residential & Commercial\(^6\) 10.7 (11%)
- Electric Power\(^7\) 39.3 (40%)

Source: EIA, Annual Economic Report
Primary energy consumption by source and sector

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- Petroleum: 35.3 (36%)
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Sector

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Source: EIA, Annual Economic Report
U.S. energy production by source

Figure 1.2  Primary Energy Production
(Quadrillion Btu)

By Source, 1949–2012

Coal
Natural Gas
Crude Oil and NGPL\(^a\)
Renewable Energy
Nuclear Electric Power

Source: EIA
U.S. energy consumption greater than production

Source: EIA, "Annual Energy Outlook 2014 Early Release"
The unconventional oil and natural gas boom

• “Conventional” oil and natural gas: reservoirs in which wells can be drilled so that oil and natural gas flows naturally or can be pumped to the surface
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- “Unconventional” refers to the fact that alternative methods are needed to extract the oil and gas
  - Tight oil, tight gas, shale gas, coalbed methane
- Three factors have come together to make production of these resources economically viable:
  - advances in horizontal drilling
  - advances in hydraulic fracturing (first developed in ‘50s)
  - increases in natural gas prices
What is unconventional oil and natural gas?
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What is fracking?

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Source: U.S. Department of Energy
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- Heavy impact on local communities
  - Congestion, noise & air pollution
Where are the shale plays?
Barnett Shale paves the way for future development

Source: EIA
Bakken Shale also advanced hydraulic fracturing
Boom in oil and natural gas production

Boom in oil and natural gas production

Boom in oil and natural gas production

U.S. proved crude oil reserves continue to increase

Source: EIA, “Annual Survey of Domestic Oil and Gas Reserves”
U.S. proved natural gas reserves continue to increase

U.S. oil production expected to increase in near-term

U.S. natural gas production expected to increase

U.S. to become net exporter of natural gas

U.S. imports of energy goods to fall considerably

Benefits from increased energy production are broad

- Economic growth from extraction, distribution, refining
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- Reduces U.S. trade deficit and capital outflows
- Makes U.S. a more attractive place to invest and increases capital inflows
Benefits from increased energy production are broad

Natural Gas Prices
($/mmbtu)

Source: World Bank
Benefits from increased energy production are broad

Source: IHS, “The Unconventional Oil and Gas Revolution and the US Economy”
Strong job growth in energy-producing regions

Unemployment rates by county
2013 average

Source: U.S. Bureau of Labor Statistics
Influx of labor becomes a problem in some areas

According to Apartment Guide, a 700 square-foot, one-bedroom apartment in Williston cost upwards of $2,000 a month — more than many apartments in New York or San Francisco.

These 10 cities topped the list, with average monthly rents for entry-level apartments:

1. Williston, ND ($2,394)
2. San Jose-Sunnyvale-Santa Clara, CA ($1,881)
3. San Francisco-Oakland-Fremont, CA ($1,776)
4. Dickinson, ND ($1,733)
5. Key West, FL ($1,640)
6. Boston-Cambridge-Quincy, MA-NH ($1,537)
8. Los Angeles-Long Beach-Santa Ana, CA ($1,411)
9. Oxnard-Thousand Oaks-Ventura, CA ($1,387)
10. Santa Barbara-Santa Maria-Goleta, CA ($1,346)

Source: Business Insider, Apartment Guide
What about Maryland?

**Candidates differ over 'fracking'**

Mizeur stresses "dangers" of shale gas drilling, while Brown-Ulman cite study of safety questions

January 10, 2014 | Tim Wheeler

**Bill to ban fracking in Maryland lacking support**

Posted: Thursday, February 6, 2014 7:06 pm

By E.B. FURGURSON III pfurgurson@capgaznews.com
What about Maryland?
In summary

• U.S. energy boom due to technological advances in extraction methods and higher energy prices
• Proved recoverable reserves of oil and natural gas continue to increase
• Production of shale gas expected to continue to grow to the point where supply will exceed consumption
  • U.S. anticipated to be net exporter of natural gas and petroleum products
• Broad implications for economic growth, particularly in the manufacturing sector
• Considerable environmental concerns
The views expressed here are those of the author, and do not necessarily represent those of the Federal Reserve Bank of Richmond or the Federal Reserve System.