From Scarcity to Abundance: How the Energy Boom is Transforming America’s Economy

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Federal Reserve Bank of Dallas

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The opinions expressed are solely those of the presenter and do not reflect the opinions of the Federal Reserve Bank of Dallas or the Federal Reserve System.

June 18, 2014
NEW BOOM IN THE OIL PATCH

Photo by Getty Images; Circa 1920: The oilfield at Venice, California.
TYPICAL FRACKING PAD SITE IN PENNSYLVANIA
U.S. Leads The Oil Revolution

United States: 2.75
Canada: 0.78
China: 0.24
Brazil: 0.15
Colombia: 0.12
Russia: 0.10
Kazakhstan: 0.04
Malaysia: 0.04
Oman: 0.01
Australia: -0.01
Sudan: -0.02
Mexico: -0.09
Azerbaijan: -0.14
United Kingdom: -0.16
Norway: -0.20
Syria: -0.22

Non-OPEC oil production growth
2012 to 2014, in millions of barrels per day

Source: Energy Information Agency
U.S. to Leapfrog Saudis

The U.S. is set to overtake Saudi oil output thanks to unconventional reservoirs...

Oil production, in millions barrels a day

- U.S.
- Saudi Arabia
- Russia

...while its oil demand is expected to fall

U.S. oil demand vs. production, in millions of barrels a day

Note: Figures include crude and liquids
Source: International Energy Agency

The Wall Street Journal
Free Falling

U.S. net crude-oil imports, trailing 12-month average

12 million barrels a day

Source: U.S. Department of Energy
The Wall Street Journal

Pump jacks and wells in an oil field near McKittrick, Calif.
Estimated U.S., Russia, and Saudi Arabia petroleum and natural gas production

- Quadrillion British thermal units
- Million barrels per day of oil equivalent

- United States
- Russia
- Saudi Arabia


- Natural gas
- Petroleum

Graph shows fluctuations in production from 2008 to 2013.
Powering Up
The IEA expects global oil demand to rise...
In millions of barrels a day

...with the U.S. adding enough capacity to meet much of the increase.
Cumulative change in production

Note: Production data include condensates, natural-gas liquids and oil from nonconventional sources; OPEC crude figures reflect capacity.
Source: International Energy Agency
Top Oil Producers in 2013

Country (*OPEC Member)

Source: International Energy Agency
The shale gale

Barrels per day, m
United States

Crude oil production
of which: tight oil*

Source: Energy Information Administration  *Including shale
Lower 48 states shale plays

Shale plays
- Current plays
- Prospective plays

Stacked plays
- Shallowest/youngest
- Intermediate depth/age
- Deepest/oldest

Basins
- Mixed shale & chalk play
- Mixed shale & limestone play
- Mixed shale & tight dolostone-limestone carbonate}

Map showing various shale plays across the Lower 48 states, including Bakken, Fayetteville, Haynesville-Bossier, and others.
LUXURY HOUSING IN THE BAKKEN: $2500 PER MONTH
MACONDO EXPLOSION AND OIL SPILL
Offshore Potentially Recoverable Federal Oil and Natural Gas Resources

Source: MMS and Department of the Interior
Top Natural Gas Producing Countries in 2012

- U.S. 681.4 Billion Cubic Metres
- Russian Federation 592.3 Billion Cubic Metres
- Canada 156.5 Billion Cubic Metres
- Iran 160.5 Billion Cubic Metres
- Qatar 157 Billion Cubic Metres
- China 107.2 Billion Cubic Metres
- Norway 114.9 Billion Cubic Metres
- Saudi Arabia 102.8 Billion Cubic Metres
- Algeria 81.5 Billion Cubic Metres
- Indonesia 71.1 Billion Cubic Metres

Source: BP Statistical Review of World Energy June 2013
Ever-expanding gas
US production, million barrels a day

Sources: Energy Information Administration; The Economist

*Converted from cubic feet to barrels of oil equivalent
Top Gas Exporting Countries, 2011

Source: Deloitte, Exporting the American Renaissance; Global Impacts of LNG Exports from the United States, Jan. 2013
Cove Point, Maryland LNG Facility to Export Marcellus Gas
CURRENT LEGISLATIVE AND REGULATORY RESTRICTIONS ON ENERGY INVESTMENT

• Keystone XL pipeline
• Restrictions on oil and natural gas exports
• Limitations on drilling offshore and on federal lands
• Renewal fuels standard (ethanol mandate)
• Cross-state air pollution rule and utility MACT
• EPA greenhouse gas limits for power plants
• Proposed fracking regulations from EPA and DOI
Real Economic Growth

Gross domestic product

Source: Commerce Department

1Q 2014: 0.1%
In percent, seasonally adjusted:

U. S. Jobless Rate

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<tr>
<th>Month</th>
<th>2013</th>
<th>2014</th>
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<tr>
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April ‘14: 6.3%

Source: U.S. Department of Labor
Nonfarm Payrolls

Monthly change, in thousands

Source: Labor Department
Stagnant Employment
Share of the U.S. working-age population employed, age 16 and over, Jan. 2000-April 2014

Source: Bureau of Labor Statistics
Cumulative Change in Oil Production
2012-2018

Change in Production

Year

Source: International Energy Agency
US Oil and Gas Jobs
January 1988 through April 2013

US Oil and Gas Jobs (Thousands)

Source: Bureau of Labor Statistics
Percent Change in Employment
January 2008–April 2013

Total Nonfarm Payroll Employees (in thousands)

Oil and Gas Extraction Employees (in thousands)

-1.87% 
+24.81%

<table>
<thead>
<tr>
<th>State</th>
<th>Mining Sector</th>
<th>Total Real GDP, All Industries</th>
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<tr>
<td>U.S.</td>
<td>13.55%</td>
<td>2.50%</td>
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<tr>
<td>Texas</td>
<td>23.54%</td>
<td>13.07%</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>66.08%</td>
<td>2.81%</td>
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<tr>
<td>Colorado</td>
<td>12.64%</td>
<td>5.17%</td>
</tr>
<tr>
<td>Louisiana</td>
<td>19.13%</td>
<td>6.37%</td>
</tr>
</tbody>
</table>

Source: Bureau of Economic Analysis
Employment Growth, U.S. vs. Selected Energy Producing States
2008-2012

Source: Bureau of Labor Statistics
Texas added 36.4% of the jobs in the U.S. during this 13+ year period.
Daily Oil Production In Texas
January 1985 to April 2013

Barrels, in thousands

Sources: EIA, Carpe Diem blog
Over-the-year percent change in employment, United States and 12 largest metropolitan areas, October 2013

Percent

<table>
<thead>
<tr>
<th>City</th>
<th>Percent</th>
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<tr>
<td>Dallas</td>
<td>3.1</td>
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<tr>
<td>Houston</td>
<td>2.9</td>
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<tr>
<td>Atlanta</td>
<td>2.7</td>
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<tr>
<td>Boston</td>
<td>2.1</td>
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<tr>
<td>Miami</td>
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<td>Los Angeles</td>
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<tr>
<td>New York</td>
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<tr>
<td>San Francisco</td>
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<tr>
<td>Chicago</td>
<td>1.3</td>
</tr>
<tr>
<td>Detroit</td>
<td>1.1</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>0.9</td>
</tr>
<tr>
<td>Washington</td>
<td>0.7</td>
</tr>
</tbody>
</table>

110 Years of Oil and Gas Production in Texas

Total statewide jobs provided or supported by the oil and gas industry: 1,982,140

Average salary for non-gas station oil & natural gas employees: $112,707

Annual average salary in Texas across all industries and sectors: $47,610

Contribution to Texas labor income: $134.9 billion

Contribution to Texas economy: $297.5 billion


Monthly Crude Oil Production and Unemployment Rate in Texas and California 2000-2013

Sources: Energy Information Administration and Bureau of Labor Statistics
Percent Change in Real GDP by State, 2012

- Far West: 3.3%
- Southwest: 4.1%
- Rocky Mountain: 2.1%
- Plains: 2.7%
- Great Lakes: 2.2%
- Mideast: 1.5%
- New England: 1.2%

U.S.: 2.5%

Color Key:
- 3.3 to 13.4%
- 2.2 to 3.3%
- 1.5 to 2.2%
- 1.2 to 1.5%
- -0.1 to 1.2%

Source: U.S. Bureau of Economic Analysis
MAP 2. Job Recovery Rates in County Economies by State, 2013

Notes: The county job recovery rate by state is calculated as the share of the number of the state's county economies that recovered to their pre-recession employment peaks out of the number of all the state's county economies. This includes only the 3,069 county economies with county governments.

Source: NACo analysis of Moody's Analytics Data
MAP 1. Economic Output (GDP) Recovery Rates in County Economies, 2013

Note: The dark grey areas in Conn., R.I., parts of Alaska, Mass. and Va. are counties without county governments.
Source: NACo analysis of Moody’s Analytics Data
THE “PETROSTATE” OF AMERICA
WE’RE NUMBER 1!