U.S. EIA’s Liquid Fuels Outlook

NCSL 2011 Energy Policy Summit: Fueling Tomorrow’s Transportation
John Staub, Team Lead
August 8, 2011 | San Antonio, Texas
Overview

• Oil demand

• International and domestic supply

• Prices

• Potential impacts of domestic production on imports and prices

• Concluding remarks
Non-OECD countries account for vast majority of the nearly 50% projected increase in global energy use by 2035

Source: EIA, International Energy Outlook 2010
Primary energy use by end-use sector, 2009-2035

U.S. energy use
quadrillion Btu

Industrial
Transportation
Commercial
Residential

Source: EIA, Annual Energy Outlook 2011
Renewables grow rapidly, but under current policies fossil fuels still provide 78% of U.S. energy use in 2035

U.S. primary energy consumption
quadrillion Btu per year

Shares of total U.S. energy

<table>
<thead>
<tr>
<th>Year</th>
<th>History</th>
<th>Projections</th>
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<tbody>
<tr>
<td>1980</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>1985</td>
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<tr>
<td>1990</td>
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<tr>
<td>1995</td>
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<td>2000</td>
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<tr>
<td>2005</td>
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<tr>
<td>2010</td>
<td>46%</td>
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<tr>
<td>2015</td>
<td>49%</td>
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</tr>
<tr>
<td>2020</td>
<td>52%</td>
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</tr>
<tr>
<td>2025</td>
<td>55%</td>
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</tr>
<tr>
<td>2030</td>
<td>58%</td>
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<tr>
<td>2035</td>
<td>61%</td>
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Source: EIA, Annual Energy Outlook 2011

John Staub | San Antonio, TX
August 8, 2011
Liquid fuels consumption by sector, 1990-2035

U.S. liquid fuels use
million barrels per day

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<thead>
<tr>
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<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
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</tbody>
</table>

Source: EIA, Annual Energy Outlook 2011
Most transport fuel growth is in light and heavy duty vehicles

U.S. transportation energy consumption
million barrels per day oil equivalent

Source: EIA, Annual Energy Outlook 2011
New light duty vehicle fuel economy achieves almost 38 mpg by 2035 in the Reference case, lowering fuel demand by about 3 million barrels per day.
FFVs make up the largest share of unconventional vehicles, which account for 40% of U.S. light-duty vehicle sales in 2035.

Source: EIA, Annual Energy Outlook 2011
On-road fuel economy of new medium and heavy heavy-duty vehicles in two cases, 2005-2035

(new) new vehicle fuel economy
miles per gallon gasoline equivalent

Source: EIA, Annual Energy Outlook 2011

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Supply
Unconventional sources more than triple globally, but conventional petroleum continues to comprise the vast majority of liquids supply.

global liquids production
million barrels per day

History 2009 Projections

Source: EIA, Annual Energy Outlook 2011
U.S. reliance on imported liquid fuels is reduced by increased domestic production and greater fuel efficiency

Source: EIA, Annual Energy Outlook 2011
U.S. imports of liquid fuels fall due to increased domestic production – including biofuels – and greater fuel efficiency

U.S. liquid fuels consumption
million barrels per day

Source: EIA, Annual Energy Outlook 2011
Domestic crude oil production by source 1990-2035

million barrels per day

Source: EIA, Annual Energy Outlook 2011
Domestic biofuels production displaces 1.25 million barrels per day of gasoline and 0.36 million barrels per day of diesel by 2035

U.S. biofuels production
million barrels per day

Source: EIA, Annual Energy Outlook 2011
Prices
Oil demand and consumption:

• Oil consumption is determined by demand drivers and price

• Demand is closely related to the state of the global economy
  – oil is an input into industrial production and the transport of goods
  – household income and employment drive personal transport demand

• Demand in recent years has come increasingly from non-OECD countries, led by China
  – growth expectations for Asia ex-Japan approached 10% by 2010

• Price increases tamp-down fundamental demand drivers
  – the net effect on consumption depends on the relative strength of price impacts and economic growth
The majority of global liquids consumption and production occurs in a limited number of countries

Liquid fuels consumption, 2009

- United States
- China
- Japan
- India
- Russia
- Brazil
- Saudi Arabia
- Germany
- Korea, South
- Canada

60% of global liquid fuels consumption

Liquid fuels production, 2009

- Russia
- Saudi Arabia
- United States
- Iran
- China
- Canada
- Mexico
- UAE
- Brazil
- Kuwait

60% of global liquid fuels production

Source: EIA estimates
Average annual world oil prices in three cases, 1980-2035

annual average price of low-sulfur light crude oil
real 2009 dollars per barrel

Source: EIA, Annual Energy Outlook 2011
U.S. Gasoline and Crude Oil Prices

Crude oil price is refiner average acquisition cost. Retail prices include State and Federal taxes.

Source: Short-Term Energy Outlook, July 2011
OPEC production often acts to balance the oil market; OPEC quota cuts tend to lead to price increases.
Energy and Financial Markets: Crude oil price drivers
During 2003-2008, OPEC’s spare production levels were low, limiting its ability to respond to demand and price increases.

Source: EIA Short Term Energy Outlook (July 2011), Thomson Reuters
The years 2003-2008 experienced periods of very strong economic and oil demand growth, slow supply growth and tight spare capacity.

Sources: EIA Short Term Energy Outlook (July 2011), Thomson Reuters
Rising oil prices held down global oil consumption growth from 2005-2008, despite high economic growth.
For more information

U.S. Energy Information Administration home page | [www.eia.gov](http://www.eia.gov)

Short-Term Energy Outlook | [www.eia.gov/steo](http://www.eia.gov/steo)

Annual Energy Outlook | [www.eia.gov/aeo](http://www.eia.gov/aeo)

International Energy Outlook | [www.eia.gov/ieo](http://www.eia.gov/ieo)

Monthly Energy Review | [www.eia.gov/mer](http://www.eia.gov/mer)

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24-hour automated information line about EIA and frequently asked questions.

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Multiple factors have contributed to crude oil resource estimate increases over the years, with tight oil contributing recently.

U.S. crude oil and lease condensate resources in non-prohibited areas (billion barrels)

(1) Prior to AEO2009, resources in Pacific, Atlantic, and Eastern GOM OCS were under moratoria and not included.

(2) Includes shale oil. Prior to AEO2011, tight oil is included in unproved other lower-48 onshore category.
### Recent Annual Energy Outlook natural gas resources

#### U.S. dry natural gas resources

<table>
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<tr>
<th>Year</th>
<th>Trillion Cubic Feet</th>
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<tbody>
<tr>
<td>2000</td>
<td>245</td>
</tr>
<tr>
<td>2005</td>
<td>539</td>
</tr>
<tr>
<td>2006</td>
<td>827</td>
</tr>
<tr>
<td>2007</td>
<td>1472</td>
</tr>
<tr>
<td>2008</td>
<td>2543</td>
</tr>
<tr>
<td>2009</td>
<td>2543</td>
</tr>
<tr>
<td>2010</td>
<td>2543</td>
</tr>
<tr>
<td>2011</td>
<td>2543</td>
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</table>

<table>
<thead>
<tr>
<th>Status</th>
<th>Trillion Cubic Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proved reserves</td>
<td>245</td>
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<tr>
<td>Unproved other</td>
<td>1472</td>
</tr>
<tr>
<td>Unproved shale</td>
<td>827</td>
</tr>
<tr>
<td>Total</td>
<td>2543</td>
</tr>
</tbody>
</table>

**Source:** EIA, Annual Energy Outlook 2011 and earlier editions
Over the last decade, U.S. shale gas production has increased 14-fold and now comprises about 22 percent of total U.S. production.

Annual shale gas production:
- 3.6 trillion cubic feet in 2010

Sources: EIA, Lippman Consulting

Diagram showing the increase in annual shale gas production from 2000 to 2010 for various regions:
- Eagle Ford (TX)
- Marcellus (PA and Other Eastern states)
- Haynesville (LA and TX)
- Woodford (OK)
- Fayetteville (AR)
- Barnett (TX)
- Antrim (MI, IN, and OH)
Shale gas offsets declines in other U.S. supply to meet consumption growth and lower import needs

U.S. dry gas
trillion cubic feet per year

Source: EIA, Annual Energy Outlook 2011
Natural gas consumption is quite dispersed; industrial and electric power use drives future demand growth

U.S. dry gas consumption trillion cubic feet per year

<table>
<thead>
<tr>
<th>Year</th>
<th>Industrial*</th>
<th>Central electric power</th>
<th>Commercial</th>
<th>Residential</th>
<th>Transportation**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>21%</td>
<td>3%</td>
</tr>
<tr>
<td>2000</td>
<td>30%</td>
<td>21%</td>
<td>14%</td>
<td>21%</td>
<td>3%</td>
</tr>
<tr>
<td>2005</td>
<td>32%</td>
<td>30%</td>
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<td>14%</td>
<td>21%</td>
<td>3%</td>
</tr>
</tbody>
</table>

*Includes combined heat-and-power and lease and plant fuel. **Includes pipeline fuel.

Source: EIA, Annual Energy Outlook 2011
Accessing EIA Data on

• Prices
  • **Spot prices** for WTI, Brent and products at various U.S. locations
  • **Futures prices** for several contracts traded on NYMEX

• Production
  • **Financial Markets Dashboard** and the **Short Term Energy Outlook** database contain crude oil and product production data

• Consumption
  • **Financial Markets Dashboard** and the **Short Term Energy Outlook** database contain liquid fuel demand and consumption data

• Inventories
  • EIA has both **domestic** and **international** inventory levels

• Financial Data
  • The **Financial Markets Dashboard** contains the financial data that we are allowed to share outside of EIA
  • The **Market Prices and Uncertainty Report** also contains data and analysis which is updated monthly
Biofuels, natural gas liquids, and crude oil production are key sources of increased domestic liquids supply

U.S. liquid fuels
million barrels per day

Source: EIA, Annual Energy Outlook 2011
Crude oil production by source, 1990-2035

million barrels per day

Source: EIA, Annual Energy Outlook 2011
Biofuels fall short of the goal in 2022, but exceed the 36 billion gallon RFS target by 2031

*billions ethanol-equivalent gallons*

Source: EIA, Annual Energy Outlook 2011