

# Gas and Crude Oil Production Outlook



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*COQA/CCQTA Joint meeting*

*October 30-31, 2014 | San Francisco, California*

*By John Powell*

*Office of Petroleum, Natural Gas, and Biofuels Analysis*

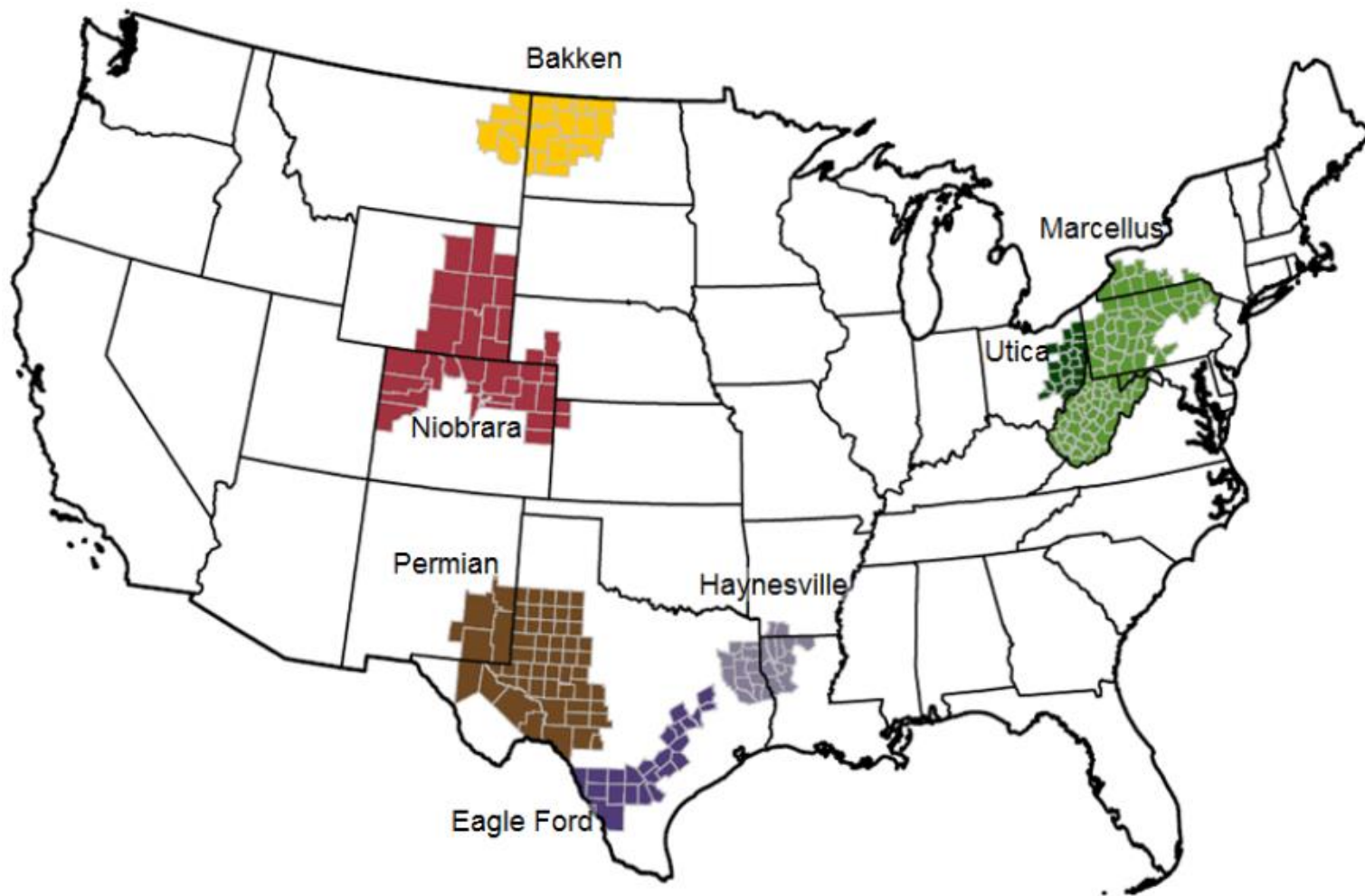
# EIA mission: independent statistics and analysis

- EIA was created by the U.S. Congress in 1977
- EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment
- EIA is the Nation's premier source of energy information and, by law, its data, analyses, and forecasts are independent of approval by any other officer or employee of the U.S. Government
- EIA does not propose or advocate any policy positions

# EIA produces data series, analyses, and energy projections

- *Weekly, monthly, and annual data*
  - Displays U.S. and regional production, stocks, blender inputs, imports, and exports
- *Real-time analyses*
  - Digests important developments in Today in Energy, This Week in Petroleum, Issues & Trends, Country Analysis Briefs
- *Short-Term Energy Outlook (STEO)*
  - Forecasts U.S. supplies, demands, imports, stocks, and prices of energy with a horizon of 12 to 24 months
- *Annual Energy Outlook (AEO)*
  - Presents 25- to 30-year projection and analysis of U.S. energy supply, demand, and prices
- *International Energy Outlook (IEO)*
  - Assesses international energy production and consumption

# EIA Drilling Productivity Report: Seven key plays account for nearly all recent growth in oil and natural gas production



Source: EIA, Drilling Productivity Report, <http://www.eia.gov/petroleum/drilling/>

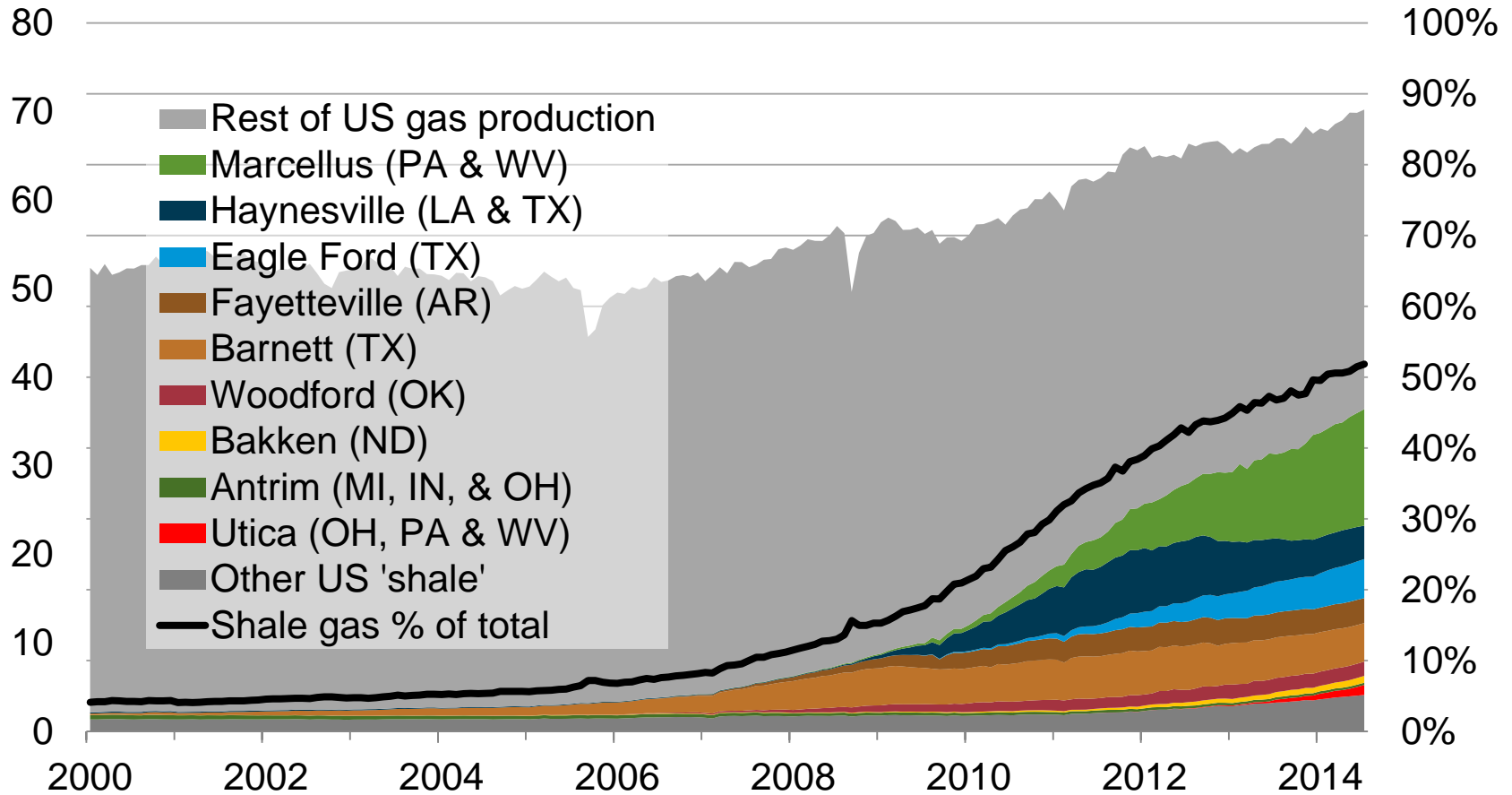
# Drilling Productivity Report (DPR) represents a step change in analyzing production metrics

- Prior to the shale revolution
  - Drillers targeted either oil or natural gas formations
  - Production was relatively stable over a long period from each well
  - Simple rig count was sufficient to monitor and forecast production
- Drilling in tight formations, the “shale revolution”
  - New applications of technology: Horizontal drilling and hydraulic fracturing
  - Pad drilling: Multiple wells per rig from one surface location
  - High initial production rates driven by better technology
  - Steep production declines
  - Formations yielding both oil and natural gas
  - Regional differences contrast rig and well productivity

# U.S. shale gas production was 36.4 Bcf/d in August 2014, approximately 52% of total U.S. dry production

Shale gas production (dry)  
Billion cubic feet per day

Dry shale gas production as a  
percent of total dry natural gas production

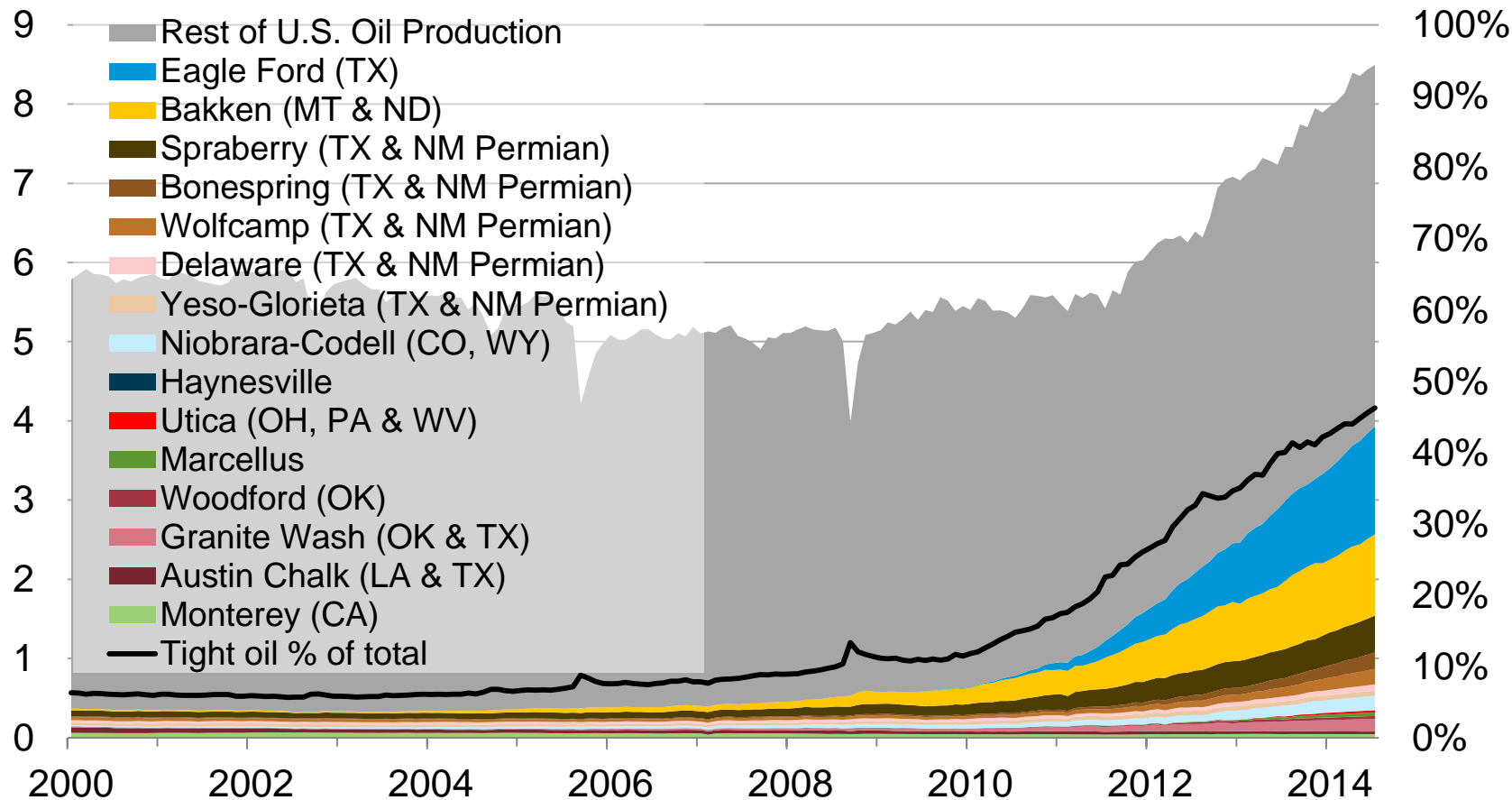


Sources: EIA Natural Gas Monthly data through November, STEO through July 2014 and Drilling Info.

# U.S. tight oil production from selected plays has increased to nearly 50% of total U.S. oil production

Tight oil production  
million barrels of oil per day

Tight oil production as a  
percent of total oil production

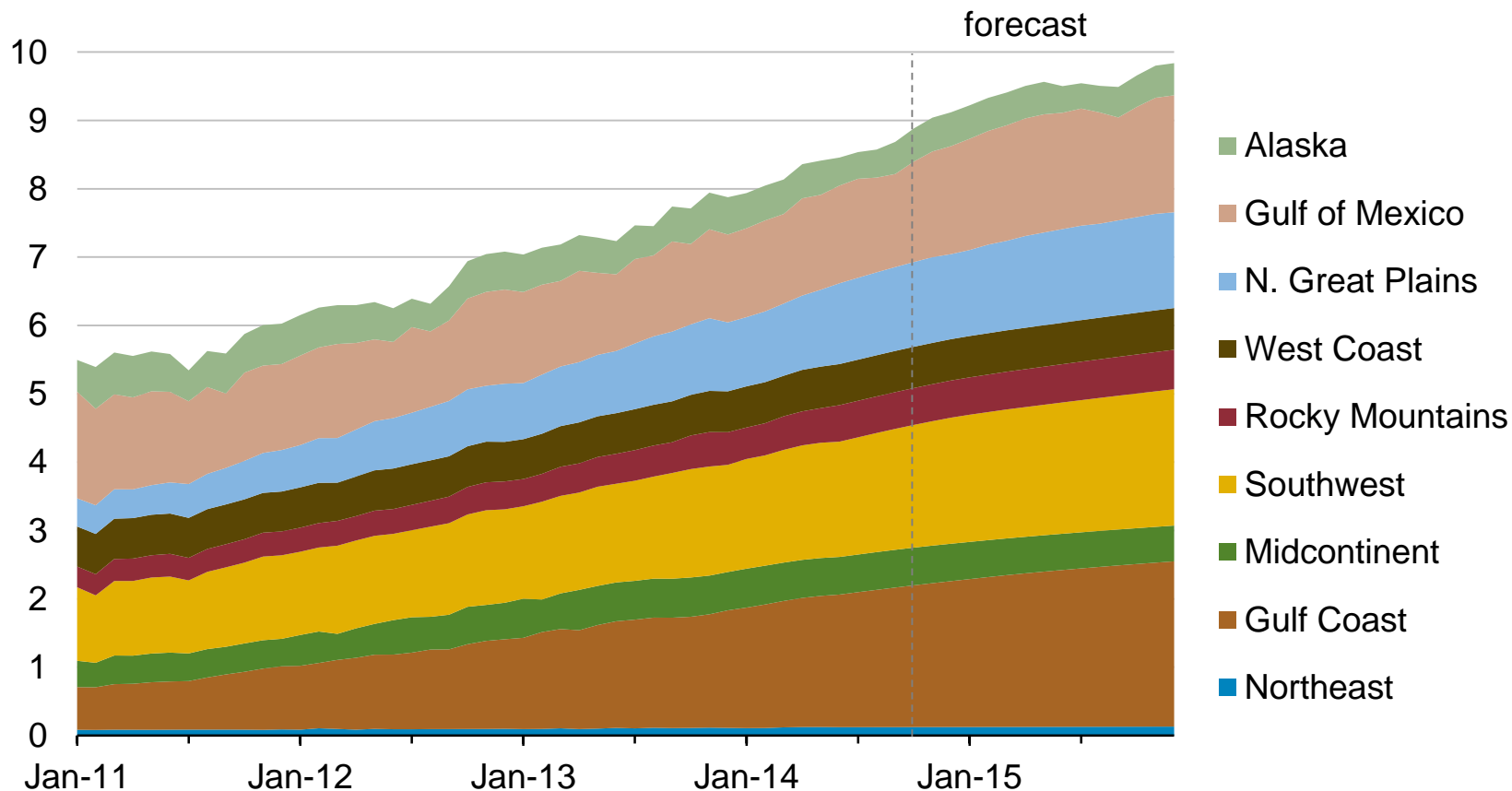


Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through July 2014 and represent EIA's official tight oil estimates, but are not survey data. State abbreviations indicate primary state(s).



# EIA forecast that U.S. crude oil production will grow from an average of 7.4 million b/d in 2013 to 9.5 million b/d in 2015

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

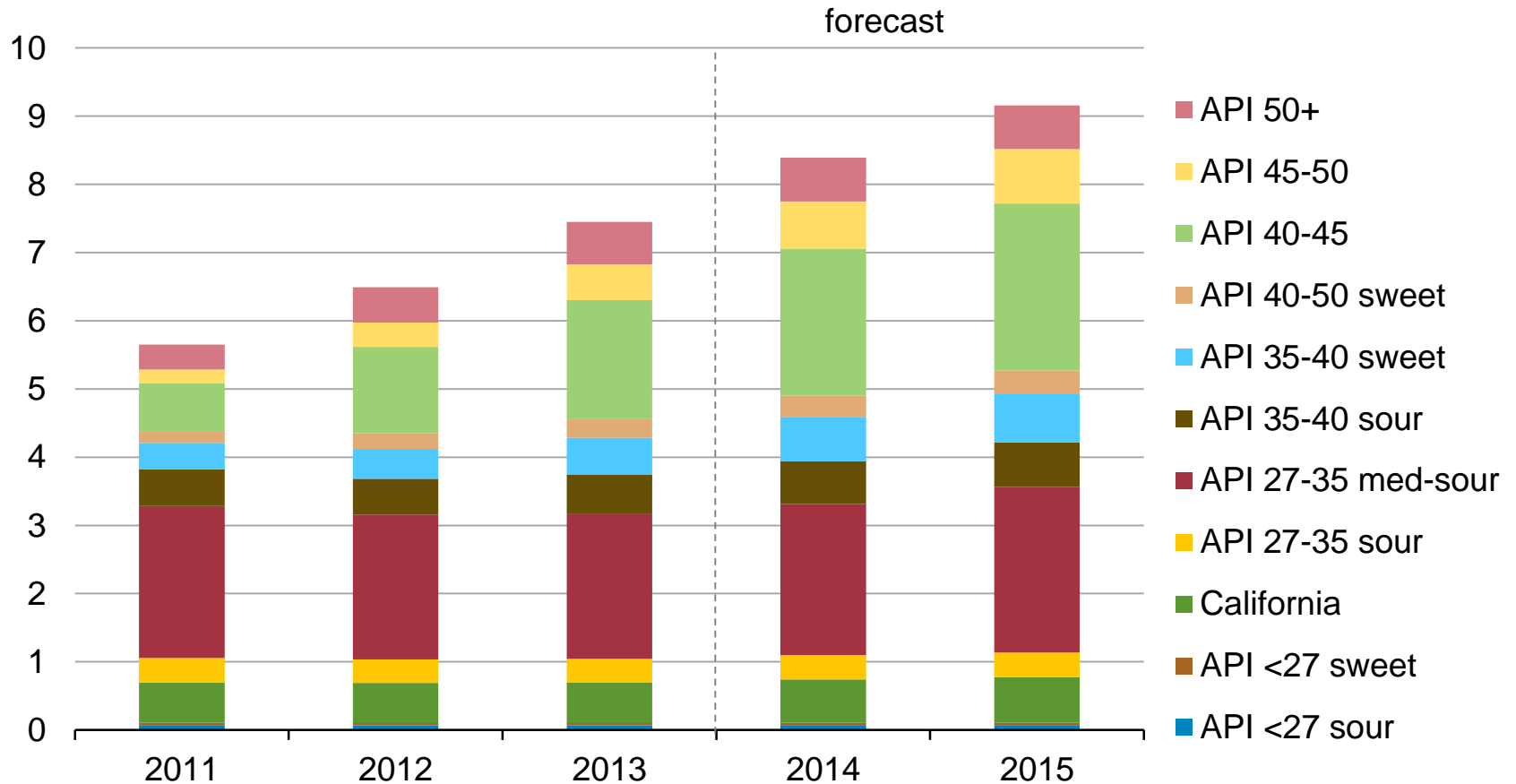


Source: EIA, Short-Term Energy Outlook, May 2014



# Roughly 96% of the growth in production between 2011 and 2013 consisted of sweet grades with API gravity of 40 or above

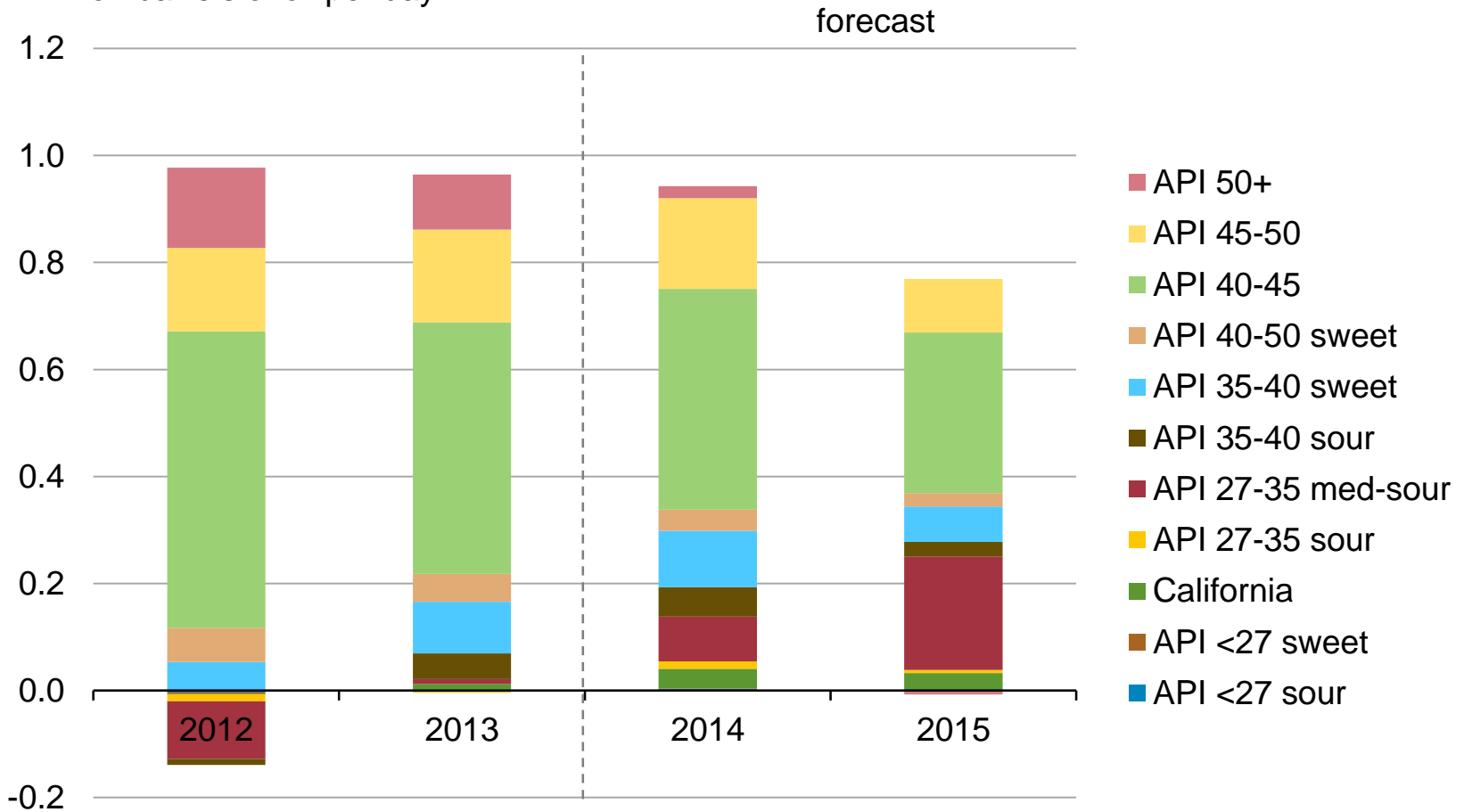
U.S. crude oil production by type  
million barrels of oil per day



Source: EIA, DrillingInfo, Colorado DNR, Texas RRC. <http://www.eia.gov/analysis/petroleum/crudetypes/>

# More than 60% of EIA's production growth forecast for 2014 and 2015 consists of sweet grades with API gravity of 40+

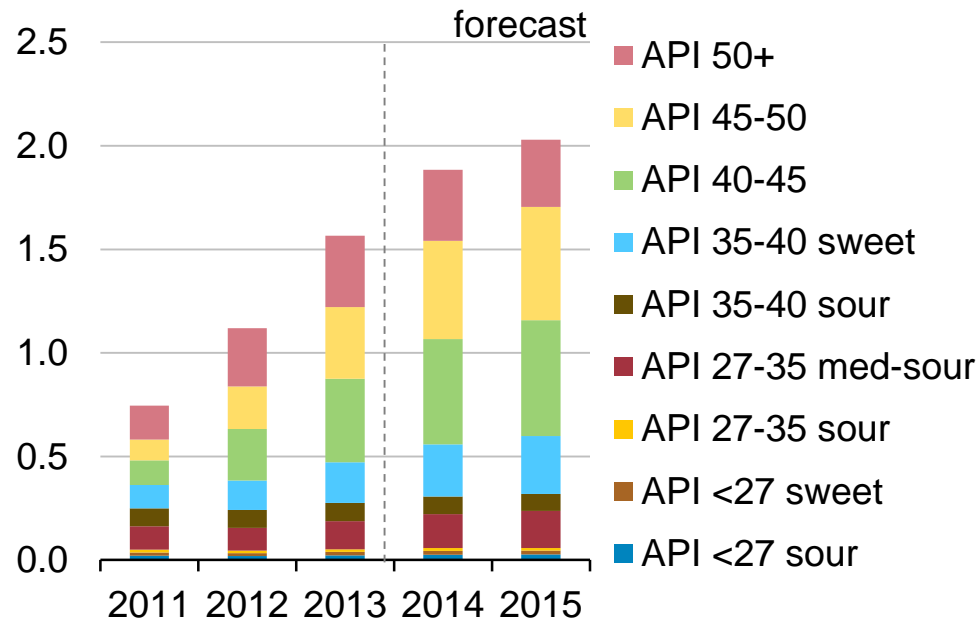
Annual change in U.S. crude oil production by type  
million barrels of oil per day



Source: EIA, DrillingInfo, Colorado DNR, Texas RRC.

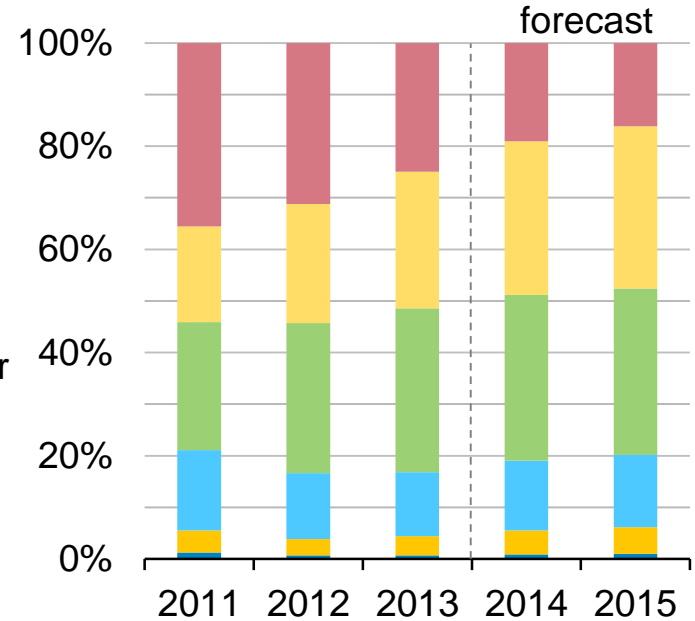
## Eagle Ford is driving growth of Gulf Coast API 40-50 production

Gulf Coast crude oil production by crude type  
million barrels of oil per day



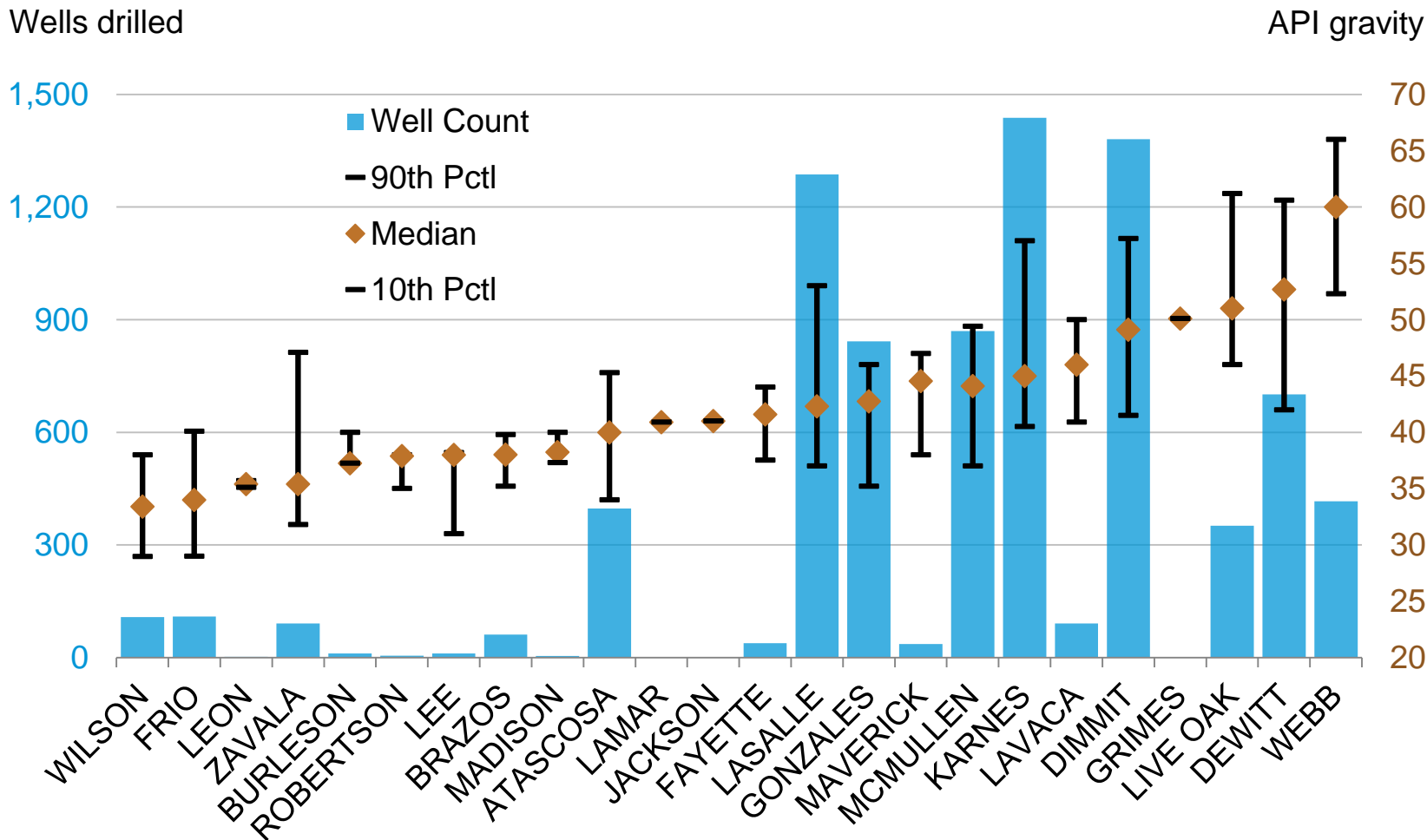
Source: EIA, DrillingInfo, Texas RRC.

Annual distribution of Eagle Ford production  
percent



- The Eagle Ford formation becomes deeper moving from northwest to southeast, creating an oil window, a wet gas window, and a dry gas window
- Since 2010, producers in the Eagle Ford have moved steadily towards areas with more liquids, as prices have continued to favor oil over natural gas

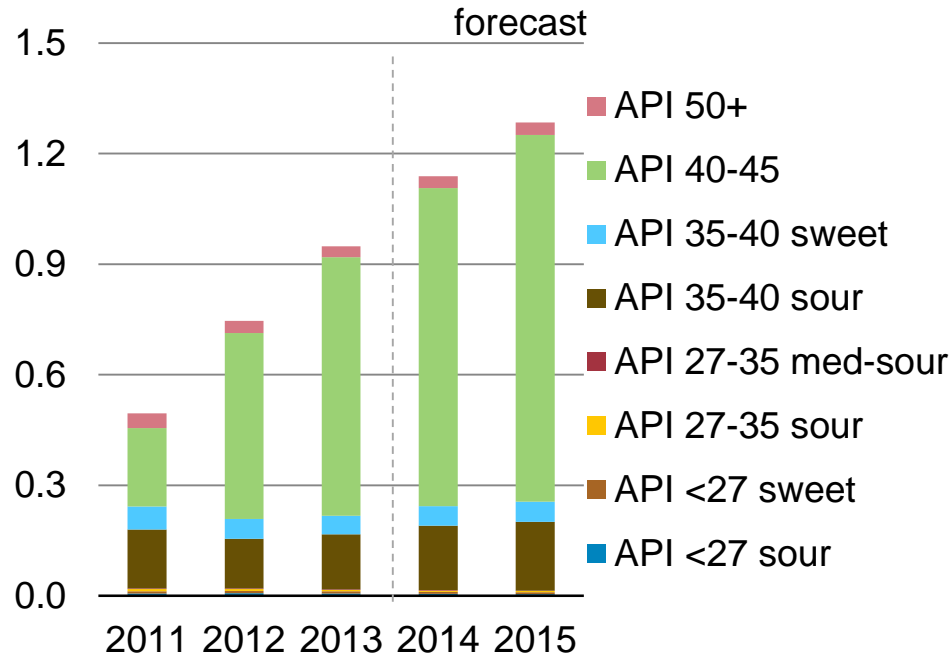
# Crude quality varies widely within counties and across the Eagle Ford region



Source: DrillingInfo Inc, Texas RRC, EIA

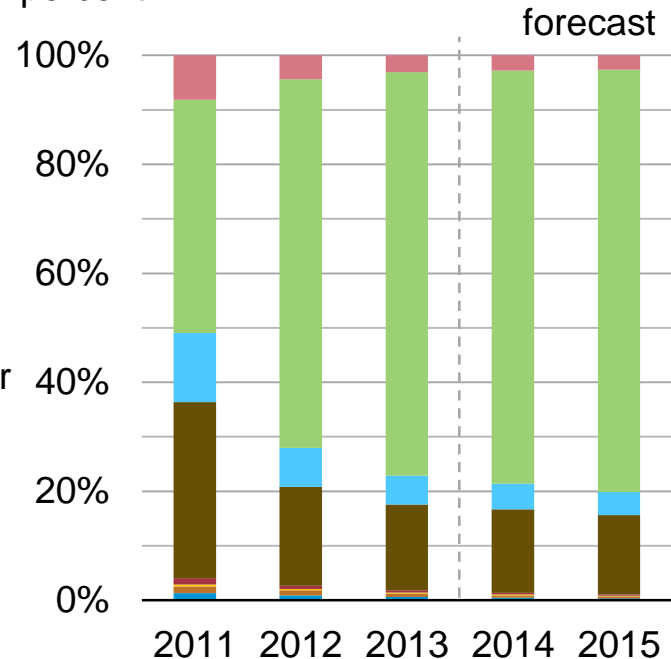
## Bakken crude dominates the Northern Great Plains crude quality

Crude oil production by well start date  
million barrels of oil per day



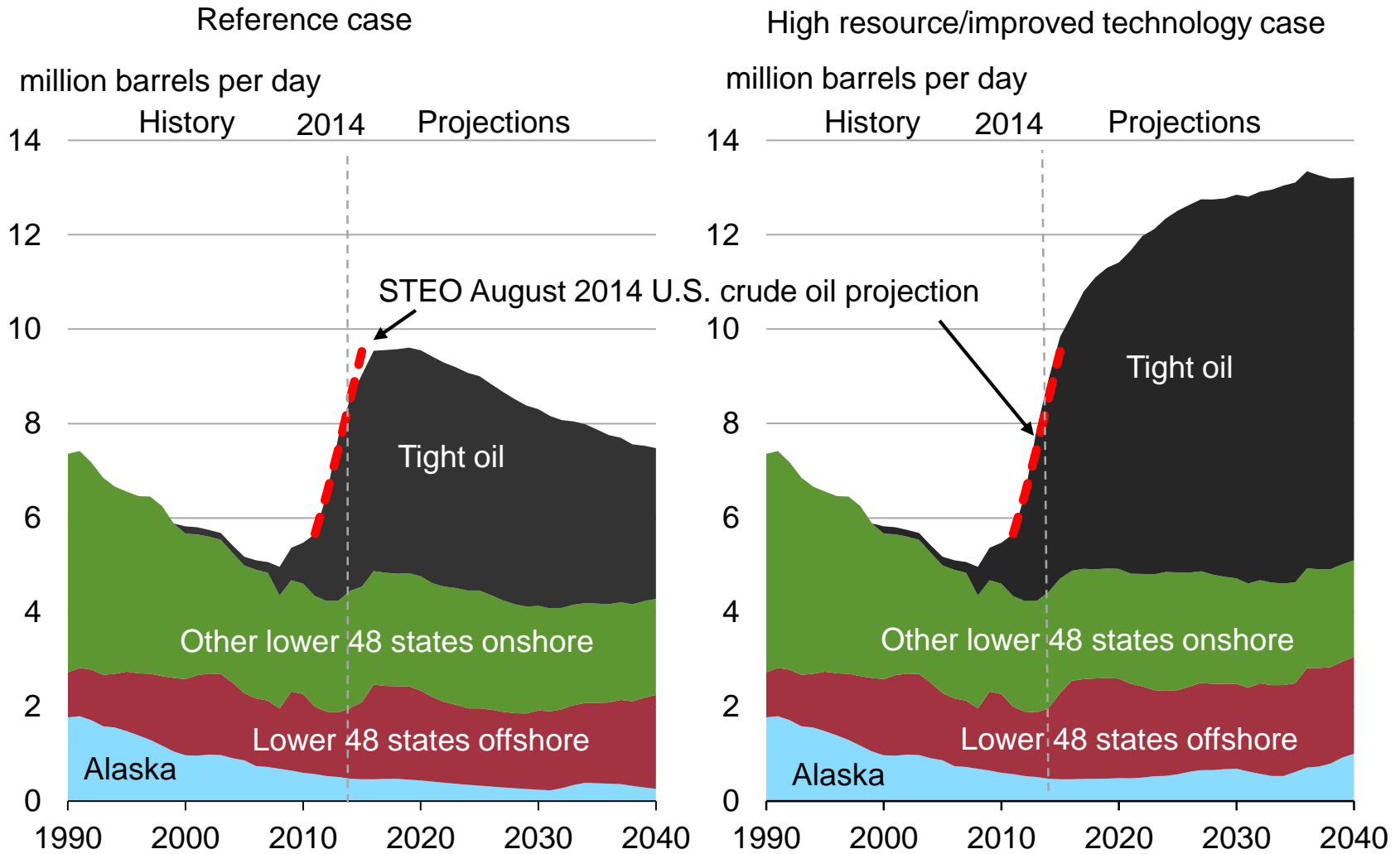
Source: EIA, DrillingInfo

Annual distribution of N. Great Plains production  
percent



- Although additional API gravity data were not available for the Bakken, industry reports indicate that most Bakken wells produce relatively uniform quality crude oil between 38 and 44 degrees API gravity, and narrowly centered on 41 degrees API gravity

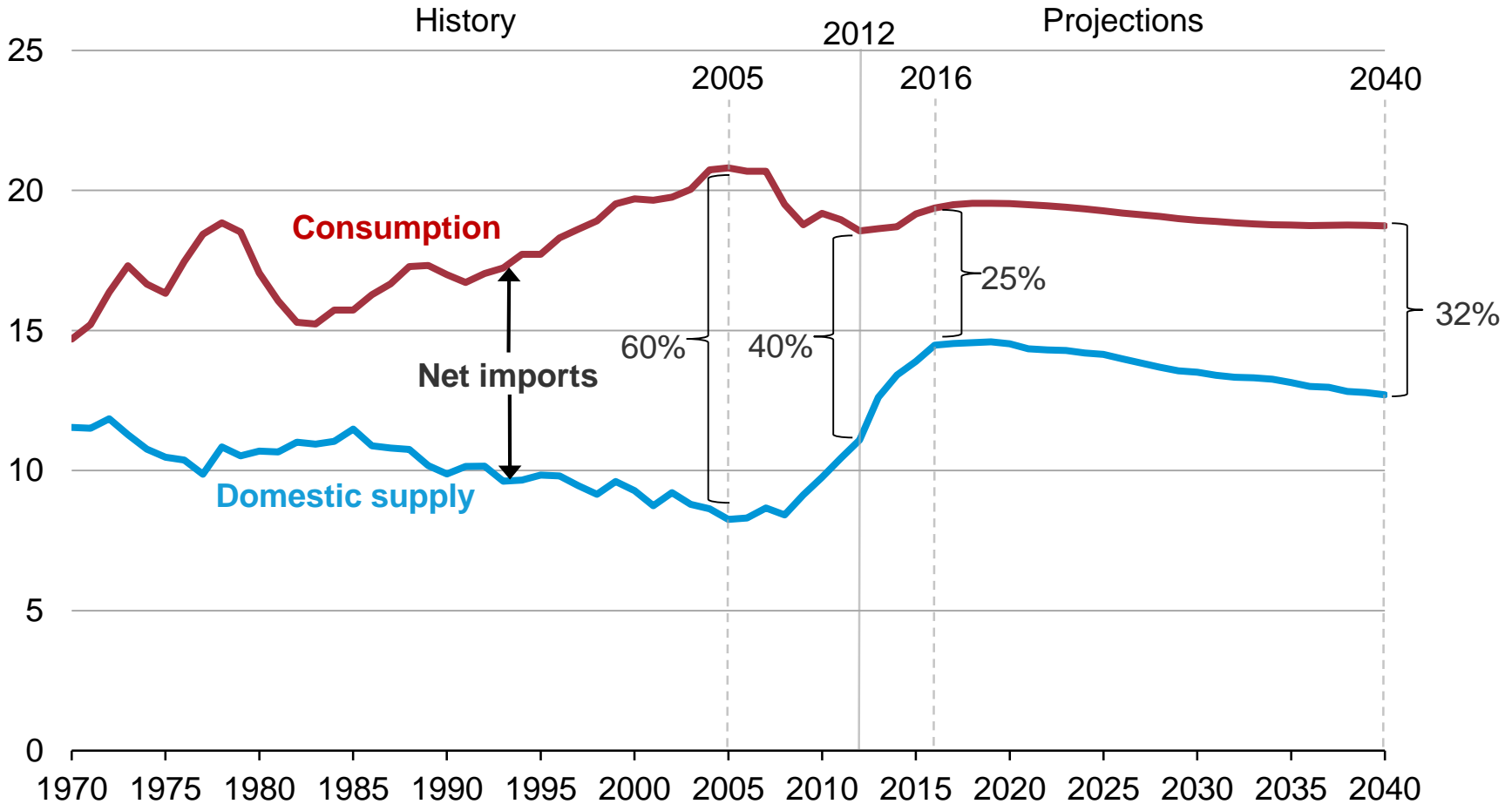
# Changes in resource assumptions between the reference and high resource case lead to a 76% increase in oil production rates



Source: EIA, Annual Energy Outlook 2014 and August 2014 Short-Term Energy Outlook

# U.S. dependence on imported liquids is declining, particularly in the near term

U.S. liquid fuels  
million barrels per day

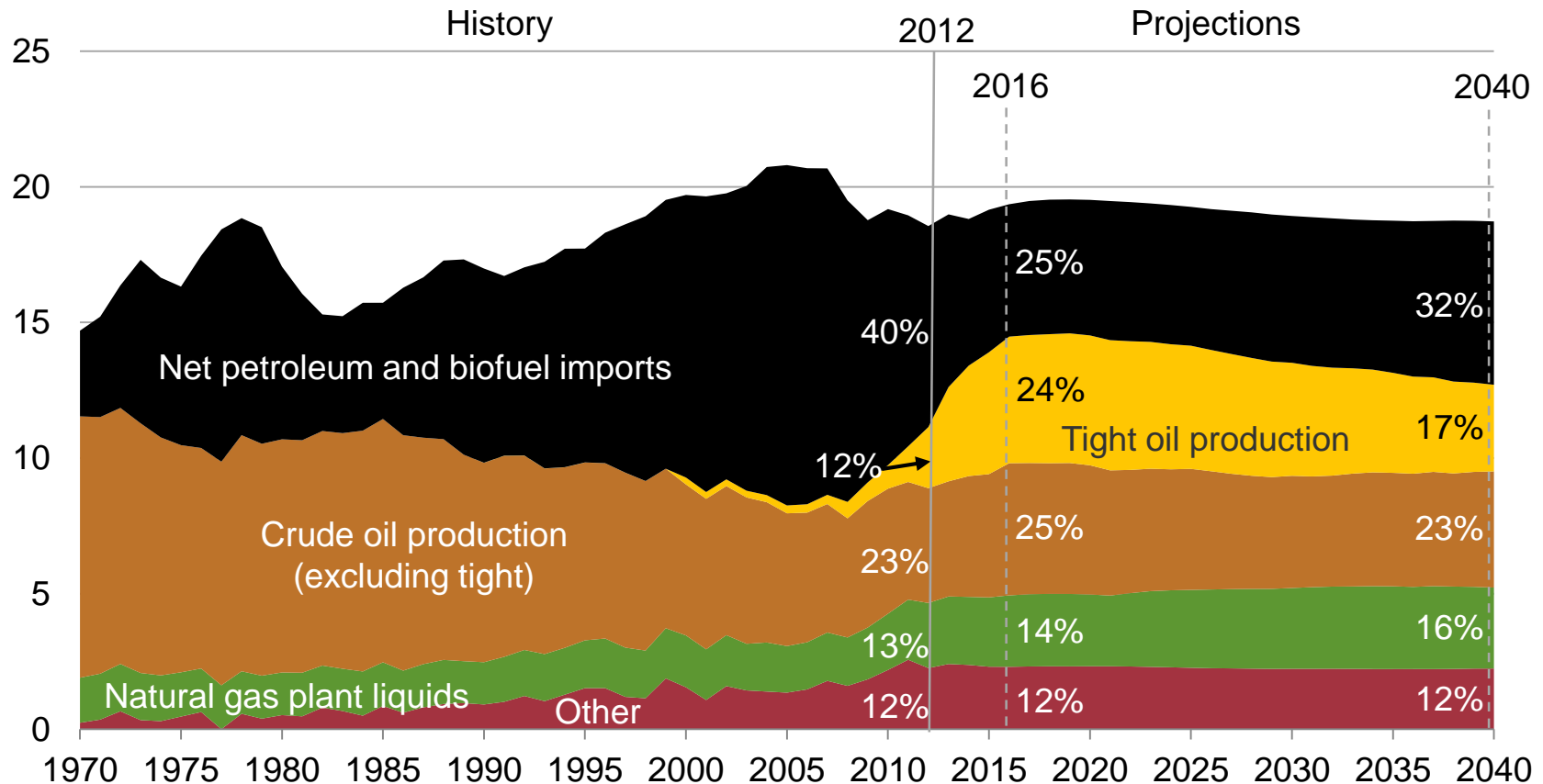


Source: EIA, Annual Energy Outlook 2014



# U.S. import share of liquid fuels declines sharply because of increased production of tight oil and greater fuel efficiency

U.S. liquid fuels supply  
million barrels per day

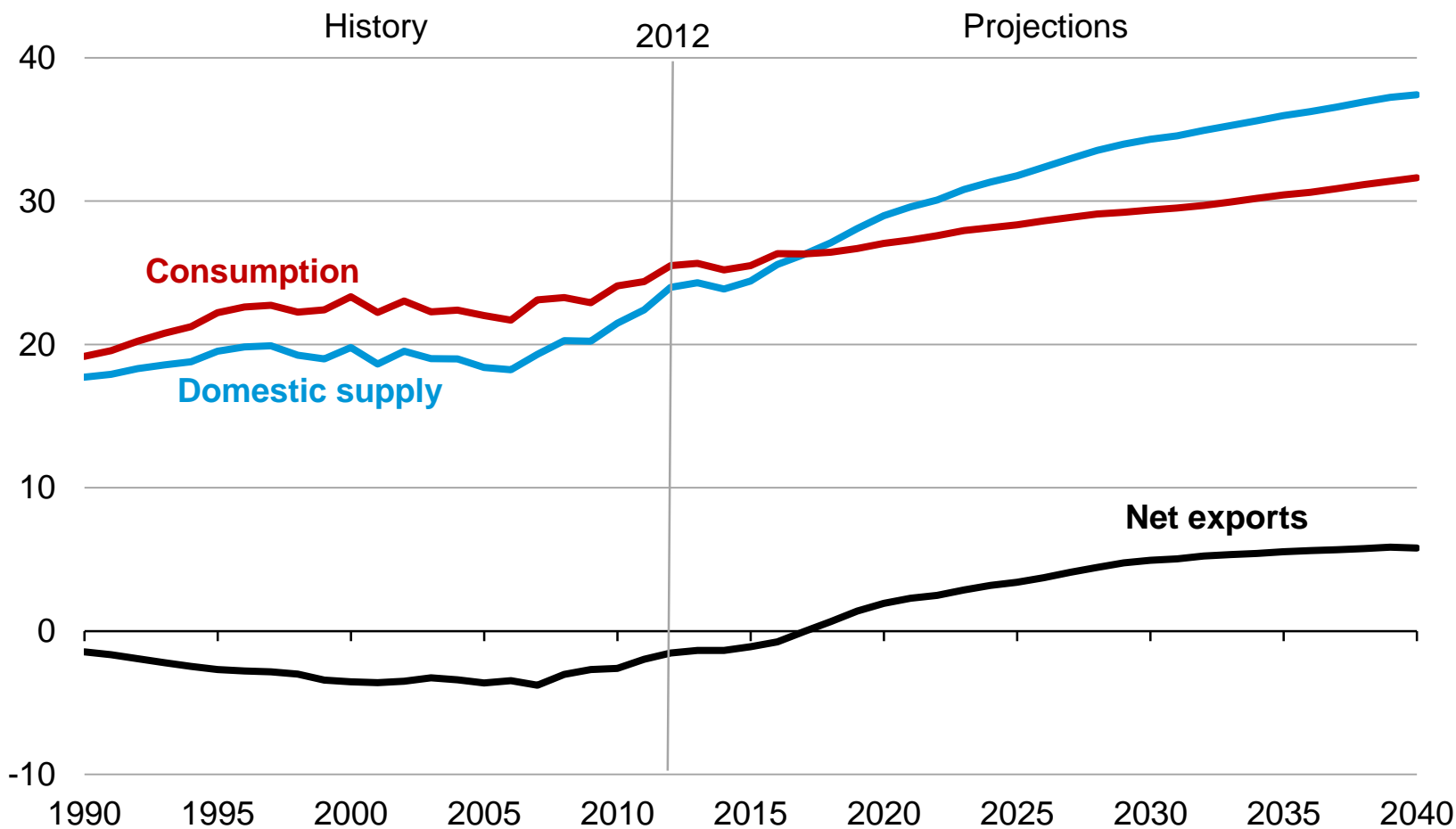


Note: "Other" includes refinery gain, biofuels production, all stock withdrawals, and other domestic sources of liquid fuels

Source: EIA, Annual Energy Outlook 2014

# U.S. becomes a net exporter of natural gas in the near future

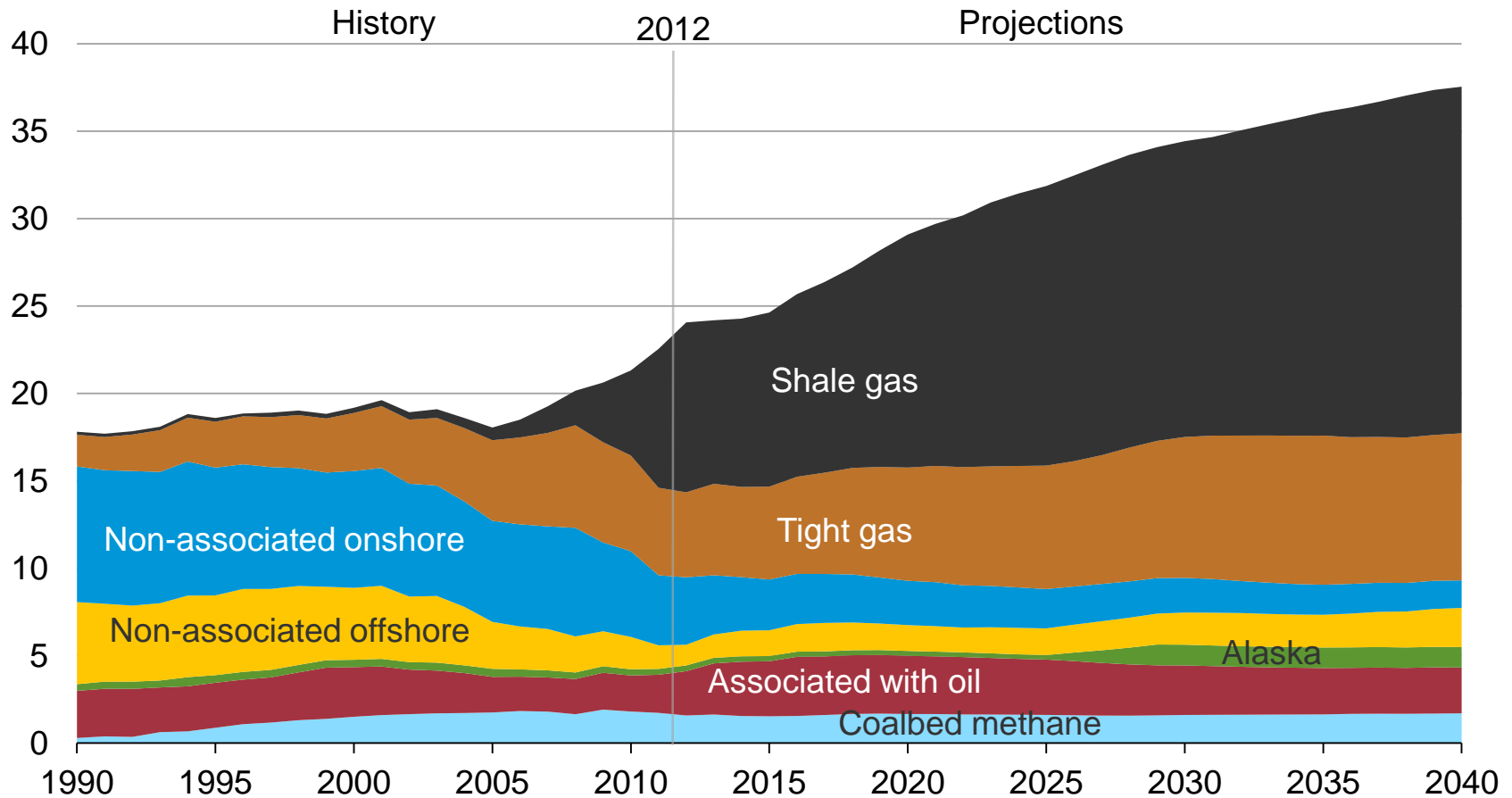
U.S. dry natural gas  
trillion cubic feet per year



Source: EIA, Annual Energy Outlook 2014

# Shale gas leads U.S. production growth

U.S. dry natural gas production  
trillion cubic feet



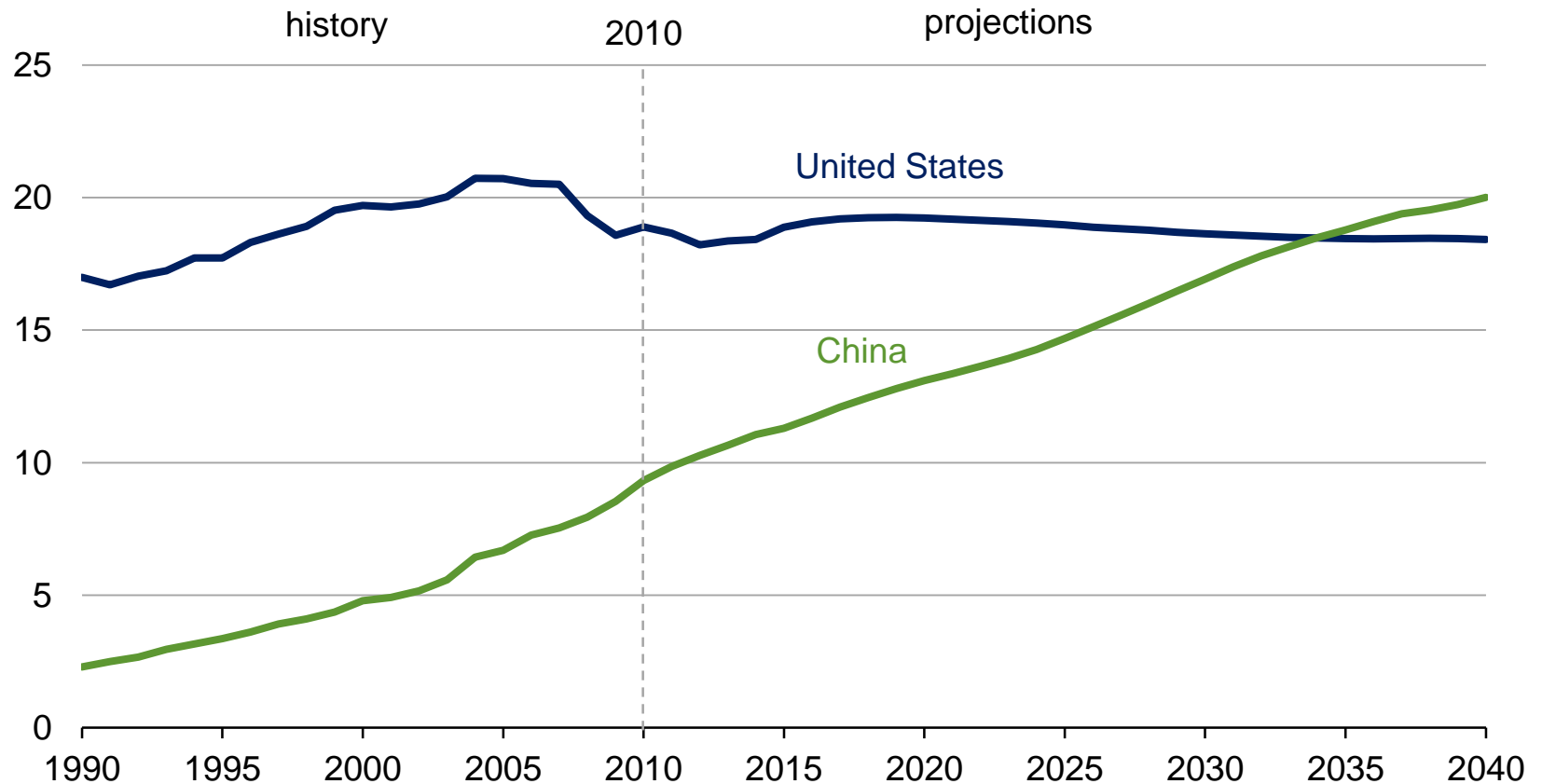
Source: EIA, Annual Energy Outlook 2014

# Results from EIA's International Energy Outlook 2014 (IEO2014) Reference case

- World petroleum and other liquid fuels use increases by 38% between 2010 and 2040, all in the non-OECD
- Developing Asia (including China and India) and the Middle East account for 85% of the increase
- Increased demand requires 33 million b/d of additional liquid fuels supplies to reach 110 million b/d by 2040
  - OPEC crude and lease condensate increases by 14 MMbbl/d
  - Non-OPEC crude and lease condensate increases by 10 MMbbl/d
- Other liquid supplies (from NGPL, biofuels, CTL, GTL, and refinery gain) grow in importance, supplying 17% of total liquids production by 2040

# China's use of liquid fuels exceeds the United States by 2035

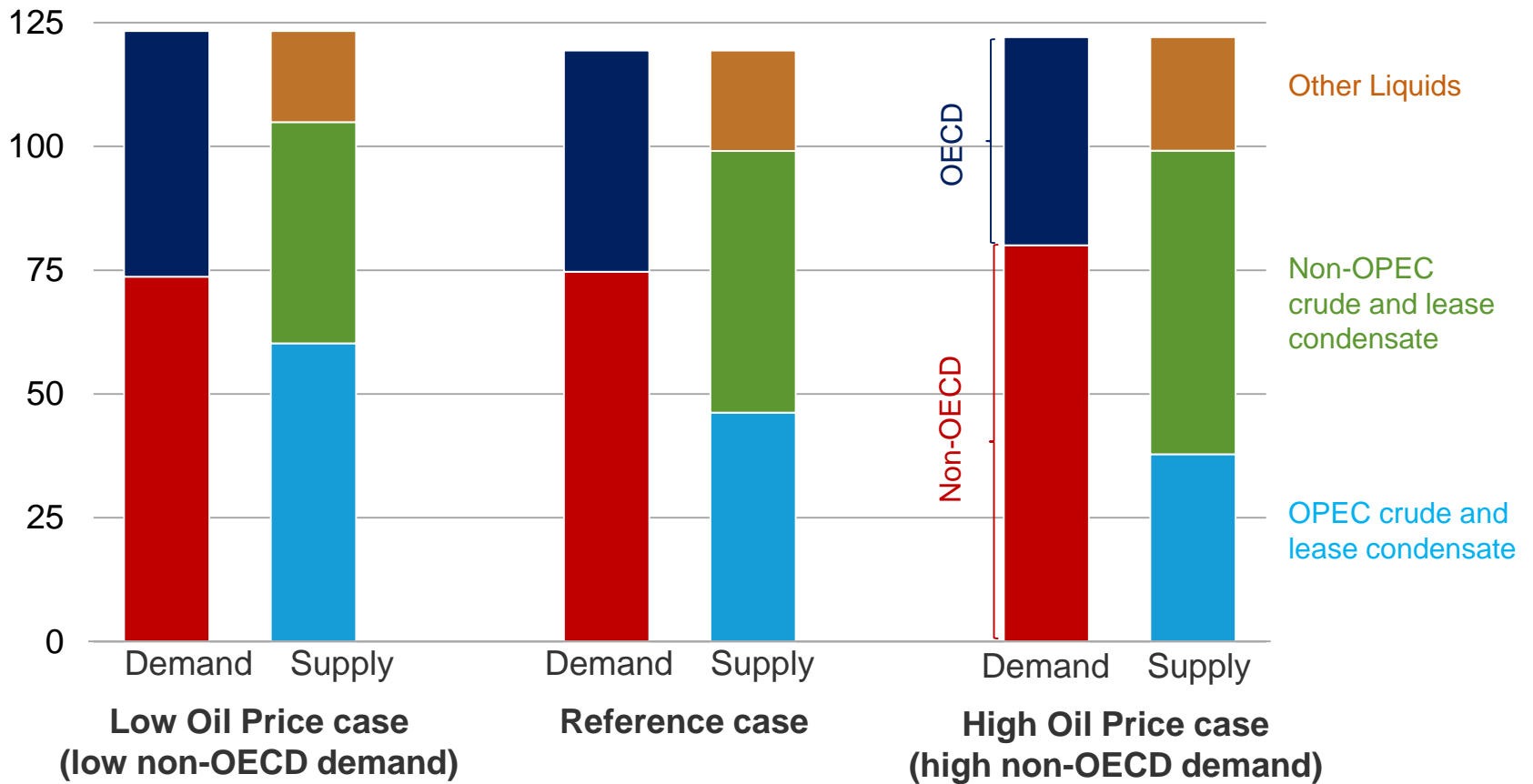
liquid fuels consumption in China and the United States, Reference case  
million barrels per day



Source: EIA, International Energy Outlook 2014

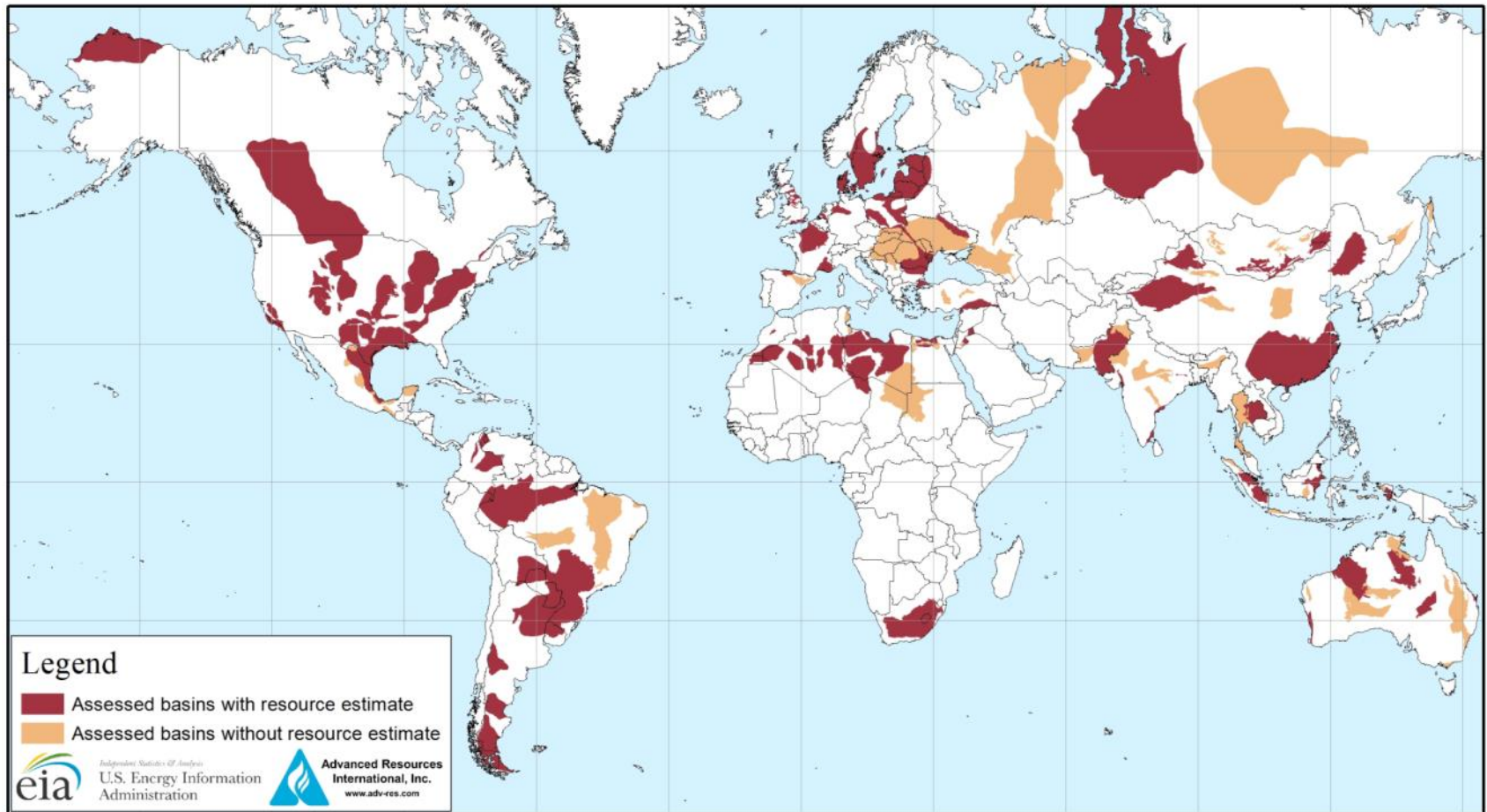
# Supply composition changes more than demand across cases

liquids consumption and production in three price cases, 2040  
million barrels per day



Source: EIA, International Energy Outlook 2014

# The shale revolution, starting in North America, is changing where crude oil and natural gas are produced

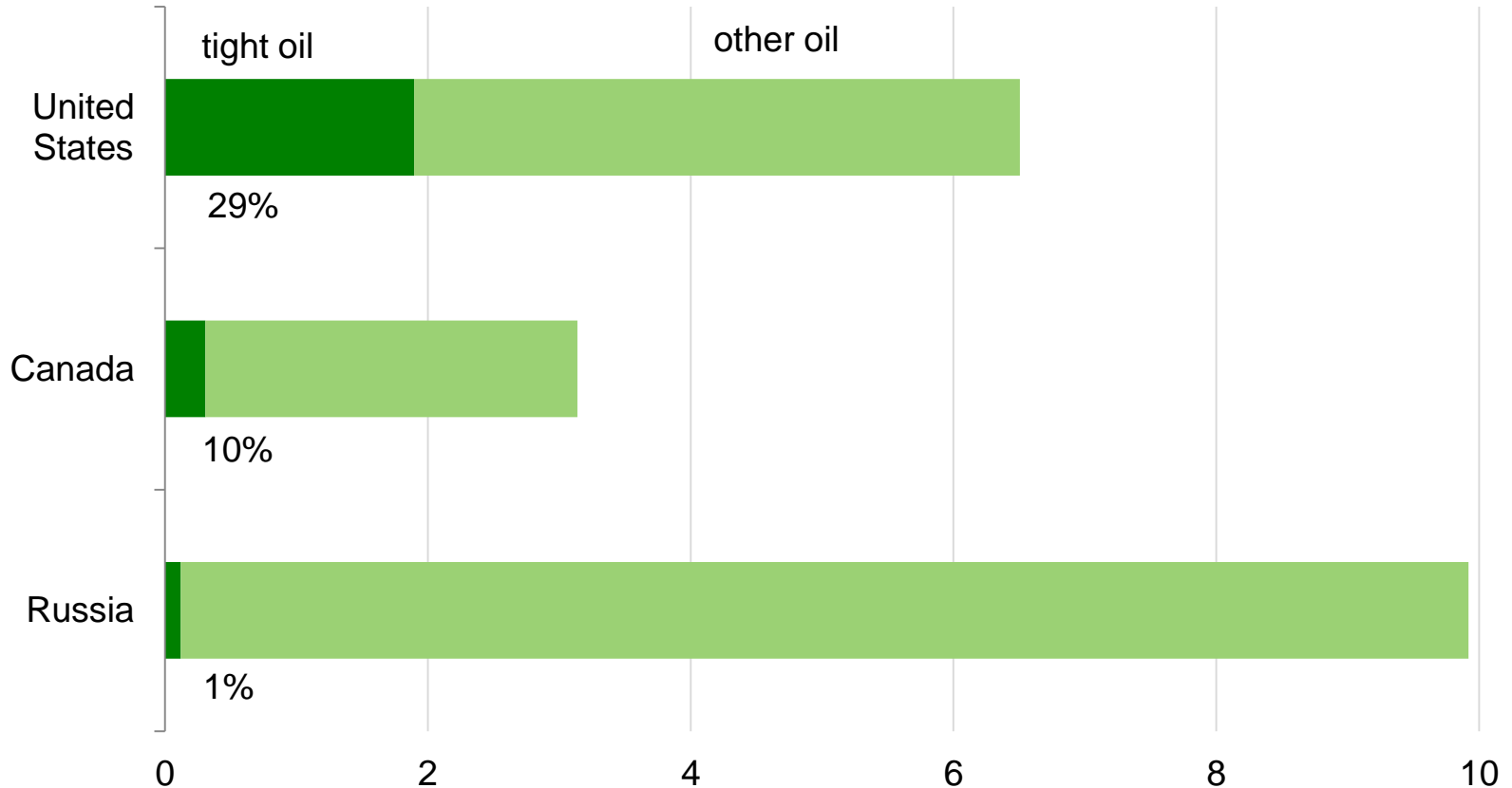


Source: United States basins from EIA and U.S. Geological Survey, other basins from ARI based on data from various published studies



# North America leads the world in tight oil production in 2012

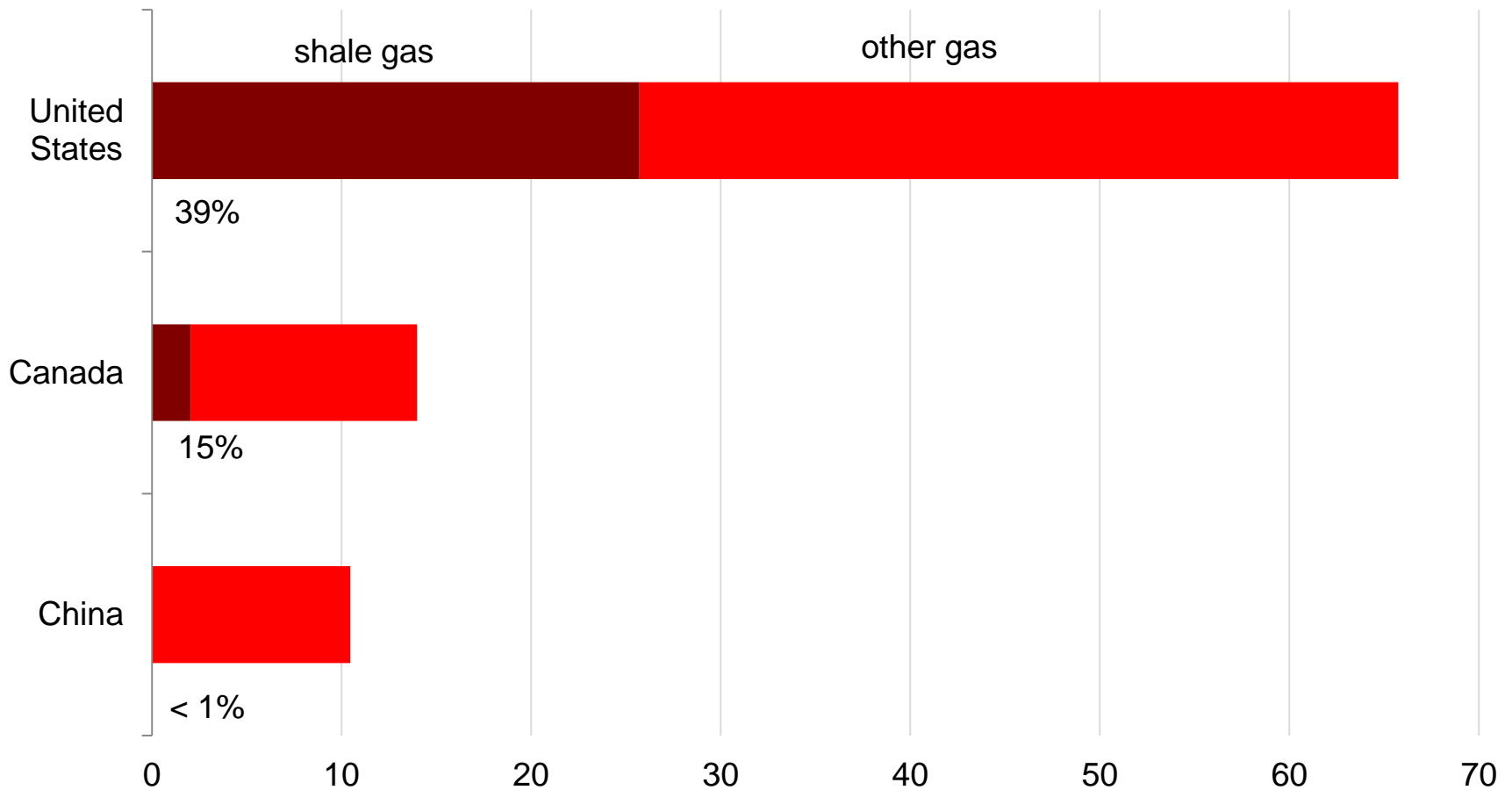
tight oil production  
million barrels per day



Source: U.S. Energy Information Administration, LCI Energy Insight, Canada National Energy Board, and Thane Gustafson's *Wheel of Fortune: The Battle for Oil and Power in Russia*

# North America leads the world in shale gas production in 2012

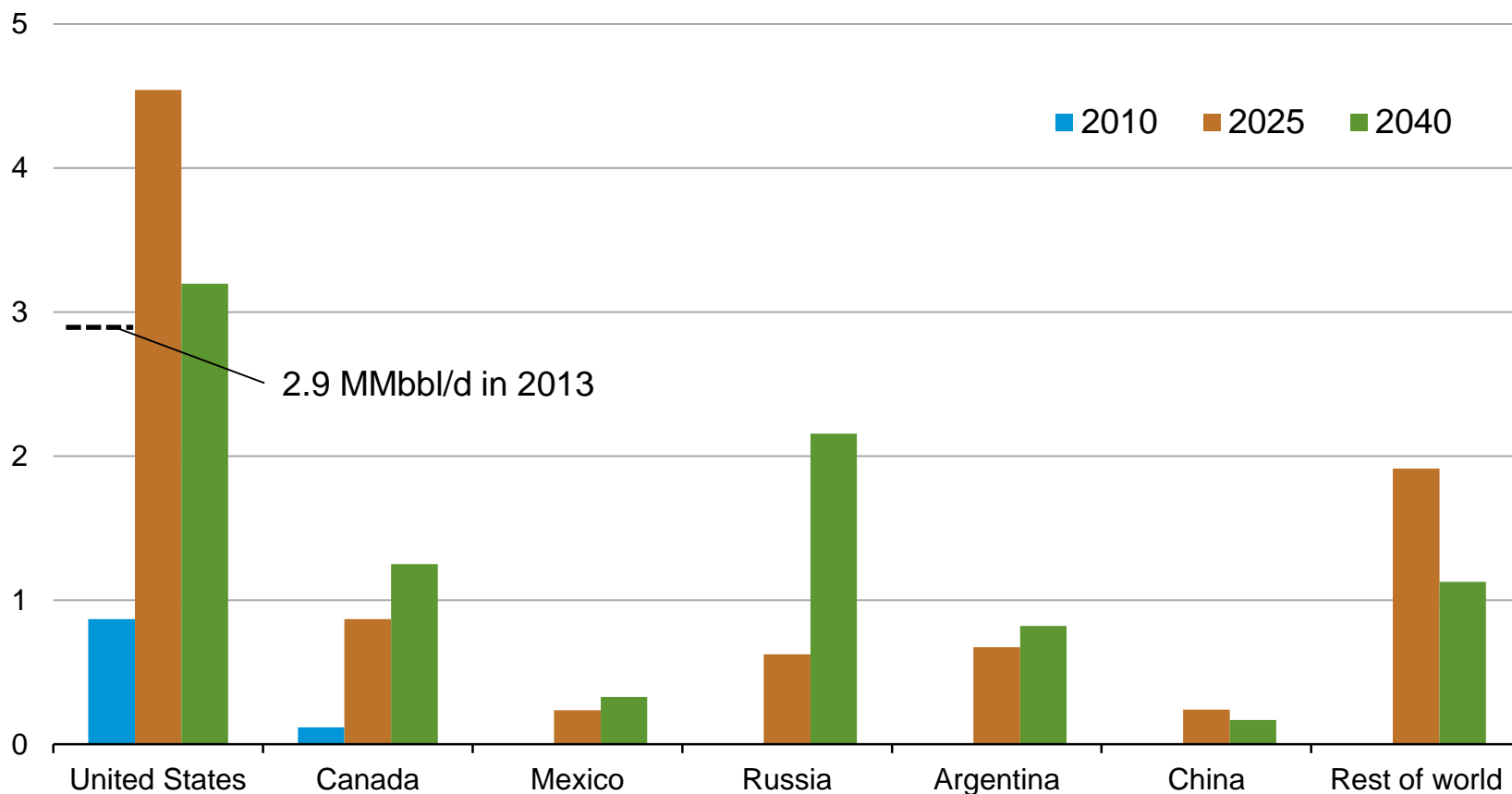
shale gas production  
billion cubic feet per day



Source: U.S. Energy Information Administration; LCI Energy Insight; Canada National Energy Board; Facts Global Energy

# Tight oil production will spread to nations outside of the United States and Canada over the projection

tight oil production, Reference case  
million barrels per day



Source: EIA, International Energy Outlook 2014

## 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)

State Energy Portal | [www.eia.gov/state](http://www.eia.gov/state)

Today in Energy | [www.eia.gov/todayinenergy](http://www.eia.gov/todayinenergy)