

# International Energy Outlook



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*For*

*Deloitte Oil and Gas Conference*

*November 18, 2014 | Houston, TX*

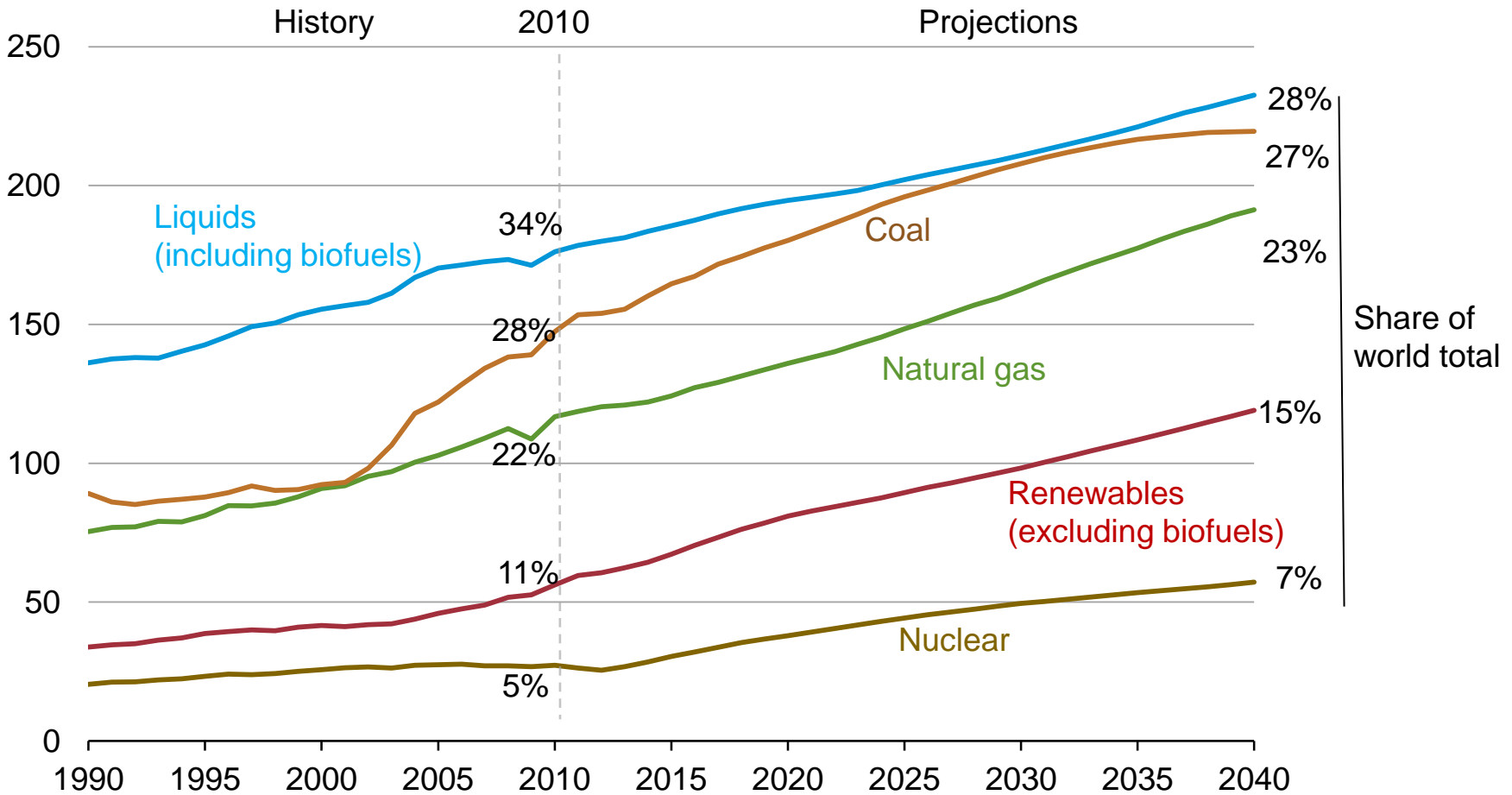
*By*

*Adam Sieminski, Administrator*

*U.S. Energy Information Administration*

# Renewable energy and nuclear power are the fastest growing sources of energy consumption; oil still dominates

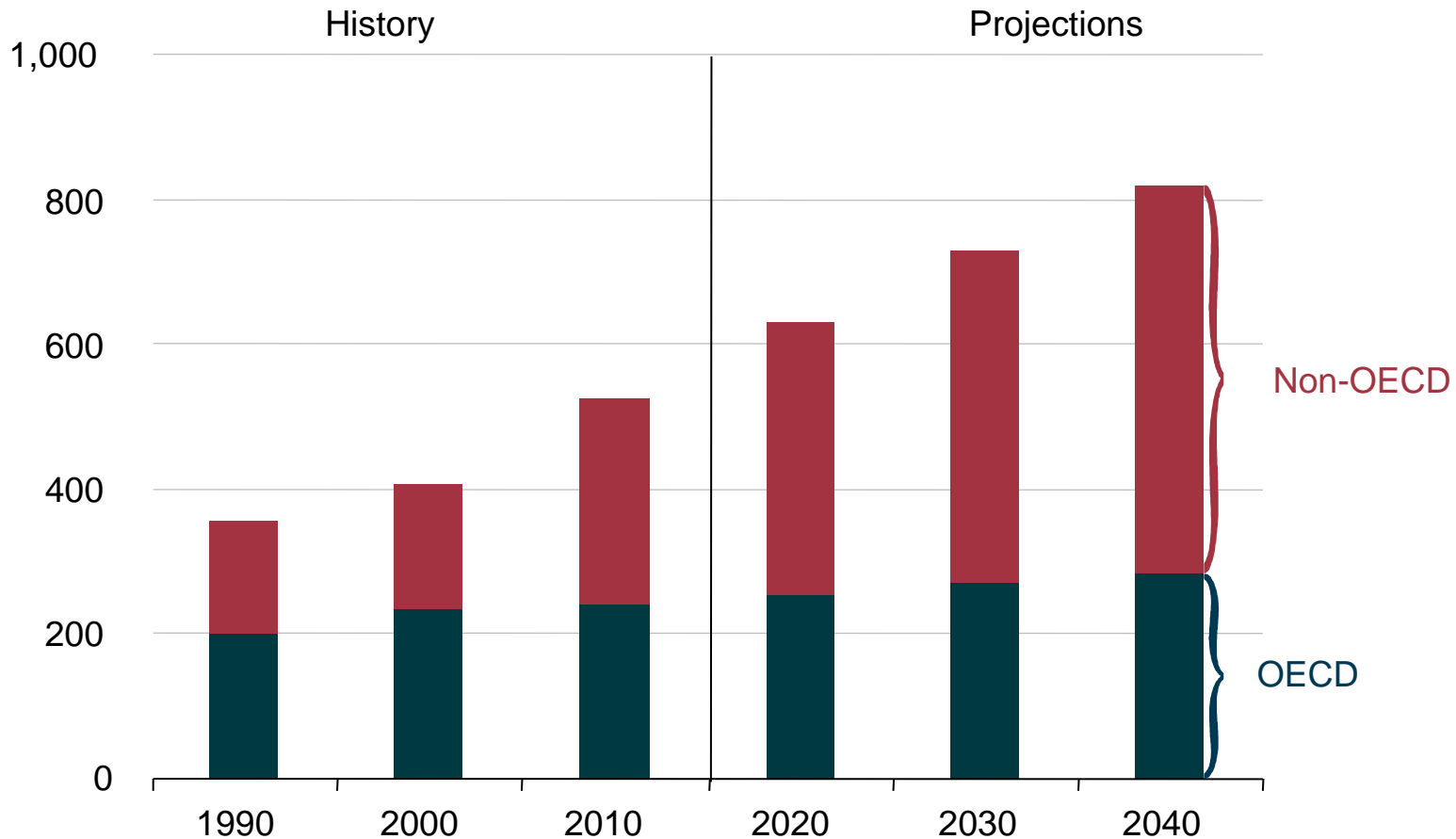
world energy consumption by fuel  
quadrillion Btu



Source: EIA, International Energy Outlook 2013

# World energy consumption growth is concentrated in non-OECD countries

world energy consumption, 1990-2040  
quadrillion Btu

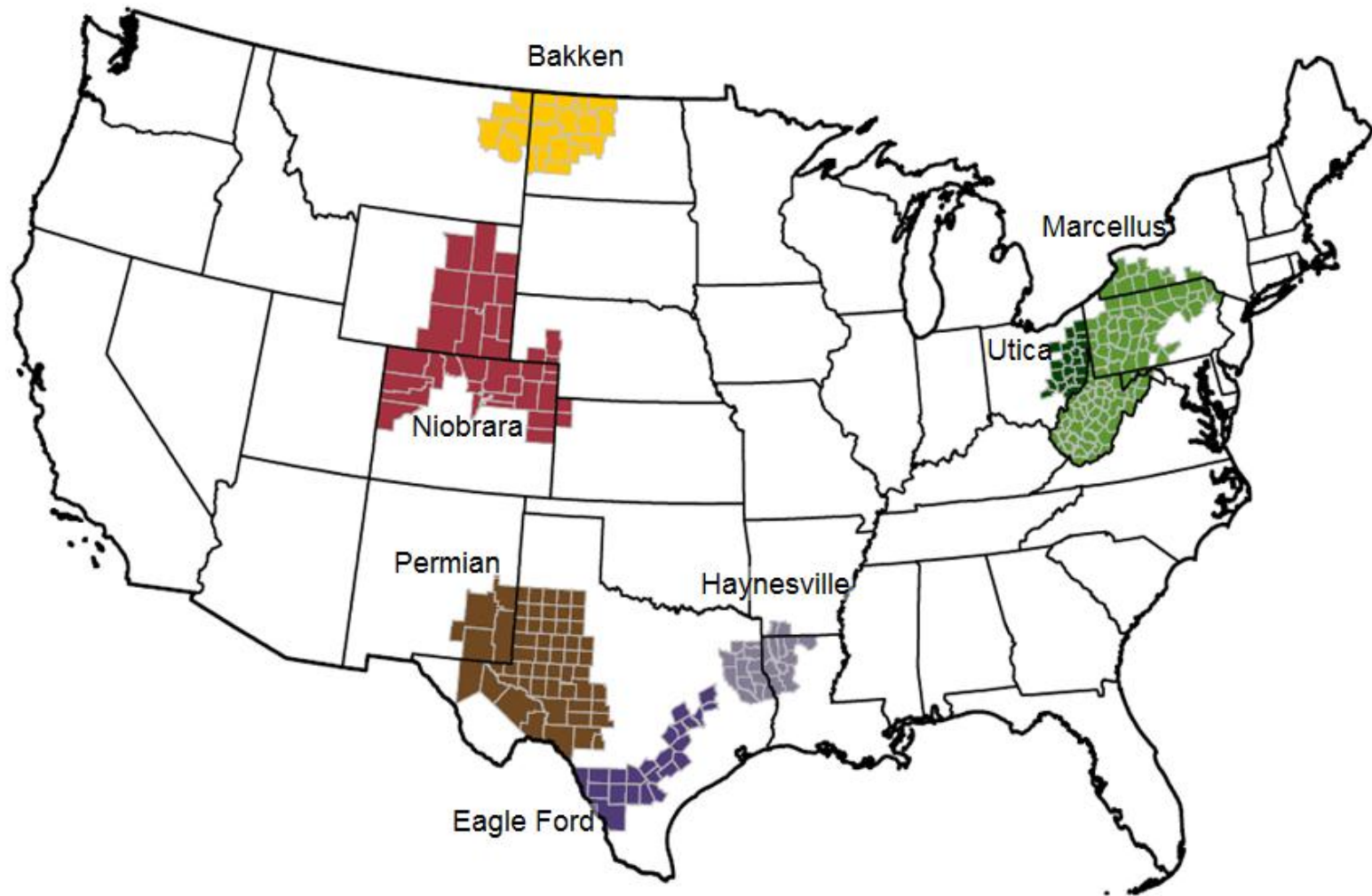


Source: EIA, International Energy Outlook 2013

## Results from the IEO2014 Reference case

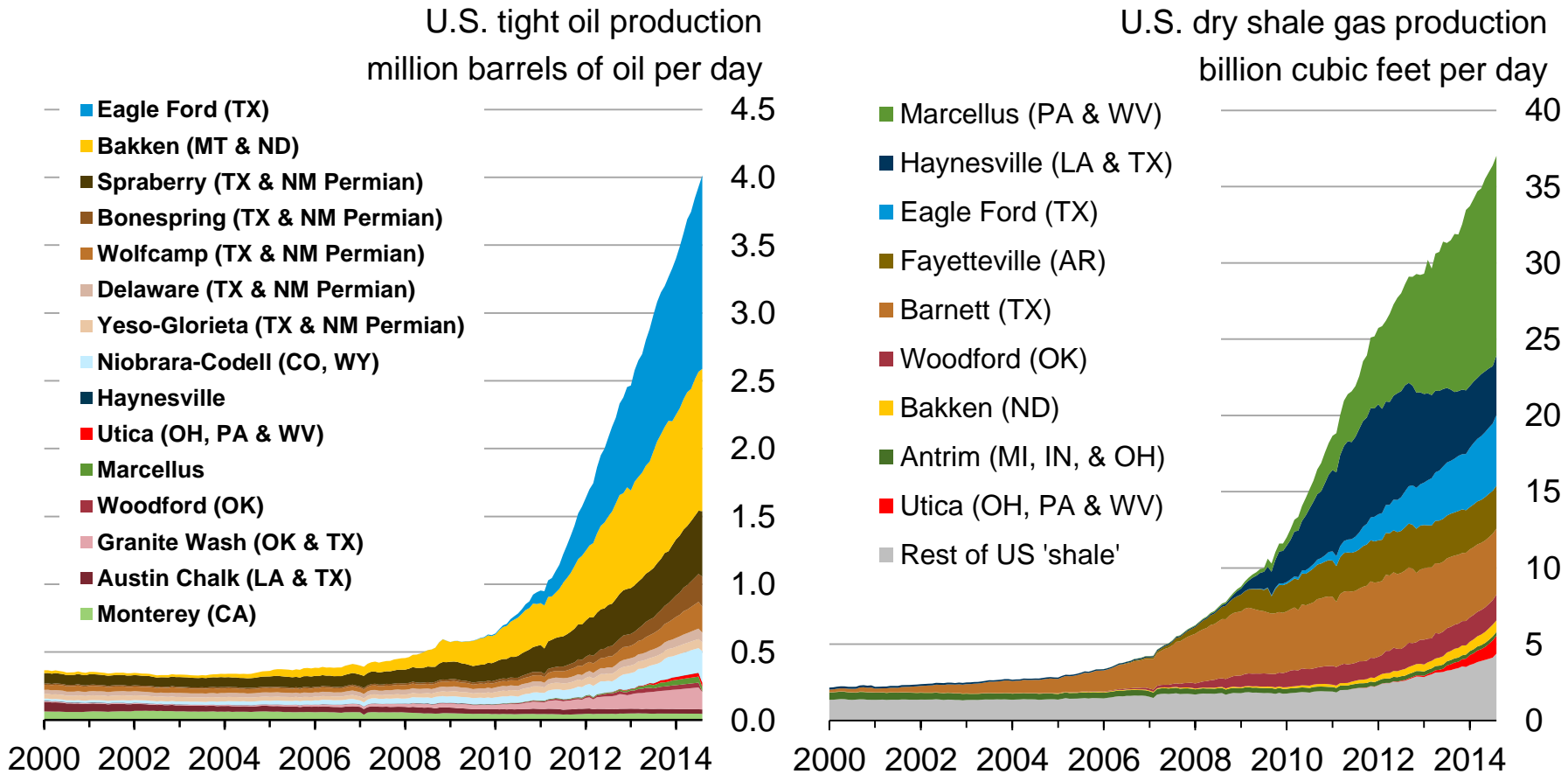
- World petroleum and other liquid fuels use increases by 38% between 2010 and 2040, all in the non-OECD
- Developing Asia (including China and India) and the Middle East account for 85% of the increase
- Increased demand requires 33 MMbbl/d of additional liquid fuels supplies to reach 119 MMb/d by 2040
  - 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

These seven regions accounted for 95% of U.S. oil production growth and all U.S. natural gas production growth from 2011-2013



Source: EIA, Drilling Productivity Report

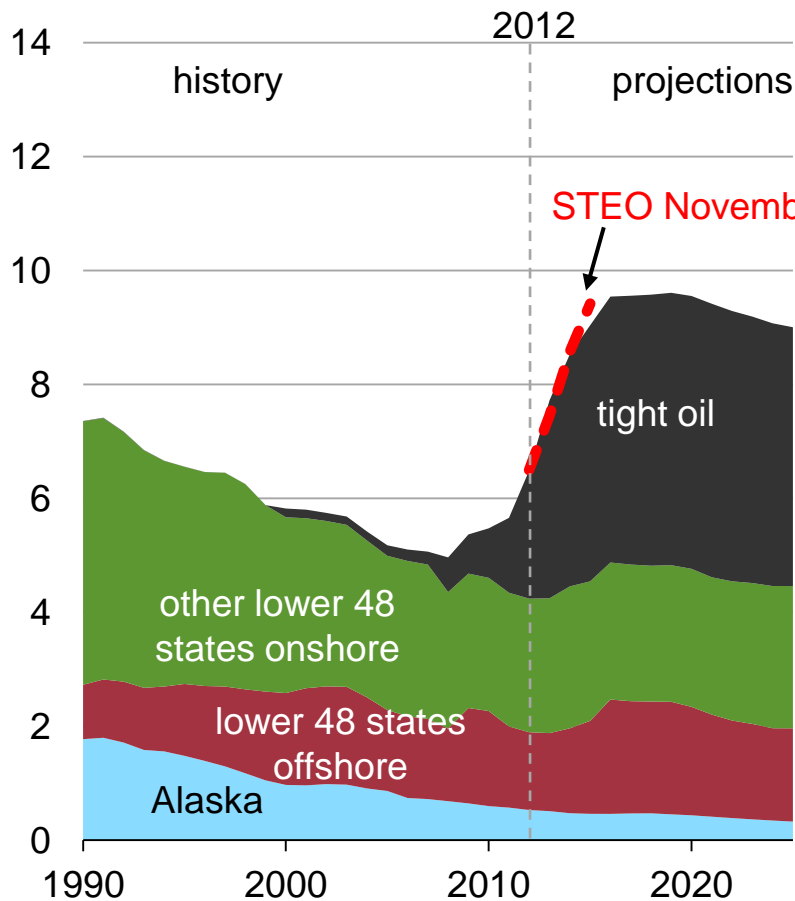
# The U.S. has experienced a rapid increase in natural gas and oil production from shale and other tight resources



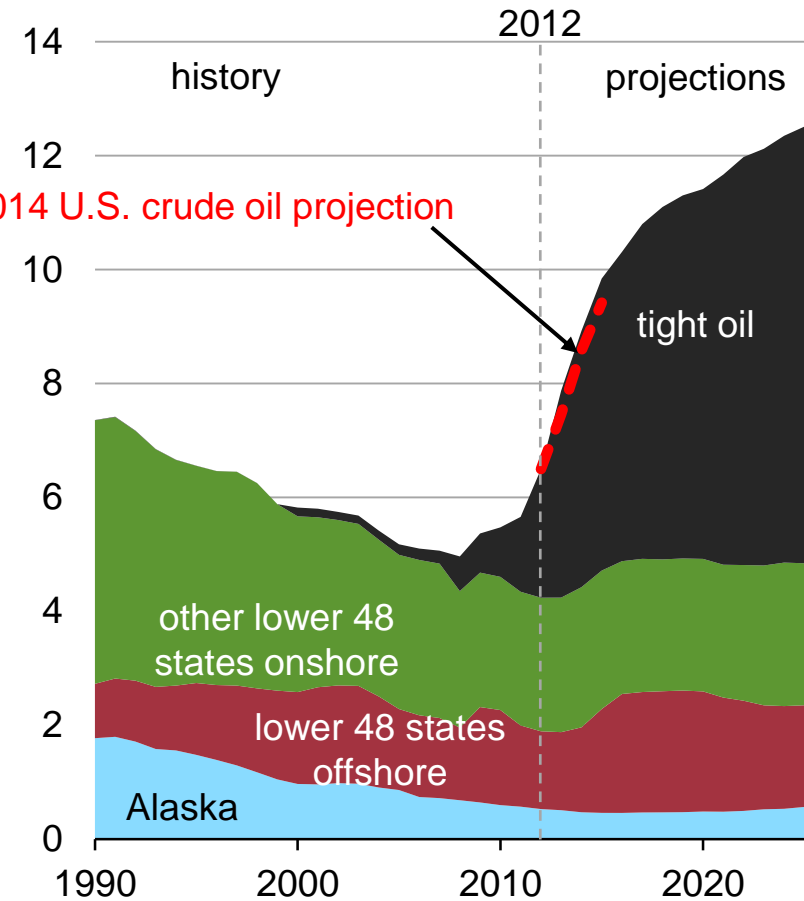
Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through August 2014 and represent EIA's official tight oil & shale gas estimates, but are not survey data. State abbreviations indicate primary state(s).

# Resource and technology assumptions have major implications for projected U.S. crude oil production beyond the next few years

Reference case  
million barrels per day



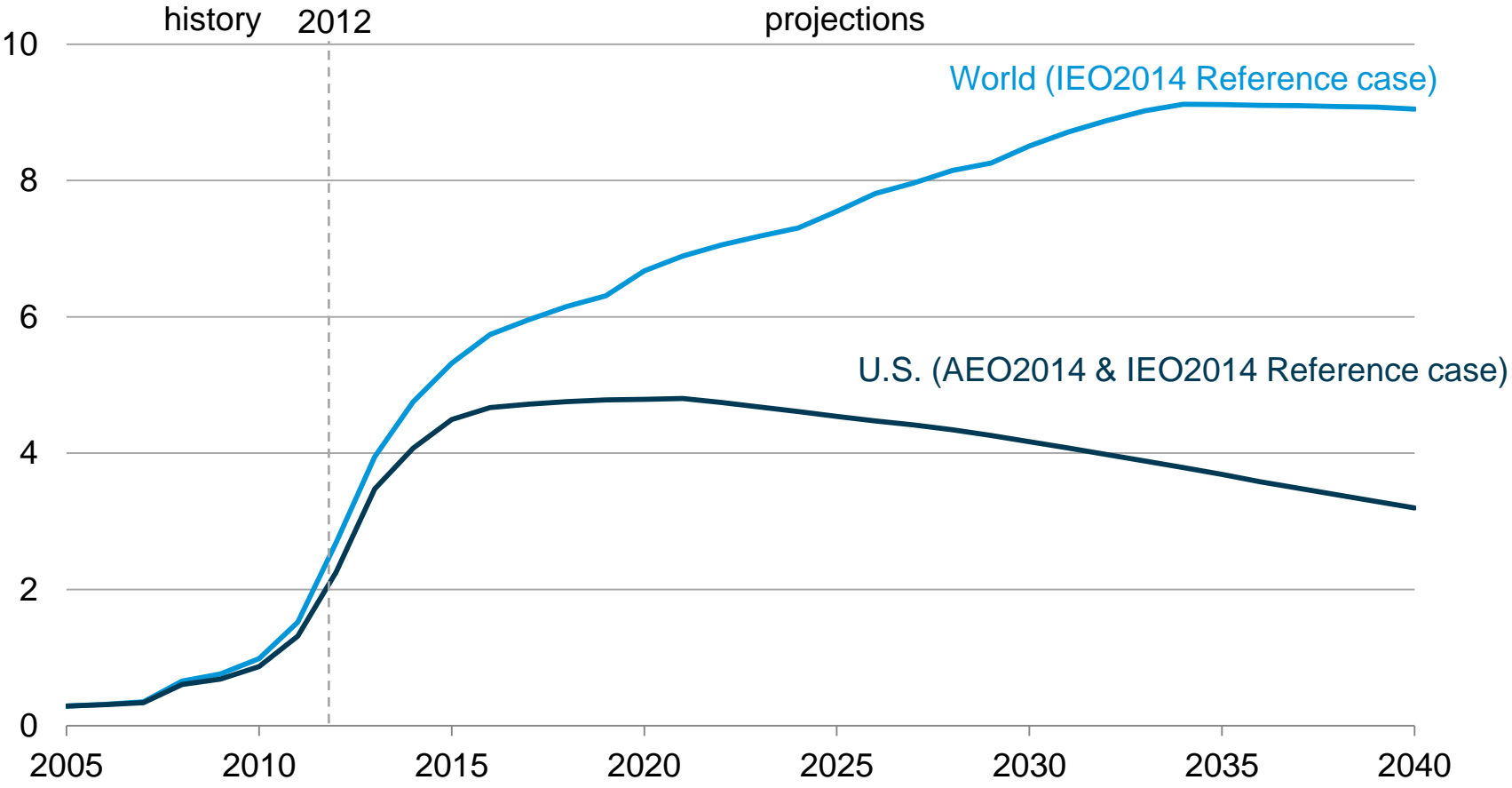
High Oil and Gas Resource case  
million barrels per day



Source: EIA, Annual Energy Outlook 2014; Short Term Energy Outlook, November 2014

# EIA Reference scenario shows world tight oil production increasing to almost 8 million b/d in 2025

tight oil production  
million barrels per day

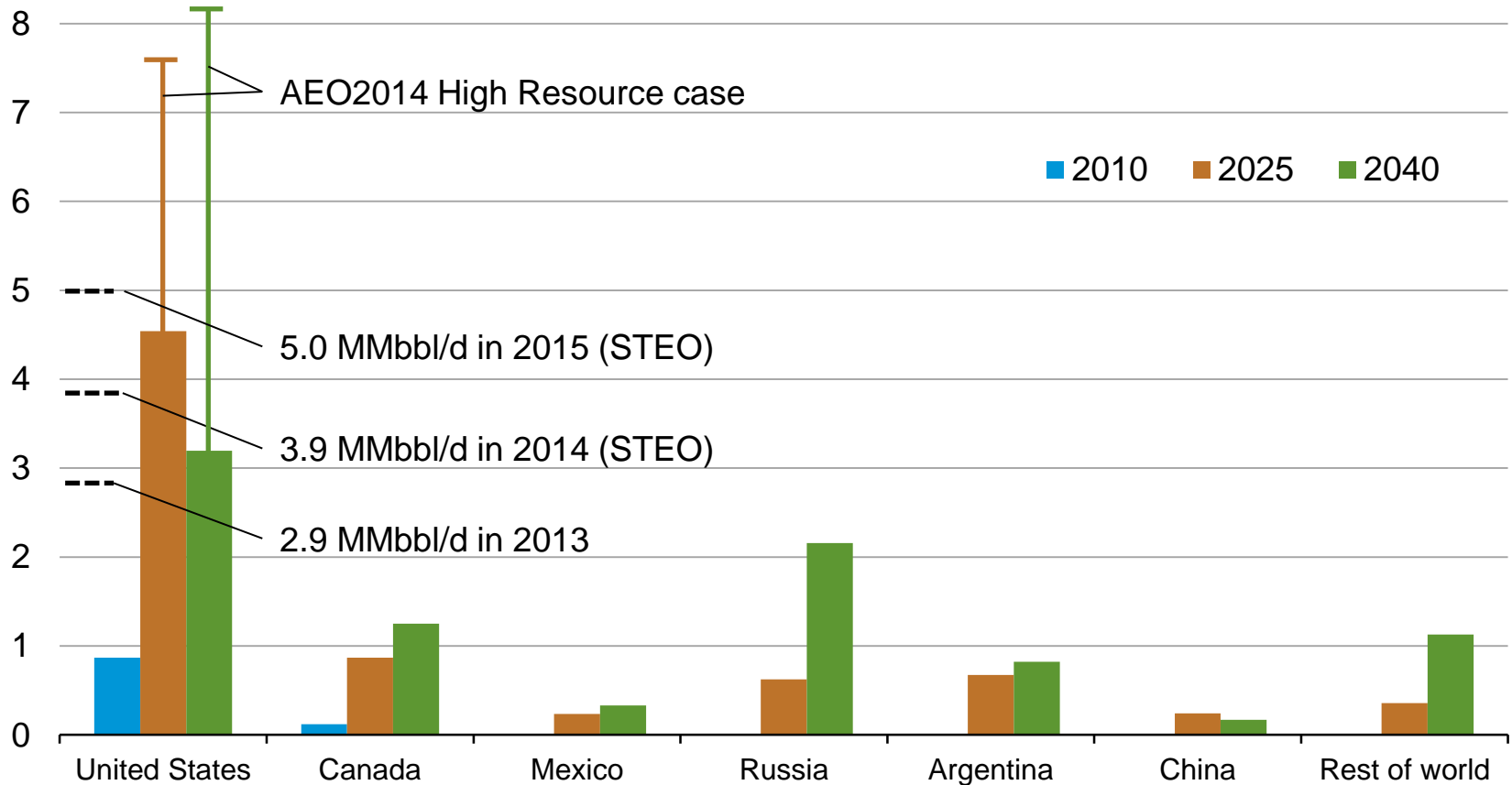


Source: EIA, Annual Energy Outlook 2014 and International Energy Outlook 2014



# 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

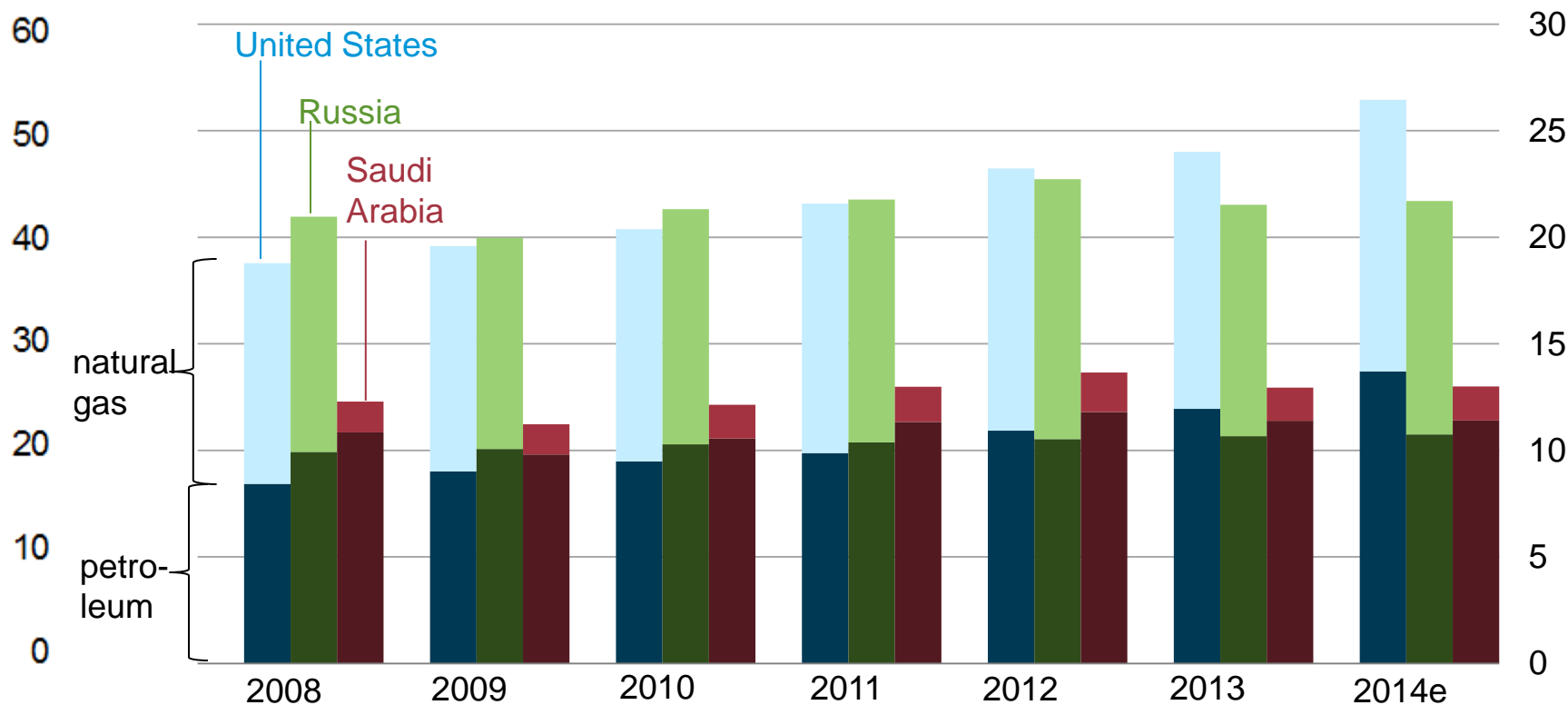


Source: EIA, International Energy Outlook 2014

# U.S. is the largest producer of petroleum and natural gas in the world

estimated U.S., Russia, and Saudi Arabia petroleum and natural gas production  
quadrillion Btu

million barrels per day of oil equivalent

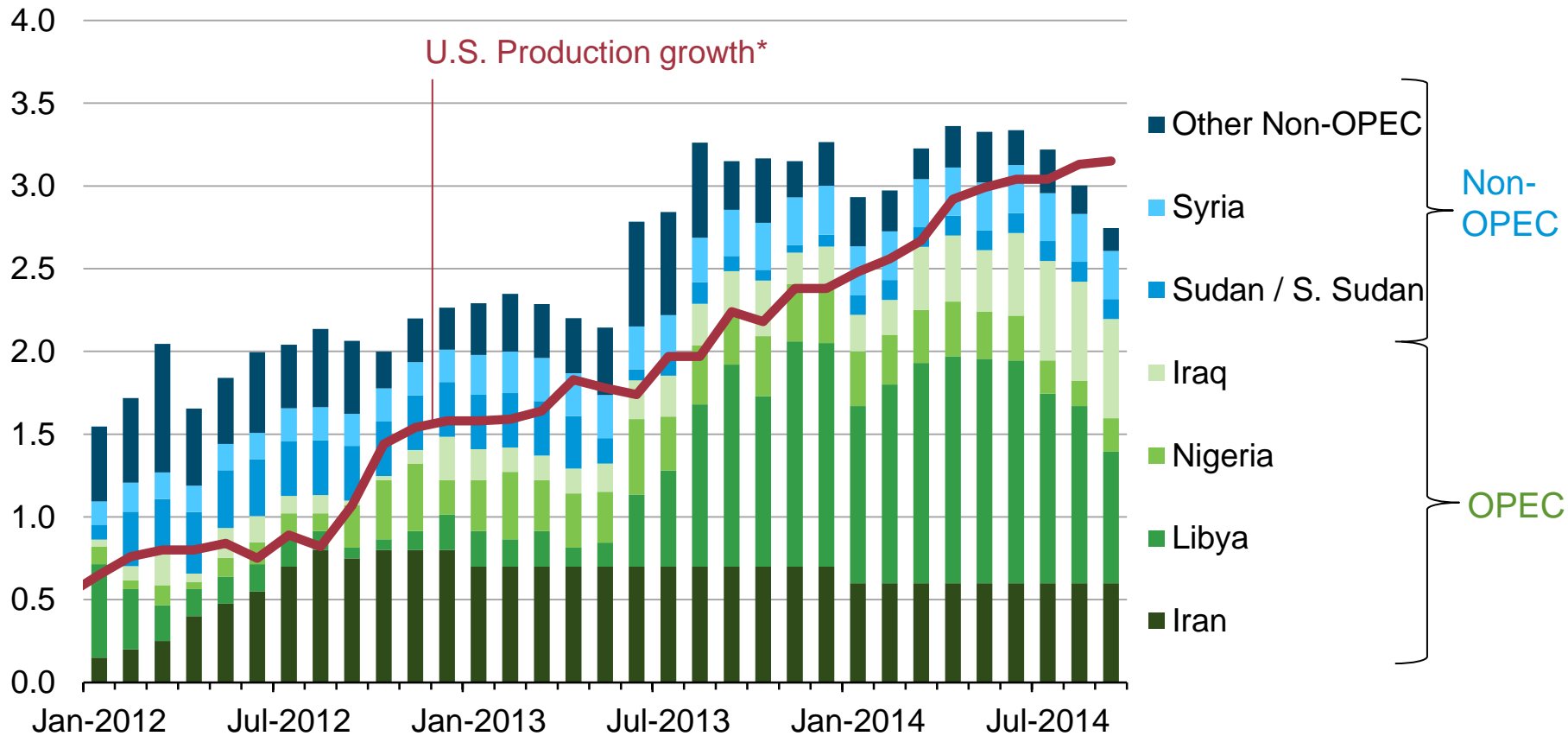


Source: U.S. Energy Information Administration

Note: Petroleum production includes crude oil, natural gas liquids, condensates, refinery processing gain, and other liquids, including biofuels; barrels per day oil equivalent were calculated using a conversion factor of 1 barrel oil equivalent=5.55 million British thermal units (Btu)

# U.S. oil production growth helping to offset unplanned outages

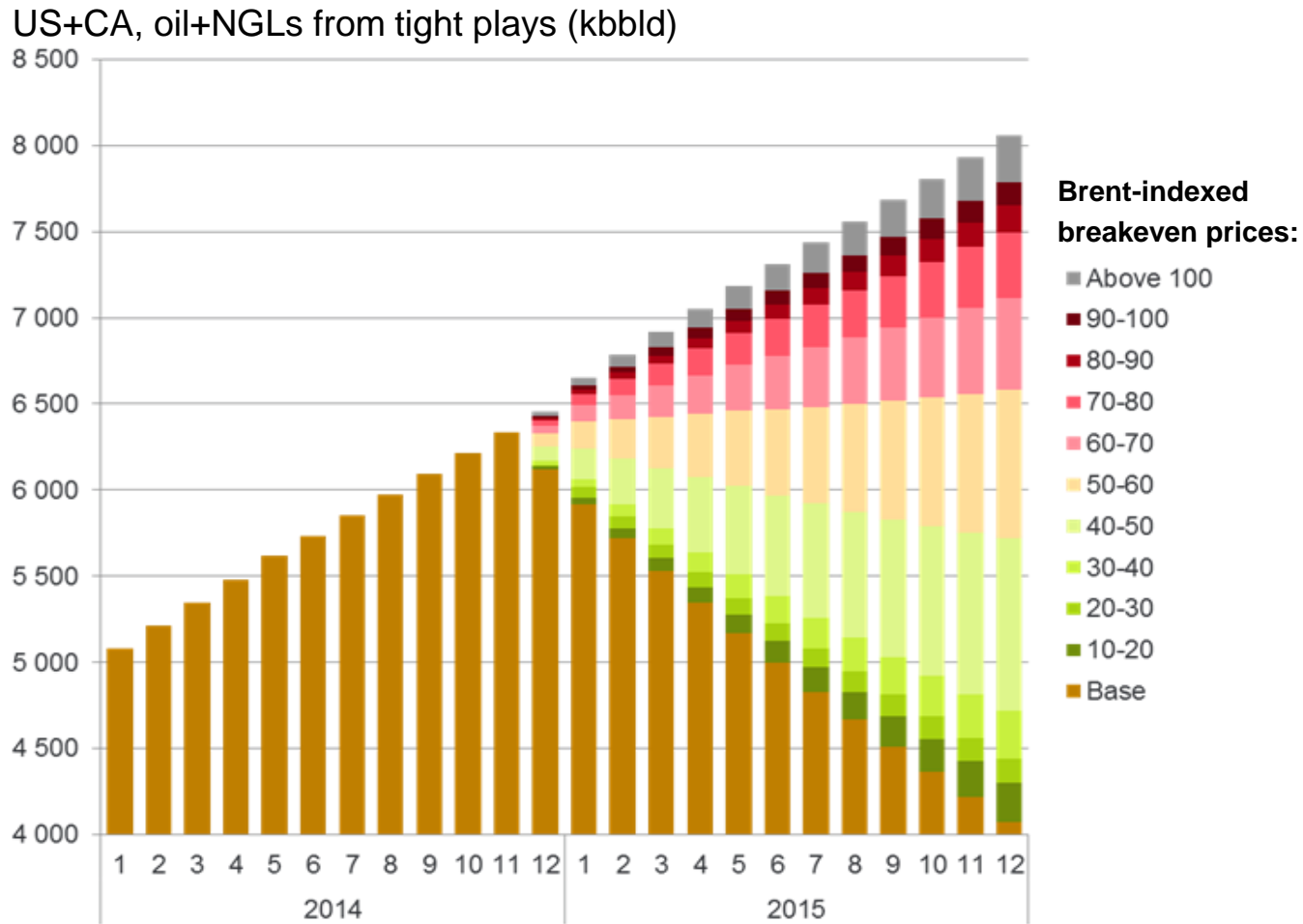
estimated unplanned crude oil production outages  
million barrels per day



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

\*monthly production delta versus Jan. 2011 production level

# Effect of low oil prices on U.S. shale oil production



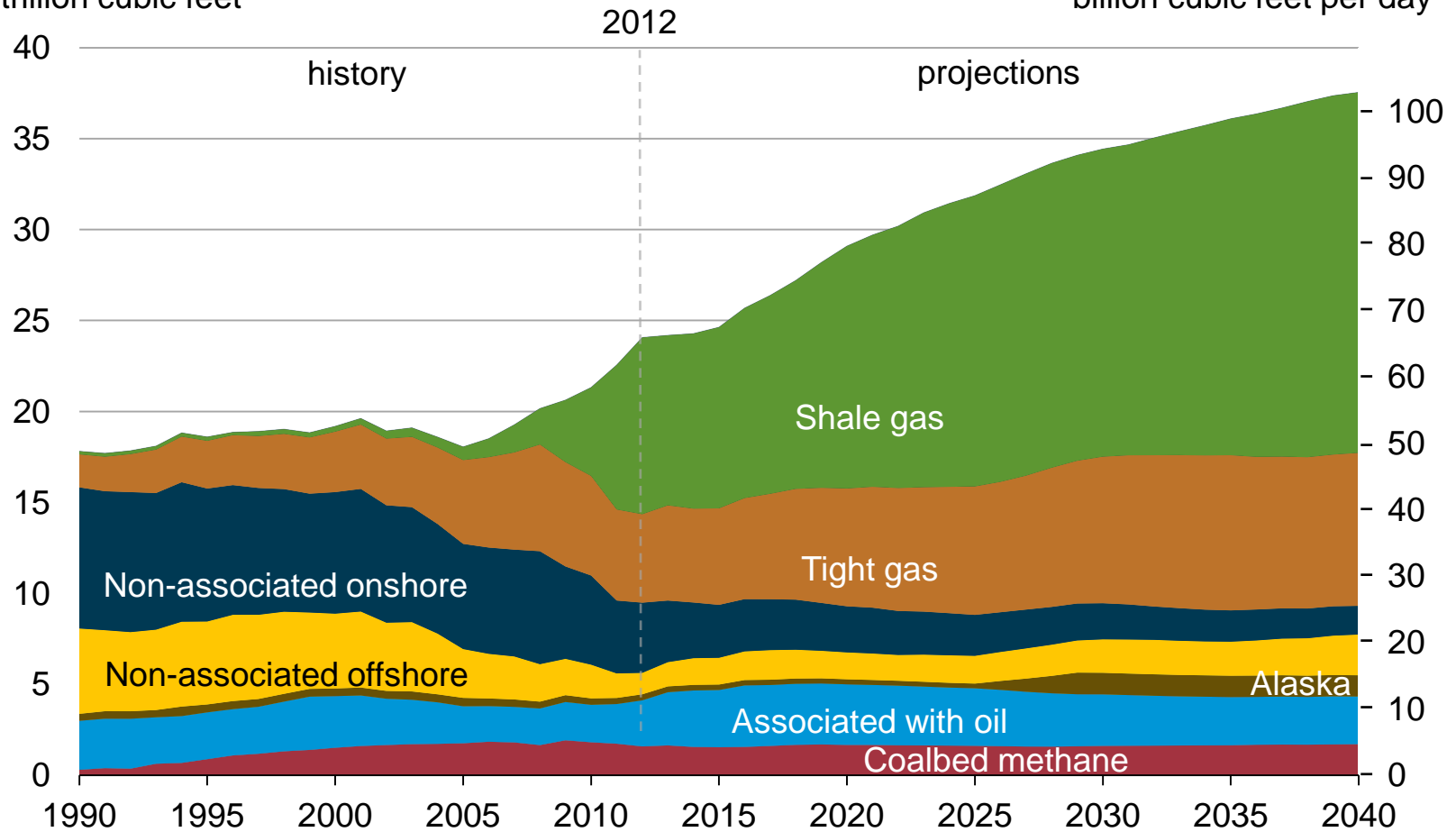
Source: Rystad Energy North America Quarterly Shale Report

# U.S. shale gas leads growth in total gas production through 2040, when production exceeds 100 billion cubic feet per day

U.S. dry natural gas production

trillion cubic feet

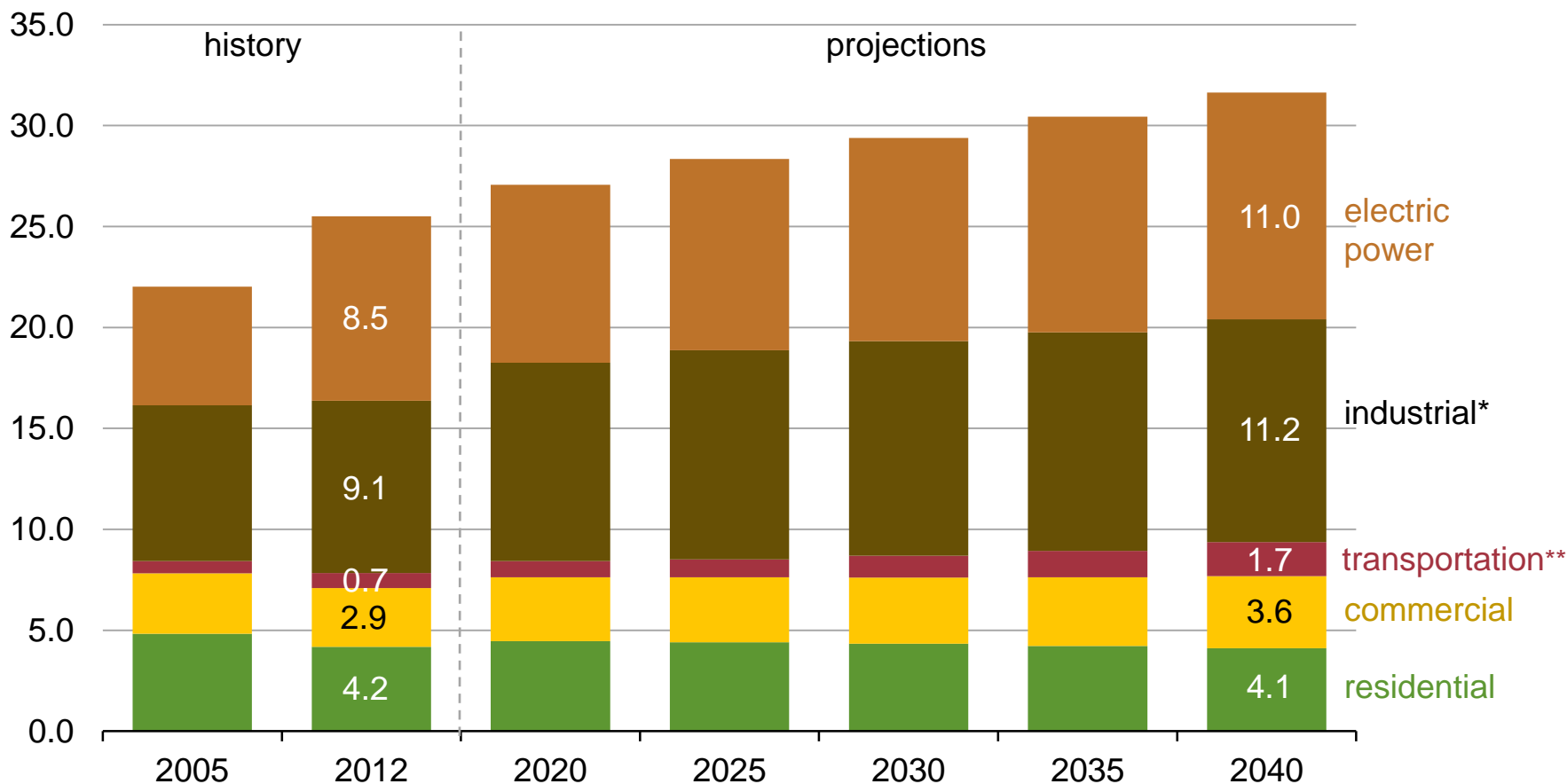
billion cubic feet per day



Source: EIA, Annual Energy Outlook 2014, Reference case

# Natural gas consumption growth is driven by electric power, industrial, and transportation use

U.S. dry gas consumption  
trillion cubic feet



Source: EIA, Annual Energy Outlook 2014, Reference case

\*Includes combined heat-and-power and lease and plant fuel

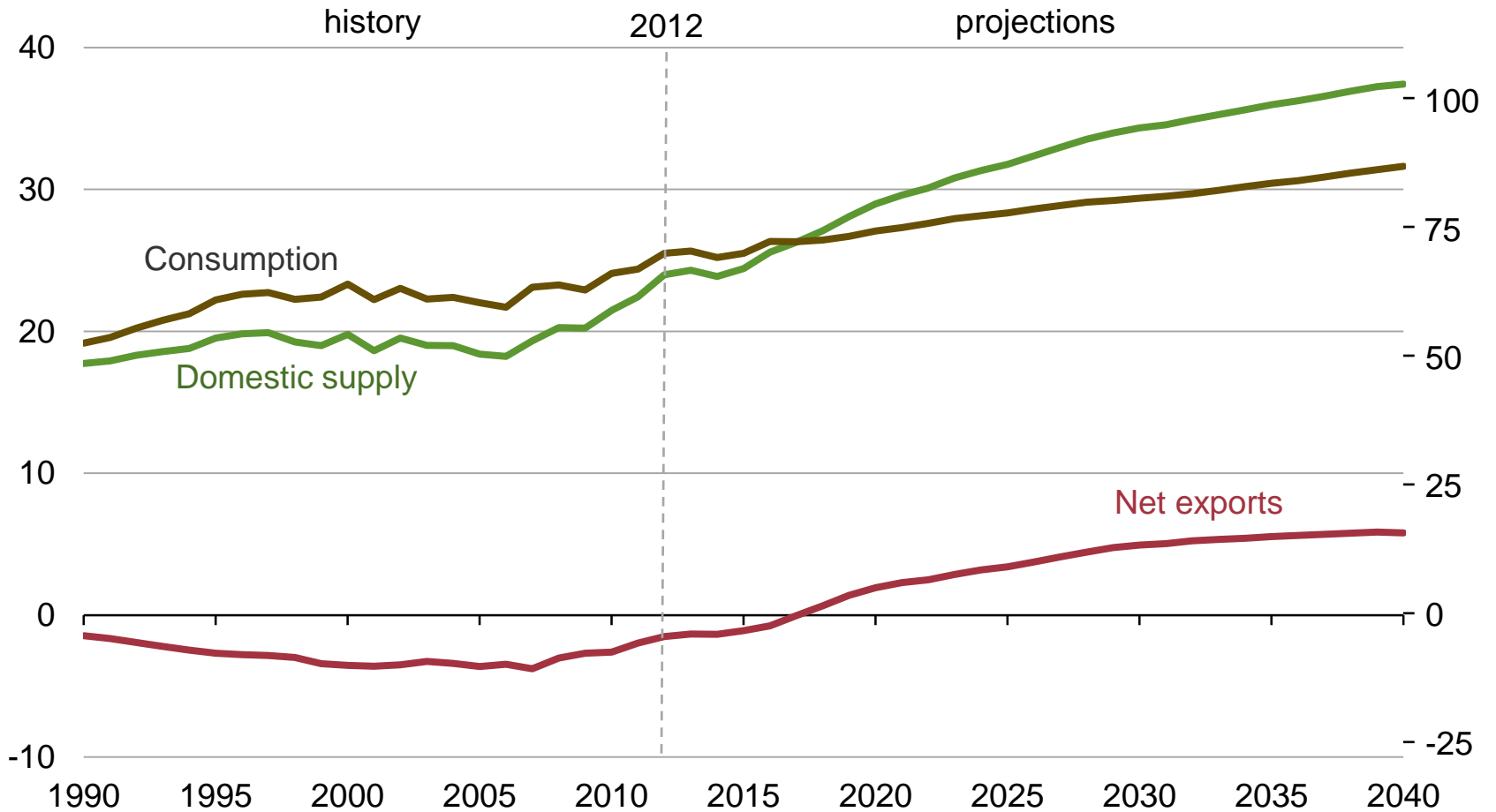
\*\*Includes pipeline fuel

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

U.S. dry natural gas

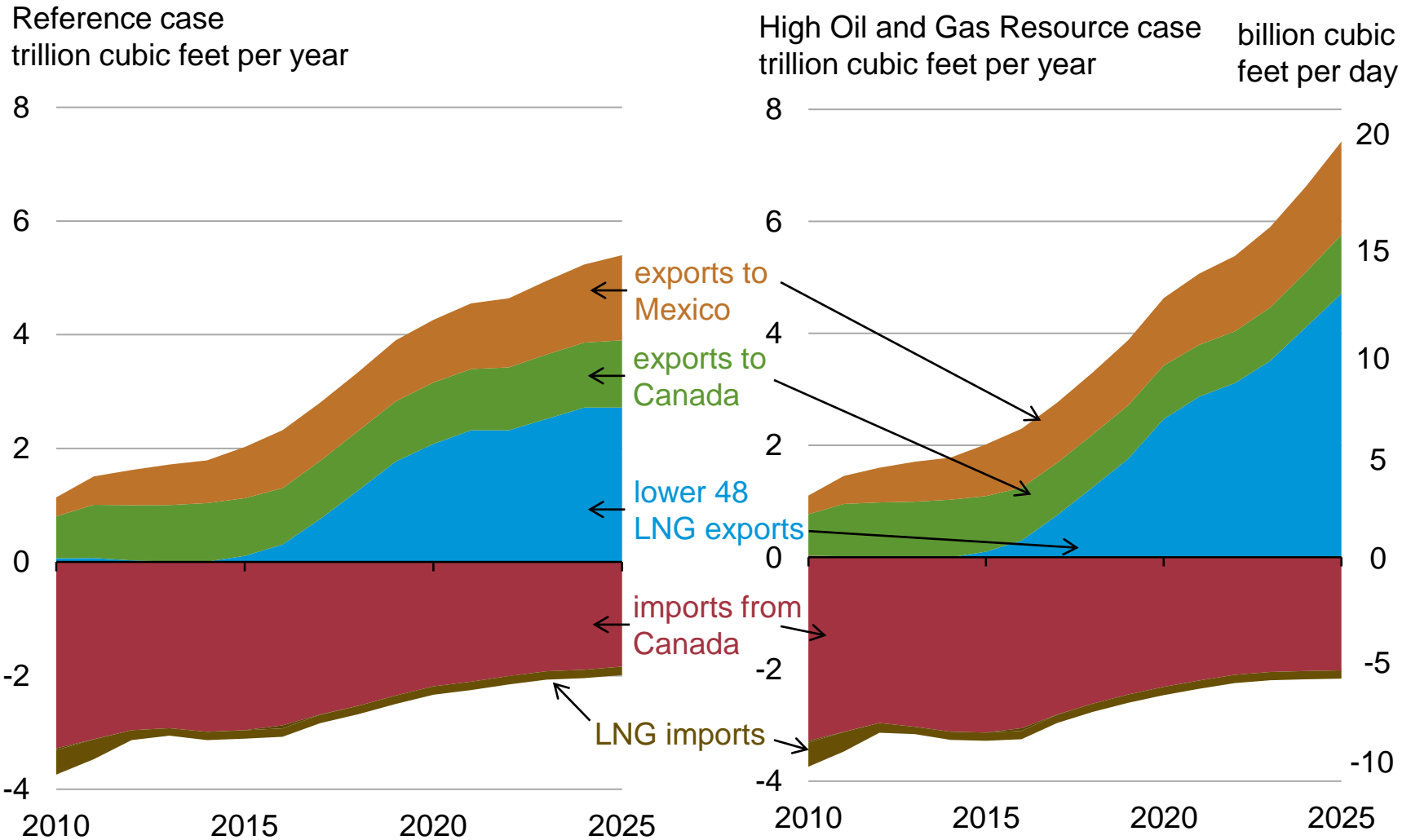
trillion cubic feet per year

billion cubic feet per day



Source: EIA, Annual Energy Outlook 2014 Reference case

# Projected U.S. natural gas trade depends on assumptions regarding resources and future technology advances

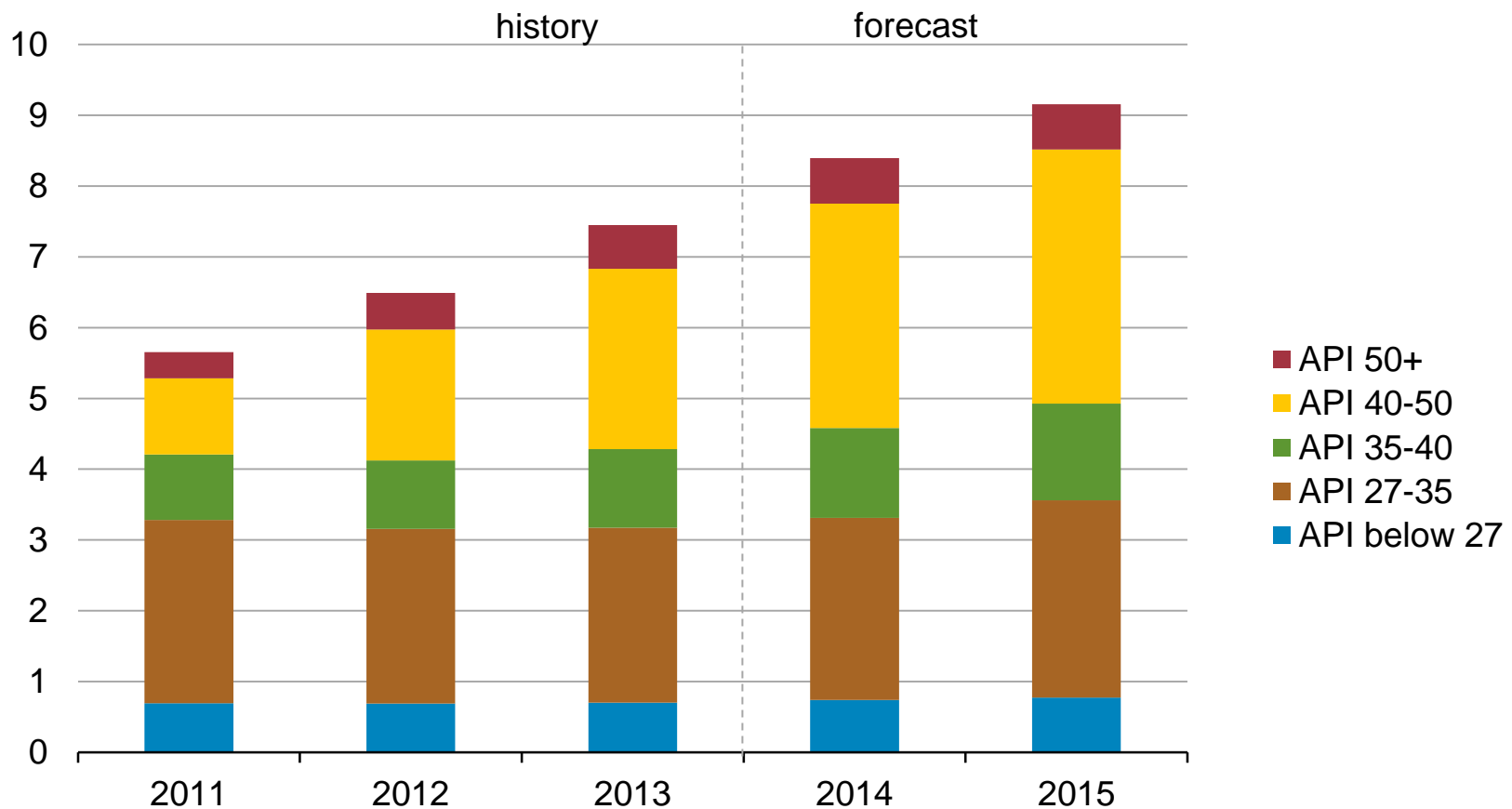


Source: EIA, Annual Energy Outlook 2014, Reference case and High Oil and Gas Resource case



# Most of the growth in production between 2011 and 2015 consists of sweet grades with API gravity of 40 or above

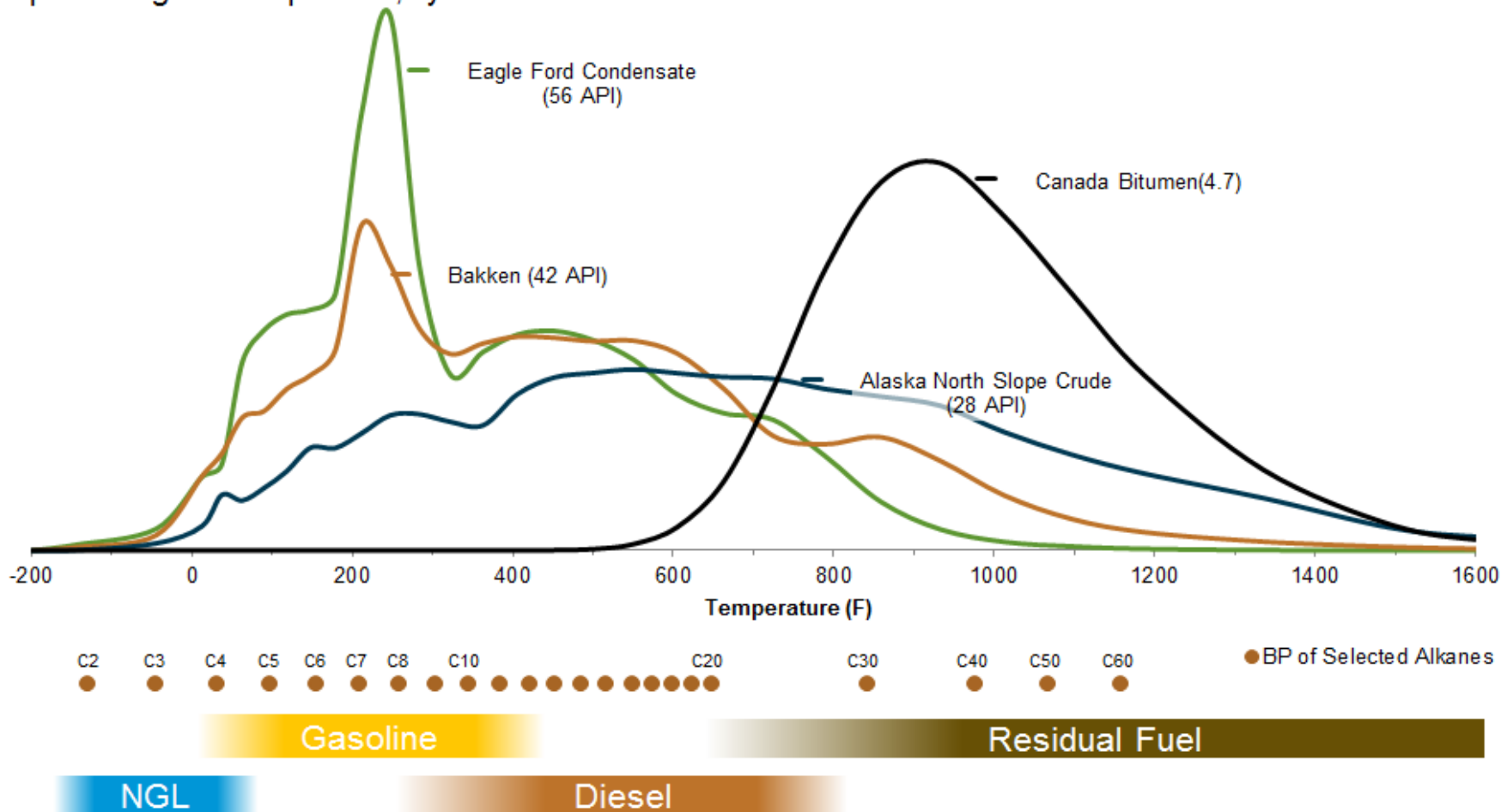
U.S. crude oil production by type  
million barrels of oil per day



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

# Crude oil and associated liquids contain a wide variety of hydrocarbons

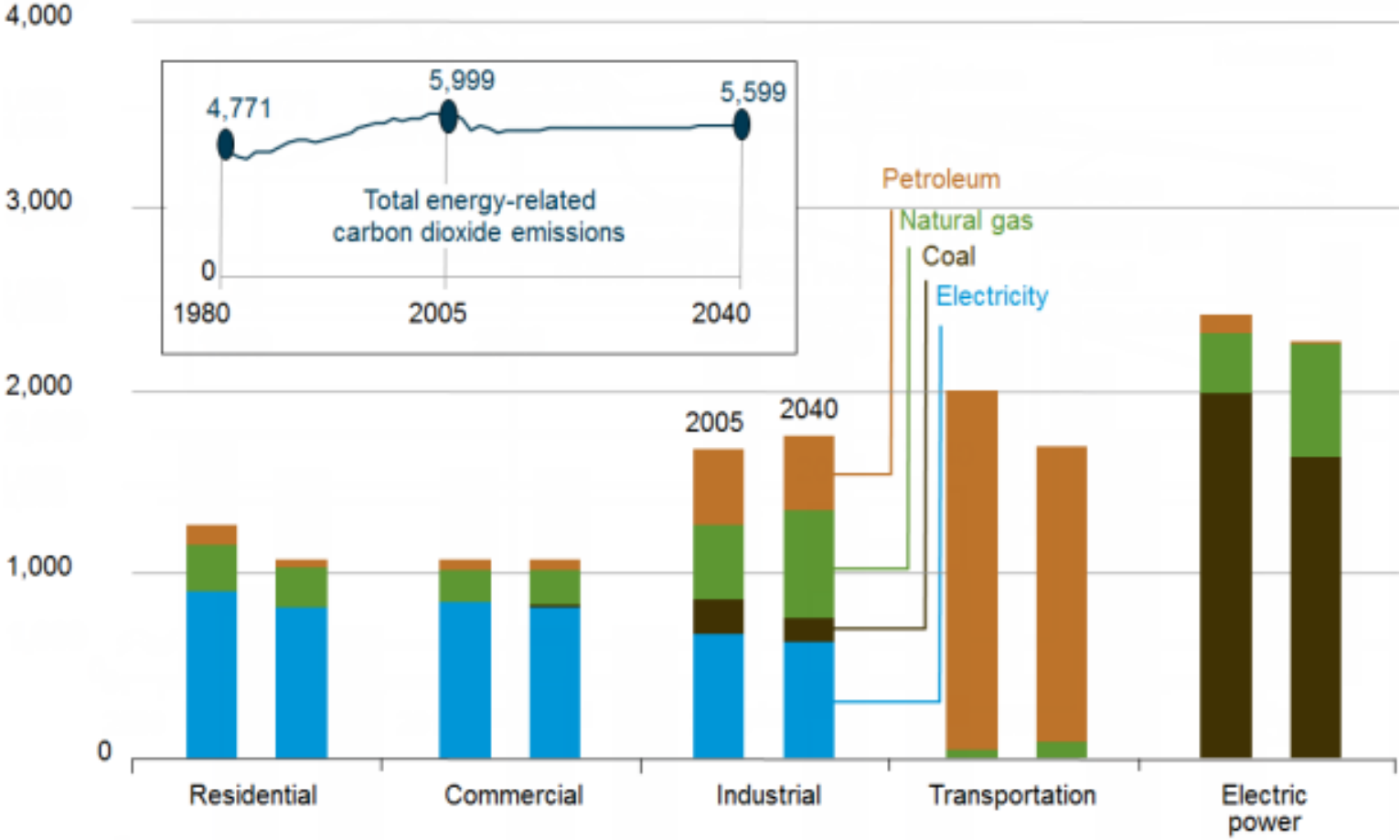
percentage of composition, by volume



Source: EIA via Harvey Crude Assay Management System

# EIA projects declines in carbon dioxide emissions for all sectors except industrial relative to 2005

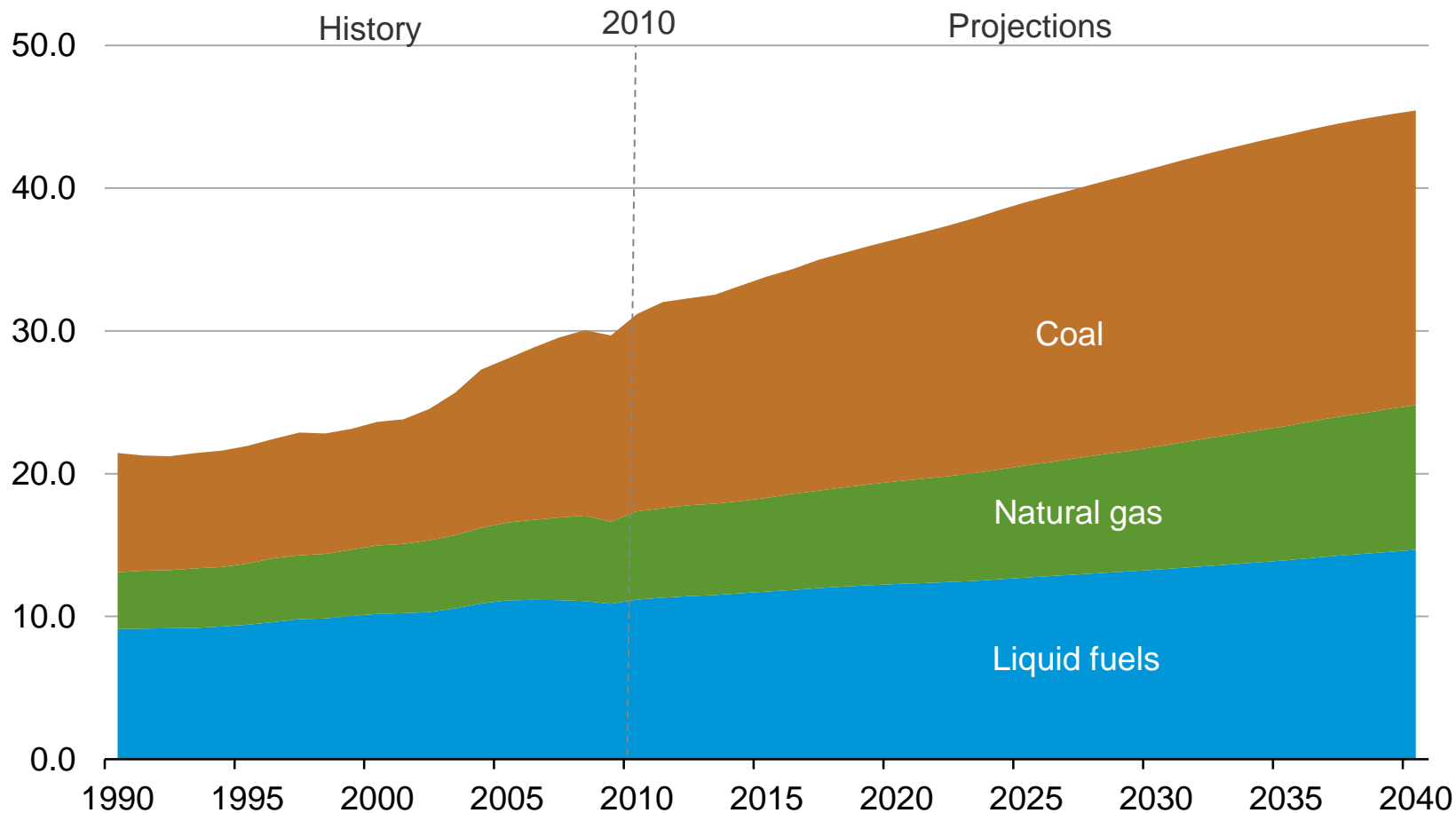
Figure MT-64. U.S. energy-related carbon dioxide emissions by sector and fuel in the Reference case, 2005 and 2040  
million metric tons



Source: EIA Annual Energy Outlook 2014

# Coal continues to account for the largest share of global energy-related carbon dioxide emissions throughout the projection

world energy-related carbon dioxide emissions by fuel  
billion metric tons



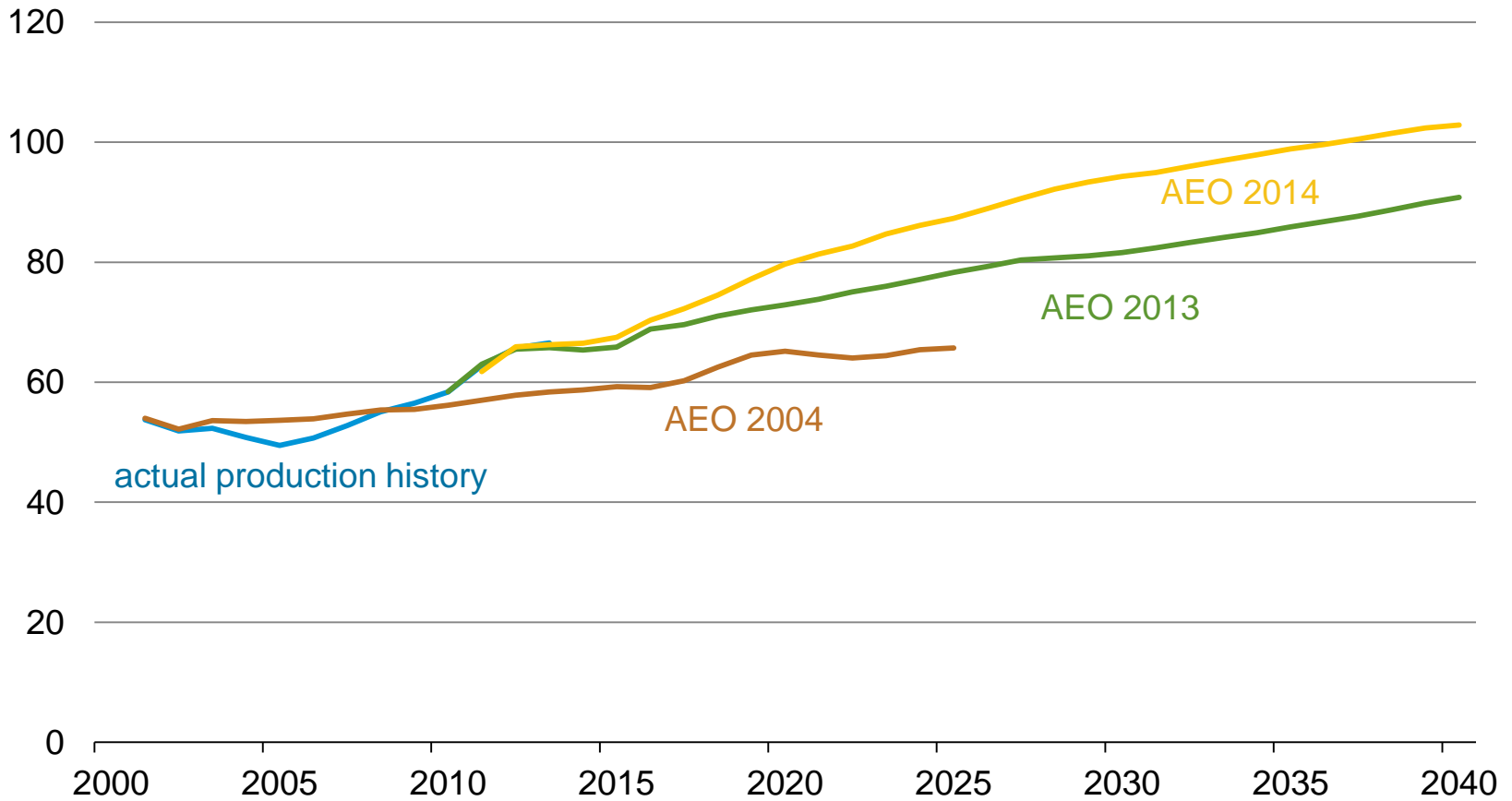
Source: EIA, International Energy Outlook 2013

## Areas of uncertainty in the outlook

- Oil prices
- China's energy demand growth; particularly in transportation
- Increasing global trade of natural gas and hydrocarbon gas liquids in addition to oil
- Global development of tight oil and shale gas resources
- Policy decisions on crude oil exports
- Impact of geopolitical tensions on energy supply
- Constraints on CO<sub>2</sub>

# EIA natural gas production forecasts were revised up significantly between 2013 and 2014

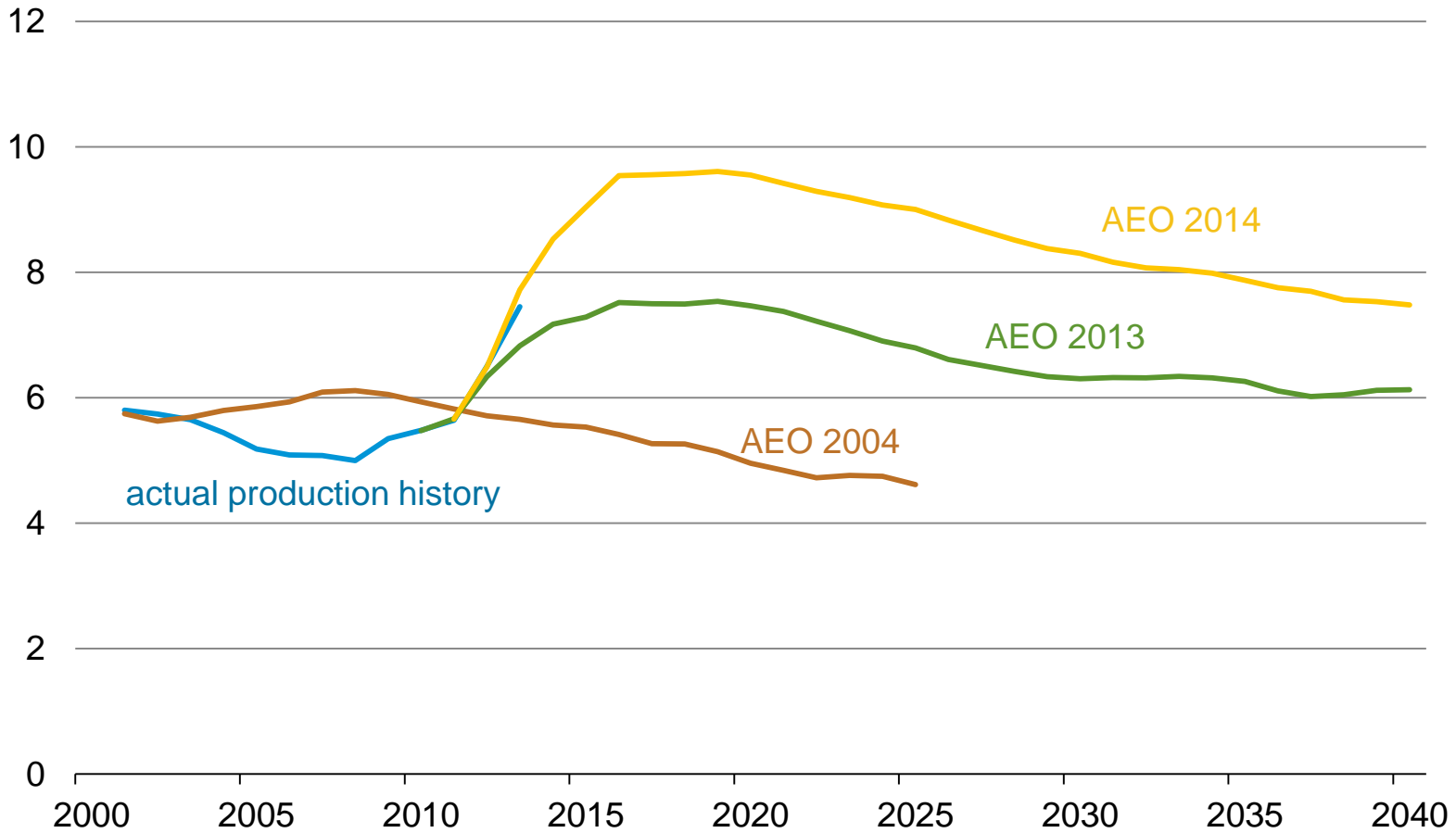
forecasted dry natural gas production  
billion cubic feet per day



Source: EIA Annual Energy Outlook; EIA Monthly Natural Gas Production Report

# EIA crude oil production forecasts were also revised up substantially between 2013 and 2014

forecasted crude oil production  
million barrels per day



Source: EIA Annual Energy Outlook; EIA via state agencies

## For more information

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

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

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

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

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

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

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

Drilling Productivity Report | [www.eia.gov/petroleum/drilling/](http://www.eia.gov/petroleum/drilling/)