

# Oil and Gas Outlook



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*For*

*Independent Petroleum Association of America*

*November 13, 2014 | Palm Beach, FL*

*By*

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*U.S. Energy Information Administration*

## Recent research

- **Growth in light sweet crude oil production**

- U.S. supply of lighter API gravity crude will continue to outpace that of medium and heavier crudes; more than 60% of EIA's forecast of production growth for 2014 and 2015 consists of sweet grades with API gravity 40+ oil; 28% of production growth in 2015 is Gulf of Mexico API gravity 27-35 medium sour oil

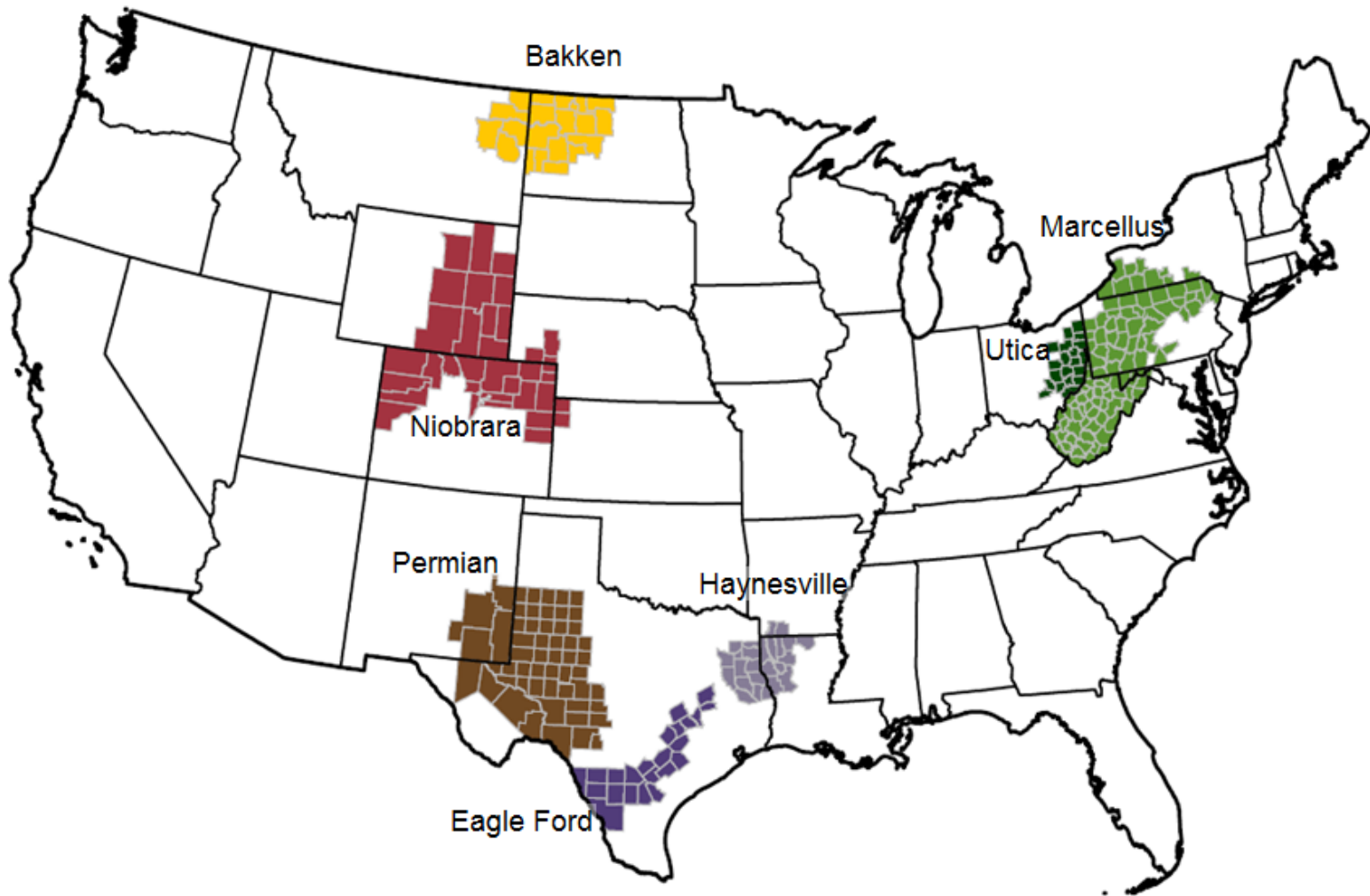
- **Updated LNG Study**

- EIA was asked to assess how significantly increased exports of LNG could affect domestic energy markets, focusing on consumption, production, and prices. The scenarios reach as high as 20 Bcf/d, with these exports phased in at a rate of 2 Bcf/d each year beginning in 2015, sourced from the lower 48 states

- **Study of the relationship of gasoline and crude oil prices**

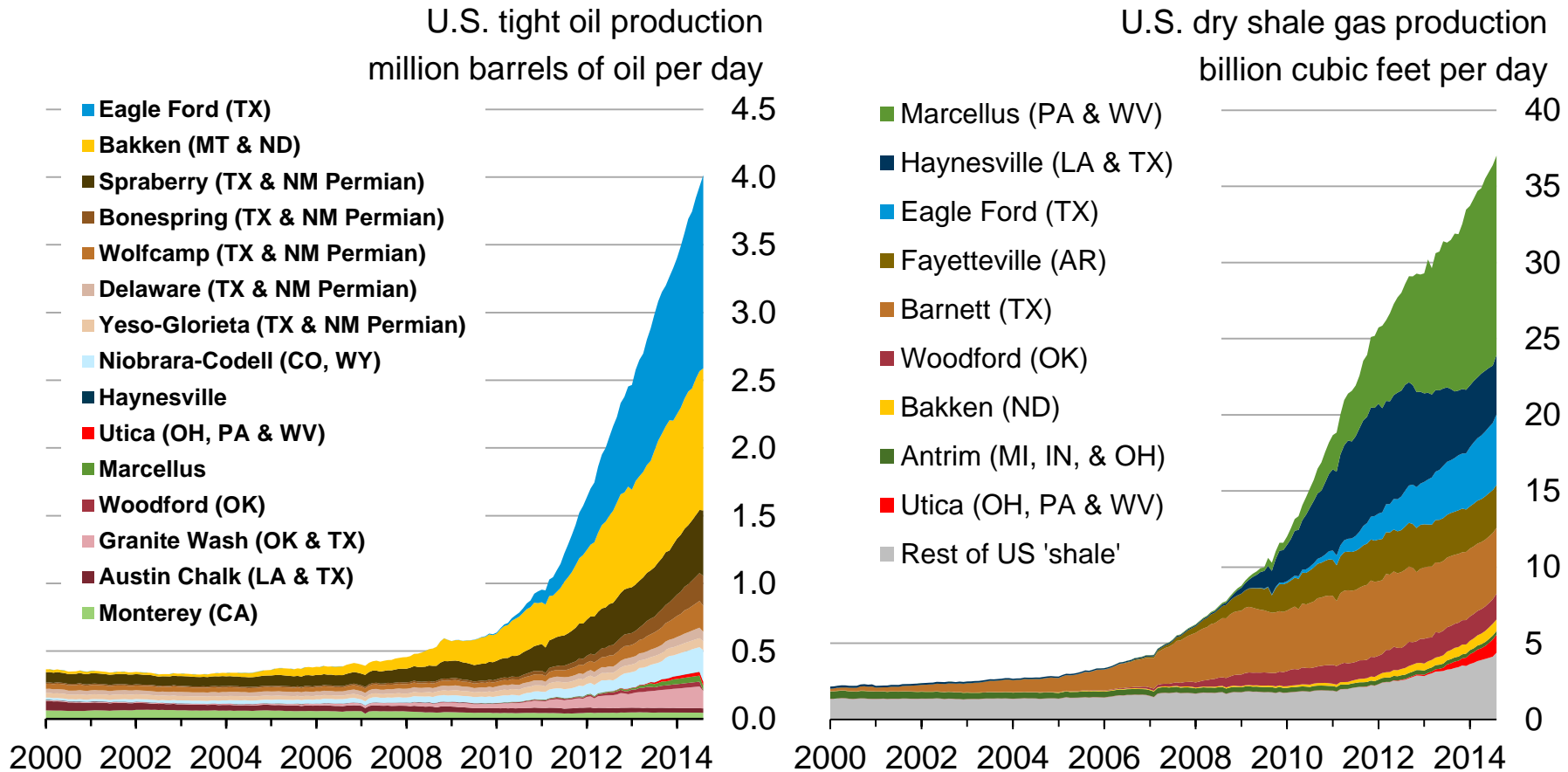
- EIA looked into the determinants of gasoline prices in the United States, and whether a change in current limitations on crude oil exports would have an effect on those prices, and the magnitude of that effect

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



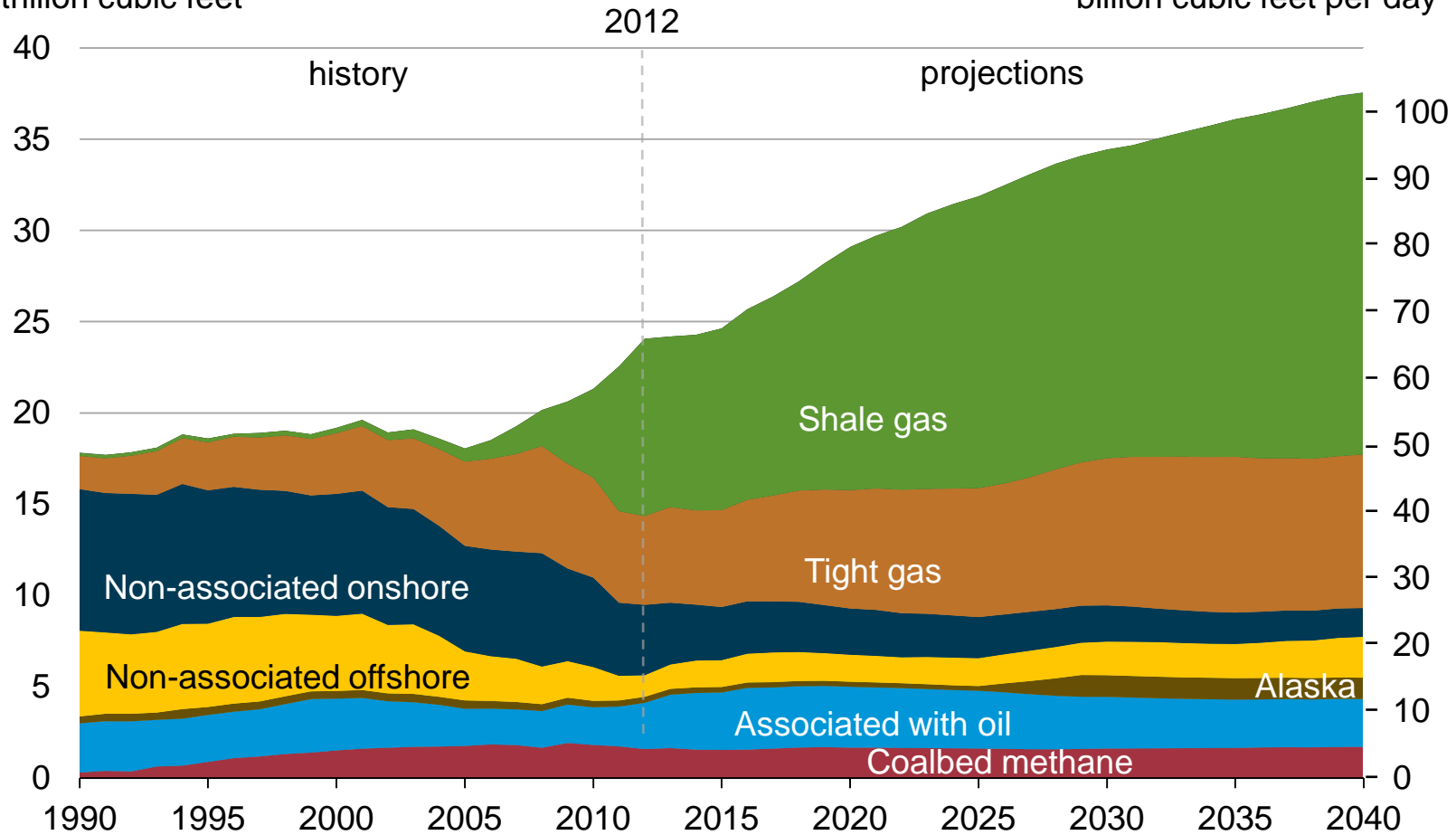
Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through August 2014 and represent EIA's official tight oil & shale gas estimates, but are not survey data. State abbreviations indicate primary state(s).

# 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

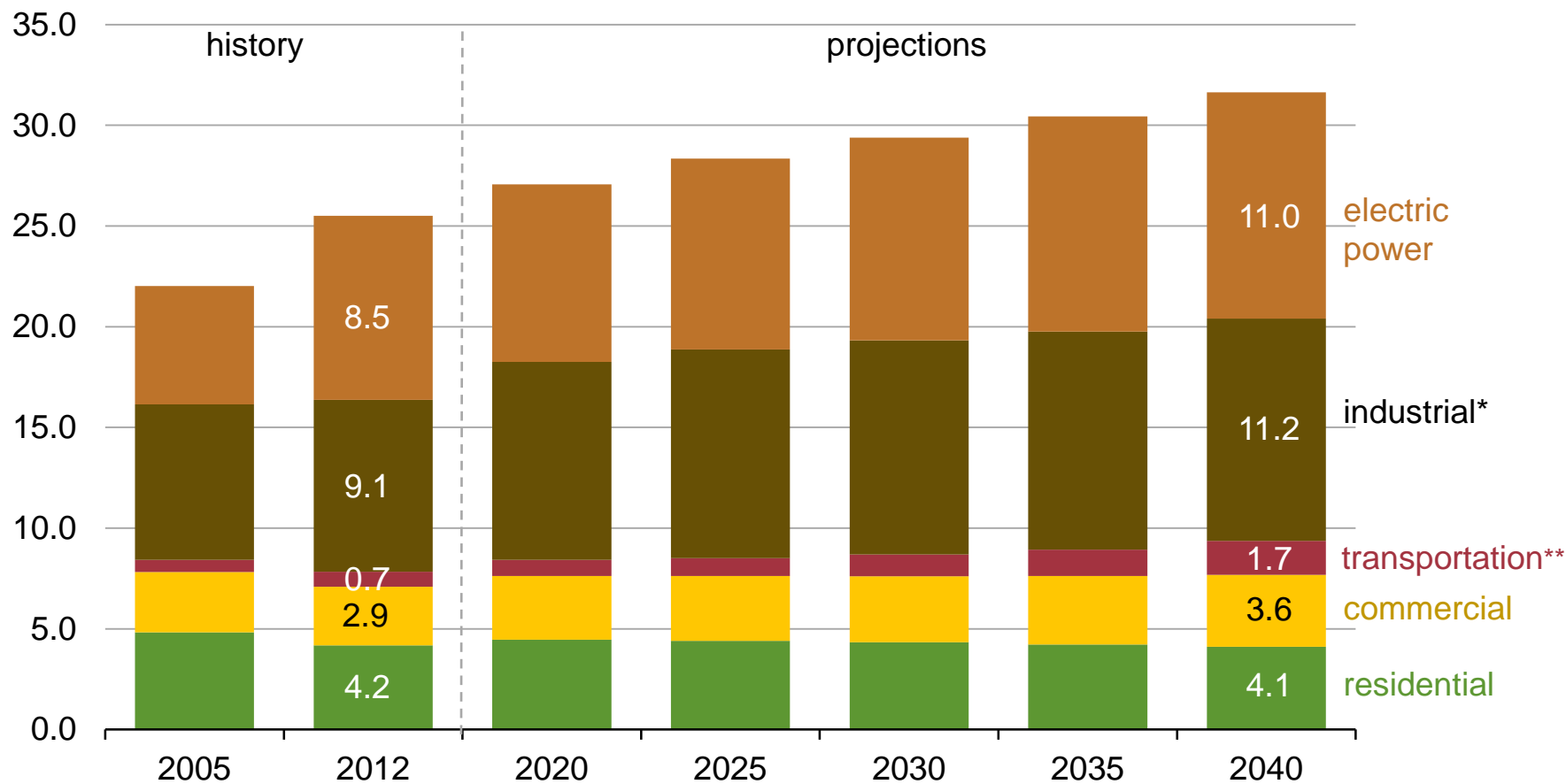
billion cubic feet per day



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

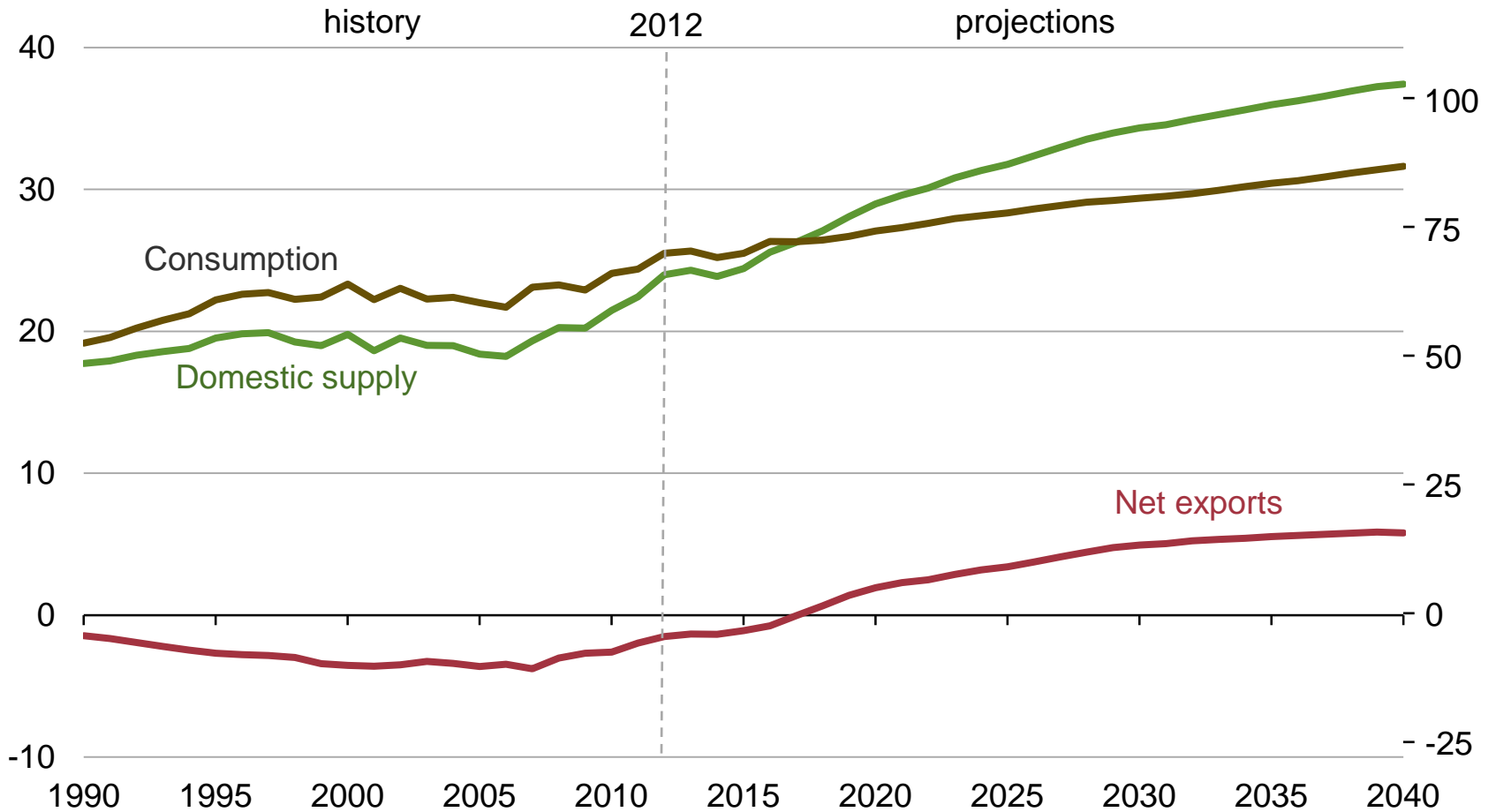
\*\*Includes pipeline fuel

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

U.S. dry natural gas

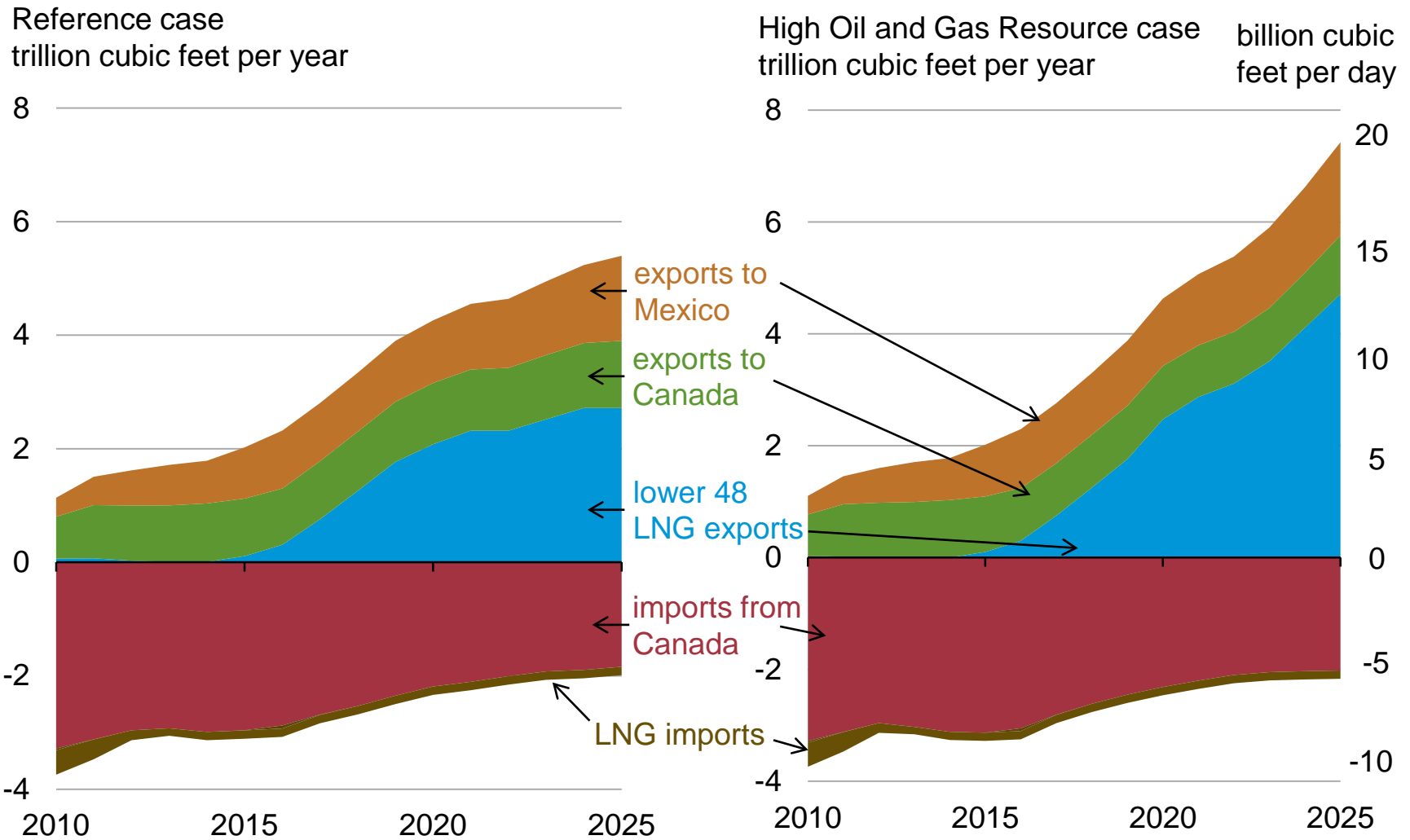
trillion cubic feet per year

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



## Key Takeaways from Updated EIA Study of added LNG exports

**Prices:** Projected average natural gas prices at the producer level average 4% to 11% above the Reference case projection across export scenarios over 2015-40, while residential natural gas prices in the export scenarios average 2% to 5% above their base projection

**Natural gas production:** With the exception of one baseline/scenario pairing, higher natural gas production satisfies 60% to 80% of the increase in natural gas demand from LNG exports over 2015-40

**Natural gas consumption:** The electric power sector accounts for most of the decrease in delivered natural gas. The electric generation mix shifts towards other generation sources, including coal and renewables, with some decrease in total generation as electricity prices rise

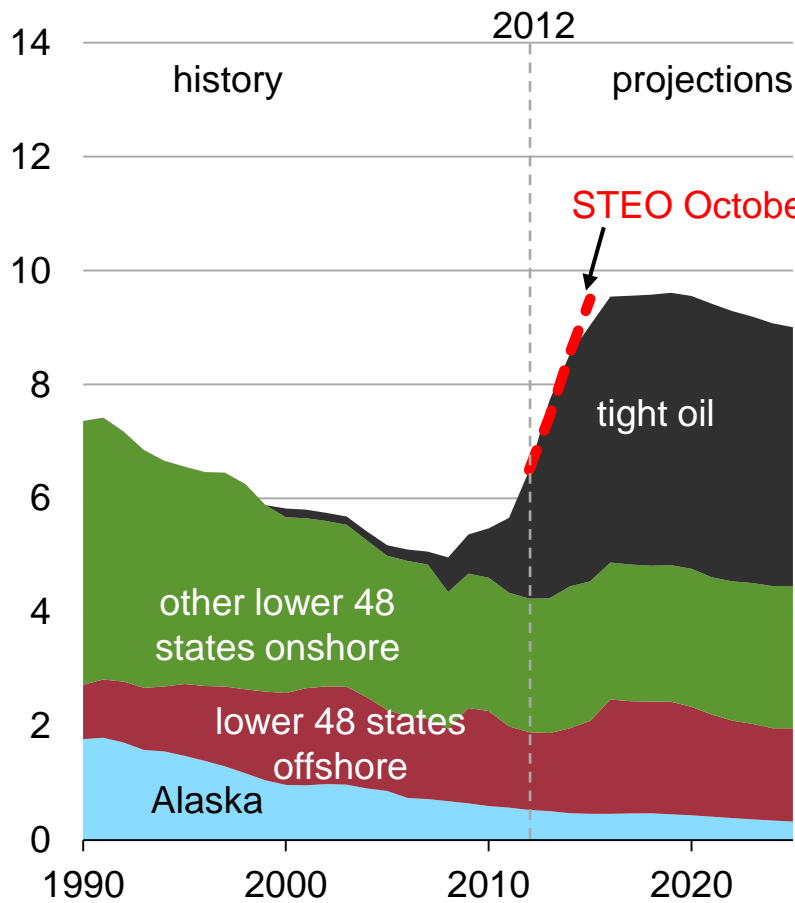
**CO<sub>2</sub> emissions:** Higher coal use leads to higher carbon dioxide output

**Expenditures:** On average, from 2015 to 2040, natural gas bills paid by end-use consumers in the residential, commercial and industrial sectors combined increase 1% to 8% across pairings of export scenarios and baselines. Increases in electricity bills paid by end-use customers range from 0% to 3%

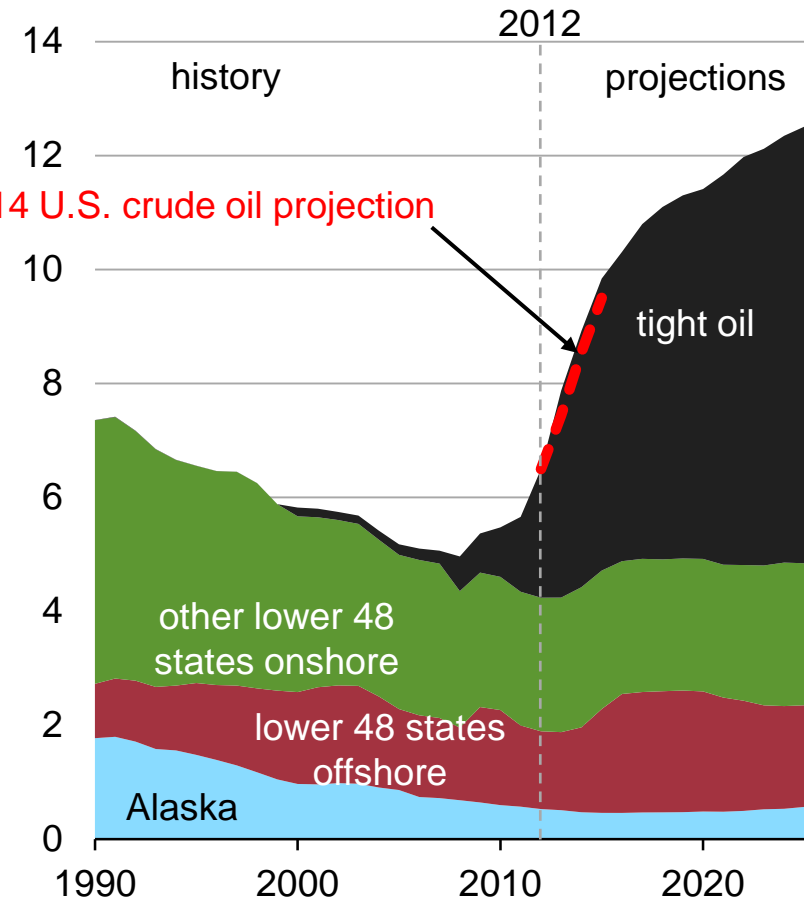
**Economic gains:** Changes in the level of GDP relative to baseline range from 0.05% to 0.17% and generally increase with the amount of added LNG exports required to fulfill an export scenario; EIA's NEMS model may understate the economic benefits

# 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



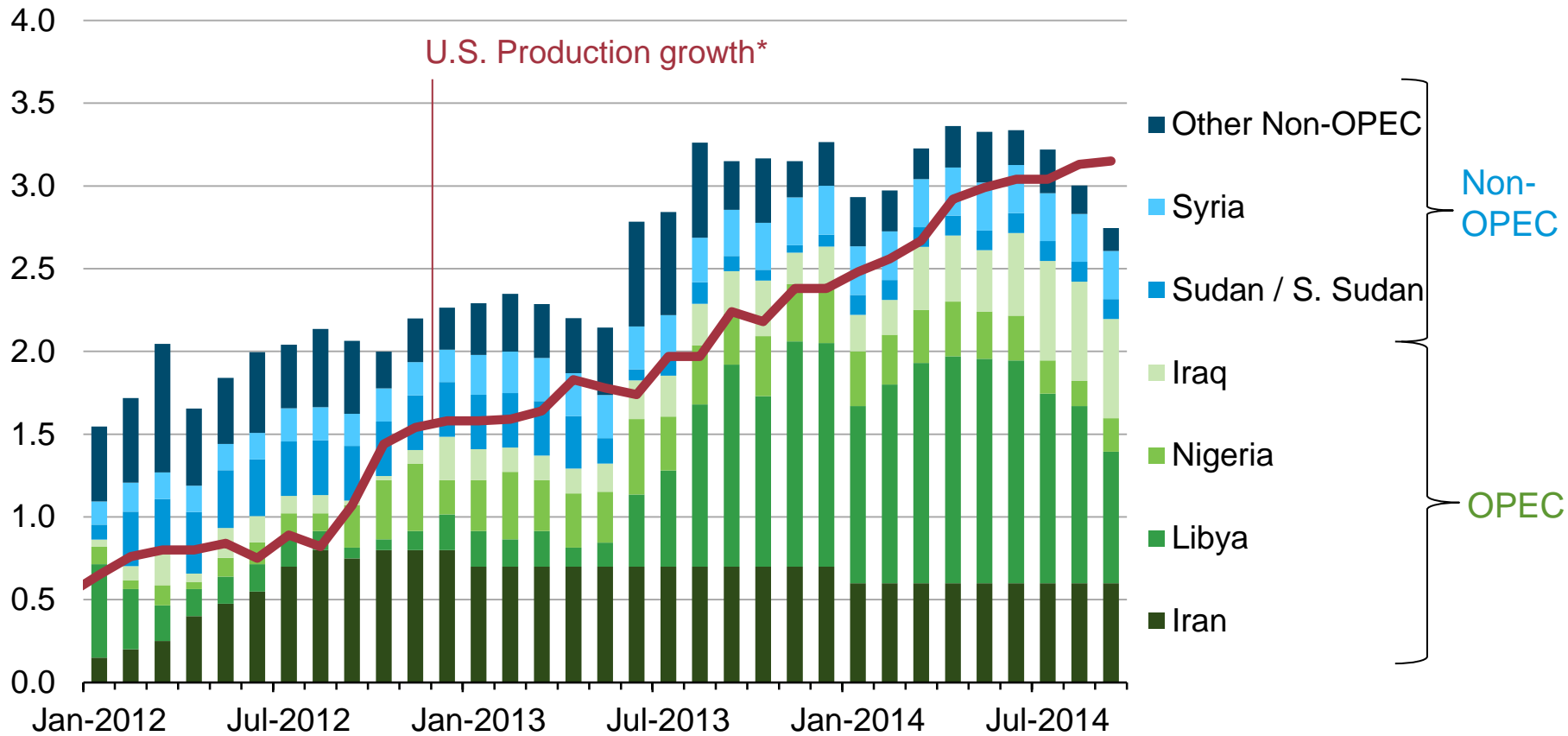
High Oil and Gas Resource case  
million barrels per day



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

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

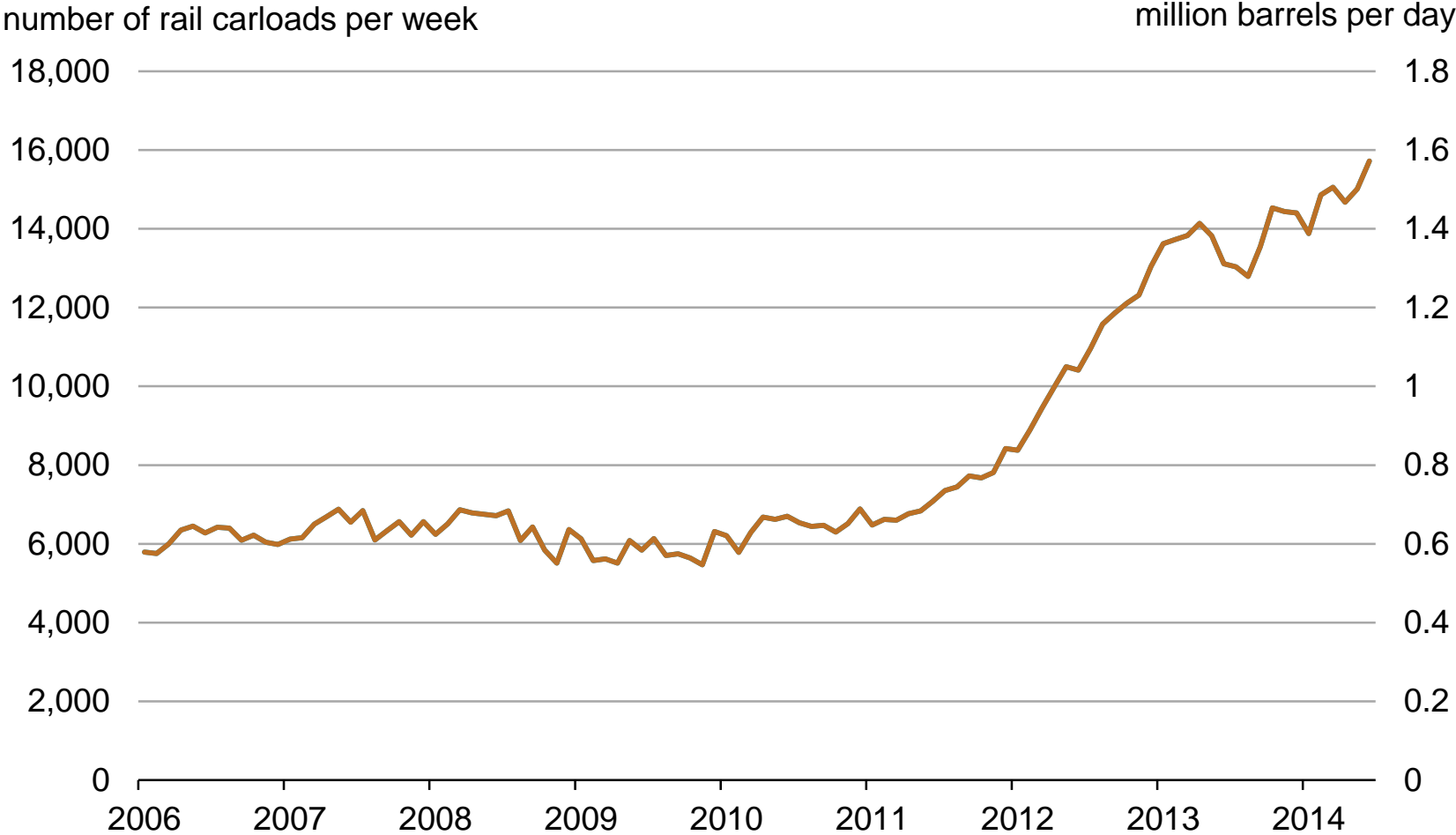
estimated unplanned crude oil production outages  
million barrels per day



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

\*monthly production delta versus Jan. 2011 production level

# U.S. rail carloads of crude oil and petroleum products exceed 1.5 million b/d in 2014

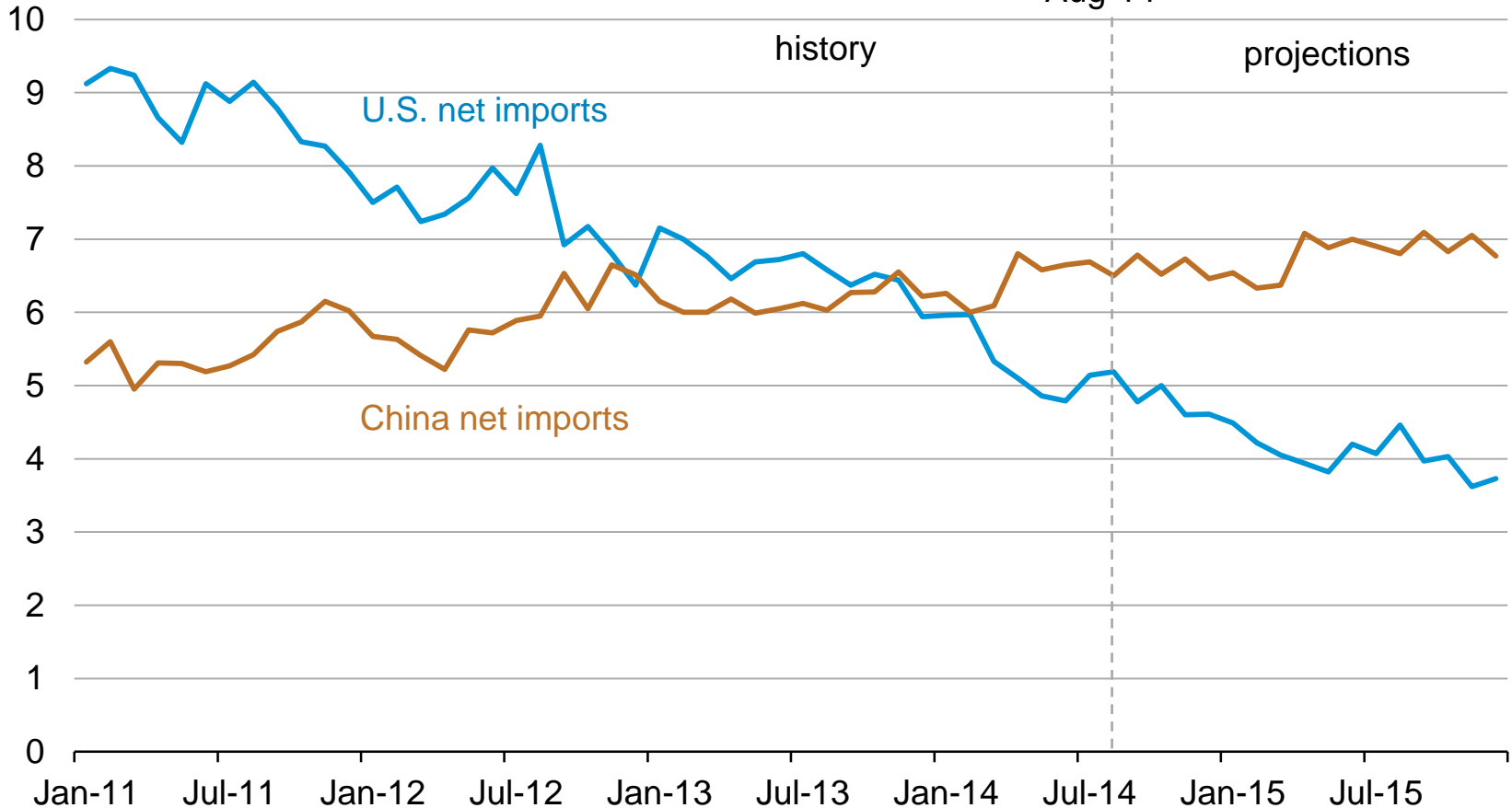


Source: U.S. Energy Information Administration, based on Association of American Railroads

# Growing U.S. oil production and rising demand in China have together made China the world's largest net oil importer

net imports for China and the United States

million barrels per day



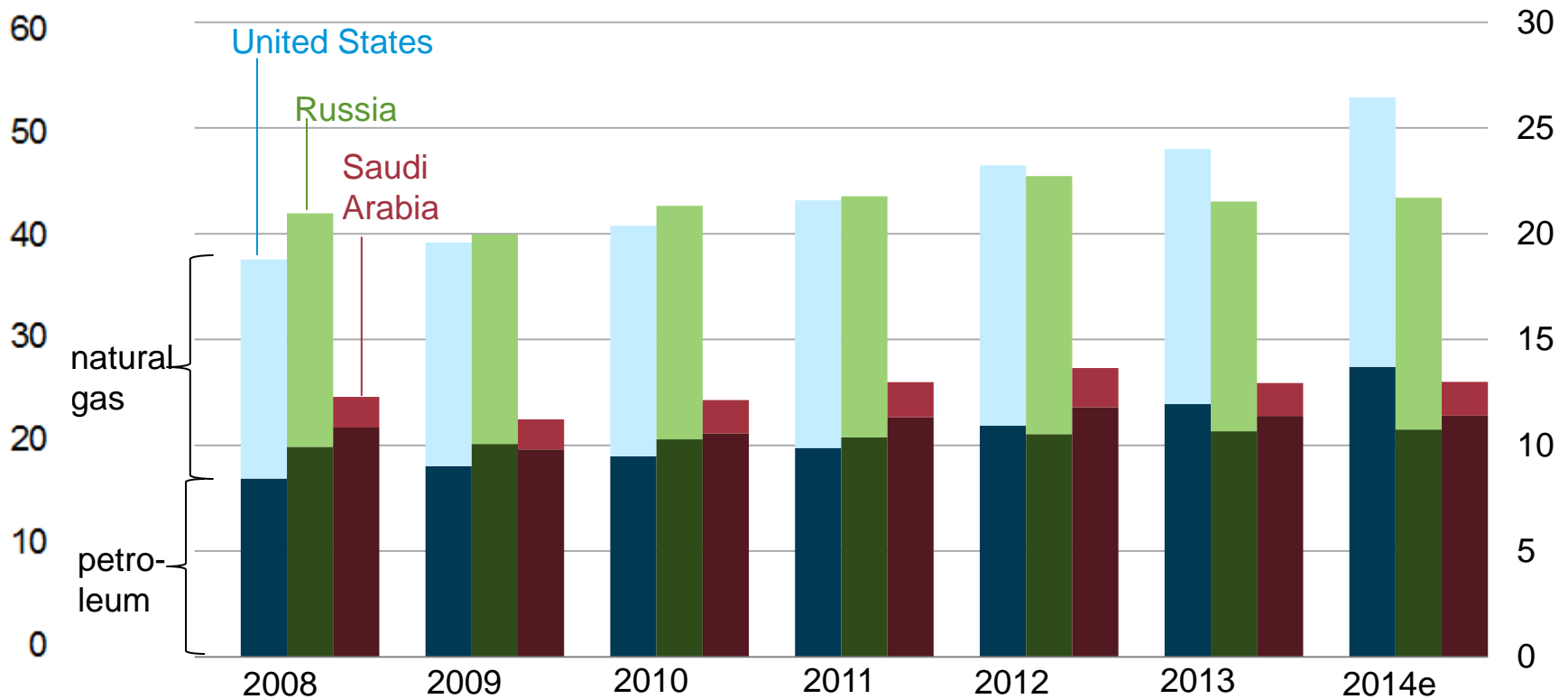
Note: Net oil imports are defined as total liquid fuels consumption less domestic production

Source: EIA, Short-Term Energy Outlook, October 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

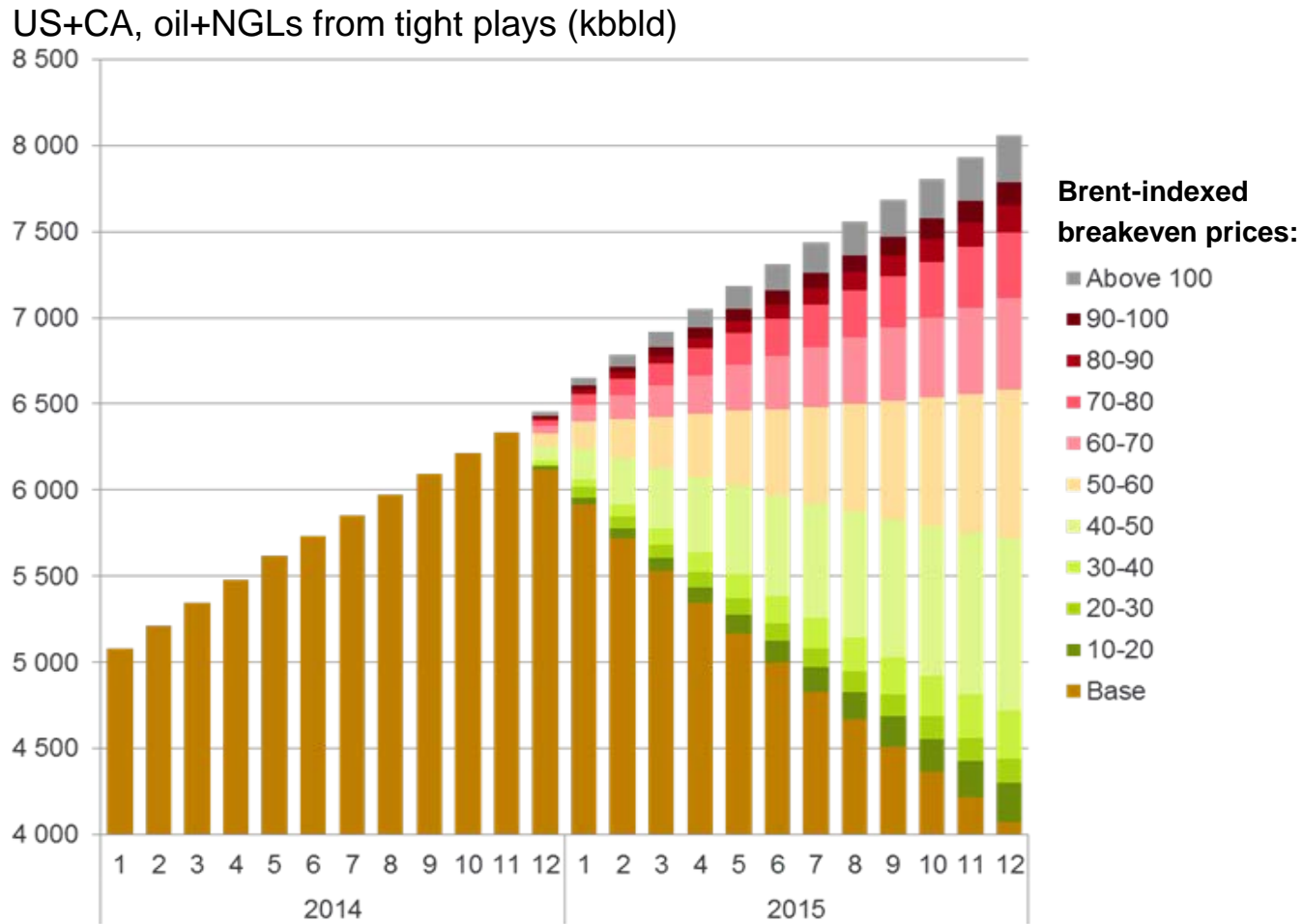
million barrels per day of oil equivalent



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)

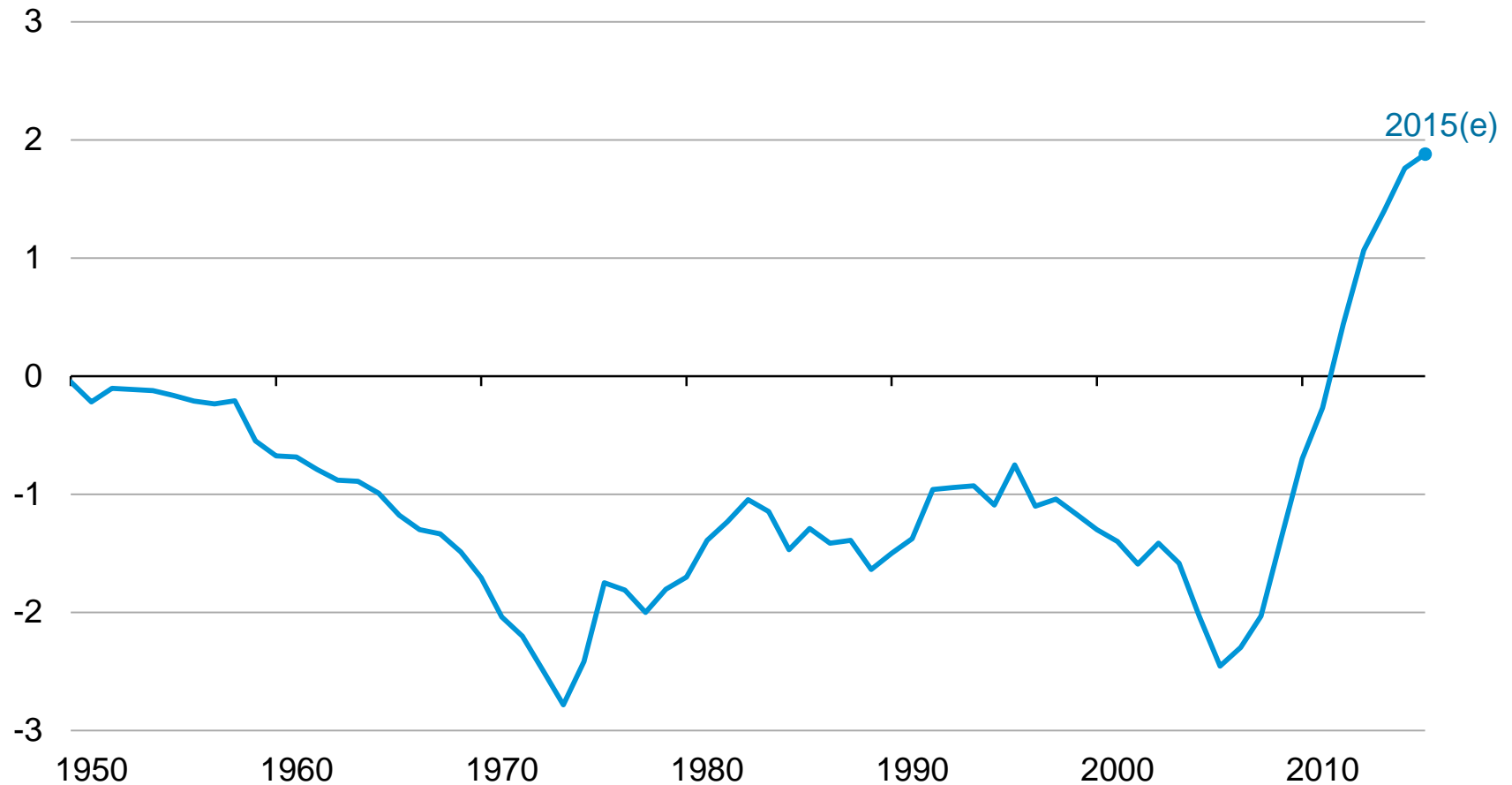
# Effect of low oil prices on U.S. shale oil production



Source: Rystad Energy North America Quarterly Shale Report

# U.S. is already a major net exporter of petroleum products

U.S. petroleum product net exports  
million barrels per day



Source: EIA, Annual Energy Outlook 2014 Reference case and Short Term Energy Outlook

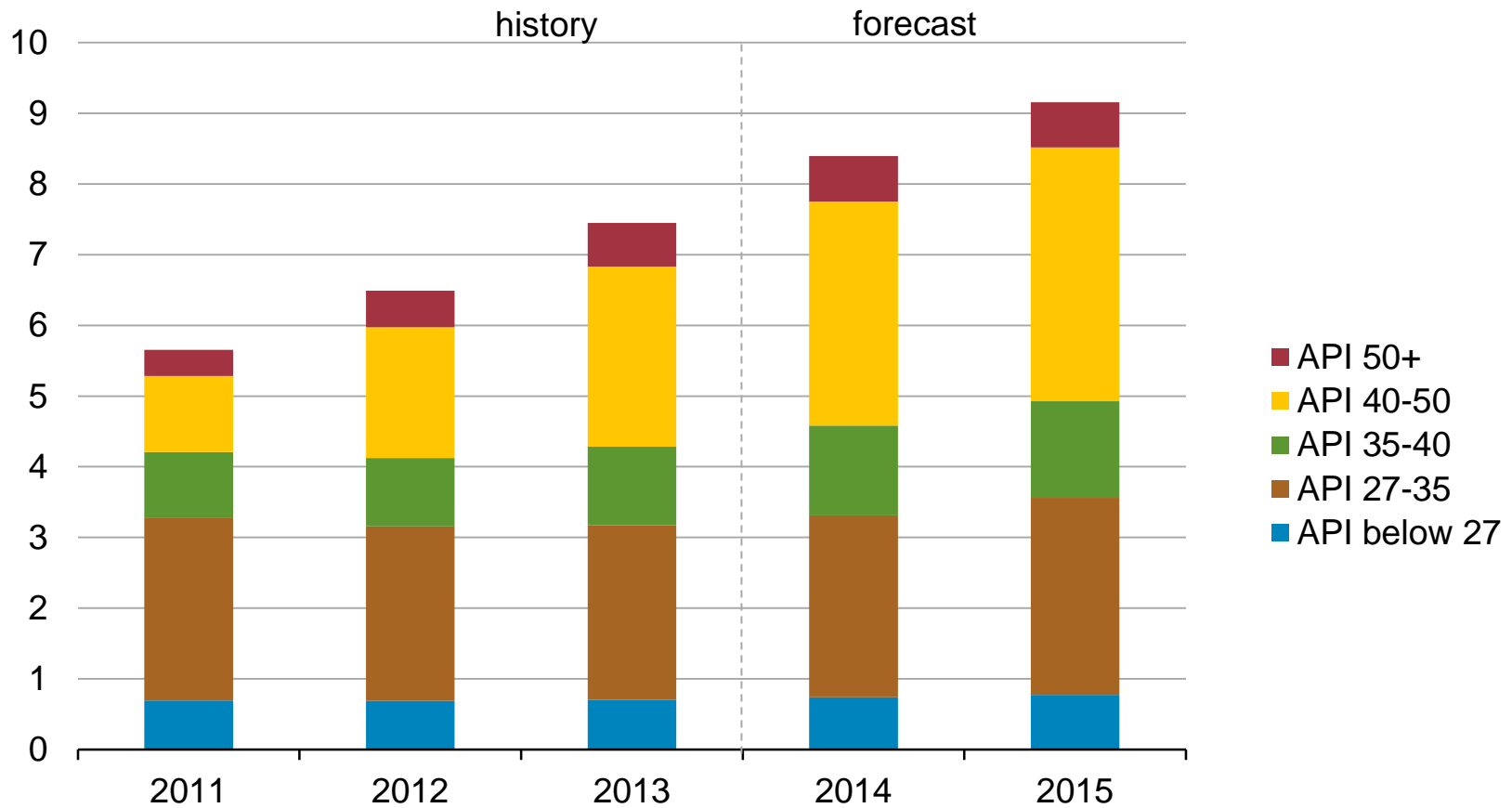


## Key observations from EIA's analysis of the relationship between gasoline and crude oil prices

- Prices of Brent crude oil, an international benchmark, are more important than the price of West Texas Intermediate (WTI), a domestic benchmark, for determining gasoline prices in all four U.S. regions studied
- The effect that a relaxation of current limitations on U.S. crude oil exports would have on U.S. gasoline prices depends on its effect on international crude prices rather than its effect on domestic crude prices
- Gasoline is a globally traded commodity, and prices are highly correlated across global spot markets
- Gasoline supply, demand, and trade in various regions are changing; U.S. Gulf Coast and Chicago spot gasoline prices, which are closely linked, are now often the lowest in the world during fall and winter months

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

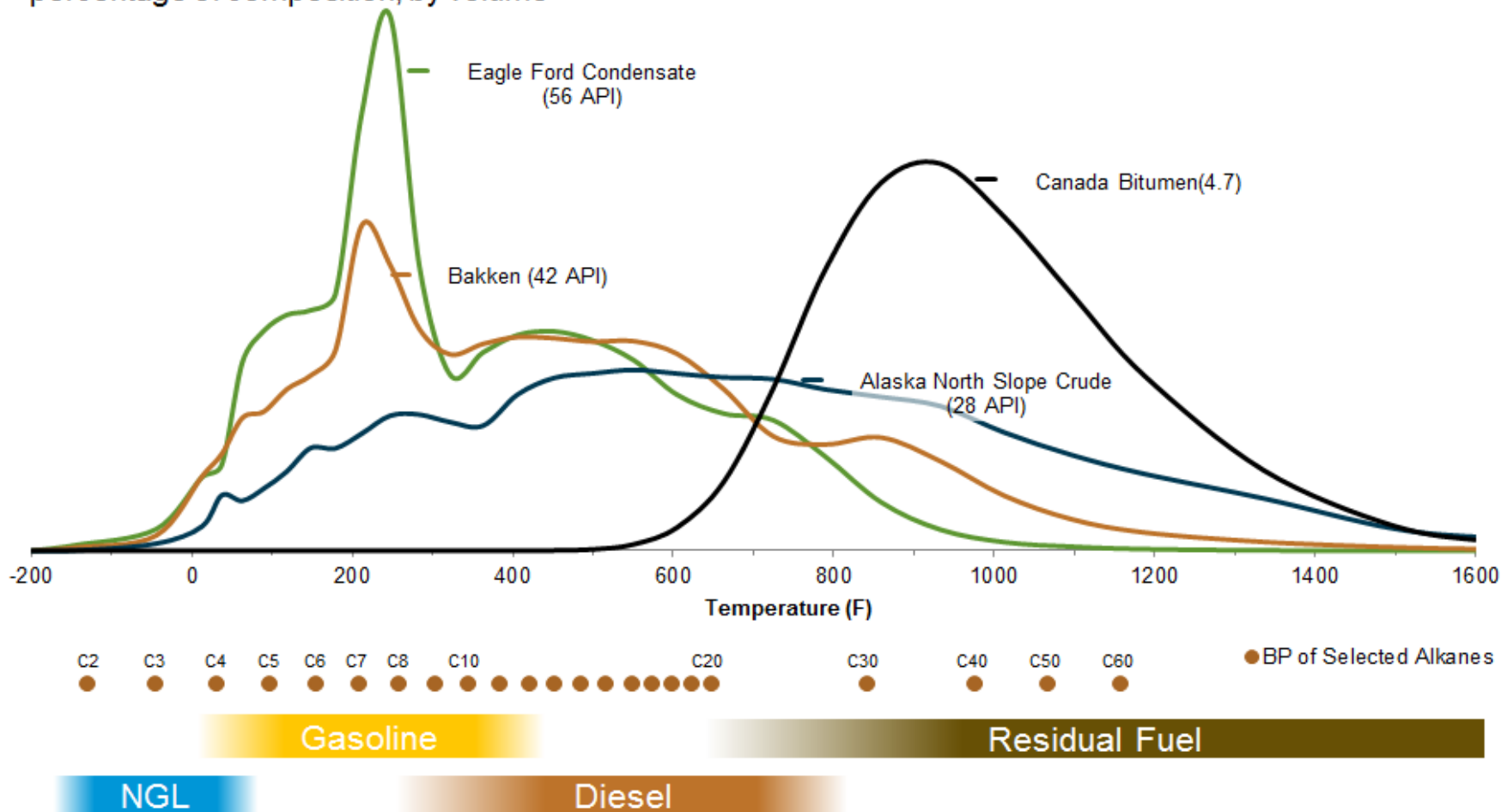
U.S. crude oil production by type  
million barrels of oil per day



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

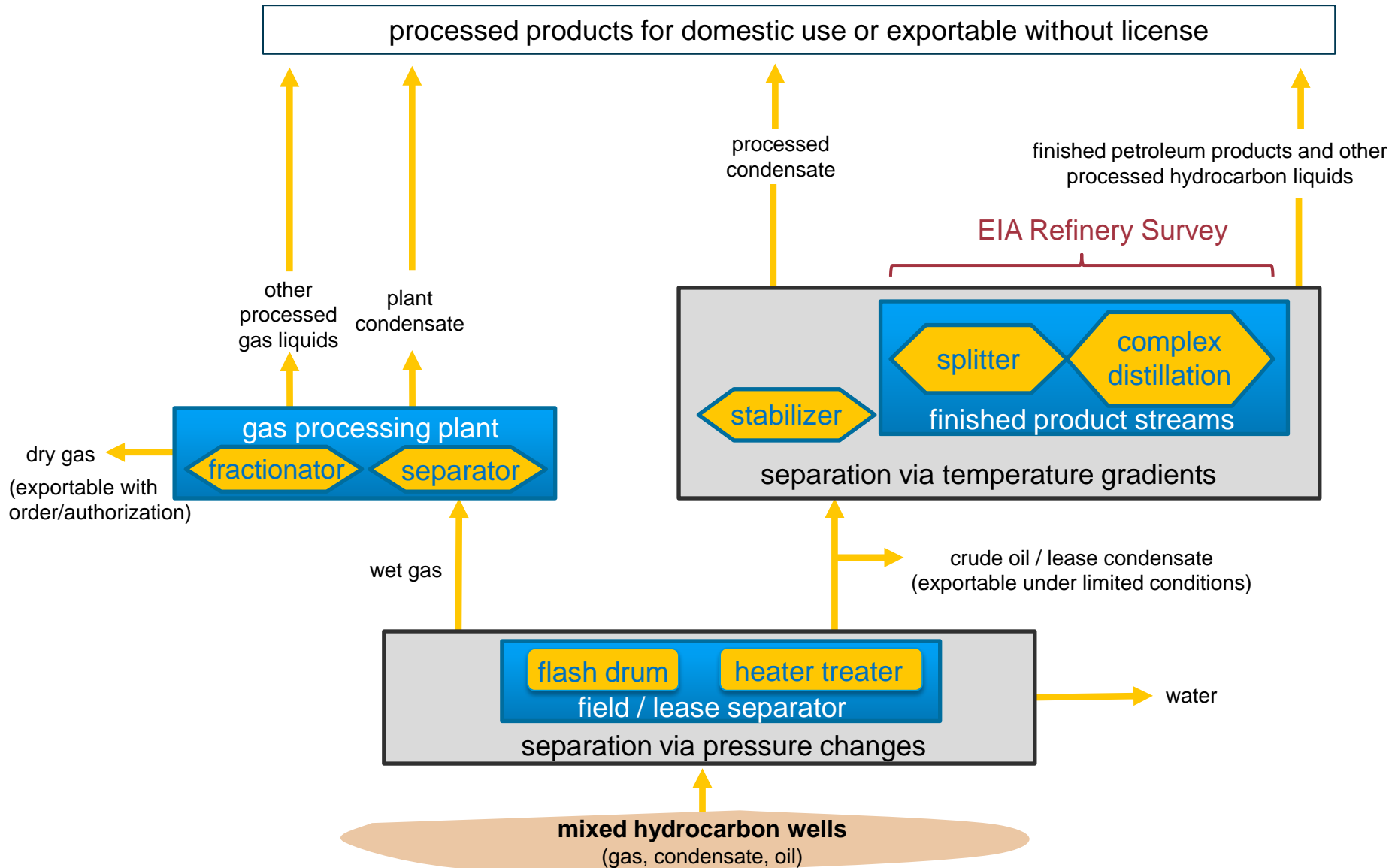
# Crude oil and associated liquids contain a wide variety of hydrocarbons

percentage of composition, by volume



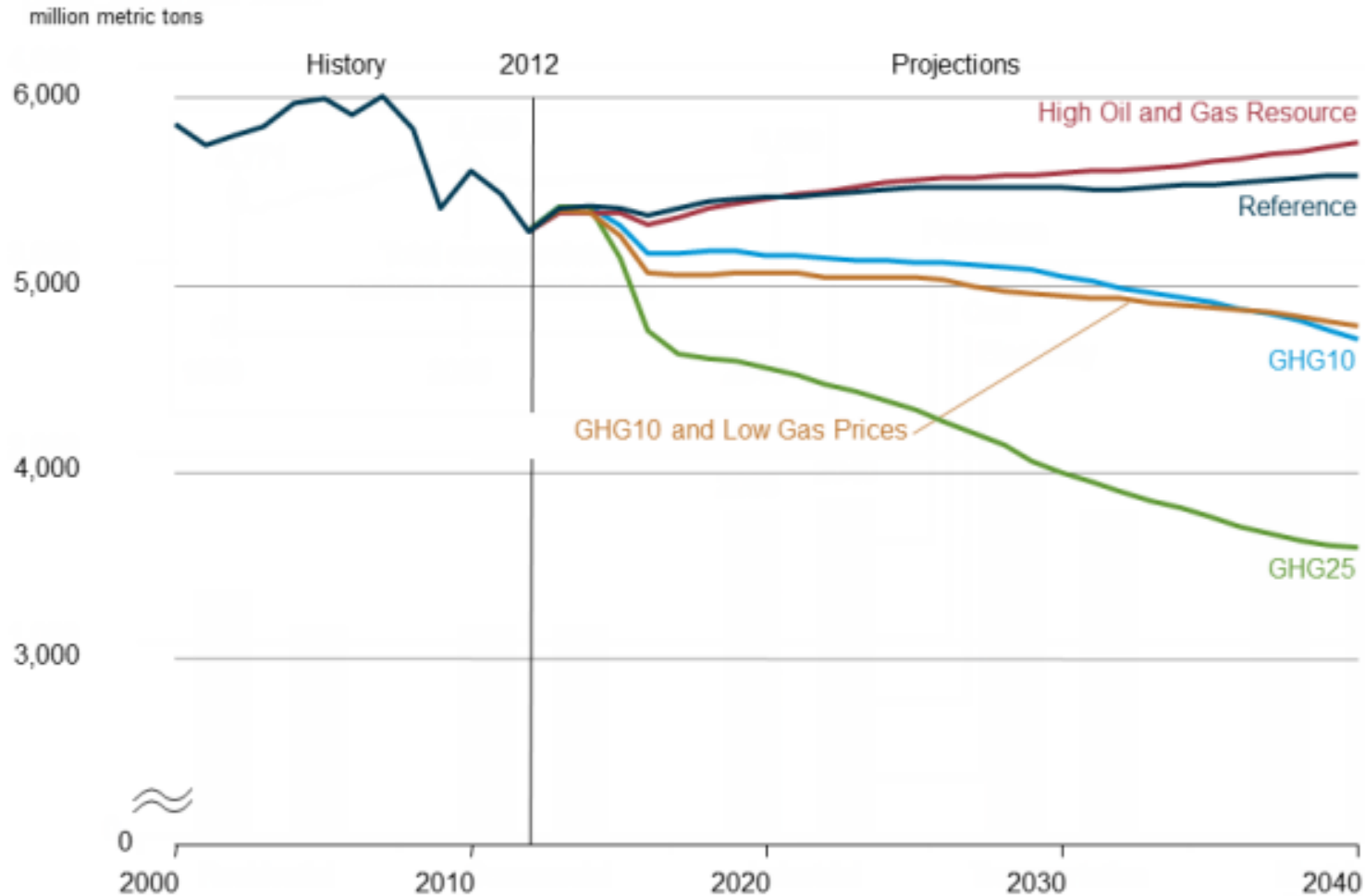
Source: EIA via Harvey Crude Assay Management System

# Distillation processes and resulting products



# In the AEO reference case, annual carbon dioxide emissions rise slowly, but remain below levels reached in the 2000s

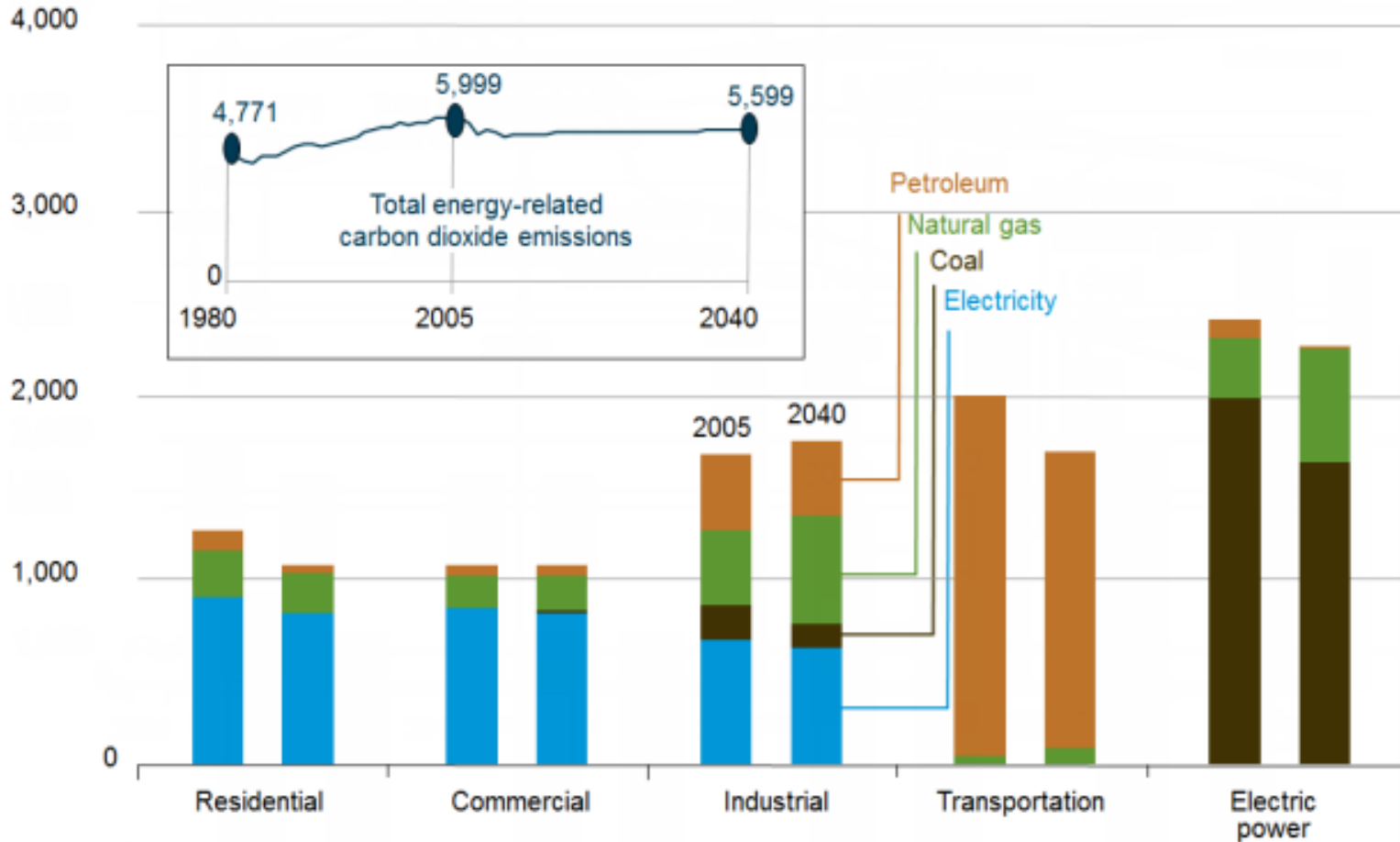
Figure MT-66. Energy-related carbon dioxide emissions in five cases, 2000-40



Source: EIA Annual Energy Outlook 2014

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

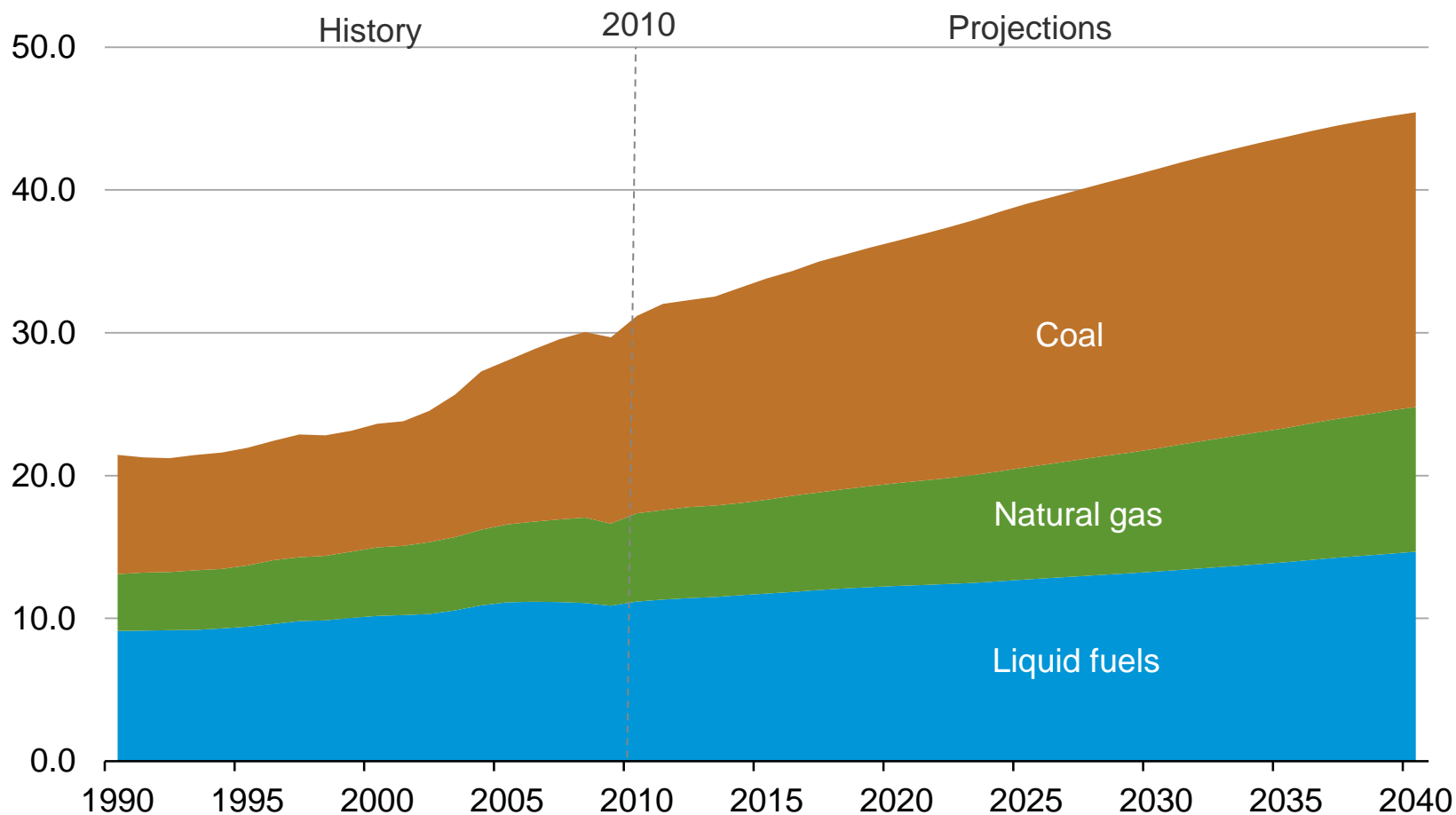
Figure MT-64. U.S. energy-related carbon dioxide emissions by sector and fuel in the Reference case, 2005 and 2040  
million metric tons



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>



## 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/)