

The U.S. Energy Outlook



for

Track II Energy Dialogue

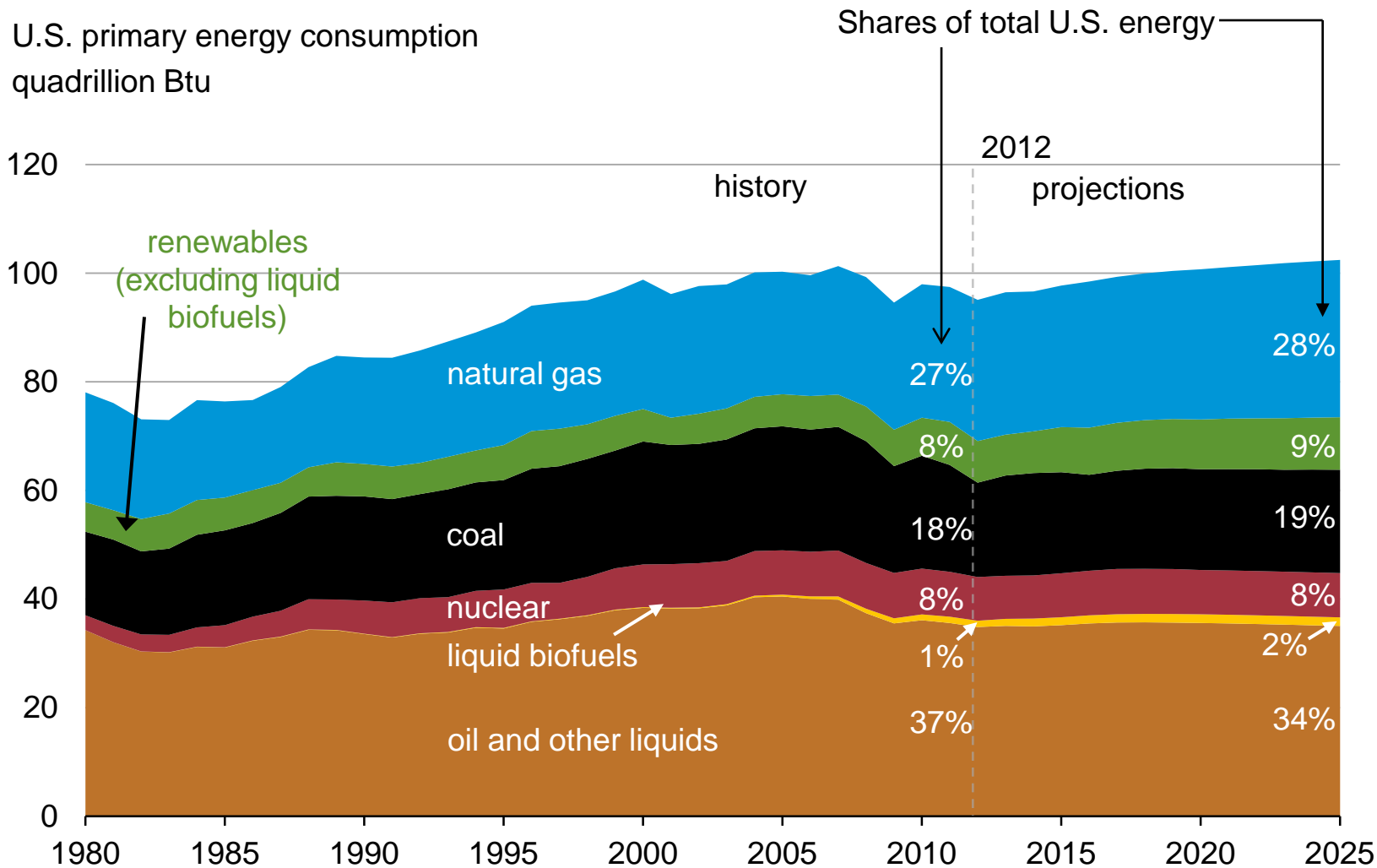
New York, NY

September 11-12, 2014

by

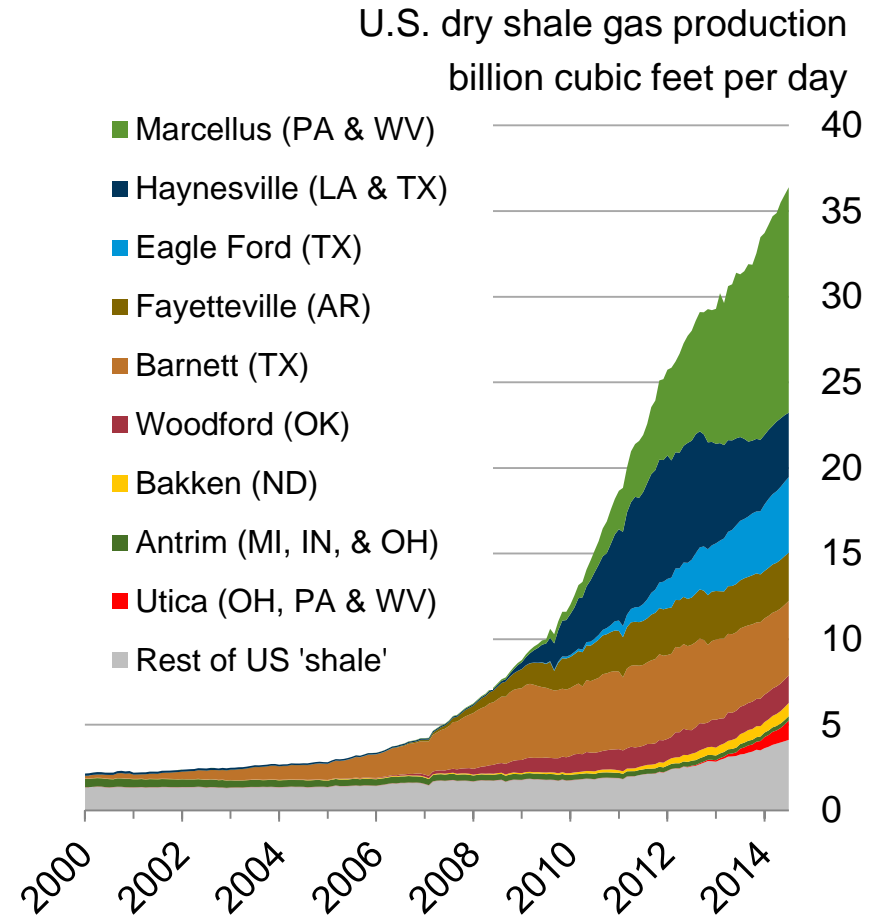
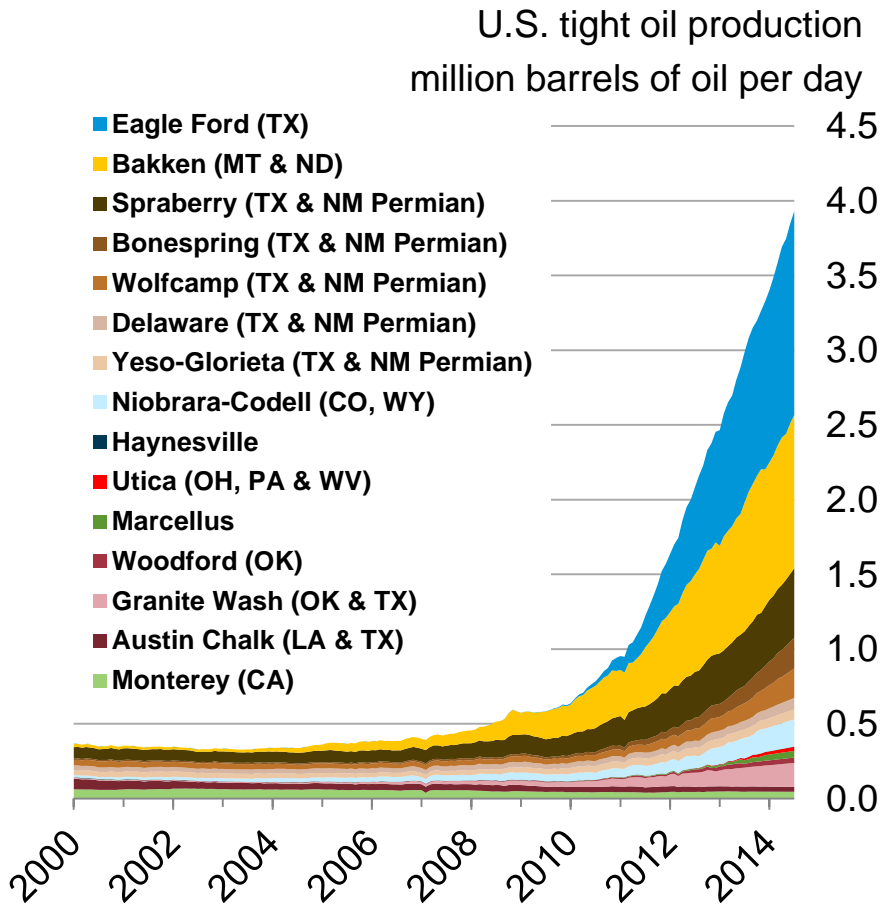
Howard Gruenspecht, Deputy Administrator

U.S. energy use grows slowly over the projection reflecting steady growth in GDP offset by improving energy efficiency



Source: EIA, Annual Energy Outlook 2014 Early Release

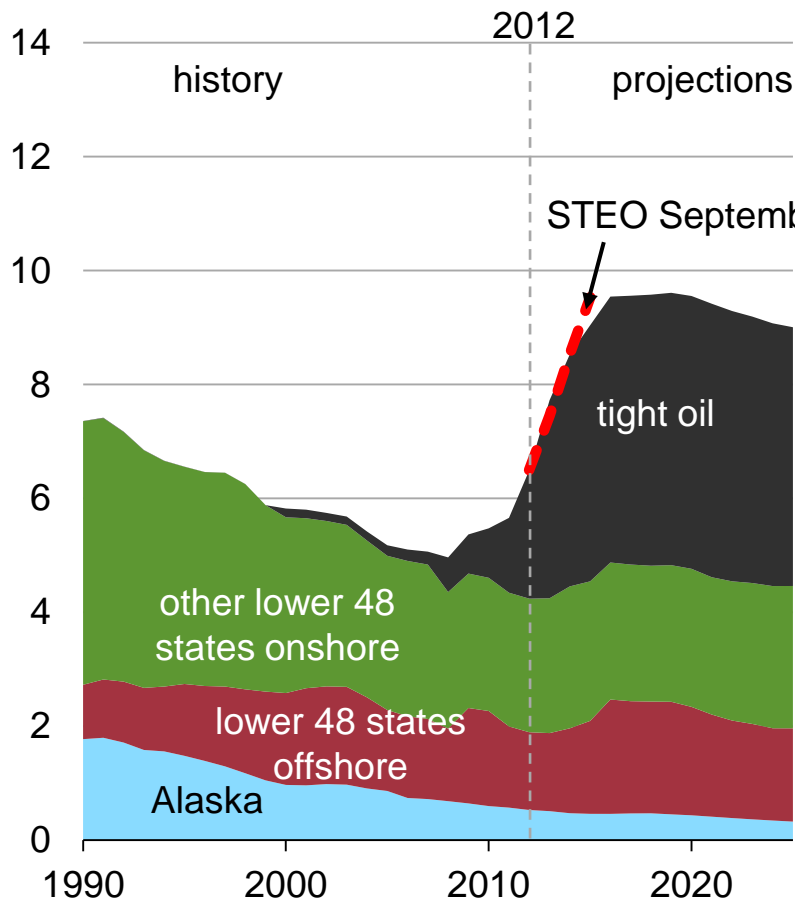
The U.S. has experienced a rapid increase in natural gas and oil production from shale and other tight resources



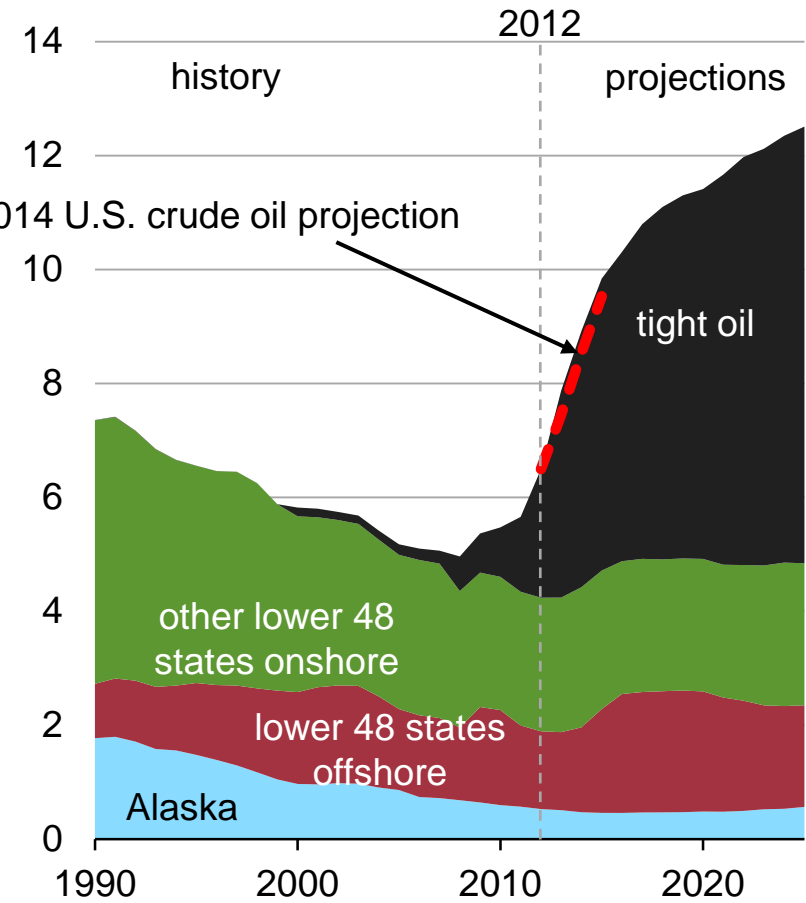
Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through July 2014 and represent EIA's official tight oil & shale gas estimates, but are not survey data. State abbreviations indicate primary state(s).

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

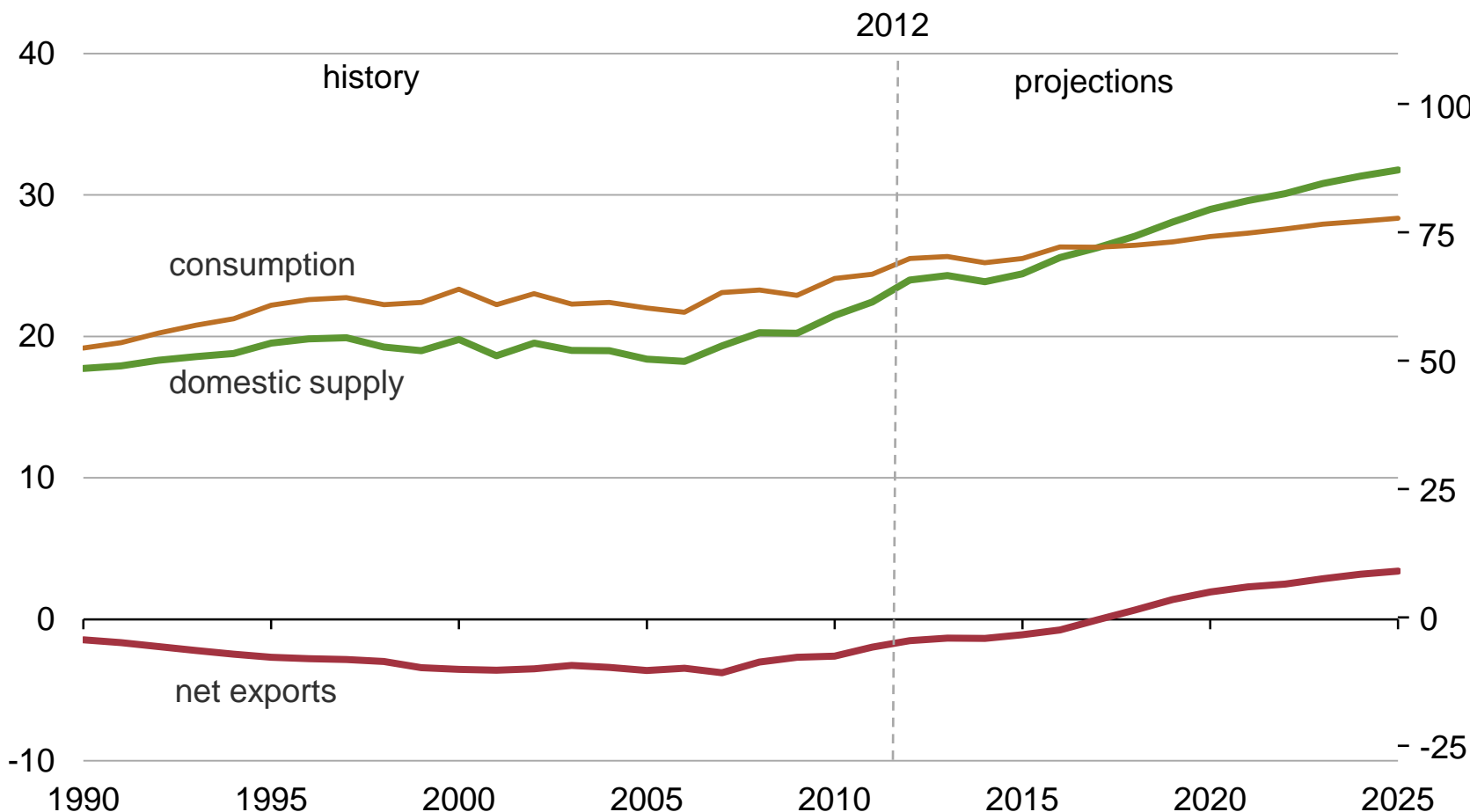


Source: EIA, Annual Energy Outlook 2014 Reference case and High Oil and Gas Resource case; Short Term Energy Outlook, September 2014

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

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

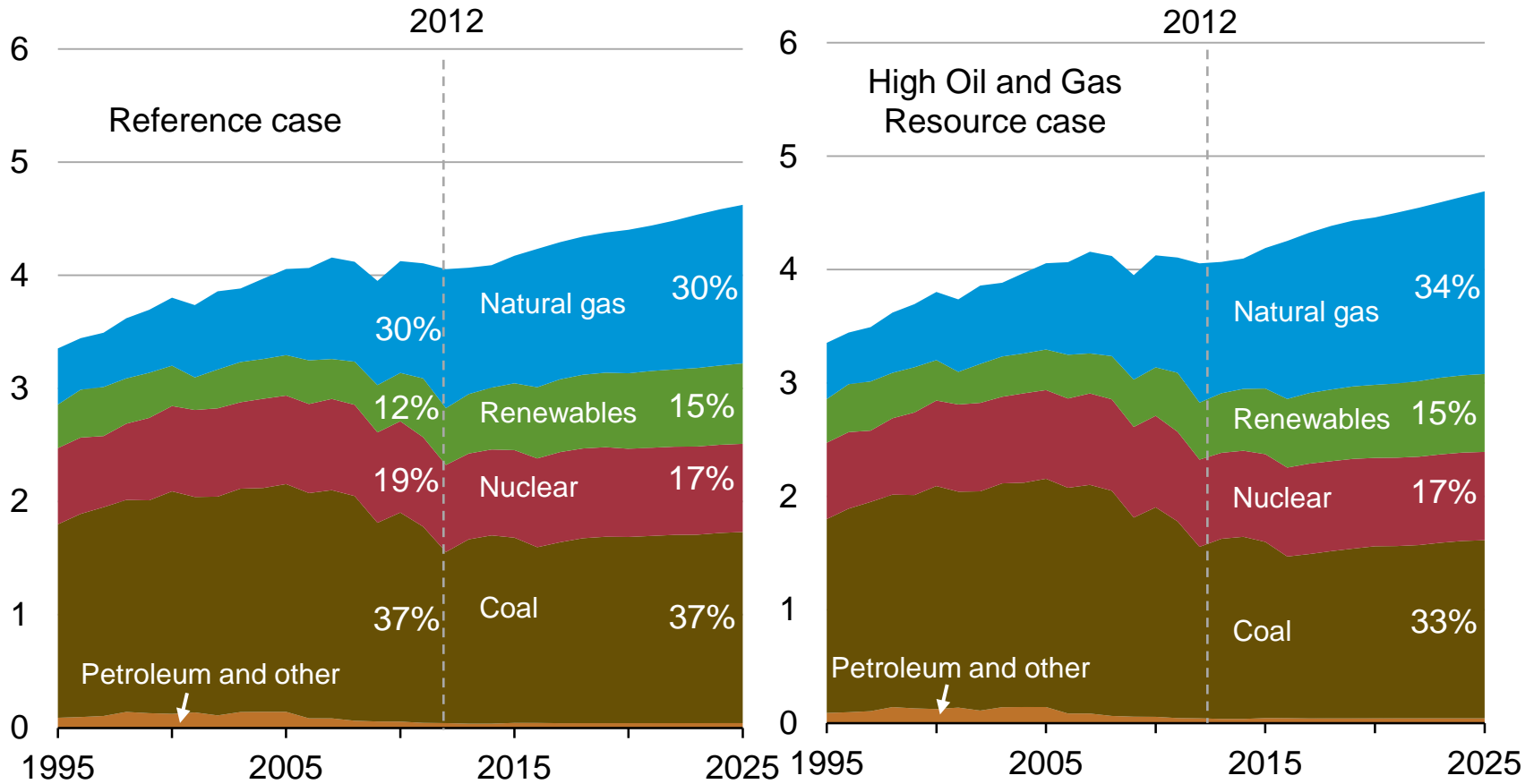
billion cubic feet per day



Source: EIA, Annual Energy Outlook 2014 Reference case

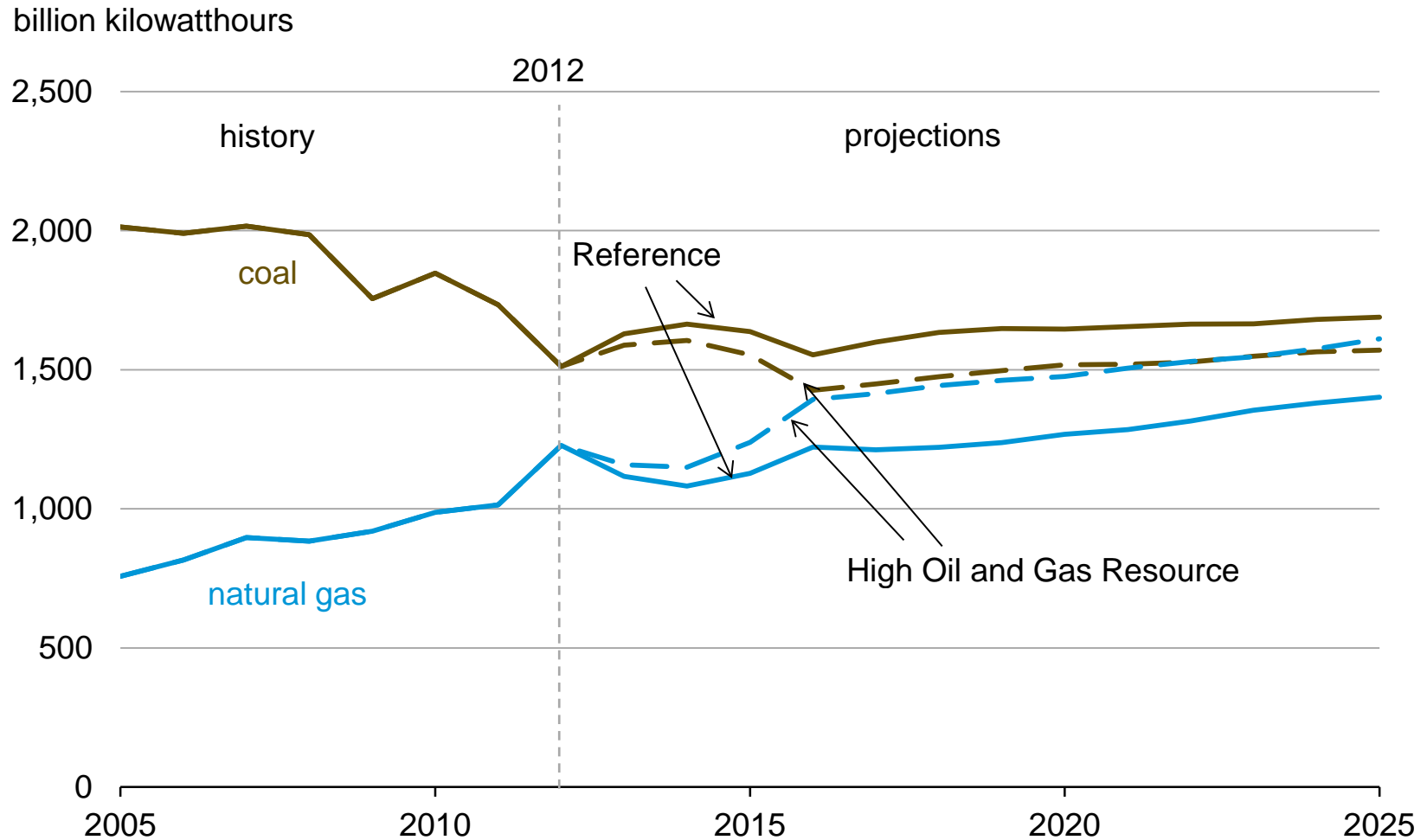
Coal generation is reduced in a high gas availability case, but it does not gain much in a low gas availability case

U.S. electricity net generation
trillion kilowatthours



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

Natural gas is projected to surpass coal as the largest generation source more quickly under high oil and gas resource assumptions; proposed polices (not shown here) also affect the changeover



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

Key questions regarding the U.S. energy outlook

1. Which path (Reference or High Resource) best characterizes U.S. crude oil production growth over the next 5 to 10 years?
2. What is the impact of possible relaxation of limitations on hydrocarbon exports for production growth and markets ?
3. What will EPA's final rules for existing coal fired power plants look like, will they be delayed by legal challenges, and how will they be implemented by states?

China's energy outlook – what I'd like to learn about

1. What is the outlook for China's electricity demand growth rate over the next 5 to 10 years, and how might it be impacted by shifts towards a more consumer- and service-oriented economy?
2. What mix of the following strategies will be used to tackle coal-related local pollution: emissions controls, fuel switching, end-use demand cuts, and shifting coal use away from key cities through remotely-sited gasification or generation?
3. What is the outlook for fuel demand in China's transportation sector given the likelihood that China remains the top global market for vehicle sales, resulting in a rapid rise in the number of vehicles in use?
4. How can outside observers assess the actual role of energy policies:
 - distinguish between binding policies and ideas that are under consideration
 - reconcile inconsistencies across various plans/policies
 - understand the role of different governmental levels in fashioning and implementing energy policies
5. What is the current view of prospects for shale gas in China?

For more information

U.S. Energy Information Administration home page | www.eia.gov

Annual Energy Outlook | www.eia.gov/aeo

Short-Term Energy Outlook | www.eia.gov/steo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

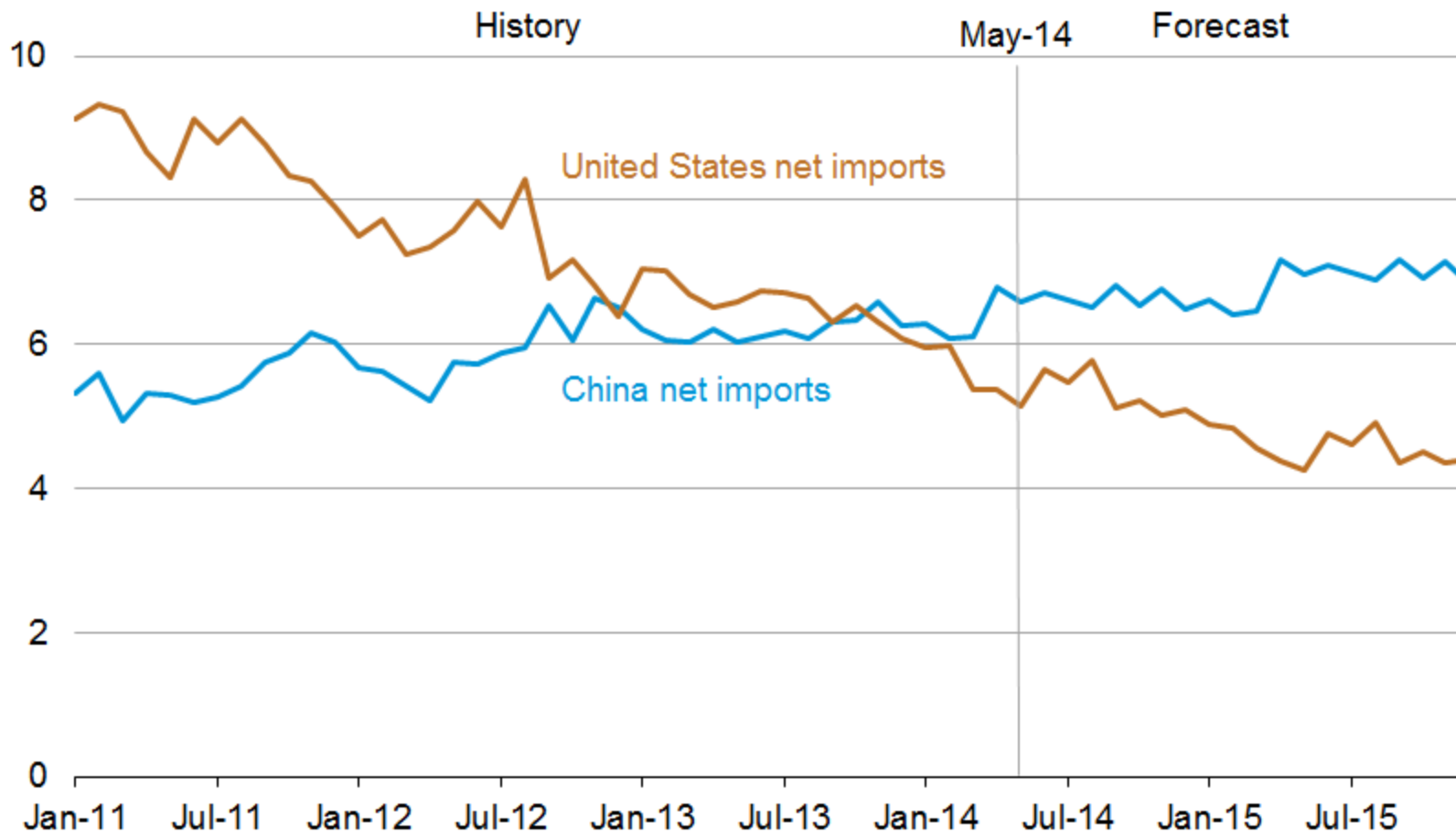
Today in Energy | www.eia.gov/todayinenergy

Drilling Productivity Report | www.eia.gov/petroleum/drilling/

Supplementary slides

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

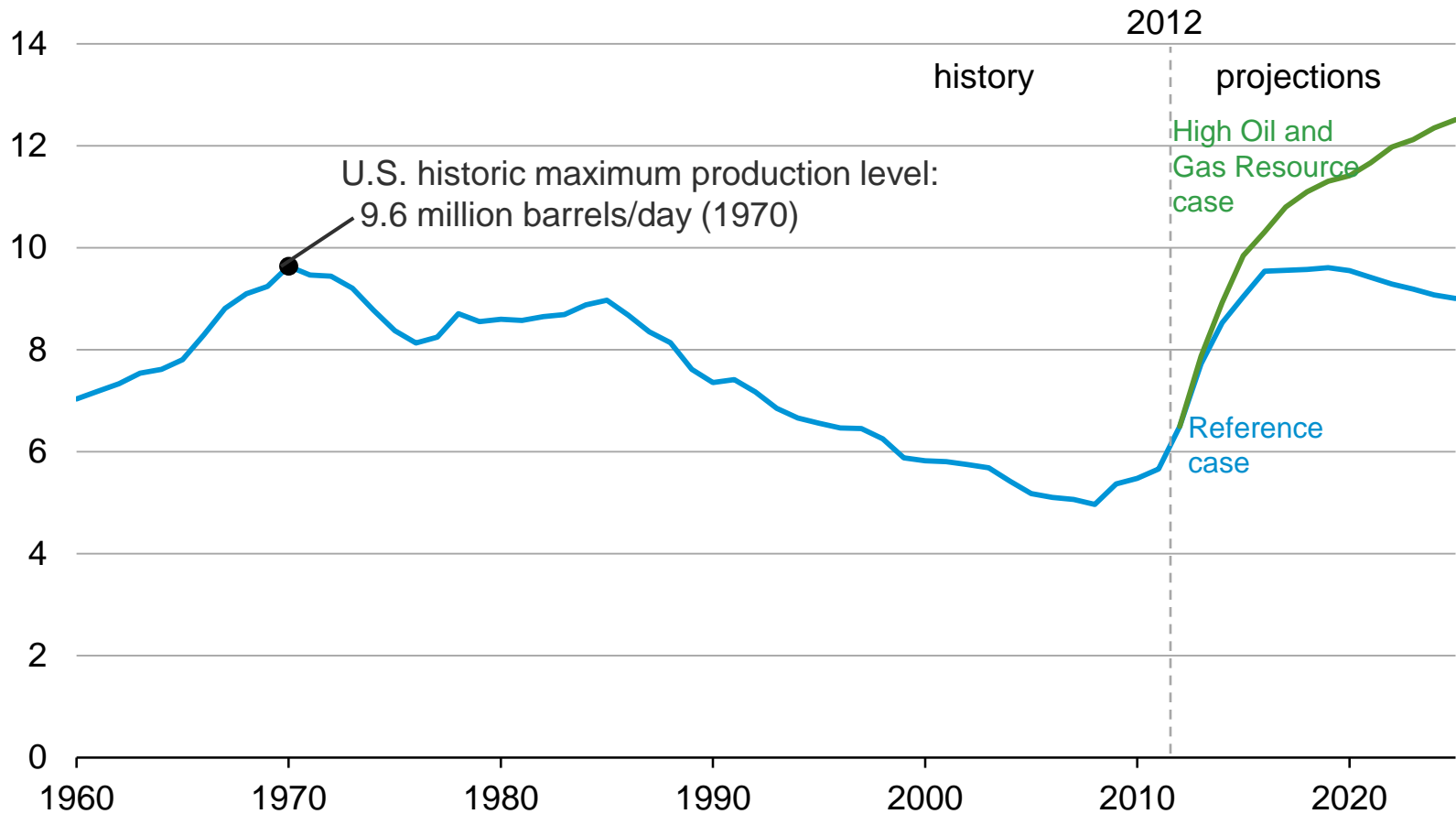


Note: Net oil imports are defined as total liquid fuels consumption less domestic production

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

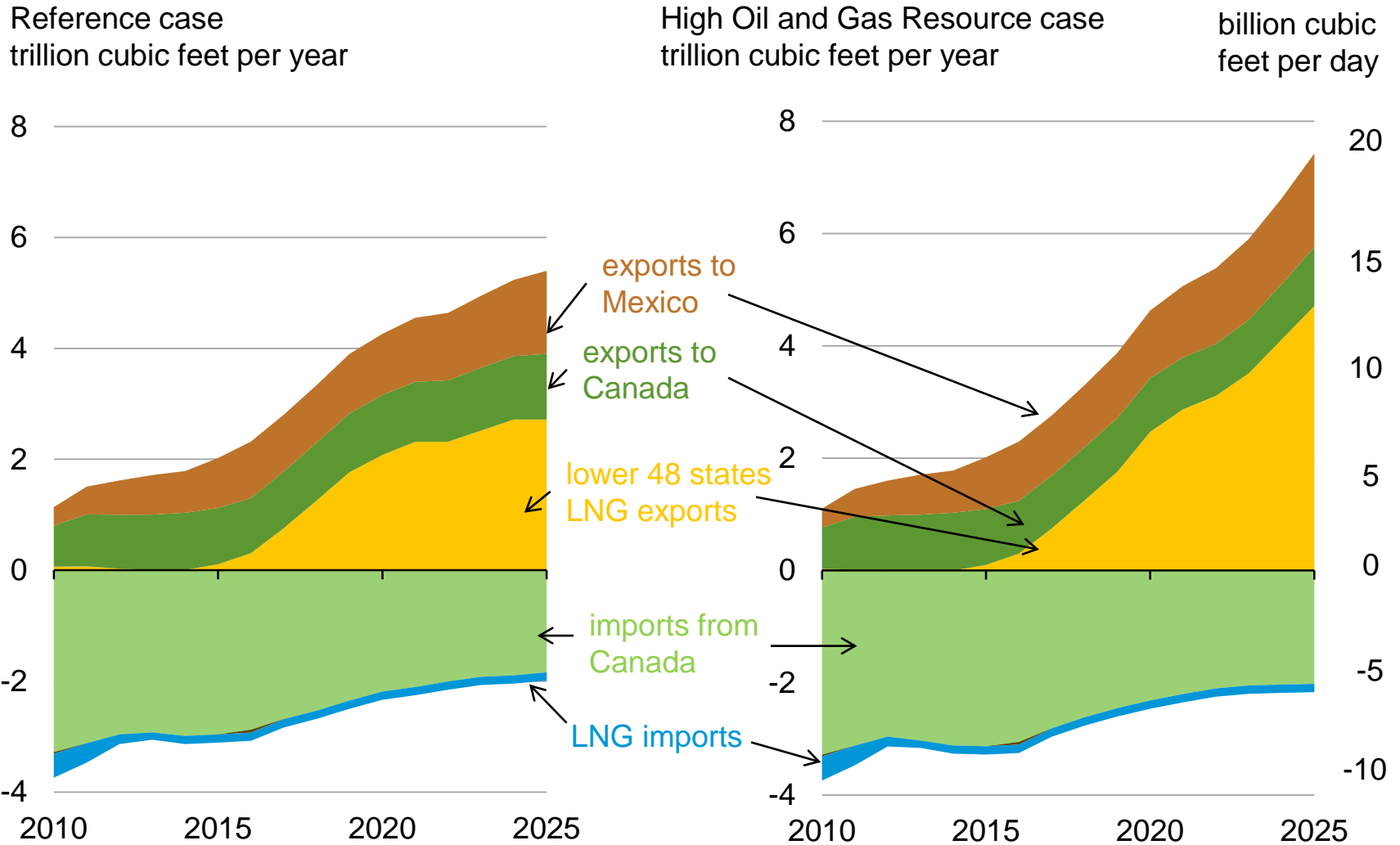
U.S. crude oil production approaches 13 million b/d by 2025 in the High Oil and Gas Resource case

U.S. crude oil production in three cases
million barrels per day



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

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

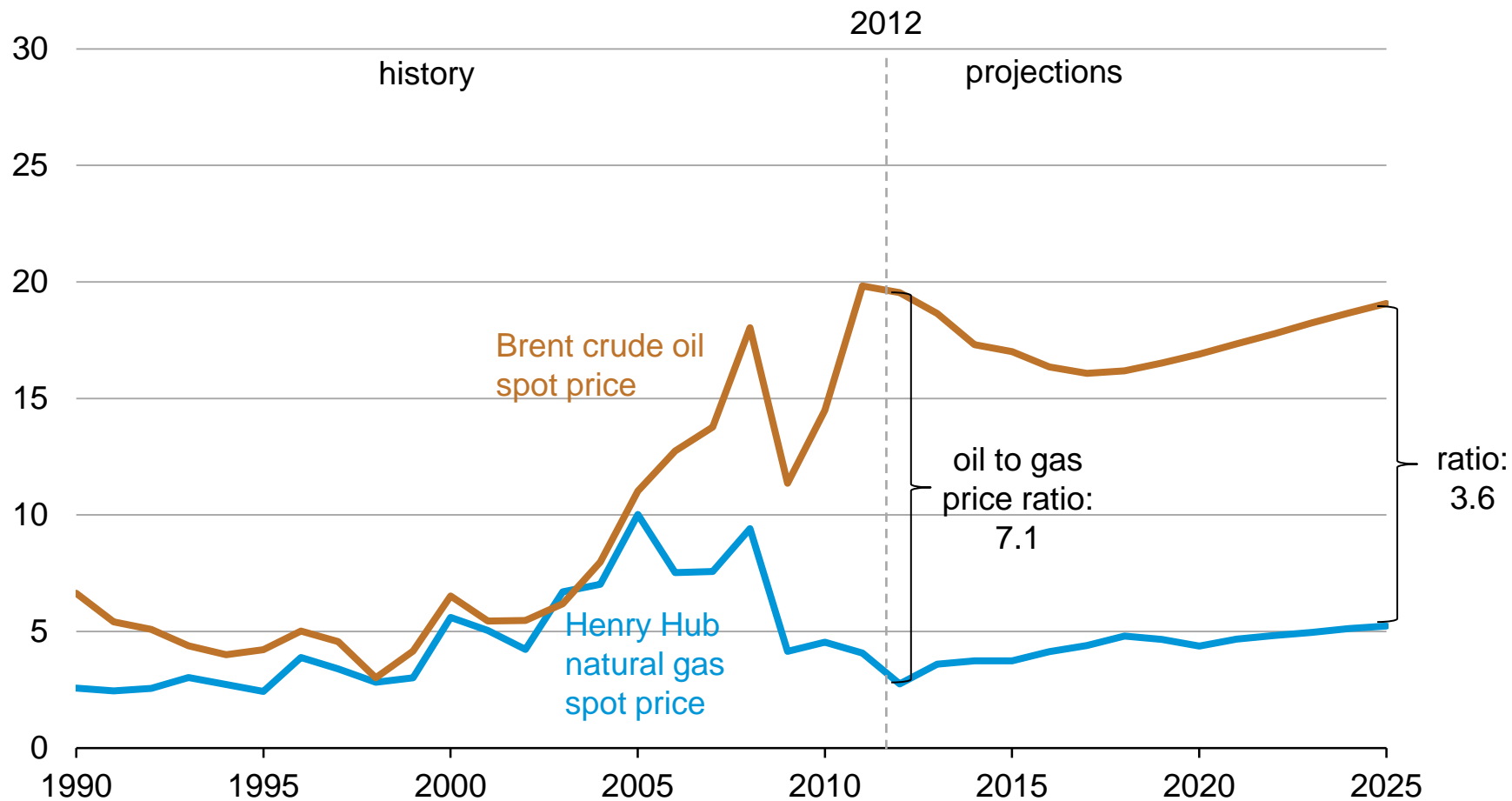


Source: EIA, Annual Energy Outlook 2014 Reference case and High Oil and Gas Resource case

U.S. natural gas prices are expected to remain well below crude oil prices

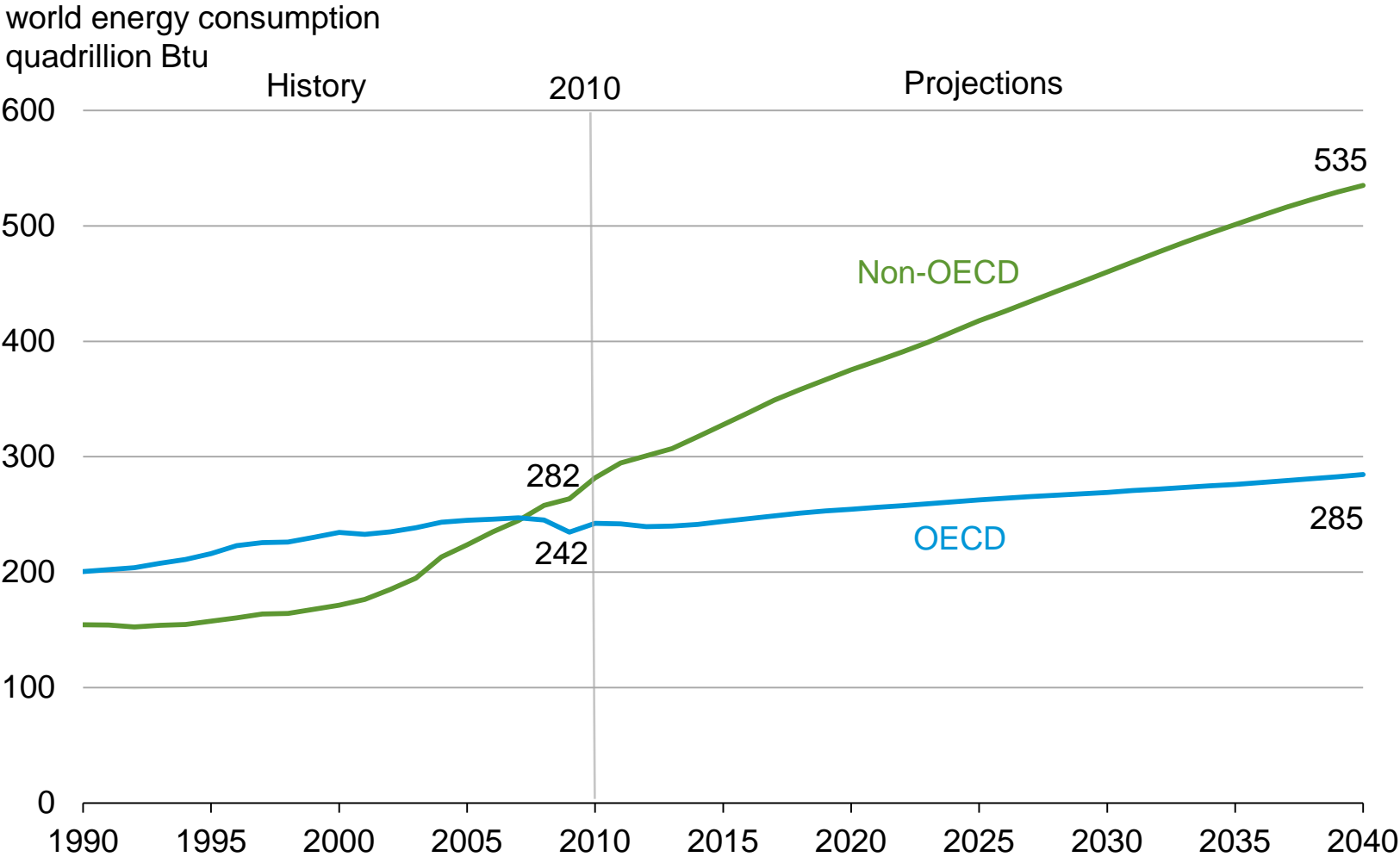
energy spot prices

2012 dollars per million Btu



Source: EIA, Annual Energy Outlook 2014 Reference case

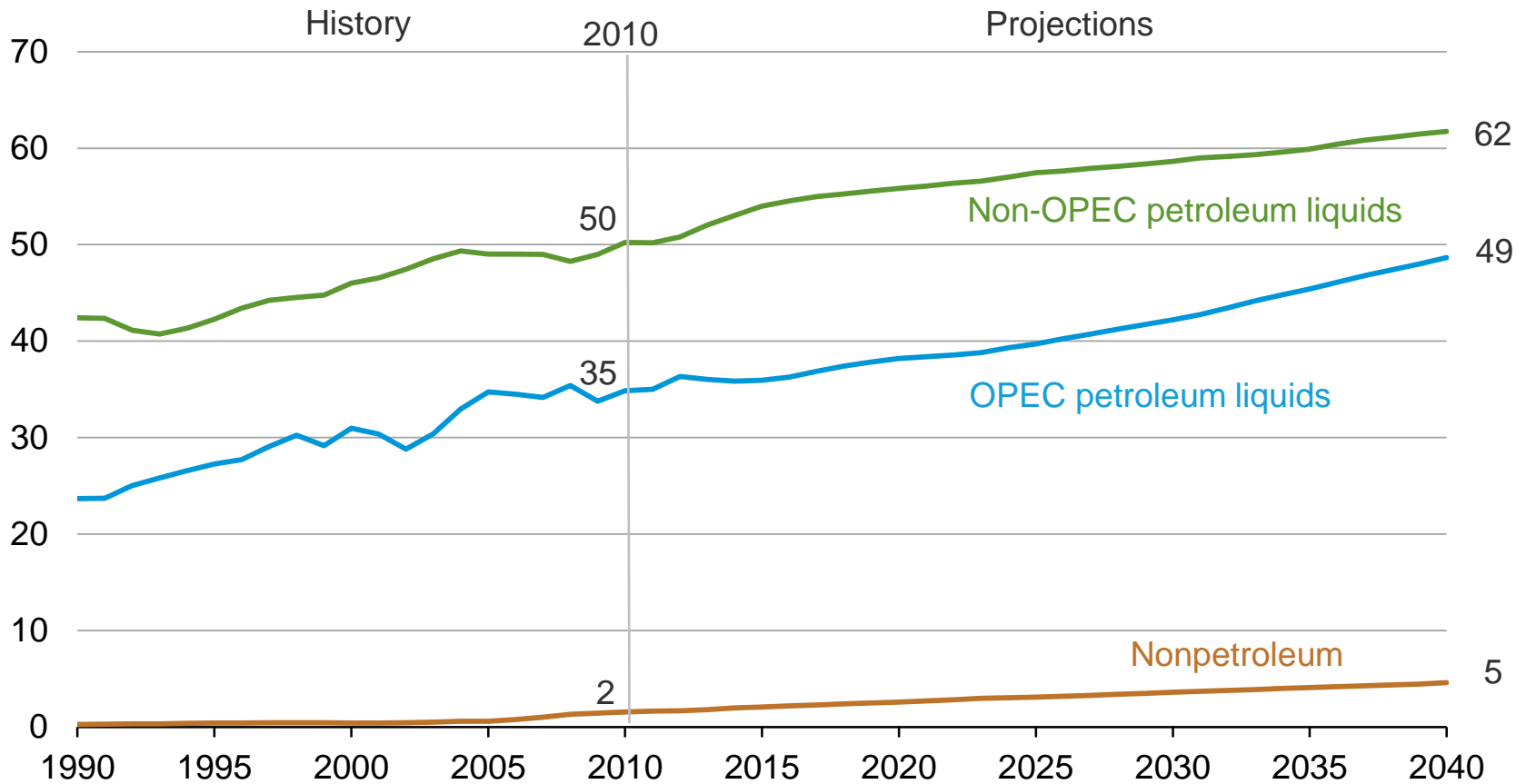
Non-OECD nations drive the increase in energy demand



Source: EIA, International Energy Outlook 2013

OPEC member countries contribute almost half of the total increase in world liquid supplies

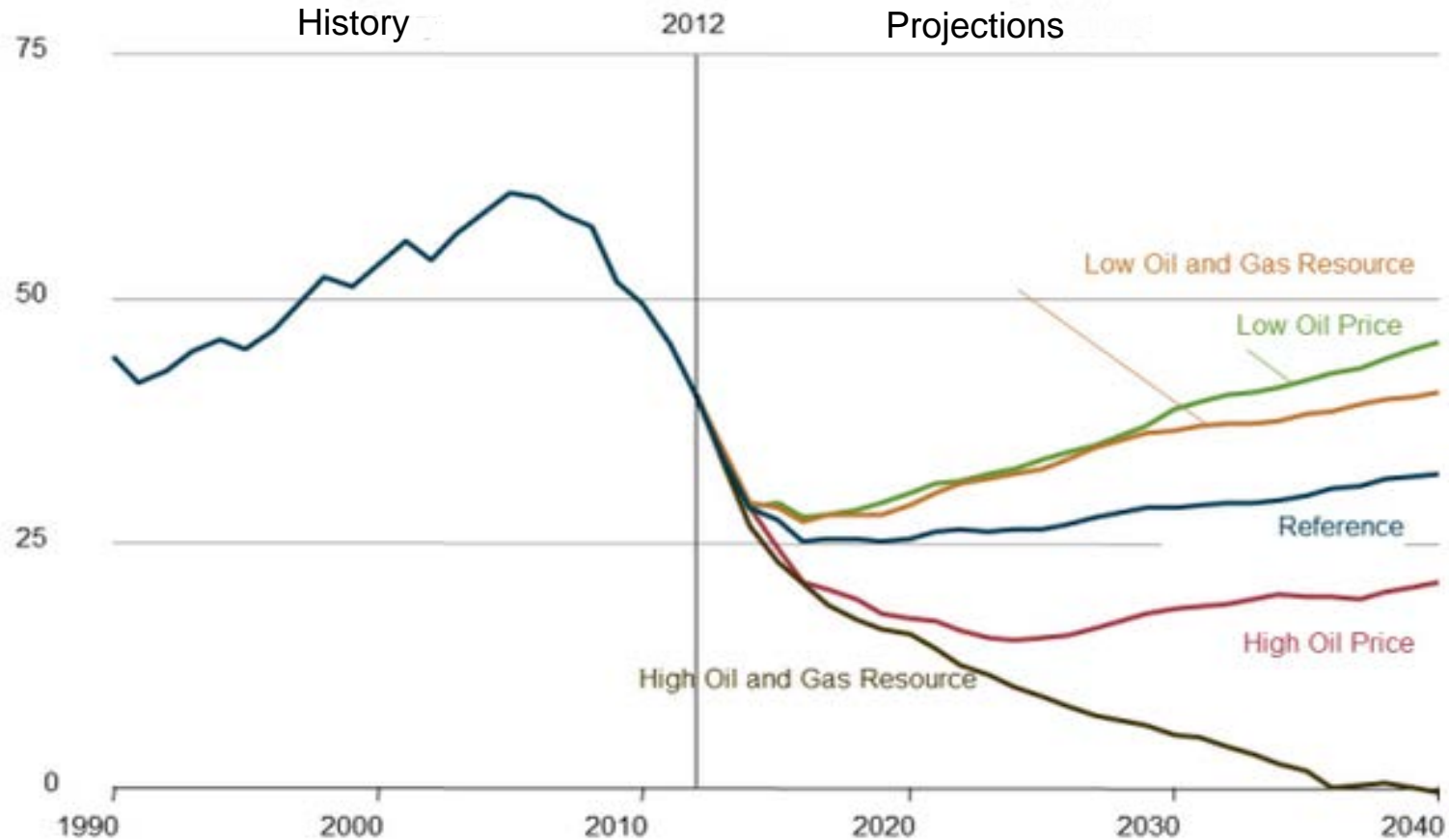
world liquids production
million barrels per day



Source: EIA, International Energy Outlook 2013

U.S. reliance on net imports of petroleum and other liquids is virtually eliminated by 2035 in High Oil and Gas Resource case

net import share of U.S. petroleum and other liquids consumption
percent



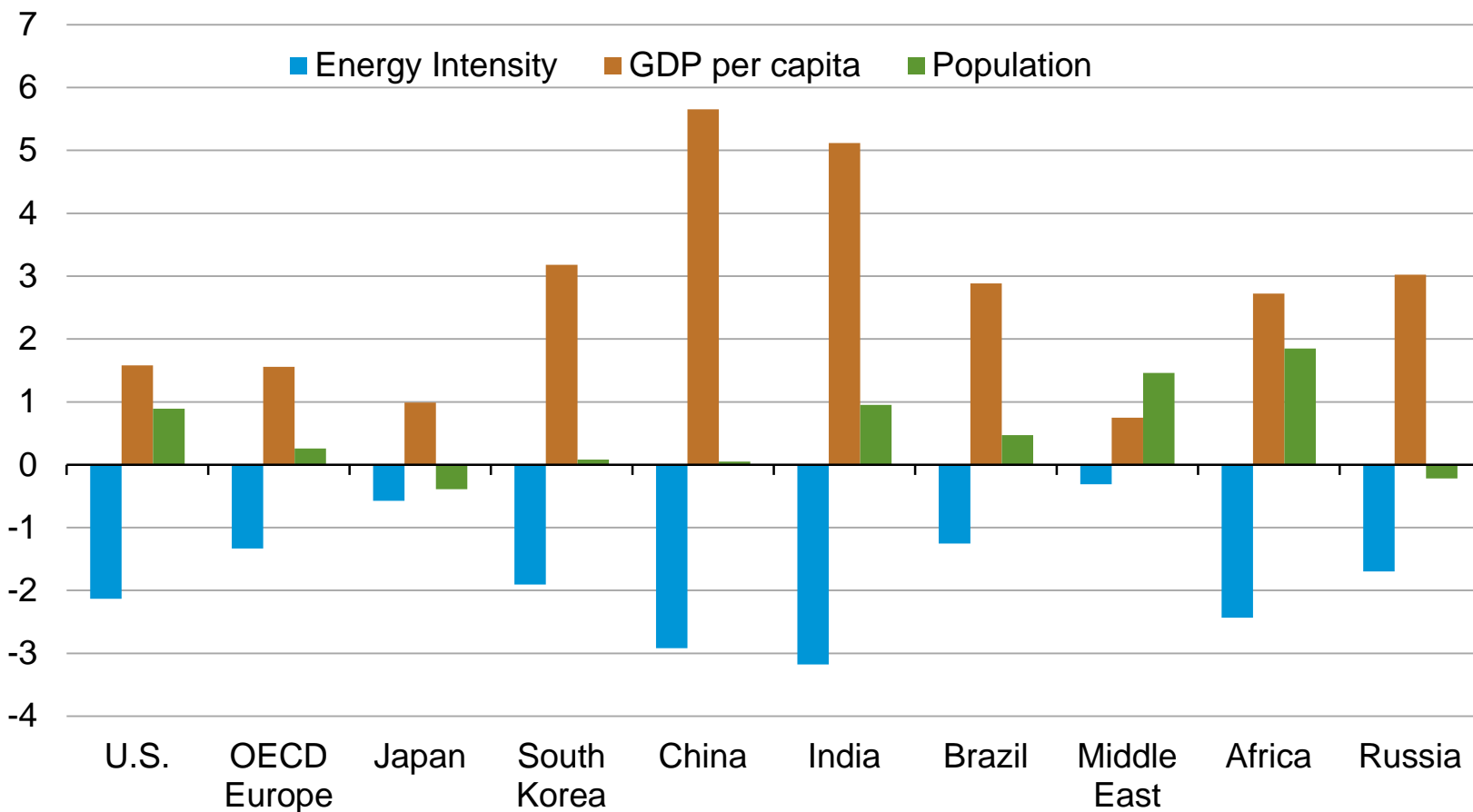
Source: EIA, Annual Energy Outlook 2014 Reference case, High Oil and Gas Resource case, Low Oil and Gas Resource case, High Oil Price case, and Low Oil Price case

Change in world liquid fuel balances: comparison of two 12-year historical periods and the *AEO2014* Reference case over 2013-25 (million barrels per day)

	Actual		Projected AEO 2014 Reference Case
	1973–85	2000–12	2013–25
World Liquids Demand	+ 3	+12	+11 ?
OECD	-4	-2	0 ?
Non-OECD	+7	+15	+11 ?
World Liquids Supply	-1	+12	+11?
Non-OPEC Supply	+13	+ 6	+ 6 ?
OPEC Production	-14	+ 6	+ 5 ?

Economic activity and population drive increases in energy use; energy intensity improvements moderate this trend

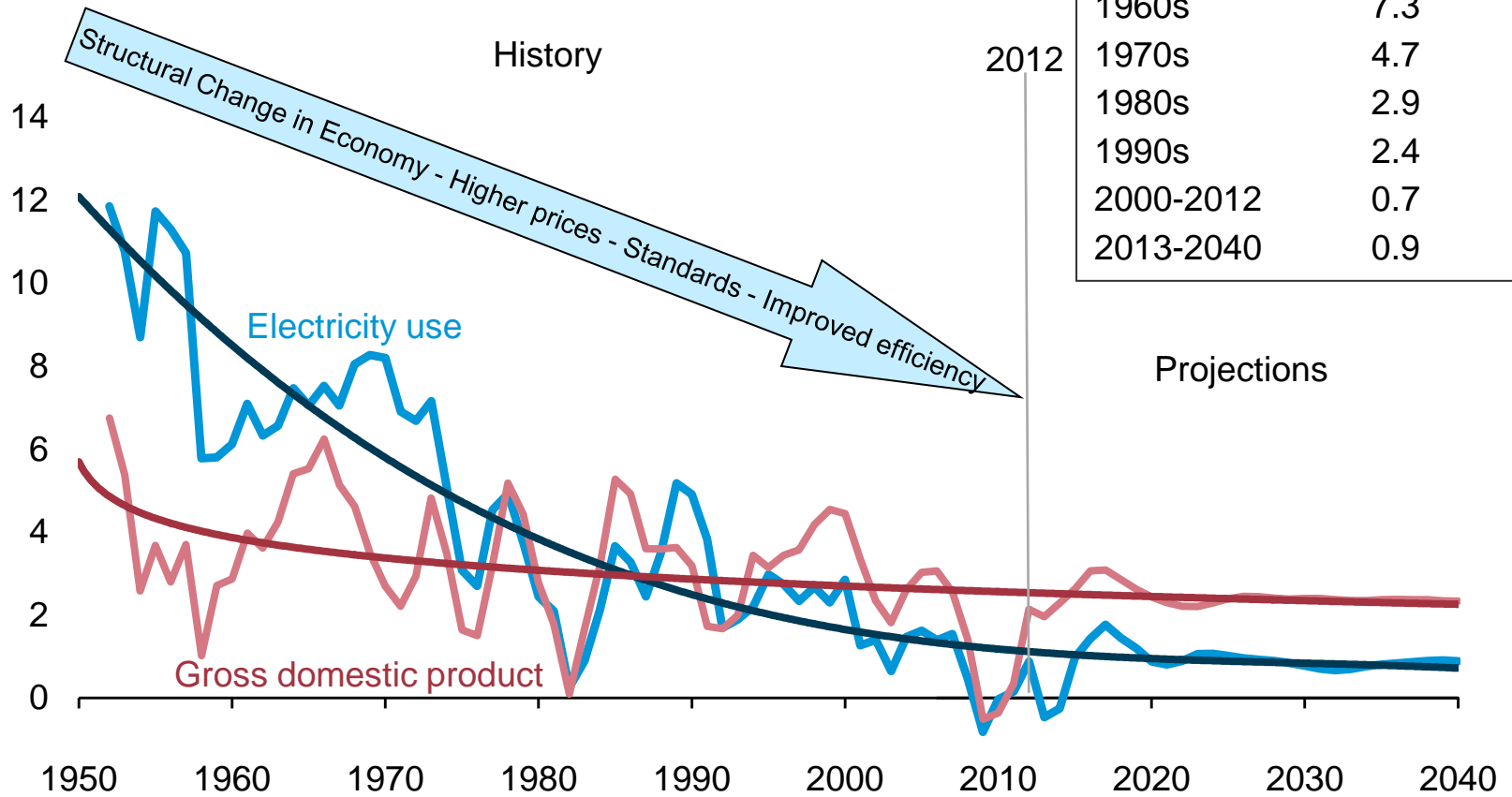
average annual change (2010-2040)
percent per year



Source: EIA, International Energy Outlook 2013

Growth in electricity use slows, but electricity demand still increases by 28% between 2012 and 2040

U.S. electricity use
percent growth (3-year rolling average)

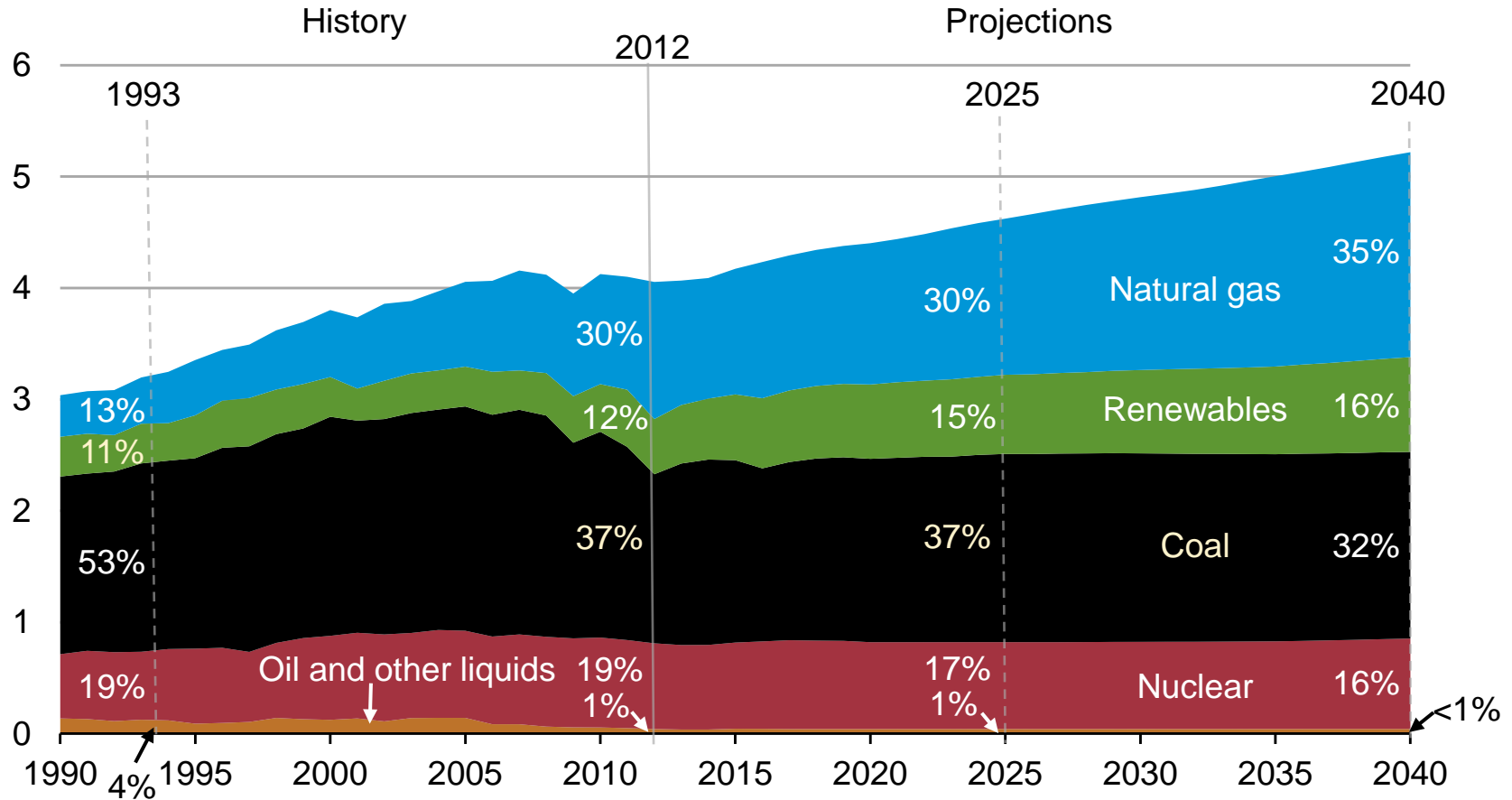


Period	Annual Growth	
	Electricity use	GDP
1950s	9.8	4.1
1960s	7.3	4.4
1970s	4.7	3.2
1980s	2.9	3.0
1990s	2.4	3.2
2000-2012	0.7	1.8
2013-2040	0.9	2.4

Source: EIA, Annual Energy Outlook 2014 Reference case

Over time the electricity mix gradually shifts to lower-carbon options, led by growth in natural gas and renewable generation

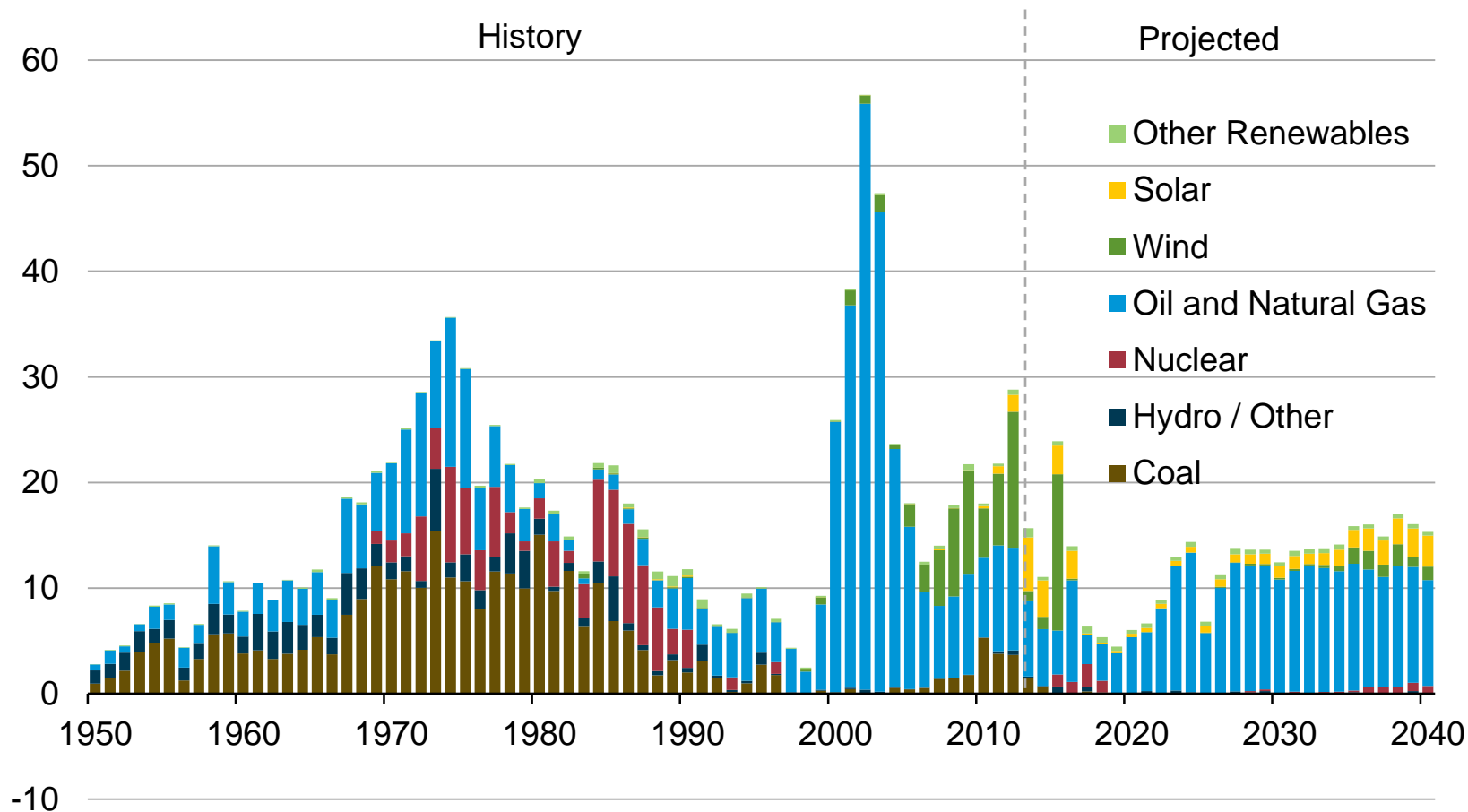
electricity net generation
trillion kilowatthours per year



Source: EIA, Annual Energy Outlook 2014 Reference case

Gas-fueled units account for most projected capacity additions in the AEO2014 Reference case

U.S. electricity generation capacity additions
gigawatts

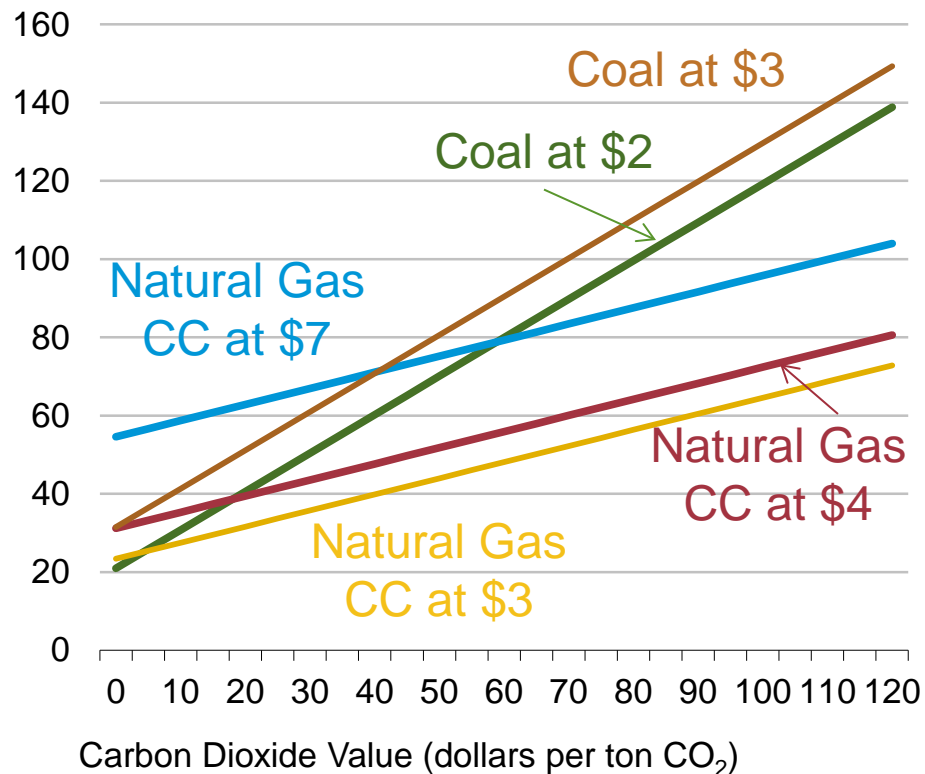


Source: Form EIA-860 & EIA Annual Energy Outlook 2014

Operating costs: existing plants with and without a value on carbon

Fuel cost for existing coal and combined cycle natural gas units with a value placed on carbon dioxide emissions

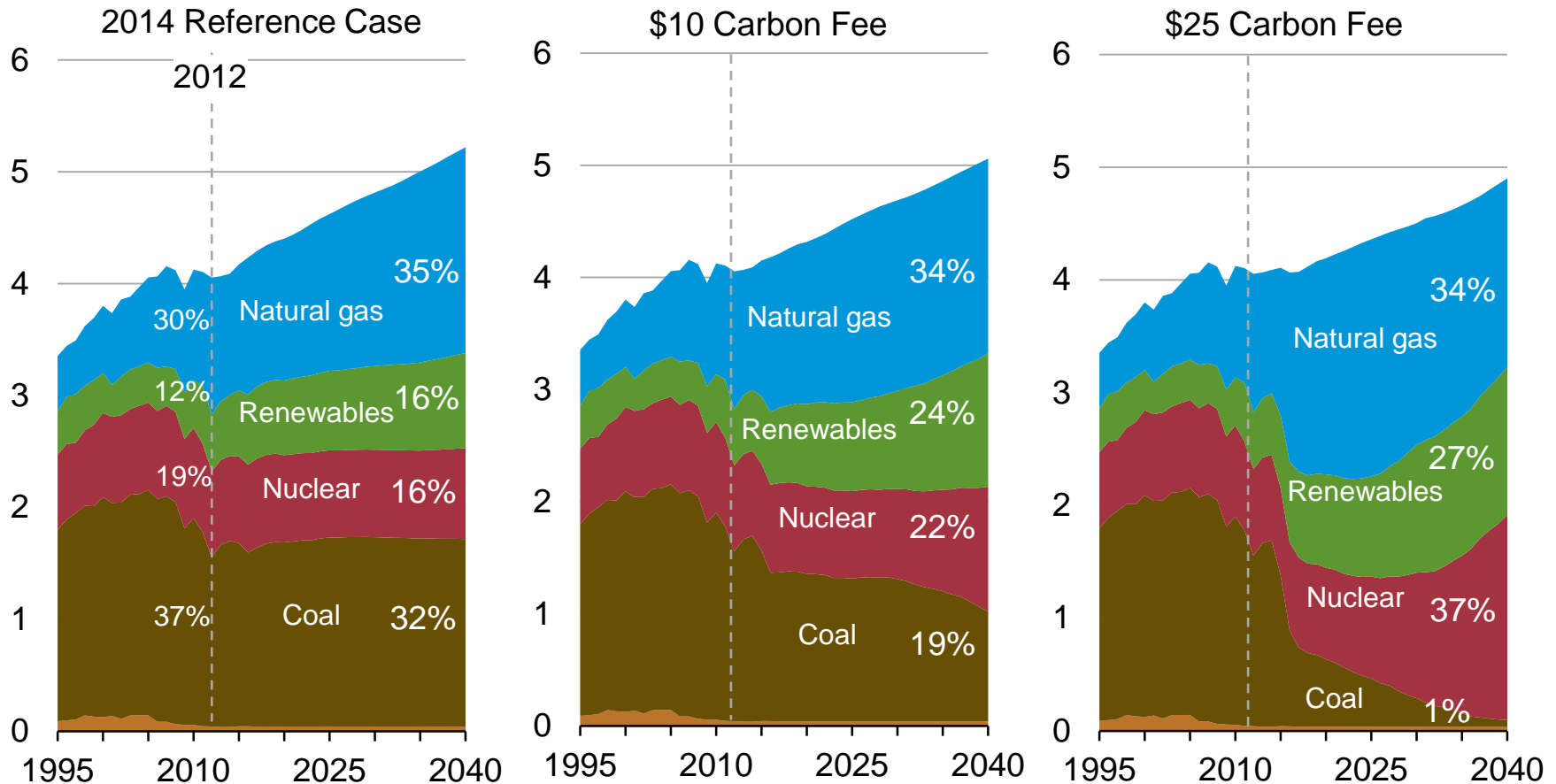
2010 dollars per megawatt-hour



- The “crossover point” for least-cost dispatch of coal and natural gas capacity depends on both fuel prices and the carbon value; at lower natural gas prices, the “crossover” occurs at a lower carbon value
- Environmental operating costs and retrofit costs for pollution controls at existing coal-fired plants can “raise the bar” for their continued operation.
 - For retrofit decisions, the unit’s perceived “useful life,” which plays a critical role, can be affected by views regarding future climate policies

An implicit or explicit carbon value growing at a 5% real rate has a major impact on the projected generation mix in *AEO2014*

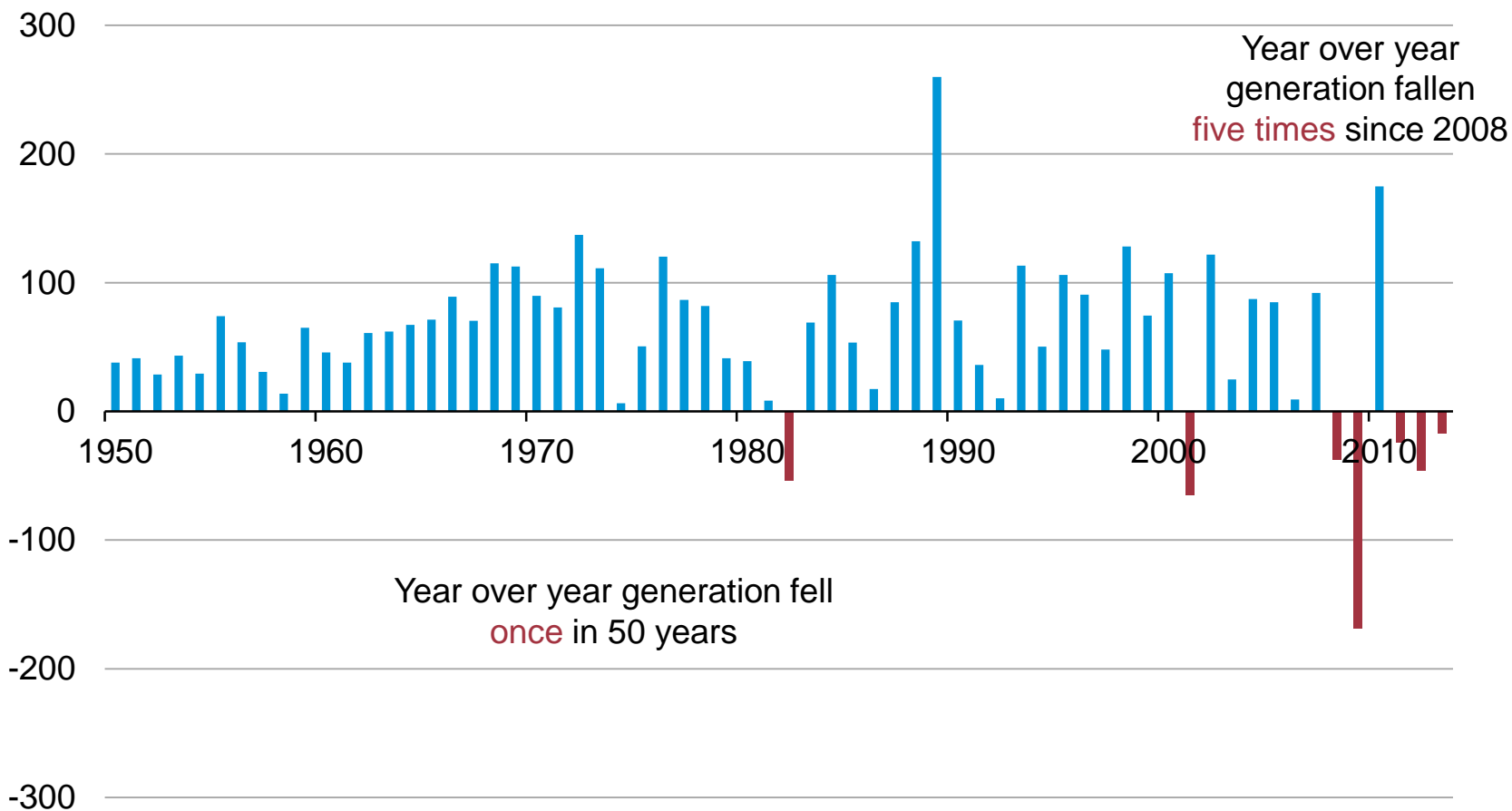
U.S. electricity net generation
trillion kilowatthours



Source: EIA, Annual Energy Outlook 2014

Electricity sales have decreased in 5 of the last 6 years; prior to 2008, sales declined only twice in 58 years

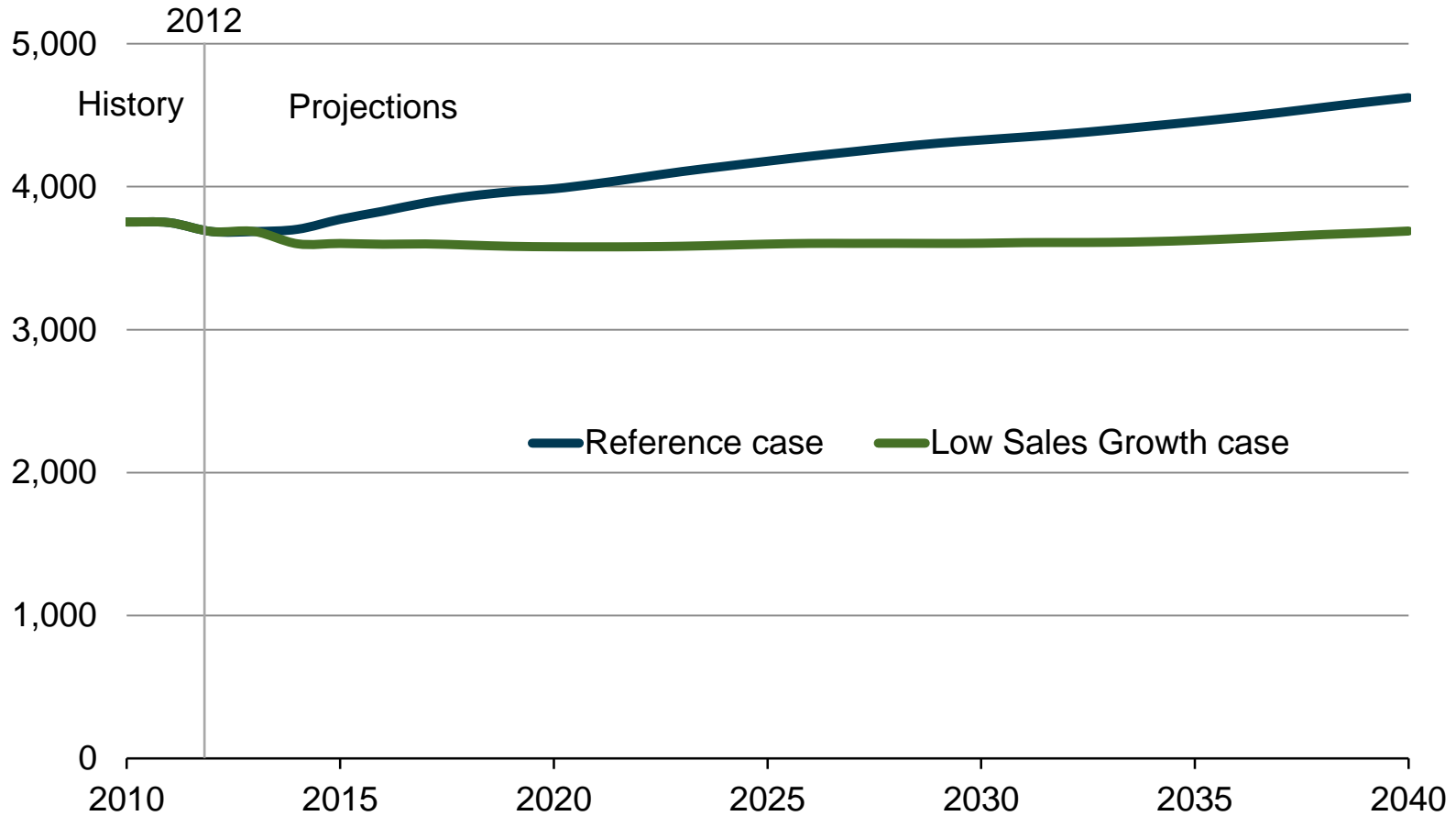
billion kilowatthours



Source: Energy Information Administration, Form EIA-923 and predecessor forms.

EIA considered a low electricity sales growth case in AEO2014

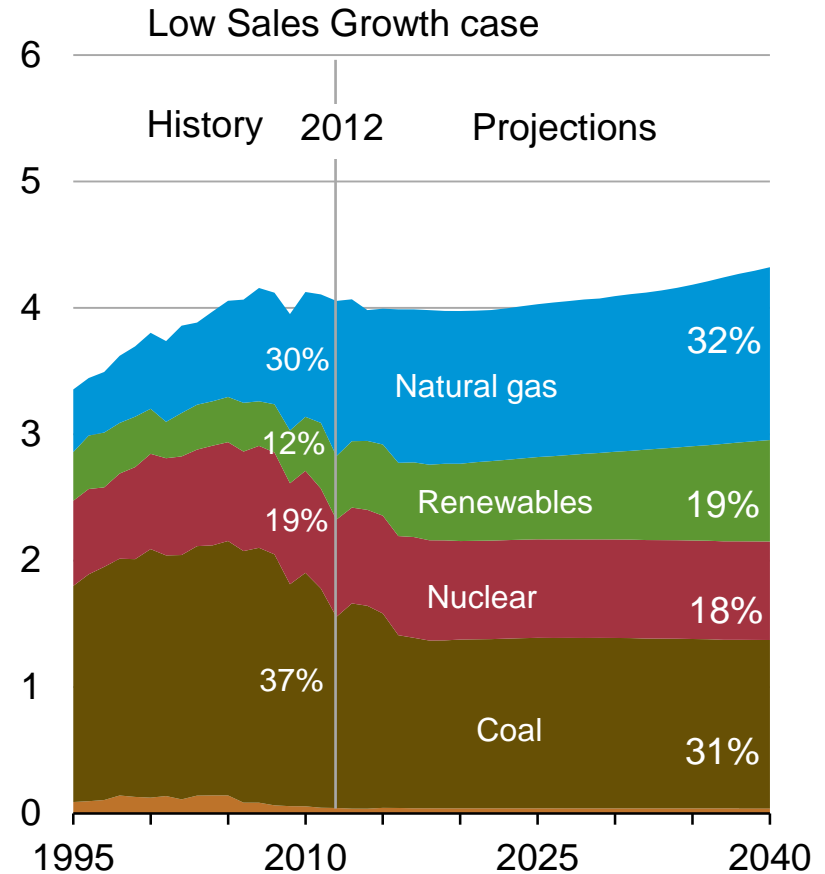
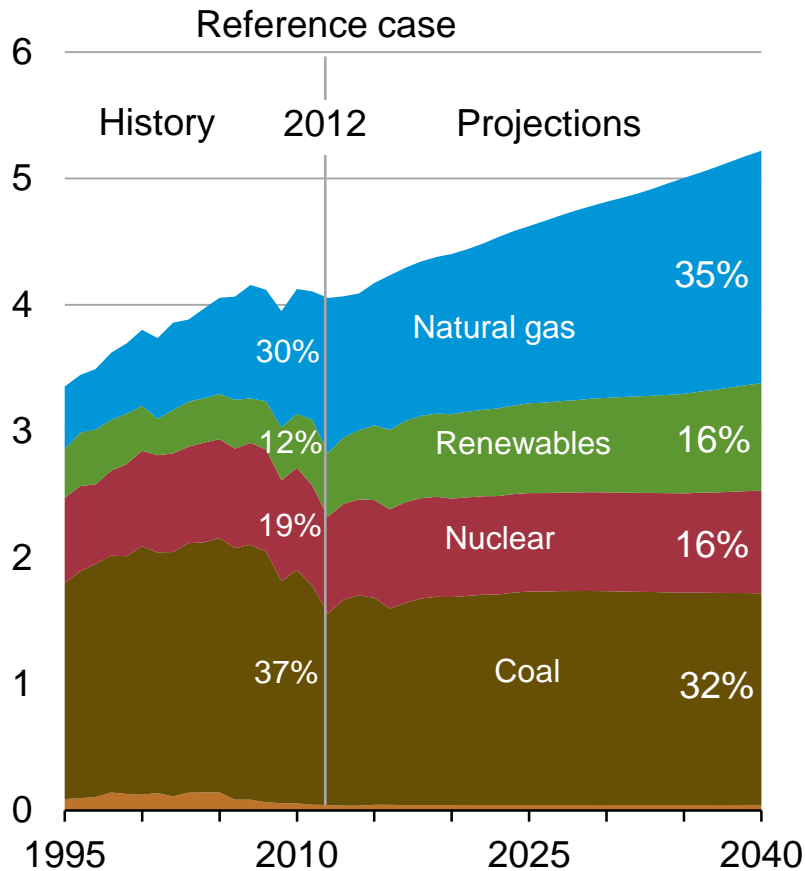
Total electricity sales
billion kilowatthours



Source: EIA, Annual Energy Outlook 2014

Generation fueled by natural gas grows much more slowly in the Low Sales Growth case

U.S. electricity net generation
trillion kilowatthours

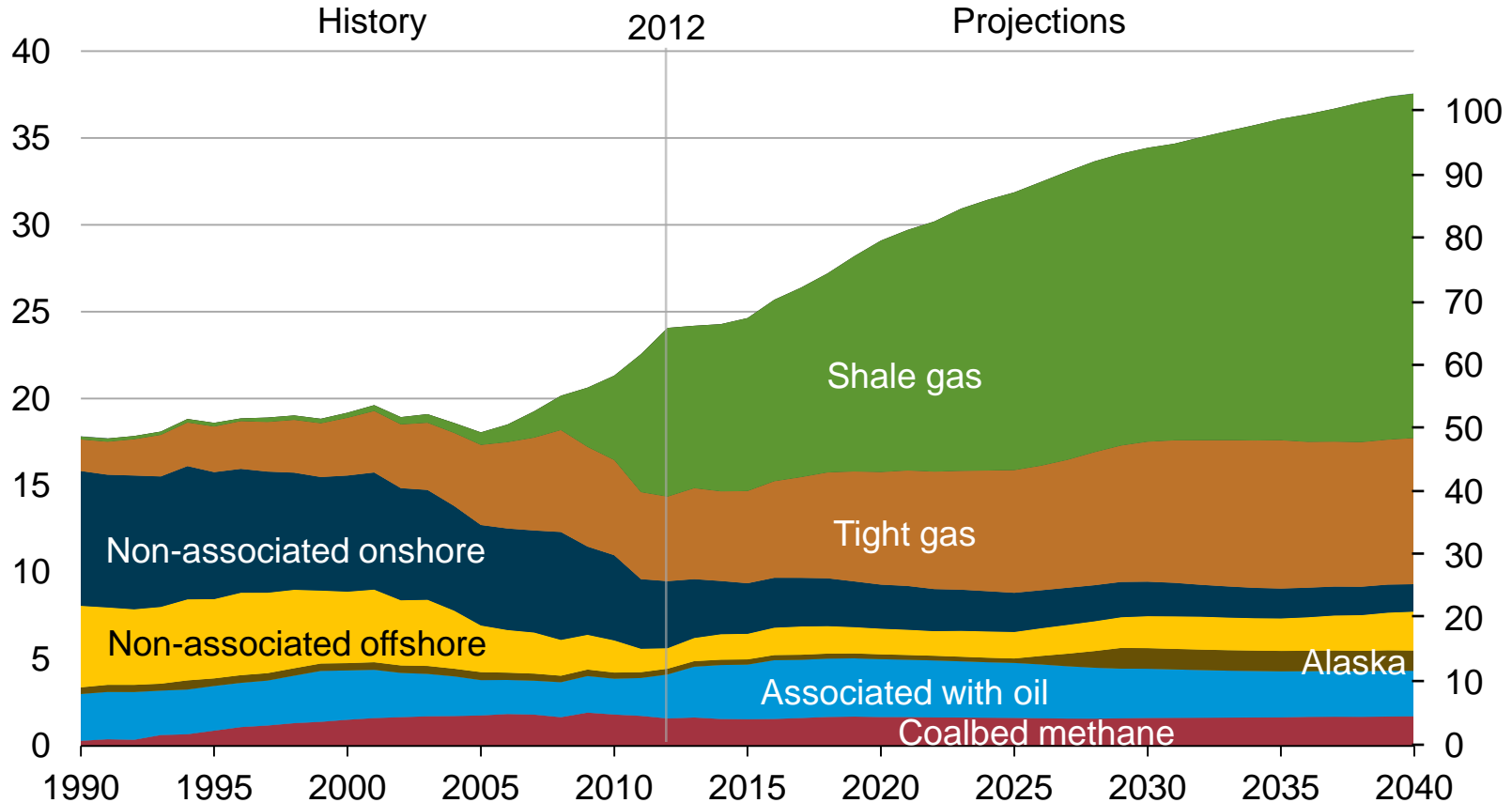


Source: EIA, Annual Energy Outlook 2014

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

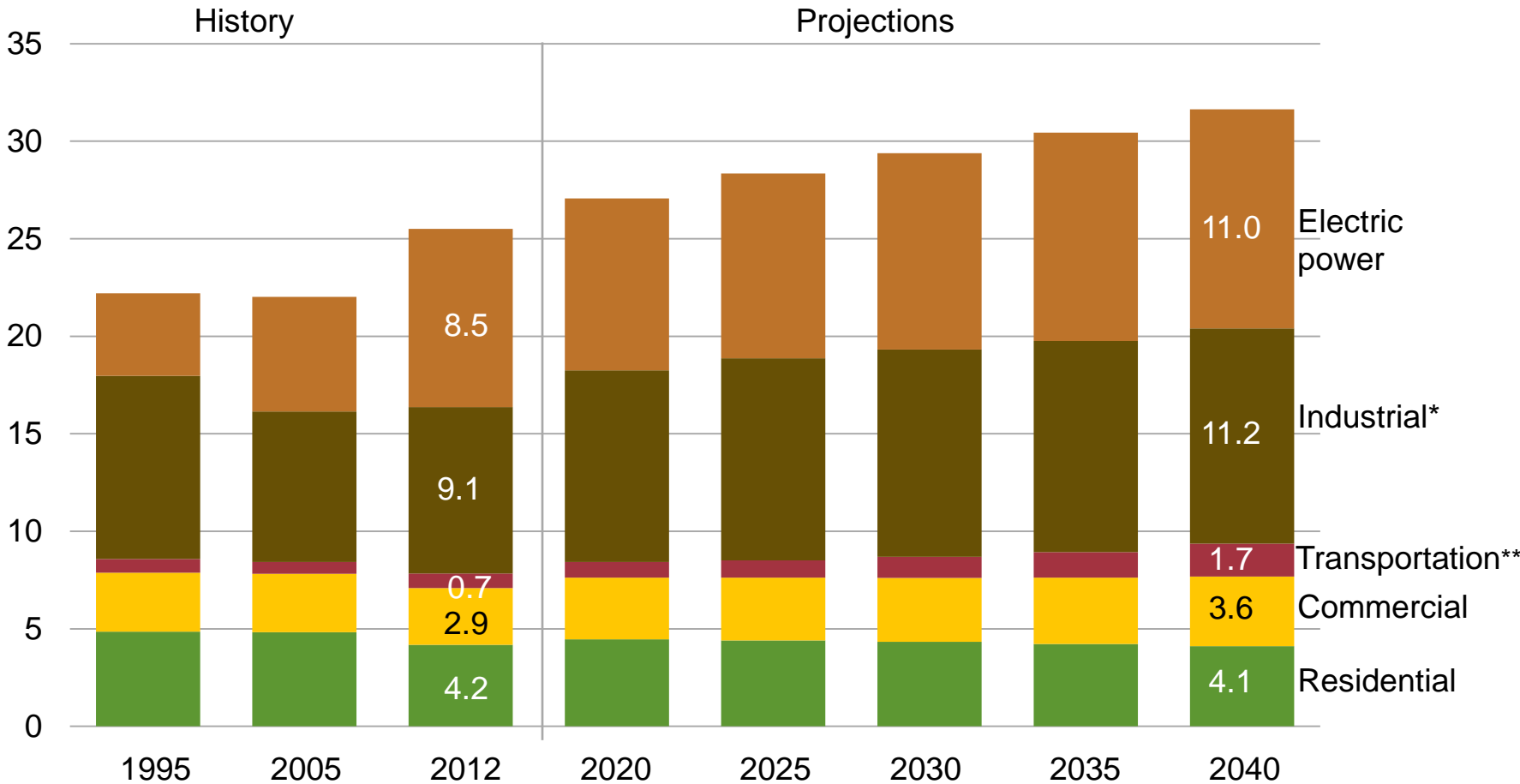
billion cubic feet per day



Source: EIA, Annual Energy Outlook 2014 Reference case

U.S. natural gas consumption growth is driven by electric power, industrial, and transportation use

U.S. dry natural gas consumption
trillion cubic feet

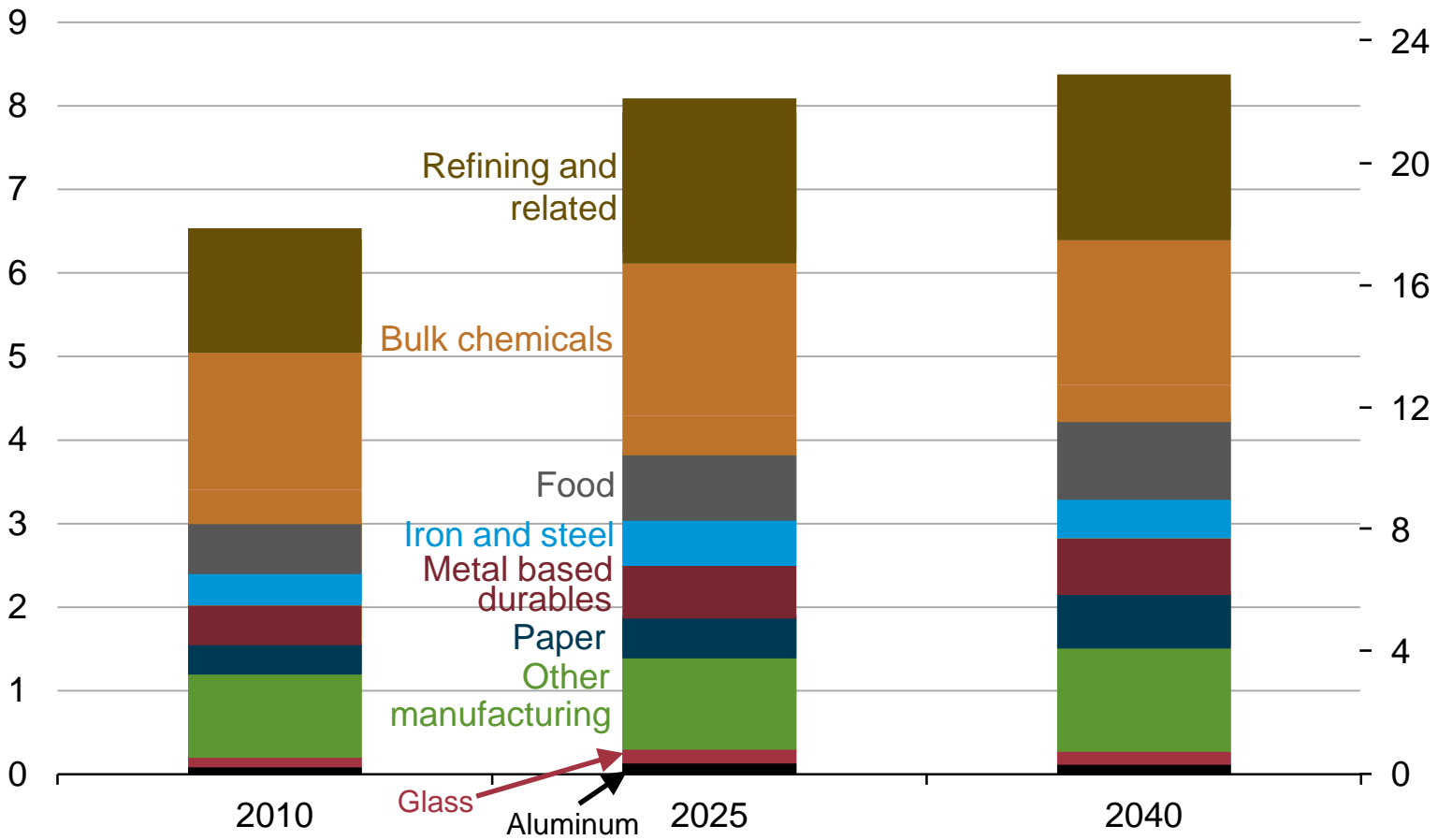


Source: EIA, Annual Energy Outlook 2014 Reference case
 *Includes combined heat-and-power and lease and plant fuel
 **Includes pipeline fuel

U.S. manufacturing output and natural gas use grows with low natural gas prices, particularly in the near term

manufacturing natural gas consumption
quadrillion Btu

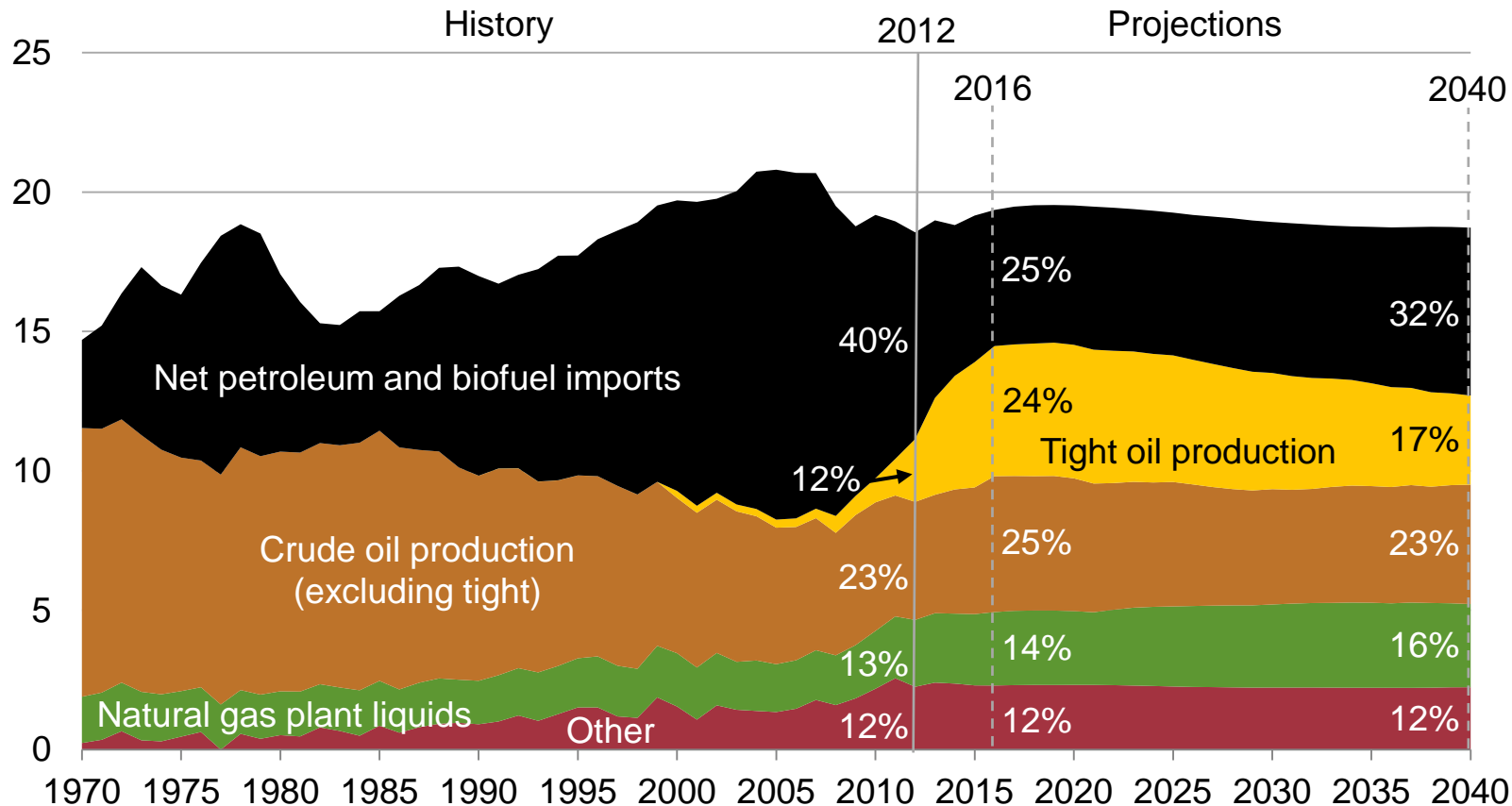
billion cubic feet per day



Source: EIA, Annual Energy Outlook 2014 Reference case

Increased production of tight oil and greater fuel efficiency drive decline in petroleum and other liquids imports

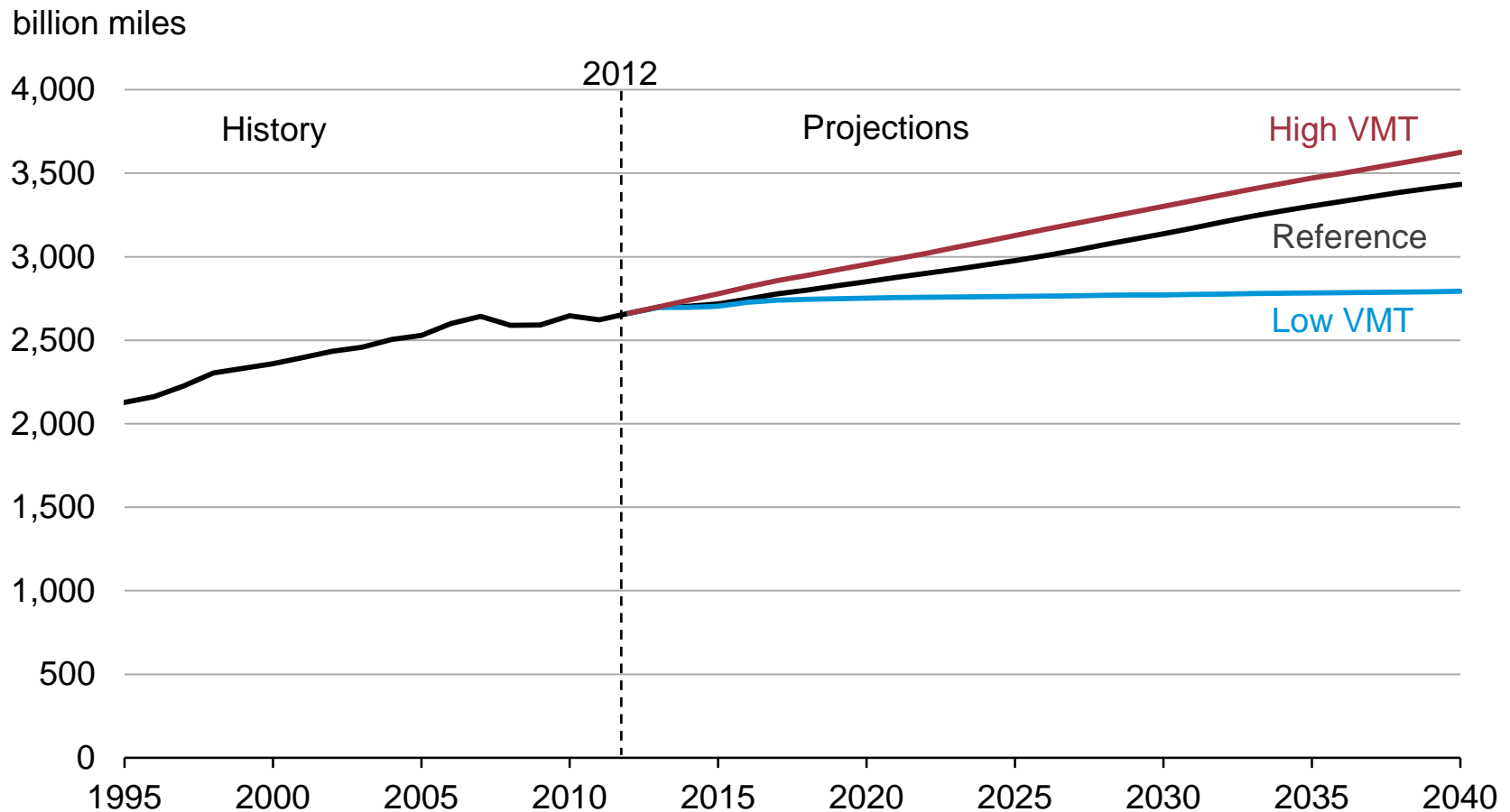
U.S. liquid fuels supply
million barrels per day



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

Source: EIA, Annual Energy Outlook 2014 Reference case

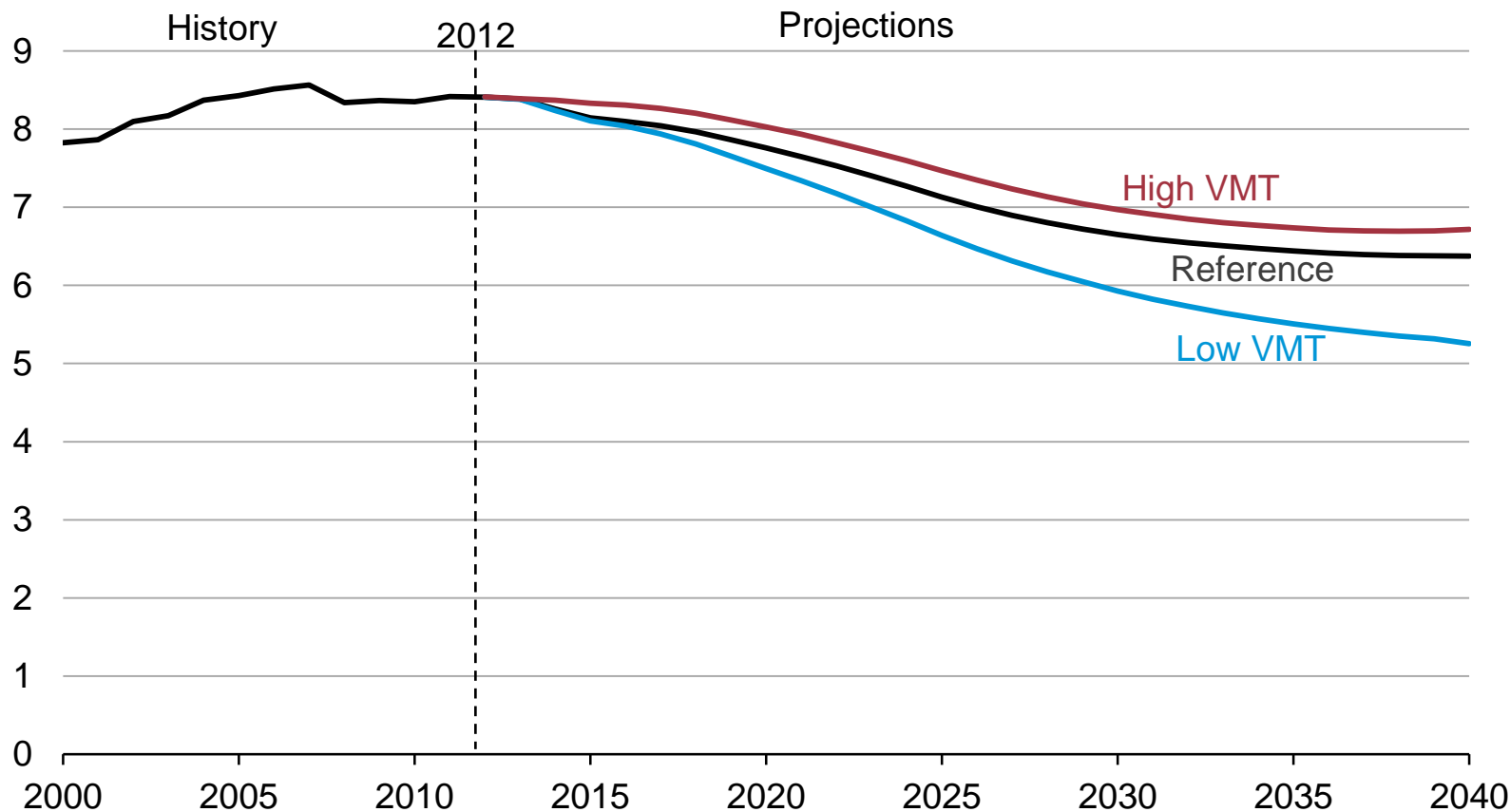
Total light-duty vehicle miles traveled ranges from 3.6 trillion miles in the High VMT case to 2.8 trillion miles in the Low VMT case



Source: U.S. Energy Information Administration AEO2014

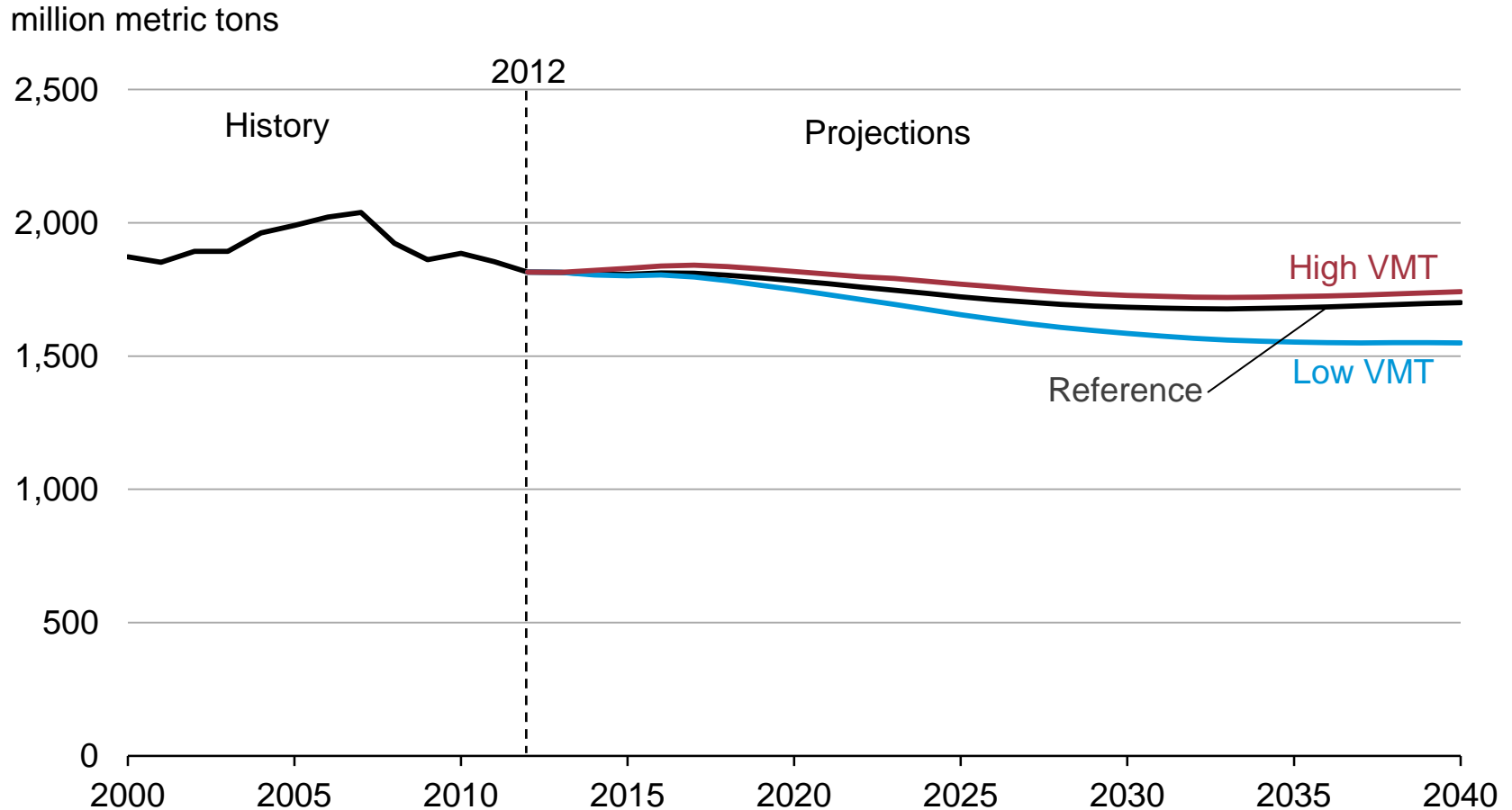
Total light-duty vehicle transportation energy demand decreases by an average annual rate of 0.8% in the High VMT case, and 1.7% in the Low VMT case

million barrels of oil equivalent per day



Source: U.S. Energy Information Administration AEO2014

Total U.S. transportation carbon dioxide emissions increase by 3% in the High VMT case, decrease by 9% in the Low VMT case when compared to the Reference case



Source: U.S. Energy Information Administration AEO2014