Annual Energy Outlook 2015

for

Asia Pacific Energy Research Centre

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by

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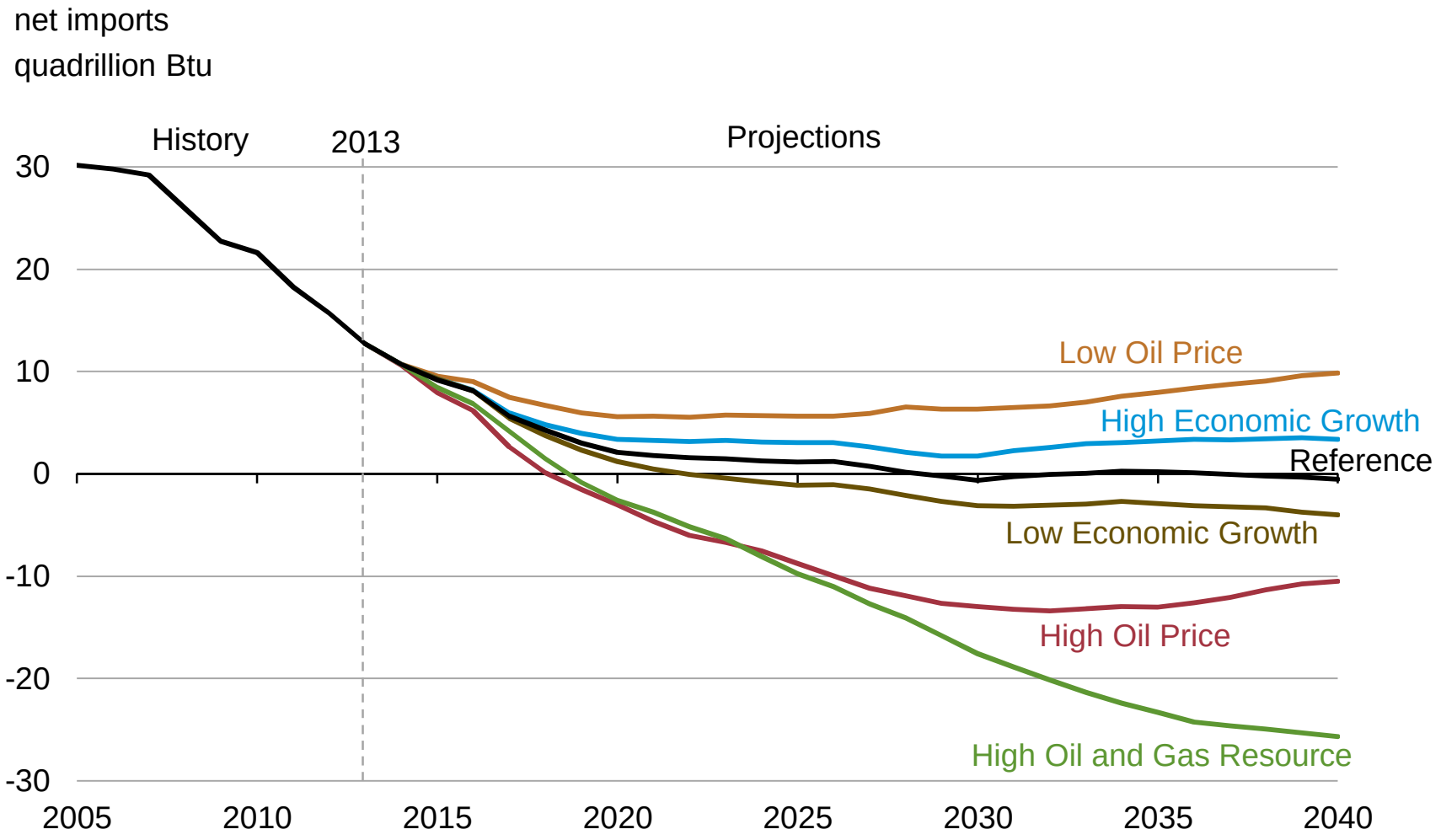
Key results from *AEO2015*

- In most AEO2015 cases, U.S. net energy imports, including all fuels, decline and ultimately end by 2030 for the first time since the 1950s
  - Strong growth in domestic production of crude oil from tight formations through 2020 and limited growth in domestic demand after 2020 leads to a decline in net petroleum and other liquids imports
  - The United States transitions from being a net importer of natural gas to a net exporter by 2017 in all cases
- U.S. energy consumption grows at a modest rate over the projection with reductions in energy intensity resulting from improved technologies and trends driven by existing laws and regulations
- Renewables provide an increased share of electricity generation, reflecting rising long-term natural gas prices and the high capital costs of new coal and nuclear generation capacity

Key results from *AEO2015* (continued)

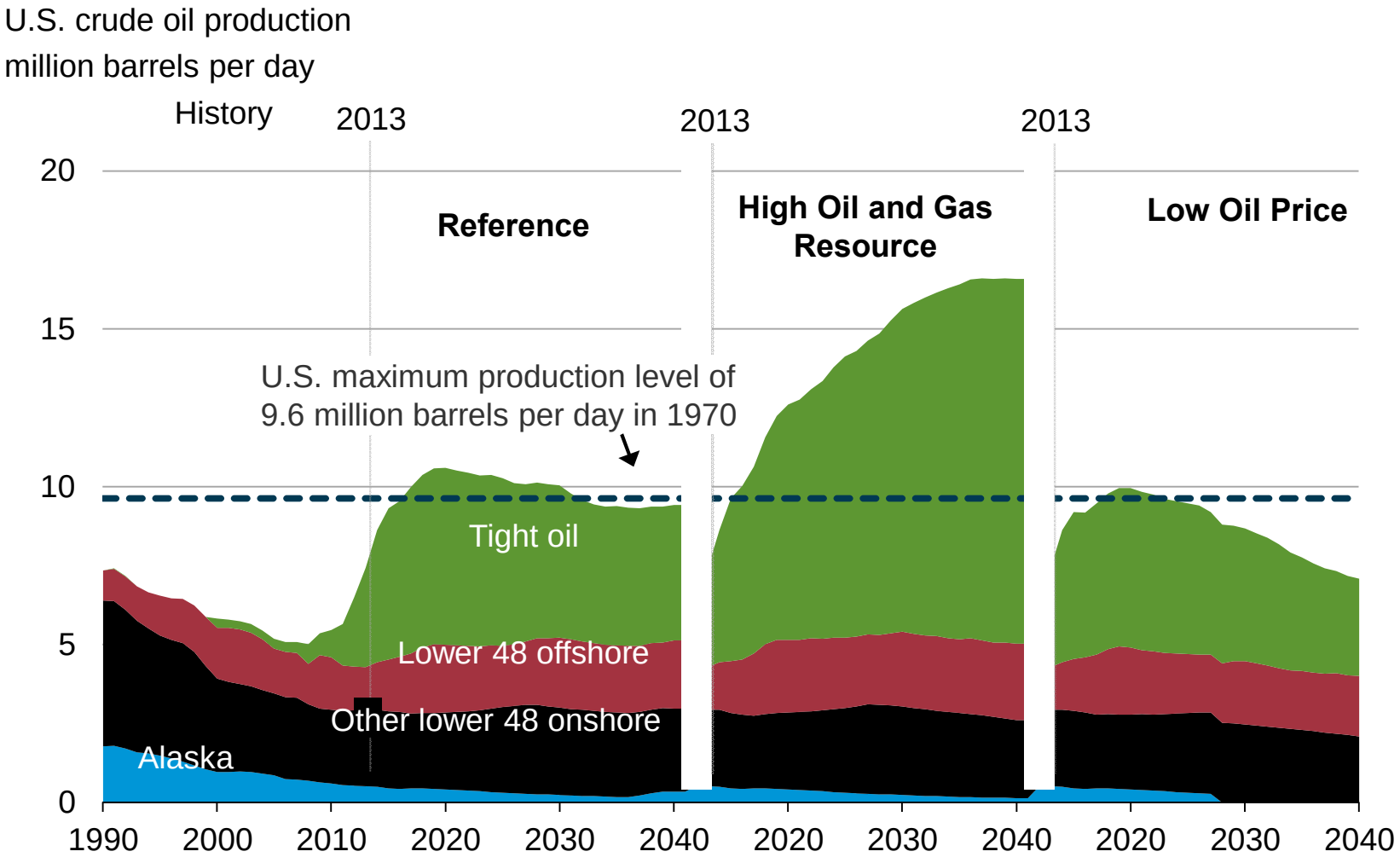
- Improved efficiency of energy consumption in end-use sectors and a shift away from more carbon-intensive fuels help to stabilize U.S. energy-related carbon dioxide emissions, which remain below the 2005 level through 2040
- Growth of domestic crude oil and natural gas production varies significantly across regions and cases, leading to shifts in crude oil and natural gas flows between regions, requiring infrastructure adjustments
- The AEO2015 cases generally reflect current policies, including final regulations and the sunset of tax credits under current law; consistent with this approach, EPAôs proposed Clean Power Plan rules for existing fossil-fired electric generating units or the effects of relaxing current limits on crude oil exports are not considered in AEO2015

U.S. net energy imports continue to decline in the near term, reflecting increased oil and natural gas production coupled with slow demand growth



Source: EIA, Annual Energy Outlook 2015

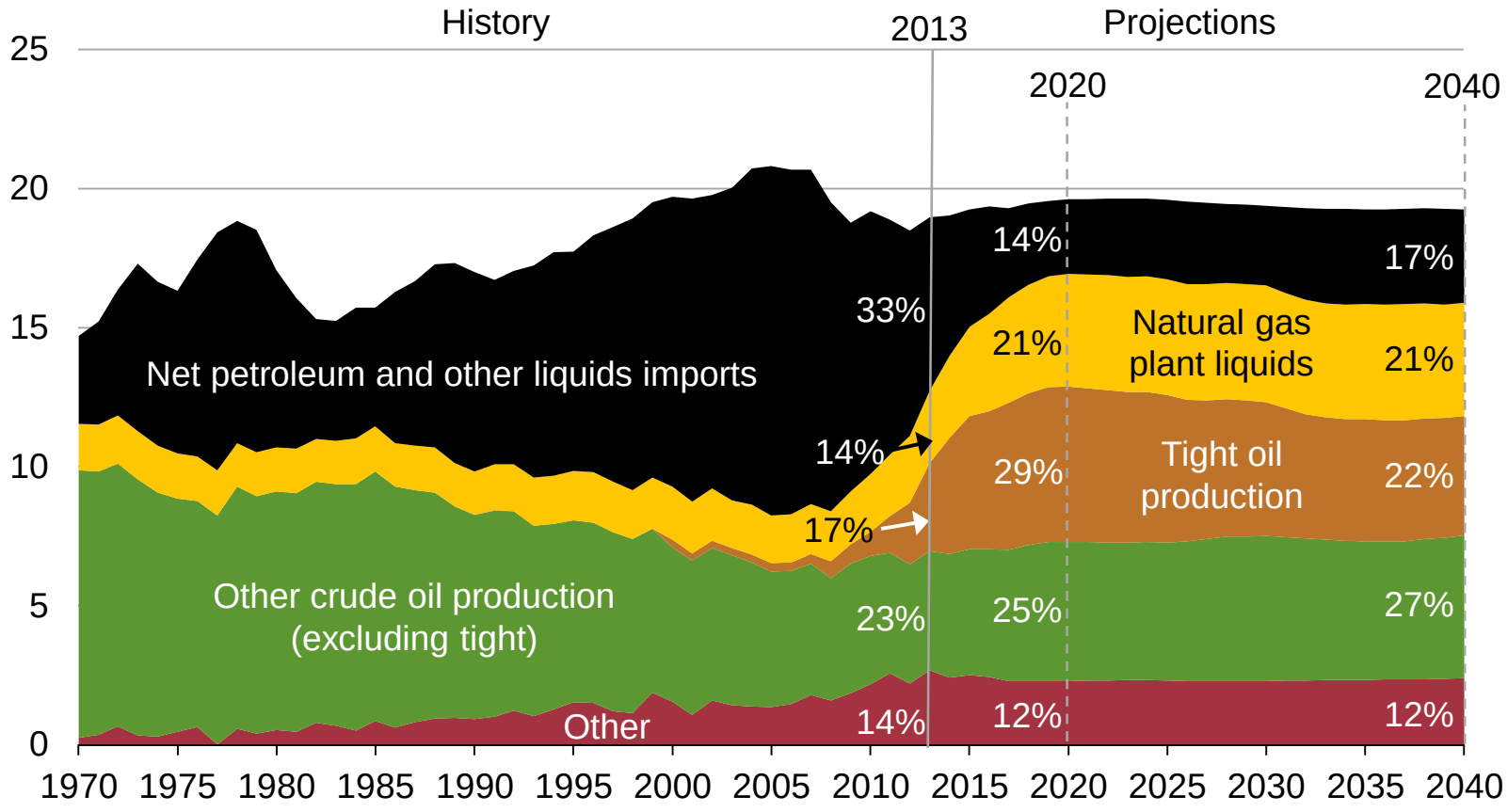
U.S. crude oil production rises above previous historical highs before 2020 in all AEO2015 cases, with a range of longer-term outcomes



Source: EIA, Annual Energy Outlook 2015

Combination of increased tight oil production and higher fuel efficiency drive projected decline in oil imports

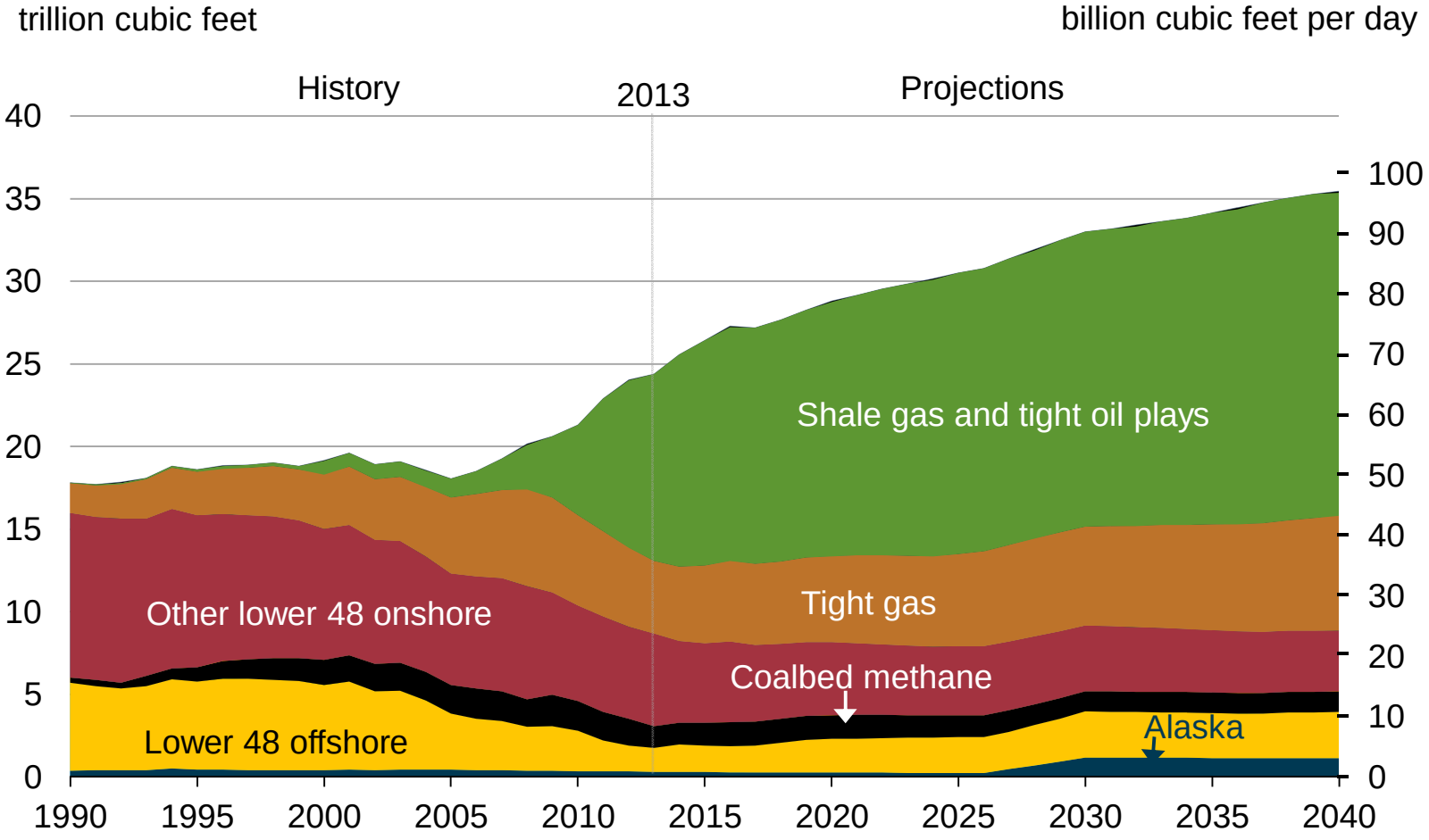
U.S. liquid fuels supply
million barrels per day



Note: "Other" includes refinery gain, biofuels production, all stock withdrawals, and other domestic sources of liquid fuels
Source: EIA, Annual Energy Outlook 2015 Reference case

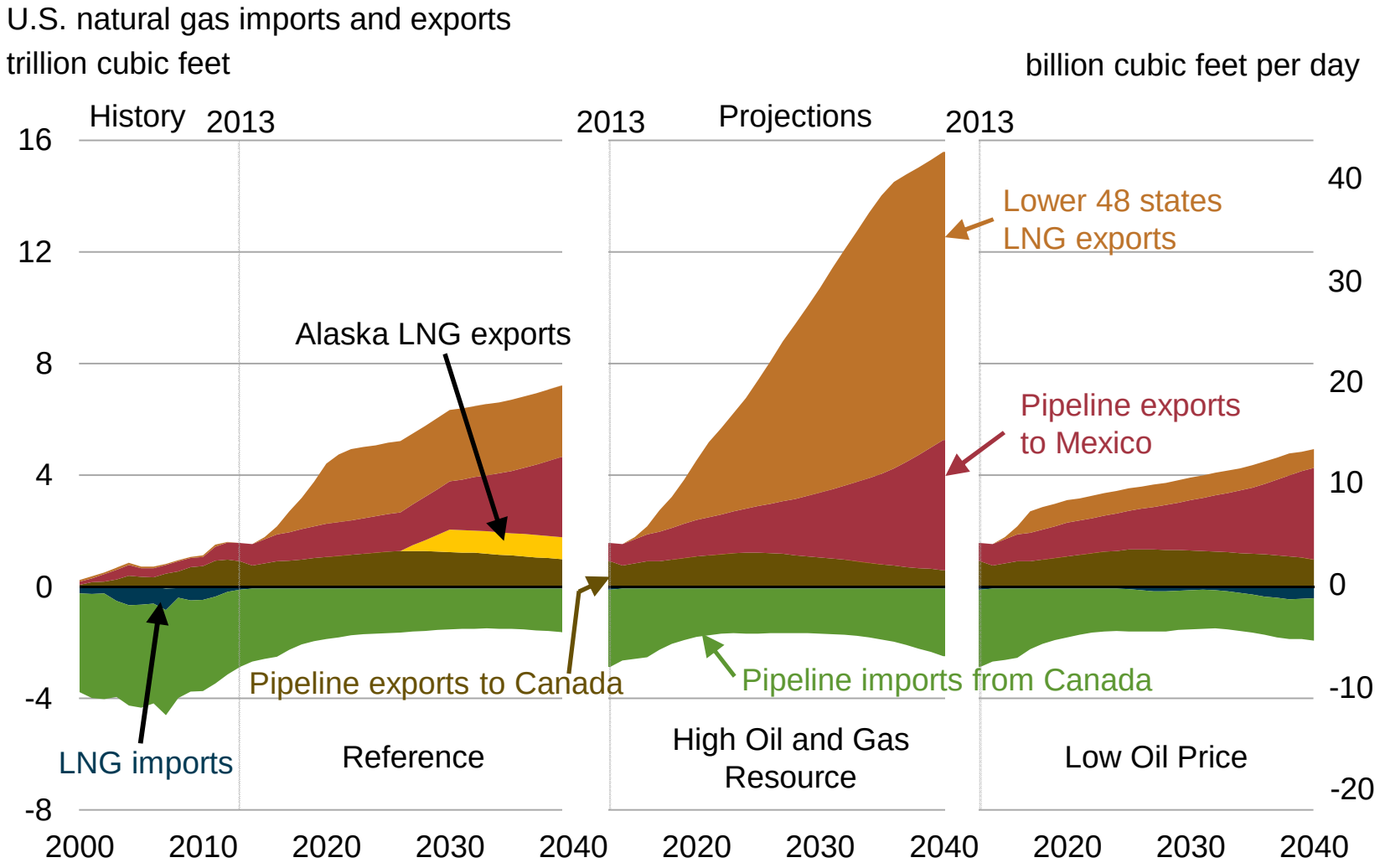
Shale resources remain the dominant source of U.S. natural gas production growth

U.S. dry natural gas production



Source: EIA, Annual Energy Outlook 2015 Reference case

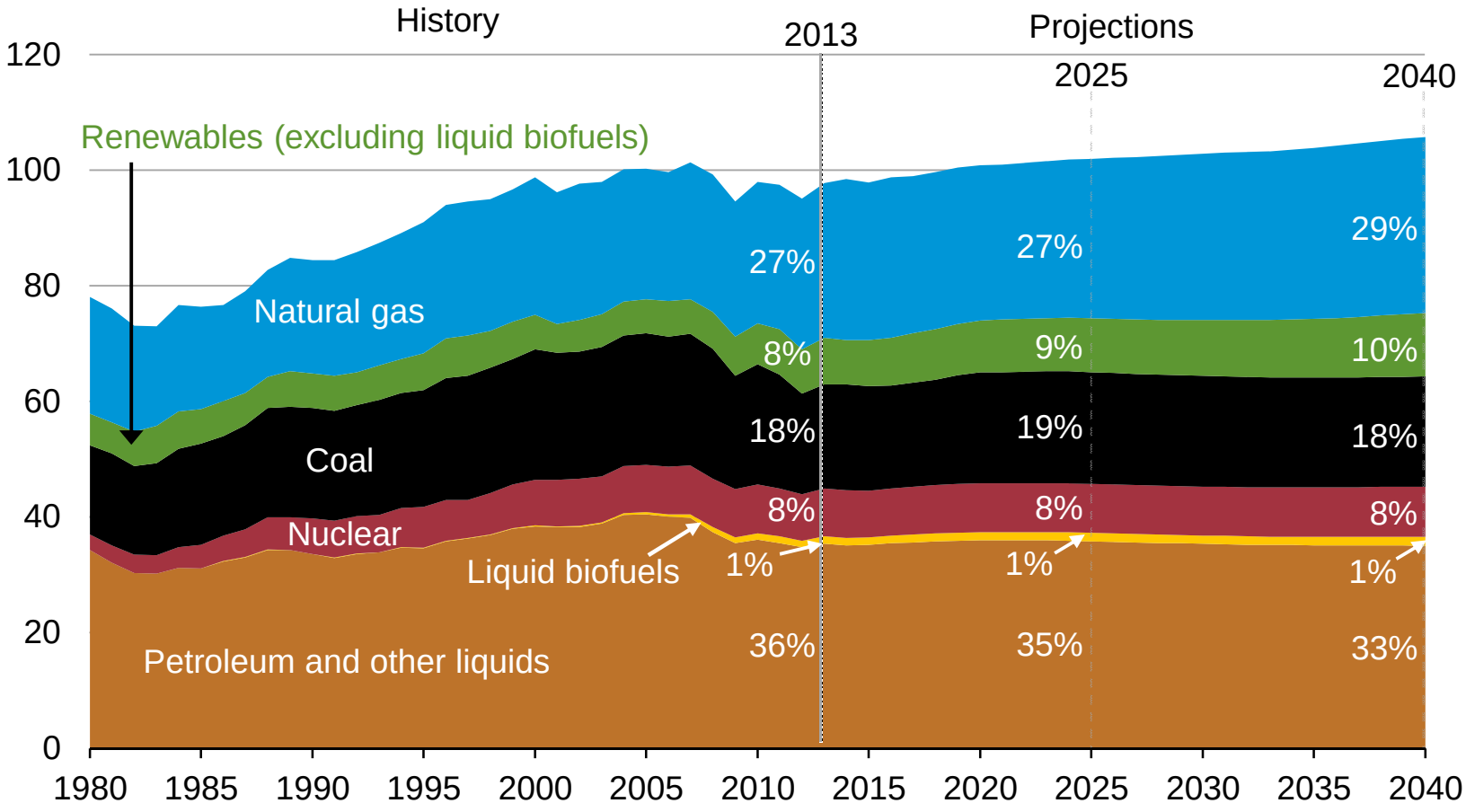
Projected U.S. natural gas exports reflect the spread between domestic natural gas prices and world energy prices



Source: EIA, Annual Energy Outlook 2015

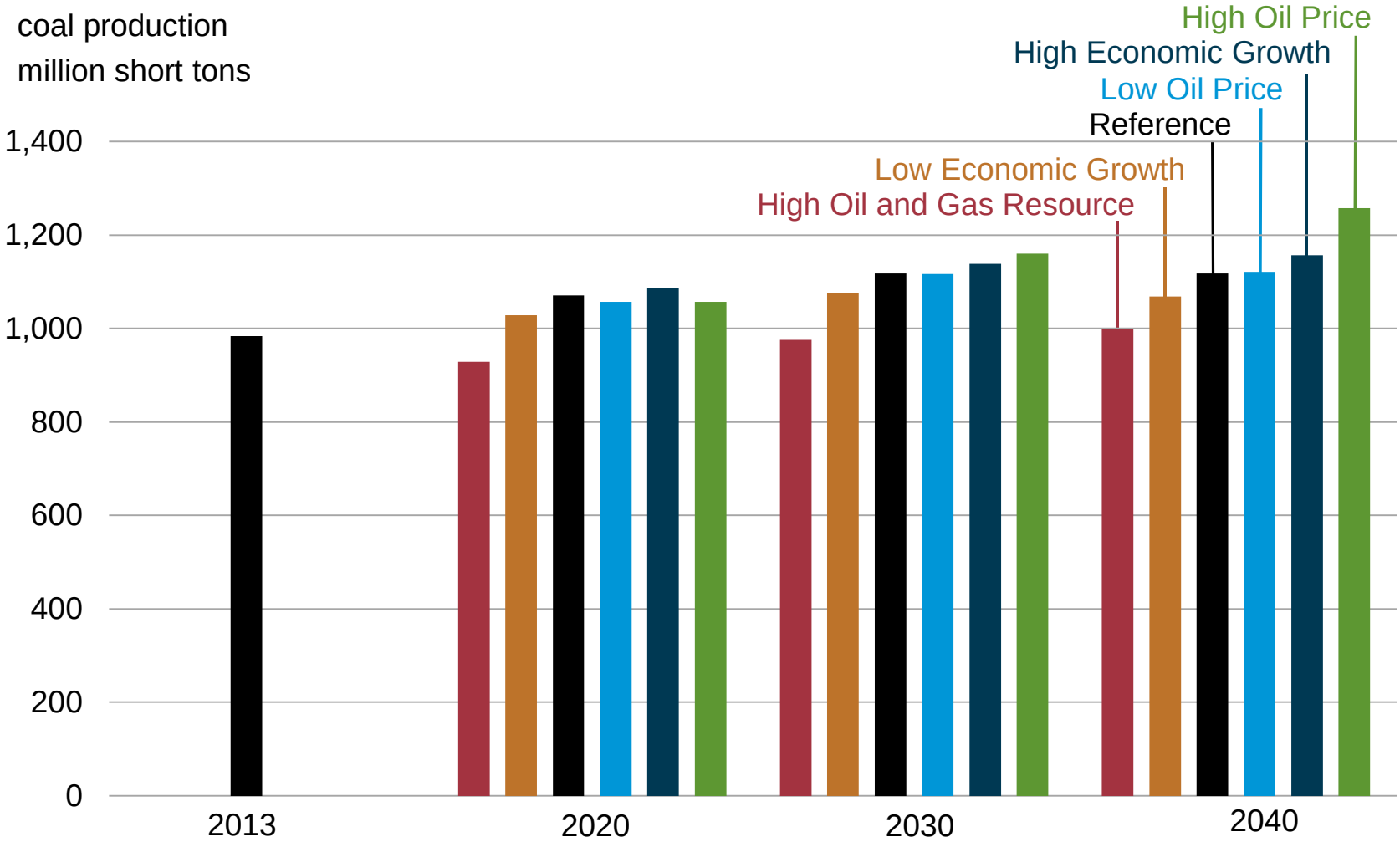
Reductions in energy intensity largely offset impact of GDP growth, leading to slow projected growth in energy use

U.S. primary energy consumption
quadrillion Btu



Source: EIA, Annual Energy Outlook 2015 Reference case

U.S. coal production is sensitive to economic and market conditions

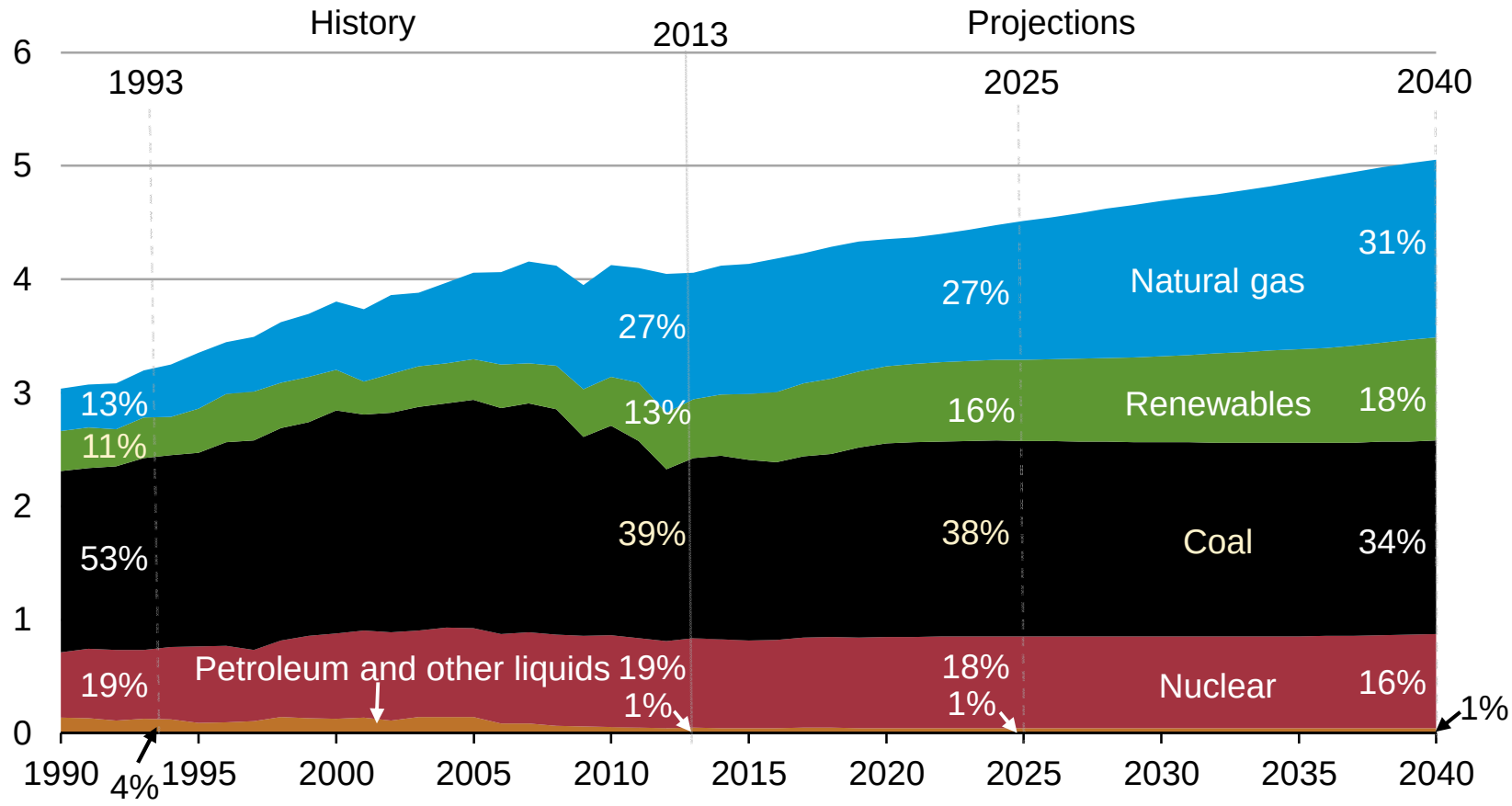


Source: Annual Energy Outlook 2015

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

electricity net generation

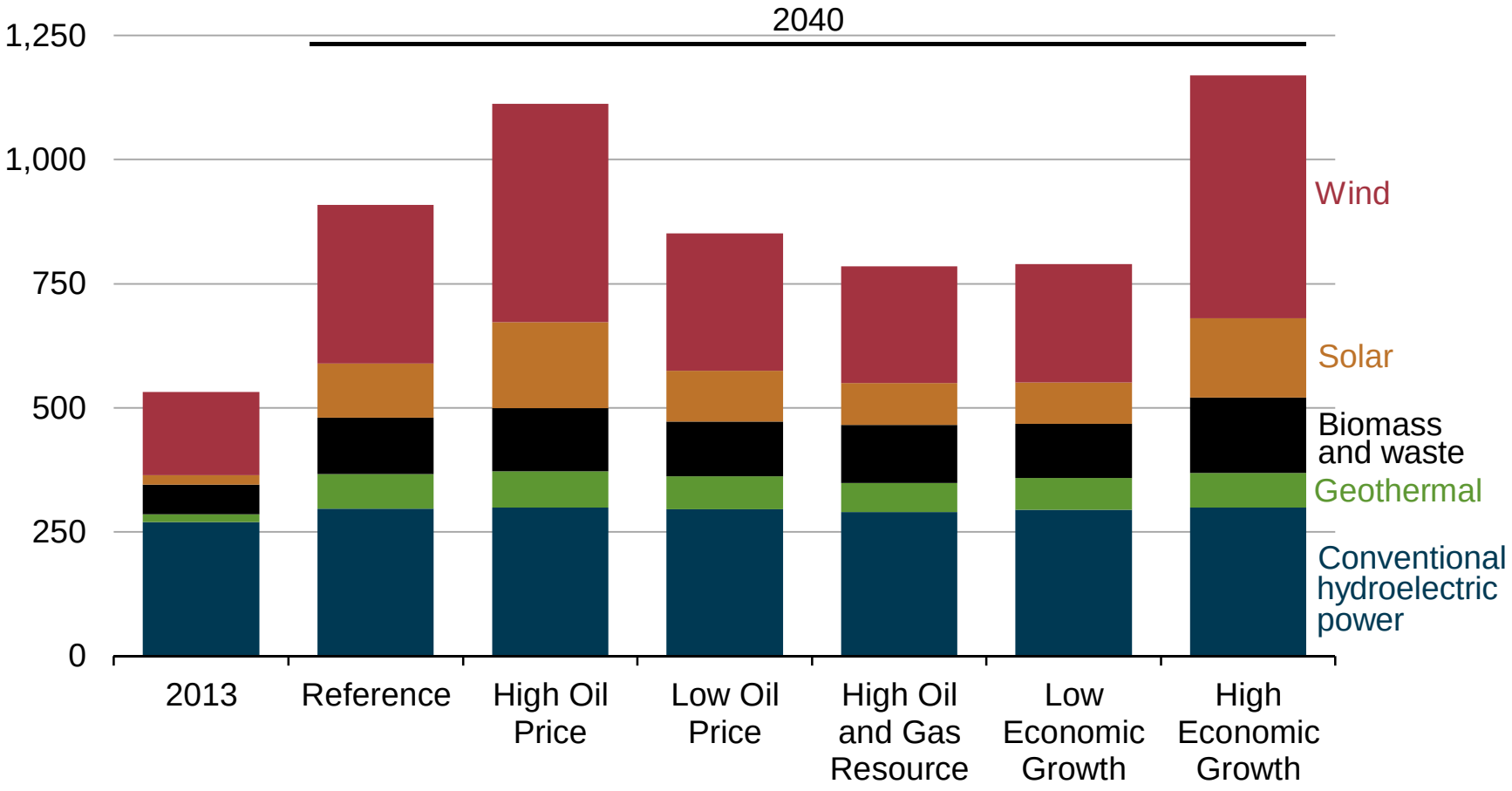
trillion kilowatthours



Source: EIA, Annual Energy Outlook 2015 Reference case

Growth in wind and solar generation meets a significant portion of projected total electric load growth in all AEO2015 cases

U.S. renewable generation in all sectors by fuel
billion kilowatthours

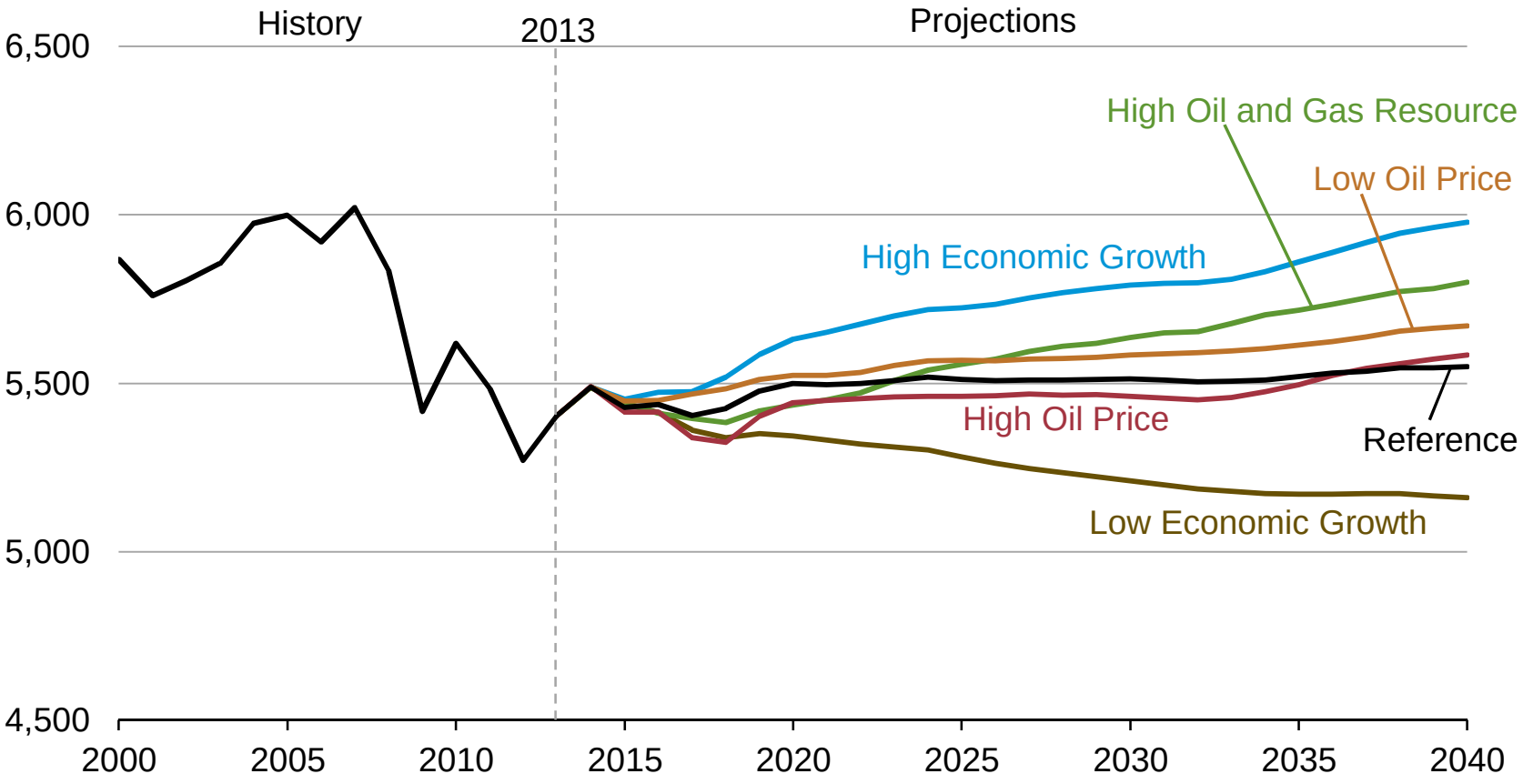


Source: EIA, Annual Energy Outlook 2015

CO_2 emissions are sensitive to the influence of future economic growth and energy price trends on energy consumption

carbon dioxide emissions

million metric tons

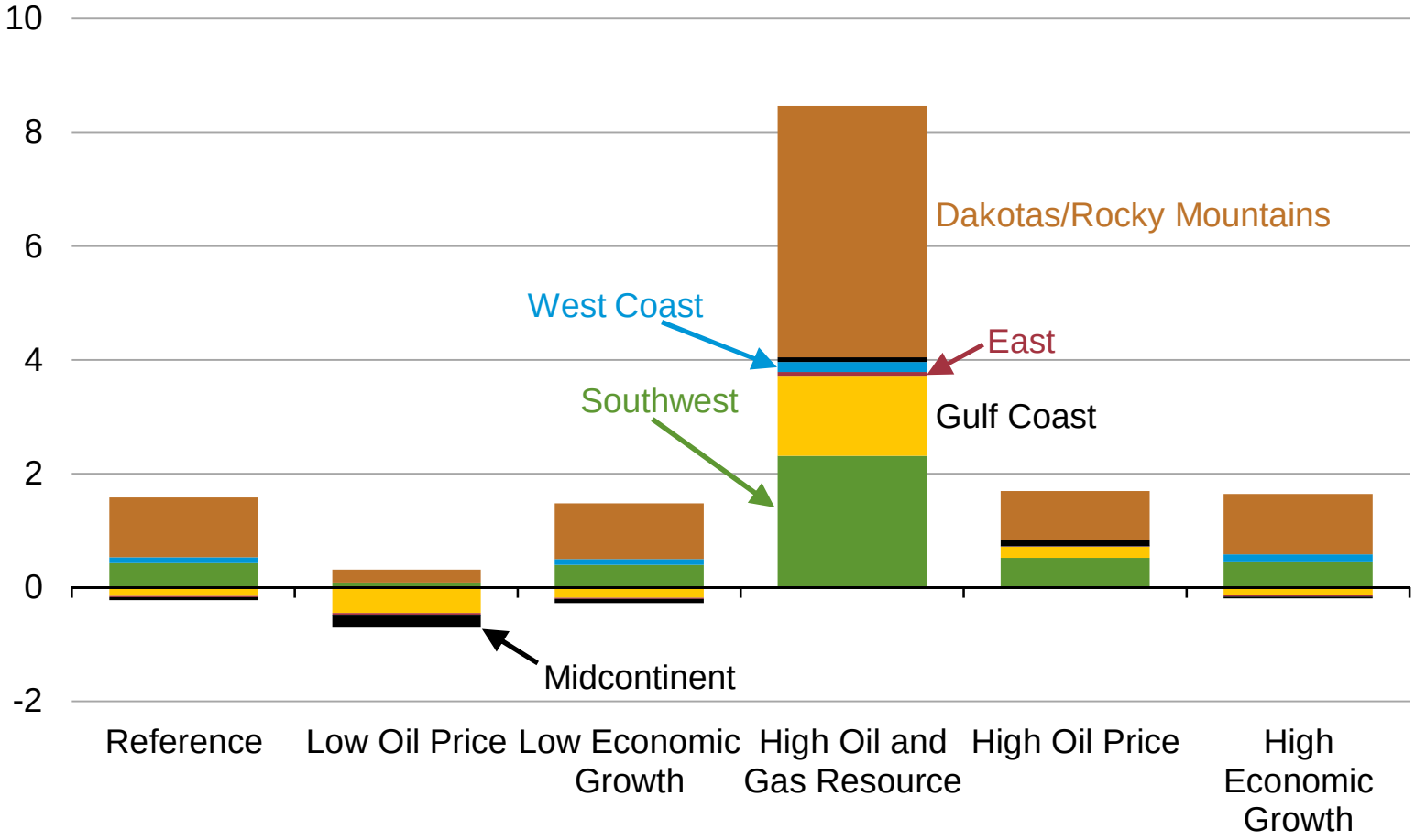


Source: EIA, Annual Energy Outlook 2015

Growth of onshore crude oil production varies across supply regions, affecting pipeline and midstream infrastructure needs

change between 2013 and 2040 in U.S. lower 48 onshore crude oil production by region

million barrels per day



Source: EIA, Annual Energy Outlook 2015

For more information

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

Annual Energy Outlook | www.eia.gov/forecasts/aeo

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

International Energy Outlook | www.eia.gov/forecasts/ieo

Today In Energy | www.eia.gov/todayinenergy

Monthly Energy Review | www.eia.gov/totalenergy/data/monthly

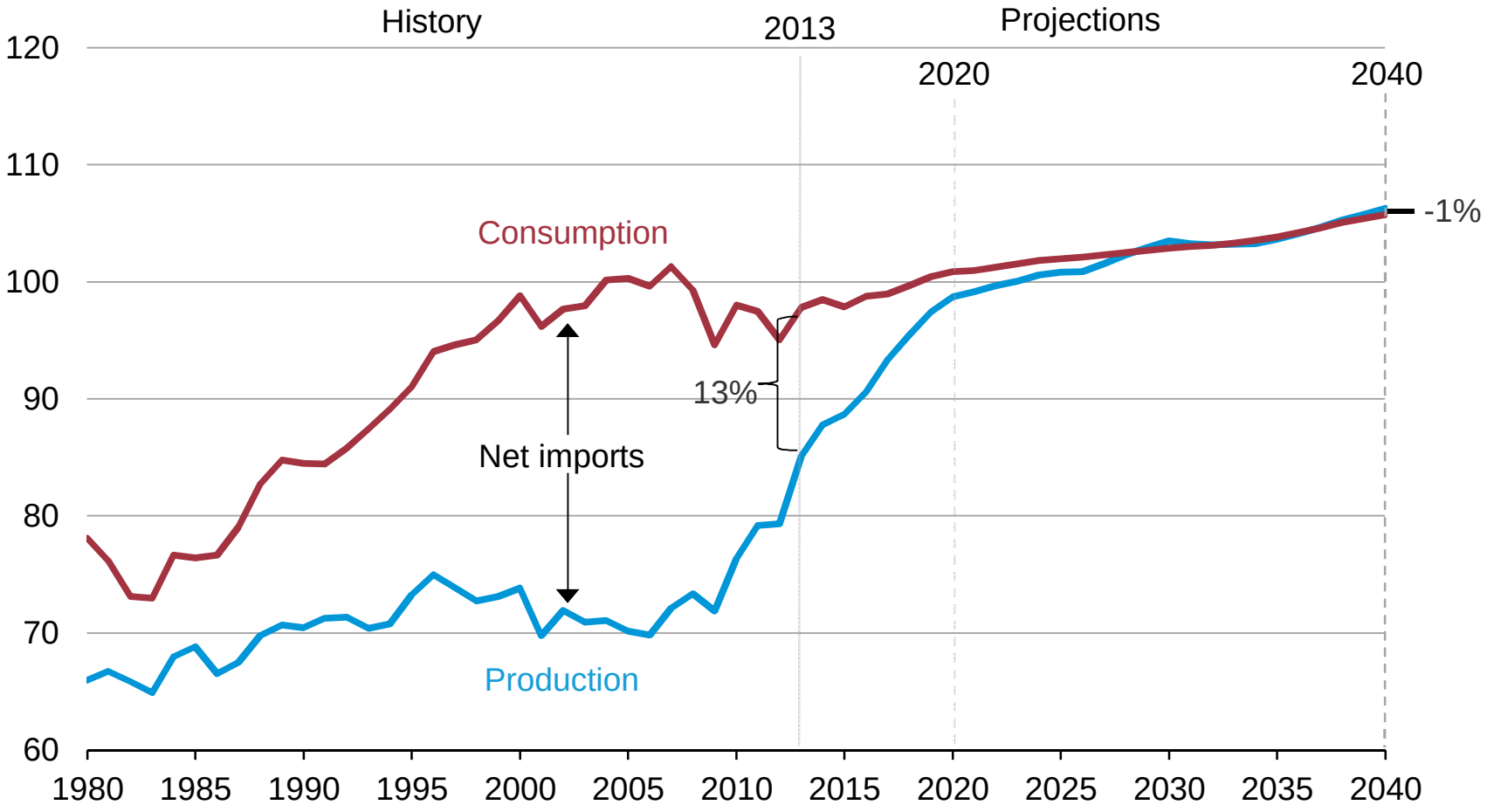
State Energy Portal | www.eia.gov/state

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

Supplemental slides

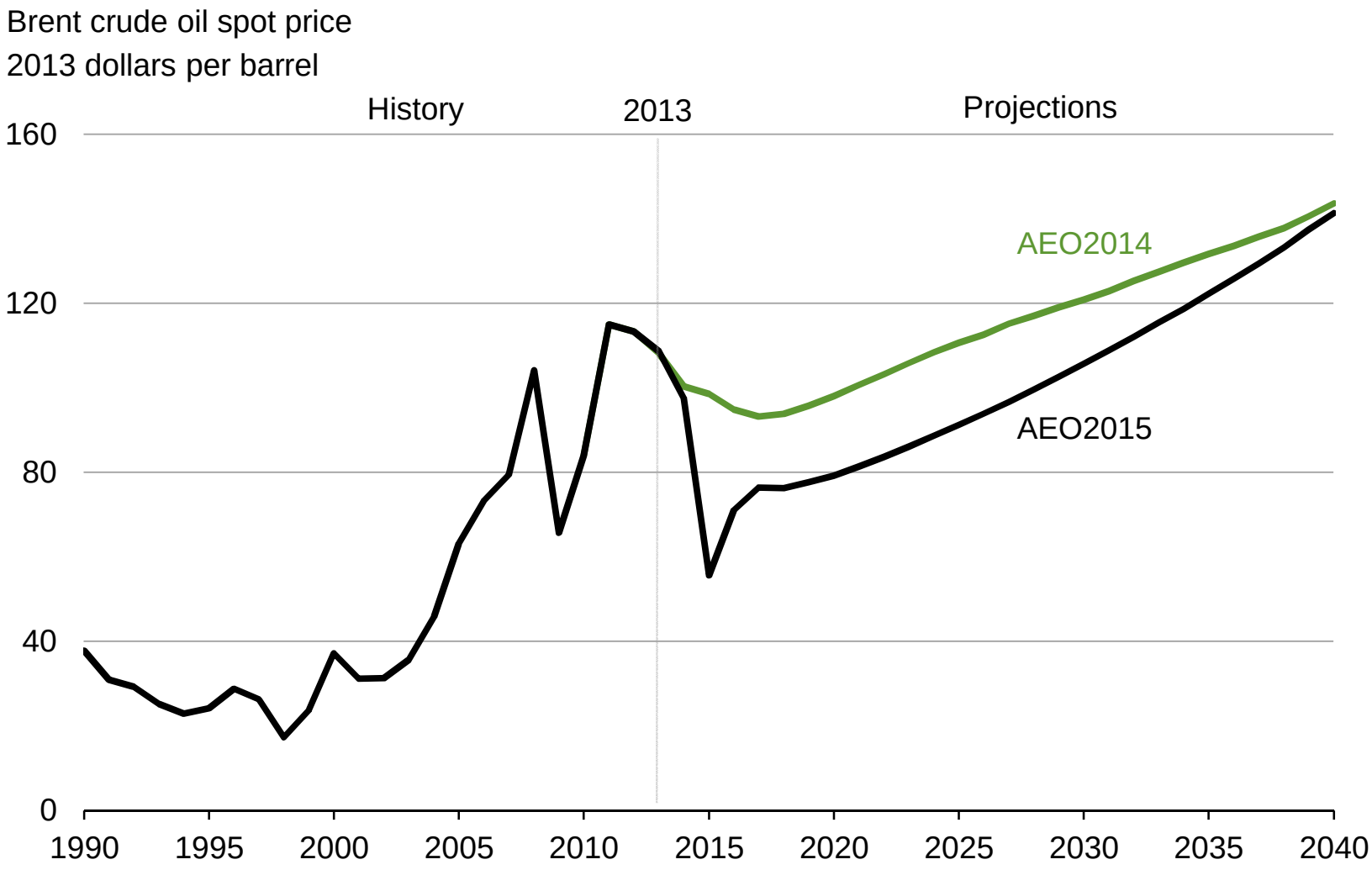
Growth in U.S. energy production outstrips consumption leading to a balance in United States energy imports and exports

U.S. energy production and consumption
quadrillion Btu



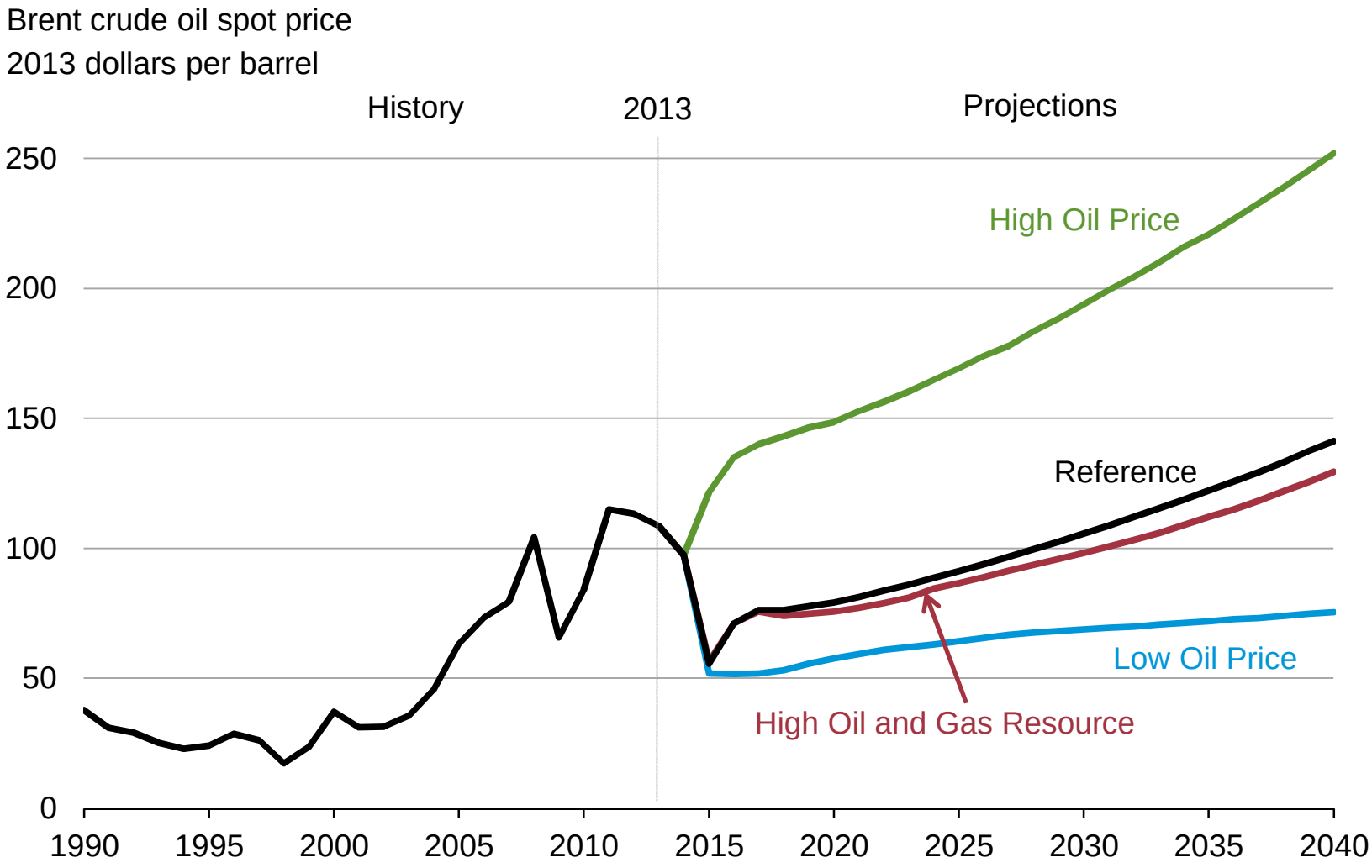
Source: EIA, Annual Energy Outlook 2015 Reference case

Crude oil price projection is lower in the AEO2015 Reference case than in AEO2014, particularly in the near term



Source: EIA, Annual Energy Outlook 2015 Reference case and Annual Energy Outlook 2014 Reference case

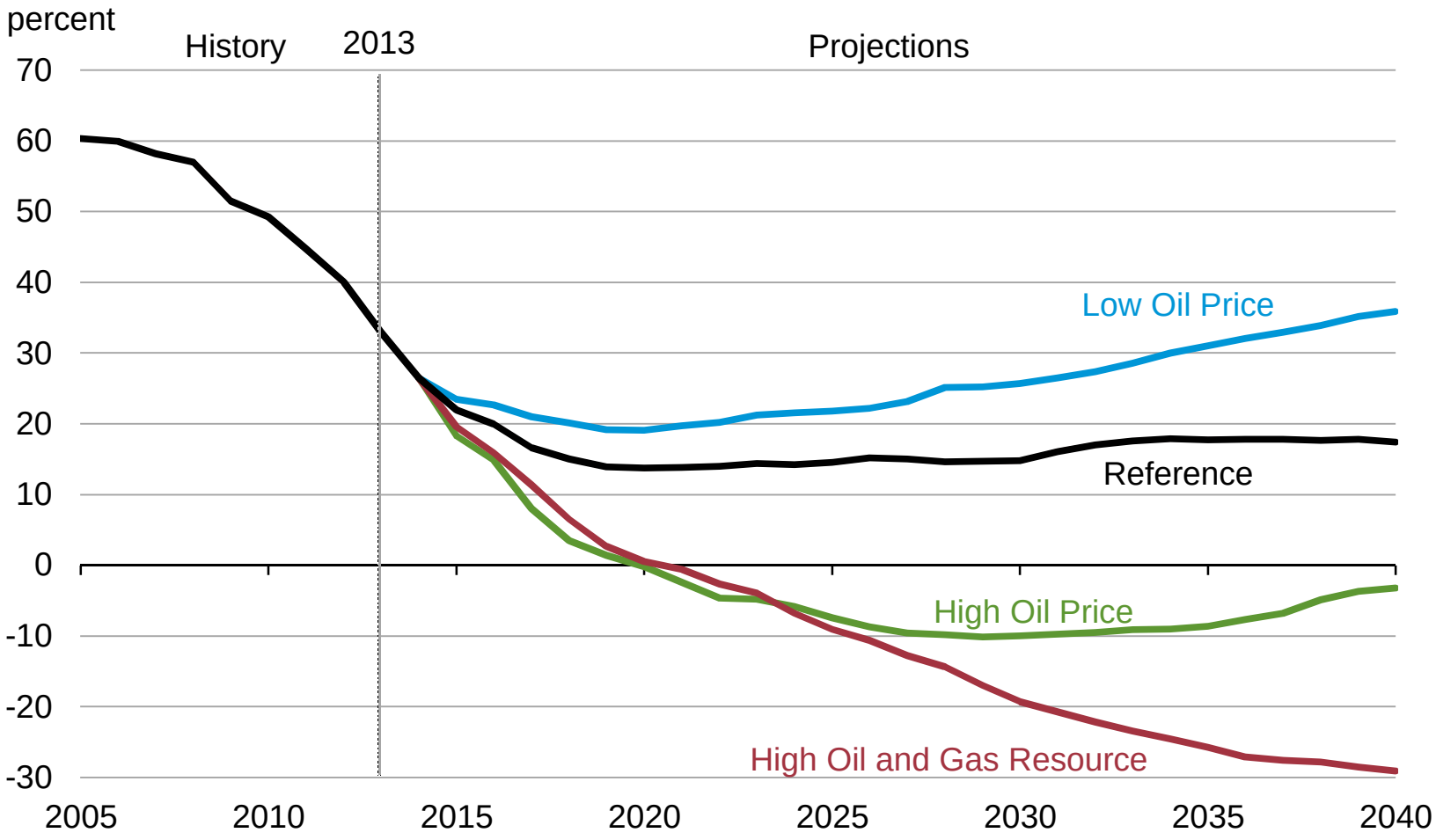
AEO2015 explores scenarios that encompass a wide range of future crude oil price paths



Source: EIA, Annual Energy Outlook 2015

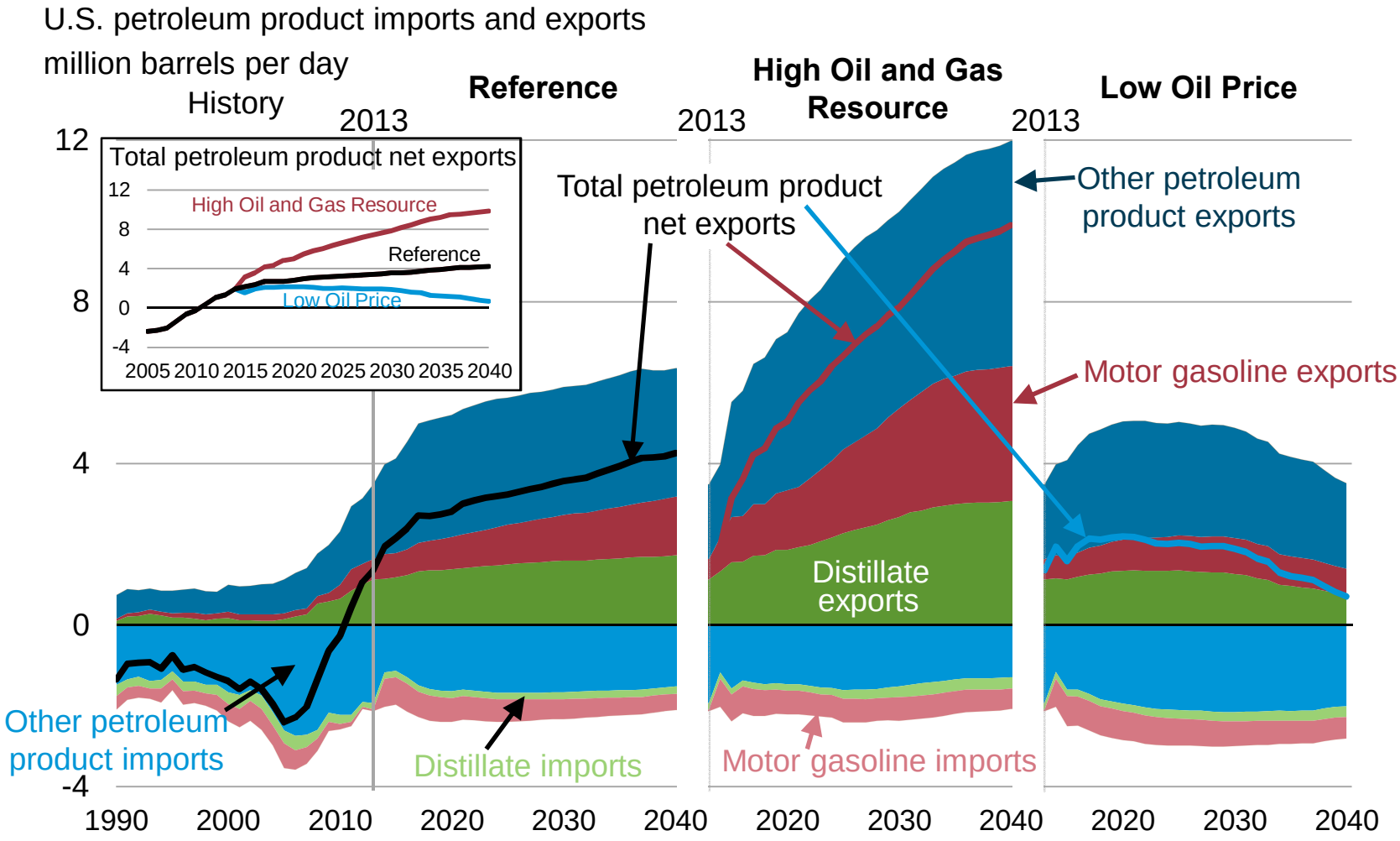
Net liquids imports provide a declining share of U.S. liquid fuels supply in most AEO2015 cases; in two cases the nation becomes a net exporter

net crude oil and petroleum product imports as a percentage of total U.S. supply



Source: EIA, Annual Energy Outlook 2015

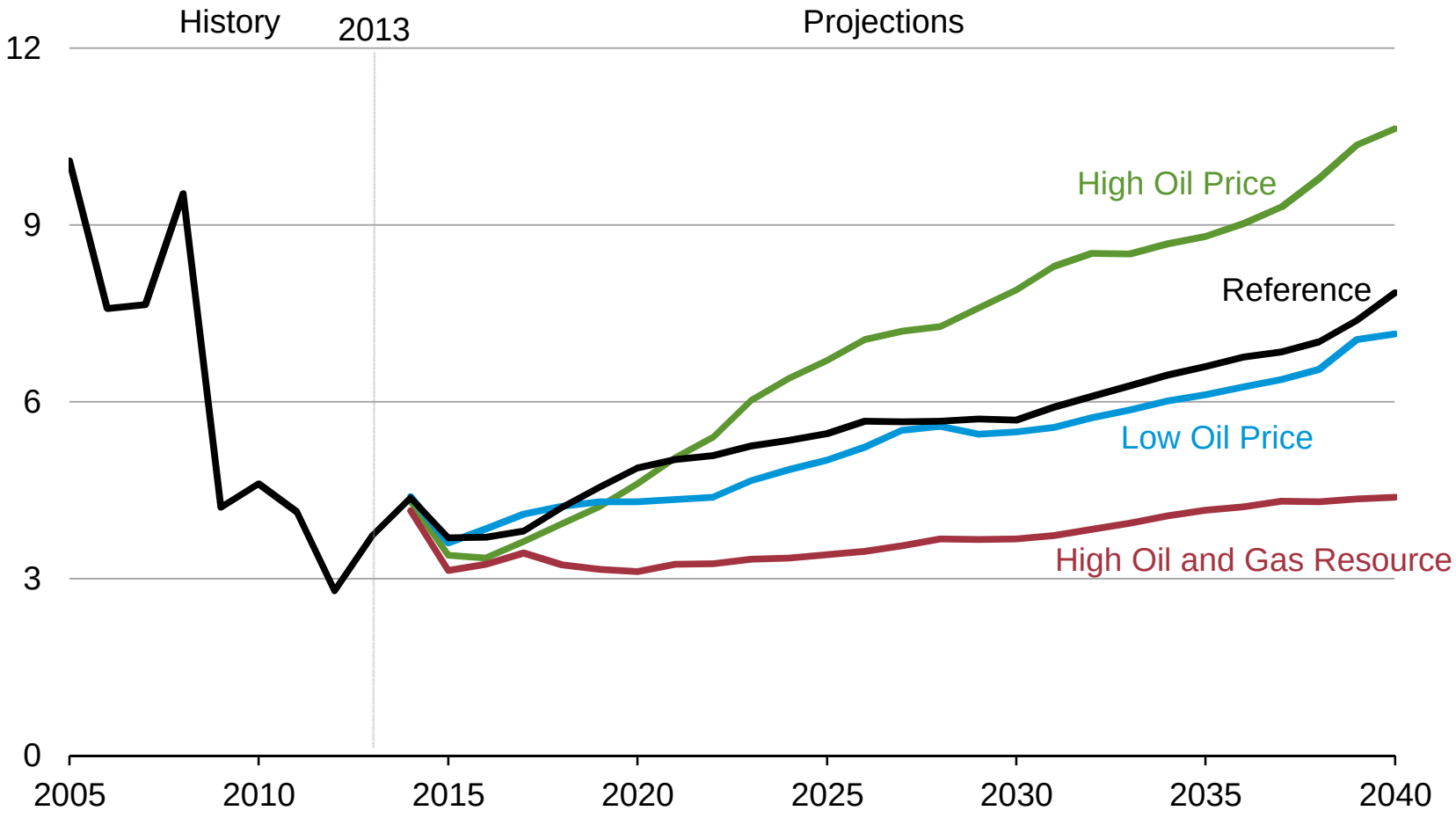
U.S. net exports of petroleum products vary with the level of domestic oil production given current limits on U.S. crude oil exports



Source: EIA, Annual Energy Outlook 2015

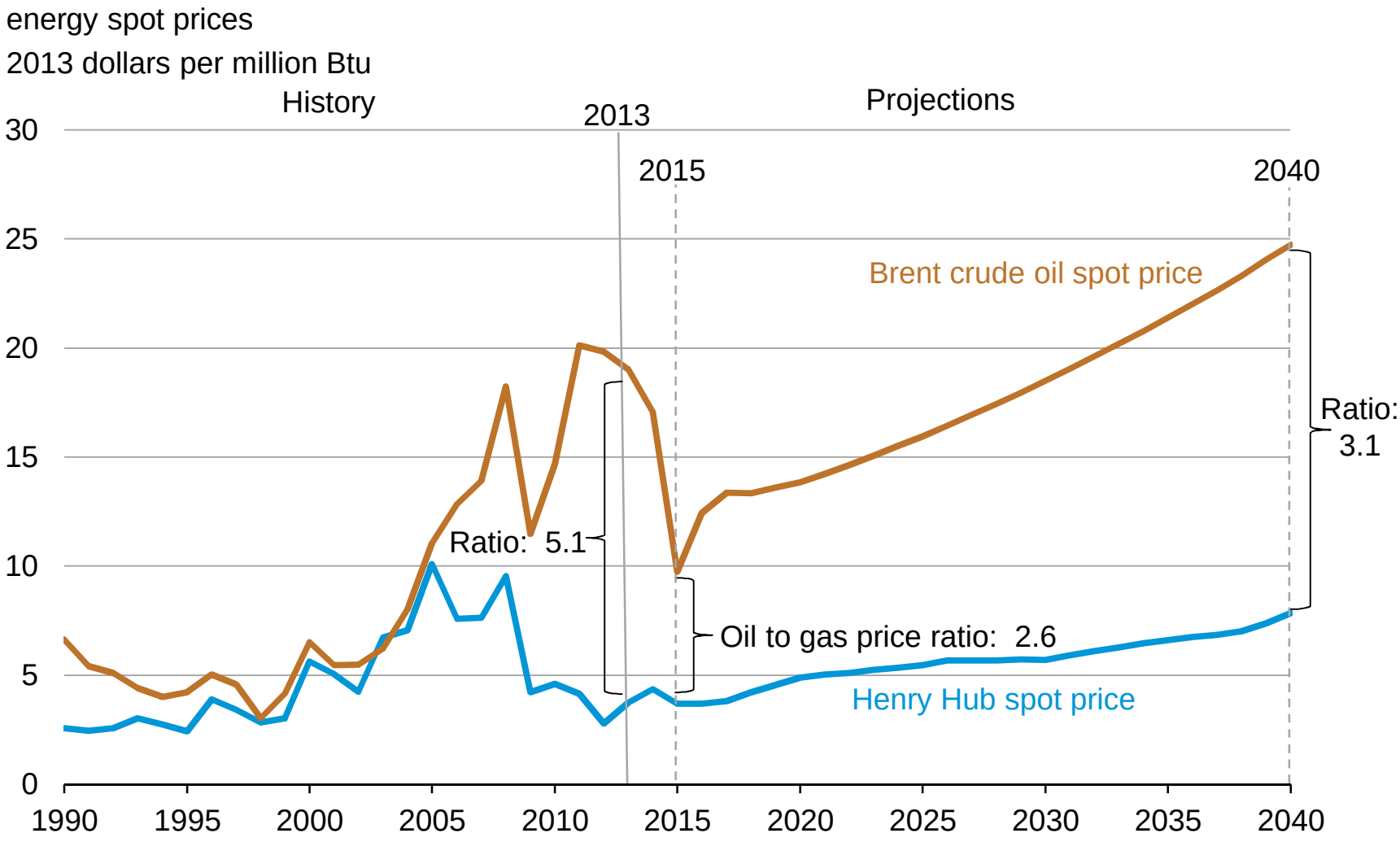
Future domestic natural gas prices depend on both domestic resource availability and world energy prices

average Henry Hub spot prices for natural gas
2013 dollars per million Btu



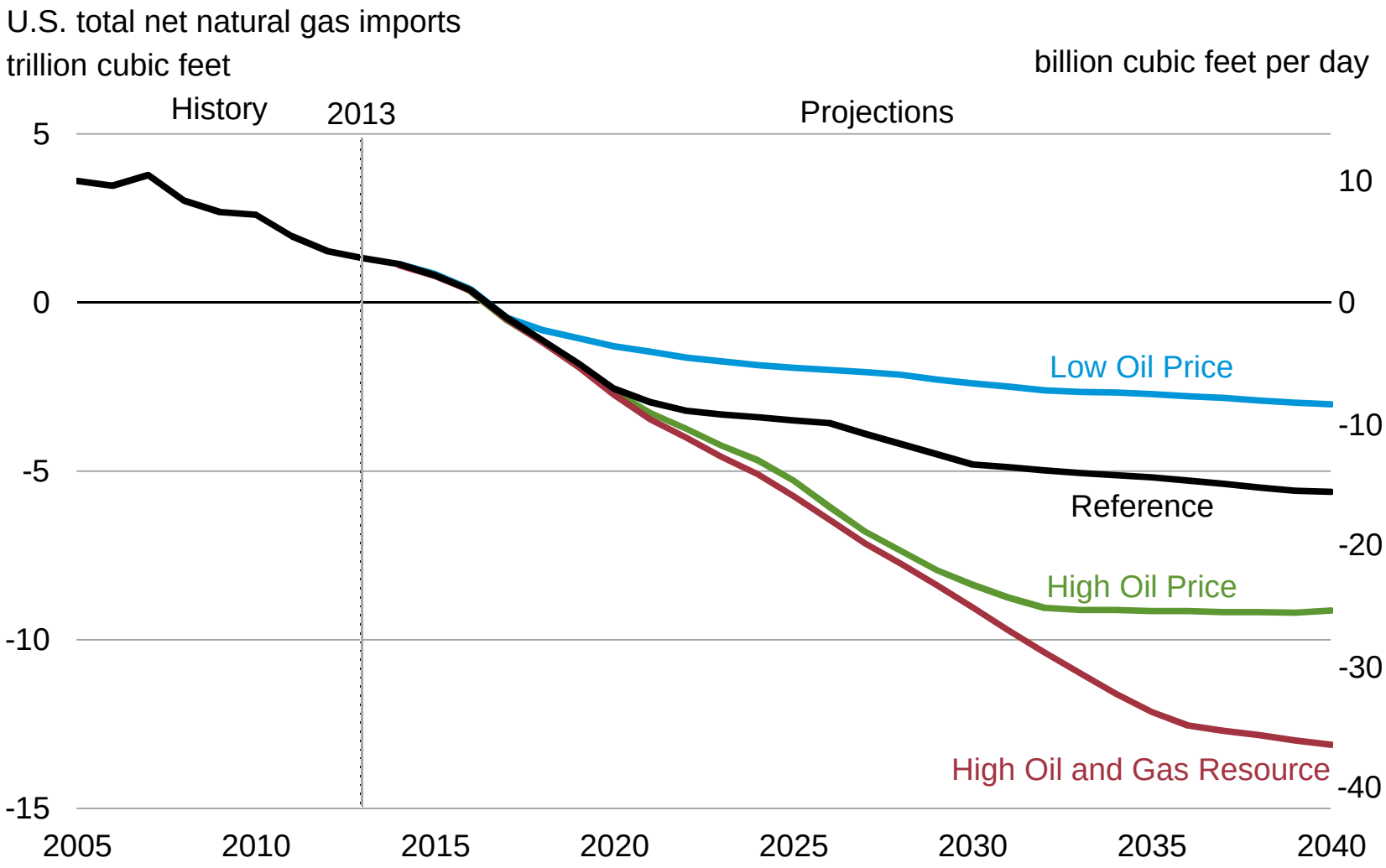
Source: EIA, Annual Energy Outlook 2015

Difference between U.S. natural gas and crude oil prices grows through 2040



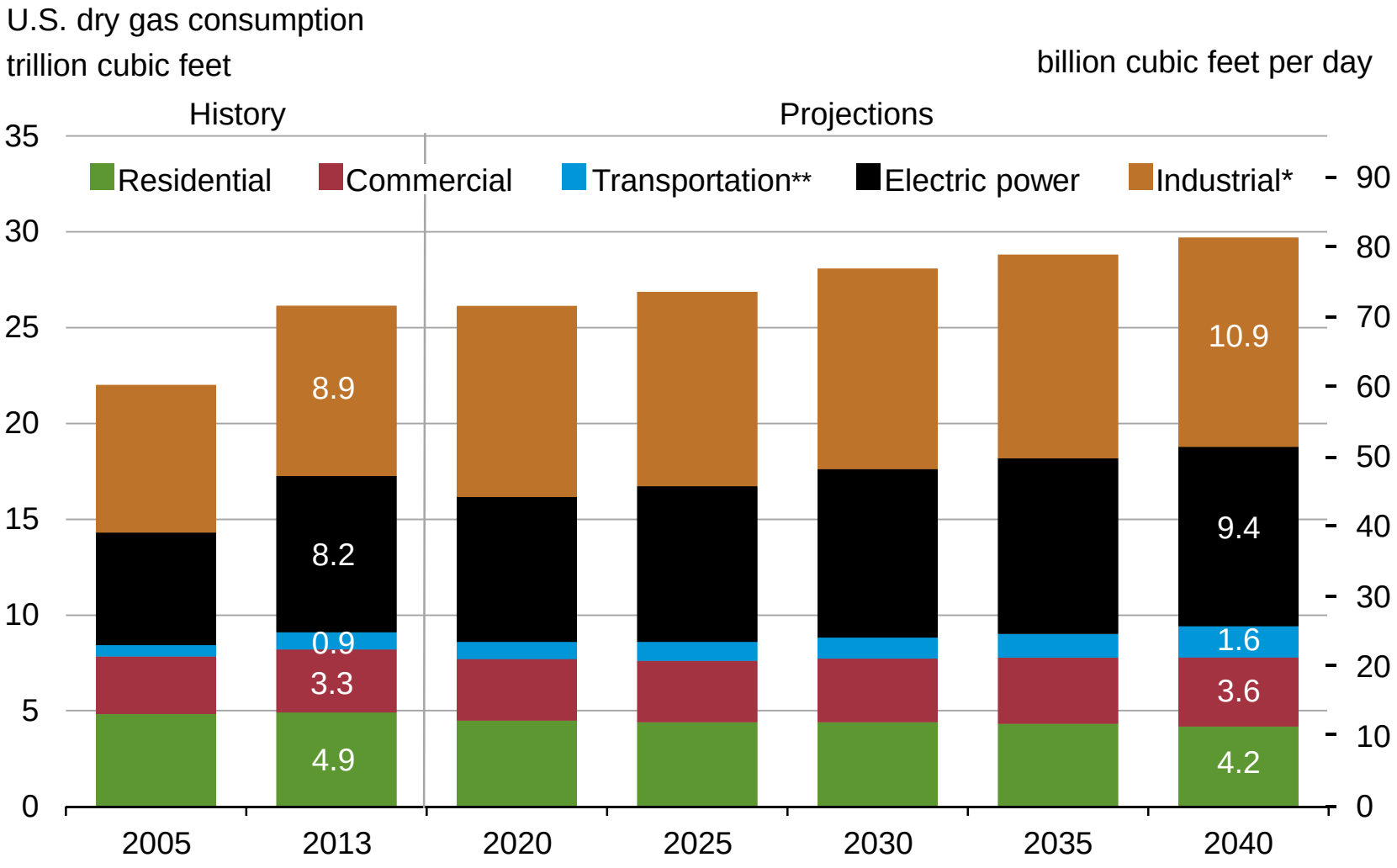
Source: EIA, Annual Energy Outlook 2015 Reference case

Level of net natural gas trade, including LNG exports, depends largely on resource levels and oil prices



Source: EIA, Annual Energy Outlook 2015

Natural gas consumption growth is driven by increased use in all sectors except residential



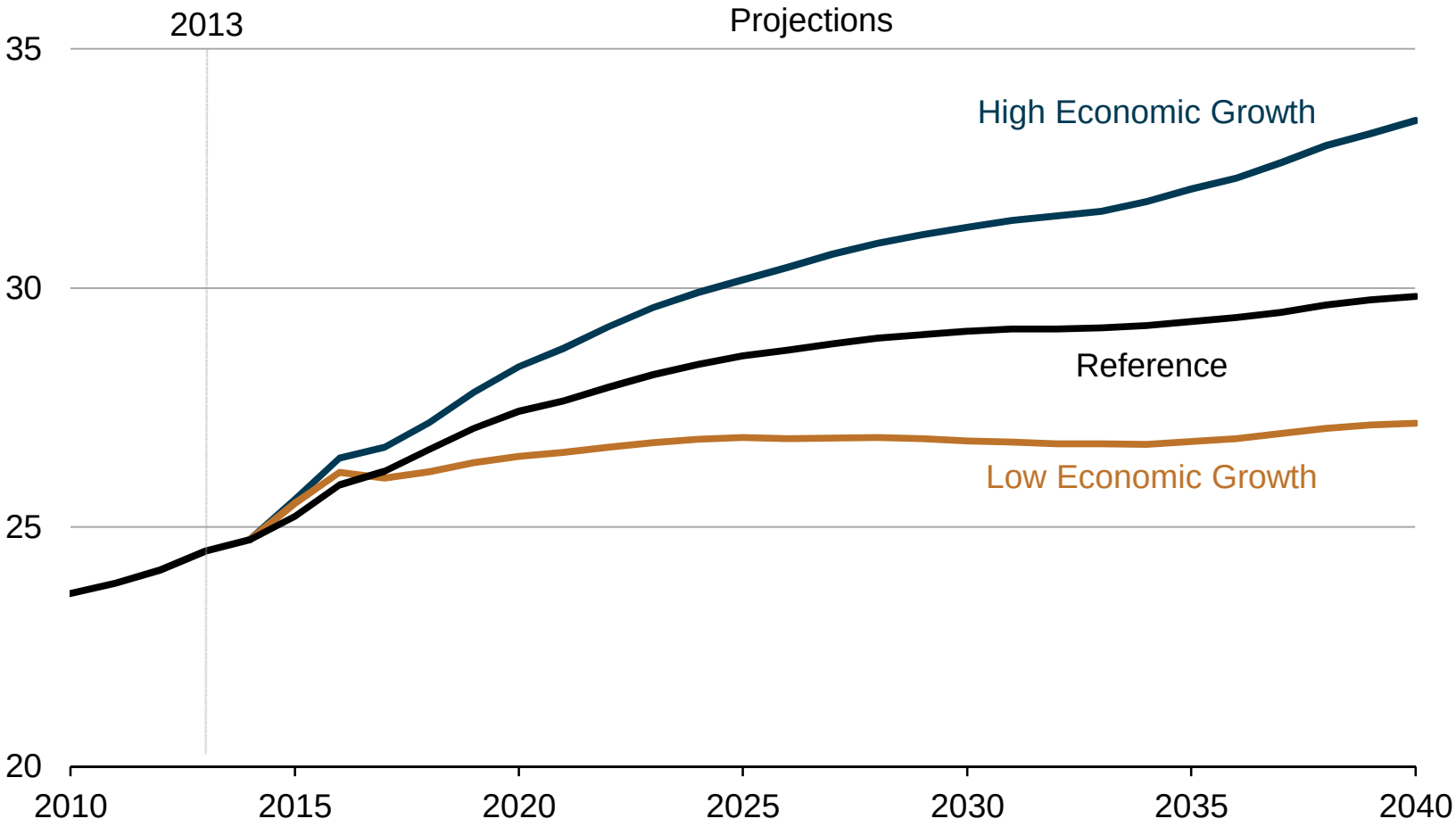
Source: EIA, Annual Energy Outlook 2015 Reference case

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

Industrial energy use rises with growth of shale gas supply

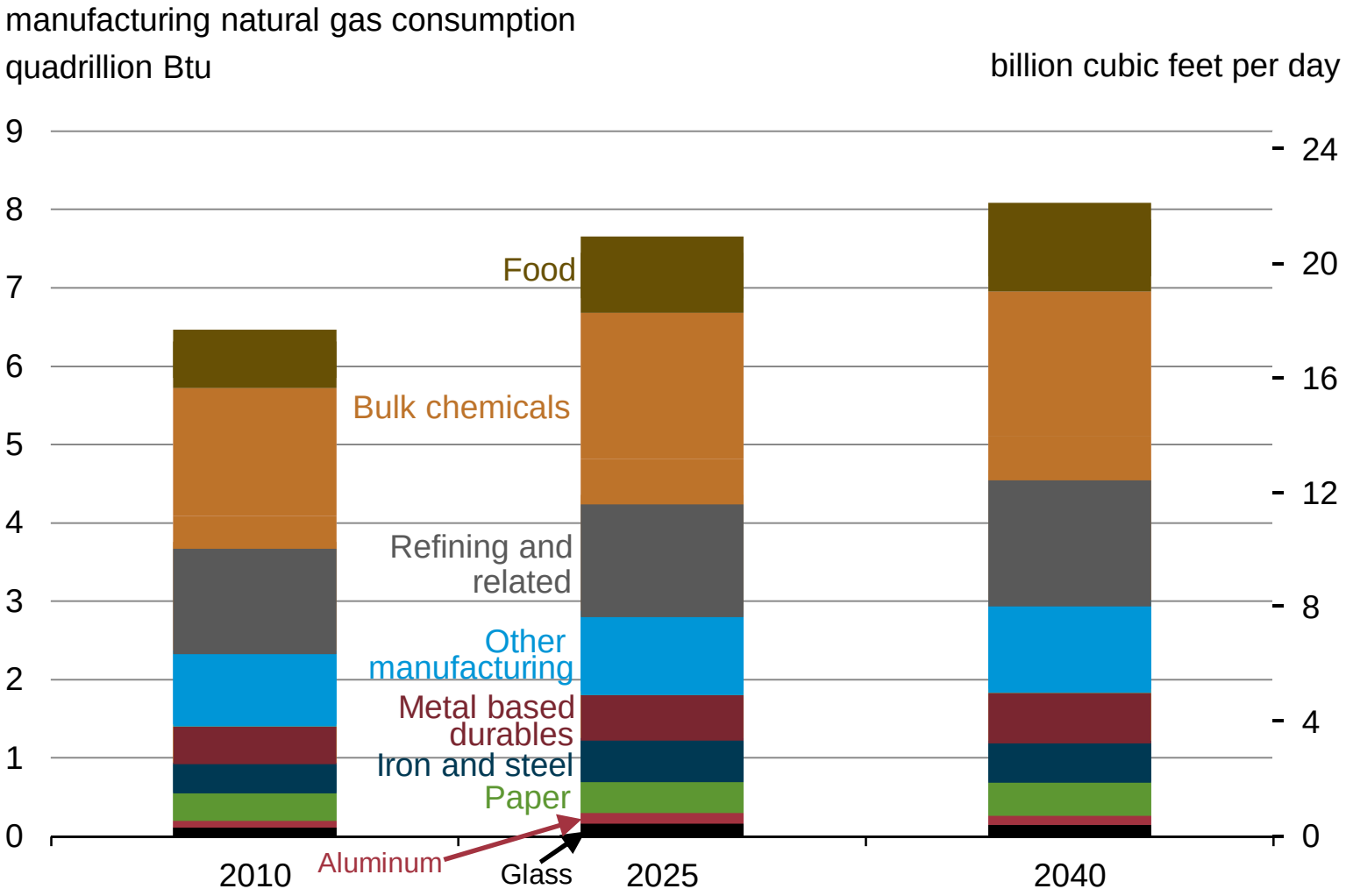
industrial sector total delivered energy consumption

quadrillion Btu



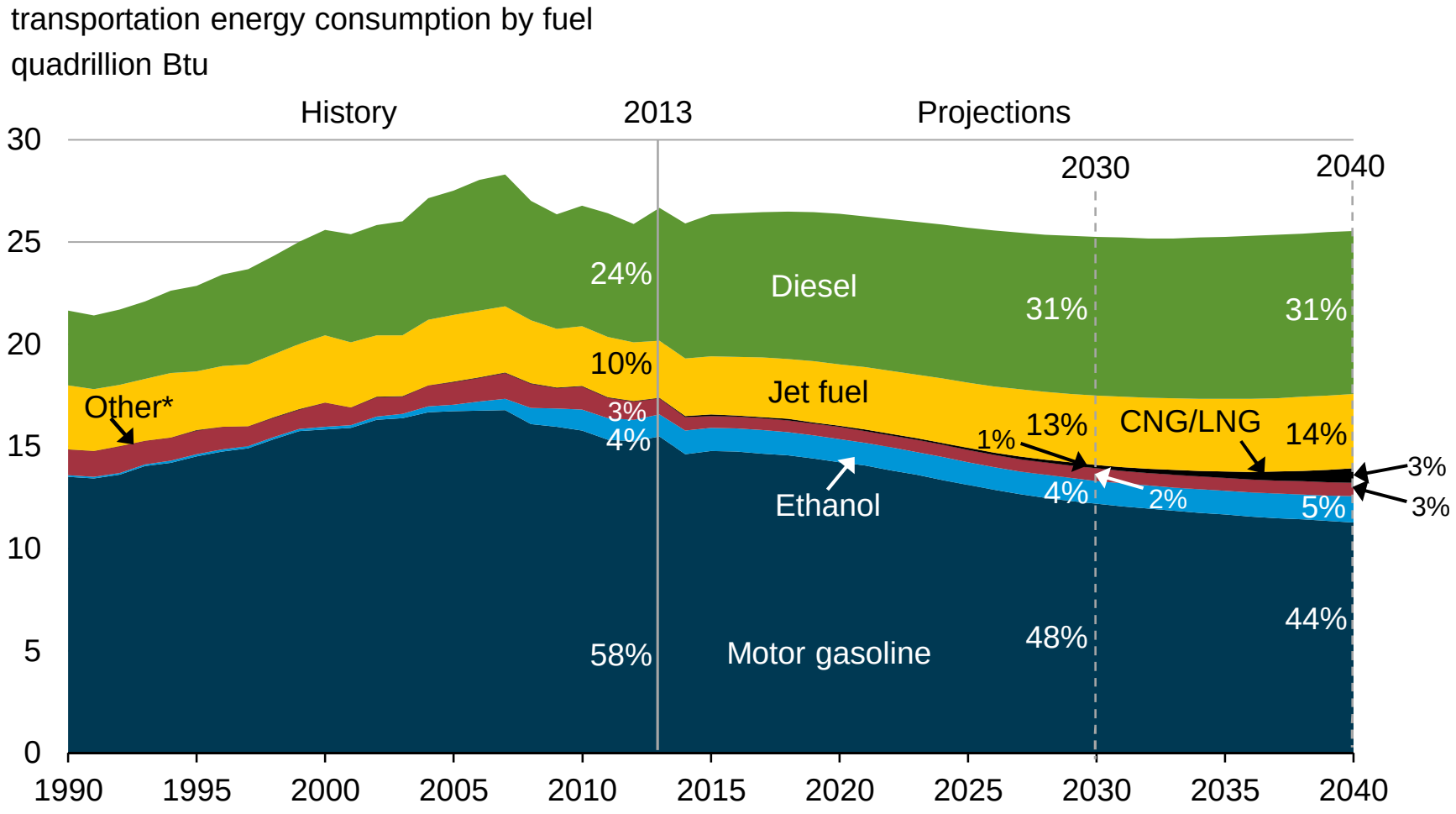
Source: EIA, Annual Energy Outlook 2015

Growth in manufacturing output and use of natural gas reflect high natural gas supply and low prices, particularly in near term



Source: EIA, Annual Energy Outlook 2015 Reference case

In the transportation sector, motor gasoline use declines; diesel fuel, jet fuel, and natural gas use all grow



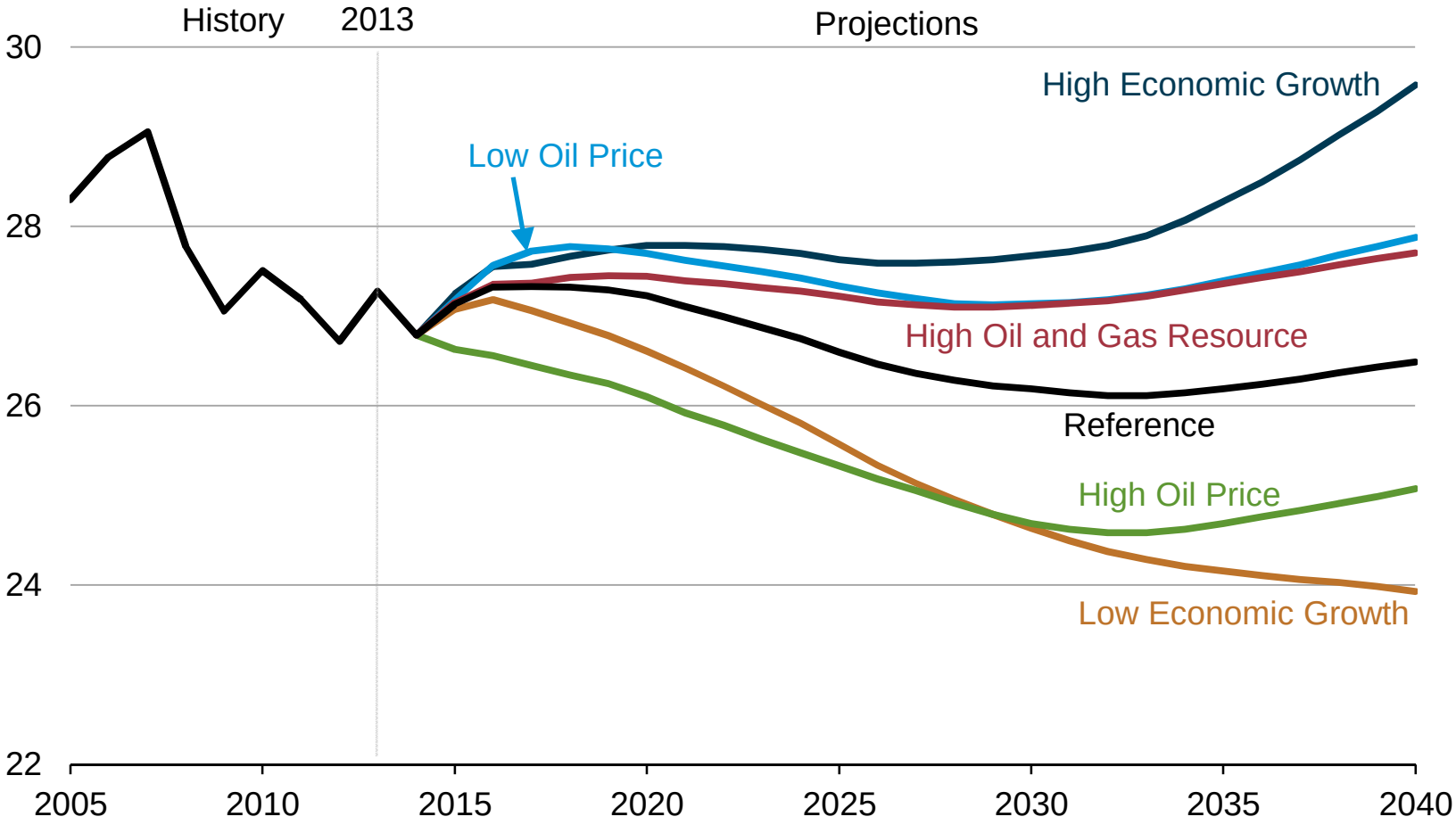
Source: EIA, Annual Energy Outlook 2015 Reference case

**Includes aviation gasoline, propane, residual fuel oil, lubricants, electricity, and liquid hydrogen*

Technology and policy promotes slower growth of transportation energy demand

delivered transportation sector energy consumption

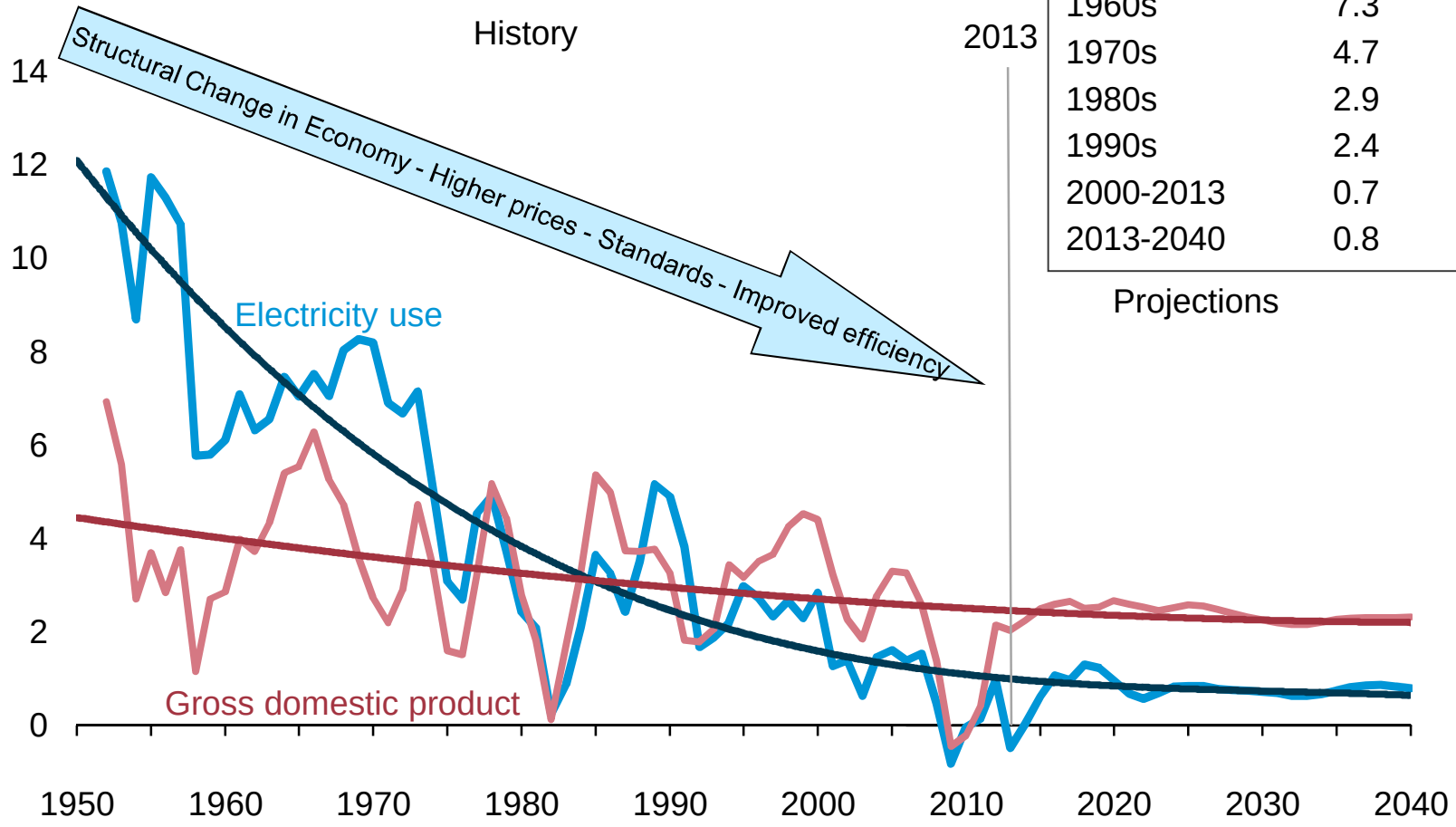
quadrillion Btu



Source: EIA, Annual Energy Outlook 2015

Growth in electricity use slows, but electricity use still increases by 24% from 2013 to 2040

U.S. electricity use and GDP
percent growth (rolling average of 3-year periods)



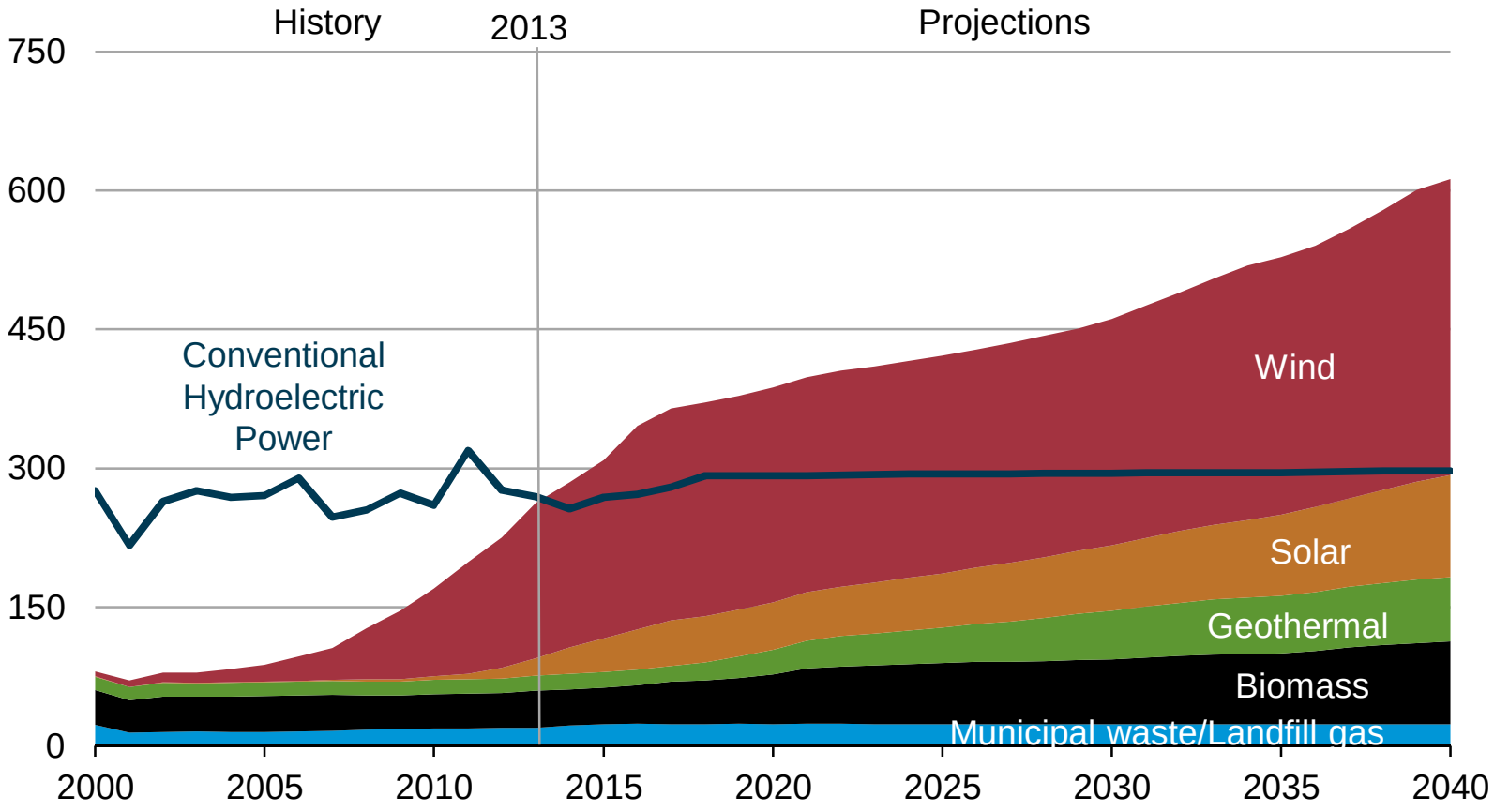
Period	Average Growth	
	Electricity use	GDP
1950s	9.8	4.2
1960s	7.3	4.5
1970s	4.7	3.2
1980s	2.9	3.1
1990s	2.4	3.2
2000-2013	0.7	1.9
2013-2040	0.8	2.4

Source: EIA, Annual Energy Outlook 2015 Reference case

Non-hydro renewable generation grows to double hydropower generation by 2040

renewable electricity generation by fuel type

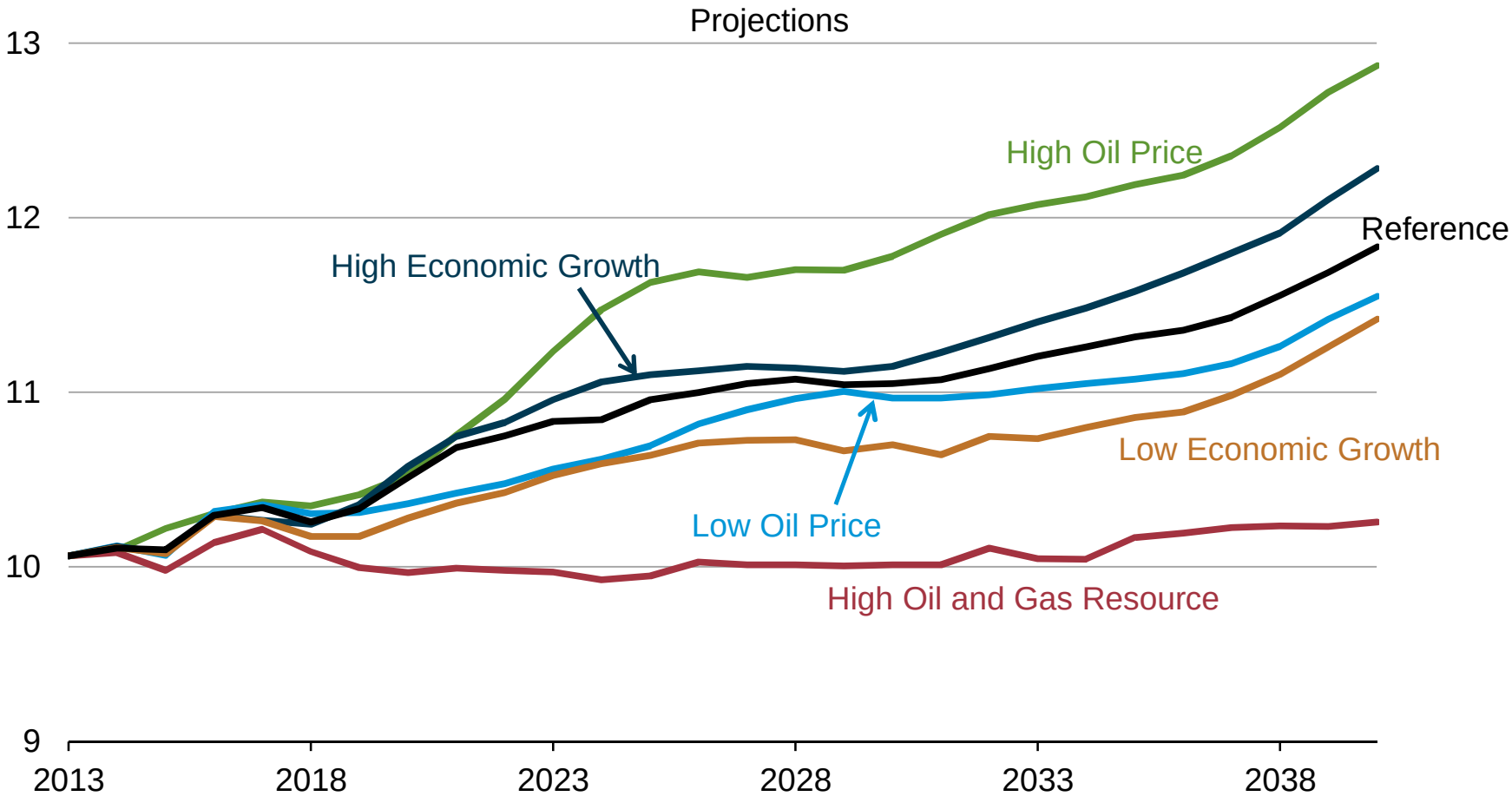
billion kilowatthours



Source: EIA, Annual Energy Outlook 2015 Reference case

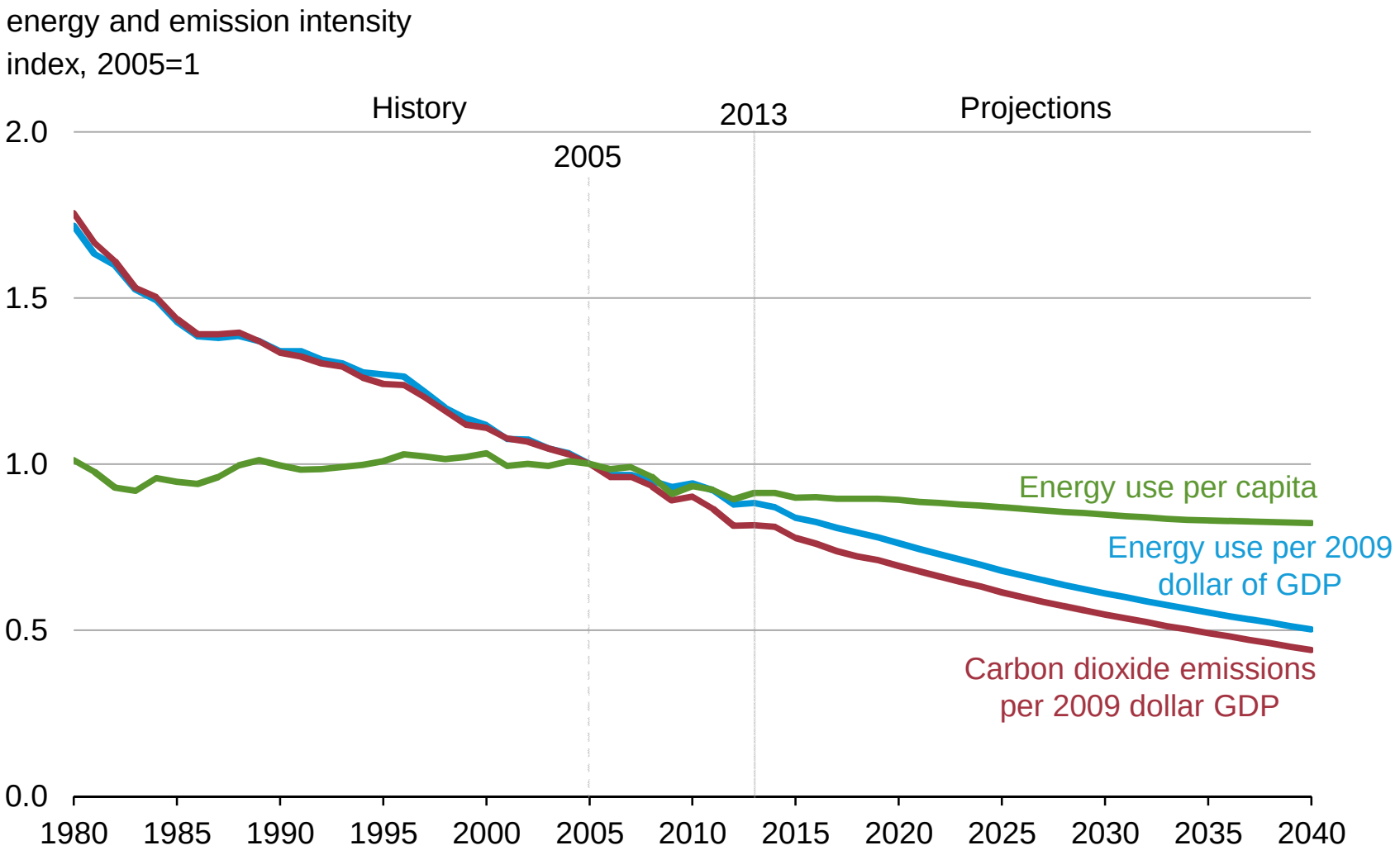
Electricity prices increase with rising fuel costs and expenditures for electric transmission and distribution infrastructure

average retail electricity prices
2013 cents per kilowatthour



Source: EIA, Annual Energy Outlook 2015

CO_2 emissions per dollar of GDP decline faster than energy use per dollar of GDP with a shift towards lower-carbon fuels



Source: EIA, Annual Energy Outlook 2015 Reference case