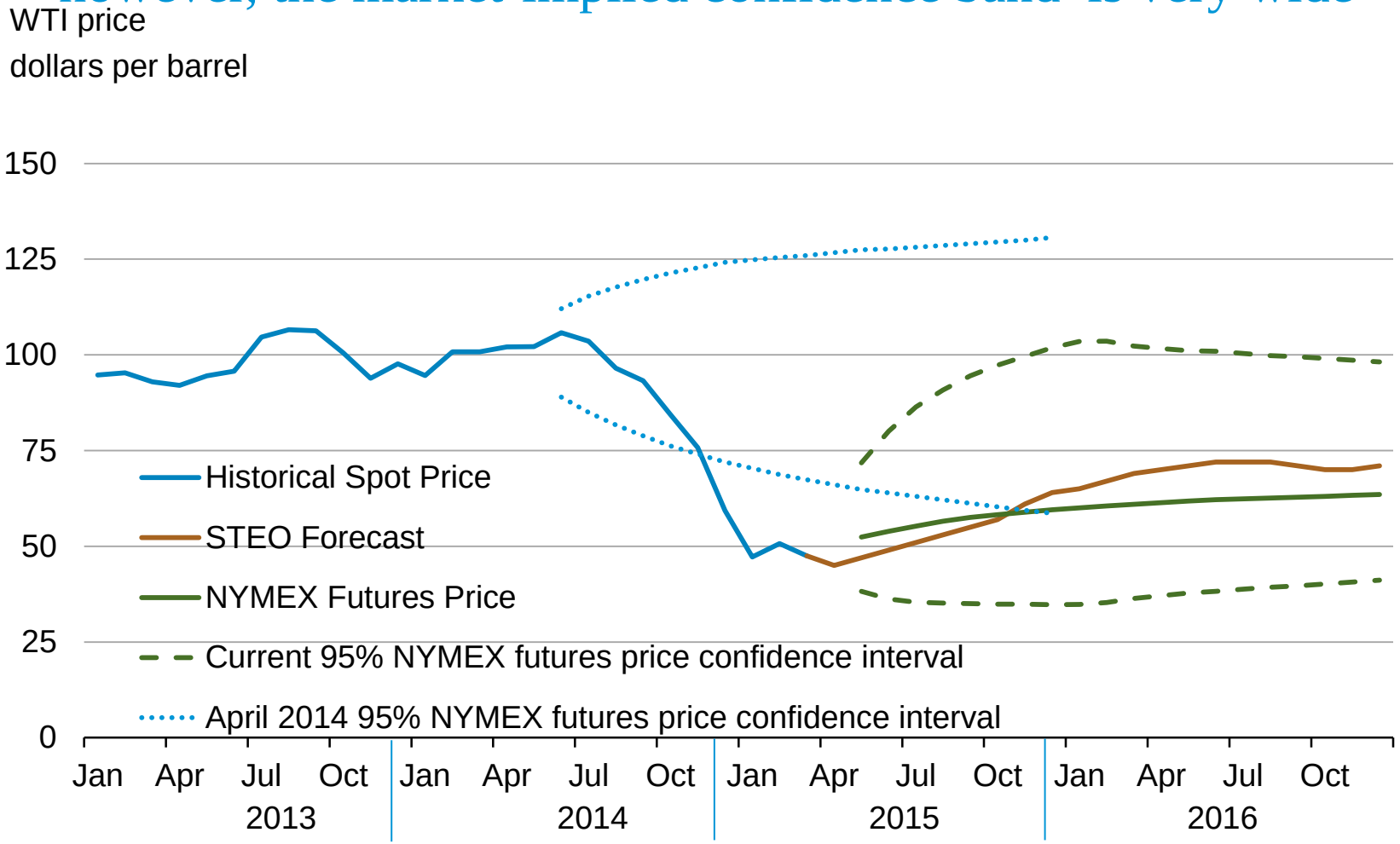
Energy Outlook 2015

for
National Governors Association
Governors' Advisors Energy Policy Institute
April 16, 2015 | Alexandria, V.A.

by
Howard Gruenspecht, Deputy Administrator

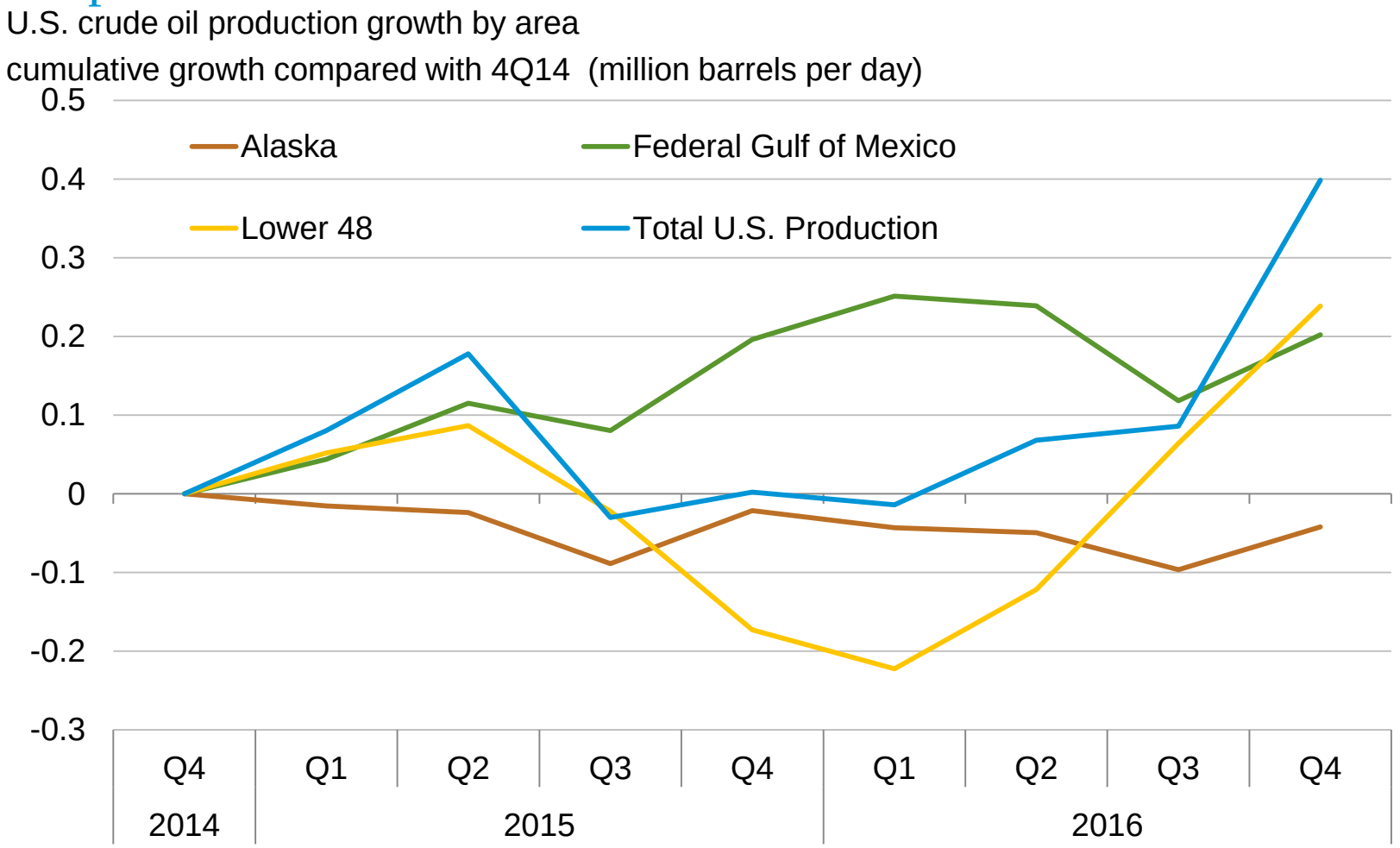
Short-term

Oil prices rise from mid-2015 through mid-2016 in EIA's forecast – however, the market-implied confidence band is very wide



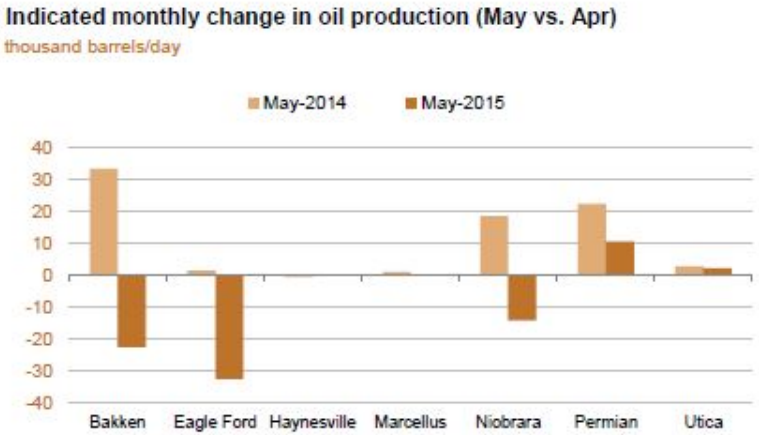
Source: EIA, Short-Term Energy Outlook, April 2015

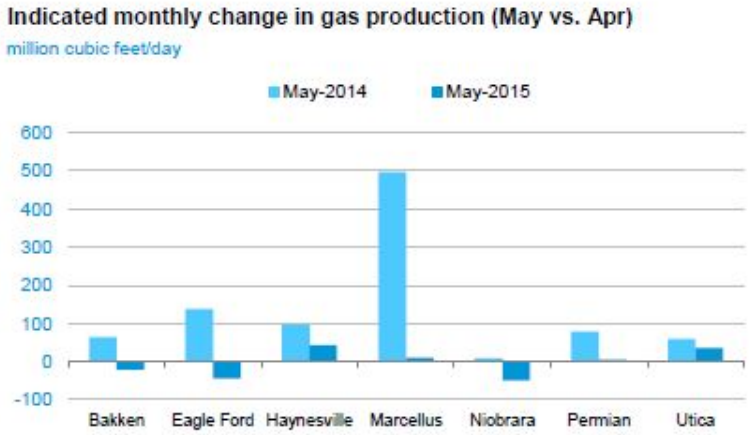
Total U.S. crude production is forecast to decline between 2Q15 and 1Q16; output growth then resumes growth in 2016, reflecting EIA's price forecast

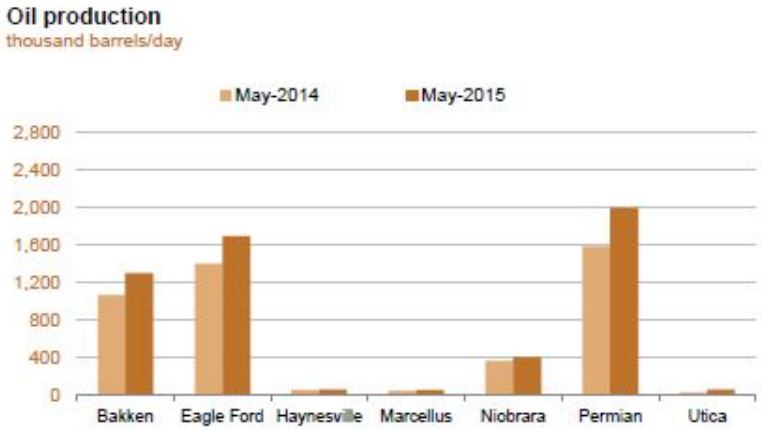


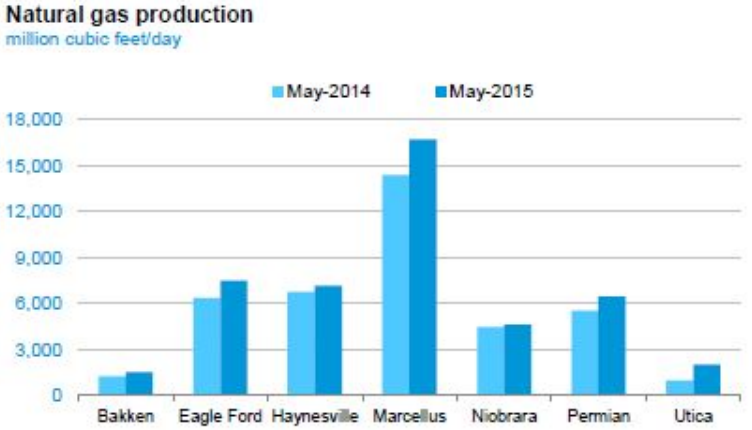
Source: EIA, Short-Term Energy Outlook, April 2015

EIA's latest DPR forecasts May oil production below the April level in the Bakken, Eagle Ford, and Niobrara regions





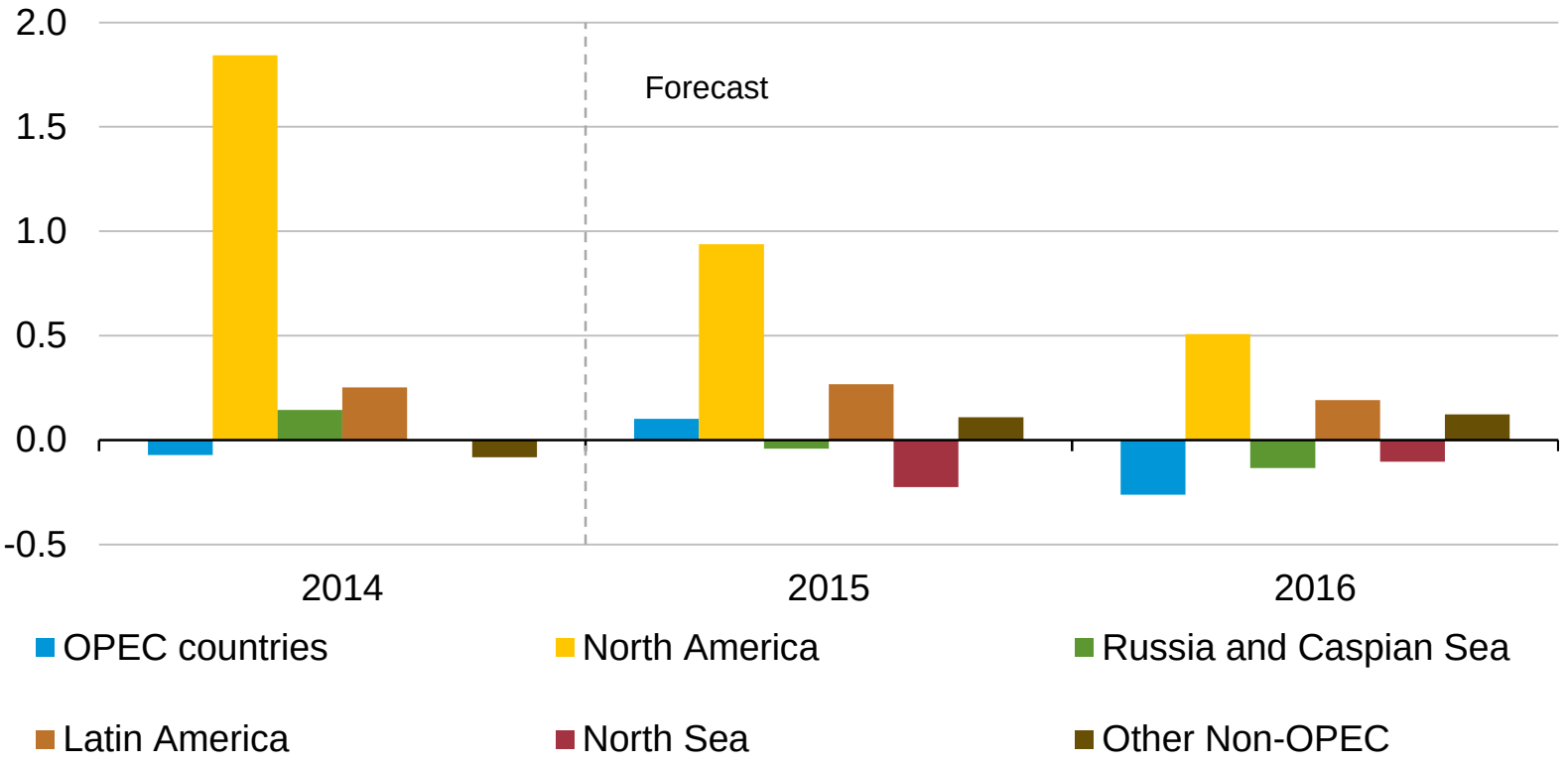




North American oil production growth slows with lower oil prices but remains the main driver of global production growth

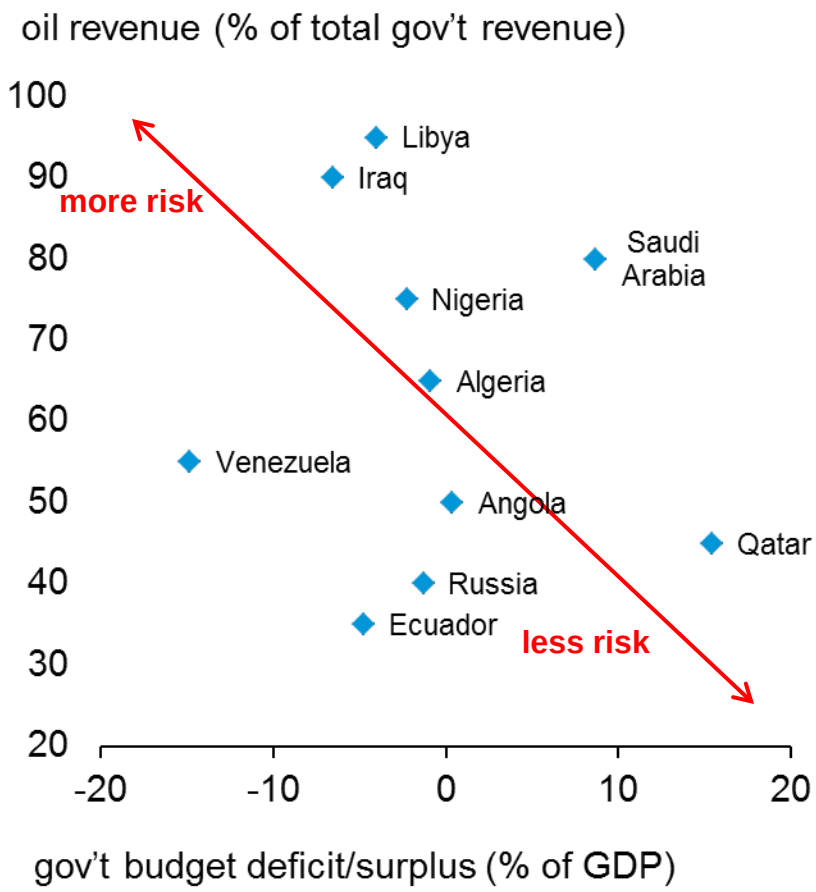
world crude oil and liquid fuels production growth

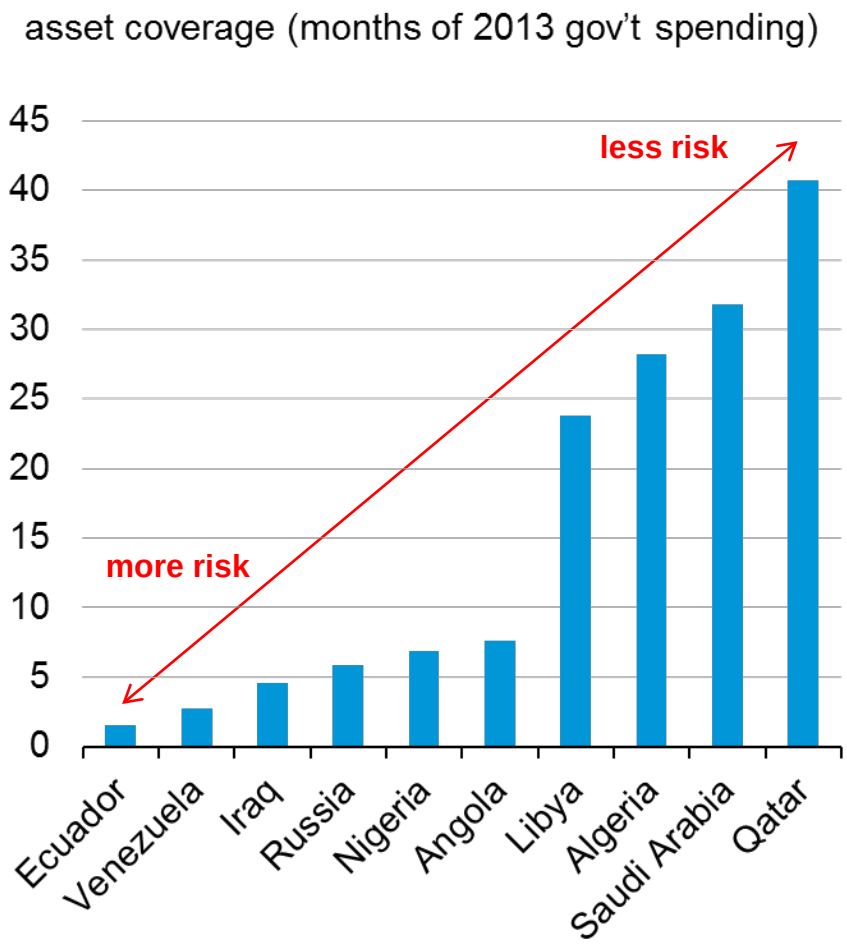
million barrels per day



Source: EIA, Short-Term Energy Outlook, April 2015

Gov't deficits, high reliance on oil revenue, and asset coverage of gov't spending are indicators of geopolitical stress exposure



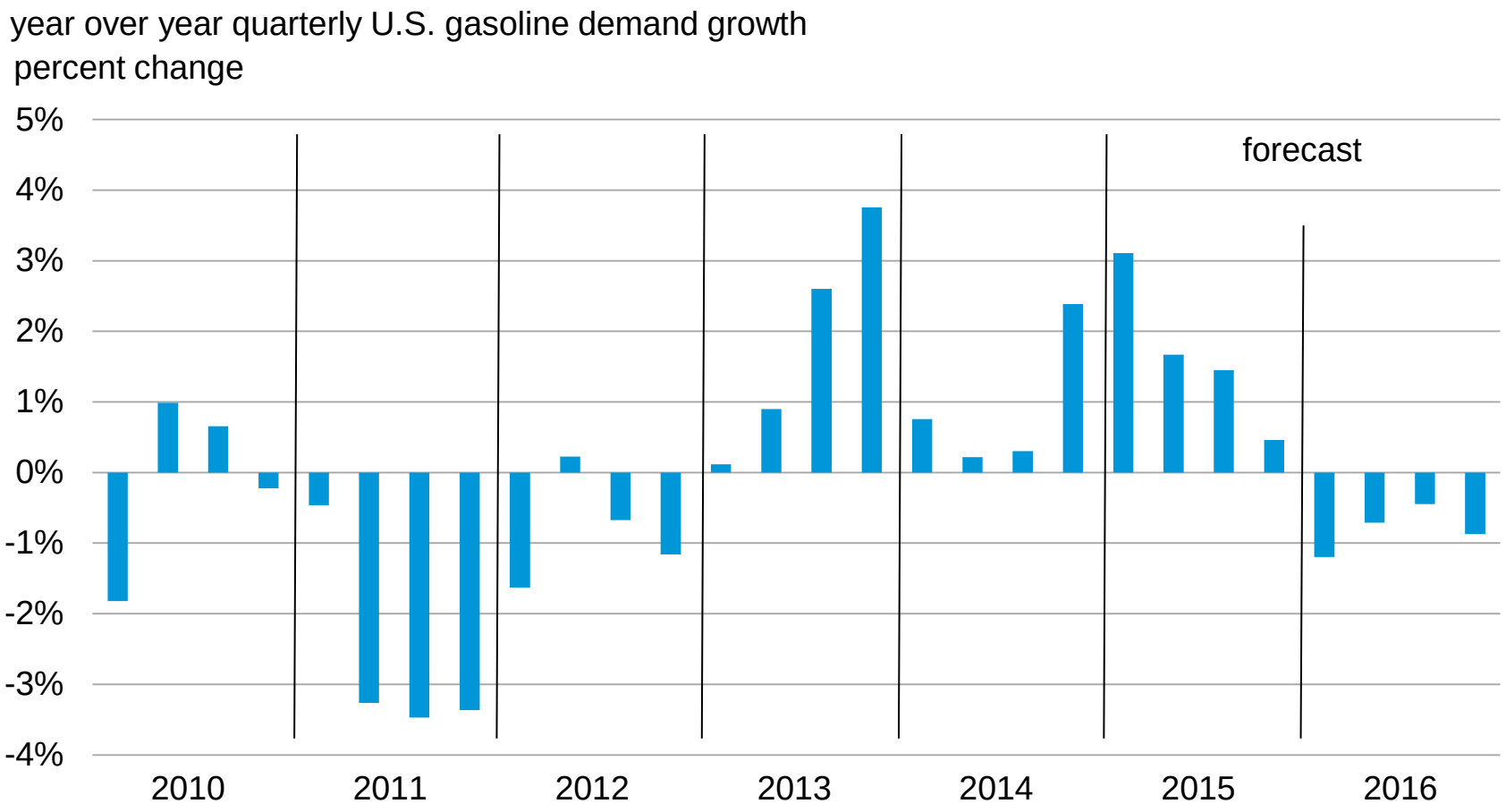


Source: EIA, International Monetary Fund (IMF), individual country investment authorities

Various events could lead to changes in global supply or demand that could push future crude oil prices higher or lower than the forecast

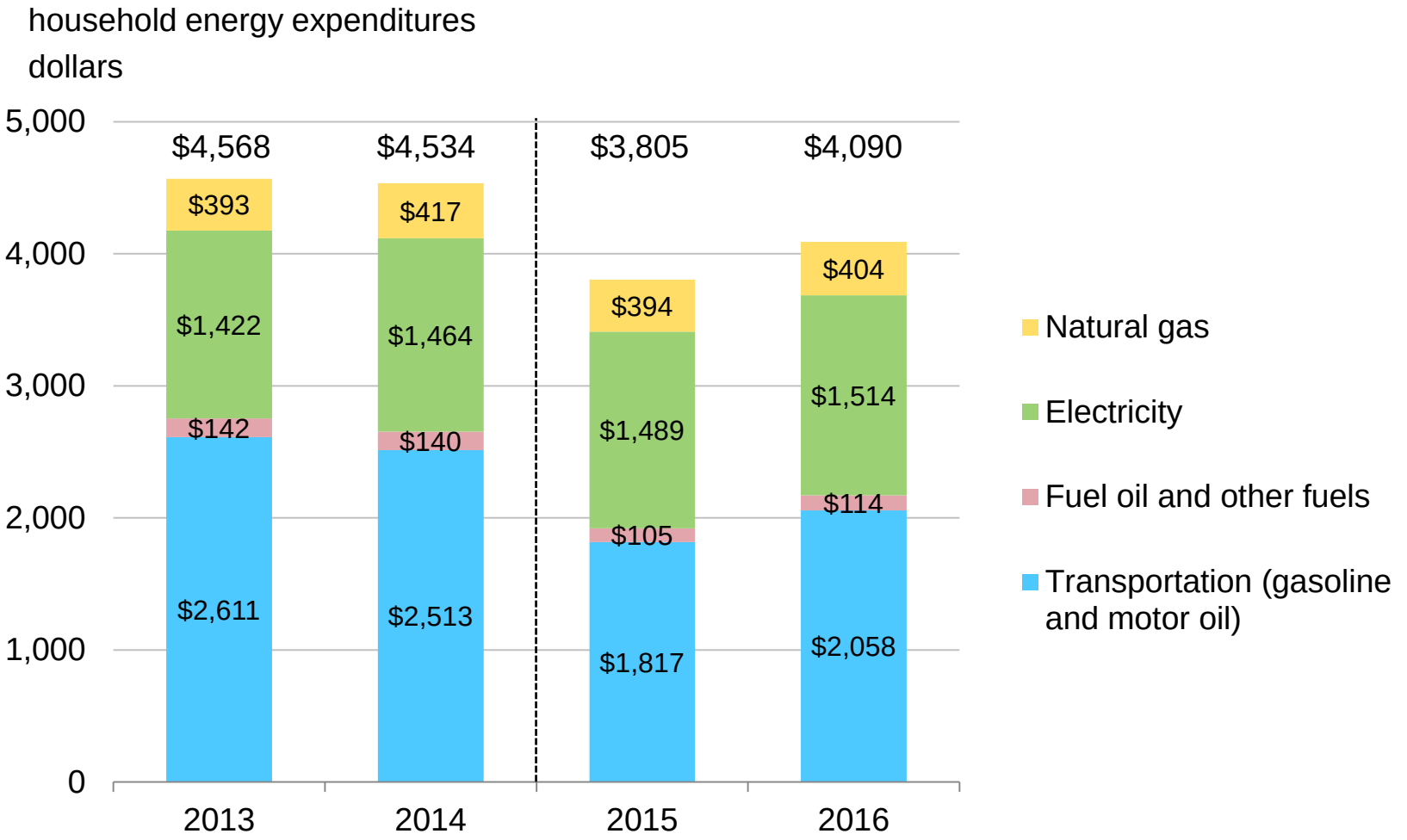
	Event
Increase Prices	Oil demand growth surprises to the upside (economy- or price-driven)
	Key OPEC producers cut output more than expected
	Iraq production is significantly disrupted (ISIL? other discord?)
	Social unrest in oil-dependent countries leads to supply disruptions
	Non-OPEC production slows more than expected
Decrease Prices	World economic growth is lower than projected (e.g., China)
	Saudi Arabia keeps production at 9.6-9.7 million bbl/d in 2016
	Reduction in unplanned production outages
	Iranian sanctions are lifted

U.S. gasoline demand is forecast to increase 1.6% percent in 2015 reflecting a combination of factors



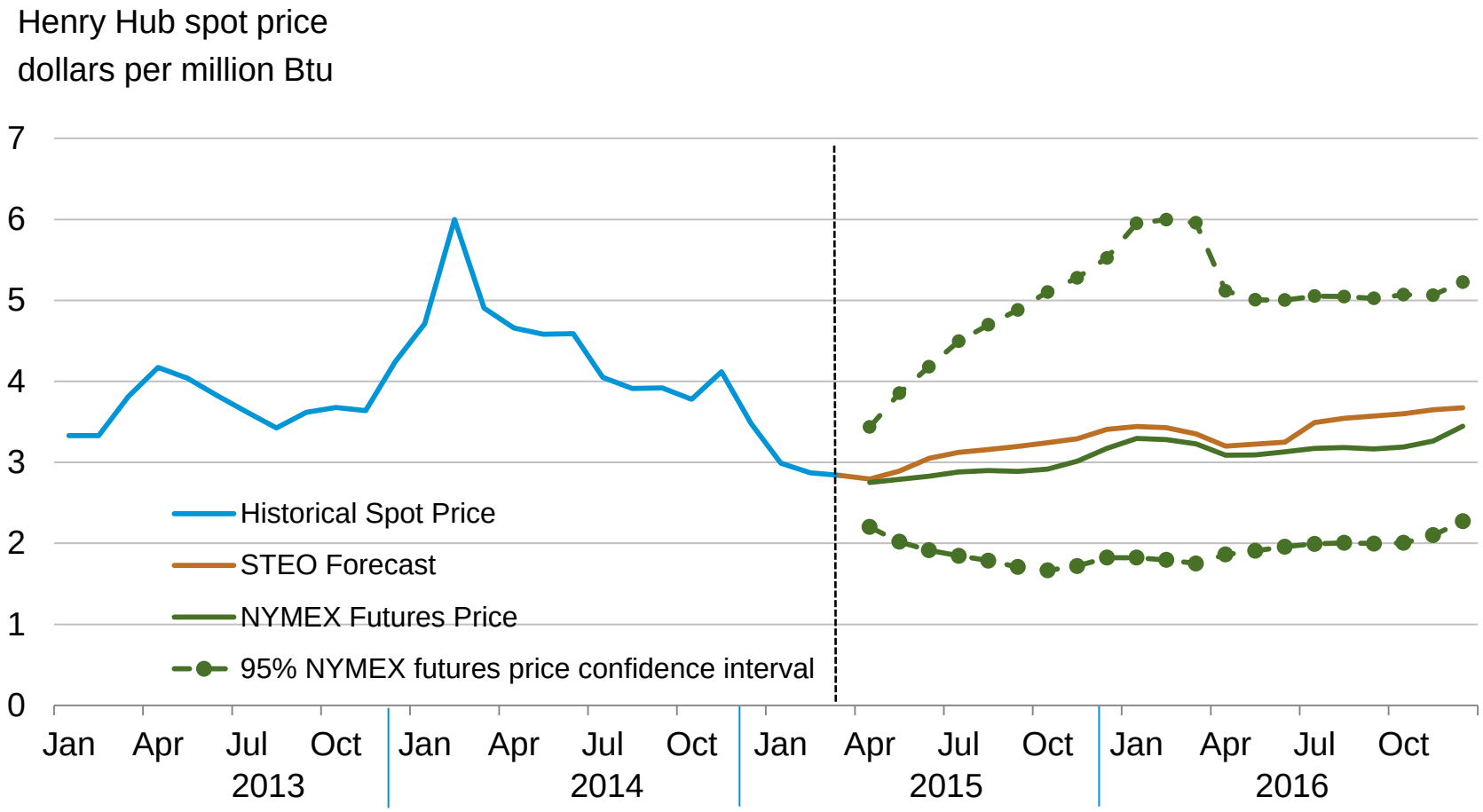
Source: EIA, Short-Term Energy Outlook, April 2015

Average household energy expenditures fall by 16% in 2015, then increase somewhat in 2016 (based on EIA price forecast)



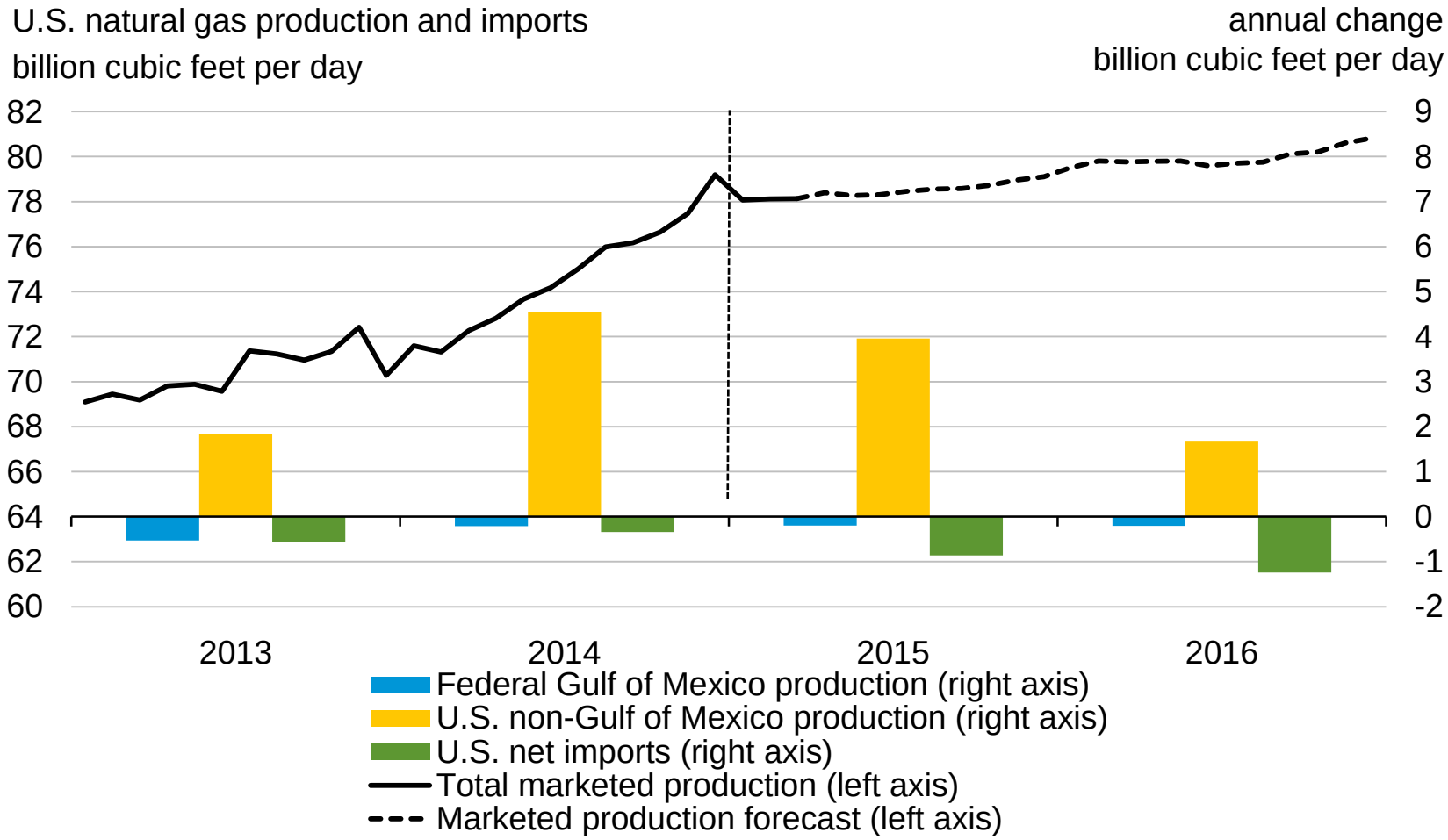
Sources: 2013 expenditures and income from BLS Consumer Expenditure Survey. The average household in the BLS survey (called a consuming unit) averages 2.5 people and 1.3 income earners. Expenditures for 2014-16 based on average prices from EIA Short-Term Energy Outlook, April 2015

Henry Hub spot prices are expected to average $3.07/million Btu in 2015 and $3.45/million Btu in 2016



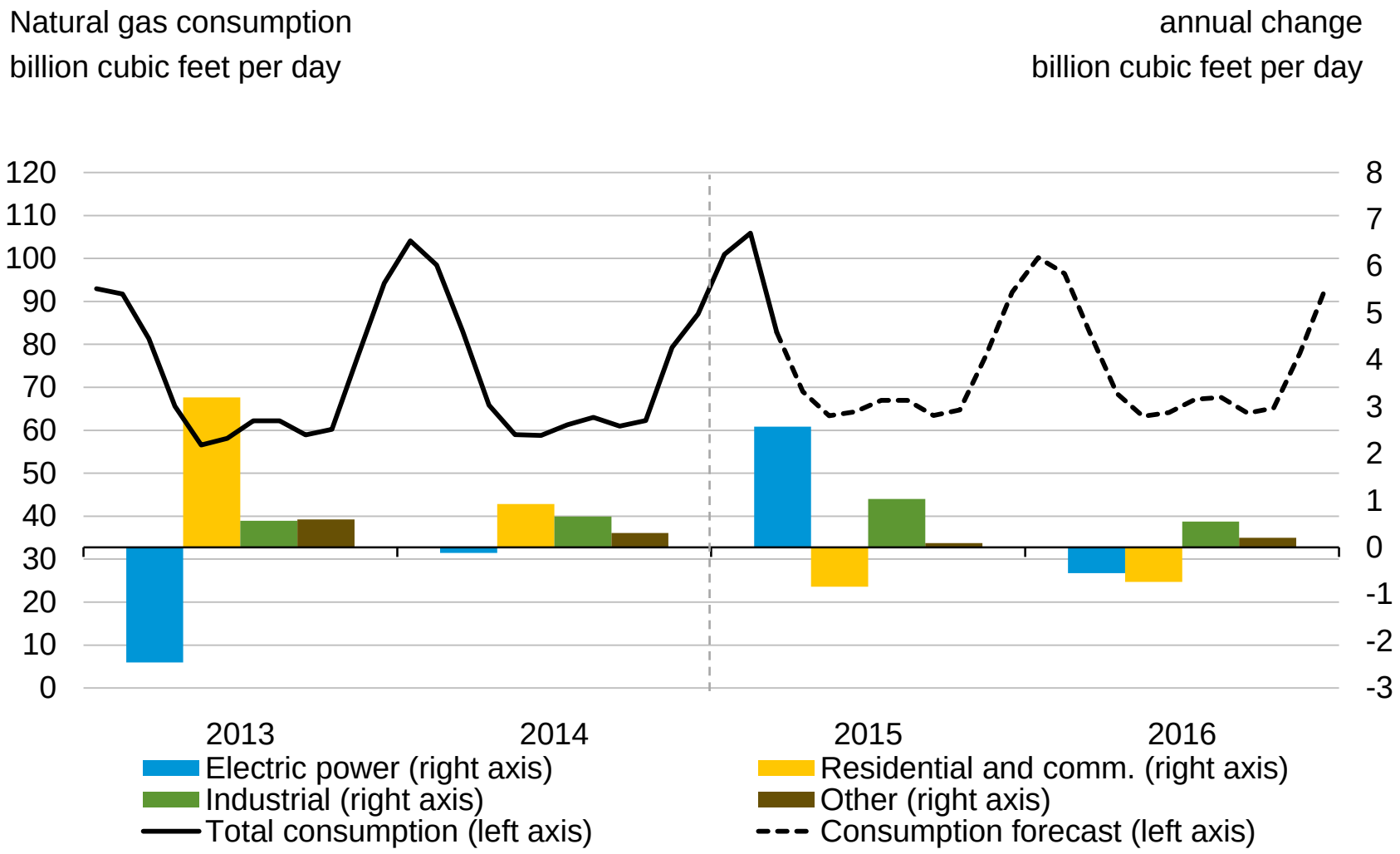
Source: EIA, Short-Term Energy Outlook, April 2015

Natural gas production is expected to increase by 3.8 bcf/day in 2015 and by 1.5 bcf/day in 2016



Source: EIA, Short-Term Energy Outlook, April 2015

Industrial and power sectors drive natural gas consumption growth in the forecast



Source: EIA, Short-Term Energy Outlook, April 2015

Long-term

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
- 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

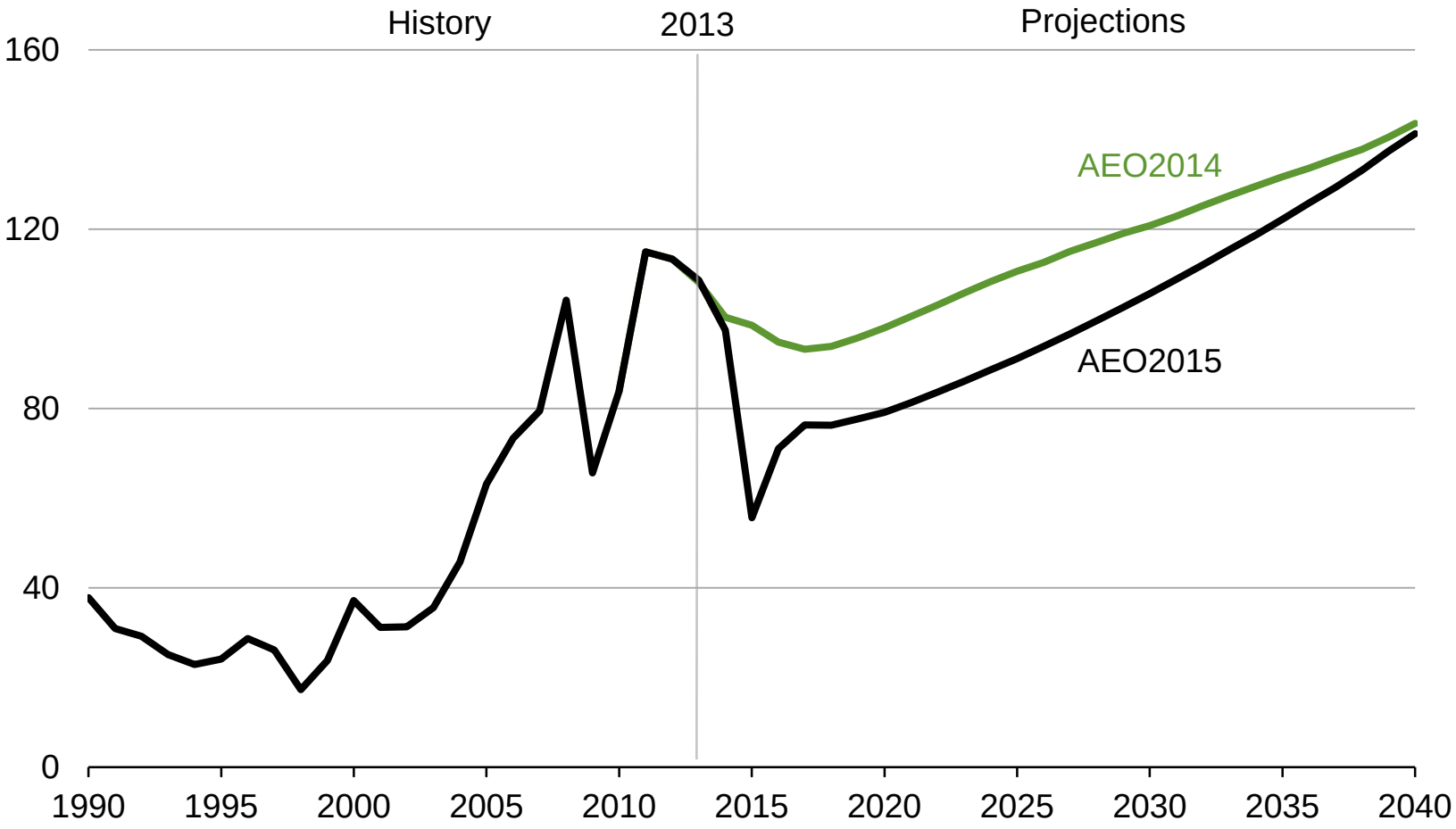
Key results from *AEO2015* (continued)

- 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, EPA's 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

Overview

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

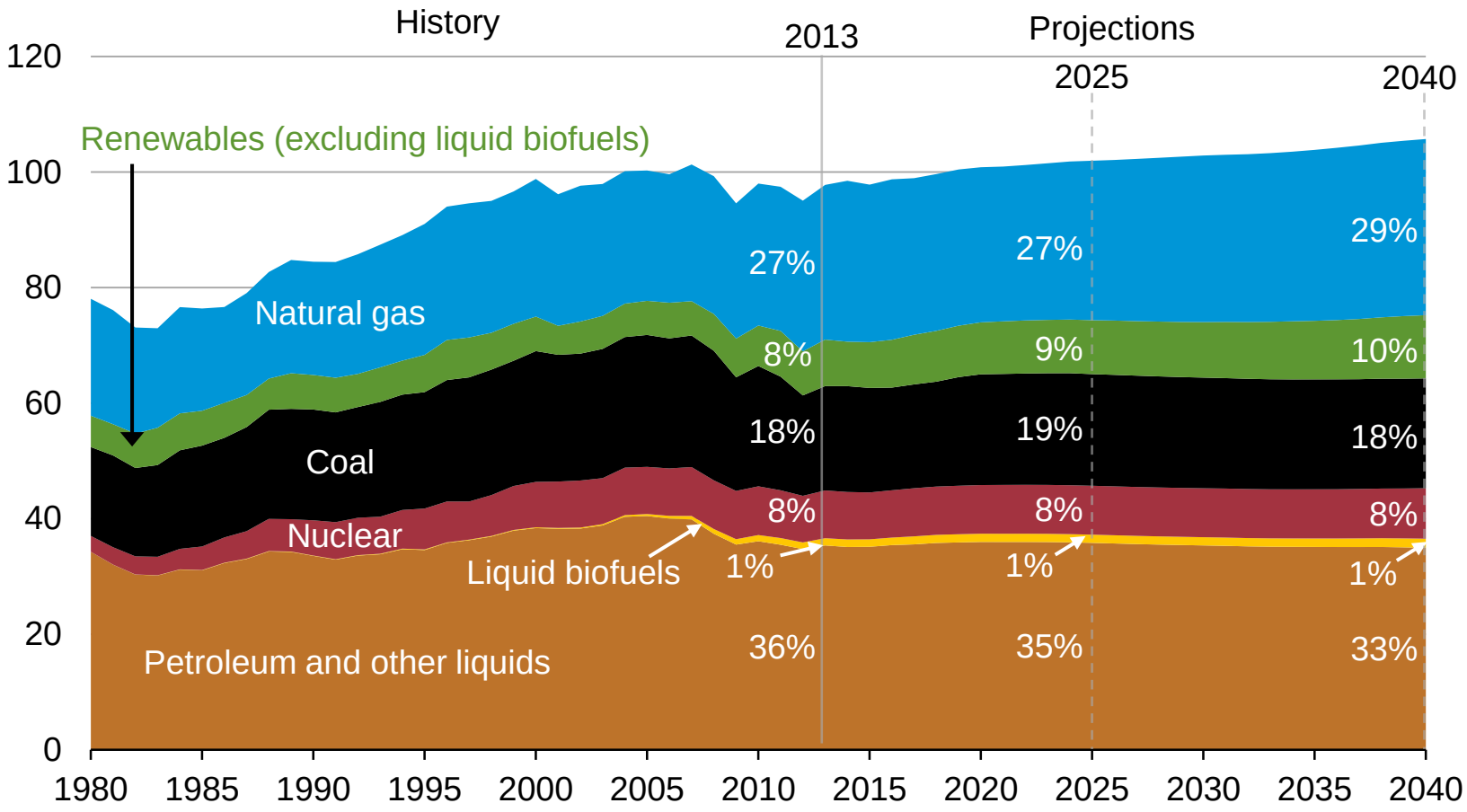
Brent crude oil spot price
2013 dollars per barrel



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

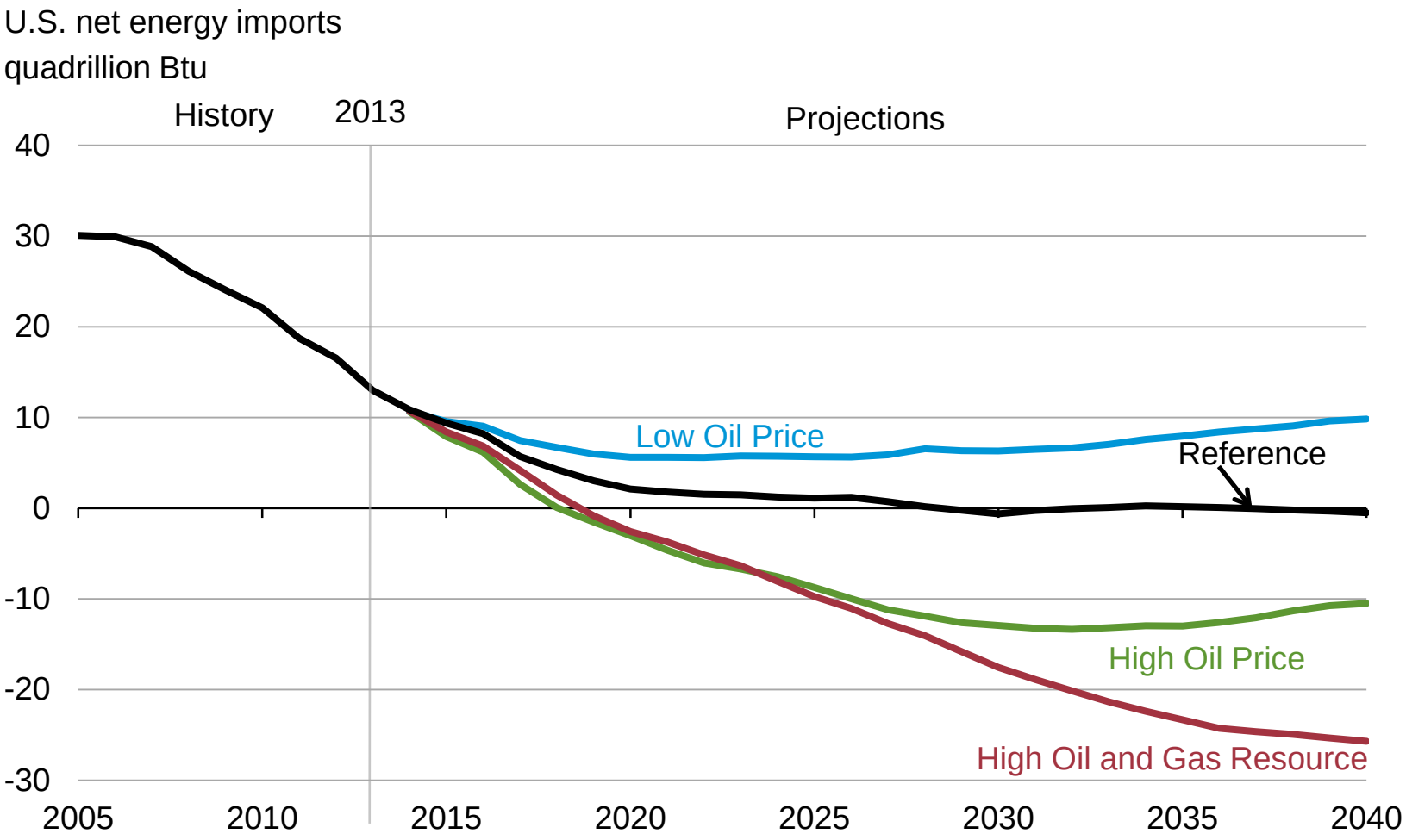
Reductions in energy intensity largely offset impact of GDP growth, leading to slow projected growth in energy use

U.S. primary energy consumption
quadrillion Btu



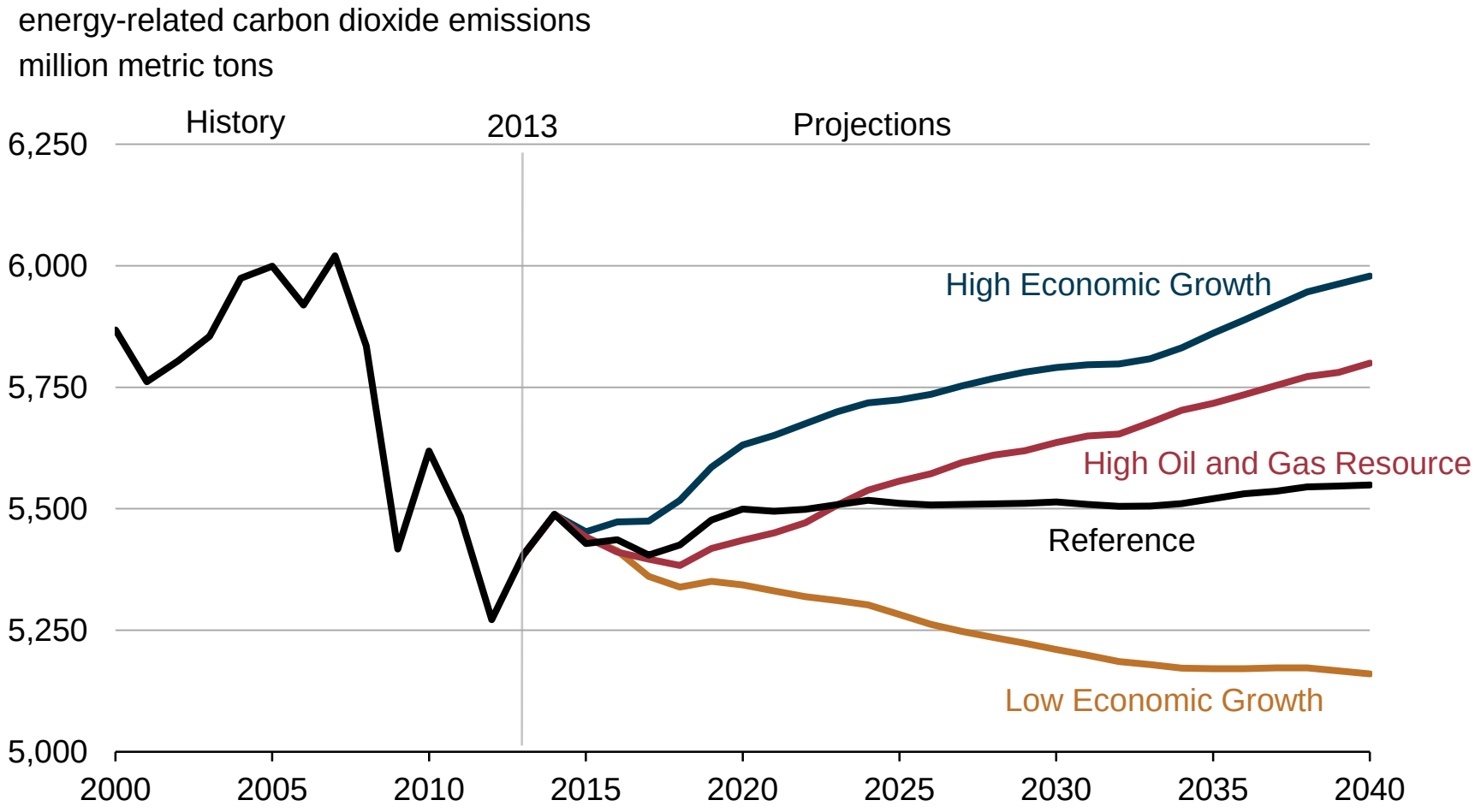
Source: EIA, Annual Energy Outlook 2015 Reference case

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



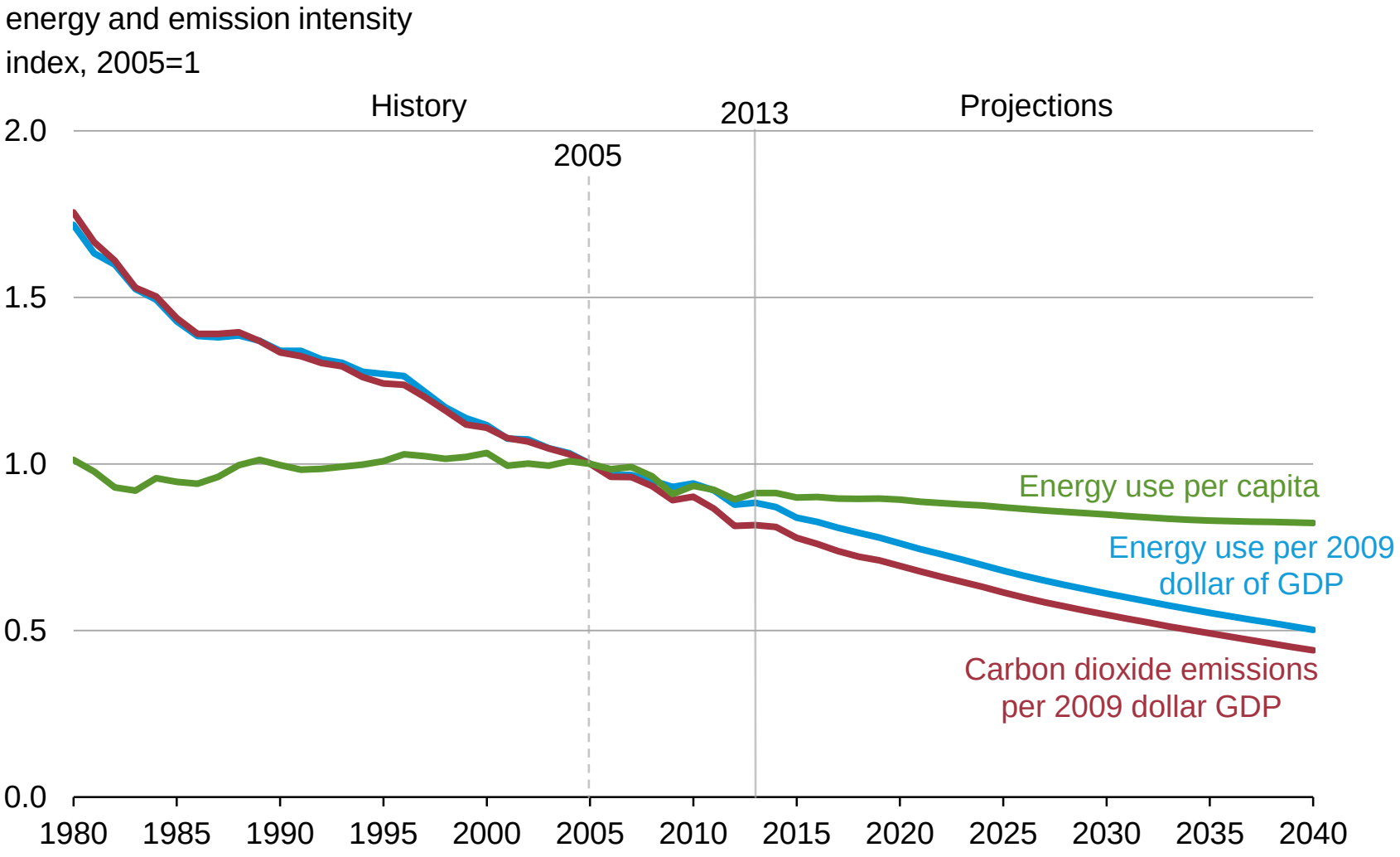
Source: EIA, Annual Energy Outlook 2015

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



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

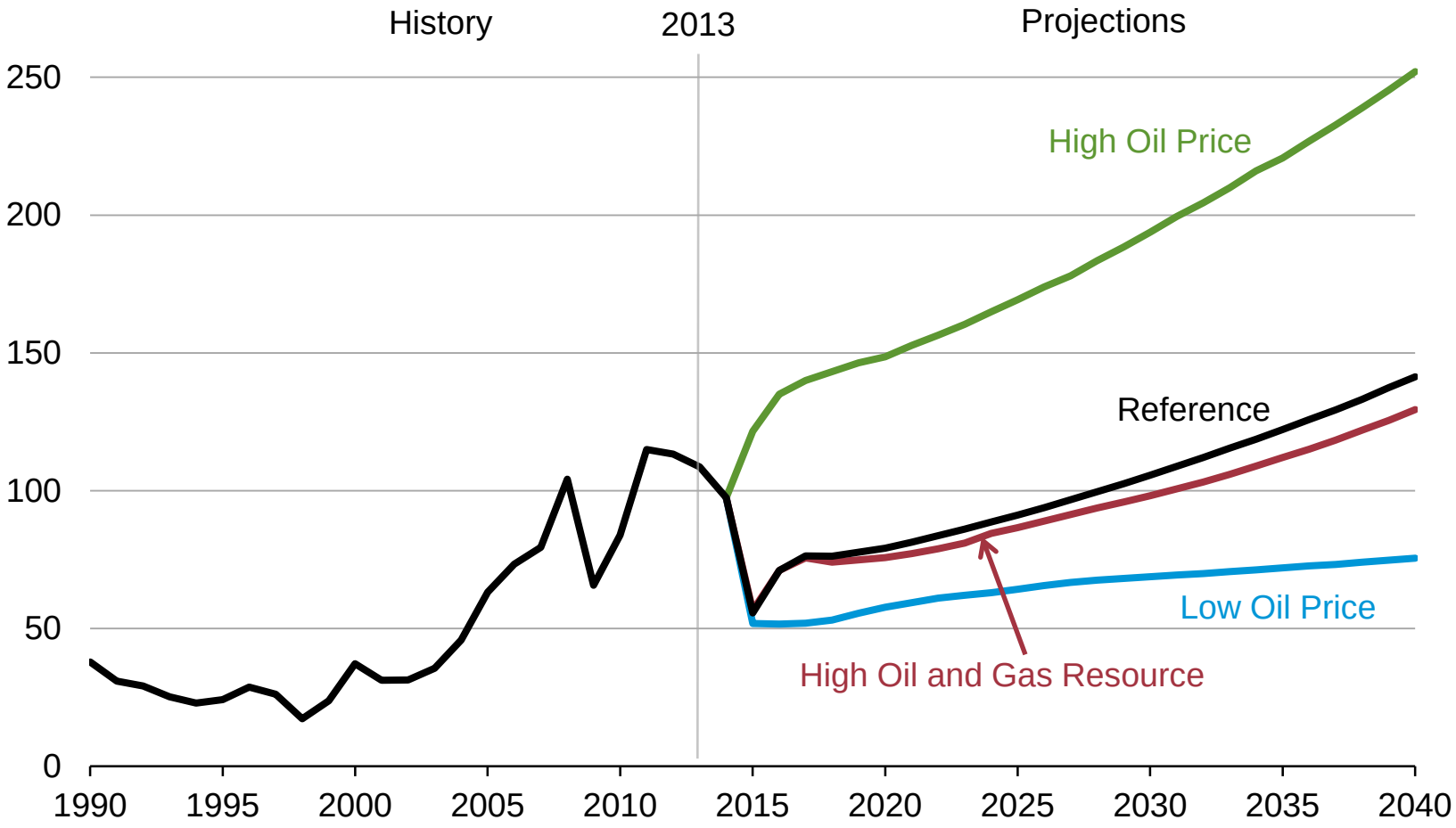


Source: EIA, Annual Energy Outlook 2015 Reference case

Petroleum and other liquid supply

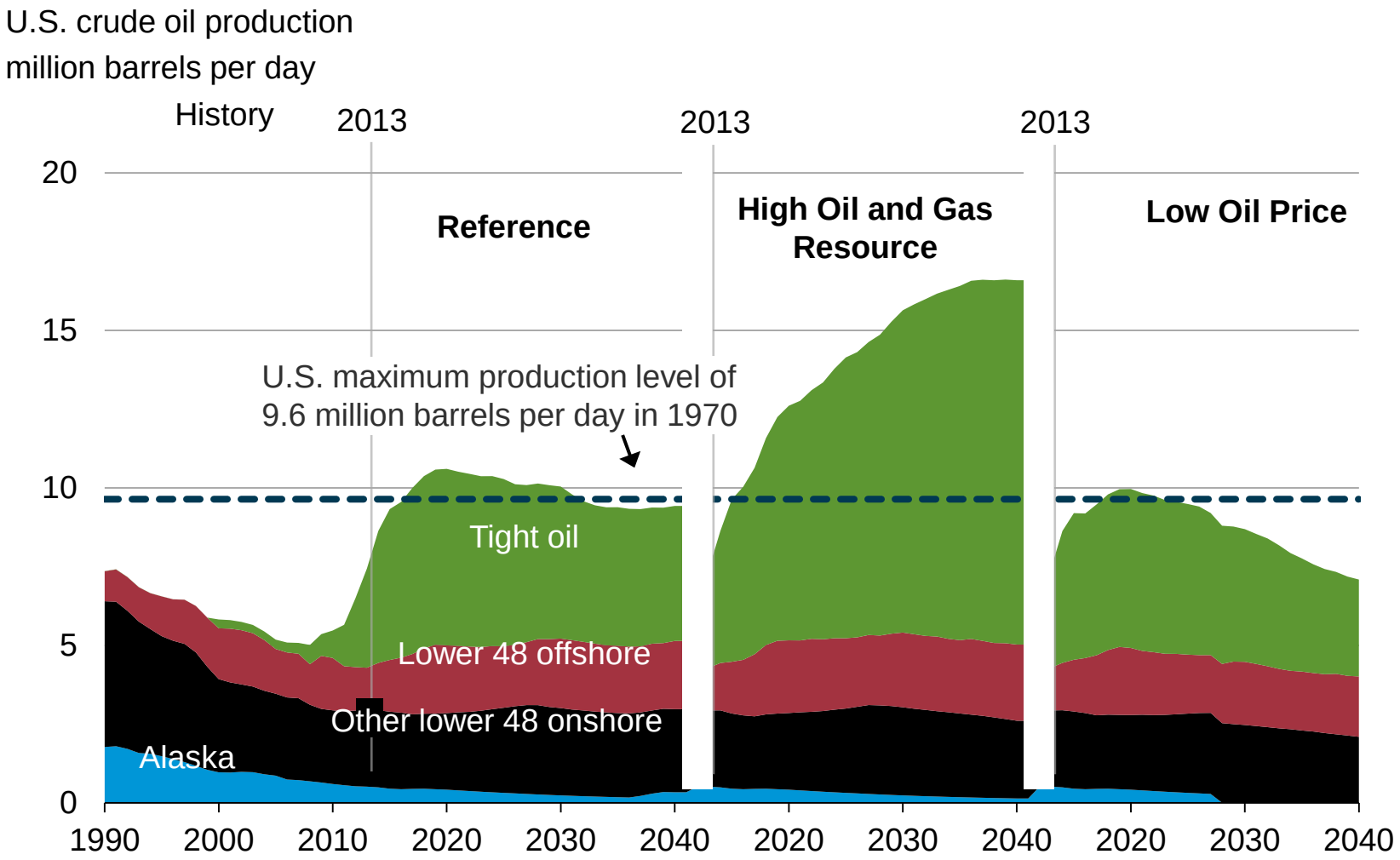
AEO2015 explores scenarios that encompass a wide range of future crude oil price paths

Brent crude oil spot price
2013 dollars per barrel



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

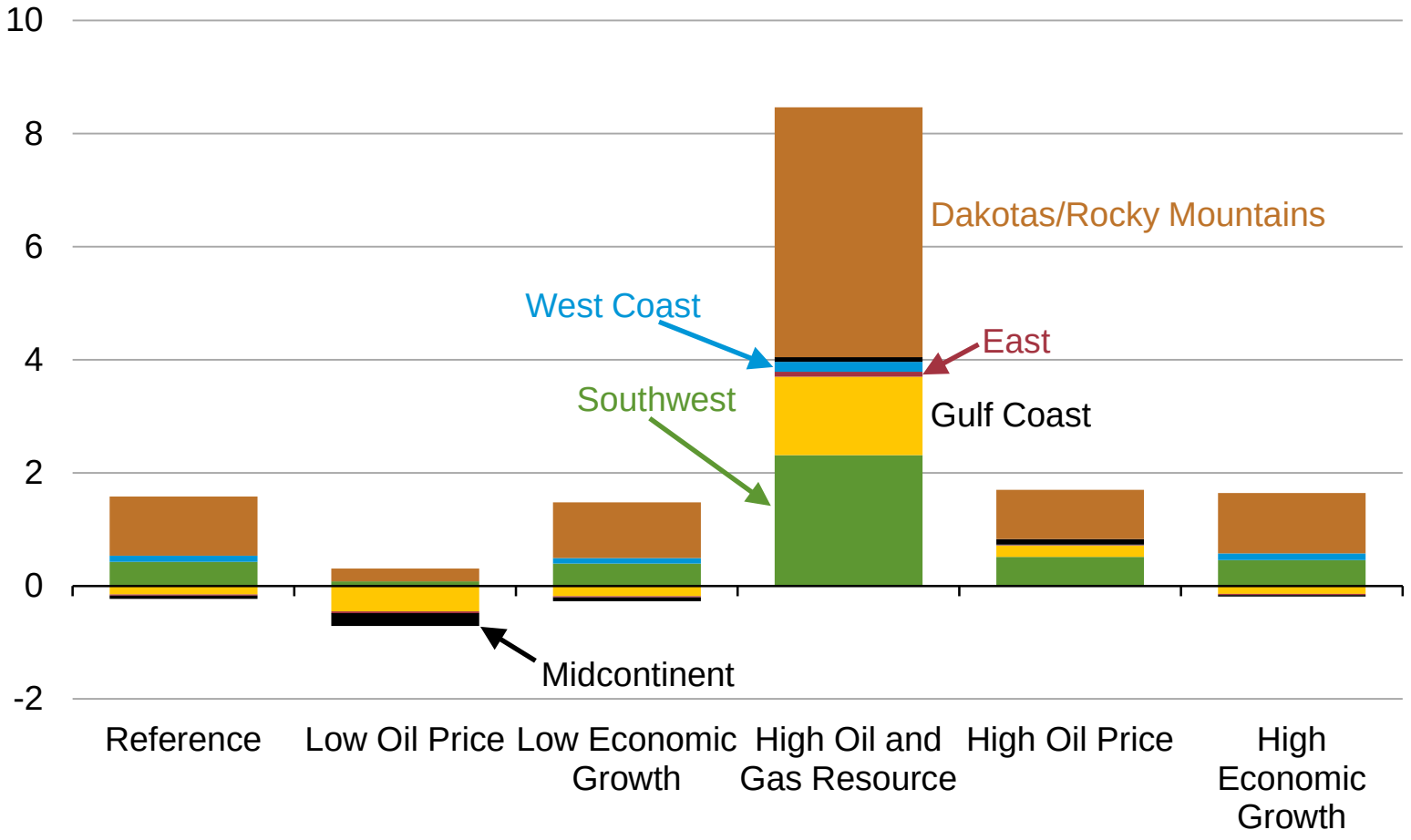


Source: EIA, Annual Energy Outlook 2015

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

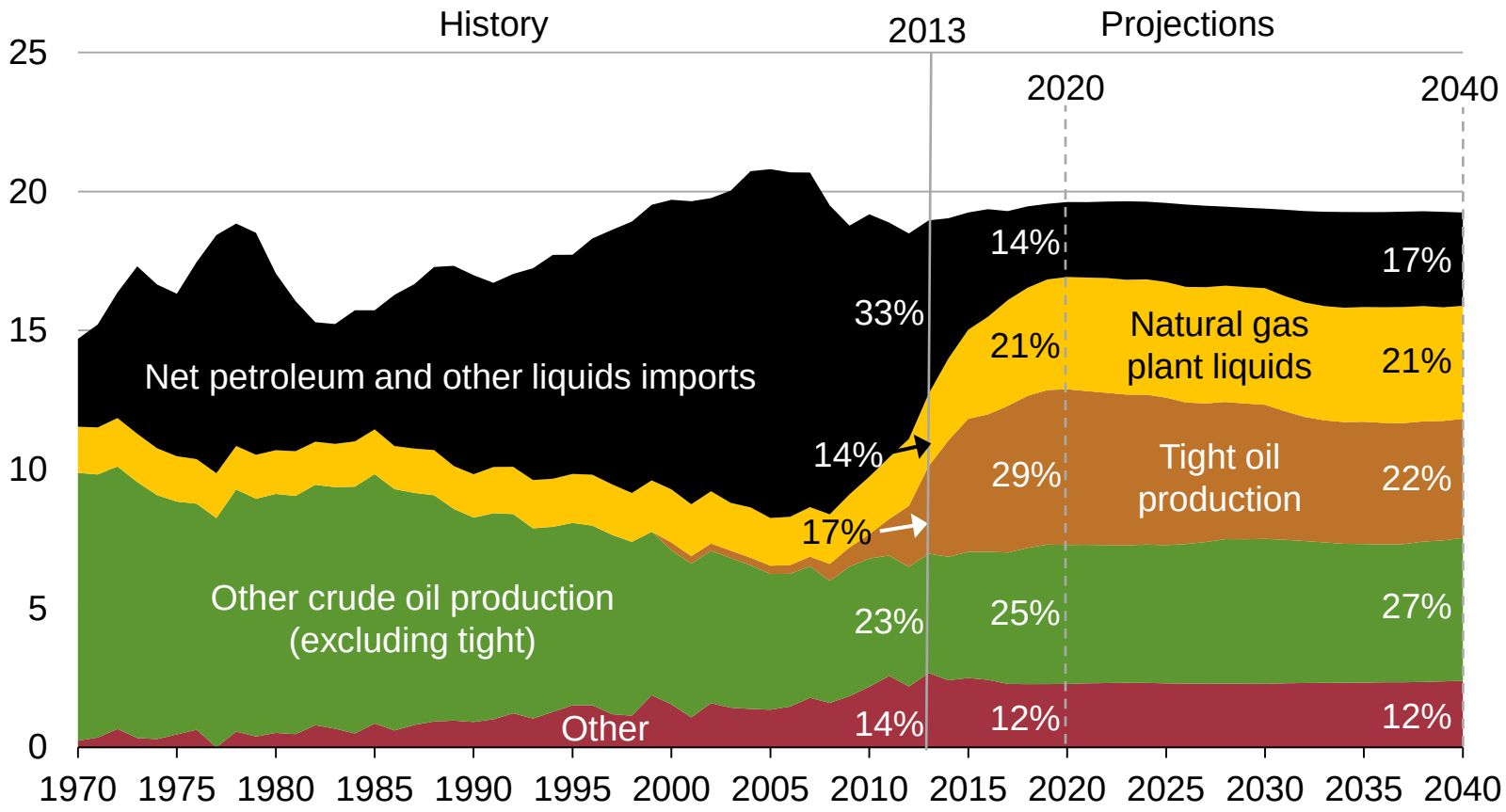
million barrels per day



Source: EIA, Annual Energy Outlook 2015

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

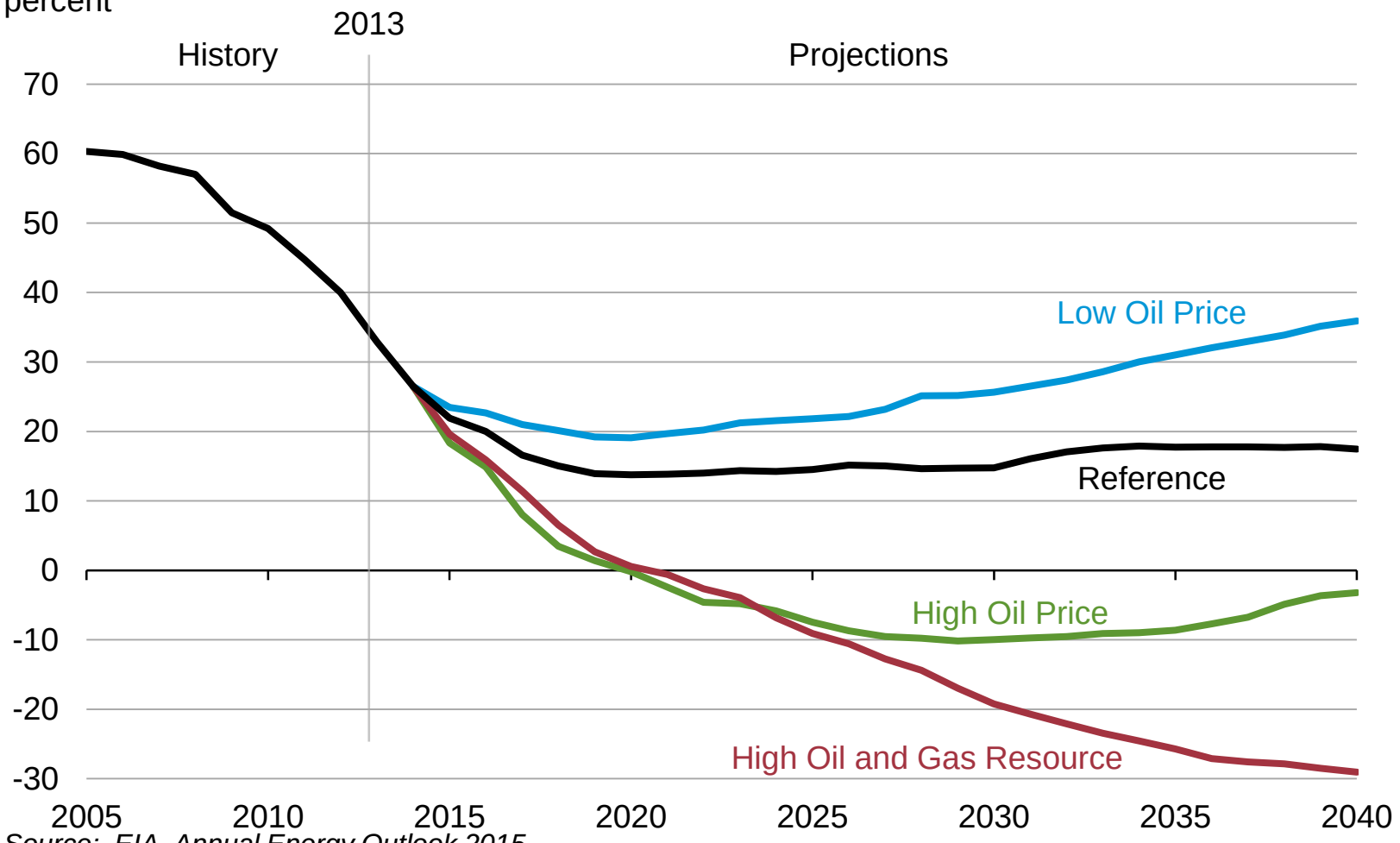


Note: "Other" includes refinery gain, biofuels production, all stock withdrawals, and other domestic sources of liquid fuels

Source: EIA, Annual Energy Outlook 2015 Reference case

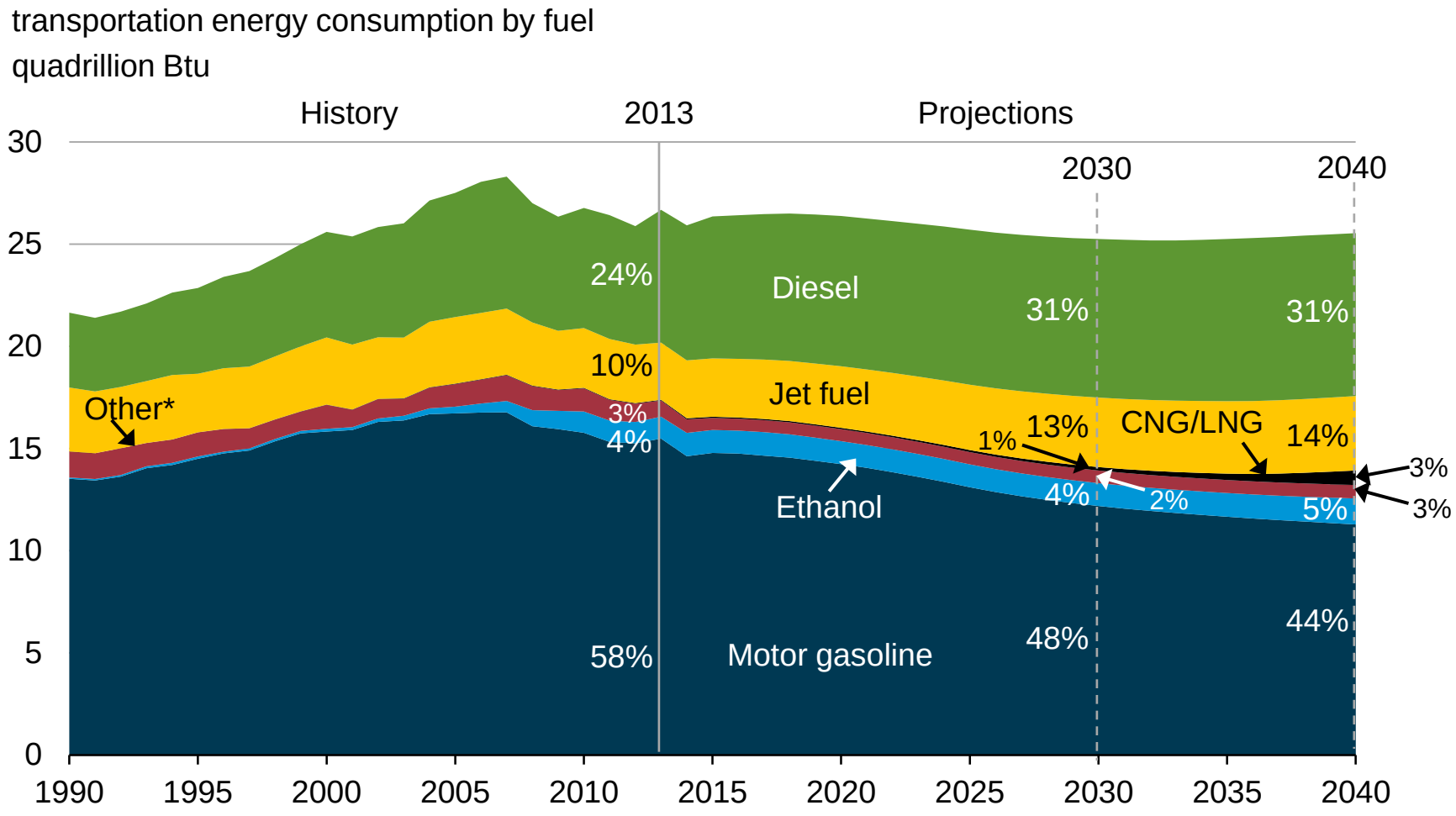
Net liquid imports provide a declining share of U.S. liquid fuels supply in most AEO2015 cases; in two cases the nation becomes a net exporter

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



Source: EIA, Annual Energy Outlook 2015

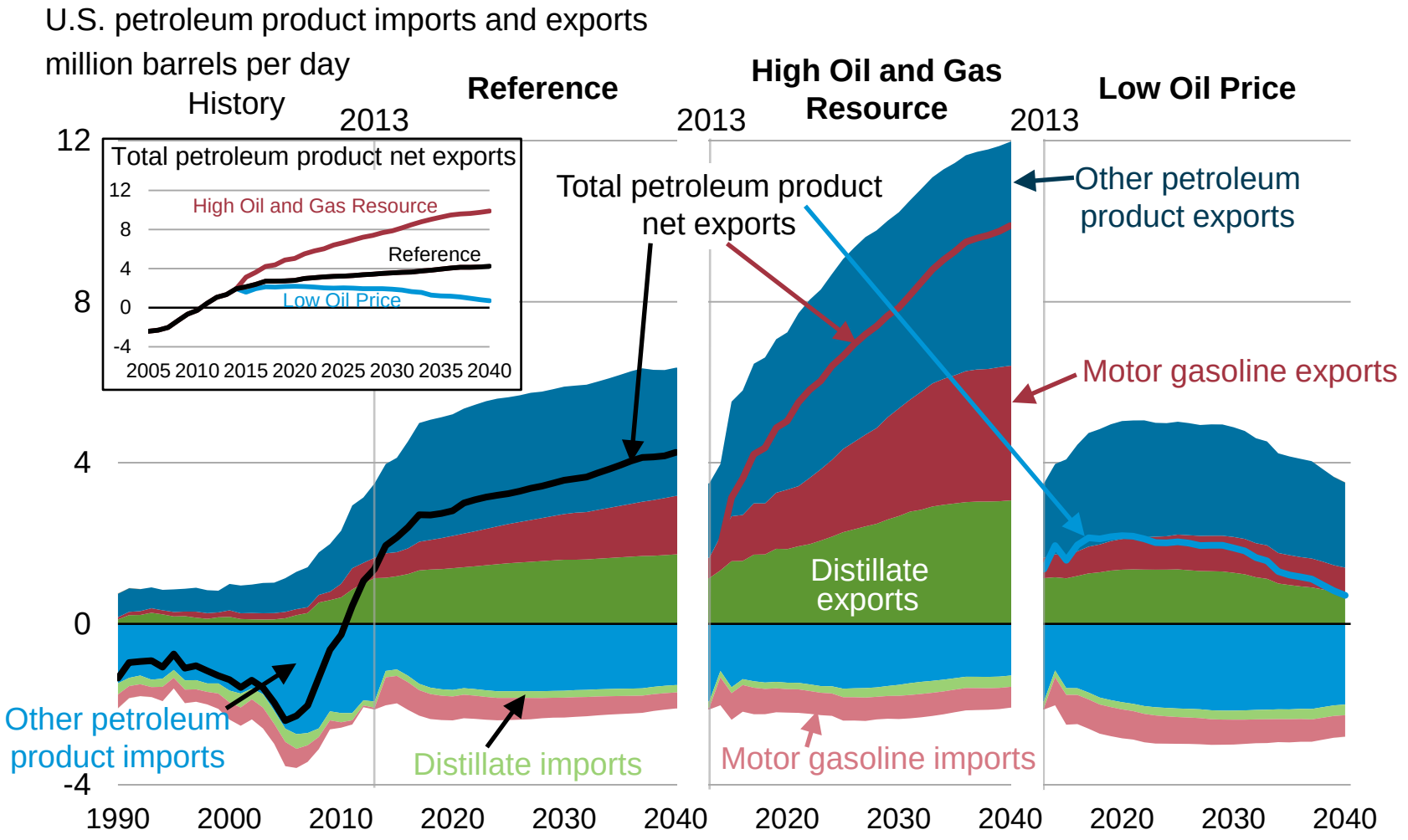
In the transportation sector, motor gasoline use declines; diesel fuel, jet fuel, and natural gas use all grow



Source: EIA, Annual Energy Outlook 2015 Reference case

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

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



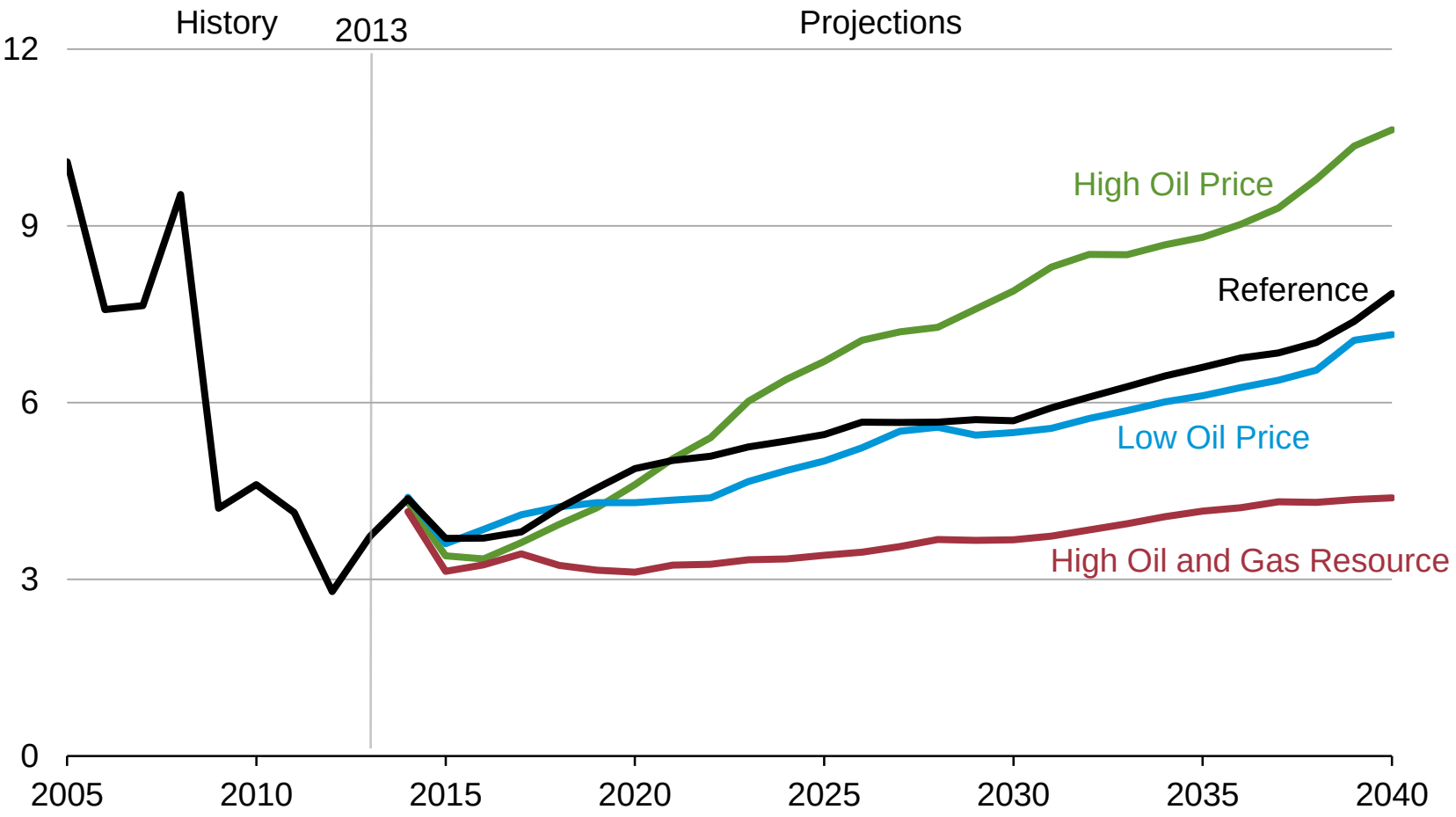
Source: EIA, Annual Energy Outlook 2015

Natural gas

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



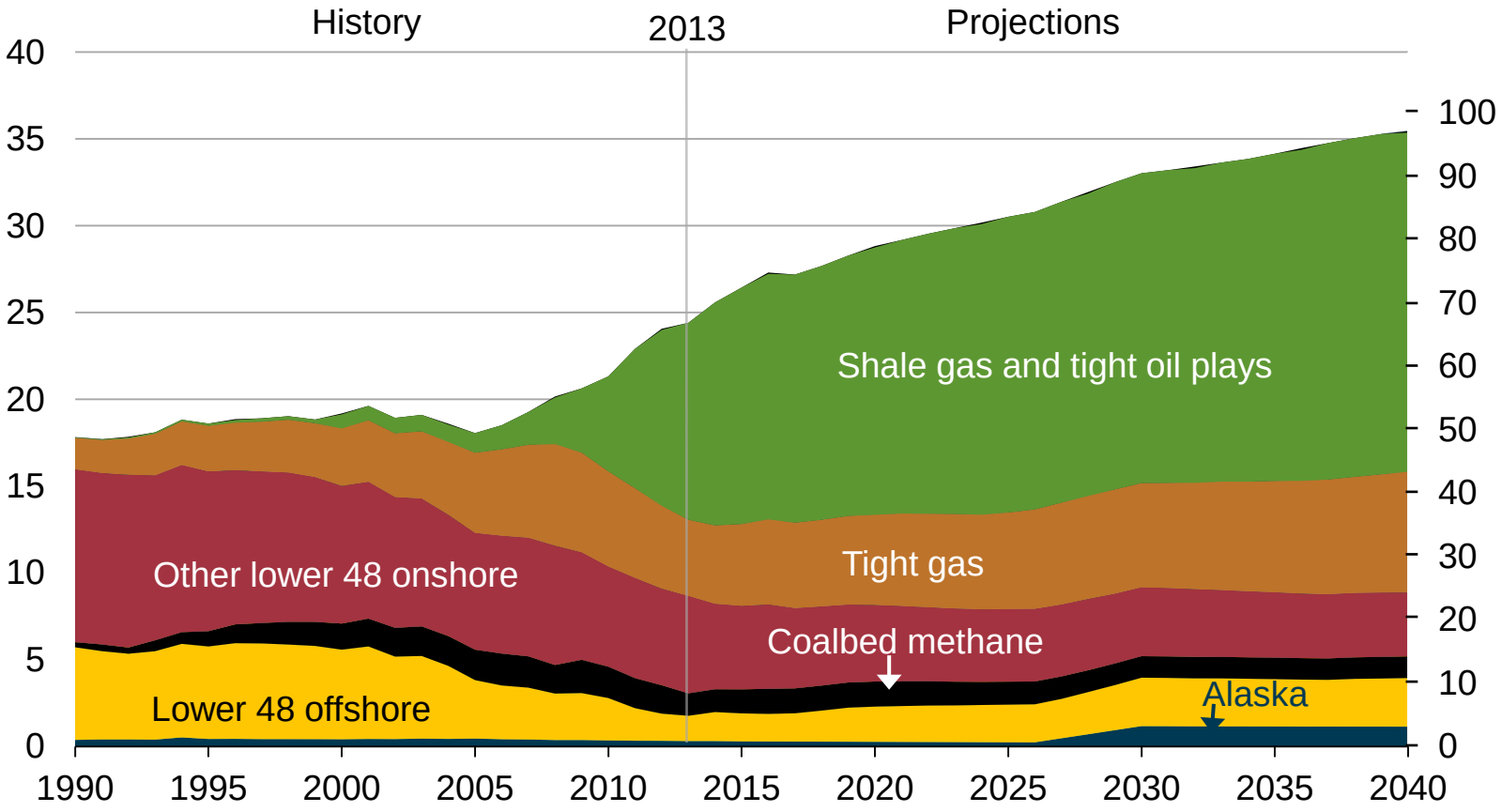
Source: EIA, Annual Energy Outlook 2015

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

U.S. dry natural gas production

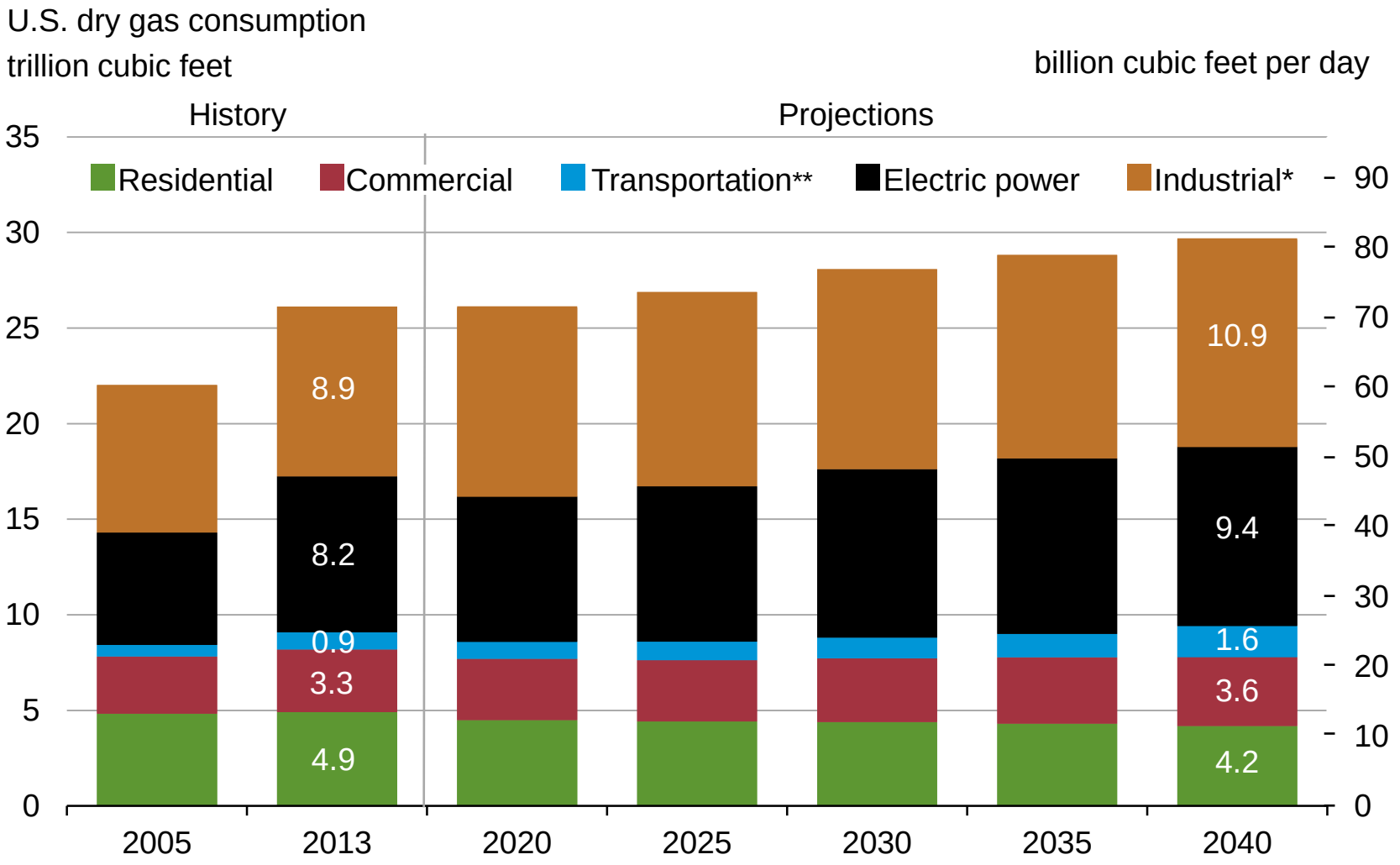
trillion cubic feet

billion cubic feet per day



Source: EIA, Annual Energy Outlook 2015 Reference case

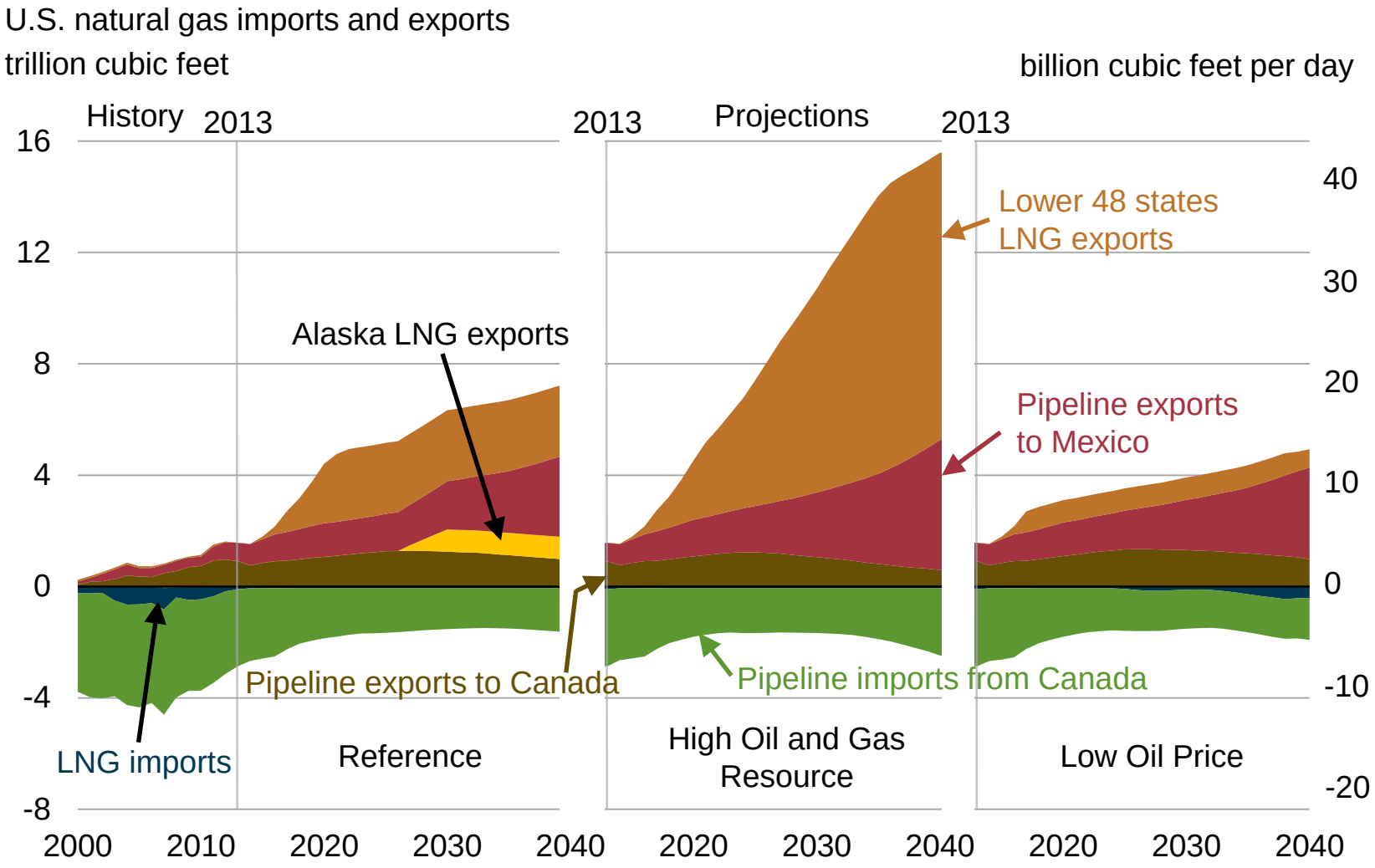
Natural gas consumption growth is driven by increased use in all sectors except residential



Source: EIA, Annual Energy Outlook 2015 Reference case

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

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



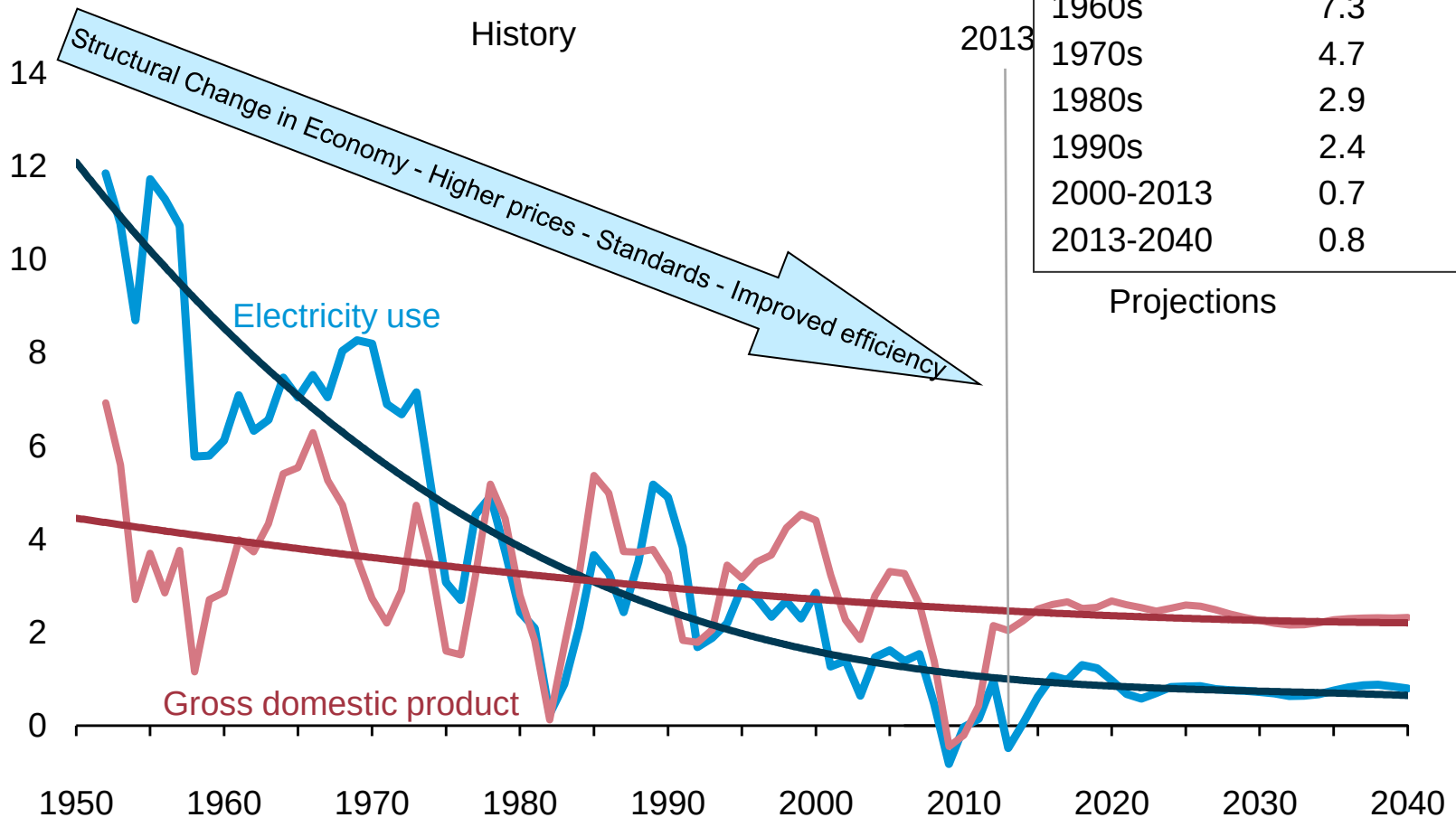
Source: EIA, Annual Energy Outlook 2015

Electricity

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)



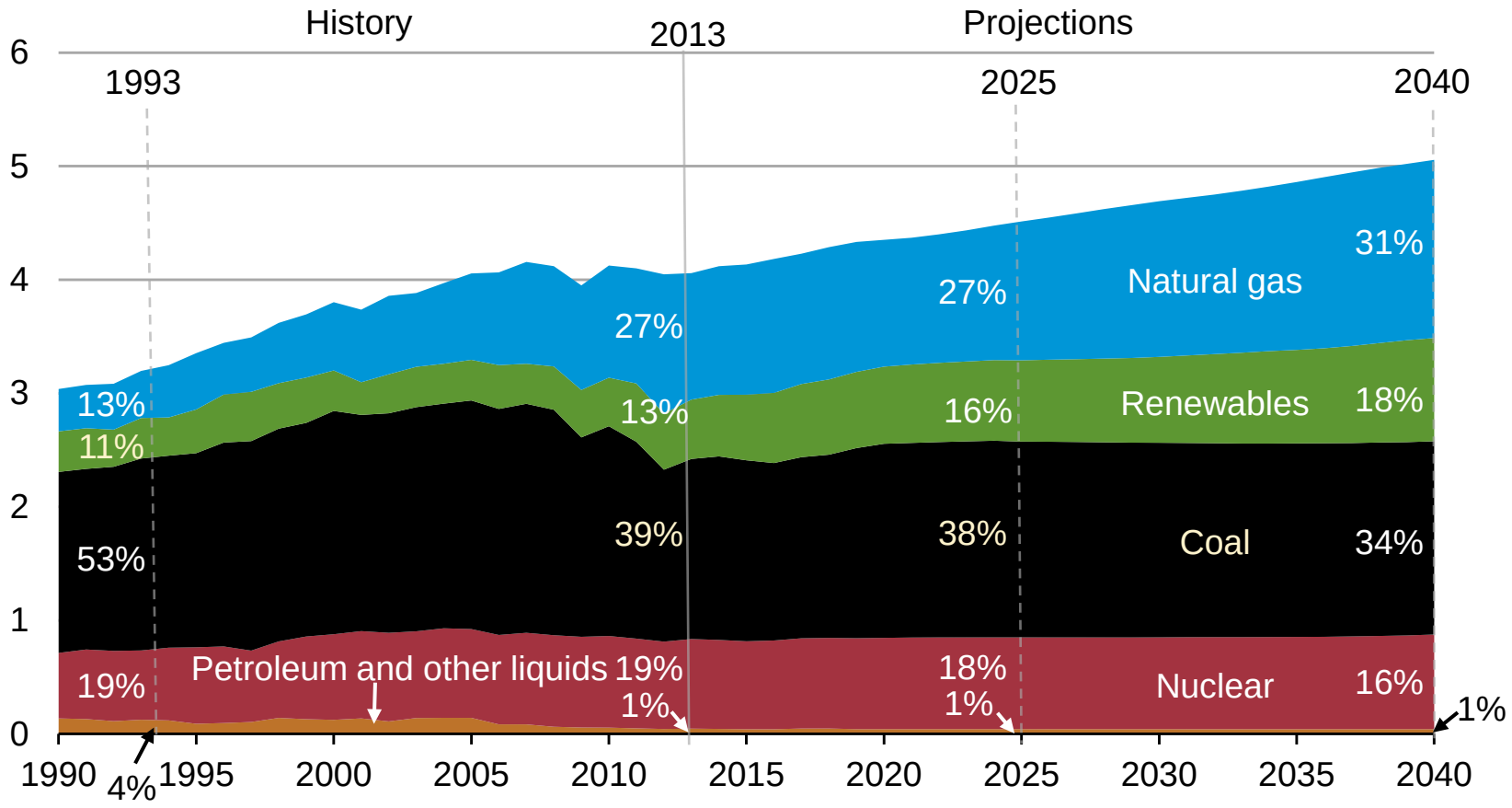
Period	Average Growth	
	Electricity use	GDP
1950s	9.8	4.2
1960s	7.3	4.5
1970s	4.7	3.2
1980s	2.9	3.1
1990s	2.4	3.2
2000-2013	0.7	1.9
2013-2040	0.8	2.4

Source: EIA, Annual Energy Outlook 2015 Reference case

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

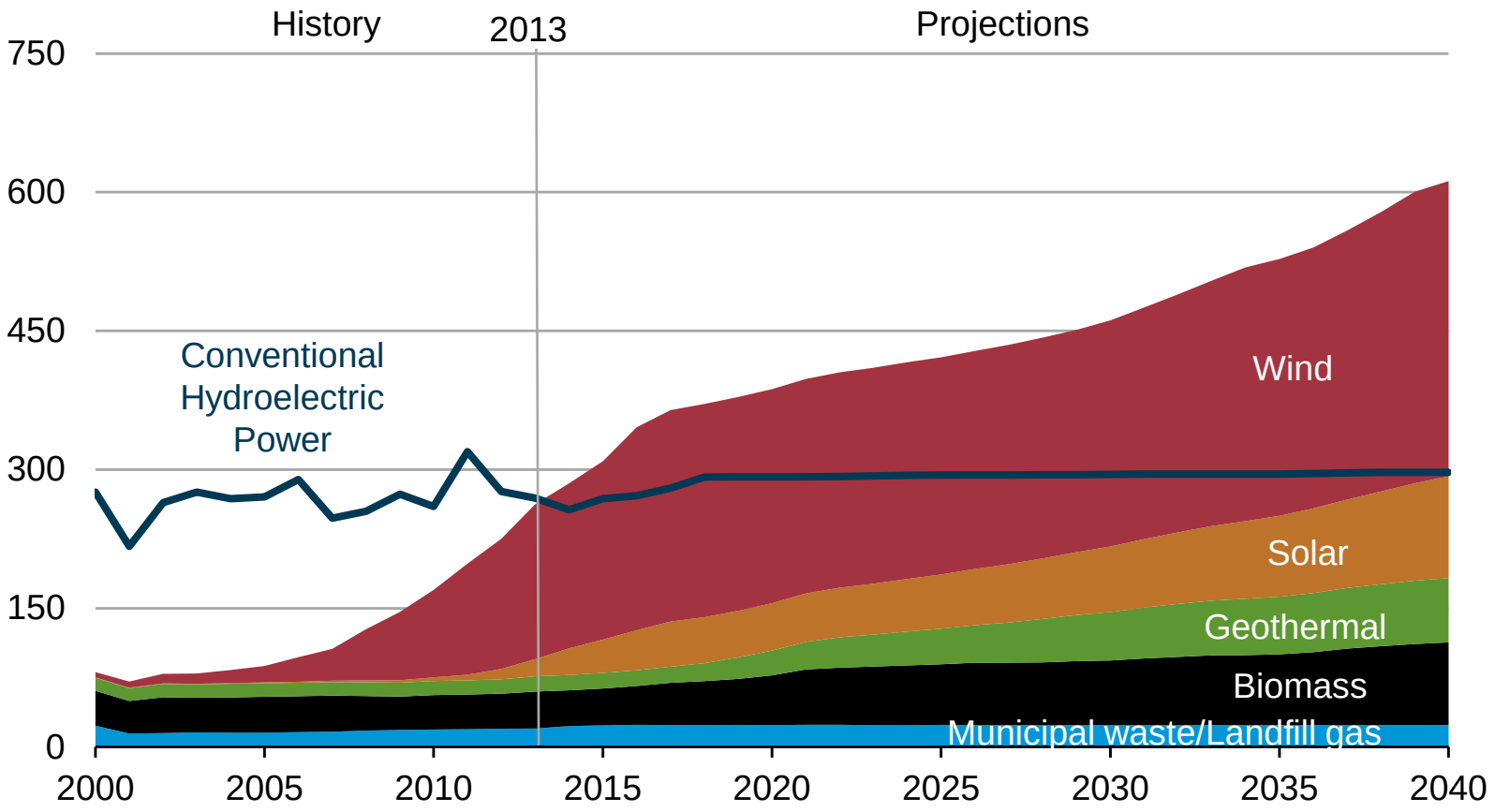


Source: EIA, Annual Energy Outlook 2015 Reference case

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

renewable electricity generation by fuel type

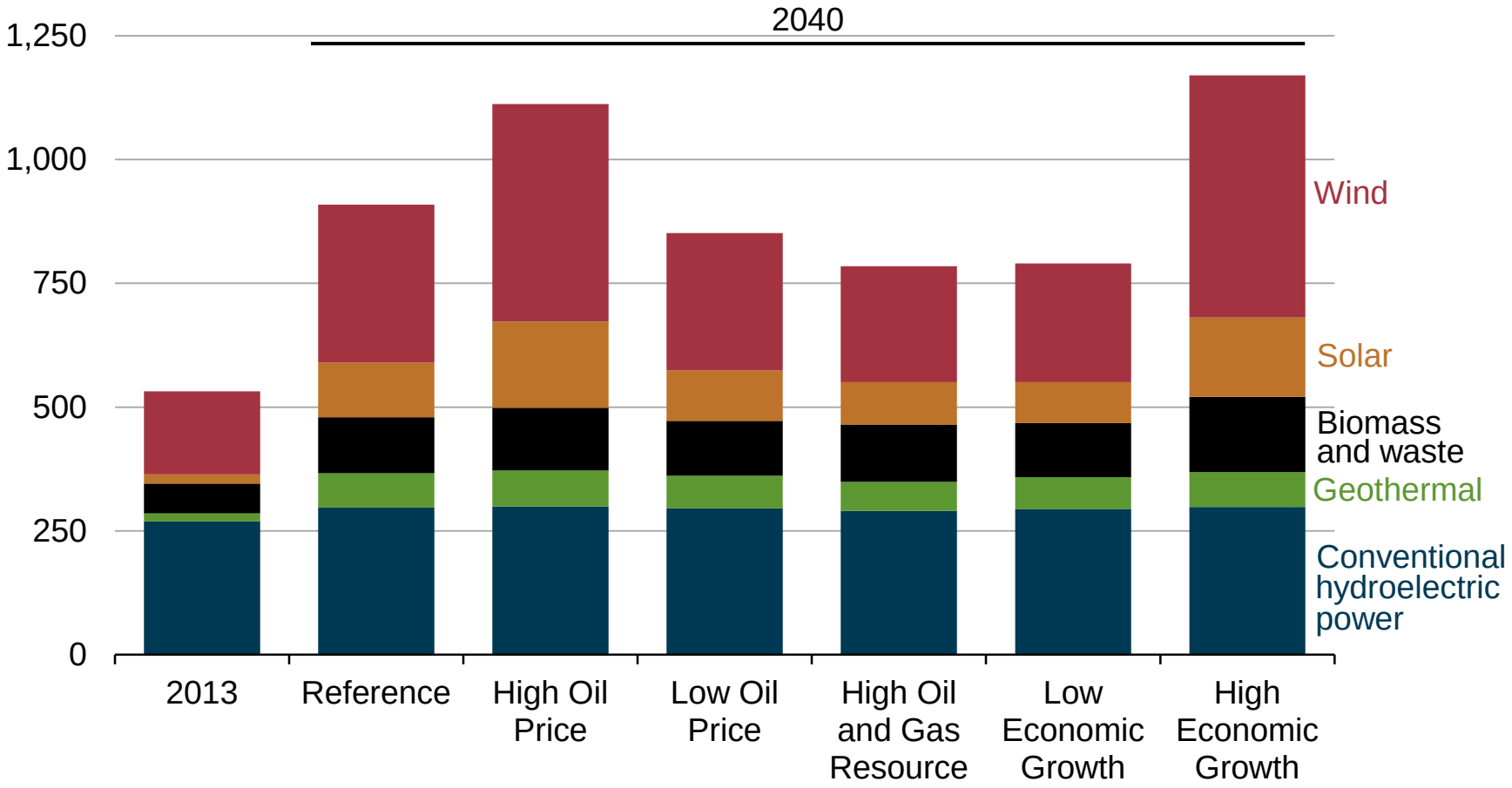
billion kilowatthours



Source: EIA, Annual Energy Outlook 2015 Reference case

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

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

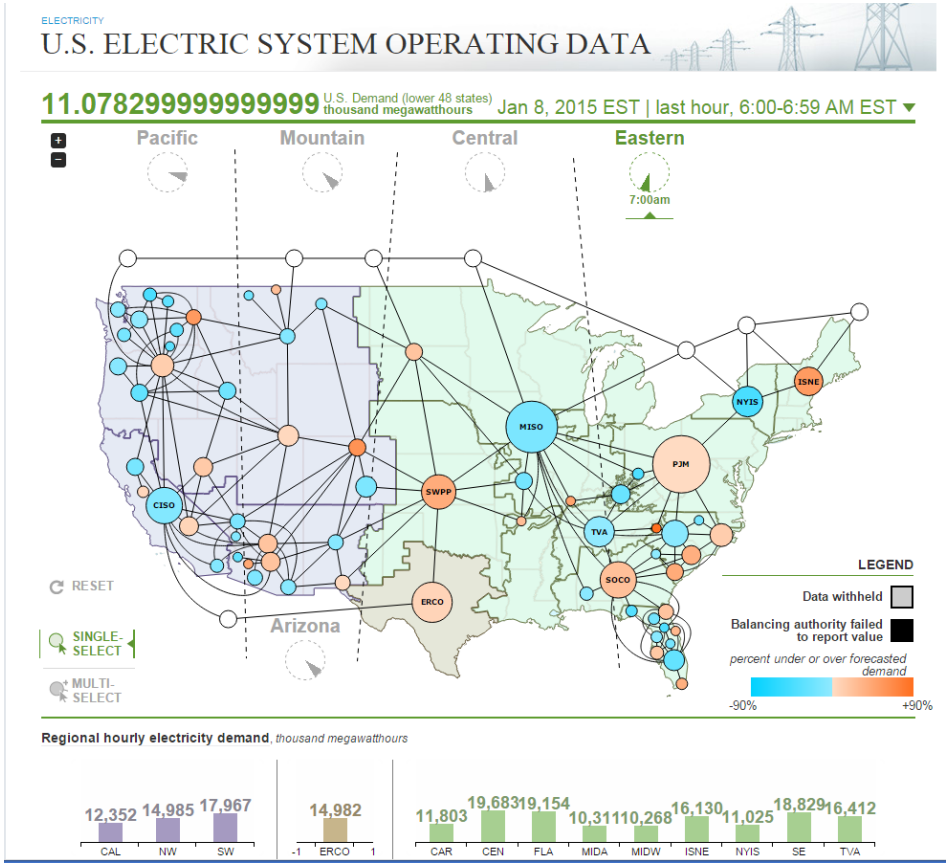
Preview of coming attractions

Upcoming: improved international energy web presence

- New data browser to replace IES
- Better map-based navigations and visualizations
- Consolidate CABs/CANs
- Status: dev integration
- Launch: beta in April

Upcoming: EIA-930—hourly survey of electricity balancing authorities

- First near-real time report for EIA
- Dashboard view of the U.S. power grid
- Highly anticipated by EIA customers
- Status: dev largely complete; awaiting OES data to continue
- Launch: TBD



Upcoming: Final four reports on EIA crude oil exports

Over the next two months, the final four reports will cover:

1) technical options for U.S. refineries to facilitate the processing additional light tight oil

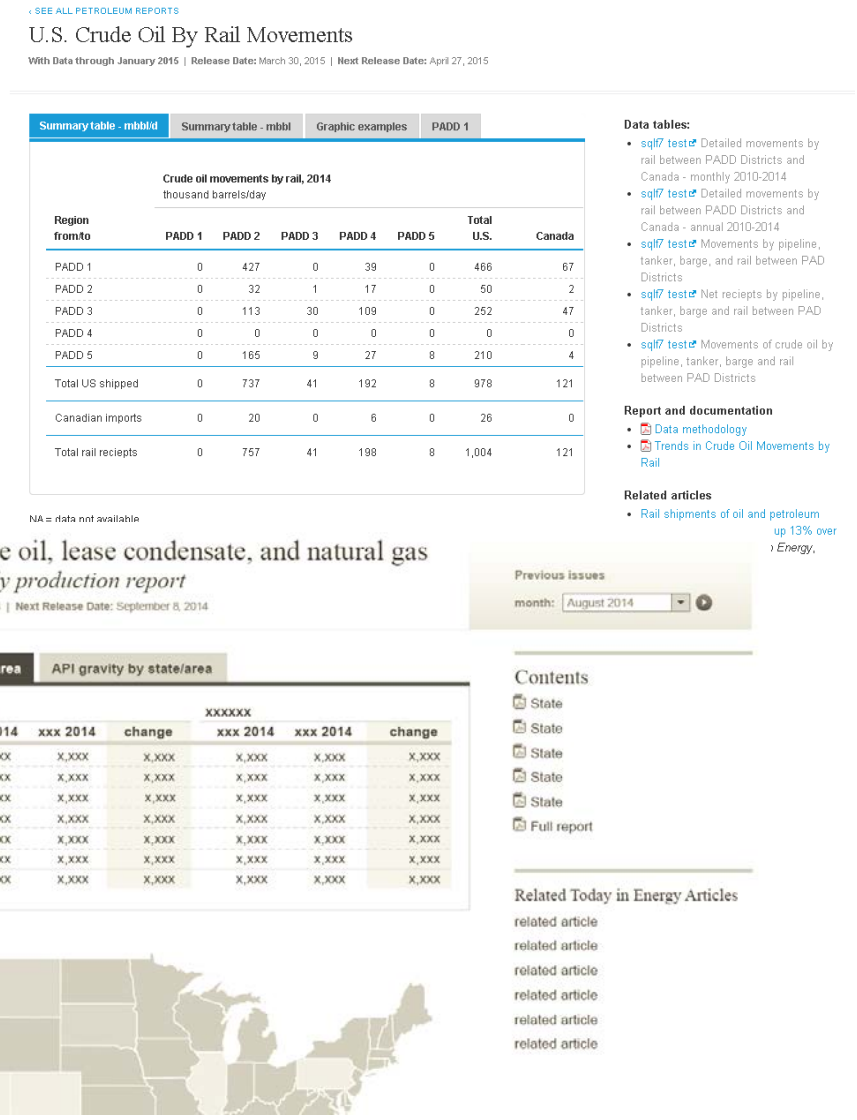
2) implications of increasing light tight oil production for the overall U.S. refining system

3) an update to EIA's May 29, 2014, report on projections of U.S. crude oil production by API gravity

4) the effects on oil prices, oil production, and oil trade if restrictions on U.S. crude oil exports were removed

Now playing: Crude by rail and EIA-914—data updates

- Both high priority
- Crude by rail due out with PSM, March 30
- Updated 914 expected in June with new data collection



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U.S. Crude Oil By Rail Movements

With Data through January 2015 | **Release Date:** March 30, 2015 | **Next Release Date:** April 27, 2015

Summary table - mbbl/d | Summary table - mbbl | Graphic examples | PADD 1

Crude oil movements by rail, 2014
thousand barrels/day

Region from/to	PADD 1	PADD 2	PADD 3	PADD 4	PADD 5	Total U.S.	Canada
PADD 1	0	427	0	39	0	466	67
PADD 2	0	32	1	17	0	50	2
PADD 3	0	113	30	109	0	252	47
PADD 4	0	0	0	0	0	0	0
PADD 5	0	165	9	27	8	210	4
Total US shipped	0	737	41	192	8	978	121
Canadian imports	0	20	0	6	0	26	0
Total rail reciepts	0	757	41	198	8	1,004	121

NA = data not available

Data tables:
- sqlf7 test Detailed movements by rail between PADD Districts and Canada - monthly 2010-2014
- sqlf7 test Detailed movements by rail between PADD Districts and Canada - annual 2010-2014
- sqlf7 test Movements by pipeline, tanker, barge, and rail between PAD Districts
- sqlf7 test Net reciepts by pipeline, tanker, barge and rail between PAD Districts
- sqlf7 test Movements of crude oil by pipeline, tanker, barge and rail between PAD Districts

Report and documentation
- Data methodology
- Trends in Crude Oil Movements by Rail

Related articles
- Rail shipments of oil and petroleum up 13% over ... Energy,

Monthly crude oil, lease condensate, and natural gas

EIA-914 monthly production report

Release Date: August 11, 2014 | **Next Release Date:** September 8, 2014

Previous issues
month: August 2014

Production by state/area | API gravity by state/area

	xxxxxx			xxxxxx		
	xxx 2014	xxx 2014	change	xxx 2014	xxx 2014	change
xxxxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx
xxxxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx
xxxxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx
xxxxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx
xxxxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx
xxxxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx
Total	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx	x,xxx

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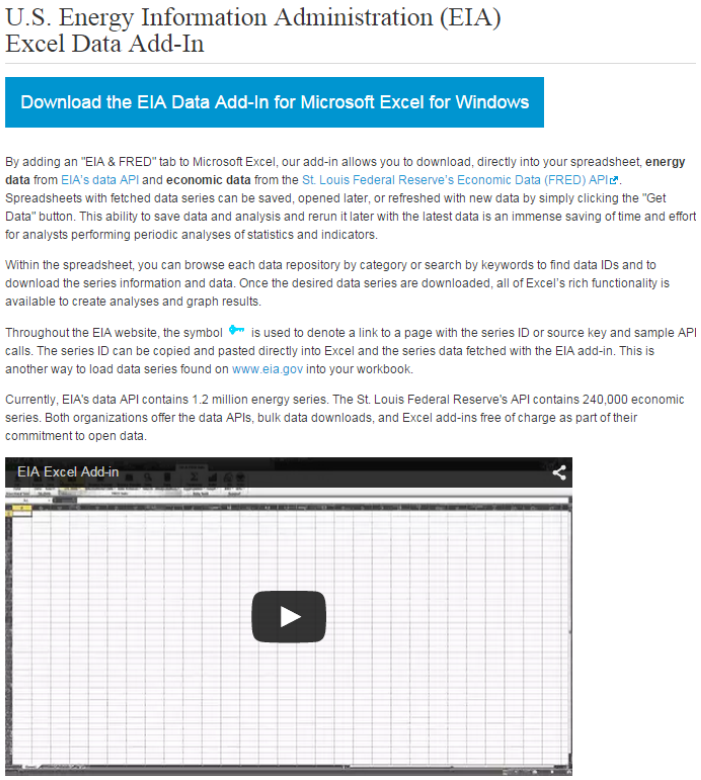
Now playing: New Microsoft Excel add-in for Windows

- Enables spreadsheet users – inside and outside of EIA – to pull recent EIA/FRED data into their existing workbooks

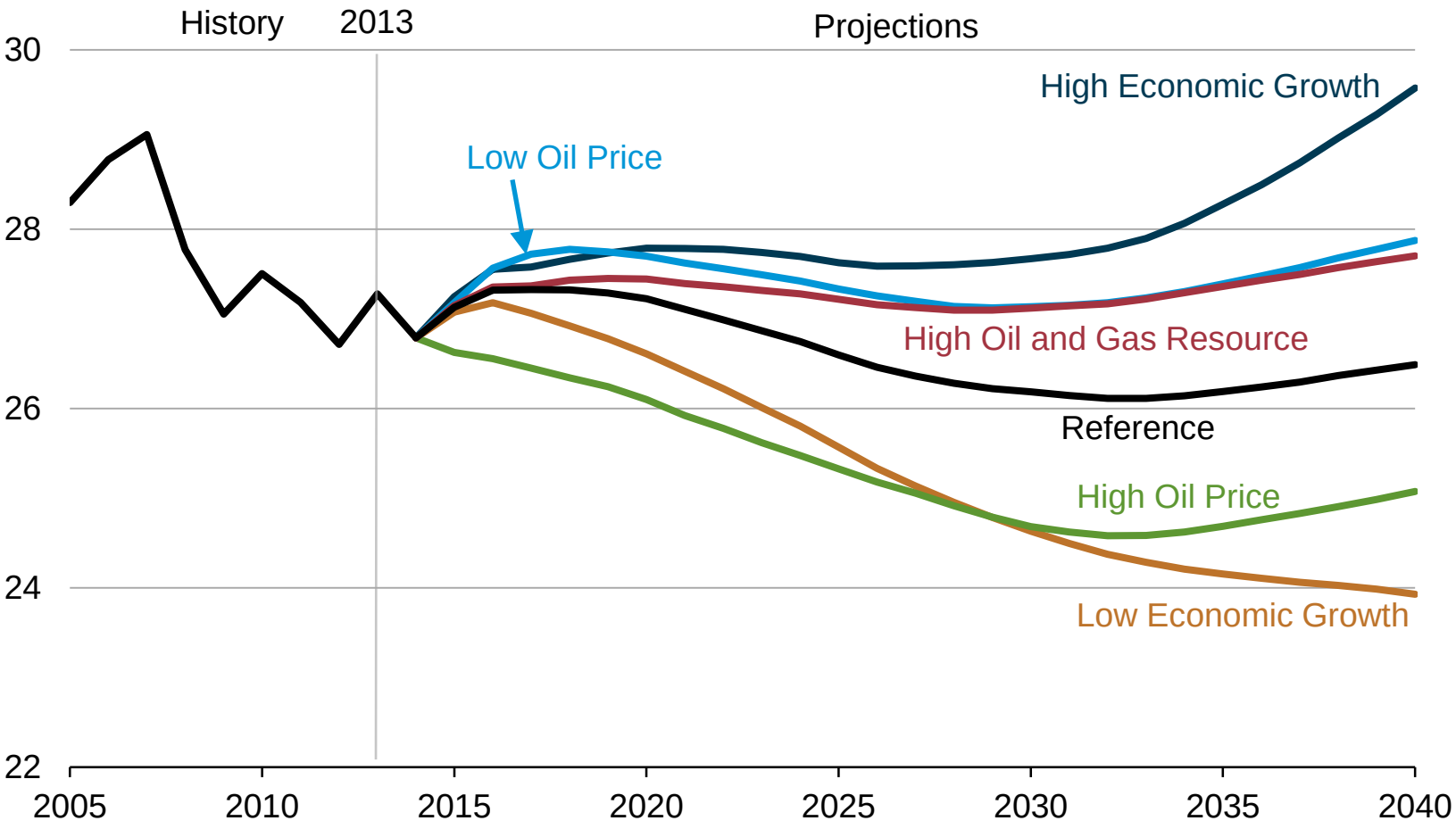


Supplemental slides

Technology and policy promotes slower growth of transportation energy demand

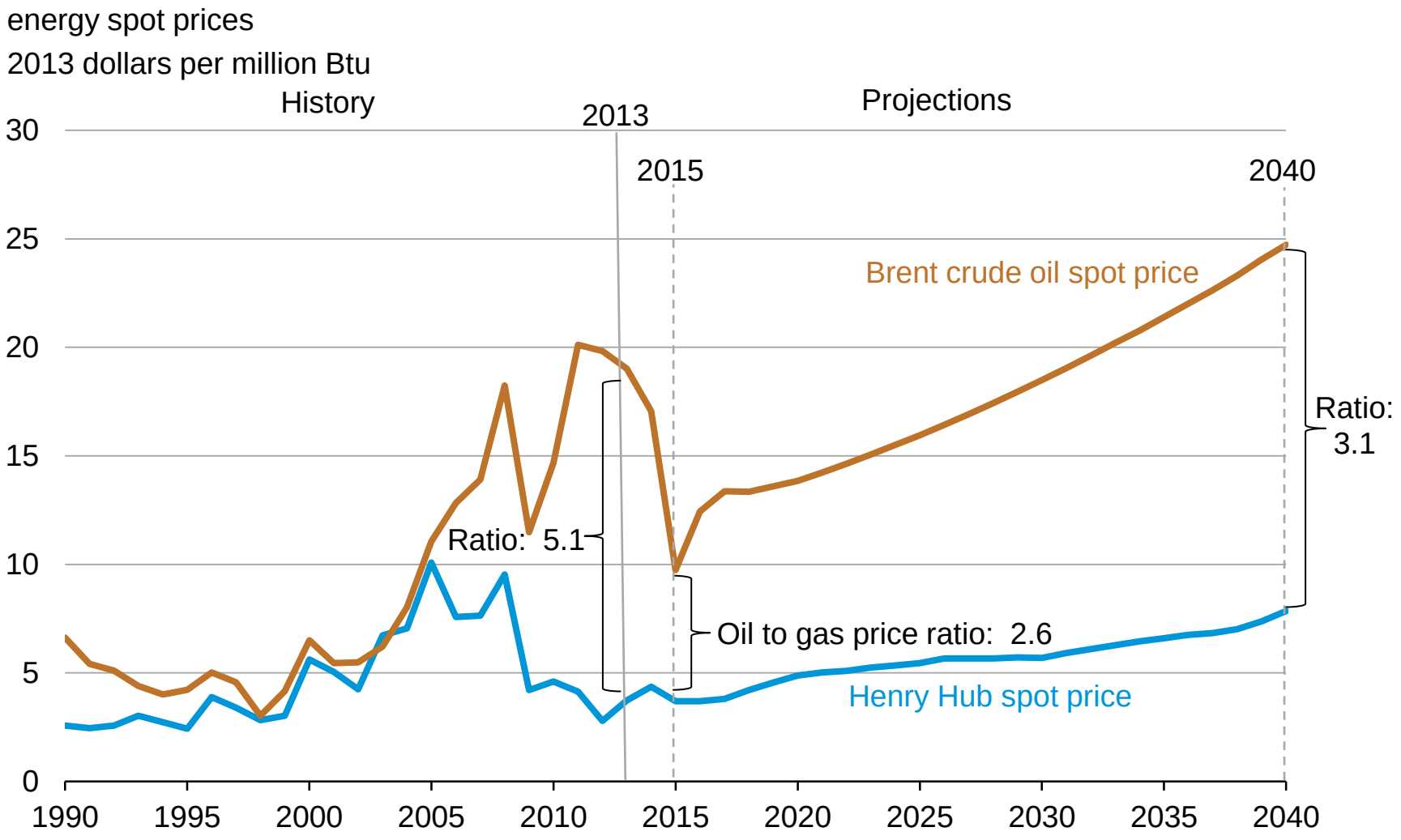
delivered transportation sector energy consumption

quadrillion Btu



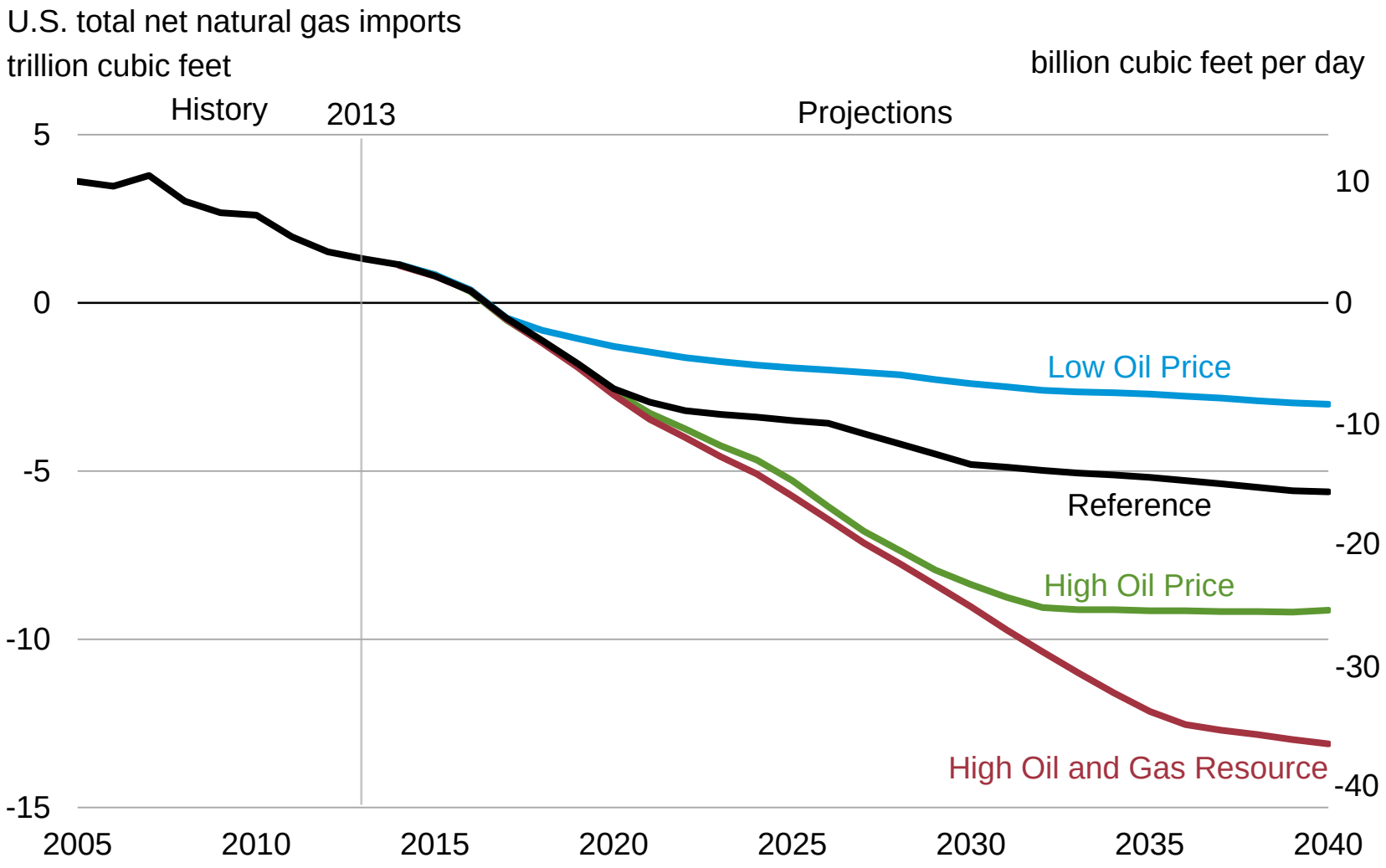
Source: EIA, Annual Energy Outlook 2015

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

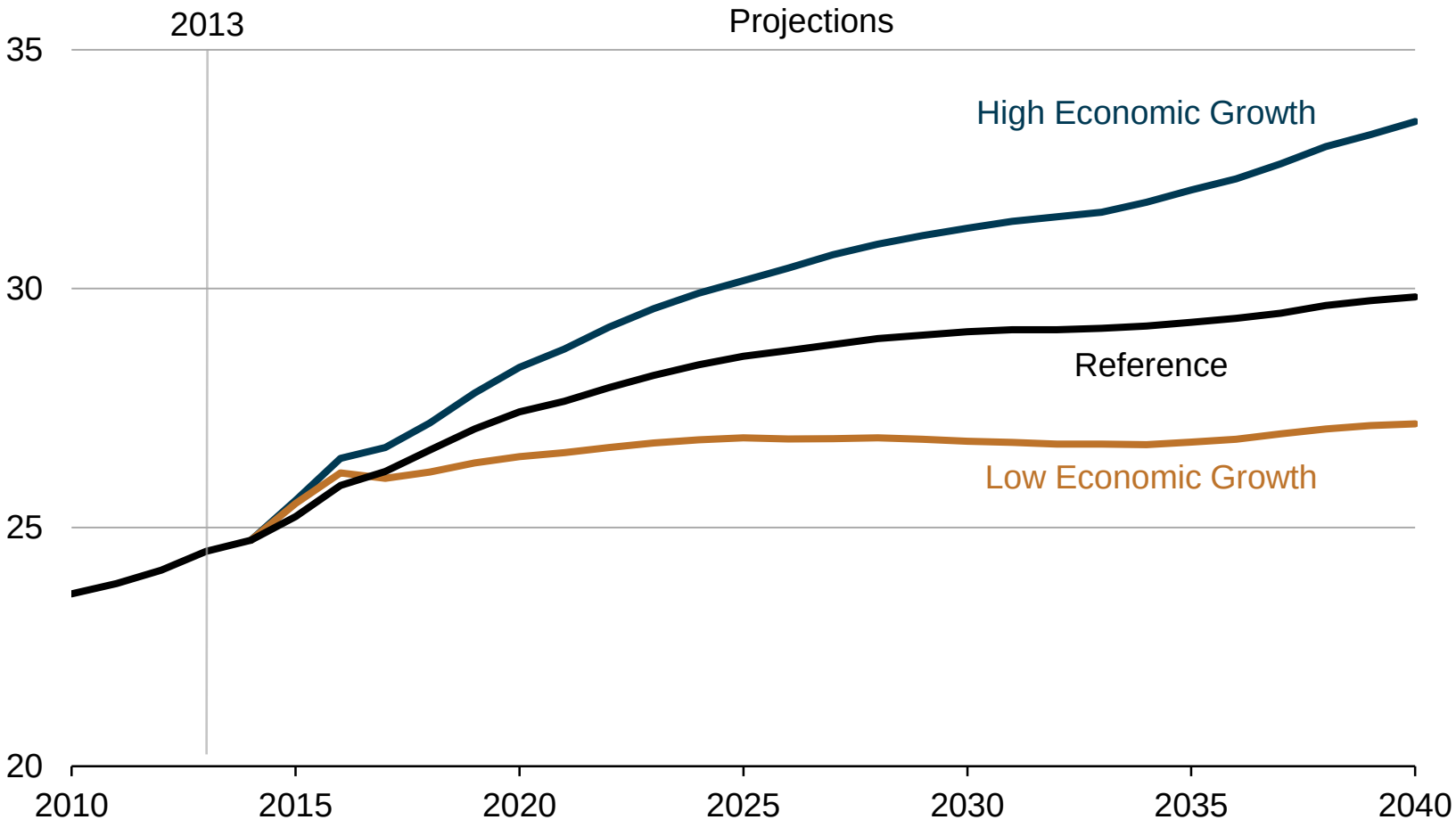


Source: EIA, Annual Energy Outlook 2015

Industrial energy use rises with growth of shale gas supply

industrial sector total delivered energy consumption

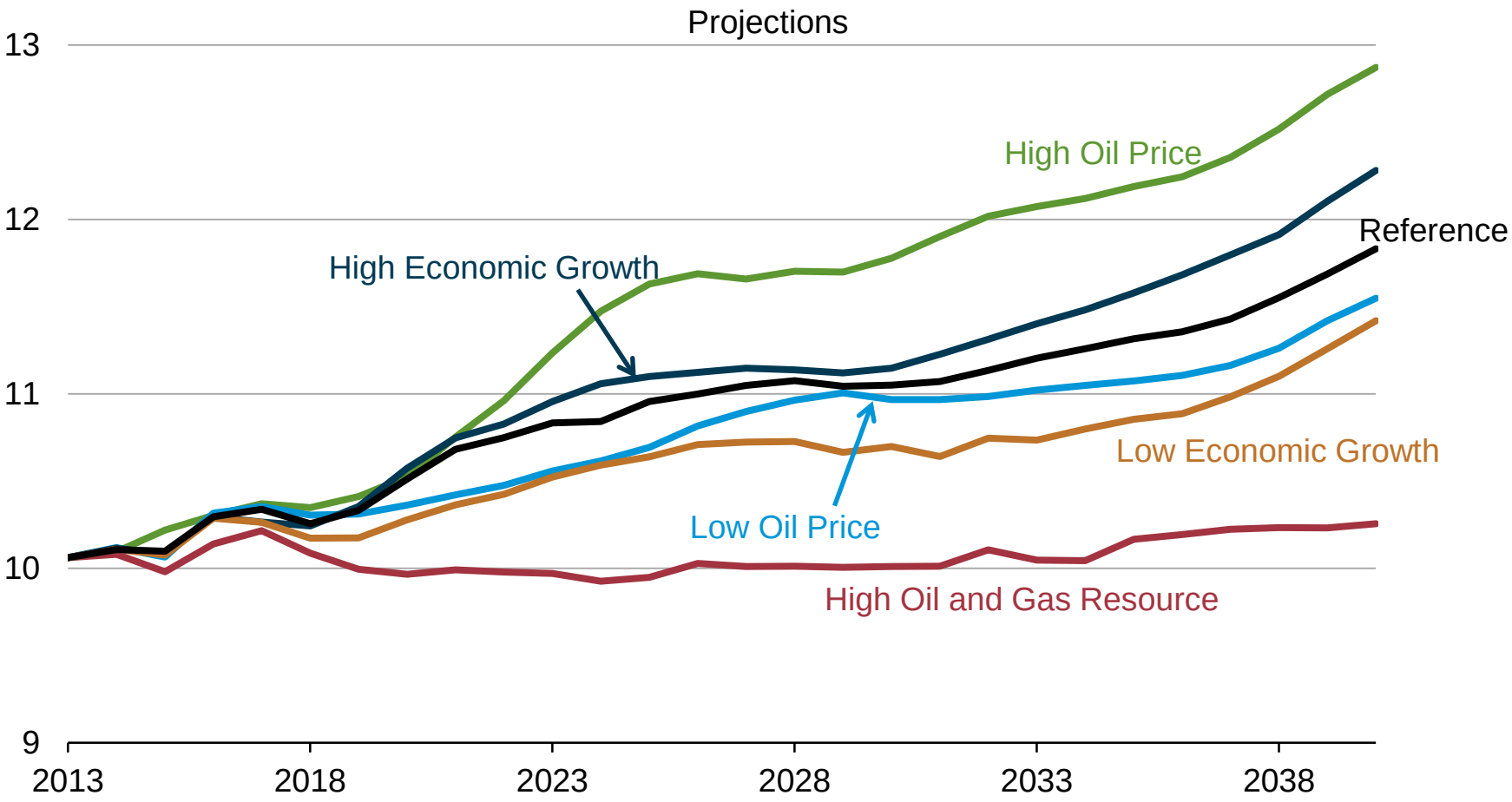
quadrillion Btu



Source: EIA, Annual Energy Outlook 2015

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

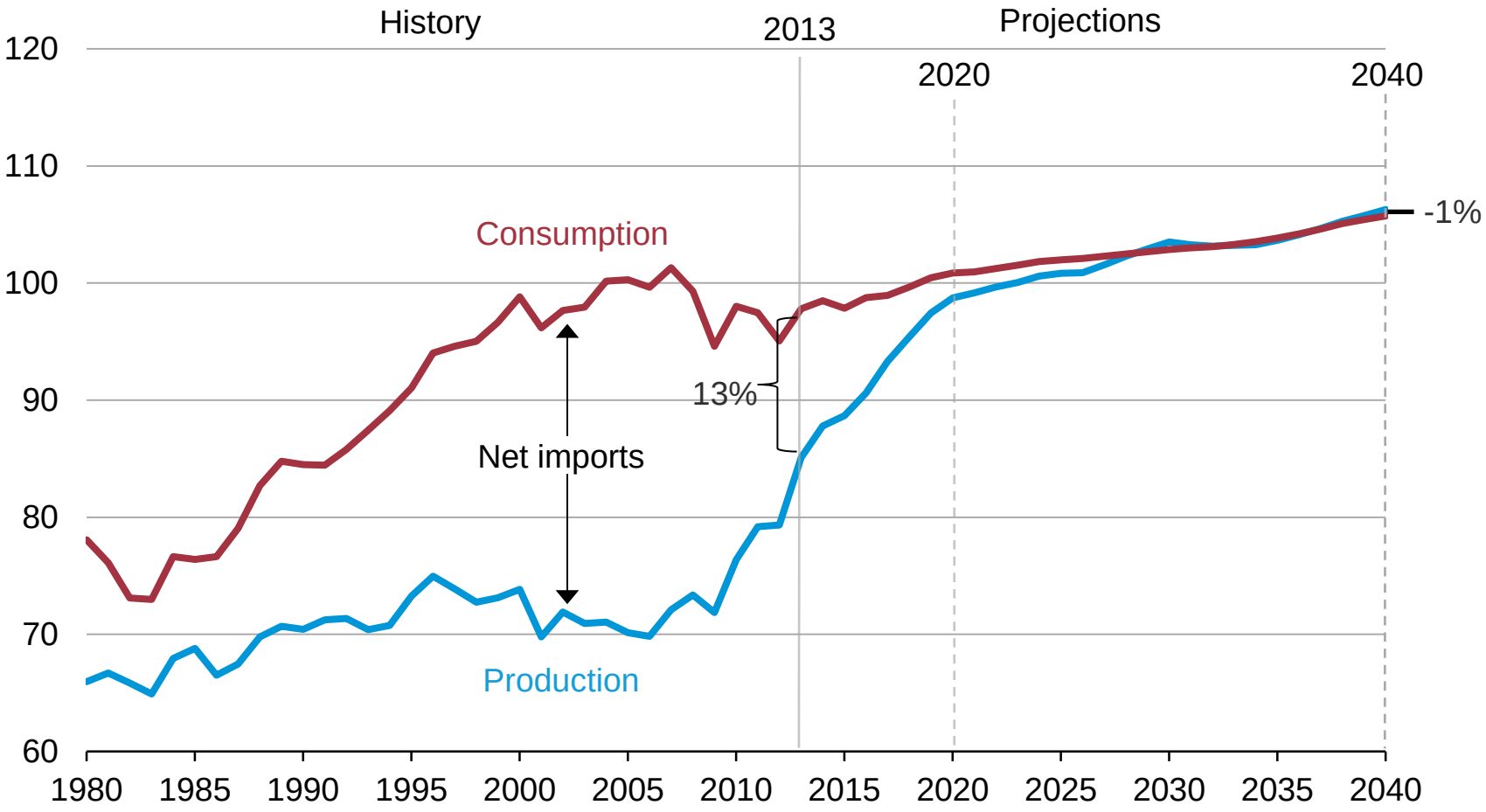
average retail electricity prices
2013 cents per kilowatthour



Source: EIA, Annual Energy Outlook 2015

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