Annual Energy Outlook 2013

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by

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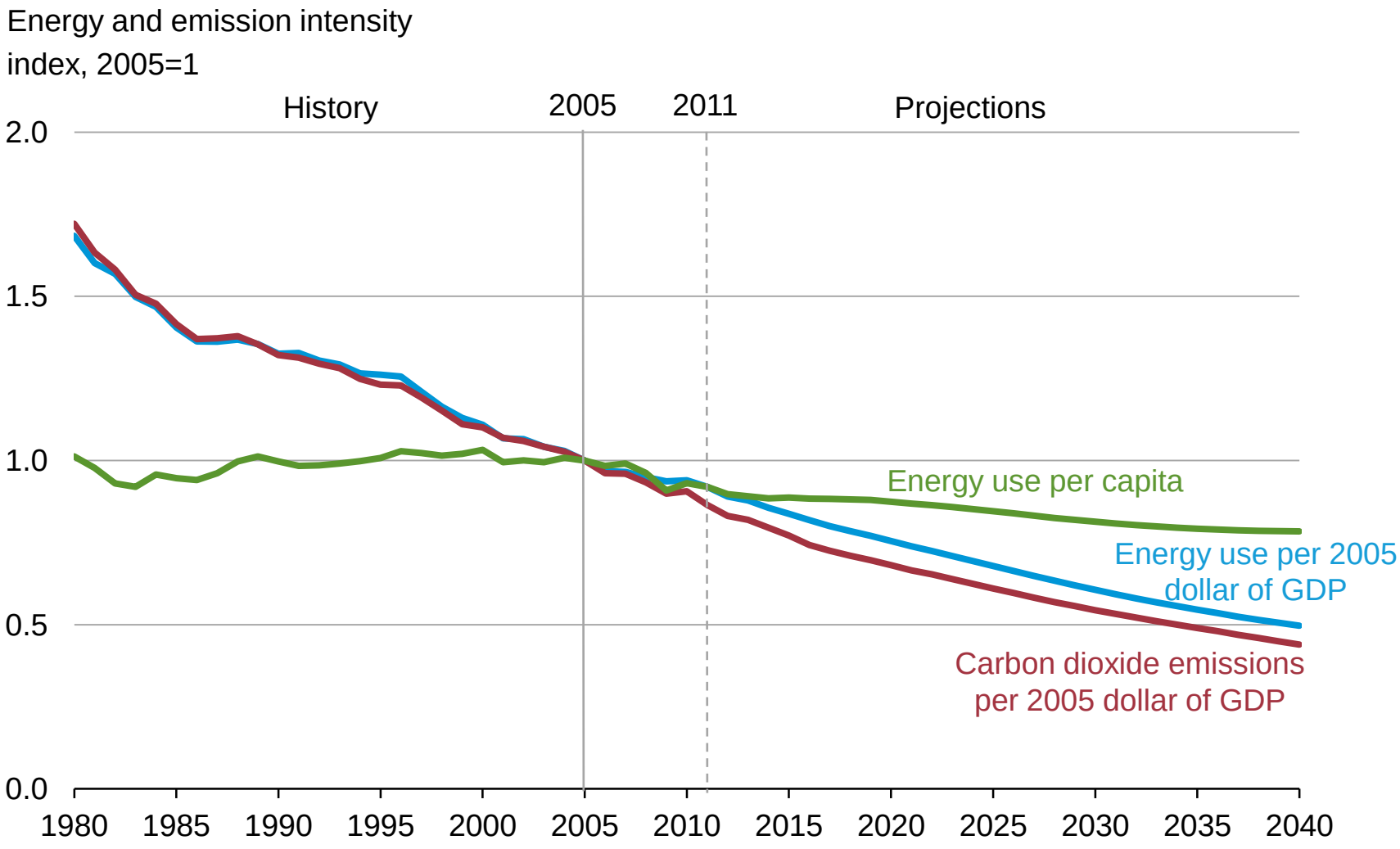
EIA's "Reference case"

- Generally assumes current laws and regulations
  - excludes potential future laws and regulations (e.g., proposed greenhouse gas legislation is not included)
  - Sunset provisions as specified in law (e.g., renewable production tax credits expire at the end of 2012)
- Some grey regulatory areas
  - adds a premium to the cost of financing CO_2-intensive technologies to reflect current market behavior regarding possible future policies to mitigate greenhouse gas emissions
  - assumes implementation of existing regulations that enable the building of new energy infrastructure and resource extraction
- Includes technologies that are commercial or reasonably expected to become commercial over next decade or so
  - includes projected technology cost and efficiency improvements, as well as cost reductions linked to cumulative deployment levels
  - does not assume revolutionary or breakthrough technologies

Key results from the *AEO2013* Reference case:

- Growth in energy production outstrips consumption growth
- Crude oil production, particularly from tight oil plays, rises sharply over the next decade
- Natural gas production is higher throughout the Reference case projection than it was in *AEO2012*, serving the industrial and power sectors and an expanding export market
- Motor gasoline consumption reflects the introduction of more stringent fuel economy standards, while diesel fuel consumption is moderated by increased natural gas use in heavy-duty vehicles
- The U.S. becomes a larger exporter of natural gas and coal than was projected in the *AEO2012* Reference case
- All renewable fuels grow, but biomass and biofuels growth is slower than in *AEO2012*
- U.S. energy-related carbon dioxide emissions remain more than five percent below their 2005 level through 2040, reflecting increased efficiency and the shift to a less carbon-intensive fuel mix

Energy and CO_2 per dollar of GDP continue to decline; per-capita energy use also declines

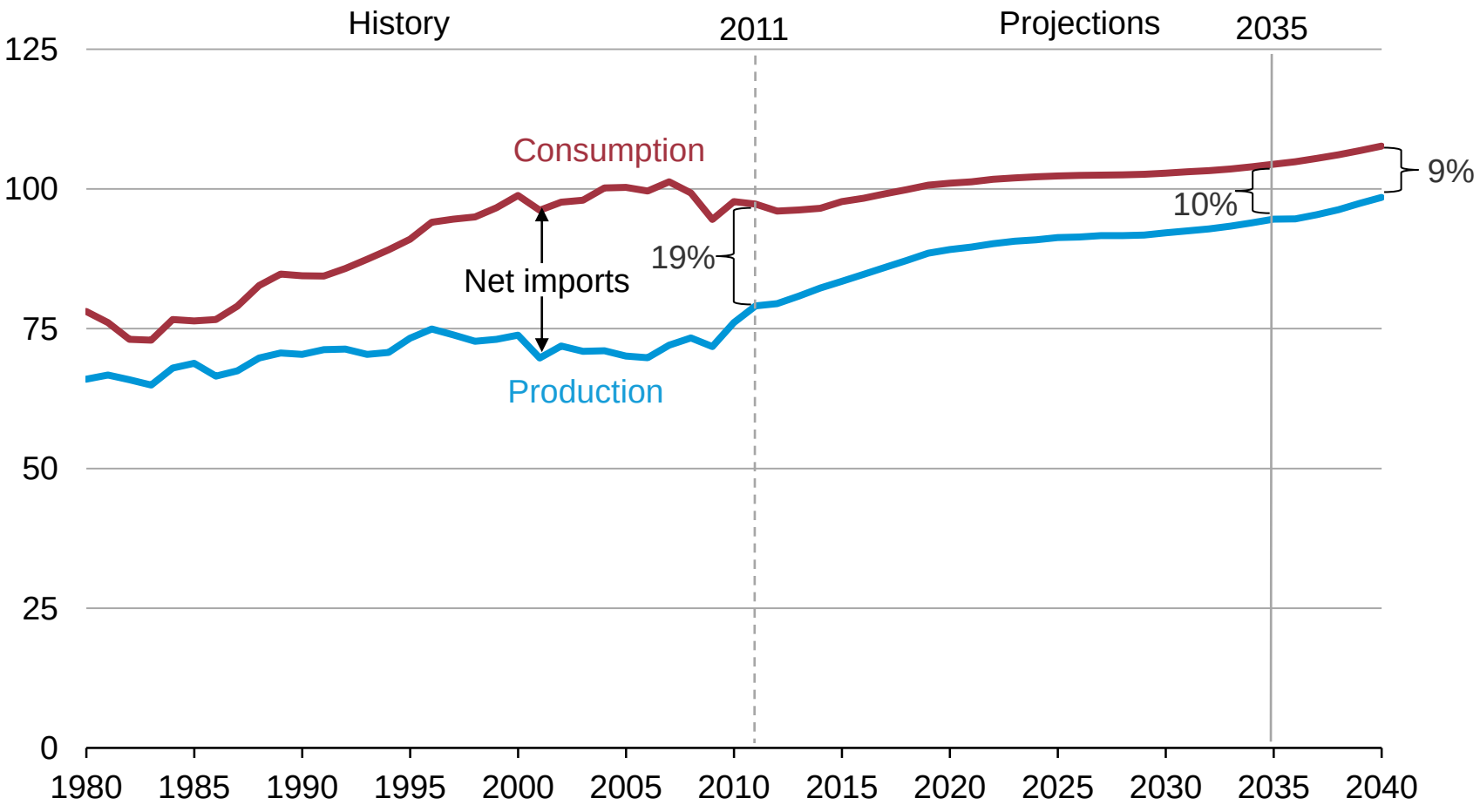


Source: EIA, Annual Energy Outlook 2013

Growth in energy production outstrips growth in consumption leading to reduction in net imports

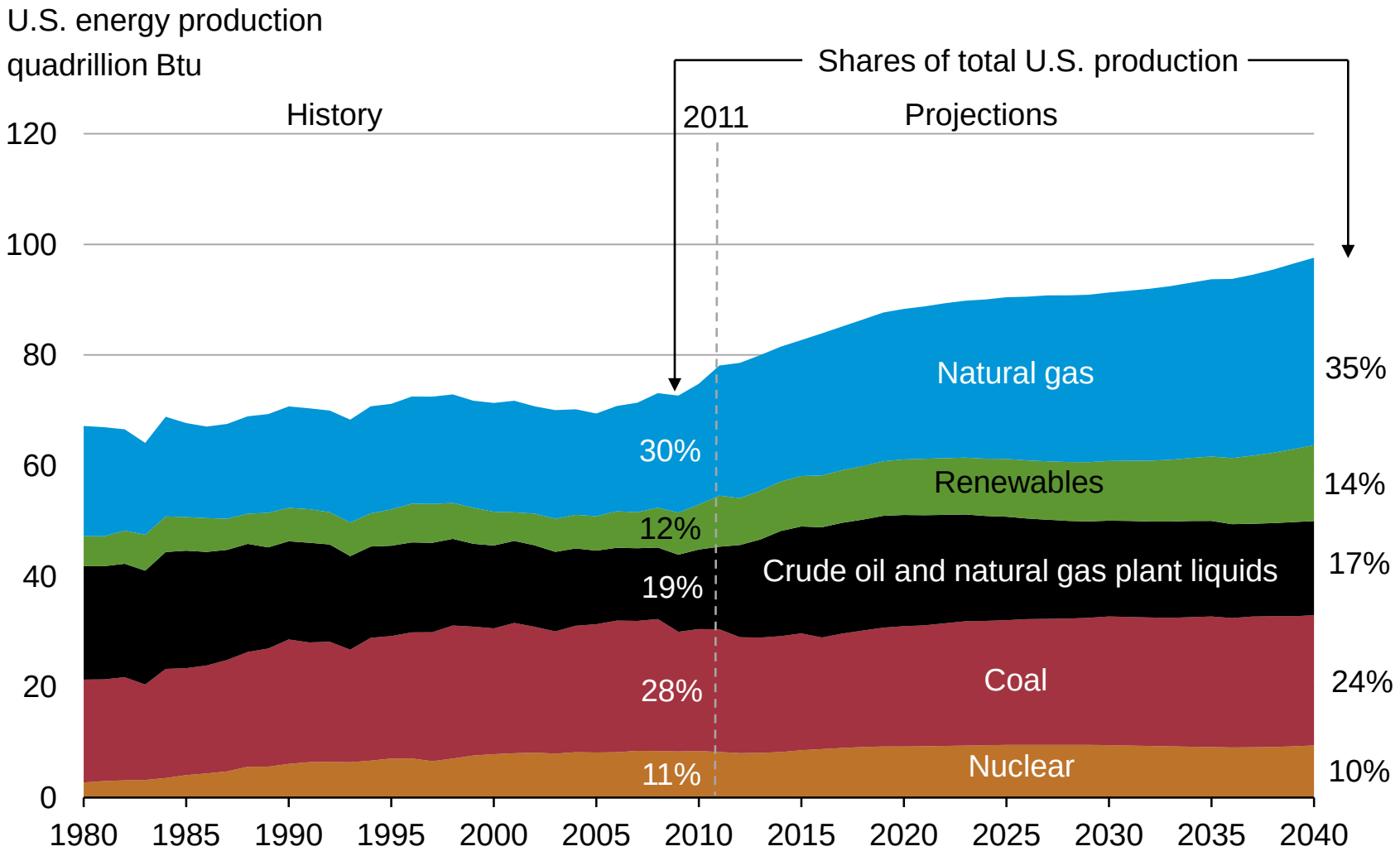
U.S. energy production and consumption

quadrillion Btu



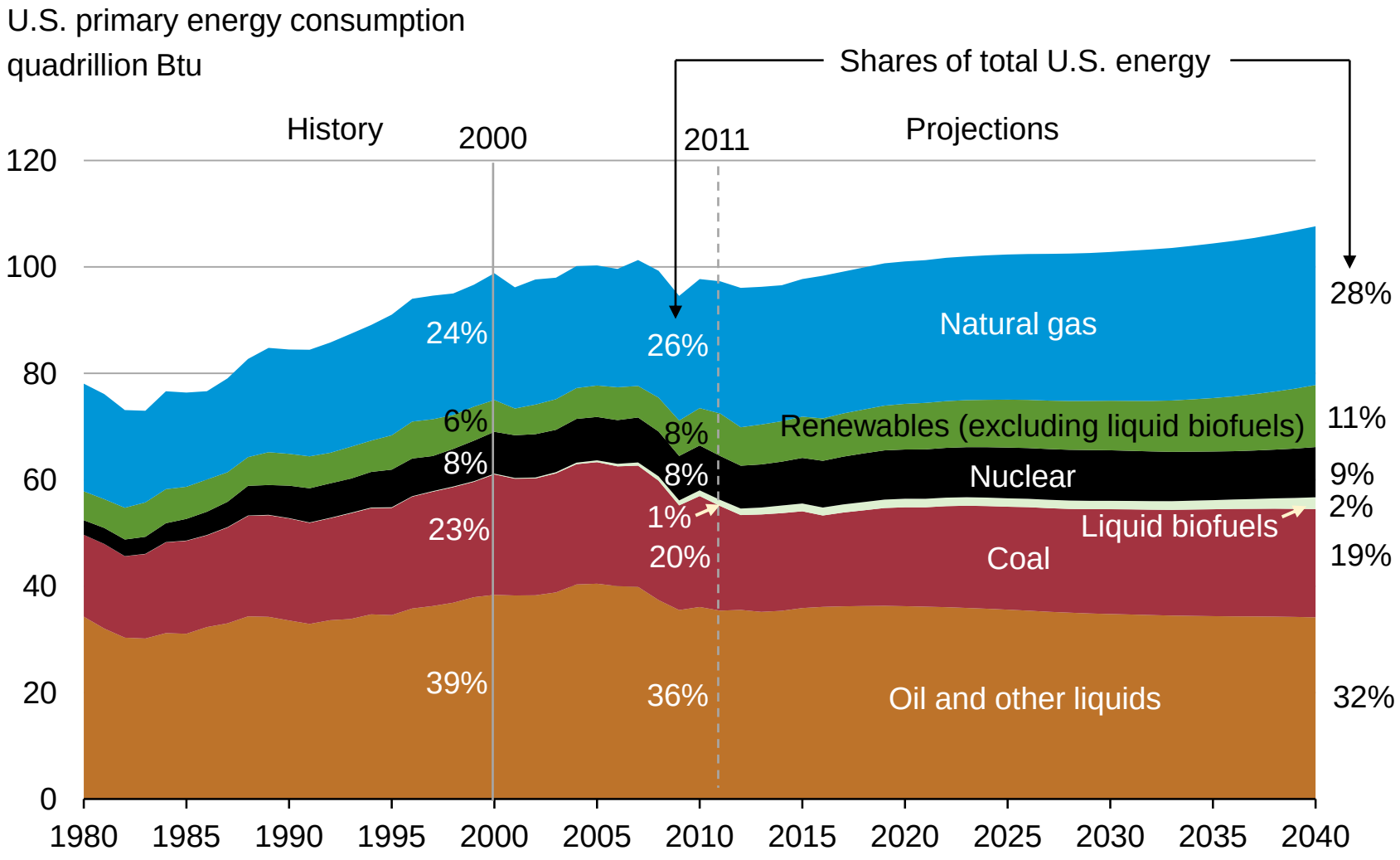
Source: EIA, Annual Energy Outlook 2013

Domestic production grows rapidly over projection period, particularly natural gas and renewables, and liquids in the near term



Source: EIA, Annual Energy Outlook 2013

U.S. energy use grows slowly over the projection reflecting improving energy efficiency and a slow and extended economic recovery

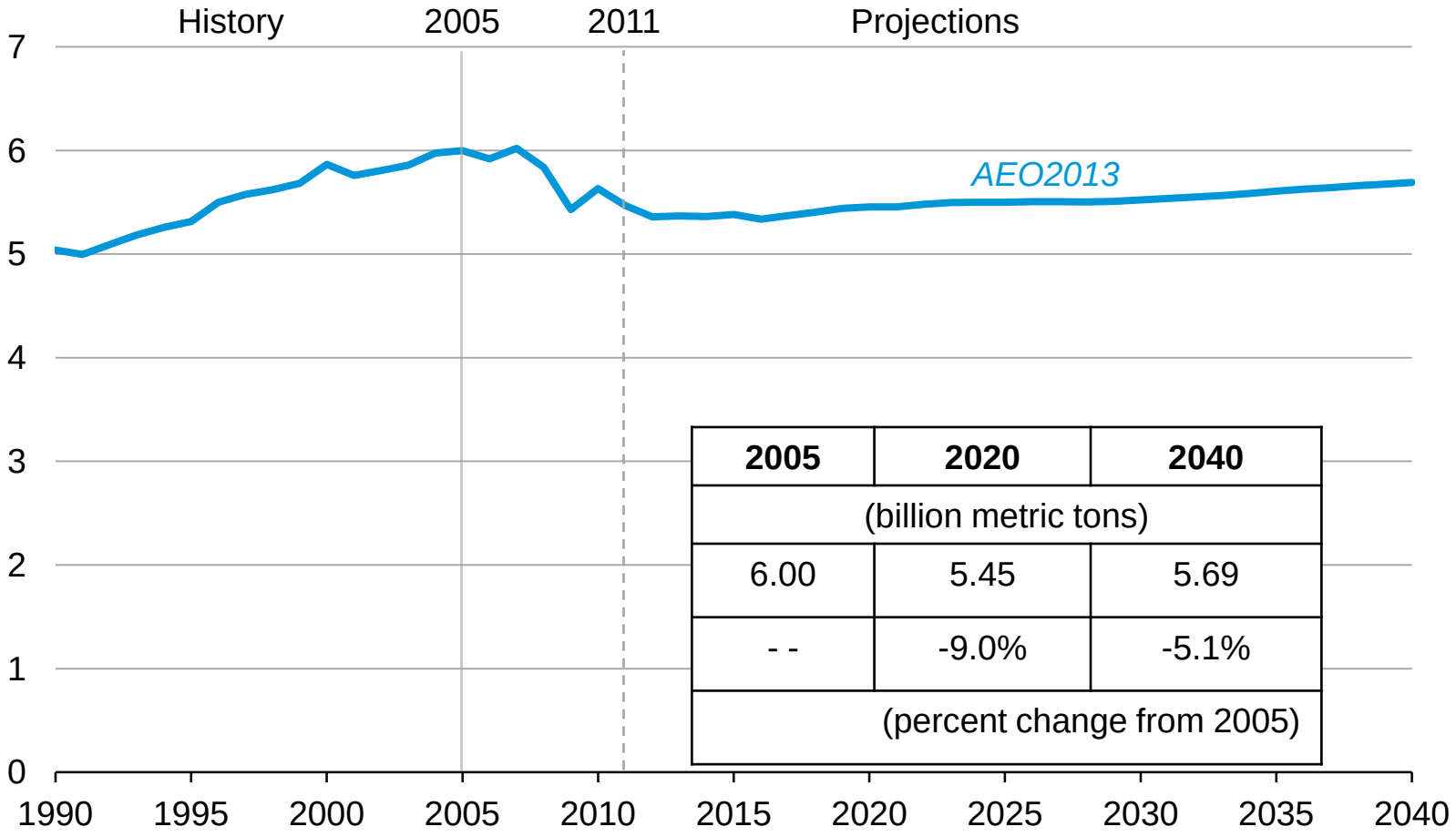


Source: EIA, Annual Energy Outlook 2013

In the *AEO2013* Reference case, energy-related CO_2 emissions never get back to their 2005 level

Carbon dioxide emissions

billion metric tons



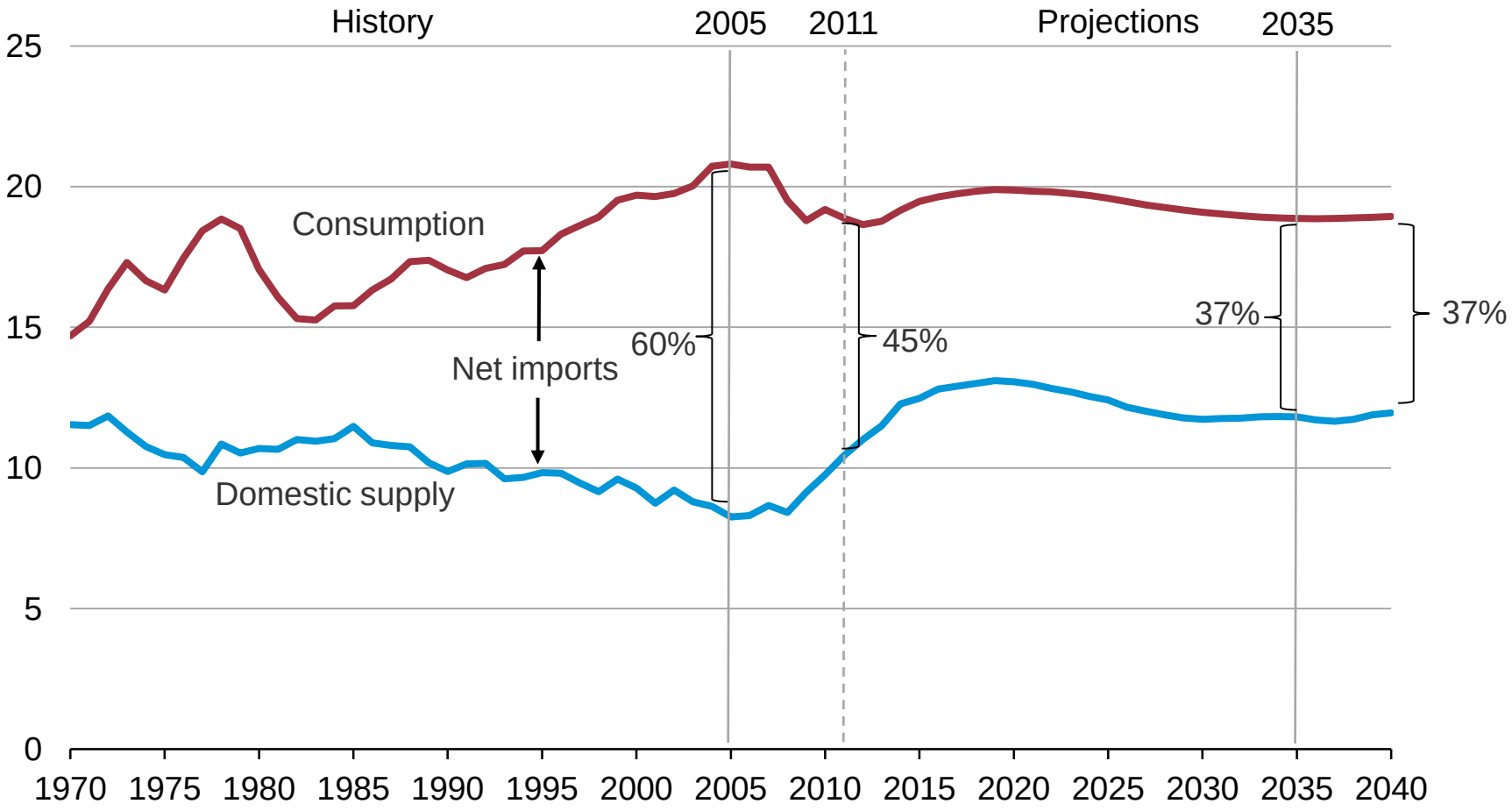
2005	2020	2040
(billion metric tons)		
6.00	5.45	5.69
- -	-9.0%	-5.1%
(percent change from 2005)		

Source: EIA, Annual Energy Outlook 2013

Petroleum and other liquid supply

U.S. dependence on imported liquids declines

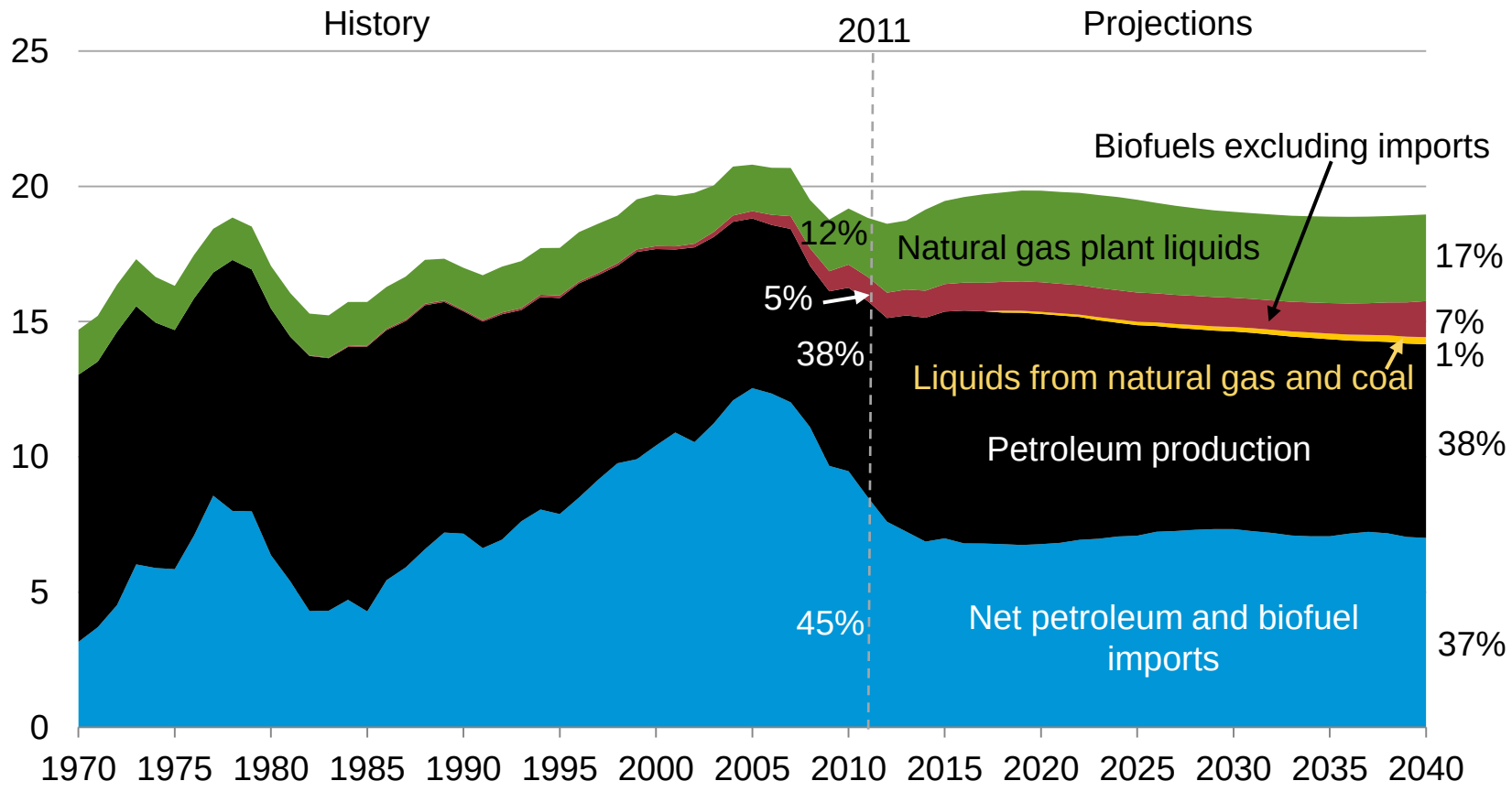
U.S. liquid fuel supply
million barrels per day



Source: EIA, Annual Energy Outlook 2013

U.S. import share of liquid fuels declines due to increased production of tight oil and gas liquids, and greater fuel efficiency

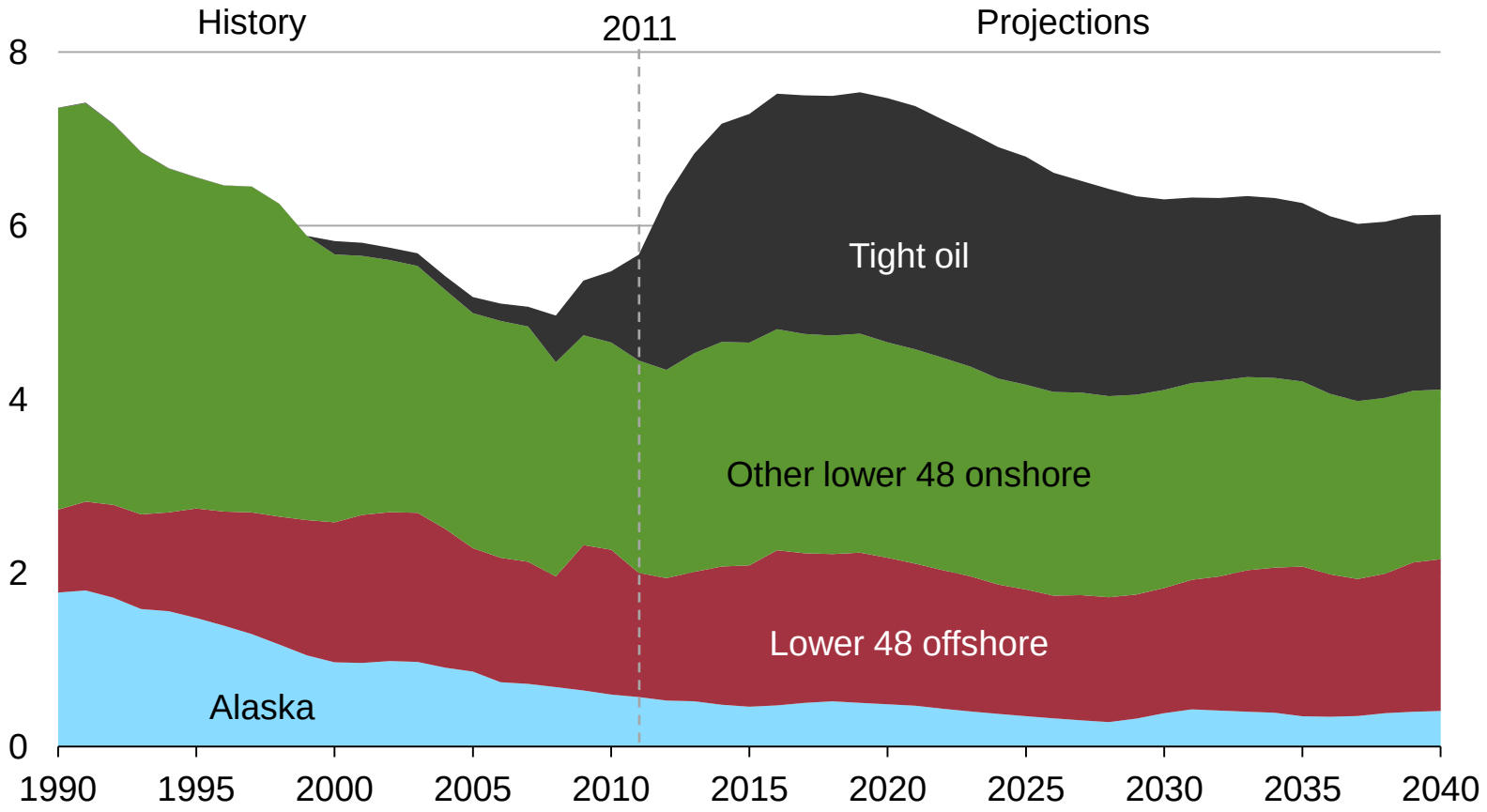
U.S. liquid fuels supply
million barrels per day



Source: EIA, Annual Energy Outlook 2013

U.S. tight oil production leads a growth in domestic production of 2.6 million barrels per day between 2008 and 2019

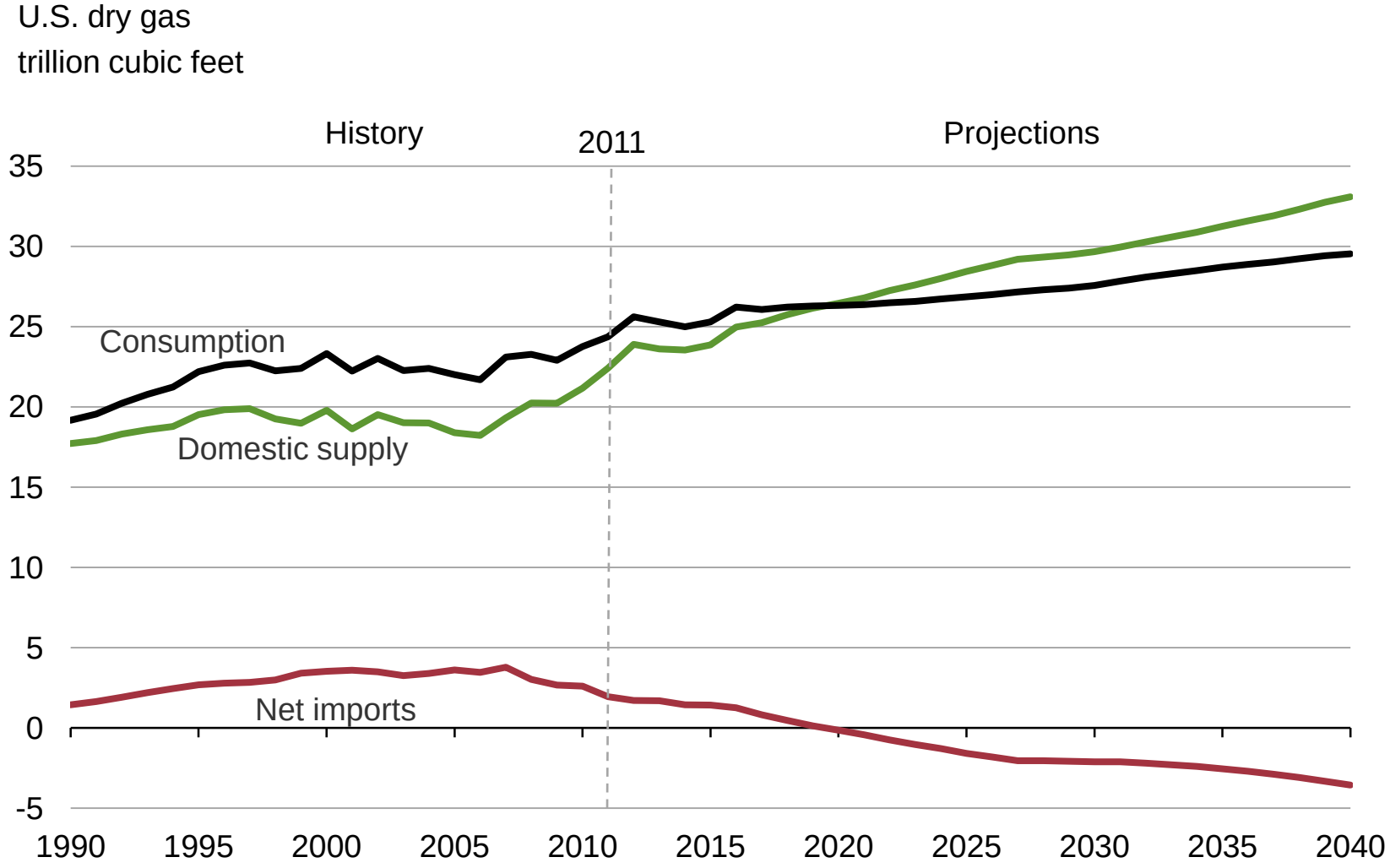
U.S. crude oil production
million barrels per day



Source: EIA, Annual Energy Outlook 2013

Natural gas

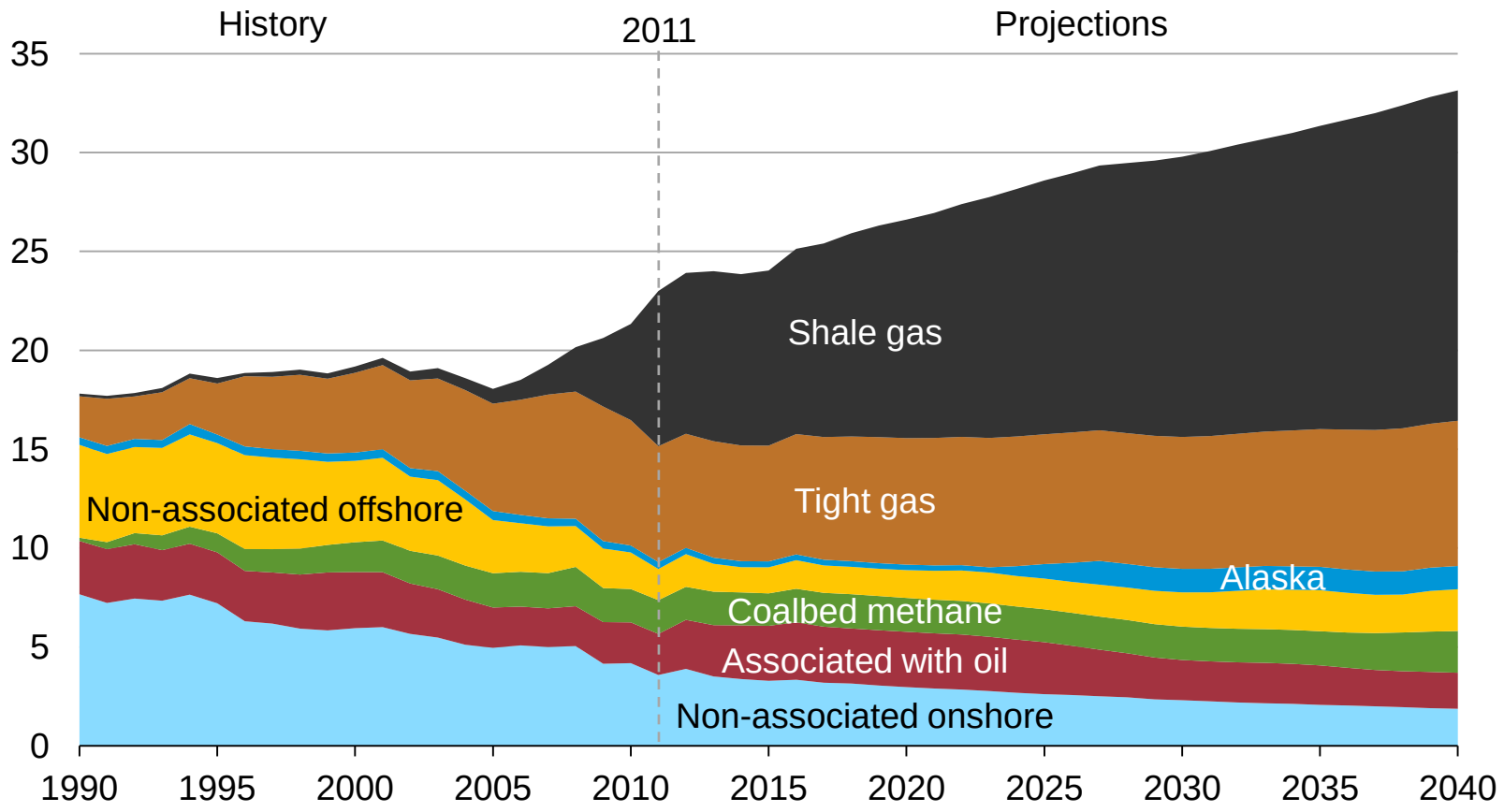
Domestic natural gas production grows faster than consumption and the U.S. becomes a net exporter of natural gas around 2020



Source: EIA, Annual Energy Outlook 2013

Shale gas production leads growth in production through 2040

U.S. dry natural gas production
trillion cubic feet



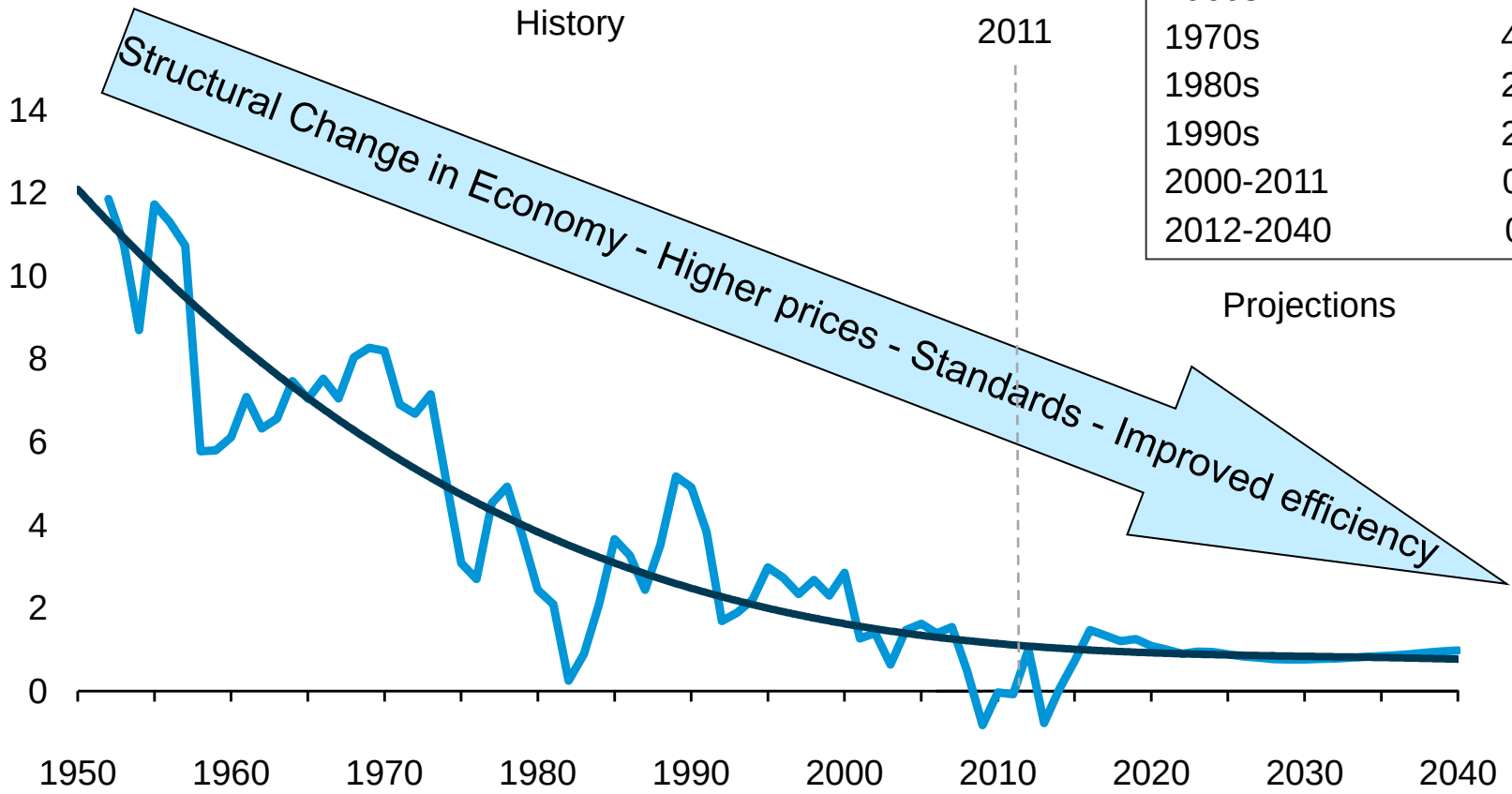
Source: EIA, Annual Energy Outlook 2013

Electricity

Growth in electricity use slows, but still increases by 28% from 2012 to 2040

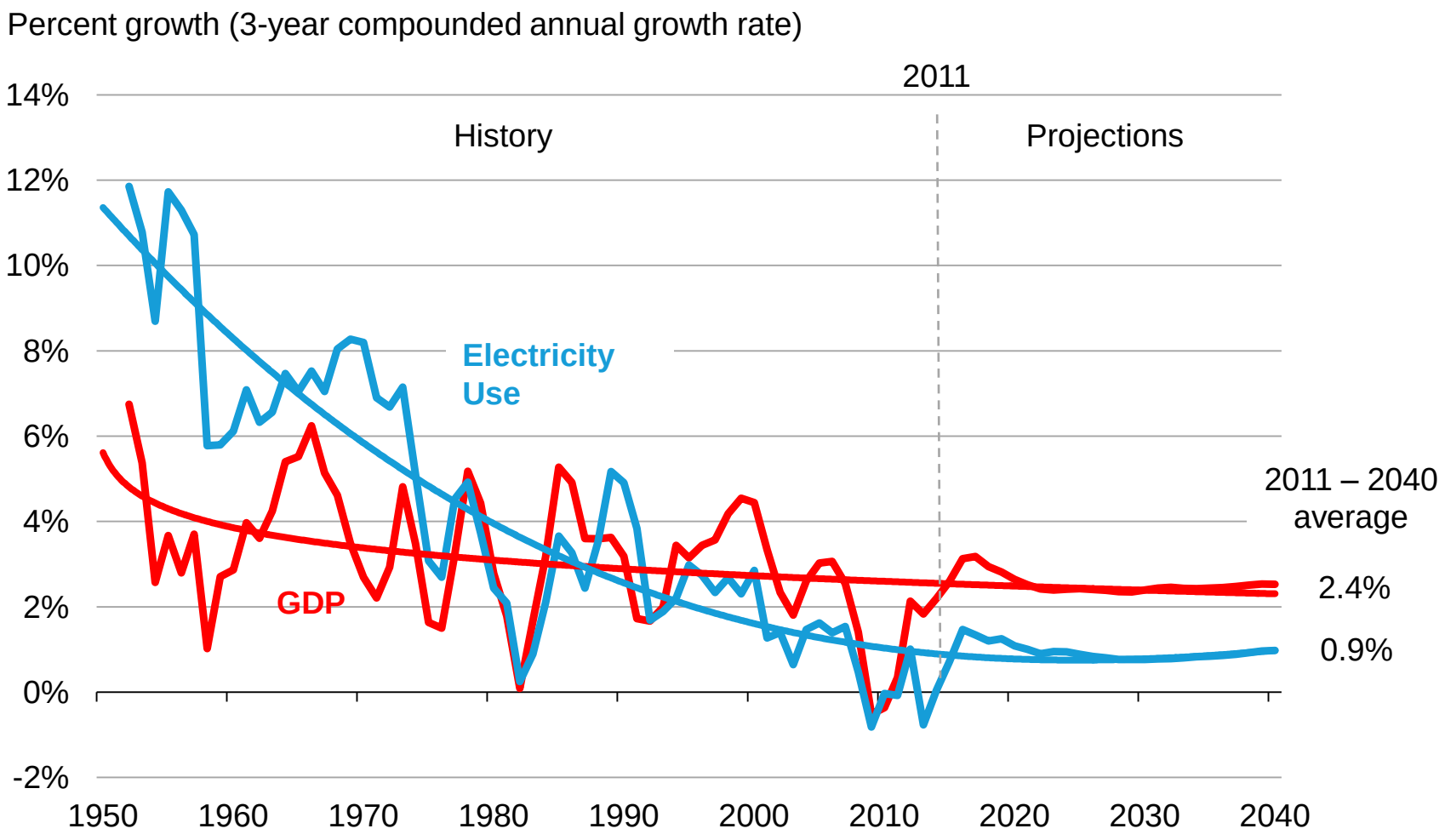
U.S. electricity use
percent growth (3-year rolling average)

Period	Annual Growth
1950s	9.8
1960s	7.3
1970s	4.7
1980s	2.9
1990s	2.4
2000-2011	0.9
2012-2040	0.9



Source: EIA, Annual Energy Outlook 2013

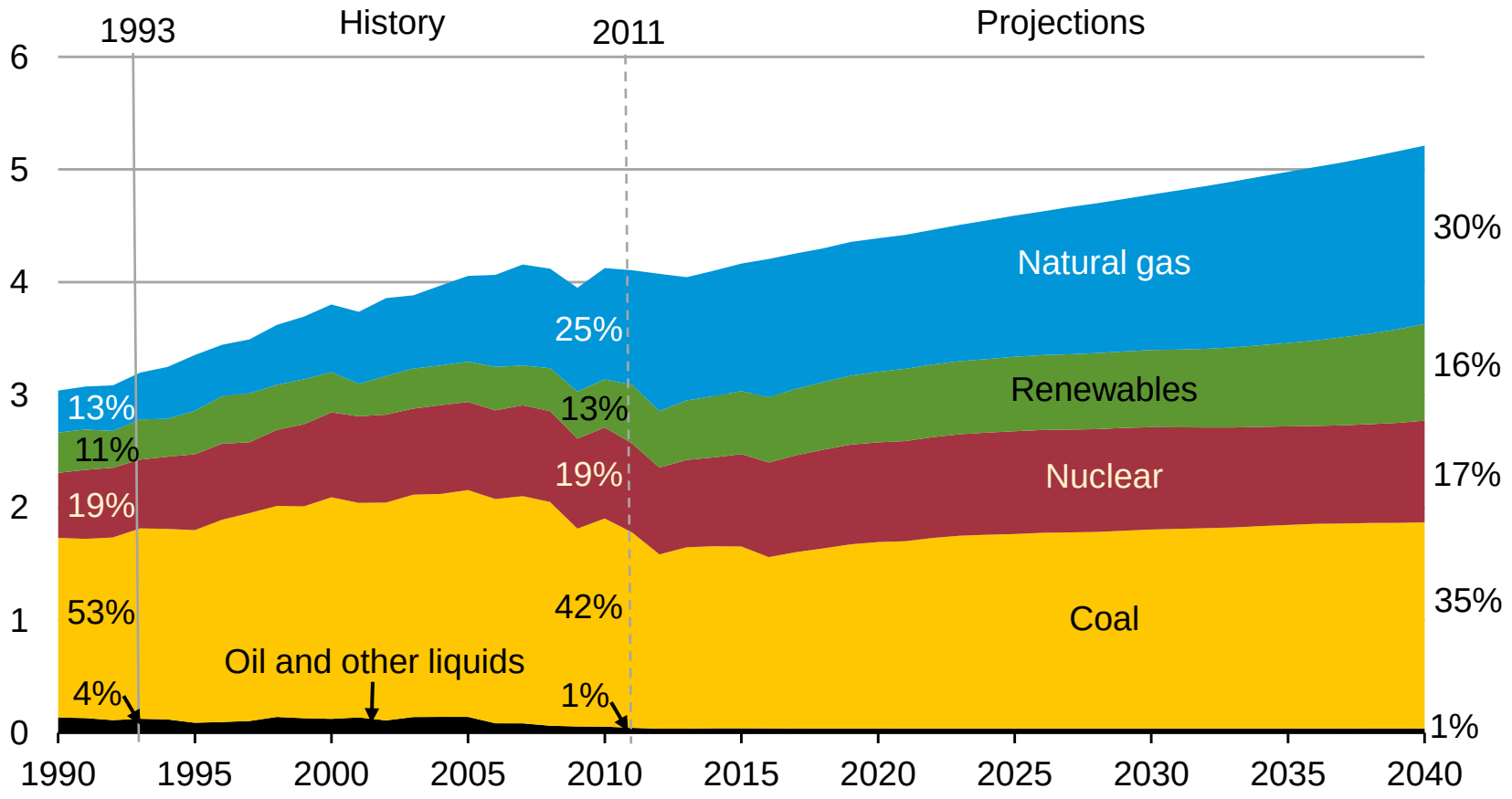
U. S. electricity use and economic growth, 1950-2040



Source: EIA, Annual Energy Outlook 2013

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

U.S. electricity net generation
trillion kilowatthours



Source: EIA, Annual Energy Outlook 2013

Alternative cases explore key uncertainties

Why ~~might~~ ~~could~~ will we be wrong?

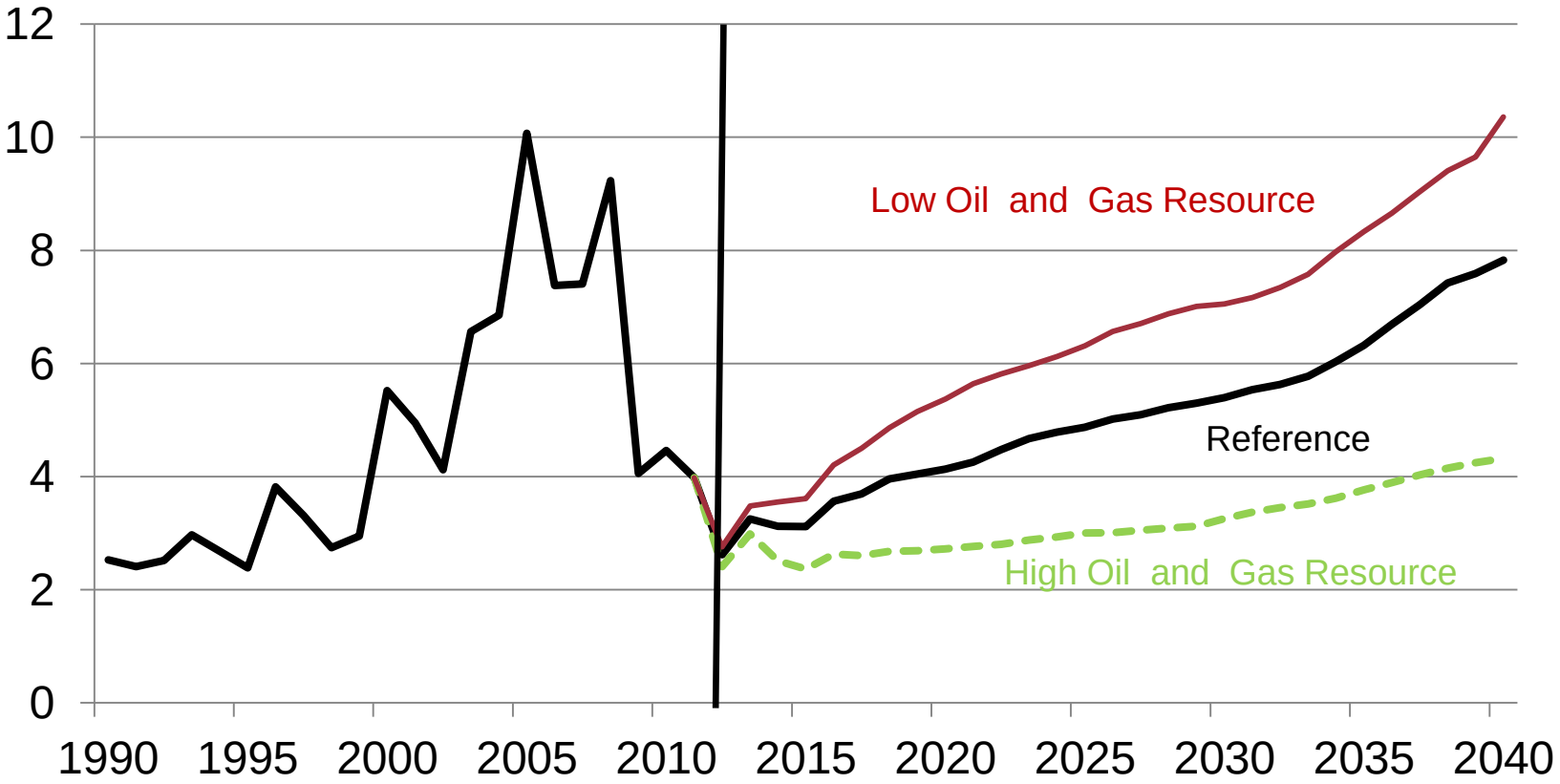
- Different relative fuel prices
- Faster / slower demand growth
- Changing policies and regulations
- Changing consumer preferences
- Faster / slower technological progress
- Technological breakthroughs

Some key alternative cases and how they impact energy related CO_2 emissions

- High and low economic growth cases
- High and low oil/gas resource cases
- High and low coal cost cases
- High and low nuclear cases
- High and low renewables cases
- No sunset and extended policies cases
- GHG fee cases
- High net imports and Low/no net imports cases

Annual average henry hub spot prices for natural gas in alternative cases

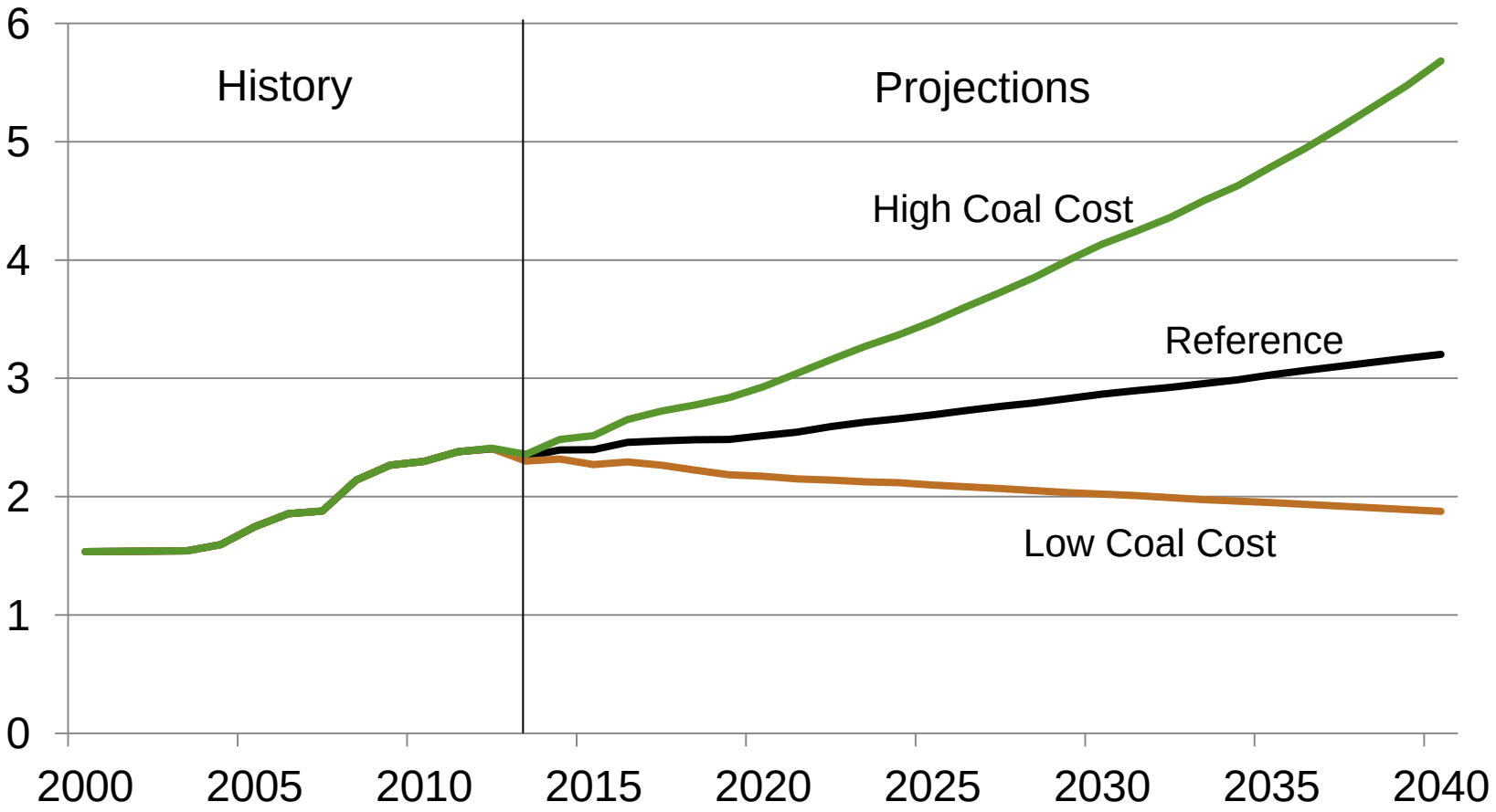
2011 dollars per million btu



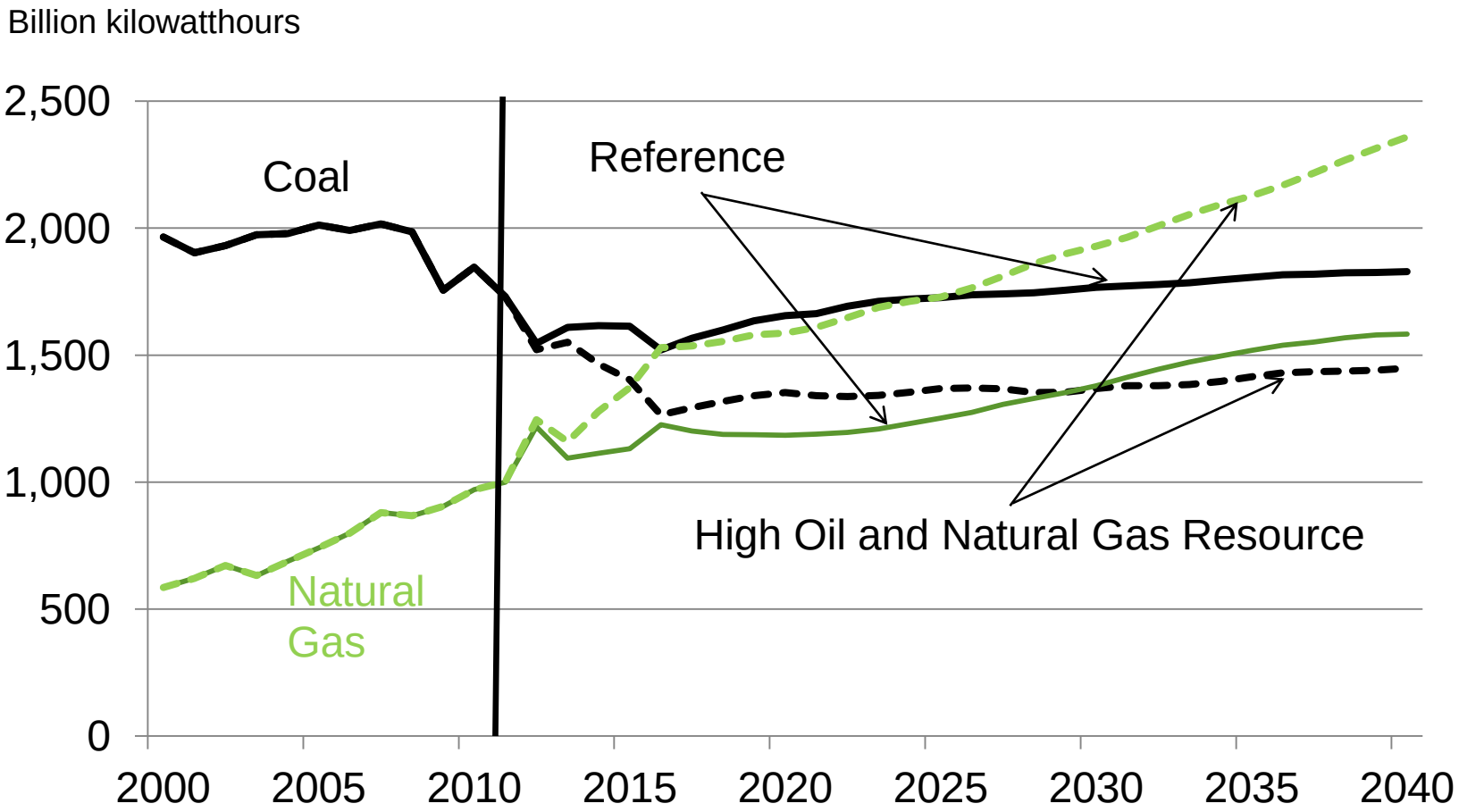
Source: EIA, Annual Energy Outlook 2013

Annual average coal prices to power plants in alternative cases

2011 dollars per million Btu



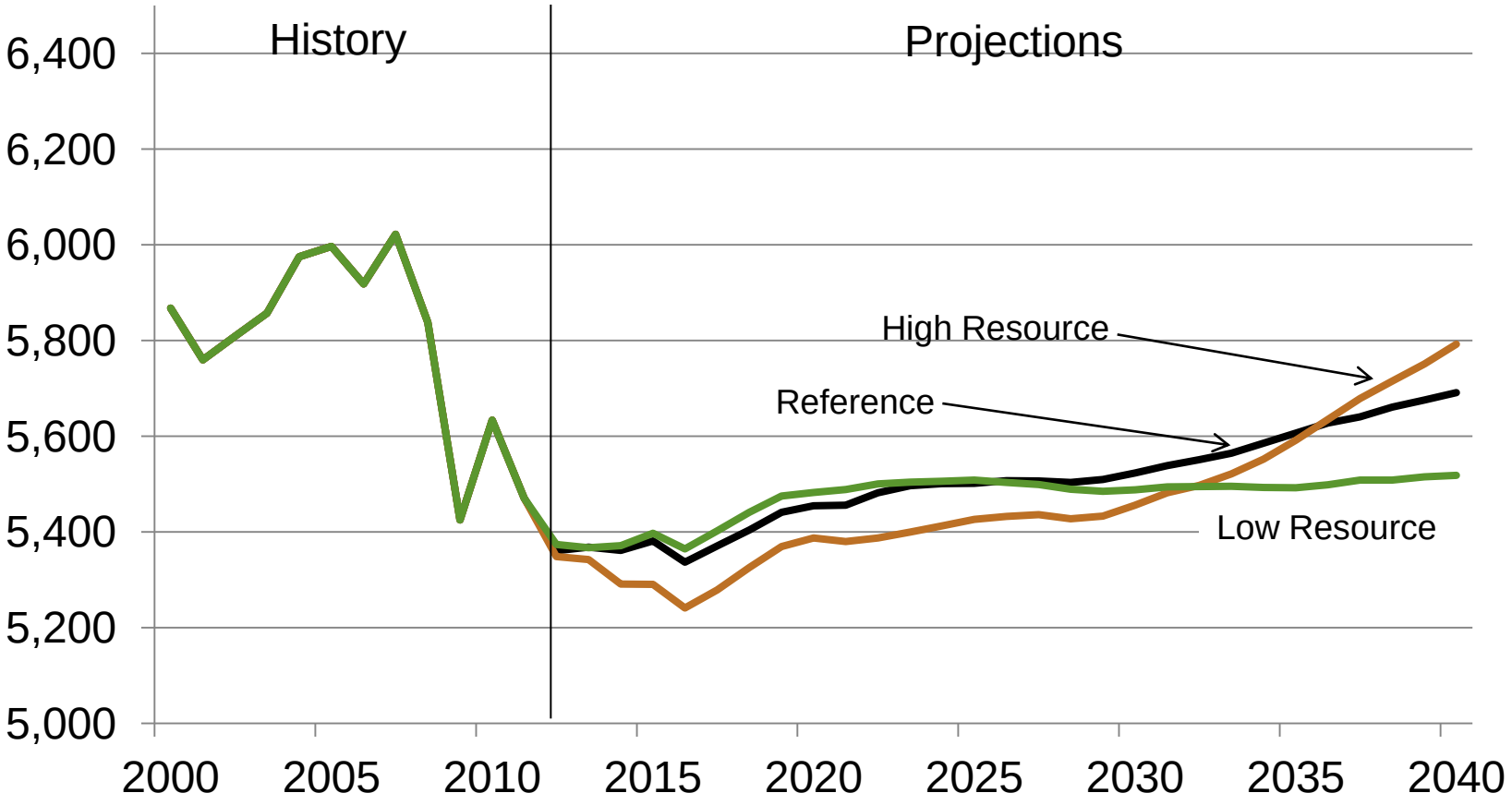
With lower natural gas prices in the High Oil and Gas resource case, coal is permanently displaced as the leading generation source in the near future



Source: EIA, Annual Energy Outlook 2013

Energy-Related CO_2 Emissions with Alternative Oil and Natural Gas Resource Estimates

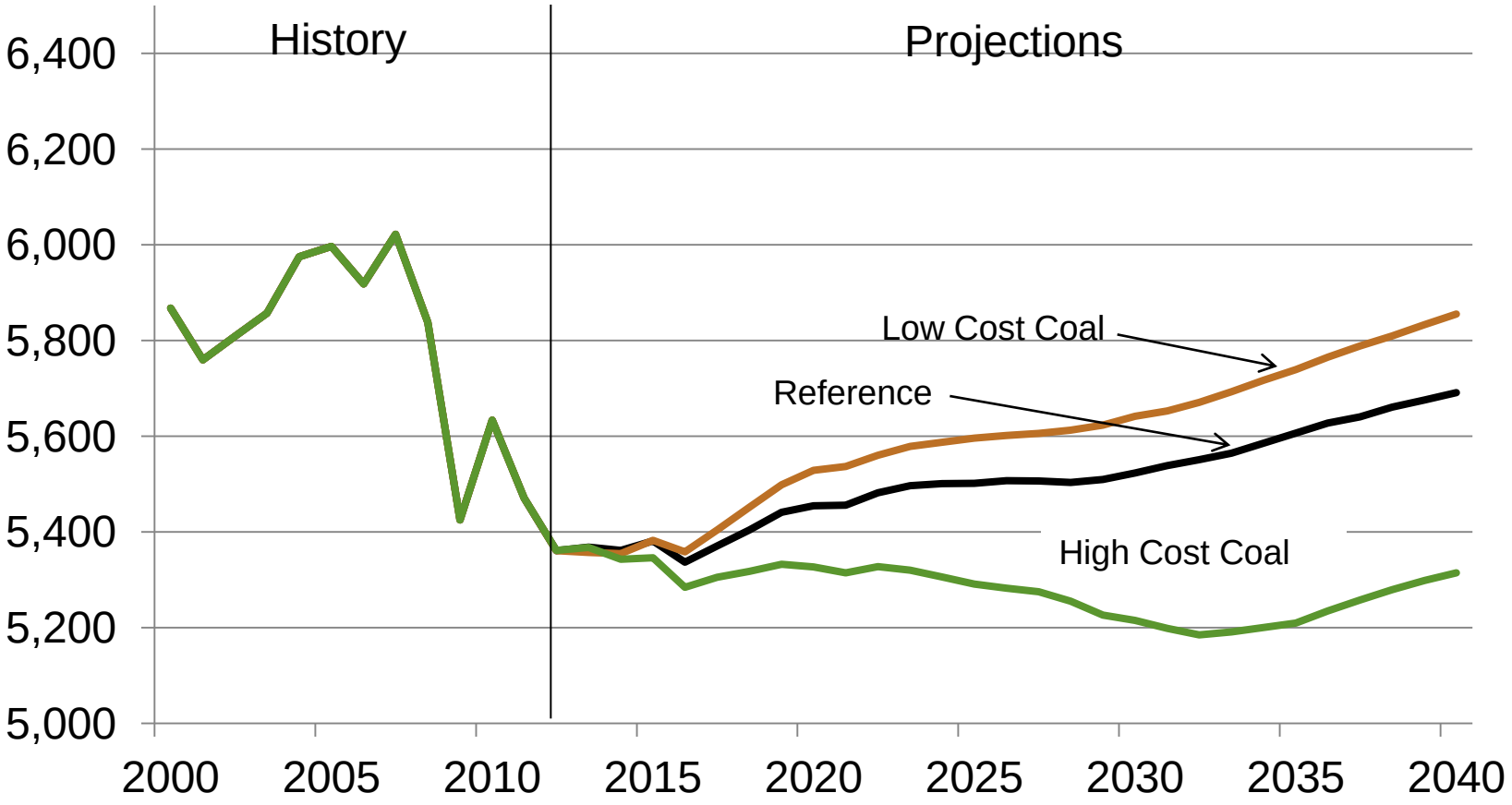
Million metric tons CO_2 equivalent



Source: EIA, Annual Energy Outlook 2013

Energy-Related CO_2 Emissions with Alternative Coal Prices

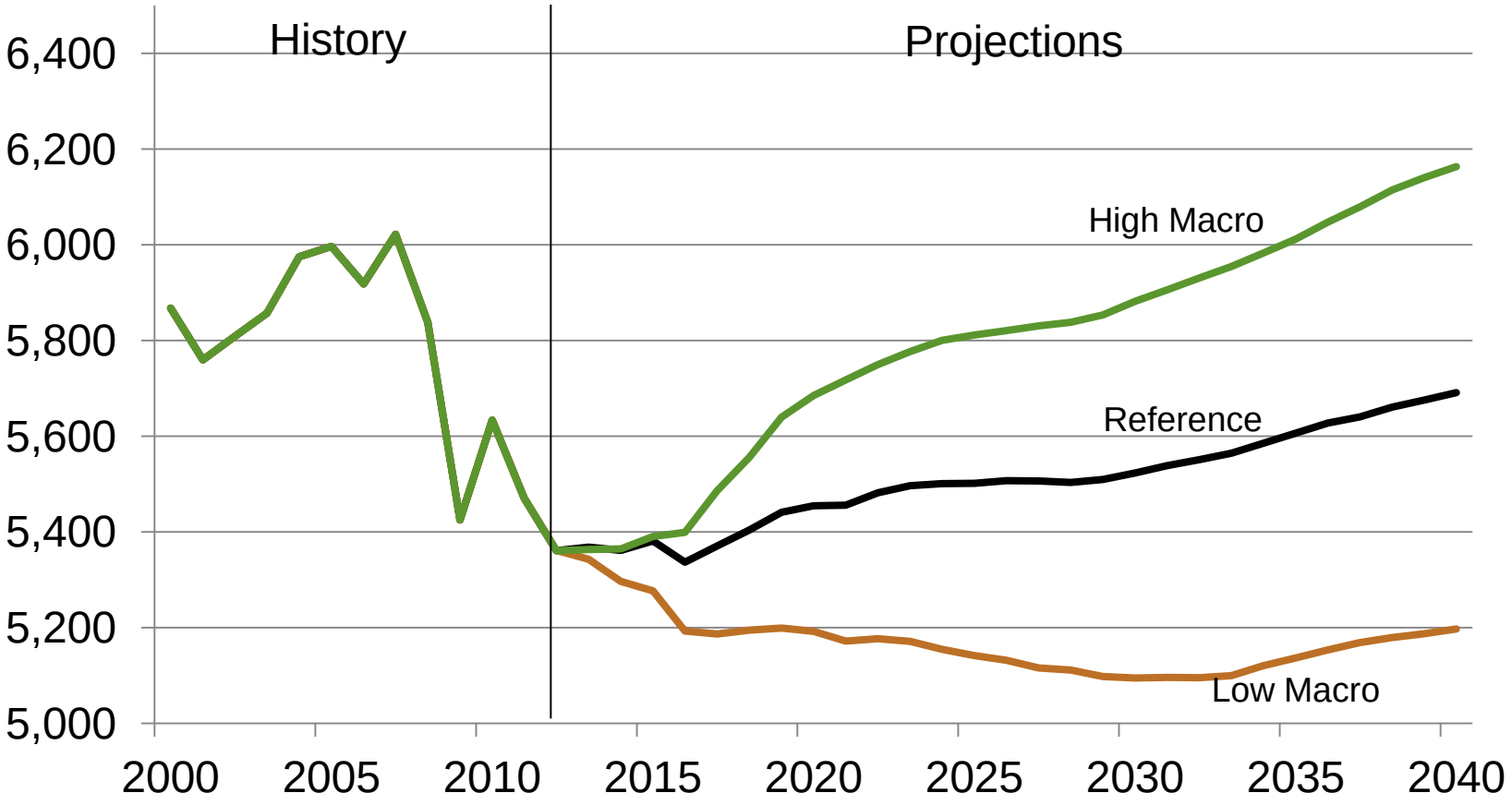
Million metric tons CO_2 equivalent



Source: EIA, Annual Energy Outlook 2013

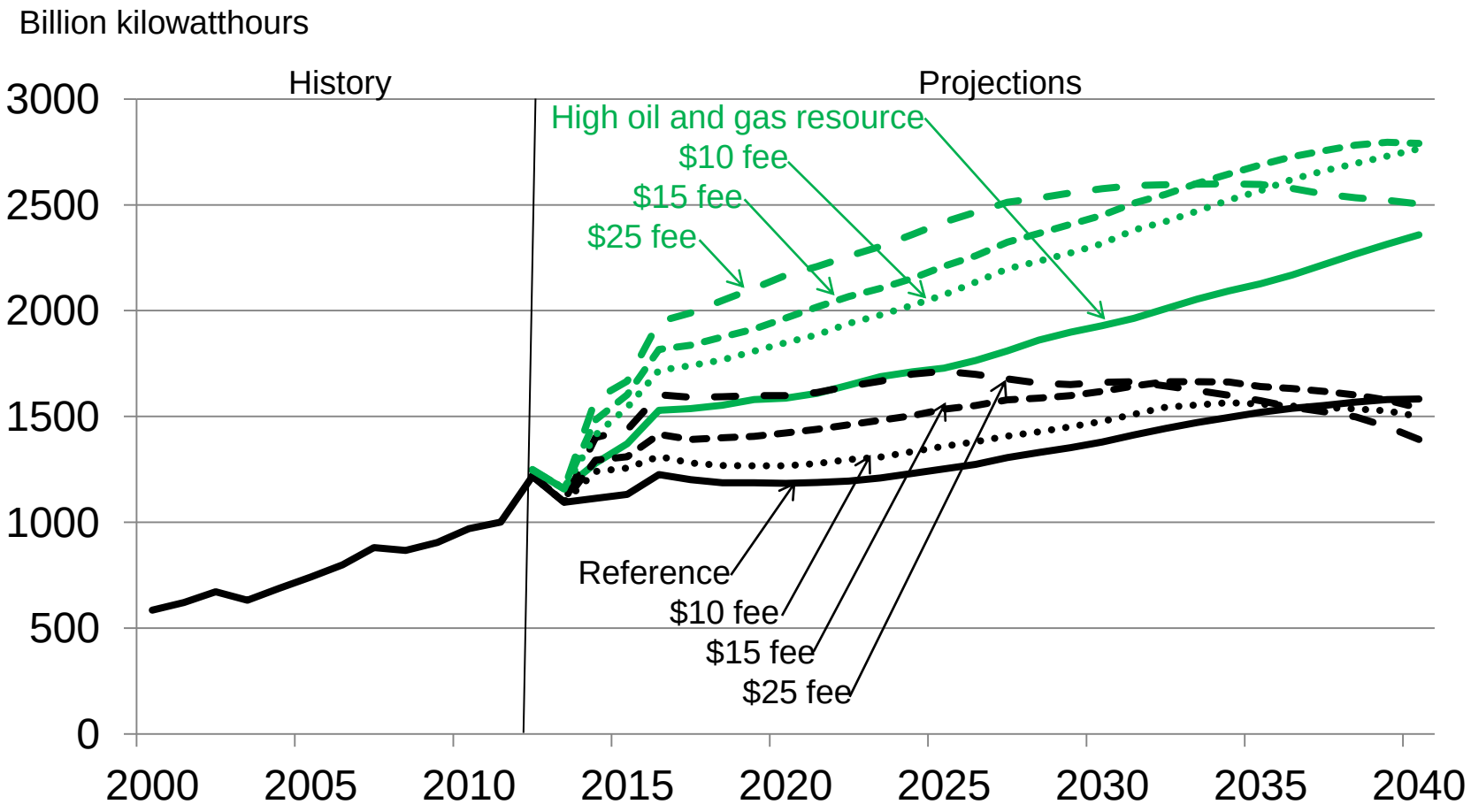
Economic Growth Path and Energy-Related CO_2 Emissions

Million metric tons CO_2 equivalent



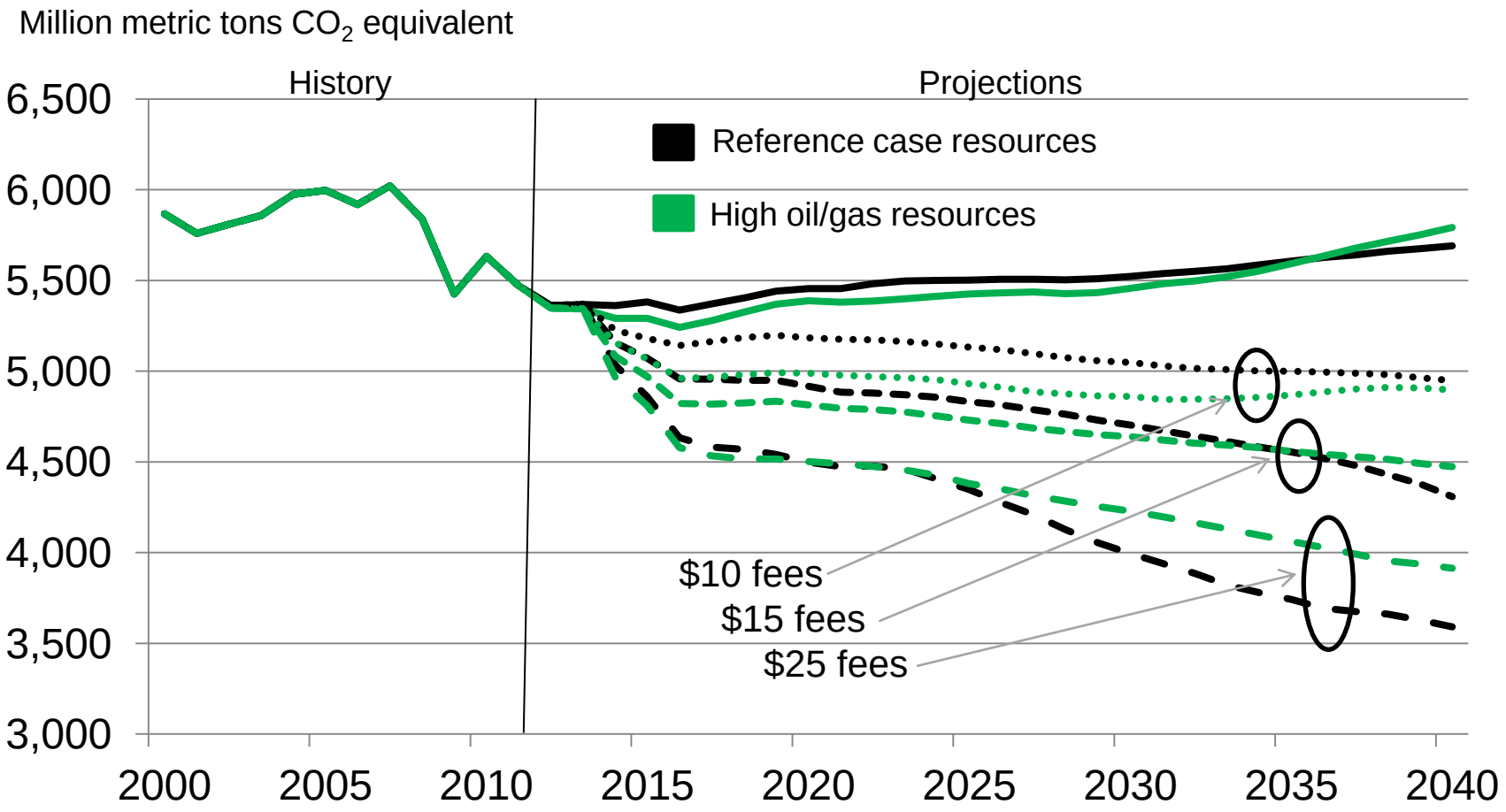
Source: EIA, Annual Energy Outlook 2013

Role of natural gas electricity generation in reducing energy-related CO_2 emissions



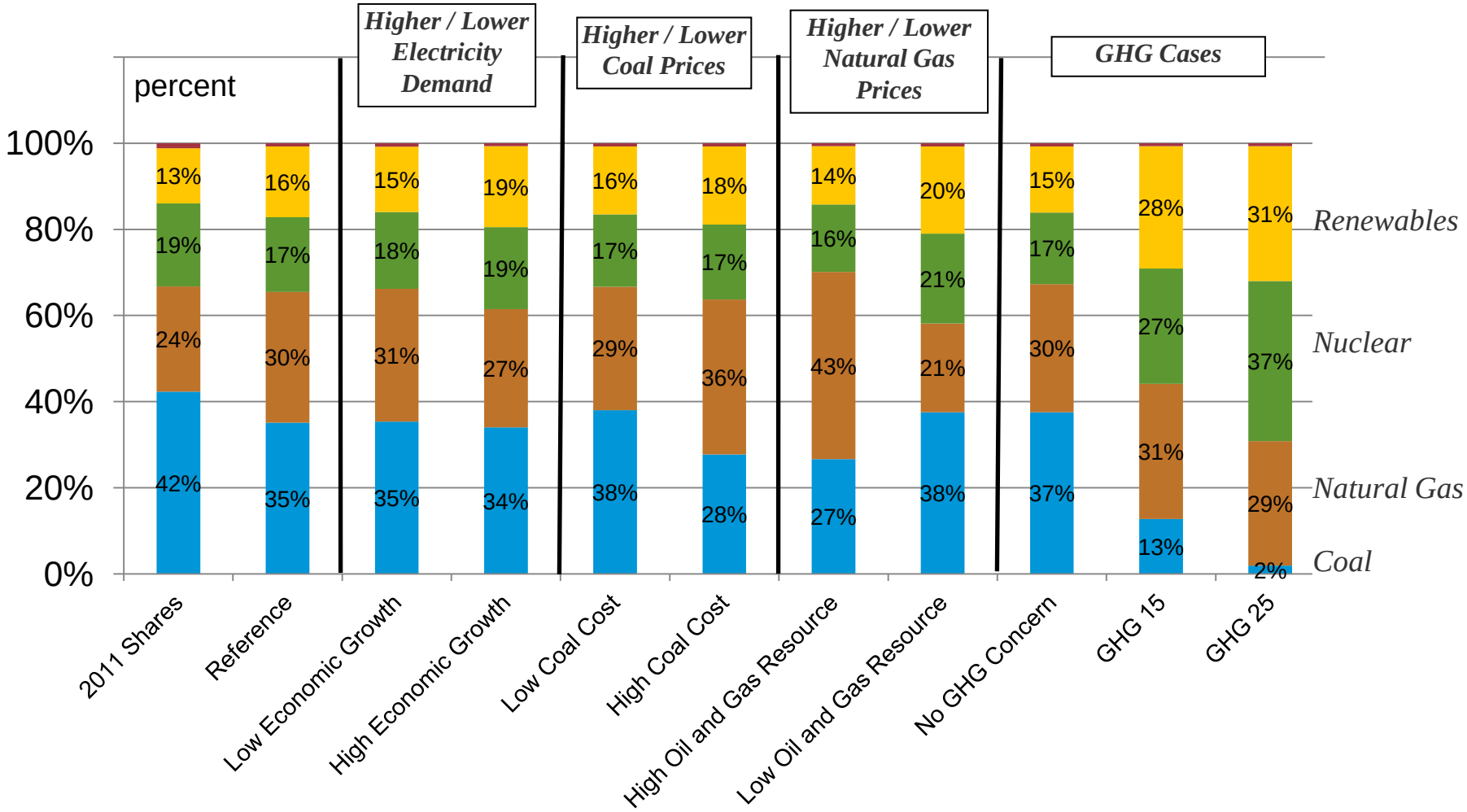
Source: EIA, Annual Energy Outlook 2013

Role of natural gas in reducing total energy-related CO_2 emissions



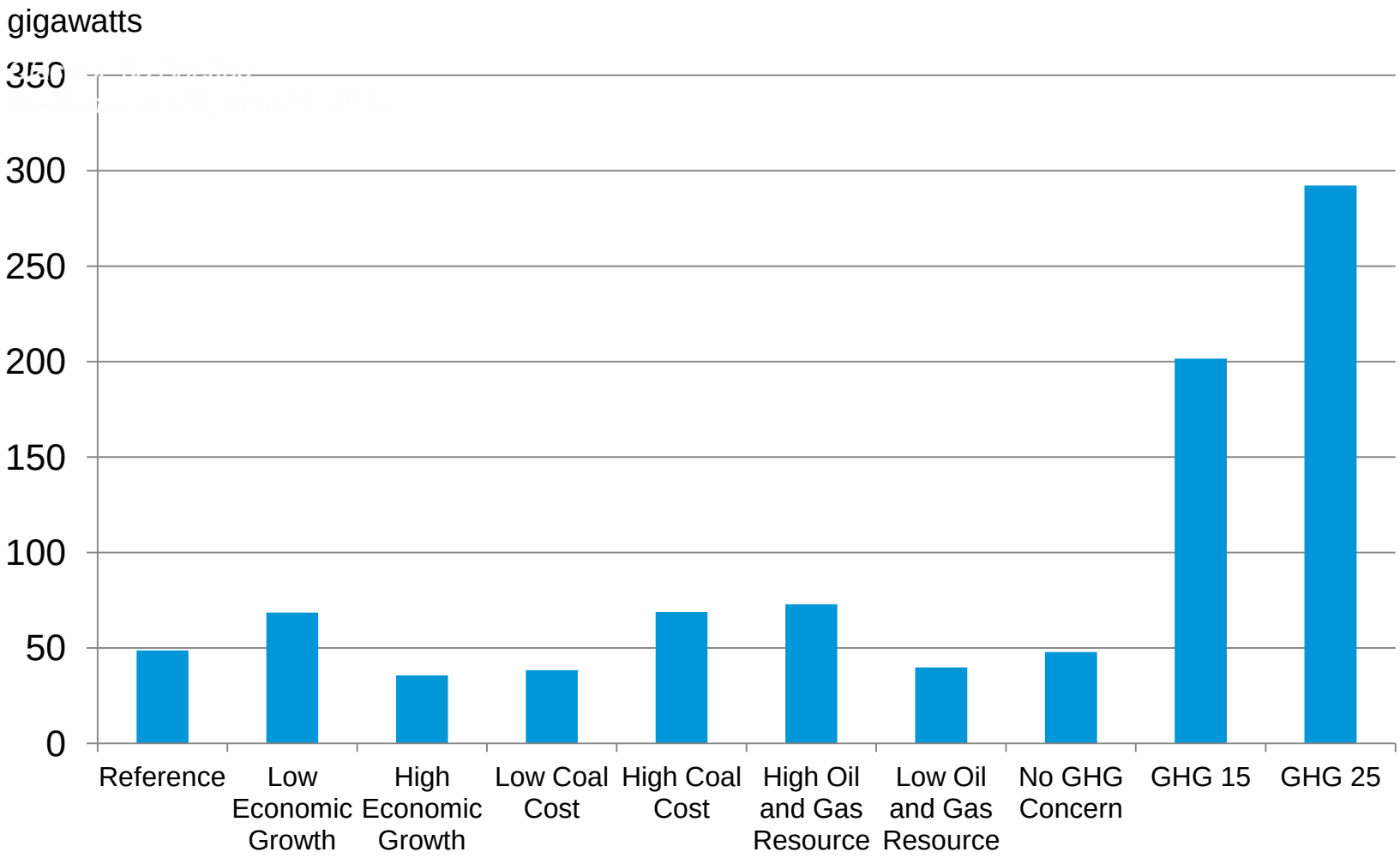
Source: EIA, Annual Energy Outlook 2013

Projected electricity generation shares of different fuels are sensitive to fuel prices and policy developments



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2013,* National Energy Modeling System runs REF2013.D102312A, LOWMACRO.D110912A, HIGHMACRO.D110912A, LCCST13.D112112A HCCST13.D112112A, HIGHRESOURCE.D021413A, LOWRESOURCE.D012813A, NOGHGCONCERN.D110912A, CO2FEE15.D021413A, and CO2FEE25.D021413A.

Cumulative coal-fired capacity retirements, 2012-2040



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2013,* National Energy Modeling System runs REF2013.D102312A, LOWMACRO.D110912A, HIGHMACRO.D110912A, LCCST13.D112112A HCCST13.D112112A, HIGHRESOURCE.D021413A, LOWRESOURCE.D012813A, NOGHGCONCERN.D110912A, CO2FEE15.D021413A, and CO2FEE25.D021413A.

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Key differences between alternate cases

	AEO2013 Reference	Low Economic Growth	High Economic Growth	Low Coal Cost	High Coal Cost	High Oil and Gas Resource	Low Oil and Gas Resource	GHG15 (CO2 fee of $15 in 2014 increasing to $53 in 2040)	GHG25 (CO2 fee of $25 in 2014 increasing to $89 in 2040)
GDP growth (avg. annual change from 2011)	2.5%	1.9%	2.9%						
Electricity demand (avg. annual change from 2011)	0.9%	0.6%	1.2%						
Delivered natural gas price to the electricity sector, 2040 (2011 dollars per million Btu)	$8.38					$5.13	$10.55	$11.01	$11.10
Delivered coal price to the electricity sector , 2040 (2011 dollars per million Btu)	$3.20			$1.88	$5.68			$7.71	$9.45
Minemouth coal price, 2040 (2011 dollars per short ton)	$61.28			$33.90	$128.09				
Western coal transportation rates (percent change from 2011, constant dollar basis)	0.0%			-24%	27%				
Coal mining productivity (avg. annual change from 2011)	-1.4%			0.9%	-4.3%				
Coal with CCS in power sector, 2040 (gigawatts)	0.9							2.6	3.9
NGCC with CCS in power sector, 2040 (gigawatts)	0.0							5.8	49.9