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# *Annual Energy Outlook 2010*

## Reference Case

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**The Paul H. Nitze School of Advanced International Studies**  
**December 14, 2009**  
**Washington, DC**

**Richard Newell, Administrator**



**U.S. Energy Information Administration**  
Independent Statistics and Analysis

# How does the *AEO2010* reference case handle public policy and technology?

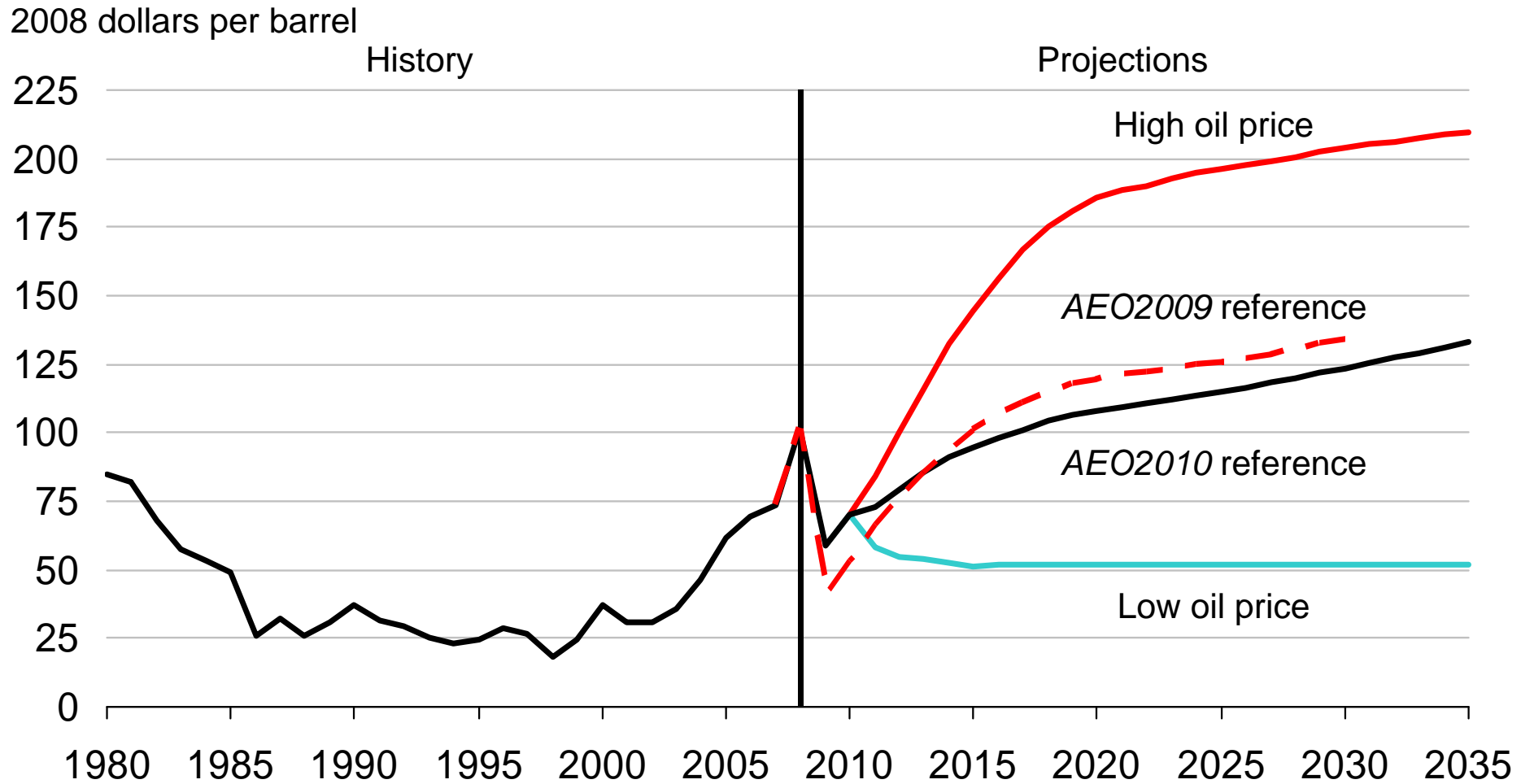
- Generally assumes current laws and regulations
  - provisions sunset if specified (e.g., renewable tax credits expire)
  - excludes potential future laws and regulations (e.g., proposed greenhouse gas legislation is not included)
  - some grey areas
    - adopts proposed regulations that are not yet final, in order to inform the likely implementation of a statute
    - adds a premium to the capital cost of CO<sub>2</sub>-intensive technologies to reflect market behavior regarding possible CO<sub>2</sub> regulation
    - assumes implementation of existing regulations that enable building new energy infrastructure and resource extraction
- Includes technologies that are commercial or reasonably expected to become commercial in the next decade or so
  - includes cost and efficiency improvements from learning, but not revolutionary or breakthrough technologies

## Key updates included in the *AEO2010* reference case

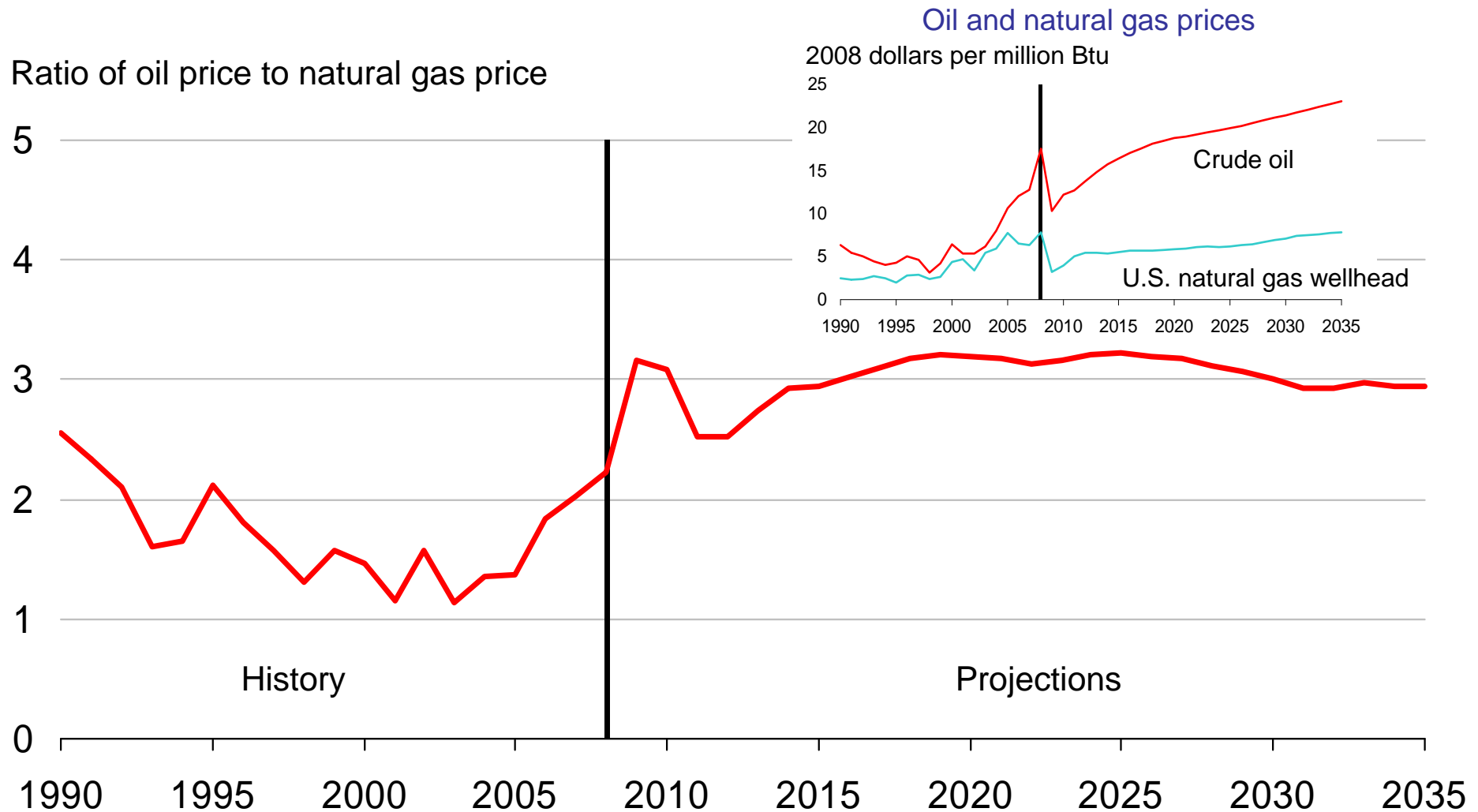
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- Extended projection period to 2035
- Changes in Federal and State laws and regulations
  - revised handling of fuel economy standards to reflect the proposal for light-duty vehicles in model years 2012-2016
  - assumes permission will be granted to extend nuclear power unit operating licenses beyond 60 years; no retirements through 2035
- Revised capital costs for capital-intensive projects
  - overnight costs for nuclear and coal power up 10-20%
- Changes to assumptions about oil and gas resource base
  - updated characterization of natural gas shales, reflecting evolution of shale gas resources and technology
  - new lower-48 onshore oil and gas supply submodule

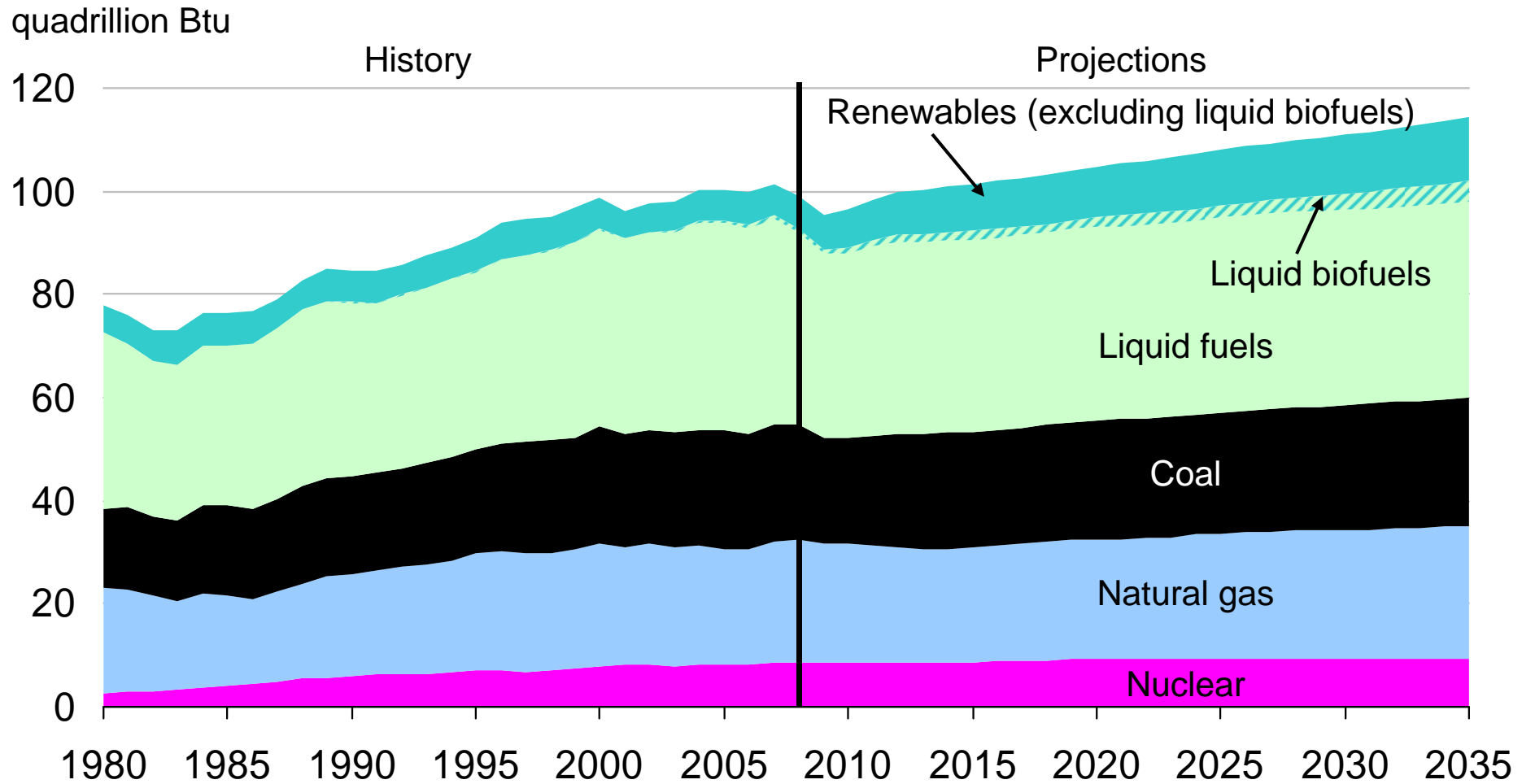
# Oil prices in the reference case rise steadily; the full *AEO2010* will include a wide range of prices



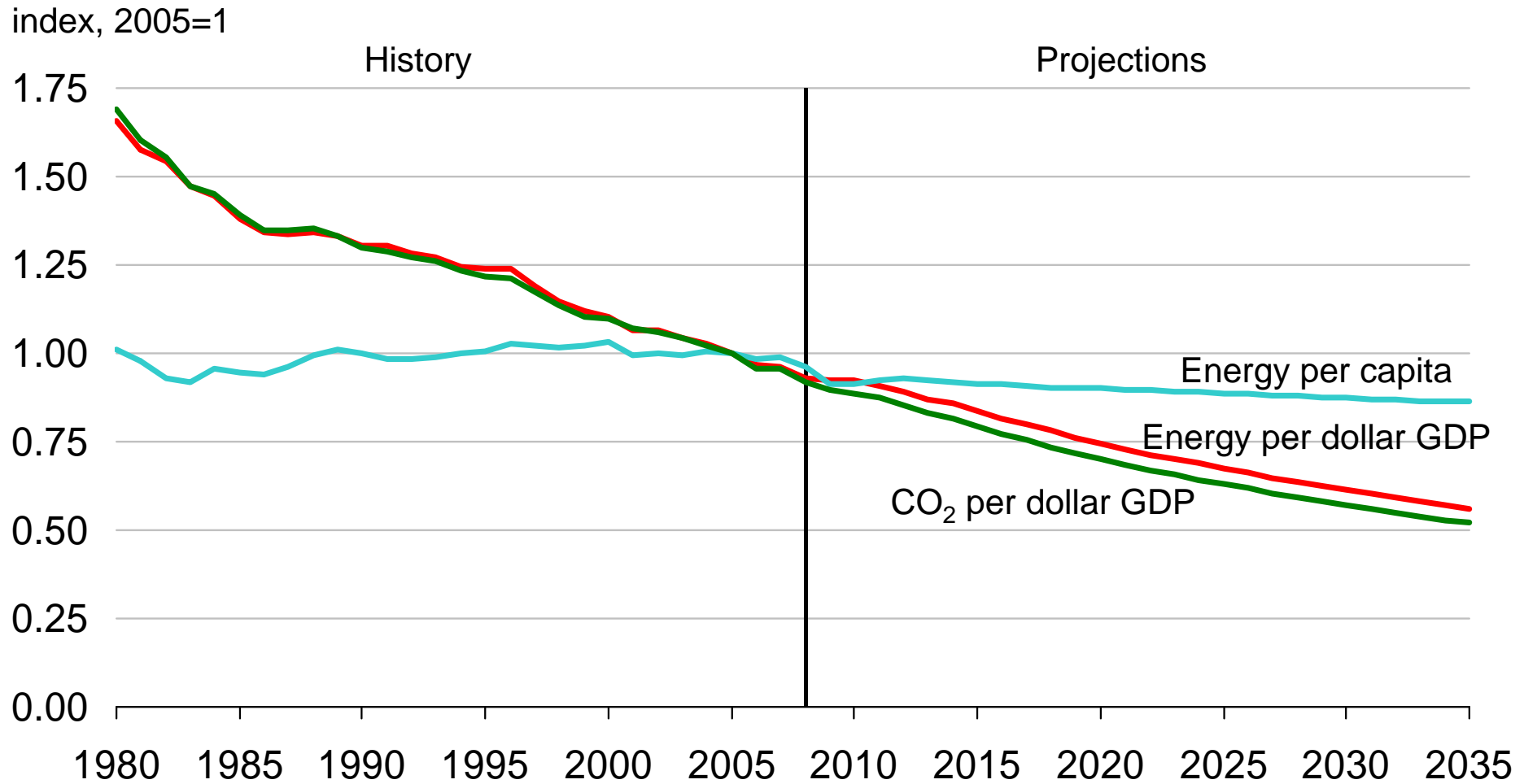
# Oil to natural gas price ratio remains high over the projection



# Non-fossil energy use grows rapidly, but fossil fuels still provide 78 percent of total energy use in 2035

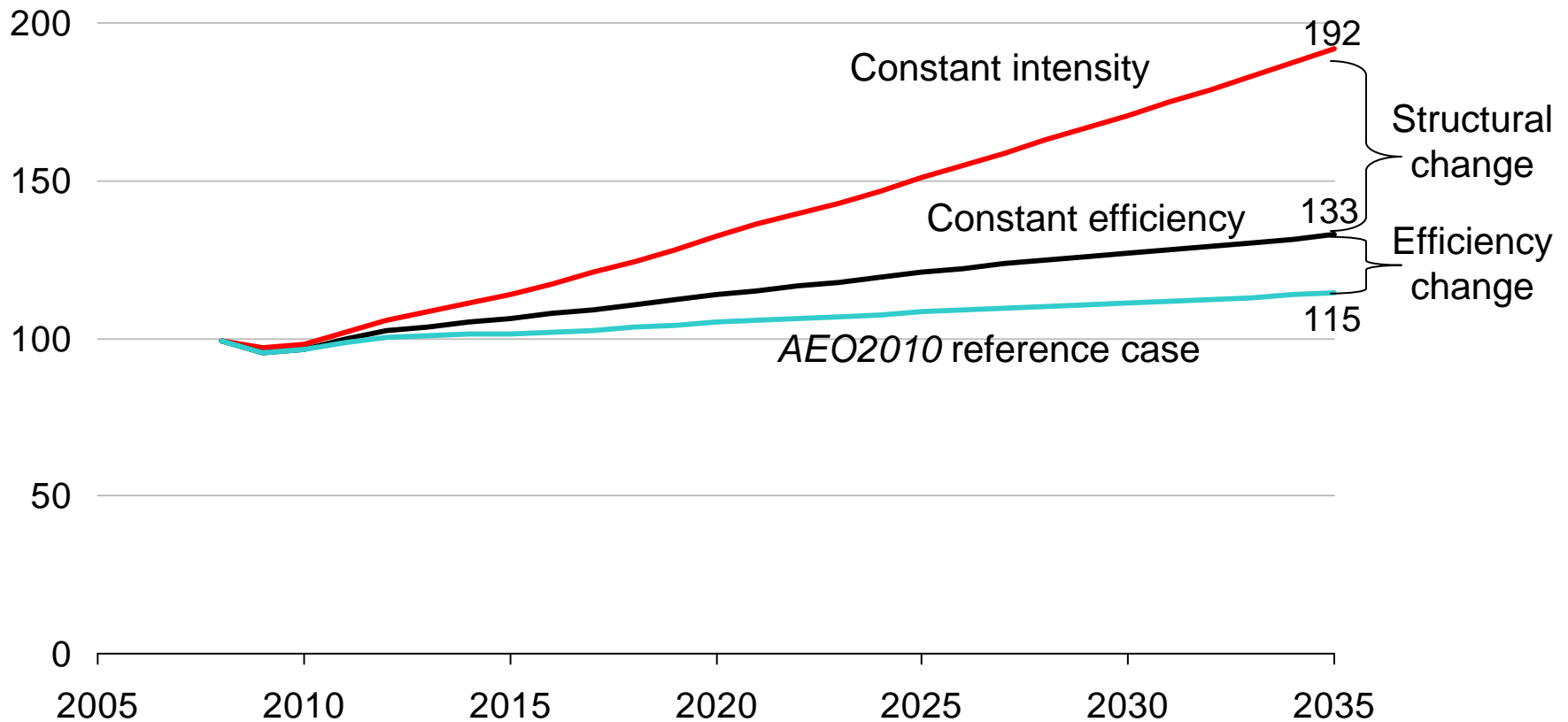


# Energy and CO<sub>2</sub> per dollar GDP continue to decline; per capita energy use also declines



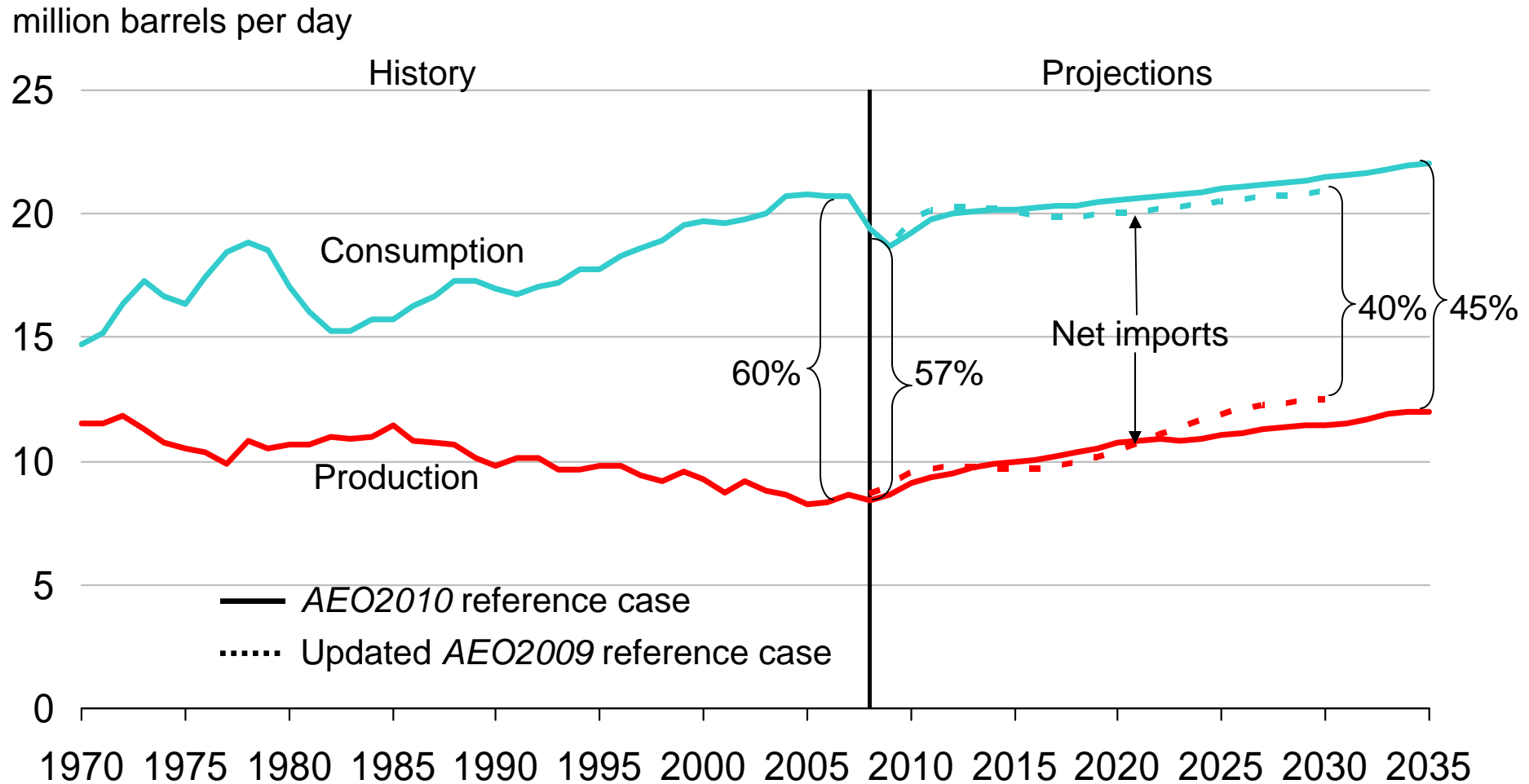
# Energy efficiency gains reduce consumption 15% from where it would otherwise be; structural change is even larger

quadrillion Btu

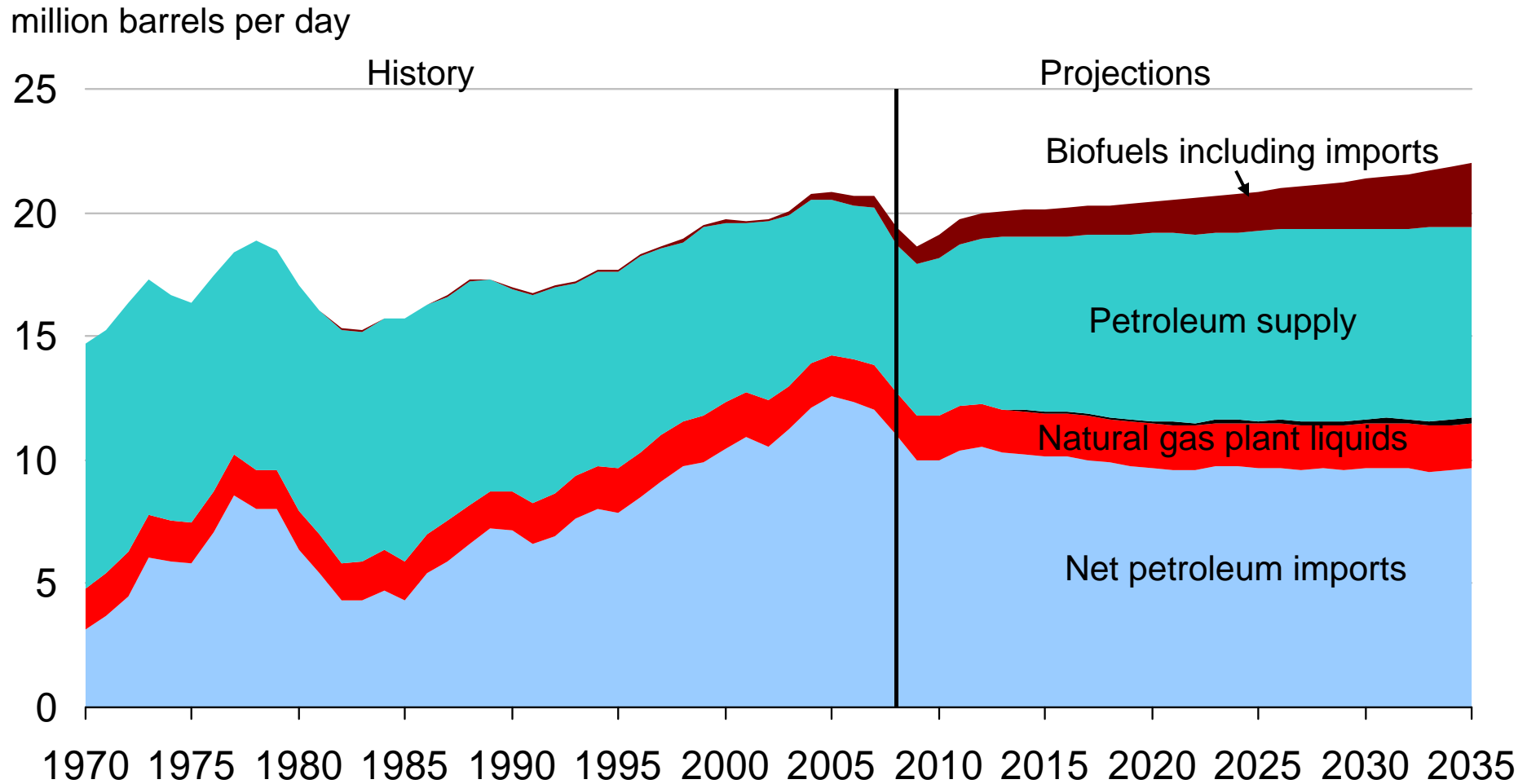




# U.S. reliance on imported liquid fuels is reduced by increased domestic production and greater fuel efficiency

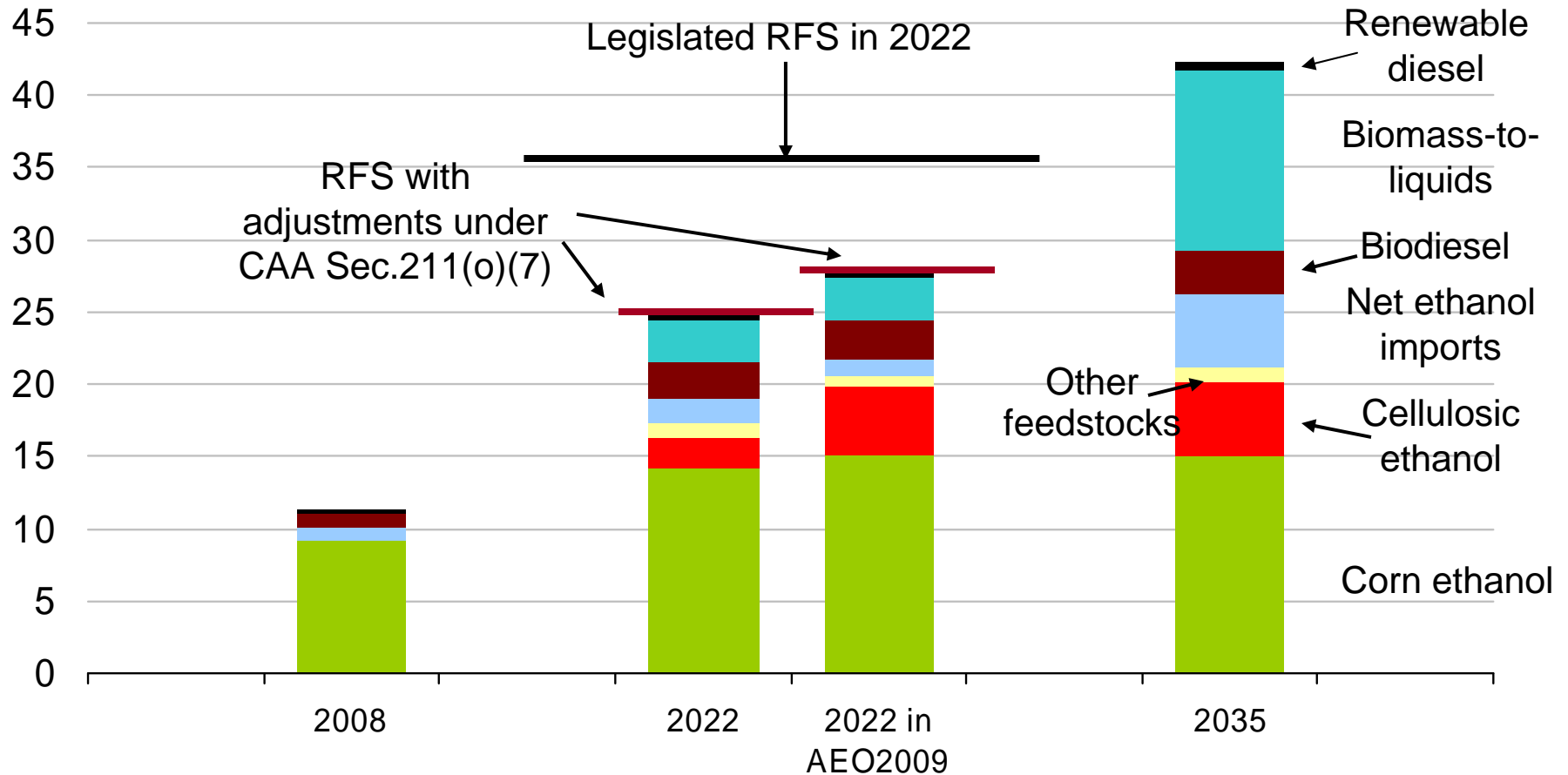


# Biofuels meet most of the growth in liquid fuels supply

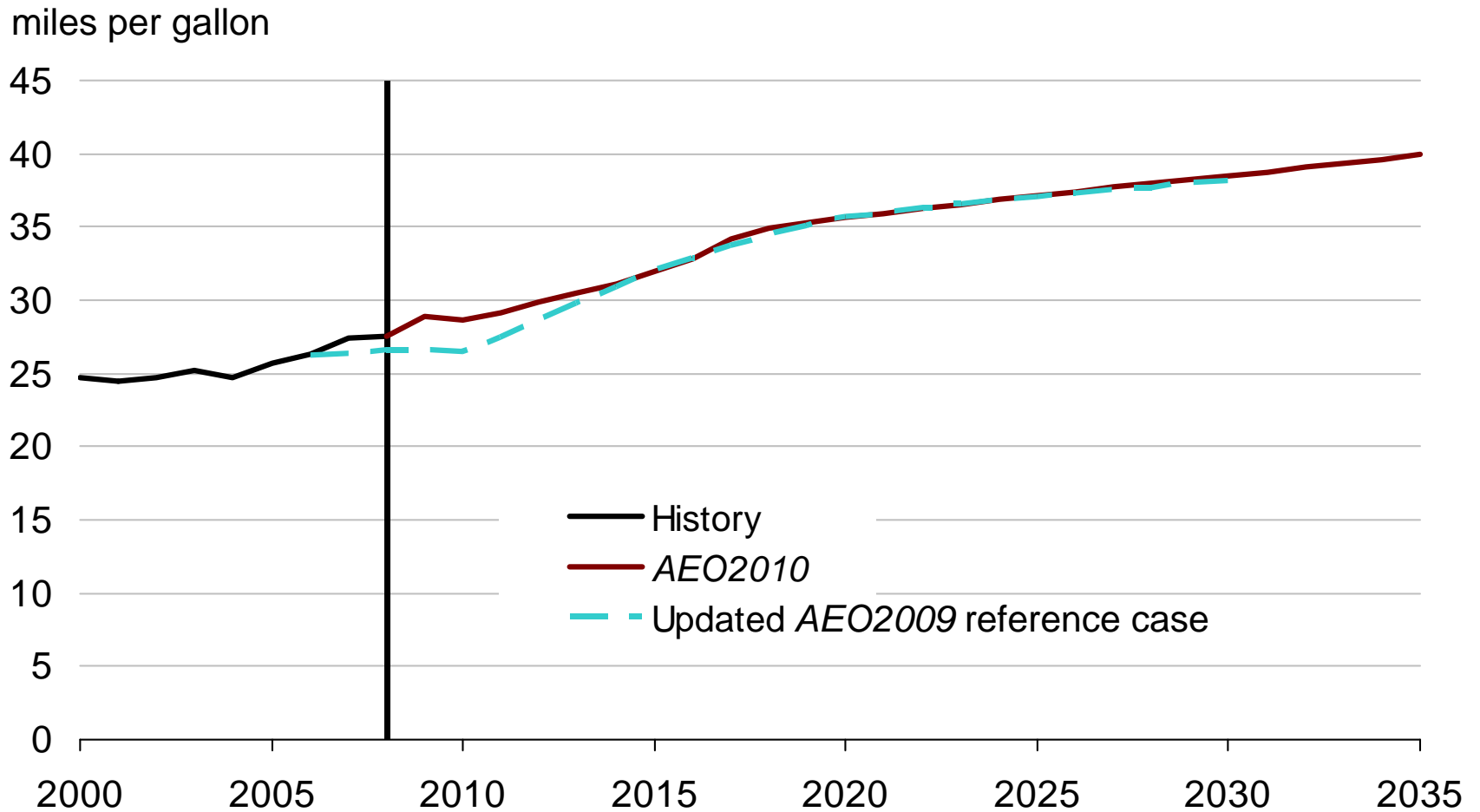


# Biofuels grow, but fall short of the 36 billion gallon RFS target in 2022, exceed it in 2035

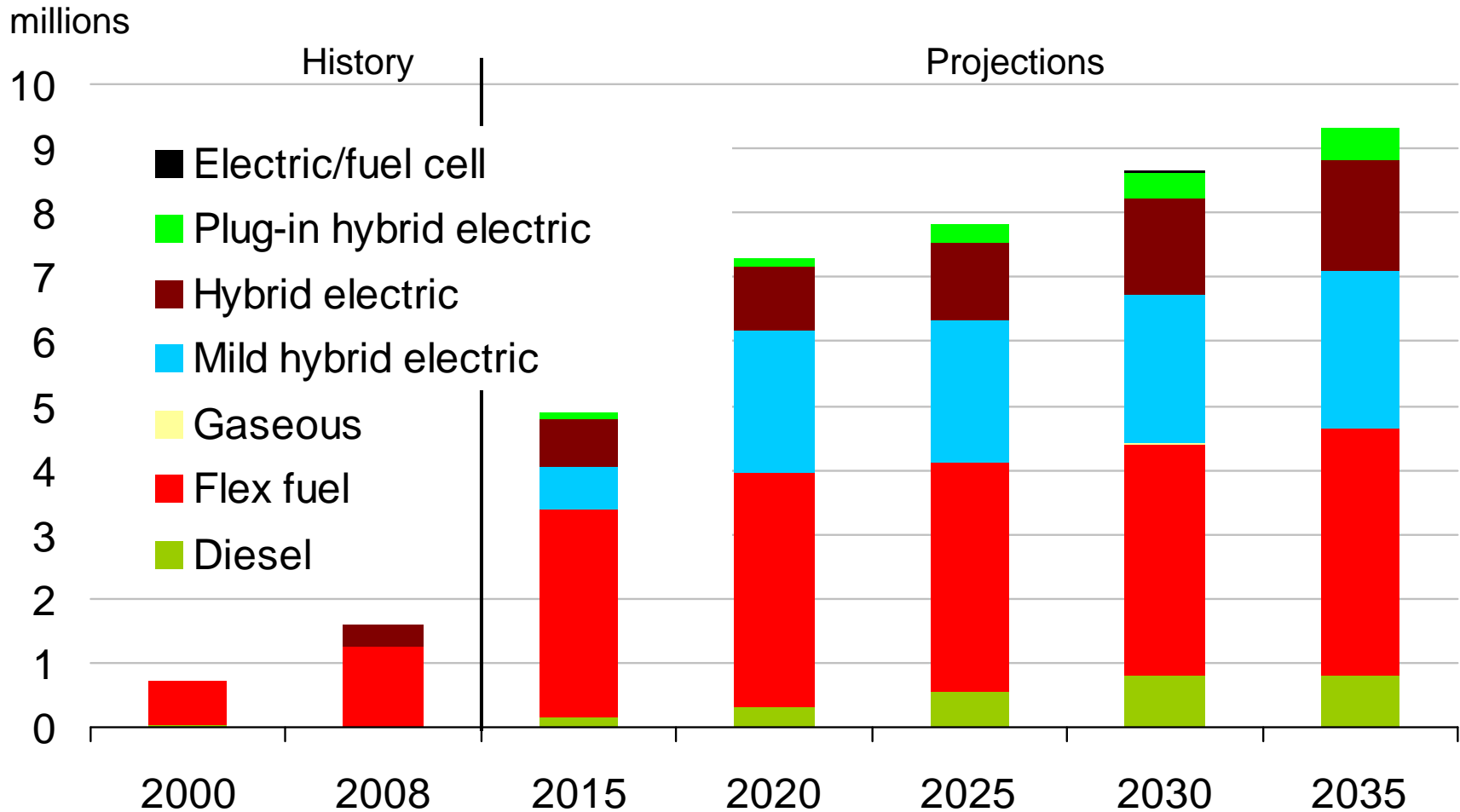
billion gallon-equivalents



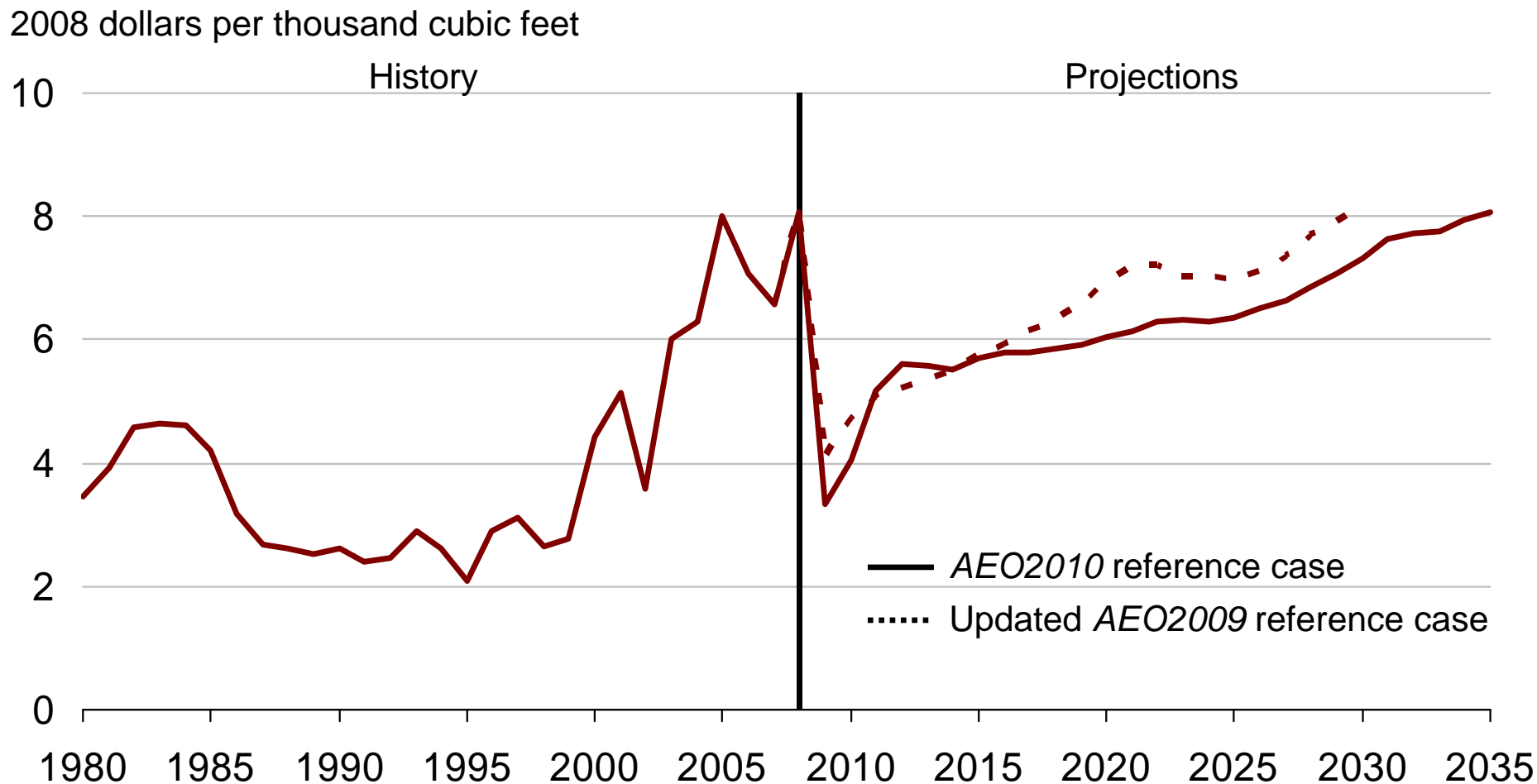
# New light duty vehicle efficiency reaches 40 mpg by 2035



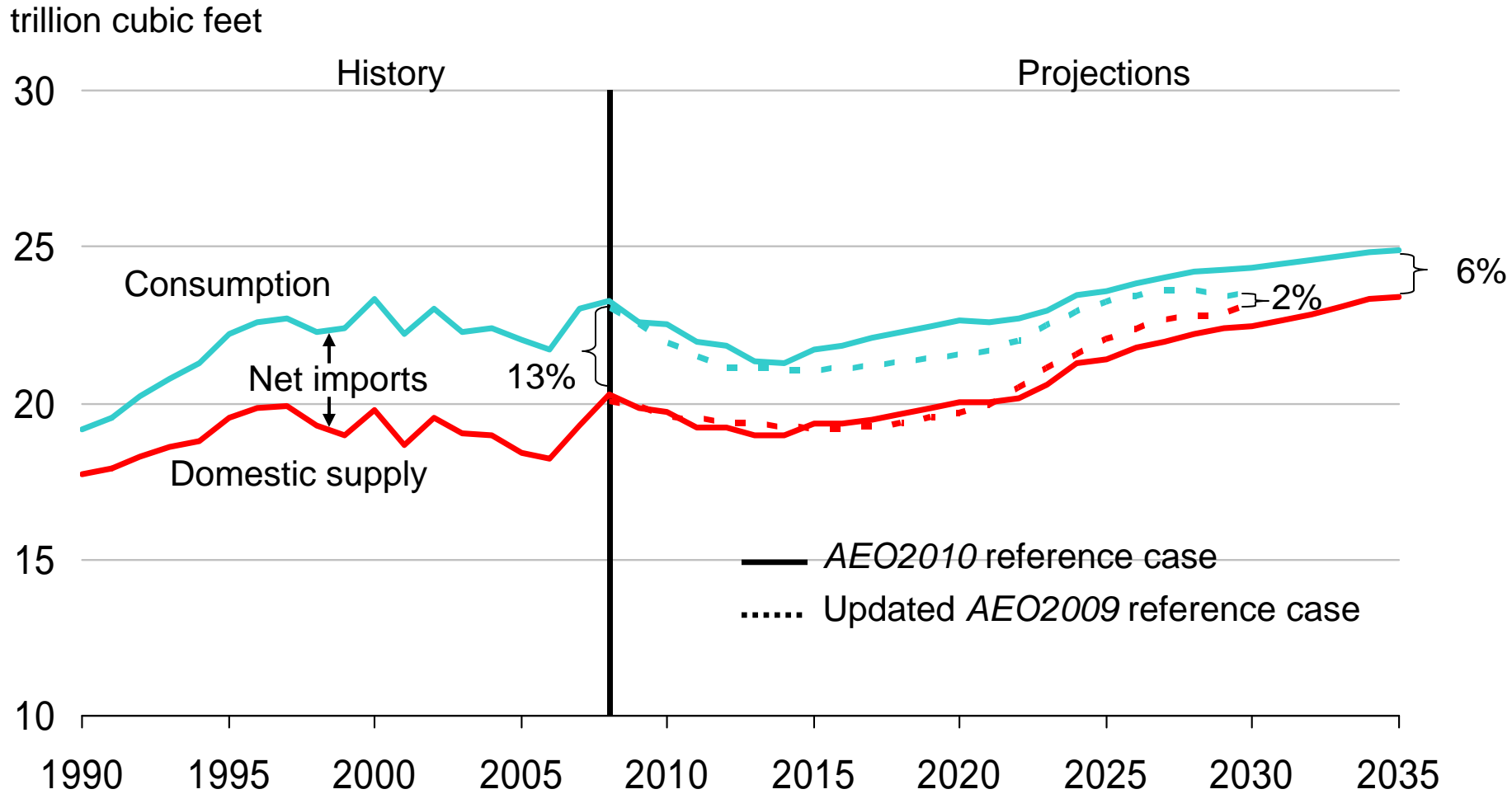
# Mild and full hybrid systems dominate new light-duty vehicle sales by 2035



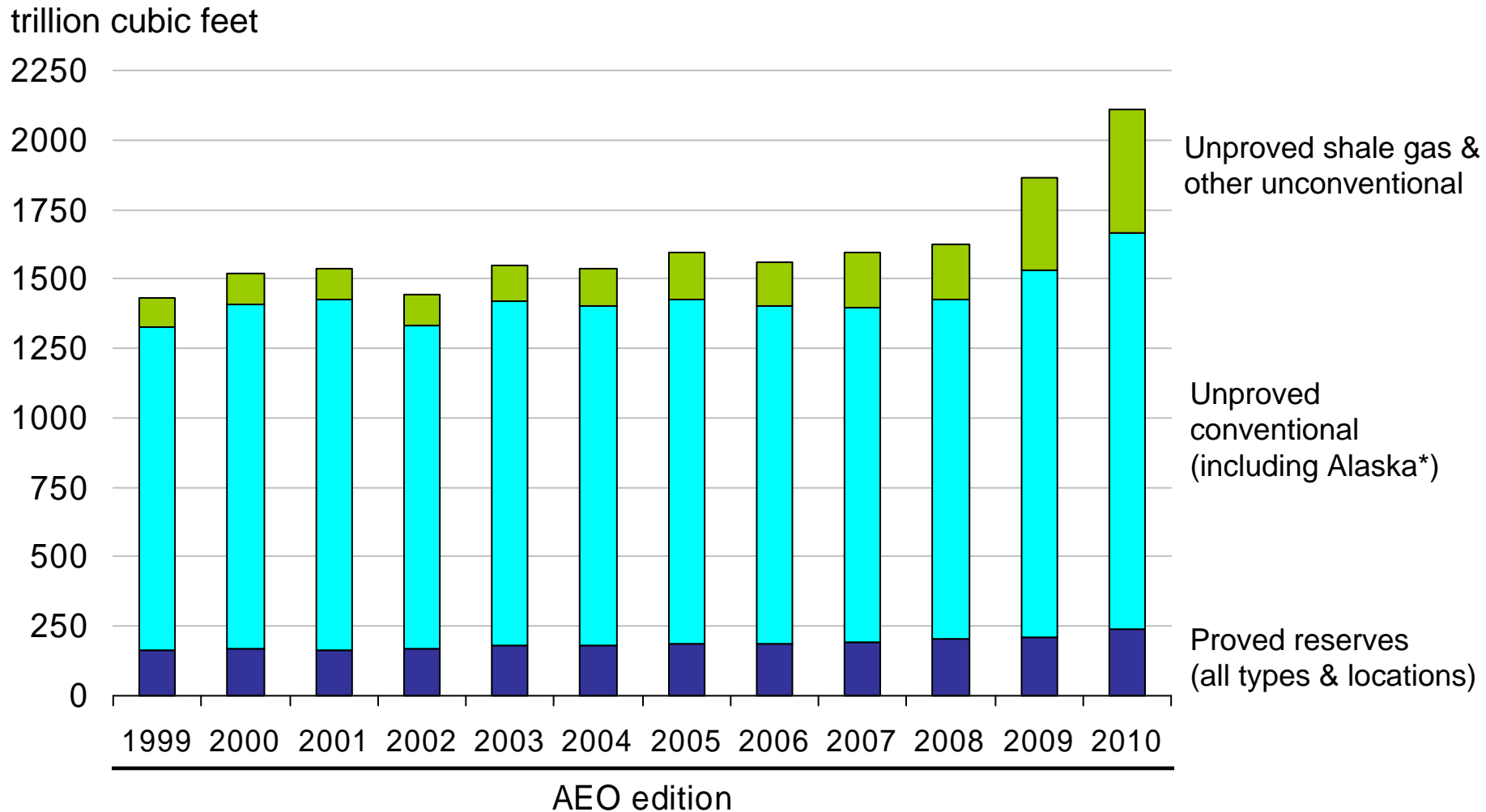
# Natural gas wellhead price is projected to rise from low levels experienced during 2008-2009 recession



# Import share of natural gas supply declines as domestic supply grows



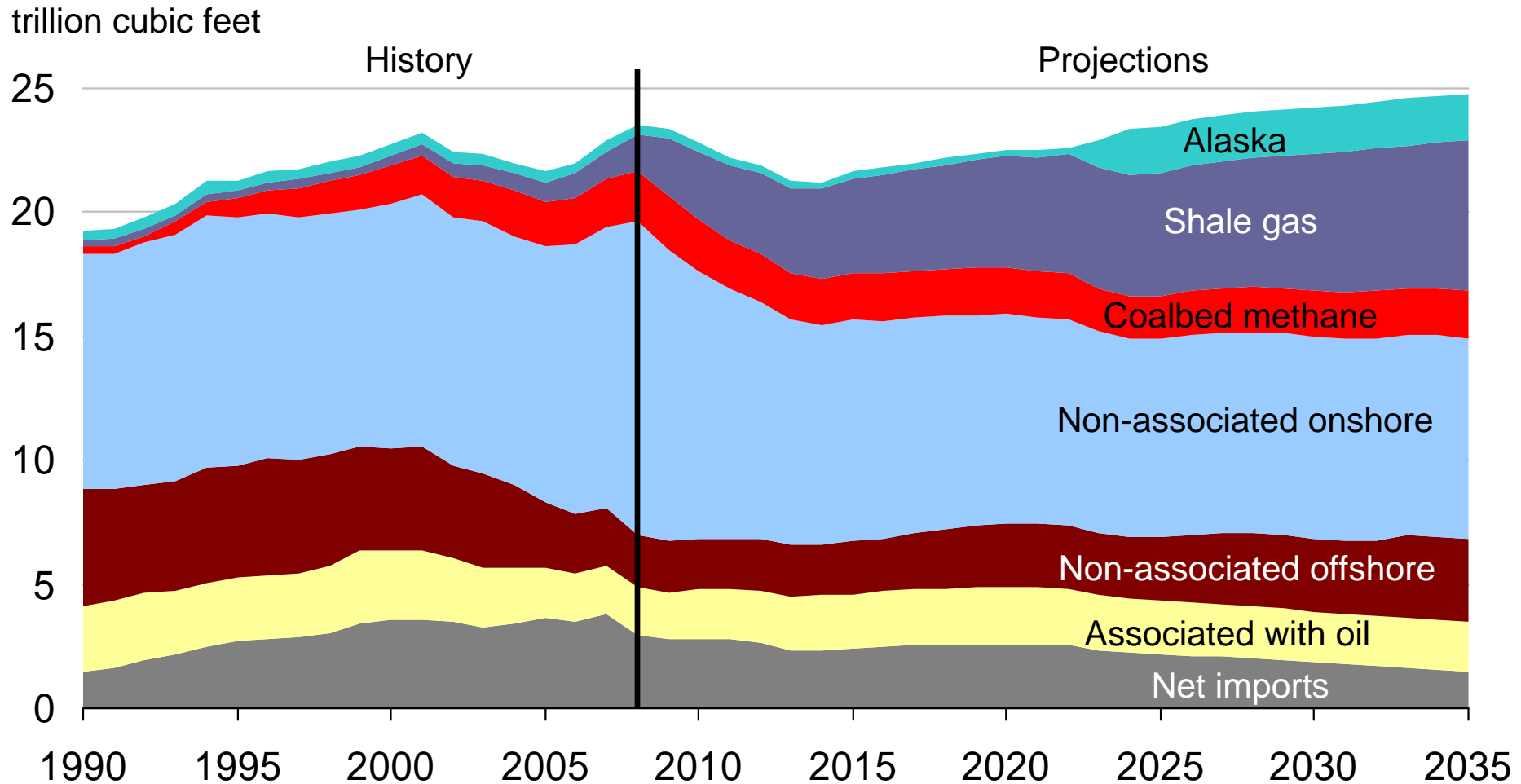
# Shale gas has been the primary source of recent growth in U.S. technically recoverable natural gas resources



\* Alaska resource estimates prior to AEO2009 reflect resources from the North Slope that were not included in previously published documentation.

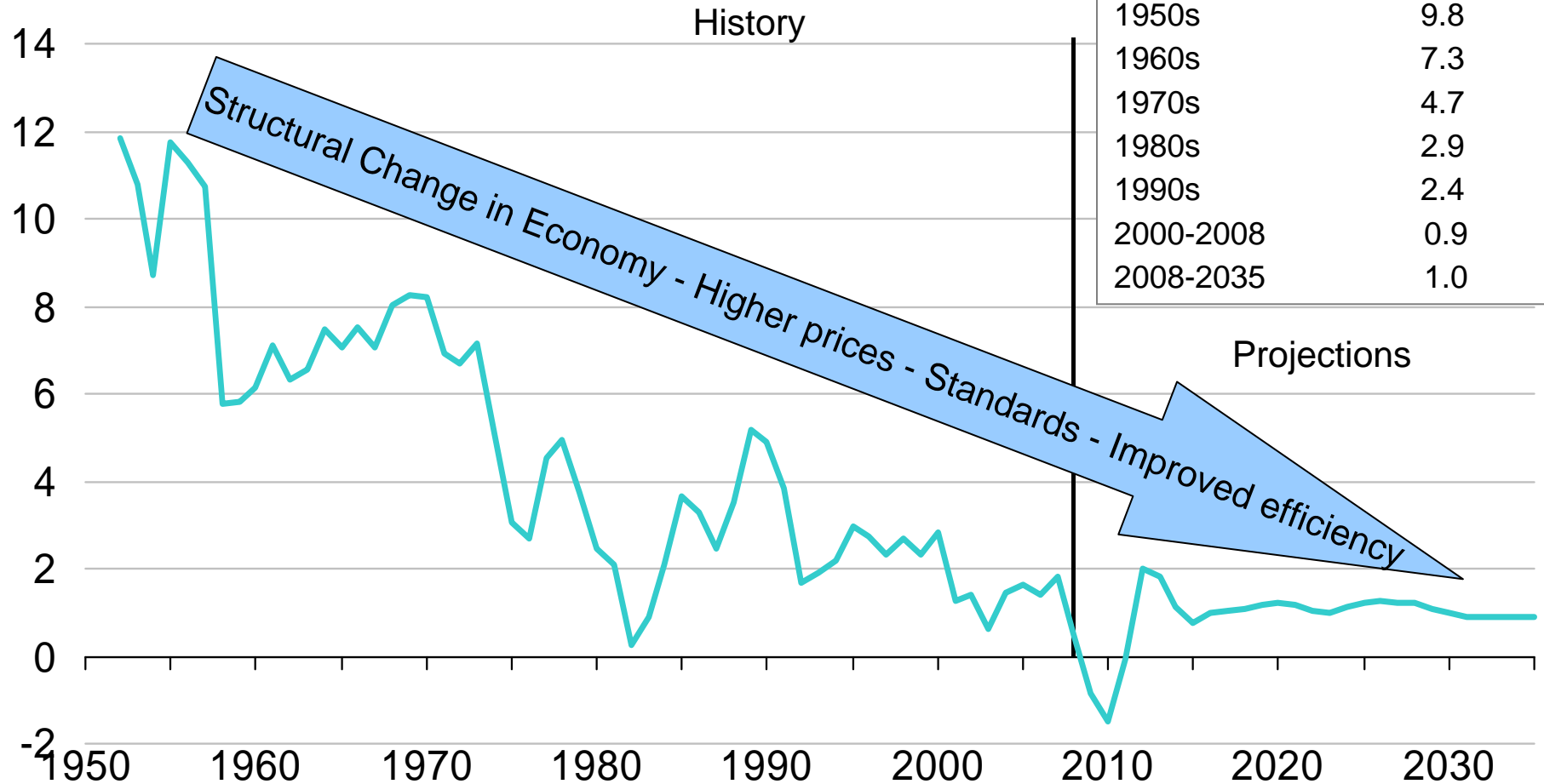


# Shale gas and Alaska production offset declines in supply to meet consumption growth and lower import needs



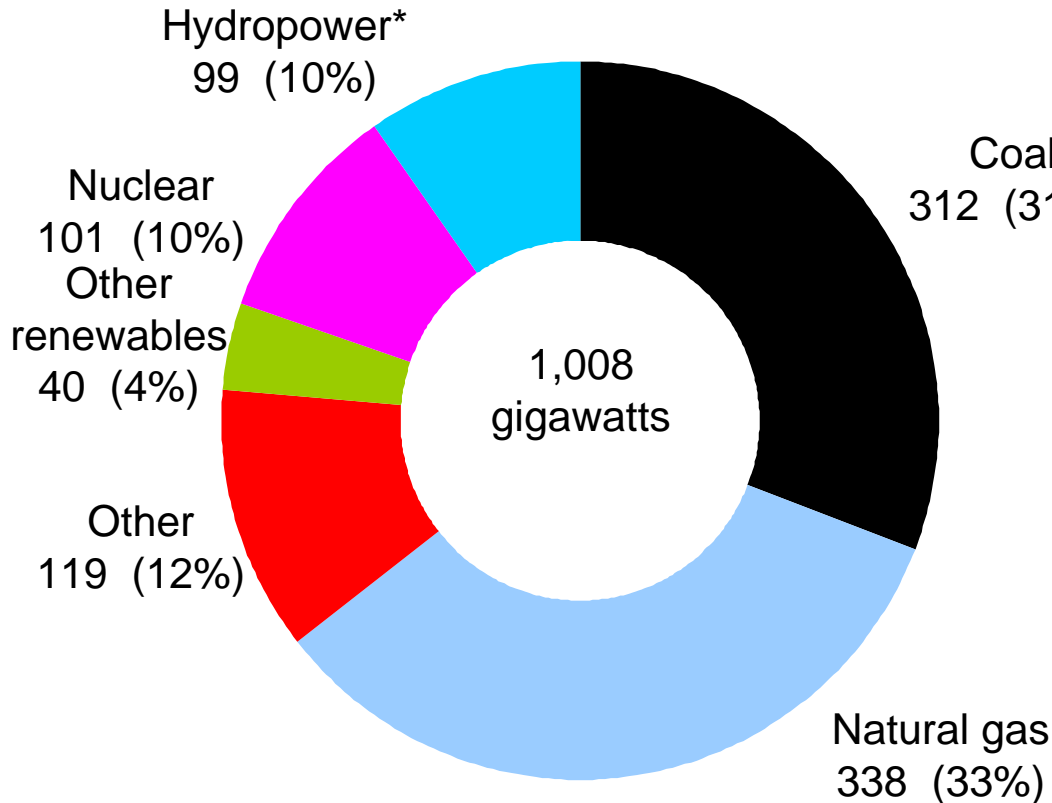
# Growth in electricity use continues to slow

3-year rolling average percent growth

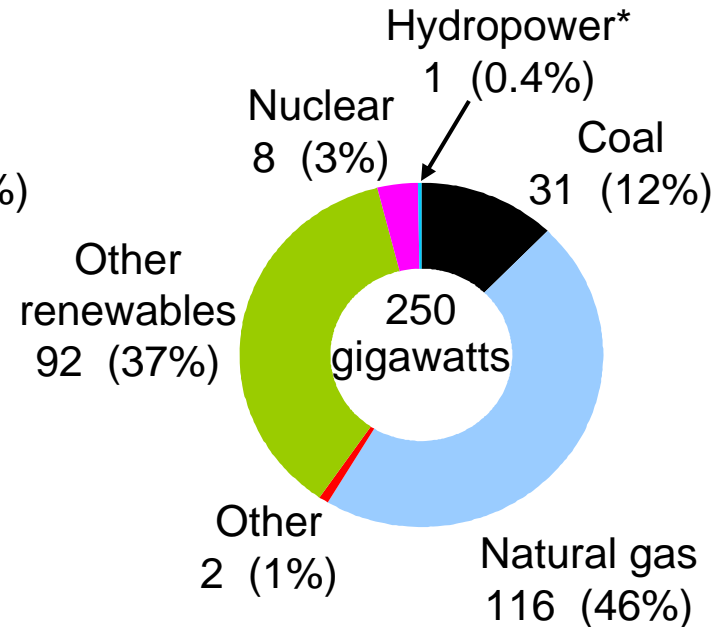


# Natural gas and renewables account for the majority of capacity additions from 2008 to 2035

## 2008 capacity



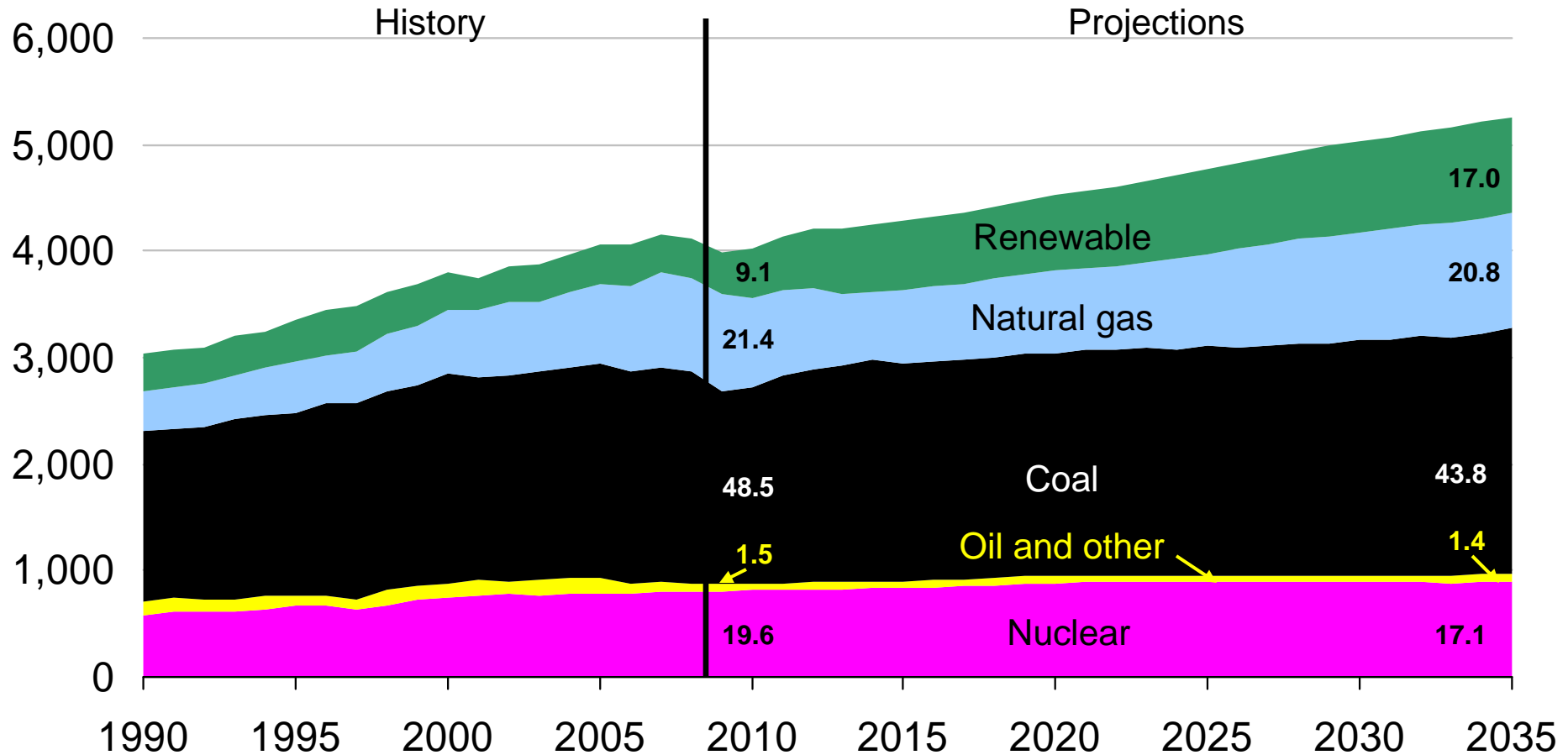
## Capacity additions 2008 to 2035



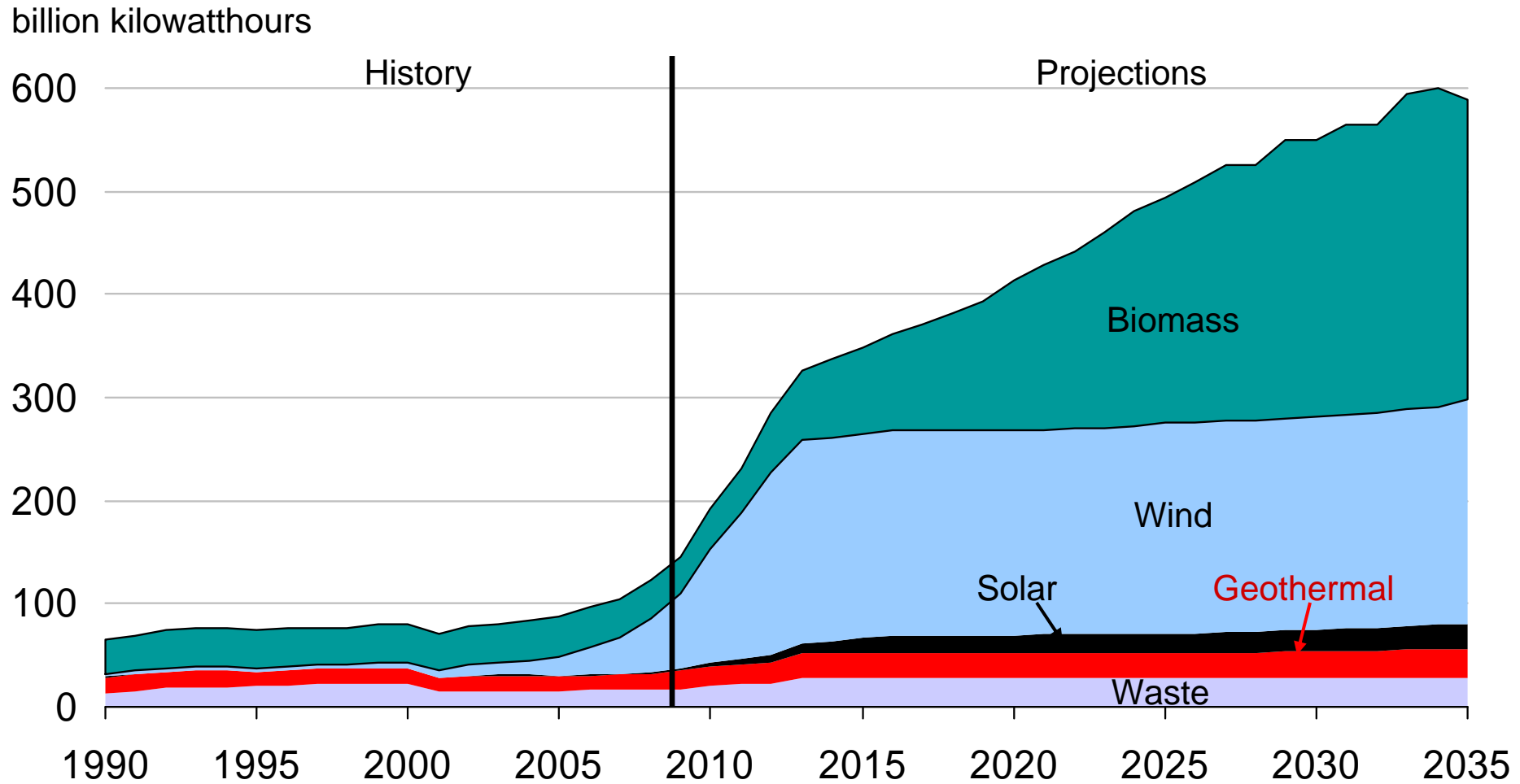
\* Includes pumped storage

# Renewables gain electricity market share; coal share declines

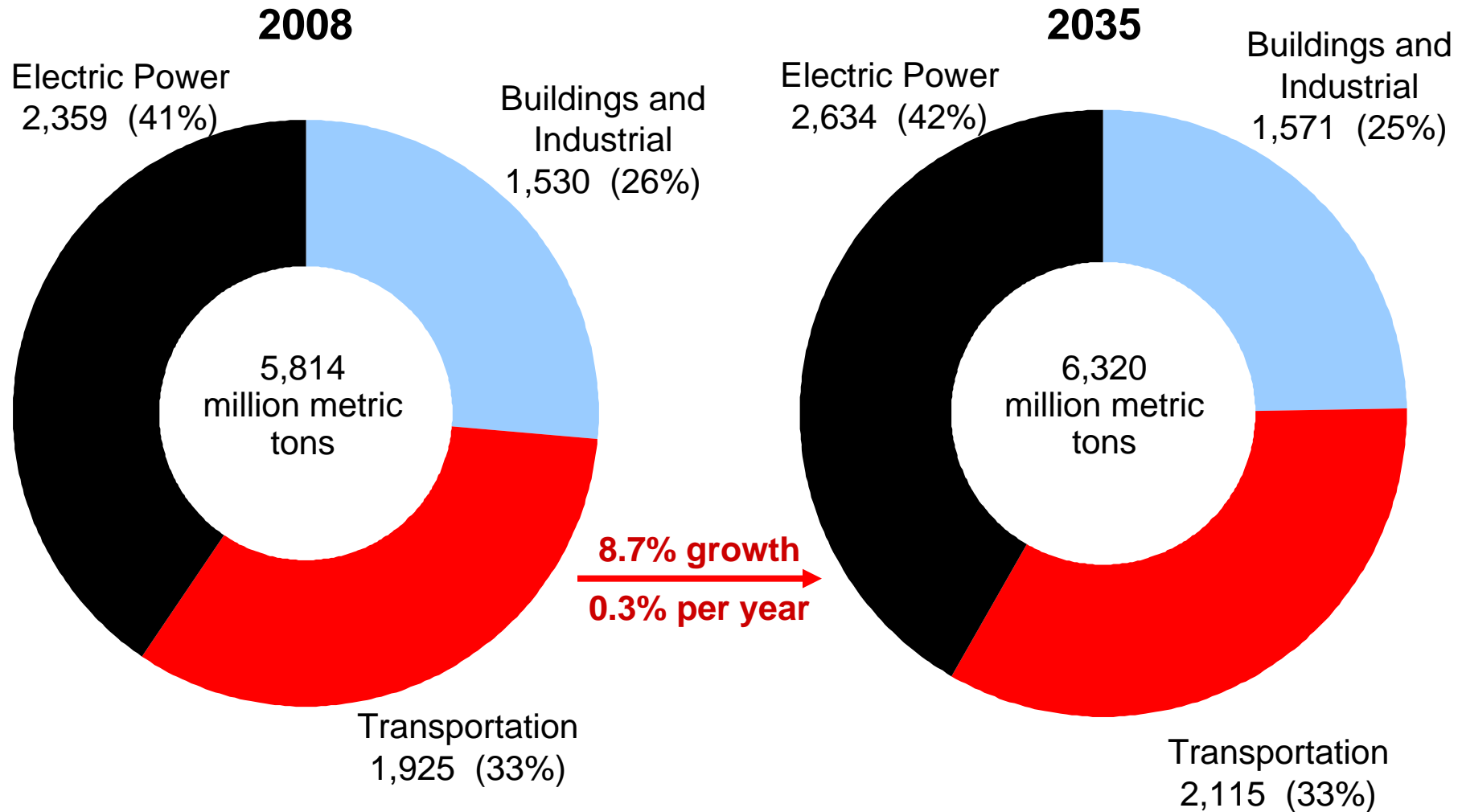
billion kilowatthours and percent shares



# Nonhydropower renewable sources meet 41% of total electricity generation growth from 2008 to 2035



# Assuming no new policies, growth in energy-related CO<sub>2</sub> is driven by electricity and transportation fuel use



## Key results from the *AEO2010* reference case

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- Recent Federal and State policies, and rising energy prices, moderate growth in energy consumption and shift it to renewable fuels
- U.S. oil use remains near its present level through 2035
  - growth in overall liquids demand is met by biofuels, and ethanol accounts for >17% of gasoline consumption by 2035
  - U.S. reliance on imported oil as a share of U.S. liquids use, declines to 45% over the next 25 years
- Shale gas provides the majority of growth in gas supply
- Energy-related CO<sub>2</sub> emissions grow 0.3% per year, absent any new policies to limit emissions

## For more information

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<b>U.S. Energy Information Administration home page</b>	<b><a href="http://www.eia.gov">www.eia.gov</a></b>
<b>Short-Term Energy Outlook</b>	<b><a href="http://www.eia.gov/emeu/steo/pub/contents.html">www.eia.gov/emeu/steo/pub/contents.html</a></b>
<b>Annual Energy Outlook</b>	<b><a href="http://www.eia.gov/oiaf/aeo/index.html">www.eia.gov/oiaf/aeo/index.html</a></b>
<b>International Energy Outlook</b>	<b><a href="http://www.eia.gov/oiaf/ieo/index.html">www.eia.gov/oiaf/ieo/index.html</a></b>
<b>Monthly Energy Review</b>	<b><a href="http://www.eia.gov/emeu/mer/contents.html">www.eia.gov/emeu/mer/contents.html</a></b>

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