

# *Fuels Used in Electricity Generation*



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*for*

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## Key results from the *AEO2012* Reference case, which assumes current laws remain unchanged

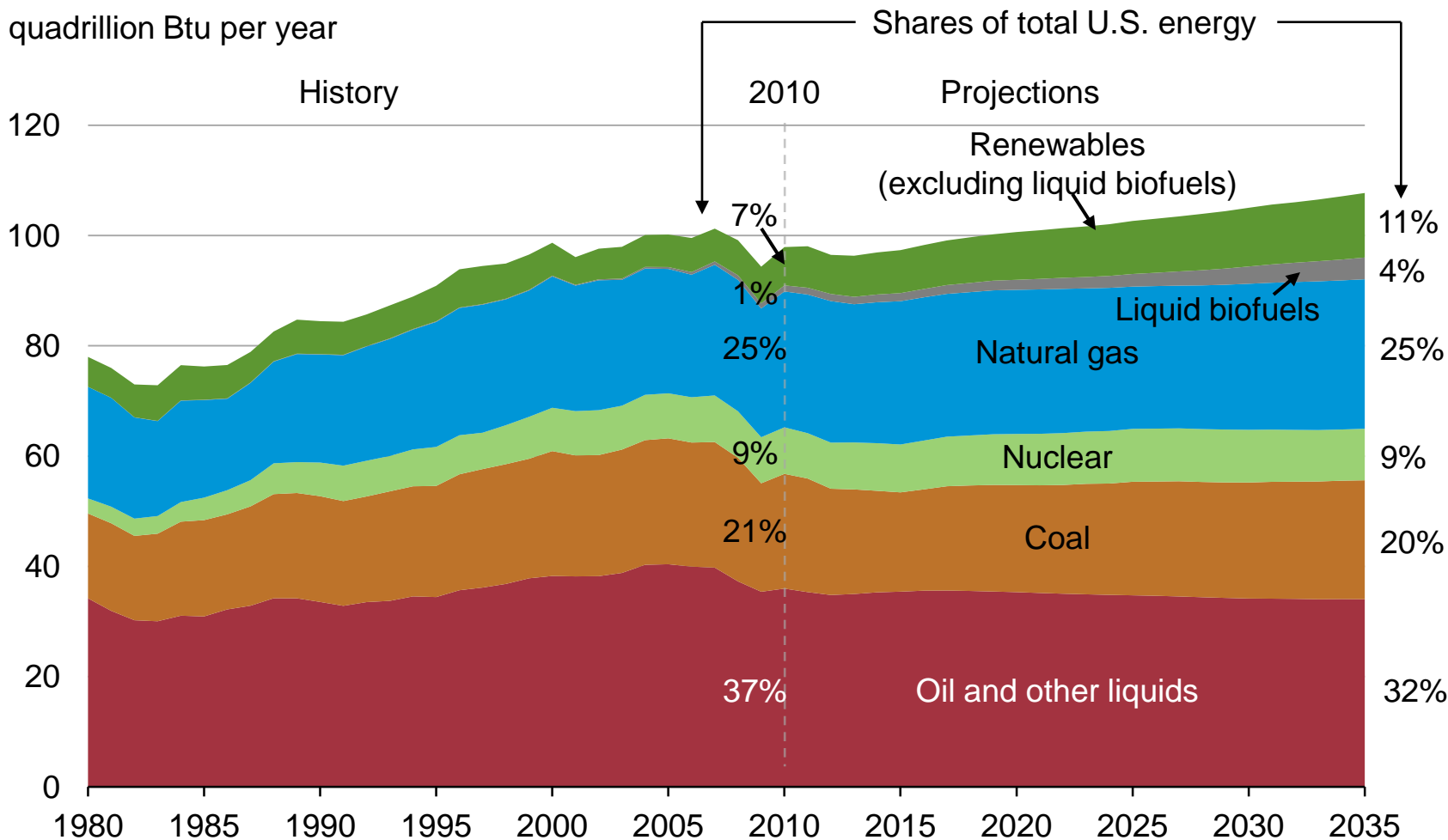
- Projected growth of energy use slows over the projection period reflecting an extended economic recovery and increasing energy efficiency in end-use applications
- Domestic crude oil production increases, reaching levels not experienced since 1994 by 2020
- With modest economic growth, increased efficiency, growing domestic production, and continued adoption of nonpetroleum liquids, net petroleum imports make up a smaller share of total liquids consumption
- Natural gas production increases throughout the projection period and exceeds consumption early in the next decade
- Renewables and natural gas fuel a growing share of electric power generation
- Total U.S. energy-related carbon dioxide emissions remain below their 2005 level through 2035

# What is included (and excluded) in developing EIA's "Reference case" projections?

- Generally assumes current laws and regulations
  - excludes potential future laws and regulations (e.g., proposed greenhouse gas legislation and proposed fuel economy standards are not included)
  - provisions generally sunset as specified in law (e.g., renewable tax credits expire)
- Some grey areas
  - adds a premium to the capital cost of CO<sub>2</sub>-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

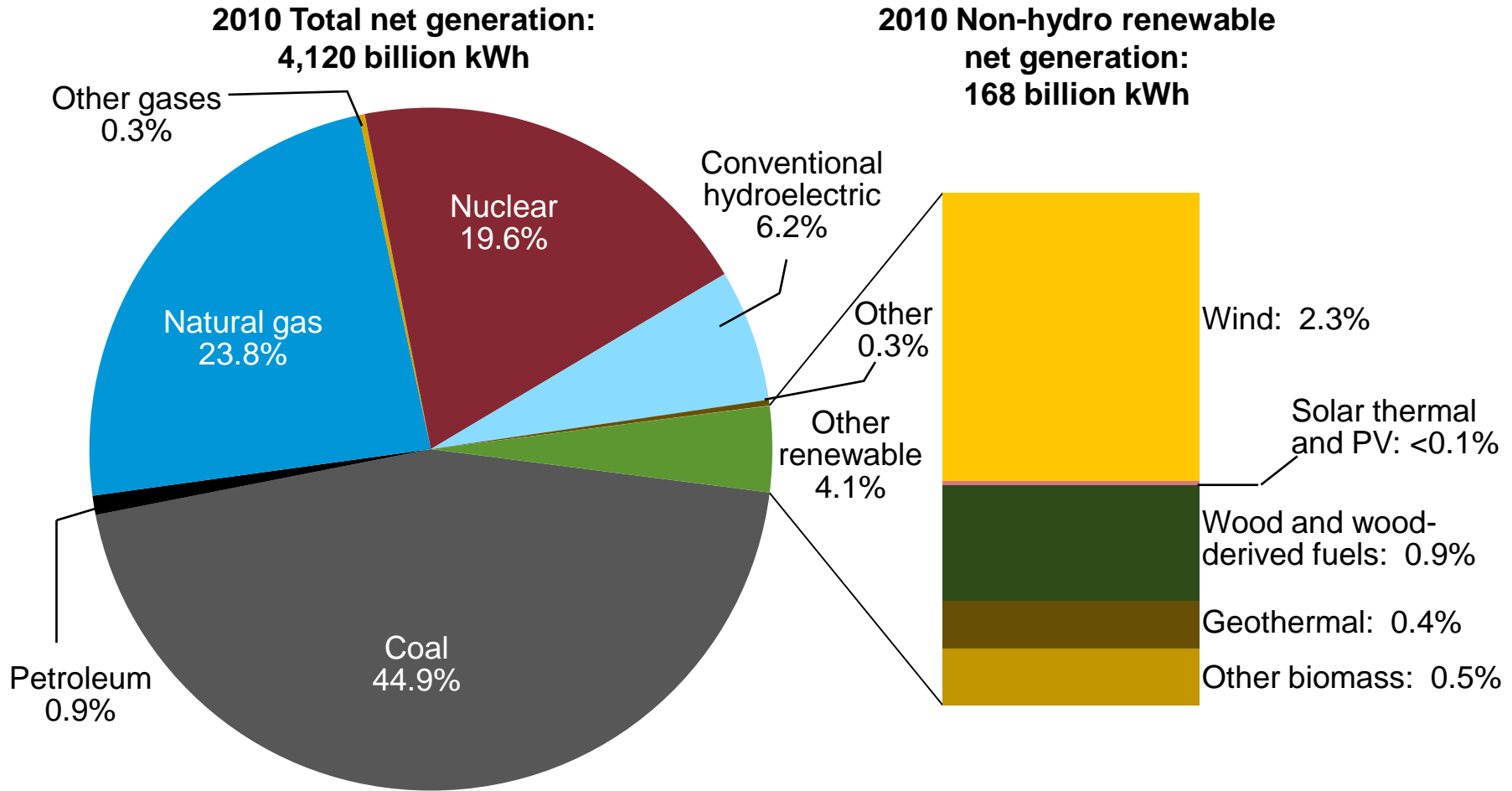
# Energy use grows slowly over the projection in response to a slow and extended economic recovery and improving energy efficiency

U.S. primary energy consumption  
quadrillion Btu per year



Source: EIA, Annual Energy Outlook 2012 Early Release

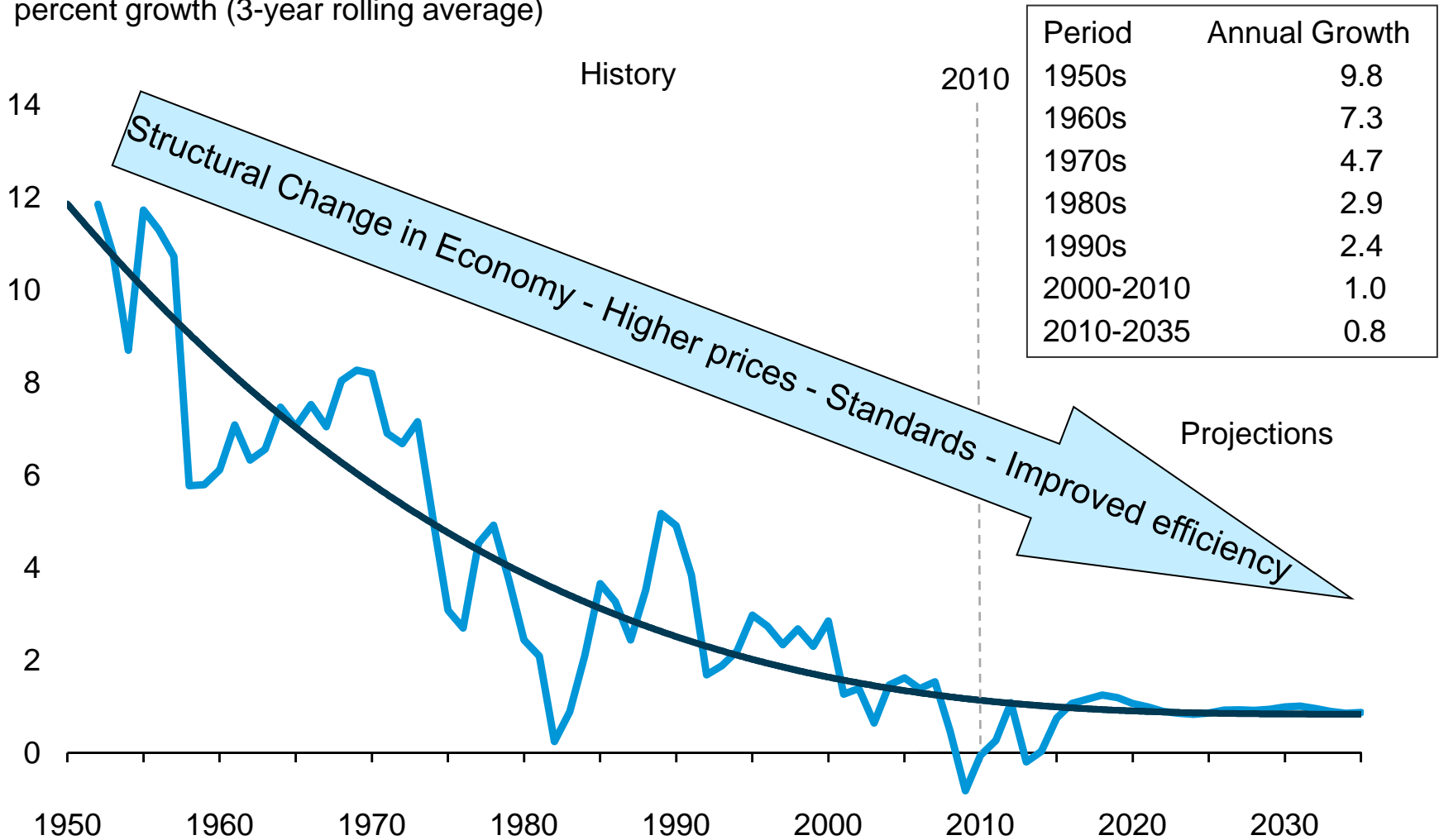
# In 2010, U.S. electricity generation was 70% fossil fuels, 20% nuclear, and 10% renewable



Source: EIA, Annual Energy Review, October 2011

# While electricity consumption grows by 23% over the projection, the annual rate of growth slows

percent growth (3-year rolling average)

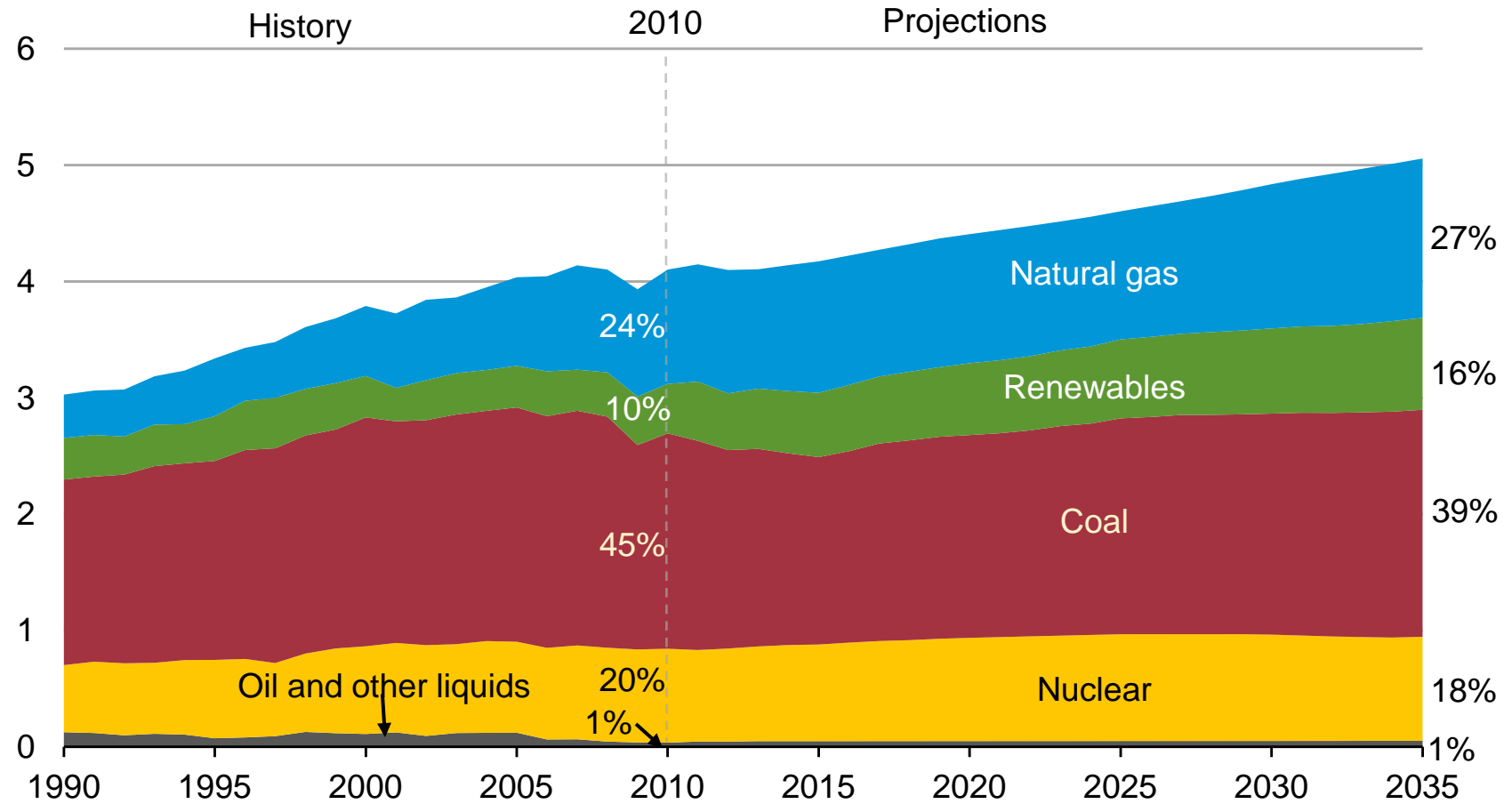


Source: EIA, Annual Energy Outlook 2012 Early Release

# Electricity mix gradually shifts to lower-carbon options, led by growth in renewables and natural gas

electricity net generation

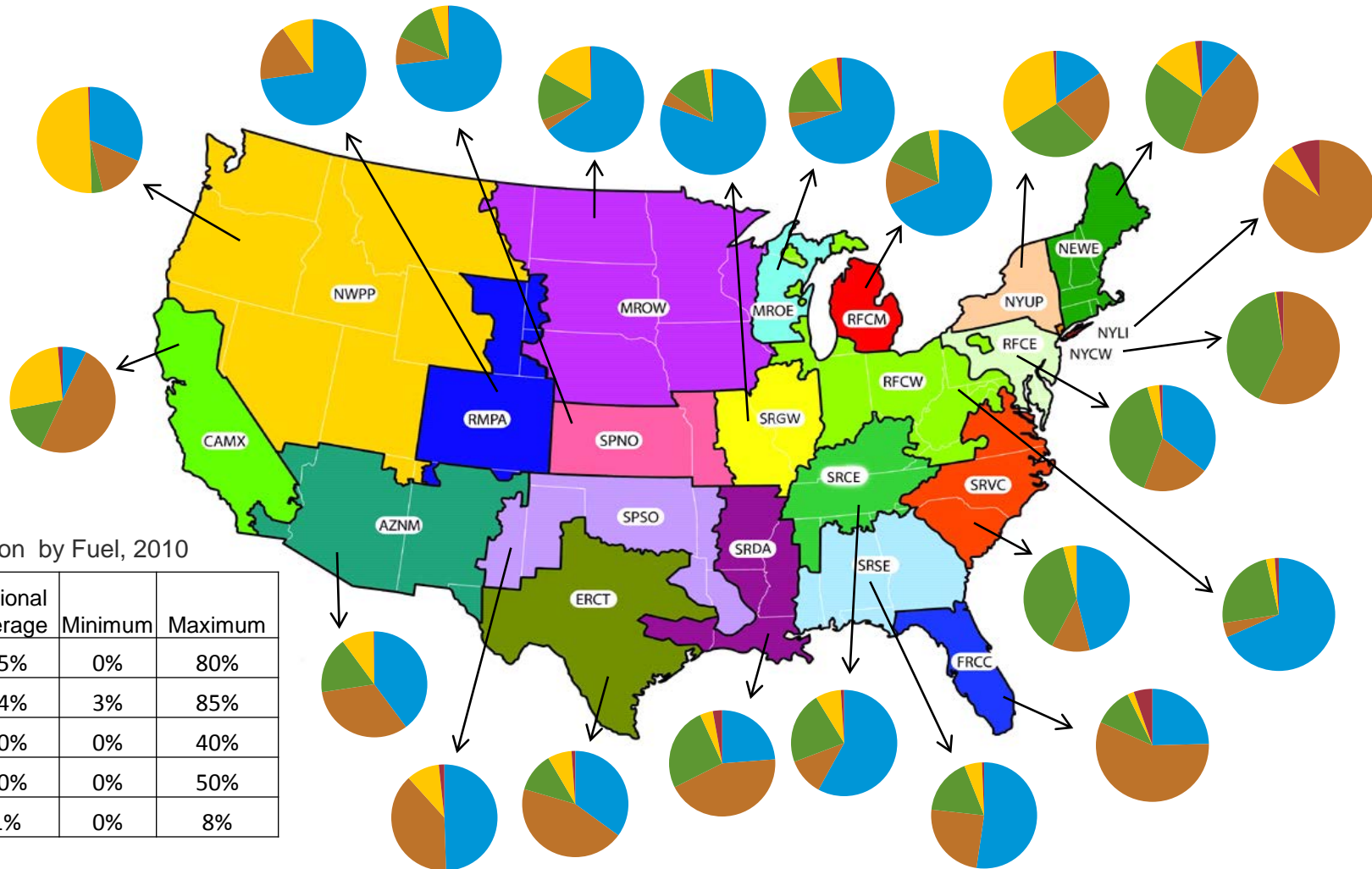
trillion kilowatthours per year



Source: EIA, Annual Energy Outlook 2012 Early Release



# The fuel mix for electricity generation by region (2010)



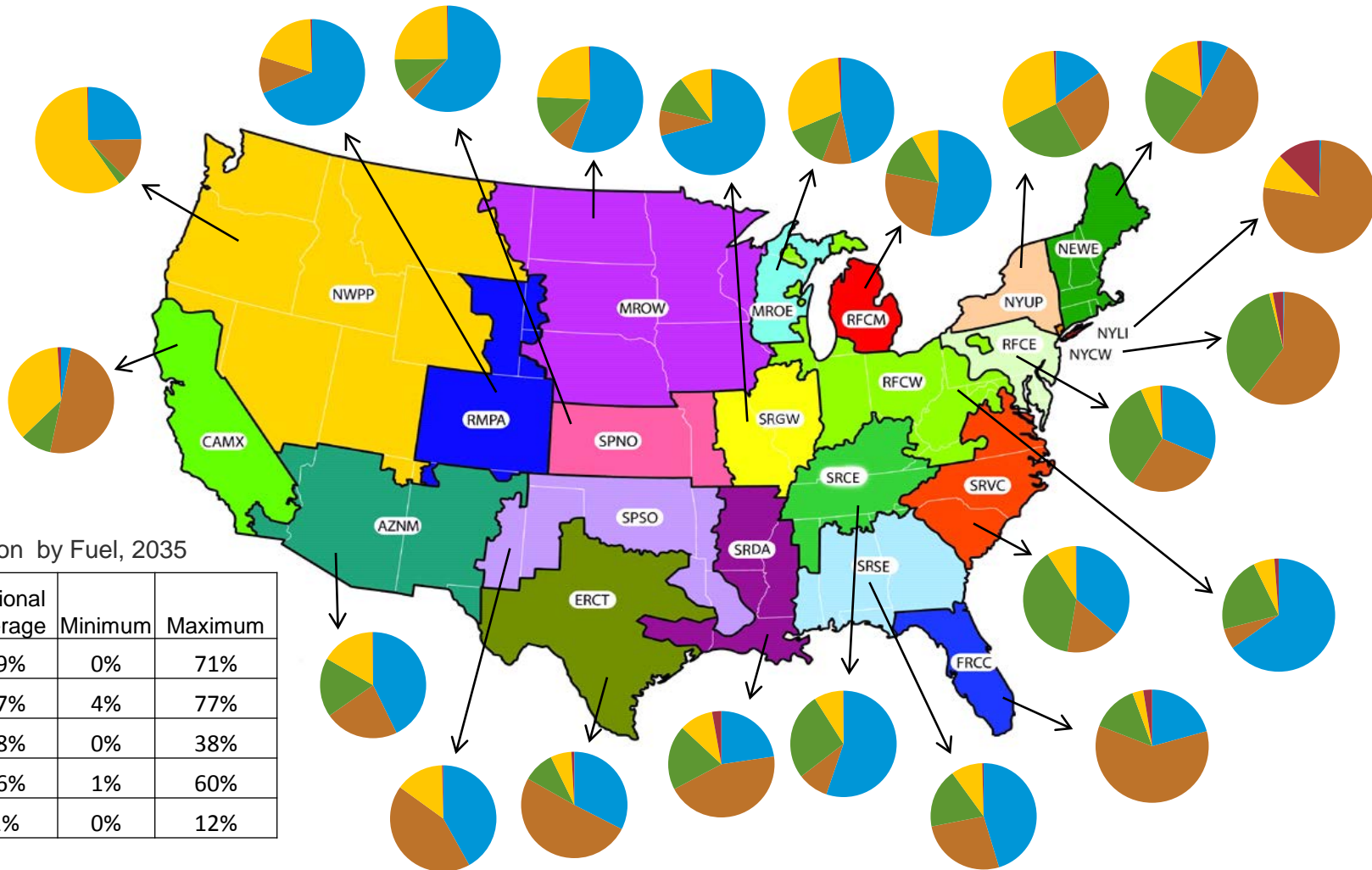
Share of Generation by Fuel, 2010

	National Average	Minimum	Maximum
Coal	45%	0%	80%
Natural Gas	24%	3%	85%
Nuclear	20%	0%	40%
Renewables	10%	0%	50%
Oil / Other	1%	0%	8%

Source: EIA AEO2012 (Early Release), based on Form EIA-923



# The fuel mix for electricity generation by region (2035)



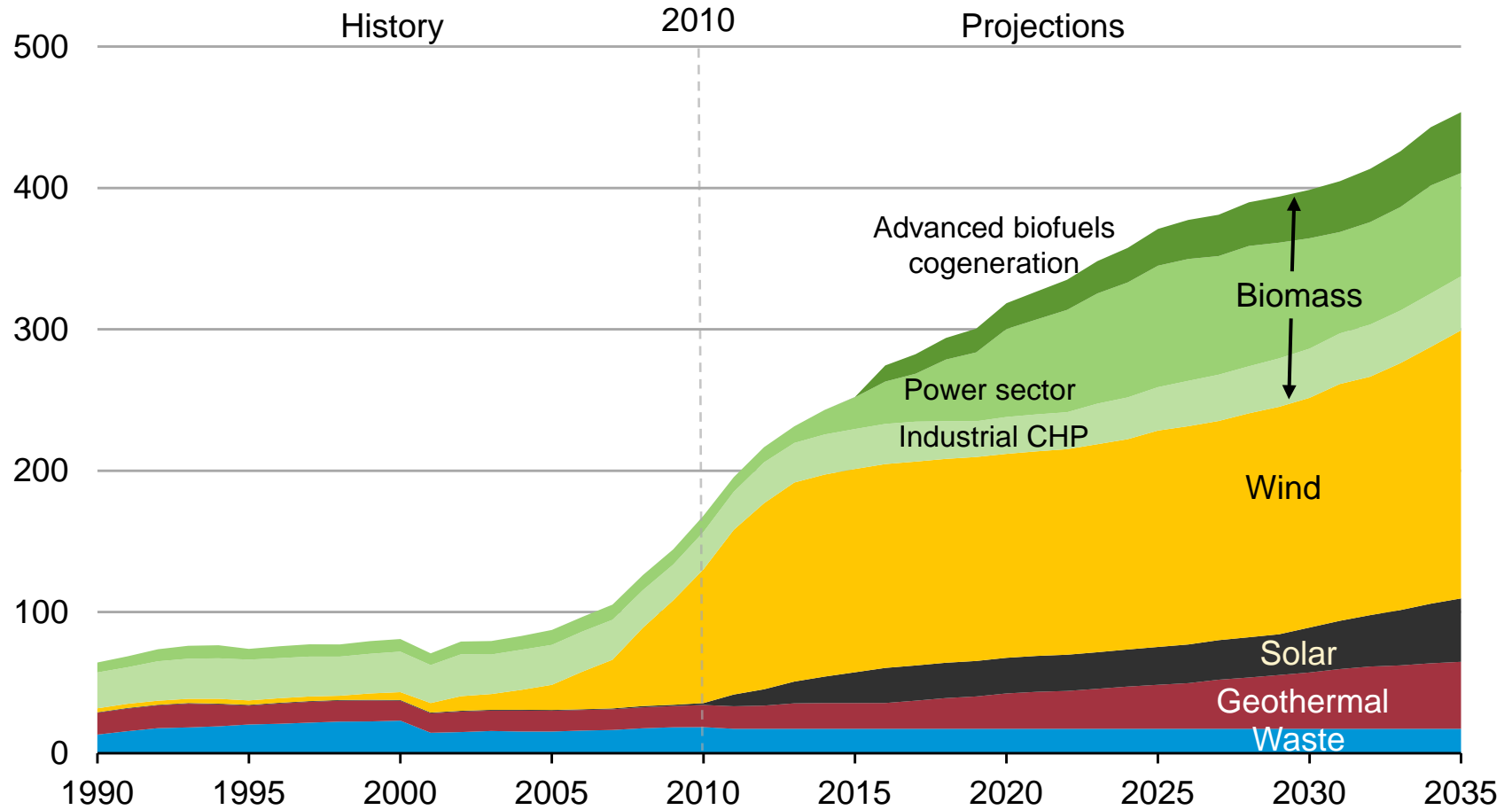
Share of Generation by Fuel, 2035

	National Average	Minimum	Maximum
Coal	39%	0%	71%
Natural Gas	27%	4%	77%
Nuclear	18%	0%	38%
Renewables	16%	1%	60%
Oil / Other	1%	0%	12%

Source: EIA AEO2012 (Early Release)

# Non-hydro renewable sources more than double between 2010 and 2035

non-hydropower renewable generation  
billion kilowatthours per year

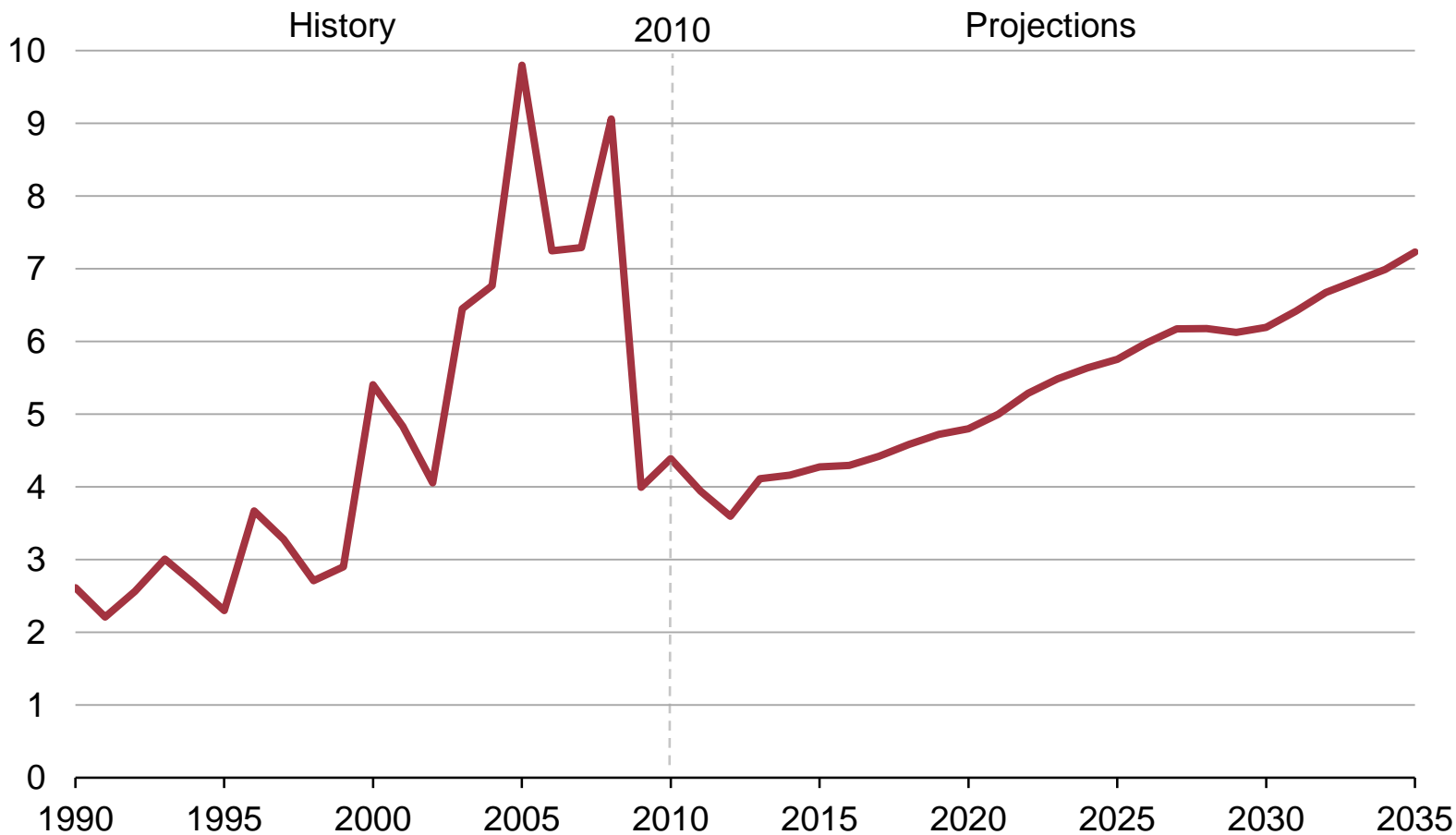


Source: EIA, Annual Energy Outlook 2012 Early Release

# EIA's natural gas price projections are slightly lower than in *AEO2011*, consistent with recent market developments

natural gas spot price (Henry Hub)

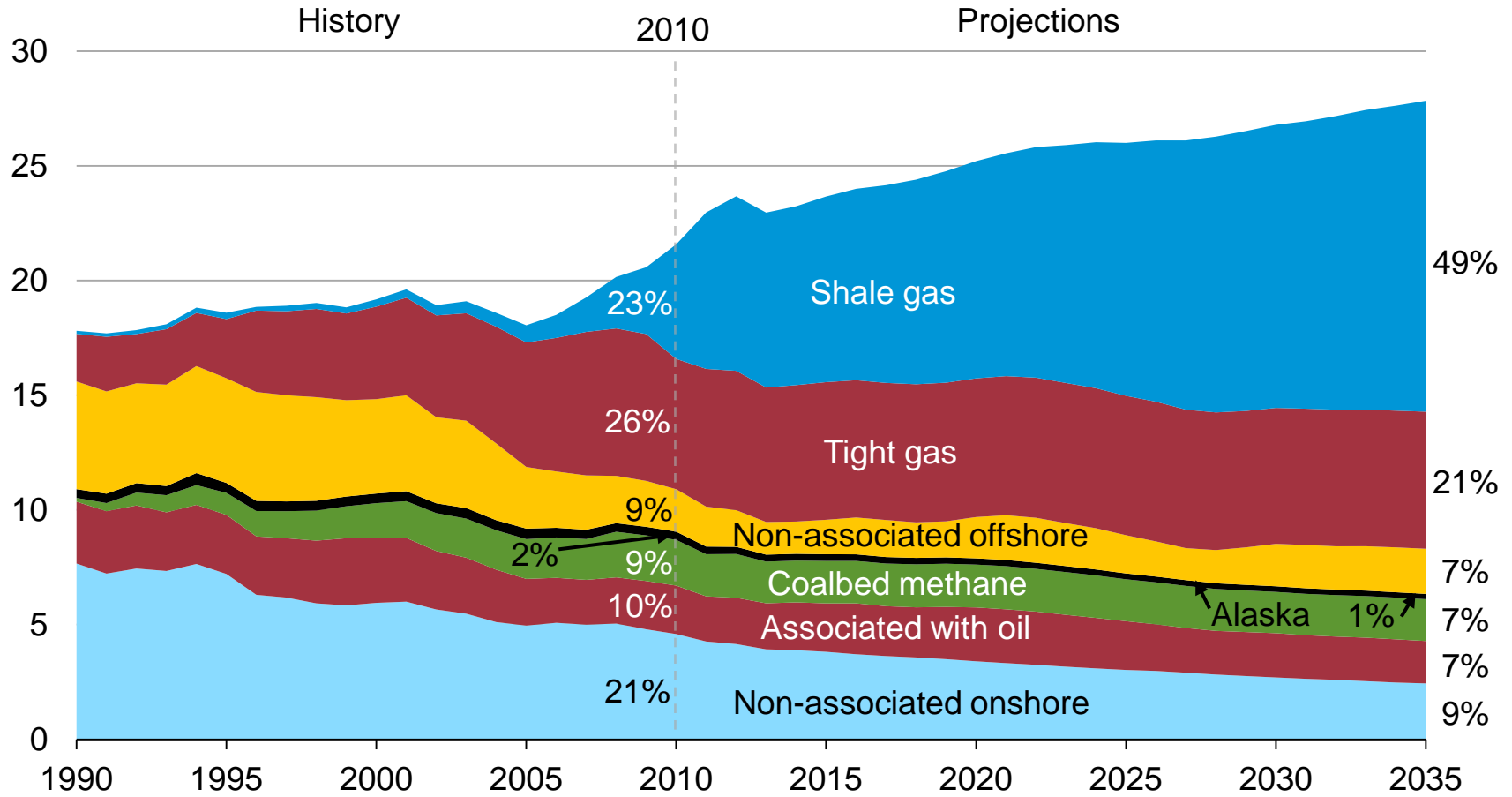
2010 dollars per million Btu



Sources: EIA, Annual Energy Outlook 2012 Early Release and EIA, Annual Energy Outlook 2011

# Shale gas offsets declines in other U.S. natural gas production sources

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

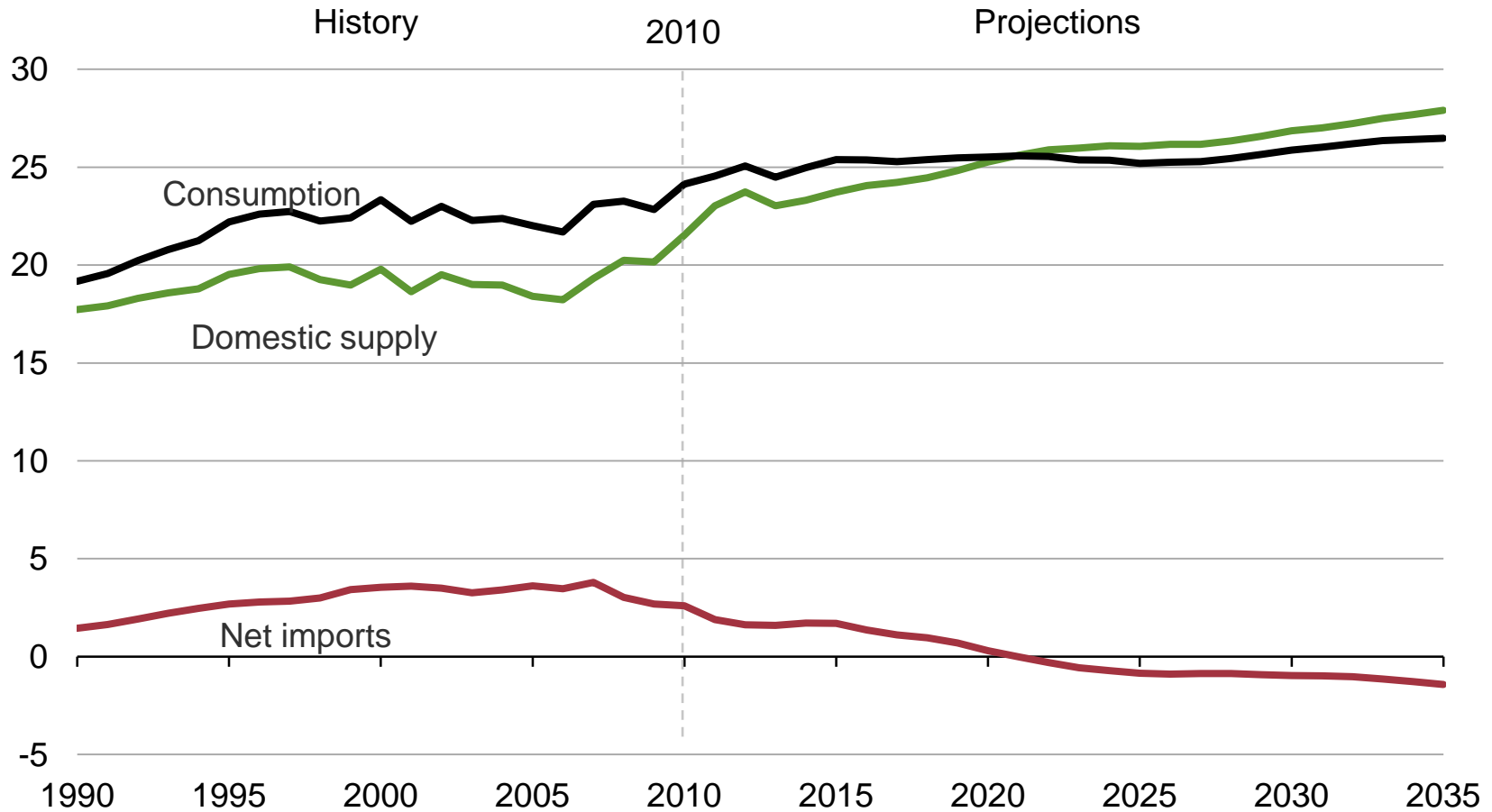


Source: EIA, Annual Energy Outlook 2012 Early Release

# Domestic natural gas production grows faster than consumption

U.S. dry gas

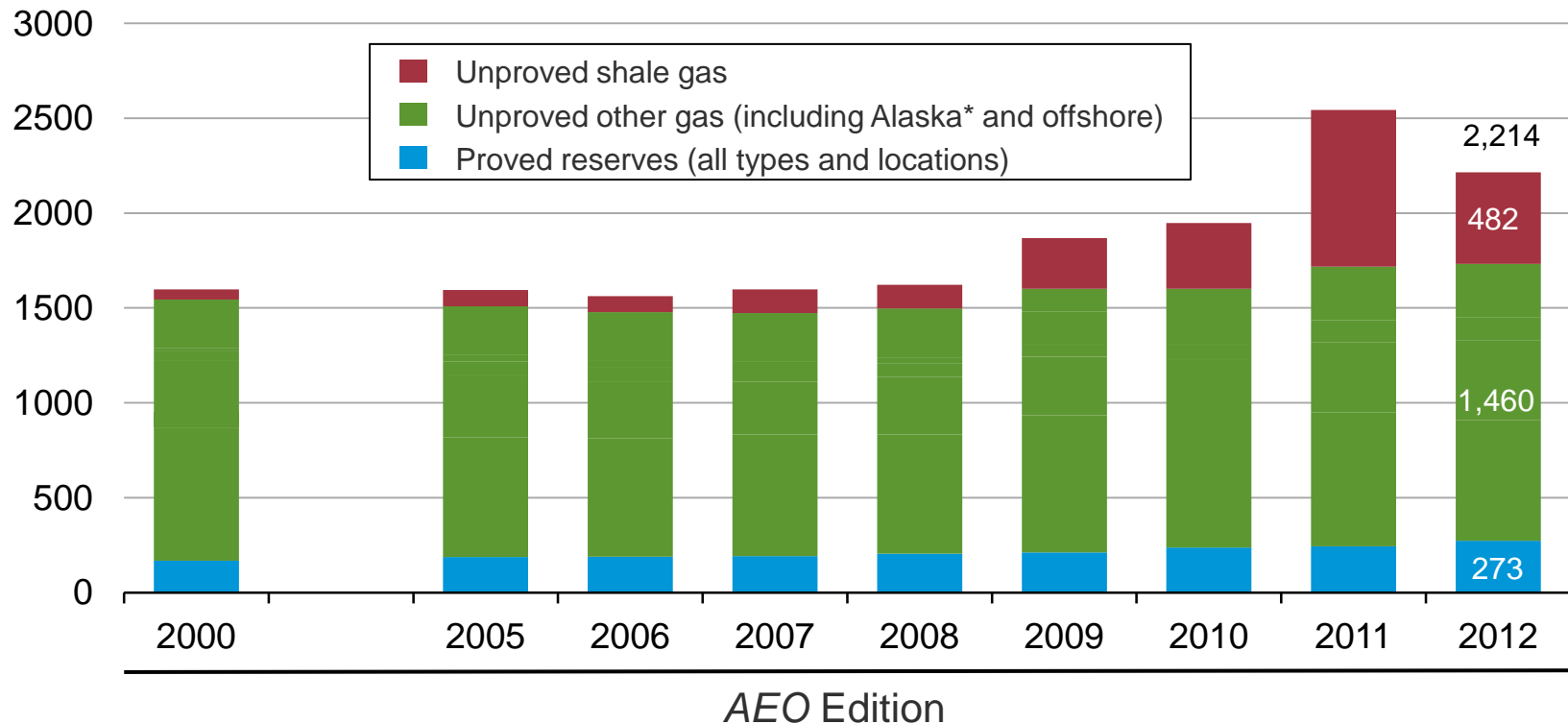
trillion cubic feet per year



Source: EIA, Annual Energy Outlook 2012 Early Release

# Technically recoverable natural gas resources reflect updated assessments

U.S. dry gas resources  
trillion cubic feet



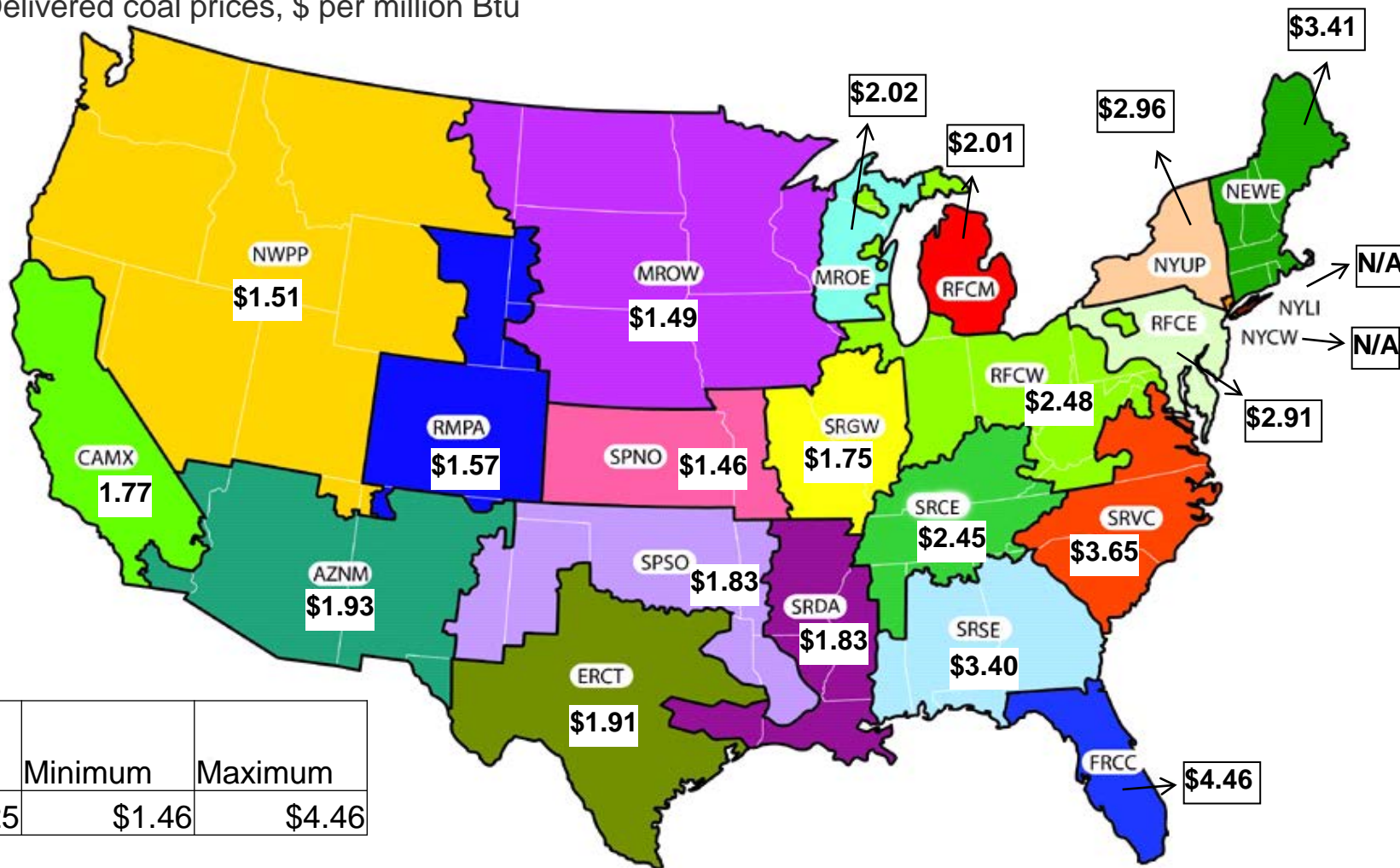
\*Alaska resource estimates prior to AEO2009 reflect resources from the North Slope that were not included in previously published documentation.

Source: EIA, Annual Energy Outlook



# The average delivered price of coal to electricity generators varies widely across U.S. regions – transport costs are a key reason

2010 Delivered coal prices, \$ per million Btu



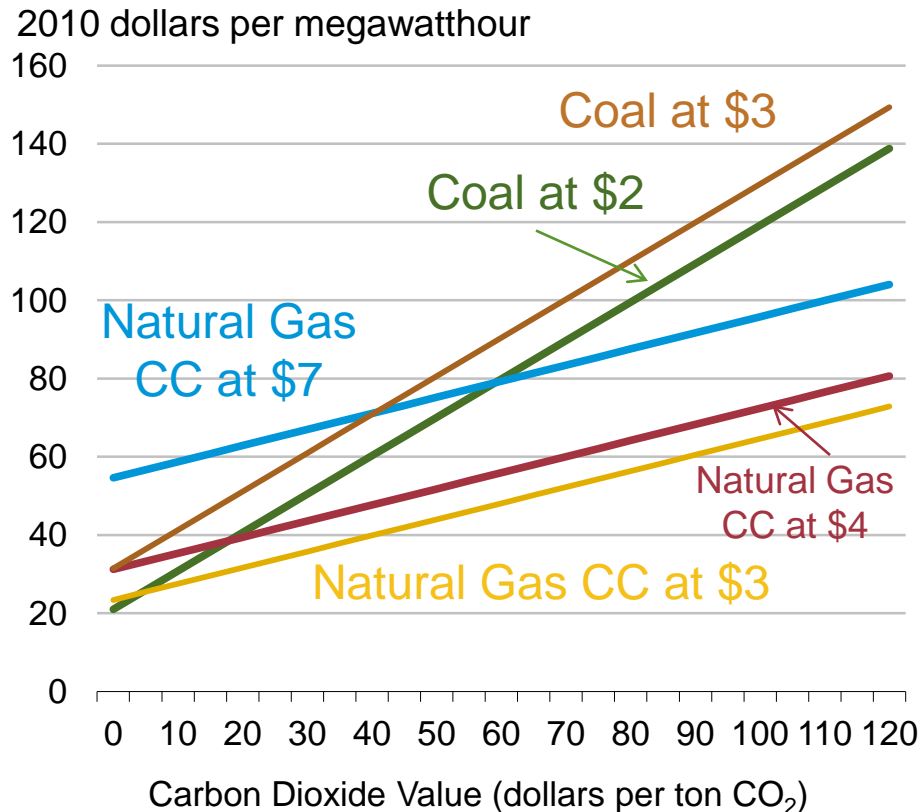
National Average	Minimum	Maximum
\$2.25	\$1.46	\$4.46

Source: EIA, Annual Energy Outlook 2012 Early Release



# 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



- 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

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

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

# For more information

U.S. Energy Information Administration home page | [www.eia.gov](http://www.eia.gov)

Annual Energy Outlook | [www.eia.gov/forecasts/aeo](http://www.eia.gov/forecasts/aeo)

Short-Term Energy Outlook | [www.eia.gov/forecasts/steo](http://www.eia.gov/forecasts/steo)

International Energy Outlook | [www.eia.gov/forecasts/ieo](http://www.eia.gov/forecasts/ieo)

Monthly Energy Review | [www.eia.gov/totalenergy/data/monthly](http://www.eia.gov/totalenergy/data/monthly)

Annual Energy Review | [www.eia.gov/totalenergy/data/annual](http://www.eia.gov/totalenergy/data/annual)