Fuels Used in Electricity Generation

for

Energy and Climate Change Research Seminar

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by

J. Alan Beamon, Office of Electricity, Coal, Nuclear and Renewables Analysis

Energy Information Administration

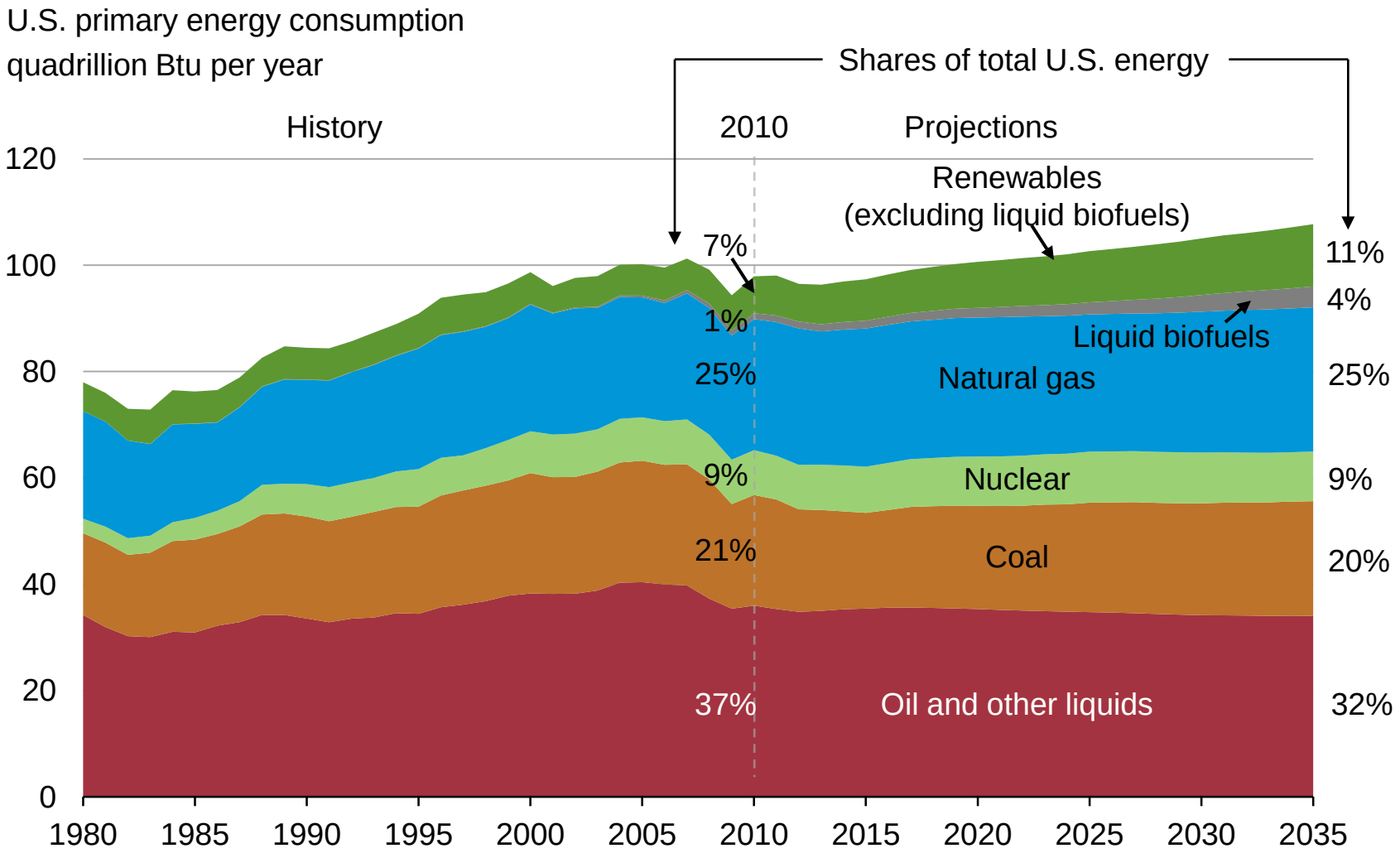
Key results from the *AEO2012* Reference case, which assumes current laws remain unchanged

- 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?

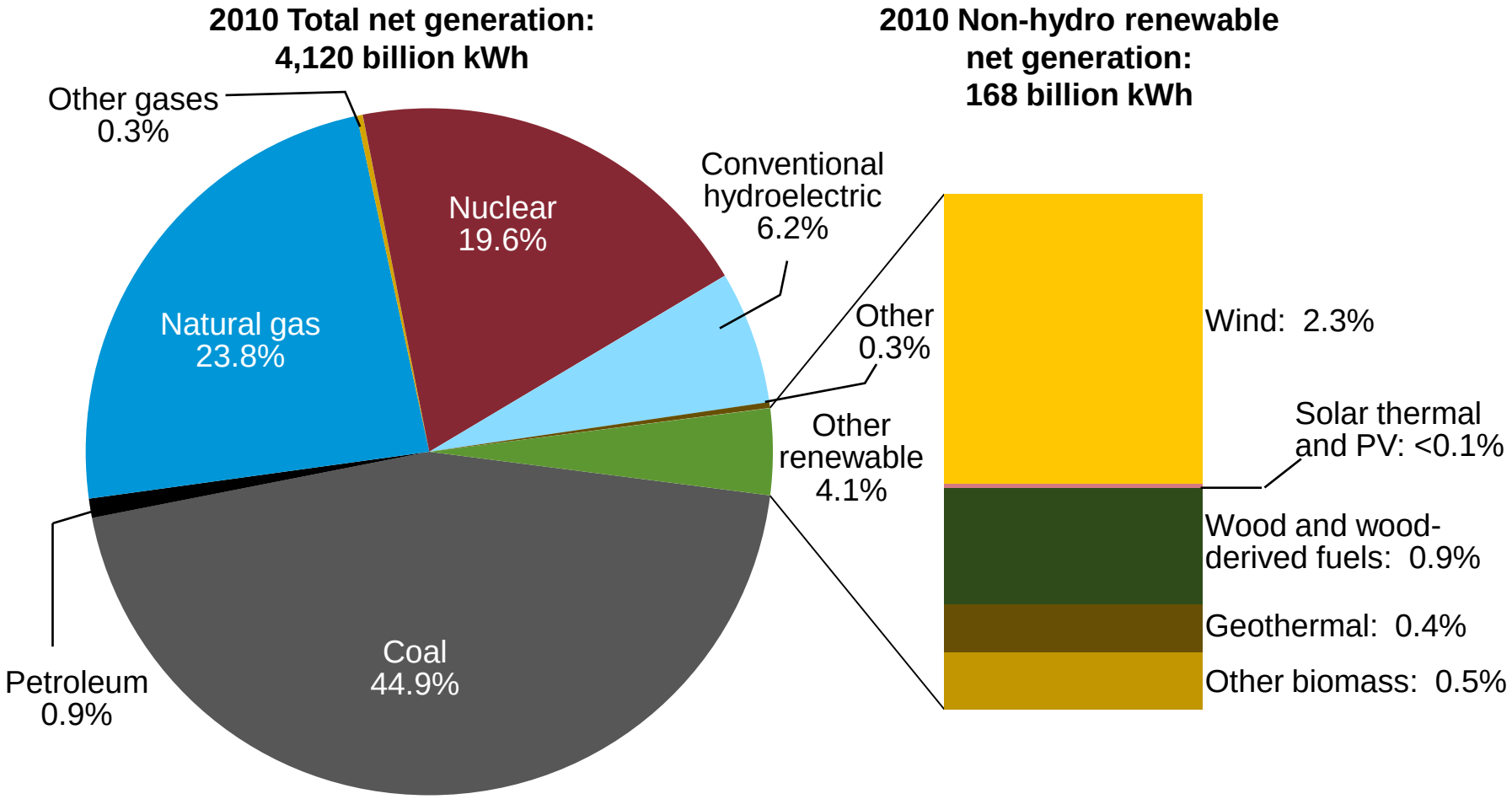
- Generally assumes current laws and regulations
  - excludes potential future laws and regulations (e.g., proposed greenhouse gas legislation and proposed fuel economy standards are not included)
  - provisions generally sunset as specified in law (e.g., renewable tax credits expire)
- Some grey areas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

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



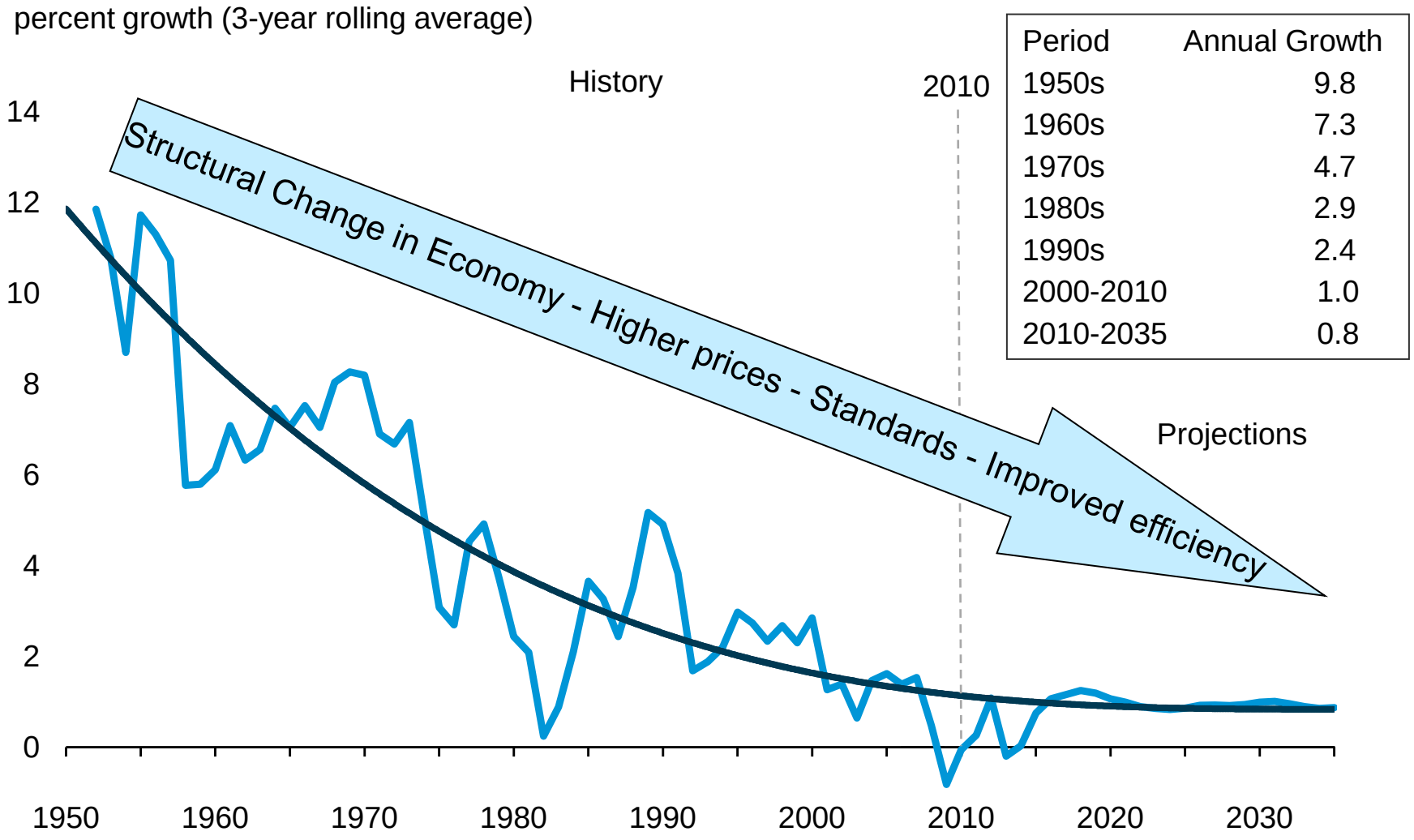
Source: EIA, Annual Energy Outlook 2012 Early Release

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



Source: EIA, Annual Energy Review, October 2011

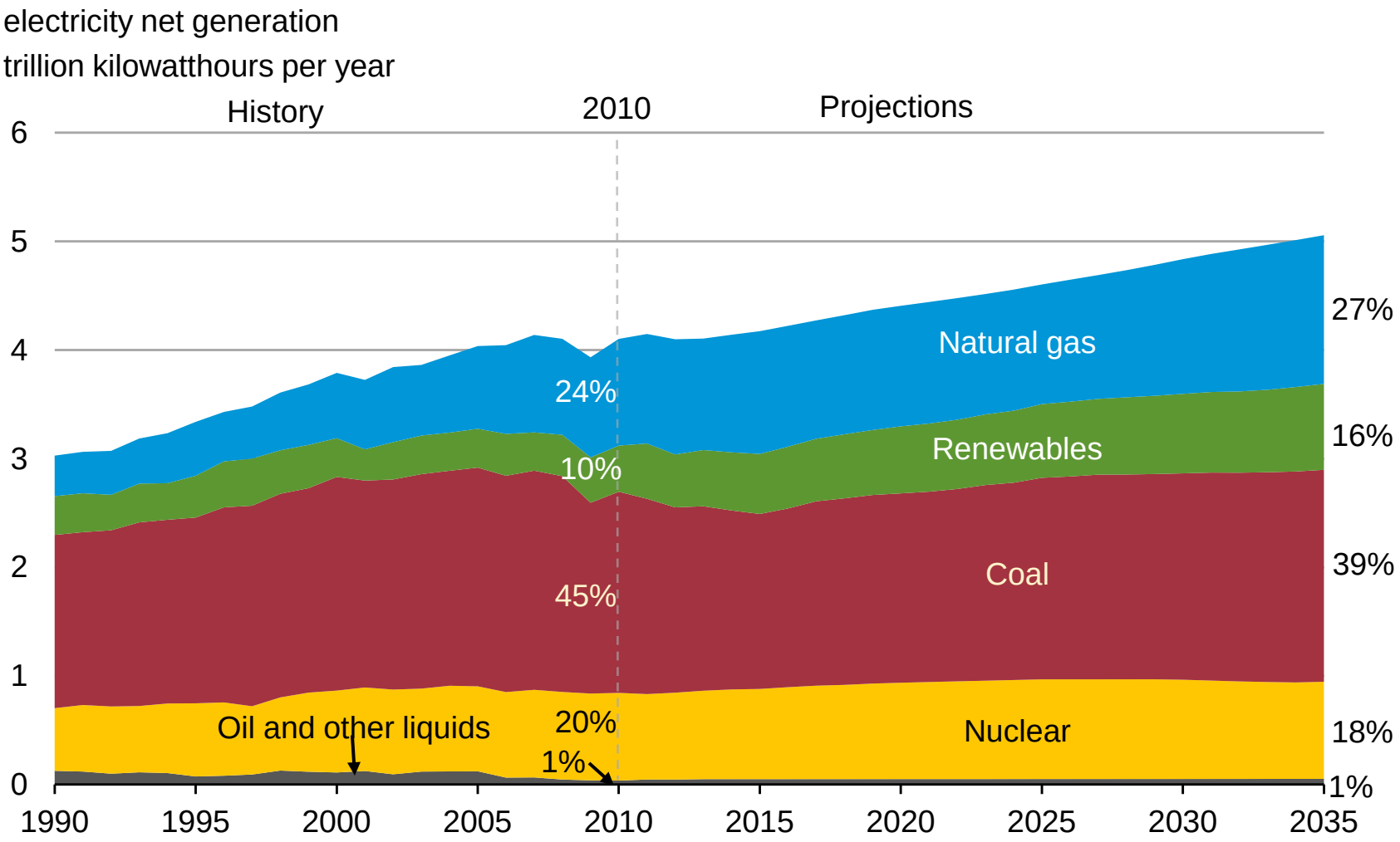
While electricity consumption grows by 23% over the projection, the annual rate of growth slows



Period	Annual Growth
1950s	9.8
1960s	7.3
1970s	4.7
1980s	2.9
1990s	2.4
2000-2010	1.0
2010-2035	0.8

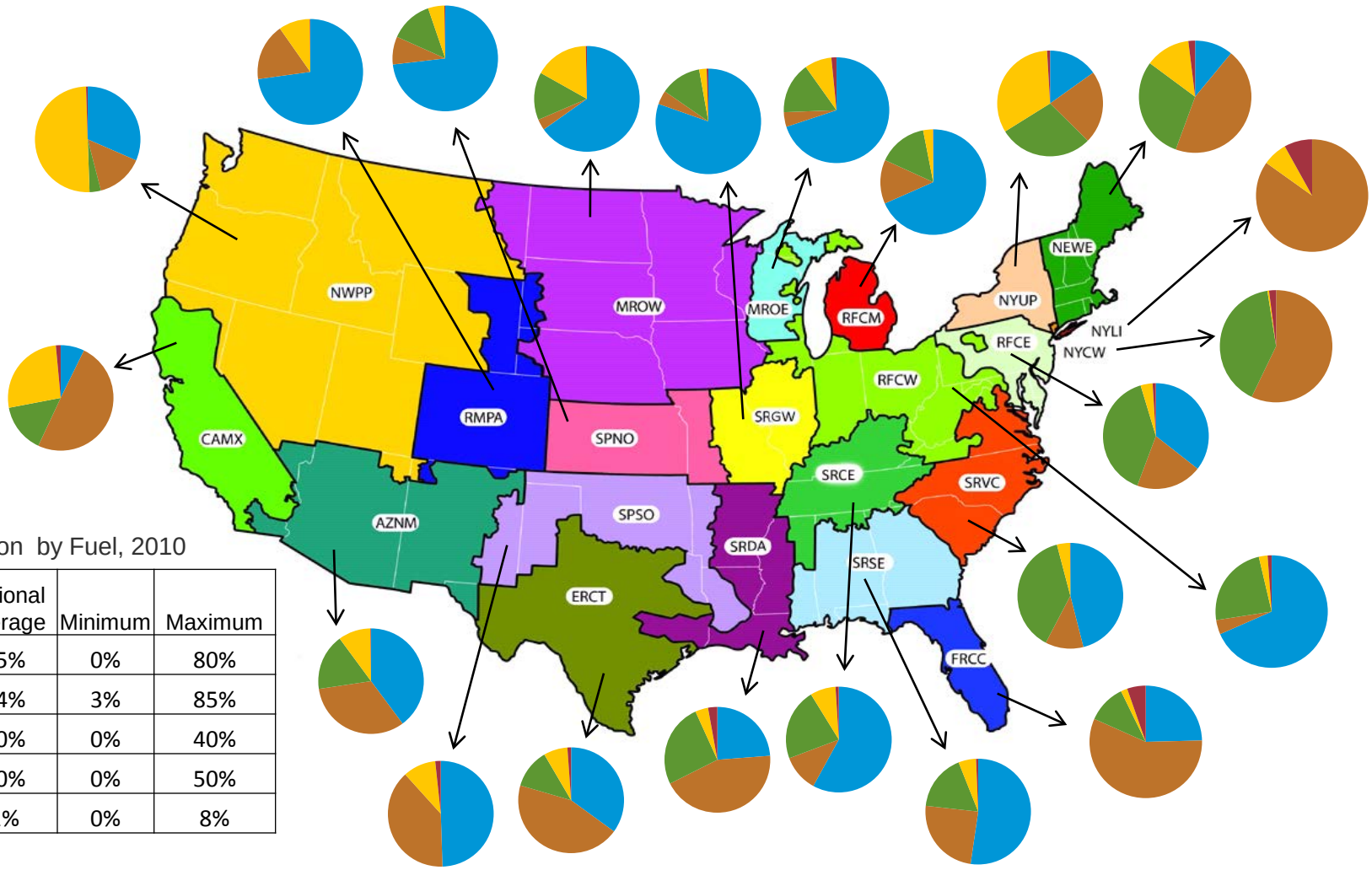
Source: EIA, Annual Energy Outlook 2012 Early Release

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



Source: EIA, Annual Energy Outlook 2012 Early Release

The fuel mix for electricity generation by region (2010)

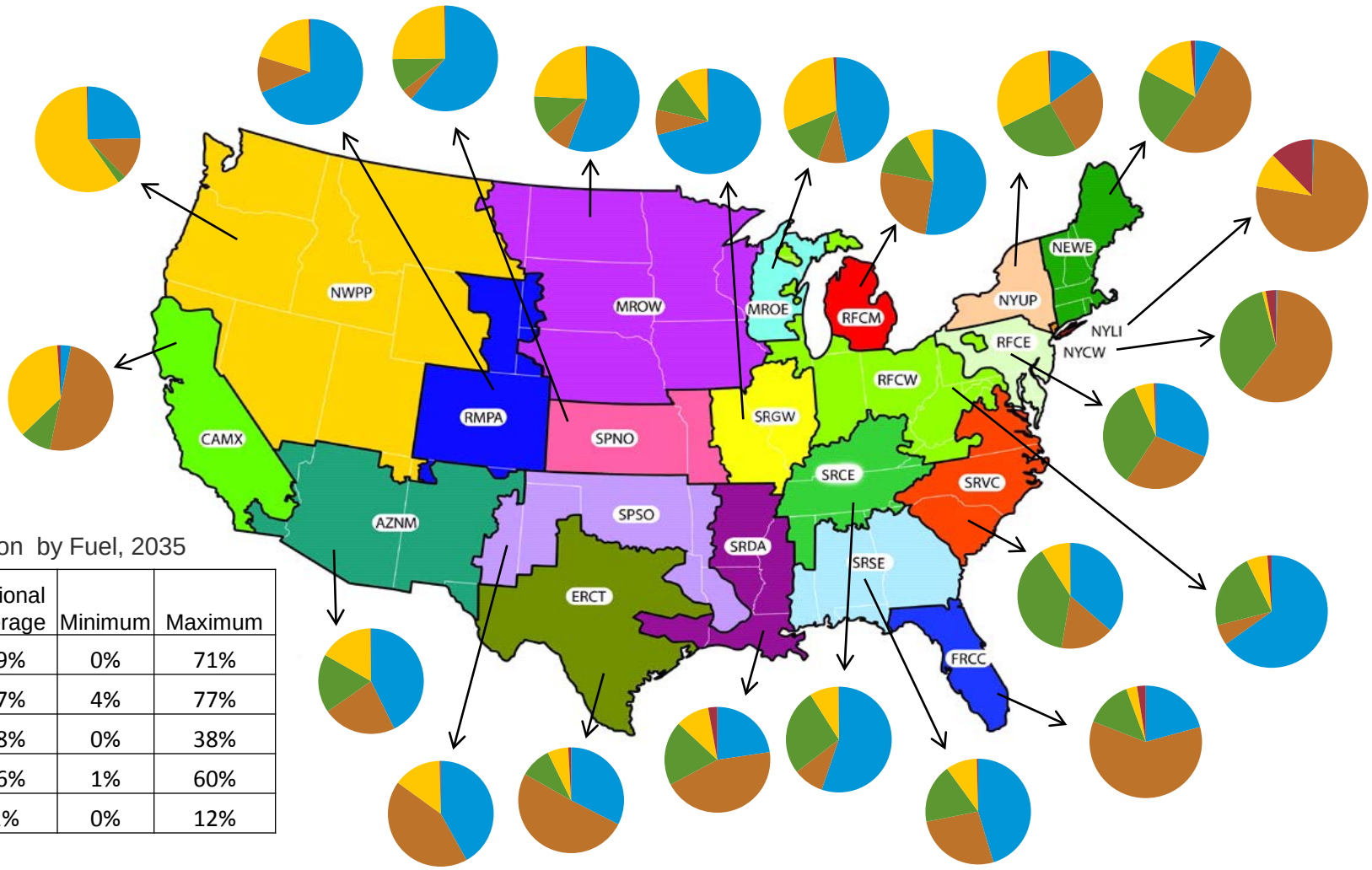


Share of Generation by Fuel, 2010

	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)



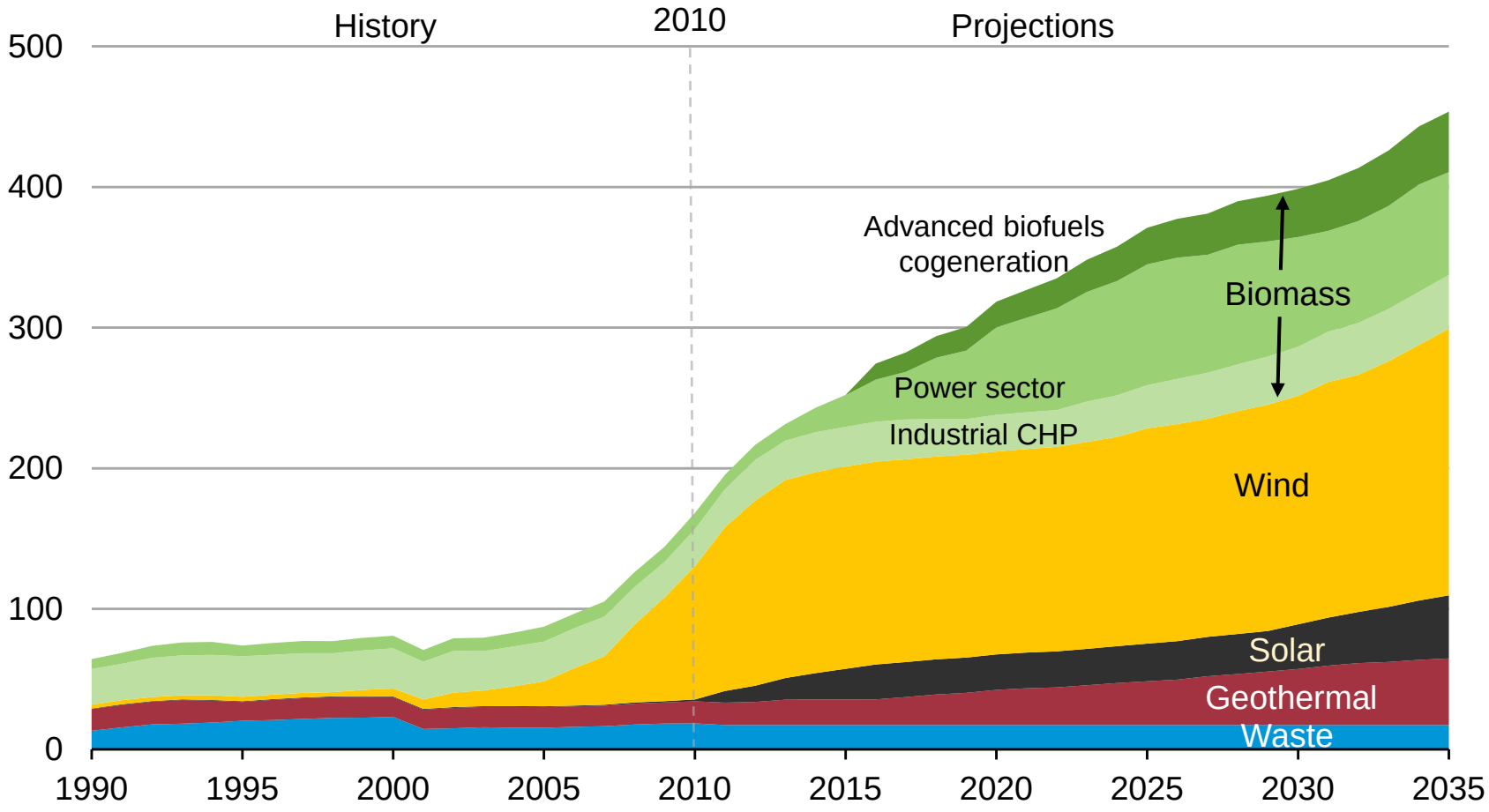
Share of Generation by Fuel, 2035

	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)

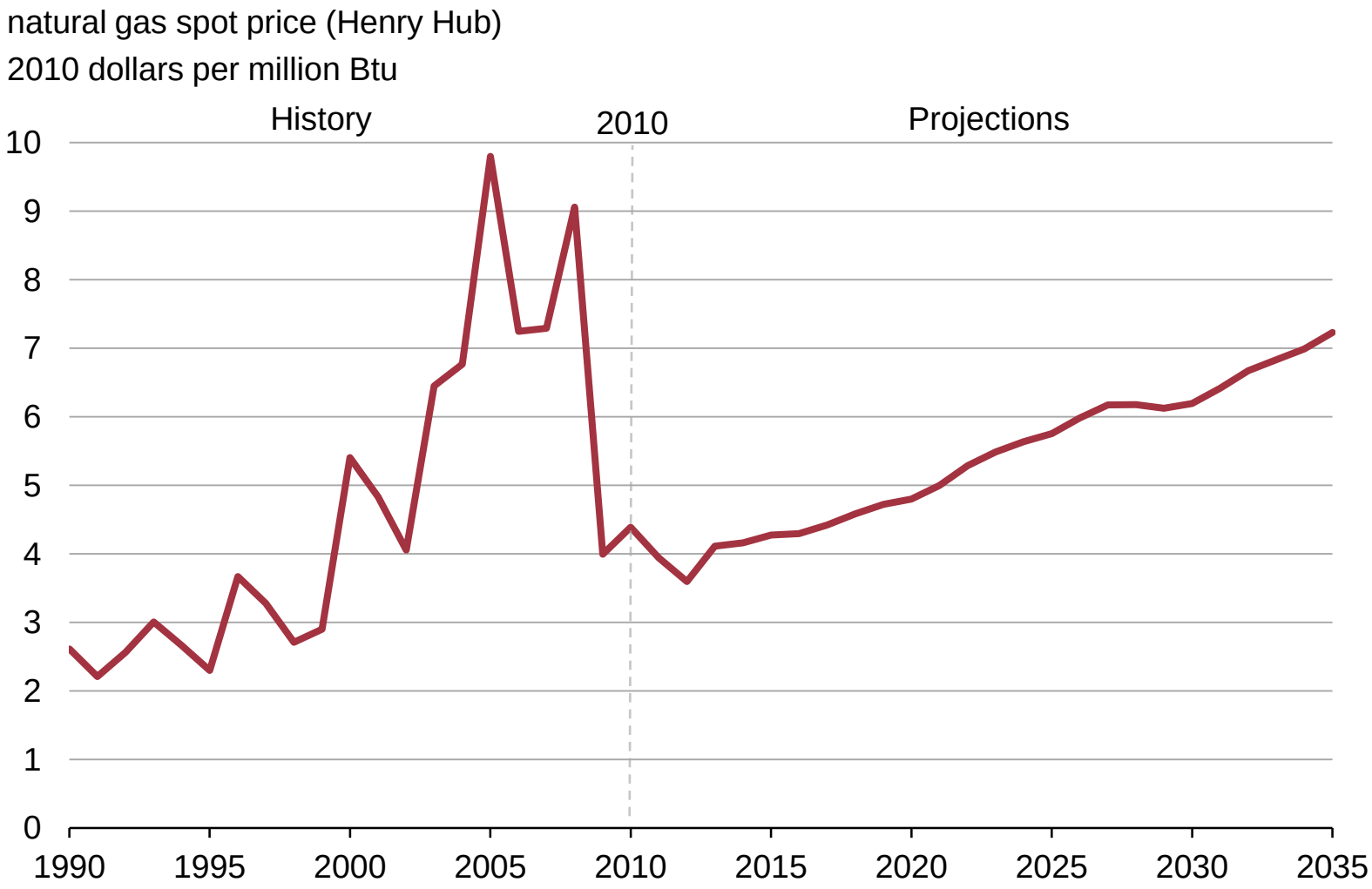
Non-hydro renewable sources more than double between 2010 and 2035

non-hydropower renewable generation
billion kilowatthours per year



Source: EIA, Annual Energy Outlook 2012 Early Release

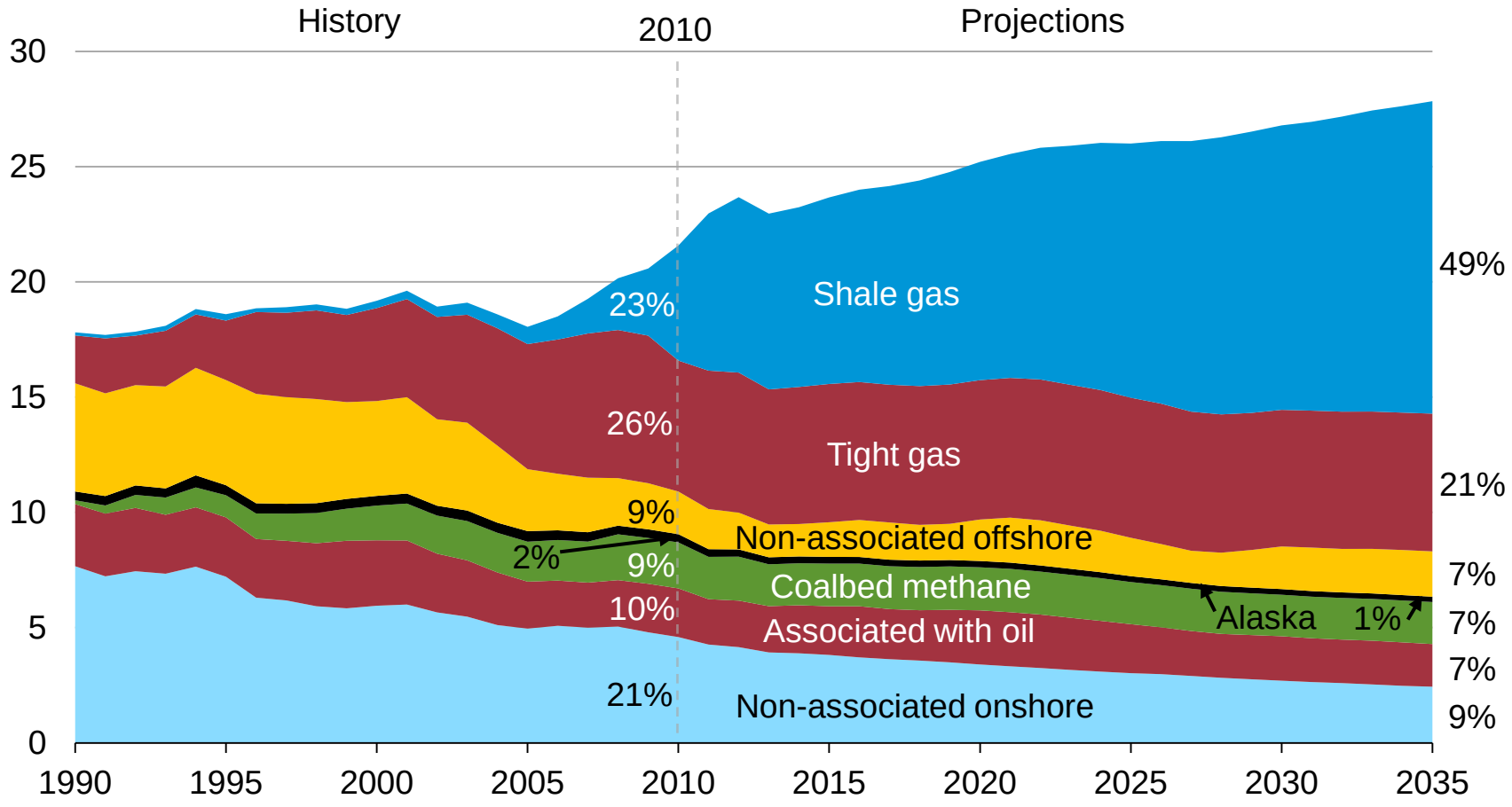
EIA's natural gas price projections are slightly lower than in *AEO2011*, consistent with recent market developments



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

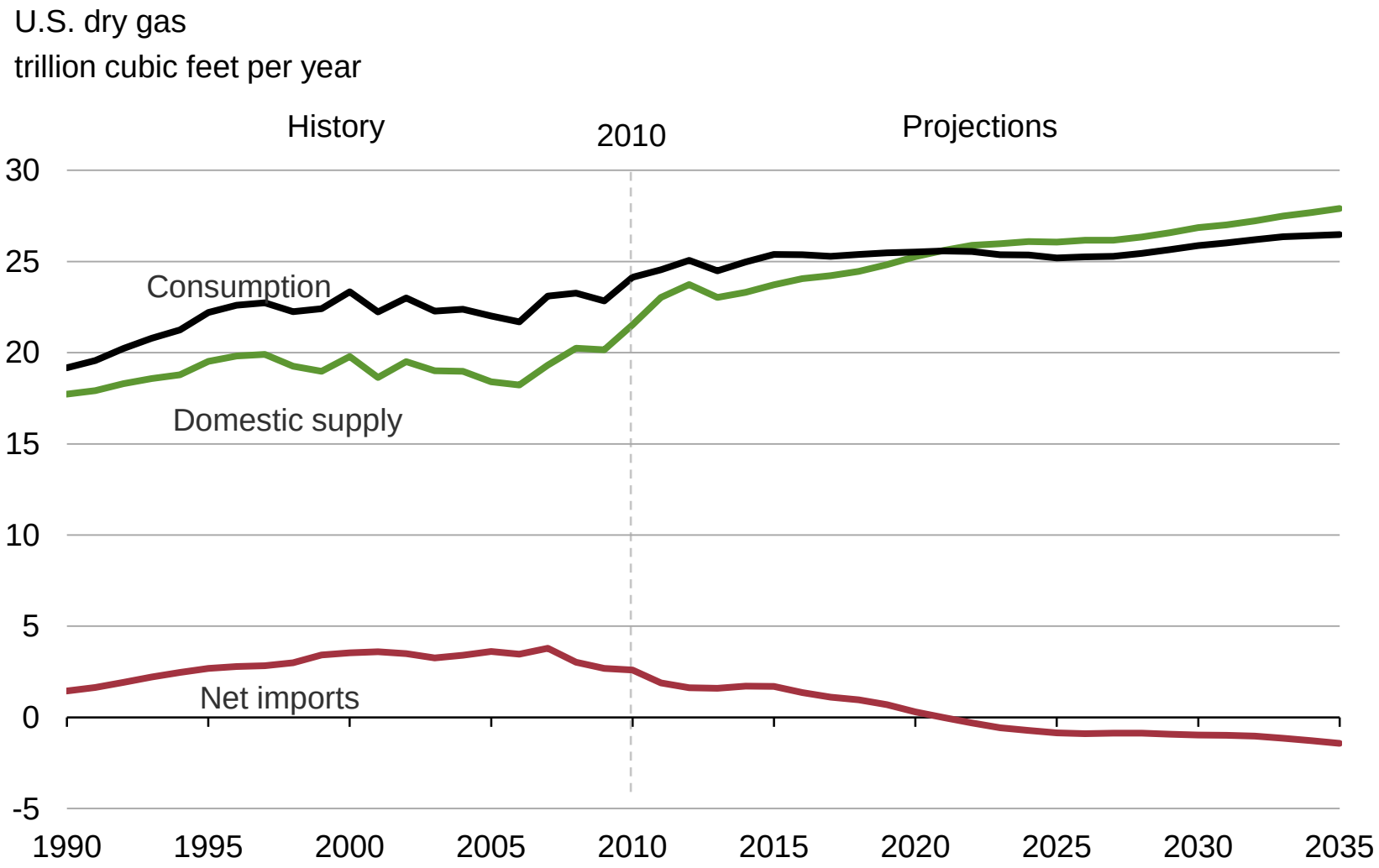
Shale gas offsets declines in other U.S. natural gas production sources

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



Source: EIA, Annual Energy Outlook 2012 Early Release

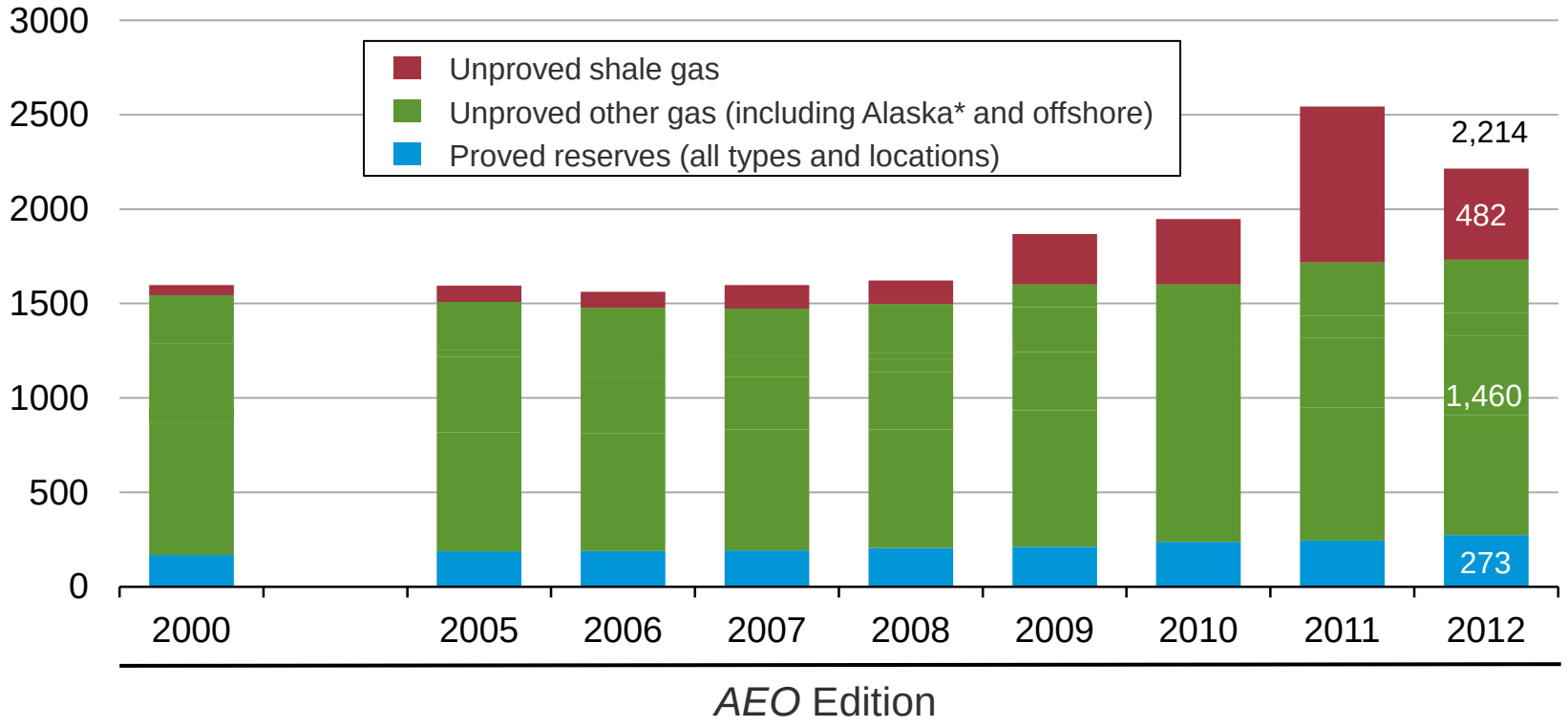
Domestic natural gas production grows faster than consumption



Source: EIA, Annual Energy Outlook 2012 Early Release

Technically recoverable natural gas resources reflect updated assessments

U.S. dry gas resources
trillion cubic feet

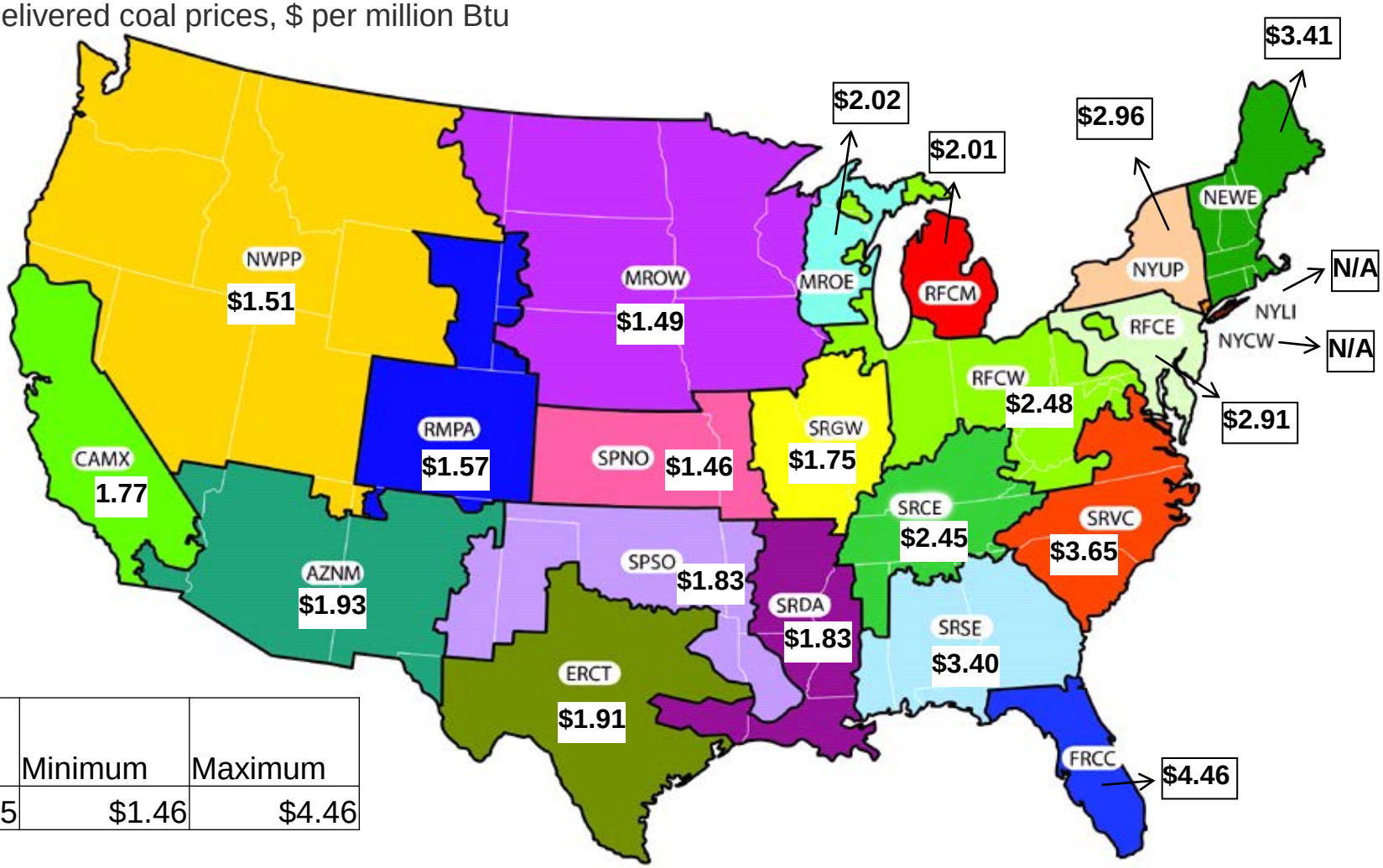


**Alaska resource estimates prior to AEO2009 reflect resources from the North Slope that were not included in previously published documentation.*

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

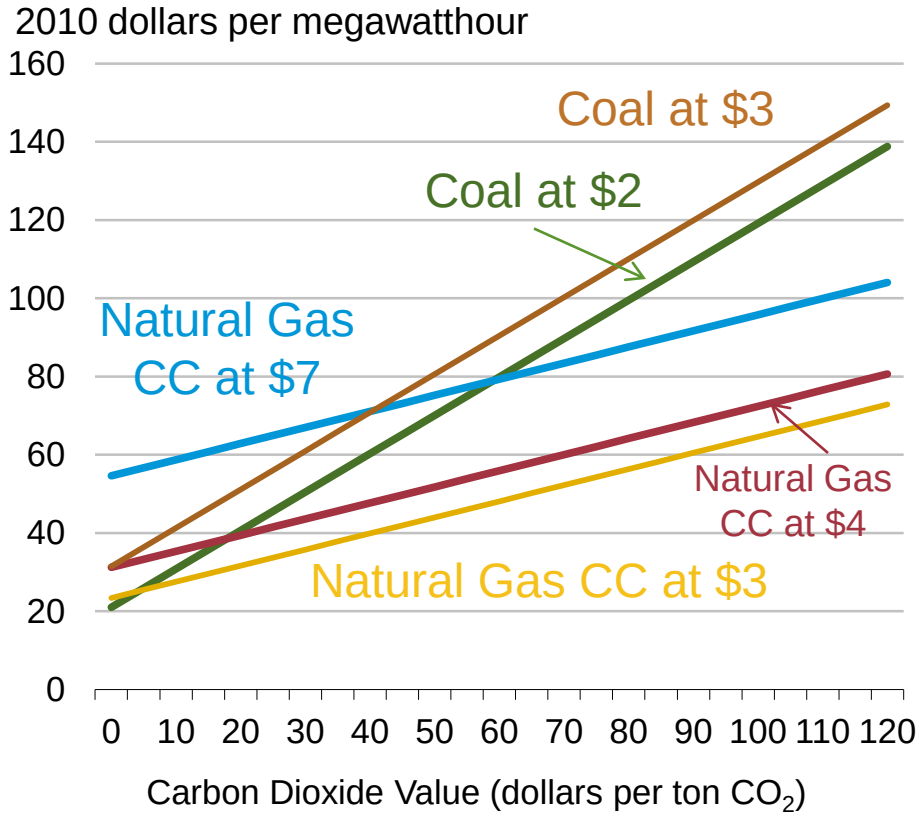


National Average	Minimum	Maximum
$2.25	$1.46	$4.46

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

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

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

Annual Energy Review | www.eia.gov/totalenergy/data/annual