

The U.S. Energy Future



for

Institute of Clean Air Companies

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by

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

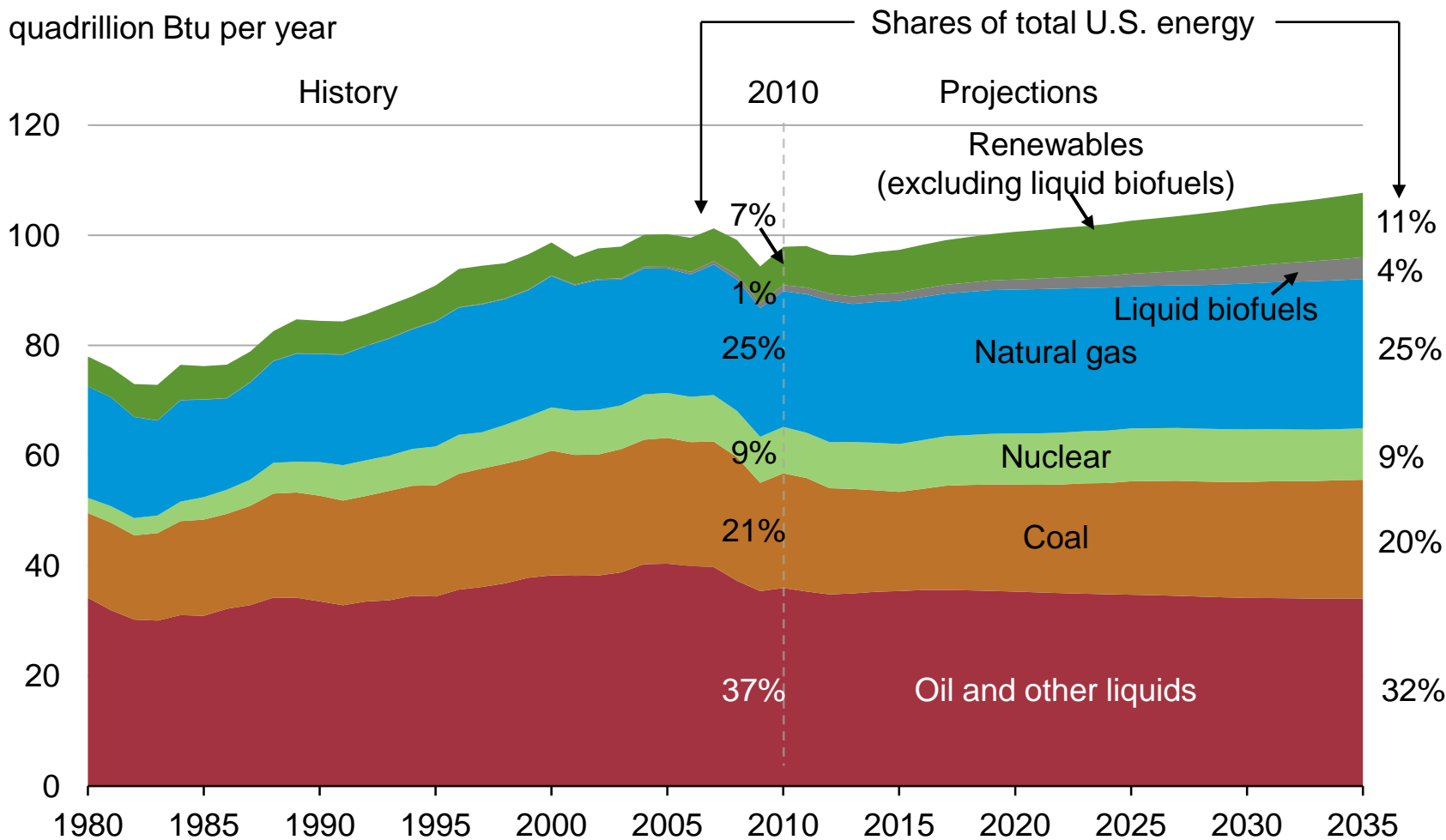
- Projected growth of energy use slows over the projection period reflecting an extended economic recovery and increasing energy efficiency in end-use applications
- Domestic crude oil production increases, reaching levels not experienced since 1994 by 2020
- With modest economic growth, increased efficiency, 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 CO₂-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

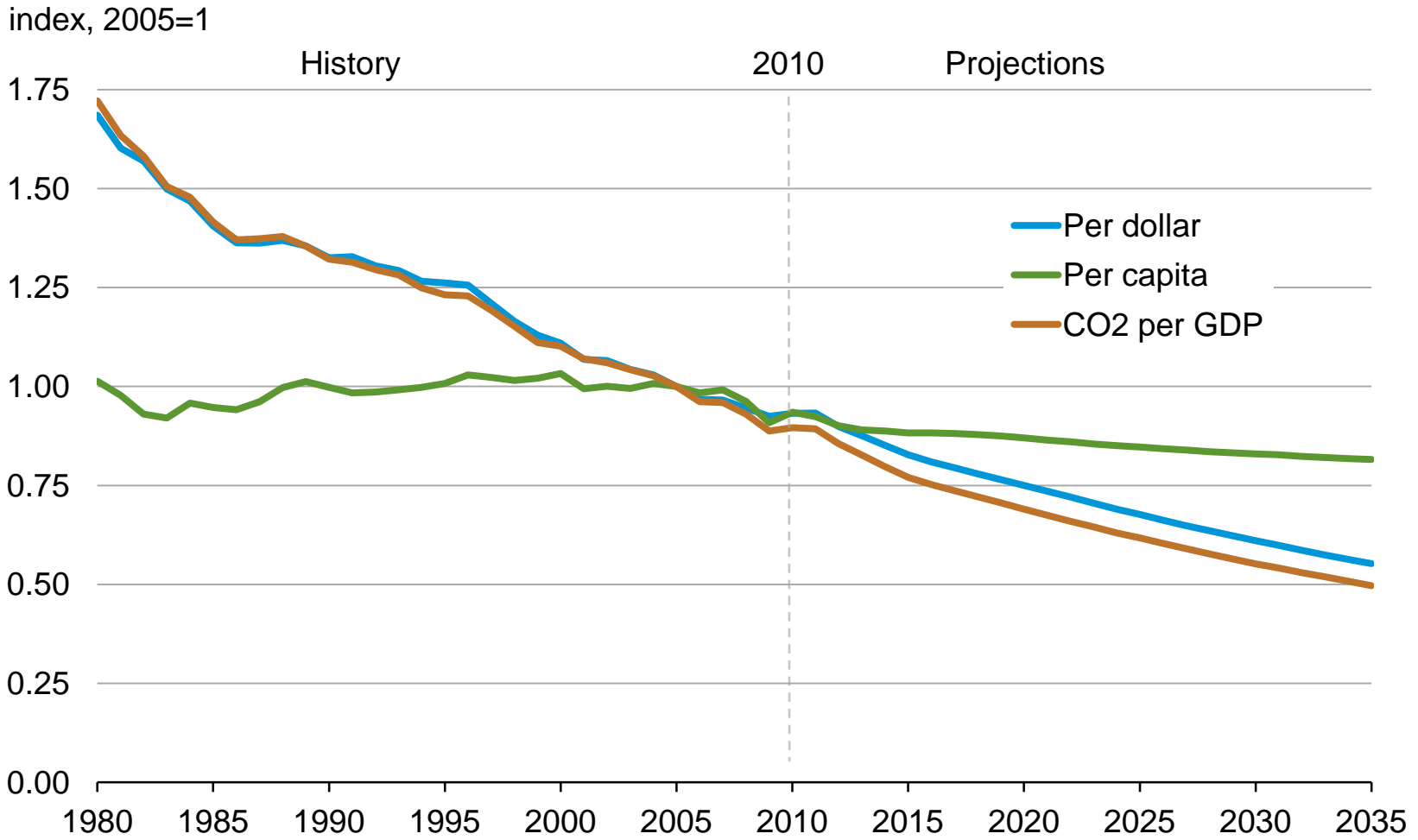
Energy use grows slowly over the projection in response to a slow and extended economic recovery and improving energy efficiency

U.S. primary energy consumption
quadrillion Btu per year



Source: EIA, Annual Energy Outlook 2012 Early Release

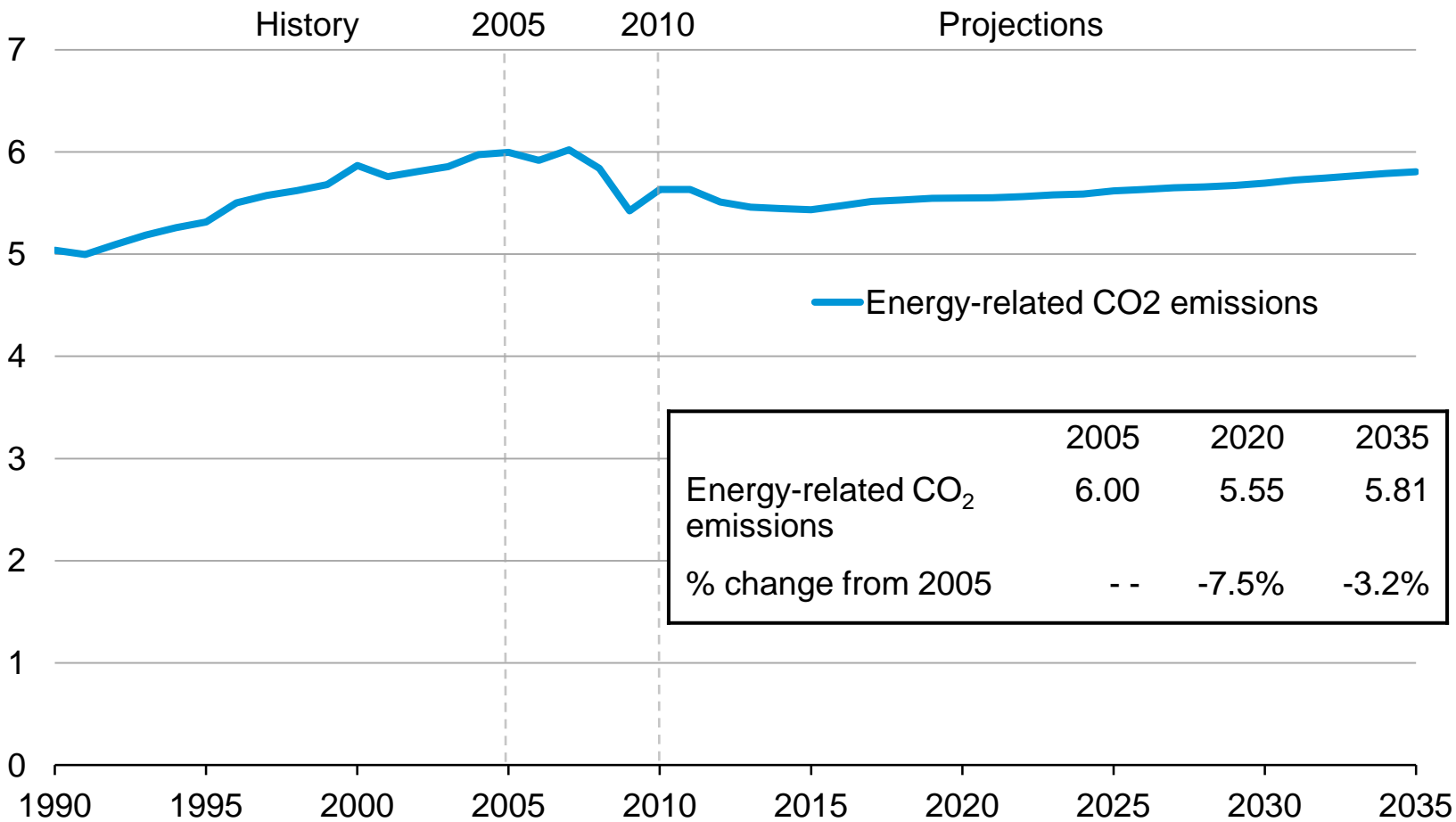
Energy and CO₂ per dollar of GDP continue to decline; per-capita energy use also declines



Source: EIA, Annual Energy Outlook 2012 Early Release

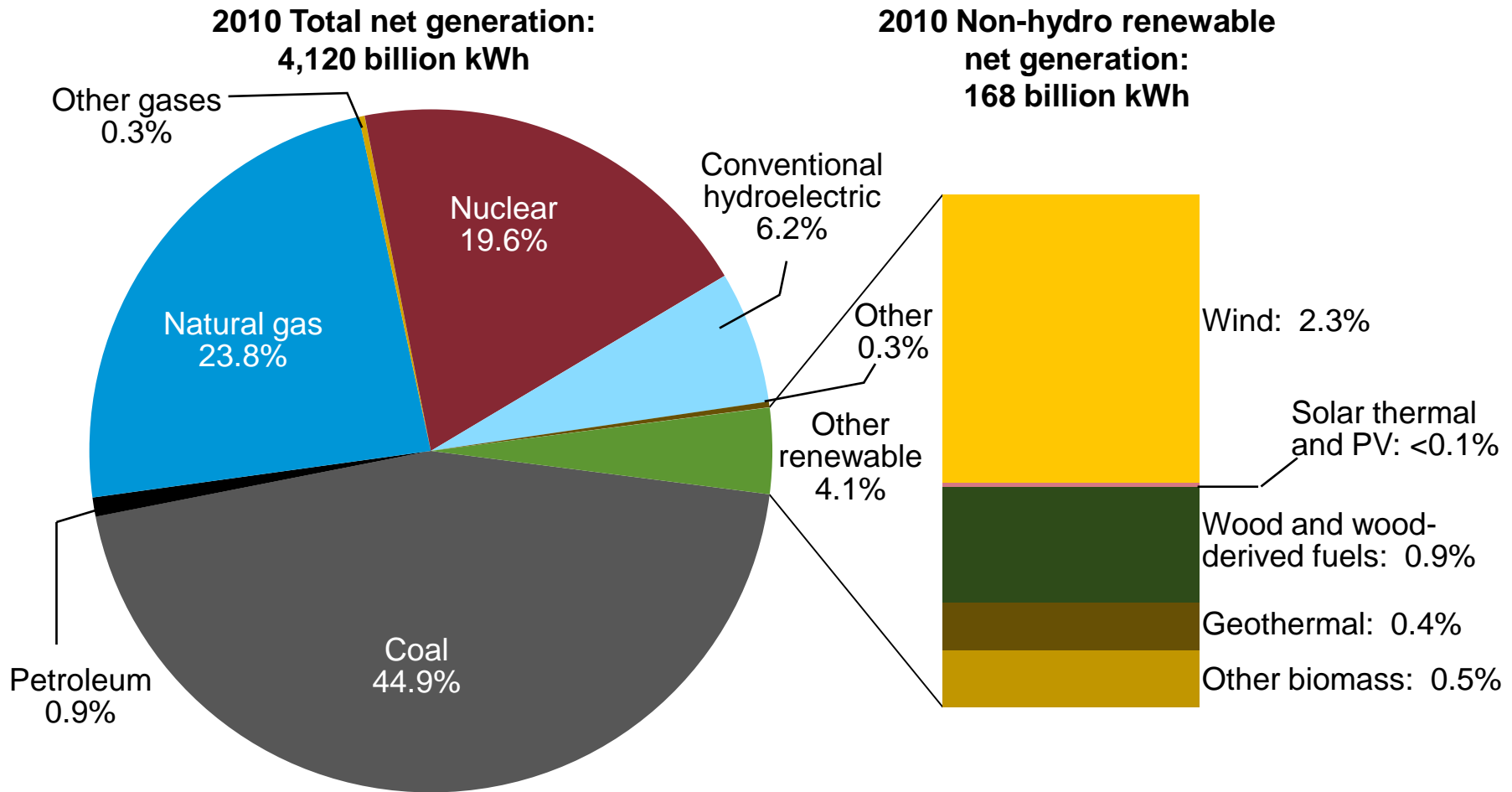
In the *AEO2012* Reference case, energy-related CO₂ emissions never get back to pre-recession levels by 2035

billion metric tons carbon dioxide



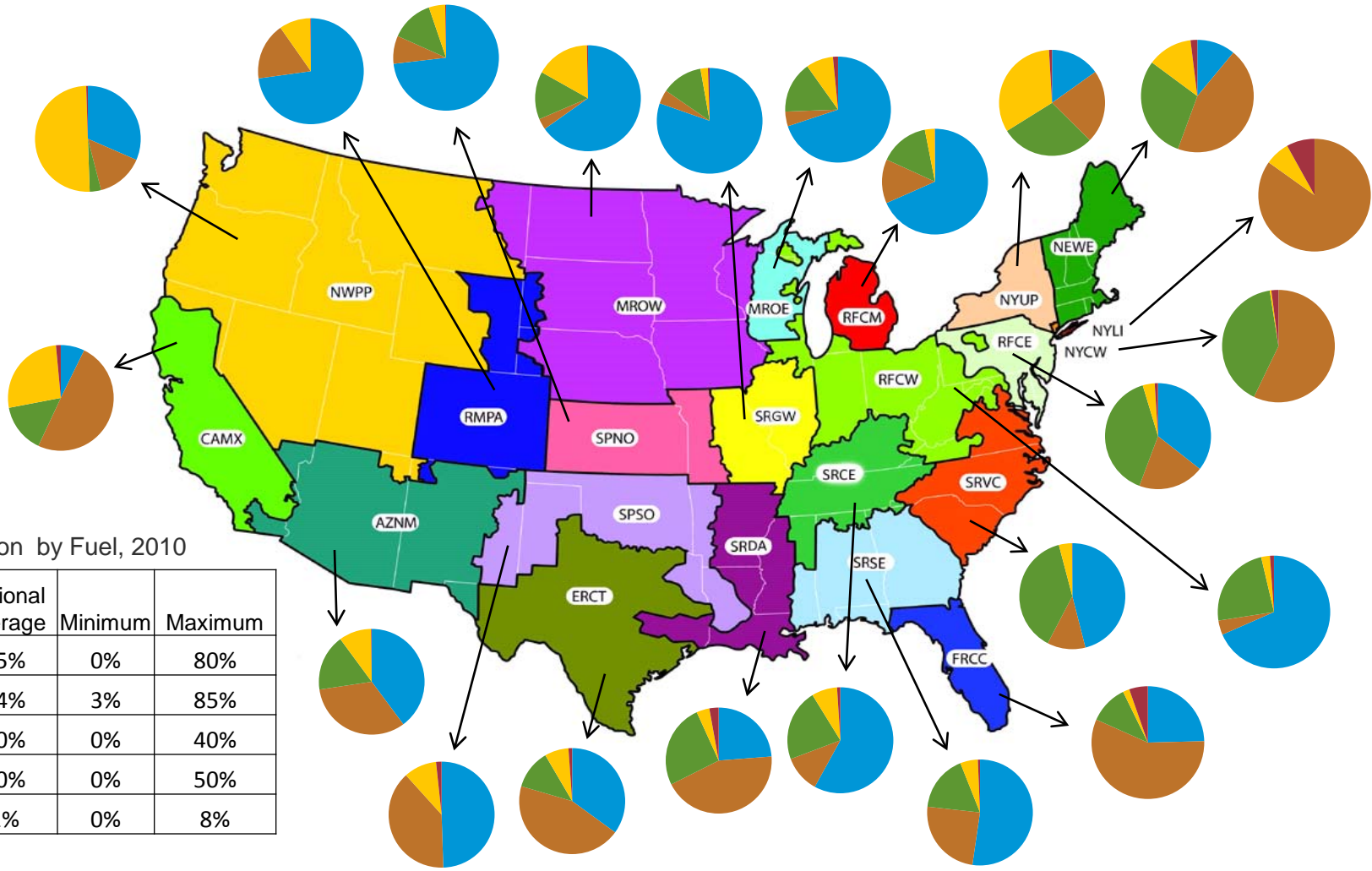
Source: EIA, Annual Energy Outlook 2012 Early Release

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



Source: EIA, Annual Energy Review, October 2011

The fuel mix for electricity generation varies widely across U.S. regions



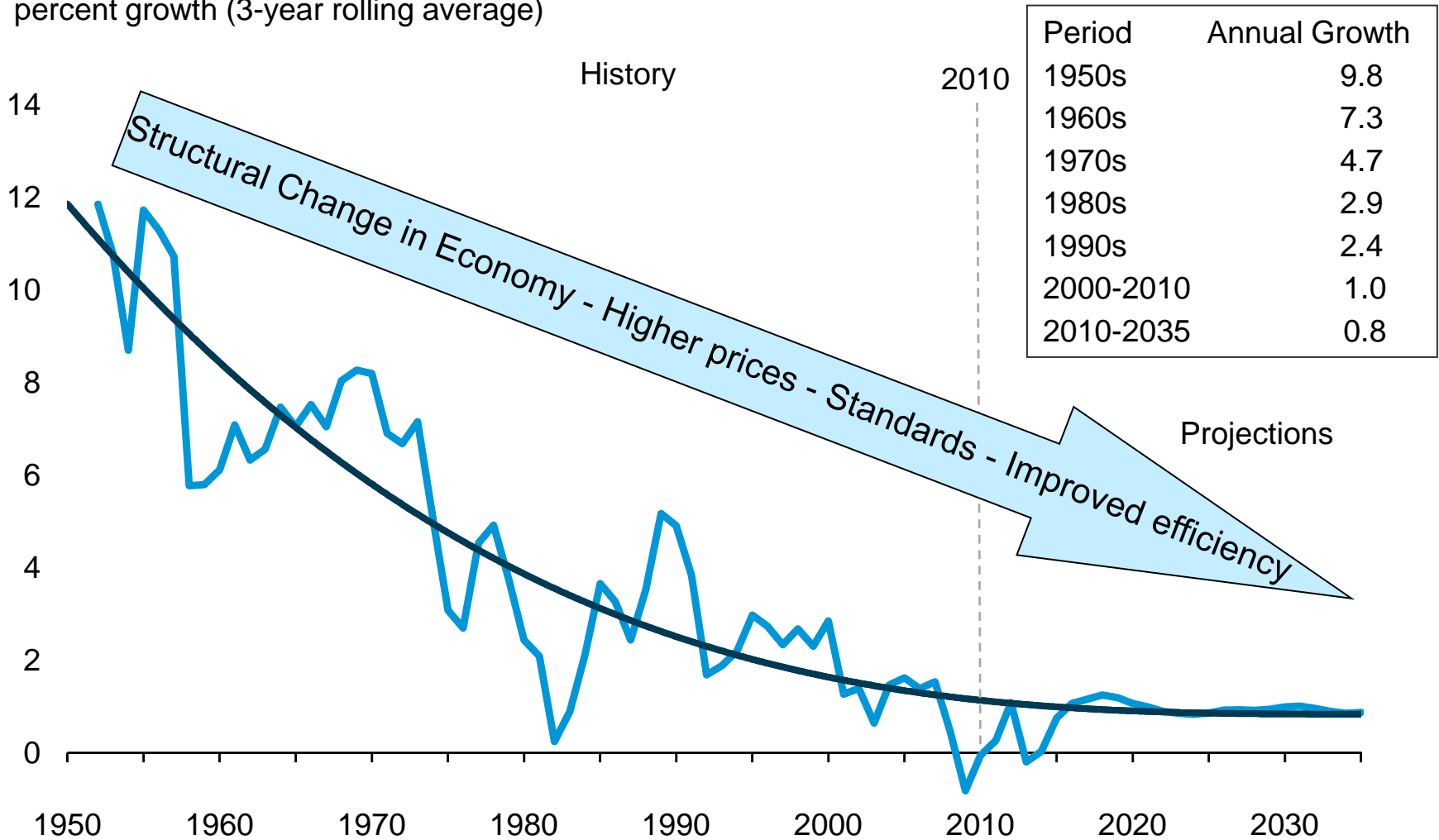
Share of Generation by Fuel, 2010

	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: Annual Energy Outlook 2012 Early Release,

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

percent growth (3-year rolling average)

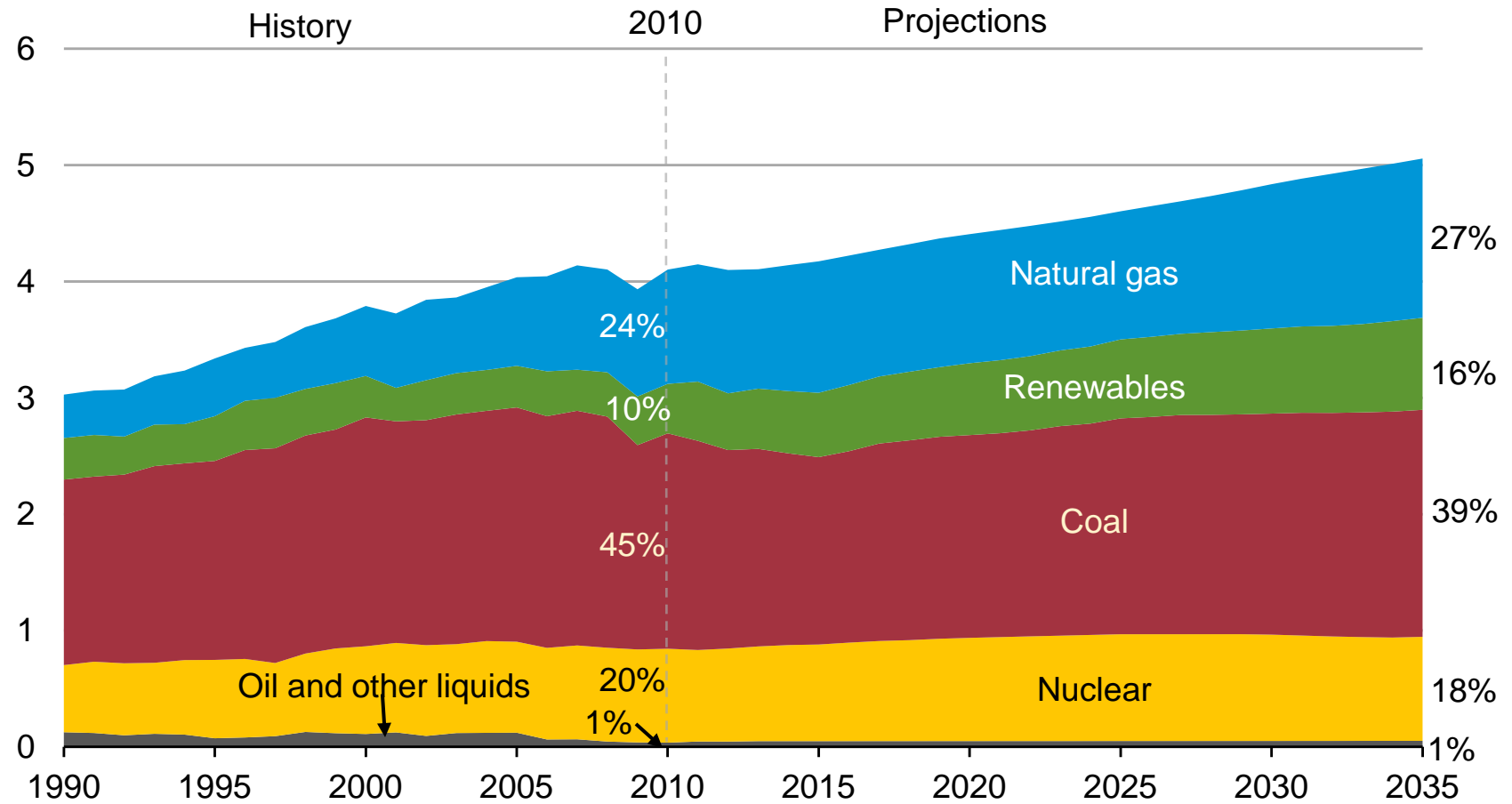


Source: EIA, Annual Energy Outlook 2012 Early Release

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

electricity net generation

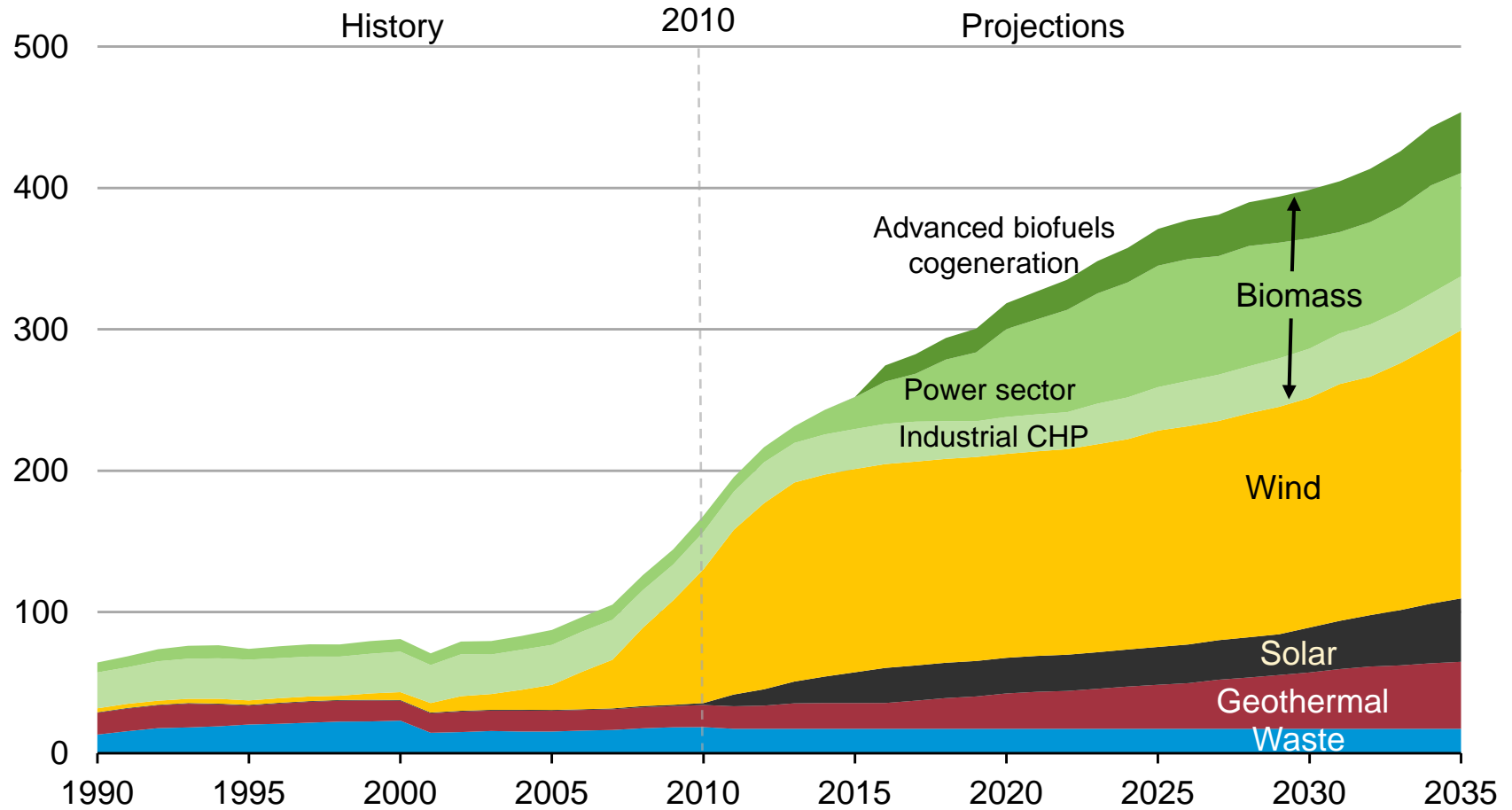
trillion kilowatthours per year



Source: EIA, Annual Energy Outlook 2012 Early Release

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

Examples of updated environmental retrofit costs

Flue Gas Desulfurization (2010\$/kW)		
	Capital Costs (\$/kW)	VOM (\$/MWh)
300 MW	\$602	\$1.72
500 MW	\$521	
700 MW	\$474	

Selective Catalytic Reduction (2010 \$/kW)		
	Capital Costs (\$/kW)	VOM (\$/MWh)
300 MW	\$203	\$1.30
500 MW	\$185	
700 MW	\$177	

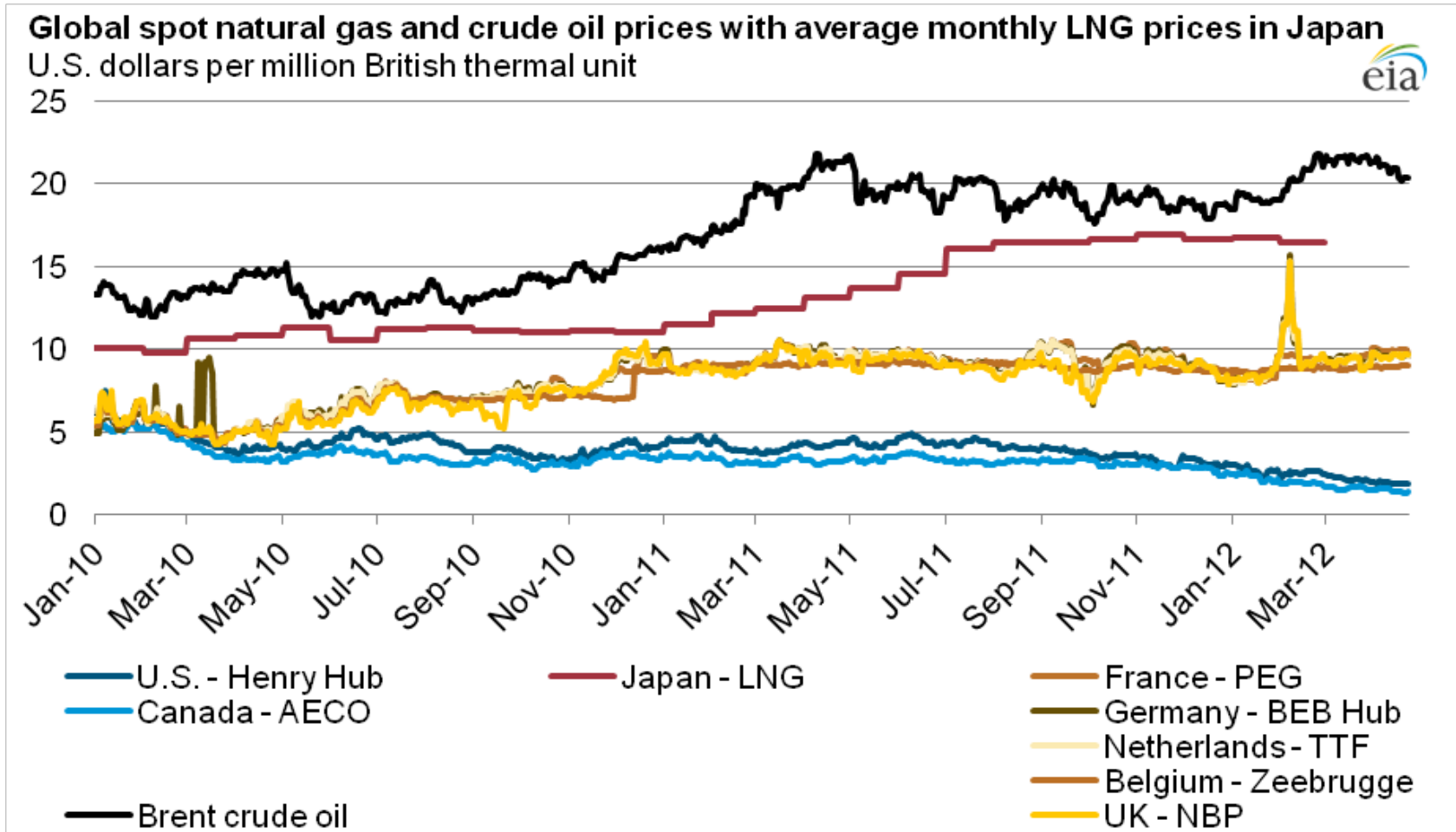
Dry Sorbent Injection + Full Fabric Filter (Baghouse) (2010\$/kW)		
Size (MW)	Capital Cost (\$/kW)	VOM (\$/MWh)
300	197	6.72
500	180	
700	171	

Source: EPA IPM v4.1 Documentation

<http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/suppdoc.pdf>

<http://www.epa.gov/airmarkt/progsregs/epa-ipm/docs/v410/Chapter5.pdf>

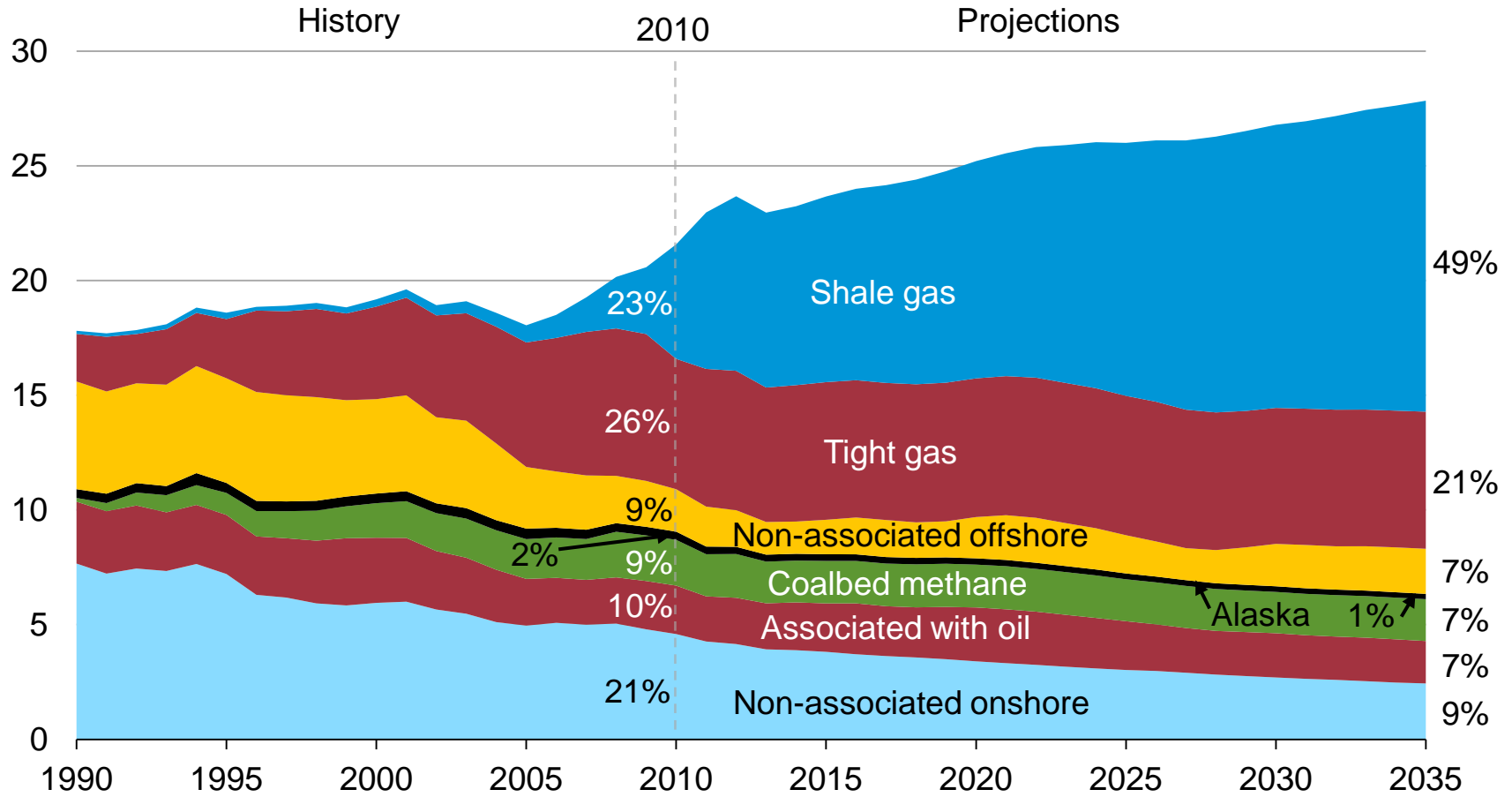
Global spot natural gas and crude oil prices with average monthly LNG prices in Japan



Source: EIA , based on Bloomberg as of 4/23/2012

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

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

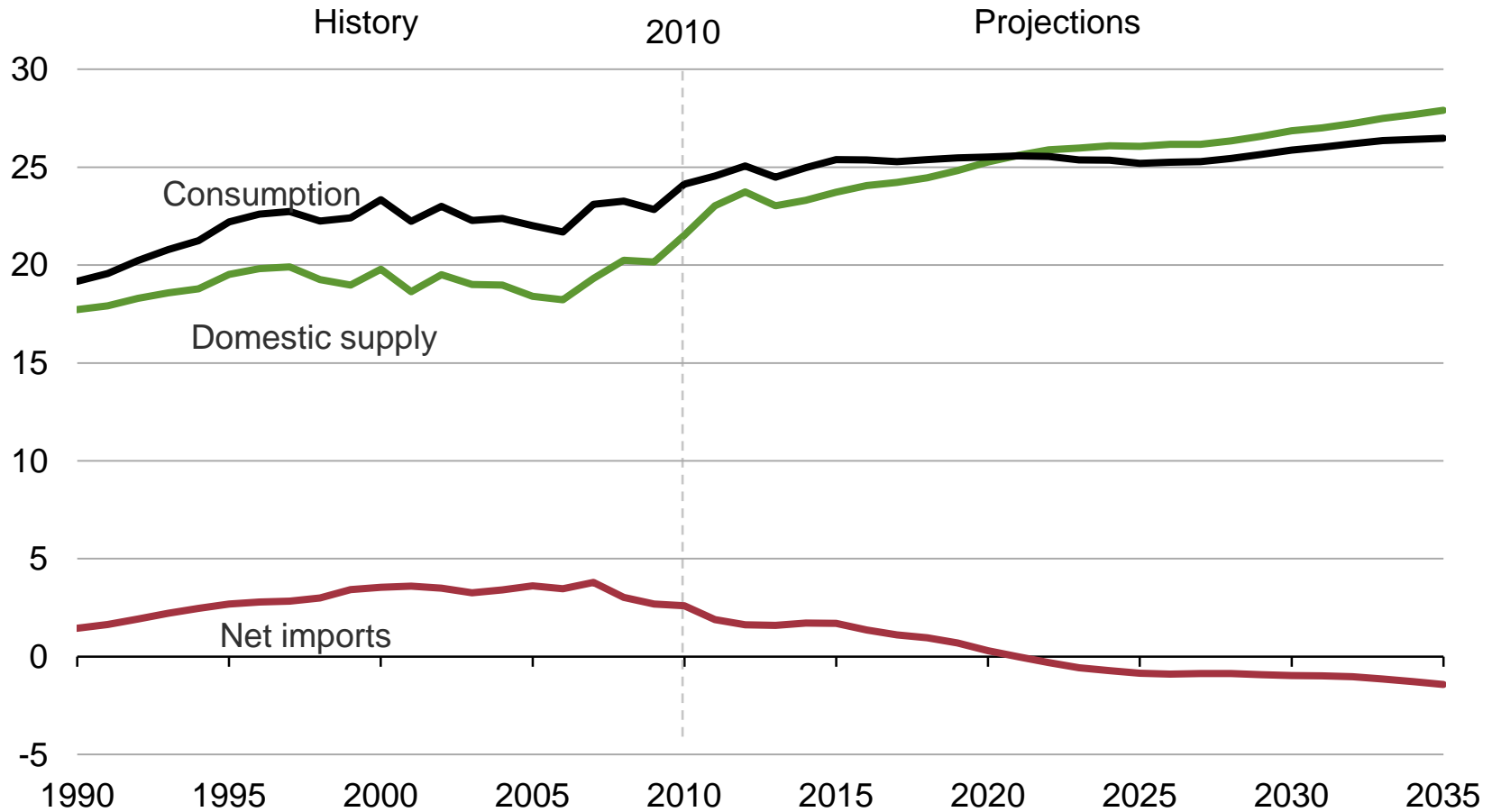


Source: EIA, Annual Energy Outlook 2012 Early Release

Domestic natural gas production grows faster than consumption

U.S. dry gas

trillion cubic feet per year

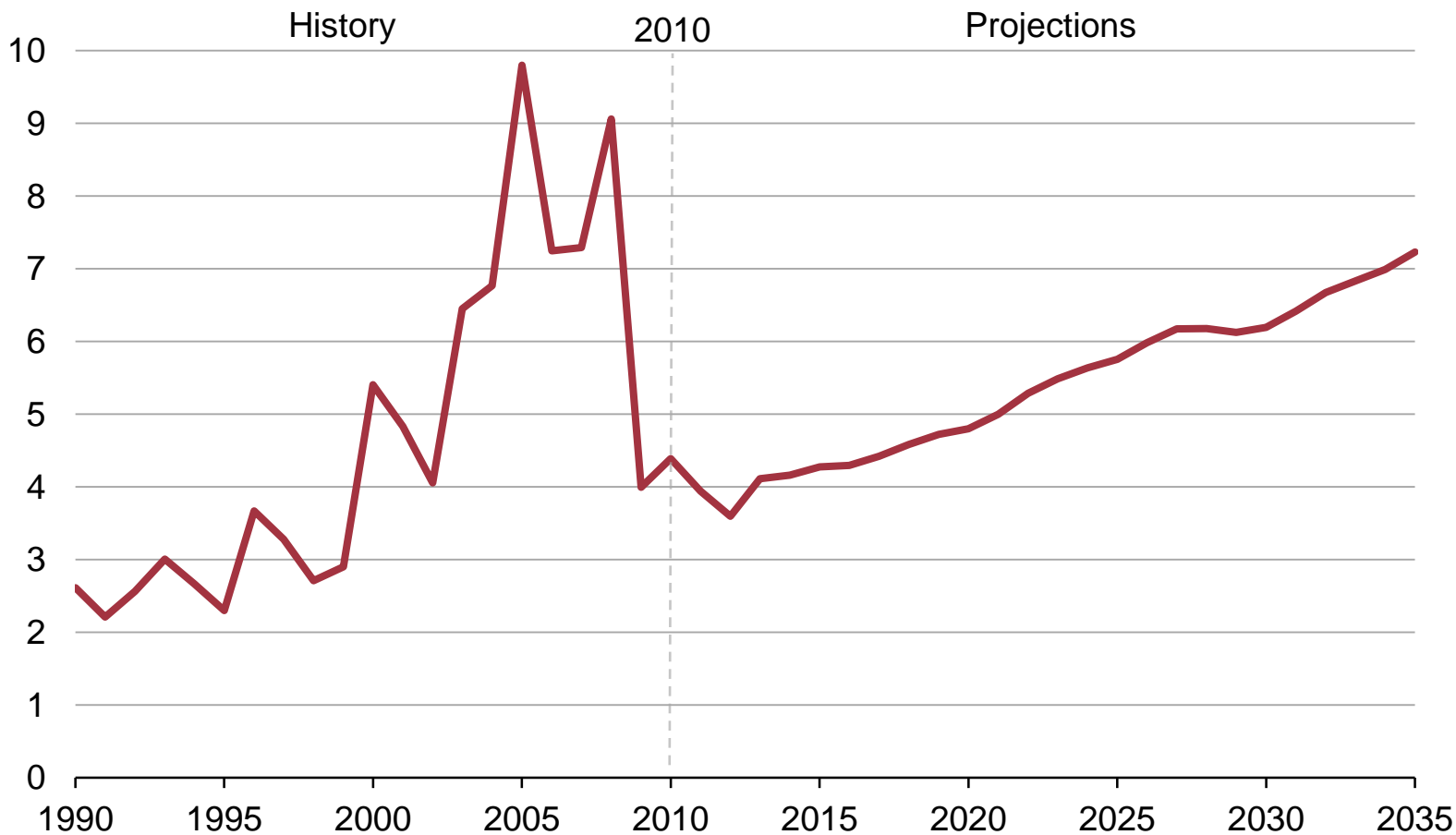


Source: EIA, Annual Energy Outlook 2012 Early Release

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

natural gas spot price (Henry Hub)

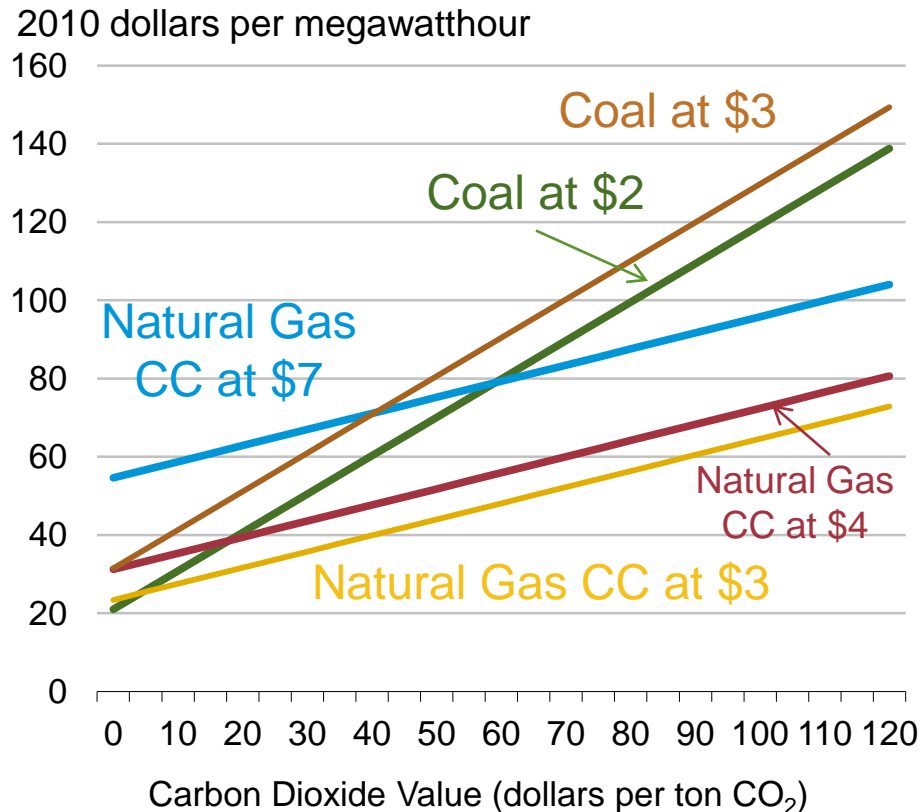
2010 dollars per million Btu



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

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

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