

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

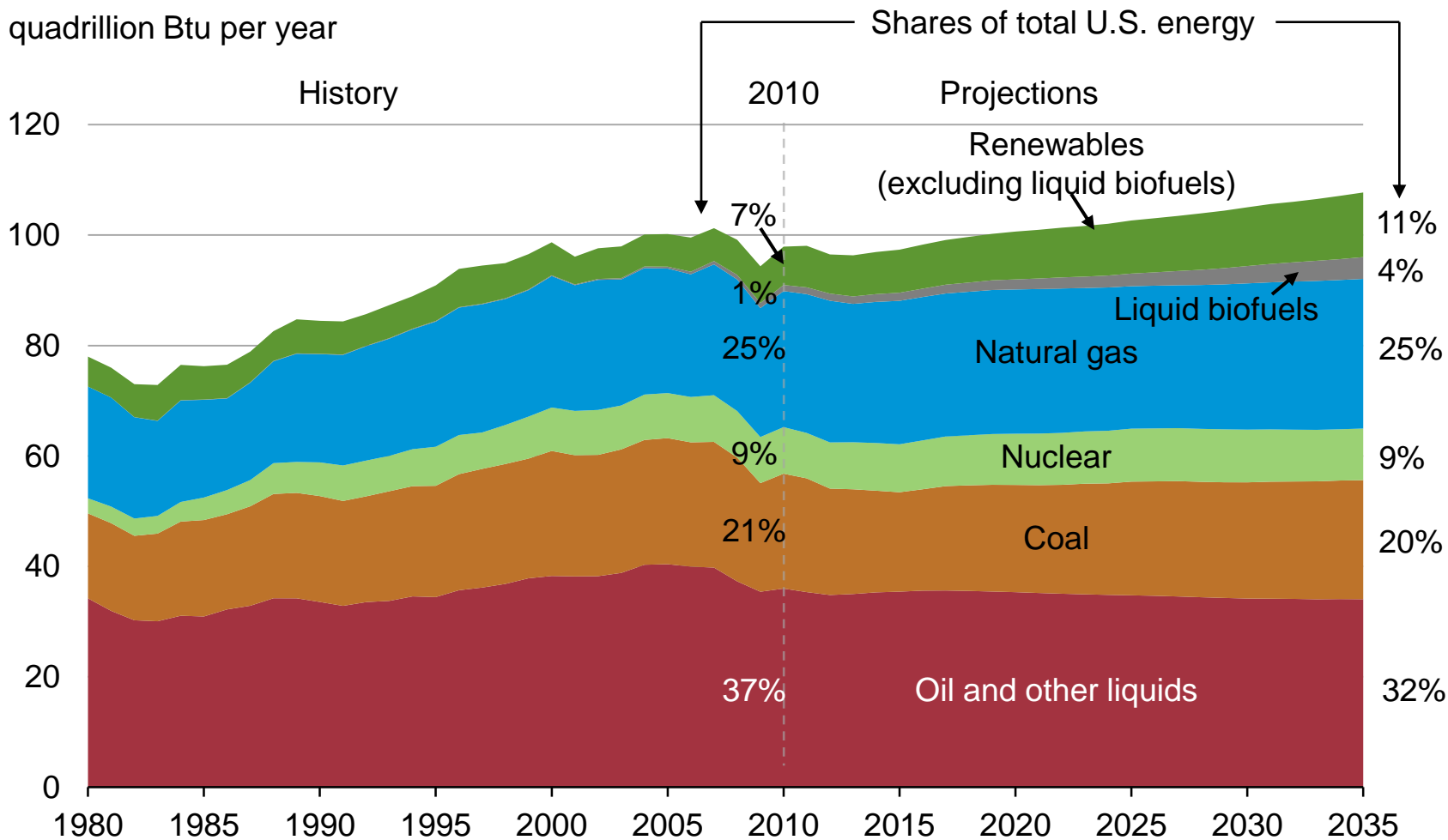
- Projected growth of energy use slows over the projection period reflecting an extended economic recovery and increasing energy efficiency in end-use applications
- Domestic crude oil production increases, reaching levels not experienced since 1994 by 2020
- With modest economic growth, increased efficiency,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

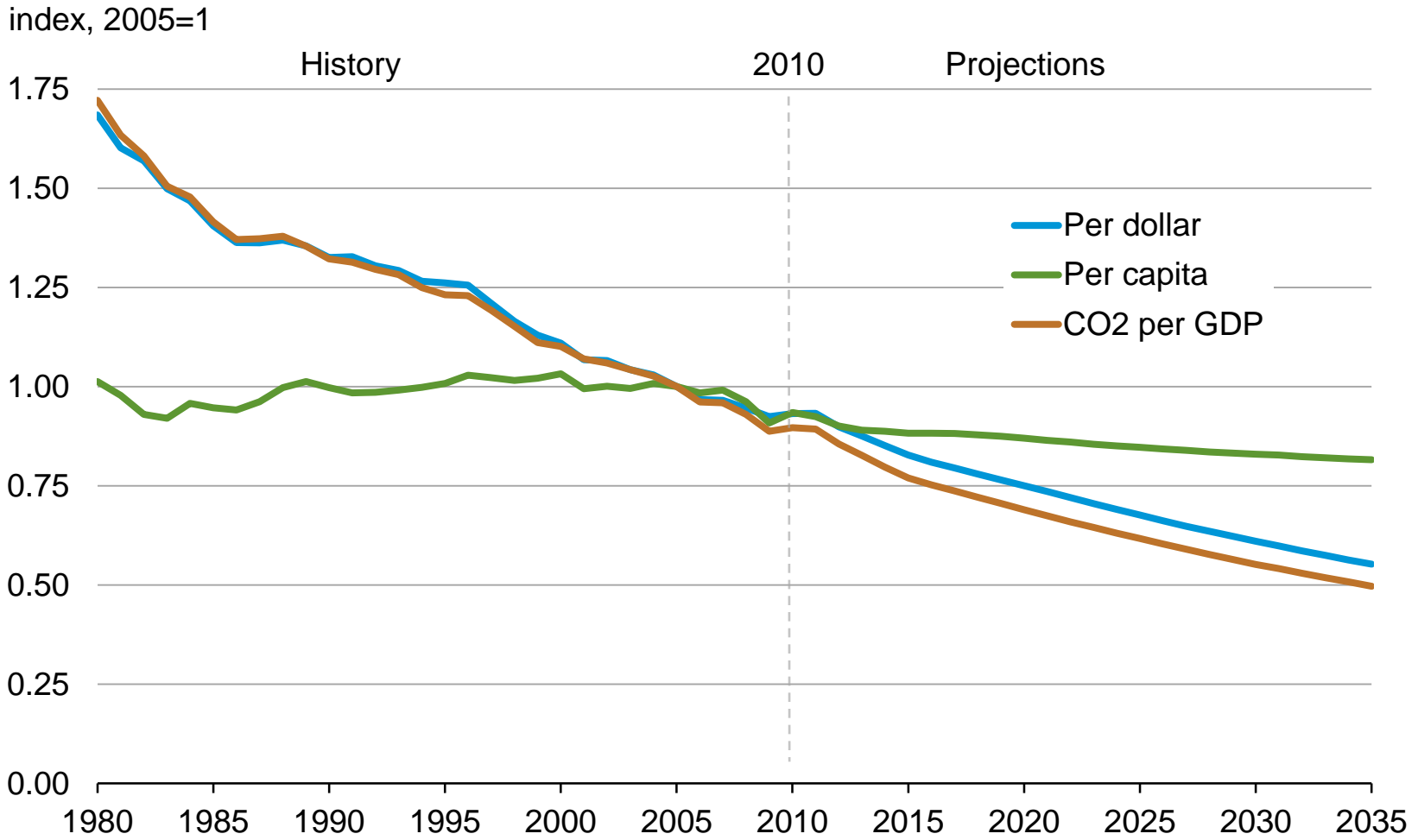
Energy use grows slowly over the projection in response to a slow and extended economic recovery and improving energy efficiency

U.S. primary energy consumption
quadrillion Btu per year



Source: EIA, Annual Energy Outlook 2012 Early Release

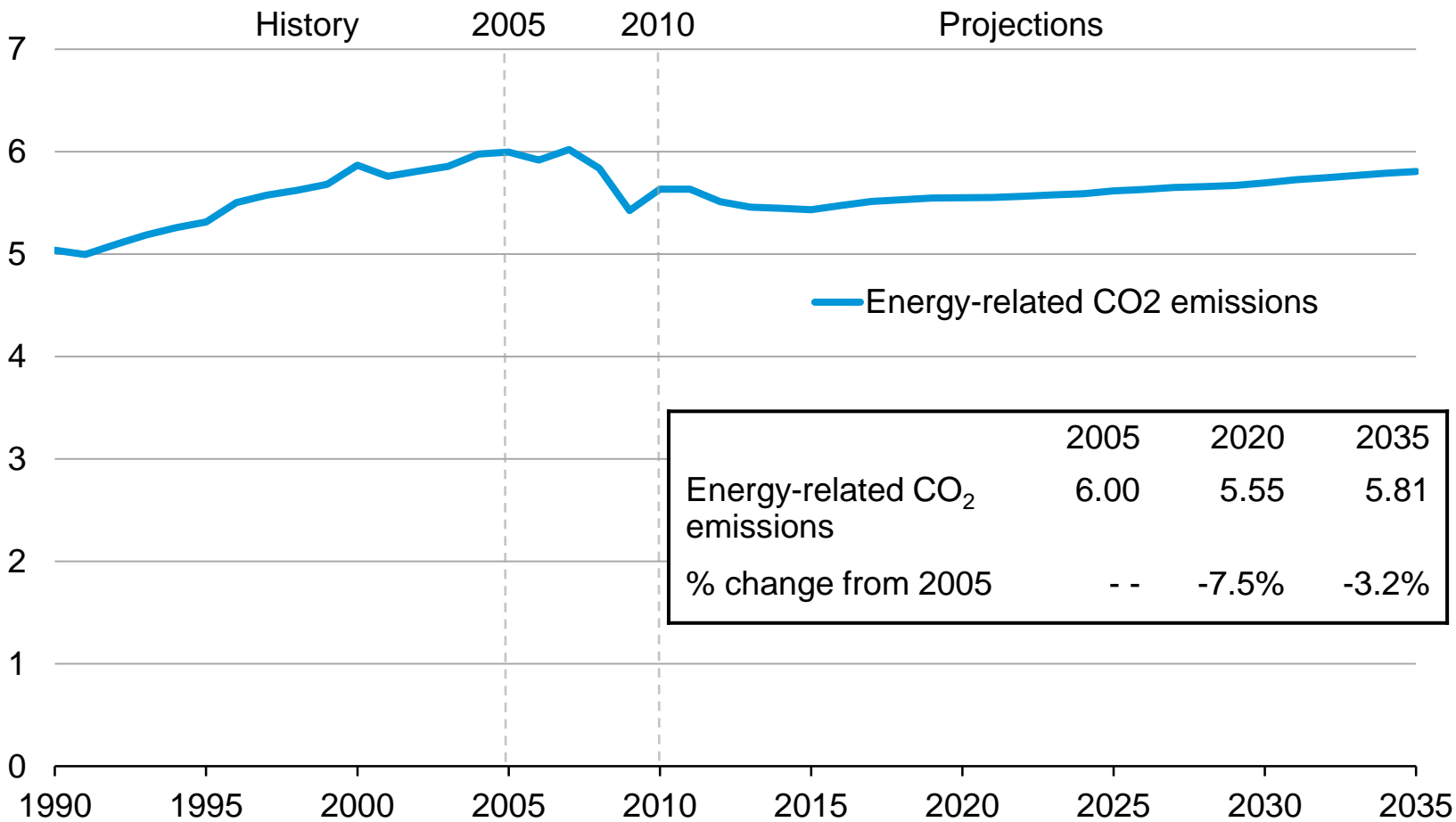
Energy and CO₂ per dollar of GDP continue to decline; per-capita energy use also declines



Source: EIA, Annual Energy Outlook 2012 Early Release

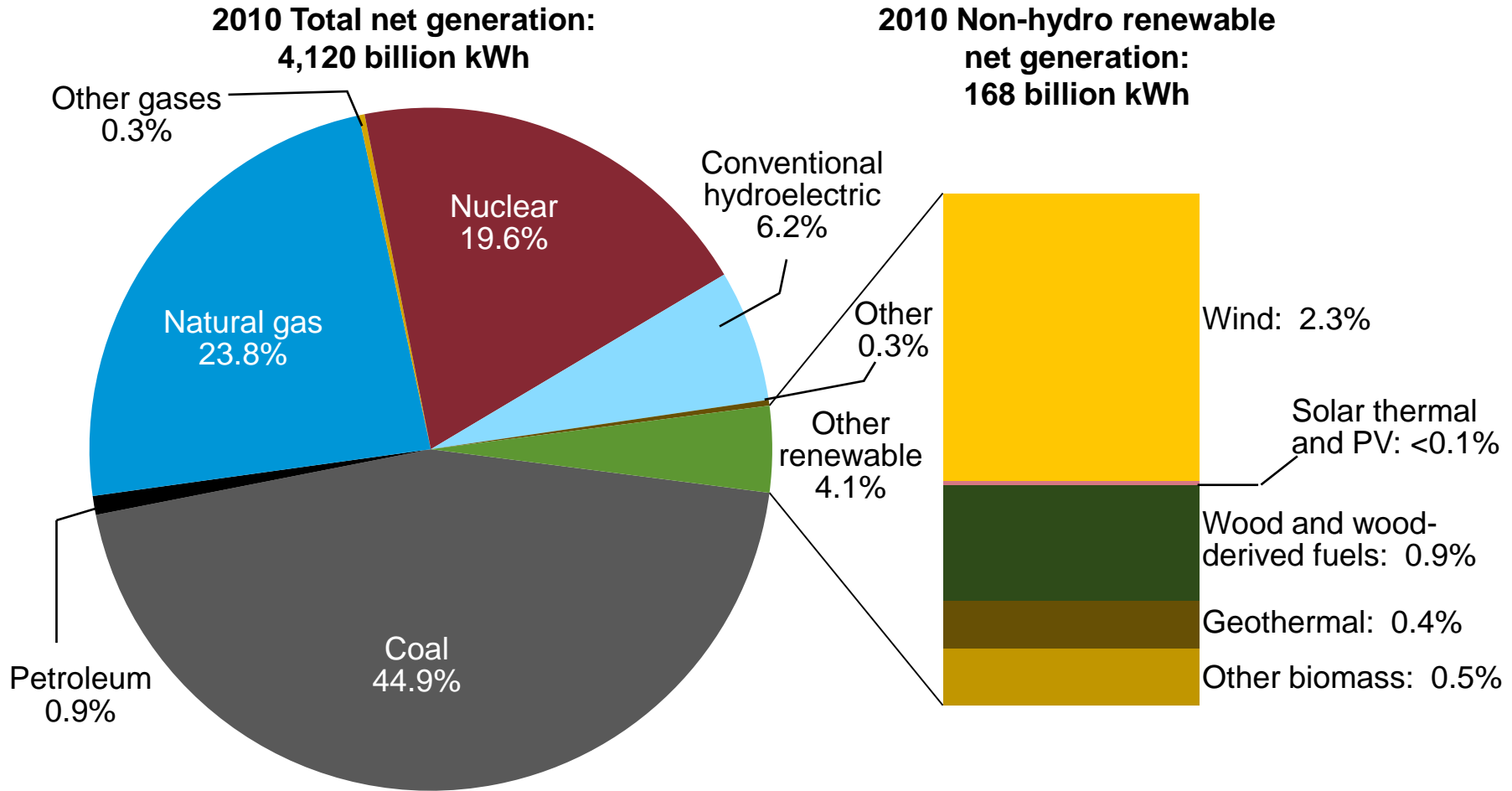
In the *AEO2012* Reference case, energy-related CO₂ emissions never get back to pre-recession levels by 2035

billion metric tons carbon dioxide



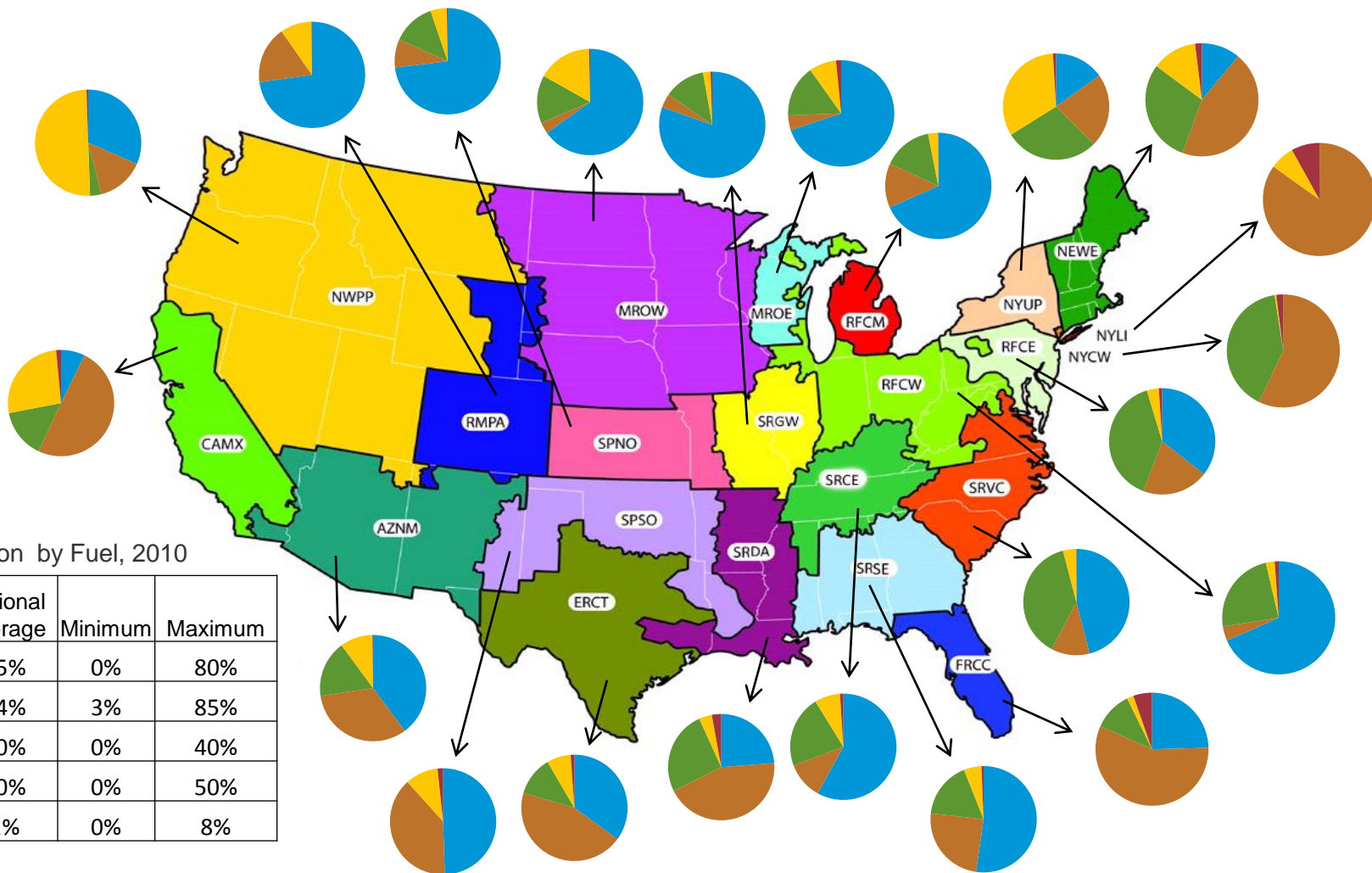
Source: EIA, Annual Energy Outlook 2012 Early Release

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



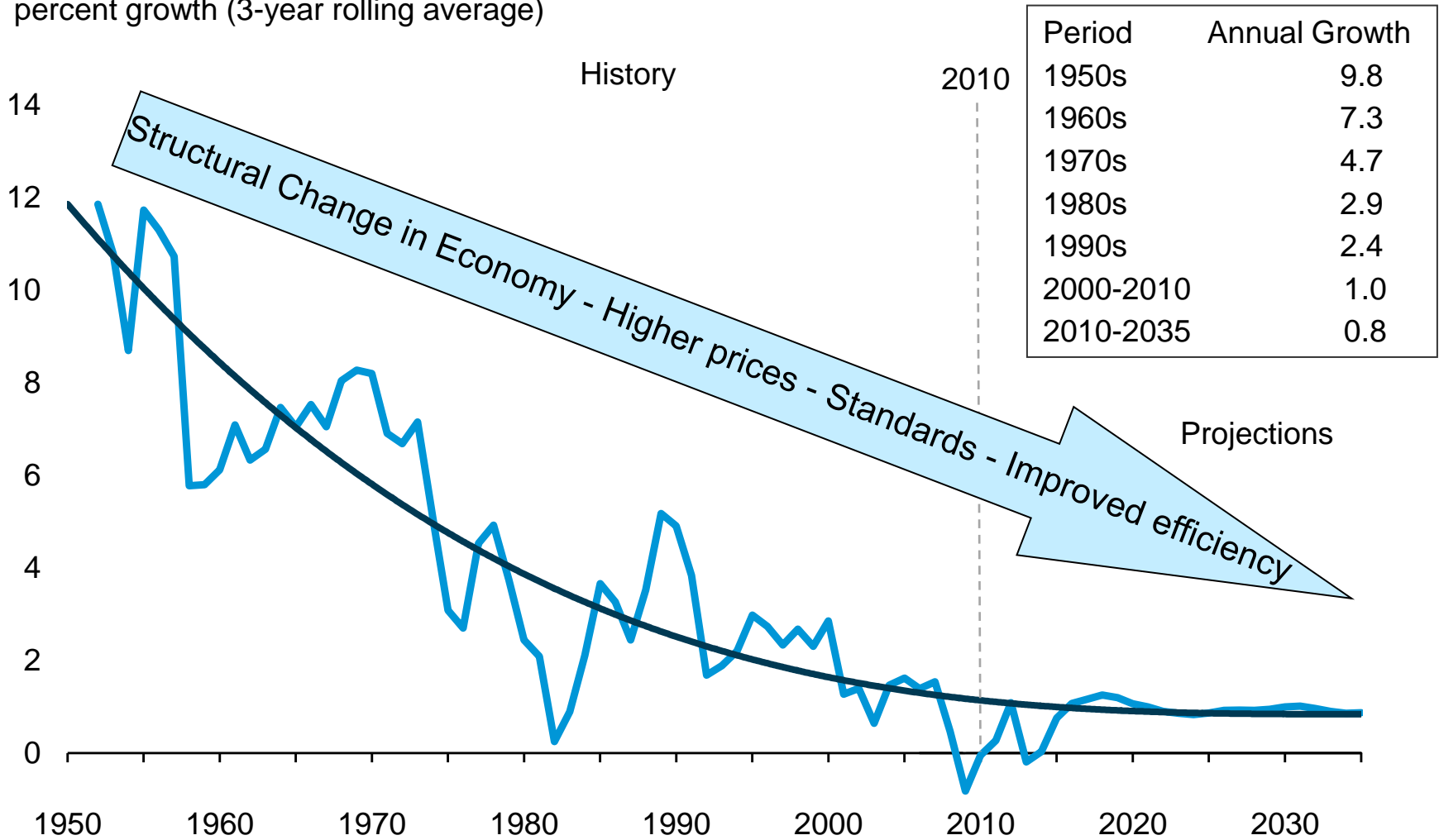
Share of Generation by Fuel, 2010

	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)

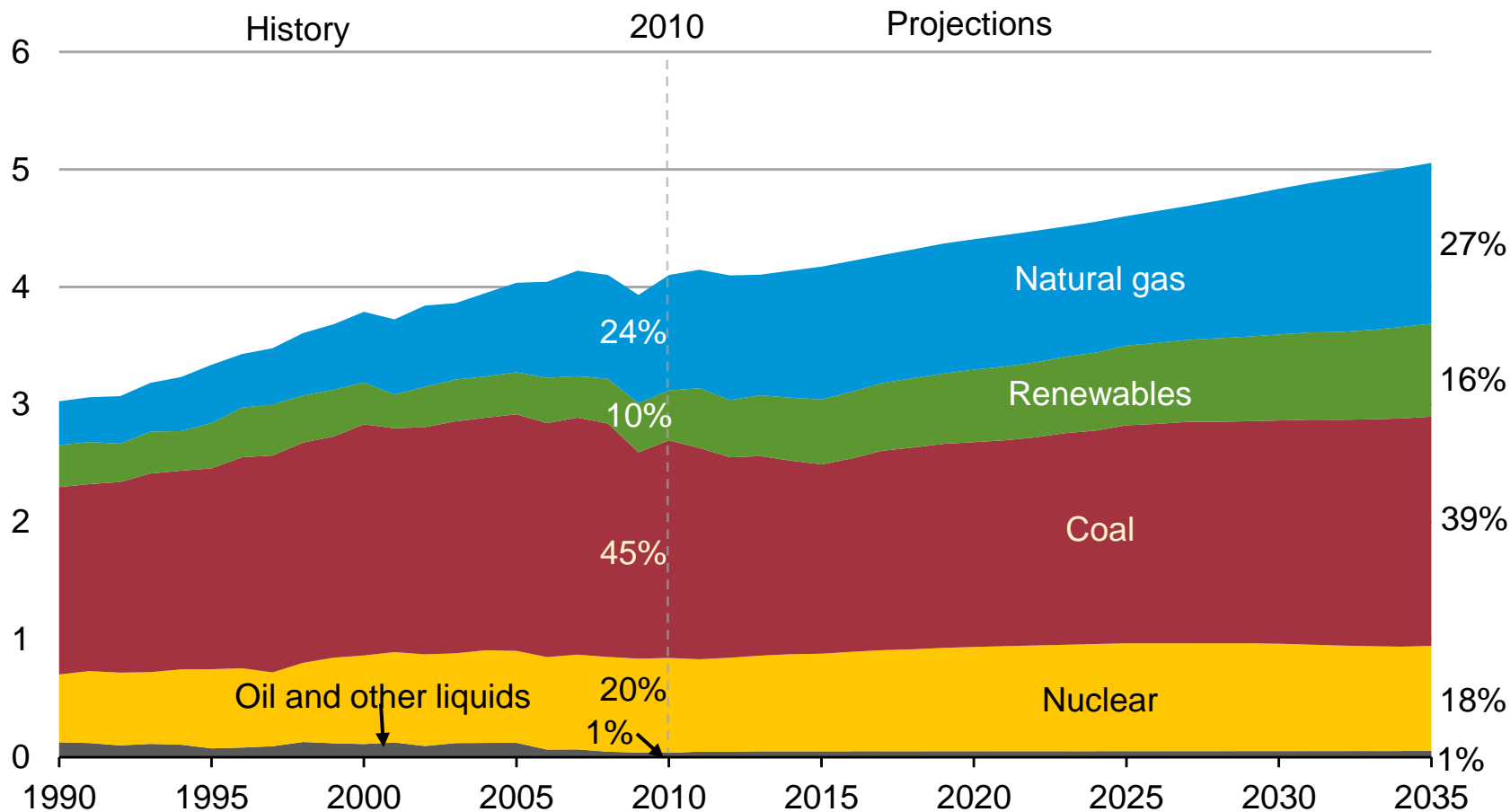


Source: EIA, Annual Energy Outlook 2012 Early Release

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

electricity net generation

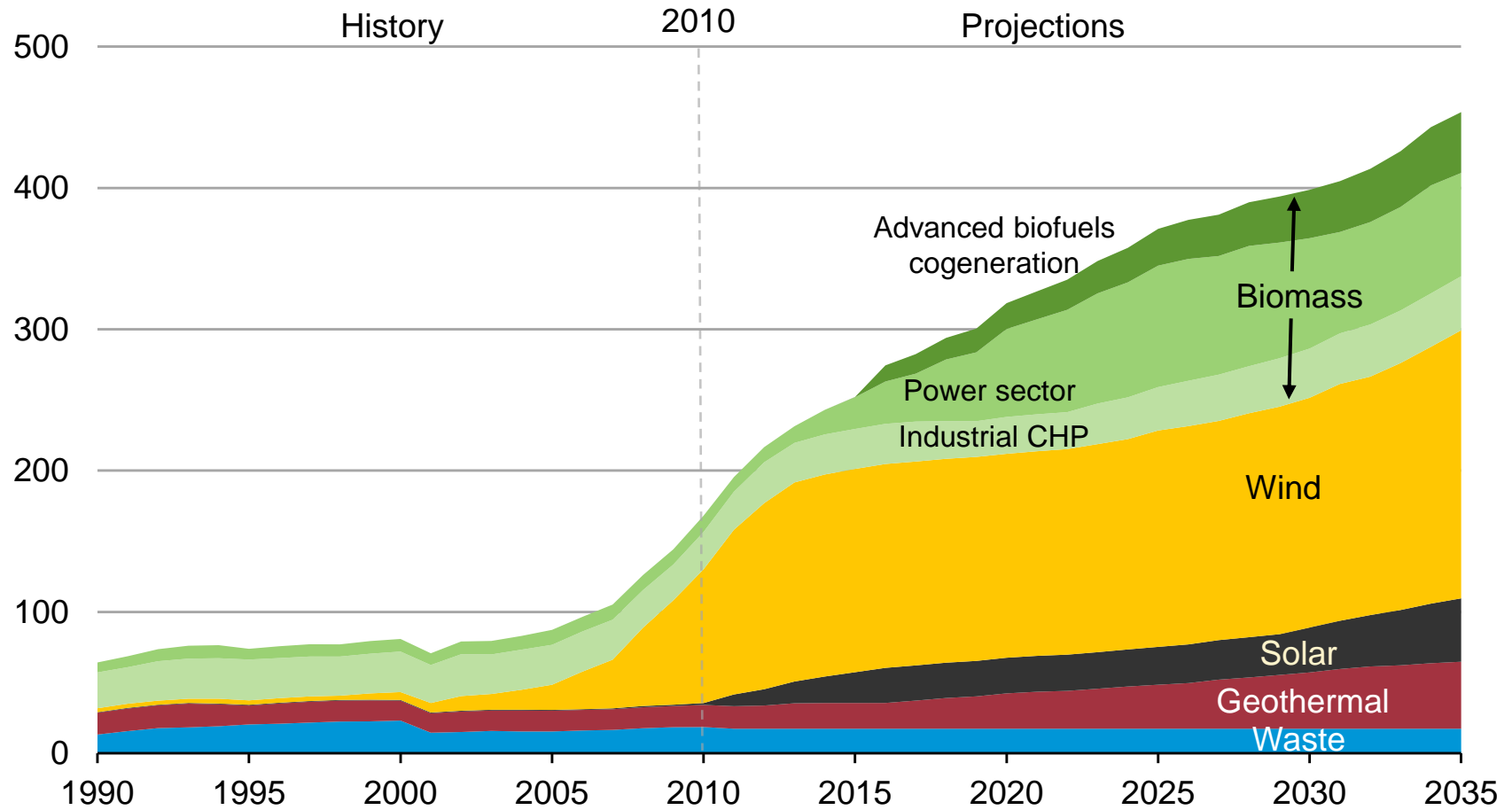
trillion kilowatthours per year



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	

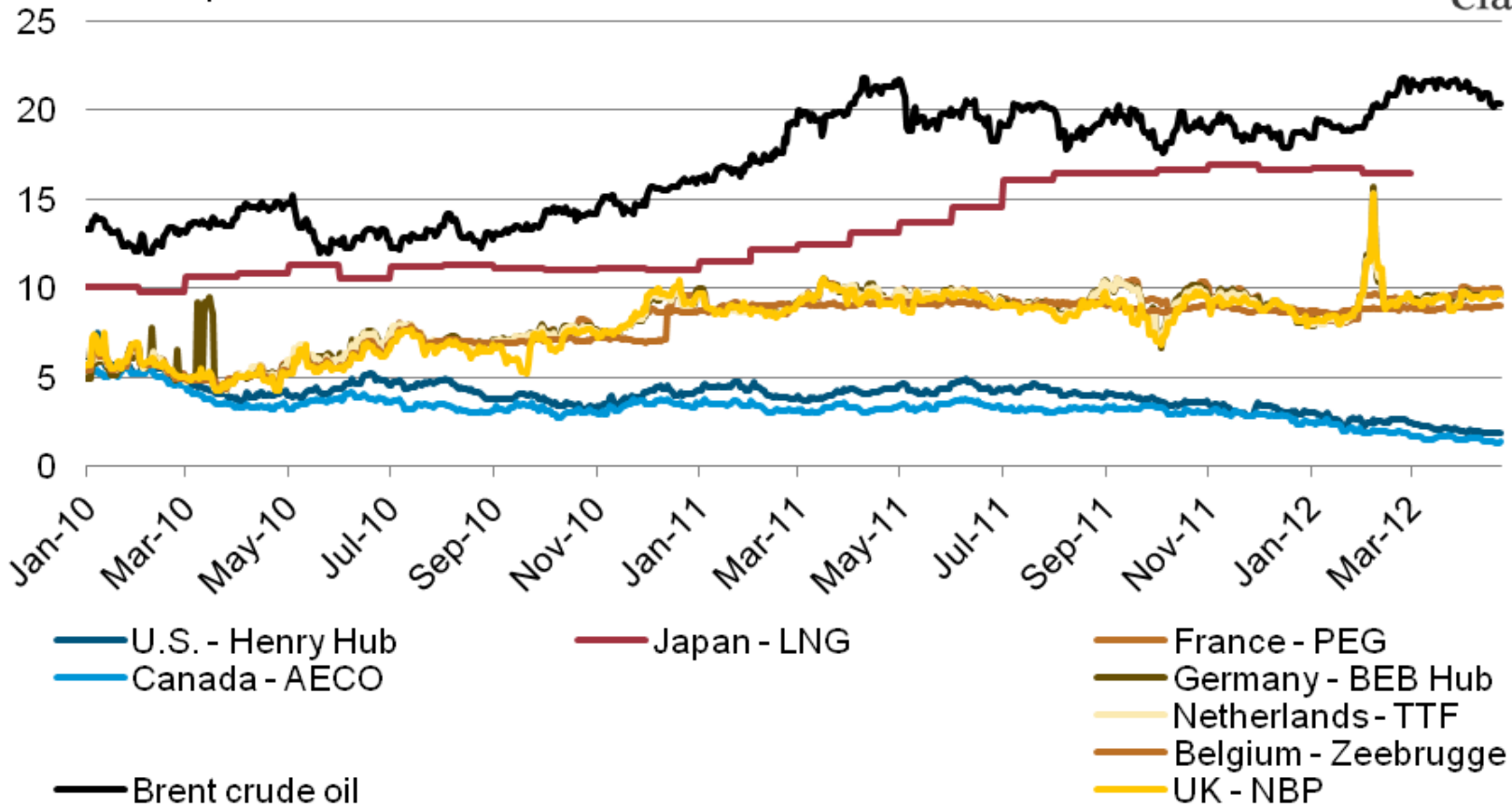
Source: EPA IPM v4.1 Documentation

<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

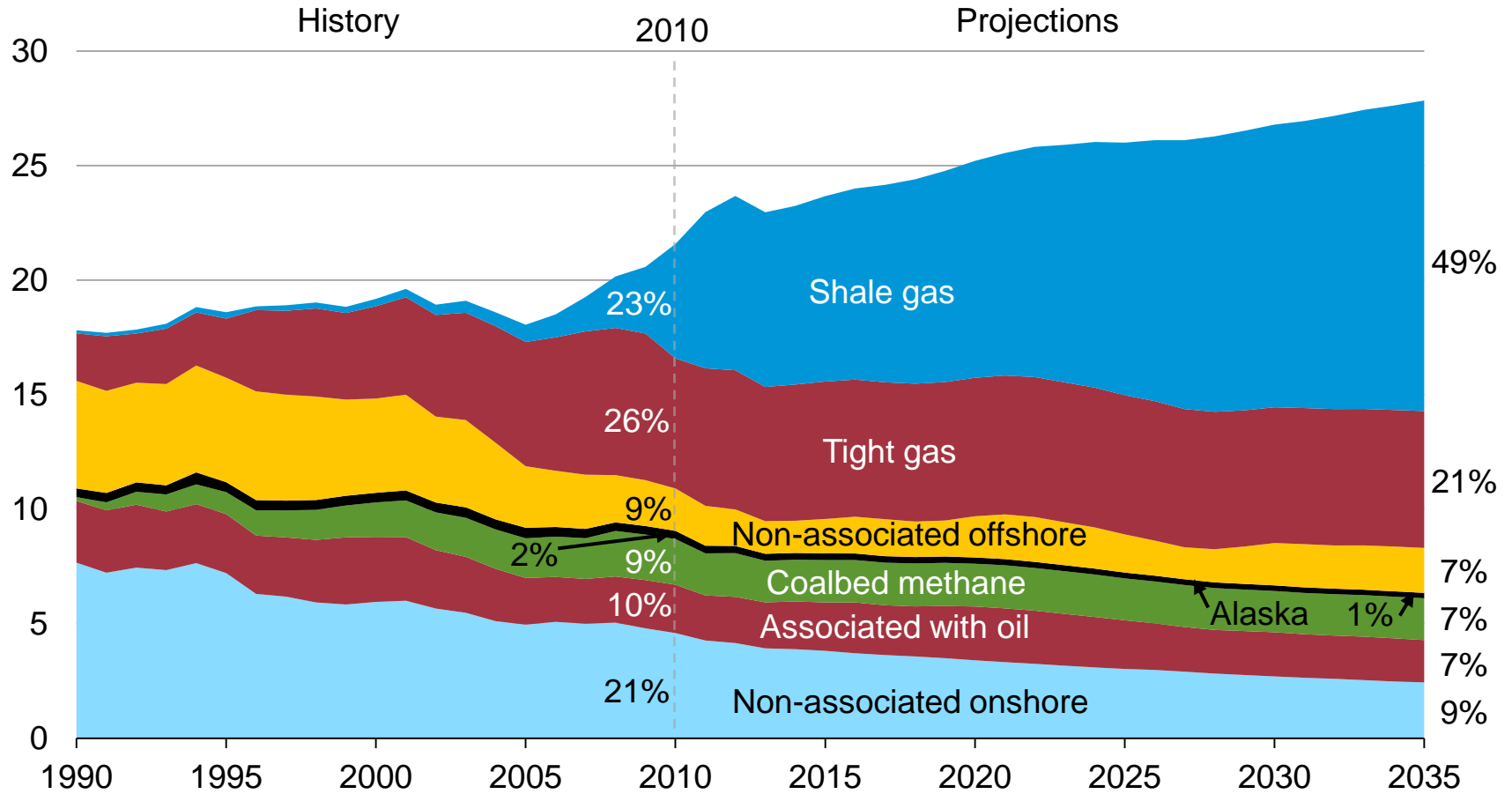
Global spot natural gas and crude oil prices with average monthly LNG prices in Japan
U.S. dollars per million British thermal unit



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

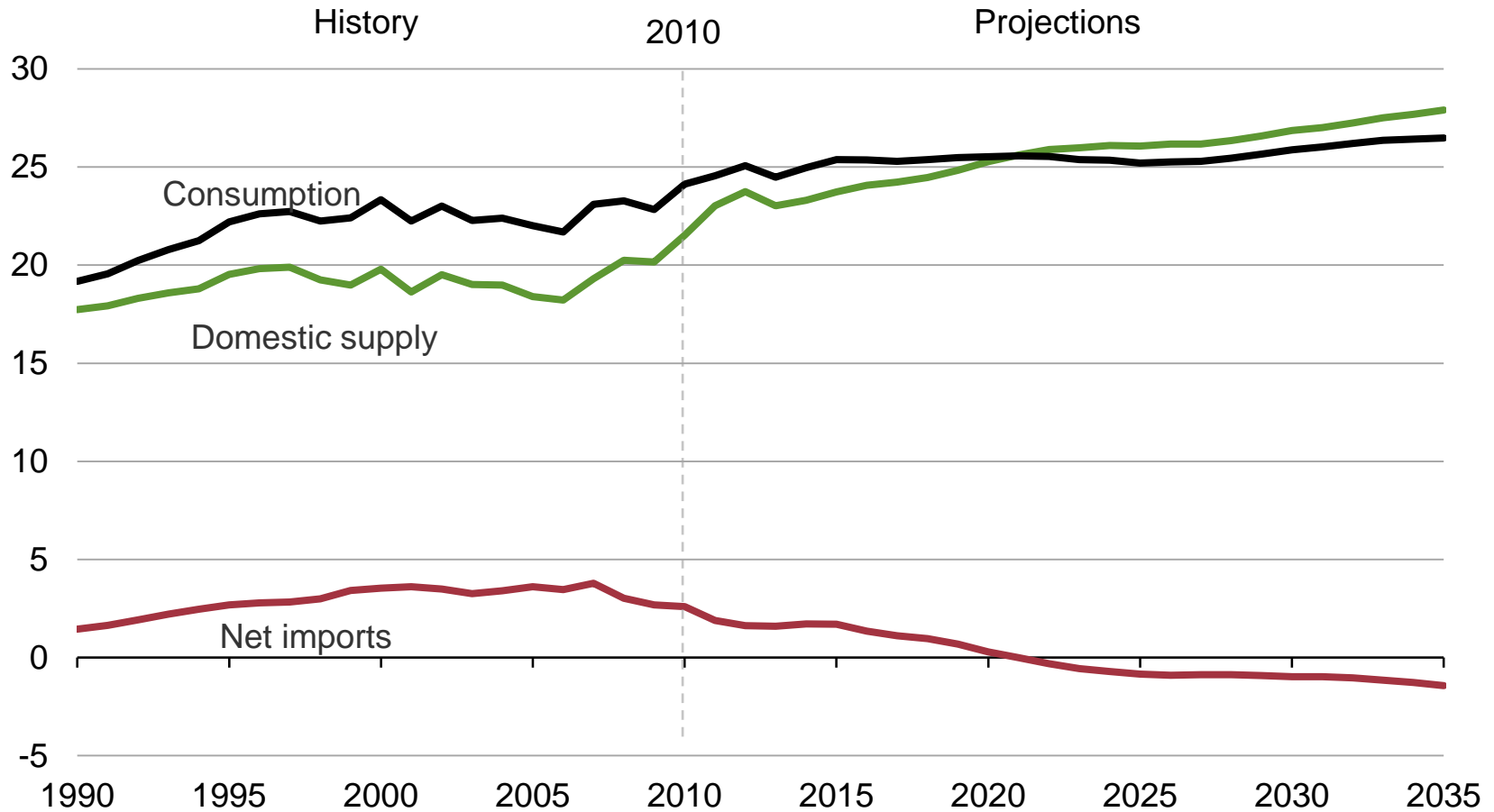


Source: EIA, Annual Energy Outlook 2012 Early Release

Domestic natural gas production grows faster than consumption

U.S. dry gas

trillion cubic feet per year

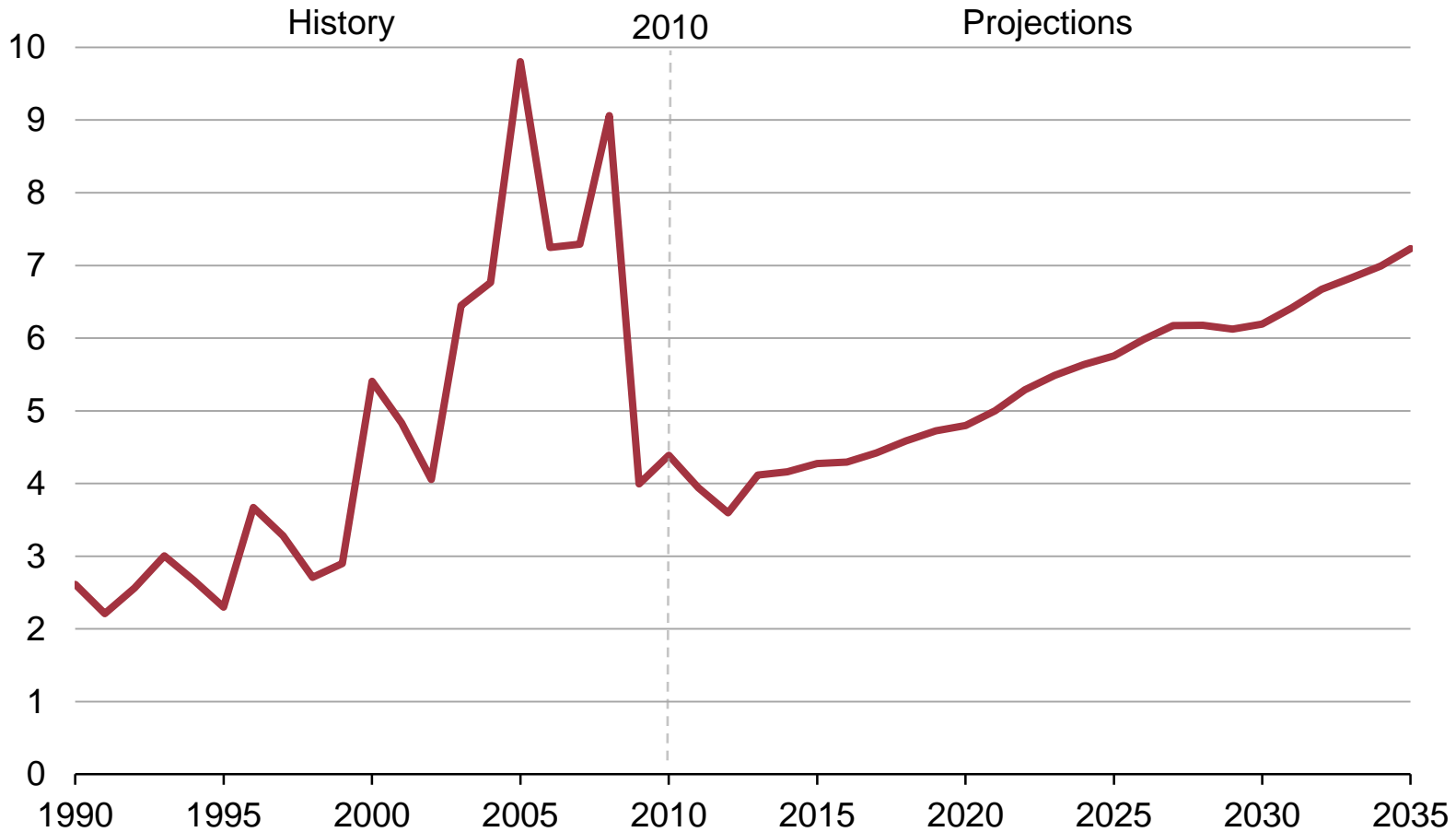


Source: EIA, Annual Energy Outlook 2012 Early Release

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

natural gas spot price (Henry Hub)

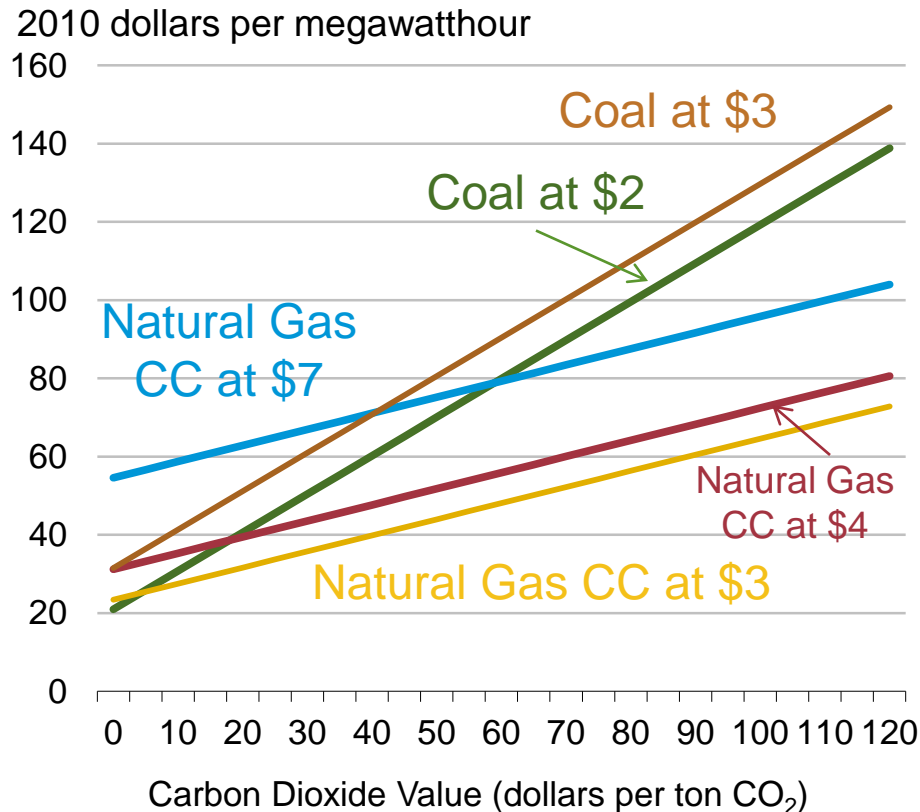
2010 dollars per million Btu



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