The Future Electricity Fuels Mix: Key Drivers

for

Electric Power Conference & Exhibition

May 15th, 2012 | Baltimore, Maryland

by

Howard Gruenspecht, Acting Administrator

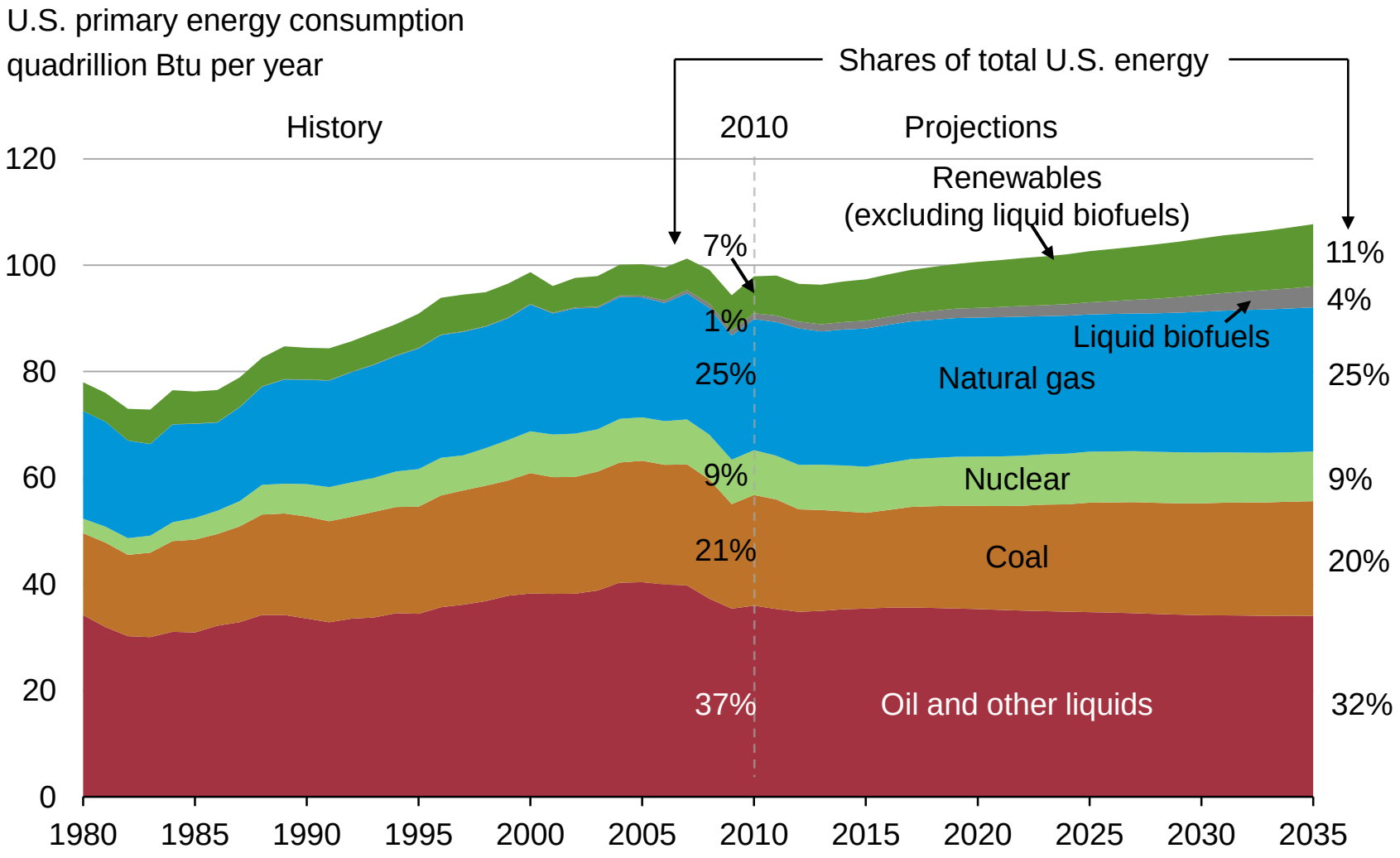
Key results from the *AEO2012* Reference case, which assumes current laws remain unchanged

- 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?

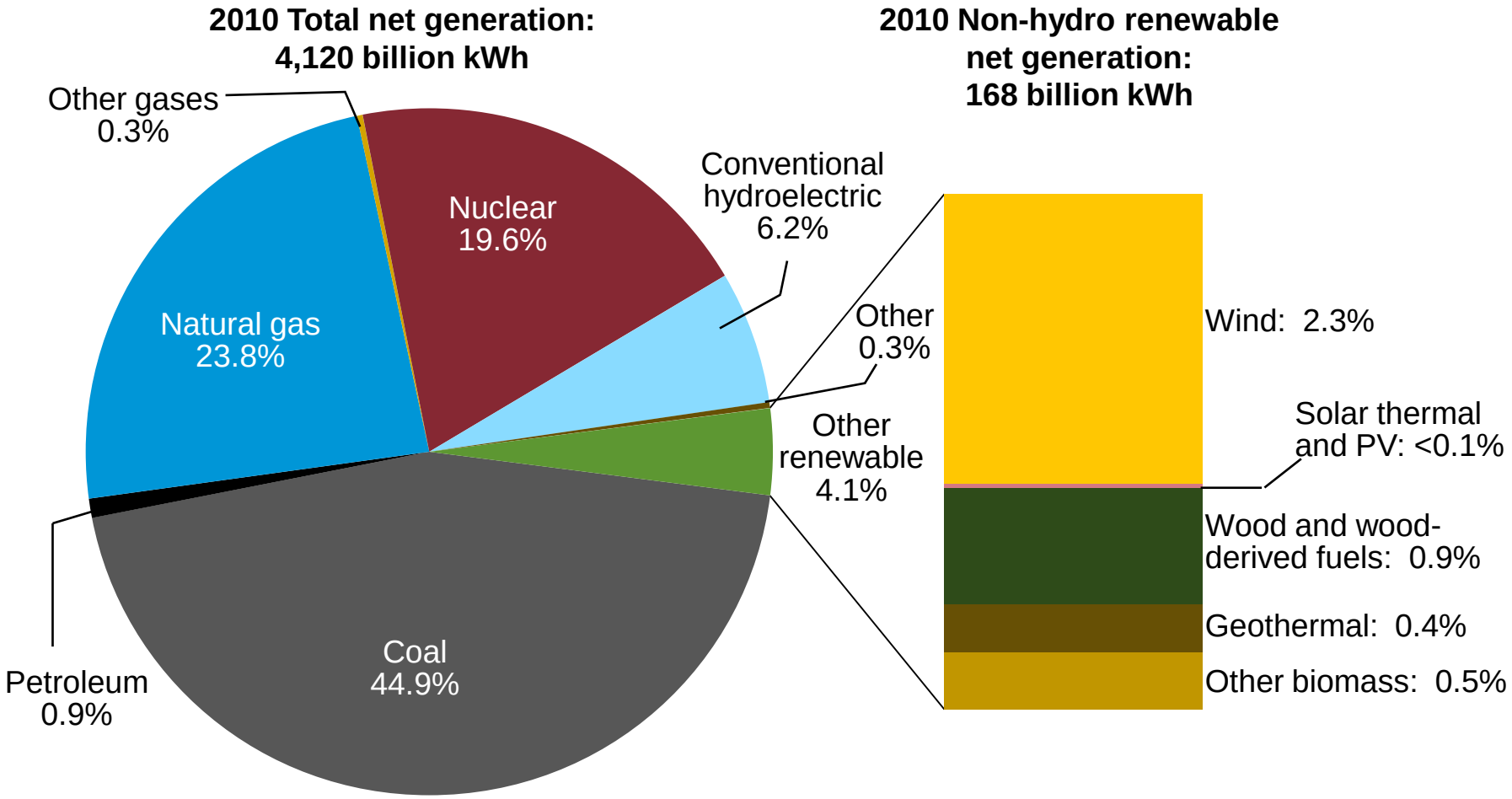
- Generally assumes current laws and regulations
  - excludes potential future laws and regulations (e.g., proposed greenhouse gas legislation and proposed fuel economy standards are not included)
  - provisions generally sunset as specified in law (e.g., renewable tax credits expire)
- Some grey areas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



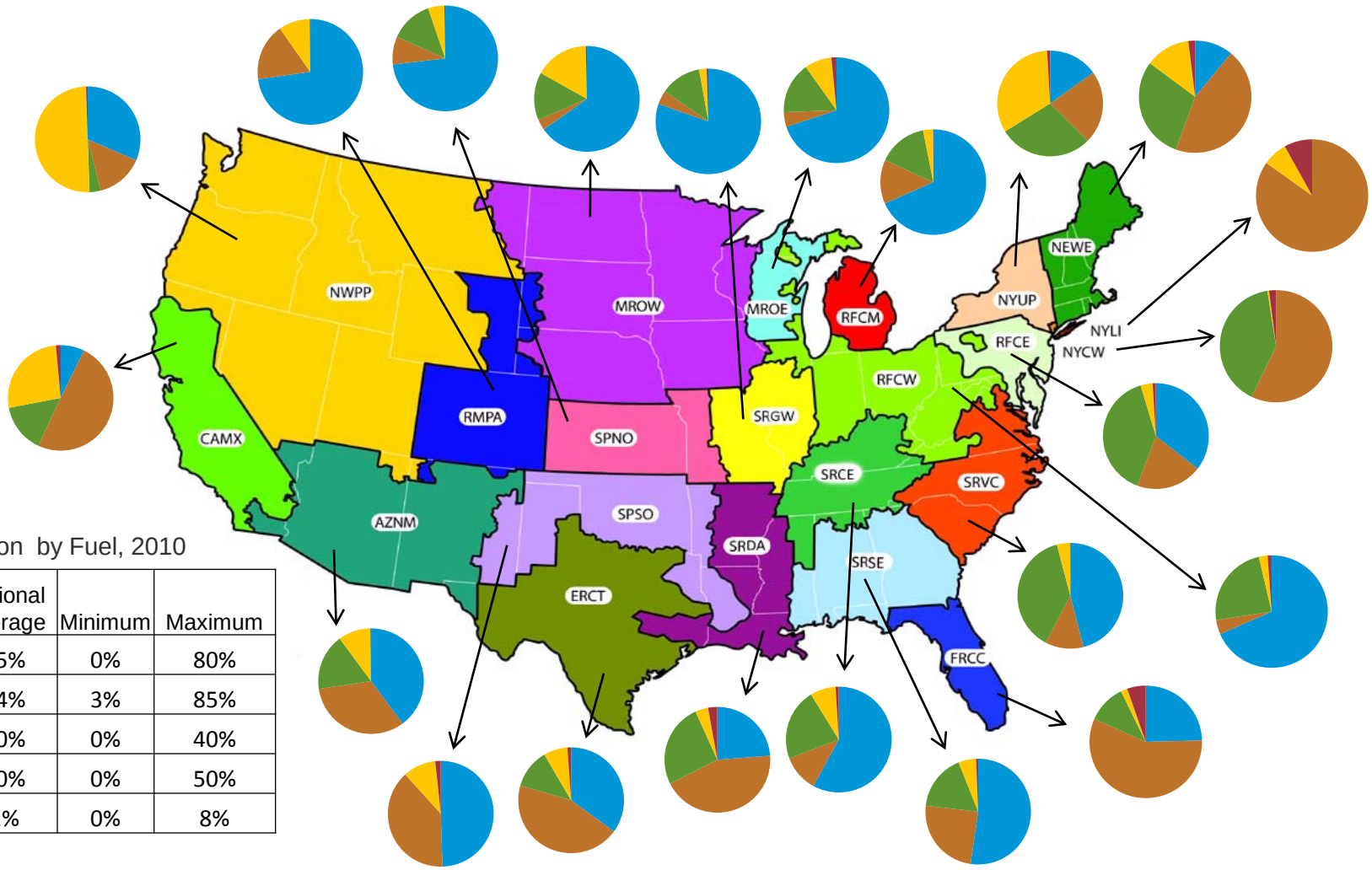
Source: EIA, Annual Energy Outlook 2012 Early Release

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



Source: EIA, Annual Energy Review, October 2011

The fuel mix for electricity generation varies widely across U.S. regions (2010)

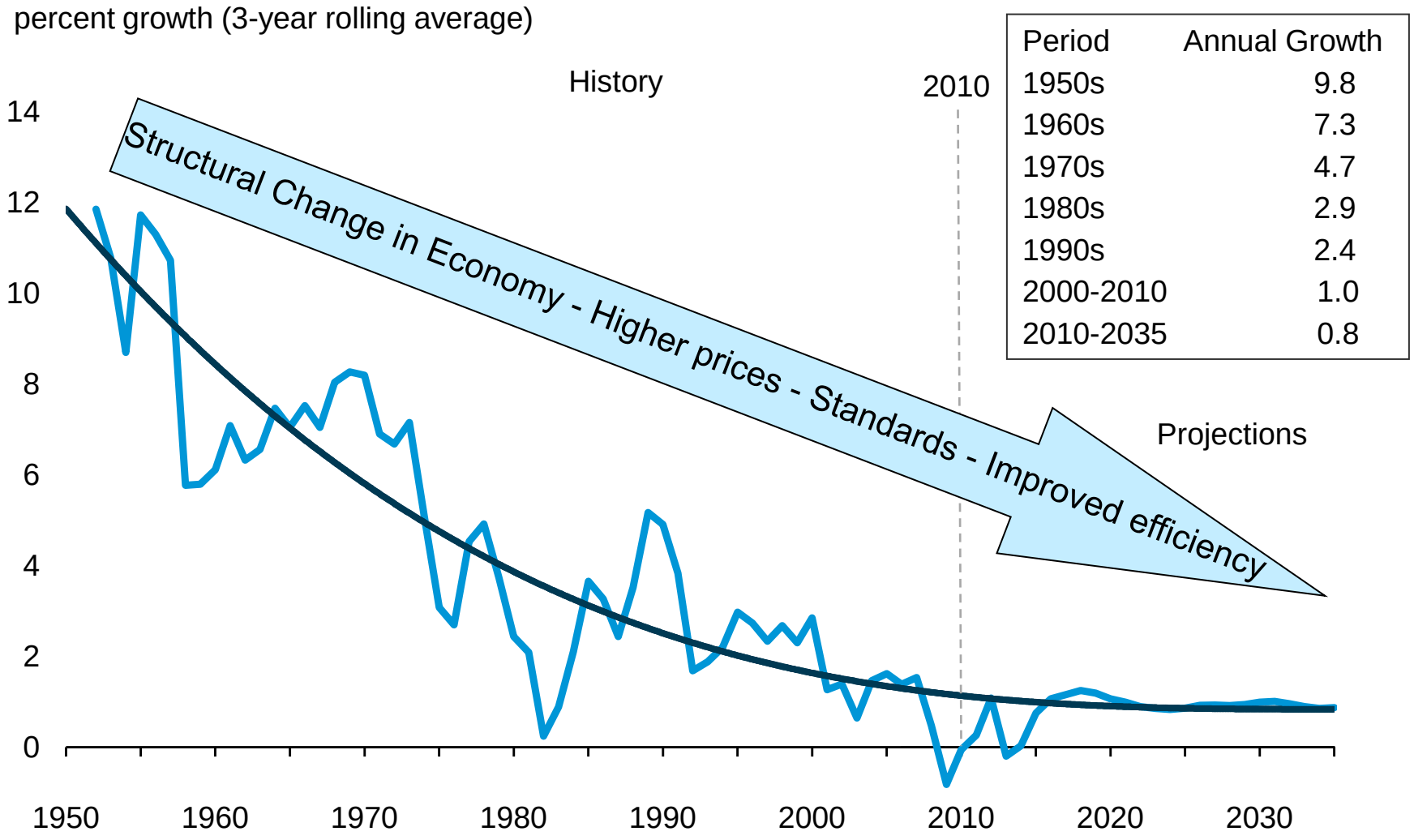


Share of Generation by Fuel, 2010

	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

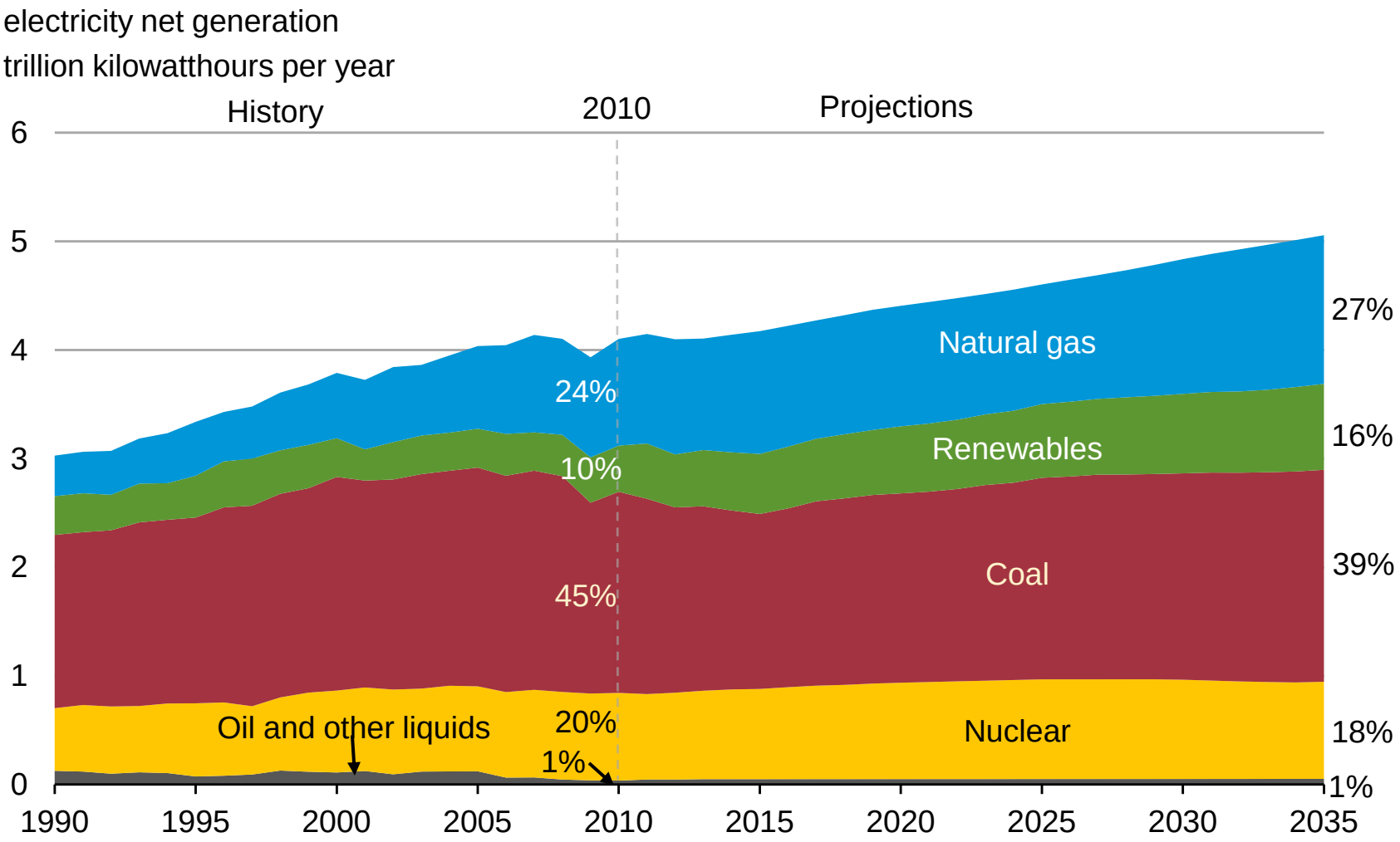
While electricity consumption grows by 23% over the projection, the annual rate of growth slows



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

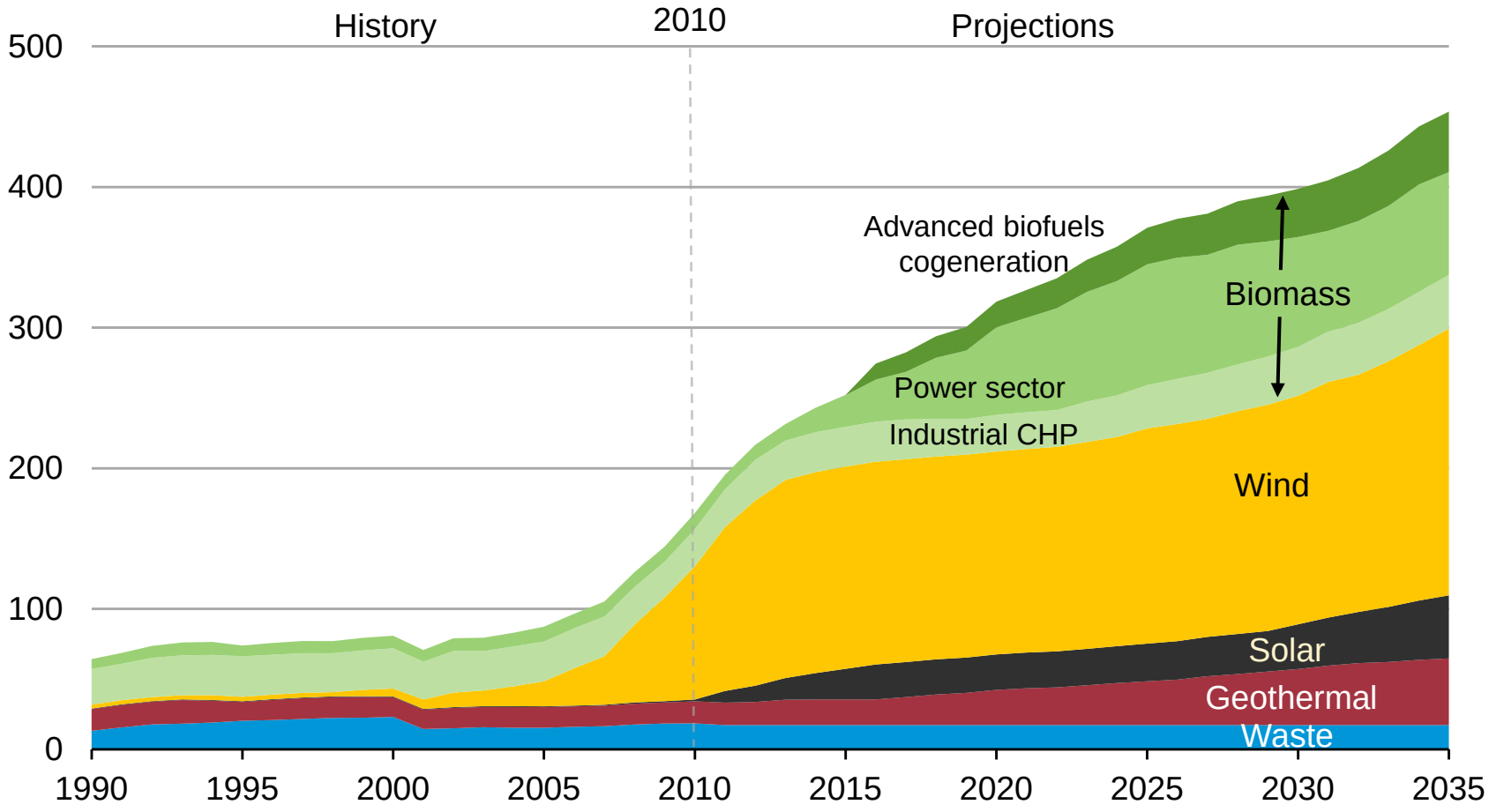


Source: EIA, Annual Energy Outlook 2012 Early Release

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

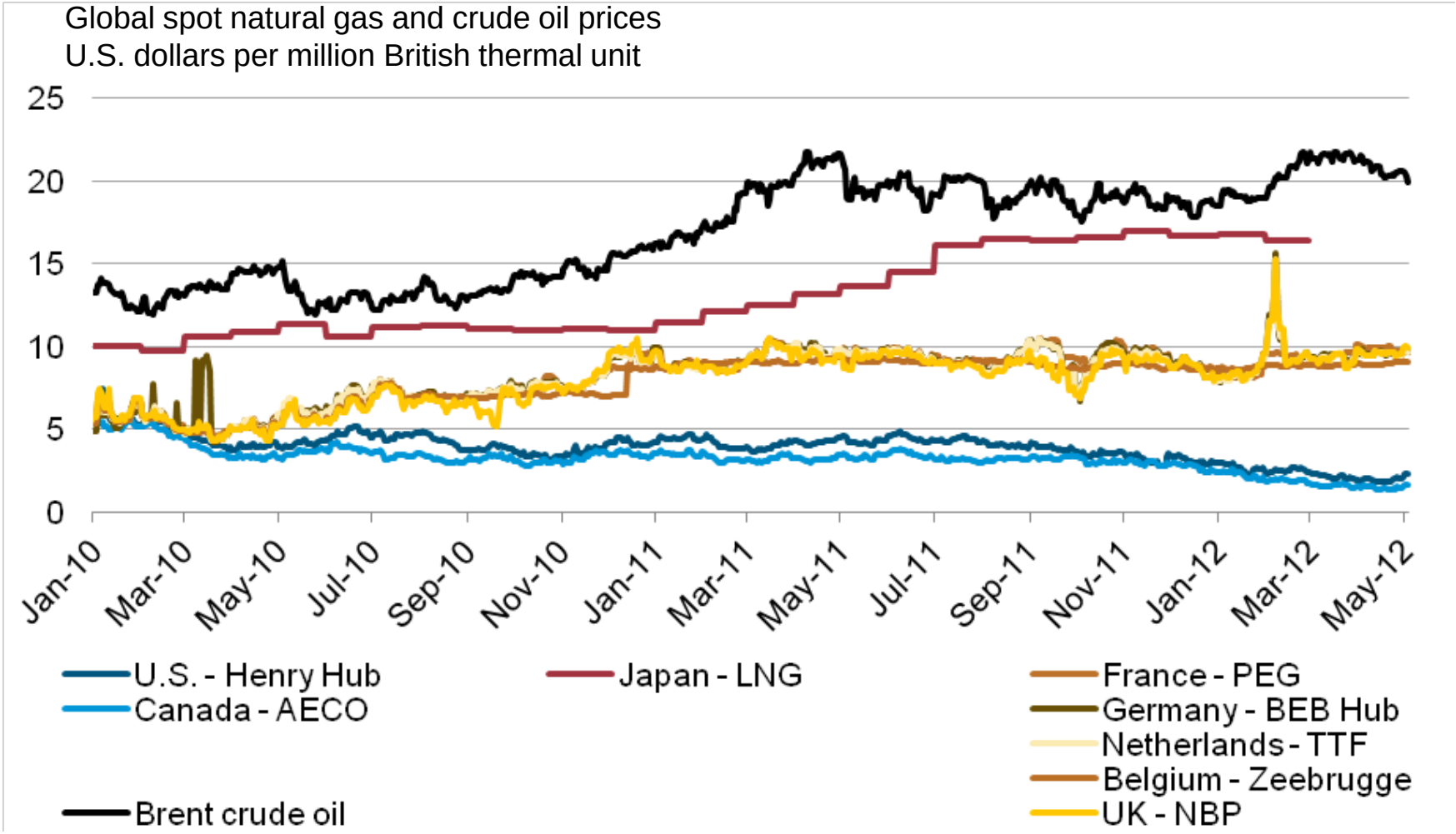
Flue Gas Desulfurization (2010$/kW)		
	Capital Costs ($/kW)	VOM ($/MWh)
300 MW	$602	$1.72
500 MW	$521	
700 MW	$474	

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

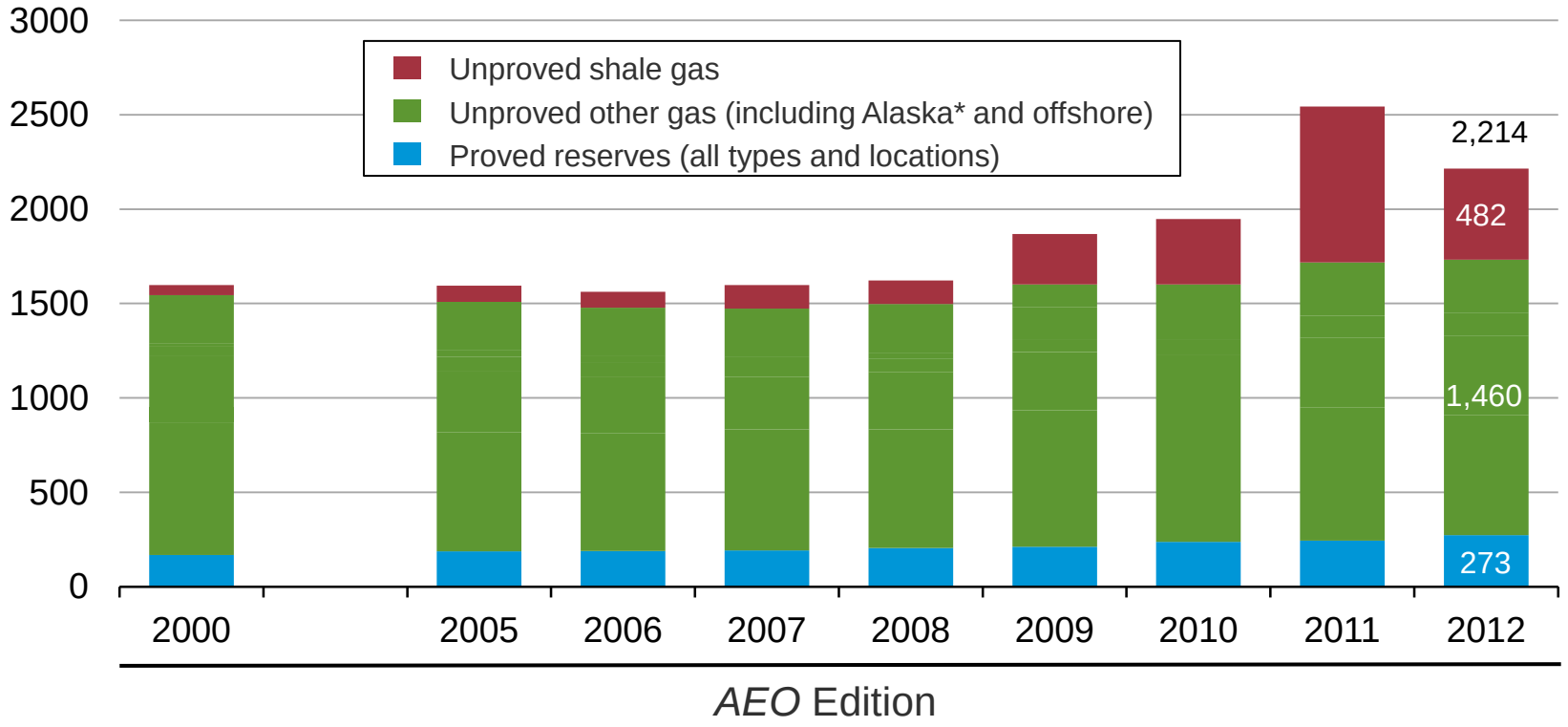
Global spot natural gas and crude oil prices vary widely



Source: EIA based on Bloomberg as of 5/4/2012

Technically recoverable natural gas resources reflect updated assessments

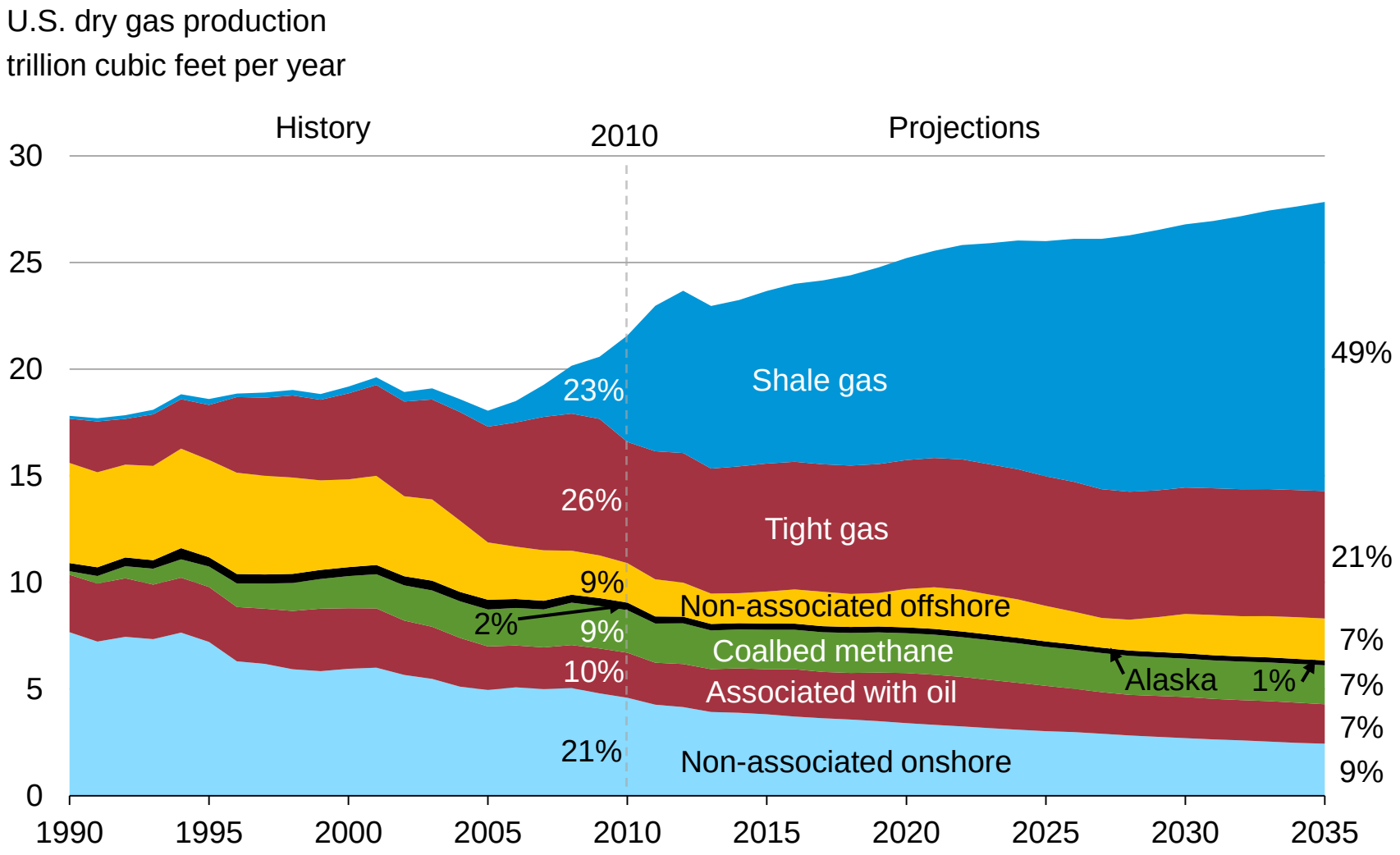
U.S. dry gas resources
trillion cubic feet



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

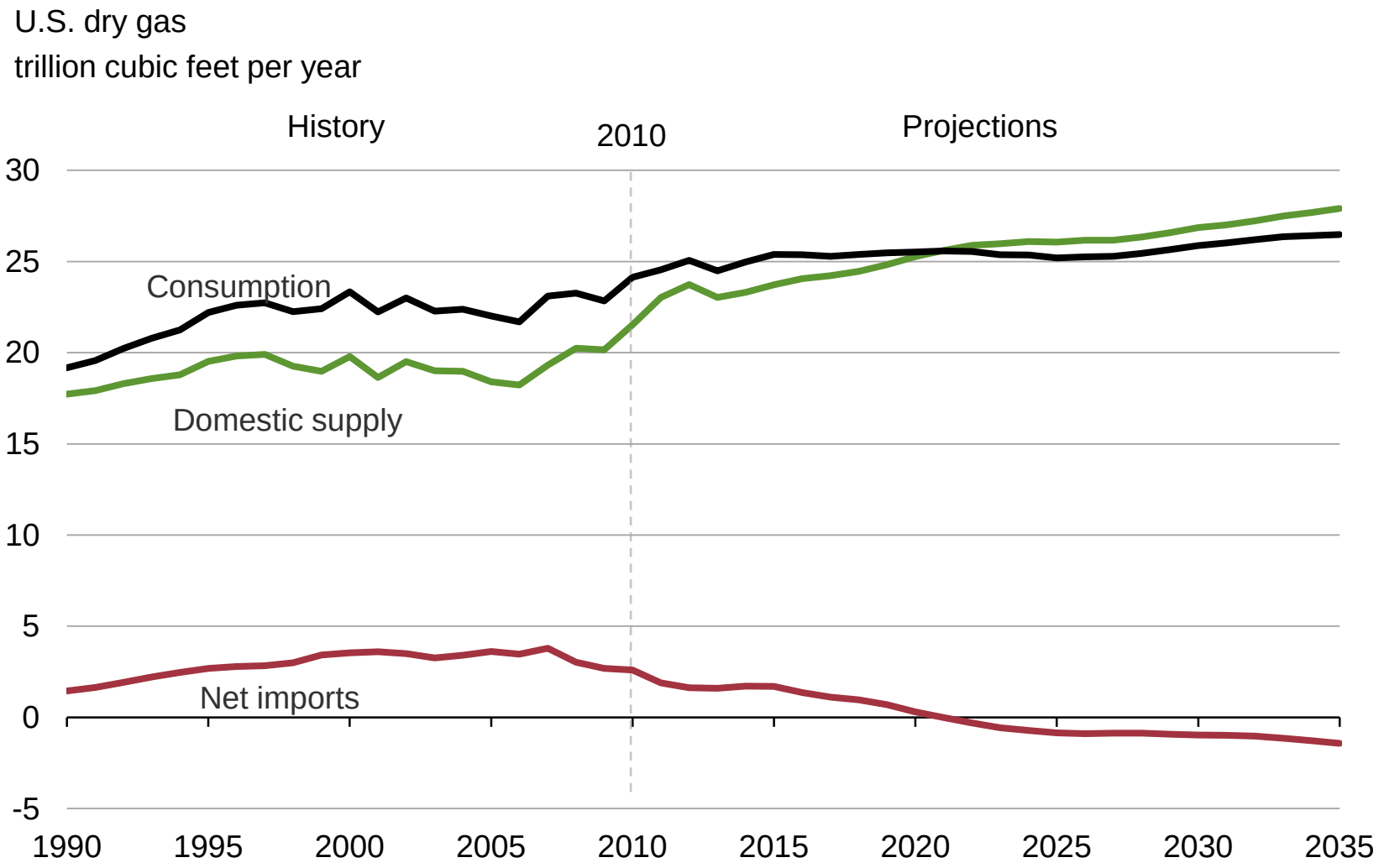
Source: EIA, Annual Energy Outlook

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



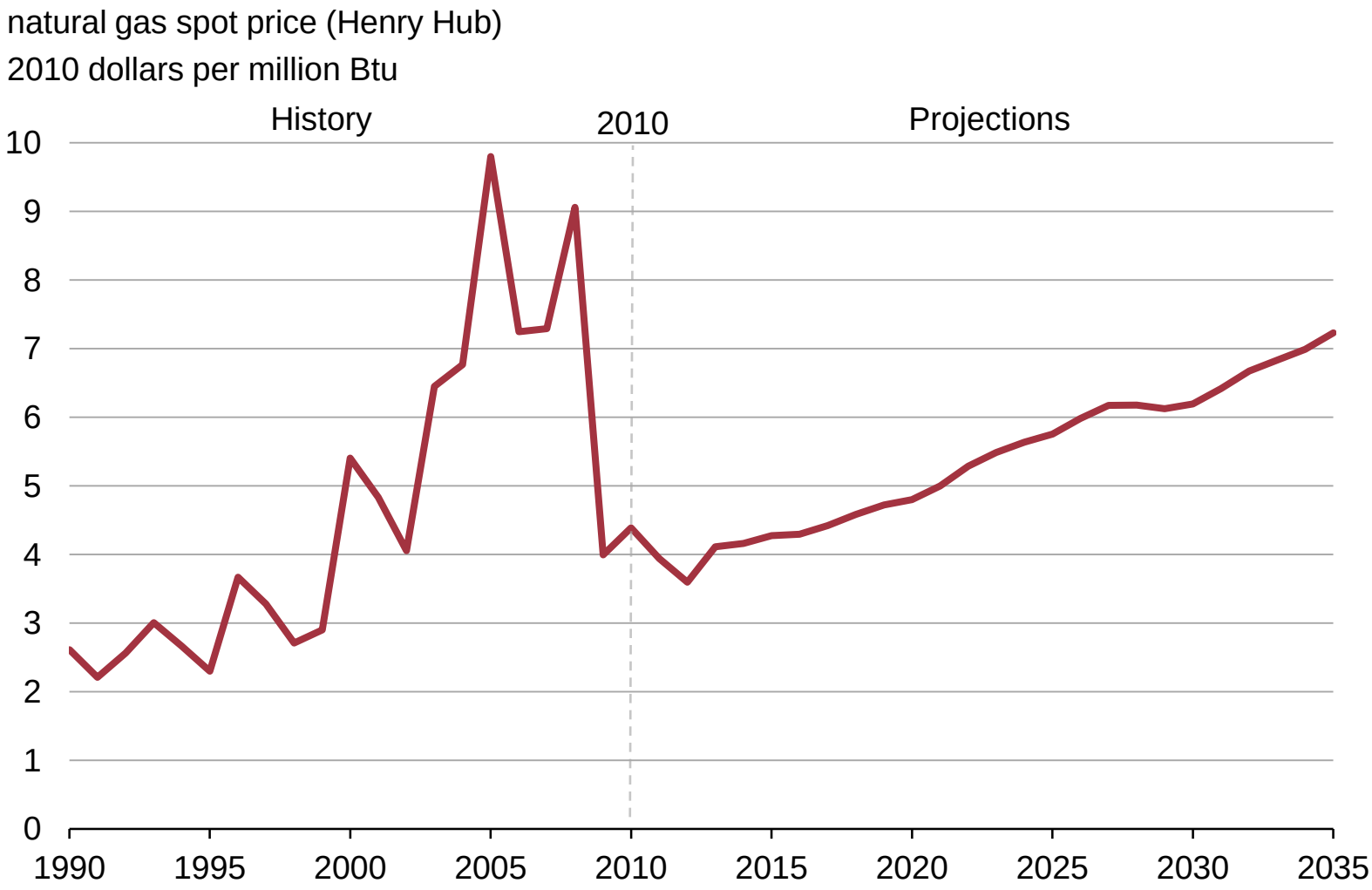
Source: EIA, Annual Energy Outlook 2012 Early Release

Domestic natural gas production grows faster than consumption



Source: EIA, Annual Energy Outlook 2012 Early Release

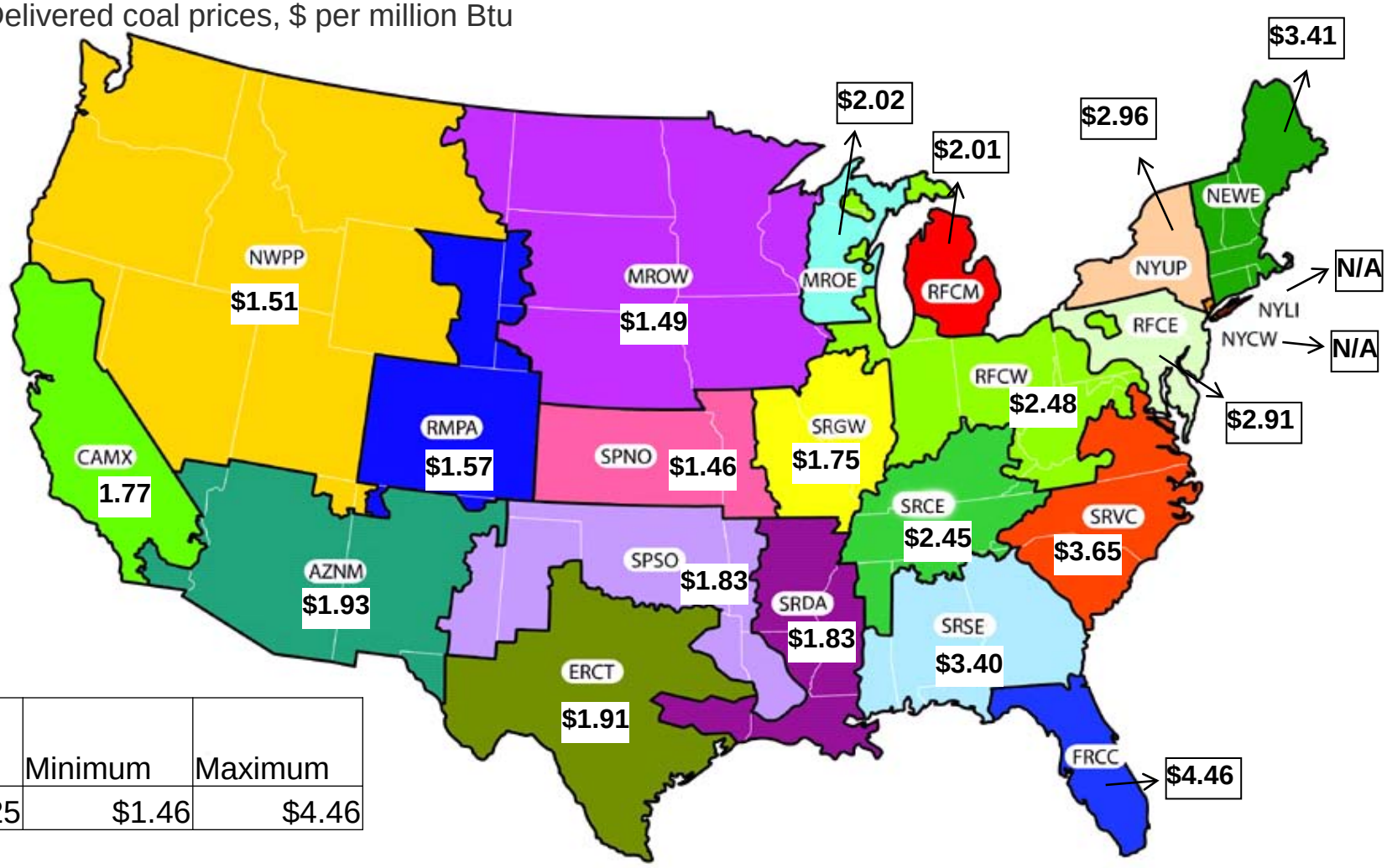
EIA's natural gas price projections for *AEO 2012* Early Release



Sources: EIA, Annual Energy Outlook 2012 Early Release

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

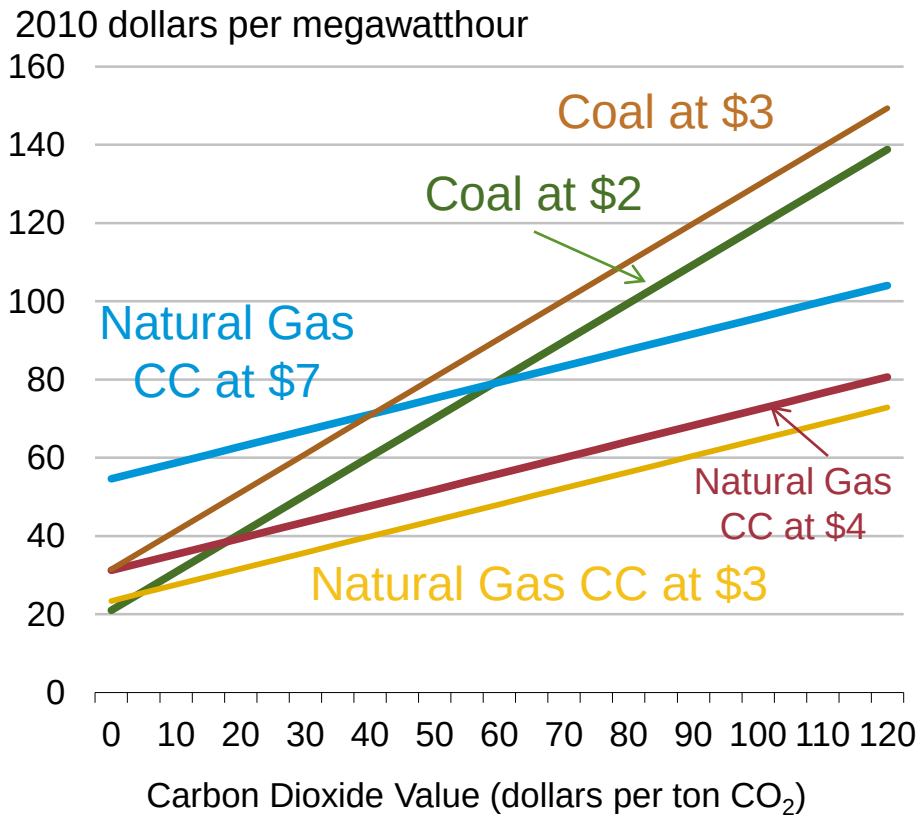


National Average	Minimum	Maximum
$2.25	$1.46	$4.46

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

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