EIA's Annual Energy Outlook 2012

A comprehensive assessment of the U.S. energy picture

For

National Governors Association

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By

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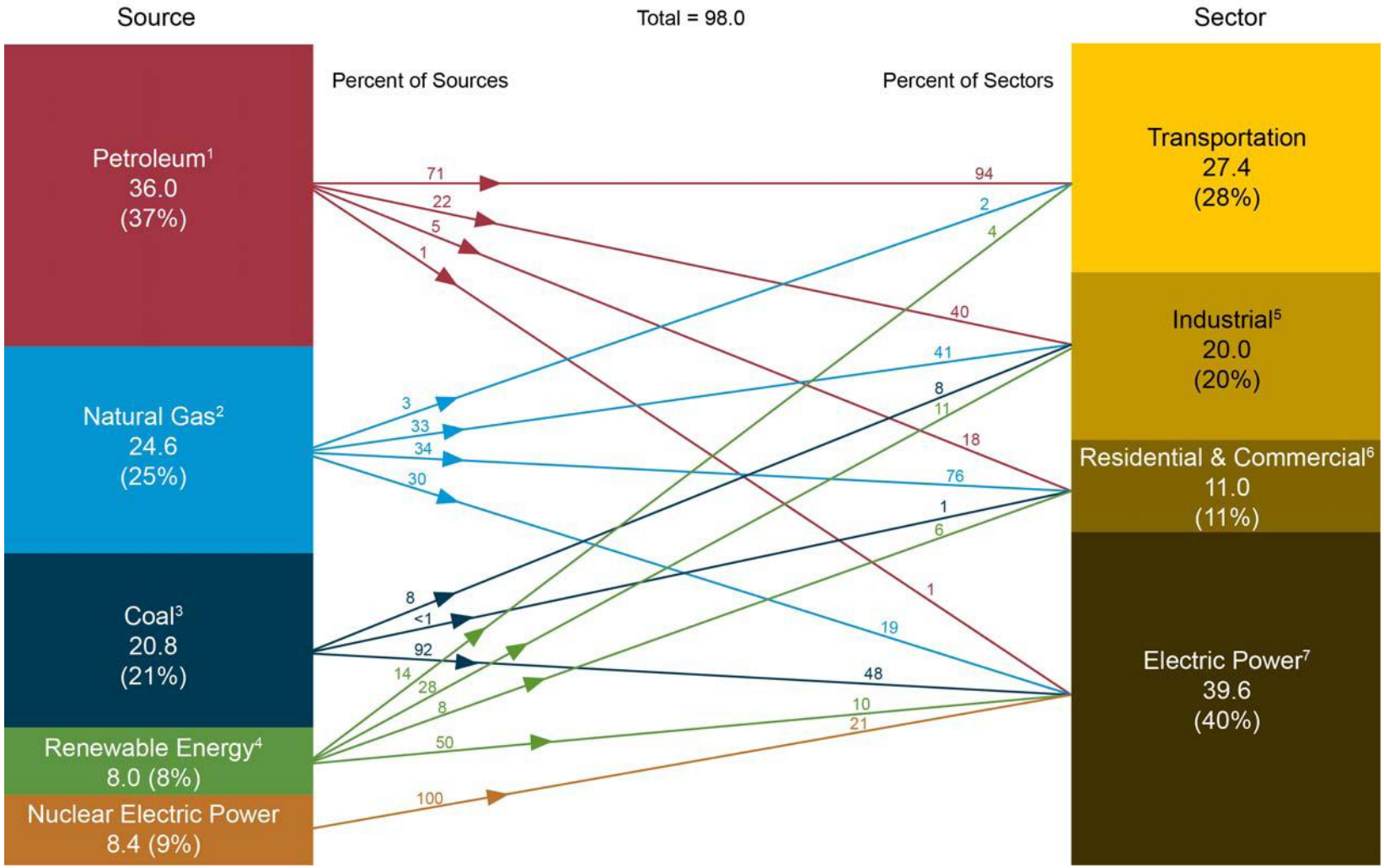
U.S. Energy Breakdown by Fuel and Sector



Source: EIA *Annual Energy Review 2010*

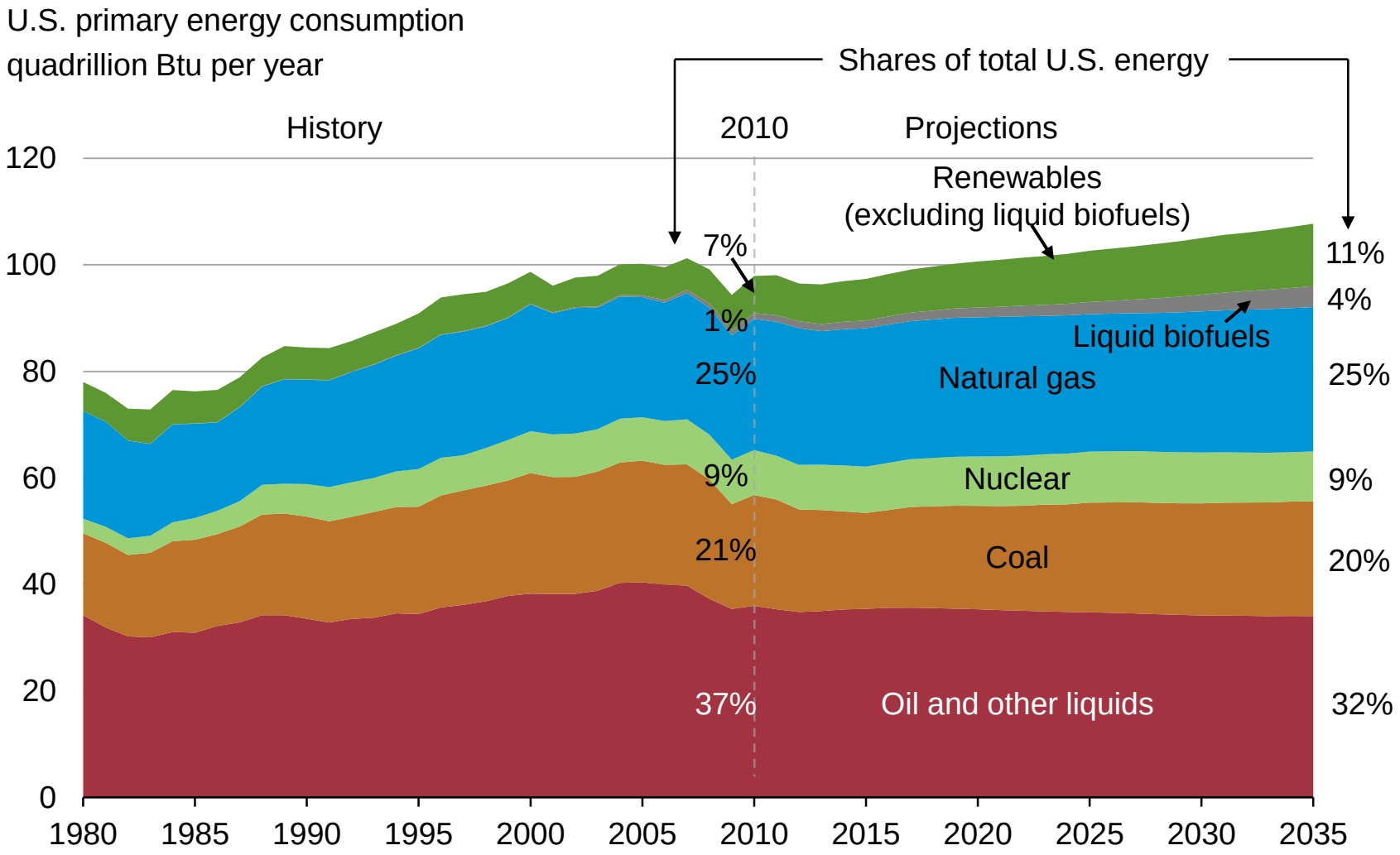
Key results from the *AEO2012* Reference case, which assumes current laws remain unchanged

- 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?

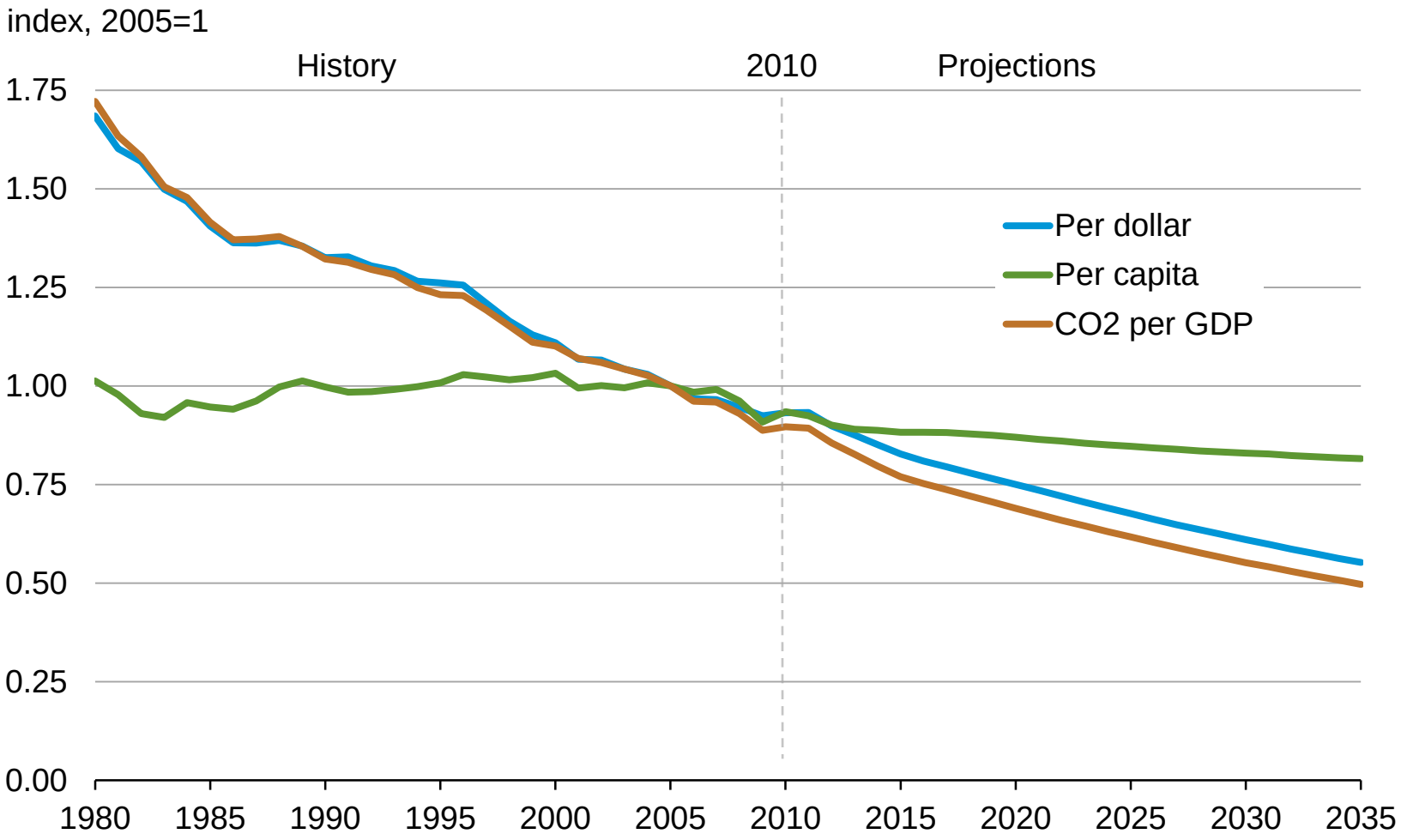
- Generally assumes current laws and regulations
  - excludes potential future laws and regulations (e.g., proposed greenhouse gas legislation and proposed fuel economy standards are not included)
  - provisions generally sunset as specified in law (e.g., renewable tax credits expire)
- Some grey areas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



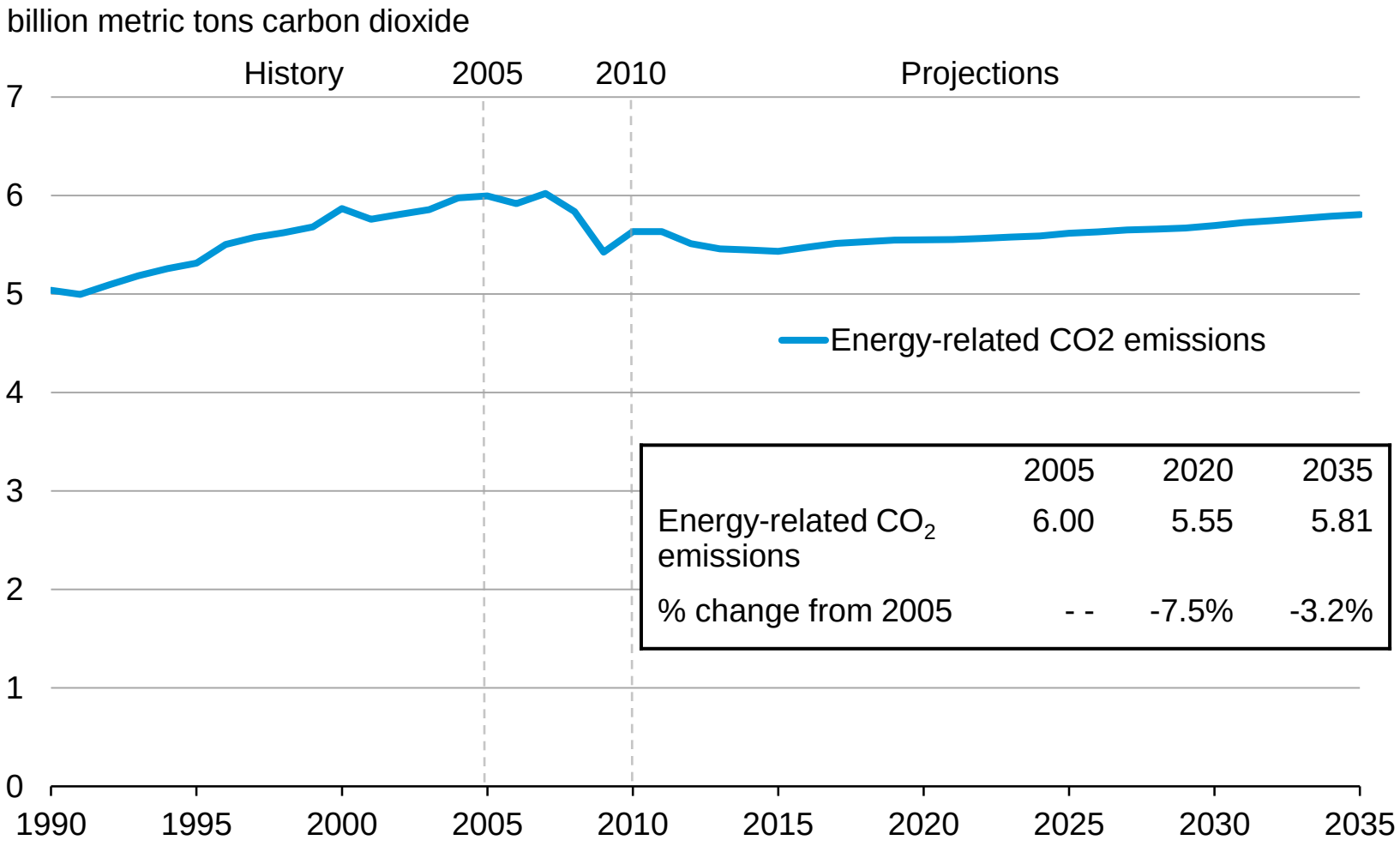
Source: EIA, Annual Energy Outlook 2012 Early Release

Energy and CO_2 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 CO_2 emissions never get back to pre-recession levels by 2035

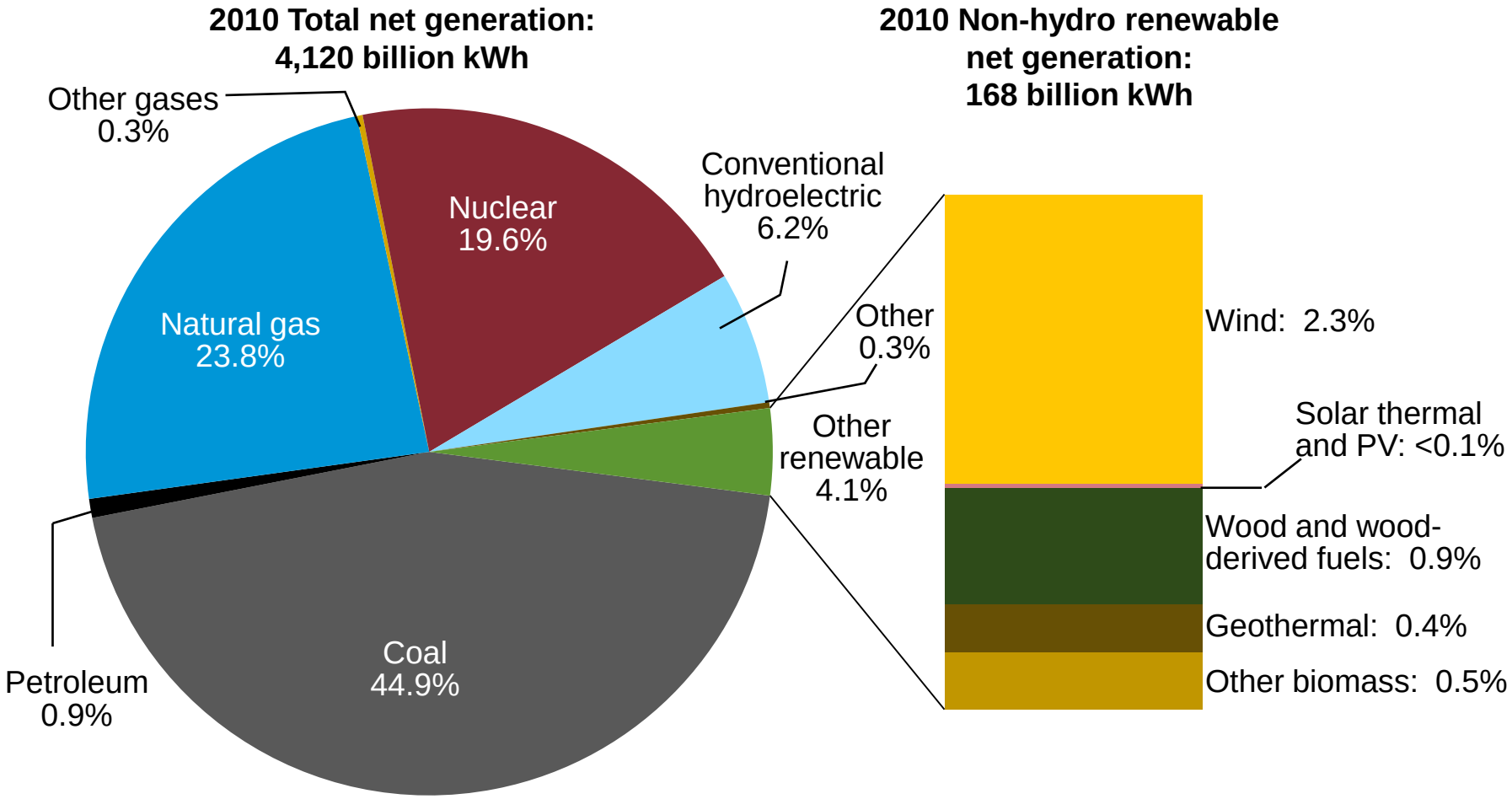


	2005	2020	2035
Energy-related CO_2 emissions	6.00	5.55	5.81
% change from 2005	- -	-7.5%	-3.2%

Source: EIA, Annual Energy Outlook 2012 Early Release

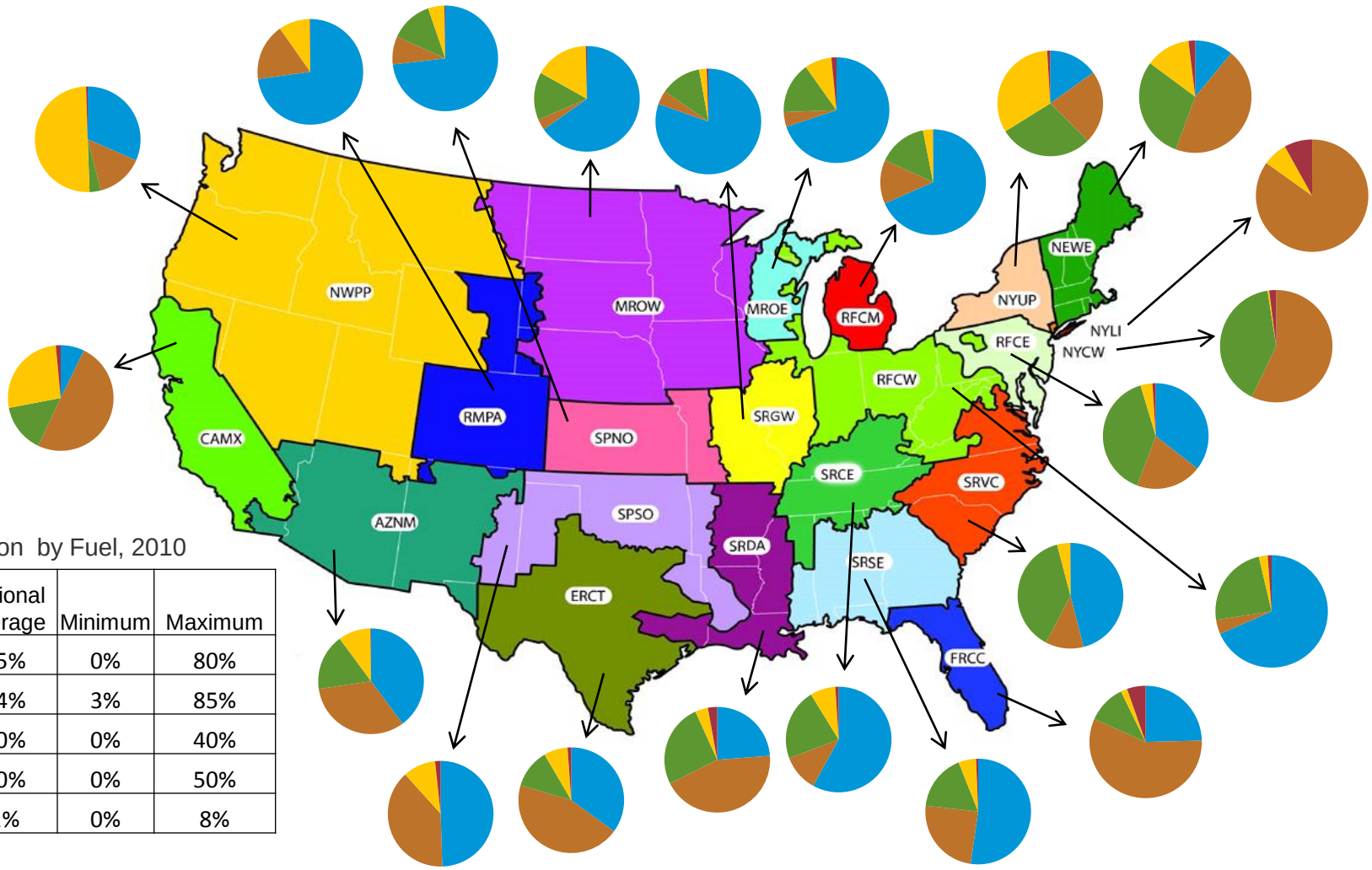
Electricity

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)

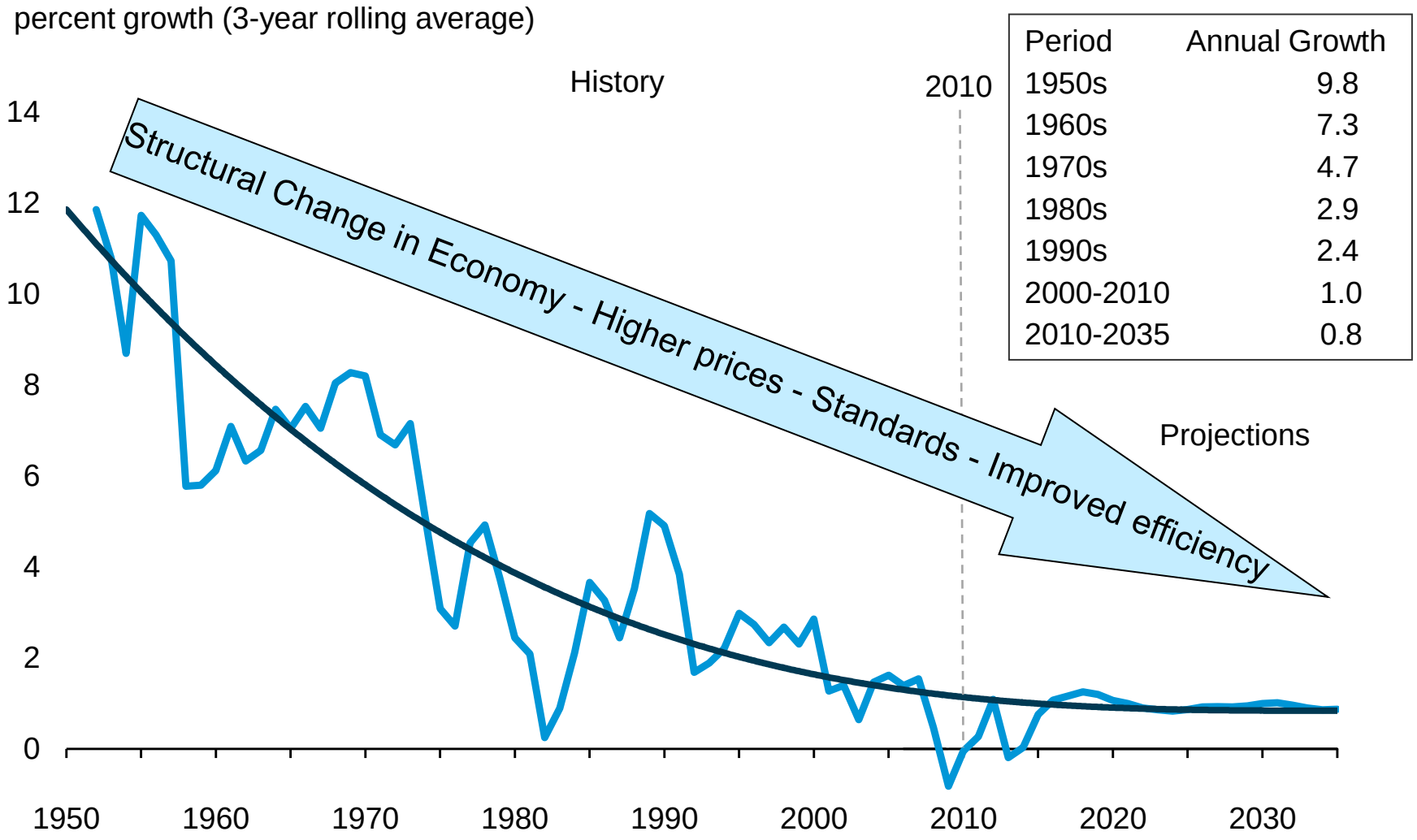


Share of Generation by Fuel, 2010

	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

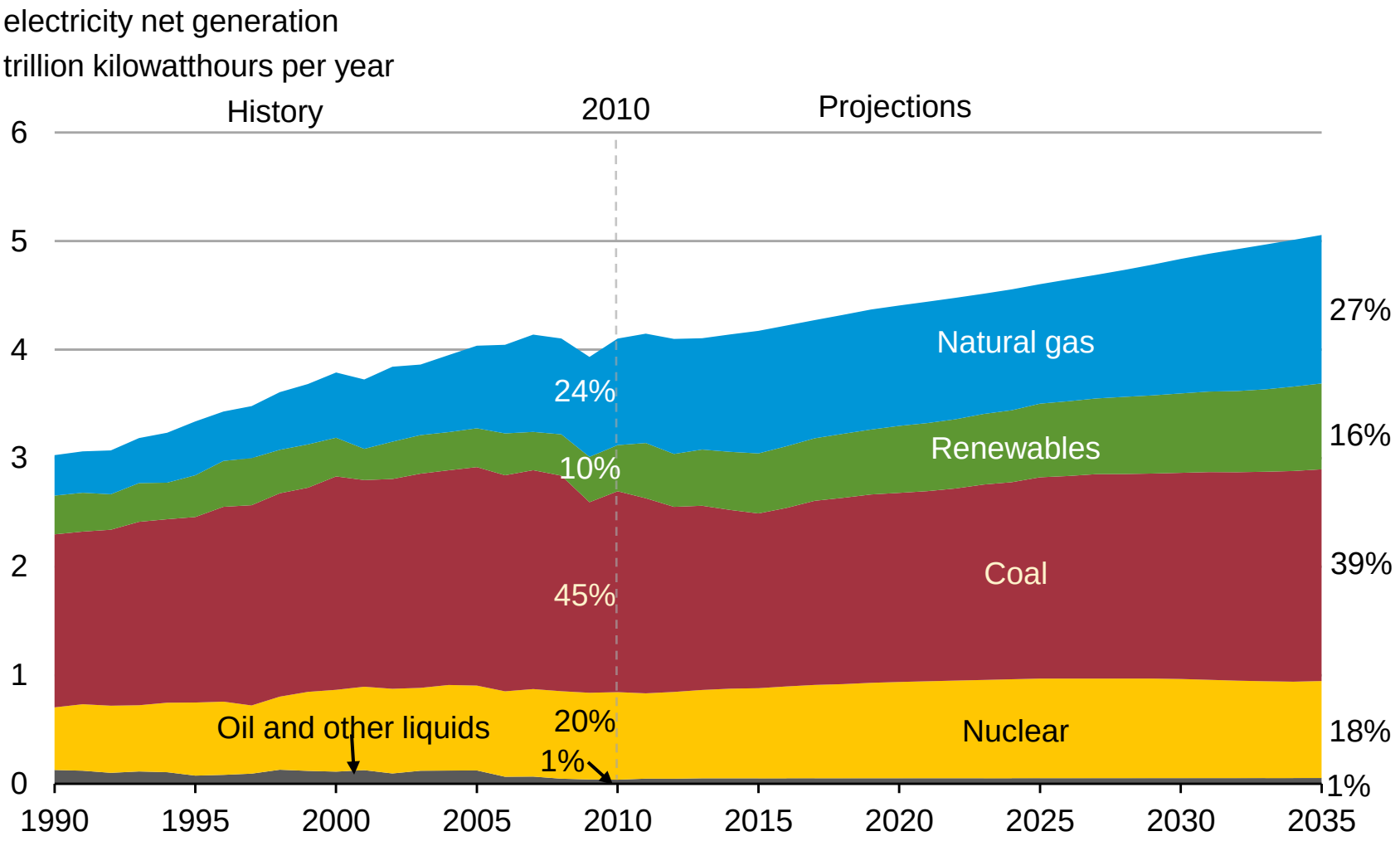
While electricity consumption grows by 23% over the projection, the annual rate of growth slows



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

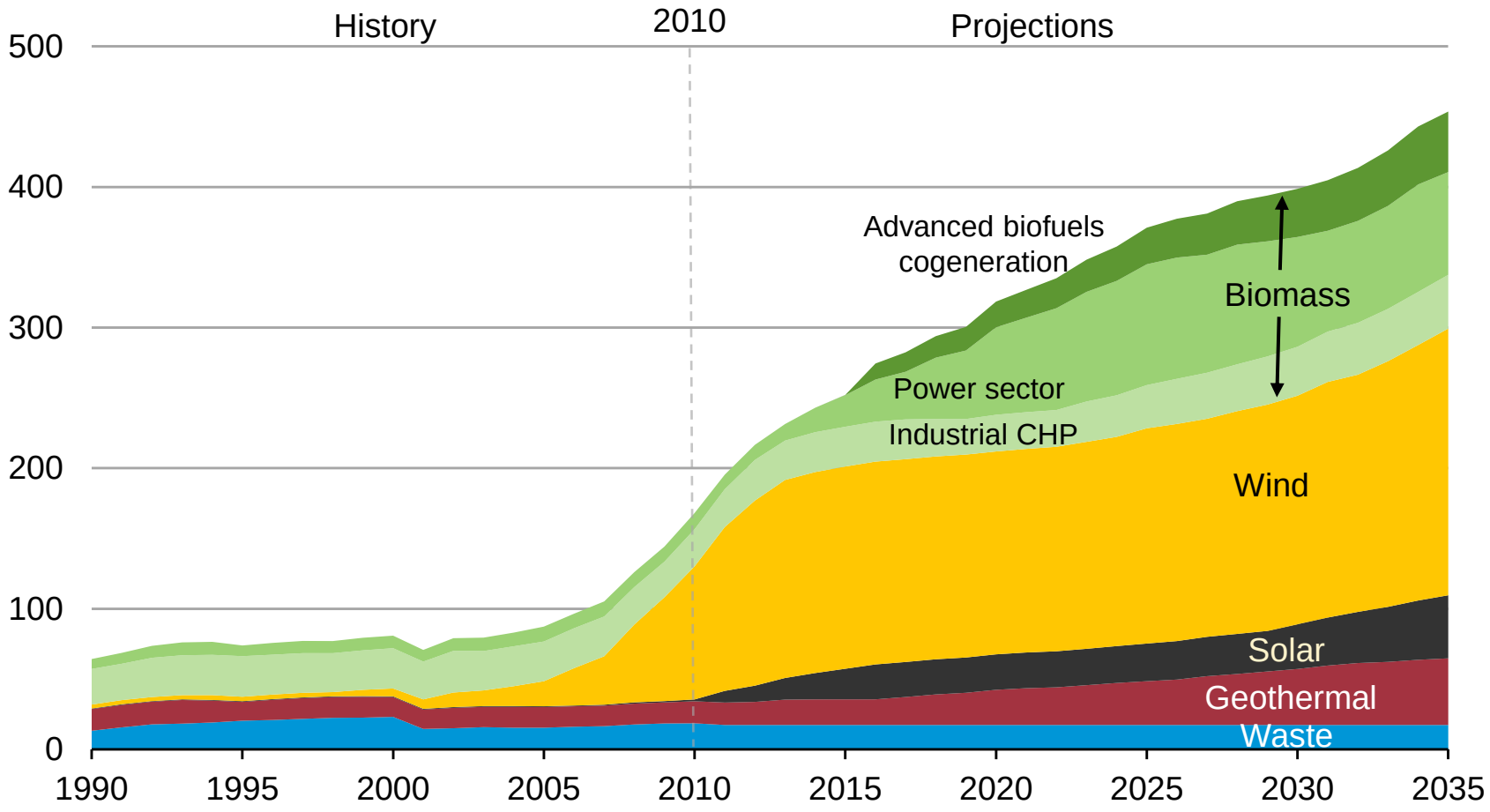
Electricity mix gradually shifts to lower-carbon options, led by growth in renewables and natural gas



Source: EIA, Annual Energy Outlook 2012 Early Release

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

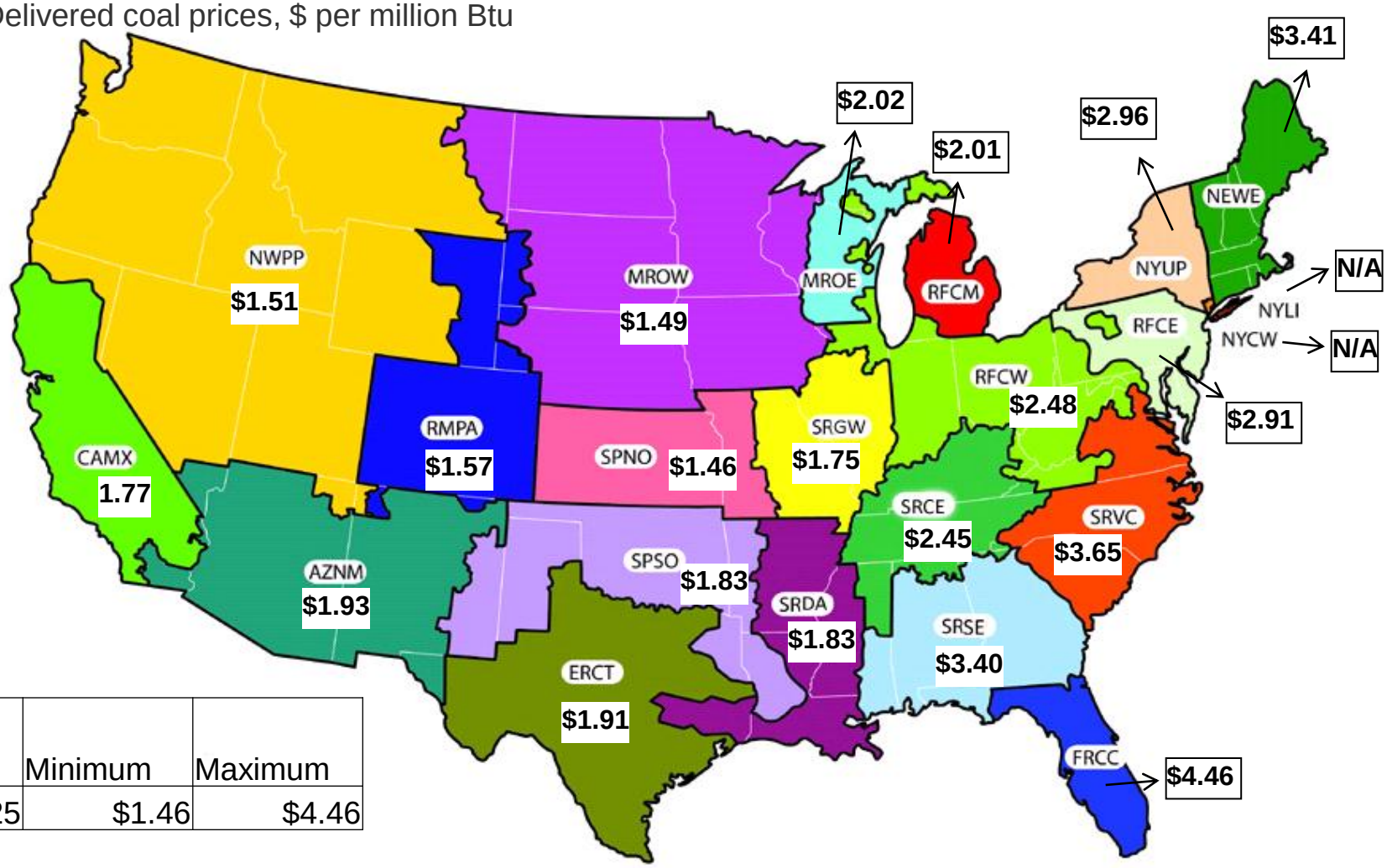
non-hydropower renewable generation
billion kilowatthours per year



Source: EIA, Annual Energy Outlook 2012 Early Release

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

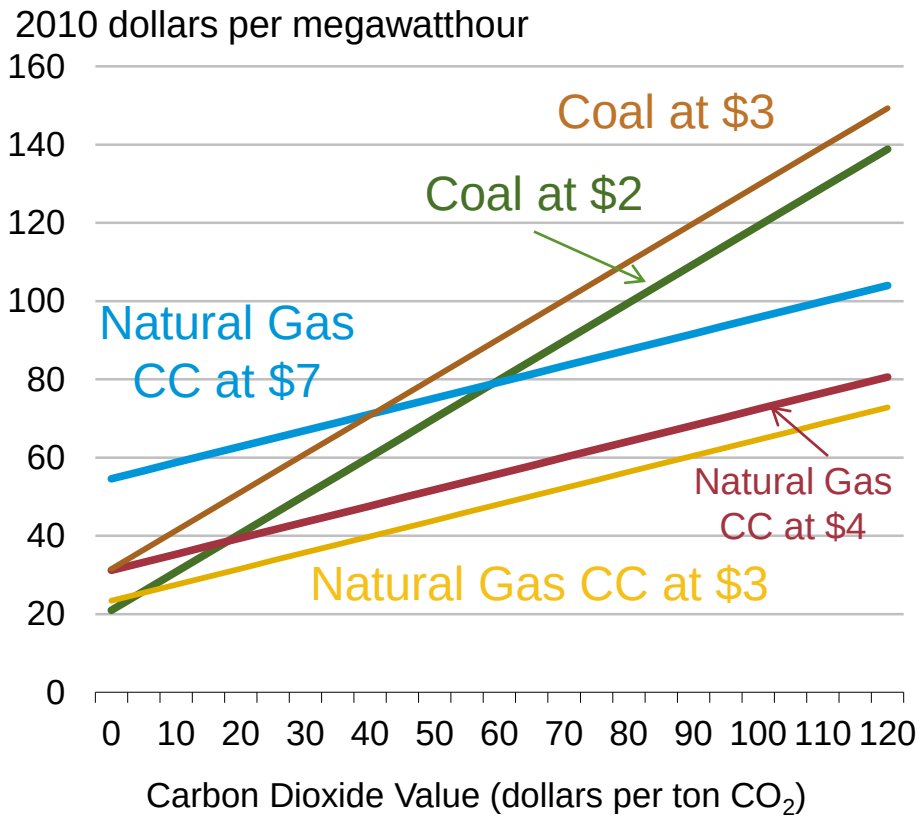


National Average	Minimum	Maximum
$2.25	$1.46	$4.46

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

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	

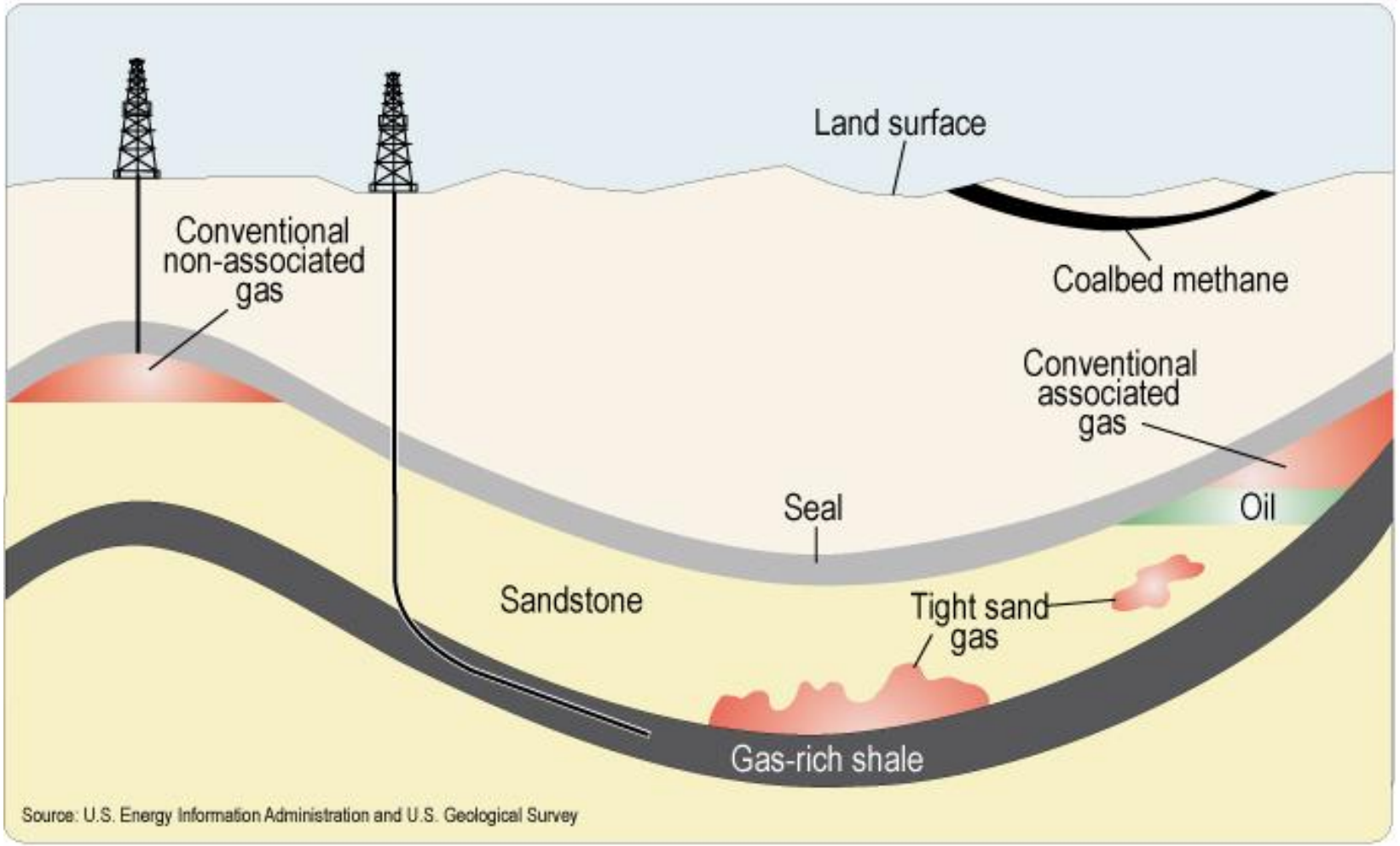
Selective Catalytic Reduction (2010 $/kW)		
	Capital Costs ($/kW)	VOM ($/MWh)
300 MW	$203	$1.30
500 MW	$185	
700 MW	$177	

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

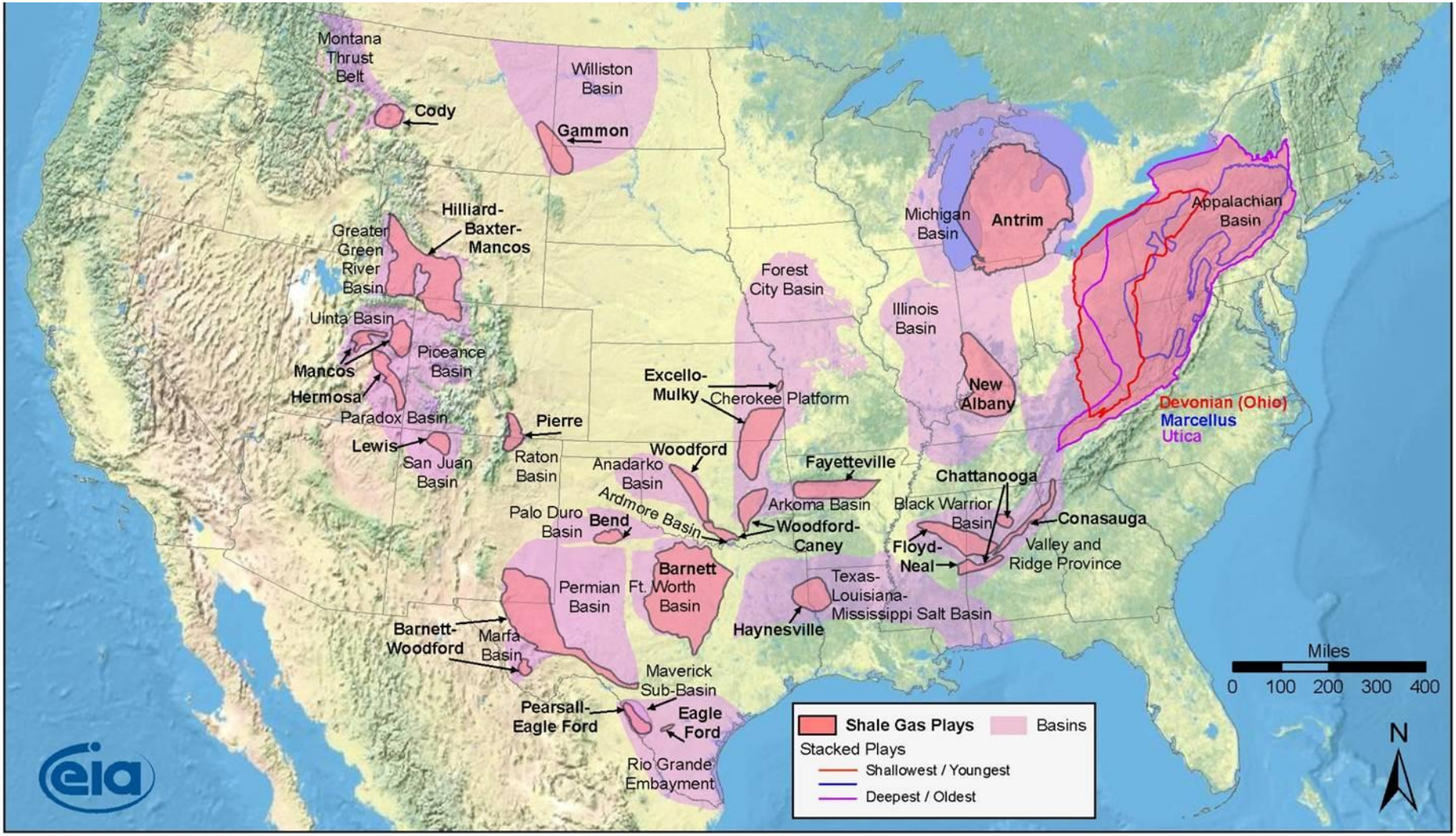
Natural Gas

Underground sources of natural gas



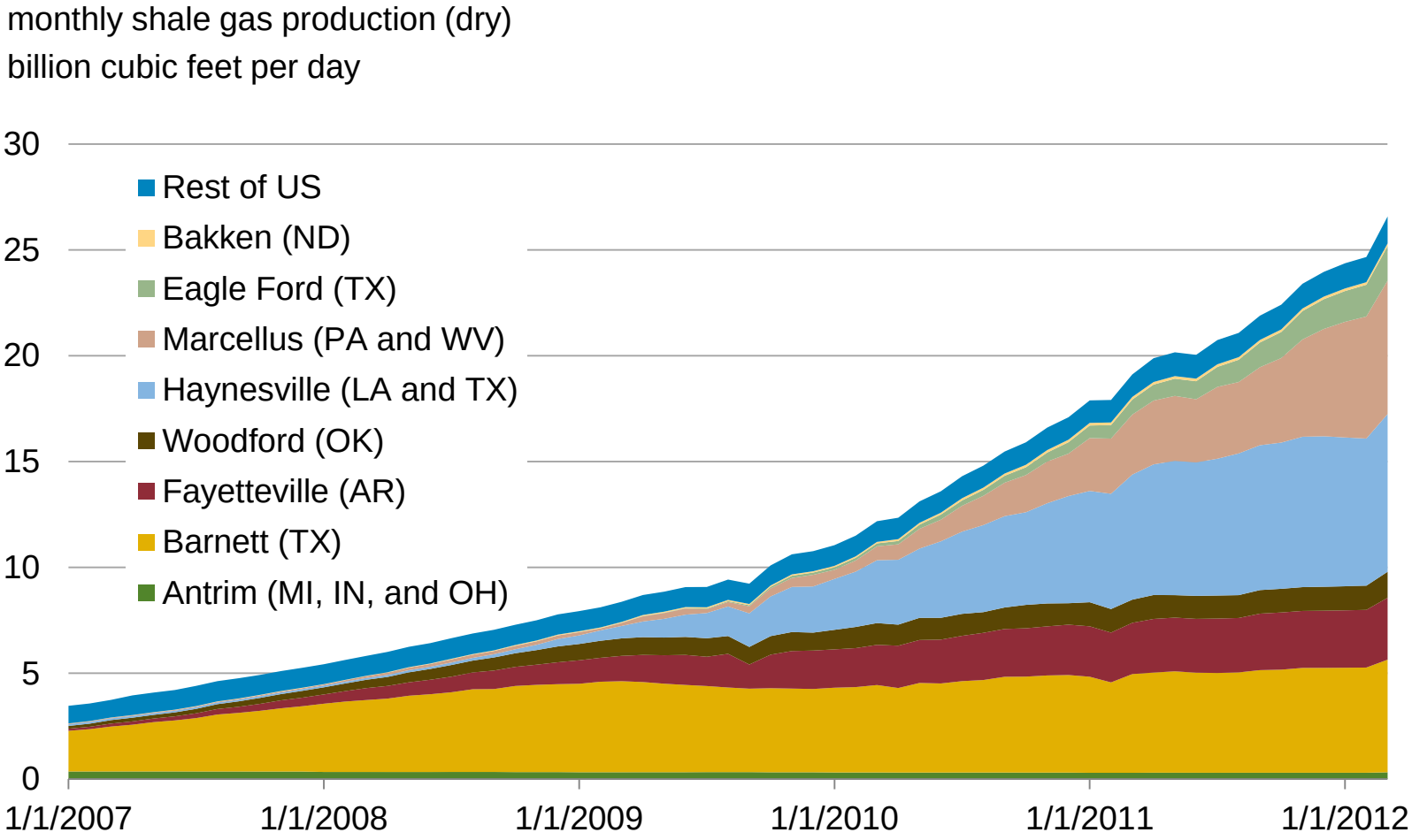
Source: modified from U.S. Geological Survey Fact Sheet 0113-01

Shale gas plays, Lower 48 States

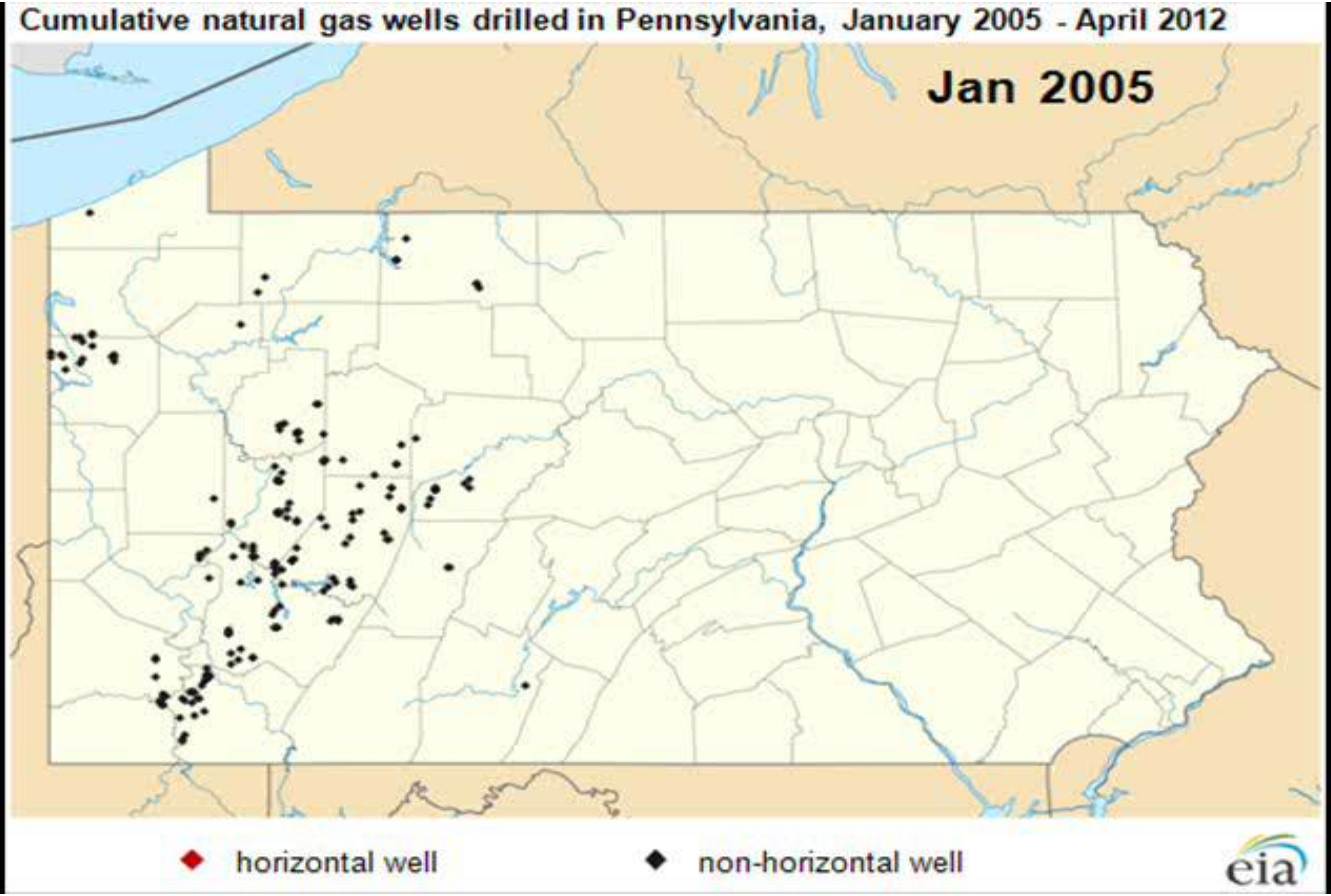


Source: Energy Information Administration based on data from various published studies.

Since January 2007, U.S. shale gas production has increased over 7-fold and in 2011 comprised over 30 percent of total U.S. dry production

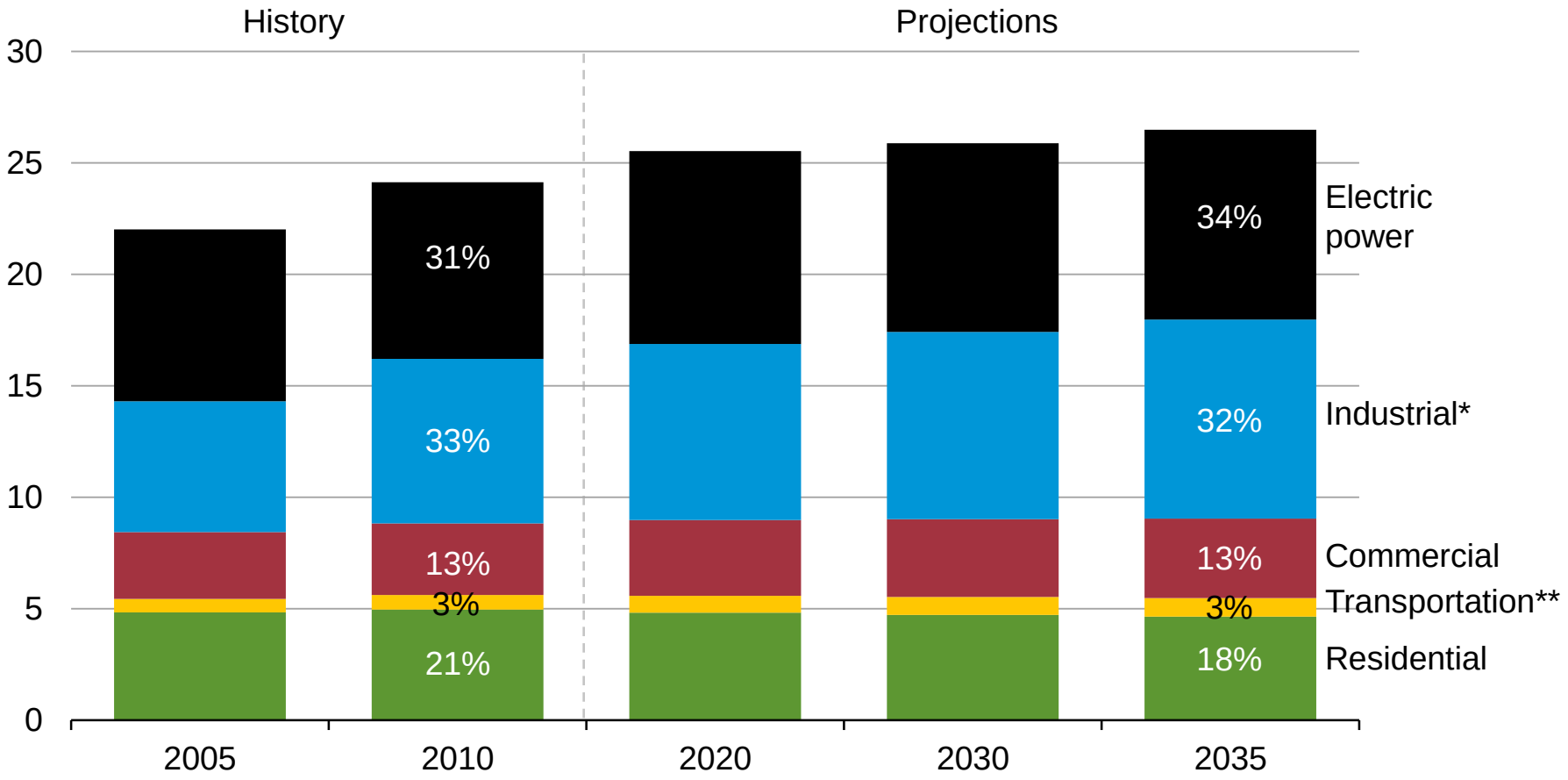


Sources: Lippman Consulting, Inc. gross withdrawal estimates as of March 2012 and converted to dry production estimates with EIA-calculated average gross-to-dry shrinkage factors by state and/or shale play.


Cumulative natural gas wells drilled in Pennsylvania, January 2005 - April 2012
Jan 2005
horizontal well
non-horizontal well
eia

Natural gas consumption is quite dispersed; electric power and industrial use drives much of the future demand growth

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

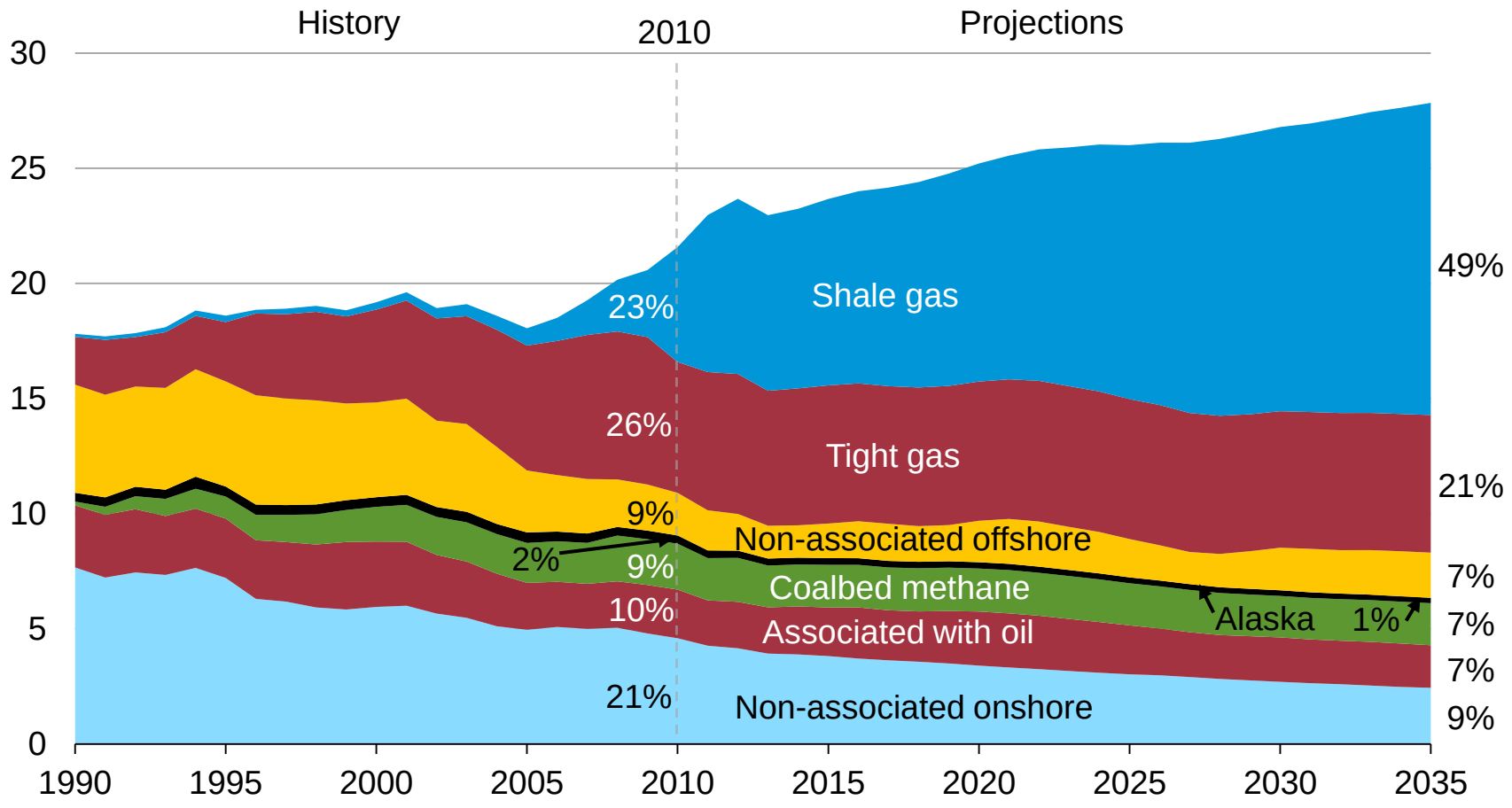


*Includes combined heat-and-power and lease and plant fuel. **Includes pipeline fuel.

Source: EIA, Annual Energy Outlook 2012 Early Release

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

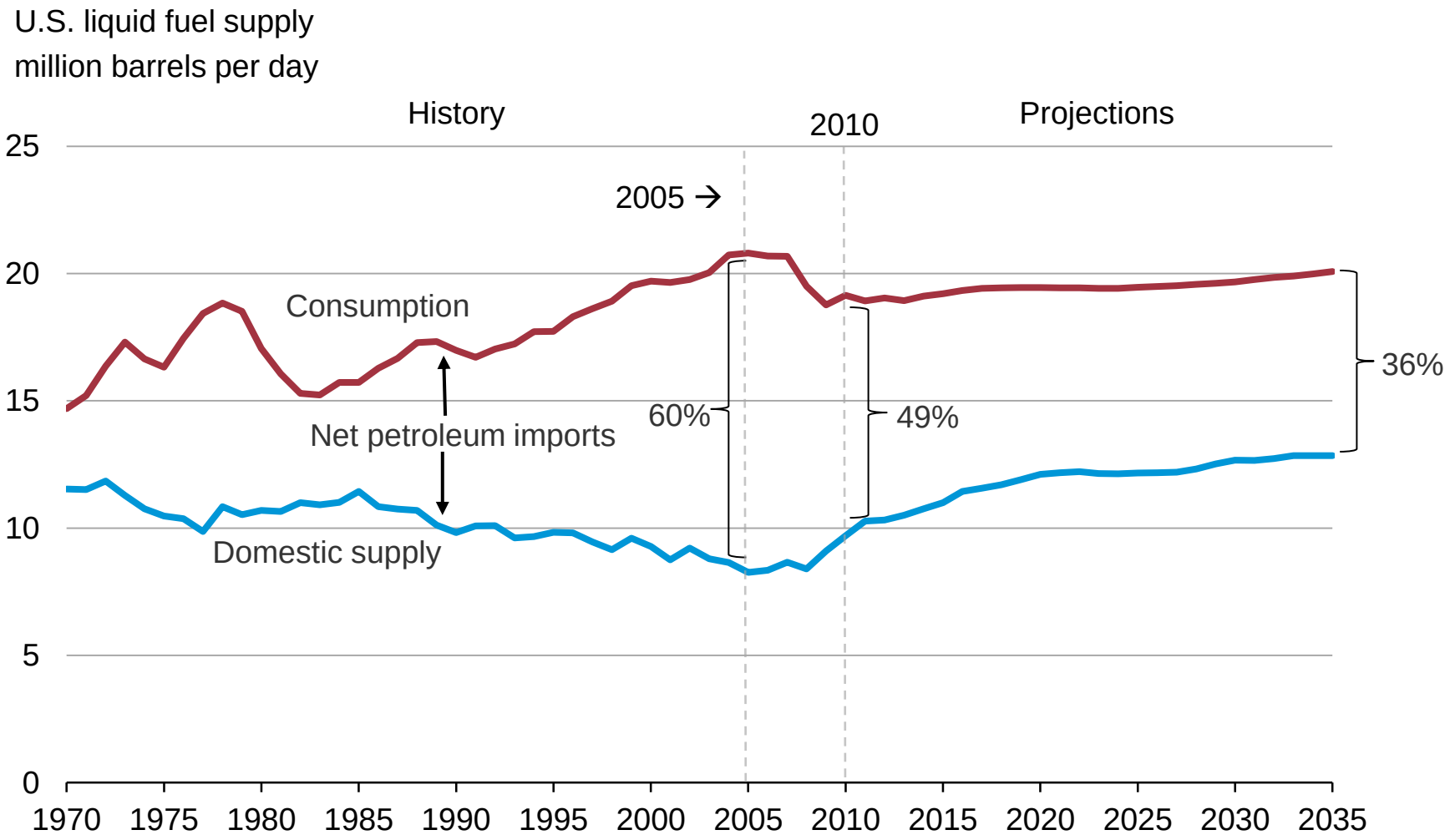
U.S. dry gas production
trillion cubic feet per year



Source: EIA, Annual Energy Outlook 2012 Early Release

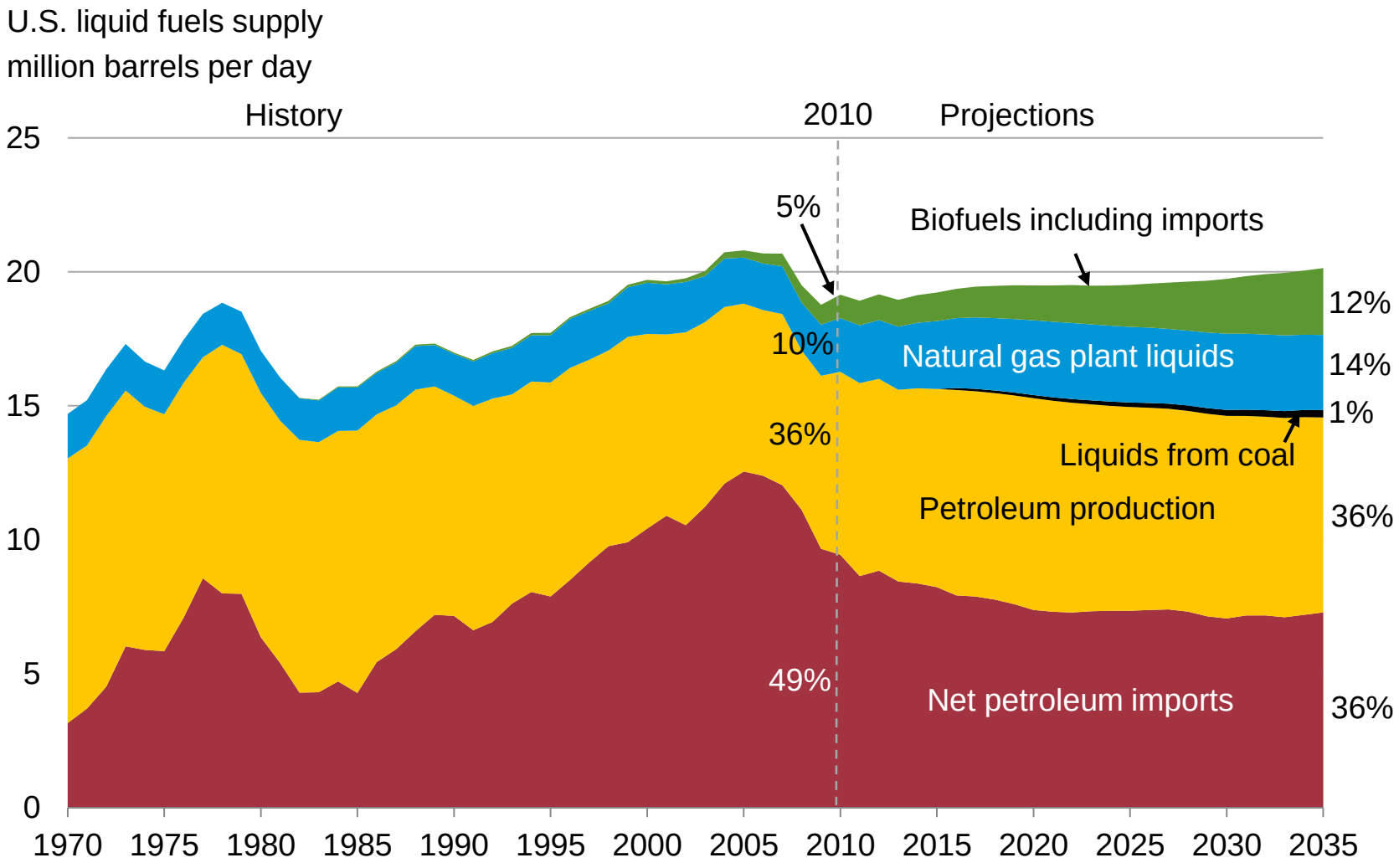
Petroleum

U.S. dependence on imported petroleum continues to decline



Source: EIA, Annual Energy Outlook 2012 Early Release

U.S. imports of liquid fuels continue to decline due to increased production of gas liquids and biofuels and greater fuel efficiency



Source: EIA, Annual Energy Outlook 2012 Early Release

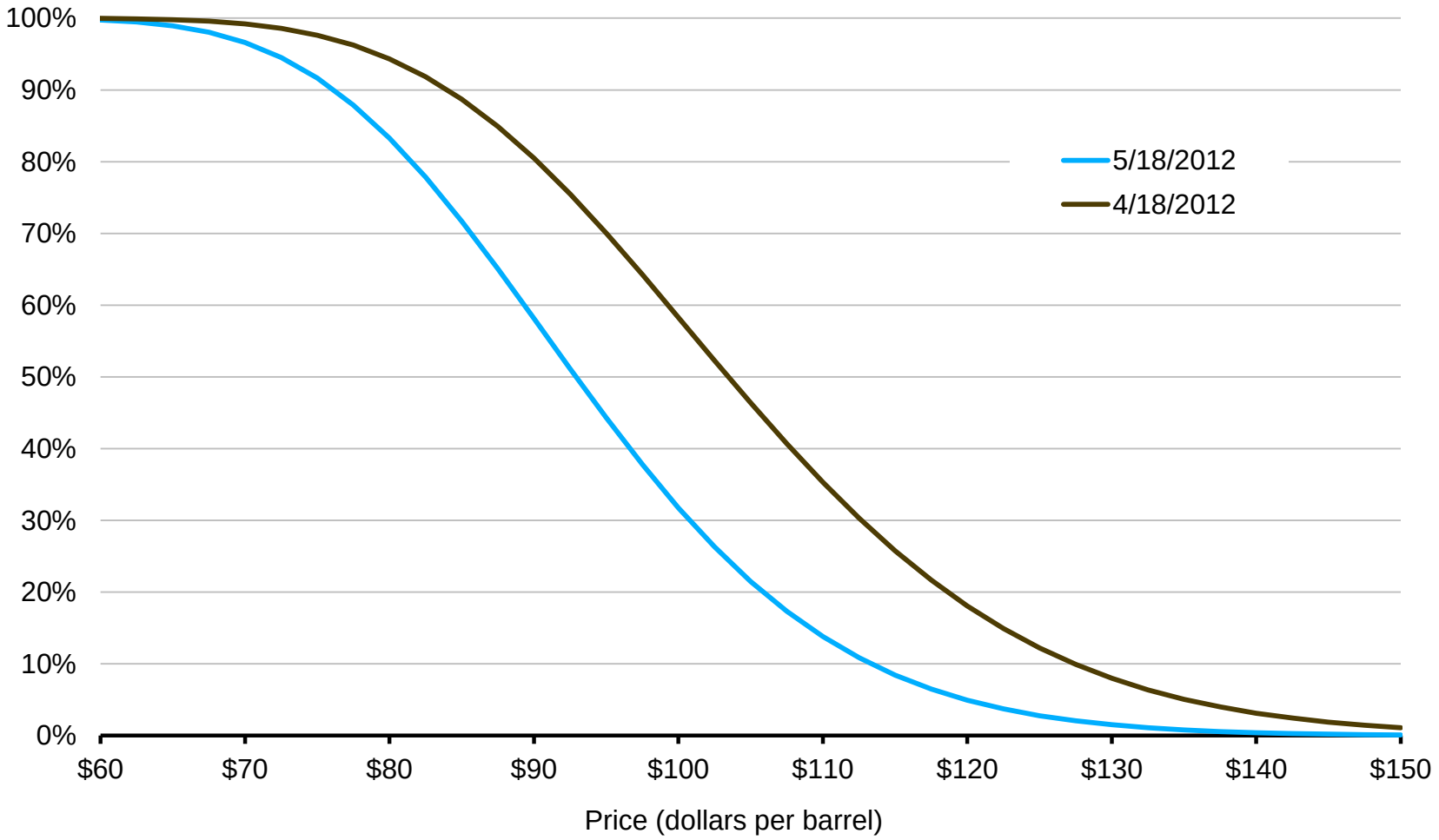
Efficiency improvements mostly offset underlying drivers of growth in transportation services

	2010	2035	Growth (2010-2035)
Light duty vehicles			
Fuel consumption (million barrels per day oil equivalent)	8.6	8.8	2%
Number of licensed drivers (millions)	209	265	27%
Miles per licensed driver	12,700	13,600	7%
Efficiency of vehicle stock (mpg)	20.4	27.8	36%*
Heavy duty vehicles			
Fuel consumption (million barrels per day oil equivalent)	2.4	2.8	18%
Manufacturing output (billion 2005 dollars)	4,260	6,270	47%
Number of freight trucks (millions)	9.3	13.4	44%
Miles per vehicle	25,300	25,700	1.3%
Efficiency of vehicle stock (mpg)	6.7	8.2	23%**

* Equal to a 27% reduction in fuel use per mile. ** Equal to an 19% reduction in fuel use per mile.

Source: EIA, Annual Energy Outlook 2012 Early Release

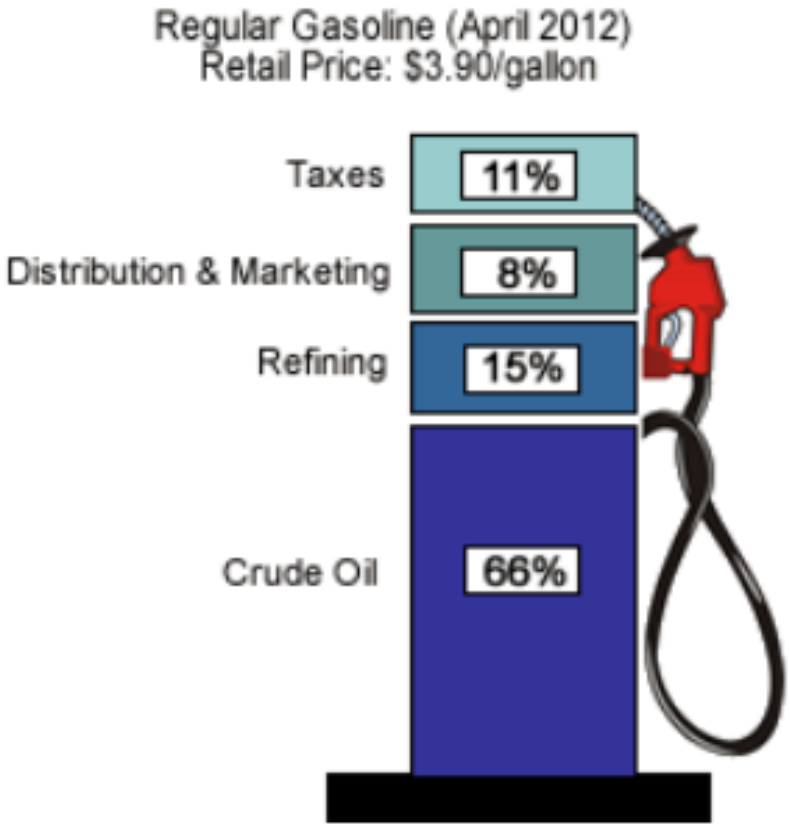
Probability of WTI crude oil exceeding different price levels by September 2012

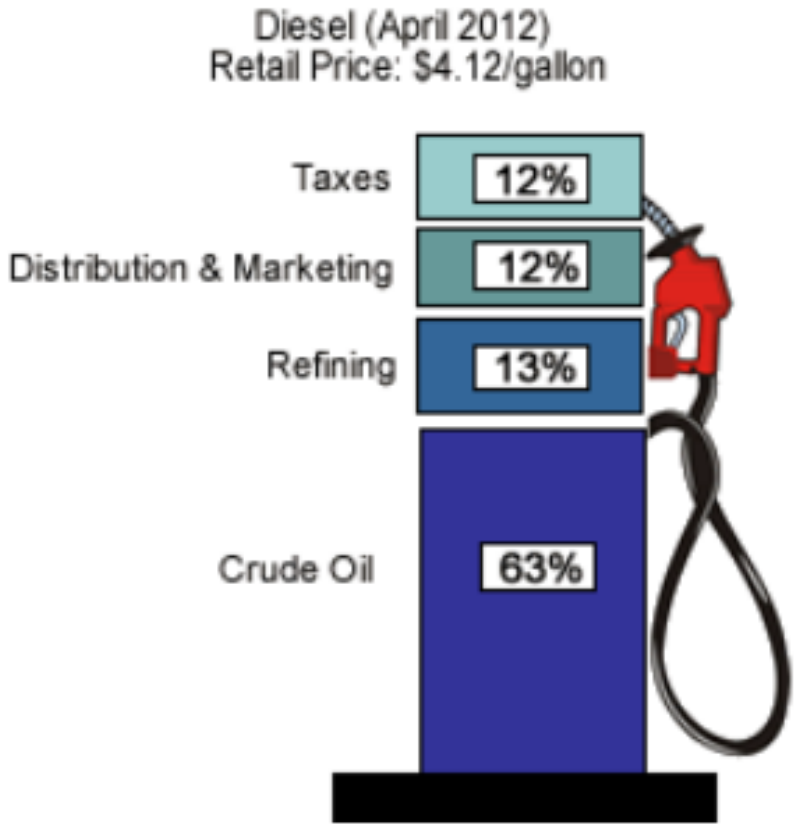


Note: All prices represent rolling 5-day averages.

Source: U.S. Energy Information Administration, Chicago Mercantile Exchange (CME)

What makes up the price at the pump?





Source: U.S. Energy Information Administration

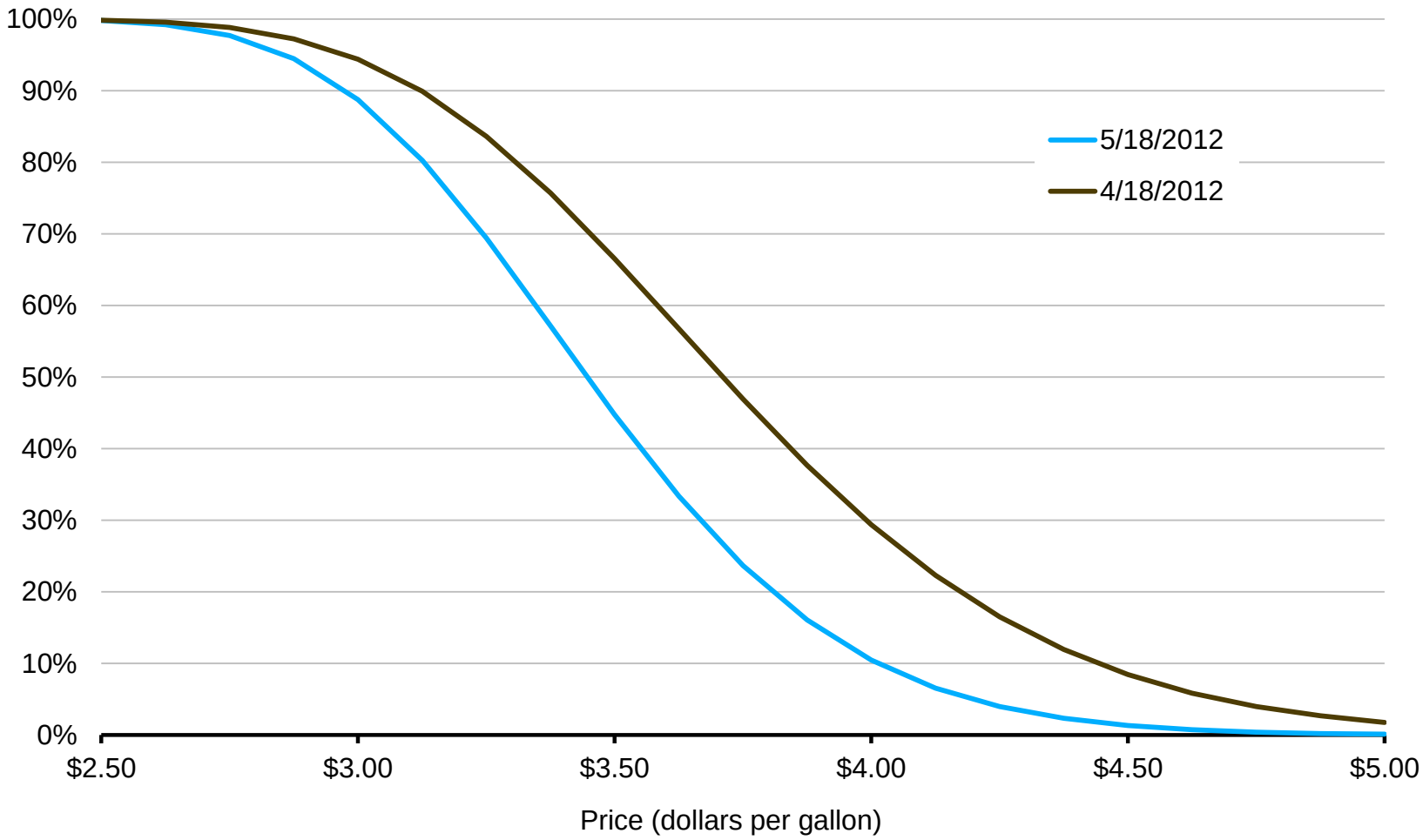
Gasoline prices vary regionally

U.S. Regular Gasoline Prices* (dollars per gallon) full history

				Change from	
	05/07/12	05/14/12	05/21/12	week ago	year ago
U.S.	3.790	3.754	3.714	-0.040	-0.135
East Coast (PADD1)	3.762	3.698	3.631	-0.067	-0.228
New England (PADD1A)	3.880	3.828	3.781	-0.047	-0.196
Central Atlantic (PADD1B)	3.809	3.764	3.707	-0.057	-0.205
Lower Atlantic (PADD1C)	3.692	3.610	3.530	-0.080	-0.254
Midwest (PADD2)	3.721	3.641	3.626	-0.015	-0.191
Gulf Coast (PADD3)	3.622	3.558	3.489	-0.069	-0.221
Rocky Mountain (PADD4)	3.764	3.762	3.754	-0.008	0.021
West Coast (PADD5)	4.135	4.255	4.242	-0.013	0.206
West Coast less California	4.001	4.063	4.081	0.018	0.193

Source: U.S. Energy Information Administration

Probability of U.S. retail gasoline exceeding different price levels by September 2012



Note: All prices represent rolling 5-day averages.

Source: U.S. Energy Information Administration, Chicago Mercantile Exchange (CME)