Annual Energy Outlook 2011
and an update on EIA activities

NGA Center for Best Practices
State Energy Working Group
February 8, 2011

Richard Newell, Administrator

U.S. Energy Information Administration
Independent Statistics and Analysis

Key results from the *AEO2011* Reference case, which assumes current laws remain unchanged

- Increased estimates for U.S. shale gas resources drive increased U.S. production, lower prices, and lower imports of natural gas
- Industrial natural gas demand recovers, reversing recent trend
- Non-hydro renewables and natural gas are the fastest growing electricity generation sources, but coal remains the dominant fuel because of the large amount of existing capacity
- Oil imports fall due to increased domestic production—including biofuels—and greater fuel efficiency
- U.S. carbon dioxide emissions rise slowly, but do not pass 2005 levels again until 2027

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 sunset as specified in law (e.g., renewable tax credits expire)
- Includes technologies that are commercial or reasonably expected to become commercial over next decade or so
  - includes projected cost and efficiency improvements due to technology improvements, as well as cost reductions linked to cumulative deployment levels.
  - does not assume revolutionary or breakthrough technologies

Key updates included in the *AEO2011* Reference case

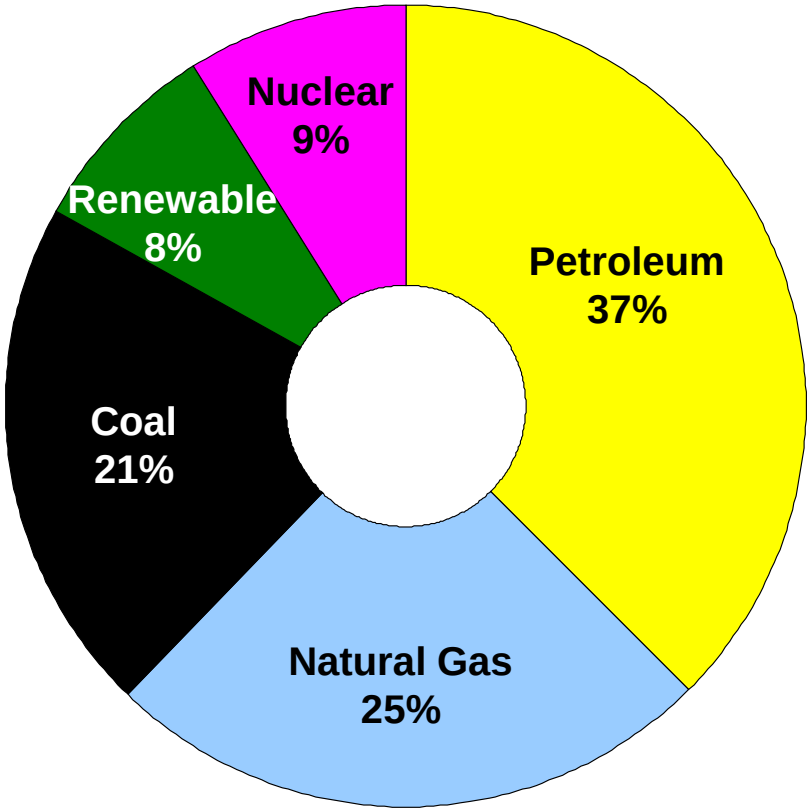
- Natural gas and oil supply
  - More than doubled the technically recoverable U.S. shale gas resources assumed in *AEO2010* and added new shale oil resources
  - Updated offshore data and assumptions, pushing out start dates for several projects as a result of the drilling moratoria and delaying Atlantic and Pacific offshore leasing beyond 2017
- Electricity
  - Updated costs for new power plants
  - Expanded number of electricity regions to 22 from 13, allowing better regional representation of market structure and power flow
- Transport
  - Increased limit for ethanol blending into gasoline from E10 to E15 for approved vehicles, as a result of the EPA waiver granted in October 2010
  - Includes California's Low Carbon Fuel Standard, which reduces the carbon intensity of gasoline and diesel fuels in that state by 10% from 2012 through 2020
  - Revised light duty vehicle miles travelled downward
  - Updated electric and plug-in hybrid electric battery cost and size

U.S. Energy Consumption

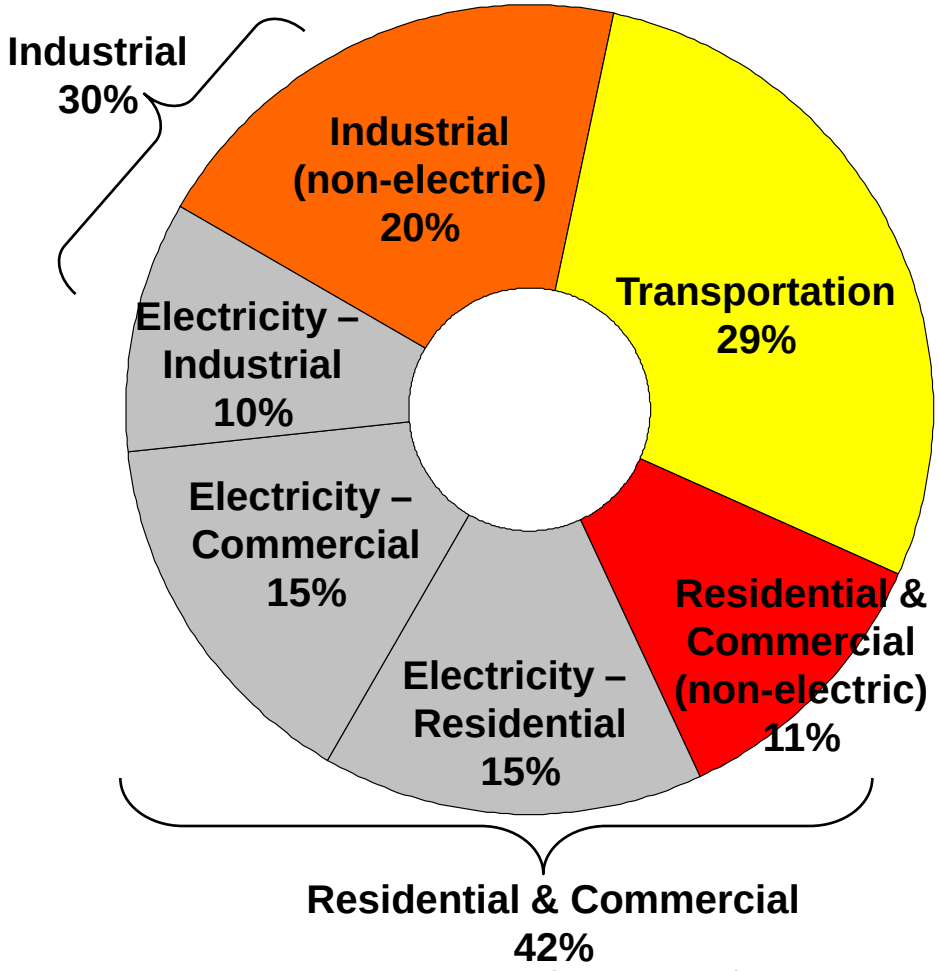
Current U.S. energy supply is 83% fossil fuels; demand is broadly distributed among the major sectors

2009 total U.S. energy use = 94.6 quadrillion Btu

Energy supply

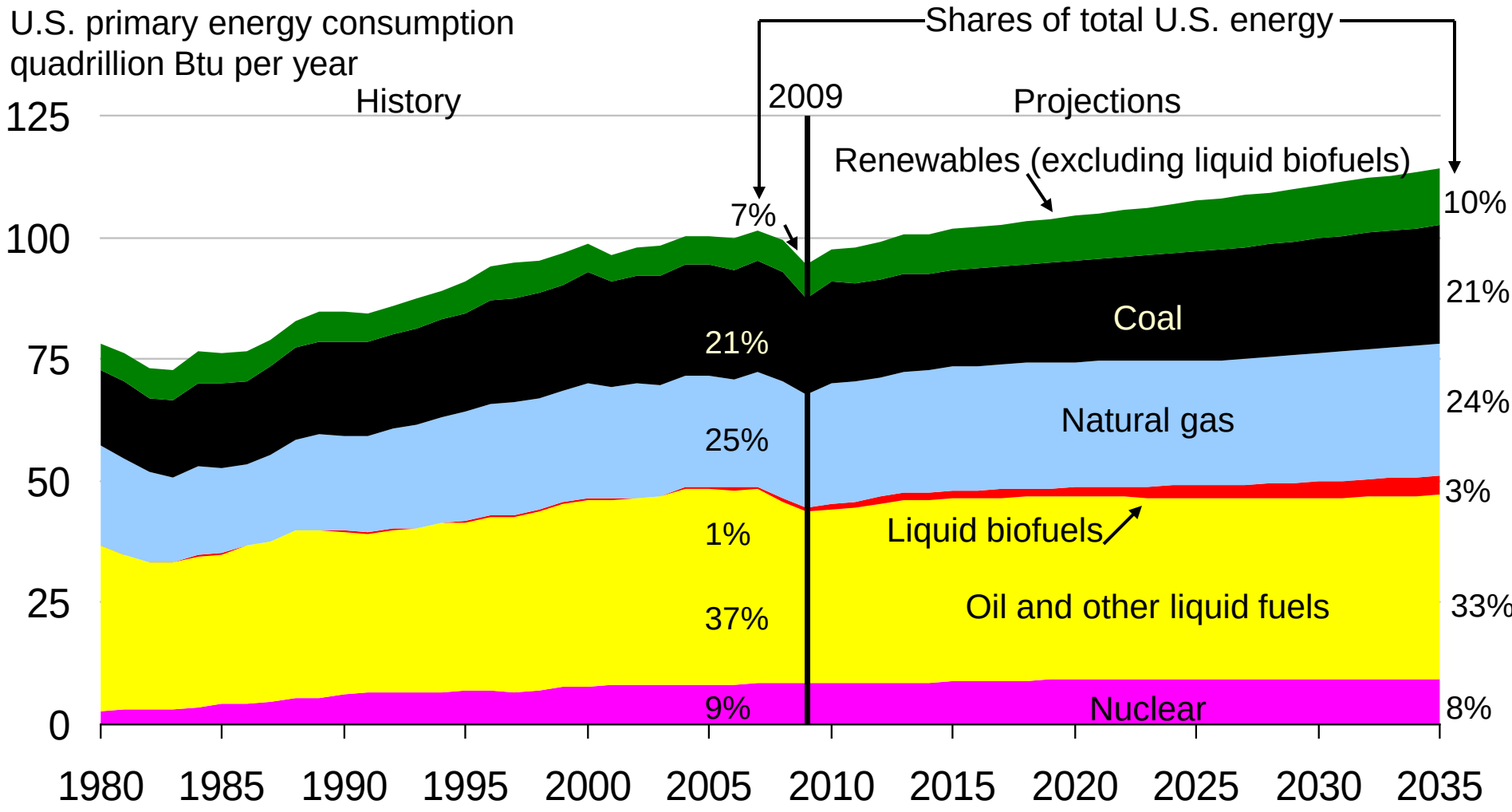


Energy demand



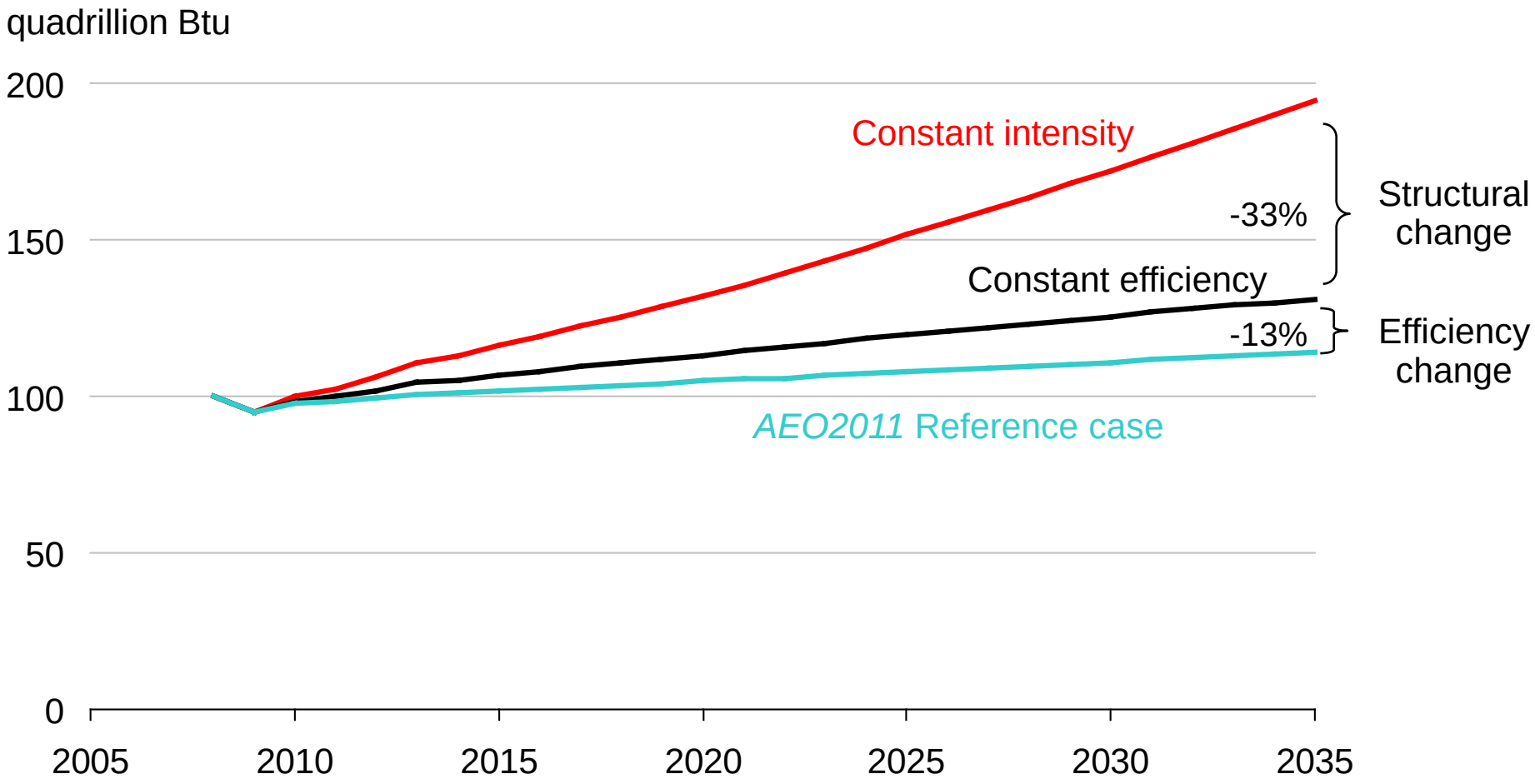
Source: EIA *Annual Energy Review 2009*

Renewables grow rapidly, but under current policies fossil fuels still provide 78% of U.S. energy use in 2035



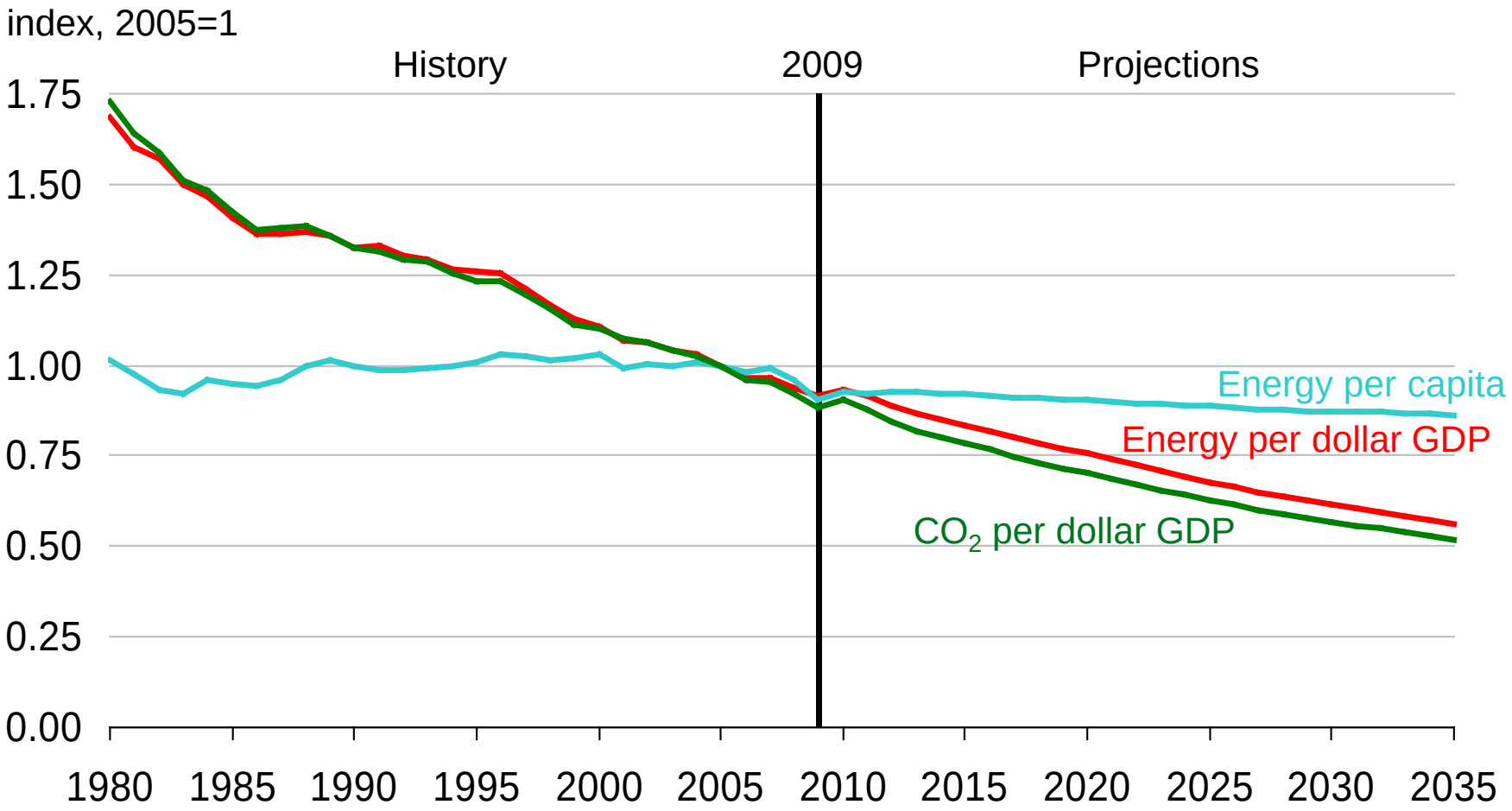
Source: EIA, *Annual Energy Outlook 2011*

Energy efficiency gains reduce consumption 13% from where it would otherwise be; structural change is even larger



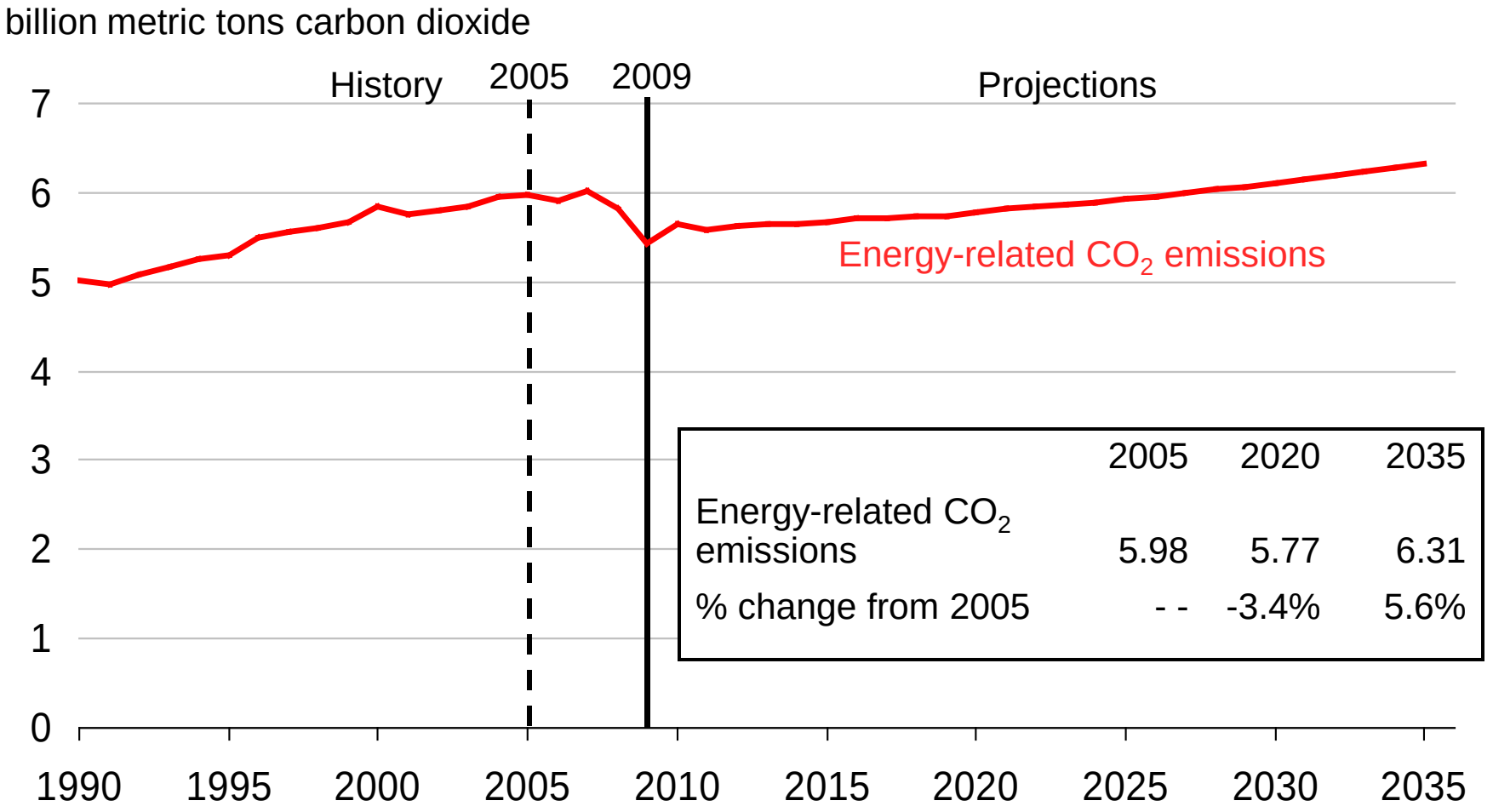
Source: EIA, *Annual Energy Outlook 2011*

Energy and CO_2 per dollar of GDP continue to decline; per-capita energy use also declines



Source: EIA, *Annual Energy Outlook 2011*

In the *AEO2011* Reference case, energy-related CO_2 emissions grow almost 6% over 2005 levels by 2035

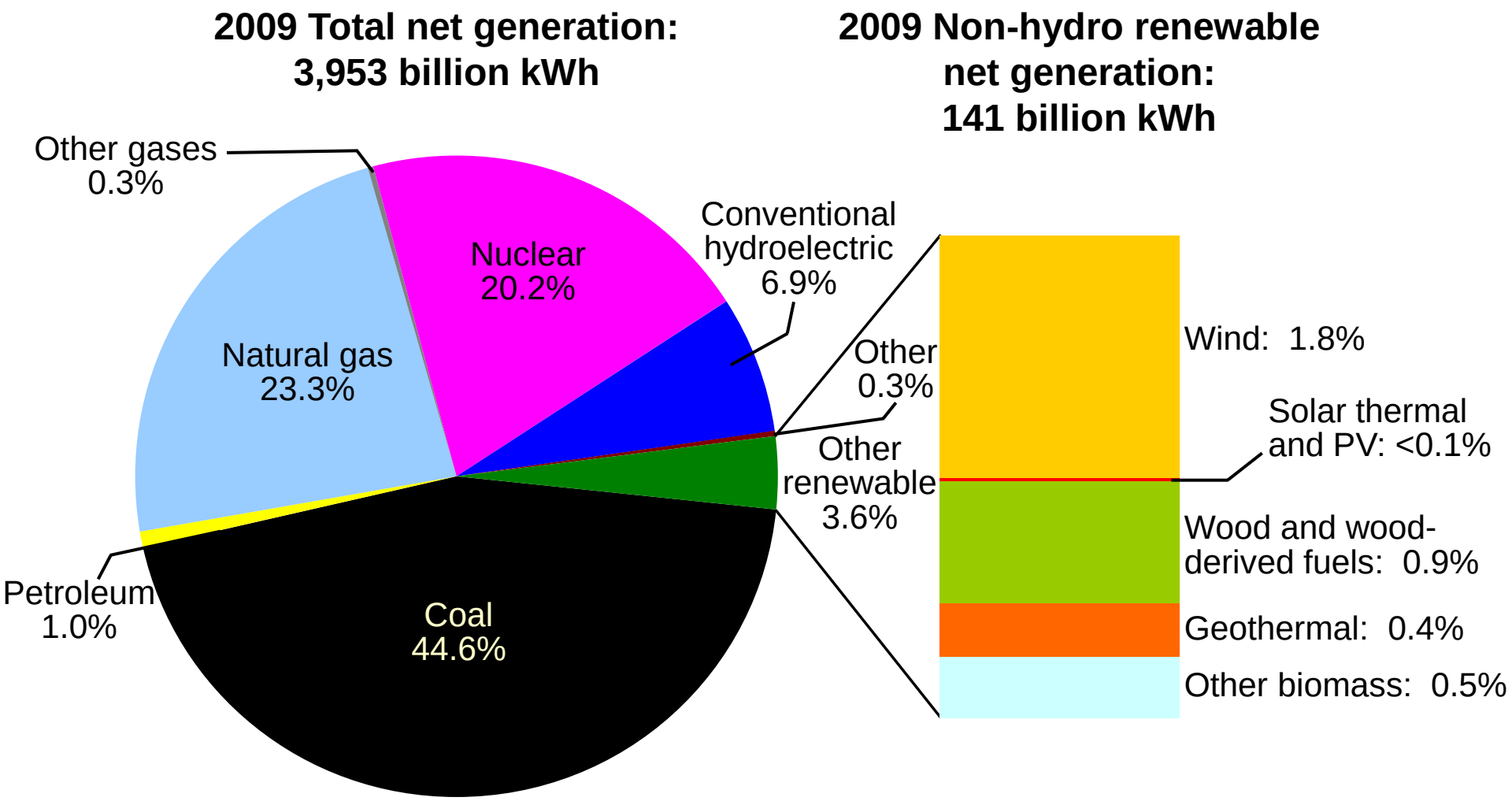


	2005	2020	2035
Energy-related CO_2 emissions	5.98	5.77	6.31
% change from 2005	- -	-3.4%	5.6%

Source: EIA, *Annual Energy Outlook 2011*

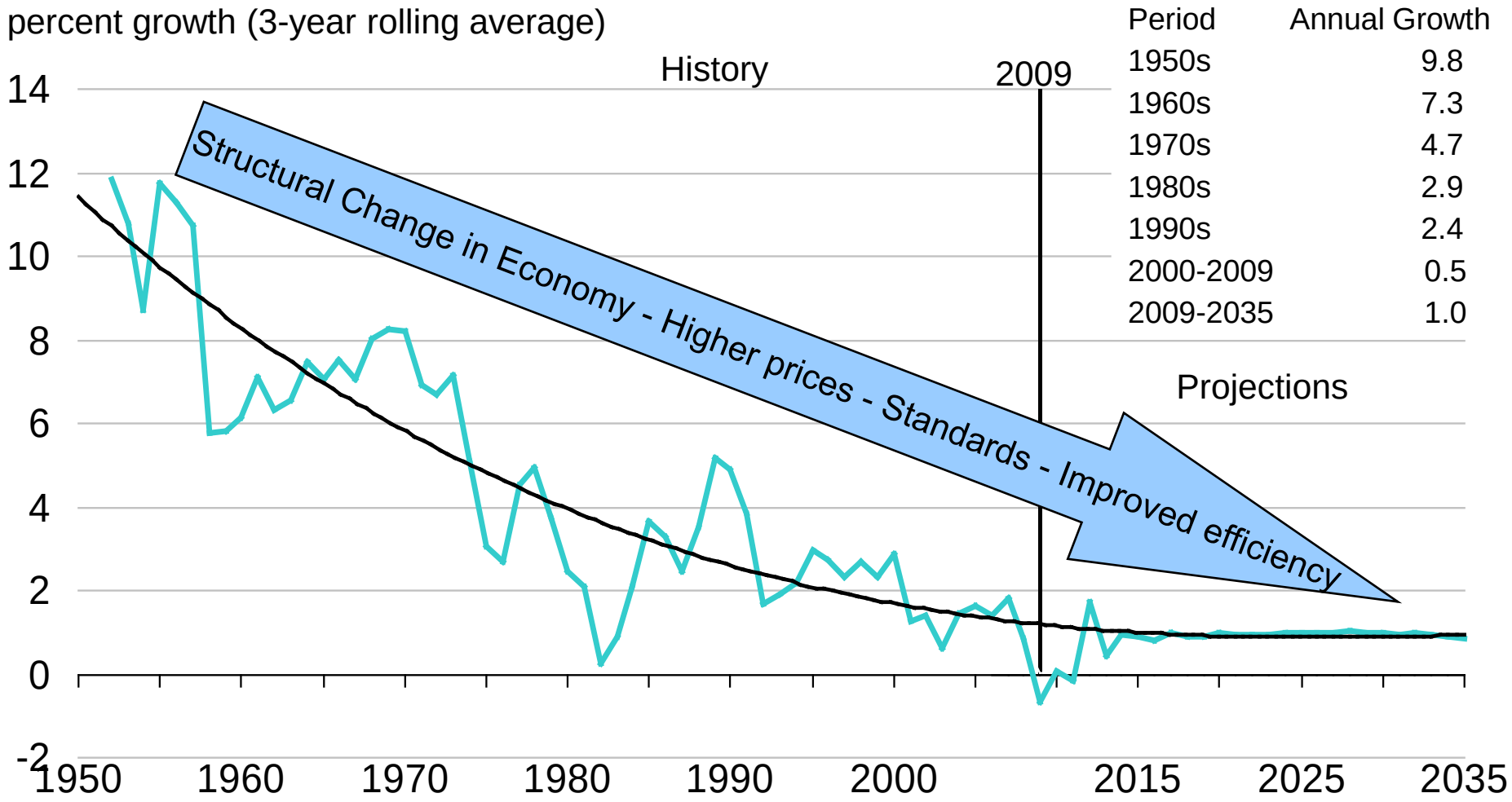
Electricity

In 2009, electricity generation was 70% fossil fuels, 20% nuclear, and 10% renewable



Source: EIA *Electric Power Monthly,* October 2010

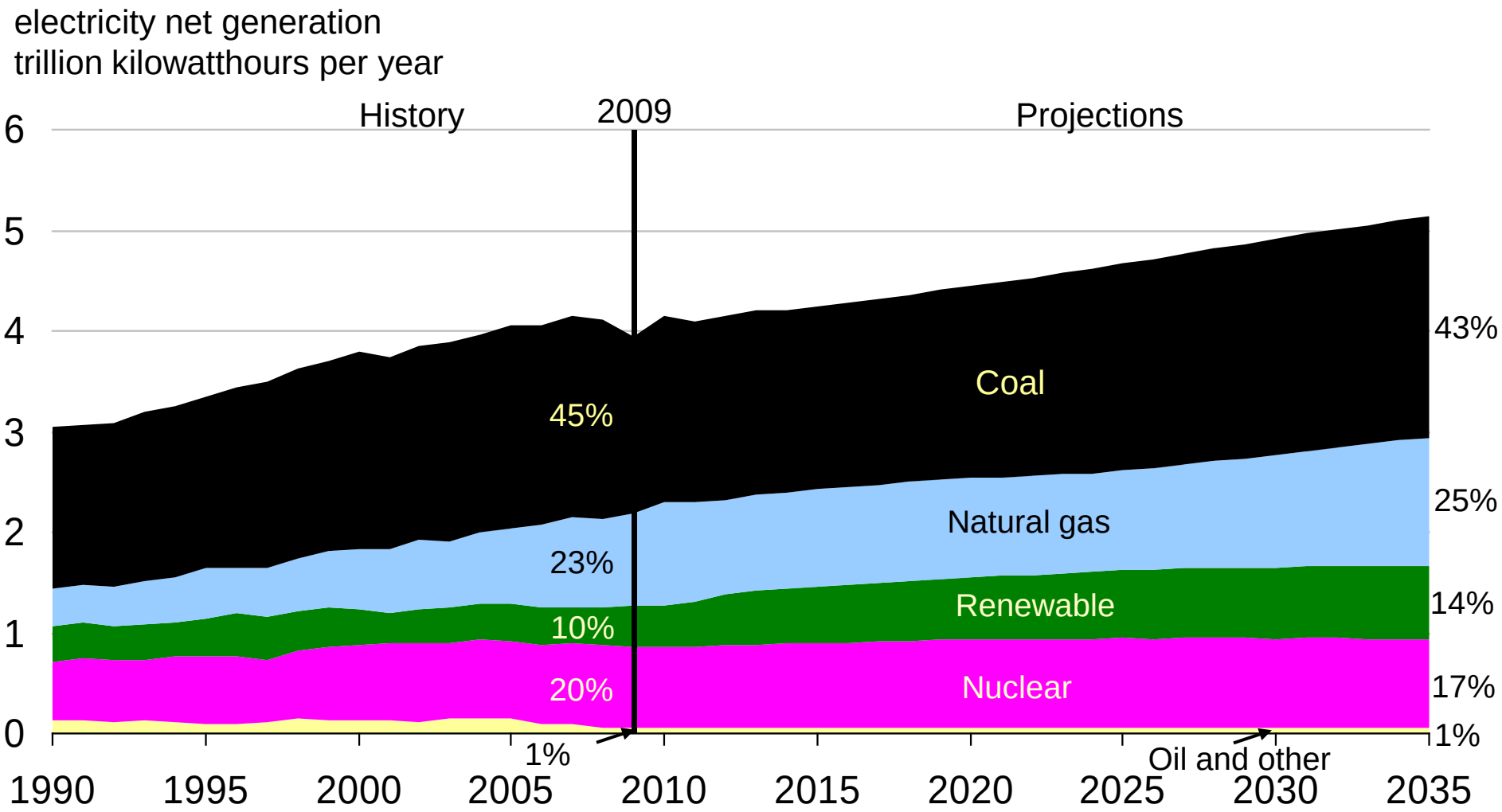
While projected electricity consumption grows by 30%, the rate of growth has slowed



Period	Annual Growth
1950s	9.8
1960s	7.3
1970s	4.7
1980s	2.9
1990s	2.4
2000-2009	0.5
2009-2035	1.0

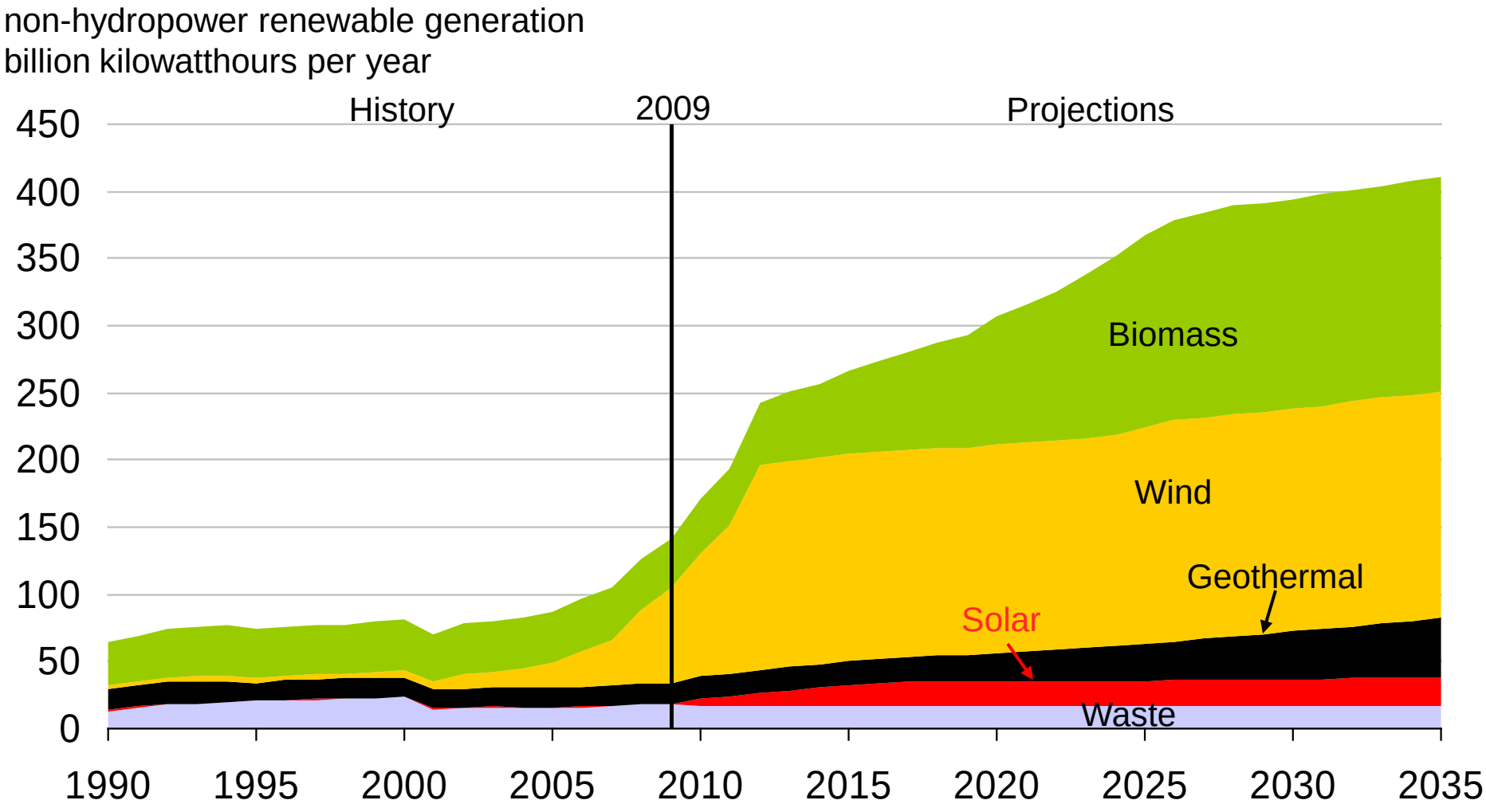
Source: EIA, *Annual Energy Outlook 2011*

The projected electricity mix gradually shifts to lower-carbon options, with generation from natural gas rising 37% and renewables rising 73%



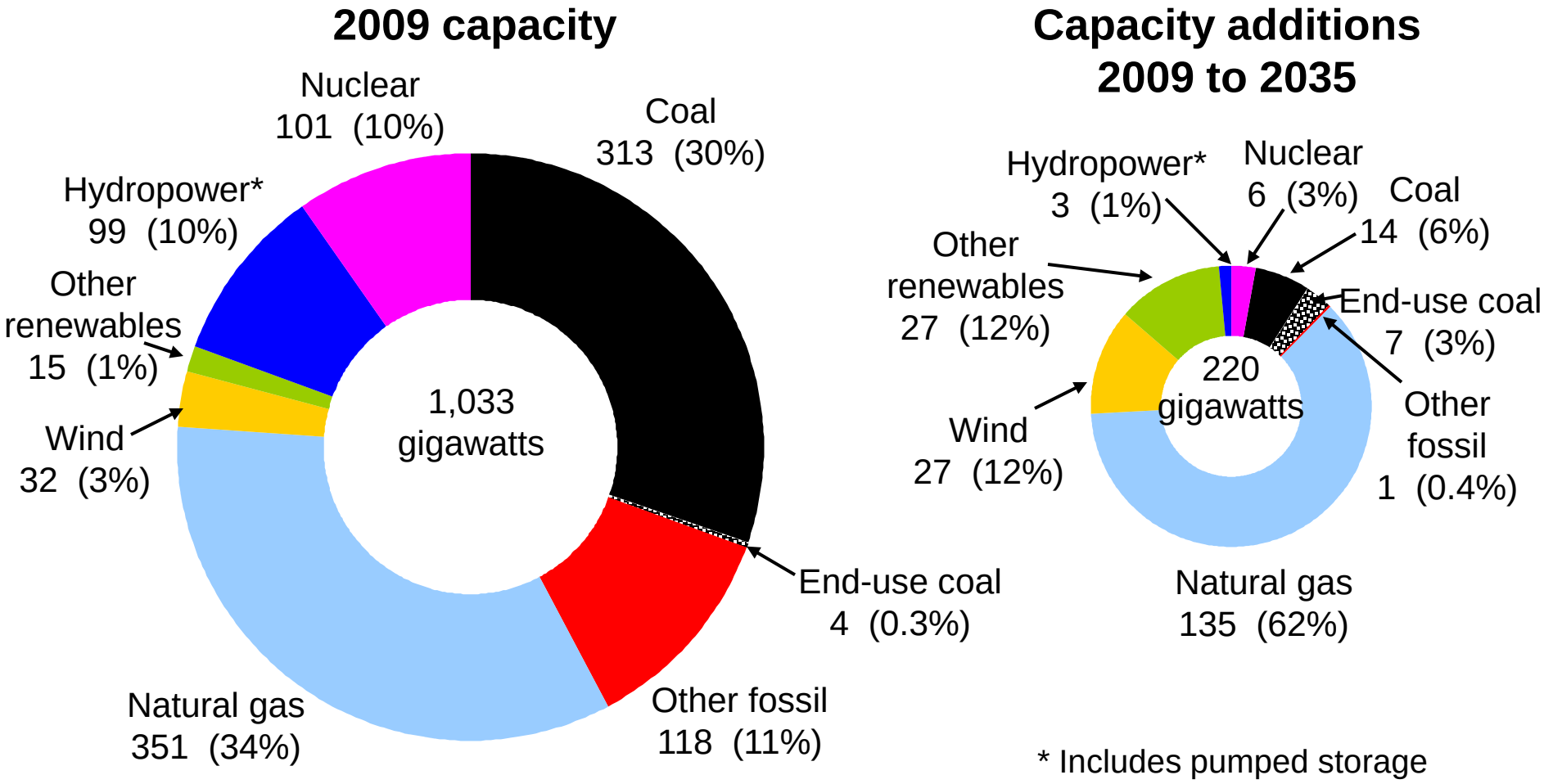
Source: EIA, *Annual Energy Outlook 2011*

Non-hydro renewable sources grow nearly three-fold, meeting 23% of projected electricity generation growth



Source: EIA, *Annual Energy Outlook 2011*

Natural gas, wind and other renewables account for the vast majority of capacity additions from 2009 to 2035

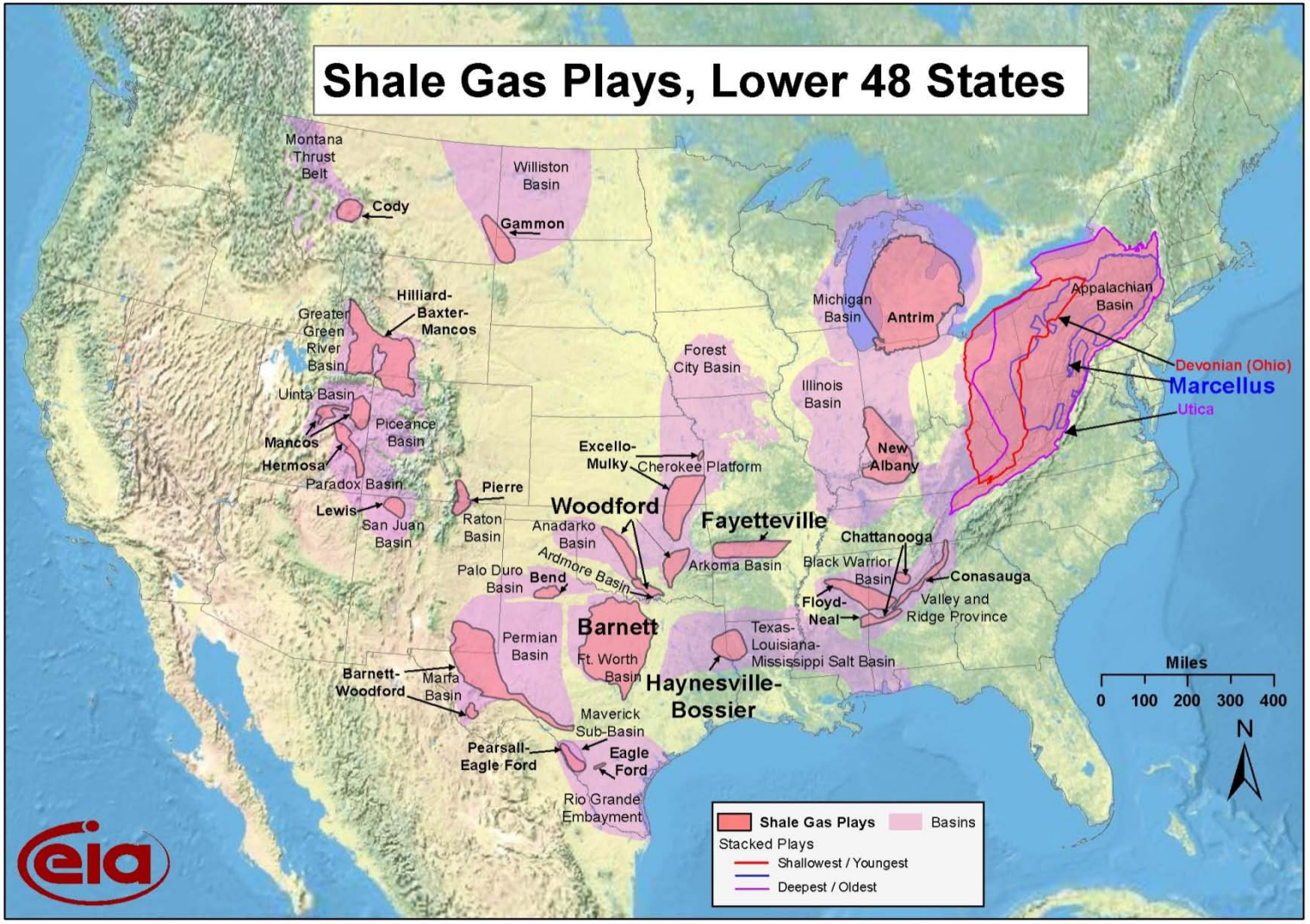


* Includes pumped storage

Source: EIA, *Annual Energy Outlook 2011*

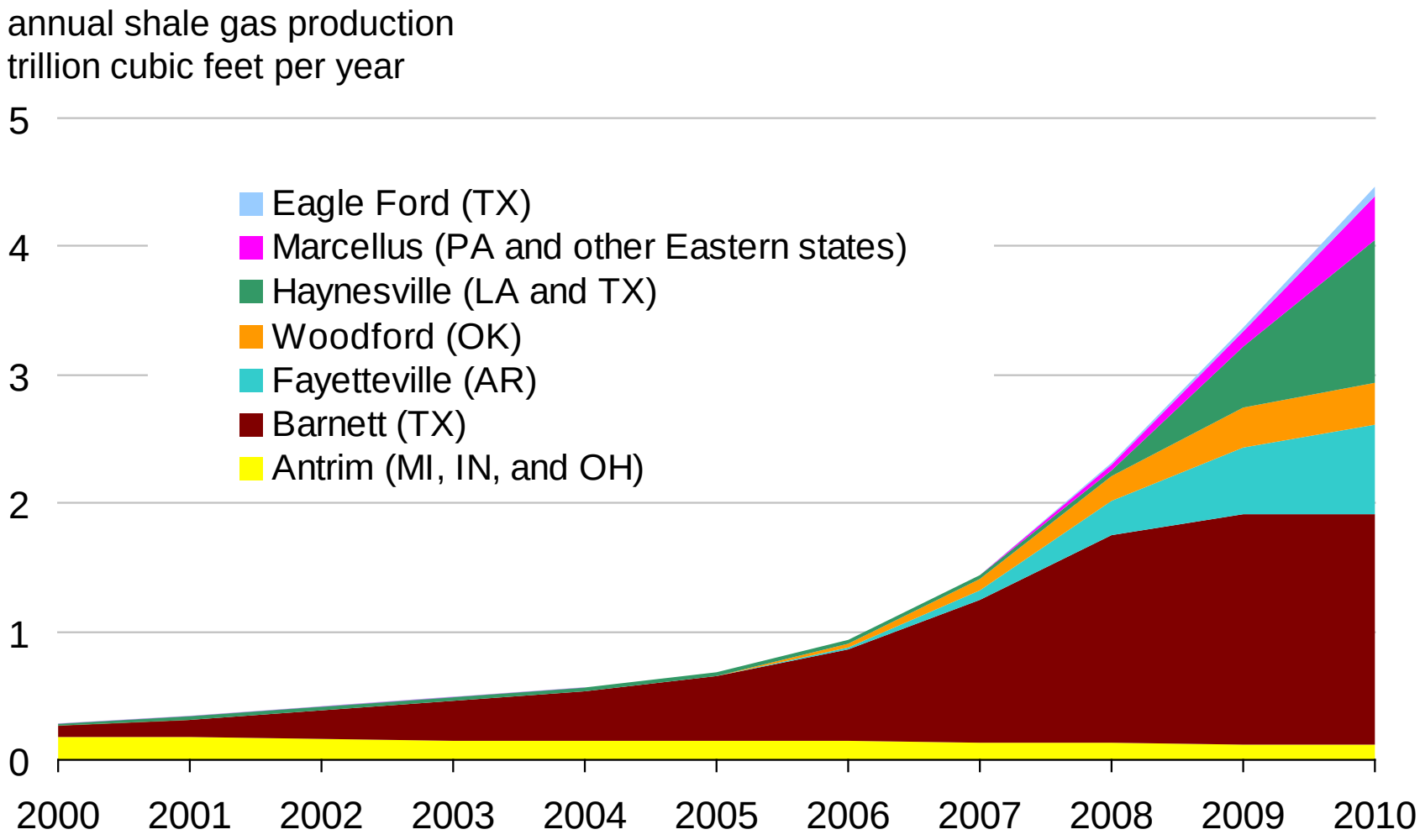
Natural gas

Success in the Barnett prompted companies to look at other shale formations in the United States



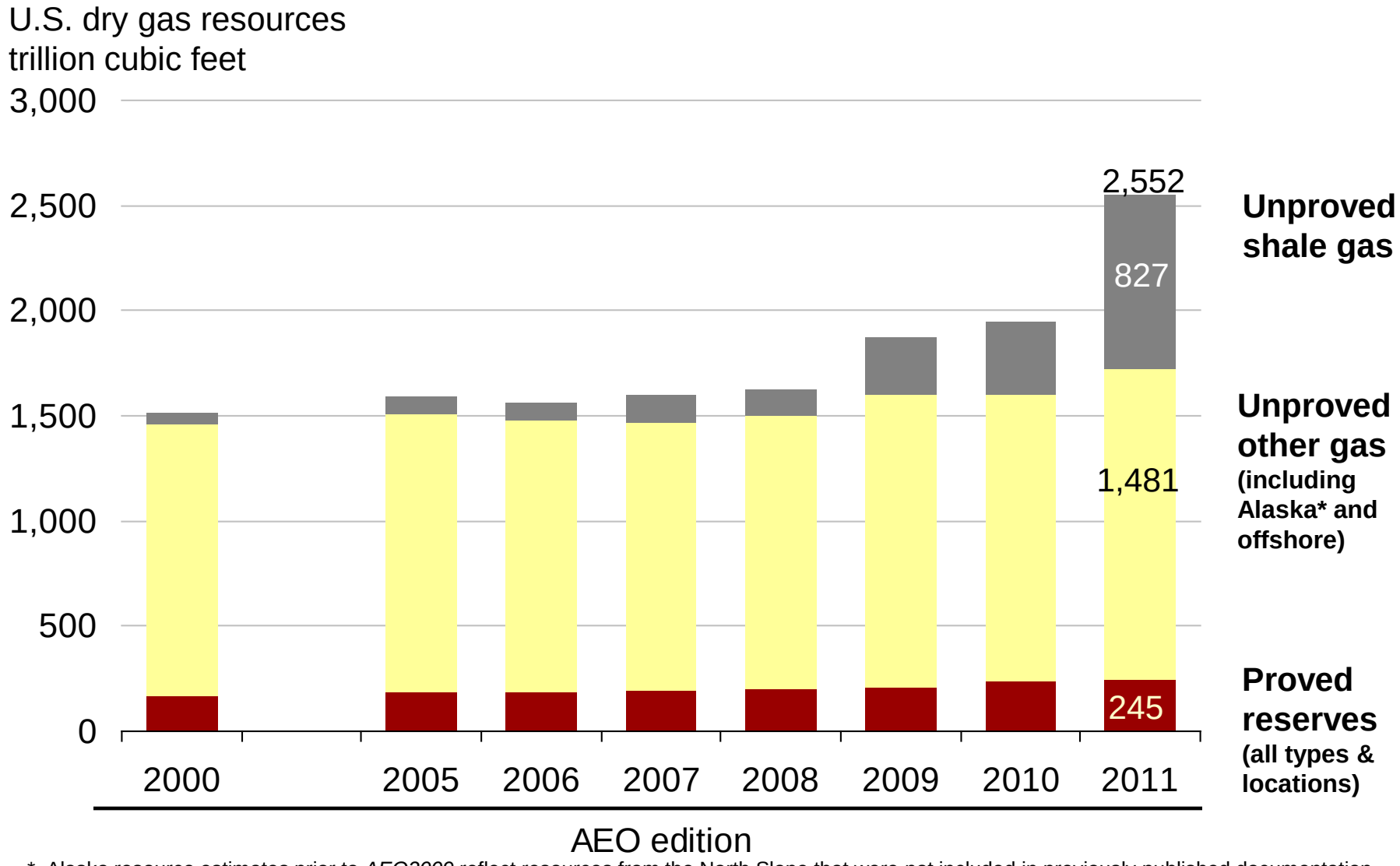
Source: Energy Information Administration based on data from various published studies.
Updated: March 10, 2010

U.S. shale gas production increased 14-fold over the last decade; reserves tripled over the last few years



Source: Lippman Consulting (2010 estimated)

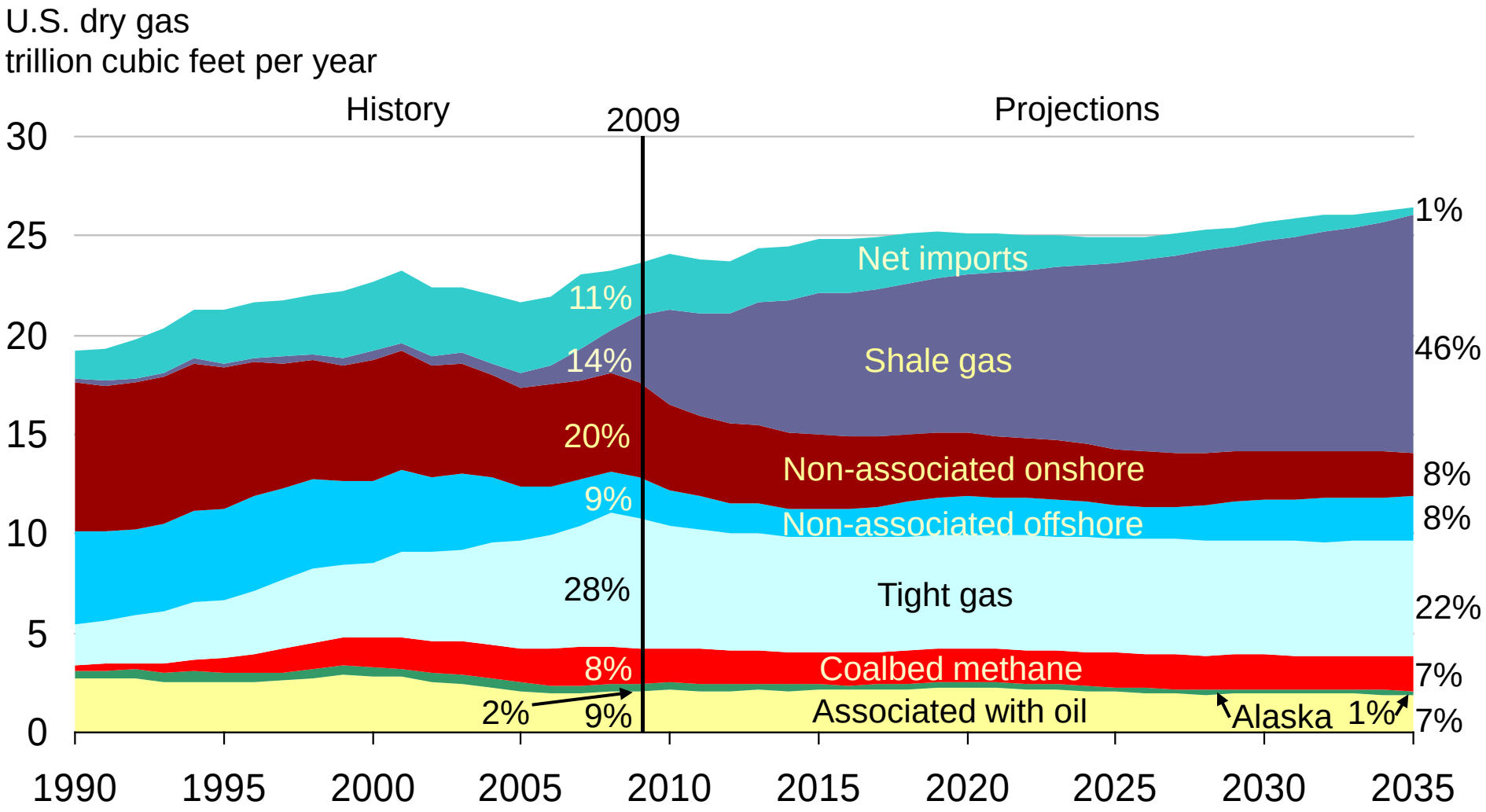
Shale gas has been the primary source of recent growth in U.S. technically recoverable natural gas resources



* 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 2011*

Four-fold increase in shale gas production offsets declines in other U.S. supply, meeting consumption growth and lowering import needs



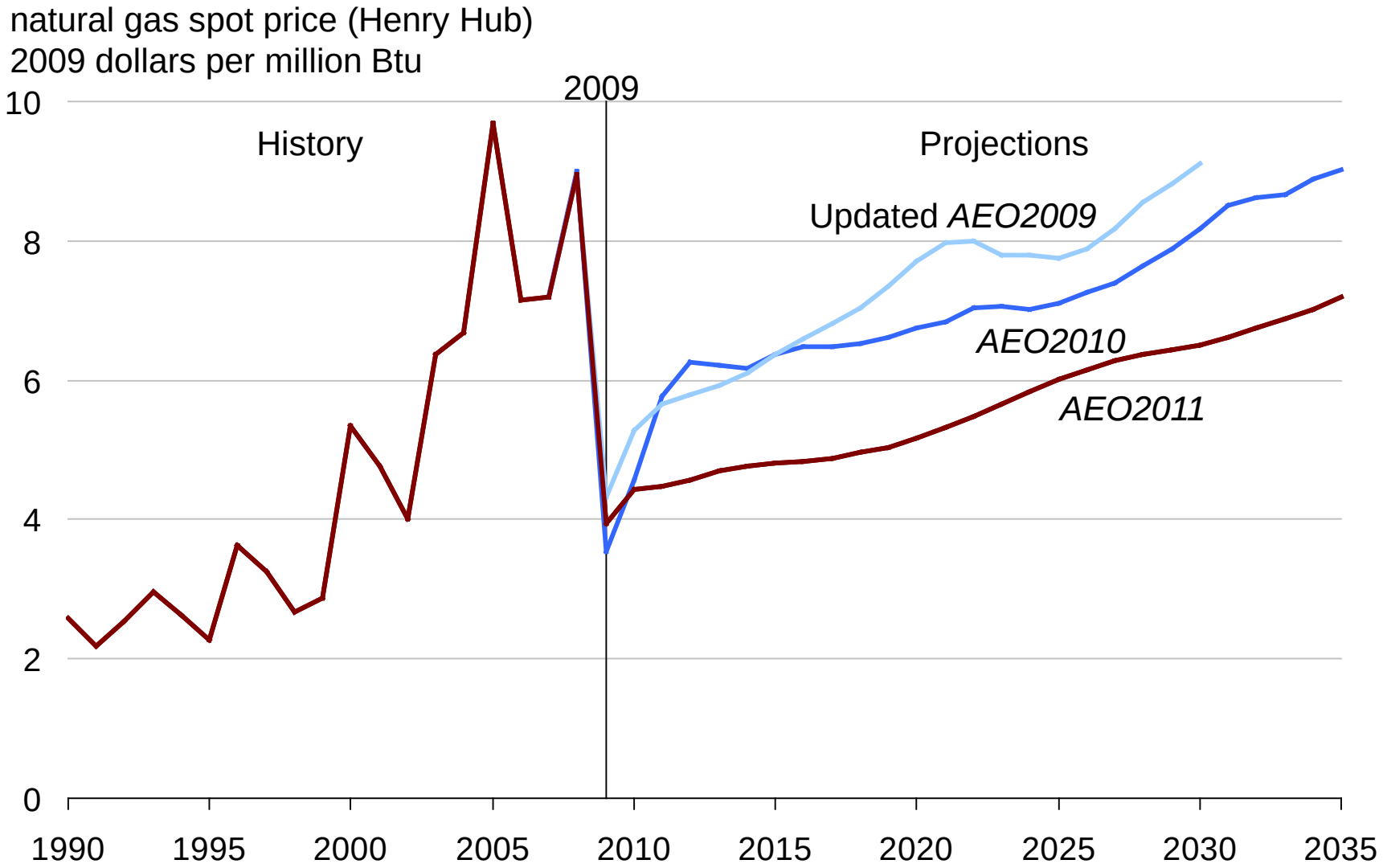
Source: EIA, *Annual Energy Outlook 2011*

Natural gas consumption is quite dispersed; a number of key economic and market drivers underpin natural gas consumption growth

Sector	TCF gas consumption		Growth (2009-2035)	Key drivers
	2009	2035		
Industrial, including combined heat-and-power	7.3	9.3	26%	+187% combined heat-and-power generation; +30% output of gas-intensive industry; lower natural gas prices
Central electric power	6.9	7.8	13%	+30% electricity consumption; lower natural gas prices; offset by +72% renewable generation and +24% coal generation
Commercial	3.1	3.8	22%	+37% commercial floorspace; -3% energy intensity
Residential	4.7	4.8	<1%	+30% number of households; +19% total square footage; -16% energy intensity

Source: EIA, *Annual Energy Outlook 2011*

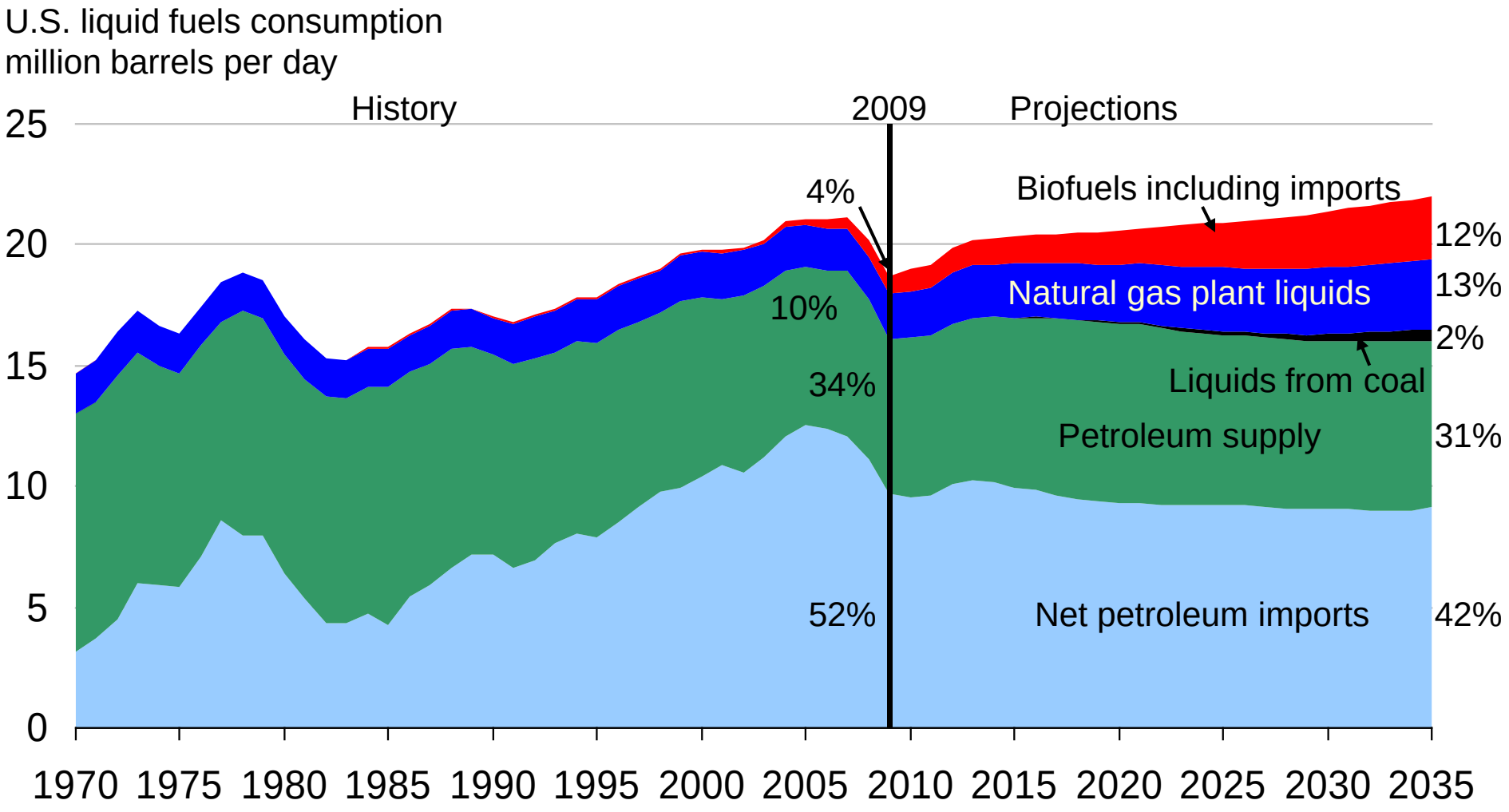
Natural gas price projections are significantly lower than past years due to an expanded shale gas resource base



Source: EIA, *Annual Energy Outlook 2011*

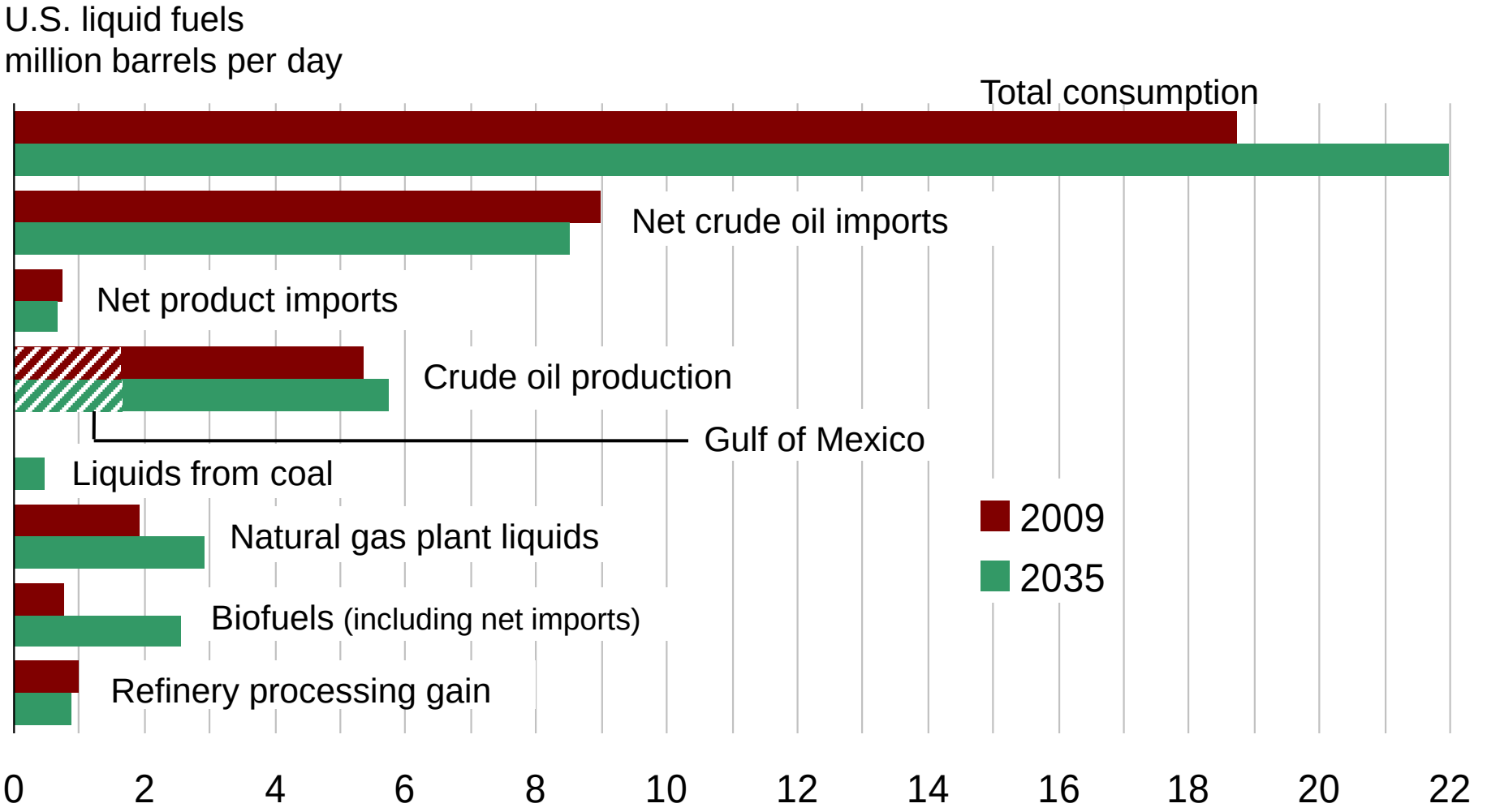
Oil and other liquid fuels

U.S. imports of liquid fuels fall due to increased domestic production—including biofuels—and greater fuel efficiency



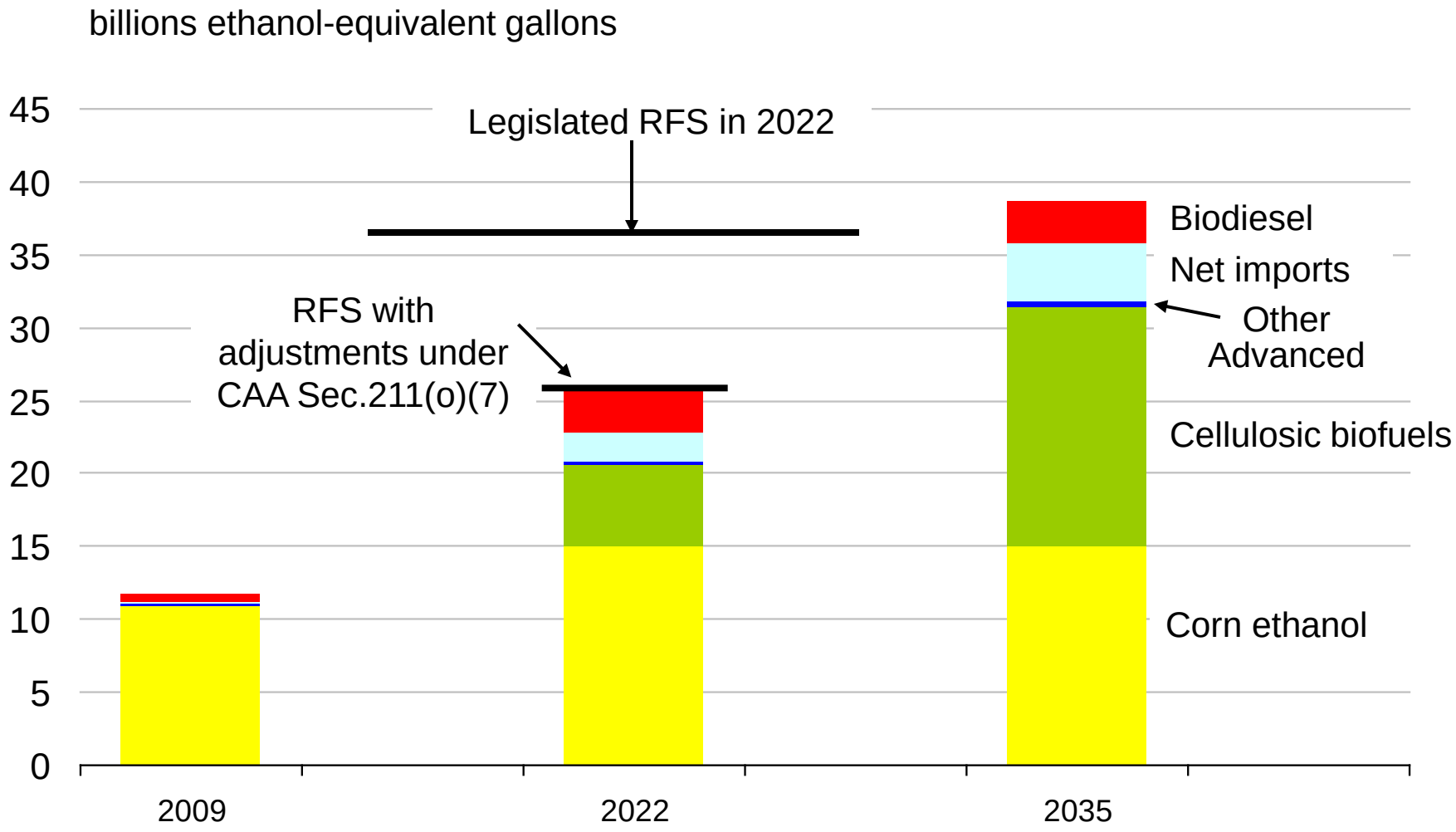
Source: EIA, *Annual Energy Outlook 2011*

Biofuels, natural gas liquids, and crude oil production are key sources of increased domestic liquids supply



Source: EIA, *Annual Energy Outlook 2011*

Biofuels fall short of the goal in 2022, but exceed the 36 billion gallon RFS target by 2030



Source: EIA, *Annual Energy Outlook 2011*

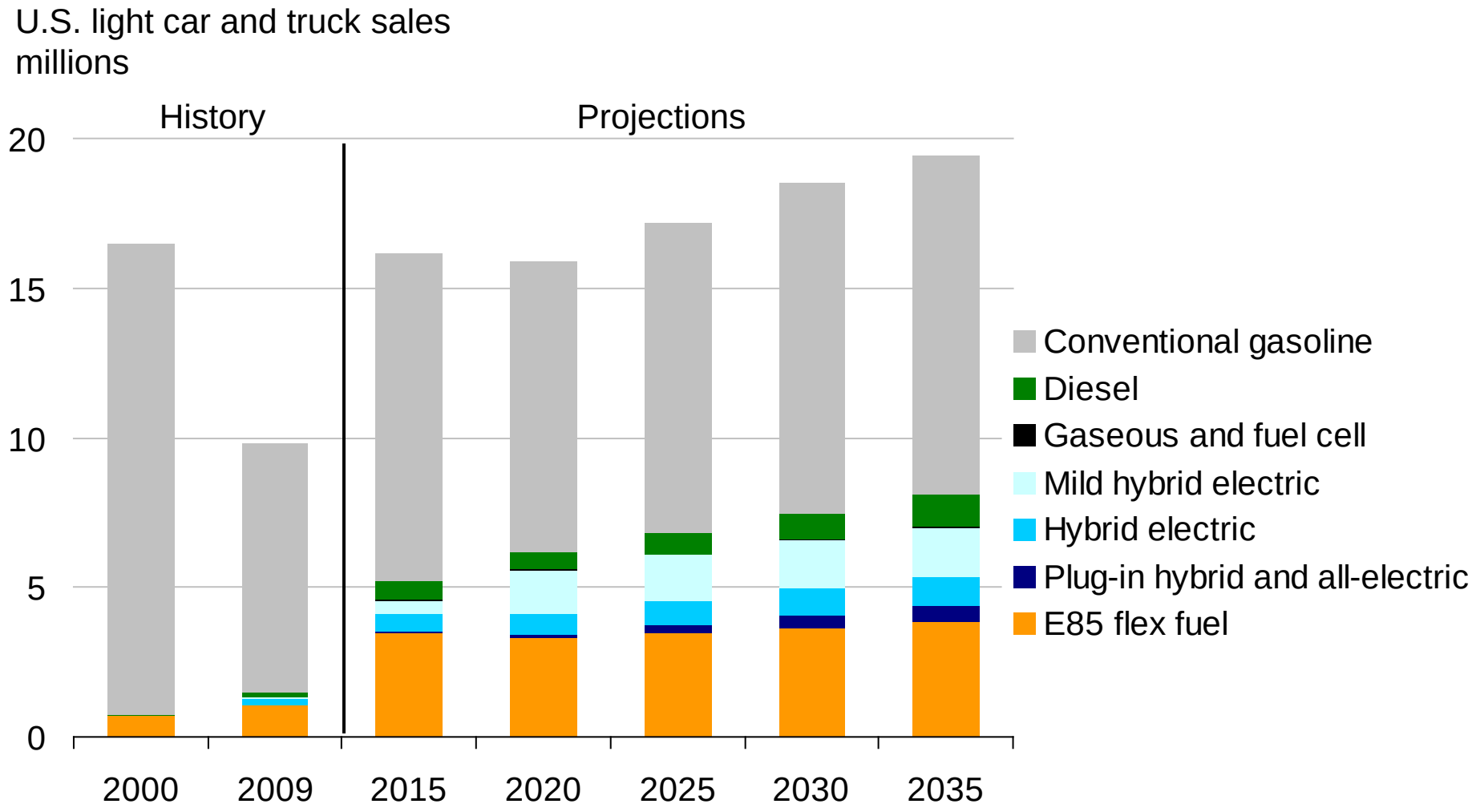
Efficiency improvements partially offset underlying drivers of growth in transportation services

	2009	2035	Growth (2009-2035)
Light duty vehicles			
Fuel consumption (million barrels per day oil equivalent)	8.9	10.2	15%
Number of licensed drivers (millions)	207	265	28%
Miles per licensed driver	13,100	15,300	17%
Efficiency of vehicle stock (mpg)	20.8	27.8	34%*
Heavy duty vehicles			
Fuel consumption (million barrels per day oil equivalent)	2.2	3.2	47%
Manufacturing output (billion 2005 dollars)	4,197	6,761	61%
Number of freight trucks (millions)	8.7	16.6	90%
Miles per vehicle	23,700	20,200	-15%
Efficiency of vehicle stock (mpg)	6.1	6.6	9%**

* Equal to a 25% reduction in fuel use per mile. ** Equal to an 8% reduction in fuel use per mile.

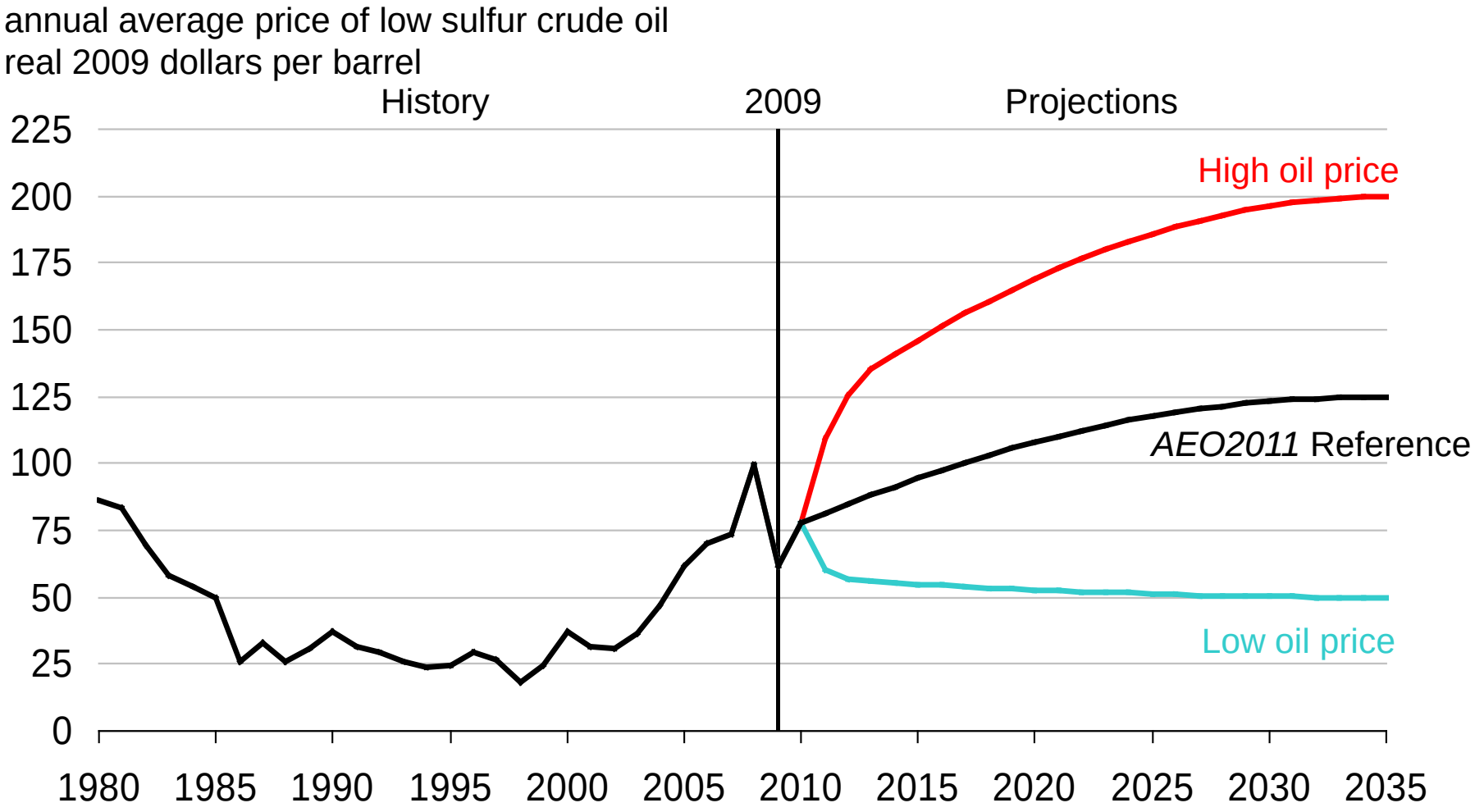
Source: EIA, *Annual Energy Outlook 2011*

Unconventional vehicles meet over 40% of U.S. light-duty vehicle sales in 2035



Source: EIA, *Annual Energy Outlook 2011*

Oil prices in the Reference case rise steadily; the full *AEO2011* will include a wide range of oil prices



Source: EIA, *Annual Energy Outlook 2011*

Other EIA activities

EIA's Energy and Financial Markets Initiative

- Collection of critical energy information to improve market transparency
  - improved petroleum storage capacity data
  - other improvements to data quality and coverage
- Analysis of energy and financial market dynamics to improve understanding of what drives energy prices
  - internal analysis and sponsorship of external research
- Outreach with other Federal agencies, experts, and the public
  - expert workshops
  - public sessions at EIA's energy conferences
  - solicitation of public comment on EIA's data collections

On Dec. 1, 2010, EIA started publishing much-improved data on petroleum products storage capacity

- Analysis of inventory levels in the context of storage capacity is important for understanding petroleum market activity and price movements, especially at key market centers such as Cushing, OK
- EIA's new storage capacity data will be a major improvement over previous data
  - **greater coverage**: EIA is collecting the new data from terminals and pipelines, in addition to refineries
  - **more frequent**: unlike prior annual refinery-only data collection, the new data will be semi-annual, which is particularly important given opportunities to shift storage capacity across products to meet seasonal needs that vary across products
  - **market center information**: in addition to standard PADD-level reporting, the new data will break out storage capacity at Cushing

Many factors influence the formation of oil prices and other energy prices

Supply

Affected by current conditions and future expectations for:

- energy prices
- OPEC supply capacity
- usable spare capacity
- non-OPEC capacity
- geopolitics
- weather
- E&P costs
- E&P investments
- E&P innovations

Physical balancing

- Inventories

Markets & market behavior

- Energy prices
  - spot
  - futures
  - options
  - spreads
  - swaps
- Other financial markets
  - other commodity prices
  - commodity investment
  - currency exchange rates
  - stocks and other assets
  - interest rates

Demand

Affected by current conditions and future expectations for:

- energy prices
- economic growth
- industrial production
- goods transport
- personal transport
- weather
- innovation in energy-using equipment

EIA portals provide State energy data in one convenient place

State Energy Profiles feature…

- **Quick Facts** to provide the most important State energy information
- **Overviews and maps** to explain each State's energy markets
- **Data tables** to provide the most current State-level statistics from EIA surveys

State Energy Data System (SEDS)

- Comprehensive data for analysis
- Analytical tool
- Common units
- All fuels, all sectors

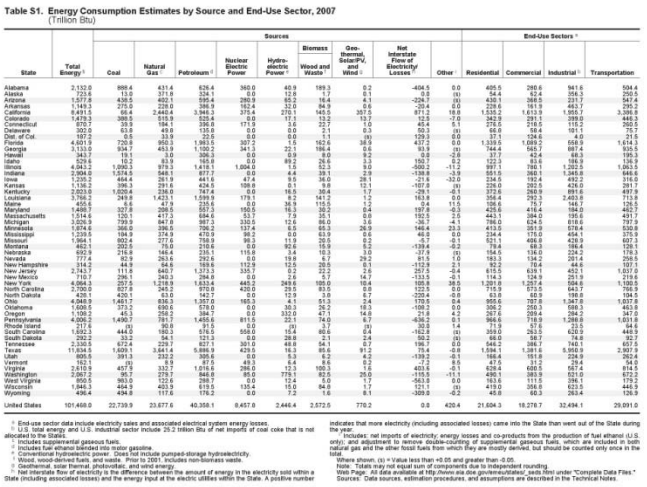


Table S1. Energy Consumption Estimates by Source and End-Use Sector, 2007
(Trillion Btu)

2007 SUMMARIES

Energy Information Administration
State Energy Data 2007: Consumption

3

Richard Newell, February 8, 2011

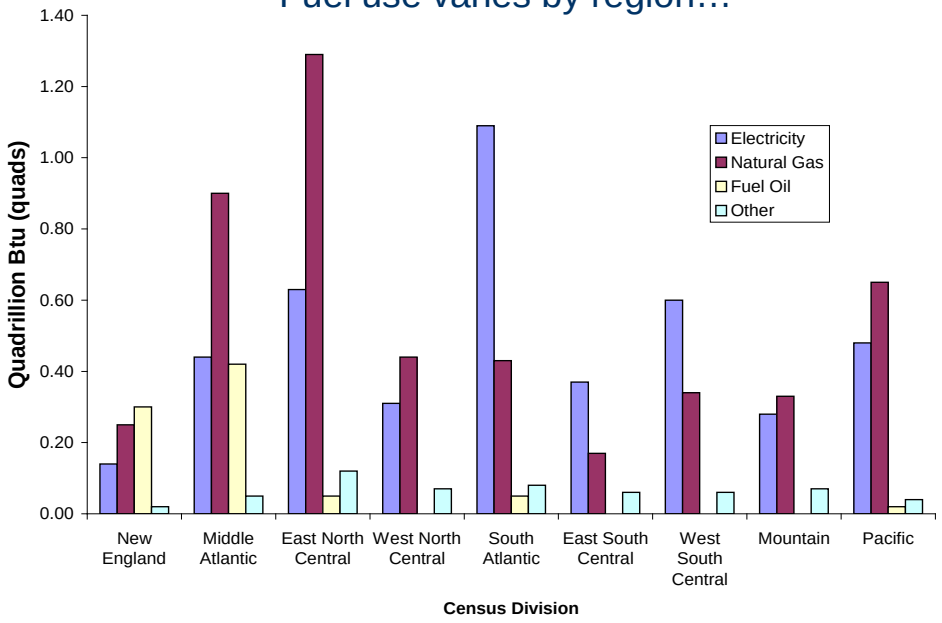
New this year for State Energy Profiles and State Energy Data System

- State Energy Profiles
  - New maps of selected energy-intensive areas (June 2010)
  - New dynamic graphs on State profile pages (in development)
  - Website redesign (launching soon)
- State Energy Data System
  - Improved estimation methodology (June 2010)
  - New tables for total end-use consumption (publishing soon)
  - Website redesign (launching soon)

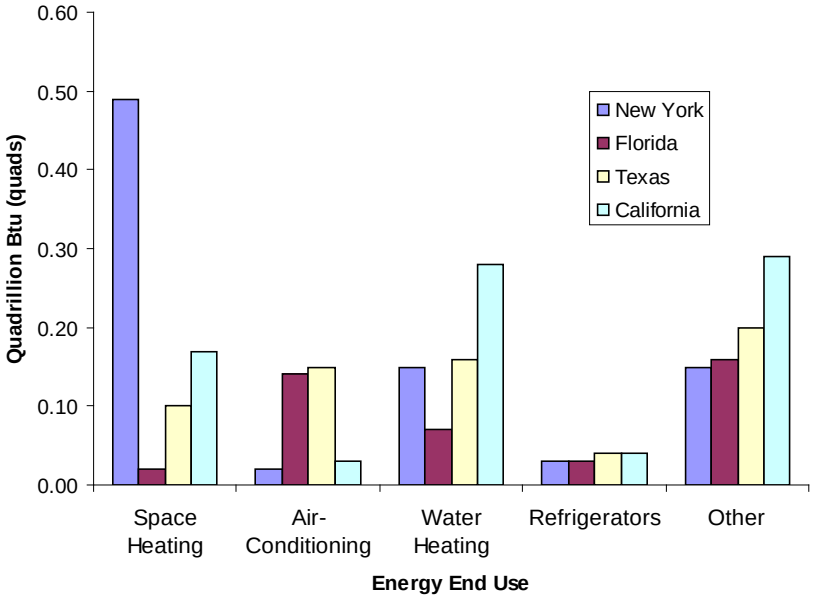
Residential Energy Consumption Survey (RECS)

- Only comprehensive source of energy-related characteristics and consumption across U.S. households
- Only EIA survey that collects household data; conducted every 4 years

Fuel use varies by region…



…due in part to different end-use needs



Expanded 2009 RECS

RECS 2005

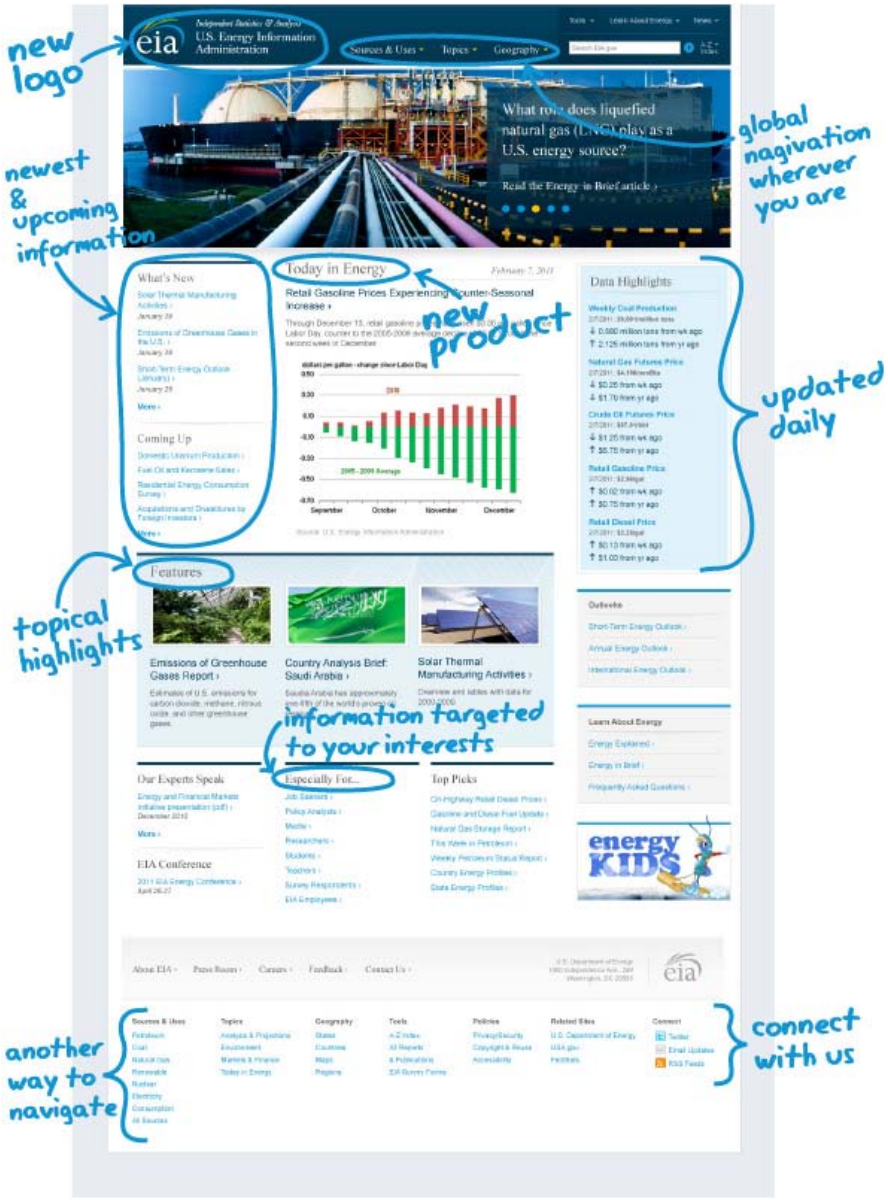
- ✓ 4,382 completed interviews
- ✓ Low sampling precision for all areas (census regions, divisions, States)
- ✓ National, census region and division estimates, but state-level estimates for only four states
- ✓ Sample too small to support complex analyses

RECS 2009

- ✓ 12,083 completed interviews
- ✓ Greater precision assured for key geographies and statistics
- ✓ End use statistics for 16 states, with more precision (MA, NY, PA, NJ, VA, GA, FL, TN, MI, IL, WI, MO, TX, CO, AZ, CA)
- ✓ Greater statistical power for multivariate analyses
- ✓ First release of 2009 RECS Home Energy Characteristics in March 2011

A new EIA.gov goes live this week

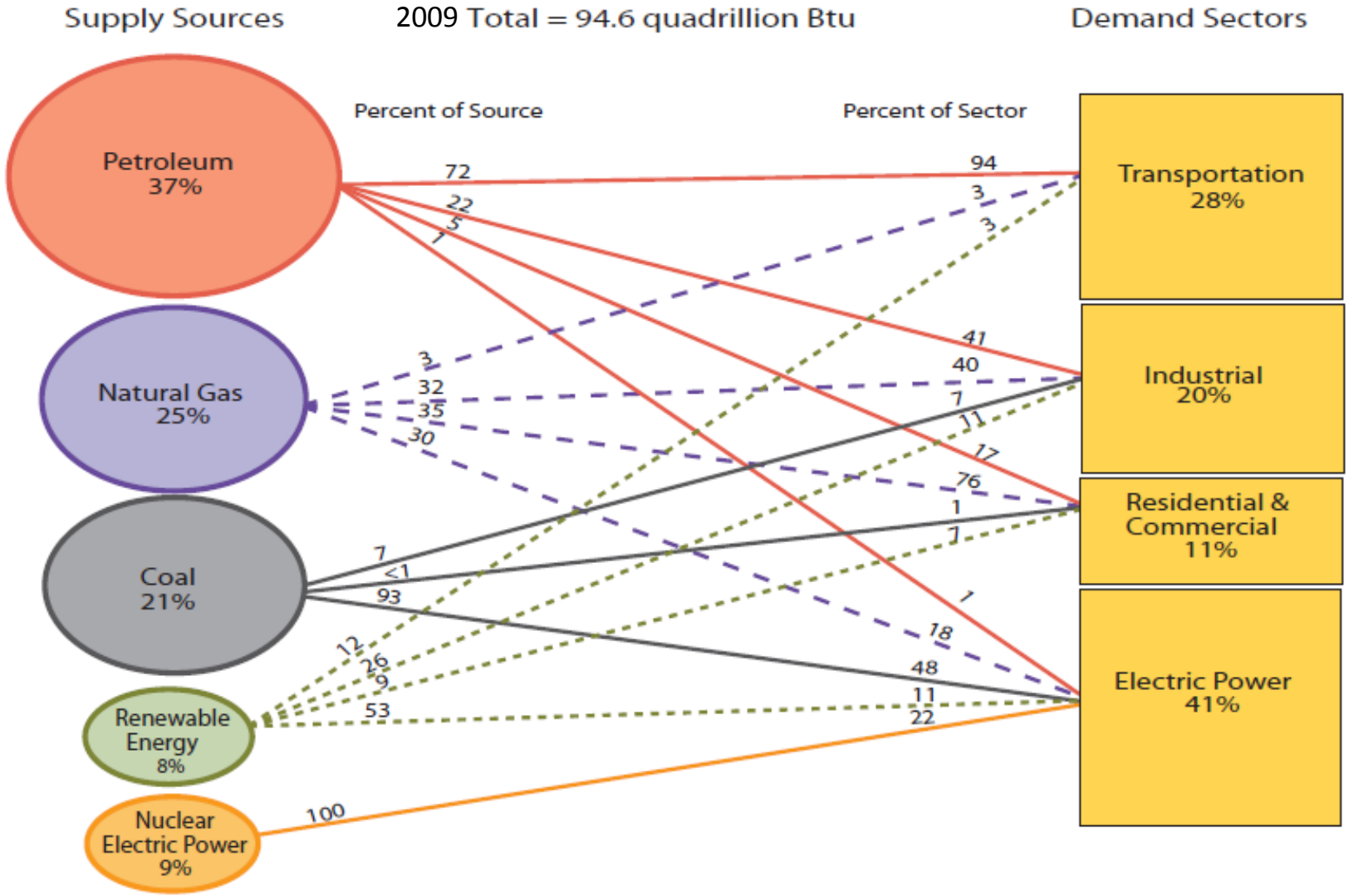
- New homepage and improved navigation
- Updated logo and new visual identity
- A new “Today in Energy” education product that:
  - Publishes a daily release of timely and topical bites of our information, on the EIA homepage, in plain language.
  - Allows us to highlight current issues, topics, and trends.



For more information

U.S. Energy Information Administration home page	www.eia.gov
Short-Term Energy Outlook	www.eia.gov/emeu/steo/pub/contents.html
Annual Energy Outlook	www.eia.gov/oiaf/aeo/index.html
International Energy Outlook	www.eia.gov/oiaf/ieo/index.html
Monthly Energy Review	www.eia.gov/emeu/mer/contents.html
EIA Information Center	(202) 586-8800 Live expert from 9:00 AM – 5:00 p.m. EST Monday – Friday (excluding Federal holidays) email: InfoCtr@eia.gov

Some supply sources and demand sectors are strongly linked, while others are more dispersed



Source: EIA *Annual Energy Review 2009*