

Energy Markets and Projections

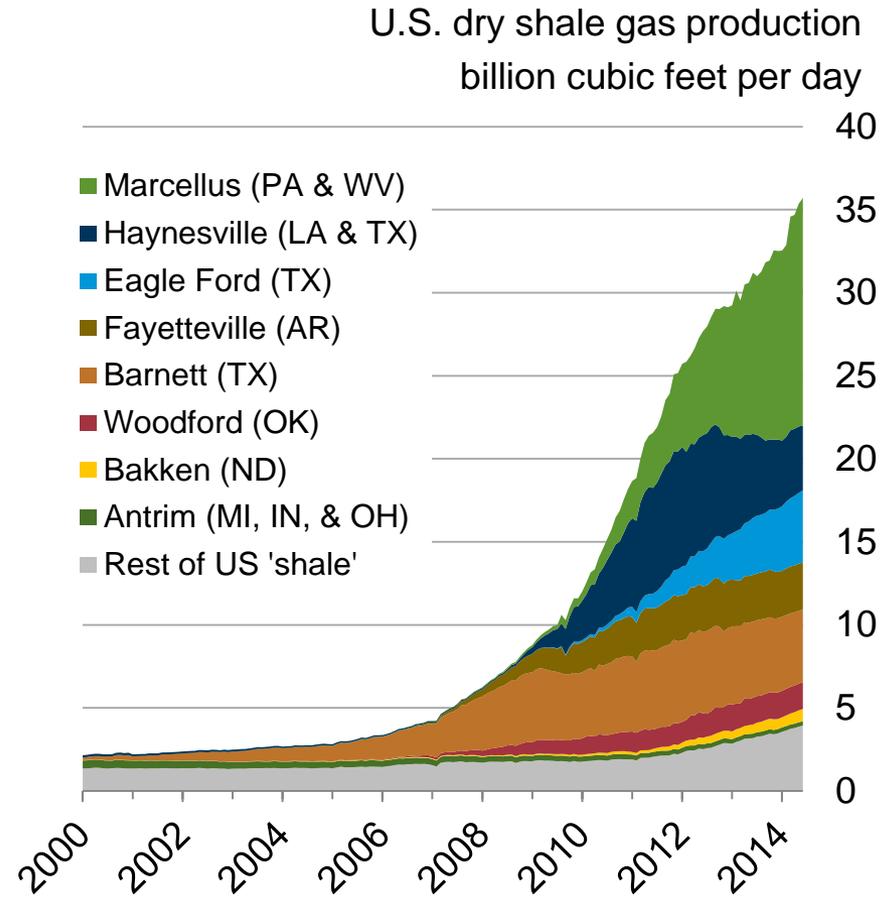
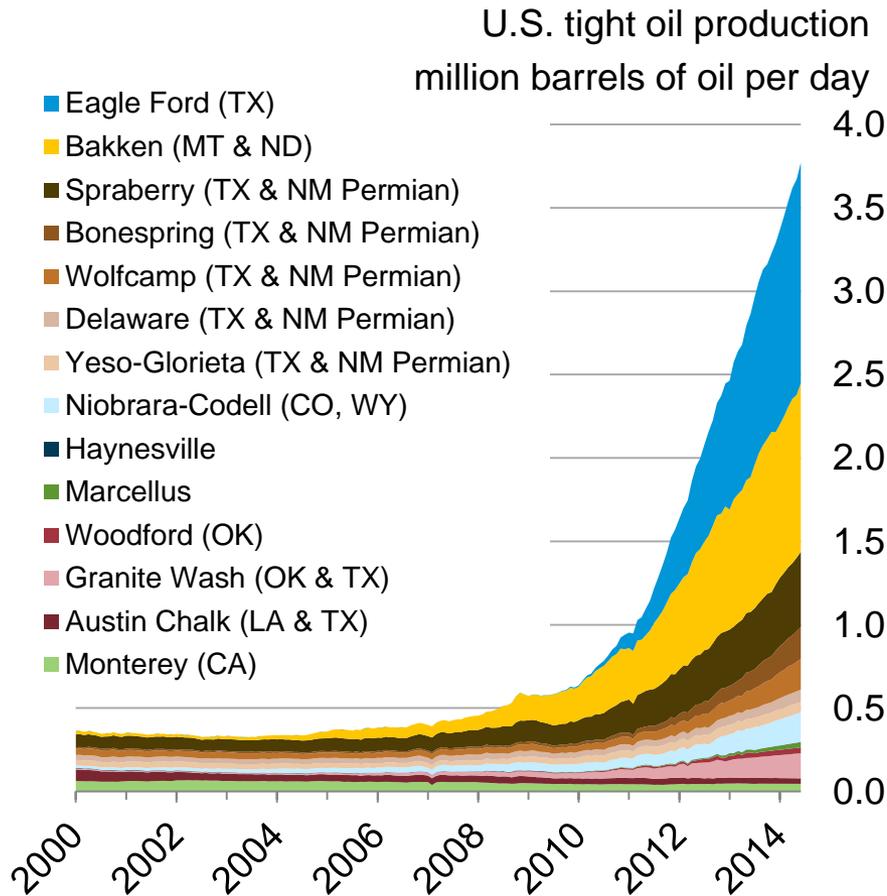


For
National Governors Association
Governors' Advisors Energy Policy Institute
July 24, 2014 | Washington, DC

By
Adam Sieminski, EIA Administrator

Market impacts from increased oil and natural gas production

The U.S. has experienced a rapid increase in natural gas and oil production from shale and other tight resources

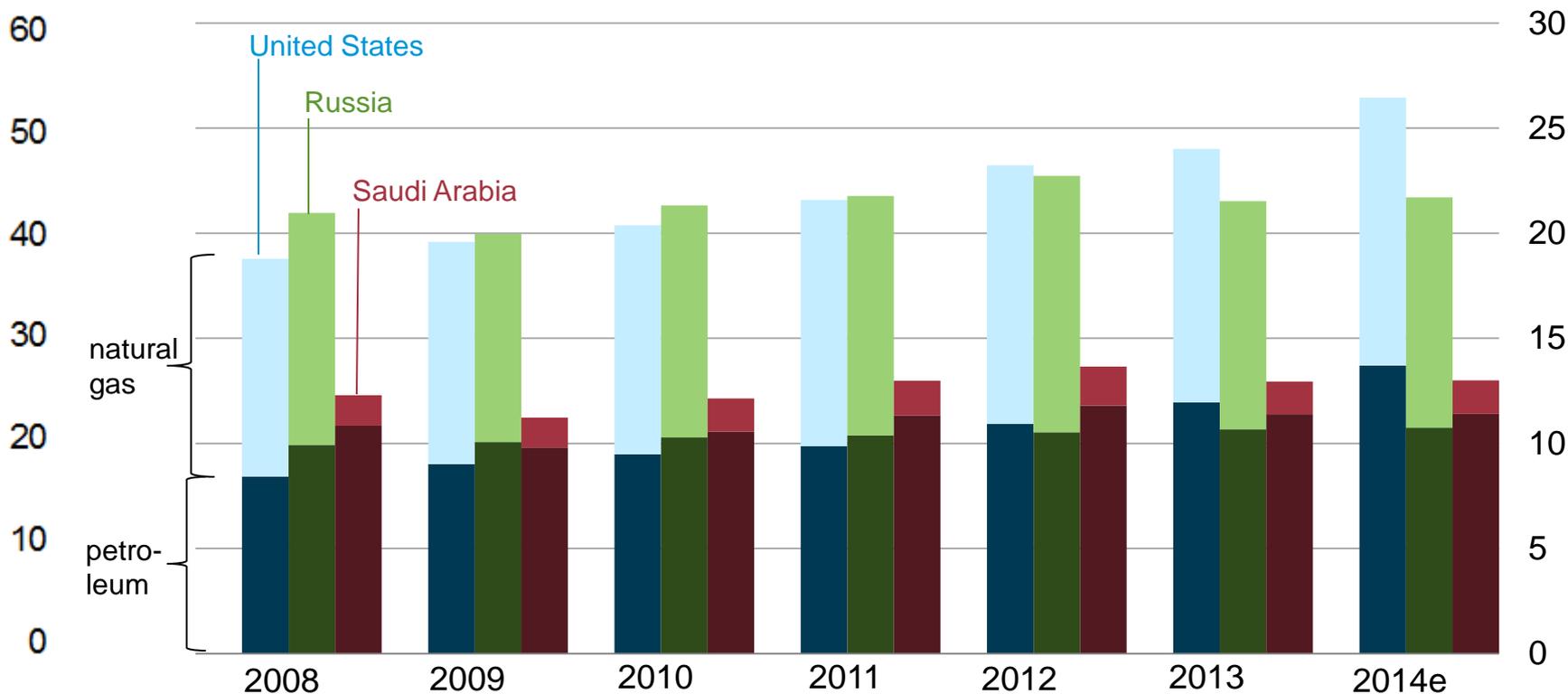


Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through June 2014 and represent EIA's official tight oil & shale gas estimates, but are not survey data. State abbreviations indicate primary state(s).

U.S. is the largest producer of petroleum and natural gas in the world

estimated U.S., Russia, and Saudi Arabia petroleum and natural gas production
quadrillion Btu

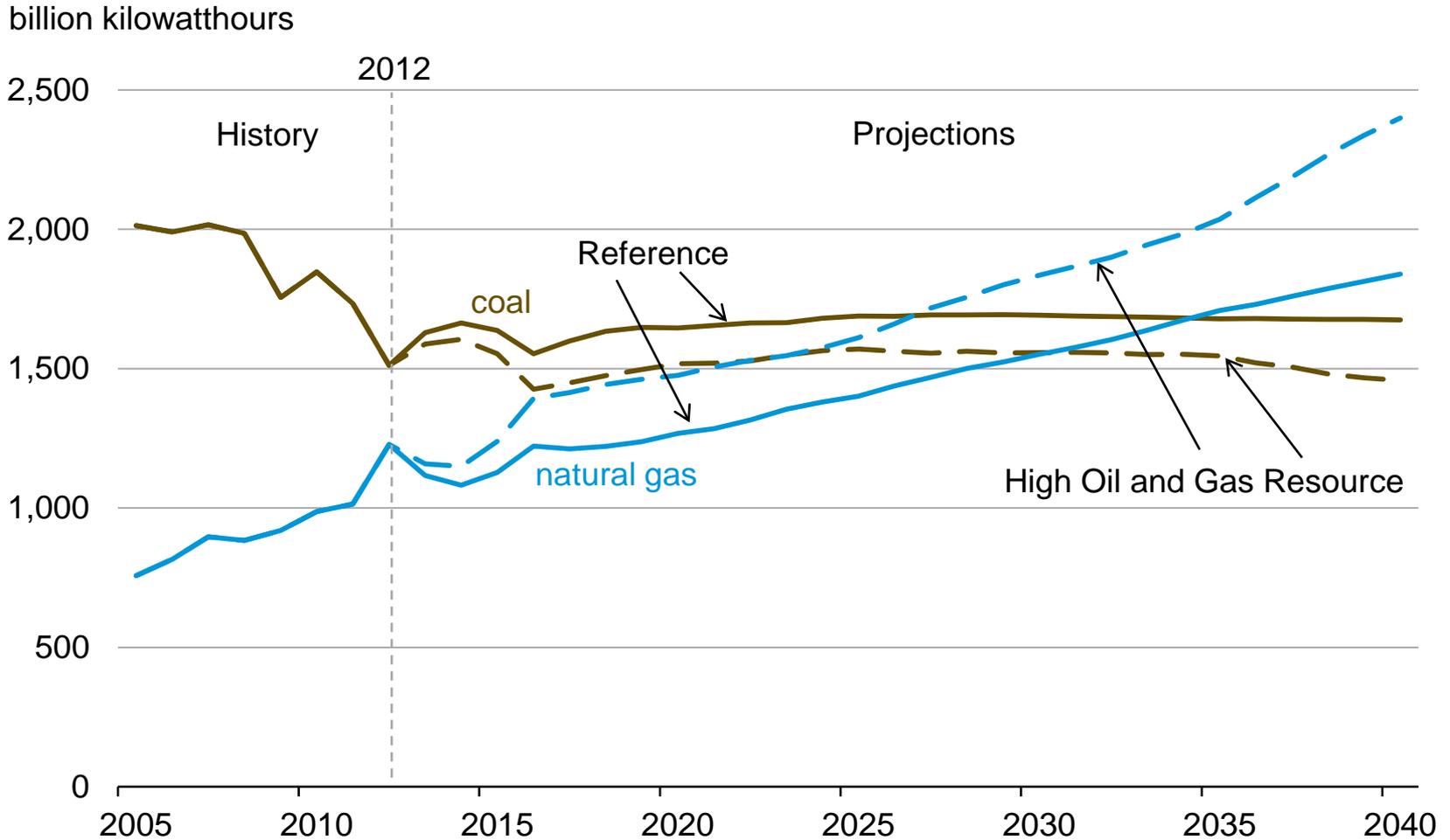
million barrels per day of oil equivalent



Source: U.S. Energy Information Administration

Note: Petroleum production includes crude oil, natural gas liquids, condensates, refinery processing gain, and other liquids, including biofuels; barrels per day oil equivalent were calculated using a conversion factor of 1 barrel oil equivalent=5.55 million British thermal units (Btu)

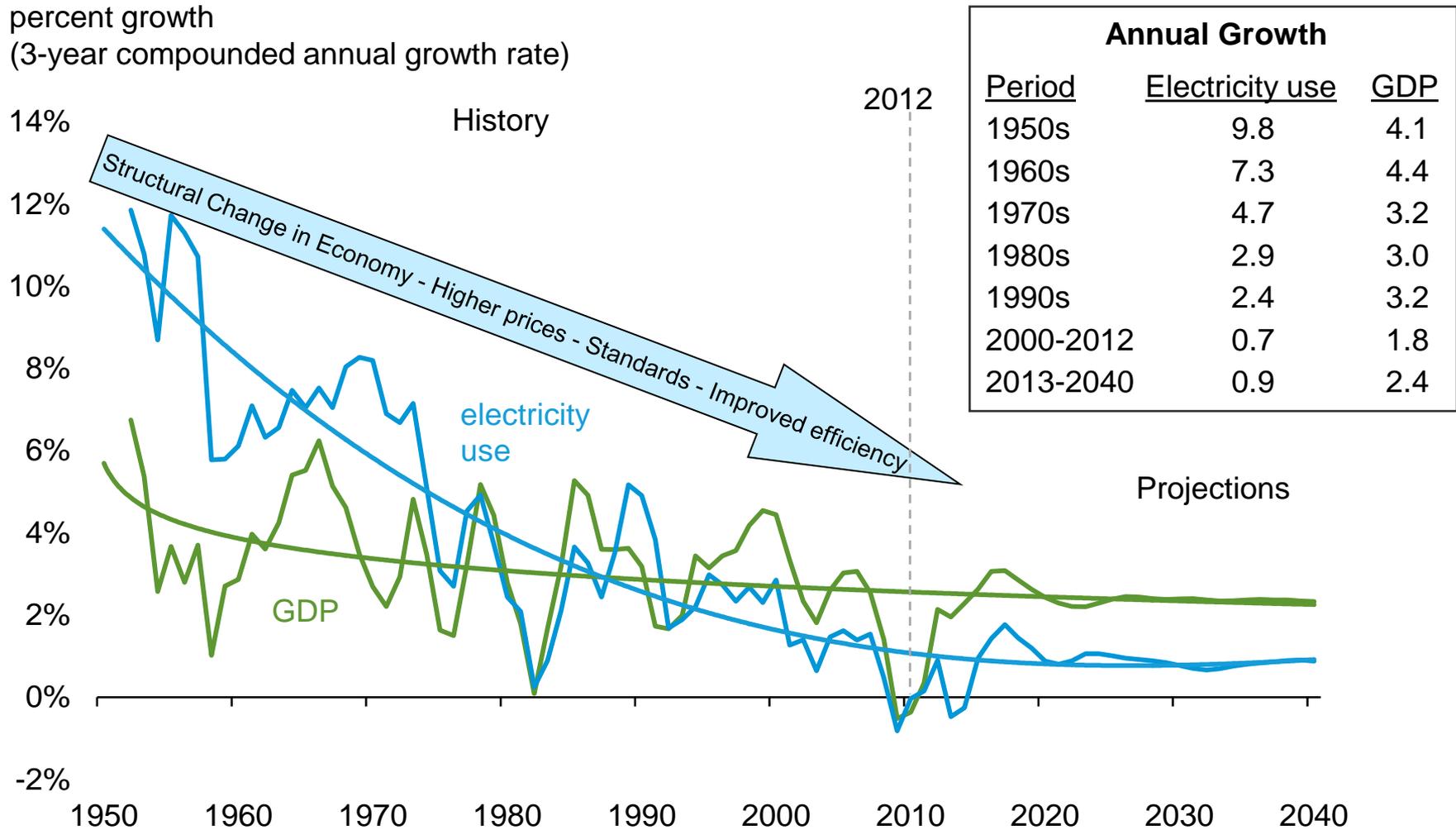
Natural gas surpasses coal as the largest generation source more quickly under high oil and gas resource assumptions



Source: Annual Energy Outlook 2014 Early Release and Preliminary side cases

Implications of zero/low electricity demand growth

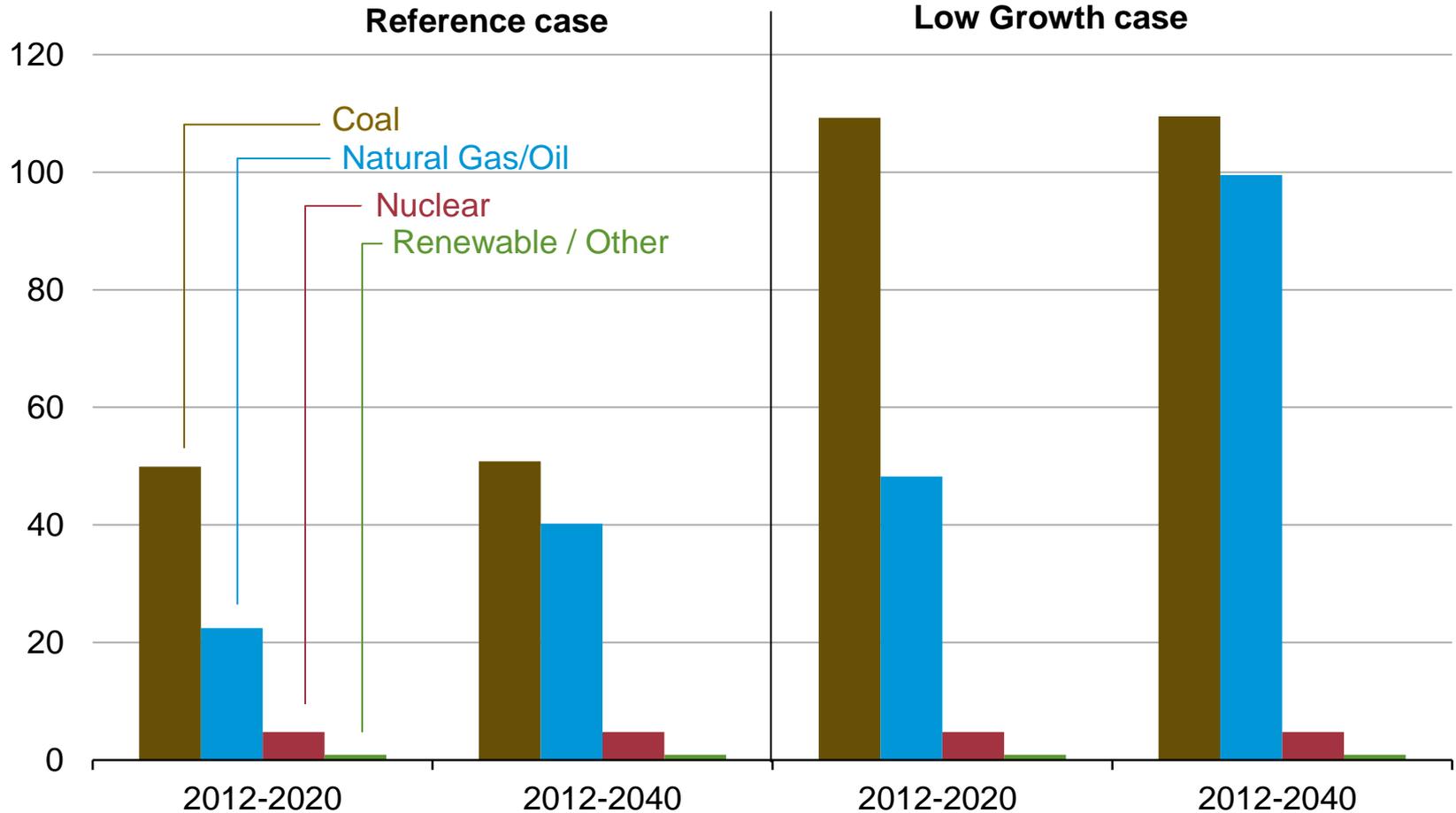
In EIA's AEO2014 Reference Case, growth in electricity use slows, but still increases by 29% from 2012 to 2040



Source: EIA, Annual Energy Outlook 2014

More fossil capacity is retired in the Low Growth case

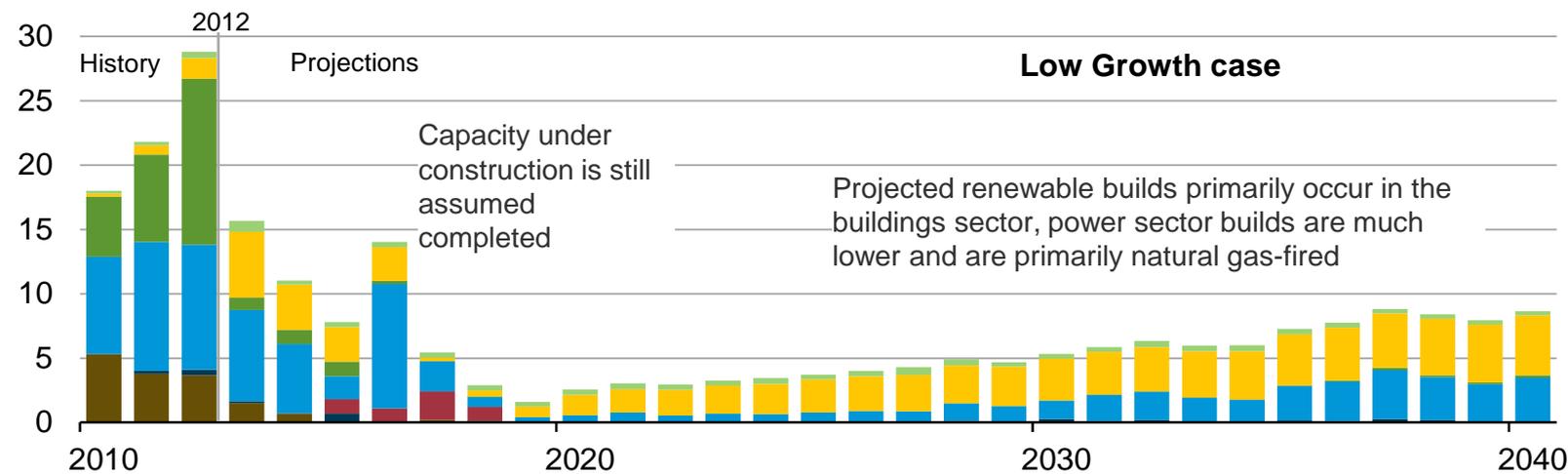
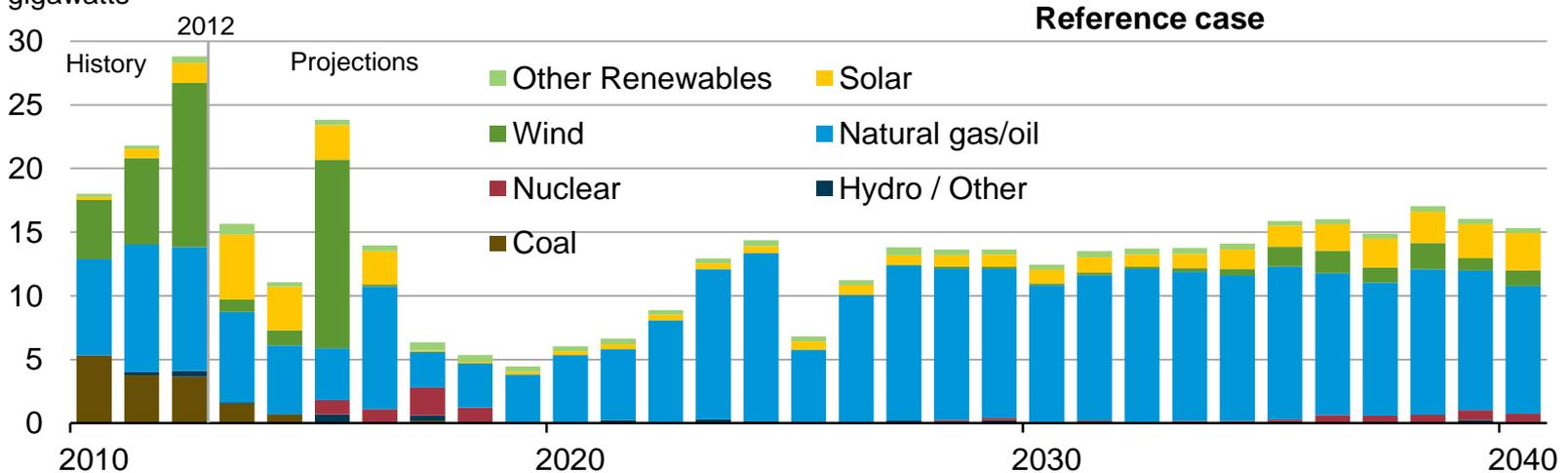
U.S. electric power sector capacity retirements
gigawatts (cumulative)



Source: EIA, Annual Energy Outlook 2014

Capacity additions decline dramatically in the Low Growth case

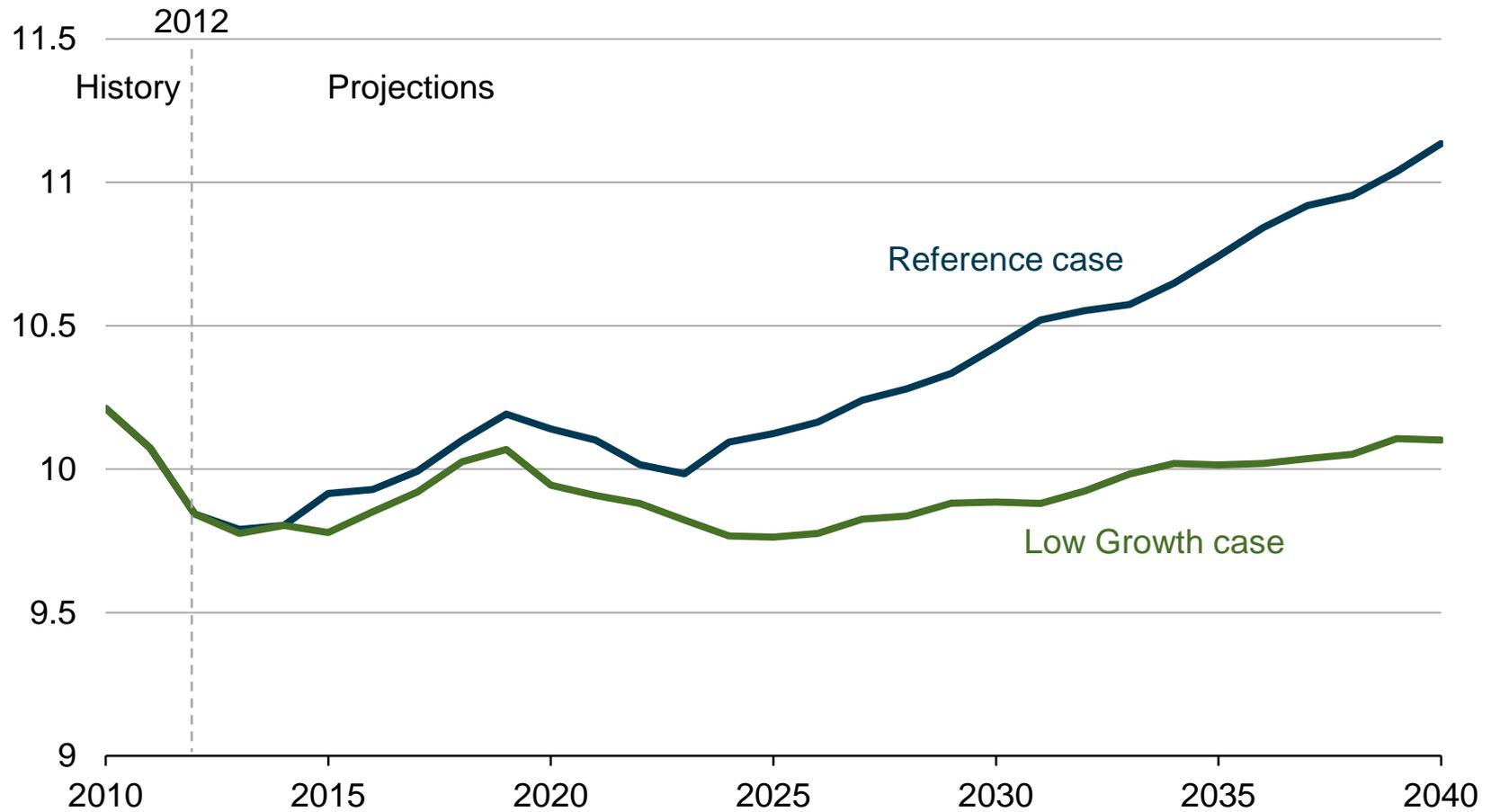
U.S. electricity generation capacity additions
gigawatts



Source: EIA, Annual Energy Outlook 2014

Projected end-use electricity prices are lower in the Low Growth case

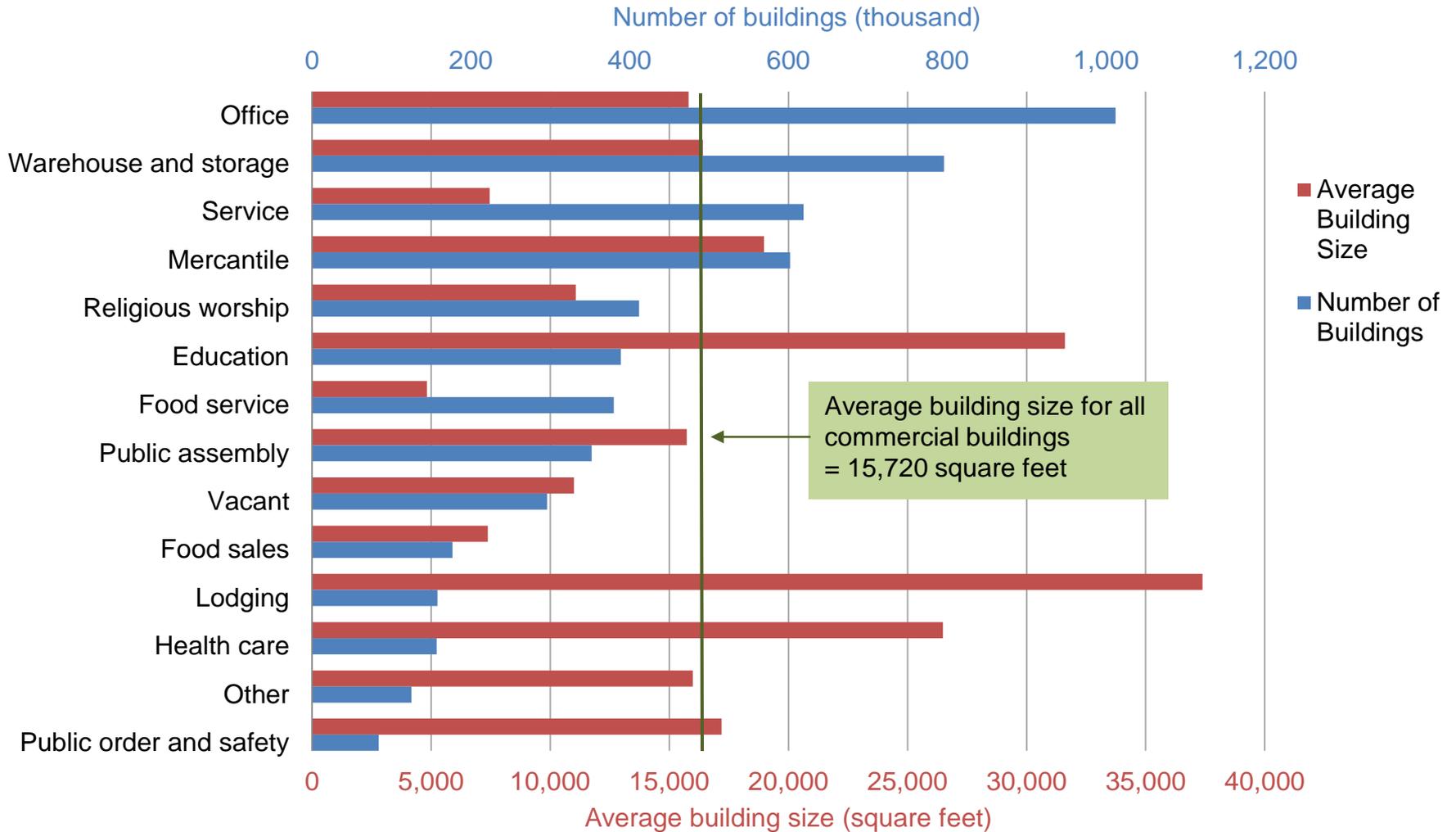
Average end-use electricity price, all sectors
2012 cents per kilowatthour



Source: EIA, Annual Energy Outlook 2014

Findings from EIA's updated Commercial Buildings Energy Consumption Survey (CBECS)

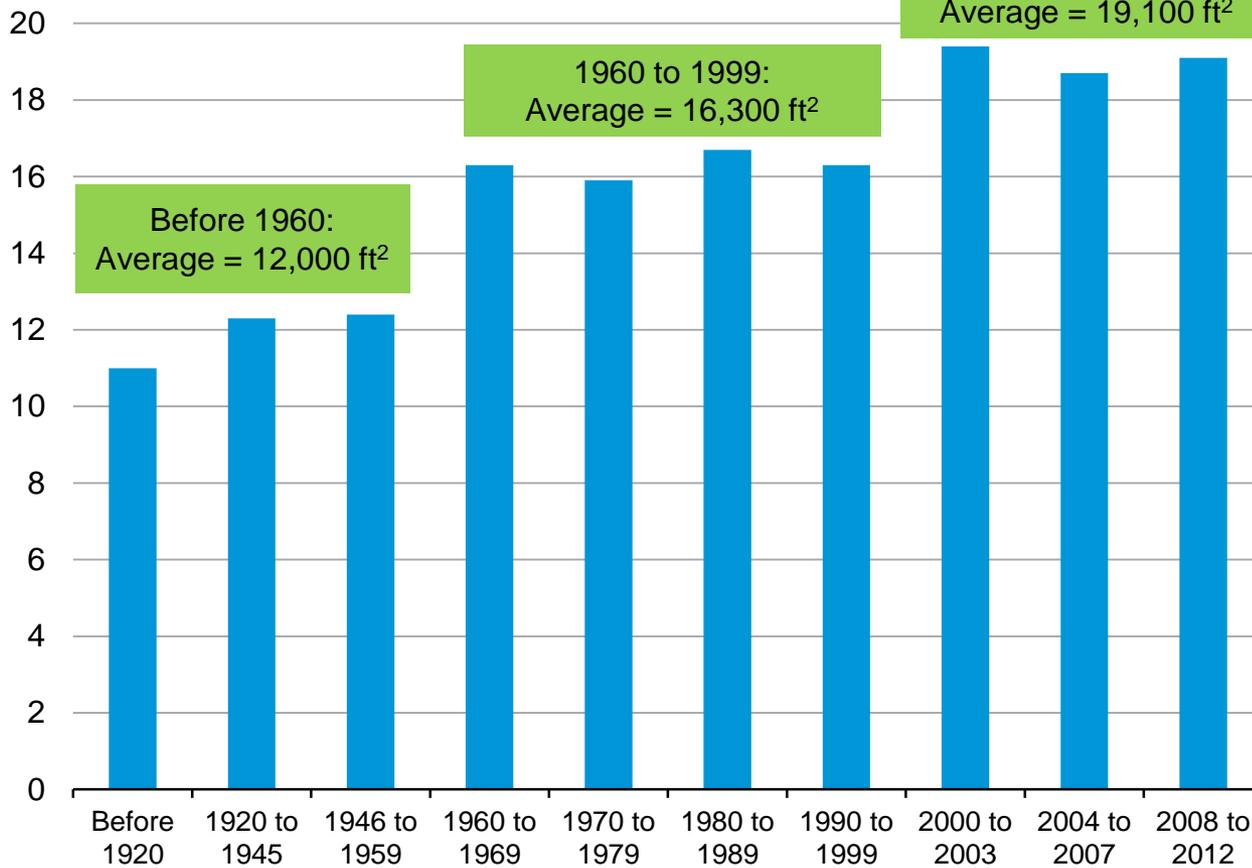
The CBECS building population is diverse and smaller building types are the most common



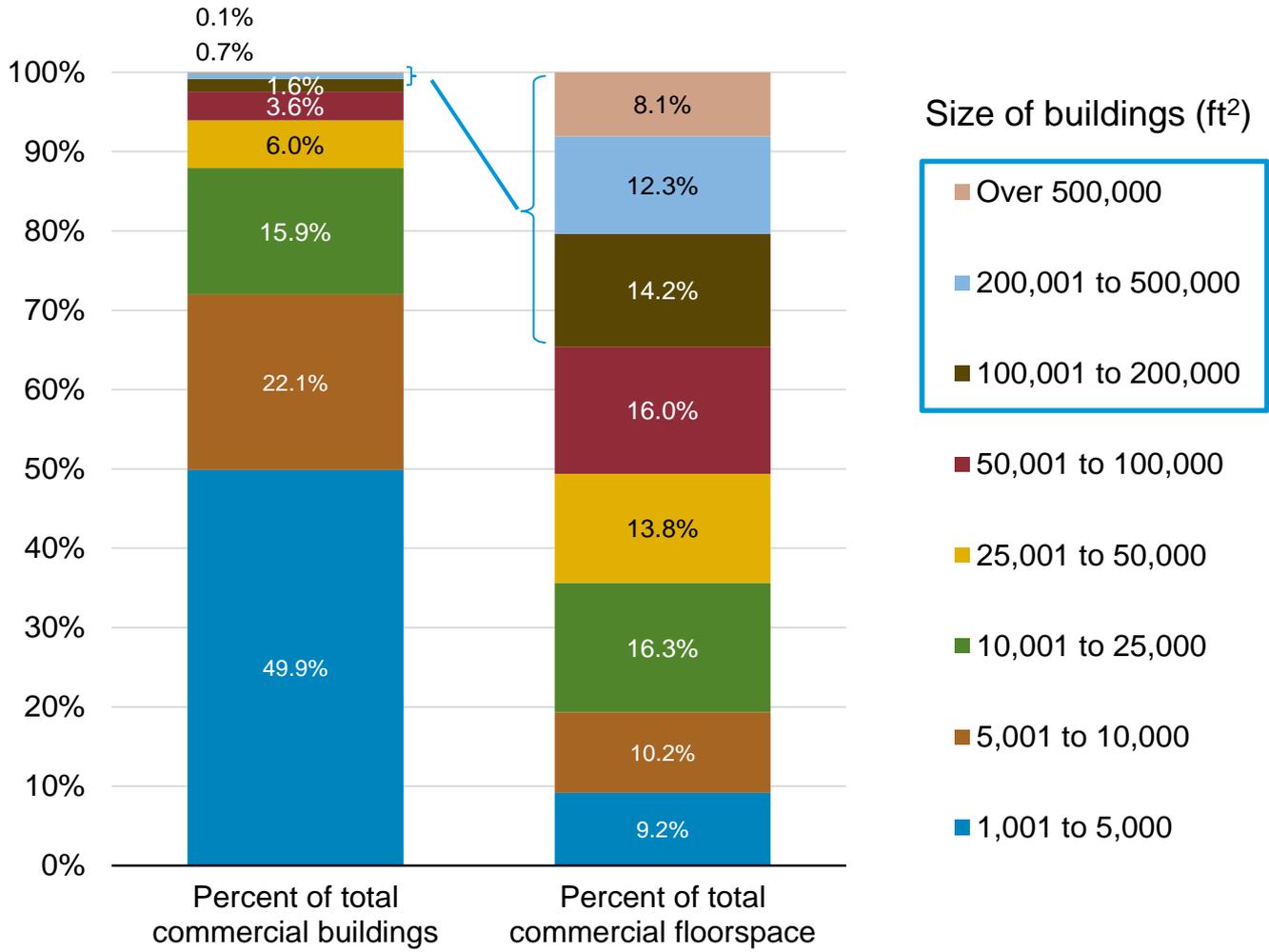
New commercial buildings are larger, on average, than old commercial buildings

Average building size by year constructed

Thousand ft²

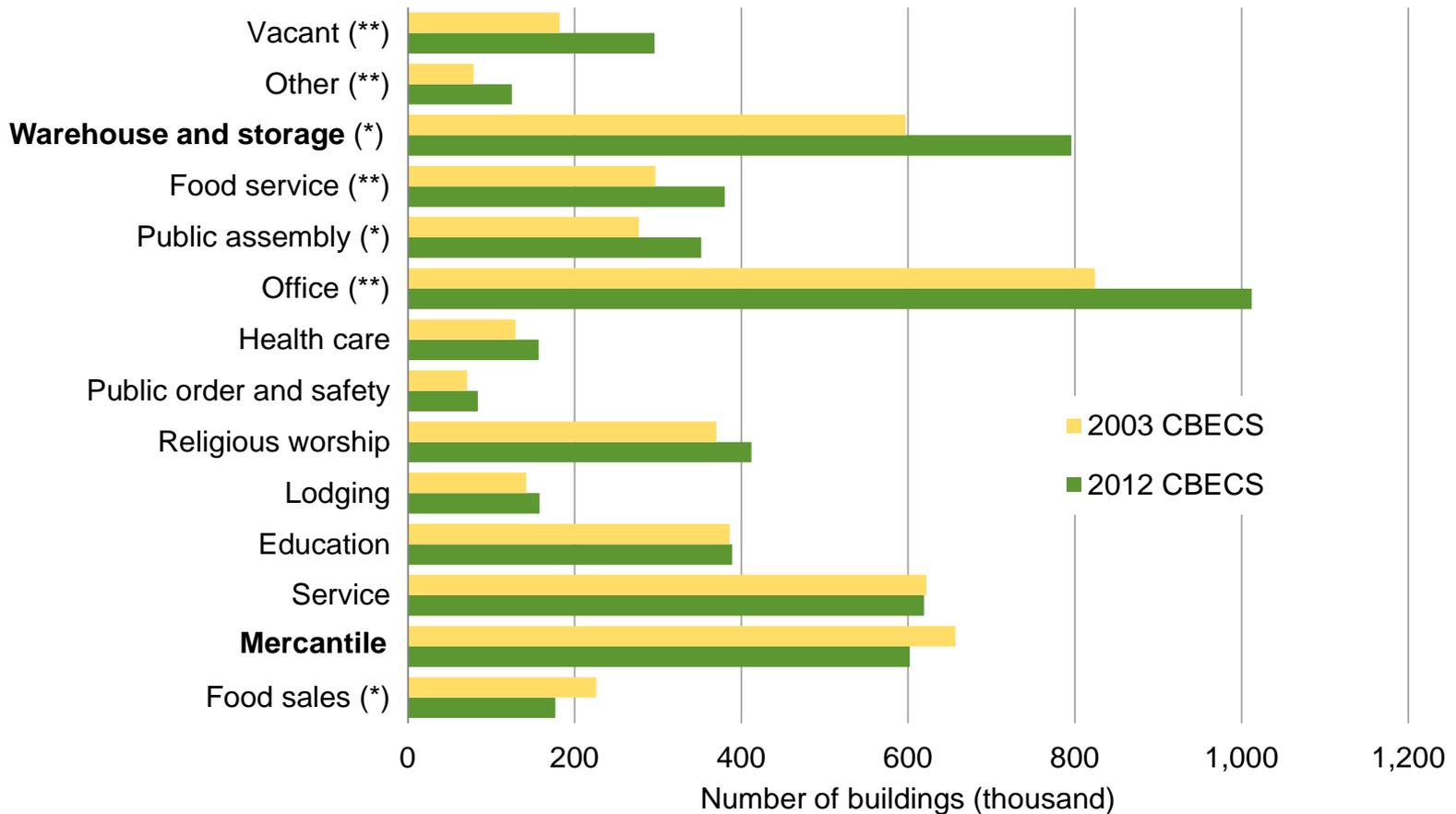


Buildings over 100,000 square feet make up only about 2% of the building count but about 35% of the total floorspace



About half the building types show an increase in the number of buildings from 2003 to 2012

in order of largest to smallest relative growth from 2003 to 2012



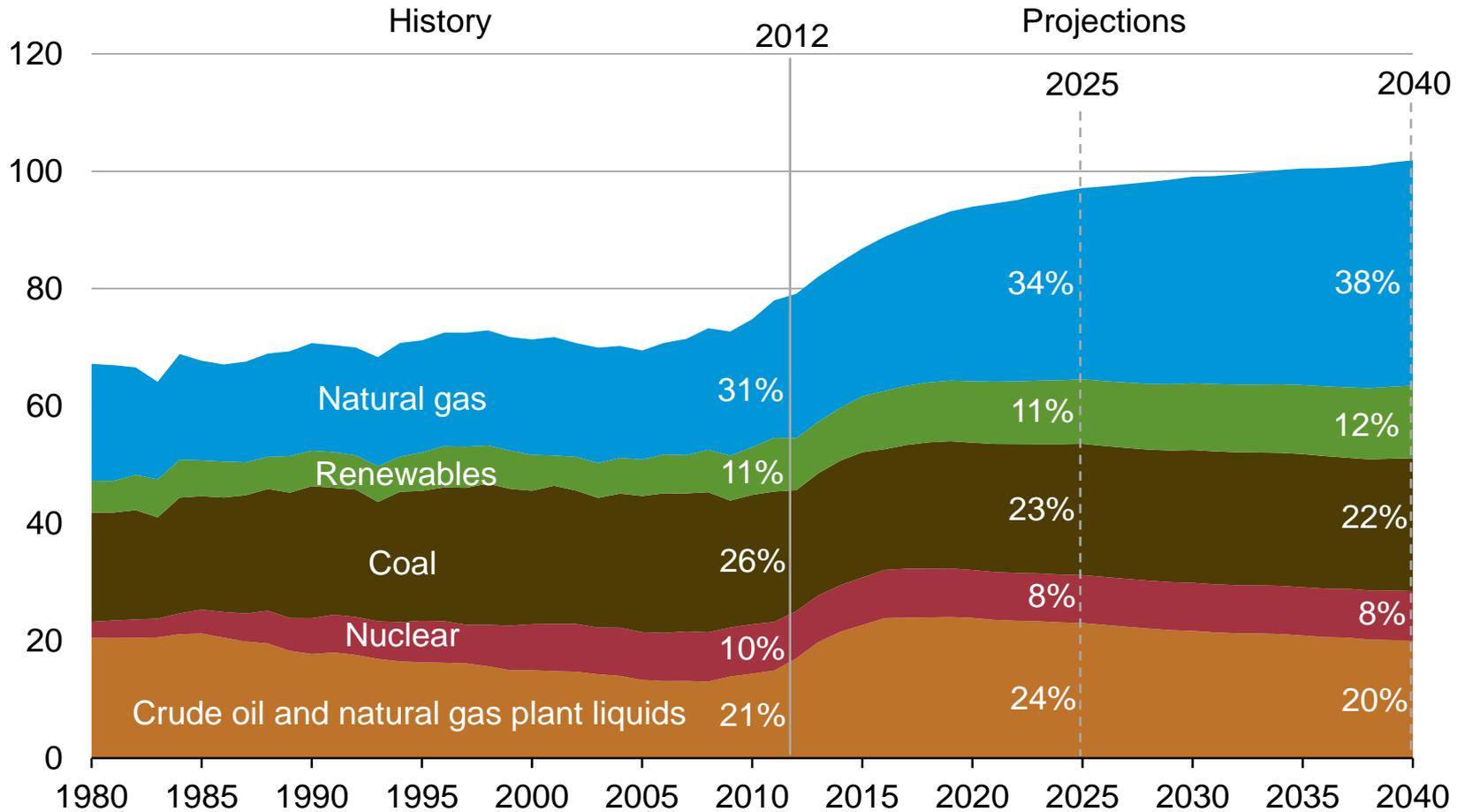
(*) indicates change is statistically significant at the 90% confidence level

(**) indicates change is statistically significant at the 90% and 95% confidence levels

Growth scenarios for renewables

U.S. production grows rapidly, particularly natural gas, renewables, and liquids in the near term

U.S. energy production
quadrillion Btu

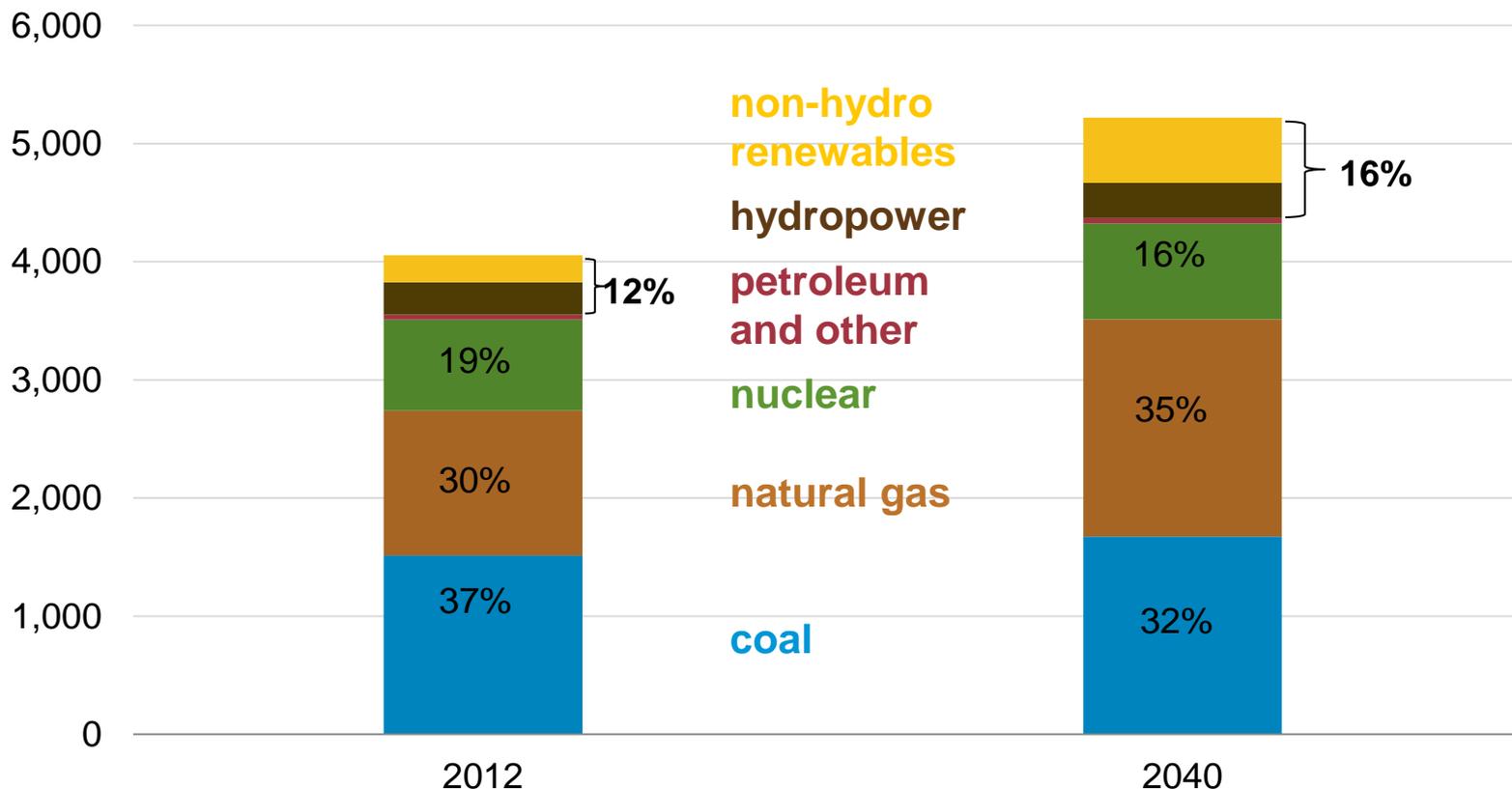


Source: EIA, Annual Energy Outlook 2014 Early Release

What do EIA's Annual Energy Outlook 2014 projections say about the role of renewable electricity in the generation mix?

Net generation by fuel source in the AEO2014 Reference case

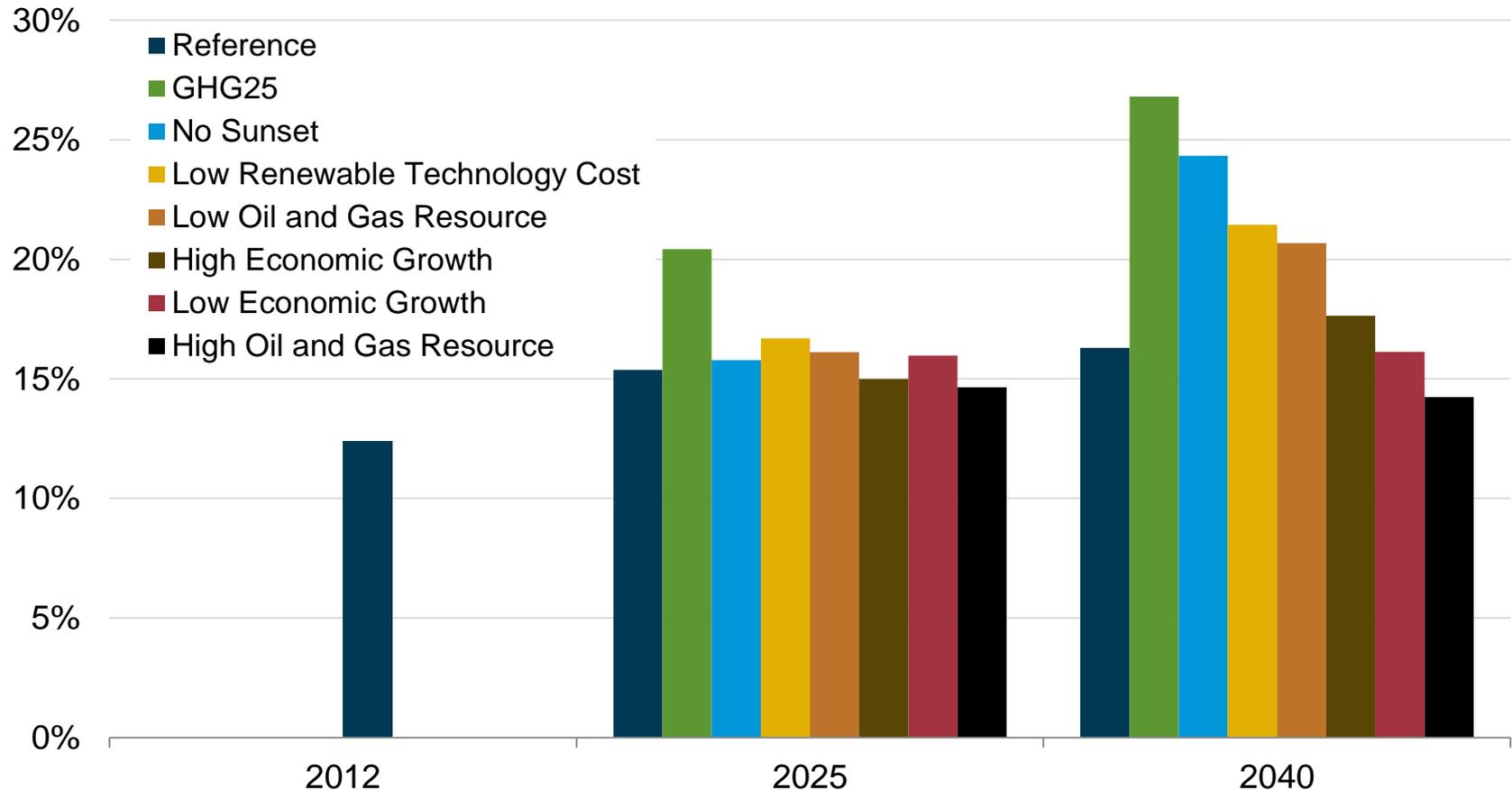
billion kilowatthours



Source: EIA, Annual Energy Outlook

Projected renewable generation market shares vary significantly under alternative assumptions

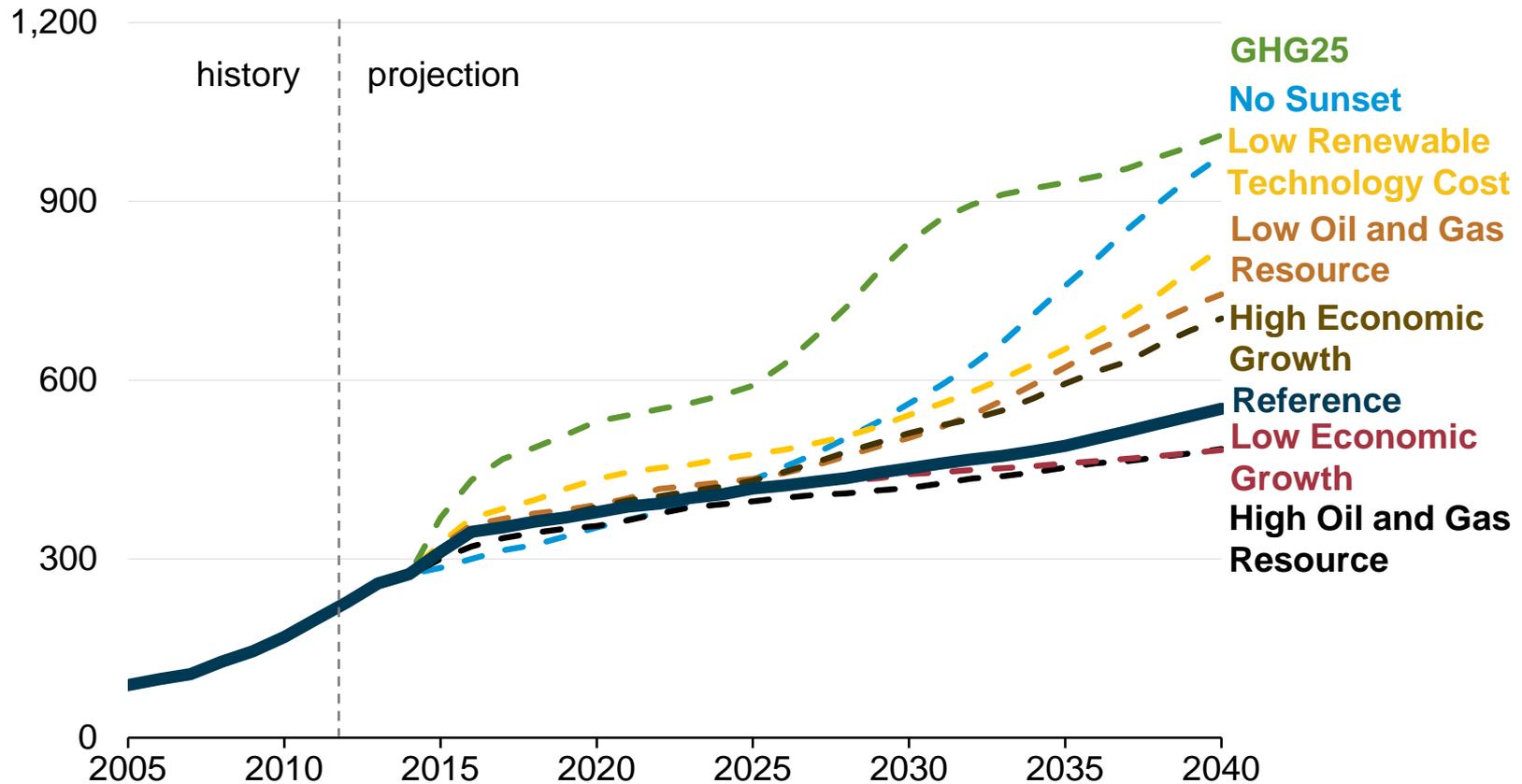
Renewable share of electricity generation in eight cases
billion kilowatthours



Source: EIA, Annual Energy Outlook 2014

Uncertainty in renewable projections is skewed to the upside of the Reference case

U.S. non-hydro renewable electricity generation in eight cases (2005-40)
billion kilowatthours



Source: EIA, Annual Energy Outlook 2014

How EIA helps to provide information on current energy issues

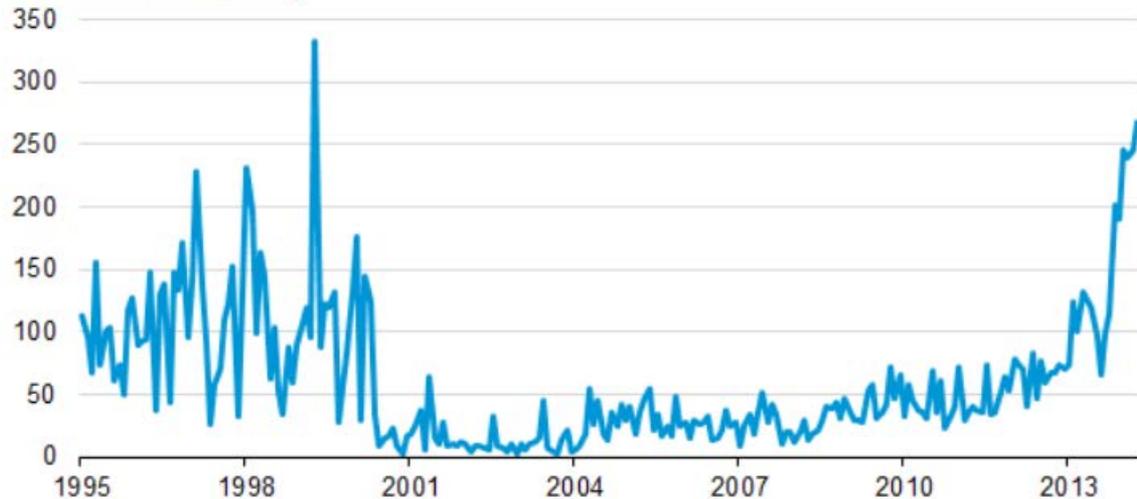
TODAY IN ENERGY

Crude exports

JUNE 16, 2014

U.S. crude exports in April rise to highest level in 15 years

U.S. crude exports (January 1995-April 2014)
thousand barrels per day



Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*

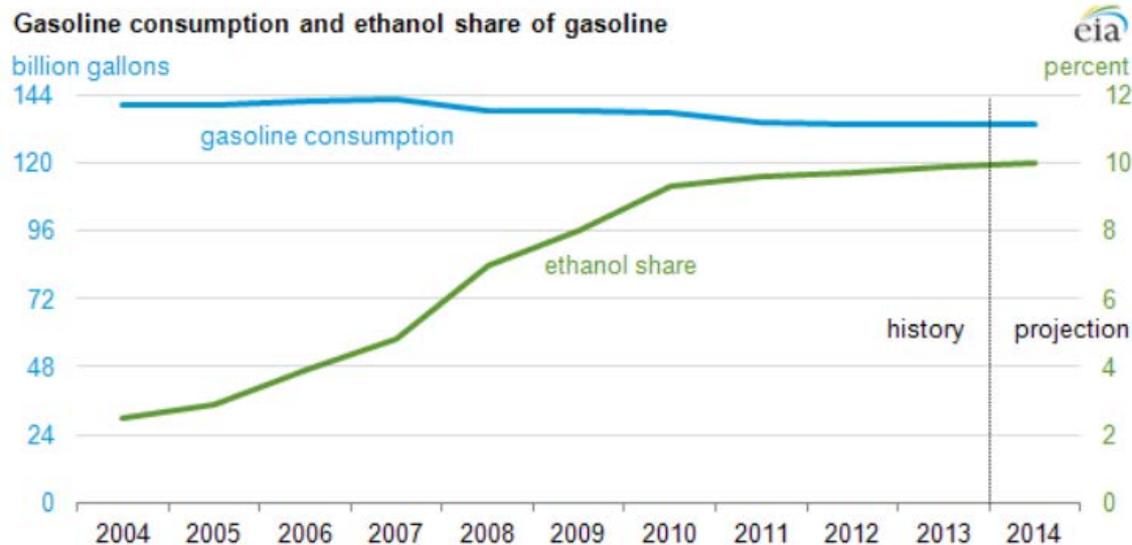
The United States exported 268,000 barrels per day (b/d) of crude oil in April (the latest data available from the U.S. Census Bureau), the highest level of exports in 15 years. [Exports have increased sharply](#) since the start of 2013 and have exceeded 200,000 b/d in five of the past six months. The increase in crude exports is [largely the result of rising U.S. crude production](#), which was 8.2 million b/d in March.

TODAY IN ENERGY

Biofuels

NOVEMBER 21, 2013

EPA issues proposed rule for the 2014 Renewable Fuel Standard



Source: U.S. Energy Information Administration, Short-Term Energy Outlook November 2013

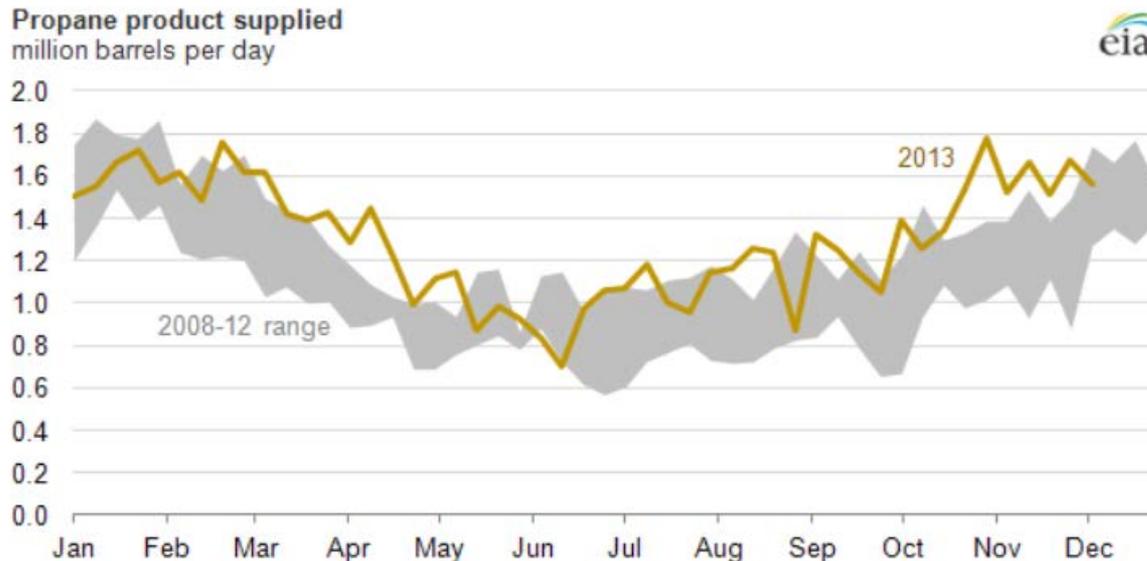
On November 15, 2013, the Environmental Protection Agency (EPA) released its [Notice of Proposed Rulemaking for the 2014 Renewable Fuels Standard \(RFS\)](#). The RFS program, established by the Energy Policy Act of 2005 and later expanded by the [Energy Independence and Security Act of 2007](#) (EISA07), requires EPA to set annual requirements for the renewable content of liquid fuels that may differ from a set of targets specified by law. The U.S. Energy Information Administration is required by the RFS provisions in EISA07 to provide EPA with information related to the projected use of motor gasoline and diesel fuel and the supply of various categories of biofuels in the month prior to issuance of EPA's final RFS rulemaking for each program year.

TODAY IN ENERGY

Propane

DECEMBER 12, 2013

Propane demand hits a record high for November



Source: U.S. Energy Information Administration, [Weekly Petroleum Status Report](#)

Note: Product supplied is a proxy for consumption.

Propane is produced from natural gas at processing plants and from crude oil at refineries. Propane produced from natural gas has been the fastest-growing component of overall U.S. propane supply. Propane production in the United States has set record highs on an almost weekly basis in 2013 as a result of increased oil and natural gas drilling. A record corn crop harvest has increased the demand for propane (shown in the graph above as [product supplied](#)) in the central United States. Expanded propane production met this agricultural demand, while continuing to supply other markets.

EIA data and market reports on propane, heating oil, biofuels, oil and natural gas

- Propane, Heating Oil, Gasoline and Diesel
 - [Weekly Petroleum Status Report](#) and [This Week in Petroleum](#)
 - State Heating Oil and Propane Program (SHOPP)
 - [Heating Oil and Propane Update](#) (October – March)
- EIA will be reporting propane inventory data in the Midwest below the PADD level, by single state where possible. In addition to posting weekly stocks data on the website, EIA will communicate directly with Governors' designees when stocks are below the five year average for three consecutive weeks.
- Ethanol and Biodiesel
 - Ethanol [production](#) and [refiner/blender inputs](#)
 - Biodiesel [Monthly Biodiesel Production Report](#)
 - Trade [imports and exports of biofuel/renewable fuel](#)
- Crude Oil and Refined Product Trade
 - [Crude Oil and Refined Product Imports and Exports](#)
- Natural Gas Trade
 - [Natural Gas – Imports and Exports by Pipeline and as LNG](#)
 - [DOE Office of Fossil Energy](#) handles natural gas export applications

For more information

U.S. Energy Information Administration home page | www.eia.gov

Annual Energy Outlook | www.eia.gov/aeo

Short-Term Energy Outlook | www.eia.gov/steo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

Today in Energy | www.eia.gov/todayinenergy

State Energy Portal | www.eia.gov/state

Drilling Productivity Report | www.eia.gov/petroleum/drilling/

Supplementary slides

EIA Analysis on Crude Oil Markets

- Work is underway on the following aspects of relevance to policymakers:
 - changes in pipeline systems to accommodate changing crude and product flows and movements of oil by rail
 - refinery utilization by crude type and downstream investment options to accommodate a changing production mix
 - the relationships linking crude prices to refined product prices and product prices across different trading hubs
- EIA released its first forecast of oil production by crude type
- EIA has also proposed the expansion of an existing monthly natural gas production survey to include crude oil and condensate by gravity

CBECS provides essential, unique information

- The CBECS is the only independent, statistically representative source of national-level data on the *characteristics* and *energy use* of commercial buildings*
- Mandated by Congress, it has been conducted periodically since 1979; this is the first reported data since the 2003 survey; the 2007 survey did not provide valid results
- CBECS data are the backbone of the Energy Star ratings at EPA, and are used by EERE for a variety of programs
- The 2012 CBECS is in its final stage of data collection; EIA is gathering usage data from energy providers across the country
- This briefing provides initial data about building characteristics; consumption and expenditures data will be available next year
- Since 2007, CBECS also collects water usage information

**Commercial buildings must contain 50 percent or more commercial activity (i.e., not residential, industrial, or agricultural) and be larger than 1,000 ft²*

AEO2014 projects more coal-fired power plant retirements by 2016 than have been scheduled

- U.S. coal plants under economic pressure - low natural gas prices , slow electricity demand growth
- The [Annual Energy Outlook 2014 \(AEO2014\)](#) Reference Case projects that 60 GW will retire by 2020 (including retirements that have already been reported); retirement decisions based on relative economics and regulatory environment of electricity markets
- Coal plants are subject to the [Mercury and Air Toxics Standards \(MATS\)](#)
 - requires significant reduction in mercury, acid gases, and toxic metals emissions
 - scheduled to take effect in April 2015, or April 2016 with extensions
 - 90% of retirements are projected to occur by the first full year of MATS enforcement
 - MATS compliance - all coal plants must have flue gas desulfurization equipment ([scrubbers](#)) or dry sorbent injection systems installed by 2016
- End of 2012: 1,308 coal units, 310 GW (after 10.2 GW retirements = 3.2% of the 2011 total)

Key takeaways on coal/natural gas substitution in power generation

- Coal-to-gas switching in recent years has been driven by lower natural gas prices resulting from rapid growth in shale gas production, inflexible coal prices, and high availability of generating capacity given stagnant electricity demand
 - At the national level, April 2012 marked a milestone: gas-fired and coal-fired electric power generation levels were identical for the first time ever.
 - The intensity of gas-on-coal competition varies by region depending on relative delivered fuel prices, the available capacity mix and its utilization, and the status of coal contracts; the Southeast region saw the most switching towards dispatch of gas-fired units in 2012
- In the AEO Reference case, factors such as MATS compliance, stagnant nuclear capacity growth, and increased generation from renewables contribute to natural gas overtaking coal as the leading fuel for electric power generation on an annual basis by 2035; the projected crossover comes much sooner, almost immediately, in cases with different assumptions about resources or policies
- Given the fuel prices projected in the AEO Reference case, existing coal units that are not retired for MATS compliance are projected to be fully utilized. In scenarios with lower relative gas prices, coal-to-gas switching reduces projected coal generation in some regions. While scenarios with higher relative gas prices increase projected reliance on renewables and nuclear, they do not appreciably increase projected coal-fired generation from Reference case levels.

What might a low electricity demand growth future look like?

- Assumptions used to achieve low electricity demand growth:
 - Applied best available technology to buildings, and layered on greater industrial motor efficiency
 - Assumptions are technically achievable but not necessarily cost-effective at this time
- Shifts in demand are accompanied by changes in patterns of investment and prices
 - Consumers spend less for electricity, and utility bill savings nearly balance households' increased costs for more efficient equipment, insulation, etc.
 - From 2012-2040, electricity generation capacity additions decline by about 50% relative to the *AEO2014* Reference case, while retirements of fossil fuel-fired capacity more than double relative to the *AEO2014* Reference case
 - Lower marginal energy prices in competitive wholesale electricity markets, relative to the *AEO2014* Reference case
 - Declines in residential electricity generation prices are partially offset by near-term increases in transmission and distribution prices

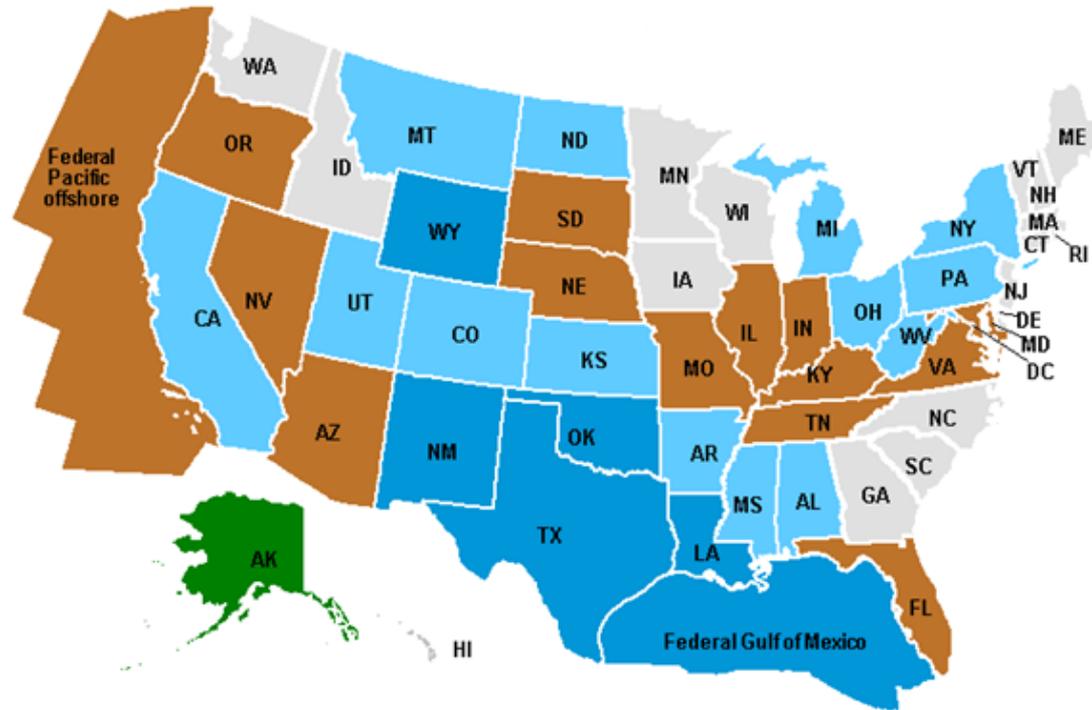
The AEO2014 includes an analysis of renewable projections by varying key assumptions, including policy

	Key uncertainties	Relevant AEO2014 side cases
Technology uncertainty	<ul style="list-style-type: none"> • How much will it cost to build and operate a renewable generation facility? 	<ul style="list-style-type: none"> • Low Renewable Technology Cost
Policy Uncertainty	<ul style="list-style-type: none"> • Will current policies be extended? • Will new policies be enacted? 	<ul style="list-style-type: none"> • No Sunset • GHG25
Macroeconomic and Price Uncertainty	<ul style="list-style-type: none"> • Will natural gas prices increase more than currently projected in the Reference case? • Could the economy (GDP) grow faster or slower than the average of 2.4% per year assumed in the Reference case? 	<ul style="list-style-type: none"> • High/Low Oil and Gas Resource • High/Low Macroeconomic Growth

Expanded EIA-914 proposal

- Current oil and gas production data is necessary to address questions about the very rapid changes occurring in quantity and quality of domestic output
- Collect monthly data on oil and natural gas production and associated API gravity from operators in 19 states and Federal GOM
- Anticipated benefits of 914 expansion
 - Improves EIA's reporting: timeliness, transparency, coverage (more states), informs upstream discussions/analyses, reduces estimation errors in statistical models
 - Respondent burden expected to be modest: roughly 500 respondents out of a 10,000-12,000 producer universe; electronic (web portal) interface
- Inadequacy of existing tools
 - GWPC National Gateway, even with EIA help, is still subject to the same state lags and consistency limitations
 - EIA Drilling Productivity Report (DPR) is an estimate based on a set of assumptions, not a survey of actual production trends

EIA-914 expansion will add 20 states/areas to oil and 14 states to current coverage of natural gas



Lower 48 states expanded survey coverage:

- Natural gas: 92%
- Oil: 89%

States covered in the EIA-914 survey

- current states/areas
- expansion states
- other producing states/areas (only if producer operates in current or expansion state)

States not covered in the EIA-914 survey

- data received from the state authorities
- non-producing states

EIA product highlight: State Energy Portal

U.S. STATES

MICHIGAN

State Profile and Energy Estimates

CHANGE STATE/TERRITORY

OVERVIEW DATA ANALYSIS RANKINGS COMPARE FIND ? HELP

Profile Overview

Layers/Legend Base Maps

Map details and data

Send map questions, comments and suggestions to: mapping@eia.gov

QUICK FACTS

- In 2010, Michigan had more underground natural gas storage capacity – 1.1 trillion cubic feet – than any other State in the Nation.
- The Antrim Gas Field, located in Michigan's Lower Peninsula, was ranked 15th in the Nation in estimated proved wet natural gas reserves as of 2009 and produced an estimated 126 billion cubic feet of gas that year.
- In 2011, Michigan's three nuclear power plants, with four reactor units, provided 30 percent of the State's net electricity generation.
- Michigan used coal for 54 percent of its net electricity generation in 2011; much of its coal is

Print State Energy Profile (overview, data, & analysis)

Michigan, U.S. Rankings

Consumption

Total Energy per Capita 35

Expenditures

Total Energy per Capita 37

Production

Total Energy 25

Crude Oil 16

Natural Gas 17

Coal --

Electricity 12

Prices

Natural Gas 42

Electricity 11

Environment

Carbon Dioxide Emissions 11

[See more rankings >](#)

Today In Energy

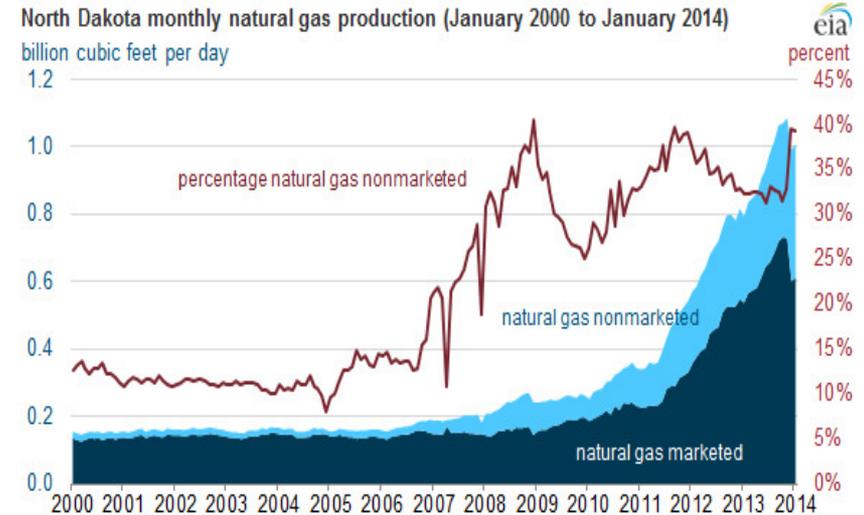
[See all state articles >](#)

Household Energy Use



- EIA's State Energy Portal gives users detailed portraits of energy production, consumption, and energy prices at the state level
- The State Energy Portal features almost 90 key data series, state Quick Facts, and charts for each state
- State Energy Portal www.eia.gov/state

EIA adjusts social media tools to meet state needs



Electricity generation from wind, by state (2013)

