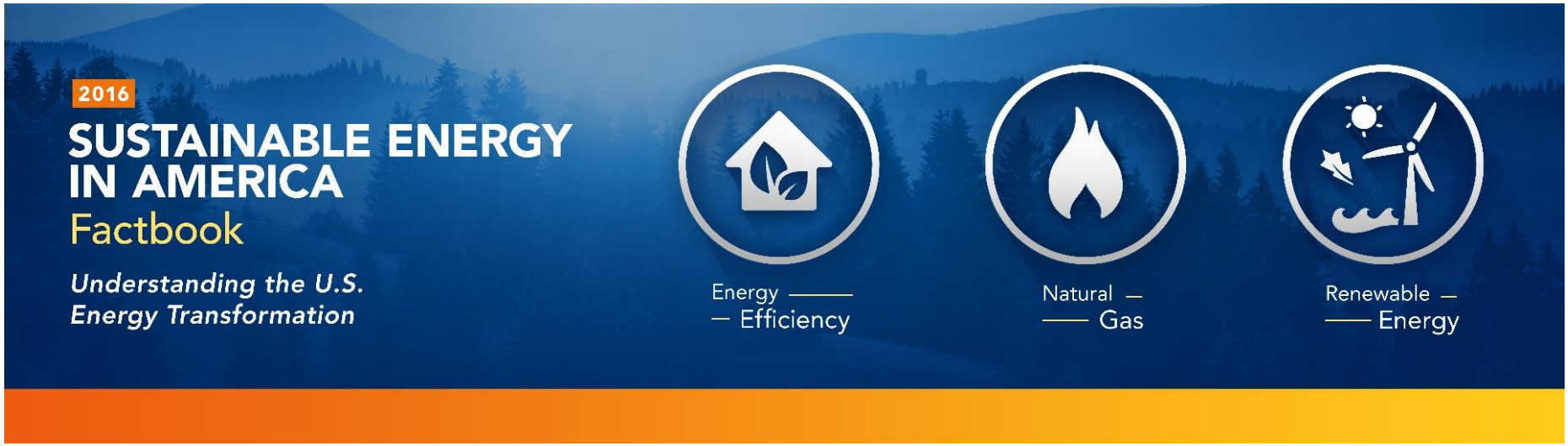


2016 Sustainable Energy in America Factbook Congressional Briefing

April 29, 2016

Hosted in coordination with the

House and Senate Renewable Energy and Energy Efficiency Caucus

EESI
Environmental and Energy Study Institute

The Business Council for Sustainable Energy®

GET THE FACTS: http://www.bcse.org/sustainableenergyfactbook #Factbook

About the BCSE

- The Business Council for Sustainable Energy (BCSE) is a coalition of companies and trade associations from the energy efficiency, natural gas and renewable energy sectors.

- The Council advocates for policies at state, national and international levels that:
  - increase the use of commercially-available clean energy technologies, products and services
  - support an affordable, reliable power system
  - reduce air pollution & greenhouse gas emissions

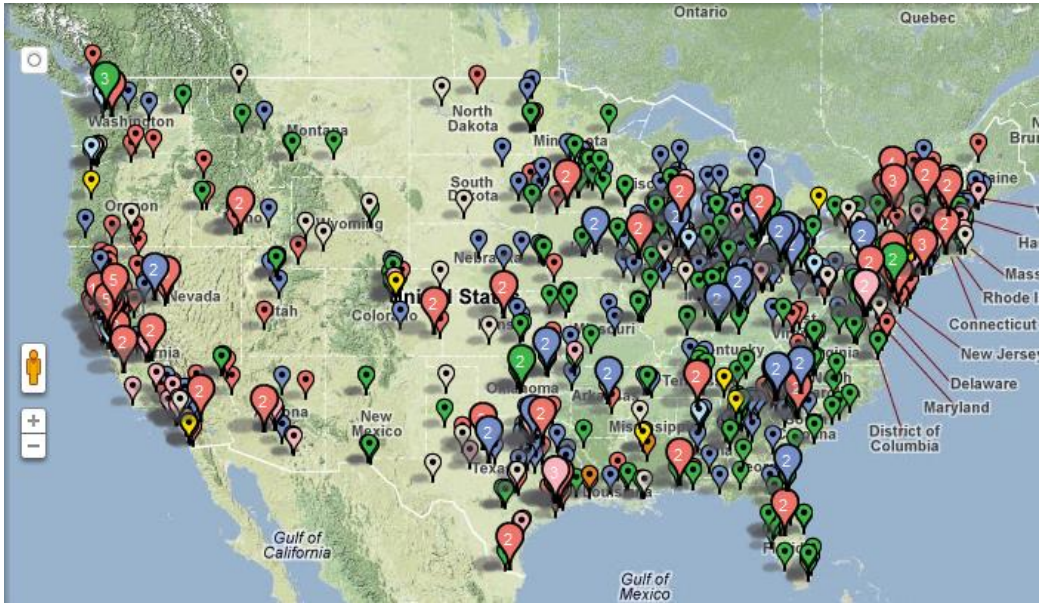
2016 BCSE Members

Clean Energy Coast to Coast

U.S. Clean Energy Jobs from Coast to Coast

The Council's members are strengthening America's energy future and creating American jobs in every state of the country.

Visit www.bcse.org to explore the interactive map.



2016

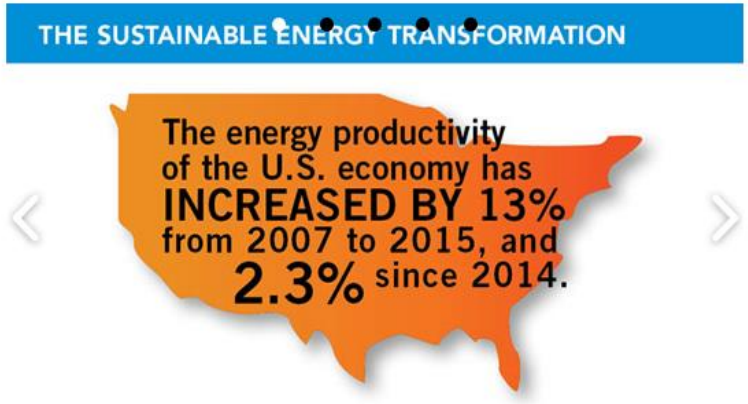
SUSTAINABLE ENERGY IN AMERICA

Factbook

Understanding the U.S. Energy Transformation

It is a new era for American energy. In 2015, increased use of sustainable energy set the stage for a U.S. triple play of carbon reductions, cost savings and economic growth.

The 2016 edition of the Sustainable Energy in America Factbook – produced for the Business Council for Sustainable Energy by Bloomberg New Energy Finance, provides up-to-date, accurate market information about the broad range of industries — energy efficiency, renewable energy and natural gas — that are contributing to the country's move towards cleaner energy production and more efficient energy usage.



Get the 2016 Factbook

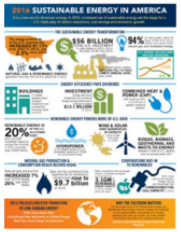
See State Spotlight

Browse the Brochure →

Watch the Video →

View the Slideshow →

Infographic



Get the Facts

- American energy productivity has increased by 13% from 2007 to 2015.
- 2015 was a record year for natural gas production, consumption, flows to power generation and volumes into storage.
- Renewable energy is a prominent part (20%) of the U.S. 2015 capacity mix, with 221GW installed across the country, a 57% increase over 2008 levels.
- Total U.S. investment in clean energy topped $56 billion in 2015, the second highest level in the world.
- 2015 U.S. power sector carbon emissions fell to their lowest annual level since 1995.

Executive Summary

Industry Focus: Energy Efficiency, Natural Gas, Renewable Energy

Quick Facts On: Alternative Fuel Vehicles, Biomass/ Waste-to-Energy, Carbon Capture & Storage, Combined Heat & Power, Fuel Cells, Hydropower

State Spotlight

Learn about clean energy in the following states:

- Minnesota
- Nevada
- Pennsylvania
- Virginia
- See 2016 Factbook State & Regional Slides

Previous Factbook Editions

Download previous editions of the Factbook here.

2013

2014

2015

About the Factbook Partners

Bloomberg NEW ENERGY FINANCE

Bloomberg New Energy Finance (BNEF) provides unique analysis, tools and data for decision makers driving change in the energy system. With unrivalled depth and breadth, BNEF helps clients stay on top of developments across the energy spectrum from our comprehensive web-based platform.BNEF has 200 staff based in London, New York, Beijing, Cape Town, Hong Kong, Munich, New Delhi, San Francisco, São Paulo, Singapore, Sydney, Tokyo, Washington D.C., and Zurich.

The Business Council for Sustainable Energy®

The Business Council for Sustainable Energy (BCSE) is a coalition of companies and trade associations from the energy efficiency, natural gas and renewable energy sectors. The Council membership also includes independent electric power producers, investor-owned utilities, public power, commercial end-users and project developers and service providers for energy and environmental markets.

For more information please contact Laura Tierney of BCSE at 202-785-0507

2016

SUSTAINABLE ENERGY IN AMERICA

Factbook

The Business Council for Sustainable Energy®

Sponsored by:

AGA American Gas Association

COVANTA
Powering Today. Protecting Tomorrow.

First Solar®

IR Ingersoll Rand

Johnson Controls

JUPITER 2

JUPITER OXYGEN CORPORATION

Kingspan®
Insulated Panels

NHA
National Hydropower Association

PIMA
POLYISOCYANURATE INSULATION MANUFACTURERS ASSOCIATION

Sempra Energy®

SEIA Solar Energy Industries Association®

2016

SUSTAINABLE ENERGY IN AMERICA

Factbook

GET THE FACTS www.bcse.org

Bloomberg NEW ENERGY FINANCE

The Business Council for Sustainable Energy®

Developed in partnership with the Business Council for Sustainable Energy.

About the Factbook (1 of 2):
What is it and what's new

What is it?

- Aims to augment existing, reputable sources of information on US energy
- Focuses on **renewables, efficiency, natural gas**
- **Fills important data gaps** in certain areas (eg, investment flows by sector, contribution of distributed energy)
- Contains data through the end of 2015 wherever possible
- Employs **Bloomberg New Energy Finance data** in most cases, augmented by EIA, FERC, ACEEE, ICF International, LBNL, and other sources where necessary
- Contains the very **latest information on new energy technology costs**
- Has been graciously underwritten by the **Business Council for Sustainable Energy**
- Is in its **fourth edition** (first published in January 2013)

What's new?

- **Format**: This year's edition of the Factbook (this document) consists of Powerpoint slides showing updated charts. For those looking for more context on any sector, the 2014 edition(1) can continue to serve as a reference. The emphasis of this 2016 edition is to *capture new developments that occurred in the past year*.
- **Updated analysis**: Most charts have been extended by one year to capture the latest data.
- **2015 developments**: The text in the slides highlights major changes that occurred over the past year.
- **New coverage**: This report contains data shown for the first time in the Factbook, including analyses of US levelized costs of electricity, corporate renewables procurement, US transmission build, small-scale CHP generation and additional energy efficiency data.

(1) The 2014 Factbook can be found here: http://www.bcse.org/factbook/pdfs/2014%20Sustainable%20Energy%20in%20America%20Factbook.pdf

About the Factbook (2 of 2):
Understanding terminology for this report

Bloomberg NEW ENERGY FINANCE

	FOSSIL-FIRED / NUCLEAR POWER	RENEWABLE ENERGY	DISTRIBUTED POWER, STORAGE, EFFICIENCY	TRANSPORT
SUSTAINABLE ENERGY (as defined in this report)	• Natural gas • CCS	• Solar • Wind • Geothermal • Hydro • Biomass • Biogas • Waste-to-energy	• Small-scale renewables • CHP and WHP • Fuel cells • Storage • Smart grid / demand response • Building efficiency • Industrial efficiency (aluminum) • Direct use applications for natural gas	• Electric vehicles (including hybrids) • Natural gas vehicles
OTHER CLEAN ENERGY (not covered in this report)	• Nuclear	• Wave / tidal	• Lighting • Industrial efficiency (other industries)	• Biofuels

Roadmap

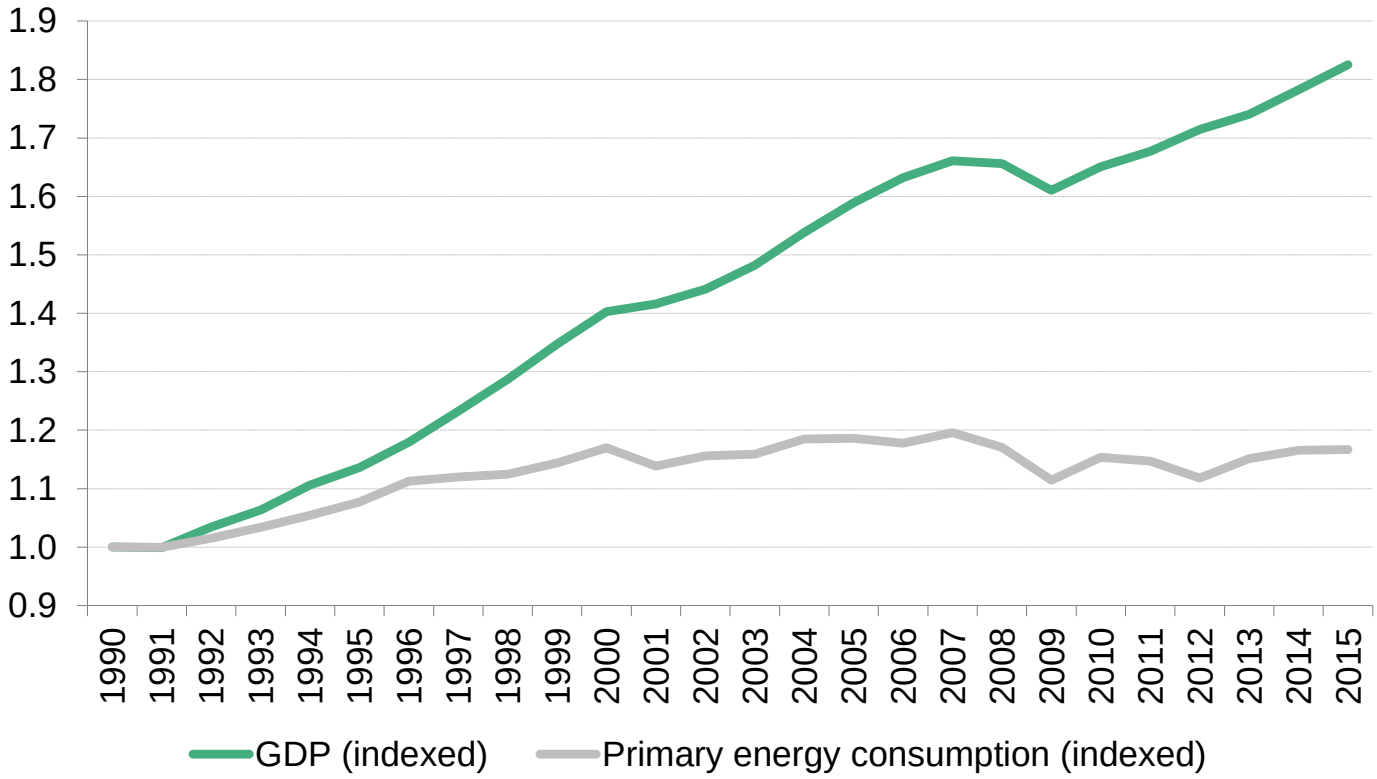
Bloomberg NEW ENERGY FINANCE

- 2015: A YEAR OF MILESTONES
- US ENERGY IN TRANSITION
- AN ERA OF LOW ENERGY PRICES
- OUTLOOK
- WRAP-UP

2015: A YEAR OF MILESTONES

Bloomberg
NEW ENERGY FINANCE

Economy's energy productivity: GDP and primary energy consumption (indexed to 1990 levels)

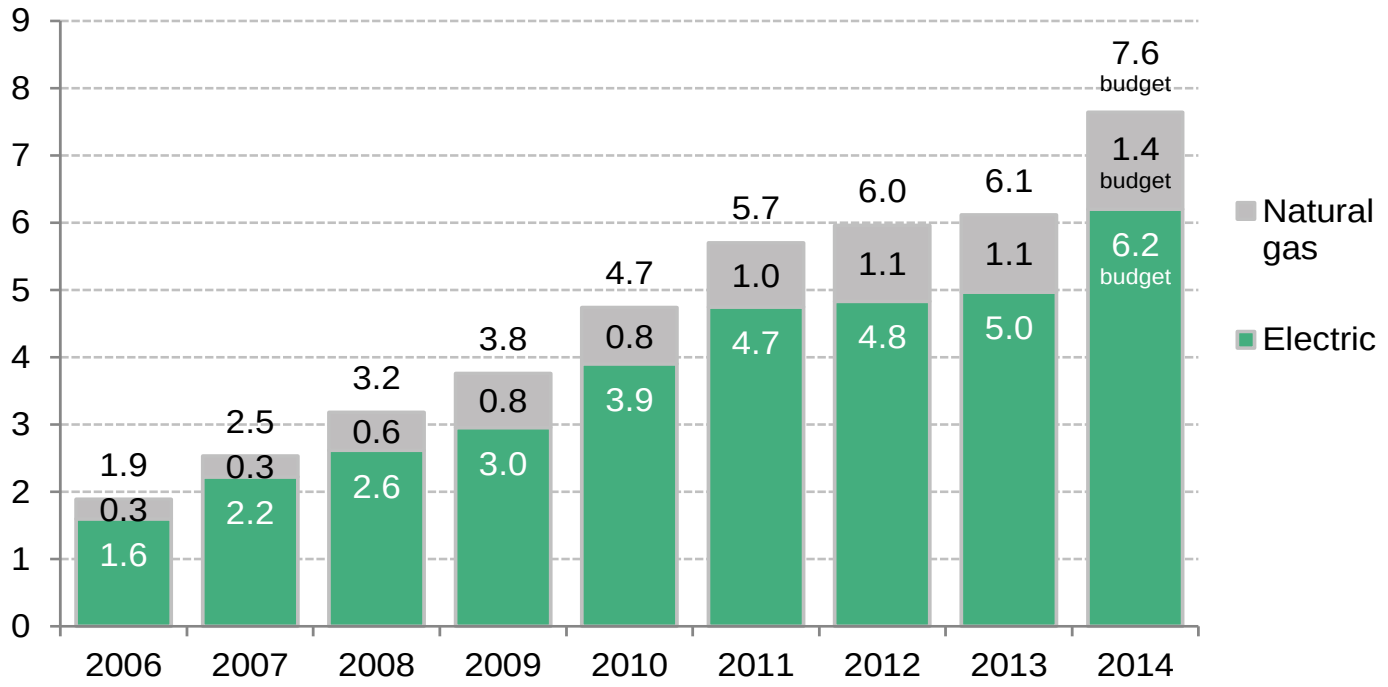


- The US economy is increasingly energy productive, resulting in a decoupling between growth in GDP and growth in energy consumption. As US GDP expanded 83% over the last 25 years, energy consumption only ticked up 17%.
- By one measure (US GDP per unit of energy consumed), productivity has improved 56% since 1990, 13% since 2007, and 2.3% between 2014 and 2015.

Source: US Energy Information Administration (EIA), Bureau of Economic Analysis, Bloomberg Terminal

Notes: Values for 2015 energy consumption are projected, accounting for seasonality, based on latest monthly values from EIA (data available through September 2015). GDP is real and chained (2009 dollars); annual growth rate for GDP for 2015 is based on consensus of economic forecasts gathered on the Bloomberg Terminal as of January 2016.

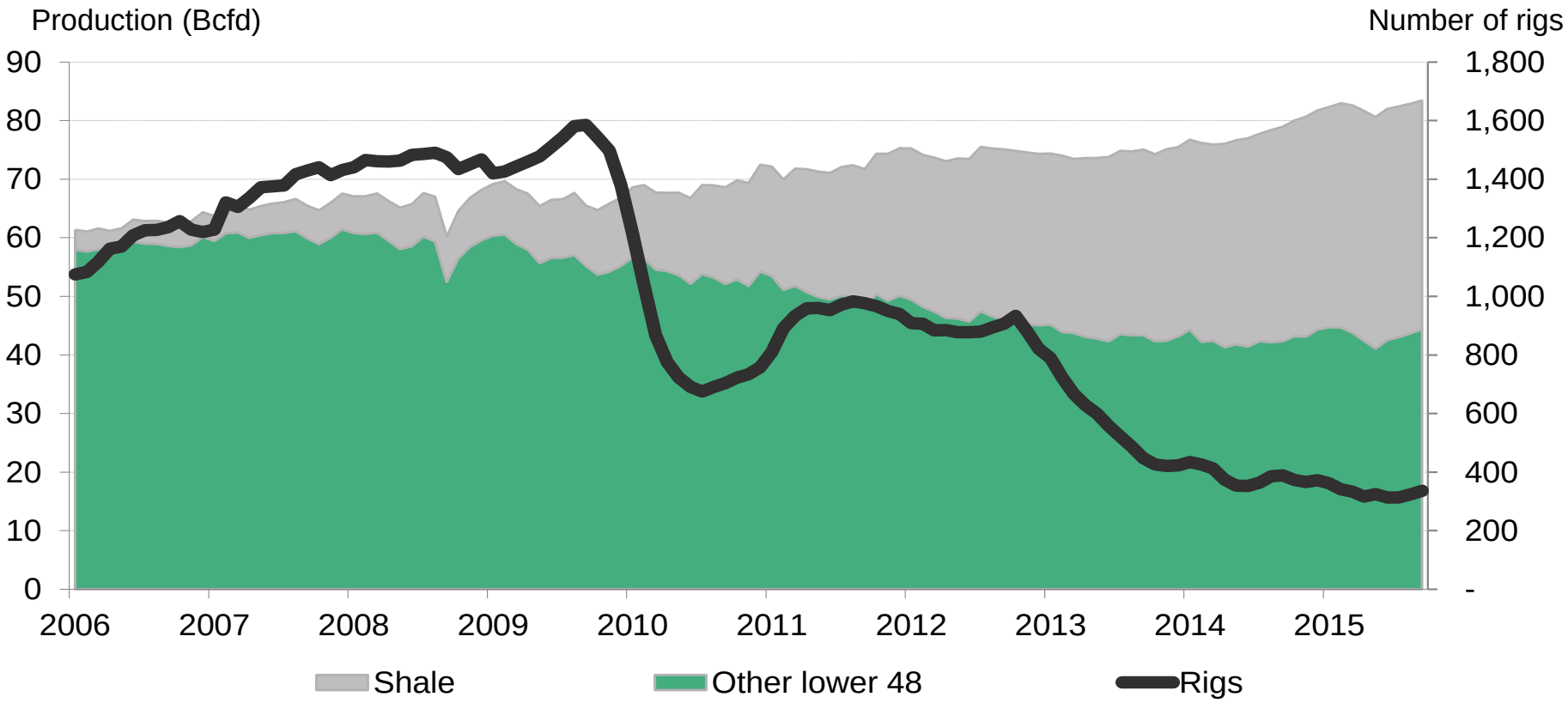
Financing: US utility energy efficiency spending and budgets ($bn)



- From 2006 to 2011, US utility expenditure for energy efficiency grew 25% per year.
- The budgeted amount for 2014 would represent a 25% growth between 2013 and 2014.
- Maryland was the state with the largest increase in utility budgets for energy efficiency, with an increase from $119m in 2013 to $292m in 2014.
- In December 2015, US Congress renewed the energy-efficient commercial buildings tax deduction and nonbusiness (ie, residential) Energy-efficient Property Credit that retroactively reinstates tax credits for projects completed in 2015 and 2016.

Source: CEE, ACEEE, Bloomberg New Energy Finance

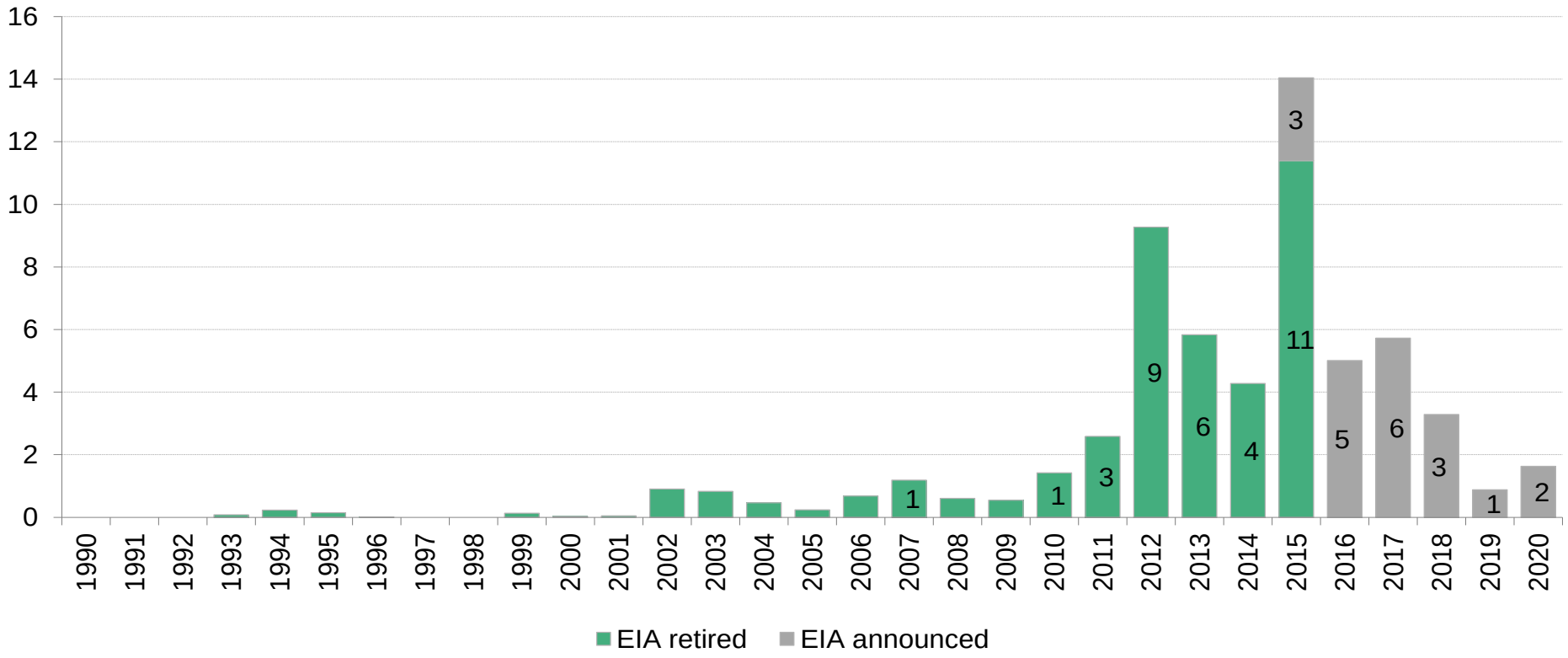
Deployment: US natural gas production and gas-directed rig count (Bcfd, rigs)



- Natural gas production in 2015 was up 7% from 2014 levels, 26% from 2007 levels. Shale production now accounts from almost half of total.
- Technological improvements in efficiencies (like pad drilling and longer laterals) and drilling in productive “sweet spots” has allowed production to increase even as rig counts drop.

Source: Bloomberg New Energy Finance, EIA, Baker Hughes. Data up through the latest comprehensive numbers available (September 2015).

Policy: US coal power plant retirements completed and announced by year (GW)



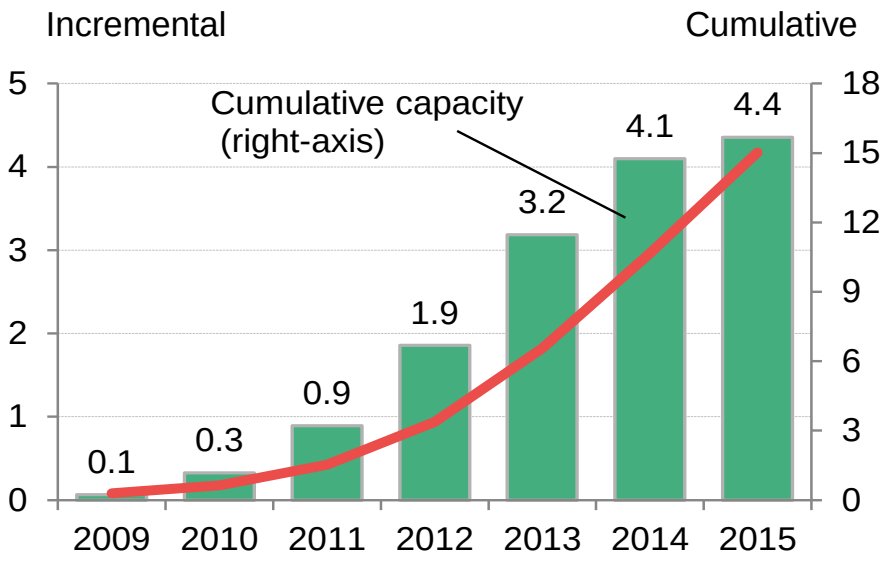
- 2015 saw the largest wave of coal retirements ever, with 14GW of coal-fired power plants disconnecting from the grid. An additional, undetermined number of plants (likely less than 5GW in total) also converted from coal to burn natural gas and, in a few cases, biomass.
- Record low gas prices, old age, and increasing operating costs – partly due to US Environmental Protection Agency (EPA) regulations covering sulfur, nitrogen, and mercury emissions from power plants – have forced many coal plants to retire earlier than originally planned.

Source: Bloomberg New Energy Finance

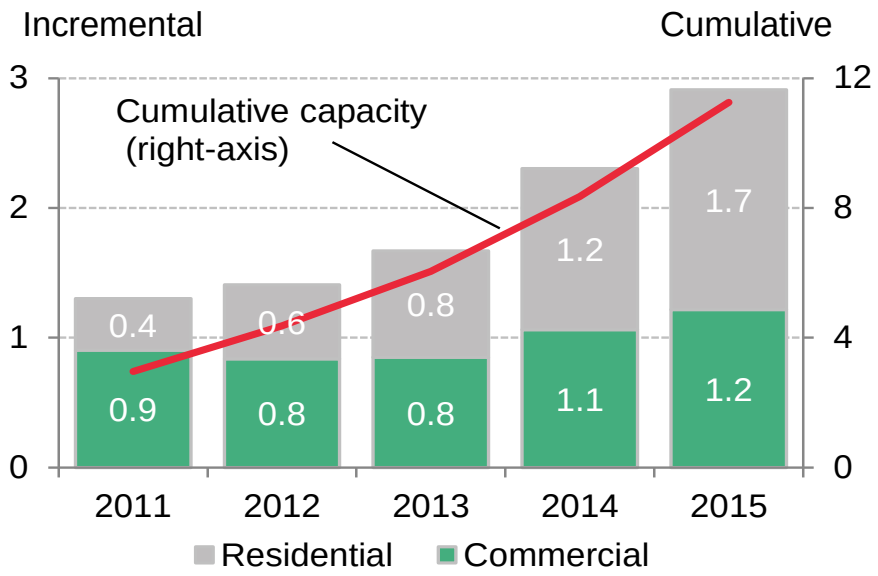
Notes: "Retirements" does not include conversions from coal to natural gas or biomass; retirement numbers through end-October 2015.

Deployment: US solar PV build

US utility-scale photovoltaic build (GW)



US small-scale photovoltaic build (GW)



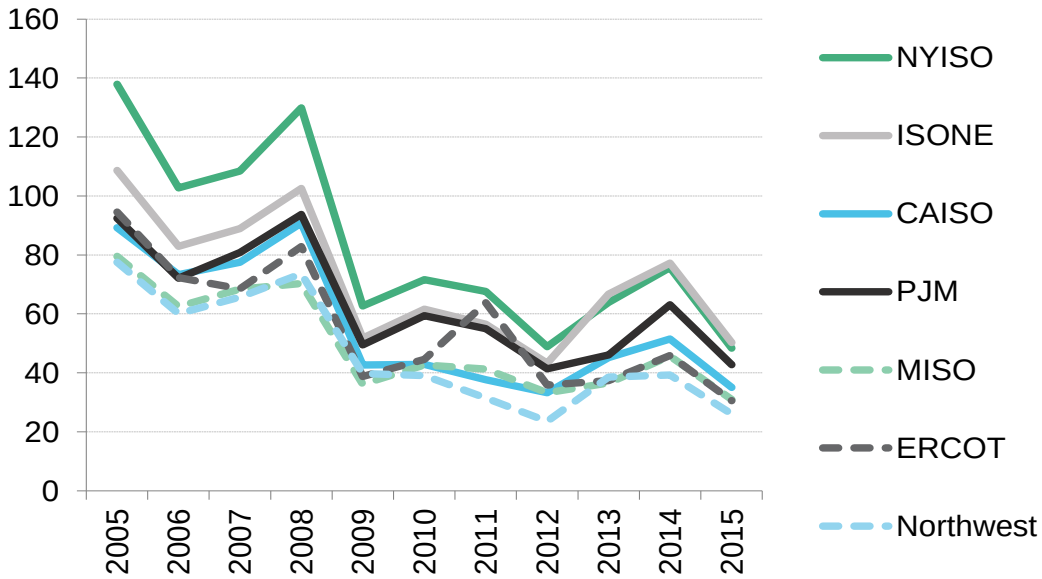
- After six years of dramatic growth, utility-scale PV build began to level off in 2015, although installations still increased 6% over the previous year.
- Distributed PV had yet another record-year in 2015, driven by growth in both the residential and commercial segments.
- The economics for both segments benefit from premium retail electricity rates (compared to wholesale power for utility-scale projects), and a secondary, behavioral driver of consumer dynamics – ie, the more people go solar near you, the more likely you are to consider it.

Source: Bloomberg New Energy Finance

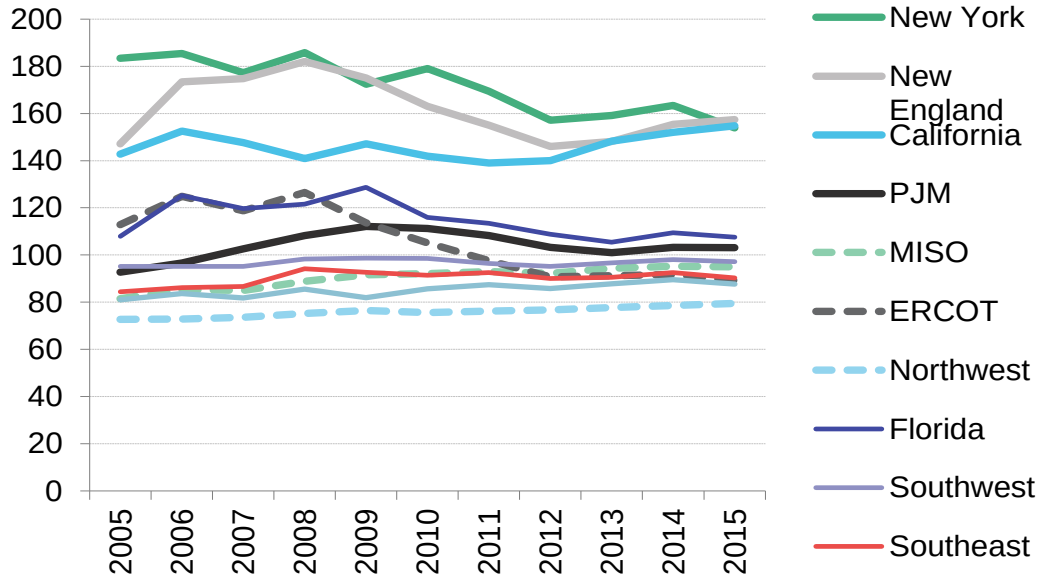
US energy overview:
Retail and wholesale power prices

Bloomberg NEW ENERGY FINANCE

Wholesale power prices ($/MWh)



Average retail power prices ($/MWh)

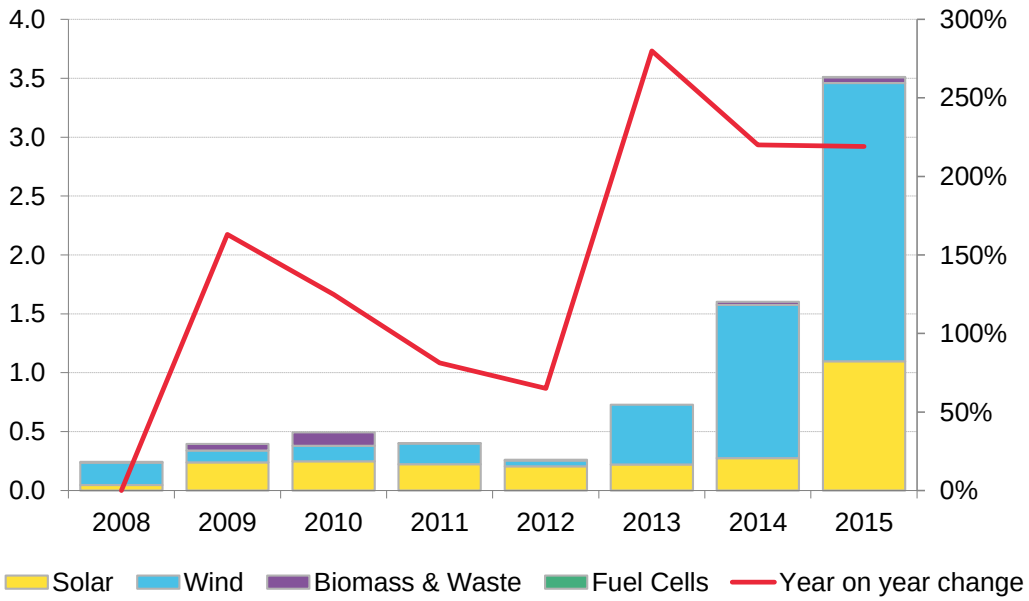


- Wholesale prices fell by about a third in 2015, as natural gas prices fell and more renewables connected to the grid.
- Retail power prices in most regions remain well below the peak prices seen in 2008-09.
- In 2015, retail electricity rates fell by 1.3% on average nationwide. New York (-5.8%) and Texas (-2.7%) saw the biggest year-on-year declines.
- Exceptions included California and New England where retail prices rose marginally (1.8% and 1.3%, respectively).

Source: Bloomberg New Energy Finance, EIA, Bloomberg Terminal Notes: Data through end-November 2015. Wholesale prices taken from proxy power hubs in each ISO. Prices are in real 2014 dollars.

Finance: Corporate procurement of clean energy

Renewable capacity contracted by corporations, by technology, 2008-15 (MW)



Key players in corporate procurement

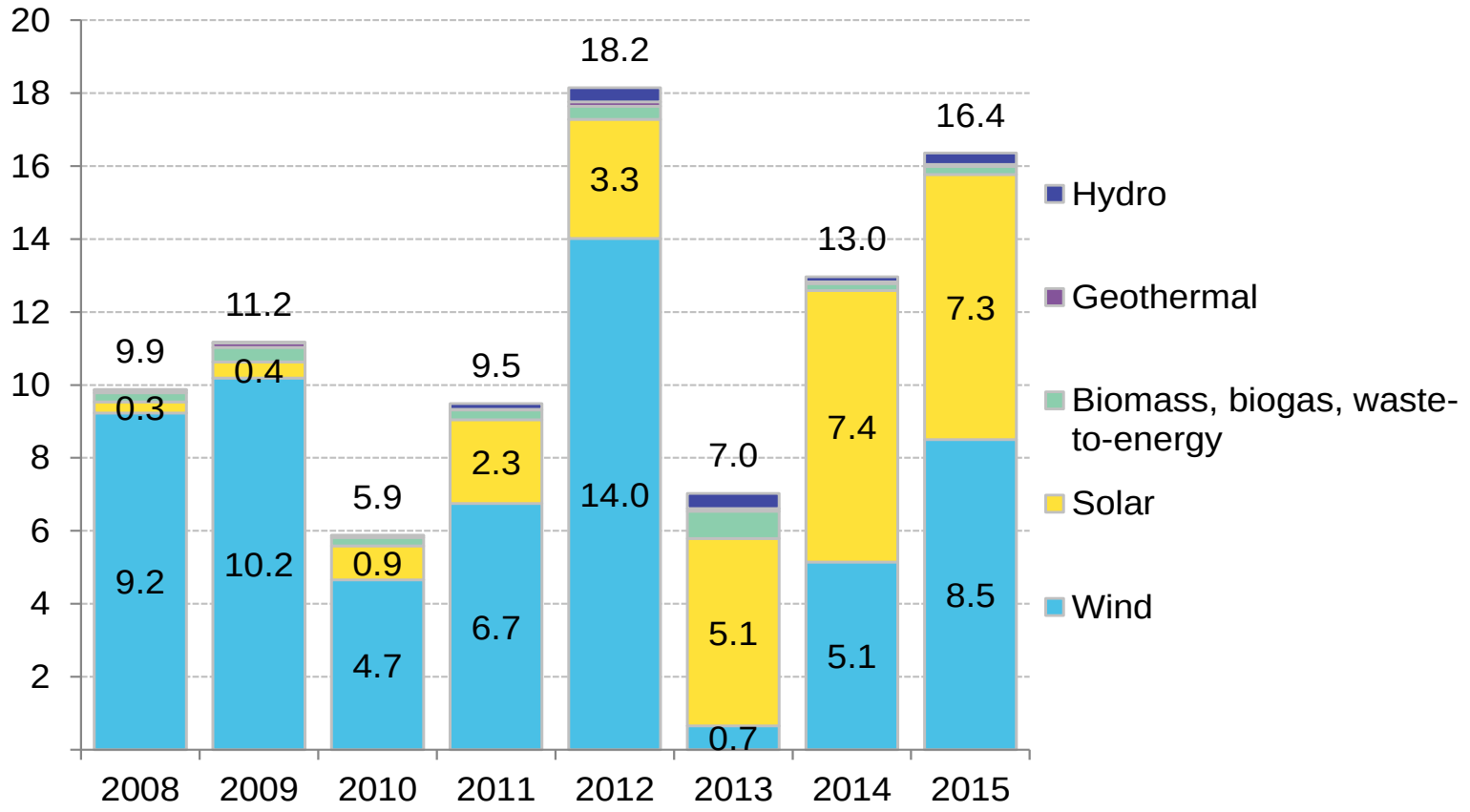
- Corporate procurement of clean energy doubled in 2014 and again in 2015, breaching 3.5GW.
- Wind and solar are the energy technologies of choice. When procurement levels were low between 2008 and 2012, solar generally made up the majority of MW. After corporate procurement took off in 2013, however, wind has made up the dominant portion of procurement.
- Google has been the largest player to date, procuring 71MW of solar and 1.6GW of wind. Amazon is second, with 80MW of solar and 458MW of wind contracted in 2015 alone. Large individual projects include Facebook's 202MW purchasing power agreement (PPA) with Shannon Wind Farm in Texas, and Apple's 153MW PPA with First Solar.

Source: Bloomberg New Energy Finance, company announcements Note: this slide has been updated to reflect two late-reporting commitments from Google for 0.4GW of wind contracts.

US ENERGY IN TRANSITION

Bloomberg
NEW ENERGY FINANCE

Renewable energy capacity build by technology (GW)



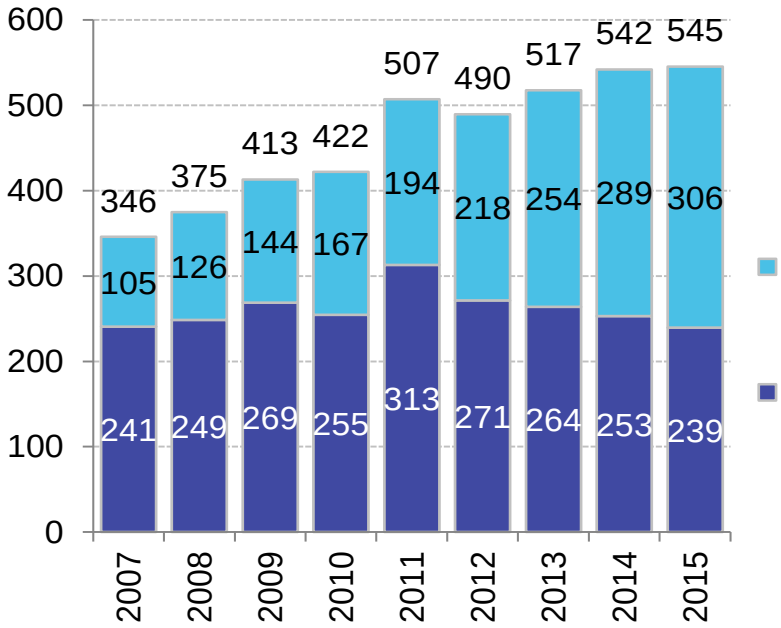
- Solar experienced another year of strong build, adding 7.3GW of PV in 2015 – a record.
- Small-scale solar continues to grow as the economics make it a viable alternative to retail rates in many regions of the country.
- Wind build surged to 8.5GW in 2015 as developers rushed to capture the Production Tax Credit (PTC) before it was due to expire at the end of 2016.
- Other sectors (biomass, biogas, waste-to-energy, geothermal, hydro) are idling without long-term policy support.

Source: Bloomberg New Energy Finance, EIA Notes: Numbers include utility-scale (>1MW) projects of all types, rooftop solar, and small- and medium-sized wind.

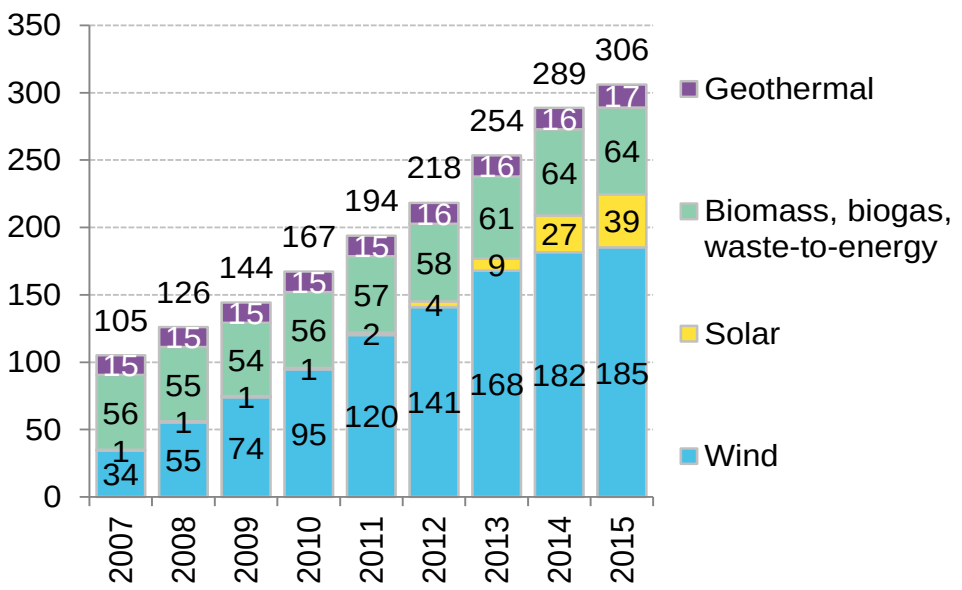
US energy overview:
Renewable energy generation by technology

Bloomberg NEW ENERGY FINANCE

US renewable generation by technology (including hydropower) (TWh)



US non-hydropower renewable generation by technology (TWh)

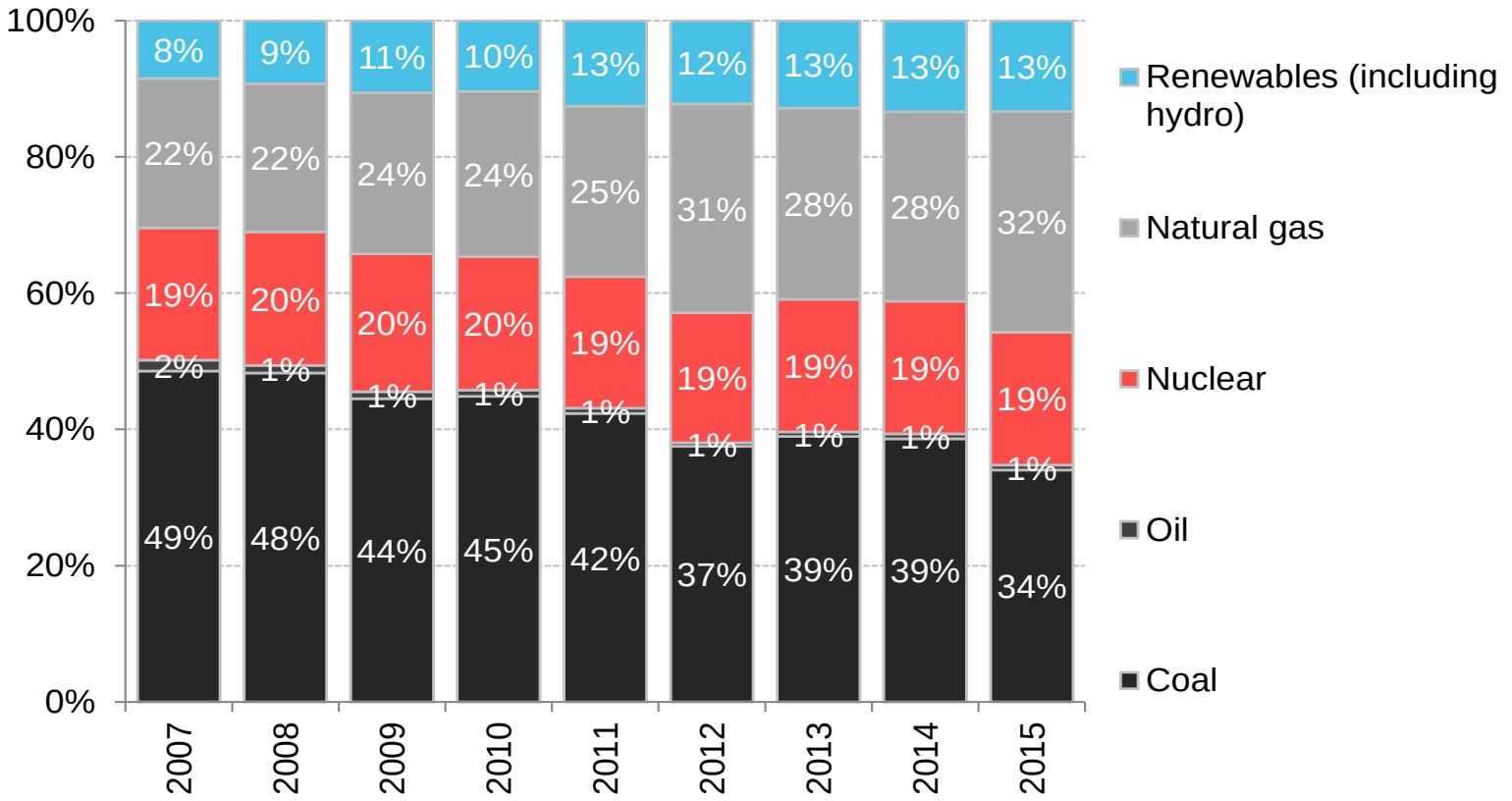


- Generation from non-hydropower renewables grew to 306TWh in 2015, up from 289TWh in 2014. Wind continues to make up the bulk of this generation (185TWh, or 61%) but the growth in 2015 came primarily from a 45% surge in generation from solar.
- Hydro generation has decreased since 2011 due to the ongoing droughts in the West Coast states.
- Non-hydropower renewables now account for 7.4% of US electricity, up from 7.0% the previous year. This figure has grown every year since 2005, when non-hydro renewables generated only 2.2% of US electricity.

Source: Bloomberg New Energy Finance, EIA

Notes: Values for 2015 are projected, accounting for seasonality, based on latest monthly values from EIA (data available through October 2015). Includes net energy consumption by pumped hydropower storage facilities. Totals may not sum due to rounding. Beginning in 2014, numbers include estimated generation from distributed solar; generation from other distributed resources are not included.

US energy overview:
US electricity generation by fuel type (%)

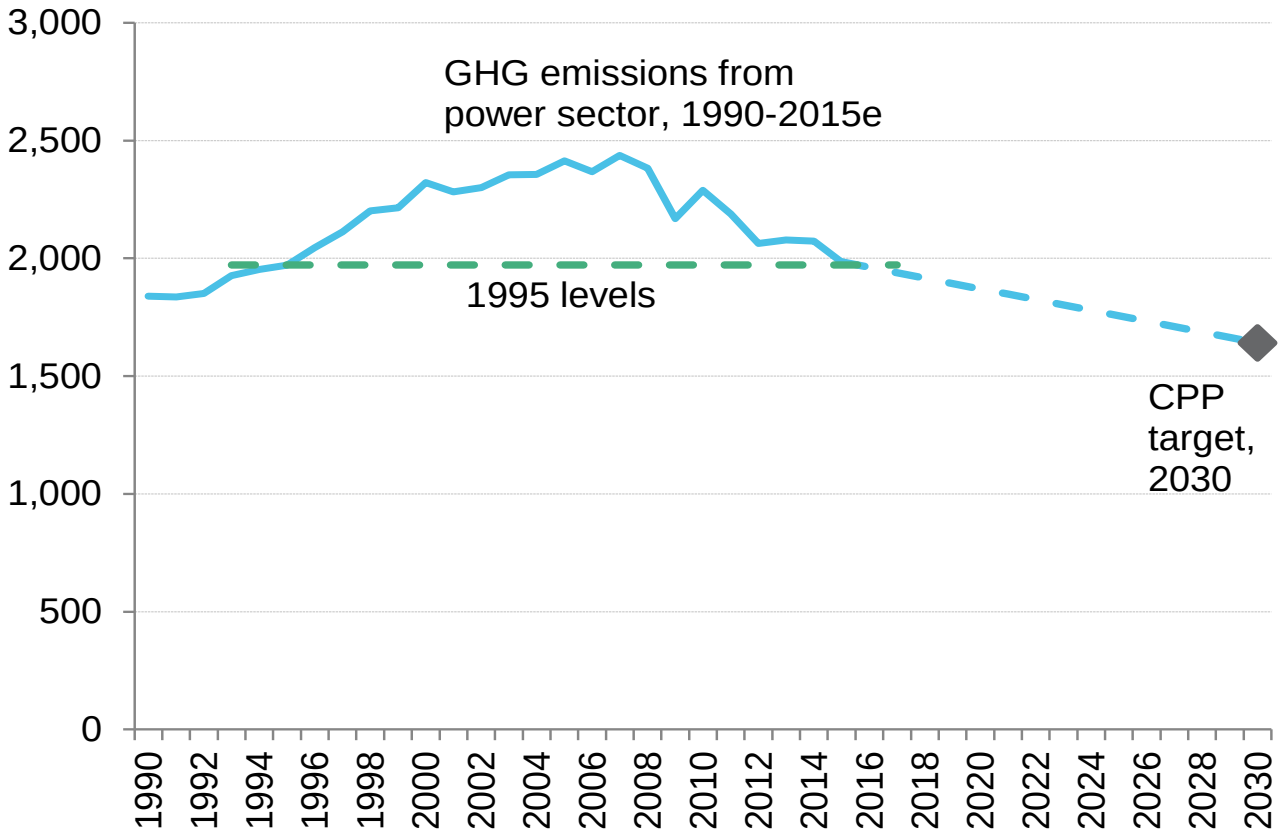


- Generation from natural gas plants increased by 17% from 2014 to 2015, while coal generation fell by 11%.
- The US power sector is gradually decarbonizing. From 2007 to 2015, natural gas increased from 22% to 32% of electricity generation, and renewables climbed from 8% to 13%. Coal's share slipped from 49% in 2007 to only 34% in 2015.

Source: EIA

Notes: Values for 2015 are projected, accounting for seasonality, based on latest monthly values from EIA (data available through October 2015). In chart at left, contribution from 'Other' is not shown; the amount is minimal and consists of miscellaneous technologies including hydrogen and non-renewable waste. The hydropower portion of 'Renewables' includes negative generation from pumped storage.

Greenhouse gas emissions from the power sector (MtCO2e)



- In 2015, power-sector emissions sunk to their lowest levels (1,985Mt) since 1995 as cleaner-burning natural gas has displaced generation from coal-fired power plants.
- Emissions are 18% below 2005 levels.
- The Clean Power Plan targets a 32% cut from 2005 levels by 2030.

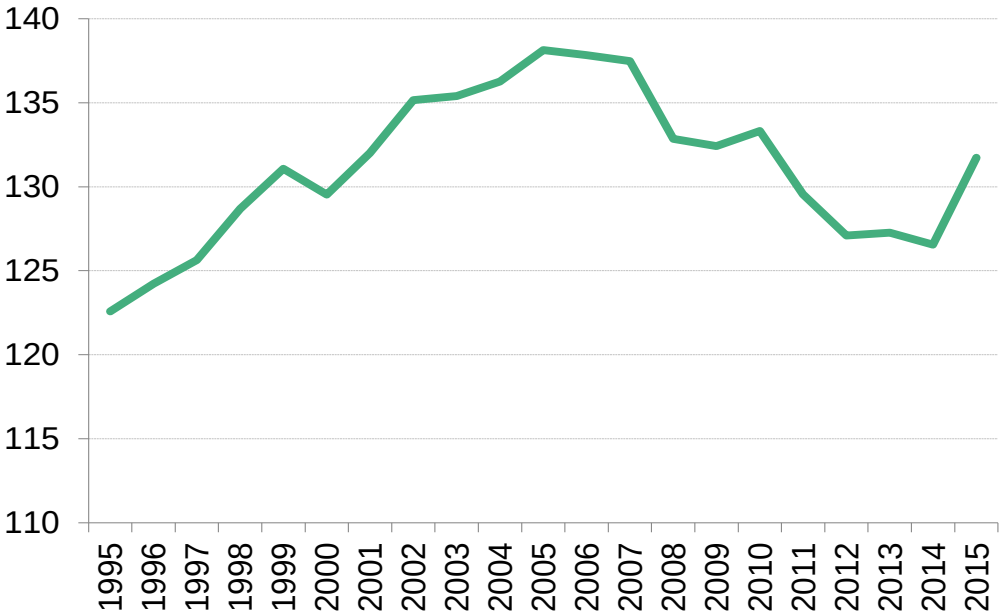
Source: Bloomberg New Energy Finance, EIA, EPA

Notes: Values for 2015 are projected, accounting for seasonality, based on latest monthly values from EIA (data available through September 2015).

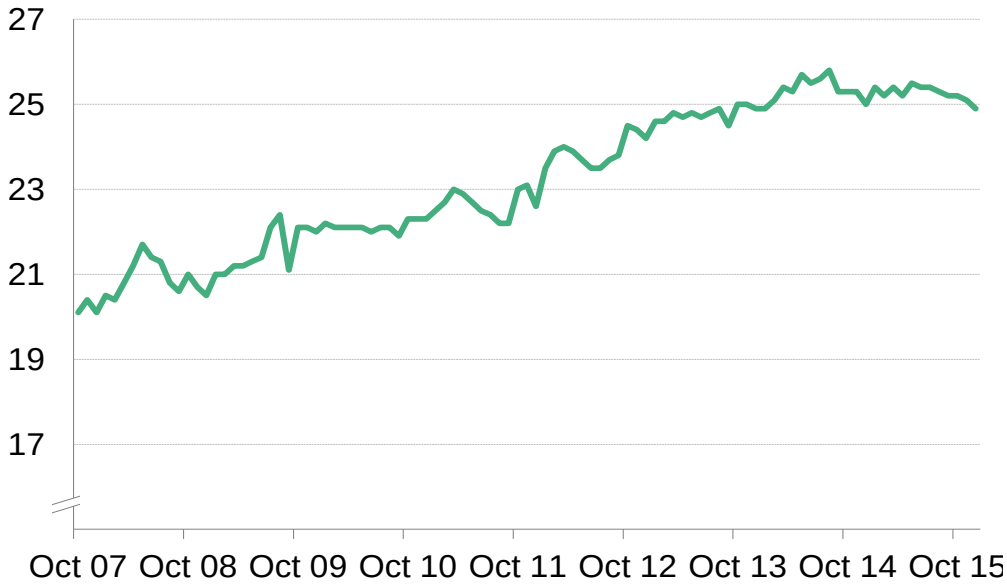
Global context: US-related causes and implications of falling oil prices

Bloomberg NEW ENERGY FINANCE

US gasoline consumption (bn gallons per year)



US average fuel-economy rating (weighted by sales) of purchased new vehicles (MPG)



- Gasoline consumption in the US ticked up to 132bn gallons per year in 2015, a 4% increase from the low seen in 2014.
- Consumption is still 4.6% below the 2005 peak, and both corporate average fuel economy (CAFE) standards and emissions targets have tightened over the past decade.
- Average US fuel economy of new vehicle sales flatlined from 2014 to 2015, ending the trend of steady improvement seen in 2007-2013. Consumers bought 6% more vehicles in 2015, but sales of alternative vehicles stalled: PHEV sales collapsed 24%, and HEV sales declined 16%. Only battery electric vehicles proved resilient, with sales growing 16%.

Source: EIA

Notes: Analysis is based on daily averages of 'total gasoline all sales / deliveries by prime supplier'. Values for 2015 are projected, accounting for seasonality, based on latest monthly values from EIA (data available through October 2015).

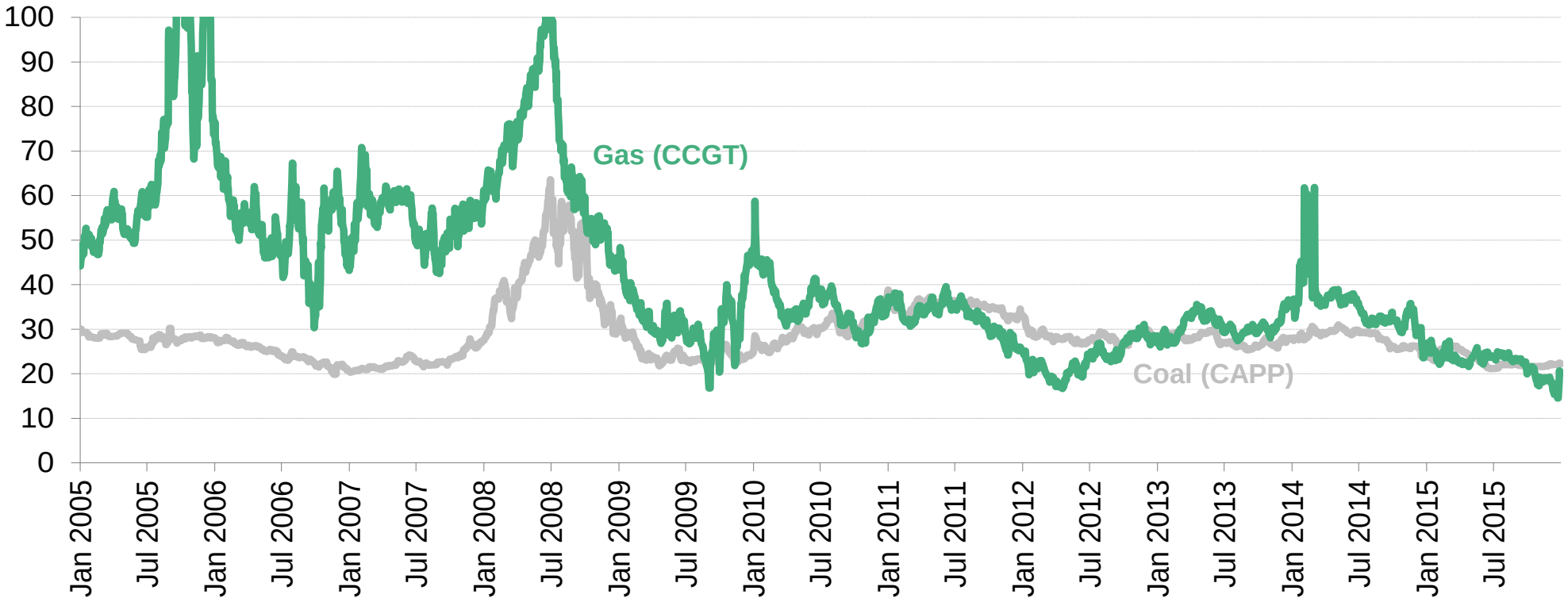
Source: UMTRI, Bloomberg New Energy Finance

Notes: Relies on combined city/highway EPA fuel economy ratings. PHEV stands for plug-in hybrid electric vehicle; HEV stands for hybrid electric vehicle.

AN ERA OF LOW PRICES

Bloomberg
NEW ENERGY FINANCE

Economics: Cost of generating electricity in the US from natural gas vs coal ($/MWh)



- The so-called ‘shale revolution’ has lowered gas prices significantly, enabling gas plants in many parts of the country to compete head-to-head with coal-fired plants.
- In some regions (eg, the Mid-Atlantic and Southeast) in 2012 and again in 2015, gas was the cheaper resource. Competition from natural gas was a key factor in 2015’s record level of coal retirements.

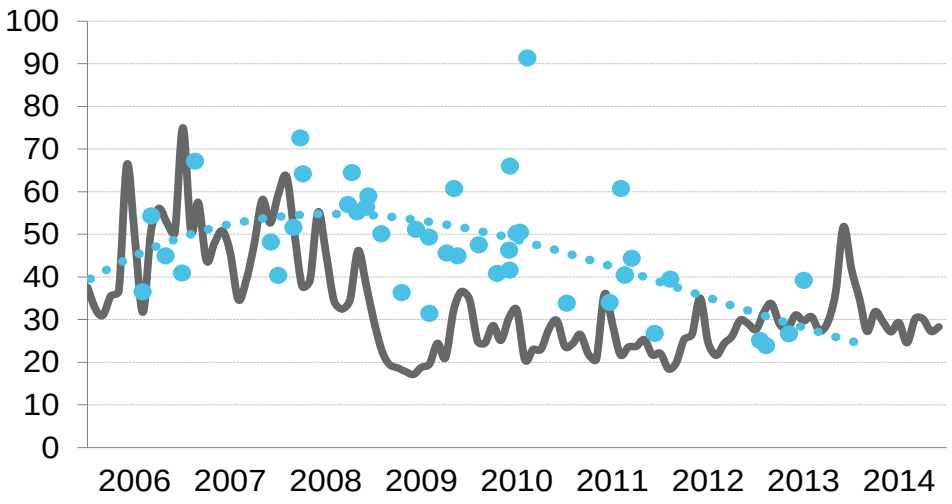
Source: Bloomberg New Energy Finance

Notes: Assumes heat rates of 7,410Btu/kWh for CCGT and 10,360Btu/kWh for coal (both are fleet-wide generation-weighted medians); variable O&M of $3.15/MWh for CCGT and $4.25/MWh for coal. Gas price used is Henry Hub. CCGT stands for a combined-cycle gas turbine. CAPP represents Appalachian coal prices.

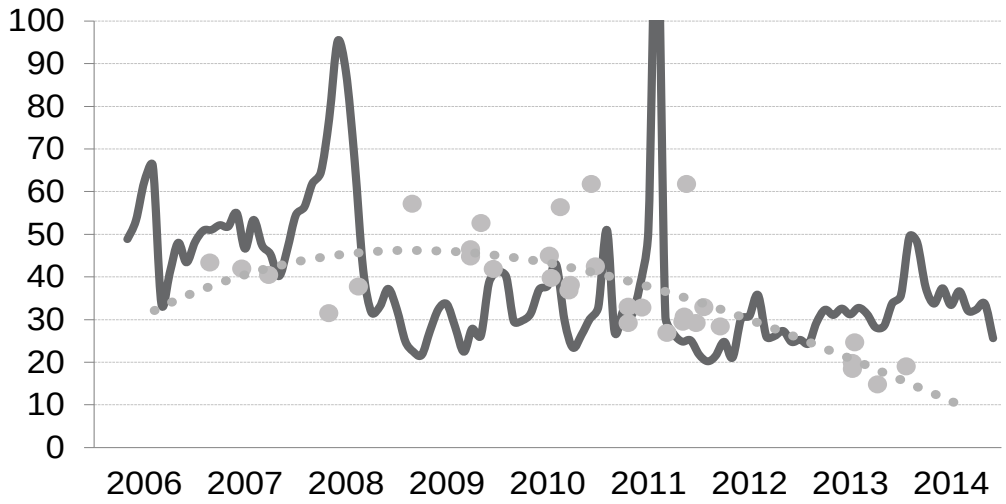
Economics: US onshore wind PPA prices by signing date, relative to wholesale power prices, 2006-2014 ($/MWh)

Bloomberg NEW ENERGY FINANCE

MISO



SPP

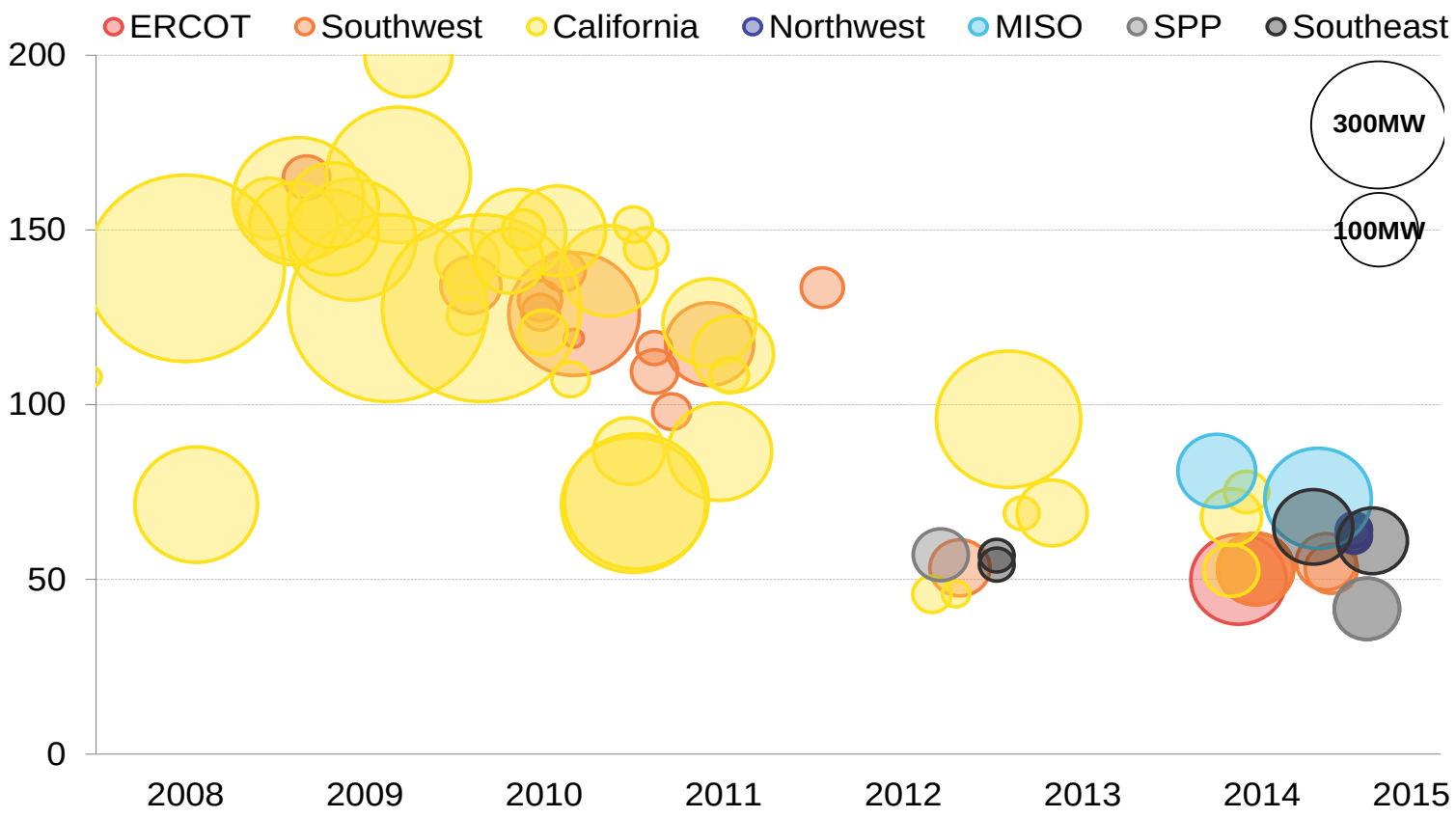


- Prices for long-term contracts for onshore wind also have declined (reaching the $20-30/MWh range), driven by improvements in technology and decreasing financing costs
- In the Midwest (MISO) and Central southern states (SPP), wind PPAs are competitive with wholesale power prices

Source: Bloomberg New Energy Finance, FERC EQR, public disclosures and analyst estimates

Notes: Does not include PPAs under 5MW. 'PPA price' is calculated as the average offtake price over the period of project operation.

Economics: US utility-scale solar PPA prices by signing date, 2008-H1 2015 ($/MWh)



- Prices for long-term contracts for utility-scale PV continue to decline – from over $100/MWh in 2008-9 to consistently in the $40-60/MWh range in 2015, driven by falling system costs
- The threat of an ITC step-down drove particularly aggressive (<$40/MWh) PPA bids in 2015

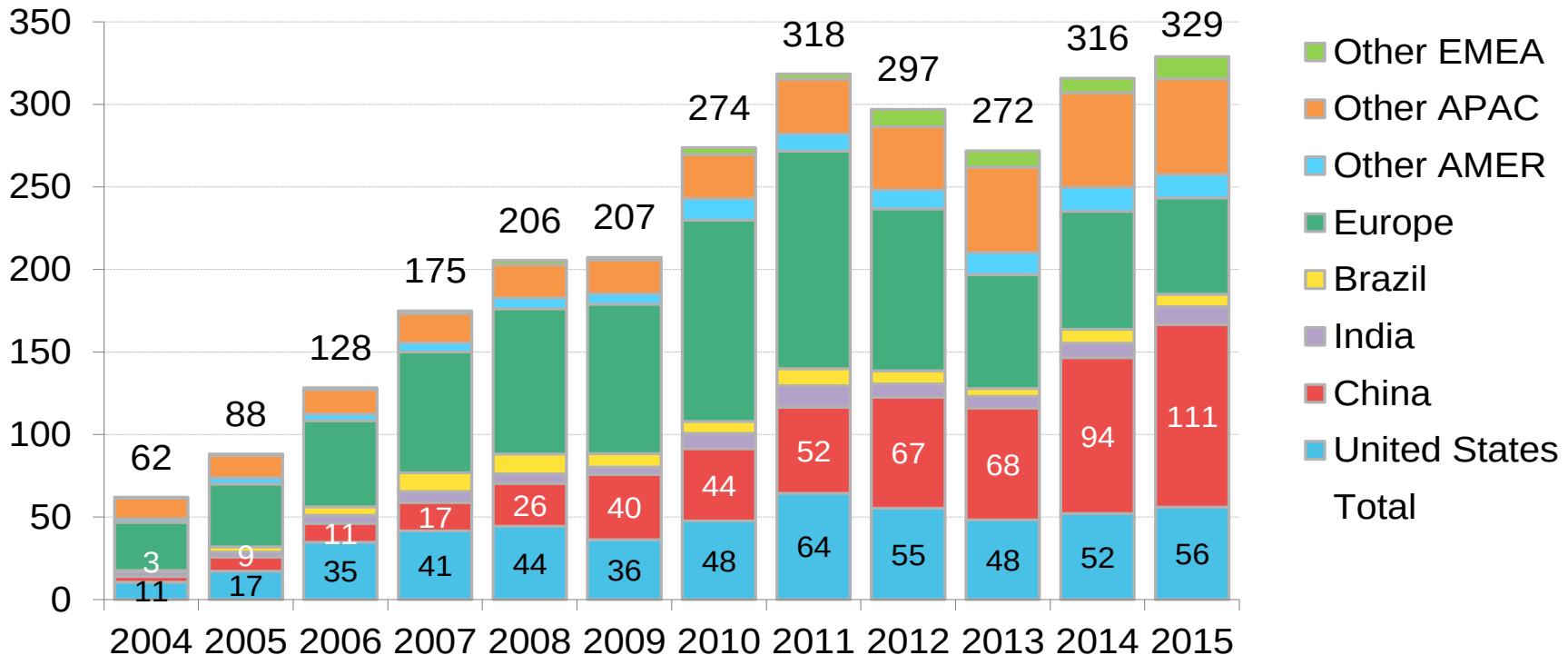
Source: Bloomberg New Energy Finance, FERC EQR, public disclosures and analyst estimates

Notes: Does not include PPAs under 5MW. 'PPA price' is calculated as the average offtake price over the period of project operation.

OUTLOOK

Bloomberg
NEW ENERGY FINANCE

Global context: Total new investment in clean energy by country or region ($bn)



- Total new investment in clean energy set a new record high at $329bn in 2015.
- Investments climbed 8% in the US, mostly in wind and solar. The US currently makes up 17% of world investment in clean energy.
- China was #1 again, investing $111bn.

Source: Bloomberg New Energy Finance

Notes: For definition of clean energy, see slide in Section 2.2 of this report titled 'Finance: US clean energy investment (1 of 2) – total new investment, all asset classes ($bn)' . AMER is Americas; APAC is Asia-Pacific; EMEA is Europe, Middle East, and Africa.

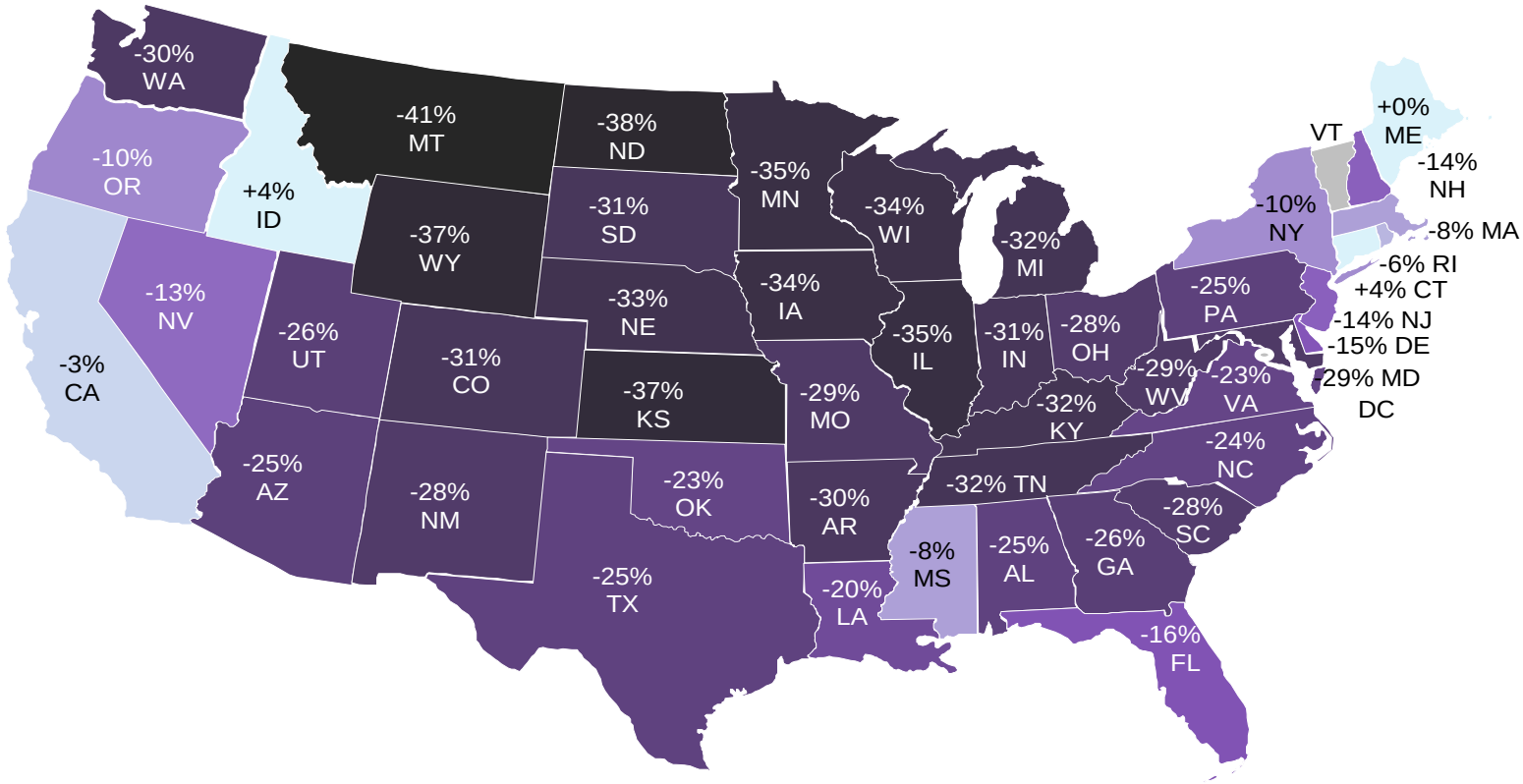
Policy: Federal support of clean energy

- At the end of 2015, Congress enacted major subsidy extensions for clean energy projects.
- The Production Tax Credit (PTC) for wind projects was extended through the end of 2019. The credit is $23/MWh for projects beginning construction in 2015 and 2016, then steps down through 2019.
- The Investment Tax Credit (ITC) for solar projects was extended and now applies to projects beginning construction before 2022. The credit begins at 30% for projects breaking ground before 2020, then steps down gradually to 10%.
- Extensions were also granted for the production of second-generation biofuels and energy from geothermal, biomass and landfill gas, hydroelectric projects and ocean energy; however, the majority of these technologies received extensions of only two years, compared to five year for wind and solar.
- Deductions and credits were extended for energy efficiency building improvements and the construction of efficient homes.

Policy: EPA Clean Power Plan

Bloomberg NEW ENERGY FINANCE

Emissions reductions required by the Clean Power Plan between 2012 and 2030, under mass-based compliance



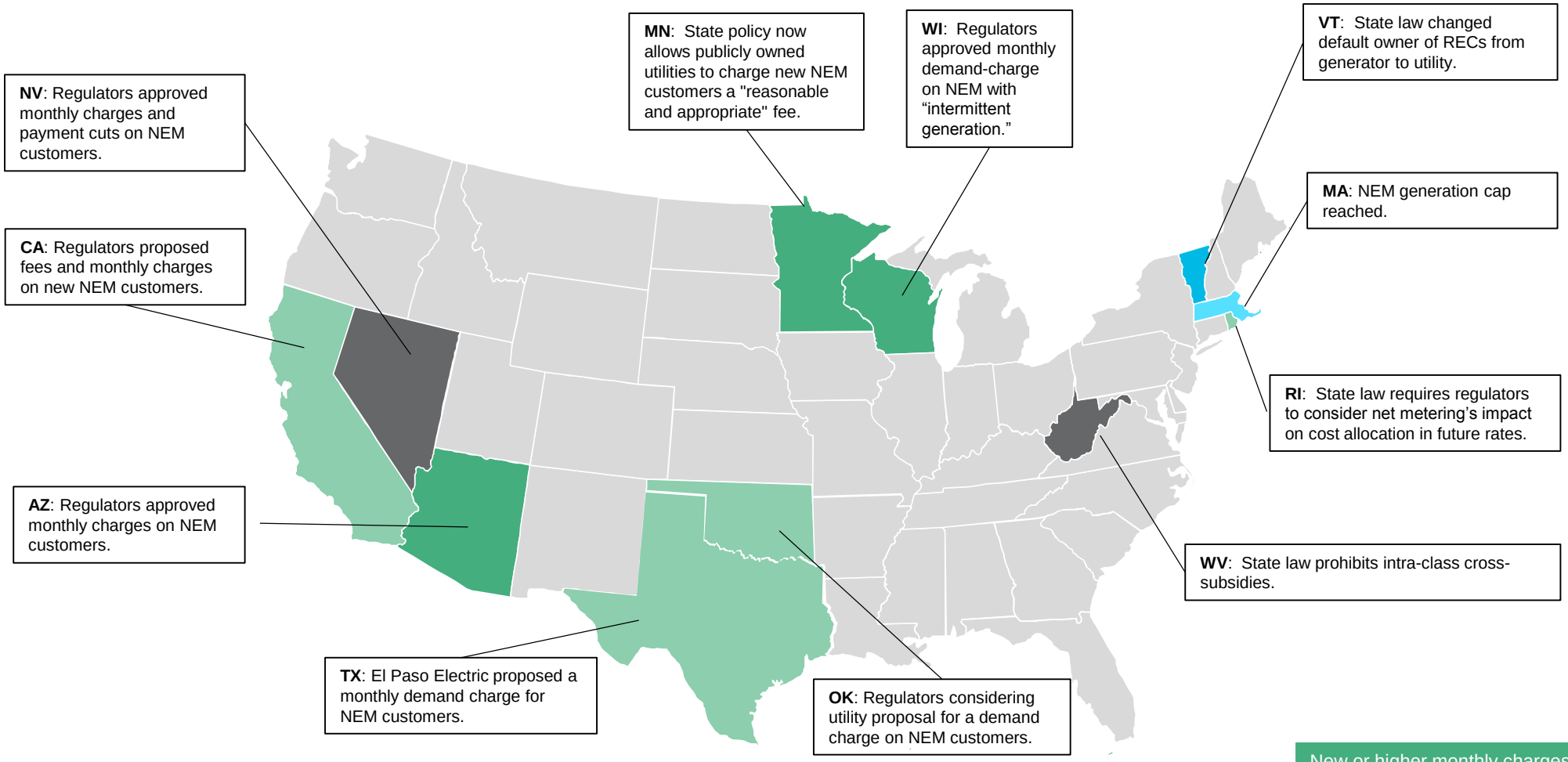
- EPA finalized the Clean Power Plan (CPP), its regulation on carbon emissions from the existing power fleet, in August 2015
- The Plan could cut power-sector emissions 32% from 2005 levels by 2030, although its status is currently in limbo, pending the outcome of a lawsuit.

Source: Bloomberg New Energy Finance, based on analysis of EPA Clean Power Plan

Notes: Darker colors indicate deeper emissions cuts. Yellow states may actually increase their overall emissions, while remaining in compliance with the EPA's Clean Power Plan. Data is not available for Alaska and Hawaii; Vermont and DC are not covered by the EPA's regulations. Data is based on EPA modelling and EPA historical emissions inventories.

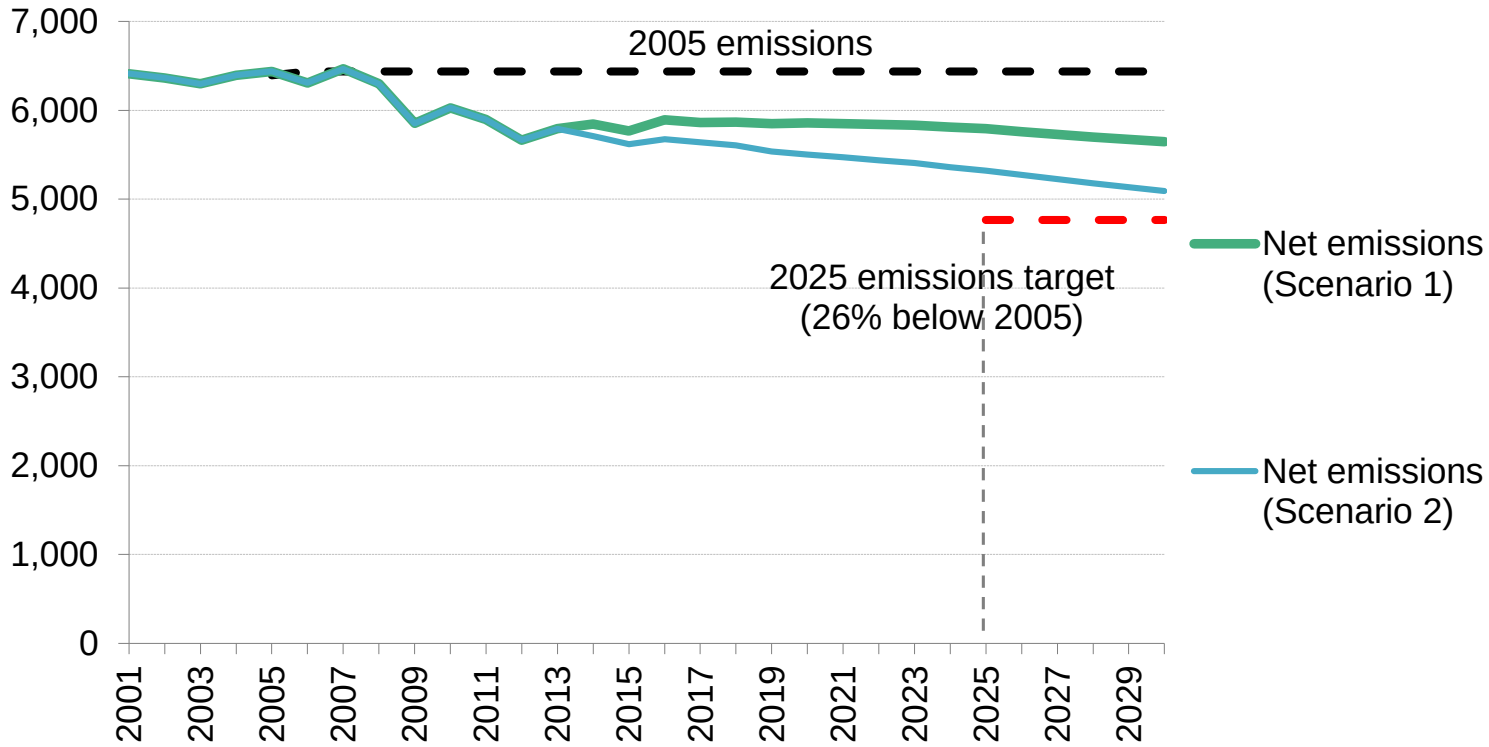
Policy: State policy barriers to net energy metering erected in 2015

Bloomberg NEW ENERGY FINANCE



- States across the country imposed policies against net energy metering (NEM), a practice key to the economics of distributed generation.
- For example, Nevada regulators approved higher fixed charges and lower compensation for surplus generation from NEM customers. In response, SolarCity and Sunrun announced plans to leave the state. State regulators are now considering grandfathering in existing NEM customers so that they are not subject to the new rule.

Policy: US emissions pledge in Paris



- On March 31, 2015, the US released its official pledge for US emissions cuts as part of the United Nations climate negotiations: to reduce emissions to 26-28% below 2005 levels by 2025. An earlier target proposed by President Obama set a 2020 goal of 17% below 2005 levels.
- In 2013, the last year with complete data, net emissions (ie, including sinks) stood 10% below 2005 levels.
- The new pledge builds off existing and coming programs (eg, CAFE standards, EPA Clean Power Plan), but more policy may be needed to achieve the targets.

Source: Bloomberg New Energy Finance, EIA, EPA, US Department of State Notes: Net GHG emissions include total emissions less sequestration. Full data only available through 2013. Scenarios 1 and 2 show two trajectories for US emissions growth, based on a combination of Bloomberg New Energy Finance (BNEF) forecasts and EPA, EIA and US Department of State analyses. Both scenarios use BNEF's forecast for US power-sector emissions, assuming full compliance with the EPA Clean Power Plan. Both scenarios assume transportation growth as per the EIA's AEO2015 reference case and assuming existing CAFE standards. Scenario 1 assumes residential, commercial and industrial sectors' energy growth as per the EIA AEO2015 reference case; and agricultural, waste and forestry and land use sectors' growth as per the 2014 US Climate Action report. Scenario 2 assumes the historical decline rate for the residential and commercial sectors; assumes the industrial, agricultural and waste sectors' emissions level remain constant from 2013; and assumes forestry and land use emissions follow the "high sequestration case" in the 2014 US Climate Action report.

WRAP-UP

Bloomberg
NEW ENERGY FINANCE

Wrap-up

- **2015 was a watershed year for sustainable energy in the US:**
  - GDP grew 2.4%, while energy consumption grew only 0.1%
  - Record natural gas production and consumption
  - Record coal retirements (14GW+)
  - Record solar PV build (7.3GW)
  - Record corporate procurement of renewables (3.5GW)
- **These changes are signs of a permanent shift:**
  - Natural gas has been displacing coal within the power sector
  - Renewables (excluding hydro) provided 7.4% of power, up from 2.2% in 2005
  - Power sector emissions 18% below 2005 levels
  - Hybrid vehicle sales fell and gasoline consumption rose, but long-term trend still positive
- **Meanwhile, energy prices remain low:**
  - Natural gas prices hit lowest levels since 1999, allowing gas to outcompete coal
  - Solar, wind costs continue to decline
  - Retail power prices 6% below 2008 peak
- **And the outlook is strong:**
  - US remains key destination for clean energy investment
  - Critical policy developments (Paris, Clean Power Plan, tax credit extensions)

COPYRIGHT AND DISCLAIMER

MARKETS

Renewable Energy
Energy Smart Technologies
Advanced Transport
Gas
Carbon and RECs

SERVICES

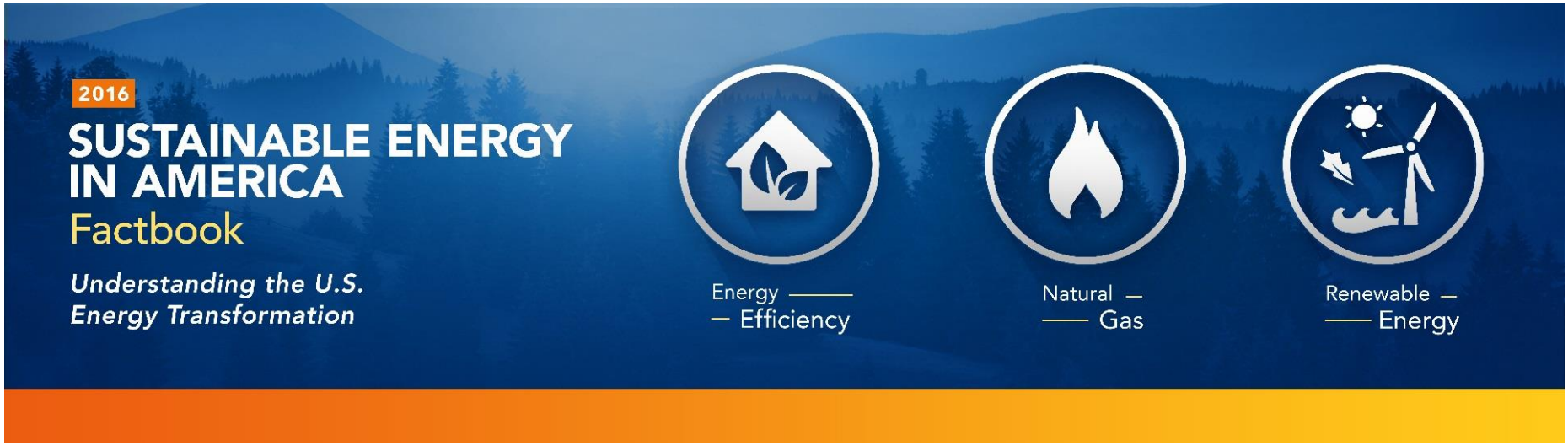
Americas Service
Asia Pacific Service
EMEA Service
Applied Research
Events and Workshops

Colleen Regan
support.bnef@bloomberg.net

Unique analysis, tools and data for decision-makers driving change in the energy system

sales.bnef@bloomberg.net

Bloomberg
NEW ENERGY FINANCE



2016 Sustainable Energy in America Factbook Congressional Briefing

April 29, 2016

Hosted in coordination with the

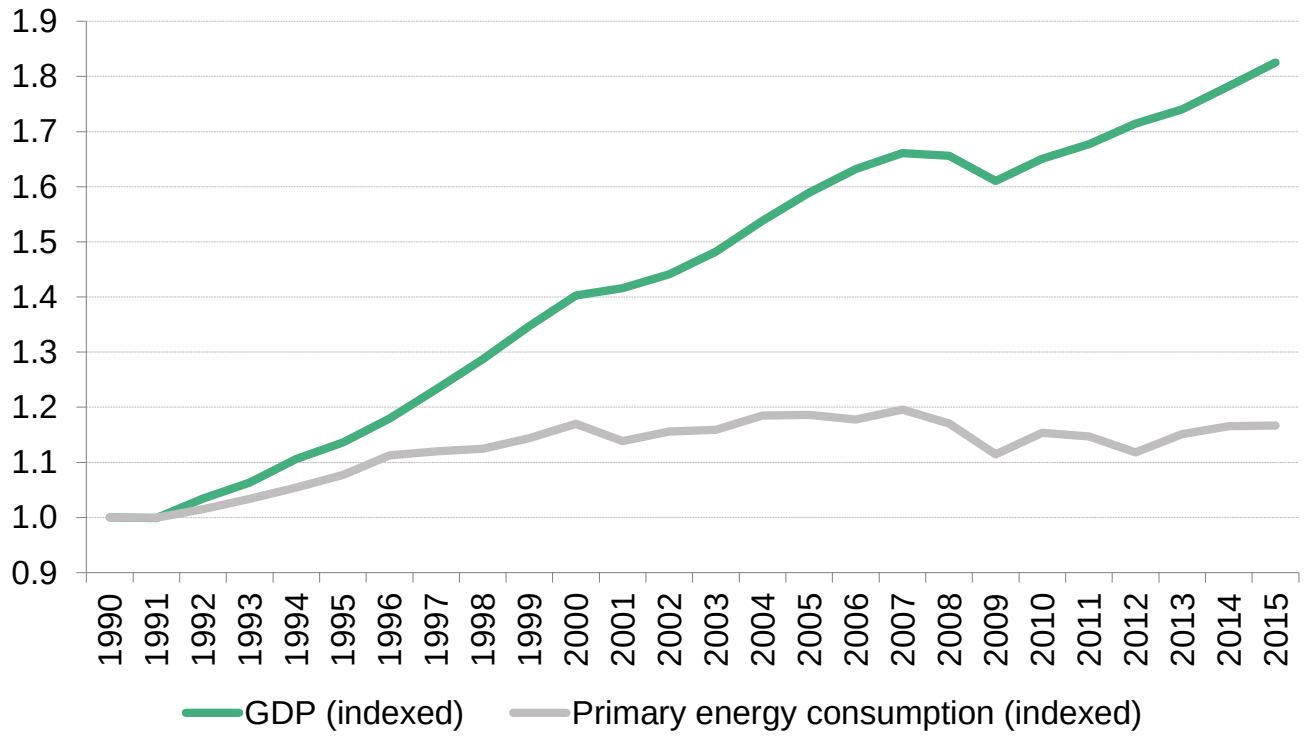
House and Senate Renewable Energy and Energy Efficiency Caucus

EESI
Environmental and Energy Study Institute

The Business Council for Sustainable Energy®

GET THE FACTS: http://www.bcse.org/sustainableenergyfactbook #Factbook

Economy's energy productivity: GDP and primary energy consumption (indexed to 1990 levels)



- The US economy is increasingly energy productive, resulting in a decoupling between growth in GDP and growth in energy consumption. As US GDP expanded 83% over the last 25 years, energy consumption only ticked up 17%.
- By one measure (US GDP per unit of energy consumed), productivity has improved 56% since 1990, 13% since 2007, and 2.3% between 2014 and 2015.

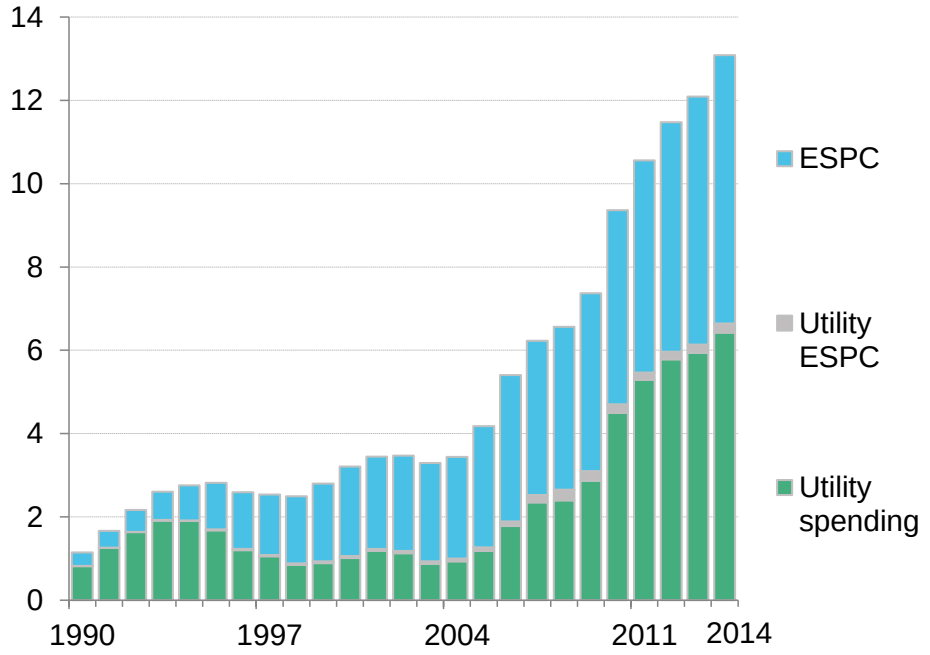
Source: US Energy Information Administration (EIA), Bureau of Economic Analysis, Bloomberg Terminal

Notes: Values for 2015 energy consumption are projected, accounting for seasonality, based on latest monthly values from EIA (data available through September 2015). GDP is real and chained (2009 dollars); annual growth rate for GDP for 2015 is based on consensus of economic forecasts gathered on the Bloomberg Terminal as of January 2016.

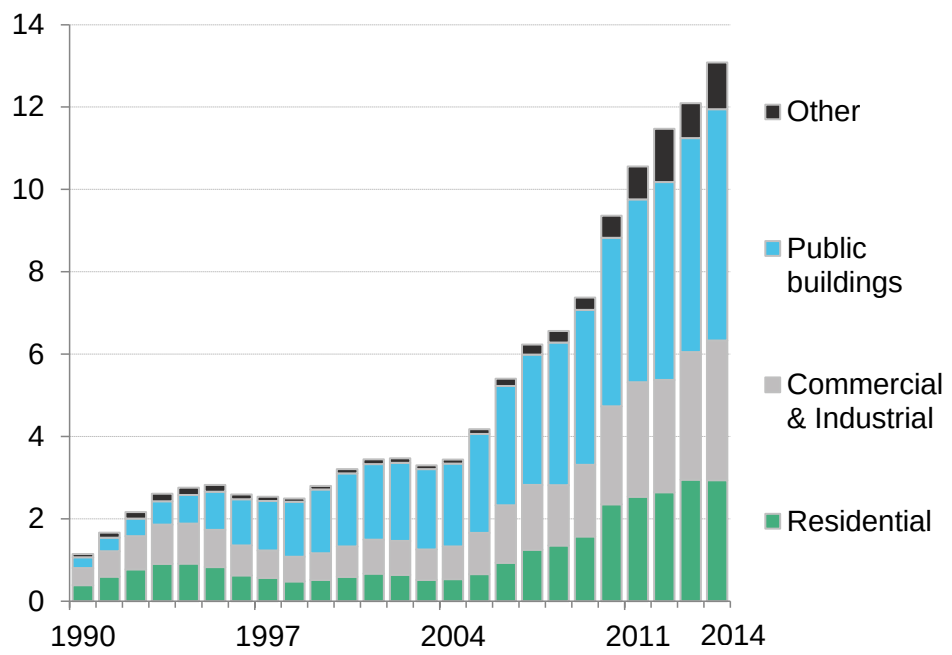
Financing: US *estimated* investment in energy efficiency through formal frameworks ($bn nominal)

Bloomberg NEW ENERGY FINANCE

By framework



By sector



- Utility spending on energy efficiency remains the fastest growing driver of investments in energy efficiency. This is based primarily on state EERS targets and decoupling legislation.
- In 2014, electric and natural gas utilities are estimated to have invested a record $6.7bn in energy efficiency.
- Utility spending will continue to increase if more states adopt EERS targets in response to the EPA Clean Power Plan.
- Energy savings performance contracts (ESPCs) are mainly focused on public buildings.

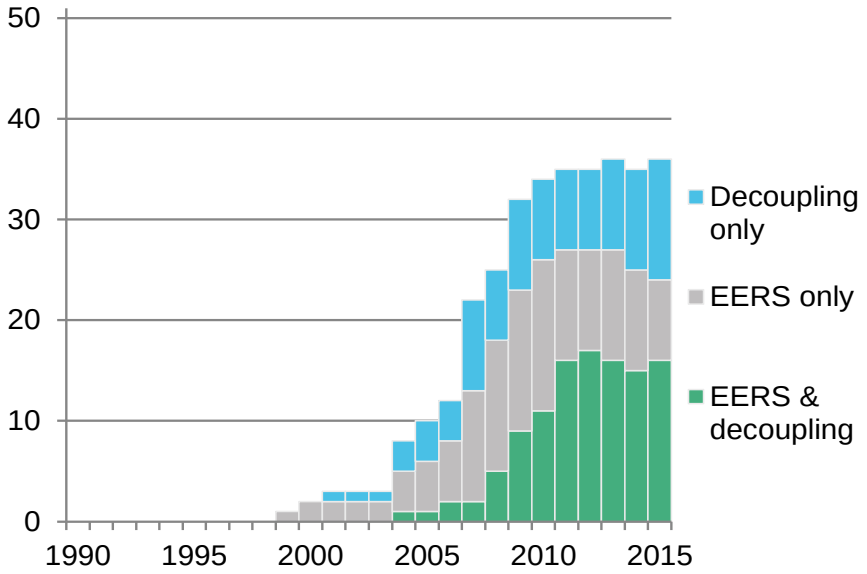
Source: ACEEE, NAESCO, LBNL, CEE, IAEE, Bloomberg New Energy Finance

Notes: The values for the 2012-2014 ESPC market size shown here are estimates. The most recent published data from LBNL puts reported revenues at $5.3bn in 2011. In the same report, the forecast for 2013 was >$6.5bn. The $6.2bn estimate for 2013 and the $6.7bn for 2014 are based on a continuation of 2008-11 growth rates, sitting between the most recently reported data and LBNL's forecast. LBNL will publish an updated report in spring 2016 that will provide more accurate data for the estimated period.

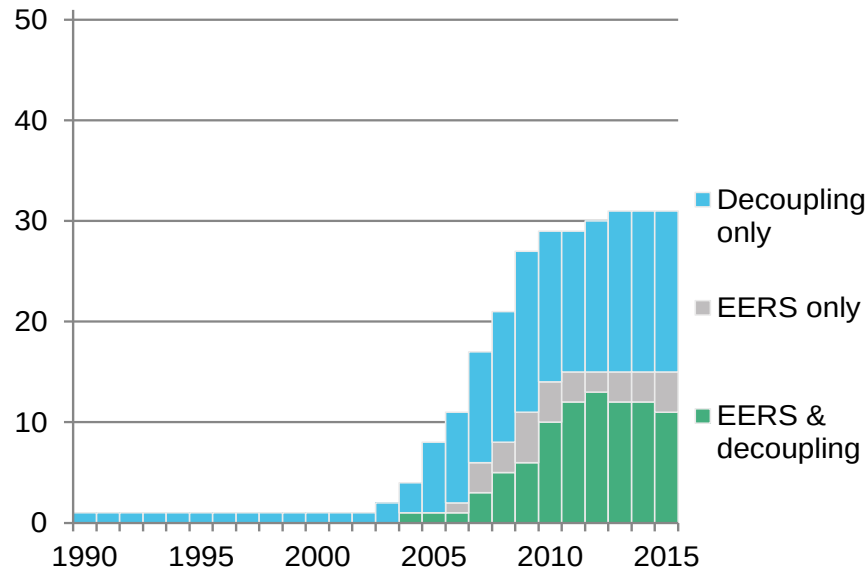
Policy: US states with EERS and decoupling legislation for electricity and natural gas, 2015 (number of states)

Bloomberg NEW ENERGY FINANCE

Electricity



Natural Gas

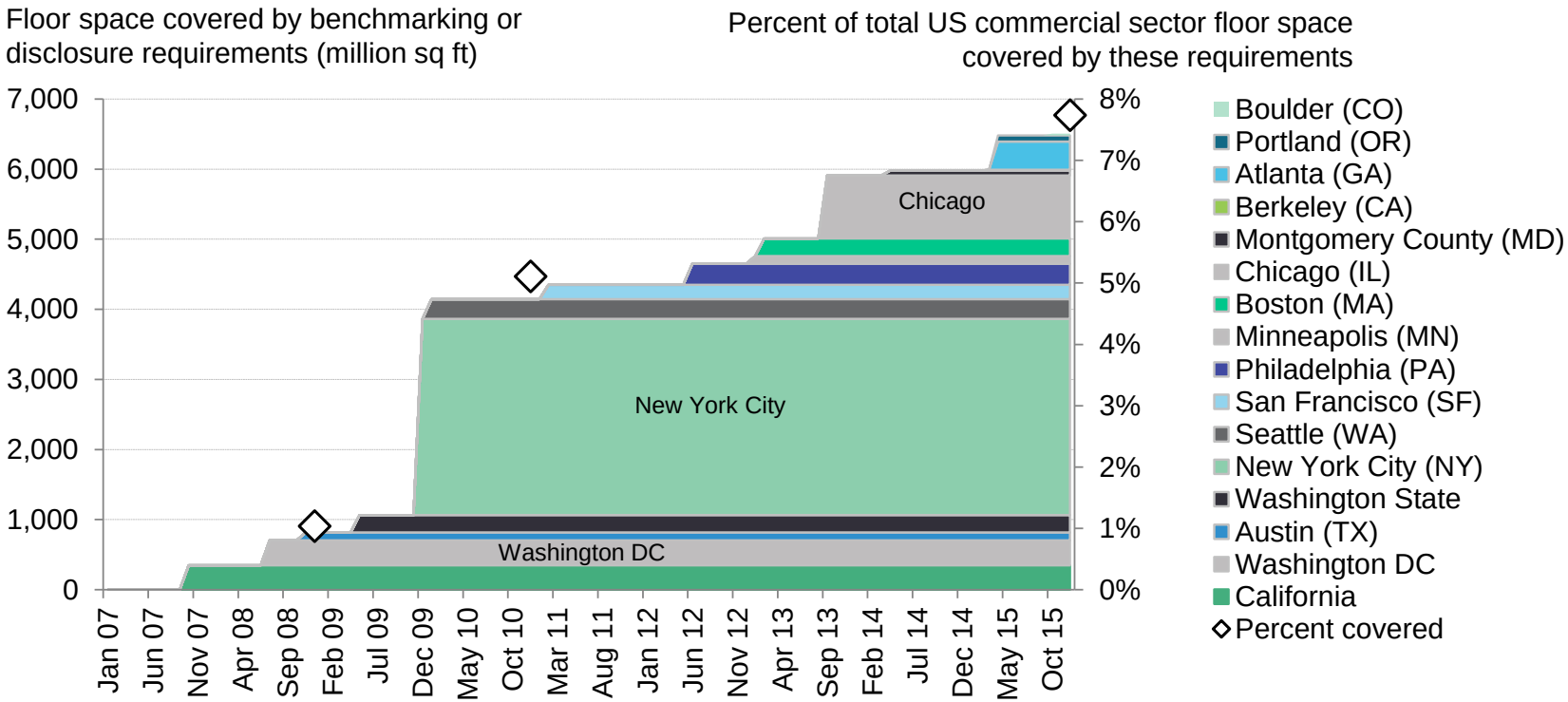


- The key policy story of the past decade has been the uptake of EERS targets and decoupling legislation among US states. However, momentum has slowed since 2010.
- Florida and Indiana removed their EERS schemes in 2014. In 2015, the “freeze” on the Ohio electricity EERS came into effect – this allows utilities that have achieved certain levels of savings to remove their efficiency programs.
- Louisiana, Washington and Minnesota added decoupling policies for electricity in 2015 (the latter two states already had gas decoupling legislation). Meanwhile, similar policies in Wisconsin drew to a close.
- Delaware, Utah and New Hampshire are working towards adopting EERS policies and electricity decoupling is planned for Colorado, Mississippi, Missouri, Nevada and New Mexico.

Source: ACEEE, Bloomberg New Energy Finance

Notes: Decoupling includes all lost revenue adjustment mechanisms, but no longer includes pending policies as per a methodology change in ACEEE reporting.

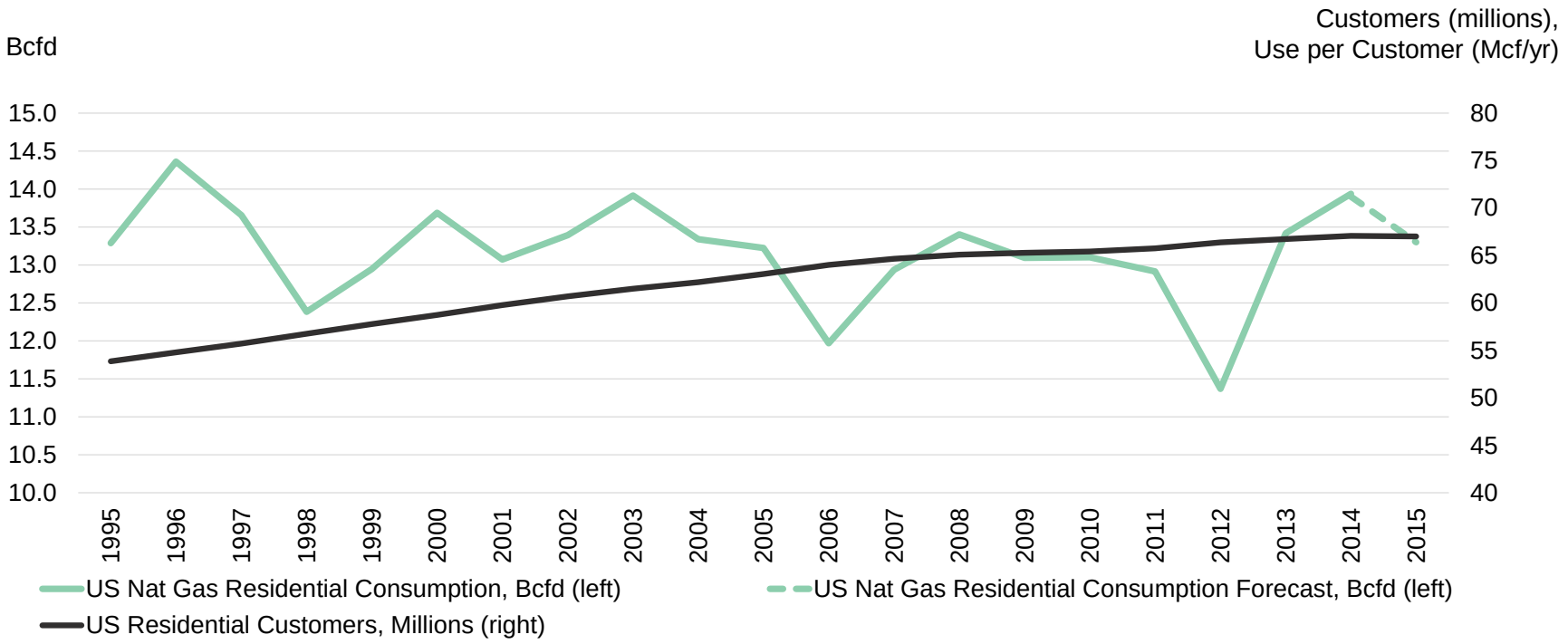
Policy: US building floor space covered under state or local building energy use benchmarking / disclosure policies



- States and cities have been creating building energy use policies, including building energy efficiency benchmarks and mandates to disclose energy consumption.
- As of the end of 2015, 6.5bn square feet of commercial floor space, or around 7.7% of total US commercial sector floor space, was covered by such policies. This represents an 8% uptick over the 2014 tally.
- In 2015, California passed a law to increase building energy efficiency 50% by 2030 for both residential and non-residential properties. The state also enacted a law to require benchmarking and disclosure for most commercial and multi-family buildings.

Source: Institute for Market Transformation (IMT), US DOE's Buildings Energy Data Book, Bloomberg New Energy Finance Notes: Cambridge is not shown in the chart, as the square footage numbers for the city are still being tallied. Accounts for overlap between cities and states (eg, no double-counting between Seattle and Washington State numbers). Assumes that the Buildings Energy Data Book's definition of floor space covered at least roughly corresponds to IMT's definition. Shaded areas show amount of floor space covered, diamonds represent percentage of US commercial sector floor space covered. Diamonds are spaced out in irregular intervals since data for the denominator (total commercial sector floor space in the US) is available at irregular periods (2008, 2010, 2015e). The diamond for December 2014 assumes linear growth in the denominator over 2010-15.

Deployment: US natural gas residential customers vs. residential consumption

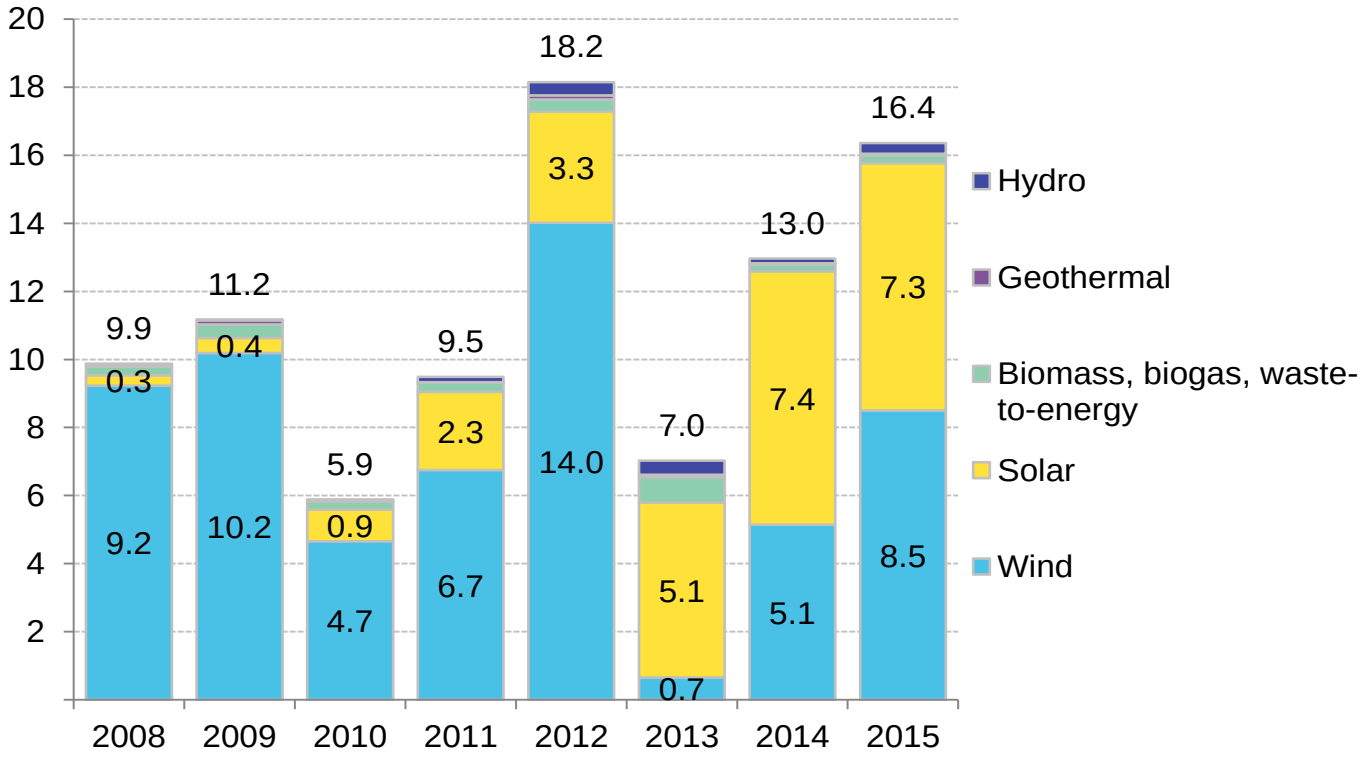


- Due to energy efficiency efforts, residential consumption has fallen even as more customers join the gas network. Per capita consumption has fallen steadily since the mid-1990s.
- Consumption dropped during the abnormally mild winter of 2011-12, but a return to more normal winter temperatures and increased heating demand during the polar vortices increased consumption in 2013 and 2014.
- Estimated residential consumption in 2015 was lower than in 2014 because of milder winter temperatures.

Source: Bloomberg New Energy Finance, EIA

Notes: Values for 2015 are projected, accounting for seasonality, based on latest monthly values from EIA (data available through September 2015).

Renewable energy capacity build by technology (GW)

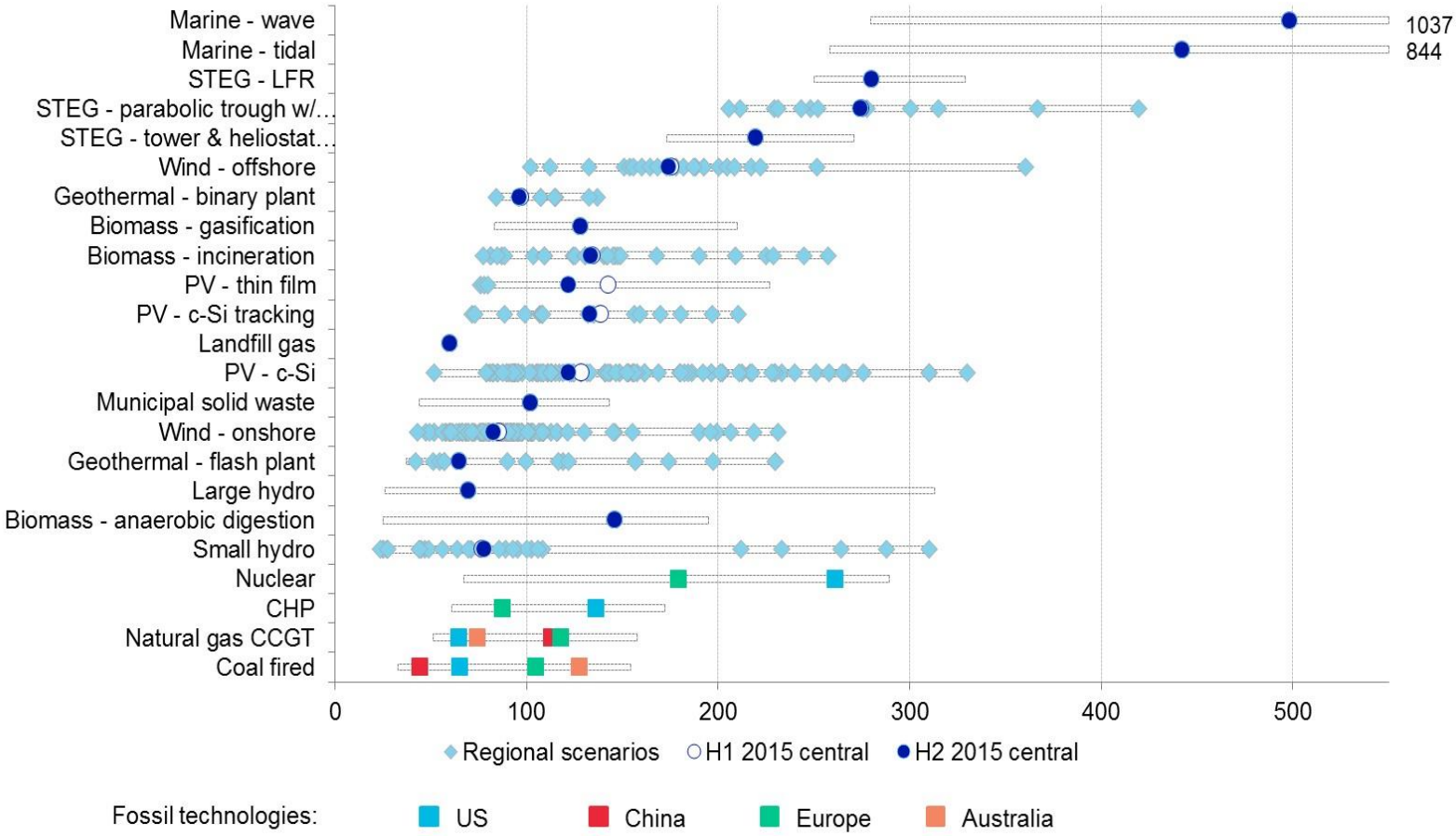


- Solar experienced another year of strong build, adding 7.3GW of PV in 2015 – a record.
- Small-scale solar continues to grow as the economics make it a viable alternative to retail rates in many regions of the country.
- Wind build surged to 8.5GW in 2015 as developers rushed to capture the Production Tax Credit (PTC) before it was due to expire at the end of 2016.
- Other sectors (biomass, biogas, waste-to-energy, geothermal, hydro) are idling without long-term policy support.

Source: Bloomberg New Energy Finance, EIA Notes: Numbers include utility-scale (>1MW) projects of all types, rooftop solar, and small- and medium-sized wind.

Economics: Global levelized costs of electricity (unsubsidized across power generation technologies, H2 2015 ($/MWh)

Bloomberg NEW ENERGY FINANCE



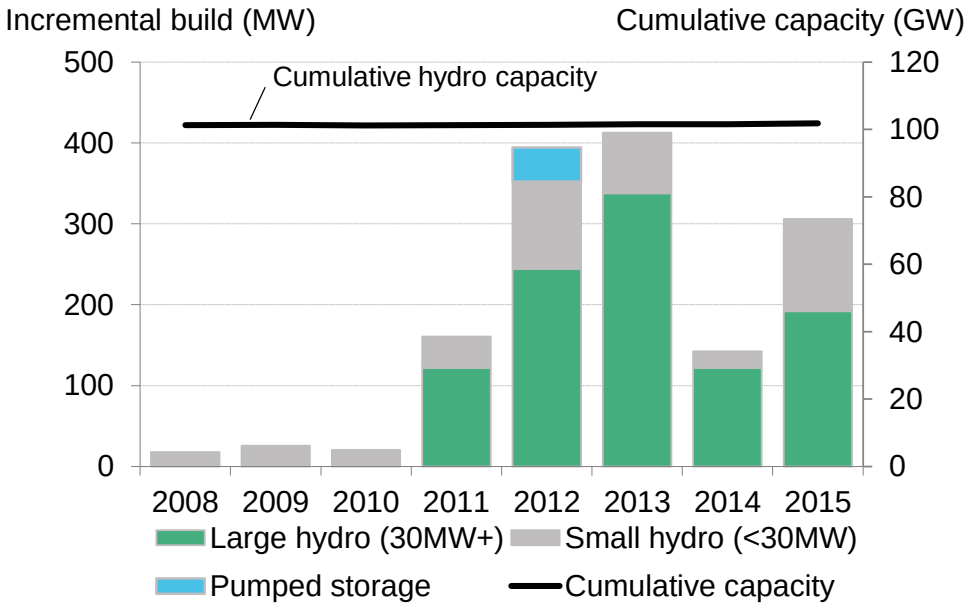
- A number of renewable energies have comparable and, at times, cheaper LCOEs than "conventional" power sources.

Source: Bloomberg New Energy Finance, EIA

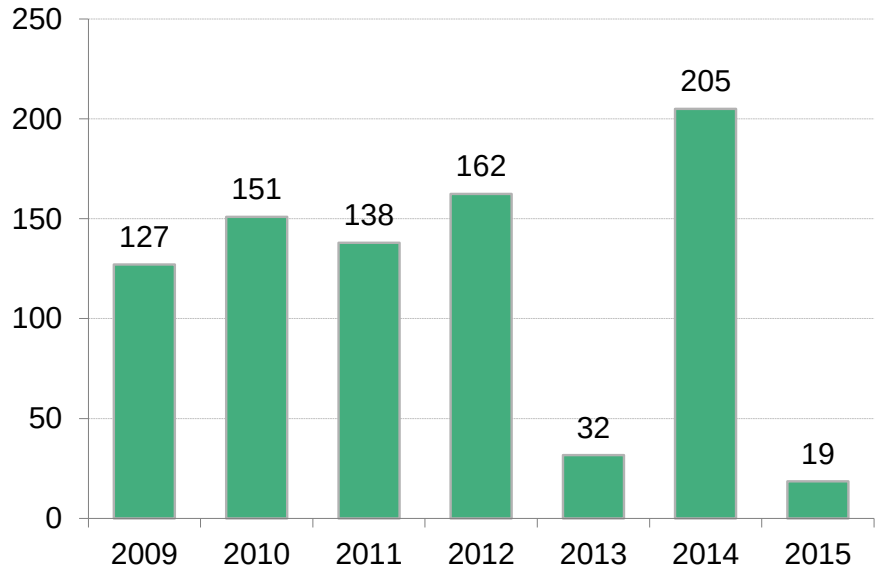
Notes: LCOE is the per-MWh inflation-adjusted lifecycle cost of producing electricity from a technology assuming a certain hurdle rate (ie, after-tax, equity internal rate of return, or IRR). The target IRR used for this analysis is 10% across all technologies. All figures are derived from Bloomberg New Energy Finance analysis. Analysis is based on numbers derived from actual deals (for inputs pertaining to capital costs per MW) and from interviews with industry participants (for inputs such as debt/equity mix, cost of debt, operating costs, and typical project performance). Capital costs are based on evidence from actual deals, which may or may not have yielded a margin to the sellers of the equipment; the only 'margin' that is assumed for this analysis is 10% after-tax equity IRR for project sponsor. The diamonds correspond to the costs of actual projects from regions all over the world; the hollow circles correspond to 'global central scenarios' (these central scenarios are made up of a blend of inputs from competitive projects in mature markets). For nuclear, gas, and coal, the light blue squares correspond to US-specific scenarios. 'CHP' stands for combined heat and power; 'CCGT' stands for combined cycle gas turbine; 'c-Si' stands for crystalline silicon; 'CSP' stands for concentrated solar power; 'LFR' stands for linear Fresnel reflector. EIA is source for capex ranges for nuclear and conventional plants.

Deployment: US hydropower build and licensed capacity

US hydropower



US new hydropower capacity licensed or exempted by FERC (MW)

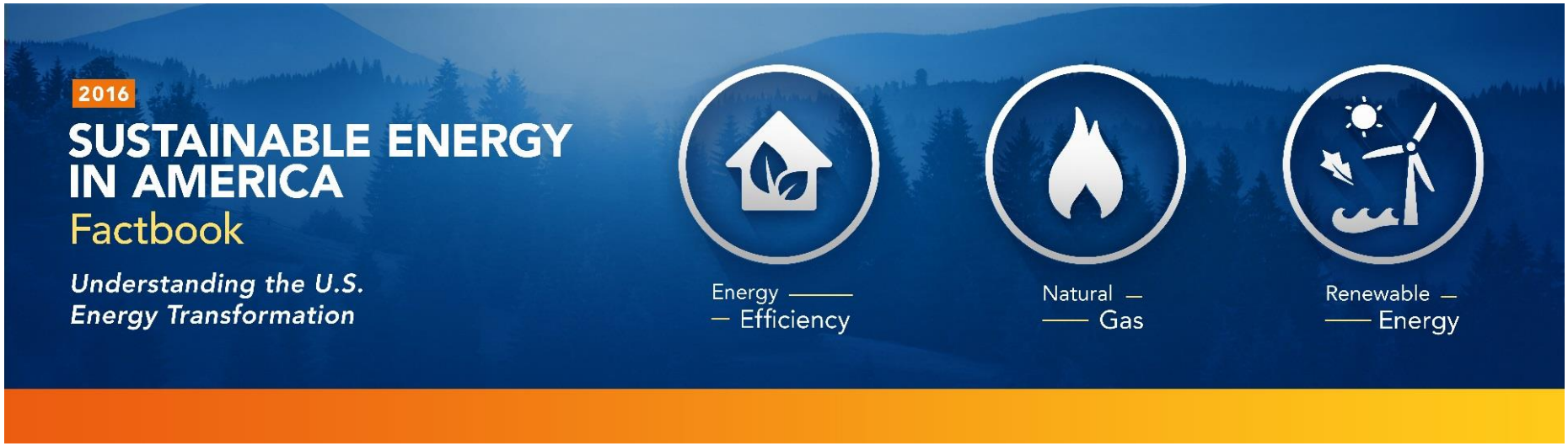


- New commissioned capacity in hydropower rebounded in 2015 after a 2014 lull. But the largest new hydroelectric generator installed in 2015 (the 120MW Wanapum unit in Washington) was tied to a dam repair effort, not a greenfield project.
- Kentucky installed more hydropower in 2015 than any other state.
- Most new development is focused on existing infrastructure; the industry hopes to unlock the potential in existing non-powered dams. According to the Department of Energy, the largest 100 such dams could offer as much as 8GW.
- PTC eligibility was extended to hydro projects beginning construction before 2017, with no phase out. Hydro projects may also elect to claim the 30% ITC instead.

Source: Bloomberg New Energy Finance, EIA

Notes: 2014 results are as of end-October 2015. Excludes pumped storage.

Source: Bloomberg New Energy Finance, FERC
Notes: The licensing figures exclude 152MW of pumped storage licensed in 2012 and 1,736MW of pumped storage licensed in 2014. 2015 results are as of end-October 2015.



2016 Sustainable Energy in America Factbook Congressional Briefing

April 29, 2016

Hosted in coordination with the

House and Senate Renewable Energy and Energy Efficiency Caucus

EESI
Environmental and Energy Study Institute

The Business Council for Sustainable Energy®

GET THE FACTS: http://www.bcse.org/sustainableenergyfactbook #Factbook