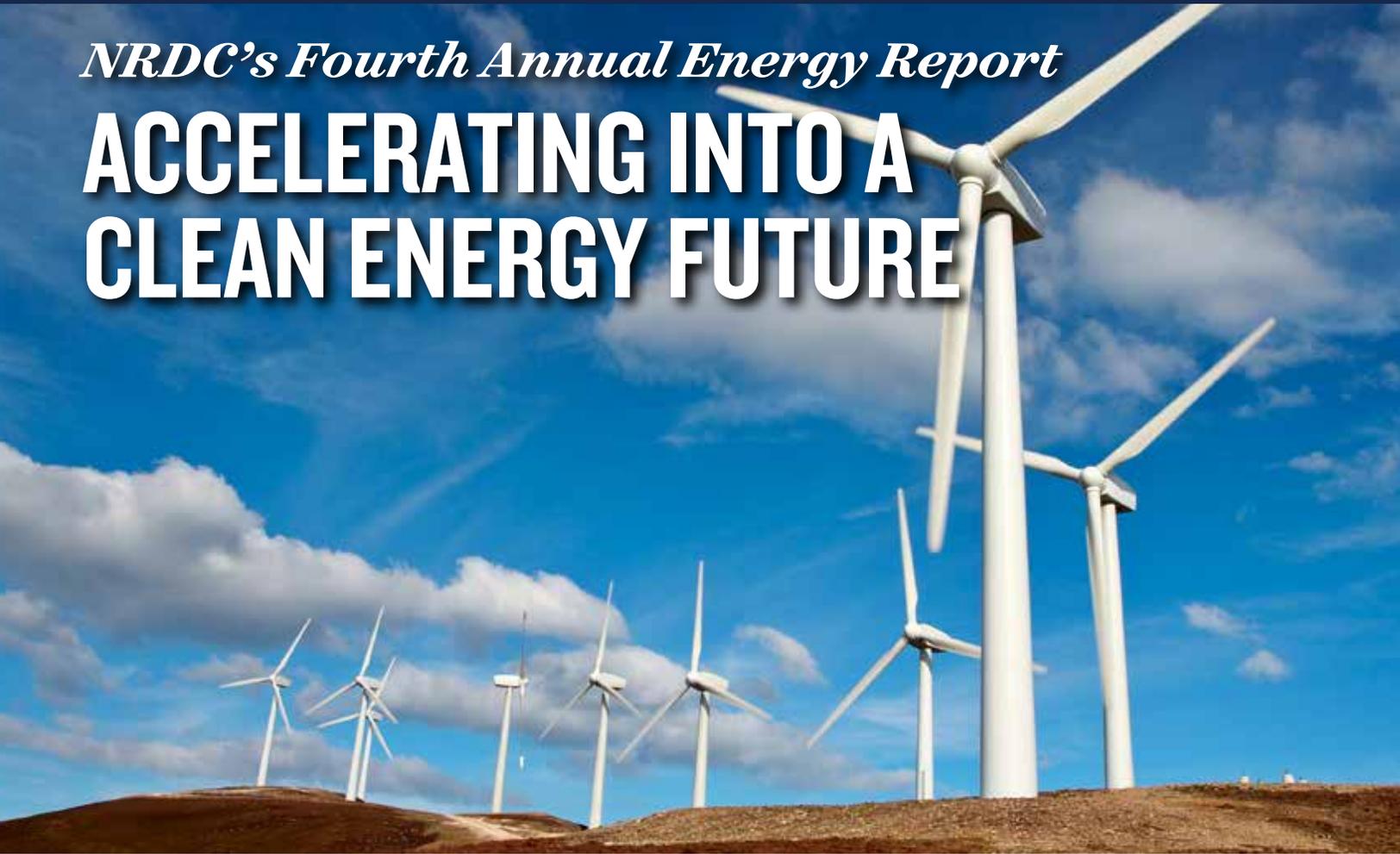




NRDC's Fourth Annual Energy Report

ACCELERATING INTO A CLEAN ENERGY FUTURE



ACKNOWLEDGMENTS

This report reflects extensive editorial and substantive contributions from Pat Remick, Luke Tonachel, Kevin Steinberger, and Lauren Urbanek.

FOR MORE INFORMATION, CONTACT:

Ralph Cavanagh

rcavanagh@nrdc.org

Kala Viswanthan

kviswanthan@nrdc.org

About NRDC

The Natural Resources Defense Council is an international nonprofit environmental organization with more than 2.4 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Montana, and Beijing. Visit us at nrdc.org.

NRDC Acting Chief Communications Officer: Michelle Egan

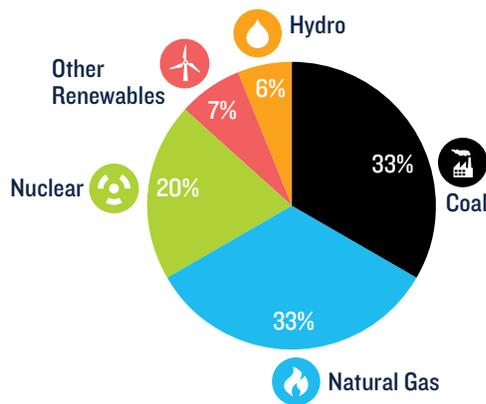
NRDC Deputy Directors of Communications: Lisa Goffredi and Jenny Powers

NRDC Senior Editor, Policy Publications: Mary Annaise Heglar

Design and Production: www.suerossi.com

The United States is building a clean energy revolution that will deliver deep pollution reductions. Coal-fired generation dropped to historic lows this year, producing only one-third of our electricity, while renewable energy generation reached record highs, with more than one-eighth of America’s electricity generated from solar panels, wind turbines, and other renewable resources. The past year in energy saw a number of victories for the environment, highlighted by a global climate agreement and a carbon pollution reduction plan for the United States. There have been strong efforts to decarbonize the electric grid through carbon reduction targets, energy efficiency gains, and renewable energy additions. In fact, more than one-fifth of the U.S. population lives in a state with a goal of at least 50 percent renewable energy.

U.S. Electricity Generation Sources in 2015



*Percentages are rounded

These strong trends indicate that a transition to a clean energy economy is irrevocably underway, and independent of any changes in federal administrations or congressional leadership. As *New York Times* op-ed columnist Thomas Friedman wrote recently in [an open letter to President-elect Trump](#) (quoting Hal Harvey, CEO of the energy and environmental policy firm Energy Innovation), “the cost of solar energy has dropped more than 80 percent since 2008, wind costs dropped more than 50 percent since 2008, battery costs dropped more than 70 percent since 2008, and LED lighting costs dropped more than 90 percent since 2008. As a result, a clean future now costs less than a dirty one.”²¹ This is further evidence that economic forces, integrated with energy policy made at state and regional levels, will remain the most significant factors in determining America’s energy future, not partisan ideological differences.

2015 U.S. GOOD ENERGY NEWS

GDP INCREASED BY
30%
SINCE 2000 BUT
TOTAL ENERGY CONSUMPTION
REMAINS FLAT, THANKS TO
ENERGY EFFICIENCY



**1/8 OF ELECTRICITY
CAME FROM RENEWABLE
RESOURCES**

CO₂

**ENERGY-RELATED CARBON
DIOXIDE EMISSIONS DOWN
12% FROM 2005 LEVELS**



**COAL PRODUCTION
REACHED THE LOWEST
LEVEL SINCE 1986**



**1/5 OF POPULATION
LIVES IN A STATE WITH A
GOAL OF AT LEAST 50%
RENEWABLE ENERGY**



**MODEL YEAR 2015
AUTO FUEL ECONOMY
REACHED A RECORD HIGH**



**WHILE NEW VEHICLE
EMISSIONS REACHED
A RECORD LOW**

CLEAN ENERGY HIGHLIGHTS

NRDC's *Fourth Annual Energy Report* comes after the United States helped achieve a successful agreement at the historic global climate negotiations in Paris at the Conference of the Parties 21 (COP 21). The accord included greenhouse gas (GHG) reduction targets for 195 nations after 2020, with the goal of avoiding the worst impacts of climate change.² Both developed and developing countries pledged significant GHG reductions and accepted provisions calling for greater transparency and accountability in maintaining these commitments. For the United States, that means economy-wide cuts up to 28 percent below 2005 GHG emissions levels by 2025. As energy policy expert Michael Grunwald wrote shortly after the 2016 presidential election, "even if [the United States were] to withdraw from the Paris climate deal, the U.S. is on track to fulfill its pledges under that deal."³ But continued federal action to strengthen and uphold these pledges is crucial to maintain the United States' leadership and reputation around the world. At the state level, California pushed the leadership bar still higher with Senate Bill (SB) 32, enacted in August 2016, which should ensure a statewide GHG emissions reduction of 40 percent or more below 1990 levels by 2030.

This clean energy transition is being driven in large part by gains in energy efficiency, the least expensive and most productive way to meet our energy needs. Energy efficiency in our homes, buildings, and appliances reduces our need for dirty fuels and allows utilities to avoid building polluting power plants. The United States has also worked to reduce pollution from the transportation sector by improving vehicle efficiency through standards, advancing cleaner fuels, promoting electric vehicle use, and improving land use practices. Oil consumption in 2015 was 12 percent below its 2005 peak. Primarily as a result of reduced coal use, energy efficiency gains, and soaring generation from solar and wind, 2015 marked a milestone in modern U.S. history: carbon dioxide emissions from electric generation dropped below those of the entire transportation sector for half of the year.⁴

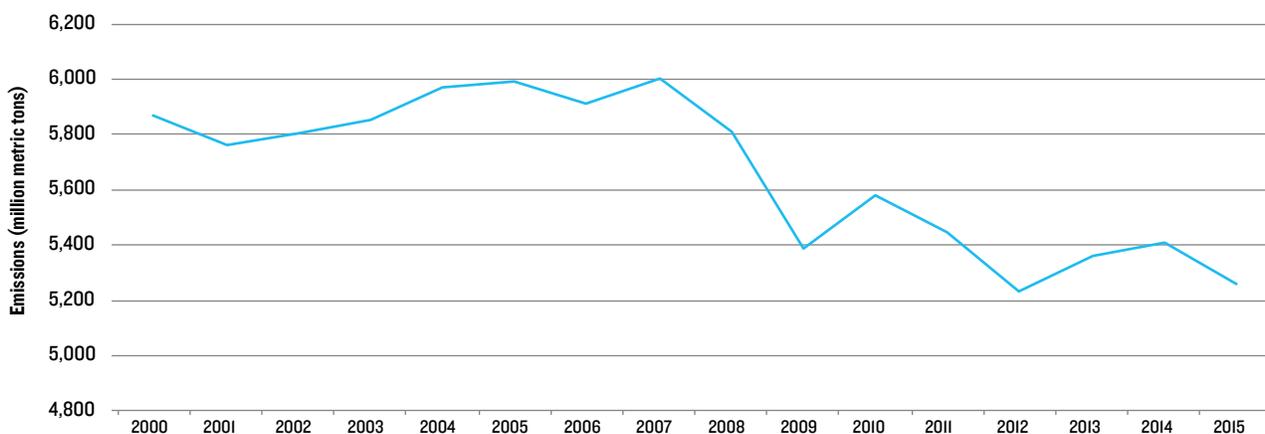
Also of note is the joint proposal by Pacific Gas & Electric—California's largest utility—and diverse allies, including NRDC, to retire a giant, aging nuclear power plant. The proposal aims to retire the Diablo Canyon plant, California's last remaining nuclear power resource, and replace it by 2025 with less costly zero-carbon alternatives, led by energy efficiency and renewable energy.

GREENHOUSE GASES

Carbon dioxide accounts for the majority of climate-harming U.S. greenhouse gas emissions, with methane, nitrous oxide, and fluorinated gases following in order of importance.⁵ Compared with levels recorded a decade ago, U.S. energy-related carbon dioxide emissions in 2015 were down 12 percent from their 2005 levels (Figure 1), a significant drop in pollution that causes climate change. However, much more progress is urgently needed. In December 2015, as part of the Paris Agreement, the Obama administration formally committed to achieving economy-wide greenhouse gas reductions of 26 percent to 28 percent below 2005 levels by 2025.⁶ Both federal and state emissions limits are vital to meeting these targets and achieving our longer-term climate goals.

In August 2015, the U.S. Environmental Protection Agency (EPA) finalized the Clean Power Plan (CPP), an historic climate change policy setting the first-ever limits on carbon pollution from coal- and gas-fired power plants. It is projected to reduce carbon emissions from the power sector by one-third relative to 2005 levels by 2030.⁷ However, in February 2016, the U.S. Supreme Court issued a stay, putting a temporary pause on implementation of the Clean Power Plan until legal arguments are resolved. In September 2016, the United States Court of Appeals for the District of Columbia Circuit heard arguments for and against the Clean Power Plan, and at this writing, a decision is pending. Meanwhile, despite the legal wrangling, many states have continued their clean energy transition, implementing policies that will cut energy waste

Figure 1: U.S. Energy-Related Carbon Dioxide Emissions



in homes and buildings and formulating standards that will strengthen investments in renewable energy.⁸ In August 2016, California passed SB 32, which sets North America’s most aggressive emissions reduction targets for carbon pollution. California—by some reckonings the world’s sixth-largest economy—aims to reduce emissions by at least 40 percent below 1990 levels by 2030.⁹

The EPA in 2016 also released the first standards to cut methane emissions from new sources in the oil and gas sector. These standards are an important step toward meeting President Obama’s Climate Action Plan goal to reduce methane emissions from the oil and gas sector by 40 to 45 percent from 2012 levels by 2025.¹⁰ Meanwhile, more than 140 countries signed a landmark agreement in October 2016 to limit hydrofluorocarbons (HFCs), a class of damaging, climate-warming fluorinated gases. Under the Kigali Amendment to the Montreal Protocol (the treaty that saved the ozone layer), developed and developing countries agreed to phase down HFCs used in air conditioners, refrigerators, other appliances, and insulation. The agreement is expected to avoid up to half a degree Celsius of future global warming.¹¹

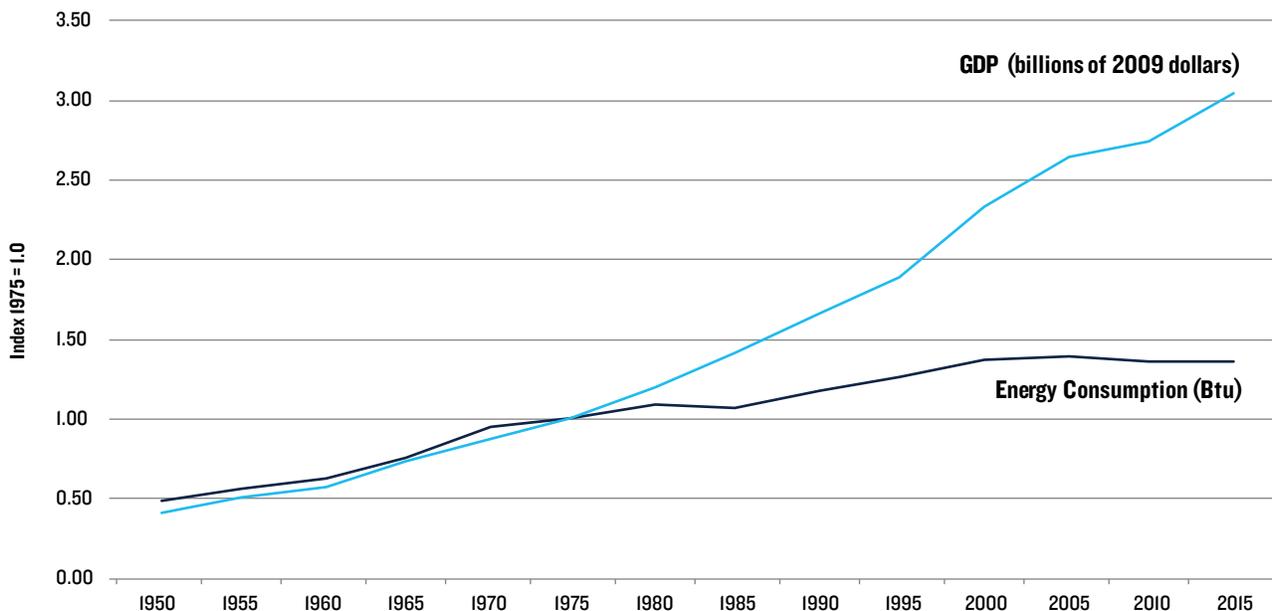
ENERGY EFFICIENCY

Energy efficiency is the most productive and cost-effective way to meet our energy needs. By using energy in our homes and businesses more efficiently, we are able to reduce the amount generated and supplied and avoid the need to build more power plants, while also saving homeowners and businesses tens of billions of dollars annually on their utility bills and preventing significant carbon emissions. For example, for the four-state region of

Idaho, Montana, Oregon, and Washington, efficiency had become the second-largest “resource” to meet customer energy needs by 2015, saving consumers \$3.75 billion per year on their electricity bills and lowering annual carbon dioxide emissions by 22.2 million tons.¹² Moreover, since less energy is being used due to efficiency nationally, there is more market competition among the resources used to generate it, which drives down electricity prices for everyone. Due to energy efficiency progress, the historical link between economic growth and total energy use was broken four decades ago and has not reappeared. GDP increased by 30 percent between 2000 and 2015, while total energy consumption remained flat (Figure 2). Utilities are seeking approval for new business models encouraging efficiency, such as revenue decoupling which removes the disincentive for utilities to support energy-savings programs and ensures that utilities recover authorized costs of service regardless of fluctuations in sales.¹³

The United States remains a leader in energy efficiency building codes, and appliance and equipment standards. In 2015, Congress passed the Energy Efficiency Improvement Act, which includes a new way to identify high-efficiency spaces, using the Tenant Star labeling program to recognize the design and construction of efficient tenant spaces and rewarding top energy performance in those spaces. By boosting market demand for building upgrades, the Tenant Star program is expected to cut utility bills by up to \$2 billion by 2030 and reduce carbon emissions by almost 12 million metric tons.¹⁴ President Obama also set a goal of reducing carbon pollution by 3 billion metric tons cumulatively by 2030 through efficiency standards for new buildings and appliances.¹⁵ In 2015, the U.S. Department of Energy (DOE) finalized 13 rules for minimum efficiency

Figure 2: U.S. Growth in Energy Consumption and Gross Domestic Product Since 1950



standards, including a major standard for commercial rooftop heating and cooling equipment (air conditioners, heat pumps, and warm-air furnaces); standards for battery chargers, dehumidifiers, and some refrigeration equipment followed in 2016. The rooftop air conditioner standard alone will yield the largest energy savings of any DOE standard issued to date; it resulted from a strategically negotiated rulemaking involving manufacturers, utilities, and consumer and environmental groups.¹⁶ DOE in 2015 also set the first-ever efficiency standards for commercial and industrial pumps.¹⁷ Energy efficiency standards issued since 1987 for appliances have saved U.S. households an average of \$500 per year on utility bills, adding up to \$63 billion in 2015 alone. Moreover, energy saved through appliance standards in 2015 was equivalent to the amount of electricity required to meet the needs of 43 million U.S. homes, almost a third of the nation's residences.¹⁸ According to the Appliance Standards Awareness Project, the climate-warming emissions avoided as a result of these standards represent 11 percent of what the United States needs in order to meet its 2025 target under the Paris climate treaty.¹⁹

RENEWABLE ENERGY

The United States' clean energy transition is exemplified by the remarkable growth of renewable energy, which represented more than 13 percent of total U.S. electricity generation in 2015 (and more than 15 percent over the first three quarters of 2016). This mostly reflects contributions from wind and solar, as the percentage of electricity generated by these technologies has more than doubled in the past five years (Figure 3), while hydropower production has remained relatively flat. Until recently, hydropower accounted for significantly more renewable electricity generation than non-hydro renewables (wind, solar, geothermal, and biomass); in both 2014 and 2015, however, this relationship was reversed.

Economies of scale and smart federal and state policies have prompted a rapid decline in the cost of generating electricity from onshore wind and solar photovoltaic (PV) since 2009, with onshore wind costs falling by 61 percent and PV by 82 percent.²⁰ Wind provided almost 5 percent of U.S. electricity generation in 2015 and surpassed 75 gigawatts (GW) of total capacity in 2016. Moreover, the absolute increase in wind generation was more than four times the corresponding increase in nuclear generation from 2000 to 2015. Although only about 1 percent of U.S. electricity generation came from solar sources in 2015, their contribution has grown at a rapid pace (Figure 4), and that progress is expected to continue. In fact, the United States reached a milestone of 1 million solar PV installations in 2016, generating enough power to supply almost 6 million homes.²¹ In 2016, utility-scale solar capacity additions are expected to reach 9.5 gigawatt-hours (GW), more than in the past three years combined.²²

Figure 3: Percentage of Annual U.S. Electricity Generation by Wind and Solar Energy²³

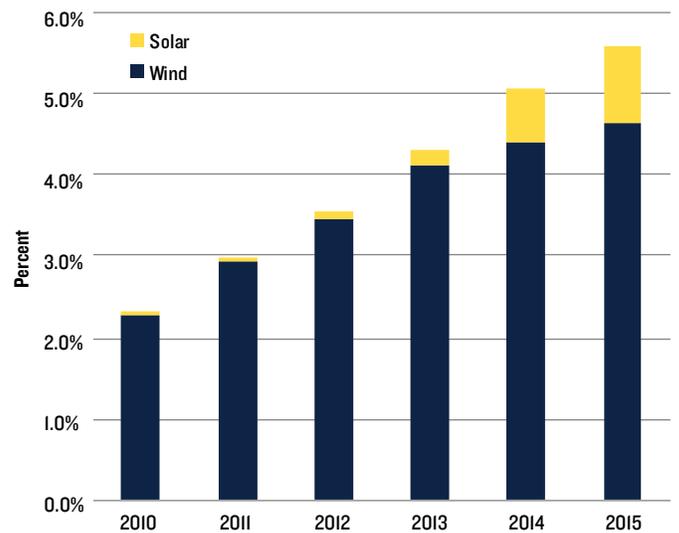
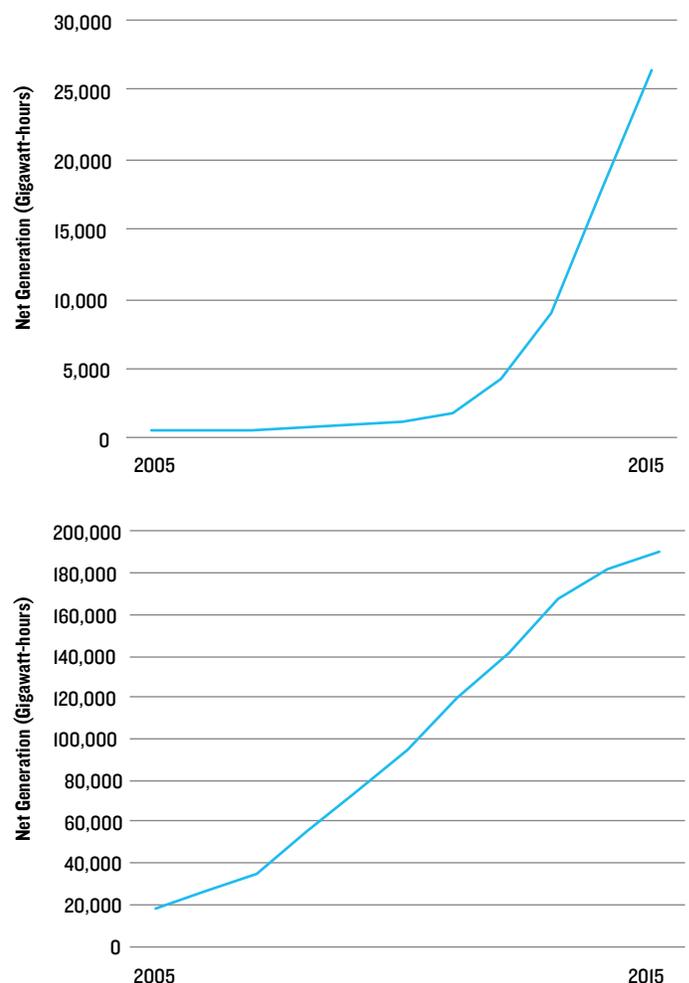


Figure 4: Annual Utility-Scale Solar (top) and Wind Generation (bottom)



The 2015 extension of federal incentives for solar and wind energy development will help ensure continued growth in renewable energy. Congress extended the solar investment tax credit for residential, commercial, and utility-scale solar projects at its current level of 30 percent through 2019, with a phase-down in subsequent years, dropping to 10 percent permanently for large-scale projects in 2022 and phasing out entirely for residential projects without further legislative action. The full production tax credit of 2.3 cents per kilowatt-hour for wind was extended through the end of 2016. It will then drop by 20 percent each year until 2019, after which it will expire without further action. Additionally, offshore wind projects are allowed to claim the investment tax credit, although few will be built before the end of the five-year extension.²⁴ The nation's first offshore wind project, the Block Island Wind Farm in Rhode Island, finished construction and was scheduled to go online in late 2016.²⁵ Massachusetts has enacted legislation that will lead to the development of offshore wind, and New York is actively moving forward with similar policies. Overall, solar and wind energy are projected to nearly double from 2015 levels by 2021 as a result of the tax credit extensions and other policies.²⁶

Many states have strengthened renewable portfolio standards (RPS) that promote clean renewable energy, with both California and New York recently enacting aggressive “50 by ’30” goals that require 50 percent renewable energy by 2030. Oregon’s new RPS calls for 50 percent renewable energy by 2040, Vermont’s calls for at least 75 percent renewable energy by 2032, and all of Hawaii’s electricity will be renewable by 2045. More than one-fifth of the U.S. population now lives in a State that officially aims to secure at least 50 percent of its electricity from renewable resources. Cities also are active in the transition to 100 percent clean energy; leaders (in alphabetical order) include Aspen, Colorado; Burlington, Vermont; East Hampton, New York; Georgetown, Texas; Grand Rapids, Michigan; Greensburg, Kansas; Rochester, Minnesota; and the California cities of San Jose, San Diego, and San Francisco.²⁷

Energy storage is another tool for changing the electricity landscape by making the grid more flexible and integrating variable energy resources. For example, energy storage technologies can stockpile excess solar energy when the sun is shining and release it later when demand for power is highest. Pumped hydroelectric storage currently represents the majority of storage capacity in the United States. However, non-hydro storage technologies—such as compressed air, batteries, and flywheels—more than doubled their capacity from 160 megawatts in 2010 to 350 megawatts in 2014. States have begun to develop policy road maps and mandates to develop energy storage technologies; for example, California is committed to adding at least 1.3 gigawatts of capacity by 2020.²⁸

NUCLEAR ENERGY

Nuclear energy remained below 20 percent of total electric generation in 2015 for the sixth consecutive year and at the same level as in 2000. There are 61 commercially operating nuclear stations with 99 nuclear reactors in the United States, representing about 19.5 percent of total U.S. electricity production in 2015.²⁹ Several plants have been retired for either cost or safety reasons in recent years, including Duke Energy’s Crystal River power plant, Southern California Edison’s San Onofre units, Dominion’s Kewaunee power plant, Omaha Public Power District’s Fort Calhoun power plant, and Entergy’s Vermont Yankee plant. In June 2016, Pacific Gas and Electric announced a proposal jointly with labor and environmental groups to retire Diablo Canyon, California’s last two nuclear reactors, when their federal operating licenses expire in 2024 and 2025, and replace them with lower-cost zero-emission energy options, such as energy efficiency, energy storage, demand response, and renewables. This is the first proposal ever to replace nuclear energy without raising carbon emissions, establishing an inspiring model that also accommodates community and labor interests.³⁰ Debates are underway in Illinois, New York, and nationally over whether and how to address a decline in wholesale electricity prices that threatens the immediate economic viability of other operating nuclear units, many of which rely on these markets for all or most of their revenues.

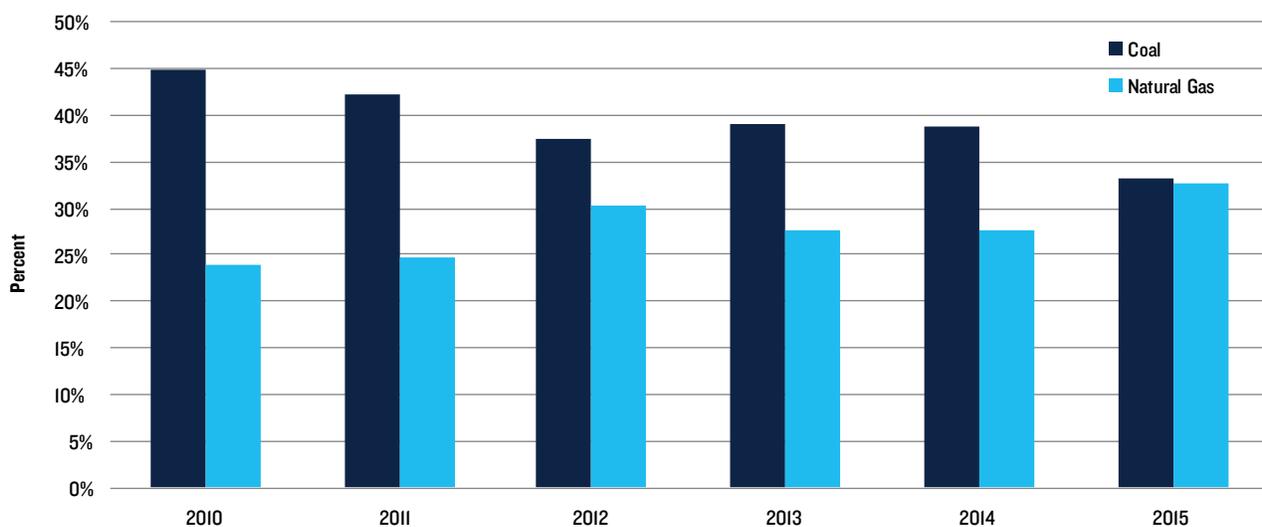
On the other hand, after decades of construction delays and suspensions, Tennessee Valley Authority’s Watts Bar reactor came online in Tennessee in October 2016, and four more nuclear reactors are under construction in Georgia and South Carolina.³¹ The reactors in Georgia and South Carolina have seen repeated slippages in their construction schedules and are not expected to come online before 2019, costing billions of dollars more than their original budgets. Meanwhile, recent years have seen no government progress in siting a deep geologic repository to dispose of spent nuclear fuel, and the nation’s only high-level radioactive waste site, the Waste Isolation Pilot Plant (WIPP) in New Mexico, remains closed following a 2014 accident.

NATURAL GAS

For decades, coal has been the leading source of U.S. electricity generation. However, natural gas nearly tied coal in 2015, generating 32.7 percent of the nation’s total to coal’s 33.2 percent (Figure 5). By the close of 2016, natural gas is likely to surpass coal as the leading source of annual generation.³²

Much of the growth in natural gas production is due to low natural gas prices, driven by a boom in domestic production from shale gas resources. In 2015, hydraulically fractured wells provided two-thirds of U.S. natural gas production.³³ This technique, which injects fluids at high pressure into deeply buried fossil fuel reservoirs, has reduced America’s dependence on foreign oil and helped keep natural gas

Figure 5: Percentage of U.S. Electricity Generated by Coal and Natural Gas



prices relatively low. But it has also been linked to adverse public health and climate impacts, and emissions of methane, a potent climate change pollutant, are an issue throughout the gas production chain.³⁴

COAL

America is decreasing its reliance on coal-fired generation. The share of electricity generated from coal fell from 52 percent in 2000 to 33 percent in 2015 (Figure 6), driven by market shifts to natural gas and non-hydro renewable energy, as well as by strengthened air pollution standards. Until 2008, coal out-produced natural gas, wind, and solar energy combined by a factor of 2; however, in 2015 natural gas, wind, and solar together produced 5 percent more

electricity than coal. U.S. coal production dropped below 1 billion short tons in 2015, reaching the lowest level since 1986.³⁵ Around 18 GW of coal capacity was retired in 2015, representing about 5 percent of the nation's coal fleet.³⁶ Coal power plant retirements were also influenced by EPA's Mercury and Air Toxics Standards (MATS), which set limits for hazardous air pollutants emitted by coal power plants with a capacity of 25 megawatts or greater.³⁷ States are passing laws to speed the power sector's shift away from coal generation: a decade ago, California's SB 1368 ended long-term utility investments in conventional coal generation, and Oregon recently became the first state to direct its utilities to stop purchasing coal-fired electricity altogether (by 2035).³⁸

Figure 6: Percentage of U.S. Electricity Generated by Coal, Natural Gas, Nuclear, Hydro, and Other Renewables

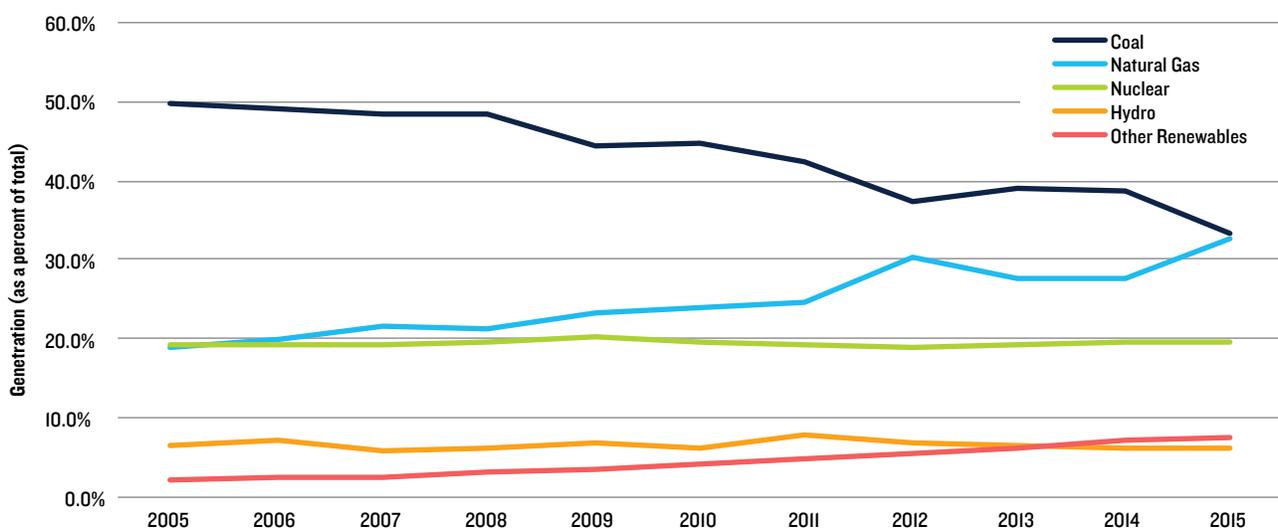
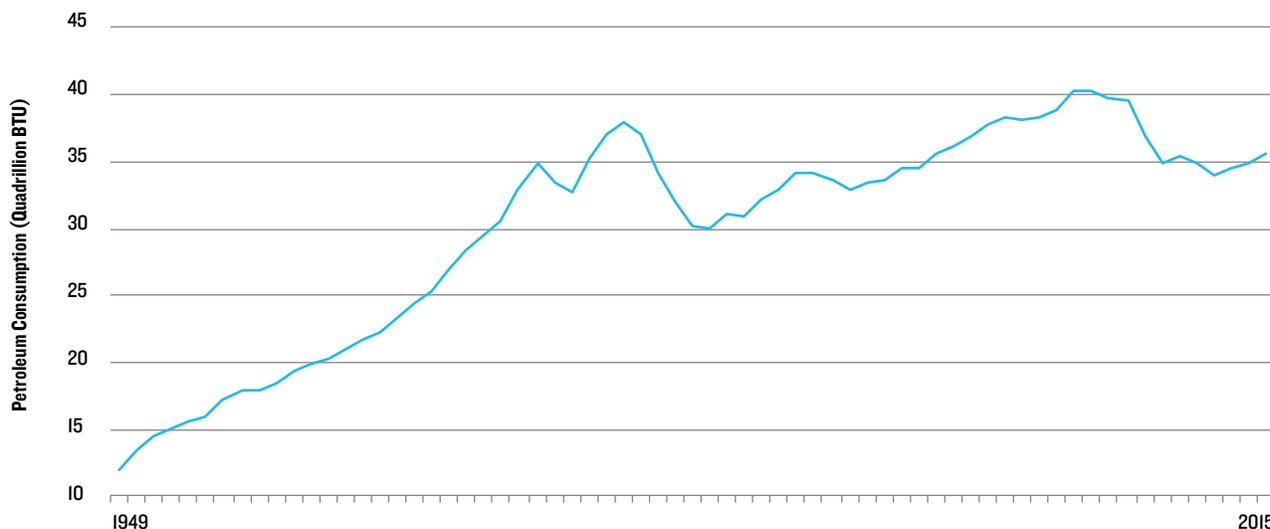


Figure 7: Annual Petroleum Consumption



OIL

Annual U.S. oil consumption in 2015 was almost 12 percent below that of 2005, which was the highest in the nation’s history. In fact, oil use today is only slightly higher than it was in 1973, the year of the first “oil shock” and the OPEC oil embargo. However, annual oil consumption has increased for the past three years (Figure 7). This is due mainly to increased vehicle miles traveled and consumers’ revived interest in SUVs and light trucks, spurred by low gasoline prices. Continued strengthening of clean car and fuel economy standards remain critical for achieving future oil consumption reductions.

The United States is relying partly on federal standards to decarbonize the transportation sector. Model year 2015 automobile fuel economy reached a record high, while new vehicle emissions reached a record low.³⁹ The Obama administration set greenhouse gas emissions and fuel economy standards for cars, SUVs, and light trucks that will nearly double automobile fuel efficiency from 2010 levels by 2025. These standards will cut oil imports by a third and avoid the consumption of 3.1 million barrels per day by 2030, more than what the United States purchases now from any OPEC nation.⁴⁰ In August 2016, EPA and the U.S. Department of Transportation also finalized new fuel economy standards for medium- and heavy-duty trucks—including new large pickups, tractor-trailers, buses, and delivery vans—that will reduce fuel use by up to 25 percent by 2027. This is equivalent to cutting oil consumption by almost 2 billion barrels over the lifetimes of these vehicles and saving owners about \$170 billion in fuel costs.⁴¹

New transportation policies across the United States are spurring vehicle electrification. As the electric grid becomes cleaner, for all the reasons described earlier, electric vehicles are being charged with increasingly decarbonized electric power. Widespread transportation

electrification could reduce carbon pollution by 550 million metric tons annually by 2050, equivalent to the emissions from 100 million petroleum-fueled passenger cars.⁴²

The Obama administration in November 2015 rejected the construction of the Keystone XL pipeline, which would have pumped 830,000 barrels per day of oil from Canada through the U.S. heartland to the Texas Gulf Coast.⁴³ The Keystone XL pipeline would have increased greenhouse gas emissions, disrupted areas of sensitive wildlife habitat, and threatened to pollute water sources in America’s heartland.⁴⁴

ON THE HORIZON: AMERICA’S UTILITIES PREPARE FOR NEW ROLES

There is a shift from large, centralized power plants to a new energy landscape with distributed (on site) energy resources—such as energy efficiency, demand response, small-scale renewable generation, and energy storage—that can help meet Americans’ energy needs. With the proliferation of these distributed technologies and advanced metering technology, energy is now flowing two ways between utilities and customers. “Net metering” is among the mechanisms that allow customers to be compensated for sending their excess local generation to the grid, while electric cars and other devices increasingly will be storing and dispatching energy. Customers are also beginning to see enhanced rewards for reducing their household energy consumption when it matters the most.⁴⁵

Utilities of the future and their regulators should align shareholder incentives with state and federal environmental goals, adapt to new technologies, and support innovation while ensuring equitable treatment of all customers. Utilities should compensate distributed generation according to the benefits and costs of these

resources and fairly weigh their societal value. All utilities also need revenue decoupling, which encourages customers to save energy while avoiding new fixed charges on utility bills that are independent of consumption, reducing customers' reward for saving energy. The current count of states with electricity and natural gas decoupling mechanisms stands at 15 and 23, respectively. And a number of additional states—including Colorado, Louisiana, Michigan, Missouri, Montana, New Hampshire, New Jersey, and Pennsylvania—have decoupling under review.

CONCLUSION

The United States is changing fundamentally across the energy sector, accelerating away from fossil fuels into a clean energy future. The trend,* obvious for more than a decade, is a combined product of state and federal policy harmonized with potent economic forces. To continue our progress in decarbonizing electric grids, states should

strengthen renewable portfolio standards and adopt strong energy efficiency policies for our homes, buildings, and appliances. Power companies and their regulators should curb power plant emissions and prioritize renewable energy and energy efficiency. In the transportation sector we need to incentivize electric vehicles and strengthen our fuel economy standards to continue reducing our reliance on oil. Clean energy companies and businesses should also lead the way, creating jobs for the sustainable energy economy. In both international and domestic policy, the federal government should remain an active partner in a clean energy transition driven increasingly by the recognition that clean energy costs less than dirty energy.

This edition of NRDC's *Annual Energy Report* is a testament to America's progress in reducing harmful greenhouse gas emissions while also improving our nation's energy security and financial health. It is a trend that will continue to clean our air, create good-paying jobs, lower customer bills, and avoid the worst effects of climate change.

*Unless otherwise indicated, all data on U.S. energy production and use in this report are taken from U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*.

ENDNOTES

- 1 Thomas L. Friedman, "Mr. Trump, Help Heal the Planet," *New York Times*, Nov. 16, 2016, <http://www.nytimes.com/2016/11/16/opinion/donald-trump-help-heal-the-planets-climate-change-problem.html>
- 2 Natural Resources Defense Council (hereinafter NRDC), "The Paris Agreement on Climate Change," December 2015, <https://www.nrdc.org/sites/default/files/paris-climate-agreement-IB.pdf>.
- 3 Michael Grunwald, "Environmentalists Get a Dose of Good News," *Politico*, November 2016, <http://www.politico.com/agenda/story/2016/11/environmentalists-get-a-dose-of-good-news>.
- 4 Eric Roston, "America's Energy Revolution Hits a Historic Milepost," *Bloomberg*, October 2016, <http://www.bloomberg.com/news/articles/2016-10-31/america-s-energy-revolution-hits-a-historic-milepost>.
- 5 U.S. Environmental Protection Agency (hereinafter EPA), "Overview of Greenhouse Gases," <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>, (accessed Nov. 22, 2016) .
- 6 White House Office of the Press Secretary, "Remarks by President Obama at the First Session of COP 21," press release, November 30, 2015, <https://www.whitehouse.gov/the-press-office/2015/11/30/remarks-president-obama-first-session-cop21>.
- 7 EPA, "Clean Power Plan for Existing Power Plants," <https://www.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants>, (accessed Nov. 21, 2016).
- 8 "Governors' Accord for a New Energy Future," February 16, 2016, <http://www.governorsnewenergyfuture.org/the-accord/>.
- 9 NRDC, "California Passes Historic Climate Package," press release, August 24, 2016, <https://www.nrdc.org/media/2016/160824>.
- 10 EPA, "EPA Releases First-Ever Standards to Cut Methane Emissions from the Oil and Gas Sector," press release, May 2016, <https://www.epa.gov/newsreleases/epa-releases-first-ever-standards-cut-methane-emissions-oil-and-gas-sector>.
- 11 John Kerry, U.S. Secretary of State, "An Ambitious HFC Amendment to the Montreal Protocol," press statement, October 2016, <http://www.state.gov/secretary/remarks/2016/10/263170.htm>.
- 12 Carol Winkel, "Northwestern Power Plan Supports Growth While Preserving Natural Resources," Northwest Power and Conservation Council, February 2016, <http://www.nwcouncil.org/news/blog/7th-pp-approved>.

- 13 NRDC, “A Vision for the Future of the Electric Industry,” December 2015, <https://www.nrdc.org/sites/default/files/electric-utility-business-model-ib.pdf>.
- 14 Elizabeth Noll, “A Step Forward for Efficiency, but Many Other Steps Back,” NRDC, April 2015, <https://www.nrdc.org/experts/elizabeth-noll/step-forward-efficiency-many-other-steps-back>.
- 15 Heather Zichal, “Historic Energy Efficiency Rules Would Save Customers Money and Cut Carbon Emissions,” White House Blog, August 2013, <https://www.whitehouse.gov/blog/2013/08/29/historic-energy-efficiency-rules-would-save-consumers-money-and-cut-carbon-emissions>.
- 16 Meg Waltner, “Major Agreement for Rooftop Air Conditioners Will Lead to Biggest Energy Savings Yet,” NRDC, June 2015, <https://www.nrdc.org/experts/meg-waltner/major-agreement-rooftop-air-conditioners-will-lead-biggest-energy-savings-yet>.
- 17 Lauren Urbanek, “2015 Closes with New Energy Efficiency Standards That Will Save Consumers and Businesses Billions,” NRDC, January 2016, <https://www.nrdc.org/experts/lauren-urbanek/doe-sets-first-ever-standards-commercial-and-industrial-pumps>.
- 18 Elizabeth Noll, “Appliance Standards: 40 Years of Success and Here’s to Many More,” NRDC, June 2016, <https://www.nrdc.org/experts/elizabeth-noll/appliance-standards-40-years-success-and-heres-many-more>.
- 19 Appliance Standards Awareness Project, infographic on “Appliance Standards: The Best Energy and Climate Policy You’ve Never Heard Of,” <http://www.standardsasap.org/sites/default/files/Appliance%20standards%20infographic%20large.jpg> (accessed November 17, 2016).
- 20 Lazard, “Levelized Cost of Energy Analysis—Version 9.0,” November 2015, <https://www.lazard.com/media/2390/lazards-levelized-cost-of-energy-analysis-90.pdf>.
- 21 Solar Energy Industries Association, “Million Solar Milestone,” <http://www.seia.org/sites/default/files/Million%20Solar%20Install%20Factbook%205.3.16.pdf>.
- 22 U.S. Energy Information Administration (hereinafter EIA), “Solar, Natural Gas, Wind Make Up Most 2016 Generation Additions,” *Today in Energy*, March 1, 2016, <http://www.eia.gov/todayinenergy/detail.php?id=25172>.
- 23 Note: Distributed solar energy was included in EIA data in 2014 and 2015, but not in previous years, so it is not included here.
- 24 Nathanael Greene, “Extension of Clean Energy Tax Incentive Is a Major Bright Spot in Congress’s New Spending Bill,” NRDC, December 2015, <https://www.nrdc.org/experts/nathanael-greene/extension-clean-energy-tax-incentives-major-bright-spot-congress-new>.
- 25 Justin Gillis, “America’s First Offshore Wind Farm May Power Up a New Industry,” *New York Times*, August 22, 2016, <http://www.nytimes.com/2016/08/23/science/americas-first-offshore-wind-farm-may-power-up-a-new-industry.html>.
- 26 Kevin Steinberger and Starla Yeh, “The Clean Power Plan: Keeping Climate Progress on Track,” NRDC, June 2016, <https://www.nrdc.org/sites/default/files/clean-power-plan-climate-progress.pdf>.
- 27 Sierra Club, “Cities are for 100% Clean Energy: 10 Case Studies,” <https://www.sierraclub.org/sites/www.sierraclub.org/files/blog/RF100-Case-Studies-Cities-Report.pdf>, (accessed Nov. 21, 2016).
- 28 EIA, “Nonhydro Electricity Storage Increasing as New Policies Are Implemented,” *Today in Energy*, April 3, 2015, <https://www.eia.gov/todayinenergy/detail.php?id=20652>.
- 29 EIA, “How Many Nuclear Power Plants Are in the United States and Where Are They Located?” *Frequently Asked Questions*, <https://www.eia.gov/tools/faqs/faq.cfm?id=207&t=21>, (accessed Nov. 21, 2016).
- 30 NRDC, “NRDC Joins PG&E, Labor & Other Enviro Groups in Historic Proposal to Replace California Nuclear Plant with Efficiency, Renewables,” press release, June 21, 2016, <https://www.nrdc.org/media/2016/160621>.
- 31 See EIA, note 29 above.
- 32 EIA, “Natural Gas Expected to Surpass Coal in Mix of Fuel Used for U.S. Power Generation in 2016,” *Today in Energy*, March 16, 2016, <http://www.eia.gov/todayinenergy/detail.php?id=25392>.
- 33 EIA, “Hydraulically Fractured Wells Provide Two-Thirds of U.S. Natural Gas Production,” *Today in Energy*, May 5, 2016, <https://www.eia.gov/todayinenergy/detail.php?id=26112>.
- 34 Kate Sinding, “New York State’s Fracking Ban Is Official,” NRDC, June 29, 2015, <https://www.nrdc.org/experts/kate-sinding/new-york-states-fracking-ban-official>.
- 35 EIA, “In 2015, U.S. Coal Production, Consumption, and Employment Fell by More Than 10%,” *Today in Energy*, November 10, 2016, <https://www.eia.gov/todayinenergy/detail.php?id=28732>.
- 36 EIA, “Coal Made Up More Than 80% of Retired Electricity Generating Capacity in 2015,” *Today in Energy*, March 8, 2016, <http://www.eia.gov/todayinenergy/detail.php?id=25272>.
- 37 EPA, “Basic Information About Mercury and Air Toxics Standards,” <https://www.epa.gov/mats/basic-information-about-mercury-and-air-toxics-standards>, (accessed Nov. 21, 2016).
- 38 Noah Long, “Oregon’s Groundbreaking Clean Energy Bill Becomes Law, Adds to Growing Momentum to Address Climate Change,” NRDC, March 11, 2016, <https://www.nrdc.org/experts/noah-long/oregons-groundbreaking-clean-energy-bill-becomes-law-adds-growing-momentum-address>.
- 39 EPA, “Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends Report Overview,” <https://www.epa.gov/fuel-economy/trends-report#pane-1> (accessed Nov. 21, 2016).
- 40 EPA, “Regulatory Impact Analysis: Final Rulemaking for 2017–2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards,” August 2012, <https://nepis.epa.gov/Exe/ZyPDF.cgi/P100EZIL.PDF?Dockey=P100EZIL.PDF>.
- 41 EPA, “EPA and NHTSA Adopt Standards to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles for Model Year 2018 and Beyond,” August 2016, <https://nepis.epa.gov/Exe/ZyPDF.cgi/P100P7NL.PDF?Dockey=P100P7NL.PDF>.
- 42 Electric Power Research Institute, and NRDC, “Environmental Assessment of a Full Electric Transportation Portfolio,” September 17, 2015, <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=3002006881>.
- 43 The White House, “Statement by the President on the Keystone XL Pipeline,” press release, November 6, 2015, <https://www.whitehouse.gov/the-press-office/2015/11/06/statement-president-keystone-xl-pipeline>.
- 44 NRDC, “Climate Impacts of the Keystone XL Tar Sands Pipeline,” October 2013, <https://www.nrdc.org/sites/default/files/tar-sands-climate-impacts-IB.pdf>.
- 45 For an excellent review of recent experience with time-varying electricity rates, see <https://www.raponline.org/knowledge-center/time-use-rates-methods-experience-results>.