NRDC REPORT

OCTOBER 2013
R:13-09-B

NRDC's First Annual Energy & Environment Report

America's (Amazingly) Good Energy News

Acknowledgments

Particular thanks to Jenny Powers, Pat Remick, and Jennifer Wang for their assistance with this project.

For more information, contact:

Ralph Cavanagh
rcavanagh@nrdc.org
http://switchboard.nrdc.org/blogs/rcavanagh

Sierra Martinez
smartinez@nrdc.org
http://switchboard.nrdc.org/blogs/smartinez

About NRDC

The Natural Resources Defense Council (NRDC) is an international nonprofit environmental organization with more than 1.4 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, Bozeman, and Beijing. Visit us at www.nrdc.org and follow us on Twitter @NRDC.

NRDC's policy publications aim to inform and influence solutions to the world's most pressing environmental and public health issues. For additional policy content, visit our online policy portal at www.nrdc.org/policy.

NRDC Director of Communications: Edwin Chen
NRDC Deputy Director of Communications: Lisa Goffredi
NRDC Policy Communications Director: Alex Kennaugh
Lead Editor: Pat Remick
Design and Production: www.suerossi.com

Cover photo: Oncor command center © Oncor

U.S. ENERGY PRODUCTIVITY AND SECURITY HAVE NEVER BEEN BETTER

For decades, America's energy news trended from bad to worse, beginning with the oil crises of the 1970s. However, NRDC recently conducted an exhaustive analysis that found a remarkable turnaround. Based on key economic, security, and environmental indicators, all examined below, the state of the U.S. energy economy has never been better.[1] And in an era of escalating Mideast turmoil and gyrating oil prices, this accumulated resilience could hardly be more timely.

Extensive new government data reviewed by NRDC shows much of the credit can be given to a huge and inexpensive energy resource that deserves far more attention: *energy efficiency*. In fact, over the past 40 years Americans have found so many innovative ways to save energy that we have more than doubled the economic productivity of the oil that runs our vehicles and the natural gas and electricity that runs almost everything else. Factories and businesses are producing substantially more products and value with less energy.

As a result, across the United States:

- Total energy used per dollar of goods produced is down;
- Gasoline per mile driven is down;
- And the cost of energy services (from lighting to refrigeration) is down.

Because increasing efficiency is far less costly than adding other energy resources like fossil fuels, this is saving the nation hundreds of billions of dollars annually, helping U.S. workers and companies compete worldwide, and making our country more energy-secure.

Most importantly, positive energy trends are substantially reducing our national carbon footprint, putting the United States on track to meet President Obama's target of a 17 percent emissions reduction by 2020 (relative to 2005). However, these trends must continue and accelerate to offset the most damaging effects of climate change.

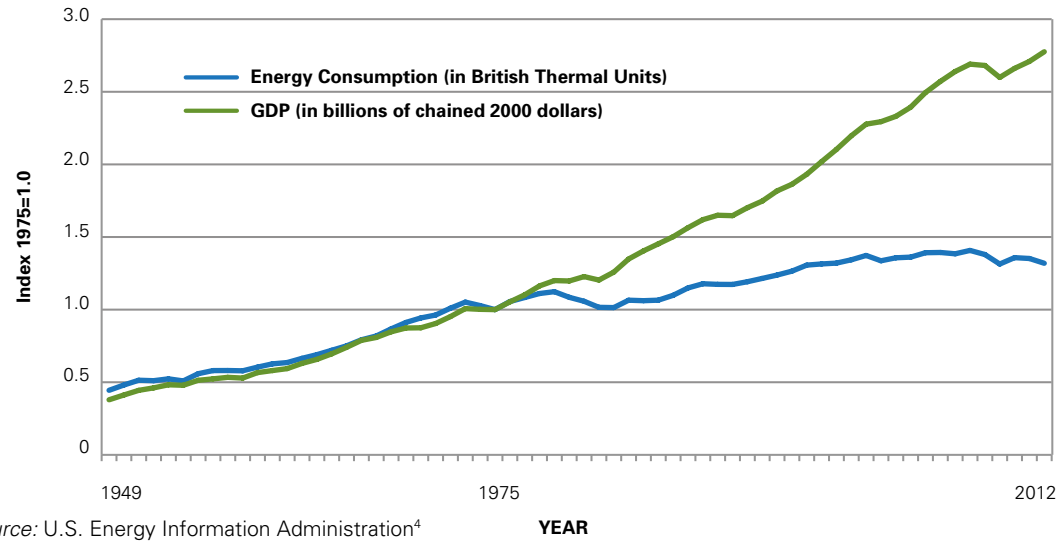
A CLOSER LOOK AT AMERICA'S ENERGY USE

Total U.S. energy use peaked in 2007 and has trended downward since; the 2012 total was below the 1999 level, even though the economy grew by more than 25 percent (adjusted for inflation) from 1999 to 2012.[2] Any lockstep linkage between economic growth and total energy use ended almost 40 years ago, as shown in Figure 1 below.

The remainder of this report breaks this general trend down into some of its most important elements and explores the implications for our economy, security, and environment.

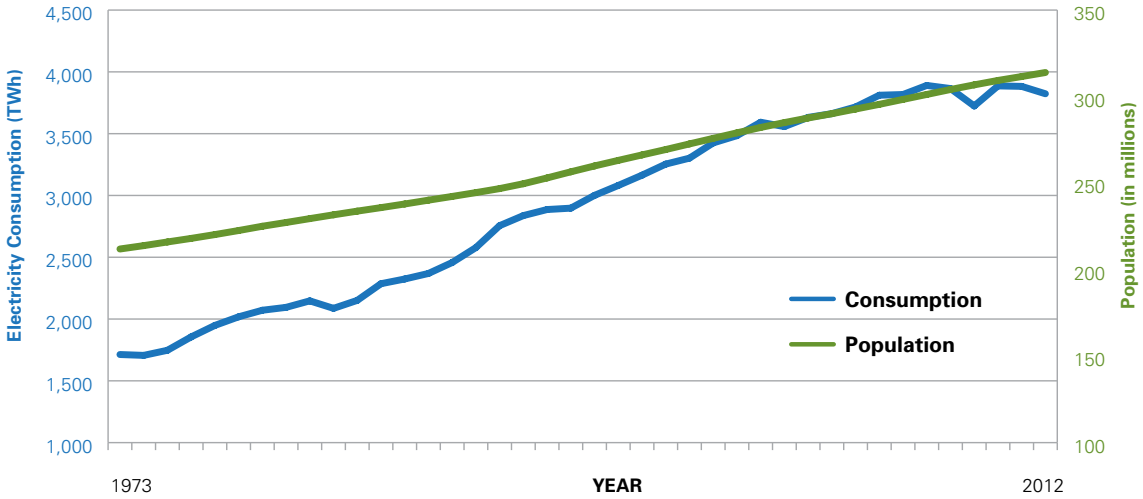
ELECTRICITY: From 1973 to 2000, electricity use more than doubled, during a time when the population increased by only about a third (see Figure 2). But since then, for the first time in modern history, the national growth rate for electricity consumption has dropped below that of the population for an extended period, as shown in Figure 2, thanks in large part to our increased energy productivity. From 2000 to 2012, electricity consumption rose by about 6 percent, with an average annual growth rate of about 0.5 percent, even as the population grew by about twice that rate during the same period.[3] This slowdown has generated increased interest in curtailing utilities' longstanding financial addiction to robust growth in their commodity sales.

Figure 1: Economic and Energy Growth Trends Diverge



Source: U.S. Energy Information Administration[4]

Figure 2: Trends in U.S. Electricity Use and Population



Source: U.S. Energy Information Administration, State Energy Data System

OIL: The amount of oil used in U.S. vehicles, homes, and businesses continued an extended decline in 2012, down 14 percent from its 2005 peak. Surprisingly, 2012 oil use was lower than in 1973 (when the nation's economy was only about one-third its current size). As oil use declines, America also reduces its dependence on oil imports from unstable and unfriendly places, as well as its vulnerability to price spikes when conditions in those places suddenly worsen. According to the U.S. Environmental Protection Agency (EPA), new fuel economy and clean car standards will cut oil consumption in 2025 by 2.1 million barrels per day, which is more than we buy now from any OPEC country.[5]

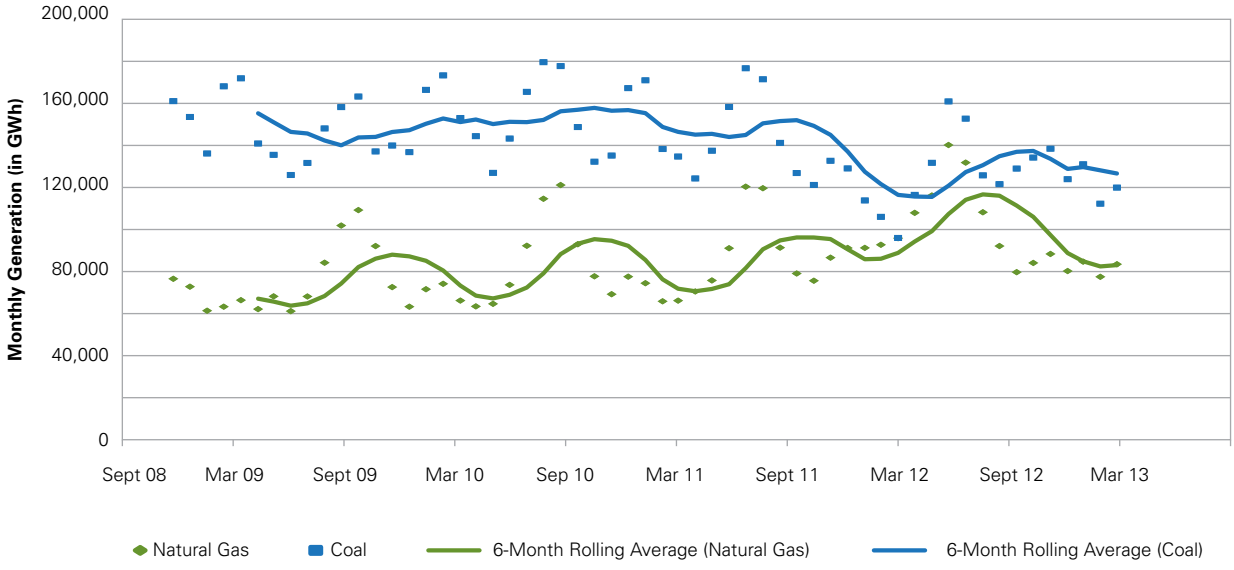
COAL: U.S. coal use in 2012 was less than in 1985 and down almost one-fourth from the peak year of 2005.[6] This mostly reflects a shift away from increasingly uneconomic coal-burning power plants, whose air pollution produces more premature deaths than any other form of energy use in the United States and abroad.[7] The most important contributing factor has been a growing movement by utilities to turn away from dirty and obsolete power generation and toward integrating more energy efficiency and renewable energy, such as wind and solar, into their resource mix.

NATURAL GAS: Natural gas raised its market share above 30 percent of electricity generation in 2012, a 40-year high. Although natural gas generally has been displacing coal for electricity production, it bears noting that the trend is anything but steady and uniform, and recently coal recovered significant market share after sudden shifts in commodity prices, as shown in Figure 3.

NUCLEAR: After decades of rising sales driven mostly by increased productivity at existing plants, U.S. nuclear generation has flattened, with market share dropping below 19 percent of total electric generation in 2012. Total nuclear power production in 2012 was down almost 5 percent from its peak five years earlier.[8] A strong factor has been the retirement of aging and uneconomic plants like Southern California Edison's two San Onofre units and Duke's Crystal River reactor in Florida.

RENEWABLE ENERGY: Much media attention rightly accompanied announcements that wind power led all competitors—both renewables and fossil fuels—in terms of new generating capacity installed over the course of 2012; but even more impressive was the 24-fold increase in wind-produced electricity from 2000 to 2012. By the close of that period, wind was providing 3.5 percent of all U.S. electricity, and the absolute increase in wind generation from 2000 to 2012 was almost nine times greater than the increase in nuclear generation over the same period.[9] Solar power is surging too, although still a small fraction of 1 percent of total U.S. generation.

Figure 3: Electricity Generation: The Uncertain Course of Gas v. Coal Competition



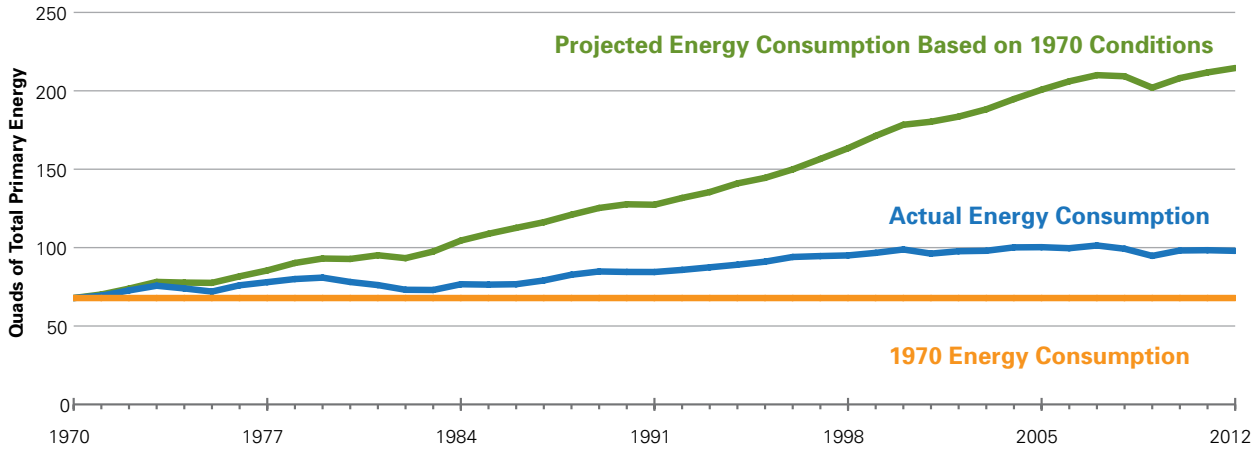
Source: U.S. Department of Energy, Energy Information Administration[10]

WHAT WE'RE USING INSTEAD TO POWER OUR ECONOMY

On the basis of its own analysis of all these energy trends, which show no signs of abating, the Bipartisan Policy Center concluded that "over the past four decades, energy savings achieved through improvements in energy productivity have exceeded the contribution from all new supply resources in meeting America's growing energy needs," highlighting "the importance of treating demand and supply-side resources on an equal footing."[11] Figures 4 and 5 underscore these points.

Energy efficiency is a proven resource with significant potential to dramatically reduce power plant emissions, which represent 40 percent of the nation's total carbon pollution, and to do so at low cost. Additional investments in efficiency could cut U.S. energy consumption by 23 percent by 2020, save customers nearly $700 billion, and create up to 900,000 direct jobs (plus countless more when consumers spend their savings elsewhere).[12]

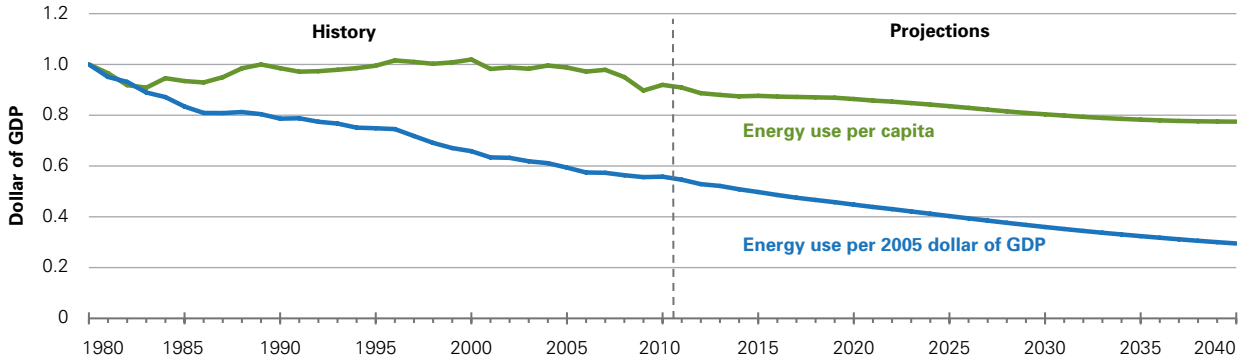
Figure 4: Energy Demand and Supply: Energy Productivity Contribution



Source: Bipartisan Policy Center, *America's Energy Resurgence* (February 2013)

Note: The BPC report concludes that even by the most conservative estimate, the energy efficiency contribution to these productivity gains exceeds the impact of all other energy resources combined in meeting the needs of a growing U.S. economy over the past four decades.

Figure 5: U.S. Energy Consumption Per Capita and Energy Use Per Dollar of Gross Domestic Product

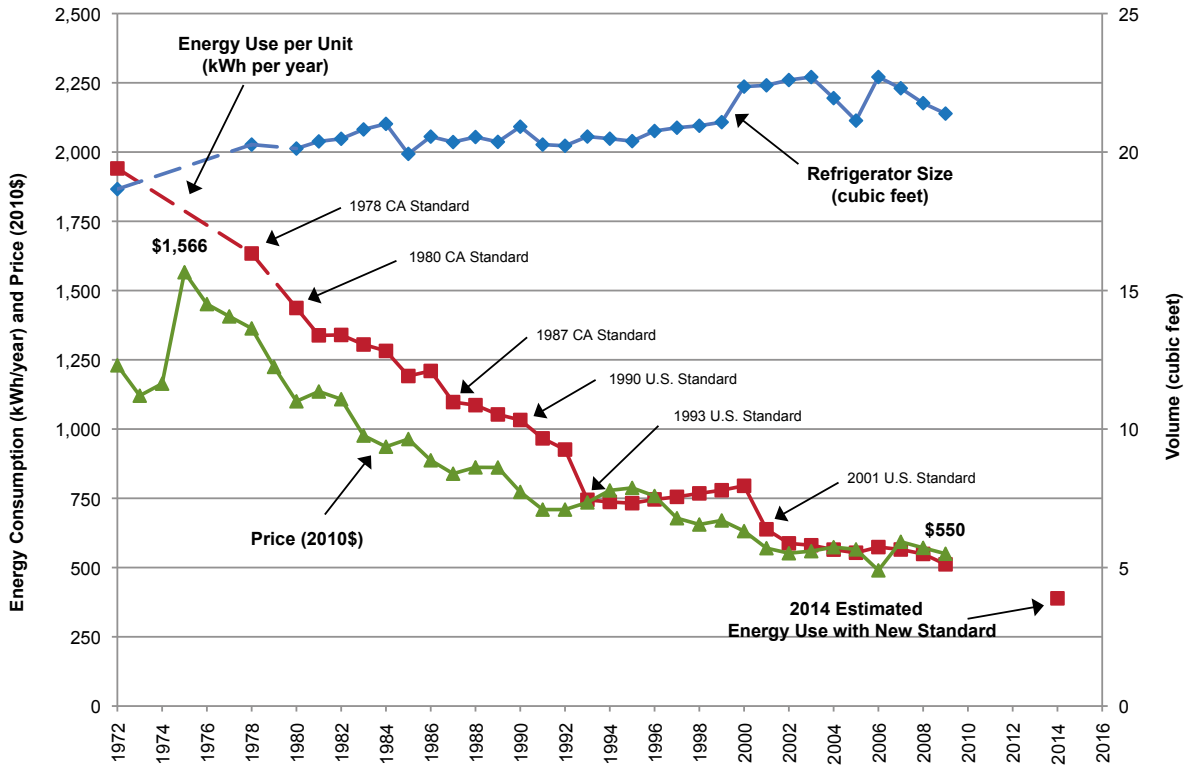


Source: Bipartisan Policy Center, *America's Energy Resurgence* (February 2013)

Some argue that energy efficiency creates excessive upfront costs to consumers. However, the result is typically quite the contrary, as demonstrated by recent assessments of long-term trends in refrigerator efficiency and the inflation-adjusted cost of refrigeration (taking into account the cost of buying and operating increasingly efficient refrigerators) as shown in Figures 6 and 7. Today's new refrigerator uses a fourth of the energy of its 1973 counterpart, offers 20 percent more storage, and costs half as much.

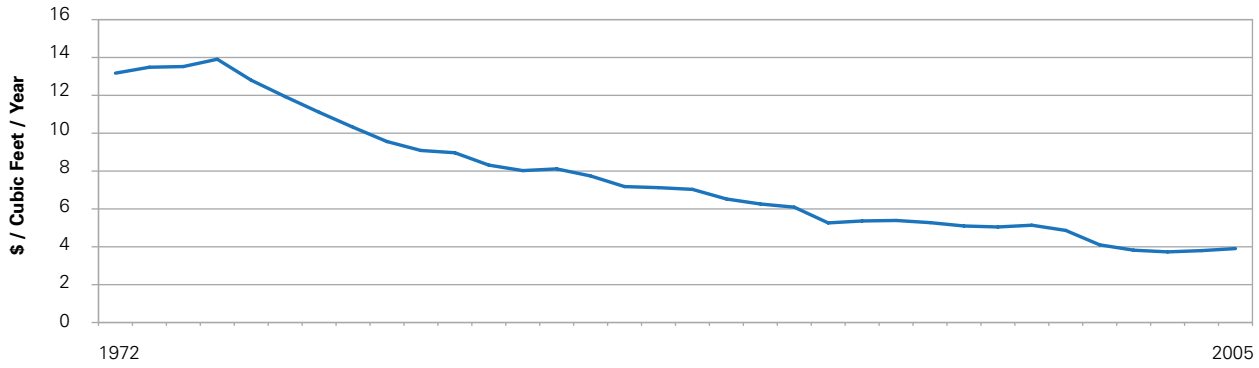
THE COST-EFFECTIVENESS OF ENERGY EFFICIENCY: THE CASE OF REFRIGERATION

Figure 6: Average Household Refrigerator Energy Use, Volume, and Price Over Time



Source: Appliance Standards Awareness Project

Figure 7: The Cost of Refrigeration Has Declined Since the Early 1970s



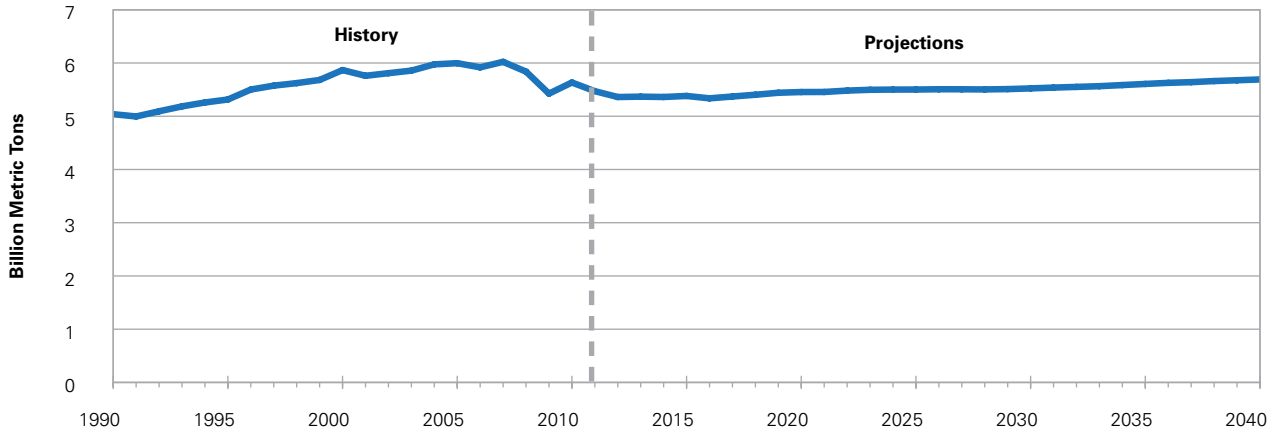
Source: Bipartisan Policy Center, *America's Energy Resurgence* (February 2013)

Note: For each model year, the calculation includes the average retail price for a new refrigerator amortized over the life of the refrigerator plus the average annual electricity cost of operating a new refrigerator in that year. The lifetime of the refrigerator and the price of electricity are assumed to be constant in real terms from 1972 to 2005. As Figure 6 shows, this was the period of principal regulatory activity.

WE NEED TO DO MORE

Although these energy trends have been pushing U.S. emissions of greenhouse gases down since 2007, the decline is not nearly sufficient to fully address the climate change threat. While we are on track to meet the president's 17 percent emissions reduction target by 2020, stabilizing the atmosphere will require the United States and other major economies to achieve a more rapid rate of decline, and ultimately an end to these emissions (see Figure 8).[13]

Figure 8: Energy-Related Carbon Dioxide Emissions



U.S. energy-related carbon dioxide emissions have remained below the peak seen in 2007.

Source: Bipartisan Policy Center, *America's Energy Resurgence* (February 2013)

Fortunately, numerous studies have uncovered vast untapped energy efficiency opportunities that can further reduce emissions. At both the personal and government levels, we must focus on achieving more of these efficiencies, which cost (and pollute) far less than the electricity, natural gas, and oil they replace. Options include upgrading homes and other buildings with energy-saving appliances and products such as light bulbs and insulation. In addition:

- The federal government and the states must keep tightening efficiency standards for buildings, equipment, and vehicles. The EPA must end the unlimited free dumping of carbon pollution into our atmosphere by adopting standards for existing power plants that recognize the contribution energy efficiency can make to reducing such pollution.

- State regulators should reward utilities for helping residential, business, and industrial customers use energy more efficiently, and stop the unintended but widespread practice of automatic financial penalties when the utility's sales level off or decline because customers do the right thing. Half the states have instituted "revenue decoupling" systems for investor-owned natural gas and/or electric utilities to avoid those penalties that understandably might reduce their motivation to inspire customers to save energy.[14] But progress is too slow, and only two publicly owned utilities (serving Los Angeles and Glendale, California), have adopted this reform. The rest should step up—to cut customer bills, save energy, and help reduce carbon emissions.

Energy efficiency is America's most productive energy resource. In a nation—and a world—with funding constraints, an "all of the above" energy policy that includes our most expensive and environmentally risky resources like oil and coal is a guarantee of costly disappointment. Instead, we should build on America's positive energy trends, and give priority to efficiency improvements that cost far less than the energy they displace. The ultimate prize extends well beyond America's borders, as NRDC's Dr. David Goldstein concludes in his book *Invisible Energy*: "Energy efficiency can become the cornerstone of a global effort to stabilize the earth's climate."[15] Goldstein is referring to an 80 percent reduction in carbon pollution before 2050, achieved at a net economic savings to energy users, thanks to energy efficiency. As this report shows, the journey began decades ago and the results so far are most promising.

Endnotes

1 See, e.g., Bipartisan Policy Center's Strategic Energy Policy Initiative, *America's Energy Resurgence: Sustaining Success, Confronting Challenges* (February 2013), p. 1 *("The state of U.S. domestic energy sectors, energy productivity and energy security is the best it has been in many decades.").*

2 U.S. Bureau of Economic Analysis (2013). U.S. Department of Energy, Energy Information Administration (2013). Infra note 4.

3 U.S. Department of Energy, Energy Information Administration (2013).

4 U.S. Department of Energy, Energy Intensity Indicators in the U.S.: Economy-Wide Total Energy Consumption (May 2008). For 2005-2011: U.S. Department of Energy, State Energy Database System, Consumption, British Thermal Units, 1960–2011 (June 2013). Growth in post-2004 years normalized to 2008 data in order to maintain consistency across data sources.

5 See EPA, "Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards," EPA-420-R-12-016, August 2012, Table 7.4-7 (available at http://www.epa.gov/otaq/climate/regs-light-duty.htm); Energy Information Administration, http://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbblpd_a.htm.

6 U.S. Department of Energy, Monthly Energy Review (August 2013).

7 See, e.g., Paul R. Epstein et al., "Full Cost Accounting for the Life Cycle of Coal," *Annals of the New York Academy of Science* (2011), solar.gwu.edu/index_files/Resources_files/epstein_full%20cost%20of%20coal.pdf.

8 U.S. Department of Energy, note 2, Table 7.2a.

9 Ibid. Wind power accounted for more than 13,000 MW of the new generation added to the U.S. grid in 2012, which was about 43 percent of the total. American Wind Energy Association, *Wind Energy SmartBrief* (August 7, 2013).

10 Electric Power Monthly, Table 1.1 (July 2013)

11 Bipartisan Policy Center, note 1, p. viii.

12 McKinsey & Company, *Electric Power & Natural Gas: Unlocking Energy Efficiency in the U.S. Economy*, July 2009, www.mckinsey.com/client_service/electric_power_and_natural_gas/latest_thinking/unlocking_energy_efficiency_in_the_us_economy.

13 See, for example, Dan Lashof, "U.S. Carbon Emissions Have Been Falling—Will That Continue?" NRDC *Switchboard* (April 2013), switchboard.nrdc.org/blogs/dlashof/us_co2_emissions_have_been_fal.html.

14 A very promising recent precedent is the Washington Utilities and Transportation Commission's decision to change fundamentally the electricity and natural gas business models for Puget Sound Energy, at the joint request of the utility, NRDC and the Northwest Energy Coalition. See Dockets UE-121697 and UG-121705, Order 07 (June 25, 2013).

15 David Goldstein, *Invisible Energy* (2009), p.186.