CALIFORNIA’S GOLDEN ENERGY EFFICIENCY OPPORTUNITY:
Ramping Up Success to Save Billions and Meet Climate Goals
Report written by: Lara Ettenson and Christa Heavey

Report edited by: Pat Remick

Internal reviews by:
Jeff Benzak (E2)
Bob Keefe (E2)
Mary Soelecki (E2)
Merrian Borgeson (NRDC)
Sheryl Carter (NRDC)
Pierre Delforge (NRDC)
Philip Henderson (NRDC)
Alex Jackson (NRDC)
Sierra Martinez (NRDC)
Peter Miller (NRDC)
George Peridas (NRDC)
Maria Stamas (NRDC)
Meg Waltner (NRDC)
Julia Prochnik (NRDC consultant)

Special thanks to Lisa Xue for her contribution to developing the data analytics.

External reviews by:
Eddie Ahn (Brightline Defense)
Andrew McAllister (California Energy Commission)
Chris Kavalec (California Energy Commission)
Jeanne Clinton (California Public Utilities Commission)
Cara Goldenberg (Dian Grueneich Consulting)
Robbie Orvis (Energy Innovation)
Michael O’Boyle (Energy Innovation)
Sonia Aggarwal (Energy Innovation)
David Jacot (Los Angeles Department of Water and Power)
David Nemtzow (Nemtzow and Associates)
Jonathan Changus (Northern California Power Agency)
Jan Berman (Pacific Gas & Electric)
Shannon Cheng (Pacific Gas & Electric)
Luke Nickerman (Pacific Gas & Electric)
Andra Pligavko (Pacific Gas & Electric)
Dian Grueneich (Precourt Energy Efficiency Center, Stanford University)
Michael Nguyen (The Energy Coalition)
Bryan Cope (Southern California Public Power Authority)
Carol Zabin (Donald Vial Center on Employment in the Green Economy, University of California, Berkeley)

We would like to thank everyone for their time reviewing this report.

It should be noted, though, that the external reviews do not indicate authorship or a full endorsement of the report and its findings.

Please Note: The Clean Energy and Pollution Reduction Act of 2015 (Senate Bill 350), which was signed into law on October 8, 2015, included direction on the data to be used to determine the estimate of energy savings necessary to meet the 2030 energy efficiency goals. This report was updated accordingly.

About NRDC
The Natural Resources Defense Council is an international nonprofit environmental organization with more than 2 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.

About E2
Environmental Entrepreneurs (E2) is a national, nonpartisan group of business leaders, investors and others who promote smart environmental policies that drive economic growth. E2 members, active in nearly every state in the country, have built or financed more than 1,700 companies that have created more than 570,000 jobs, and manage more than $100 billion in venture and private equity capital. E2 is an affiliate of the Natural Resources Defense Council (NRDC).

NRDC Director of Communications: Lisa Benenson
NRDC Deputy Director of Communications: Lisa Goffredi
NRDC Policy Publications Director: Alex Kennaugh
Design and Production: www.suerossi.com

© Natural Resources Defense Council 2015
Executive Summary

California’s dedication to implementing energy-saving programs, building codes, and appliance standards over the past 40 years has saved Californians nearly $90 billion on their energy bills through 2013—with average residential electricity bills that are $240 less than in other states—and reduced electricity demand by more than 15,500 megawatts (MW), equivalent to the output from more than 30 large power plants.1

This report, a five-year update of California’s energy efficiency progress, shows California is ahead of schedule to reach its 32,000 gigawatt-hours (GWh) goal of using efficiency to cut emissions by 2020 and help the state meet its total pollution reduction target under the landmark Global Warming Solutions Act (AB 32), but a significant ramp-up is needed to meet California’s long-term climate and energy goals.2

Since the plan for implementing AB 32 was launched in 2008, California has saved enough electricity to cut its annual climate-warming greenhouse gas (GHG) emissions by more than 8 million metric tons, equivalent to the annual pollution from nearly 2 million cars.3 Eliminating this electricity generation also avoids hundreds of tons of sulfur oxide gases and nitrogen oxides, pollutants that contribute to health issues such as coughing, wheezing, and decreased lung function.4

Based on the state’s energy-saving achievements as of 2013 (the most recent complete data set available), NRDC estimates that efficiency could save Californians an additional $2 billion on their utility bills through 2015—$85 for the average household in this year alone—while avoiding another 10,000 gigawatt-hours (GWh) of electricity, 270 million therms (MMth) of natural gas, and the associated pollution. These savings are enough to serve over 1.5 million households for electricity and more than 500,000 households for natural gas for one year; together avoiding the carbon dioxide pollution equivalent to annual emissions from more than 1.5 million cars.

Figure ES-1: Benefits from California’s Investment in Energy Efficiency

- **DECREASES POLLUTION**
  - Avoided at least 30 LARGE POWER PLANTS since 1970s, if more expected to be avoided over the next decade
  - Cuts MILLIONS OF TONS OF POLLUTANTS contributing to asthma, other ills

- **CUTS ENERGY WASTE**
  - Saved enough electricity since 2003 to power MORE THAN HALF OF CALIFORNIA’S HOMES FOR ONE YEAR
  - Met about 1/5 of the state’s electricity need in 2013
  - Helped keep per capita electricity use flat vs. 50% increase in rest of U.S. (since 1970s)

- **SAVES CALIFORNIANS MONEY**
  - Efficiency programs saved $12 billion after costs (2003-2013)
  - Research projects yielded $446 for every $1 invested
  - Newest building codes to save $6,000 per house
  - Codes and standards saved a total of $75 billion (since 1970s)

- **CREATES JOBS, SPURS ECONOMY**
  - Efficiency jobs grew 15% compared to 2% economy-wide (2002-2012)
  - California produces 2x benefit for every unit of electricity compared to the rest of U.S.

- **HELPS LOW-INCOME CUSTOMERS**
  - Low-income efficiency programs served almost 3 MILLION HOUSEHOLDS (since 2003)
  - Saved enough electricity to power 90,000 HOMES and enough natural gas for nearly 80,000 HOMES for 1 year

- **HELPS MEET CLIMATE GOALS**
  - Slashed 30 MILLION metric tons of CO₂ pollution, equal to annual emissions of 6 MILLION cars (since 2003)
  - Cuts one of the largest sources of California’s greenhouse gas emissions

NRDC & E2
**STRONG EFFICIENCY POLICIES SAVE CALIFORNIANS MONEY AND ENERGY**

California’s 2003 Energy Action Plan requires that utilities make energy efficiency the top priority to meet customer needs before turning to other sources like renewable energy and natural gas. Since then, the state’s efficiency efforts have cut total electricity demand by nearly one-fifth, saved nearly 50,000 GWh of electricity (equivalent to the electricity needed to power over half of California’s households in 2013), and saved more than 1,000 MMth of natural gas. These efficiency savings have avoided carbon dioxide emissions equivalent to the annual emissions from more than 6 million cars.

Thanks in part to California’s strong energy and climate policies, annual household electric bills are on average 18 percent below the rest of the nation. In addition to avoiding the amount of power needed from more than 10 large plants since 2003 thanks to efficiency programs alone, California is expected to avoid another 11 large (500 MW) power plants’ worth of electricity demand by 2025 as a result of future programs, codes, and standards.

The more than $8 billion funded by customer bills that utilities and other efficiency program administrators have invested in cutting energy waste since 2003 yielded the following benefits as of 2013 (the most recent complete data set available):

- **Electricity savings** of 30,000 GWh in the investor-owned utilities’ (IOU) territory (serving 75 percent of the state), equivalent to the power needed to serve more than 4 million California homes for one year.
- **Natural gas savings** in the same area of 500 MMth, equal to the annual consumption of 1 million California households.
- **Electricity savings** of 3,400 GWh in the publicly owned utilities’ (POU) territory (serving the remaining 25 percent of the state), enough to avoid carbon dioxide emissions equal to the annual pollution from more than 370,000 cars and
- **Electricity savings** of 600 GWh from low-income programs statewide, lowering electricity usage enough to power 90,000 homes for one year, and avoiding 35 MMth, enough natural gas to serve nearly 80,000 California homes for one year.

In 2013, alone:

- **Investment in efficiency programs surpassed $30 per capita.** This is more than twice the average spending of $12 per capita across the country.
- **All three electric IOUs’ electricity savings exceeded 1 percent of electricity sales (a metric that evaluates a utility’s overall effort in developing and implementing efficiency programs), along with one large POU and a number of mid-sized and small POUs; and**
- **The IOUs (electric and natural gas) and POUs (electric) had average investments in energy efficiency programs that were approximately 2 percent of their total revenue (a metric that indicates a utility’s effort to invest in energy efficiency).**

In addition to efficiency programs, the state continues to support research, development, and demonstration (RD&D), as well as advancing buildings codes and equipment standards. These efforts have led to:

- **More than 10,000 GWh in electricity savings since 2003 from the state’s appliance efficiency standards, enough to serve nearly 2 million households for one year.**
- **Homeowner savings of $6,000 over 30 years for a house constructed in accordance with the 2013 building energy efficiency code compared with similar houses built to the previous energy code.**
- **Nearly $450 of benefit for every $1 of public funding invested in projects.**

Efficiency also supports a healthy economy. In fact, California spends less of its gross domestic product on electricity to power its homes and businesses than states with comparable populations and economies, and is nearly twice as productive per unit of electricity consumed. If California were as inefficient as Texas, Californians would be spending $9.5 billion more on electricity each year and $24 billion more if the state were as inefficient as Florida.

Meanwhile, efficiency employment grew by 15 percent from 2002 to 2012 and more than 300,000 positions, or nearly 70 percent of California’s green economy jobs, are now related to improving energy efficiency in buildings alone.

**LAUNCHING CALIFORNIA TO THE NEXT LEVEL**

The urgent threat of climate change makes it incumbent upon the Golden State to substantially ramp up efficiency efforts to cut emissions and meet the state’s long-term energy and climate goals. Governor Edmund G. Brown Jr. has called for a doubling of current energy efficiency savings and a 40 percent reduction of greenhouse gas emissions below 1990 levels by 2030. This will help put the state on a path to meet the goal Governor Arnold Schwarzenegger established in his 2005 Executive Order to cut emissions to 80 percent below 1990 levels by 2050.
California is ahead of schedule to meet the amount of efficiency savings projected in the state’s blueprint to cut greenhouse gas emissions to 1990 levels by 2020. But without a significant acceleration, the current trajectory would fall short of Governor Brown’s goal to double efficiency savings by 2030. Based on the most current projections for efficiency savings, doubling them would require that over the next 15 years, customer-funded efficiency programs for both investor-owned and publicly owned utility territories, as well as new minimum energy standards for buildings and appliances, save nearly 89,000 GWh (enough to reduce our total statewide electricity needs in 2030 by 26 percent), and 1,377 MMth (enough to meet more than 10 percent of the state’s 2030 natural gas demand).27

Thanks in part to the state’s great success, including a strong policy foundation and network of energy efficiency professionals, California is planning to significantly exceed its power plant emissions reduction requirements under the federal Clean Power Plan. But to succeed at reaching the ambitious goal to double its efficiency savings, the state must improve upon and expand policies to address a variety of issues that are limiting opportunities to capture substantial energy savings. For example, efficiency efforts are not always coordinated statewide, a number of policy rules that prevent administrators and implementers from capturing cost-effective savings need to be changed, commission staff capacity is frequently limited, and/or tasks may not be prioritized or are too numerous to complete in a timely manner.

Fortunately, many of the issues that could hamper California’s future efficiency success are already being addressed in formal proceedings or by informal working groups at the state energy and climate agencies.

This report offers recommendations for how state agencies, decision makers, and stakeholders can collaboratively move forward to achieve California’s efficiency and climate goals. To aid in this effort, the Legislature should codify the state’s post-2020 energy efficiency and greenhouse gas reduction goals to provide a long-term framework for updating efficiency policies. However, most of the responsibility for implementing the following recommendations falls on the energy and climate agencies, which should:

- Provide strategic direction on how to double savings from efficiency;
- Establish a statewide collaborative group to inform ongoing efficiency planning and implementation;
- Prioritize the challenges to resolve;
- Align policies and processes with climate and efficiency goals;
- Set efficiency rules to enable market transformation;
- Expand the use of efficiency to avoid upgrading or adding new power generation;
- Adopt a process for ongoing program planning and oversight;
- Ensure low- and moderate-income customers have access to high-quality energy-saving opportunities;
- Include workforce strategies to help scale up efficiency;
- Accelerate implementation of building codes and appliance standards;
- Foster opportunities to capture greater efficiency; and
- Improve access to and use of energy data.

Chapter 1 of this report sets the context for energy efficiency and its critical role in meeting California’s climate goals. Chapter 2 highlights California’s progress and the direct benefits efficiency has yielded for customers and the economy, including contributing to a strong and growing workforce. Chapter 3 describes California’s smart foundational efficiency policies and associated benefits, and Chapter 4 provides detailed, action-oriented recommendations to align the state’s policy rules with its climate goals to enable more efficiency to be captured. In sum, this report examines the history, benefits, current opportunities, and potential for more energy efficiency with policy improvements and leadership.
The document contains statistical information and data related to energy efficiency and carbon emissions. It includes references to various reports and studies, such as the California Energy Commission (CEC) reports and the U.S. Energy Information Administration (EIA). The text discusses the calculation of carbon dioxide emissions from various sources, such as power plants and vehicles, and provides conversion factors to metric tons from pounds CO2/MMBtu. The document also includes references to specific sections of the California Energy Demands reports and the California Residential Natural Gas Consumption report. The data is used to calculate the energy savings and their economic impact.
calculating electricity household equivalent (GWh): EIA, Electric Sales, Revenue, and Average Price. Source for calculating natural gas household equivalent (therms): CEC, “California Residential Natural Gas Consumption.”


20 Appendix 2 and EIA, Electric Sales, Revenue, and Average Price.


24 Next 10, 2014 California Green Innovation Index, pp. 14, 52. The difference between California’s and Texas’s electricity bill as a percent of GDP is 0.47 percentage point. 0.47 percent of California’s GDP (which is $2,032,825 million) is $9.5 billion. Repeated calculation for Florida: Difference between California’s and Florida’s electricity bill as a percent of GDP is 1.18 percentage points. 1.18 percent of California’s GDP (which is $256 billion) is $24 billion.

