AUGUST 2015
R-15-06-D

CALIFORNIA'S GOLDEN ENERGY EFFICIENCY OPPORTUNITY:

Ramping Up Success to Save Billions and Meet Climate Goals

NRDC

E2
ENVIRONMENTAL
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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.

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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

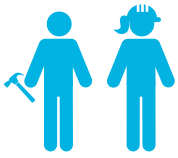
DECREASES POLLUTION

- Avoided at least **30** LARGE POWER PLANTS since 1970s, 11 more expected to be avoided over the next decade

- Cuts MILLIONS OF TONS OF POLLUTANTS contributing to asthma, other ills

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.



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)

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

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)

HELPS MEET CLIMATE GOALS

- Slashed **30 MILLION** metric tons of CO_2 pollution, equal to annual emissions of 6 MILLION cars (since 2003)

- Cuts one of the largest sources of California's greenhouse gas emissions

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.[5] 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.[6,7]

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.[8] In addition to avoiding the amount of power needed from more than 10 large plants since 2003 thanks to efficiency programs alone,[9] 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.[10]

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),[11] equivalent to the power needed to serve more than 4 million California homes for one year;[12]
- Natural gas savings in the same area of 500 MMth, equal to the annual consumption of 1 million California households;[13]
- 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;[14] 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.[15]

In 2013, alone:

- Investment in efficiency programs surpassed $30 per capita.[16] This is more than twice the average spending of $12 per capita across the country;[17]
- 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;[18] 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).[19]

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.[20]
- 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.[21]
- Nearly $450 of benefit for every $1 of public funding invested in projects.[22]

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.[23] 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.[24]

Meanwhile, efficiency employment grew by 15 percent from 2002 to 2012[25] 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.[26]

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.

ENDNOTES

Executive Summary

1 **Source for $75 billion total savings:** California Energy Commission (hereinafter CEC), *2013 Integrated Energy Policy Report,* CEC-100-2013-001-CMF, 2013, p.28, www.energy.ca.gov/2013publications/CEC-100-2013-001/CEC-100-2013-001-CMF.pdf (accessed June 6, 2015). The CEC reports codes and standards benefits as a total, not accounting for the cost of the programs. **Source for $12 billion net savings:** See Appendix 1: "Net Benefits Sources" (benefits are net of the cost to run the programs). **Source for 15,500 MW:** CEC, *California Energy Demand 2014–2024 Final Forecast Vol. 1*, 2013, p.77; Figure 38, p.78, www.energy.ca.gov/2013publications/CEC-200-2013-004/CEC-200-2013-004-V1-CMF.pdf (accessed June 6, 2015). **Power plant equivalent:** Jonathan Koomey, et al., "Defining a Standard Metric for Electricity Savings," *Environmental Research Letters* 5, no. 1 (January–March 2010): 014017, iopscience.iop.org/1748-9326/5/1/014017/pdf/1748-9326_5_1_014017.pdf (accessed June 15, 2015 by pasting URL into browser). Peak demand savings were approximately 15,500 MW in 2012. One large power plant is 500 MW (15,500MW/500MW = 31).

2 **Source for AB 32:** California State Legislature, A*ir Pollution: Greenhouse Gases: California Global Warming Solutions Act of 2006*, Assembly Bill 32 (Nunez, 2006), September 27, 2006, leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32&search_keywords (accessed June 6, 2015). **Source for AB 32 energy saving targets:** California Air Resources Board (hereinafter CARB), *Climate Change Scoping Plan*, December 2008, p. 41, www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf (accessed June 6, 2015). **Source for electricity savings:** CEC, *California Energy Demand 2014–2024,* Mid-Case Final Baseline Demand Forecast Forms, Table A-8: Electricity Efficiency/Conservation Consumption Savings (GWh), Statewide Residential + Non-residential, http://www.energy.ca.gov/2013_energypolicy/documents/demand-forecast_CMF/mid_case/ (accessed June 6, 2015), and Additional Achievable Energy Efficiency (hereinafter AAEE) forecasted savings, added individual utility's mid-case AAEE together, http://www.energy.ca.gov/2013_energypolicy/documents/demand-forecast_CMF/Additional_Achievable_Energy_Efficiency/ (accessed June 6, 2015). Governor Edmund G. Brown, Jr., Inaugural Address, remarks as prepared, January 5, 2015, gov.ca.gov/news.php?id=18828 (accessed May 16, 2015). CEC, *California's 2030 Climate Commitment: Double Energy Savings in Existing Buildings & Develop Cleaner Heating Fuels by 2030*, 2015, www.energy.ca.gov/commission/fact_sheets/documents/Fact_Sheet_-_Energy_Efficiency.pdf (accessed May 16, 2015). Governor Edmund G. Brown, Jr., Executive Order B-30-15 (California, 2015), https://www.gov.ca.gov/news.php?id=18938 (accessed May 16, 2015).

3 **Source for electricity savings:** CEC, *California Energy Demand 2014–2024*. CARB, *Climate Change Scoping Plan*. **Source for CO_2:** Energy and Environmental Economics (E3), *Developing a Greenhouse Gas Tool for Buildings in California*, p. 11 (mean of marginal emission intensities for electricity = 0.51 metric ton CO_2/MWh); p. 39 (on-site natural gas emission intensity = 117 lbs CO_2/ MMBtu), ethree.com/GHG/GHG%20Tool%20for%20Buildings%20in%20CA%20v2%20April09.pdf (accessed June 5, 2015). 117 lbs CO_2/MMBtu converts to 0.00531 metric ton CO_2/therm using 1 therm = 0.1 MMBtu. **Source:** U.S. Energy Information Administration (hereinafter EIA), "Frequently Asked Questions: What Are Ccf, Mcf, Btu, and Therms?" www.eia.gov/tools/faqs/faq.cfm?id=45&t=8 (accessed June 6, 2015); 1 lb = 0.0004536 metric ton. **Source for cars equivalent:** Calculation assumes 214,691 passenger vehicles driven for 1 year per million metric tons of carbon dioxide equivalent. Note that passenger vehicles include passenger cars, class 1 light trucks, and class 2 light trucks. CARB, *Emissions Factors Database* (EMFAC), run for 2014, www.arb.ca.gov/emfac/ (accessed June 6, 2015). 2009–2013 cumulative electricity savings were 16,804 GWh.

4 **Source for power plant emission factors:** CEC, *Estimated Cost of New Renewable and Fossil Generation in California*, Final Staff Report, CEC-200-2014-003-SF, March 2015, Table 52, p. 134, docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-03/TN203798_20150309T154237_Estimated_Cost_of_New_Renewable_and_Fossil_Generation_in_Califo.pdf (accessed May 16, 2015).

5 CEC, the California Public Utilities Commission (hereinafter CPUC), and the California Consumer Power and Financing Authority, *Energy Action Plan*, 2003, p. 4, www.energy.ca.gov/energy_action_plan/index.html (accessed May 16, 2015).

6 **Source for natural gas savings:** See Appendix 3: "Natural Gas Savings Sources. **Source for electricity savings:** See Appendix 2: "Electricity Savings Sources." **Source for CO_2:** E3, *Developing a Greenhouse Gas Tool for Buildings in California.* **Source for cars equivalent:** CARB *EMFAC Database*. **Source for calculating households (GWh):** EIA, *Electric Sales, Revenue, and Average Price,* Table 5a, 2013, http://www.eia.gov/electricity/sales_revenue_price/ and www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf (accessed May 16, 2015). 2013 average annual California household consumption was 6,684 kWh (557 kwh/month*12). U.S. Census Bureau, "American FactFinder," Community Facts, California, http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml (accessed June 5, 2015).

7 CEC, *California Energy Demand 2014-2024*. CEC, Total Electricity System Power, "2013 Total System Power in Gigawatt Hours," September 25, 2014, http://energyalmanac.ca.gov/electricity/total_system_power.html (accessed June 12, 2015).

8 **Source for historic electricity consumption:** EIA, *State Energy Database System* (SEDS), June 27, 2014, www.eia.gov/state/seds/seds-data-complete.cfm (accessed May 16, 2015). **Source for 2013 electricity consumption:** EIA, *Form 826 Monthly Utility Data* (October 2014), www.eia.gov/electricity/data/eia826/ (accessed May 16, 2015). **Source for population:** 1960-2012 population data is from EIA SEDS. 2013 population data from U.S. Census Bureau, www.census.gov/popest/data/state/totals/2013/index.html. **Source for electricity bills:** EIA, *2013 Average Monthly Bill—Residential*, www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf (accessed May 16, 2015). Calculation: California average monthly residential bill is $90.19 ($1,082.28 annually); U.S. average monthly residential bill is $110.20 ($1,322.40 annually). [110.20 – 90.19 = $20.01/month, or approximately $240/year] and [(90.19 –110.20)/110.20 = -18%]. Energy consumption per capita in California in 1973 = 6,711 GWh and 2013 = 6,704 GWh.

9 See Appendix 4: "Demand Savings Sources." Cumulative demand savings from utility programs exceeded 5,500 MW from 2003-2013. (5,891 MW/500 MW per power plant = 11.8 large power plants avoided).

10 CEC, *California Energy Demand Updated Forecast, 2015–2025*, 2014, Form 1.5b, compared the Mid Demand Baseline with Mid Additional Achievable Energy Efficiency Savings and without AAEE Savings, www.energy.ca.gov/2014publications/CEC-200-2014-009/CEC-200-2014-009-SF.pdf (accessed June 6, 2015). Expected savings reach 5,713 MW in 2025/500 MW = 11.4 large power plants avoided.

11 Appendix 2. EIA, *Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861*, www.eia.gov/electricity/data/eia861/ (accessed May 16, 2015).

12 EIA, *Electric Sales, Revenue, and Average Price.*

13 Appendix 3 and CEC, "California Residential Natural Gas Consumption," 1967–2012, *CEC Energy Almanac*, www.energyalmanac.ca.gov/naturalgas/residential_natural_gas_consumption.html (accessed May 16, 2015). The average California household uses 453 therms per year.

14 **Source for savings:** Appendix 2. **Source for emissions reductions and cars equivalent:** E3, *Developing a Greenhouse Gas Tool for Buildings in California.* CARB *EMFAC Database.* Based on publicly owned utilities' (POUs) cumulative energy savings of 3,413 GWh from 2006 through 2013 (POUs began officially reporting savings in 2006).

15 **Source for savings:** Low Income Oversight Board (hereinafter LIOB) and CPUC. Data compiled from multiple evaluated and verified savings reports and utility monthly Energy Savings Assistance filings: 2004–2005: CPUC, *Energy Efficiency 2006–2008 Interim Verification Report*, Resolution E-4272, Table 31: "RRIM Calculator Output with Positive and Negative Interactive Effects," 04-08 EM&V Adjusted EE Portfolio Savings. Annual savings numbers for 2004 and 2005 were calculated by scaling Low-Income Energy Efficiency (LIEE) cumulative totals for 2004–2008 from utility-reported annual LIEE. 2006–2013: Individual reports from liob.org/resultsqv.cfm?doctypes=10 (accessed May 21, 2015). Calculations based on cumulative energy savings of 634 GWh from 2004 through 2013 (low-income program savings not available for 2003). **Source for**

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."

16 American Council for an Energy-Efficient Economy (hereinafter ACEEE), *The 2014 State Energy Efficiency Scorecard*, Report Number U1408, October 2014, Appendix A, p.109, aceee.org/sites/default/files/publications/researchreports/u1408.pdf (access June 11, 2015).

17 Galen L. Barbose et al., *The Future of Utility Customer-Funded Energy Efficiency Programs in the United States: Projected Spending and Savings to 2025*, Ernest Orlando Lawrence Berkeley National Laboratory, January 2013, p. 10, footnote 11, emp.lbl.gov/sites/all/files/lbnl-5803e.pdf (accessed May 16, 2015).

18 **Source for electricity savings:** Appendix 2. Savings as a percentage of sales are calculated by dividing annual electric energy efficiency savings by annual electricity sales. **Source for energy sales:** CEC, "Electricity Consumption by Entity," Energy Consumption Data Management System (hereinafter ECDMS) Database, ecdms.energy.ca.gov/elecbyutil.aspx (accessed May 16, 2015).

19 **Source of annual investments:** IOUs' 2013 energy efficiency annual reports, accessed at http://eestats.cpuc.ca.gov/, Section 3: Expenditures, Table 3, eestats.cpuc.ca.gov > Regulatory > Filed Reports > choose "Annual Report" and "Program Cycle 2013-2015". POUs' 2013 investments are from CMUA's annual editions of *Energy Efficiency in California's Public Power Sector: A Status Report*, http://www.ncpa.com/policy/reports/energy-efficiency/ (accessed May 15, 2015). **Source for POU electric revenues:** EIA, *Electric Power Sales, Revenue, and Energy Efficiency Form EIA-861* (accessed May 16, 2015). **Source for IOU total revenues:** PG&E, 2013 Annual Report, p. 7, http://investor.pgecorp.com/files/doc_financials/2013/2013%20Annual%20Report%20-%20final.pdf. SCE, 2013 Annual Report, p. 23, http://www.edison.com/content/dam/eix/documents/investors/sec-filings-financials/AR_2013.pdf. SDG&E and SCE, Sempra Energy, 2013 Annual Report, p. 17, http://www.sempra.com/pdf/financial-reports/2013-annualreport.pdf.

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

21 CEC, "New Title 24 Standards Will Cut Residential Energy Use by 25 Percent, Save Water, and Reduce Greenhouse Gas Emissions," July 1, 2014, http://www.energy.ca.gov/releases/2014_releases/2014-07-01_new_title24_standards_nr.html (accessed June 6, 2015).

22 CEC, *Energy Innovation: Moving Toward a Clean Energy Future*, February 2014, p.4, http://energy.ca.gov/2014publications/CEC-500-2014-008/CEC-500-2014-008.pdf (accessed May 16, 2015).

23 Next 10, *2014 California Green Innovation Index*, 6th edition, 2014, p.14, http://next10.org/sites/next10.huang.radicaldesigns.org/files/2014 percent20Green percent20Innovation percent20Index.pdf (accessed May 16, 2015). **kWh data source:** EIA, "State Electricity Profiles," 2012, *Retail Sales + Direct Use*, http://www.eia.gov/electricity/state/california/index.cfm (accessed May 20, 2015) and "United States Electricity Profile 2012," http://www.eia.gov/electricity/state/unitedstates/index.cfm (accessed May 20, 2015). **Source for GDP:** Bureau of Economic Analysis, "Widespread but Slower Growth in 2013," June 11, 2014, Table 1, "Real GDP by State, 2010–2013," 2012 GDP, www.bea.gov/newsreleases/regional/gdp_state/2014/pdf/gsp0614.pdf (accessed May 16, 2015). California produces $7.44 for every kWh used; the national figure is only $3.98 per kWh including California, or $3.72 per kWh not including California.

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 is nearly $24 billion.

25 Next 10, *2014 California Green Innovation Index,* p.40.

26 Advanced Energy Economy Institute (hereinafter AEE) and BW Research Partnership, *California Advanced Energy Employment Survey*, December 2014, Figure 3, p. 5, info.aee.net/hs-fs/hub/211732/file-2173902479-pdf/PDF/aeei-california-advanced-energy-employment-survey-fnl.pdf (accessed May 16, 2015).

27 **Projected savings source:** Natural Gas Savings: CEC, California Energy Demand 2014-2024 (mid-case AAEE). Electricity Savings: CEC, California Energy Demand 2015–2025 Final Forecast (mid-case AAEE), January 14, 2015, http://www.energy.ca.gov/2014_energypolicy/documents/index.html#adoptedforecast (accessed October 13, 2015). CMUA, 2015 Energy Efficiency in California's Public Power Sector. Each forecast was scaled to project through 2030 and then doubled to calculate the estimated cumulative savings required to double efficiency by 2030. **2030 electricity demand source:** CEC, California Energy Demand Forecast 2016 - 2026, Preliminary Mid Demand Baseline Case, No AAEE Savings, Form 1.5a – Statewide, Electricity Deliveries to End Users by Agency (GWh), July 2015, http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-03/TN205236-3_20150703T141327_California_Energy_Demand_Forecast_2016___2026_Preliminary_Mid_De.xlsx (accessed July 15, 2015). CEC, 2015 IEPR Self-Generation Forecast, July 2015, http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-03/TN205241-6_20150703T154552_2015_IEPR_SelfGeneration_Forecast.ppt (accessed July 15, 2015). Statewide consumption in 2030 projected to be approximately 340,000 GWh (2026 data scaled to 2030). **2030 natural gas demand source:** CEC, California Energy Demand 2014-2024. "Natural Gas Planning Area and Sector Mid," Form 1.1 - State Natural Gas Planning Area (accessed July 15, 2015). Statewide consumption in 2030 projected to be 12,937 MMth (2024 data scaled to 2030).