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REPORT

POWERING FORWARD:

PUBLICLY OWNED UTILITIES ARE CRITICAL TO CALIFORNIA'S ENERGY EFFICIENCY PROGRESS

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Executive Summary

Publicly owned utilities (POUs) in California play a critical role in advancing energy efficiency. The 38 POUs that report electricity-savings data provide power to nearly one-quarter of the state's population. Our analysis shows that over the past 12 years, POU energy efficiency programs—which help people use less energy while getting the same or better services—have saved customers more than $4.3 billion in total on their electric bills, providing nearly $3 in benefits for every $1 invested after accounting for the $1.6 billion cost of the programs. These programs have also avoided more than 2 million metric tons of carbon dioxide emissions, equivalent to eliminating the harmful pollution emitted by more than 430,000 cars in one year.[1,2] However, there are still opportunities for all POUs to scale up efforts that will save even more energy and lower costs for their customers.

In 2017 alone, California's POUs reported that they helped customers save almost $850 million on electric bills (after accounting for the costs of the programs) and cut pollution equivalent to the annual emissions from more than 65,000 cars.[3,4] The POU programs also saved nearly 1,000 gigawatt-hours (GWh) of electricity, enough to power nearly all of the homes in Oakland for a year.[5] This is a 14 percent increase in electricity savings from 2016, more than five times the amount achieved in 2006, and the highest savings level to date.[6]

The POUs have a structure different from investor-owned utilities (IOUs). For example, POUs are owned by a local government body and overseen by elected or appointed councils and boards, whereas IOUs are private companies that are overseen by the California Public Utilities Commission (CPUC). As noted in Appendix 2, the Los Angeles Department of Water and Power (LADWP), the largest POU in the nation, provides electricity to approximately 1.5 million customers, while the smallest California publicly owned utilities may serve fewer than 400 customers.[7]

SINCE 2006, CALIFORNIA PUBLIC UTILITY ENERGY EFFICIENCY PROGRAMS:

SAVED CUSTOMERS **$4.3 BILLION ON THEIR ELECTRIC BILLS**

EQUAL TO $3 RETURN ON EVERY $1 INVESTED AFTER PROGRAM COSTS

SAVED ENOUGH ELECTRICITY TO POWER ALMOST

1 MILLION CALIFORNIA HOMES FOR 1 YEAR

AVOIDED **2 MILLION** METRIC TONS OF CLIMATE POLLUTION

EQUAL TO ANNUAL EMISSIONS FROM **430,000 CARS**

ELIMINATED POLLUTANTS THAT LEAD TO **COUGHING, WHEEZING & DECREASED LUNG FUNCTION**

CUT ELECTRICITY DEMAND BY MORE THAN **1,000 MW**

EQUAL TO AVOIDING **2 LARGE, 500 MW POWER PLANTS**

Regardless of structure, utilities are critical to achieving California's recently expanded and ambitious climate policies. Over the past several years, the state has committed to:

- Reducing greenhouse gas emissions to 40 percent below 1990 levels by 2030.[8]
- Doubling energy efficiency savings by 2030, as compared to projected savings published in the 2015 California Energy Commission's (CEC) demand forecast.[9]
- Becoming carbon neutral by 2045.[10]

All of California's utilities will play a key role in reaching those goals, in addition to supporting a healthy state economy and ensuring affordable and clean energy for all customers.

This report, an assessment of public power's energy efficiency progress since 2006, shows how POUs have advanced their energy-saving efforts over the past 12 years and outlines next steps to continue growing the benefits of energy efficiency. Although the POUs have been providing electricity-saving programs to their customers for decades, they only began formally reporting savings to the California Energy Commission (CEC) in 2006, pursuant to Senate Bill 1037.[11] Our analysis based on the POU reports shows that since then, the POUs have collectively:

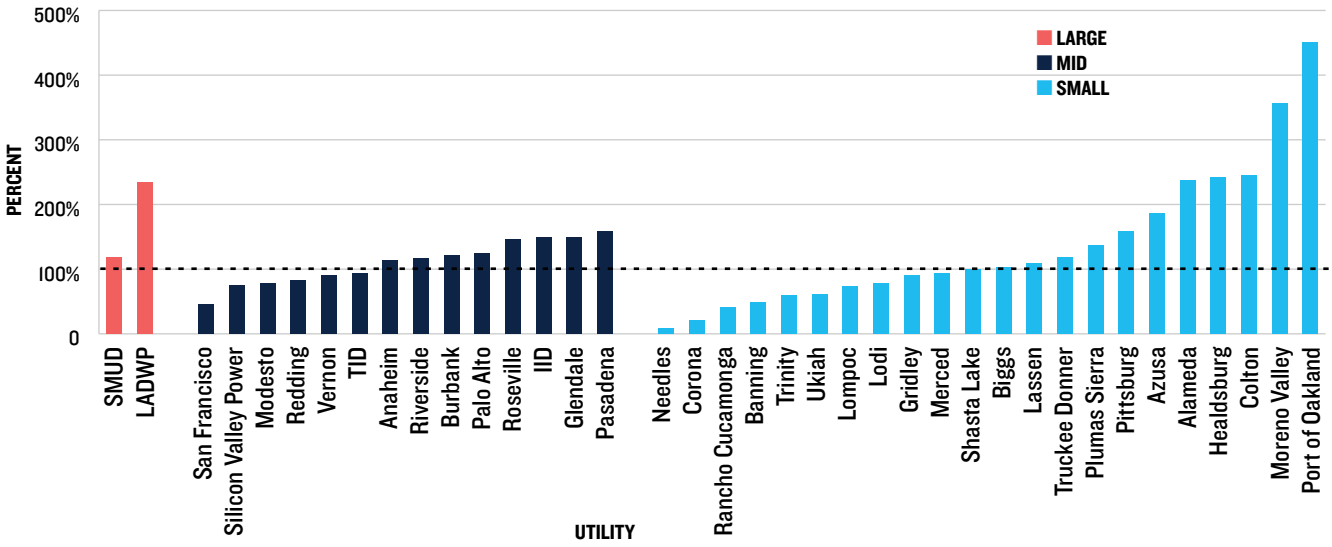
- Saved nearly 6,500 GWh of electricity, enough power to serve almost 1 million California homes for one year or more than enough power to serve the residents of San Diego, San Jose, and Bakersfield combined.[12,13,14]
- Eliminated the need for two large, 500-megawatt (MW) power plants.[15]
- Invested nearly $1.6 billion in these programs—four times the amount invested in 2006—which saved customers nearly $3 billion after accounting for the cost of the programs.[16]
- Eliminated harmful pollution associated with electricity production, including pollutants that contribute to health issues such as coughing, wheezing, and decreased lung function.[17]

The POUs have helped customers save electricity through a variety of energy efficiency programs, such as funding appliance rebates for the purchase of more efficient models, upgrading customer buildings with efficient windows and insulation, and providing energy-saving options to low-income customers free of charge.[18] Figure ES-1 shows that through these and other programs, more than half of the POUs met their average targets over the last three years, with many POUs of all sizes greatly surpassing expectations.

In 2017, the POUs set new 10-year electricity-saving targets that, if met, will save 8,000 GWh by 2027, enough electricity to serve 1.2 million households for one year, which is almost every home in Los Angeles.[19,20]

These efforts benefit all Californians. Smarter energy use decreases the need to burn fossil fuels to generate electricity, thereby cleaning our air, and aids in significant job creation for the state. More than 320,000 Californians have jobs related to energy efficiency and over half of them spend a majority of their time providing energy efficiency services.[21] Further, more than 70 percent of energy efficiency companies are small businesses, meaning that most of these jobs are local and benefit the area economy.[22]

FIGURE ES-1: AVERAGE POU 2014-2017 ELECTRICITY SAVINGS AS A PERCENTAGE OF AVERAGE 2014-2017 ENERGY EFFICIENCY TARGETS[23]



While the POUs have made substantial energy efficiency progress over the past 12 years, there are additional opportunities they can take to save customers even more money and significantly cut pollution. These include:

- Exploring new ways their programs can serve every customer.
- Making sure programs are evaluated periodically.
- Expanding services for low- and middle-income customers.
- Improving the current target-setting process by clearly defining which assumptions are being used to set targets and why.
- Assessing additional opportunities to capture energy savings over the next decade.

Further, if the POUs scale up to meet the national benchmark of aggressive energy savings—reaching electricity savings that equal 2 percent of electricity retail sales[24]—they collectively have the potential to save nearly *50 percent more* than what they currently adopted as their 10-year targets.

That would translate into saving even more money on energy bills, cutting enough electricity to meet the needs of 1.85 million households for one year (600,000 more than based on the current target), and reducing pollution equivalent to the annual emissions spewed by more than 800,000 cars (emissions avoided from 260,000 more cars than with the current targets).

Meeting these aggressive national savings benchmarks would undoubtedly require additional efficiency program budgets for the POUs and increased customer participation, which is highly variable depending on the utility. Further, while this metric is useful to assess progress across utilities, it does not tell the entire story about a utility's effort to reduce greenhouse gas emissions (e.g., through clean electrification of buildings and transportation) or to reach its customers, especially those that are harder to reach due to language, location, or income-level barriers.

Chapter 1 of this report covers the background of California's POUs and the landscape of the state's climate and energy laws; Chapter 2 reviews the progress that the POUs have made since 2006 and assesses their most recent 2018 status report, *Energy Efficiency in California's Public Power Sector: 12th Edition—2018*, summarizing 2017 electricity savings. Chapter 3 evaluates the savings targets set by each POU in 2017 for 2018–2027, and Chapter 4 offers recommendations to improve energy efficiency efforts.

This report covers the following utilities: Alameda, Anaheim, Azusa, Banning, Biggs, Burbank, Colton, Corona, Glendale, Gridley, Healdsburg, Imperial Irrigation District (IID), Lassen, Lodi, Lompoc, Los Angeles Department of Water and Power (LADWP), Merced, Modesto, Moreno Valley, Needles, Palo Alto, Pasadena, Pittsburg, Plumas Sierra, Port of Oakland, Rancho Cucamonga, Redding, Riverside, Roseville, San Francisco, Shasta Lake, Silicon Valley Power (SVP), Sacramento Municipal Utility District (SMUD), Trinity, Truckee Donner, Turlock Irrigation District (TID), Ukiah, and Vernon.

Note: All analyses in this report are based on publicly available data reported by the POUs in their annual energy efficiency status reports submitted to the CEC. The data have not been independently verified by NRDC.

Chapter 1: California's Publicly Owned Utilities

Energy efficiency—getting the same services such as lighting and cooling while using less energy—is the lowest-cost way to reduce harmful greenhouse gas emissions and a central strategy to achieve a clean energy future. As a result of efficiency programs, customers enjoy lower bills and all Californians experience healthier air and a thriving environment. Over the past several years, the state has expanded its climate goals to:

- Reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030.[25]
- Double energy efficiency savings by 2030, as compared to projected savings published in the 2015 California Energy Commission's (CEC) demand forecast.[26]
- Become carbon neutral by 2045.[27]

California's 38 publicly owned utilities (POUs), which supply about a quarter of the state's electricity needs, or as much power used in Nevada, New Mexico, and Hawaii combined, play an important role in advancing energy efficiency to ensure the state meets its ambitious environmental goals while also saving customers money.[28,29,30]

While POUs have offered energy efficiency programs for decades—such as providing rebates to customers who purchase more-efficient appliances or helping companies manage their energy better—since 2006 when POUs formally began reporting their progress, they have collectively:

- Saved nearly 6,500 gigawatt-hours (GWh) of electricity, equivalent to the annual electricity consumption of nearly 1 million California homes.[31,32] This is more than enough power to serve the residents of San Diego, San Jose, and Bakersfield combined.[33]
- Cut more than 2 million metric tons of climate-warming carbon dioxide pollution, which is equal to avoiding the carbon pollution from more than 430,000 cars for one year.[34,35]
- Reduced electricity demand by more than 1,000 megawatts (MW), enough to avoid the need for two large, 500-MW power plants.[36]
- Saved customers an impressive $4.3 billion on their bills, which translates into a savings of almost $3 for every $1 of investment, after accounting for the cost of the programs.[37]
- Eliminated harmful pollution associated with electricity production, including pollutants that contribute to health issues such as coughing, wheezing, and decreased lung function.[38]

Through efficiency programs, California's POUs achieved nearly 1,000 GWh of electricity savings in 2017 alone, their highest level on record and enough power to serve almost 150,000 California homes for a year.[39,40] These savings reduced POU customers' electricity bills by nearly $850 million in the same year, which is nearly $5 for every dollar invested after accounting for the cost of the programs.[41]

The POUs have made great progress since 2006, when they started formally reporting savings to the California Energy Commission and their customers, pursuant to Senate Bill 1037.[42] Still, there are additional feasible and cost-effective opportunities to help customers of every size or income level cut energy waste. This report summarizes energy efficiency progress since the POUs were legislatively mandated to report efficiency data and set annual targets in 2006.[43] It also offers recommendations on how POUs can sustain and increase their progress to meet the most recently set electricity-saving targets.

The successes of California POUs highlighted in this report also offer insights that are useful beyond the state. POUs of all sizes, geographic locations, and demographics are making progress, offering various models that public utilities nationwide can look to as they seek to increase efficiency programs.

POU COMPOSITION

There are 38 California POUs—varying in size, location, and customer makeup—that provided data for the 2018 status report, *Energy Efficiency in California's Public Power Sector: 12th Edition—2018*.[44] These are mapped in Figure 1. Most POUs are significantly smaller than their large investor-owned utility (IOU) counterpart in terms of electricity sales and the number of customers served, and they can be organized in various forms including municipal districts, city departments, irrigation districts, or rural cooperatives.[45] This report divides the POUs into three groups, based on their annual retail electricity sales, to better account for their differences.

FIGURE I: CALIFORNIA PUBLICLY OWNED UTILITIES[46]

Path: T:\Projects\CEC\Service Area\POU areas\CA_Electric_Public_Owned_Utilities_POUs.mxd

LARGE POUs: There are two large POUs, defined as utilities with annual retail sales of more than 10,000 GWh: the Los Angeles Department of Water and Power (LADWP) and the Sacramento Municipal Utility District (SMUD). LADWP is the largest municipal utility in the nation, serving nearly 1.5 million customers.[47,48] SMUD is one of the country's 10 largest POUs, providing three times as much power as the next-largest POU in California.[49] The two utilities combined account for about 55 percent of total POU electricity sales in California and supply about 14 percent of retail electricity sales statewide.[50]

MIDSIZE POUs: There are 14 medium-size California POUs, defined as utilities with annual retail sales between 700 GWh and 10,000 GWh. The 14 midsize POUs are Anaheim, Burbank, Glendale, Imperial Irrigation District (IID), Modesto Irrigation District, Palo Alto, Pasadena, Redding, Riverside, Roseville, San Francisco, Silicon Valley Power (SVP), Turlock Irrigation District (TID), and Vernon. The midsize POUs account for about 40 percent of POU sales and roughly 10 percent of retail electricity sales statewide.[51]

SMALL POUs: There are 22 small POUs, with annual retail sales of less than 700 GWh. The 22 small POUs are Alameda, Azusa, Banning, Biggs, Colton, Corona, Gridley, Healdsburg, Lassen, Lodi, Lompoc, Merced Irrigation District, Moreno Valley, Needles, Pittsburg/Island, Plumas Sierra, Port of Oakland, Rancho Cucamonga, Shasta Lake, Trinity, Truckee Donner, and Ukiah. The small POUs comprise about five percent of POU sales and less than 2 percent of statewide electricity sales.[52]

The POUs are geographically dispersed across California, resulting in different electric energy efficiency program portfolios depending on customers' various needs, such as how much cooling their homes need. Customer distribution also differs for each POU, with some utilities serving more residential users and others serving mostly nonresidential customers, such as industrial, agricultural, or commercial.[53] Local economic factors also play a role in efficiency decisions. Some POUs are located in areas with higher unemployment than average, such as the Imperial Irrigation District (IID), serving Imperial Valley in Southern California. IID serves the area with the state's highest rate of unemployment reaching 23.5 percent.[54] In contrast, POUs in the San Francisco Bay Area serve municipalities with unemployment levels well below average.[55] These geographic and demographic differences mean that efficiency programs must be tailored by each utility; what works for one POU's customers might not work for another.

Note: NRDC does not compare metrics between IOUs and POUs because they use different energy efficiency assumptions in their analyses and are subject to different policy rules and oversight structures (IOUs are overseen by the California Public Utilities Commission, while POUs are overseen by their individual governing board or city council). They also differ in the level of detail in their energy efficiency reporting and evaluations.

REGULATORY AND LEGAL INFRASTRUCTURE

Since many publicly owned utilities are small, they find it advantageous to belong to an association that will represent their interests before the California Legislature and the California Energy Commission (CEC). These associations also help manage electric power regulatory and reporting requirements and, for some, help provide power to customers.

- The California Municipal Utilities Association (CMUA) represents the POUs across the state and advocates on their behalf before legislative and regulatory agencies.[56]
- The Northern California Power Agency (NCPA) consists of 15 POUs from the northern portion of the state that collectively serve 600,000 customers.[57] NCPA owns and finances generation to provide power to its respective members. It also provides such services as coordinating energy efficiency efforts and offering advocacy support at the state and federal levels.
- The Southern California Public Power Authority (SCPPA) consists of 12 POUs that collectively serve 2 million customers in the southern portion of the state.[58] SCPPA develops generation and transmission projects, assists its members with related programs including energy efficiency, as well as provides regulatory and advocacy support similar to that of the other associations.

Each year the POUs submit one comprehensive status report to the CEC detailing energy efficiency achievements for the prior year, in compliance with Senate Bill 1037. The POUs also are required to submit 10-year electricity-saving targets to the CEC every four years pursuant to Assembly Bill 2021 and the subsequent Assembly Bill 2227.[59] As part of the *Integrated Energy Policy Report* (IEPR),[60] the CEC compares these annual achievements with the 10-year targets set by the POUs and offers recommendations to improve energy efficiency.[61] The information in the annual report is used to inform the CEC's statewide energy demand forecast and energy efficiency goals.[62]

Most recently, under Senate Bill 350, each POU with an average annual load greater than 700 GWh is required to create an integrated resource plan (IRP), which is a road map of how the utility will meet its customers' electricity needs as well as state goals, based on guidelines created by the CEC. The CEC evaluates the IRPs to ensure consistency with Public Utilities Code Section 9621, which requires the POU IRPs to meet California's 2030 renewable portfolio standards and greenhouse gas targets. The CEC may use the information from the IRPs to inform energy forecasting for the state, driving policy and regulatory decisions beyond the CEC.[63] However, unlike the California Public Utilities Commission (CPUC), which has broad regulatory powers over the IOUs, the CEC's role is more advisory since individual POUs are regulated by their local board or council.

The CEC set a statewide energy efficiency goal in 2017 to double energy efficiency savings compared to the savings predicted in the CEC's 2015 demand forecast, with consideration of feasibility and cost-effectiveness, as required by SB 350.[64] To develop that goal, the CEC considered targets for individual sectors, including the POUs.[65] POU local governing boards and councils continue to be responsible for establishing targets for their utilities, but these targets must now take into consideration the CEC's statewide goal.

ENERGY EFFICIENCY POLICY TIMELINE

While POUs have offered energy efficiency programs for many years and have been increasing electricity savings over the past decade, the following laws influenced POUs to take even more aggressive and comprehensive efforts.

1996

INVESTING IN PUBLIC BENEFITS

Assembly Bill (AB) 1890, which became law in 1996, required that all utilities collect a public-benefits charge to invest in cost-effective energy efficiency, low-income customer assistance programs, and other energy-related projects such as research, development, and demonstration, as well as renewable resource development. This requirement was then extended by Senate Bill (SB) 1194 and AB 995, both passed in 2000.[66]

2005

PRIORITIZING ENERGY EFFICIENCY

The passage of SB 1037 put energy efficiency at the top of the loading order, requiring utilities (both public and private) to first capture all energy efficiency that is cheaper than other sources of energy to help meet their customers' needs.[67] The law also requires that the POUs produce an annual report describing their efficiency programs and investments as well as reported and projected savings.[68] In March 2018, the POUs submitted their 12th annual report to the CEC.[69]

2006

SETTING EFFICIENCY TARGETS

AB 2021 required the POU governing boards to set 10-year energy-saving targets with the aspirational goal of reducing forecasted electrical consumption by 10 percent over those 10 years. These targets are based on studies of possible future cost-effective energy savings and are revisited every four years per AB 2227, which passed in 2012.[70] In addition, AB 2021 expanded the role of the CEC, calling on it to analyze and provide recommendations to the POUs on the energy-saving targets and reported accomplishments.[71]

2006

LOWERING GREENHOUSE GAS EMISSIONS

California adopted the Global Warming Solutions Act, AB 32, which requires the state to reduce greenhouse gas emissions to 1990 levels by 2020.[72] The California Air Resources Board, responsible for designing and implementing policies to meet this goal, adopted a Scoping Plan in 2008 (with an update in 2014) calling for energy efficiency as a substantial portion of the solution.[73,74]

2009

IMPROVING ENERGY EFFICIENCY IN ALL EXISTING BUILDINGS

The California Legislature passed AB 758, which required the CEC, in collaboration with the California Public Utilities Commission (CPUC) and stakeholders, to develop a comprehensive plan to achieve greater energy efficiency in the state's existing buildings. The CEC's 2016 update to this plan adds additional efficiency-related strategies, such as improving workforce quality and expanded financing strategies.[75]

2015

PUSHING FOR GREATER EFFICIENCY AND RENEWABLE ENERGY

Adopted in October 2015, SB 350 calls on California to double its energy efficiency savings as compared to expectations published in the 2015 CEC demand forecast and increase the amount of electricity produced from renewable resources to 50 percent by 2030.[76] Additionally, utilities (public and private) with average annual sales greater than 700 GWh are required to submit a plan to the CEC each year that demonstrates how they will prioritize low greenhouse gas energy resources to meet their customers' needs. SB 350 also authorized a study that developed recommendations for how to address existing barriers that limit the ability of low-income customers to access energy efficiency, renewable energy, and zero-emission transportation programs.[77,78]

2015

CAPTURING ALL AVAILABLE ENERGY SAVINGS

AB 802 was passed in the same year as a companion to SB 350. AB 802 requires energy usage benchmarking for large buildings across California and requires the establishment of an "existing baseline" of current energy usage to ensure that efficiency programs aim to bring existing buildings up to current California energy efficiency code and beyond. The bill also authorizes the utilities to develop programs to reduce energy use through operational and behavioral improvements.[79]

2016

LOWERING EMISSIONS AND INCREASING EQUITY

In 2016, the California Legislature pushed its emissions reduction goals even higher by passing SB 32, which calls on the state to lower emissions by 40 percent below 1990 levels by 2030. SB 32's companion bill, AB 197, provides additional legislative oversight and prioritizes lowering emissions in low-income and disadvantaged communities.[80]

ENERGY EFFICIENCY PROGRAMS

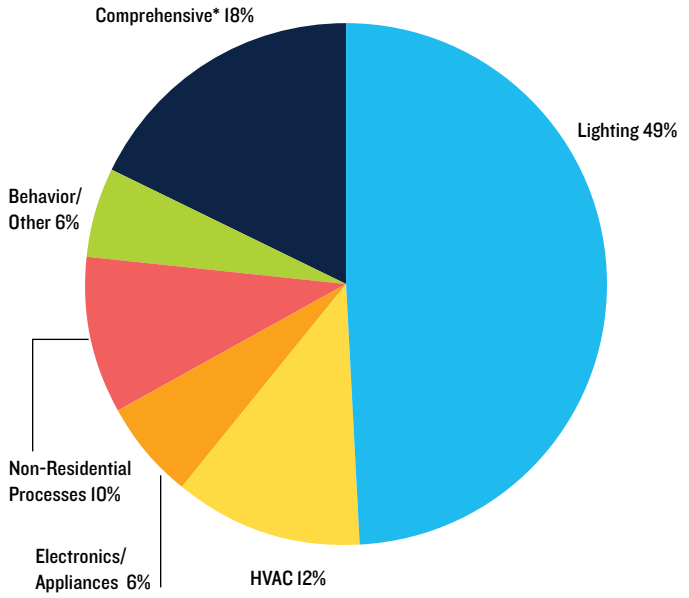
Well-designed energy efficiency programs save customers money, reduce electricity load, and cut dangerous climate pollution. However, despite the benefits, utility customers still face numerous market barriers that prevent them from adopting energy-saving measures.

Some of these barriers include inadequate information, limited time or interest to evaluate efficiency opportunities, or a lack of local stores with efficient product options. Industrial customers may lack access to sufficient capital to retire inefficient equipment early or face competing demands for that capital to make structural improvements or replace major pieces of equipment. Furthermore, many decisions about energy efficiency are made by people who do not pay the utility bills. For example, landlords may not have the motivation to make their properties more efficient if renters are the ones paying for electricity.

Successful energy efficiency programs are designed to help customers overcome these barriers, taking into account the varying circumstances of each utility's service area and demographics. As shown in Figure 2, electric energy efficiency programs target the numerous ways customers use electricity (e.g., lighting, cooling, running appliances or motors, and powering industrial processes) and employ a variety of strategies to cut electricity waste, including (but not limited to):

- Audits of customers' buildings to provide recommendations for cost-effective upgrade options.
- Rebates to customers for purchasing and installing energy-efficient products (e.g., efficient lighting) or for retiring inefficient products early (e.g., refrigerators or air conditioners).
- Partnerships with contractors, retailers, wholesalers, and manufacturers to ensure energy efficiency products are offered and available to consumers.
- Incentives and information for property managers and owners of multifamily rental properties to upgrade their buildings with more efficient options.
- Direct installs of energy-efficient products in customers' buildings.
- Public awareness programs.

FIGURE 2: POU 2017 ENERGY EFFICIENCY PROGRAMS BY END USE



* Residential and nonresidential comprehensive savings are typically from packages of certain measures or systems (e.g., plug load and lighting controls being used and incentivized together).

The set of programs that a utility offers will help customers lower their energy bills and provide the cheapest way for utilities to deliver electricity. This is because as electricity demand lessens, utilities can buy less of the more expensive power to serve their customers. Programs also ensure improved quality of life for customers by increasing comfort and health; this is especially true for lower-income customers who could not otherwise afford to make such upgrades.

However, participation in any or all of these programs is ultimately decided by customers. Economic conditions, environmental tendencies, or other factors may influence the ability or willingness of customers to participate. Unfortunately, even when a program covers 100 percent of the cost to a business or household, customers still may be be unwilling to participate. For instance, participation may require a business to temporarily shut down production, which may be considered too costly or inconvenient in the short-term regardless of the potential long-term benefits.

These challenges highlight the importance of finding new ways to provide energy efficiency services. These may include bundling efficiency programs with other clean energy options (e.g., solar power and electric vehicles) and exploring additional partnerships to reach customers, such as LADWP's Memorandum of Understanding with Southern California Gas to promote joint programs.[81]

Chapter 2: Public Power Efficiency Achievements to Date

Over the past decade, California's POUs have made significant progress toward capturing all cost-effective energy efficiency savings. This has provided monetary benefits for both customers and the economy while cutting energy waste that contributes to the harmful pollution driving climate change. This section analyzes the POUs' energy efficiency performance based on four metrics: electricity savings, efficiency investment, benefit-cost assessment, and customer benefits, which is also summarized in Appendix 1.

ELECTRICITY SAVINGS

From 2006 through 2017, POU efficiency programs saved nearly 6,500 GWh of electricity and its associated emissions, the equivalent of cutting the pollution emitted from more than 430,000 cars for one year.[82,83] The reported savings that were achieved in 2017 were more than five times those achieved in 2006.[84] POU efficiency programs from 2006 through 2017 also avoided more than 1,000 MW of electricity demand, eliminating the need for at least two large, 500-MW power plants.[85] NRDC uses the following metrics to assess progress on energy efficiency savings:

- Change in electricity savings over time, which indicates whether the utility is increasing or decreasing progress.
- Electricity savings due to energy efficiency programs as a percentage of electricity sales, which indicates how aggressively a utility is pursuing electricity savings and normalizes progress across utilities of varying sizes.

These metrics often are used to assess progress across utilities but they may not tell the entire story about a utility's effort to reduce greenhouse gas emissions or to reach its customers. For example, many POUs are small, and a choice by one large nonresidential customer to participate in the program (or not) could dramatically alter the savings for that year. In addition, energy efficiency gains in a portion of a POU's territory that has a constrained electricity system would provide customers with substantial benefits beyond those captured by these metrics, such as avoiding potential blackouts during peak consumption periods and deferring costly investment in expanding or replacing electric infrastructure.

Furthermore, since solar energy is abundant during the midday and afternoon hours but less so in the evening, many POUs are shifting their daily, seasonal, and annual loads away from the time of highest customer use, which is now the evening hours when the sun no longer produces electricity. Such efforts are critical to ensure an affordable, reliable, and environmentally sound power system but are not captured in many traditional metrics used to assess energy savings progress.

Another consideration when using these metrics is the increase of electric vehicles (EVs) in the market as a key strategy to reduce the state's greenhouse gas emissions. More EVs on the road will require more electricity, which could skew metrics such as electricity savings as a percentage of electricity sales (e.g., in a given year, sales could increase at a greater rate than savings, and this could be construed as a decline in progress). While savings as a percentage of sales continues to be a metric of interest in the industry and one used in this report, it is also important to consider other aspects of a utility's portfolio, including the utility's impact on reducing greenhouse gases and reaching underserved customers who need efficiency the most.

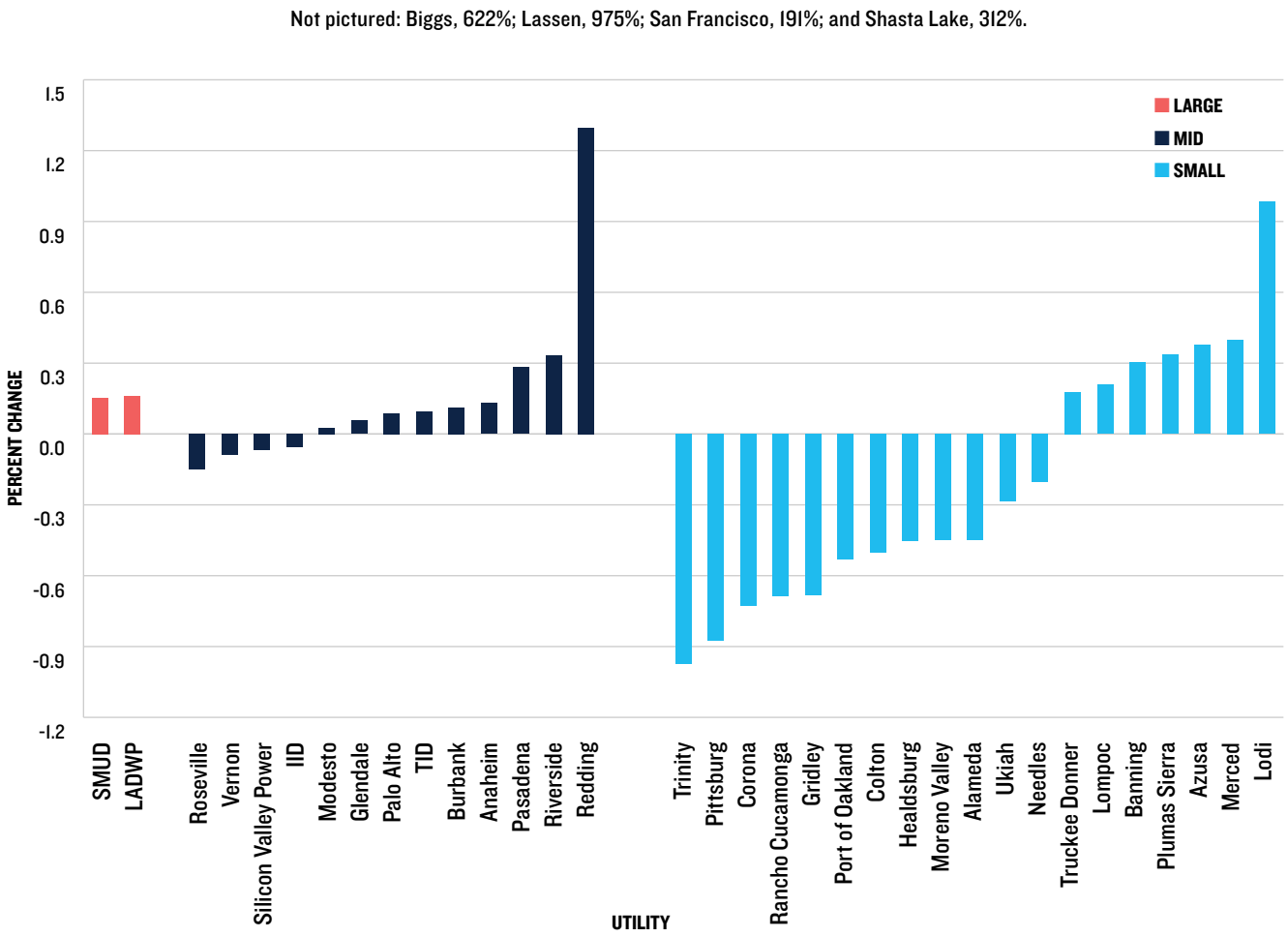
CREATIVE COLLABORATION

The Los Angeles Department of Water and Power (LADWP) and Southern California Gas Company (SoCalGas), an investor-owned utility, have an innovative partnership that allows overlapping customers to access efficiency incentives for electricity, water, and natural gas savings via a single contact. By reducing the number of calls it takes to sign up for programs, customer participation has increased dramatically.

This collaboration allows for large efficiency projects, such as a successful initiative to achieve deep energy and water savings at Park La Brea, the largest multifamily housing complex in Southern California. Through a streamlined single-point-of-contact approach, SoCalGas enrolled the complex in an array of utility efficiency programs administered by SoCalGas and LADWP. The utilities offered rebates for measures such as heating and hot water equipment, low-flow water fixtures, more efficient lighting options, as well as improvements to the building envelope. The effort helped residents of Park La Brea reduce gas load by 15 percent, cut water usage by more than 10 percent, and decrease CO_2 emissions by 17 percent.

This collaborative model is easily replicable and should be looked to as an example of how to expand opportunities for customers, reduce duplication of overlapping utilities, and join forces to meet California's ambitious climate and equity goals.

FIGURE 3: CHANGE IN GROSS ELECTRICITY SAVINGS FROM 2016 TO 2017[86]



Changes in Electricity Savings

Figure 3 shows the change in savings, by utility, between the 2017 POU status report (covering 2016 savings) and the 2018 POU status report (covering 2017 electricity savings). In sum, POUs saved 14 percent more electricity in 2017 than they did in 2016.[87] However, four midsize and 12 small utilities saw decreased electricity savings.

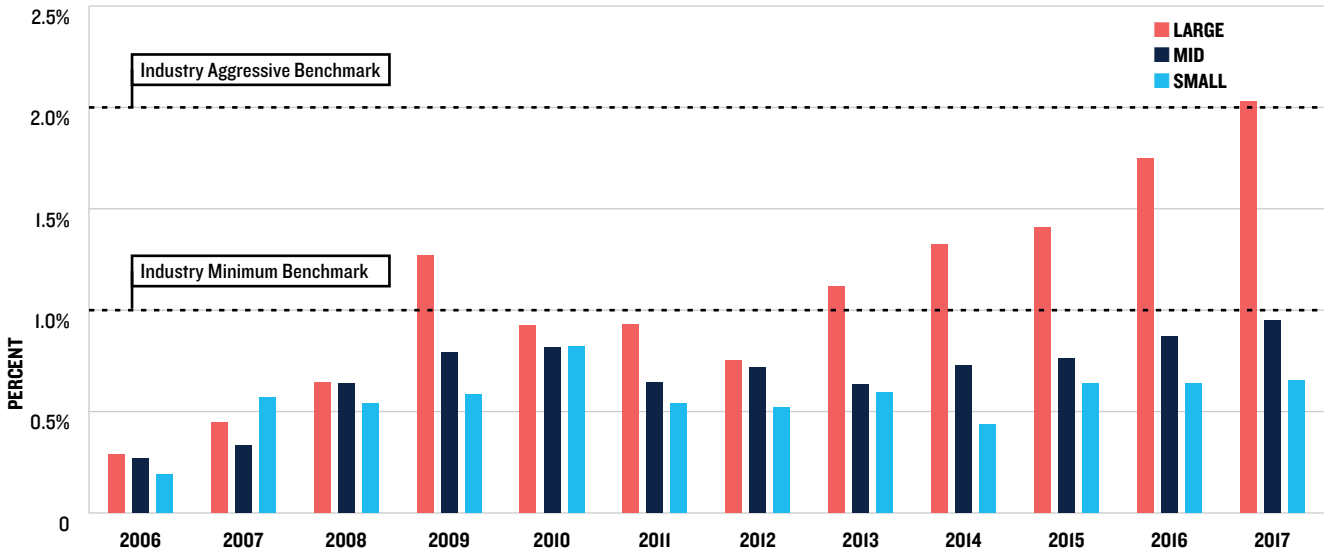
Savings as a Percentage of Electricity Sales

Evaluating savings as a percentage of retail electricity sales assesses electricity savings across utilities and normalizes for the size of the POU. A higher percentage means the utility is conducting more energy efficiency activity relative to other utilities. The American Council for an Energy-Efficient Economy (ACEEE) uses this metric when assessing state energy efficiency efforts in its annual *State Energy Efficiency Scorecard* publication.[88]

According to ACEEE, the benchmark for the most aggressive level of savings has grown over time. It was set originally at 1 percent of utility electricity sales in 2009, increased to 1.5 percent in 2011, and reached 2 percent in 2014, where it remains.[89] This report uses the benchmark of 1 percent as the floor for where energy efficiency efforts should be at a minimum, and 2 percent as a benchmark for aggressive efforts. While there are other considerations, such as customer interest in participating in programs or increases in EV deployment, metrics to evaluate these efforts are not readily available. Therefore, we continue to evaluate programs using multiple metrics, including savings as a percentage of sales.

As shown in Figure 4, the large POUs have surpassed 1 percent of sales for the past five years, and in 2017 they met the benchmark of 2 percent for the first time. On average, the small and midsize POUs have yet to reach the ACEEE minimum benchmark for achieving strong efficiency progress but have increased their percentages over the past several years.

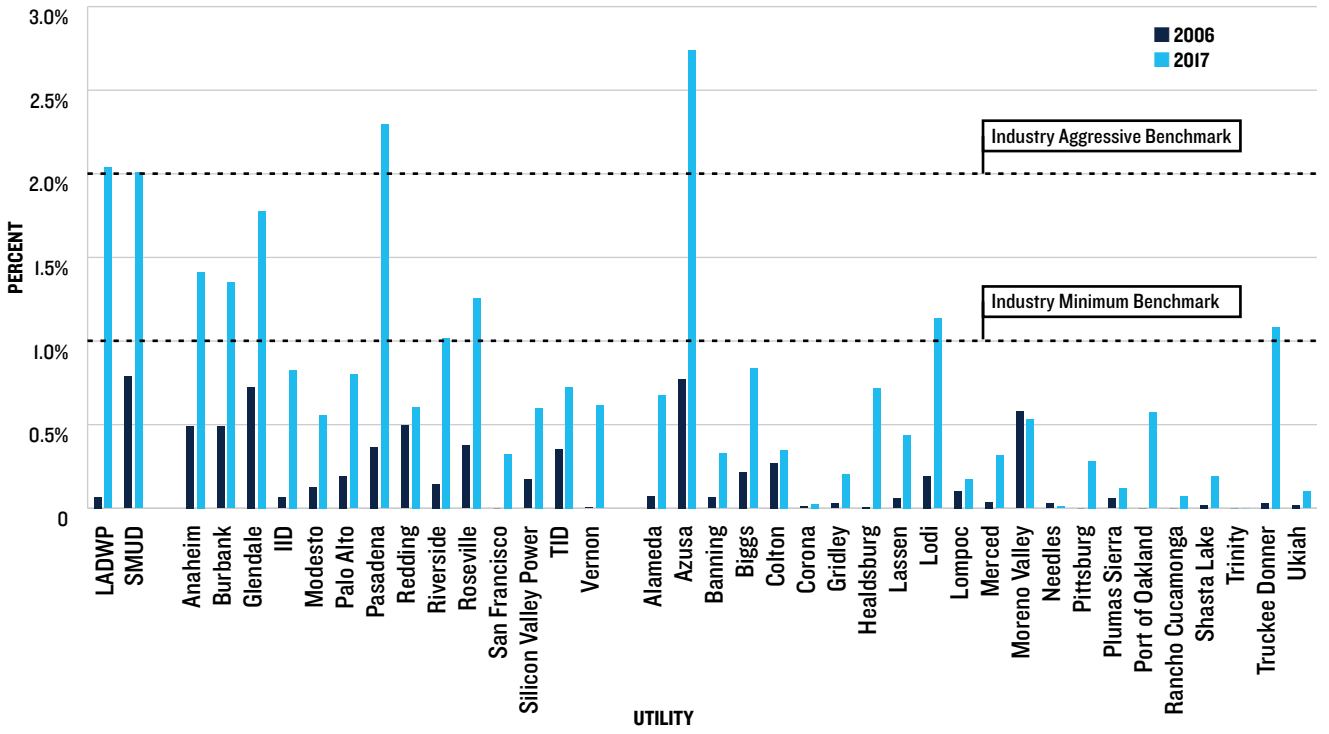
FIGURE 4: ANNUAL ELECTRICITY SAVINGS AS A PERCENTAGE OF RETAIL ELECTRICITY SALES[90]



The dashed lines represent the benchmark set in 2009 for aggressive savings, 1% of sales, and the benchmark set in 2014 for aggressive savings, 2% of sales

Overall, the POUs saved 1.5 percent of average retail electricity sales. While this is the highest level for the POUs to date, it is still below the ACEEE benchmark of 2 percent for aggressive electricity savings as described above. To further assess progress at saving energy, Figure 5 compares 2017 results for individual utilities with their efforts in 2006. Nearly all POUs show extensive improvement in savings as a percentage of sales since they began reporting data to the CEC.

FIGURE 5: 2006 VS. 2017 REPORTED SAVINGS AS A PERCENTAGE OF RETAIL ELECTRICITY SALES[91]



INVESTMENT IN EFFICIENCY

Continued investment from the POUs has helped provide lasting economic benefits in their communities. The POUs have reported investments of almost $1.6 billion since 2006, with benefits to customers approaching $3 billion after accounting for the cost of the programs, a return of nearly $3 for every $1 invested.[92] This funding results in substantial savings on customer bills. It also stimulates the local economy by putting money in customers' pockets to spend on things like retail and entertainment, which creates jobs to serve the higher demand for these and other services.

In 2017 alone, POUs invested more than $220 million in efficiency programs, 46 percent more than in the previous year, to help their customers save energy.[93] This is the highest year's worth of POU investments on record in California and more than four times the amount invested in 2006.[94] While each size category of utility collectively scaled up efficiency investments in 2017, eight POUs reduced investments by more than 10 percent.[95] Continually increasing investments in efficiency whenever it is less costly than an alternative resource will save more money for POU customers and help the state meet its ambitious climate goals.

Investments as a Percentage of Revenue

Evaluating investment as a percentage of revenue assesses utility energy efficiency investment and allows a more accurate comparison across utilities of different sizes. ACEEE uses this metric in addition to savings as a percentage of sales when it assesses state energy efficiency efforts in its annual *State Energy Efficiency Scorecard*.[96] According to ACEEE, the benchmark for the most aggressive level of savings has grown over time. It was set originally at 2 percent in 2009, increased to 2.5 percent in 2011, and reached 4 percent in 2014, where it remains.[97] This report uses the benchmark of 2 percent as the floor for determining the minimum level of investment to advance efficiency efforts and a 4 percent benchmark to assess whether investment efforts reached aggressive levels.

As with the previous metric of savings as a percentage of sales, reported investment is dependent on customer participation. While such a metric can often indicate a level of commitment to pursuing efficiency (i.e., more investment often indicates more effort), as noted before, it alone cannot clearly delineate the efforts of a POU. Furthermore, investment by itself does not indicate a quality or successful program portfolio since it is possible to invest a lot of money without achieving proportional energy savings.

However, there are times when it is appropriate to invest in programs that do not necessarily yield direct electricity savings, or at least none that are currently counted in the benefit-cost ratio. For example, it is increasingly important to invest in education, workforce training, low- and middle-income customer programs, and efforts to reach those communities that may be harder to access due to factors such as language barriers or geographic location (e.g., rural). These programs provide substantial benefit to customers and help advance energy efficiency. Regardless, it is critical that investments in those energy-saving programs intended to cut waste be as successful as possible.

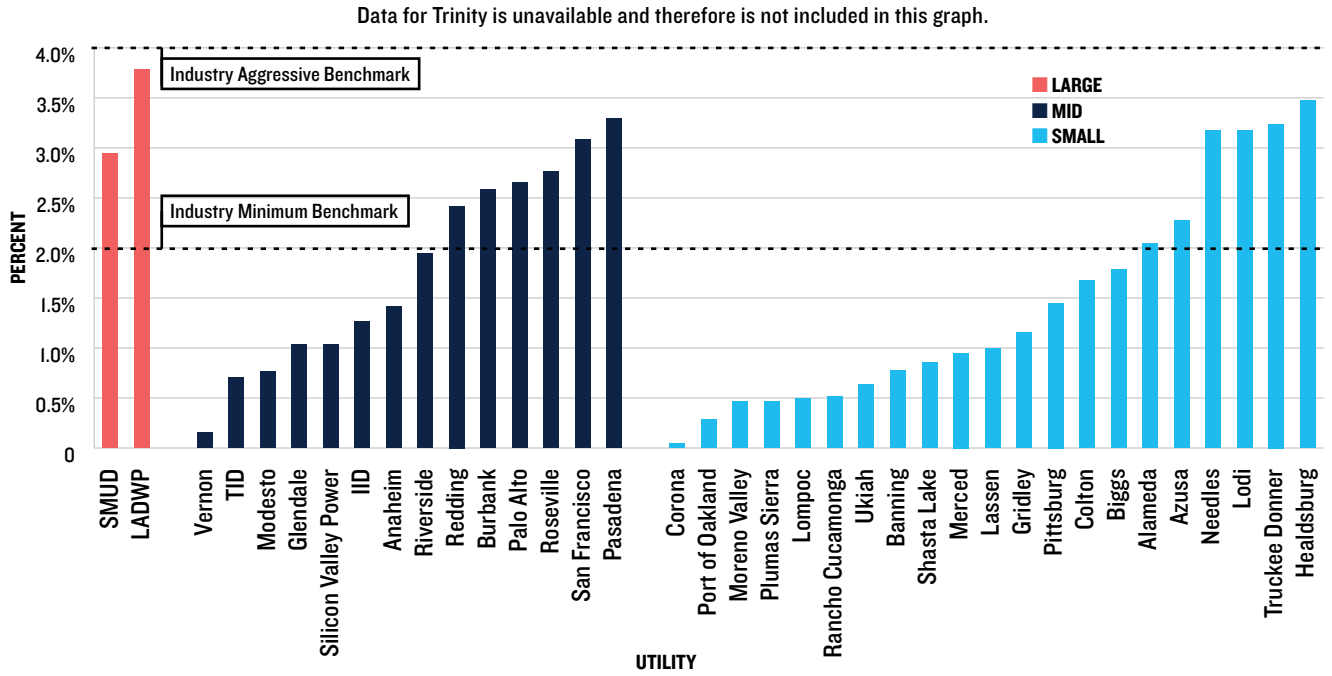
In 2017, California POUs collectively invested nearly 3 percent of revenues in energy efficiency, below the 4 percent threshold that marks the industry standard for aggressive investments but the highest amount to date.[98] As shown in Figure 6, only 14 POUs reached the minimum benchmark.

COMPLETE ENERGY SOLUTIONS

Like many other utilities, the Sacramento Municipal Utility District (SMUD) had struggled to get small and medium-size businesses to participate in energy efficiency programs. Many businesses are too small to have dedicated account representatives that can manage energy efficiency program enrollment and implementation, and business types span a wide range. Given these circumstances, the only viable option for many small businesses had been a simple program that installs a standard set of energy-saving equipment, like lighting, but does not take into account the unique situation of a particular business.

SMUD was interested in a model that was more appealing, encouraged customer engagement, and could spread funding over a greater number of customers and products. SMUD therefore developed the Complete Energy Solutions (CES) program. Unlike direct-install initiatives that cover 100 percent of the cost, this program requires a co-pay (approximately 25 percent of the project cost) from customers, which allows SMUD to invest more funding in additional products to offer a broader range of services, such as a customized energy audit, a dedicated project management team, as well as installation and rebate processing. Since 2013, over 1,670 projects that were completed in the program saved more than 1,000 customers over 65 gigawatt-hours in first-year savings.

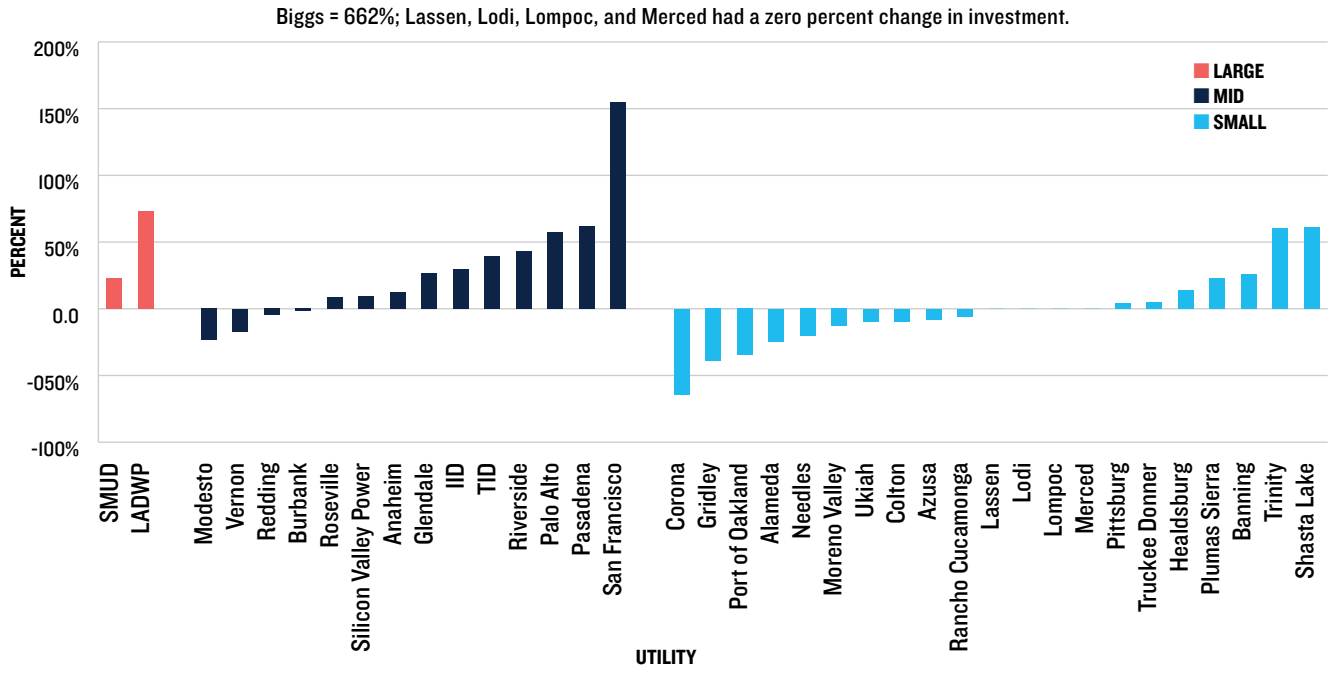
FIGURE 6: 2017 INVESTMENT IN ENERGY EFFICIENCY AS A PERCENTAGE OF 2016 REVENUE[99]



Changes in Investment Levels

Although examining changes in investment in efficiency programs over time is useful (as shown in Figure 7), it is important to note that utilities that have been increasing investments over the past several years may not be able to further increase investments as substantially as those utilities that have not traditionally invested significant funds. Therefore, changes in investments for a single year should be considered in conjunction with the other metrics in this report and should be reviewed over time to assess trends and investment patterns. However, as will be discussed in the cost-effectiveness section, wherever utilities have a highly cost-effective portfolio, there continues to be value in increasing investment to capture additional savings and expand offerings to those customers who need them the most.

FIGURE 7: PERCENTAGE CHANGE IN INVESTMENT FROM 2016 TO 2017[100]



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ENERGY EFFICIENCY FOR LOW-INCOME AND DISADVANTAGED CUSTOMERS

Low-income households, defined as earning no more than 200 percent of the Federal poverty level (i.e., $32,000 for a family of two) face unique barriers to accessing energy efficiency offerings. These include low home-ownership rates, aged housing stock, lack of capital, and lack of credit. In addition, nearly 50 percent of low-income Californians live in multifamily rental apartments, adding an additional set of challenges since the residents paying the utility bills are not in charge of making appliance upgrades and other efficiency choices.[101] However, low-income customers also have the most to gain from energy efficiency as they spend a larger share of their incomes on energy than households in other income brackets.[102]

Even with bill assistance—where POUs provide a substantial discount for qualifying low-income customers—the higher energy burden forces low-income customers to make tradeoffs between paying electric bills and buying other necessities. They also deal with a disproportionate risk of utility service disconnection and are subject to the health risks associated with poor ventilation and insufficient heating or cooling.[103] SB 350 took steps to begin addressing this issue, calling on the CEC to assess barriers for low-income customers to energy efficiency and weatherization investments.[104] As California begins to seriously address the energy concerns of its disadvantaged communities, it is important for the POUs, which provide approximately one-quarter of the state's electricity, to participate in these efforts. In addition, reducing the overall electricity needs of this population not only improves their standard of living but also reduces the amount of money POUs need to provide in bill discounts, funding that can be used for other things such as investing in more efficiency programs.

For the first time this year, the California POUs reported a line item for programs dedicated to low-income efficiency and multifamily buildings. However, the reported data in this category do not represent all savings attributable to low-income customers as they may also participate in mainstream programs without indicating their income level.[105]

ENERGY EFFICIENCY BENEFITS

Energy efficiency offers substantial benefits beyond reducing harmful greenhouse gas emissions. Programs also create significant savings for customers, put more money into the economy, create jobs, and provide numerous health benefits.

The Cheapest Electricity Resource

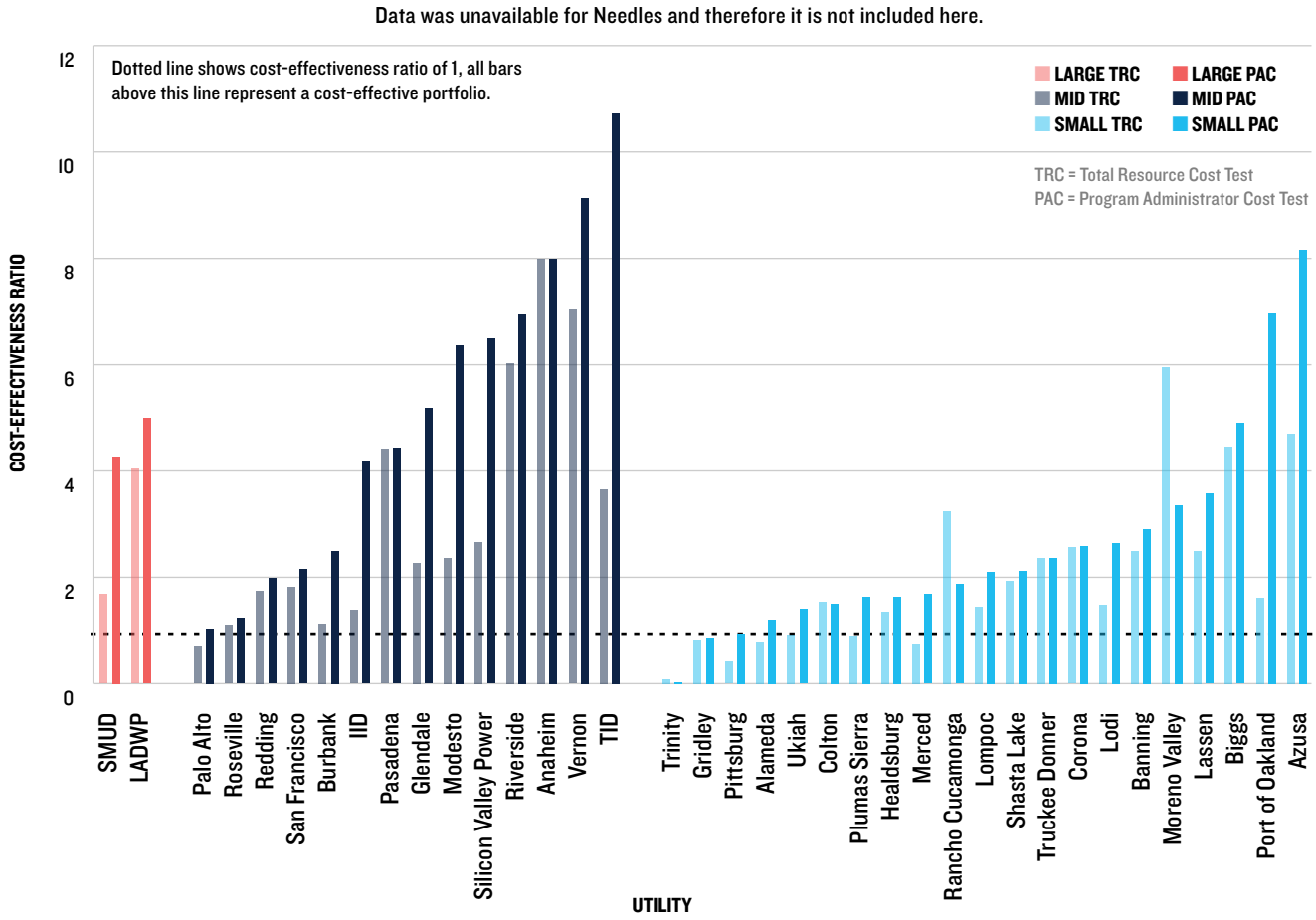
Energy efficiency continues to be the most affordable route to a clean energy future. Overall, POU programs spent only about 4 cents for every kilowatt-hour of electricity saved.[106] This is significantly cheaper than the cost of procuring conventional power sources and consistently provides greater benefits than costs.[107]

To determine whether a program is cost-effective, the utilities conduct two primary benefit-cost tests: one that looks only at the utility's costs and benefits (the program administrator cost test, or PAC) and one that measures the costs and benefits to participating customers as well as the utility (the total resource cost test, or TRC). Since TRC ratios include both utility and customer costs without a clear assessment of corresponding customer benefits beyond energy savings, they tend to be lower than PAC ratios. As long as the full portfolio of programs has a PAC benefit-cost ratio greater than 1.0, investing in energy efficiency is cheaper than using conventional power to meet customers' electricity needs. While the TRC provides important information regarding the overall program investment, the PAC is ultimately the test that determines whether investing in energy efficiency is cheaper for the POU than investing in other energy sources.

In 2017, POUs reported a collective TRC for energy efficiency programs of 3.5 and a collective PAC of nearly 5.0. This means that for every dollar invested, the return on investment was $3.50 when measured by the TRC and $5 when measured by the PAC, demonstrating highly cost-effective portfolios. As shown in Figure 8, most utilities have ratios substantially above 1.0.

While these data are important to analyze, it also is essential to individually evaluate the situation for each POU. For example, in some territories there may be opportunities to expand successful programs or add new ones, while in others it may be critical to first assess barriers to expansion and determine what would motivate customers to participate, especially if historical participation rates are low. For example, instead of adding new rebate programs, utilities could consider expanding technical assistance and education in areas where monetary incentives alone are not sufficient to increase participation. Alternatively, they could provide additional behavior programs and increase customer outreach.

FIGURE 8: 2017 BENEFIT-COST RATIO[108]



In addition, achieving high cost-effectiveness allows utilities to increase investments in less cost-effective programs, such as emerging approaches to delivering efficiency, workforce training to ensure products are installed correctly, direct-install programs that reach middle-income customers, or education and installation programs that aim to improve the standard of living for disadvantaged customers. Determining how to advance efficiency while staying cost-effective is a challenge for all utilities, public and private. This could be an avenue of increased collaboration across utilities as well as with local partners to ensure that each POU is able to reach as many customers and save as much energy as possible while continuing to be cost-effective.

Monetary Savings

Net benefits are measured by assessing the costs of the programs as compared with their benefits. The specific test used (e.g., TRC or PAC) depends on which perspective is being evaluated. Regardless of the test applied, the POU-reported data show that using energy efficiency will lower the cost of providing electricity system-wide, resulting in lower electricity bills for all customers since relying on efficiency means the POU does not have to purchase more expensive electricity sources to meet its customers' needs.

Since 2006, the POUs have saved significant money for their customers in the form of lower electricity bills. While the amount of savings fluctuates from year to year, the overall trend shows that POU customers of all sizes consistently save hundreds of millions of dollars each year. POU-reported savings indicate that since 2006 California POU energy efficiency programs have saved customers a total of almost $4.3 billion, and more than $1 billion in 2017 alone.[109]

Non-Energy Benefits

There are a number of benefits from energy efficiency programs that are not quantified but improve quality of life. For example, investing in energy efficiency lowers emissions from electric power generation, keeping toxic pollutants out of the air and reducing the risk of respiratory ailments.[110] This is especially important in California, home to six of the ten counties in the United States with the most ozone smog, a major contributor to asthma.[111] Reducing

emissions is also critical in the fight against climate change, which increases the frequency and severity of extreme weather events like droughts, storms, and heat waves.

At a more localized level, energy efficiency can improve living quality in individual homes. Specifically, a whole-building approach to energy efficiency can improve thermal quality and indoor air quality, as well as reduce dampness and therefore mold. These effects are all associated with health improvements in residents.[112] Furthermore, energy efficiency measures and the accompanying lower energy bills can reduce the burden associated with cold homes and high energy costs.[113]

Job Creation

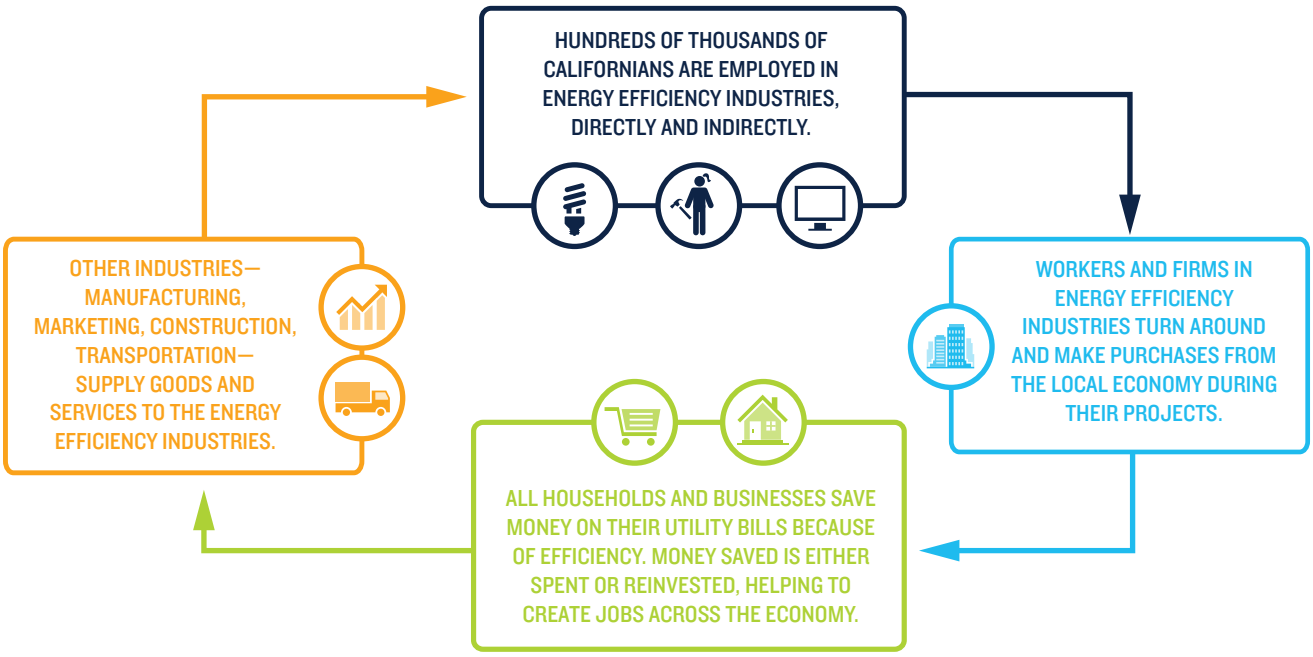
Energy efficiency is also an important job creator. More than 320,000 Californians have jobs related to energy efficiency, and over half of those workers spend a majority of their time (versus part-time) providing energy efficiency services, such as upgrading appliances, replacing windows, and installing energy-saving lighting options.[114] The robust demand for energy efficiency creates a need for:

- Companies and nonprofits to administer programs.
- Training facilities to ready the workforce.
- Workers to assess the quality of installations.
- Evaluation activities to make sure the expected energy savings are being realized.

These jobs are usually local, with more than 70 percent of energy efficiency establishments being small businesses.[115]

The employment impact of energy efficiency ripples out further, since lower energy bills allow more spending in the local economy, as shown in Figure 9. This helps create jobs and economic opportunities outside of the energy efficiency sector.

Many of the jobs created by increased demand for energy efficiency products and services are construction jobs that require the expertise of electricians, heating and air conditioning installers, insulation workers, and building inspectors. It is also important to make sure efficiency programs have strong skill requirements and that workers are sufficiently trained so energy-saving upgrades are properly installed and customers receive the energy savings they expect.



EVALUATING THE RESULTS

A critical part of any energy efficiency portfolio is independent evaluation, measurement, and verification (EM&V). EM&V allows utility managers and program administrators to confirm efficiency savings and therefore confidently rely on efficiency as a resource to replace the need for additional conventional power. Evaluation also provides valuable feedback that may be used to improve program design and implementation in the future.

Under AB 2021, while EM&V is not mandatory, California POUs are required to include the results of any evaluation they choose to conduct in the comprehensive annual report submitted under SB 1037.[117] However, unlike the investor-owned utilities (IOUs) that rely on the CPUC to manage their EM&V studies, POUs are able to contract for their own EM&V reports.

The POUs also actively update their energy-savings assumptions via their technical reference manual (TRM). Working with the California Technical Forum (CalTF), they are able to leverage the expertise of dozens of evaluations and energy efficiency experts to ensure high-quality work.[118] This approach to account for and update energy-saving assumptions is a model that should be replicated throughout the state and beyond.

Based on a review of the 2018 Status Report Appendix and posted studies on the Northern California Power Authority (NCPA) website,[119] 26 of the 38 POUs providing energy savings data in the 2018 Status Report have submitted an EM&V report for posting, three more than the number that had provided evaluations at the time of NRDC's last POU milestone report, in 2011.[120] However, of these 26, only 13 have completed an EM&V study that has been posted within the past four years: Alameda, Colton, Lodi, LADWP, Merced, Modesto, Palo Alto, Redding, Roseville, SMUD, SVP, Truckee, and Turlock.

Evaluation studies are expensive, and we support efforts to pool evaluations for similar programs or locations when feasible—such as is done by Merced Irrigation District, Modesto, and Turlock—since they are located near one another in California's Central Valley and offer similar programs.[121] Understanding the impact of a program or how well it is running is critical to ensure that the POU is effectively capturing all feasible and cost-effective energy savings. It is also important for the CEC as they develop the demand forecast, so they can best understand what has been achieved and what more could reasonably be expected to be captured in the future.

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DECOUPLING

Under a traditional rate structure, a utility runs the risk of not making up the fixed costs of energy infrastructure investment when they fund energy efficiency, since this reduces customer spending on electricity, thereby reducing the utility's revenue. Decoupling allows utilities to aggressively pursue energy savings without worrying about financial instability by breaking the link between electricity sales and the recovery of fixed costs. At the beginning of each year, the utility has an approved authorized revenue level; if it ends up making more or less than what is expected, the difference in revenue is corrected through small customer rate adjustments.

While publicly owned utilities (POUs) are not beholden to investors like investor-owned utilities (IOUs) are, they face the same disincentives for energy efficiency, such as needing to meet revenue targets for bondholders and general financial stability. California's IOUs have been decoupled since 1981, but the practice had not been pursued by POUs until recently. In 2012, LADWP adopted decoupling as a part of its rate structure, becoming the first municipal utility in the nation to do so. Glendale followed shortly thereafter.

The policy has allowed these utilities to increase their focus on other goals, such as improving energy efficiency. For example, LADWP's board approved a large budget increase for energy efficiency programs alongside decoupling. Furthermore, decoupling has improved the financial stability of both utilities. In fact, in May of 2013, a Fitch bond rating noted that decoupling provided greater revenue stability for LADWP, emphasizing how the practice can lead to higher credit, which in turn contributes to lower overall costs.*

* Lisa Xue et al., "Decoupling for Municipally Owned Utilities: Innovation in Southern California," *The Electricity Journal 27*, no. 3 (April 2014): 45-49, http://www.sciencedirect.com/science/article/pii/S1040619014000402?via%3Dihub.

Chapter 3: Public Utility Efficiency Targets

Under AB 2021, California's POUs are required to set 10-year electricity-saving targets every three years, extended to every four years by AB 2227.[122] The POUs set a round of 10-year targets in 2013, for the years spanning 2014–2023.[123] The most recent targets were set in March 2017 for 2018–2027, informed by a potential study that assessed all energy-saving opportunities.[124] Navigant Consulting developed the potential study model for the POUs to inform the goal-setting process, which is composed of the following layers:

TECHNICAL POTENTIAL: This is the highest level of potential in a review of efficiency opportunities as it includes all options that are technically viable today. This level of review does not apply current policies or budgets, which would restrict the amount of savings available for utilities to capture.

ECONOMIC POTENTIAL: This level uses the technical potential results and applies current benefit-cost tests to determine what could be achieved if the utilities were able to pursue every cost-effective opportunity without budget or customer participation constraints.

MARKET POTENTIAL: This is the level on which the utilities base their yearly efficiency targets. To determine market potential, a study takes the economic potential and applies additional filters, such as product availability, utility capacity, policies, and customer willingness to participate in order to develop reasonable and feasible targets. This level of potential also often applies existing incentive and program budgets.

If the POUs achieve their cumulative 2018–2027 energy efficiency targets, they will save an additional 8,000 GWh, enough electricity to power nearly all the homes of Los Angeles and avoid nearly 3 million metric tons of carbon dioxide pollution, equivalent to the emissions from more than 500,000 cars for one year.[125,126] Achieving the POU energy efficiency goals would also help avoid more than 1,700 MW in electricity demand, thereby avoiding the need for at least three large, 500 MW power plants.

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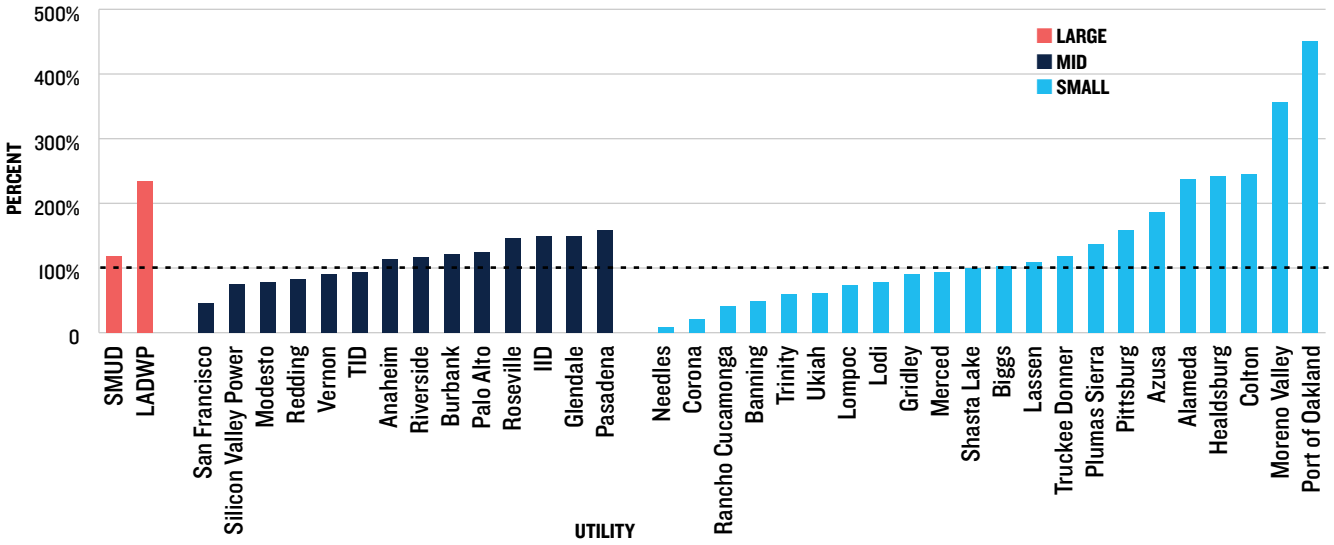
COMPARISON OF RECENT PROGRESS TOWARD ESTABLISHED ELECTRICITY-SAVING TARGETS

To assess progress toward achieving the POUs goals set in 2013, Figure 10 compares the most recent energy efficiency achievements to those goals over the 2014–2017 time-period. Each POU size category collectively surpassed its goals, and combined, the POUs reached 153 percent of their average 2014–2017 energy efficiency savings targets. Furthermore, 26 POUs nearly or fully met their savings targets (90 to 100 percent). Of the 12 POUs that fell short, 8 are small POUs.[127]

FIGURE 10: AVERAGE 2014–2017 SAVINGS AS A PERCENTAGE OF AVERAGE 2014–2017 TARGETS[128]



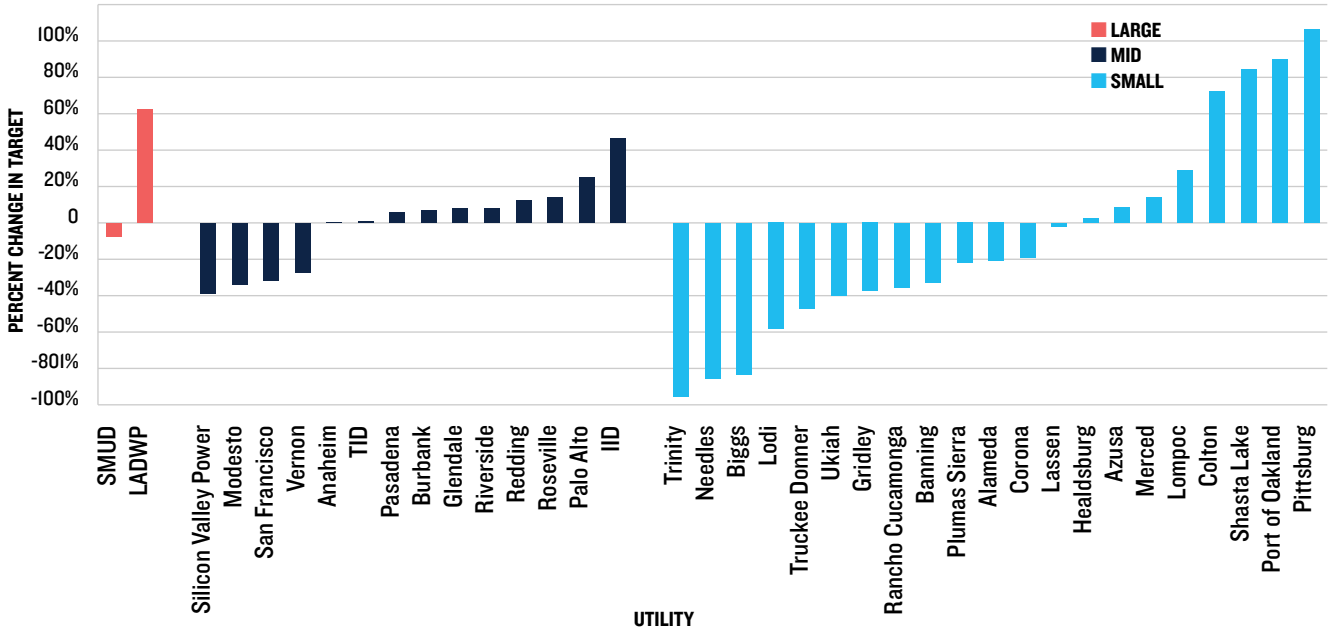
COMPARISON OF 2013 AND 2017 TARGETS

Combined, the POU goals set in 2017, for the period 2018 through 2027, are nearly 25 percent higher than the combined targets established in 2013 for 2014 through 2023.[129] However, this increase is highly driven by LADWP's targets. Excluding LADWP, the remaining combined POU electricity-saving targets decreased by about 3 percent.

As shown in Figure 11, 19 POUs increased their 10-year average target relative to their 10-year average target set in 2013, while the other 19 decreased their targets. Of those POUs that lowered their goals, 16 decreased their targets more than 10 percent.[130] In addition, LADWP (large), Colton, Moreno Valley, Pittsburg, Port of Oakland, and Shasta Lake (small) increased their individual average 10-year targets by more than 50 percent, and IID (midsize) came close.

FIGURE 11: PERCENT CHANGE BETWEEN AVERAGE TARGET SET IN 2013 VS. 2017[131]

Moreno Valley (not pictured) had a 372 percent increase between its average targets set in 2013 and those set in 2017.



While the combined POU targets set in 2017 were more aggressive than the set of targets established in 2013, there is still a significant gap between what was identified as economic potential (i.e., cost-effective efficiency opportunities if budget and customer participation were not barriers) and what the study determined to be feasible in terms of market potential. Closing that gap—for all types of utilities—is vital given the importance of energy efficiency to meeting the state's climate and energy goals.

ASSESSMENT OF POU 2018–2027 TARGETS

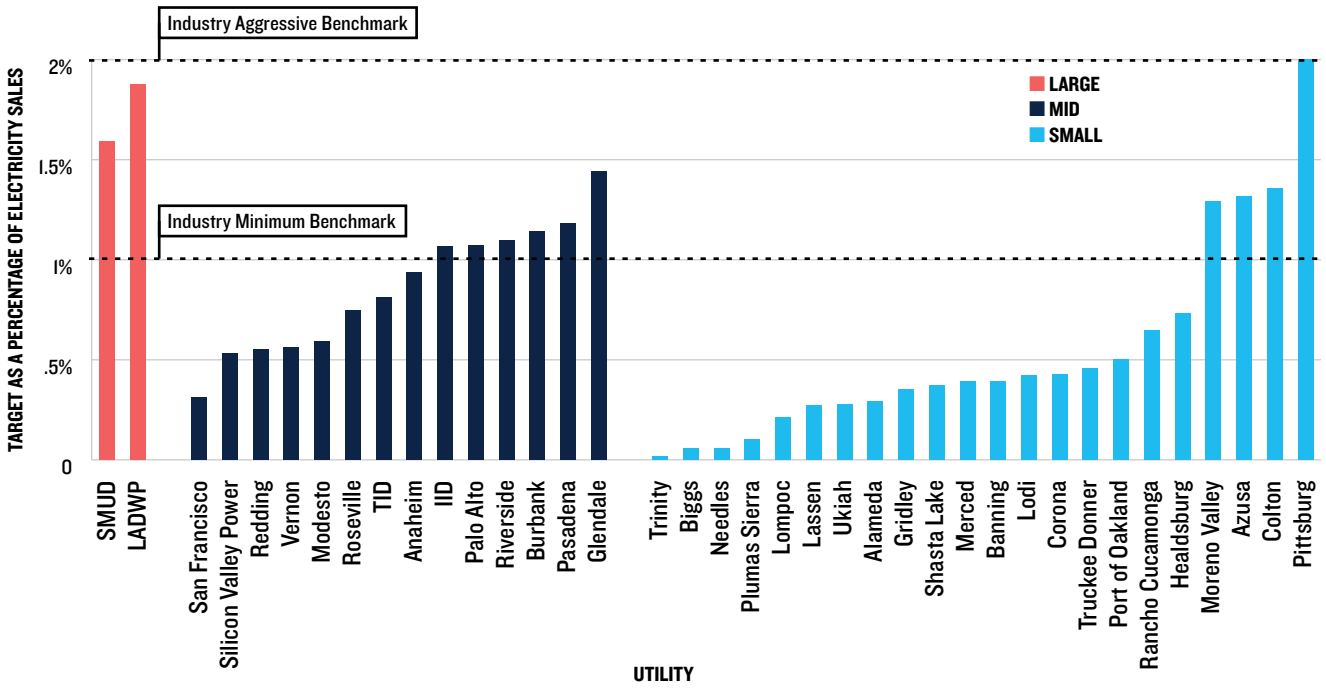
While comparing the 2017 targets to the last round of goals can indicate how much a utility is planning to help its customers save energy, it is also important to assess the information within the context of each utility's location and demographics to determine what might be feasible for that particular POU moving forward. This section compares the targets by metrics similar to those used to assess POU progress toward capturing all cost-effective energy efficiency: (1) targets as a percentage of historic electricity sales, (2) targets compared with recent achievements, (3) targets compared with market potential, and (4) targets compared with economic potential.

As previously noted, there are a number of other factors to consider when assessing a full portfolio of programs, such as reaching disadvantaged communities, reducing infrastructure investment by targeting constrained areas, and managing energy use more effectively during the highest usage times. Nevertheless, until there is a consistent means by which to compare utilities on such important objectives, these traditional metrics continue to be used when assessing progress with the understanding that the results do not capture the entirety of a POU's activities.

Electricity-Saving Targets as a Percentage of Electricity Sales

Similar to assessing savings achievements, assessing a utility's target against its historical sales indicates how aggressive a POU intends to be, based on known data. However, these values would change if, for example, a large customer departs from a small POU territory or if there were a massive scale-up of electric vehicles. Again, energy savings equaling 2 percent of sales indicates aggressive efficiency efforts.[132] Figure 12 demonstrates that only 12 utilities set savings targets at or above 1 percent of sales, where energy efficiency savings should be at a minimum based on the ACEEE benchmark. LADWP approached the national standard for aggressive savings, which is 2 percent of electricity sales, while Pittsburg was the only POU that set targets at that level.

FIGURE 12: AVERAGE 2018-2027 TARGETS AS A PERCENTAGE OF AVERAGE 10-YEAR HISTORIC RETAIL ELECTRICITY SALES[133]

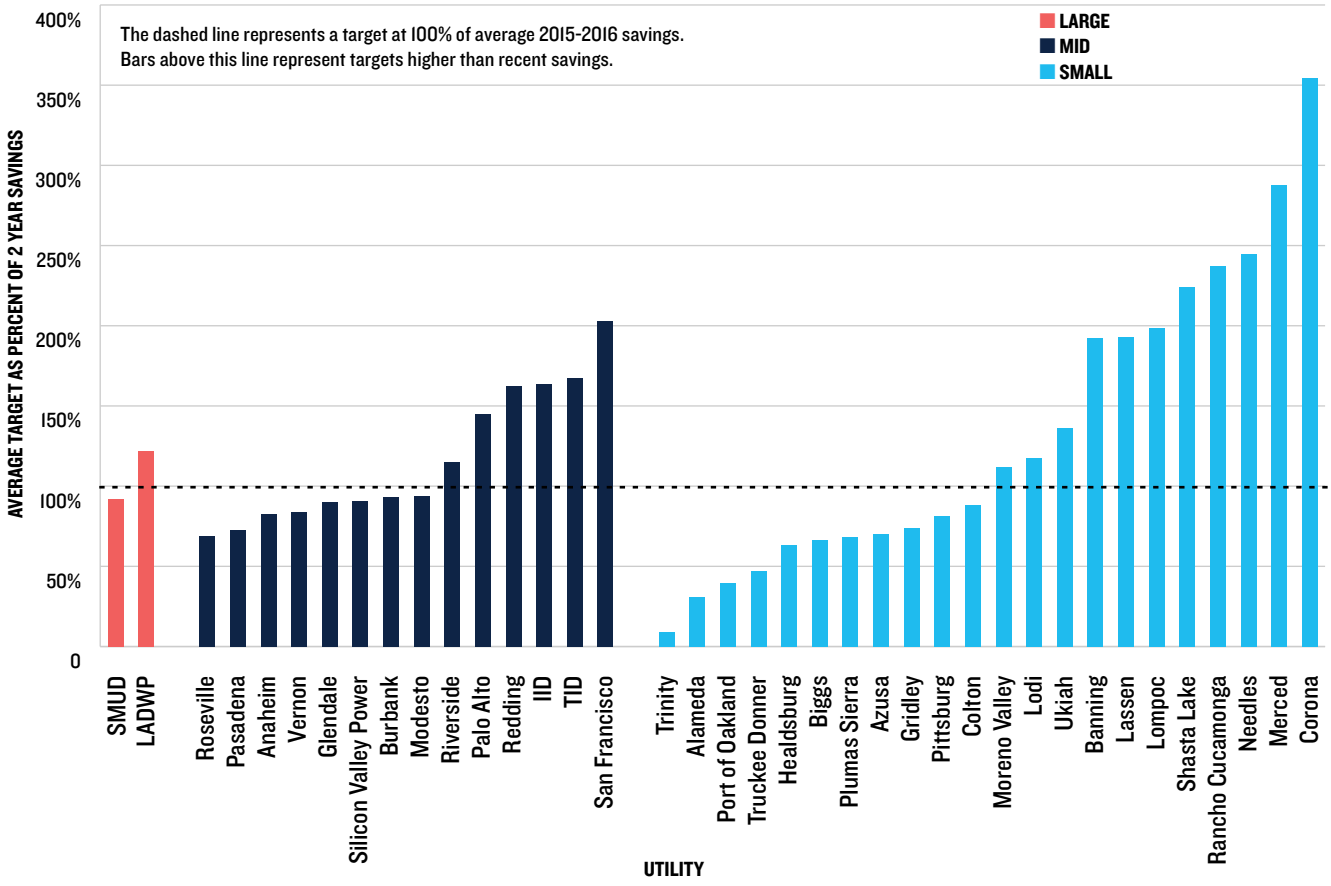


Overall, weighting for the size of each POU, the POUs set 10-year electricity-saving targets at 1.35 percent of 10-year historical sales.[134] The large utilities reached targets of nearly 1.8 percent of sales, the midsize utilities have targets just over 0.85 percent, and the small utilities set targets that are almost 0.6 percent, indicating that the large POUs are driving the positive efficiency trends among California's publicly owned utilities. While there are a number of factors that may make it difficult for midsize and smaller utilities to scale up savings, saving electricity reduces the cost for the utility to serve its customers and should continue to be pursued whenever it is more cost-effective than alternative electricity resources.

Targets Compared With Recent Achievements

A second metric to assess efficiency targets is to measure each POU's individual goal against its recent progress. This metric demonstrates whether a utility has set targets that go beyond its recent achievements, which would indicate that it is scaling up efficiency efforts. A value of 100 percent means the utility set targets at the current level of achievement. This metric does not assess how aggressive those targets are, only that those targets were set at current level of savings. A value above 100 percent shows how much more a utility is planning to save compared with its recent efforts. Since the latest POU targets were set in 2017, the recent achievements are measured based on the average of 2015-2016 savings. While aggregated POU targets were 109 percent of 2015–2016 reported savings, Figure 13 shows that more than half of the POUs set targets lower than their 2-year average savings leading up to setting the targets.

FIGURE 13: AVERAGE OF GROSS TARGETS SET IN 2017 AS A PERCENTAGE OF AVERAGE 2015–2016 REPORTED GROSS SAVINGS[135,136]



Targets Compared With Market Potential

Market potential shows how much electricity savings a utility can achieve each year given *existing* market conditions and funding levels. This level of efficiency assumes no policy changes, budget increases, or additional innovations on the part of the utilities. Thus, electricity-saving targets should at least be equal to market potential but preferably higher to reach the state's climate goals and save customers even more money.

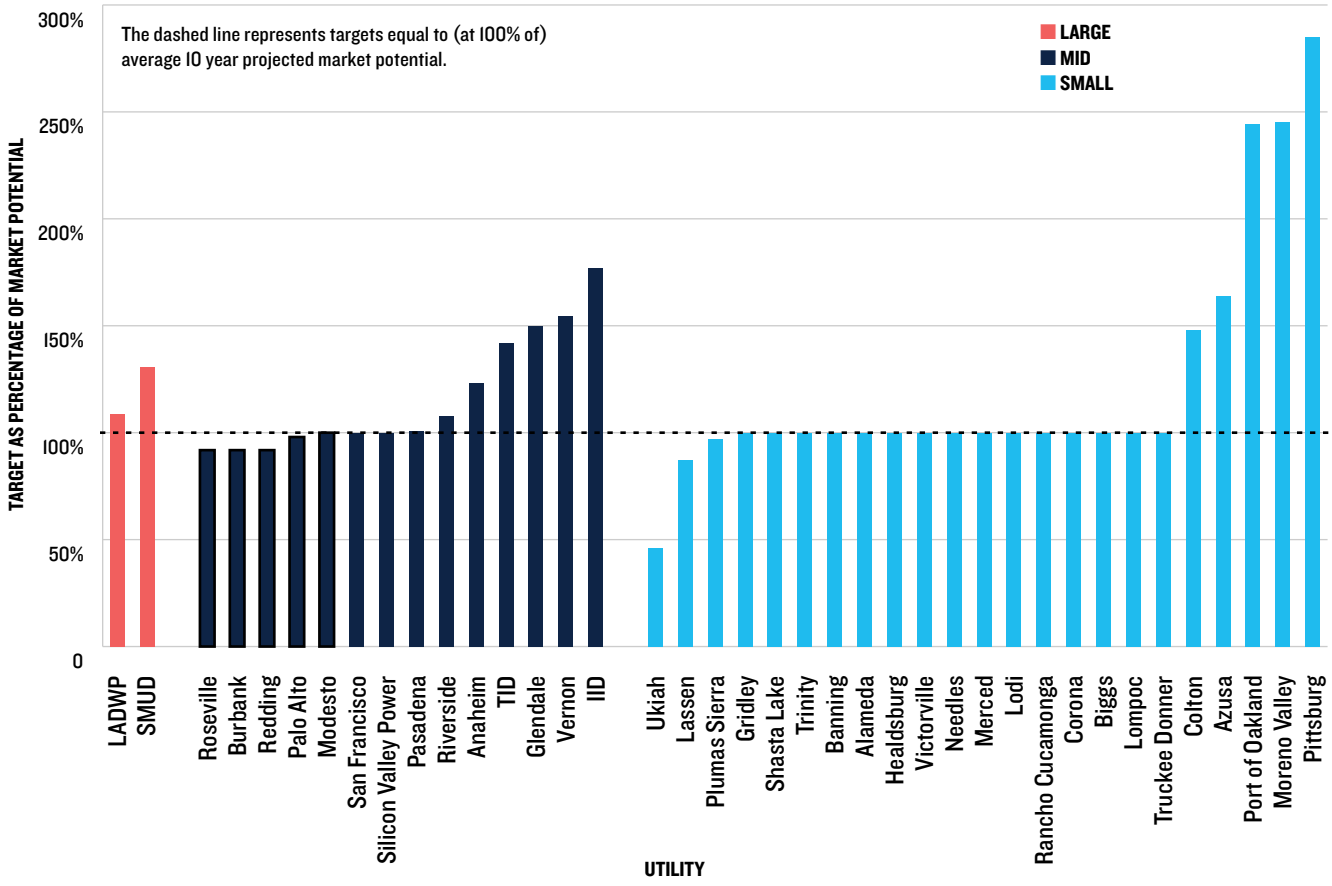
As seen in Figure 14, almost all of the POUs set targets at or above their identified market potential. LADWP, SMUD (large), Anaheim, Glendale, IID, Pasadena, Riverside, TID, Vernon, (midsize), Azusa, Colton, Moreno Valley, Pittsburg, and Port of Oakland (small) all set targets higher than the market potential, signaling an acceleration of efficiency efforts.

Targets Compared With Economic Potential

Economic potential indicates feasible efficiency achievements given sufficient investment and customer adoption and should be used as a pathway to tap more cost-effective efficiency. As noted earlier, most POUs set their targets at or close to market potential. However, those targets are based on existing feasibility and capture only a portion of the economic potential.

Similar for all California utilities, closing the gap between market and economic potential is critical to reach the state's ambitious energy efficiency goals.

FIGURE 14: AVERAGE 10-YEAR NET TARGETS AS A PERCENTAGE OF AVERAGE 10-YEAR NET MARKET POTENTIAL[137]



Chapter 4: Recommendations

The POUs have made substantial progress in expanding electricity savings over the past decade, more than quintupling savings since 2006, cutting harmful climate pollution, and saving customers significant money. While the past decade generally shows a positive trend, there remains more the POUs could do to reach additional customers. In this section, NRDC provides recommendations for how California's publicly owned utilities can scale up their energy efficiency efforts. We also show top 10 2017 rankings among the POUs for some of the metrics in this report, acknowledging that these tables do not recognize the other critical efforts utilities are doing such as reaching low- and moderate- income customers or targeting efficiency to constrained areas.

In particular, LADWP, SMUD (large) and Pasadena (midsize) rank among the top performers in three or four metrics. In addition, the following utilities rank among the top performers in two of the metrics:

- **Midsize**: Burbank, Glendale, Healdsburg, Palo Alto, Roseville
- **Small**: Azusa, Colton, Lodi, Moreno Valley, Pittsburg, Truckee Donner

RECOMMENDATION I: EXPAND PROGRAMS TO CAPTURE ALL COST-EFFECTIVE ENERGY EFFICIENCY

A number of assumptions go into designing a utility's efficiency portfolio, requesting a budget from the local governing board to implement energy efficiency programs, and developing a potential study that ultimately determines a utility's electricity-saving targets. The following analysis is intended to help guide a possible scaling up of energy efficiency based on the metrics of this report and the opportunities they reveal. For example, as the CEC continues to implement SB 350, POUs seeking to scale up their efforts can look to new ways of capturing savings, such as through electrification of building equipment or conservation voltage reduction programs to improve the efficiency of electric distribution systems.

Annual Savings

This year, LADWP, SMUD (large), Pasadena (midsize), and Azusa (small) reached ACEEE's benchmark for aggressive energy efficiency efforts at 2 percent of sales. Anaheim, Burbank, Glendale, Riverside, Roseville (midsize), Lodi, and Truckee (small) reached ACEEE's minimum benchmark for efficiency of 1 percent of sales. Table 1 shows the top 10 savers in 2017.

TABLE 1: TOP PERFORMERS, 2017 SAVINGS AS A PERCENTAGE OF 2016 RETAIL ELECTRICITY SALES

Azusa	2.74%
Pasadena	2.29%
LADWP	2.04%
SMUD	2.01%
Glendale	1.78%
Anaheim	1.41%
Burbank	1.35%
Roseville	1.26%
Lodi	1.13%
Truckee Donner	1.08%

CUSTOMER CONNECTIONS

Nearly 90 percent of the Truckee Donner Public Utility District's service area is residential, making behavior change among residents a critical part of efficiency efforts. Truckee Donner's approach to residential efficiency centers on direct contact with customers in order to empower them to pursue energy efficiency that may be more complicated to install than simply replacing a light bulb, like adding insulation or replacing windows.

For example, in connection with Truckee Donner's Residential Energy Survey, customers are offered more than 20 free, easy energy- and water-saving items (e.g., free LED bulbs) and are educated on additional efficiency opportunities they can pursue at another time to deepen their savings.

Another successful effort is the utility's use of "person to person" interaction to advance efficiency, specifically lighting. Whether through the Residential Energy Survey, the LED Holiday Light Exchange, low-income programs, or community events, the vast majority of light bulbs delivered to customers in Truckee Donner's service area is done face-to-face to increase the customer's commitment to using the light bulb. Truckee Donner takes this opportunity to educate customers about other non-lighting programs, increasing savings and promoting behavior change.

Utilities that have yet to reach the ACEEE baseline of 2 percent of annual retail electricity sales should explore ways to ramp up their efficiency programs, especially those with high benefit-cost ratios. This could mean expanding existing programs, adding new programs, targeting different customers, offering new complementary services like technical assistance and a single point of contact for programs, or other best practices.

Benefit-Cost Ratio

Many utilities have cost-effectiveness ratios well above 1.0, which indicates there are cost-effective savings opportunities remaining. While NRDC understands that the POUs generally follow practices similar to those of the nearest IOUs (which use both the TRC and PAC ratio as a threshold), NRDC uses PAC values at the portfolio level for this recommendation section as it is the benefit-cost test that best indicates how the cost of efficiency compares with what the utilities would otherwise have to spend to provide electricity services for their customers.

As seen in Figure 8, the following utilities have particularly high PAC ratios (above 4.0) but have not yet reached the national standard for aggressive levels of savings as a percentage of retail electricity sales: Anaheim, Biggs, Glendale, IID, Modesto, Port of Oakland, Riverside, Silicon Valley Power, TID, Vernon. Having a high benefit-cost ratio indicates there are still opportunities to save more electricity while remaining cost-effective. Even the utilities that have met 2 percent of sales continue to have opportunities to expand efficiency efforts as their benefit-cost ratios remain high.[138]

While all POUs have additional potential to capture more energy savings, those with high PACs in particular should consider additional ways of expanding energy efficiency efforts or trying new strategies, such as technical support that may increase participation. In addition, utilities with a high PAC have more flexibility to test programs that may not be cost-effective, such as middle-income efficiency programs or energy-saving programs targeted at disadvantaged customers.

So long as the PAC is above 1.0, the utility can continue to invest in efficiency at a lower cost than what it would otherwise have to spend to provide services for its customers.

Energy Efficiency Investment

Generally, utilities that had higher levels of investment also had higher levels of savings as a percentage of sales. Table 2 shows that 6 out of the 10 highest-ranking POUs in terms of savings as a percentage of retail electricity sales (Table 1) are also in the top ten of POUs investing at aggressive levels.[139]

It is important that a utility's energy efficiency investments target those savings opportunities identified in its potential study and that utilities balance investing in deeper and more costly savings with overall benefit to customers. However, given that most utilities have TRC and/or PAC ratios well above 1, there are a number of opportunities to increase investment and expand efficiency efforts without compromising the benefit-cost ratio. Table 2 shows the highest investors, all of which have room to cost-effectively explore additional approaches to reaching greater energy savings and/or serving more customers.

TABLE 2: TOP 10 UTILITIES, 2017 INVESTMENT AS A PERCENTAGE OF 2016 REVENUE

LADWP	3.78%
Healdsburg	3.47%
Pasadena	3.29%
Truckee Donner	3.24%
Lodi	3.17%
Needles	3.17%
San Francisco	3.09%
SMUD	2.94%
Roseville	2.76%
Palo Alto	2.65%

While the POU associations currently collaborate amongst themselves, they could also consider holding public workshops on pressing energy efficiency topics, which could lead to identifying additional strategies, increasing partnerships, or exploring how best to address existing barriers.

RECOMMENDATION 2: CONDUCT MORE REGULAR INDEPENDENT EVALUATIONS OF PROGRAMS

As mentioned earlier, while POUs are not required to do EM&V studies, they are required to make publicly available to their customers and the CEC "[t]he results of an independent evaluation that measures and verifies the energy efficiency savings and reduction in electricity demand achieved by its energy efficiency and demand reduction programs."[140] This information is referenced in the POU's annual status report but provided separately to the CEC.

Evaluations are important to assess how a program is progressing as well as to update energy-saving assumptions, such as how long a light bulb is expected to last, and to identify process improvements, such as how to best reach customers. As noted above, only 13 POUs have published at least one EM&V report within the past four years based on the 2018 Status Report Appendix and the NCPA website.[141] While the law does not require evaluation, NRDC offers three recommendations to ensure POU programs most effectively reach their customers, save electricity and money, and cut pollution:

1. **Conduct regular evaluations:** Every utility should perform regular EM&V, pooling funding with other POUs (if needed to manage the cost of evaluations) and sharing data when programs are similar. EM&V is beneficial for utility planners and offers assurance that they can rely on efficiency as a way to meet their customers' electric needs. While more POUs have posted EM&V reports on NCPA's website since the last NRDC analysis in 2011, 13 have not yet published any evaluations on the NCPA website.[142] While every program need not be evaluated annually, POUs should set and implement an evaluation plan and be transparent about the process.
2. **Ensure robust evaluations:** The CEC should work with the POU associations to figure out how best to enable the midsize and small utilities, in particular, to conduct more evaluations to inform future energy efficiency efforts. These studies would yield data the CEC can use as inputs into their demand forecasts and in determining additional energy efficiency savings beyond what is currently expected.

   NRDC further recommends that the CEC begin comparing the results of EM&V with reported savings to better understand which efficiency programs are successful. However, to be able to do so, the POUs will need to more regularly conduct and report their program evaluations to the CEC. This analysis would not only provide greater accuracy about POU savings but would also offer guidance for program administrators on how to adjust efficiency portfolios in coming years to realize the most savings.
3. **Continue to rely on the California Technical Forum (CalTF) for energy-saving assumptions:**[143] The POUs have been great supporters of the CalTF, which strives to ensure consistent and transparent energy savings data for program planning. By relying on the CalTF whenever possible, the POUs could leverage existing expertise and ensure that energy savings data are robust and relevant for both program and resource planning.

TARGETED INTERVENTION

Though commercial customers make up only 10 percent of Riverside Public Utility's customer base, their combined load represents 66 percent of total consumption. Riverside has therefore dedicated more programs and resources to assist the commercial customer segment, a group that faces unique efficiency barriers due to a lack of up-front capital and the lack of experience or technical ability to implement energy efficiency projects. Furthermore, many small businesses do not own their buildings, adding another barrier to the decision-making process.

Riverside's Small Business Direct Installation Program (SBDI) is designed to address these problems. SBDI is a comprehensive direct-installation program, incorporating high-efficiency lighting retrofits and controls, HVAC tune-ups, LED "Exit" and "Open" signs, Tier 2 advanced power strips, and various weatherization measures. Each project starts with an energy audit that prioritizes recommended energy efficiency measures for the business facility. The direct installation contractors find that there is still no shortage of businesses that can realize significant savings from the energy efficiency upgrades provided through this program. About 1,500 commercial customers were served in the 2015/2016 fiscal year.

Silicon Valley Power provides another example of the impact that specific and targeted efficiency investments can have. Through its Small Business Snapshot Audit and Direct Install Program, the utility helps small-business customers with a demand of no more than 200 kilowatts lower their energy bills, providing a free energy audit with energy-saving recommendations and then installing specified energy efficiency measures. Because most customers operate on slim financial margins, Silicon Valley Power provided the measures at no cost to its customers so long as the program was still cost-effective. It also promoted water efficiency measures for eligible customers.

The program was successful enough to be extended and the scope of products offered was expanded. It provided audits to more than 3,000 small commercial customers, achieved energy savings of nearly 21 million kilowatt-hours (enough electricity to power 300 California homes for a year), increased customer satisfaction with the utility, and saved approximately $300,000 per year for those customers.

It is especially important that the CEC better understand POU savings in light of its increased responsibilities under SB 350, which requires the state to double its energy savings by 2030 as compared to the predicted energy savings from the CEC's 2015 demand forecast. As the CEC analyzes both the POU resource plans to inform statewide energy forecasts and the POU targets to inform statewide efficiency targets, its staff should work to ensure that all data being reported are accurate and verified. Regular and thorough EM&V is central to this effort.

RECOMMENDATION 3: SCALE UP LOW-INCOME ENERGY EFFICIENCY APPROACHES

All POUs offer bill assistance to their low-income residential customers, if they serve the residential sector. Some also provide innovative programs that encourage the bundling of different types of energy-saving equipment, promote whole-home retrofits, and focus on the hard-to-reach multifamily sector. However, if the POUs are to substantially scale up their efficiency efforts in low-income communities, the CEC and stakeholders must first understand the landscape and performance of POU low-income energy efficiency programs. The POUs took the first step this year by adding a line item for low-income and multifamily program savings.

However, it is difficult to assess the magnitude of these savings without better understanding the potential or breadth of the customer base that qualifies for them. We therefore recommend that in future reports, each utility provide additional information regarding the number of eligible low-income customers, as well as customers who live in multifamily buildings.

In addition, as POUs look to expand low-income and multifamily programs, they could rely on existing best practices. For example, Energy Efficiency for All (EEFA) is a nationwide partnership (of which NRDC is a founding member) seeking to expand access to energy efficiency for low-income families. The program has identified six core priorities for strong low-income energy efficiency program design:[144]

1. Capture all potential cost-effective efficiency opportunities.
2. Coordinate among utility programs for electricity, gas, and water.
3. Make sure benefit-cost tests encourage multifamily affordable housing.
4. Develop programs specifically to target multifamily affordable housing.
5. Structure incentives to promote whole-building savings.
6. Base programs on a "one-stop shop" design that allows building owners to access integrated program services from one source.[145]

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Several publicly owned utilities currently offer programs that follow some of these recommendations, serving as models for effective POU low-income energy efficiency programs:

- Burbank Water and Power gives its customers discounted rates and refrigerator exchanges and requires audits to help reduce electricity, water, and natural gas bills. This program design succeeds in bundling savings from utilities that offer different resources.
- LADWP bundles savings from water and energy in its Home Energy Improvement Program, which offers a comprehensive direct-installation program that improves both water and energy efficiency. This program structure also incentivizes whole-building savings.
- The City of Palo Alto is the only POU that tracked impacts of multifamily measures. They also considered non-energy benefits, such as improved comfort and health, when designing the program.
- Pasadena Water and Power partners with other city departments to provide the Under One Roof program. This program gives qualified customers a free package of efficiency measures, like water-saving aerators for faucets and efficient lighting options, that target both electricity and water usage, encouraging a more comprehensive approach. Pasadena is able to leverage its structure as a POU to partner with other municipal departments.

POUs wishing to expand their low-income offerings beyond bill reductions should look to these examples of existing POU programs that achieve low-income energy efficiency. There are many examples of other model low-income energy efficiency programs outside of California's POUs. One notable program, administered by California's Department of Community Services and Development (CSD), is the Low-Income Weatherization Program (LIWP). LIWP serves as an example of an integrated program with statewide administration. Using funds from California's Cap and Trade system, the program gives funds to third-party implementers to provide whole-home energy efficiency savings for low-income families.[146]

The POUs should look at how LIWP is run and consider using components that make sense for their structures and territories whenever feasible. For example, LIWP provides a single point of contact and comprehensive technical assistance (including free property assessments, design assistance, and contractor coordination), delivers seamlessly integrated efficiency and solar offerings, has robust demand from owners, works with local contractors, and has achieved impressive energy and bill savings levels. If possible, POUs should consider pooling resources with high-performing programs like the LIWP rather than create a separate program. If it is not feasible to partner with CSD, the POUs could adopt components of the program and leverage their current practice of pooling resources to offer a joint POU program with improved efficiencies.

Furthermore, we support the low-income reporting in the 2018 Status Report and recommend expanding the information that is provided in the future (e.g., types of programs, percentage of eligible customers participation, etc.). With more information, the POUs and CEC could aggregate and analyze POU data on low-income offerings to inform program design moving forward, establish best practices for low-income efficiency programs administered by municipal utilities, and consider a modified benefit-cost test for low-income programs (if cost-effectiveness is a barrier) to best serve low-income communities.

RECOMMENDATION 4: IMPROVE TRANSPARENCY IN TARGET-SETTING

Since the enactment of AB 2021 in 2006, the POUs have gone through the efficiency target-setting process four times. In 2010, Navigant Consulting created a model for assessing energy savings potential that is now used by all California POUs. The target-setting process has improved over time, becoming more robust and incorporating many of NRDC's recommendations, such as setting savings targets for the times of highest usage each day (i.e., megawatt hour demand savings).

The Navigant model allows each utility to modify assumptions. The 2017 status report contains a compilation of all utility 2017 targets, a brief description of how each utility used the Navigant model, which base assumptions were adjusted, and the adjustments that were made. This is an improvement in line with NRDC's 2011 *Public Power Progress Report*, which recommended that utilities indicate any changes to the model's assumptions. Modifying any one of these inputs can significantly affect calculated potential, making it important to understand the circumstances around a changed assumption.

However, while most utilities noted which assumptions were changed, they did not provide substantial rationales for why the adjustment was needed.[147] Additional information is needed to truly assess whether the targets are ambitious and in line with SB 350 to reach the state's energy savings and equity goals. In addition, there was no opportunity for stakeholders to provide input into contemplated changes.

We therefore urge that the energy efficiency potential study process be public to allow all stakeholders, including the CEC, to provide input. One way to do so is to hold periodic energy efficiency public workshops throughout the process, similar to what occurs during development of the IOU potential study.[148]

In addition, all POUs should provide rationales for their reported changes in future status reports. This will increase transparency and might highlight potential barriers that prevent the POU from capturing more of the economic potential. Better understanding these barriers could allow for the POUs, CEC, and stakeholders to work together to address them if possible.

RECOMMENDATION 5: STRIVE TO CLOSE THE GAP BETWEEN ECONOMIC AND MARKET POTENTIAL

The majority of POUs set targets that are substantially below economic potential, although in line with market potential. At a time when California is accelerating its efficiency efforts, nearly 20 utilities decreased their targets relative to what was set in 2013 (Figure 11), most of which have not yet achieved aggressive savings as a percentage of sales. Twenty utilities set targets that were lower than recently achieved savings levels, 16 of which were more than 10 percent less than recent achievements. While there may be rationales for particular utilities to reduce their targets (e.g., it may be difficult for utilities that have consistently shown relatively high savings to continue to increase), the trend of targets and savings should be one that continually grows.

Table 3 lists the utilities with the largest increases in targets, although the reasons for the increases are not specified. Possible reasons could include determining additional potential that was not identified in previous potential studies, moving from net targets to gross targets, adding potential that comes from advocating for codes and standards, or completing a direction that was given by a POU governing board.

TABLE 3: TOP 10 UTILITIES, CHANGE IN AVERAGE TARGET (2013 VS. 2017)	
Moreno Valley	372%
Pittsburg	107%
Port of Oakland	90%
Shasta Lake	85%
Colton	72%
LADWP	62%
IID	47%
Lompoc	29%
Palo Alto	25%
Merced	14%

Given that most utilities have high PAC ratios and there is a large gap between economic and market potential, all utilities should reassess the assumptions they are using to determine market potential as part of the next potential study. Doing so could help the POUs reach closer to the economic potential available. In addition, Table 4 lists the utilities with the highest targets as a percentage of average historic sales, another measurement of how aggressive the targets are.

TABLE 4: TOP 10 UTILITIES, AVERAGE 10-YEAR TARGETS SET IN 2017 AS A PERCENTAGE OF AVERAGE 10-YEAR HISTORIC SALES	
Pittsburg	2.00%
LADWP	1.87%
SMUD	1.59%
Glendale	1.44%
Moreno Valley	1.36%
Colton	1.35%
Azusa	1.31%
Pasadena	1.17%
Burbank	1.13%
Riverside	1.09%

If all POUs below 2 percent of electricity retail sales scale up, they collectively have the potential to save up to nearly *50 percent more* than what they currently adopted as their ten-year targets. That translates into cutting enough electricity to meet the needs of 600,000 more households for one year and reducing pollution equivalent to emissions spewed by 260,000 more cars for one year. Meeting these aggressive national savings benchmarks would undoubtedly require additional budgets for the POUs and increased customer participation, which is highly variable depending on the utility.

CONCLUSION

Many California POUs have shown substantial progress over the past decade and will continue to be critical partners in transitioning the state to a clean energy future for all customers. The good news is that there are substantial efficiency savings still available for every POU, options to pool resources when feasible, and opportunities to continue or expand collaborations with one another (or with investor-owned utilities) to provide combined electricity, gas, and water savings for their customers.

However, if the POUs are to continue increasing energy savings and using those savings to avoid purchasing conventional power and making infrastructure investments, many of them need to increase efficiency program investment levels and ensure that their programs are evaluated to inform future efforts.

With these steps, the POUs can continue to provide homeowners and businesses with ways to cut additional energy waste and save more money. In addition, expanding program offerings for low-income customers would improve quality of life, reduce their energy burden, support local economies, and ensure that electricity production results in less pollution, thereby creating a cleaner and healthier environment for all Californians.

ENDNOTES

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91 Some utilities do not track net savings and instead report gross savings under net savings. All POUs started consistently reporting gross savings as a separate category in 2013. Values for 2006 were calculated using the numbers reported under net savings for each utility (although this value might actually be net or gross depending on the utility). Values for 2016 were calculated using gross savings. Since there is inconsistency in reporting between 2006 and 2017, some of the progress may be due to measuring 2006 (net) against 2017 (gross). Nevertheless, the general trend of progress would remain the same. 2017 aggregated EIA retail electricity sales report is not yet public; therefore, the calculation uses 2016 retail sales and 2017 savings.

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94 Investments in 2006 were $54,355,090 and in 2017 they were $226,386,251. CMUA, *2006 and 2017 Status Reports*.

95 Midsize POUs: Modesto, –23%; Vernon, –17%. Small POUs: Corona, –64%; Gridley, –39%; Port of Oakland, –35%; Alameda, –25%; Needles, -20; Moreno Valley, –13%.

96 ACEEE, "The State Energy Efficiency Scorecard."

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127 Utilities that met or surpassed their goals: Alameda, Anaheim, Azusa, Biggs, Burbank, Colton, Glendale, Healdsburg, IID, LADWP, Lassen, Moreno Valley, Palo Alto, Pasadena, Pittsburg, Plumas Sierra, Port of Oakland, Riverside, Roseville, SMUD, and Truckee Donner. Utilities that almost met their goals (90% to 99%): Gridley, Merced, Shasta Lake, TID, and Vernon. Utilities that fell short of their goals: Banning, Corona, Lodi, Lompoc, Modesto, Needles, Rancho Cucamonga, Redding, San Francisco, Silicon Valley Power, and Trinity.

128 CMUA, "2006–2018 Status Reports."

129 The average POU targets from 2014-2023 summed to 646 GWh while the average POU targets from 2018-2027 summed to 800 GWh. This represents a nearly 25 percent increase in overall targets.

130 Since POUs tend to be consistent in how they set goals over time (e.g., either net or gross), NRDC did not adjust any goals for this analysis. Utilities that increased their targets: LADWP (large), Pasadena, Burbank, Glendale, Riverside, Redding, Roseville, Palo Alto, IID (midsize), Azusa, Colton, Healdsburg, Lompoc, Merced, Moreno Valley, Pittsburg, Port of Oakland, Shasta Lake, and TID (small). Utilities that decreased their targets by more than 10 percent: Modesto, San Francisco, Silicon Valley Power, Vernon (midsize), Alameda, Banning, Biggs, Corona, Gridley, Lodi, Needles, Plumas Sierra, Rancho Cucamonga, Trinity, Truckee Donner, and Ukiah (small).

131 CMUA, *2013 and 2017 Status Reports*.

132 ACEEE, *The 2014 State Energy Efficiency Scorecard*.

133 POUs set targets in whichever metric they traditionally use to report for savings (net or gross). However, to ensure fairness among POUs when comparing targets with sales, we converted all net targets to gross using a net-to-gross ratio of 0.817 based on the ACEEE standard. See: ACEEE, *The 2016 State Energy Efficiency Scorecard*, September 2016, p.28.

134 Average 10-year historic retail sales were 60,968 GWH, and the average 10-year target, adjusted to gross, is 824 GWh. Retail sales are from EIA Form 861 https://www.eia.gov/electricity/data/eia861m/ (accessed January 23, 2018).

135 CMUA, *Energy Efficiency in California's Public Power Sector: A* 2016 *Status Report* (10th edition), http://www.ncpa.com/policy/reports/energy-efficiency/ (accessed May 10, 2018). CMUA, *2017 Status Report*.

136 Since the 2015-2016 savings were reported in gross, the targets were also adjusted to gross where needed by dividing net targets by the ACEEE standard of 0.817.

137 CMUA, *2017 Status Report*.

138 Benefit-cost ratios of POUs that met 2 percent of sales: LADWP = 4.99; SMUD = 4.27 (large); Pasadena = 4.43 (midsize); and Azusa = 8.16 (small).

139 LADWP, SMUD (large); Pasadena and Roseville (midsize); Lodi and Truckee Donner (small).

140 *California Public Utilities Code*, Cal. Pub. Utilities Code § 9505.

141 Alameda, Colton, Lodi, LADWP, Merced, Modesto, Palo Alto, Redding, Roseville, SMUD, SVP, Truckee, and Turlock.

142 The 13 utilities that have yet to publish EM&V reports on NCPA's website are: Anaheim, Glendale, San Francisco, Vernon (midsize), Corona, Moreno Valley, Needles, Pittsburg, Port of Oakland, Rancho Cucamonga, Shasta Lake, Trinity, and Ukiah (small).

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Appendix 1: Summary of POU Progress

TABLE A1: ASSESSMENT OF CHANGE IN GROSS ELECTRICITY SAVINGS, 2016–2017	
ASSESSMENT	**UTILITIES***
Increased electricity savings	**LARGE:** LADWP, SMUD **MIDSIZE:** Anaheim, Burbank, Glendale, Modesto, Palo Alto, Pasadena, Redding, Riverside, San Francisco, TID **SMALL:** Azusa, Banning, Biggs, Lassen, Lodi, Lompoc, Merced, Plumas Sierra, Shasta Lake, Truckee Donner
Decreased electricity savings	**MIDSIZE:** IID, Roseville, Silicon Valley Power, Vernon **SMALL:** Alameda, Colton, Corona, Gridley, Healdsburg, Moreno Valley, Needles, Port of Oakland, Pittsburg, Rancho Cucamonga, Trinity, Ukiah

TABLE A2: ASSESSMENT OF 2017 POU REPORTED SAVINGS AS A PERCENTAGE OF 2016 RETAIL SALES	
ASSESSMENT	**UTILITIES**
Met or surpassed aggressive metric of 2 percent of electricity sales	**LARGE:** LADWP, SMUD **MIDSIZE:** Pasadena **SMALL:** Azusa
Surpassed minimum threshold of 1 percent of electricity sales	**MIDSIZE:** Anaheim, Burbank, Glendale, Riverside, Roseville **SMALL:** Lodi, Truckee Donner
Fell short of minimum threshold	**MIDSIZE:** IID, Modesto, Palo Alto, Redding, San Francisco, Silicon Valley Power, TID, Vernon **SMALL:** Alameda, Banning, Biggs, Colton, Corona, Gridley, Healdsburg, Lassen, Lompoc, Merced, Moreno Valley, Needles, Pittsburg, Plumas Sierra, Port of Oakland, Rancho Cucamonga, Shasta Lake, Trinity, Ukiah

TABLE A3: ASSESSMENT OF 2017 ENERGY EFFICIENCY INVESTMENT AS A PERCENTAGE OF 2016 REVENUE	
ASSESSMENT	**UTILITIES**
Approached or surpassed 3 percent of revenue	**LARGE:** LADWP (approached 4 percent), SMUD **MIDSIZE:** Pasadena, San Francisco **SMALL:** Healdsburg, Lodi, Needles, Truckee Donner
Approached or surpassed minimum threshold of 2 percent of revenue	**MIDSIZE:** Burbank, Palo Alto, Redding, Riverside, Roseville **SMALL:** Alameda, Azusa
Fell short of minimum threshold of 2 percent of revenue	**MIDSIZE:** Anaheim, Glendale, IID, Modesto, Silicon Valley Power, TID, Vernon **SMALL:** Banning, Biggs, Colton, Corona, Gridley, Lassen, Lompoc, Merced, Moreno Valley, Pittsburg, Plumas Sierra, Port of Oakland, Rancho Cucamonga, Shasta Lake, Ukiah

TABLE A4: ASSESSMENT OF BENEFIT-COST RATIOS	
ASSESSMENT	**UTILITIES***
Total Resource Cost Test (TRC) below 1.0	**MIDSIZE:** Palo Alto **SMALL:** Alameda, Gridley, Merced, Pittsburg, Plumas Sierra, Trinity, Ukiah
Total Resource Cost Test (TRC) above 1.0	**LARGE:** LADWP, SMUD **MIDSIZE:** Anaheim, Burbank, Glendale, IID, Modesto, Pasadena, Redding, Riverside, Roseville, San Francisco, Silicon Valley Power, TID, Vernon **SMALL:** Azusa, Banning, Biggs, Colton, Corona, Healdsburg, Lassen, Lodi, Lompoc, Moreno Valley, Port of Oakland, Rancho Cucamonga, Shasta Lake, Truckee Donner
Program Administrator Cost Test (PAC) below 1.0	**SMALL:** Gridley, Pittsburg, Trinity
Program Administrator Cost Test (PAC) above 1.0	**LARGE:** LADWP, SMUD **MIDSIZE:** Anaheim, Burbank, Glendale, IID, Modesto, Palo Alto, Pasadena, Redding, Riverside, Roseville, San Francisco, Silicon Valley Power, TID, Vernon **SMALL:** Alameda, Azusa, Banning, Biggs, Colton, Corona, Healdsburg, Lassen, Lodi, Lompoc, Merced, Moreno Valley, Plumas Sierra, Port of Oakland, Rancho Cucamonga, Shasta Lake, Truckee Donner, Ukiah

*no data available for Needles

TABLE A5: ASSESSMENT OF 2014–2017 SAVINGS AS A PERCENTAGE OF 2014–2017 TARGETS	
ASSESSMENT	**UTILITIES**
Met or surpassed target	**LARGE:** LADWP, SMUD **MIDSIZE:** Anaheim, Burbank, Glendale, IID, Palo Alto, Pasadena, Riverside, Roseville **SMALL:** Alameda, Azusa, Biggs, Colton, Healdsburg, Lassen, Moreno Valley, Pittsburg, Plumas Sierra, Port of Oakland, Truckee Donner
Almost met target (90–99 percent)	**MIDSIZE:** TID, Vernon **SMALL:** Gridley, Merced, Shasta Lake
Failed to meet target	**MIDSIZE:** Modesto, Redding, San Francisco, Silicon Valley Power **SMALL:** Banning, Corona, Lodi, Lompoc, Needles, Rancho Cucamonga, Trinity, Ukiah

TABLE A6: ASSESSMENT OF PERCENTAGE CHANGE IN TARGETS IN 2013 VS. 2017	
ASSESSMENT	**UTILITIES***
Increased targets	**LARGE:** LADWP **MIDSIZE:** Burbank, Glendale, IID, Palo Alto, Pasadena, Redding, Riverside, Roseville, TID **SMALL:** Azusa, Colton, Healdsburg, Lompoc, Merced, Moreno Valley, Pittsburg, Port of Oakland, Shasta Lake
Decreased targets by less than 10 percent	**LARGE:** SMUD **SMALL:** LASSEN
Decreased targets by more than 10 percent	**MIDSIZE:** Modesto, San Francisco, Silicon Valley Power, Vernon **SMALL:** Alameda, Banning, Biggs, Corona, Gridley, Lassen, Lodi, Needles, Plumas Sierra, Rancho Cucamonga, Trinity, Truckee Donner, Ukiah

*Anaheim's targets were unchanged.

TABLE A7: ASSESSMENT OF AVERAGE 10-YEAR TARGETS AS A PERCENTAGE OF AVERAGE 10-YEAR SALES	
ASSESSMENT	**UTILITIES**
Target above 1 percent of sales	**LARGE:** LADWP, SMUD **MIDSIZE:** Burbank, Glendale, IID, Palo Alto, Pasadena, Riverside **SMALL:** Azusa, Colton, Moreno Valley, Pittsburg
Target below 1 percent of sales	**MIDSIZE:** Anaheim, Modesto, Redding, Roseville, San Francisco, Silicon Valley Power, TID, Vernon **SMALL:** Alameda, Banning, Biggs, Corona, Gridley, Healdsburg, Lassen, Lodi, Lompoc, Merced, Needles, Plumas Sierra, Port of Oakland, Rancho Cucamonga, Shasta Lake, Trinity, Truckee Donner, Ukiah

Appendix 2: Publicly Owned Utility 2017 Summary

#	UTILITY	LOCATION	NUMBER OF CUSTOMERS	2017 INVESTMENT	2017 SAVINGS (GWH)	2017 BENEFIT/ COST (PAC)	TOTAL BENEFITS*
	LARGE 2						
1	LADWP	Los Angeles	1,570,426	$126,664,258	478.89	4.99	$631,933,989
2	SMUD	Sacramento	628,952	$39,982,965	210.65	4.27	$170,583,459
TOTAL LARGE			**2,199,378**	**$166,647,222**	**689.53**	**4.82**	**$802,517,448**
	MIDSIZE 14						
1	Anaheim	Anaheim	118,264	$5,307,538	33.29	8.00	$42,482,663
2	Burbank	Burbank	53,153	$4,433,672	14.15	2.49	$11,023,420
3	Glendale	Glendale	87,982	$2,022,560	18.94	5.18	$10,479,260
4	Imperial Irrigation District (IID)	Imperial	148,253	$5,287,671	27.94	4.17	$22,069,785
5	Modesto	Modesto	121,615	$2,730,682	13.96	6.36	$17,365,399
6	Palo Alto	Palo Alto	29,966	$2,930,677	7.32	1.04	$3,057,173
7	Pasadena	Pasadena	64,405	$5,628,679	25.12	4.43	$24,946,129
8	Redding	Redding	44,176	$3,016,568	4.55	1.98	$5,965,941
9	Riverside	Riverside	108,607	$5,991,996	22.45	6.95	$41,631,563
10	Roseville	Roseville	58,416	$4,450,444	14.85	1.23	$5,457,926
11	San Francisco	San Francisco	117,296	$3,272,221	3.19	2.15	$7,028,896
12	Silicon Valley Power	Santa Clara	55,101	$4,371,201	20.49	6.49	$28,356,967
13	Turlock Irrigation District (TID)	Turlock	83,342	$1,967,010	14.92	10.72	$21,080,567
14	Vernon	Vernon	1,929	$255,134	6.51	9.14	$2,330,656
TOTAL MIDSIZE			**1,092,505**	**$51,666,055**	**227.69**	**4.71**	**$243,276,342**

#	UTILITY	LOCATION	NUMBER OF CUSTOMERS	2017 INVESTMENT	2017 SAVINGS (GWH)	2017 BENEFIT/ COST (PAC)	TOTAL BENEFITS*
	SMALL 22						
1	Alameda	Alameda	34,698	$1,104,284	2.52	1.20	$1,324,354
2	Azusa	Azusa	16,293	$814,445	6.91	8.16	$6,644,319
3	Banning	Banning	12,080	$210,283	0.42	2.90	$608,792
4	Biggs	Biggs	736	$34,345	0.14	4.90	$168,239
5	Colton	Colton	19,387	$950,611	1.23	1.50	$1,423,896
6	Corona	Corona	1,483	$7,778	0.03	2.59	$20,139
7	Gridley	Gridley	~3000	$66,566	0.07	0.87	$58,184
8	Healdsburg	Healdsburg	5,739	$392,891	0.54	1.63	$640,867
9	Lassen Municipal Utility District	Susanville	10,500	$200,826	0.69	3.57	$716,087
10	Lodi	Lodi	27,259	$2,084,306	4.82	2.65	$5,529,150
11	Lompoc	Lompoc	14,992	$108,632	0.22	2.10	$228,584
12	Merced	Merced	8,950	$497,369	1.45	1.68	$836,826
13	Moreno Valley	Moreno Valley	6,204	$120,166	0.97	3.36	$404,012
14	Needles	Needles	~3800	$114,424	0.00	no data	$-
15	Pittsburg	Pittsburg	583	$62,811	0.06	0.94	$59,115
16	Plumas-Sierra	Portola	8,138	$110,662	0.18	1.63	$180,357
17	Port of Oakland	Port of Oakland	384	$30,814	0.28	6.96	$214,429
18	Rancho Cucamonga	Rancho Cucamonga	924	$55,487	0.05	1.87	$103,545
19	Shasta Lake	Shasta Lake	4,510	$172,363	0.37	2.12	$365,786
20	Trinity	Trinity	7,350	$104,430	0.00	0.03	$2,773
21	Truckee Donner	Truckee	13,679	$745,339	1.77	2.37	$1,769,482
22	Ukiah	Ukiah	7,877	$84,141	0.11	1.40	$117,468
TOTAL SMALL			**208,566**	**$8,072,974**	**22.84**	**2.65**	**$21,416,404**
TOTAL ALL			**3,500,449**	**$226,386,251**	**940**	**4.71****	**$1,067,210,194**

Sources: Number of Customers: EIA, "Electric power sales, revenue, and energy efficiency Form EIA-861," https://www.eia.gov/electricity/data/eia861/ (accessed August 20, 2018). 2017 data from: CMUA, *2018 Status Report*.

*Total Benefits = the amount of savings ($) achieved by the efficiency programs before accounting for the cost of the programs.

** This value differs than the 2018 Status Report number due to differences in calculation methodologies. Nevertheless, the trend is the same of providing approximately $5 of benefit for every $1 invested.