



City of Palo Alto

(ID # 11067)

Utilities Advisory Commission Staff Report

Report Type: Agenda Items**Meeting Date: 6/17/2020****Summary Title: Demand Side Management Report****Title: Discussion of the Demand Side Management Report for Fiscal Year 2019****From: City Manager****Lead Department: Utilities****Recommendation**

This memo and the attached report present the achievements of Demand Side Management (DSM) programs implemented by the City of Palo Alto Utilities (CPAU) during Fiscal Year (FY) 2019. This is for the Commission's information and no action is required.

Executive Summary

The FY 2019 DSM Annual Report provides updates on the achievements of CPAU's electric, natural gas, and water efficiency programs, as well as locally-sited solar photovoltaic (PV), solar water heating program and sustainability-related programs. The DSM Report also provides updates on various customer outreach and research and development initiatives that are related to achieving savings in electric, gas and water.

CPAU exceeded its electric and water efficiency goals for FY 2019 but fell short of meeting its gas goals. The decline in gas savings is largely driven by less savings able to be claimed from home energy report savings persistence as well as the fact that the small and medium business efficiency program was not active in FY 2019 as it is in the process of being updated and launched.

Background

As a municipal utility that delivers electric, gas and water services to customers in its service territory, CPAU is subject to state laws that govern resource conservation and related expenditures. Key legislation that affects CPAU includes:

Assembly Bill (AB) 1890 (1996) requires publicly owned electric utility (POUs) to establish a public benefit charge of 2.85% of revenue to fund any or all of the following "public benefit" programs:

- Cost-effective, DSM services to promote energy-efficiency and energy conservation.

- New investment in renewable energy resources and technologies consistent with existing statutes and regulations that promote those resources and technologies.
- Research, development, and demonstration programs in the public interest which advance science, or a technology not being adequately provided for by competitive and regulated markets.
- Services for low-income electricity customers such as targeted energy-efficiency installations.

Senate Bill (SB) 1037 (2005) requires each POU, in procuring energy, to first acquire all available energy efficiency and demand reduction resources that are cost-effective, reliable and feasible.

AB 2021 (2006), as amended by AB 2227 (2012), requires POU's to develop annual electric efficiency targets over ten years based on all potentially achievable cost-effective energy savings, update the goals every four years, and provide annual reports to their customers and the California Energy Commission. CPAU adopted its first ten-year electric and gas efficiency targets in 2007 and has since updated these goals twice with the last update completed in December 2012.

SB 1 (2006) requires all POU's to adopt, implement and finance a solar initiative program to encourage the installation of residential and commercial solar energy systems.

AB 1470 (2007) requires each POU providing gas service to retail end-use gas customers to adopt, implement and finance a solar water heating system incentive program.

SBx7-7 (2009) requires water suppliers to reduce the state average per capita daily water consumption by 20% by December 31, 2020. This requirement is incorporated in the 2015 Urban Water Management Plan, adopted by California's urban water suppliers including Palo Alto.

SB 350 (2015) sets targets for utilities of 50% renewable electricity retail sales and double the energy efficiency savings in electricity and natural gas, both by 2030. The law grants compliance flexibility for publicly owned utilities that achieve 50% or more of retail sales from certain large hydroelectric power.

Discussion

CPAU offers incentives and education programs for customers to encourage energy and water efficiency, customer-owned renewable generation, and enrollment in voluntary renewable energy programs. The table below summarizes the FY 2019 goals and achievements. As shown, the achievements for electric and water efficiency exceeded the goals set for FY 2019. Gas savings missed the target as there was a drop off in commercial gas efficiency projects.

Goals versus Achievements

Resource	FY 2019 Savings Goals (% of load)	FY 2019 Savings Achieved (% of load)	FY 2019 Savings Achieved
Electricity	0.88%	1.02%	8,980 MWh
Gas	1.05%	0.57%	167,186 therms
Water	0.91%	3.04%	134,242 CCF

Despite not meeting all efficiency savings goals, the portfolio of programs generated cost-effective savings across all three utilities. More information on this can be found in the report.

Furthermore, CPAU develops a range of marketing campaigns to promote gas, electric, and water efficiency programs and increase public engagement. Promotional methods include community outreach events, print ads in local publications, utility bill inserts, messaging on bills and envelopes, website, email newsletters, videos for the web and local cable television channels, and the use of social media (Twitter/Facebook/NextDoor/Videos).

The attached DSM Report provides details about CPAU's FY 2019 DSM programs including costs and resource savings by program and by end use, description of customer outreach efforts, and research and development initiatives that are underway.

Stakeholder Engagement

CPAU receives significant stakeholder engagement on its demand side management programs during the energy efficiency target setting performed every four years. In addition, many program offerings are developed with input from community members, third party subject matter experts, and feedback provided from the UAC and Council.

Environmental Review

The Demand Side Management Report is not subject to review under the California Environmental Quality Act since receiving this report will have no foreseeable direct or indirect physical change in the environment and therefore does not meet the definition of a Project under Public Resources Code 21065.

Attachments:

- Attachment A: FY 2019 Demand Side Management Annual Report

**OVERVIEW:**

The City of Palo Alto Utilities (CPAU) is the only city-owned utility in California that operates its own utilities for electric, natural gas, water, fiber optic, storm drain, wastewater and refuse services. We have been providing quality services to the citizens and businesses of Palo Alto since 1896.

MISSION:

To provide safe, reliable, environmentally sustainable and cost-effective services.

STRATEGIC DIRECTION:

At CPAU, our people empower tomorrow's ambitions while caring for today's needs. We make this possible with our outstanding professional workforce, leading through collaboration and optimizing resources to ensure a sustainable and resilient Palo Alto.

PRIORITIES:

Workforce: We must create a vibrant and competitive environment that attracts, retains, and invests in a skilled and engaged workforce.

Collaboration: We must collaborate with internal teams and external stakeholders to achieve our shared objectives of enhanced communication, coordination, education, and delivery of services.

Technology: We must invest in and utilize technology to enhance the customer experience and maximize operational efficiency.

Financial Efficiency and Resource Optimization: We must manage our finances optimally and use resources efficiently to meet our customers' service priorities.

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EXECUTIVE SUMMARY

The City of Palo Alto Utilities (CPAU) is pleased to issue the Demand Side Management (DSM) Report for Fiscal Year (FY) 2019. This report is a useful public document showing the efficiency achievements and customer programs. CPAU is committed to supporting environmental sustainability through conservation of electric, gas and water resources. Additionally, CPAU promotes distributed renewable generation, building electrification, and electric vehicles using incentives and educational programs. CPAU accomplishes these goals by delivering a wide range of customer programs and services as described in this report, and strives to do so while remaining personable and in-touch with customer needs.

This annual report provides updates on:

- ◆ Electric and natural gas energy efficiency (EE) programs
- ◆ Water conservation programs
- ◆ Sustainability and carbon-reduction programs
- ◆ Customer engagement and satisfaction programs
- ◆ Achievements and expenditures

ENERGY EFFICIENCY AND WATER CONSERVATION GOALS AND ACHIEVEMENTS

CPAU offers incentives and education programs for customers to encourage energy and water efficiency - Table ES.1 summarizes the FY 2019 efficiency goals and achievements. FY 2019 represents the second year of increased energy savings targets¹ established since SB 350 was enacted in 2015 with the aim to double the energy efficiency savings in electricity and natural gas in buildings by 2030. CPAU exceeded the higher new electricity efficiency savings goal for 2019 (using gross accounting basis), while falling short of the goal for natural gas efficiency savings. The decline in gas savings is partially driven by the suspension of the home energy report program which is scheduled to resume in FY2021. Water efficiency savings dramatically increased in 2019, because a process to collect data for water savings associated with the [Green Building Ordinance](#) was developed.

Table ES.1: Efficiency Goals versus Achievements

Resource	FY 2019 Savings Goals (% of load)	FY 2019 Savings Achieved (% of load)	FY 2019 Savings Achieved
Electricity ²	0.88%	1.02%	8,980 MWh
Gas	1.05%	0.57%	167,186 therms
Water	0.91%	3.04%	134,242 CCF

¹ Electric goals: <https://www.cityofpaloalto.org/civicax/filebank/documents/56087>; Gas goals: <https://www.cityofpaloalto.org/civicax/filebank/documents/56113>

² Savings goals and savings achieved are given in Table ES.1 on a gross efficiency savings accounting basis. As a percentage of load, the net electricity savings goal was 0.75% and the net savings achieved was 0.61% or 5,372 MWh. Net values account for the impact of “free ridership” or customers who would have upgraded to more efficient measures without the program or incentive. Gas and water goals and achievements are only tracked on a gross basis, and therefore electricity efficiency savings are shown on a gross basis in Table ES.1 above for consistency.

CPAU is committed to implementing all cost-effective energy and water efficiency measures (i.e. those that are less expensive than supply-side resources). Table ES.2 summarizes the cost of efficiency over the last three years compared to the projected cost of supply resources. Electric, natural gas, and water efficiency portfolios were cost-effective compared to additional supply-side resources in FY 2019. Overall cost of the portfolios were lower than the historical average. New programs are planned for launch in 2020-2021, and total expenditures are expected to increase as a result.

The rolling 3-year average provides the longest view for interpreting the cost effectiveness of efficiency portfolios, as it accounts for yearly variations in program engagement and funding. The rolling 3-year average shows that the electric and water efficiency portfolios have been cost-effective. On the other hand, the 3-year average cost of gas efficiency savings is higher than the future supply. This was driven by very high program costs in FY 2017 as well as inexpensive future supply. The FY 2018 and 2019 gas efficiency cost effectiveness has improved versus future supply cost of gas, but staff continues to assess ways to improve the cost-effectiveness of the gas portfolio going forward.

The cost of both the electricity and natural gas efficiency portfolios are also negatively impacted by the Home Efficiency Genie program. The Home Efficiency Genie program is a customer service program that provides great educational value to Palo Alto residents but delivers fairly small energy efficiency savings.

Table ES.2: Actual Levelized Efficiency Costs versus Projected Supply Costs

		FY 2017 Efficiency	FY 2018 Efficiency	FY 2019 Efficiency	3-yr average Efficiency	Future Supply
Electric	\$/kWh	\$0.056	\$0.034	\$0.024	\$0.038	\$0.105
Gas	\$/therm	\$1.86	\$0.56	\$0.56	\$0.99	\$0.61
Water	\$/CCF	\$4.62	\$4.71	\$0.26	\$3.20	\$5.77

SUSTAINABILITY GOALS AND ACHIEVEMENTS

In FY 2019 efforts around building electrification and electric vehicle charger rebates were increased. Staff also continued working with a marketing consultant to upgrade the marketing materials for all programs including a full website migration. In addition, CPAU claimed energy savings for the third year achieved by Palo Alto’s building energy reach code and improved the data collection process to claim water savings. Staff worked with TRC, a third party auditor who conducted CPAU’s Evaluation, Measurement & Verification to estimate and claim energy savings from projects that reported time dependent valuation (TDV) energy summaries. Finally, CPAU was able to claim savings from its Business New Construction program for one large project that took multiple years to complete but accounted for a significant contribution to overall energy savings.

CPAU supports a variety of programs designed to promote sustainability and reduce carbon emissions in Palo Alto. The Electric Vehicle Supply Equipment (EVSE) rebate focuses on “hard-to-reach” market segments for EV chargers by targeting multifamily dwellings, nonprofits and schools. The state-mandated solar water heating program is not cost-effective; CPAU offers the program but does not actively promote it. Given the lack of promotion and the low natural gas prices, installed solar water heating systems continue to fall short of the goal. This program is expected to close at the end of July 2020, assuming no new legislation extends the state mandate.

Table ES.3: Sustainability Programs and Goals

Sustainability Program	Program Goal	FY 2019 Achievement	Cumulative Achievement Through FY 2019
Heat-Pump Water Heater (HPWH) Rebate	110 installed by July 2019	10	40
EV Charger Rebate (EVSE)	200-400 new charging ports by 2021	8	22
Solar Water Heating	Compliance – Not Cost Effective	0 systems	68 systems since 2008

CUSTOMER SATISFACTION GOALS AND ACHIEVEMENTS

Supporting the community is at the heart of CPAU’s mission. CPAU offers some programs that are not intended to achieve efficiency savings but are offered for educational value or as a customer service program to increase customer satisfaction. Palo Alto once again hosted two educational workshops for the [SunShares](#) program, which is a bulk buy program of PV systems for the nine counties comprising the Bay Area. Once again Palo Alto was the number one outreach partner in number of systems installed and kW installed.

Table ES.4: DSM Program Areas

Community Engagement Program	Program Goal	FY 2019 Achievement	Cumulative Achievement through FY 2019
Residential Satisfaction	>50% ³	76% ⁴	-
SunShares PV GroupBuy	PV capacity	76 kW	497 kW
Home Efficiency Genie	120 audits year	76	358

³ This goal is from the 2018 City of Palo Alto Utilities Strategic Plan in the priority area of Collaboration.

⁴ This residential satisfaction is from the 2018 RKS residential survey in Attachment D of the October 2, 2019 UAC report. The survey is conducted every other year.

HIGHLIGHTS OF FISCAL YEAR 2019

Three years after implementing the Business New Construction program, one large project was fully closed out in FY2019 and the resulting energy savings were eligible to be claimed. Successful completion of this project accounted for almost half of all gross electric savings.

The Commercial and Industrial Energy Efficiency Program is the flagship of CPAU's commercial portfolio. With three engineering firms working closely with CPAU Key Account Representatives, this program provides the bulk of Palo Alto's energy savings. The engineering firms assist customers with audits, engineering studies, vendor selection, rebate processing and post-installation inspection making the process as easy as possible for the customer. Roughly a quarter of the gross energy savings resulted from this program. CPAU mirrored this program design into the residential market with the Home Efficiency Genie as "Your Trusted Energy Advisor" and have begun seeing increased engagement with residents.

CPAU added an EV Charger Rebate Program in late FY 2017, using funds from the Low Carbon Fuel Standard credit sales and, in 2019, invested additional staff time to expand the program by contracting with a third-party vendor to provide prospective customers with technical assistance. The EV Technical Assistance Program launched in FY 2020. CPAU continues to promote the Heat Pump Water Heater rebate program in effort to achieve the City's S/CAP goals, but the program has relatively low participation. Both EV charging rebates and the Heat Pump Water Program remained a high priority for staff in FY 2019, reflecting the ongoing community priority of reducing CO₂ emissions. Palo Alto participated in the SunShares program again, which is a bulk buy program of PV systems for the nine counties comprising the Bay Area, and once again Palo Alto was the number one outreach partner in number of systems installed and kW installed. Finally, CPAU continued buying carbon offsets to offset the emissions of the entire natural gas portfolio.

1 ELECTRIC EFFICIENCY ACHIEVEMENTS

1.1 Electric Efficiency Savings versus Goals

City Council approved CPAU’s first Ten-Year Energy Efficiency Portfolio Plan in April 2007, which included a 10-year cumulative savings target of 3.5% of the forecasted energy use. As mandated by California law, the electric efficiency targets have been periodically updated, with the most recent 10-year cumulative savings goal set at 5.7% between 2018 and 2027. The goal has been impacted by increasingly stringent statewide building codes and appliance standards. The substantial energy savings from these “codes and standards” can no longer be counted towards meeting CPAU’s EE program goals displayed below. With stricter codes and standards, higher efficiency goals and over 30 years of running programs in Palo Alto, staff needs to continue to innovate to maintain and increase efficiency savings.

CPAU’s electric efficiency savings goals and achievements as a percentage of the City’s electricity usage are shown in Table 1 below. In FY 2019, on a gross efficiency savings basis, CPAU achieved electric efficiency savings of 1.02% of its total electricity sales through its customer efficiency programs. This exceeded the 2019 CPAU electric efficiency goal by 14%.

Table 1: Electric Savings versus Goals

Year	Annual Savings Goal (% of load)	Savings Achieved (% of load)	Savings Achieved (MWh)	Goal Source
FY 2008	0.25%	0.44%	4,399	2007
FY 2009	0.28%	0.47%	4,668	
FY 2010	0.31%	0.53%	5,270	
FY 2011	0.60%	0.58%	5,497	2010
FY 2012	0.65%	1.31%	12,302	
FY 2013	0.70%	0.85%	8,074	
FY 2014	0.60%	0.86%	8,218	2012
FY 2015	0.60%	0.65%	6,063	
FY 2016	0.60%	0.59%	5,530	
FY 2017	0.60%	0.65%	5,986	
FY 2018	0.88% ⁵ (0.75%)	1.00% ⁵ (0.66%)	8,988 ⁵ (5,957)	2017 ⁵
FY 2019	0.88% ⁵ (0.75%)	1.02% ⁵ (0.61%)	8,980 ⁵ (5,372)	

⁵ Electricity efficiency savings goal and achievements are presented here on a gross basis, and the net numbers are added in parenthesis for FY 2018 and 2019. CPAU will be reporting both net and gross electricity efficiency savings going forward, due to discrepancies between anticipated net to gross ratios during the 2017 goal setting and actual net-to-gross ratios for electric efficiency measures implemented. Staff is will be revising goals in 2020-2021 and is also considering a study specific to Palo Alto to develop a local net-to-gross ratio for programs and measures.

When accounting for the metric of “free-ridership” the net electric efficiency savings achieved dropped to 0.61% of load, and experts have suggested a Palo Alto specific study to examine free-ridership levels on incentive programs. Staff is currently weighing the relative impact of such a study compared to investing program innovation. Since there is so much uncertainty in the levels of free-ridership, the goals and achievements of the electric efficiency savings are presented on both a net and gross basis. For context, gas and water efficiency measures are both reported on a gross basis.

1.2 FY 2019 Electric Efficiency Savings by End Use and Customer Segment

Non-residential customers account for approximately 80% of CPAU’s electric sales, and non-residential efficiency program savings represent about 83% of CPAU’s total electric efficiency savings, as shown in Figure 1. Non-residential new construction and non-residential lighting accounted for approximately 77% of the total electric portfolio savings. The [City of Palo Alto’s Energy Reach Code Ordinance](#) is a local ordinance that exceeds state minimum efficiency standards and also contributed substantial electricity efficiency savings.

Figure 1: Composition of Net Electric Efficiency Savings in FY 2019

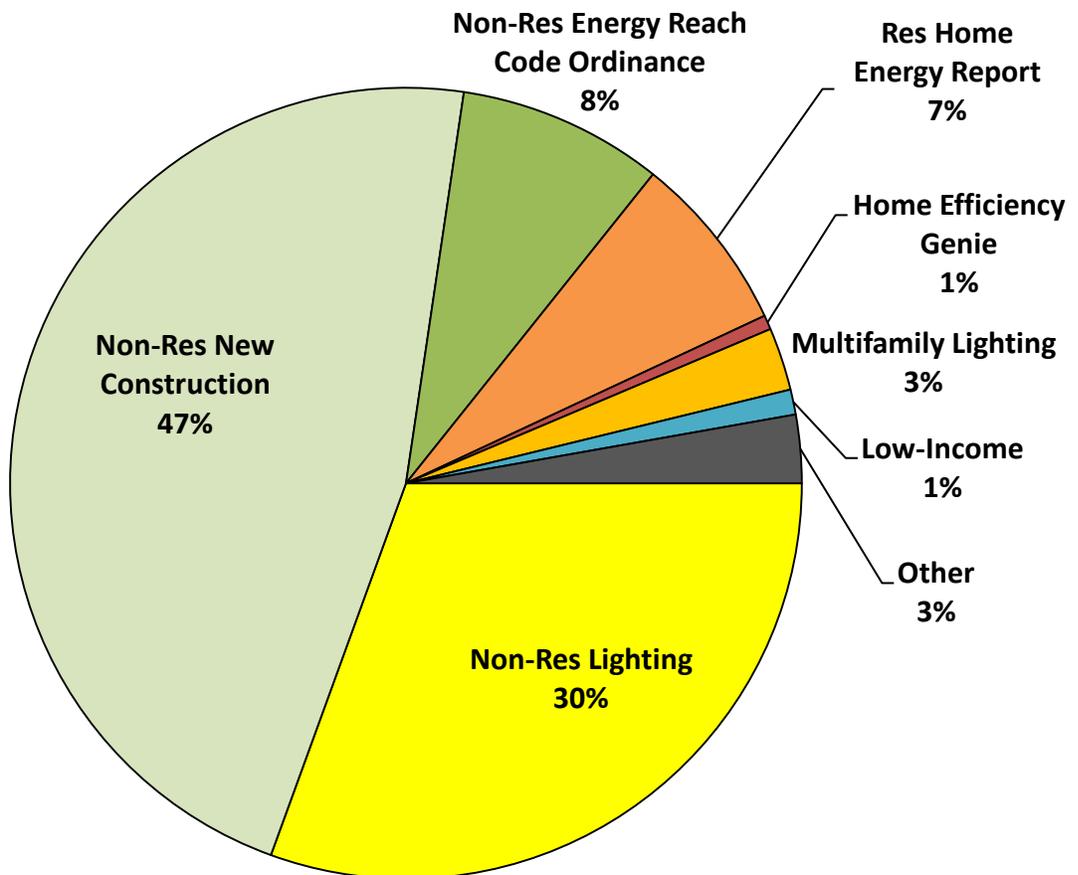
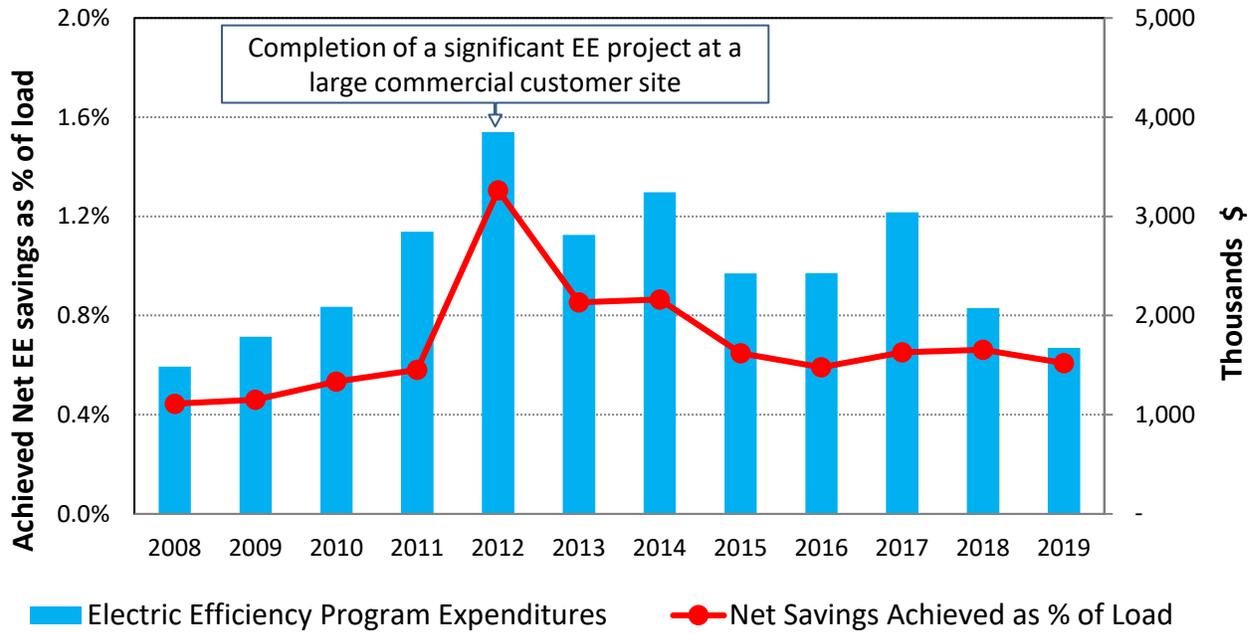


Figure 2 shows the historical annual electric efficiency savings and annual electric efficiency program expenditures.

Figure 2: FY 2008 to FY 2019 Electric Efficiency Savings and Expenditures



2 GAS EFFICIENCY ACHIEVEMENTS

2.1 Gas Efficiency Savings versus Goals

In parallel with the development of ten-year electric goals, City Council adopted CPAU's first set of gas efficiency targets in 2007 to reduce 10-year gas consumption by 3.5%. The most recent goal, set in 2017, is a 5.1% cumulative efficiency savings between 2018 and 2027. Gas savings from heat-pump water heater rebate program are included below.

CPAU's gas efficiency savings goals and achievements as a percentage of sales are shown in Table 3. CPAU has continued to expand its gas efficiency program portfolio in the past several years, with most gas savings delivered through third-party administered programs.

Table 3: Gas Savings versus Goals

Year	Annual Savings Goal (% of load)	Savings Achieved (% of load)	Savings Achieved (therms)	Goal Source
FY 2008	0.25%	0.11%	35,057	2007
FY 2009	0.28%	0.29%	146,028	
FY 2010	0.32%	0.35%	107,993	
FY 2011	0.40%	0.55%	164,640	2010
FY 2012	0.45%	0.74%	220,883	
FY 2013	0.50%	1.13%	327,077	
FY 2014	0.50%	1.20%	337,079	2012
FY 2015	0.50%	0.92%	229,373	
FY 2016	0.55%	1.08%	289,442	
FY 2017	0.55%	0.81%	228,707	
FY 2018	1.00%	0.93%	264,960	2017
FY 2019	1.05%	0.57%	167,186	

2.2 FY 2019 Gas Efficiency Savings by End Use and Customer Segment

Non-residential customers account for 52% of CPAU's gas sales, and in FY 2019, non-residential gas efficiency savings represented about 47% of CPAU's total gas savings. Non-residential HVAC comes from customers who upgrade HVAC equipment. Home Energy Reports (HERs), which compare customers' electricity and gas usage to that of similar homes, were discontinued in FY 2015 but provided savings based on assumed persistence of the program's effects⁶. In FY 2019, the HER program accounted for 35% of total gas savings and is the final year persistence will be claimed. Had Palo Alto been able to roll out the new Home Energy Report earlier we would have 30% higher gas savings. This program is currently being configured, and will hopefully help customers begin saving natural gas in FY2021. Figure 3 shows the breakdown of gas savings in FY 2019 by end use. The [City of Palo Alto's Energy Reach Code Ordinance](#) is a local ordinance that exceeds state minimum efficiency standards and also contributed natural gas efficiency savings.

⁶ Savings from a behavioral program can be claimed at a declining level for five years after it closes ([Cadmus 2015 report](#)).

Figure 3: Composition of Natural Gas Efficiency Savings in FY 2019

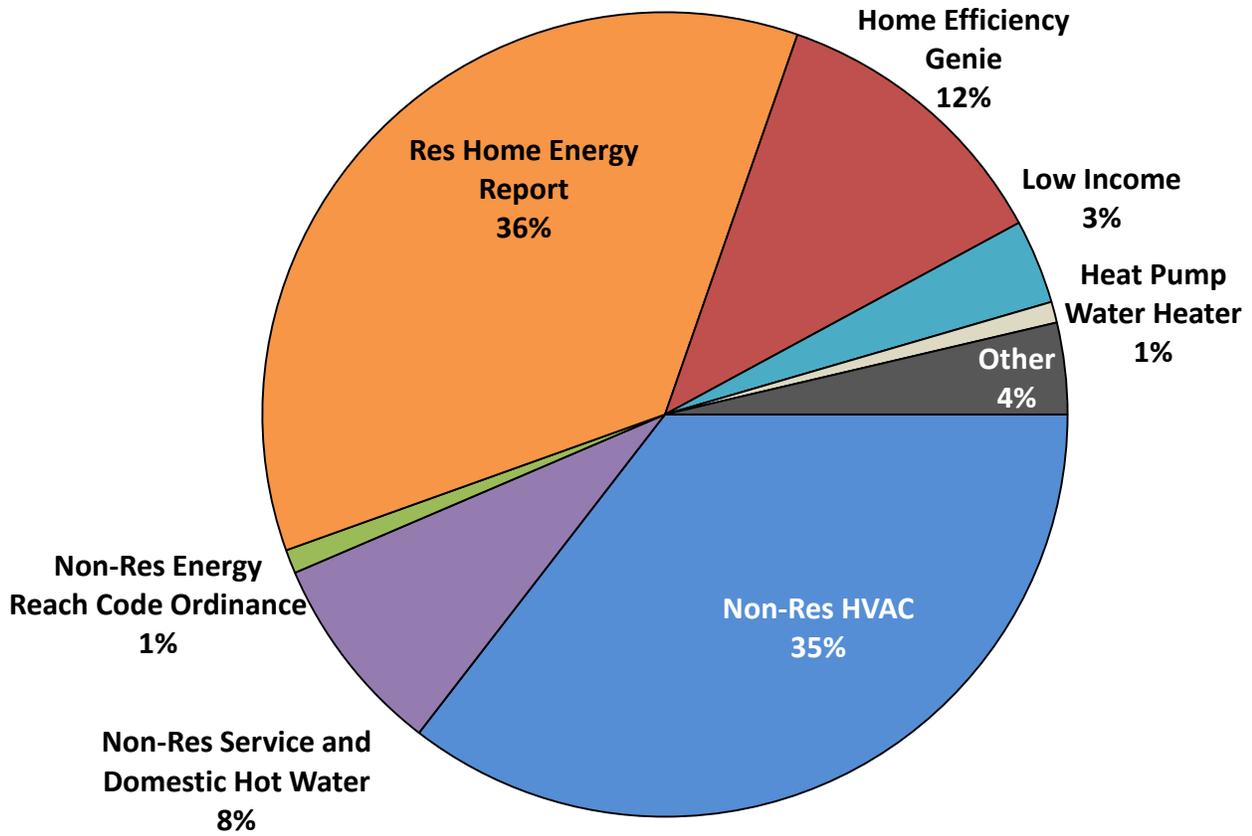
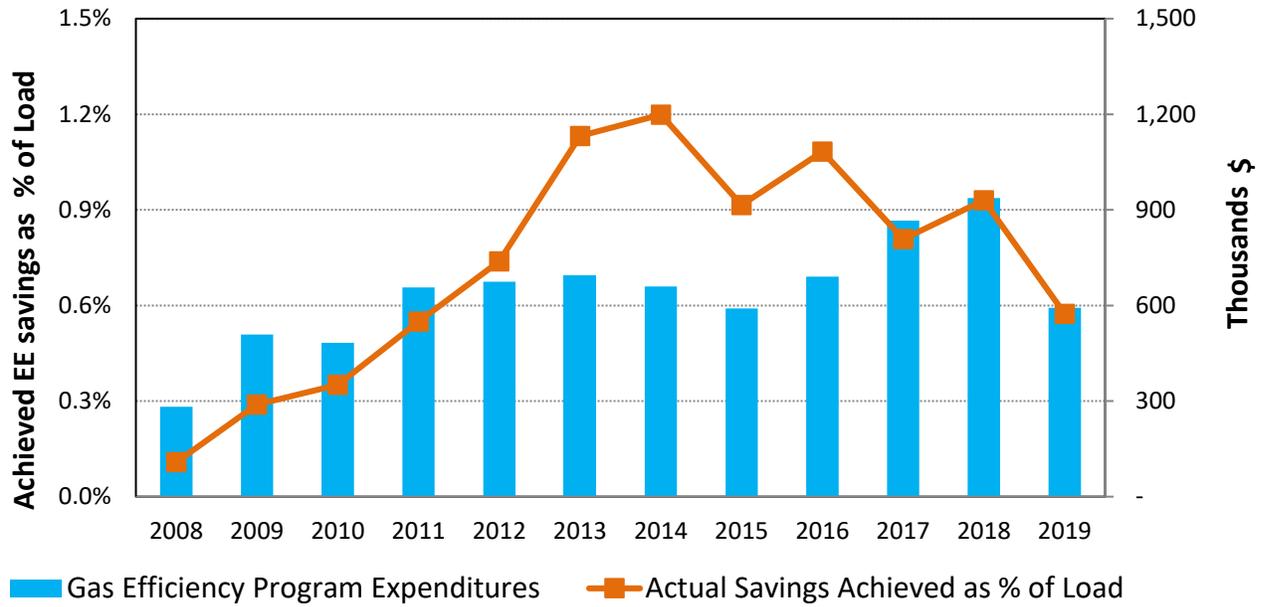


Figure 4 compares the historical annual gas efficiency savings and annual gas DSM expenditures.

Figure 4: FY 2008 to FY 2019 Gas Efficiency Savings and Expenditures



3 WATER EFFICIENCY PROGRAMS

3.1 Water Efficiency Savings versus Goals

CPAU’s water savings goals and achievements as a percentage of sales are shown in Table 5.

Table 5: Water Savings versus Goals

Year	Annual Savings Goal (% of load)	Savings Achieved (% of load)	Savings Achieved (CCF)
FY 2008	0.34%	0.72%	39,323
FY 2009	0.34%	0.98%	52,983
FY 2010	0.34%	1.35%	68,948
FY 2011	0.90%	0.47%	23,409
FY 2012	0.91%	1.09%	55,067
FY 2013	0.91%	0.53%	26,513
FY 2014	0.91%	0.64%	32,325
FY 2015	0.91%	1.54%	68,227
FY 2016	0.91%	1.96%	74,484
FY 2017	0.91%	1.40%	57,154
FY 2018	0.91%	0.47%	23,209
FY 2019	0.91%	3.04%	134,242

The City partners with the Santa Clara Valley Water District (Valley Water) to provide water conservation programs. Valley Water administers the programs for Palo Alto customers, and CPAU markets and promotes the programs. FY 2019 is the first year the City has claimed savings associated with the [City of Palo Alto’s Green Building Ordinance](#). Historically, participants were not required to submit water savings data, but the City began collecting that information at the end of FY 2018. Local ordinances such as the City of Palo Alto’s Green Building Ordinance are generally agreed to be an effective way to improve conservation and the FY2019 water efficiency and savings data proves this out.

3.2 FY 2019 Water Efficiency Savings by End Use and Customer Segment

The Green Building Ordinance accounted for nearly 90% of all water savings with the remaining 10% coming from the water programs administered by Valley Water.

Figure 5: Composition of Water Efficiency Savings in FY 2019

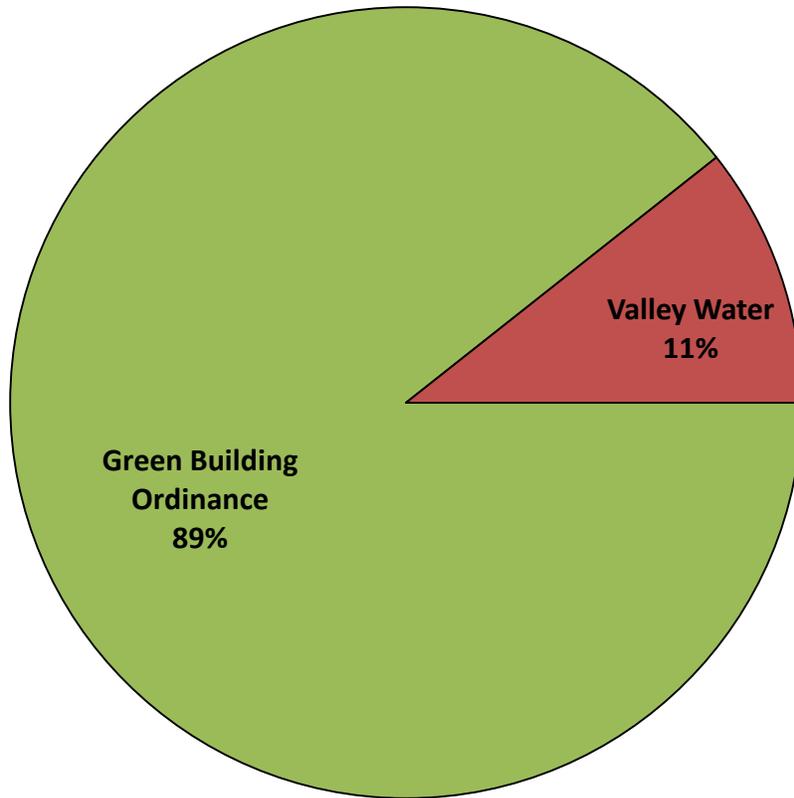
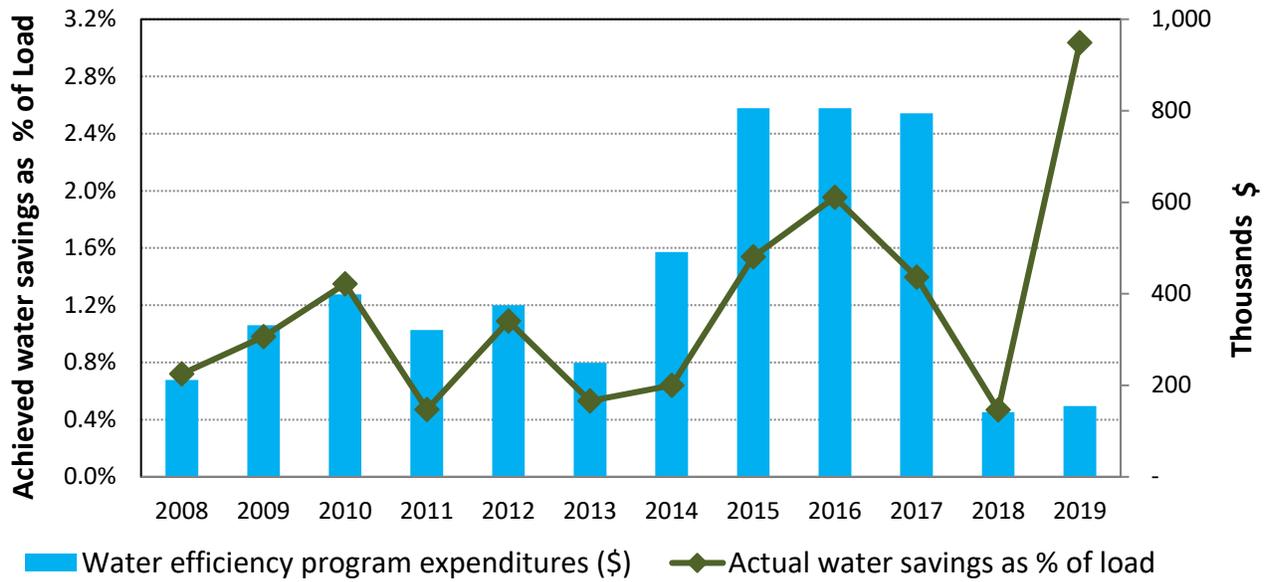


Figure 6 compares the historical annual water efficiency savings and annual water DSM expenditures.

Figure 6: FY 2008 to FY 2019 Water Efficiency Savings and Expenditures



4 SUSTAINABLE ENERGY PROGRAMS

4.1 Overview of Sustainable Energy Programs

CPAU offers a variety of programs to encourage residents and non-residents to improve the environmental impacts associated with their gas and electric consumption. Customer-side renewable generation programs are available to support the installation of both solar photovoltaic (PV) and solar water heating (SWH) systems.

4.2 PV System Installation Achievements versus Goals

As of the end of FY 2019, there were a total of 1,168 PV installations (1,139 residential, 85 non-residential, 6 CLEAN) since CPAU began supporting local solar PV installations in 1999. These customer-side generation systems are not included in CPAU's Renewable Portfolio Standard (RPS) supply requirements. In FY 2018, the first PV system went live for the Clean Local Energy Accessible Now (CLEAN) program, which purchases electricity from renewable energy generation systems in CPAU's service territory. The CLEAN program provides a Feed-In-Tariff rate of \$0.165/kwh for the first 3 MW of installed capacity. Nearly half of the capacity was reserved in FY 2018 with the remaining capacity reserved in FY 2019.

In 1999 CPAU began offering incentives for PV system installations through the PV Partners Program. In FY 2008 the PV rebate budget was increased as mandated by Senate Bill 1 (2006) and Palo Alto's share of the state-wide goal established by SB 1 was 6.5 MW by 2017. By June 30, 2017, Palo Alto exceeded its share of the state-wide goal, with a total capacity of all Palo Alto PV systems at 8.6 MW, generating about 1.5% of the City's annual electric energy needs. The PV rebate funds were fully reserved in August 2014 for residential projects and in April 2016 for commercial projects, but rebate payments are expected to continue through FY 2023 due to the five-year performance-based incentive schedule. Residents and commercial customers continue to install solar without a rebate largely due to the continued decrease in solar installation costs, net metering and the 30% Federal Tax Credit.

Figure 7: Photovoltaic (PV) Installations by Fiscal Year

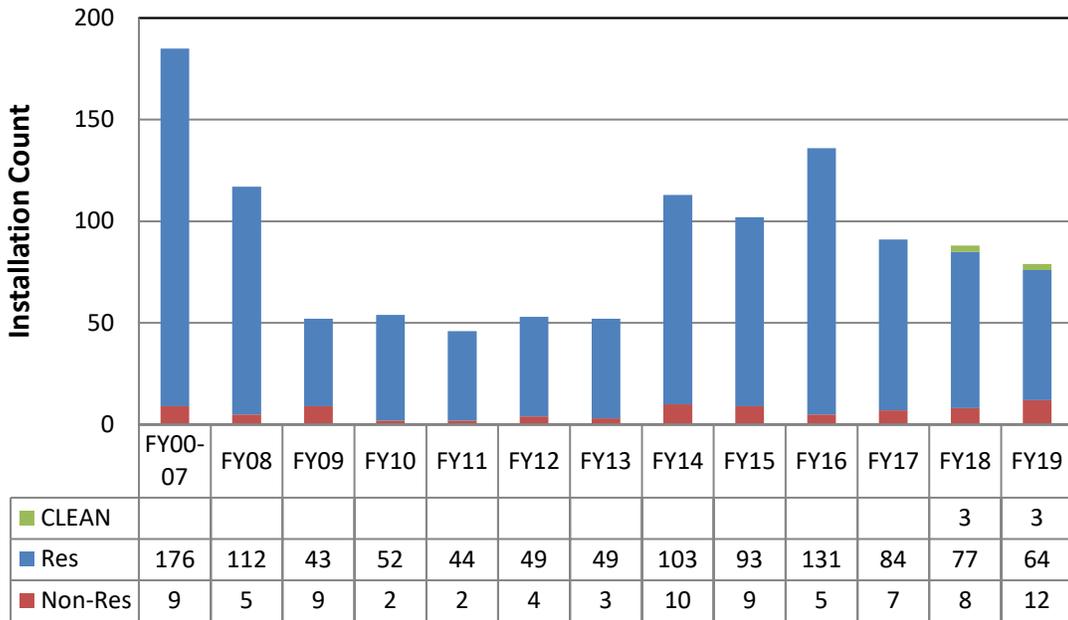
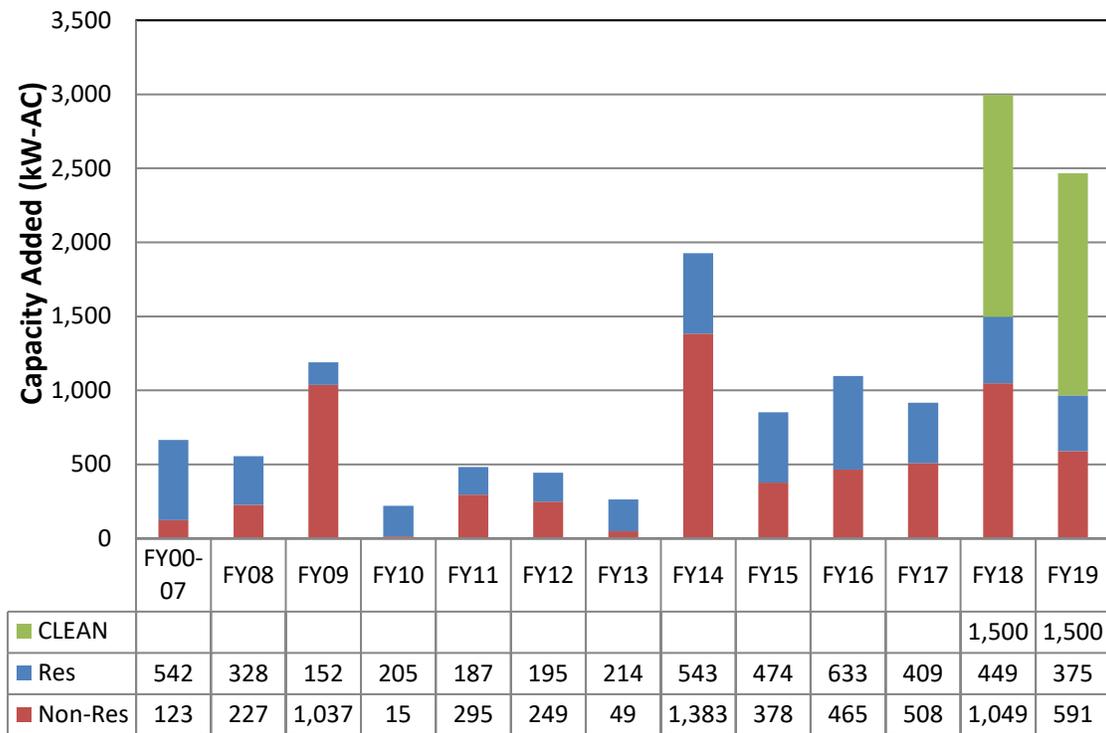


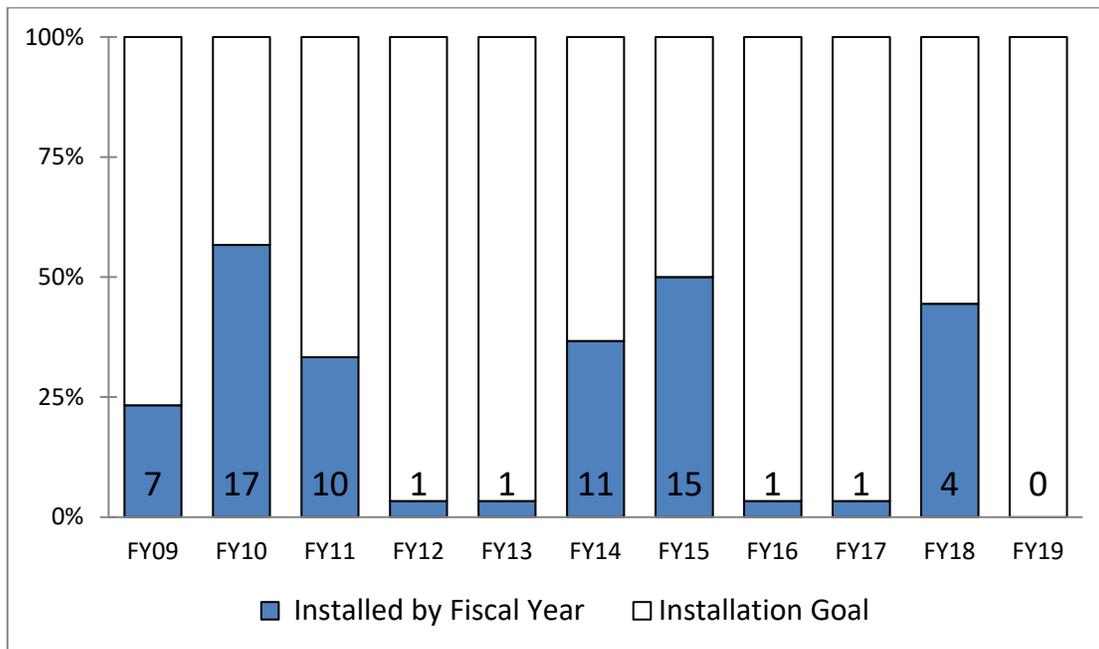
Figure 8: PV System Capacity (kW) added by Fiscal Year



4.3 Solar Water Heating System Installation Achievements versus Goals

A total of 68 solar water heating (SWH) systems have been installed since CPAU began offering SWH rebates to residential and commercial customers in 2008. The SWH rebate program was mandated by AB 1470 (2007) and was recently extended for two additional years by AB 797 (2017). It is administered by the Center for Sustainable Energy (CSE), which also administers SWH rebate programs in the San Diego area. As shown in Figure 9, the number of SWH systems installed has been consistently below target, primarily due to low gas prices which reduce the cost-effectiveness of SWH systems. Unlike PV systems, the cost for SWH systems has not decreased over time.

Figure 9: Customer-Side Solar Water Heating Systems—Program Achievements versus Annual Goal of 30



APPENDIX A: PROGRAM DESCRIPTION

The programs offered by CPAU are designed to assist all customer groups achieve efficiency savings in electricity, natural gas and water in a cost-effective manner. Please see Appendix B for the savings totals associated with each program.

RESIDENTIAL PROGRAMS

- **Home Efficiency Genie**

The Home Efficiency Genie (HEG) has become CPAU's flagship residential program. Launched in June 2015, the program enables our residents to call the 'Genie' to get free utility bill reviews and phone consultations. For a fee, residents also have the option to receive an in-depth home efficiency assessment which includes air leakage testing, duct inspections, insulation analysis, energy modeling and a one-on-one review of assessment reports with an energy expert. This package is also followed up with guidance and support throughout home improvement projects. The HEG program has a high educational component for Palo Alto residents, which likely leads to additional savings that staff cannot track and include in this program's savings totals. The Genie also tables at various events throughout the year. In FY 2019, the Genie continued to be the gateway to all of CPAU's residential programs.

- **Educational Programs and Workshops**

A variety of educational programs and workshops are held throughout the year. Typically, residential workshops on water and energy programs occur in the spring near Earth Day and in the "Summer Workshop Series." Many workshops focus on water efficiency, landscaping, energy efficiency, solar, home comfort and green building. CPAU is also invited to table at various events throughout the year to educate residents about the various programs we offer. Customers also receive timely E-newsletters on a variety of efficiency matters.

- **Home Energy Reports**

CPAU stopped providing residents with individualized reports comparing their home energy use with neighbors in similarly sized homes in FY 2015. The program was ended due to customer complaints about being compared to neighbors, as well as disputes over the basis of the comparison. Staff began focusing on developing a portal that could replace both reports, but the portal vendor later discontinued their product. Studies have shown that savings persist after the program has ended but decrease at a rate of 20% per year, so some reduced savings are still claimed ([Cadmus 2015 report](#)).

- **MultiFamily Residence Plus+ Program**

This first-ever CPAU program focusing on multifamily buildings provides free, direct installation of EE measures to multifamily residences with 4 or more units including hospices, care centers, rehab facilities and select small and medium commercial properties. In its first year the program focused on energy-efficient lighting and insulation upgrades. In the summer of 2016, the program was revamped to include more LED lighting upgrades as the price of LEDs had decreased and the

quality of the lights improved greatly. The addition of LEDs drew excitement from many property managers and building owners who were initially not interested in participating in the program. As a result, CPAU will continue to re-evaluate the program to accommodate this underserved market. Staff expects energy savings to remain high for this program, with a focus on upgrading below-market-rate apartment complexes.

- **Residential Energy Assistance Program (REAP)**

REAP provides weatherization and equipment replacement services at no cost to low-income residents and those with certain medical conditions. This program has equal focus on efficiency and comfort, and therefore it is not included in the cost effectiveness calculation used in reporting. The program provides LED lighting, heating system upgrades, insulation for walls and roofs and weather-stripping for doors and windows.

- **Do-It-Yourself Water-Wise Indoor Survey**

Palo Alto residents can request a free indoor water survey kit that can help conserve water and save money on utility bills. Residents also become educated on opportunities for conservation in their homes, and they can request free tools to improve efficiency. The program is offered in partnership with the Valley Water.

- **Free Water-Wise Outdoor Survey**

Palo Alto residents can schedule a free outdoor survey with a trained irrigation professional. The trained specialist will provide an on-site evaluation of the resident's irrigation system and provide recommended upgrades and repairs. The program is offered in partnership with the Valley Water.

- **Landscape Rebate Program (LRP)**

The Landscape Rebate Program provides rebates for various irrigation hardware upgrades, including rain sensors, high-efficiency nozzles, dedicated landscape meters, and weather-based irrigation controllers, as well as landscape conversion rebates that encourage residential and commercial customers to replace high-water-use landscaping with low-water-use landscaping. During FY 2016 residents were eligible to receive rebates of \$3.00/square foot (\$2.00 from Valley Water and \$1.00 from CPAU). A new agreement with Valley Water was signed in early 2017, continuing our partnership in the LRP. Residents are now eligible to receive rebates of \$2/square foot of replaced landscaping (\$1.00 from Valley Water and \$1.00 from CPAU).

BUSINESS PROGRAMS

- **Commercial Advantage Program**
Business customers are offered rebates for investments in a catalog of energy efficiency products including lighting, motors, HVAC and custom projects that target peak demand and energy reductions.
- **Commercial and Industrial Energy Efficiency Program (CIEEP)**
This is the fourth year that CPAU expanded this program to offer Key Accounts (the largest commercial energy users in Palo Alto) the option of picking one of three engineering consulting firms to assist in helping them evaluate and implement energy efficiency projects. Designed for the large commercial customer, CIEEP offered highly effective building commissioning services using third-party contractors Enovity, Ecology Action and BASE. The contracts were extended in June 2018 for two additional years. This assistance included reviewing lighting and heating/cooling systems and their operating specifications. Customers then obtained rebates for replacing chillers, building control systems, linear fluorescent lighting, occupancy sensors, boilers and insulation.
- **Empower SMB**
Through third party vendors, this program assisted the installation of electric and gas efficiency savings measures for small and medium sized business customers. This program ended in FY 2018 and is being revamped to launch in FY 2020 but may not generate savings until FY 2021.
- **Commercial and Industrial Water Efficiency Program**
CPAU partners with the Valley Water to provide non-residential customers with free landscape irrigation audits, and direct installation of high-efficiency toilets and urinals. Rebates are available for facility process improvements, landscape conversions, irrigation hardware upgrades and weather-based irrigation controllers.
- **Landscape Survey and Water Budget Program**
Through Valley Water, the City provides landscape irrigation surveys, water budgets and customized consumption reports for customers with large landscape sites. The service is provided by Waterfluence. The water budget for each landscape site is derived based on the amount of irrigated area, type of plants, type of irrigation system and real-time weather monitoring. Monthly reports documenting a site's irrigation performance are distributed to site managers, landscapers, HOA board members and other relevant parties, as approved by utility account holders. Through a web portal, customers can access site-specific recommendations, verify water budget assumptions and request a free landscape field survey from an irrigation expert. This program has been in place since 2012 and to date there are 118 large landscape sites covered under this program.

- **PaloAltoGreen**

This highly successful program enabled residents and businesses to pay a small premium for 100% renewable energy. In June 2014, Council terminated PaloAltoGreen for residential customers since the City's electric supplies are 100% carbon neutral. Commercial customers can still participate in this program by enrolling in the PaloAltoGreen 100% option or by purchasing blocks in 1,000 kWh increments. Participation enables commercial customers to be recognized under the U.S. EPA Green Power Leadership program or to earn Leadership in Energy and Environmental Design (LEED) Green Power credits.

- **Palo Alto Clean Local Energy Accessible Now (CLEAN) Program**

Through the CLEAN (Clean Local Energy Accessible Now) program CPAU offers a feed-in tariff, wherein developers of renewable energy generation projects in Palo Alto can receive a long-term purchase agreement for the output of their projects. All the generated electricity is procured to contribute towards fulfilling Palo Alto's Renewable Portfolio Standard (RPS) requirement. For fiscal year 2018, the prices are 16.5 ¢/kWh fixed for 15, 20 or 25 years for solar renewable energy resources, up to a capacity limit of 3 MW (and 8.8 ¢/kWh for a 15-year contract term, 8.9 ¢/kWh for a 20-year contract term or 9.1 ¢/kWh for a 25-year contract term beyond that limit), and 8.3 ¢/kWh for a 15-year contract term, 8.4 ¢/kWh for a 20-year contract term and 8.5 ¢/kWh for a 25-year contract term for non-solar eligible renewable energy resources. At the end of FY 2019, 3MW were reserved of the program's 3 MW limit.

- **EV Charger Rebate Program**

The California Air Resources Board (CARB) developed the Low Carbon Fuel Standard (LCFS) program in compliance with AB 32 (the Global Warming Solutions Act of 2006) to reduce the carbon intensity of transportation fuels used in California 10% by 2020. Electric utilities that provide electricity to charge electric vehicles (EVs) are eligible to receive LCFS credits. The City began participating in the program in April 2014 and CARB has been allocating LCFS credits to the City since then. Using funds from the sale of LCFS credits, CPAU launched an EV charger rebate program in FY 2017 to help build out EV infrastructure in anticipation of an increase in the number of EVs in Palo Alto from its current level of 2,500 to between 4,000 and 6,000 EVs by 2020. Staff determined that providing EVSE rebates for underserved segments of the market would be valuable which would include multi-family and mixed-use buildings, schools and non-profits. The LCFS funds are also used for EV education and outreach efforts.

PROGRAMS FOR ALL CUSTOMER SEGMENTS

- **PV Partners**

CPAU has offered incentives for local solar photovoltaic (PV) installations since 1999, and the City increased the PV rebate budget in 2007 as mandated by SB 1 (2006). Residential rebates were fully reserved in August 2014, and funds for non-residential PV systems were reserved in April 2016. This program is for systems interconnected behind the customer's electric meter, and customers receive net metering billing as required by SB 1.

- **Solar Water Heating**

CPAU began to offer rebates to residential and commercial customers that install solar water heating (SWH) systems in 2008. The SWH rebate program was mandated by AB 1470 (2007) and is administered by the Center for Sustainable Energy, which also administers SWH rebate programs in the San Diego area. AB 797 recently extended the SWH mandate for two additional years. Incentives are limited to solar water heating for domestic use; solar water heating systems for pools, spas, or space heat are not eligible.

- **Green Building Ordinance**

In April 2015, City Council approved revisions to the City's Green Building Ordinance (GBO), which includes the Local Energy Efficiency Reach Code requiring new construction projects to exceed California's building energy efficiency standards ("2013 Title 24 Standards") by 15%, i.e. a building's energy consumption must be 15% more efficient than current building code. The Energy Efficiency Reach Code took effect in September 2015. The new 2016 Title 24 Standards went into effect in January 2017 and the GBO mandates that new buildings be 10% more efficient than the new stricter code. CPAU is coordinating with Development Services to report the energy savings attributed to the Green Building Ordinance. CPAU is currently investigating ways to educate, assist and encourage customers to adopt green building principles and energy efficient systems when planning remodeling or new construction projects.

APPENDIX B: FY 2019 ACHIEVEMENTS BY DSM PROGRAM

Table B.1: FY 2019 Achievements by Efficiency Program⁷

Program	Electric savings		Gas savings		Water savings	
	kWh/yr	%	Therms/yr	%	CCF/yr	%
COM-Business New Construction	4,205,869	47%	6,083	4%	0	0%
COM-Com. Advantage	619,266	7%	13,541	8%	0	0%
COM-CIEEP	2,393,911	27%	59,289	35%	0	0%
RES-HPWH	-8,610 ⁸	0%	1,410	1%	0	0%
RES-Home Efficiency Genie	35,641	0%	19,656	12%	12	0%
RES-Home Energy Report	657,110	7%	59,886	36%	0	0%
RES-MultiFamilyPlus	230,641	3%	57	0%	0	0%
RES-REAP Low Inc	92,119	1%	5,666	3%	0	0%
SVWD	0	0%	0	0%	14,295	11%
Green Building Ordinance	753,862	8%	1,598	1%	119,935	89%
Efficiency Total	8,979,809	100%	167,186	100%	134,242	100%

⁷ All savings reported in this table are gross amounts. Net savings can be found in this year’s state filing found here: <https://www.ncpa.com/policy/reports/energy-efficiency/>

⁸ State utility and energy commissioners are evaluating fuel-substitution measures, like heat pump water heaters, and once a final decision is adopted, staff will align our reporting methodology for electrification measures with whatever state methodology is implemented. For this year, we are showing the increase in electricity consumption associated with heat pump water heaters as negative amount of energy savings.

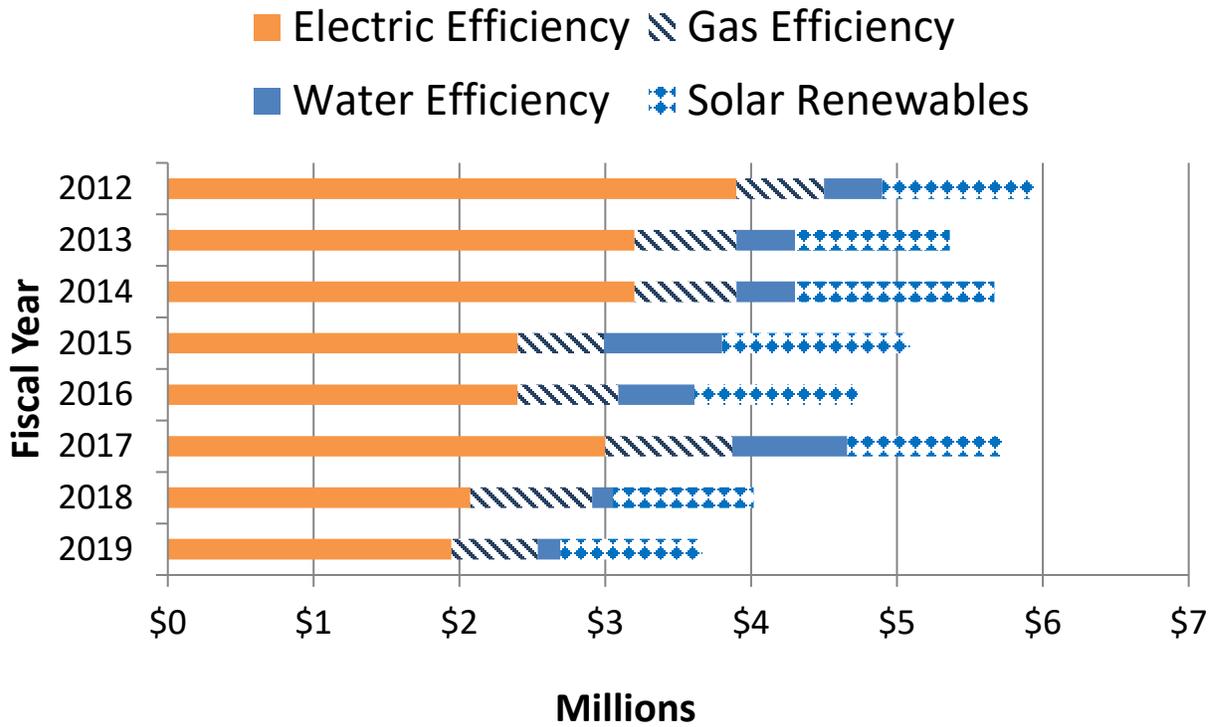
Table B.2: FY 2019 Achievements by CPAU’s Solar Programs

Program	Number of Installations	Electricity		
		kW	Saved kWh/yr	%
PV - Residential	64	375	600,000	15%
PV – Commercial (w/ CLEAN)	15	2,091	3,345,600	85%
Solar Water Heating - Single Family Residential	0	-	-	-
Solar Water Heating - Multi-Family Residential Low-Income	0	-	-	-
Solar Water Heating - Commercial	0	-	-	-
Solar Programs Total	89	2,466	3,945,600	100%

APPENDIX C: HISTORICAL DSM PROGRAM EXPENDITURES

The chart below shows expenditures by type from FY 2012 through FY 2019. The Solar Renewables category is the sum of expenditures for solar water heating and PV Partners programs.

Figure C.1 DSM Expenditures for Electricity, Gas and Water by Year and Function



APPENDIX D: CITY POLICIES/PLANS AND STATE MANDATES IMPACTING DSM PROGRAM GOALS AND IMPLEMENTATION

CITY POLICIES/PLANS

Title	Description
Resolution No. 9241	LEAP, the Long-term Electric Acquisition Plan (April 2012)
Resolution No. 9322	Carbon Neutral Plan for Electric Supply (March 2013)
Resolution No. 9402	Local Solar Plan (April 2014)
Staff Report 3706	Program for Emerging Technology (April 2013)
Staff Report 2552	GULP, the Gas Utility Long-term Plan (April 2012)
Staff Report 6851	2015 Urban Water Management Plan (May 2016)
Staff Report 7304	Sustainability and Climate Action Plan (November 2016)
Staff Report 7718	Update of Ten-Year Energy Efficiency Goals for 2018 to 2027 (March 2017)

FULL LIST OF STAFF REPORTS

- **CY 2015:** cityofpaloalto.org/gov/agendas/city_managers_reports/2015.asp
- **CY 2016:** cityofpaloalto.org/gov/agendas/city_managers_reports/2016.asp
- **CY 2017:** cityofpaloalto.org/gov/agendas/city_managers_reports/2017.asp
- **CY 2018:** cityofpaloalto.org/gov/agendas/city_managers_reports/2018.asp
- **CY 2019:** cityofpaloalto.org/gov/agendas/city_managers_reports/2019.asp

STATE MANDATES

- AB 797 (2017)** Extends existing Solar Water Heating Programs and changes the terminology of “water heating” to “solar thermal.”
- AB 802 (2015)** Requires utilities to maintain records of the energy usage data of all buildings to which they provide service for at least the most recent 12-month period and, upon the request and authorization of the owner (or owner's agent), provide aggregated energy usage data to the owner in the ENERGY STAR Portfolio Manager.
- AB 1164 (2015)** Prohibits cities and counties from enacting or enforcing any ordinance or regulation prohibiting the installation of drought tolerant landscaping, synthetic grass, or artificial turf on residential property.
- AB 1236 (2015)** Obliges cities and counties to adopt an ordinance, with certain specific elements, creating an expedited permitting process for electric vehicle charging stations. For a city the size of Palo Alto, the ordinance must be passed by September 30, 2017.
- SB 350 (2015)** The Clean Energy and Pollution Reduction Act of 2015 sets targets for utilities of 50% renewable electricity retail sales and double the energy efficiency savings in

electricity and natural gas, both by 2030. The law grants compliance flexibility for POUs that achieve 50% or more of retail sales from certain large hydroelectric power.

- AB 2188 (2014)** Requires a city and/or county to adopt an ordinance creating an expedited, streamlined permitting process for small residential rooftop solar energy systems.
- Executive Order** Due to continued water shortages, on January 17, 2014, the Governor proclaimed a State of Emergency and directed state officials to take all necessary actions to make water immediately available. Part of the proclamation included a 20 percent water reduction goal. On April 1, 2015, the Governor issued an Executive Order (B-36-15) mandating the State Water Resource Control Board impose restrictions leading to a 25 percent reduction in potable water use through February 28, 2016.
- SB 1420 (2014)** Added a requirement to report on distribution system water loss to the UWMP.
- SB 73 (2013)** The California Clean Energy Jobs Act, an initiative approved by the voters as Proposition 39 at the November 2012 statewide general election, establishes a Job Creation Fund with an annual budget of \$550M to create clean energy jobs, including funding energy efficiency projects and renewable energy installations in public schools, universities, and other public facilities. The Job Creation Fund will be funded for four years, beginning in the 2013-2014 fiscal year.
- AB 2227 (2012)** AB 2227 changed the triennial energy efficiency target-setting schedule to a quadrennial schedule, beginning March 15, 2013 and every fourth year thereafter. The last EE goals update was due to be submitted to the California Energy Commission by March 15, 2017. The next EE goals update will need to be submitted by March 15, 2021.
- AB 2514 (2010)** Mandates a local publicly owned electric utility to determine appropriate targets, if any, for the utility to procure viable and cost-effective energy storage systems and to adopt an energy storage system procurement target, if appropriate, to be achieved by the utility by December 31, 2016, and a second target to be achieved by December 31, 2021.
- SBx7-7 (2009)** The Water Conservation Bill of 2009 requires water suppliers to reduce the statewide average per capita daily water consumption by 20% by December 31, 2020. To monitor the progress toward achieving the 20% by 2020 target, the bill also requires urban retail water providers to reduce per capita water consumption 10% by the year 2015.
- AB 1103 (2007)** Requires electric and gas utilities maintain records of the energy consumption data of all nonresidential buildings to which they provide service and that by January 1, 2009, upon authorization of a nonresidential building owner or operator, an electric or gas utility shall upload all of the energy consumption data for the specified building to the EPA Energy Star Portfolio Manager in a manner that preserves the

confidentiality of the customer. This statute further requires a nonresidential building owner or operator disclose Energy Star Portfolio Manager benchmarking data and ratings, for the most recent 12-month period, to a prospective buyer, lessee, or lender. Enforcement of the latter requirement began on January 1, 2014.

- AB 1470 (2007)** Solar Water Heating and Efficiency Act of 2007. Requires the governing body of each publicly owned utility providing gas service to retail end-use gas customers, to adopt, implement, and finance a solar water heating system incentive program.
- SB 1 (2006)** The California State Legislature enacted SB 1 to encourage the installation of 3,000 megawatts (MW) of photovoltaic (PV) solar energy by the year 2017. SB 1 requires all publicly owned utilities to adopt, finance and implement a solar initiative program for the purpose of investing in and encourage the increased installation of residential and commercial solar energy systems. CPAU's share of the state goal is 6.5 MW. In 2007, CPAU increased the PV Partners program funding to meet SB1 requirements. CPAU has fully reserved all rebate funds as of April 2016.
- AB 2021 (2006)** Requires the CEC on or before November 1, 2007, and every 3 years thereafter, in consultation with the commission and local publicly owned electric utilities, to develop a statewide estimate of all potentially achievable cost-effective electricity and natural gas efficiency savings and establish statewide annual targets for energy efficiency savings and demand reduction over 10 years.
- AB 1881 (2006)** Requires cities and counties to implement a Water Efficient Landscape Ordinance which is "at least as effective as" the Department of Water Resources (DWR) Model Ordinance in reducing landscape water use. Requirements include enforcing water budgets, planting and irrigation system specifications to meet efficiency criteria.
- SB 1037 (2005)** Requires each local publicly owned electric utility, in procuring energy, to first acquire all available energy efficiency and demand reduction resources that are cost-effective, reliable, and feasible. Also requires each local publicly owned electric utility to report annually to its customers and to the (CEC) its investment on energy efficiency and demand reduction programs.
- AB 1890 (1996)** Requires electric utilities to fund low-income ratepayer assistance programs, public purpose programs for public goods research, development and demonstration, demand- side management and renewable electric generation technologies
- AB 797 (1983)** The Urban Water Management Planning Act (AB 797) requires all California urban water retailers supplying more than 3,000 acre feet per year or providing water to more than 3,000 customers to develop an UWMP. The plan is required to be updated every five years and submitted to the Department of Water Resources before December 31 on years ending in 5 and 0.