

City of Palo Alto Utilities – Local Solar Plan

Goal

To increase the penetration of local solar installations from about 0.7% of the City’s total energy needs in 2013 to 4% by 2023.

Objectives

1. Facilitate the development of local, safe and cost-effective solar in Palo Alto to meet the diverse needs of the community
2. Reduce the cost of installing solar in Palo Alto and become a leader in promoting renewable distributed generation through solar installations
3. Understand the community’s solar potential and diverse needs and develop solar programs accordingly
4. Remove internal obstacles to minimize cost and achieve greater solar potential
5. Promote solar installations in a cost effective and safe manner
6. Leverage industry resources to the extent possible
7. Deploy industry best practices

Strategies

1. **Remove internal system and institutional barriers which increase “soft” costs and may impede adoption of solar in Palo Alto**
 - a. Work with the Development Center, Planning and Utilities to identify further improvements to streamline the solar permitting process.
 - b. Promote advancements in the City’s permitting process to community and solar developers.
2. **Develop proper policies, incentives, price signals and rates to encourage solar installation**
 - a. Solar Policy and Rate Design – explore rate structures that balance cost of service with the City’s policy to promote the development of new solar systems in Palo Alto.
 - i. When evaluating new solar policies, evaluate the impact, if any, on non-solar ratepayers.
 - b. City of Palo Alto Utilities (CPAU) Billing System – explore modifications to the billing system and/or evaluate:
 - i. Incorporating net metering information on the monthly bills
 - ii. Virtual net metering to allow the sharing of net metering bill credits across accounts
 - c. CPAU Incentives – assess providing rebates or other incentives after the SB1 mandated expenditures are exhausted, the Federal Investment Tax Credit has been reduced from 30% to 10% and the net-metering cap has been met, to continue to encourage local solar installations.
 - d. Leverage available resources for solar policy and program development

- i. Participate in the Federal Department of Energy's American Solar Transformation Initiative to receive free services including development of a customized solar road map
- ii. Request assistance from existing membership in Solar Electric Power Association and ESource
- iii. Consider partnering with regional cities, counties and the State of California in developing solar programs
- e. Advocate at a local, regional and state level for effective rules, regulations and legislation to promote cost effective and fair solar development
 - i. Coordinate with other municipal utilities through the Northern California Power Agency (NCPA) and the California Municipal Utilities Association (CMUA) on state legislation related to solar

3. Assess technical and market potential of solar in Palo Alto

- a. Review commercial and residential sites to determine solar technical potential
- b. Determine cost drivers for installing solar in Palo Alto
- c. Utilize other industry studies to develop a feasible and marketable potential
- d. Develop a database of solar potential for use by developers
- e. Assess the impacts of PV on CPAU's distribution system

4. Implement policies and programs to increase solar system installations on CPAU customer sites with good solar access

- a. Continue to promote the PV Partners program to achieve the 6.5 MW of installation by 2017, per CA SB1
- b. Continue to promote the Palo Alto CLEAN (feed-in-tariff) program and revamp the marketing of Palo Alto CLEAN to facilitate the coordination of potential sites with developers and property owners/managers to achieve some level of participation
 - i. Annually re-assess the avoided cost of local renewable energy and recommend adjustments to the CLEAN offer price and contract terms, as appropriate
 - ii. Investigate developers' concerns with Palo Alto CLEAN program rules
 - iii. Continue to educate commercial property owners about the CLEAN program
- c. Evaluate solar project financing options
 - i. Coordinate with the California FIRST Property Assessed Clean Energy (PACE) program which allows solar system owners to borrow funds for the PV installation and pay it back on their property tax bills over a term equal to the expected system life (20 years).
 - ii. Partner with local lenders to offer solar financing¹

¹ See an example of such a program from New Jersey's Public Service Enterprise Group her: <http://www.pseg.com/home/save/solar/index.jsp>

5. Facilitate and/or develop new programs to encourage new participants to participate in developing local solar installations.

- a. Investigate group-discount solar PV program options to allow/facilitate Palo Alto residents to pool their buying power to secure significant discounts, making installing solar on their home simple and more affordable.
 - i. Leverage existing group-discount programs offered to regional residents and company employees.
- b. Develop a community solar program for the benefit of community members that do not have good solar access but have the desire to invest in local solar.
 - i. Evaluate program design options that allow CPAU customers to invest in a share of a new larger-scale solar PV installations located in Palo Alto
 - ii. Evaluate options for providing value back to customer investors, including:
 - (1) Evaluate CPAU’s ability to provide monthly payments (in \$) on the customer’s Utilities bill
 - (2) Evaluate CPAU’s ability to offer “virtual net metering” so that energy produced (in kWh) from a solar system could be reflected on customers’ Utilities bills. [Note that the billing system challenges may be substantial for this option.]
 - (3) Evaluate providing payments to customers via a third-party administrator separate from the Utilities bill.
 - iii. Evaluate outsourcing the administration of the community solar program to provide the following:
 - (1) Develop the community solar program
 - (2) Perform program marketing
 - (3) Identify installation sites
 - (4) Manage the solar installation contract
 - (5) Own, operate and maintain the PV installation (or contract with a third-party)
- c. Develop a solar donation program for community members to donate to public sector and non-profit organizations which may benefit from solar, but can’t afford the investment on their own.
 - i. Work with PAUSD and other non-profits to identify sites. Potential installation sites include public sector and non-profit locations which are ineligible to receive federal tax subsidies.
 - ii. Evaluate alternative mechanisms to provide donations to sustain the program, including:
 - (1) Reformulating the suspended PaloAltoGreen electric program as a mechanism to provide ongoing donations;
 - (2) Developing a bill donation mechanism to raise funds; or
 - (3) Developing on-line or crowd-funded sources to raise ongoing funds.

6. Maximize solar installations on City-owned facilities

- a. Assist Public Works in evaluating leasing City-owned facilities with low electric consumption (elevated garages and surface parking lots) to a solar developer who

could install solar PV systems and would be compensated under the Palo Alto CLEAN program.

- b. Assist Public Works in investigating installing net-metered solar on City-owned sites to reduce the City's annual electric costs (and benefit the General fund).

7. Educate the community on the benefits of solar through information and demonstration projects

- a. Develop solar demonstration projects on City and public facilities
- b. Promote the benefits of PV systems together with fuel switching (replacing end-of-life gas appliances with electric appliances or replacing a gasoline vehicle with an electric vehicle or a plug-in hybrid vehicle) strategies to reduce greenhouse gas emissions.
- c. Investigate developing a "one-stop-shop" model (e.g., Wave-one).
- d. Develop "how to go solar" promotional materials which allows customers to evaluate several solar options.
- e. Develop direct marketing for small commercial/business customers.
- f. Develop a database of solar projects installed throughout the community as "case studies" and promote them through CPAU's web site.
- g. Promote new innovative solar technologies using the CPAU Emerging technology Program
 - i. Thermoelectric paint
 - ii. PV & batteries
 - iii. Building-integrated PV (BIPV)
 - iv. White roofs
 - v. Microgrids
 - vi. Solar shingles
 - vii. Solar thermal

City of Palo Alto Utilities
Mandates and Current Solar Program Offerings

Current Palo Alto Solar Programs

1. **PV Partners Rebate Program:** This program provides incentives for Palo Alto solar electric photovoltaic (PV) installations which generate electricity that is used on site and lowers the facility's electric bill. Mandated by California law, the funds are reserved on a first-come, first-served basis and are expected to be depleted by 2015.
2. **Solar Water Heating Rebate Program:** This program provides incentives for Palo Alto solar water heating systems that generate hot water for domestic water heating uses. The funding for the Solar Water Heating program was mandated by California law and is expected to last for at least five years due to slow customer adoption of solar water heating systems.
3. **Palo Alto Clean Local Energy Accessible Now (Palo Alto CLEAN) Program:** This program offers payment for the electricity generated from Palo Alto solar electric PV installations where the electricity is not used on site but is sold to the City of Palo Alto Utilities for the renewable electricity portfolio. A Power Purchase Agreement establishes a fixed price per unit of electricity delivered to the Palo Alto electric grid over a twenty-year term.

More detailed descriptions of these three programs are provided below.

State Mandates

California has adopted several key pieces of legislation to promote renewable energy and the installation of rooftop solar. Adopted in 2007, California's Million Solar Roofs bill (Senate Bill 1, or SB1) requires that all load serving entities such as CPAU, provide incentives in the form of rebates to encourage the installation of 3,000 megawatts (MW) of solar PV systems in California by 2017. The City's proportionate share of the statewide goal is 6.5 MW by 2017 for a total of \$13 million in rebate funds. As of September 30, 2013, 3.9 MW of solar PV has been installed on customer sites and an additional 2.5 MW of new PV installations are pending completion. CPAU expects the SB1 funds to be fully reserved by December 2014.

In 1996 California state law required all electric load serving utilities to offer net energy metering¹ to eligible customers with a solar PV system, up to a defined maximum cap based on the load serving entity's total customer peak demand. Under current law, the net energy

¹ Net energy metering is a special billing arrangement that provides a bill credit to customers with solar PV systems for the full retail value of the electricity their system generates. Under net energy metering, the customer's electric meter keeps track of how much electricity is consumed by the customer and how much excess electricity is generated by the system and sent back into the electric utility grid. Under CPAU Rules and Regulations, and consistent with California law, the bill credit cannot be cashed out and can only be used to offset future electric consumption charges on the same account.

metering cap is 5% and as of September 30, 2013, the City has 565 customers on net energy metering, for a total of 3.9 MW of PV capacity representing 2.1% of the City's peak electric demand.

In 2007, California State law (Assembly Bill 1470) established a requirement for all natural gas utilities to offer rebates for solar water heating systems. In 2008, the City launched the solar water heating incentive program and as of September 30, 2013, 40 residential and two commercial customers have installed solar water heating systems.

California Assembly Bill 920 (2009) requires electric utilities to offer the option for solar customers with net energy metering to receive compensation for "net surplus electricity". Net surplus electricity is the electricity generated by an eligible customer measured in kilowatt-hours over a 12-month period that exceeds the amount of electricity consumed by the customer. AB 920 states that the utility can count the purchased net surplus electricity toward its Renewable Portfolio Standard (RPS)² requirements.

In addition, California's governor Jerry Brown has established a distributed generation³ (DG) goal of 12,000 MW. Solar is expected to play an important part in meeting the governor's DG goals and staff expects legislation or incentives will be developed in support of a DG goal. On a national level, solar makes up more than 90% of all DG⁴. While the City does not have a specific DG goal, CPAU currently offers incentives through the "Power from Local Ultra-clean Generation Incentive" (PLUG-In) program to promote DG, including from fossil-fueled resources. The PLUG-In program is planned to be revamped or terminated as the program no longer meets the City's carbon neutrality objectives. Local solar is expected to continue to be the City's primary DG resource in the future.

Current Program Detailed Descriptions

1. PV Partners

The PV Partners program started in 1999 with a limited annual budget of \$200,000 paid from the funds collected by the electric Public Benefits charge. From 1999 through 2006, 166 PV systems were installed for a total of 598 kilowatts (kW) with an average rebate of \$3.22 per Watt⁵.

² The annual amount of net surplus electricity generated in Palo Alto is minimal and therefore is not currently counted towards the City's RPS.

³ Distributed generation (DG) refers to power produced at the point of consumption which is connected to the host utility's distribution system. DG is typically a small-scale energy resource ranging in size from 3 KW to 10 MW, but can be larger. DG may be sourced through fossil-fuel energy (e.g. natural gas) or renewable resources including bio-fuel, wind or solar or be in the form of combined-heat-and-power (sometimes called co-generation) or fuel cells.

⁴ American Public Power Association, Distributed Generation, An Overview of Recent Policy and Market Developments – November 2013.

⁵ All power units (Watts, kilowatts (kW), and megawatts (MW)) are rated using the California Energy Commission (CEC) rating standard. The CEC-AC rating standards are based upon 1,000 Watt/m² solar irradiance, 20 degree Celsius ambient temperature, and 1 meter/second wind speed. The CEC-AC Watt rating is lower than the nameplate rating at Standard Test Conditions (STC).

In 2006, the California Million Solar Roofs Bill (SB1) established a goal to add 3,000 megawatts (MW) of new PV systems over ten years for the entire state and Palo Alto's share is 6.5 MW. To meet the SB1 requirements, CPAU increased the PV Partners Program budget to \$13 million over ten years. The total budget is divided into ten steps, each funded at \$1.3 million. Each step is allocated across four customer classes: residential, small and medium commercial, large commercial and non-profit/public sector. SB1 also required that solar rebates be reduced by a minimum of 7% per year to encourage lower installation costs. The average PV Partners rebate for the SB1 goal is \$2 per Watt (\$13 million divided by 6.5 MW).

For PV systems with capacities less than 30 kW, the rebate is paid in a single check to the system owner. For systems 30 kW and larger, the rebate is paid monthly for five years based on the metered PV system generation (using a revenue-grade generation meter which is separate from the City's net energy meter). Customers may reserve a PV Partners rebate after they have a purchase contract and have participated in an energy audit. The reservation period is 12 months for retrofits and 24 months for new construction projects. As of September 30, 2013 \$5 million of the SB1 PV Partners funds has been expended, \$6 million has been reserved and staff expects the balance (\$3 million) to be reserved by end of 2014. Table 1 provides a summary of local solar installations through the PV Partners Program.

Table 1: Solar PV Installations in Palo Alto through the PV Partners Program*

Year	System Count per Year	Capacity (kW-AC) per Year
1999	4	16
2000	6	16
2001	27	100
2002	22	73
2003	16	40
2004	17	45
2005	20	74
2006	54	233
2007	77	213
2008	85	1,347
2009	57	340
2010	48	503
2011	51	444
2012	40	204
2013 *	42	254
Total	566	3,904

* Data through September 30, 2013.

By law, net energy metering must be provided to customers installing PV up to a cap of 5% of the City's peak demand. For Palo Alto, the cap is 9.5 MW. Net energy metering is a special

billing arrangement that provides a bill credit to customers with solar PV systems for the full retail value of the electricity their system generates. Under net energy metering, the solar customer's electric meter keeps track of how much electricity is consumed by the customer and how much excess electricity is generated by the system and sent back into the electric utility grid. If the customer earns a net metering bill credit, it cannot be cashed out and can only be used to offset future electric consumption charges on the same account. Most solar customers are net consumers and do not generate more electricity than they need in a year.

In addition to monthly net energy metering, state law requires utilities to offer compensation for net surplus electricity, which is the amount of electricity generated which exceeds the amount of electricity consumed over a twelve-month period. The net surplus electricity compensation rate is priced based on the cost of renewable electricity (currently at \$0.05481/kWh) so that no extra cost is borne by other rate payers (beyond the program administration cost).

Table 2 is a summary of PV installations through September 30, 2013 along with forecasted new PV installations.

Table 2: PV Partners and Net Energy Metering Participation

Year	Pending PV Partners Reserved Capacity (kW)	Unreserved PV Partners Capacity (kW)	Estimated Forecasted PV Capacity After SB1 Funds Depleted ⁶ (kW)	Cumulative Installed Capacity (kW)	Percent of Net Metering 9.5 MW Cap	Rebates paid
1999-2013				3,904	41%	\$7.7M
2014	1,689			5,593	59%	
2015	765	1,000		7,358	77%	
2016		1,200		8,558	90%	
2017			1,320	9,878	104%	
2018			1,452	11,330	119%	
2019			1,597	12,927	136%	
2020			1,757	14,684	155%	
2021			1,933	16,617	175%	
TOTAL	2,454	2,200	8,059			

2. Solar Water Heating Program

As required by state law, CPAU's Solar Water Heating (SWH) Program provides incentives in the form of rebates to customers who install qualifying solar water heating systems that offset energy used by an existing water heater or boiler for domestic water heating uses. Space heating, pools and spas are not eligible for CPAU SWH program incentives. CPAU currently

⁶ Forecasted new PV capacity is estimated using 10% annual growth in net metered installations. Does not include systems installed under the CLEAN program since CLEAN participants are not eligible to receive net metering.

provides approximately 32 million therms of natural gas per year to its natural gas customers, which represents approximately 0.25% of statewide non-electric-generation natural gas sales. The State’s goal is to install 200,000 solar water heating systems by 2017, and City’s proportionate share is approximately 530 systems. The City’s Climate Protection Plan has a goal of achieving 1,000 systems by 2020.

The SHW Program is available to residential, commercial and industrial natural gas and electricity customers within Palo Alto. CPAU offers incentives on a first-come, first-served basis within each incentive category (Single-Family Residential, Multifamily Low-Income, or Multifamily/Commercial). As of September 30, 2013, \$86,737 in rebates have been issued under the program. The program is expected to continue through 2017 with incentive levels decreasing over the program lifetime.

Table 2 is an accounting of the number of SWH systems installed in Palo Alto since the SWH Program was launched in 2008.

Table 2: Palo Alto Solar Water Heating Installation Count

Year	SWH System Count per Year
2008	9
2009	10
2010	15
2011	7
2012	1
2013	1
Total	43

3. Palo Alto CLEAN

In addition to meeting the mandated solar initiatives, in 2012, the City launched the Palo Alto Clean Local Energy Access Now (CLEAN) program. Through the Palo Alto CLEAN program, building owners may lease their roof tops to solar developers, or develop solar themselves, and sell the energy and renewable attributes to the City at a fixed rate over a 20-year term.

Through Palo Alto CLEAN, CPAU would purchase electricity generated by solar electric systems located in the City through a standard Power Purchase Agreement (PPA). The power is separately metered and delivered to CPAU’s electric distribution system (as opposed to being used at the facility where the system is located), and is counted towards CPAU’s renewable energy goals. Programs like this are also known as "feed-in tariff" programs in reference to the fact that the power is "fed into" the electric grid. None of the power is used to offset the host customer’s load and therefore participants in the Palo Alto CLEAN program do not qualify for net energy metering.

A key feature of a CLEAN program is the standardized PPA so that participants know what the requirements and payments will be without having to negotiate a contract with CPAU. As of November 30, 2013, CPAU had received no applications to the Palo Alto CLEAN program.

The program was first adopted in March 2012 at a price of \$0.14/kWh fixed for a 20-year PPA with a maximum capacity for the program of 4 MW. Effective January 1, 2013, Council increased the program price to \$0.165/kWh for a 20-year PPA and the maximum capacity for the program was reduced to 2 MW. On February 3, 2014, the City Council voted to continue the program price at \$0.165/kWh for a 20-year PPA, but increasing the program cap to 3 MW.

There have been no applications for the Palo Alto CLEAN program to date, but staff believes that some CLEAN applications will be completed in 2014. There are a number of factors which may contribute to the lack of participation in the Palo Alto CLEAN program, including:

- lack of locations suitable for low cost ground mount PV installations,
- higher rate of return for PV installations which are installed on the customer-side of the meter, which are eligible for PV Partners rebates and net energy metering, and
- challenges associated with identifying interested property owners who have large solar suitable roofs and/or parking lots and who have tenants paying the electric utility bills.