

MEMORANDUM

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TO: UTILITIES ADVISORY COMMISSION

FROM: UTILITIES DEPARTMENT

DATE: February 12, 2014

SUBJECT: Staff Recommendation that the Utilities Advisory Commission Recommend that the City Council Approve the City's Local Solar Plan

REQUEST

Staff recommends that the Utilities Advisory Commission (UAC) recommend that the City Council approve staff's proposed Local Solar Plan (Attachment A).

EXECUTIVE SUMMARY

The City of Palo Alto desires to be a leading city in sustainability efforts and, as such, has set significant goals to reduce greenhouse gas (GHG) emissions. Individual homeowners and businesses also desire to do their part to reduce GHG emissions, want to control the cost of meeting their energy needs, and often look to solar energy as a means to achieve those goals.

The proposed Local Solar Plan identifies a set of strategies and initiatives to continue promoting solar in a cost-effective and sustainable manner by accelerating and increasing solar penetration in Palo Alto. The City's PV Partners program, which provides rebates to City electric customers who install rooftop photovoltaic (PV) solar systems, has been very successful, but is expected to run out of funds by the end of 2014. State and national efforts to expand the installation of solar energy systems have grown exponentially. The cost of installing solar on rooftops has fallen and many third-party entities offer creative ways for residents and businesses to install systems. However, the benefits to potential solar owners locally are lower due to Palo Alto's relatively low electric retail rates. Further, with the adoption of the City's Carbon Neutral Plan for the electric supply portfolio, installing solar in Palo Alto may be less compelling than it once was.

The City is able to fill a unique role to facilitate the development of solar by eliminating some of the hurdles and barriers which are impeding the cost-effective installation of solar systems in Palo Alto. Implementing the Local Solar Plan allows the City to continue to be a leading solar community and a leader in environmental sustainability.

BACKGROUND

The City of Palo Alto Utilities (CPAU) has been a leader in local solar development starting in 1980 when it first launched a solar hot water heating program, which reduced the cost of

systems through a bulk buy effort and provided low interest loans to home owners payable through their Utilities bill. In 1999 CPAU launched its first solar photovoltaic (PV) system rebate program to encourage residents and businesses to install solar PV systems. Since then, CPAU’s menu of solar offerings has expanded and the City has been ranked in the top ten nationally based on the number of local solar installations per utility customer since 2008. A detailed description of the City’s existing solar programs is presented in Attachment B. 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.

California has adopted several key pieces of legislation to promote renewable energy and the installation of rooftop solar. A description of these legislative initiatives is included in Attachment B.

DISCUSSION

CPAU has played an important role in promoting solar within Palo Alto through its offering of financial incentives under the PV Partners program. CPAU’s PV Partners program, along with net energy metering, provides sufficient incentives to promote solar for businesses and homeowners with good solar access. The incentives, however do not go far enough to encourage or facilitate solar for CPAU’s customers who desire to be part of the solar movement, but either do not have good solar access, financial means to install solar equipment, and/or the information necessary about available incentives. In addition, by the end of 2014 staff expects that customers will have reserved all funds under the City’s PV Partners program and that the City will have reached its net energy metering participation limit

by 2017. Thus the City's current financial incentives for roof-top solar are expected to end within the next three years.

The cost of installing solar on rooftops is at an all-time low nationwide¹ prompting many third-party entities to develop and market solar locally. A host of solar marketers have sprung up offering many creative ways in which to finance and/or coordinate the development of solar to either receive solar directly to the premise, receive financial benefits or other non-direct benefits. Many of these programs encourage community development of solar energy through group-discount purchases or leases, crowd funding and virtual net metering. Solar leases and power purchase agreements (PPA) are also rising in popularity. These financial instruments are offered by companies who own, operate, and maintain the PV system and provide generation guarantees over a 20-year term. Customers are not required to pay any money up-front and monthly payments are often lower than the cost to purchase the electricity from the customer's electric utility. In addition to solar leases and power purchase agreements, customers may finance the PV system on their property tax bill through California's Property Assessed Clean Energy (PACE)² program. PACE is currently available to commercial customers, including CPAU's customers, and is expected to expand to the residential sector in 2014.

CPAU's customers are looking to the City to assist them in making decisions to install and/or invest in solar for their homes or community facilities. As such, the City is in a unique position to facilitate the process of bringing more solar to Palo Alto.

Local Solar Penetration, Forecast and Potential

Staff conducted a technical potential assessment by reviewing the total rooftop square footage in Palo Alto adjusted for several factors including existing penetration rates, shading, and roof setbacks. A total of 100 megawatts (MW) of solar PV technical potential was identified, representing 170,000 MWh/year of energy. Staff does not yet have a good estimate of how much of the technical potential can actually be achieved. As part of the Local Solar Plan, staff will develop a better estimate of the technical potential and assess the achievable potential, given the local costs and benefits and existing penetration levels in Palo Alto.

As shown in Table 1 above, local solar installations through the PV Partners Program total about 3.9 MW of capacity and 6,630 megawatt hours (MWh) per year of energy, or about 0.7% of the City's annual energy needs.

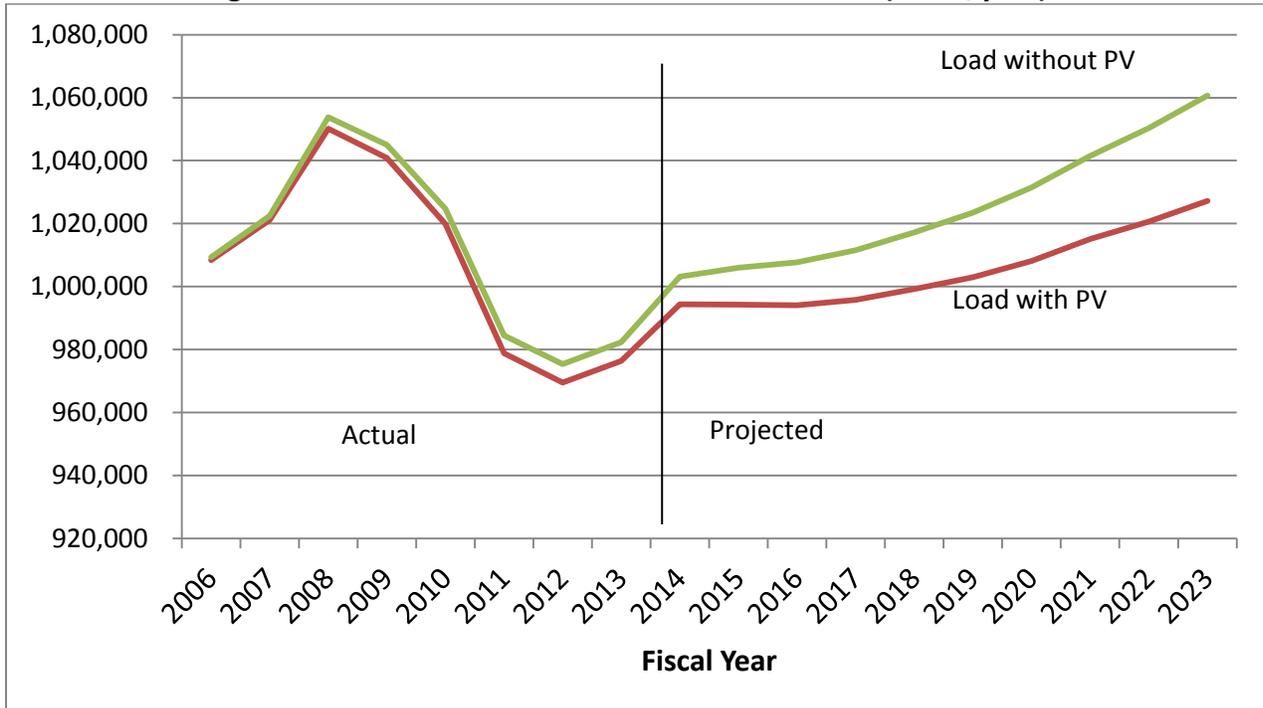
National forecasts for the annual growth rate of customer-sited PV range between 15% and 25%. Because of Palo Alto's higher costs for PV systems, lower electric rates, and lower solar availability, CPAU assumes a more modest 10% annual growth rate starting after 2016 when all the solar installations through the PV Partners program are expected to be completed. Based

¹ See Lawrence Berkeley National Lab and the Department of Energy SunShot Program's July 2013 report: Tracking the Sun VI: An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2012 (<http://emp.lbl.gov/sites/all/files/lbnl-6350e.pdf>)

² See California First's program here: <https://californiafirst.org/overview>.

on this assumption, over the next ten years, an additional 12.7 MW of local net metered solar energy is anticipated and is included in the most current electric load forecast as shown in Figure 1. Solar PV associated with participation in Palo Alto CLEAN³ program is not included in the load forecast but is accounted for in CPAU’s renewable electric supply forecast. Staff anticipates 3 MW of local solar capacity installed under the Palo Alto CLEAN program by 2015.

Figure 1: Electric Load Forecast and PV Penetration (MWh/year)



While the total installed cost of solar PV systems has decreased significantly in the last five years on a national, state and local level, there are still obstacles and/or conditions which keep installation costs in Palo Alto high, thus preventing Palo Alto from reaching its maximum solar installation potential. In the last three years, the average installed cost of residential solar PV (before rebates and tax credits) was 10% higher for CPAU customers compared to PG&E customers (\$7.38/watt versus \$6.73 respectively). One reason may be the higher rebate available for CPAU customers, which may be a reason that installers charge more in Palo Alto. Soft costs associated with design, permitting and interconnection are higher in Palo Alto, which imposes more requirements than other jurisdictions. However, the City has streamlined its permitting process to help bring the costs down. Finally, Palo Alto is considered an affluent community and therefore developers may be finding that they can charge more because of the socioeconomic conditions.

³ The Palo Alto CLEAN (Clean Local Energy Accessible Now) program is a feed-in tariff program offering a standard long-term contract for local solar energy.

Local Solar Plan

The goal of the proposed Local Solar Plan (Attachment A) is to develop a tailored solar roadmap to encourage cost-effective adoption of solar technologies in Palo Alto in keeping with the City's objectives for environmental sustainability. The proposed Local Solar Plan contains the following goal, objectives and seven supporting strategies:

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
2. Develop proper policies, incentives, price signals and rates to encourage solar installation
3. Assess technical and market potential of solar in Palo Alto
4. Implement policies and programs to increase solar system installations on CPAU customer sites with good solar access
5. Facilitate and/or develop new programs to encourage new participants to participate in developing local solar installations
6. Maximize solar installations on City-owned facilities
7. Educate the community on the benefits of solar through information and demonstration projects

The proposed Local Solar Plan includes several tasks and/or initiatives in support of the goal, objectives and strategies. The intent is to implement the Local Solar Plan over the next two years with a focus on developing several solar programs intended to reflect the different interests in the Palo Alto community.

The proposed Local Solar Plan requires staff to further evaluate the merits of community solar programs and/or other initiatives, such as a group-discount program, along with identifying several strategies to reduce hurdles to install PV in Palo Alto, reduce the cost of installing PV

and/or provide information/demonstrations to help residents and business decide if one of the City's solar programs makes sense for them. Staff intends to return to the UAC and Council with specific program details, including resource and funding needs for each program developed.

Specifically, the proposed Local Solar Plan includes the development of at least two community solar programs to facilitate solar for those customers who either don't have good solar access, cannot support solar at their own premise due to size or home/business ownership status, or want to contribute towards solar for the benefit of a community-based organization, such as local schools.

The main tasks in the Local Solar Plan are to develop new programs to encourage local PV system installations and are described below:

1. *Develop a community solar donation program to be implemented by Fall 2014*

In a community solar donation program, participants contribute funds towards building PV systems on community buildings such as schools or other community and/or nonprofit facilities. The projects could be funded in many ways, including donations from participants through monthly contributions of (e.g., \$5 to \$10) through their utility bill. In addition, members of the community or businesses could donate additional funds on a one-time basis for the installation of the systems. Alternately, funds could be gathered for specific projects through a crowd funded, or "kick-starter" type, campaign.

When sufficient funds are collected, the City would contract with a developer to build and operate the PV systems. Participants could vote to select sites from a set of locations identified as good candidates.

This program takes the least amount of staff time to develop, and is, therefore, the first program under the Local Solar Plan that staff is able to implement. Staff expects to return to Council with a community solar donation program proposal by August 2014 that could be implemented by October 2014.

2. *Develop a community share program to be implemented by July 2015*

In a community solar share program, participants pay for a share of the cost of a larger system that would be installed on a local building. This would be valuable for customers who may not be good candidates for solar PV on their own homes or businesses (due to shading, or other roof or access issues) and could be cheaper per kilowatt (kW) installed due to economies of scale. For example, 100 participants could each pay 1% of the cost of a system and virtually receive 1% of the energy output from the PV system. The City's Utility billing system may require modifications to implement "virtual net-metering" to make the participant's experience similar to customers with PV on their own roof.

A community solar investment program is a variation of the solar share program described above. In this program, participants would pay for a share of the cost of a PV system that

would be installed on a local building. For example, 100 participants could each pay 1% of the cost of a system and receive 1% of the income derived from the sale of the energy produced from the system. In this case, CPAU would buy the energy using a long-term power purchase agreement.

Staff expects to outsource the administration of a community share program and would need to identify changes that may be required to the City's Utility billing system. Staff expects to return to Council with a community solar program proposal by October 2014 that could be implemented by March 2015.

3. *Develop a solar group-discount program to be implemented by January 2016*

The goal of a group-discount, solar PV program is to lower the cost of installing PV systems in Palo Alto. In this program, CPAU would likely engage a third-party administrator to offer a group-discount program for solar PV and solar water heating systems to interested customers at a lower purchase or lease cost. CPAU could participate in existing group-discount programs offered by local governments (through ICLEI USA, for example). The program administrator would provide turnkey services including: offering consumer education, preparing a Request for Proposal for local contractors to provide solar PV and solar water heating systems to the interested CPAU customers, and managing the installation contracts. Contractor selection would be based on experience, installation services, cost, financing, and system quality. The program participants would pay the full cost of administering the program.

Staff expects to return to Council with a solar group-discount program proposal by July 2015 that could be implemented by January 2016. This program would be available after staff expects that the rebates from the PV Partners program will run out.

4. *Develop a plan to install PV at City-owned facilities*

CPAU staff has worked with Community Services, Planning, Public Works and Real Estate staff to review City-owned sites for their suitability for solar PV installation based on solar access, property leases, future redevelopment plans and whether the buildings are historical. Staff has concluded that the parking garages have good potential for a first solar project on City-owned facilities. Public Works staff has engaged the non-profit CLEAN Coalition to draft a Request for Proposals to solicit bids for installing PV systems on the City-owned garages using a variety of ownership and leasing options. If the proposals have merit, staff would request Council approval, as appropriate, of any lease agreements.

In addition, staff will continue to investigate mechanisms to install PV systems on other City-owned facilities and develop a plan to complete those installations. Staff expects to complete the plan for City-owned facilities by July 2014.

NEXT STEPS

Staff will seek Finance Committee support of the proposed Local Solar Program in March 2014 and Council approval in April 2014. Provided Council approves the proposed Local Solar Plan, staff intends to develop the programs and will return to the UAC, Finance Committee and

Council for recommendations and specific approval of programs. At that time, staff will include a description of the program and potential participation, benefits and costs and include funding and resource needs. Table 2 is a tentative timeline for seeking Council approval on specific solar programs in the Local Solar Plan.

Table 2: Tentative Timeline for Major Programs

	UAC Review	Finance Comm. Review	Council Review	Program Launch
1. Community Donation Program	June 2014	July 2014	Aug. 2014	Oct. 2014
2. Community Solar Program	Nov. 2014	Dec. 2014	Jan. 2015	July 2015
3. Group-discount Program	May 2015	June 2015	July 2015	Jan. 2016

RESOURCE IMPACTS

Approval of the Local Solar Plan will not impact budget resources for fiscal year 2014. Staff resources will be impacted for the programs contained in the plan and as such staff may seek consulting and program administration services to assist with the implementation of the Local Solar Plan. Staff will identify resource impacts and will seek Council approval for funds to implement specific programs as needed.

POLICY IMPACTS

Approval of the Local Solar Plan is consistent with existing solar legislative mandates and is in support of the 1) City’s Climate Protection Plan; 2) CPAU’s Long-term Electric Acquisition Plan; and 3) CPAU’s Strategic Plan.

ENVIRONMENTAL IMPACTS

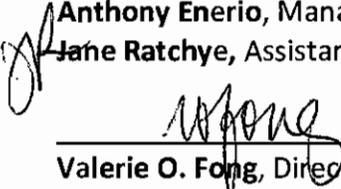
Approval of the Local Solar Plan does not meet the California Environmental Quality Act’s (CEQA) definition of “project” under California Public Resources Code Sec. 21065, thus no environmental review is required. Construction of individual solar systems on buildings in the community may be subject to CEQA review and will be addressed as needed, as each of the Local Solar Plan’s individual sub-programs are brought forward.

ATTACHMENTS

- A. Local Solar Plan
- B. Summary of State Mandates and Current Solar Programs

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DEPARTMENT HEAD: 
Valerie O. Fong, Director of Utilities

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

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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.

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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.