

Executive Summary: PA No. 3 – Residential and Commercial Renewables Rebates and Incentives

Description

A residential and/or commercial renewables rebate program could provide homeowners and businesses in the **scwd**² area with rebates or incentives to install solar photovoltaic (solar PV) and solar water heater (SWH) systems.

Amount of GHG Reduction

Two programs that were considered were a Solar Power (solar PV) Group Buy Program and SWH Group Buy Program. The Solar Power and Solar Water Heater Group Buy Programs are estimated to reduce GHG emissions on average 170 MT and 76 MT CO₂e per year, respectively, for a total 246 MT. These programs could reduce between 35 to 55% of the potential GHG reduction goals for SCWD, and approximately 15% of the potential GHG reduction goals for SqCWD.

Project Life and Sustainability

Solar Power and SWH Group Buy Programs would continue to provide GHG reductions for the estimated 30 year life of the solar PV arrays and 20 year life of the solar water heaters. The project would be sustained by normal routine maintenance.

Project Cost

The Solar Power and SWH Group Buy Programs would use local financial institutions to provide the capital for the program; therefore, there is no capital cost to SCWD or SqCWD. The incentives are \$700 per solar PV project and \$200 per SWH. Low capital and incentive costs associated with the project result in a low lifecycle cost of \$0.03 for the solar PV and \$0.034 for the SWH per MT CO₂e. In addition, the average annual net costs are about \$65,000 and \$30,000 per year respectively.

Table ES-1: Solar Power and SWH Group Buy Program Summary

Project	Life (yr)	Capital Cost (\$)	Average Annual Net Cost (\$/Yr)	Average Annual GHG Reductions (MT/Yr)	Lifecycle Energy Cost (\$/KWh) ¹	Lifecycle GHG Reduction Cost (\$/MT)
Solar PV Group Buy Program	30	\$0	\$64,714	170	\$0.10	\$0.03
Solar Water Heater Group Buy Program	20	\$0	\$29,731	76	\$0.14	\$0.04

¹ This generation cannot be counted by the **scwd**² desalination plant because it is claimed by the solar PV and SWH system owners.

Project Assessment No. 3 – Residential and Commercial Renewables Rebates and Incentives

Description

This assessment estimates the GHG reduction from an incentive program for homeowners and businesses in the **scwd**² area that would incentivize them to install new solar photovoltaic (solar PV) or solar water heater (SWH) systems. This project assessment looks at a program that enables a group of local people to buy solar PV and SWH projects in bulk to obtain a lower installed cost.

Incentives for additional water conservation activities are addressed in Project Assessment No. 1 - Additional Water Conservation Activities.

Types of Incentives

Incentives come in several forms, including rebates or up-front payments, tax credits, and loans. Incentives are designed to influence individuals and/or organizations to invest in energy efficient or renewable energy technology that they would not otherwise purchase.

Tax Credits: Tax credits are provided by federal, state, or local taxing authorities to individuals and organizations with income tax liabilities. The tax credits are deducted from the income tax liability of an individual or an organization, and usually calculated based on a percentage of the installed cost of a project (i.e. – 30% of the total installed cost). Creating new tax credits is a complicated processes that requires specific legal authority, and therefore they are not analyzed in this assessment.

Rebates: A rebate is an up-front one-time cash incentive that is designed to entice an individual and/or organization to purchase a product or system they would not otherwise purchase. The payment could be based on a flat amount, a \$/kW or \$/kWh payment over a specific period of time, or a \$/MT payment.

Loans: Loans can be used to entice individuals or businesses to make a capital investment in two ways: by providing a low or no interest loan and by creating easy access to capital. The loans can be provided through local private financial institutions and can be backed or guaranteed by the local governments. A local government can also “buy-down” the interest rate with an up-front payment to the financial institution. In addition, local governments can use their own funds and create a loan pool.

History and Technical Maturity

Rebate and incentive programs are proven and mature. Incentives and rebates have a history dating back many decades in this country. They have been applied to the purchase of durable goods like cars, appliances, and consumer electronics. In the late 1970s electric utilities started providing incentives and rebates to increase the use of energy conservation equipment. Today, rebates and incentives are commonly used to increase the use of energy efficient equipment and renewable energy systems. This is a cost-effective way to manage energy demand and defer the need to build additional generation, transmission, and distribution assets. Tax credits became an additional incentive tool in the 1990s.

Incentives continue to be a major tool to encourage energy efficiency and renewables. PG&E has incentive and rebate programs for residential customers. Rebate programs have been used

to promote the purchase of: energy efficient appliances, lighting, heating and cooling systems, and building envelope improvements like insulation, duct ceiling, cool roofs, and low-e windows.

Businesses, schools, non-profits, and governments can receive incentives for similar improvements on their facilities that include: boilers, energy management systems, controls systems, agricultural systems, data center cooling control systems, window film, and building envelope improvements like insulation, and customized energy saving projects.

There are also rebates and tax incentives to encourage the installation of renewable resources. The Self Generation Incentive Program (SGIP) and the California Solar Initiative (CSI) are examples of renewable energy rebate and incentive programs.

There are also programs to promote water conservation which in turn save energy and reduce GHG emissions. For example, the City of San Diego Water Department offers several rebate programs for low flow toilets and washing machines for residential customers. For commercial customers, they offer rebates for high-efficiency clothes washers, <http://www.cuwcc.org/smart-rebates-main.aspx> high-efficiency toilets, high-efficiency urinals, pressurized water brooms; and more specialized uses such as x-ray film processor re-circulation systems and cooling tower conductivity controllers.

Proposed Incentive Programs

Solar Power Group Buy Program: This program is modeled after successful programs at the City of Portland, OR and San Jose, CA. SCWD or SqCWD would work with local financial institutions and solar PV providers to lower the cost of purchasing solar PV system by doing a bulk purchase. This program would use local financial institutions to make the loans and would not require SCWD or SqCWD capital. As well, the loan would eliminate one of the key hurdles to purchasing solar PV projects – the lack of up-front capital. The SCWD or SqCWD roles would be limited to facilitating the program, providing a modest rebate to secure the rights to the GHG emissions, and possibly buying-down the interest rate of the loan (not modeled here). The participating financial institutions and solar vendor would be selected through an RFP process. Once the program is set-up, an advertising campaign would be used to entice participants during an enrollment period. Once the enrollment period closes, the installation period would begin. As part of participation in the program individuals and businesses would be required to contractually sign over the right to the GHG emissions reductions from their system so that they could be claimed solely by **scwd**²; thereby avoid being double counted. However, all the tax credits and energy production would remain with the system owner. This program could start in the first year with a pilot of only SCWD and SqCWD employees and a small pool of local business, and then expand to the rest of the community. This would allow for the agencies to fix any administrative issues that may occur with the kick-off of the program prior to expanding the program to the public and additional businesses. In San Jose the installation period for their initial 130 employee participants lasted from September 2010 to February 2011. San Jose's program saved about 300 KW, or about 2.3 KW per installation. For this assessment, a program is assumed to install 50 solar PV systems per year over a 5 year period. If the program is deemed to be successful it could easily be ramped up in years 2 through 5, and install more units than the planned 50 units per year.

Solar Water Heater Group Buy Program: This program operates exactly the same as the Solar Power Group Buy Program. The assessment assumes a program to install 25 SWH systems per year for a 5 year period. If the program is deemed to be successful, it could easily be ramped up in years 2 to 5, and install more units than the planned 25 units per year.

Reliability and Operational Complexity

The operation and savings associated with renewable projects is known and well understood. The rebate and incentive programs described here are fairly straight forward and only moderately difficult to administer.

The solar program savings are easily quantified by simply adding up the installed kWhs of solar PV, or the reduced electricity or natural gas resulting from newly installed solar water heaters.

Sustainability

A Solar Power Group Buy Program would continue to provide GHG reductions for the estimated 30 year life of the solar PV arrays and 20 year life of the SWHs. The projects would be sustained by normal routine maintenance.

Local Consideration

Economy

The Solar Group Buy Programs would benefit the local community. When residents, institutions, and commercial customers participate in this program, they generate sales of products and local service. Local construction and service jobs would be created to support the projects driven by rebates and incentives.

Vendors

Potential solar vendors in the area include, but are not limited to:

- Suns Up Solar (Santa Cruz, CA)
- Solar Technologies (Santa Cruz, CA)
- Westinghouse Solar (Columbia, CA)
- Sun Power (San Jose, CA)

Potential local financial institutions include, but are not limited to:

- Santa Cruz County Employees Credit Union
- Santa Cruz Community Credit Union
- Bay Federal Credit Union

Environment

Air: Solar PV and SWH projects do not create air pollution, but the reduction in electricity use will reduce GHG emissions at power plants.

Land: Larger solar PV projects require large, unobstructed, and unshaded areas, typically 100 square feet per kW. A 2.3 kW system would require about 230 square feet, and a 100 kW system would require approximately a combined 10,000 square feet, or approximately one quarter acre of land. Land impacts would be mitigated if the installation space is on land that is already disturbed, improved, or on rooftops. SWH projects occupy very little space on rooftops.

Water: Solar PV and SWH systems only use a modest amount of water during cleaning.

Noise: Solar PV systems produce little noise pollution. Larger inverters can make a “humming” sound similar to transformers. The sound can be mitigated by locating inverters in an enclosure

or within existing maintenance or electrical yards, and locating them away from residences or sleeping areas. Some SWHs have a small pump that creates a minimal amount of noise.

Aesthetic/Visual: Visual impacts from solar PV installations coincide with space constraints, and solar PV systems impact a viewshed in proportion to the size of the project. Placement of the system is the main factor that affects visual impact. For example, roof-top systems integrating solar PVs into existing structures would minimize visual impacts, whereas utility-scale installations would likely occupy large open spaces that would be visible from a considerable distance. SWH projects occupy very little space on rooftops and have a very limited aesthetic/visual impact.

Waste By-products: Installed solar PV and SWH systems generate no waste by-products from their operation.

Energy Production, Energy Savings and GHG Reductions

Table 1 provides a summary of the energy production and GHG reductions from a Solar PV and SWH Group Buy Programs. However, the energy production and savings cannot be counted toward the **scwd**² desalination plant because they would be controlled and owned by the solar PV and SWH system owners.

Table 1: Estimated Energy Production and GHG Emissions

Project	Annual Energy Production (kWh/yr) ¹	Average Annual Energy Savings (kWh/yr) ¹	Annual GHG Reduction (MT CO ₂ e/yr)	Lifetime GHG Reduction (MT CO ₂ e)
Solar PV Group Buy Program	138,000	583,000	170	5,085
Solar Water Heater Group Buy Program	62,500	260,000	76	1,818

¹ This generation cannot be counted by the **scwd**² desalination plant because it is claimed by the solar PV and SWH system owners.

Cost

The costs for the Solar PV and SWH Group Buy Programs are the set-up and administration costs, the annual enrollment advertising campaign, and a rebate. The rebate is assumed to be about 5% of the installed cost, or \$700 per solar PV project and \$200 per SWH; and is meant to secure the rights to the GHG emissions reductions. We assume this program will need 0.25 FTE per year per program, for a total of 0.5 FTE. We assume \$10,000 per year per program for marketing, for a total of \$20,000. All of the generation and all of the solar rebates and incentives accrue to the solar PV system owner, and not to SCWD or SqCWD. The programs install 50 solar PV and 25 SWH systems per year over a 5 year period. There are no capital costs since the programs use local financial institutions to make the loans. Table 2 provides a summary of the costs for the program.

Table 2: Estimated Solar PV Group Buy Program Costs

Project	Life (yr)	Capital Cost (\$)	Average Annual Net Cost (\$/Yr)	Lifecycle Energy Cost (\$/kWh) ¹	Lifecycle GHG Reduction Cost (\$/MT)
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Summary of Advantages and Disadvantages

Advantages:

- Local economic and job benefits.
- Mature technology with low risk.
- Environmental considerations are low.
- Loans overcome the barrier of up-front capital for residences and businesses, while no SCWD or SqCWD capital is needed.
- Once set-up, the program has low operations & maintenance requirements.
- Provides GHG reductions to **scwd**², and energy cost savings to the community.
- Creates community involvement from participants, and education and awareness through the enrollment advertising campaign.

Disadvantages:

- Requires additional staff and considerable set-up effort.
- Energy generation and savings cannot be counted by the **scwd**² desalination plant because it is claimed by the solar PV and SWH system owners.