

SOLAR PHOTOVOLTAIC SYSTEM REPORT

ANNUAL REPORT FOR FISCAL YEAR 2013/14

DEVELOPMENT SERVICES

A REPORT ON THE PERFORMANCE OF THE
SOLAR PHOTOVOLTAIC SYSTEM



This report, prepared by Steven C. Lake, Development Services Director and City Engineer, provides a review of performance of the Solar Photovoltaic System for the fiscal year period of July 1, 2013 to June 30, 2014.

Table of Contents

Introduction.....	Page 1
Energy Production	Page 2
Solar Savings	Page 2
Reading the Charts	Page 4
The Projects	Page 5



Cover Page Photography

Upper left photo: Town Offices Solar Project

Lower left photo: Town Service Center Solar Project

Right photo: Town Service Center Solar Project

Introduction

The Town of Danville is committed to green and sustainable practices, energy conservation, recycling, water conservation, improved water quality, improved air quality, reduced greenhouse gas emissions, and green building standards. The Town has further demonstrated this commitment in the area of electrical energy conservation by:

- Installing light emitting diode (LED) traffic signals and street lights
- Improving energy efficiency in the Town facilities
- Use of solar cells to reduce the use of carbon-intensive electrical generation

Under the Danville Town Council's direction, a solar photovoltaic feasibility study was placed in the Town's 2008/09 through 2012/13 Capital Improvement Program (CIP) for the purpose of defining a project by which solar photovoltaic electrical energy production could benefit the environment and lower the cost of energy for the Town. In the 2009/10 CIP the project was modified to include construction of a solar photovoltaic system in fiscal year 2010/11 .

The feasibility study was reviewed in a Study Session by the Town Council on September 13, 2011 resulting in 4 sites being selected. The Town Staff was directed to recommend selection of a solar system provider, define financing options, and to implement a project. Town Staff advertised for proposals, received and reviewed proposals from 6 providers, and after careful consideration, the Town Council selected SolarCity as the best provider for the Town.

At the August 14, 2012 Study Session the Town Council selected a financing option using a 20-year power purchase agreement, a prepayment of 20 years of solar electric usage costs, and a 5-year extension. The first year savings was estimated at \$145,000, an average savings of \$245,000 and a total net savings of \$4,400,000 for a 25-year contract.

On September 10, 2012 the Town entered into agreement with SolarCity and construction was started on the project in November 2012. Completion of all 4 sites was reached in August 2013. ■

Energy Production

Each solar facility location converts the solar-produced electricity to PG&E standards as it is sent to the power grid. This enables the solar facilities to replace the power normally coming from the power grid with clean solar energy. Both the production and consumption of electricity is remotely monitored to ensure that production levels are maintained.

The cost of electricity produced by the solar facilities is much less than the cost of power used from the power grid. The low cost of solar electricity and the amount of surplus electricity that is sold back to the grid represents the Town's savings. The cost of PG&E electricity is based on the time of day and season of the year making electricity during the midday in the summer months about twice as expensive as electricity in the winter months.

Solar electrical production during the summer months will exceed, by a significant amount, the solar production during the winter months. The shorter winter days and cloud cover reduce production to about 60% of summer levels. So, the overproduction in the summer months will address the shortfall in the winter months.

PG&E will allow overproduction credit in the summer to be used to offset winter shortfalls. However, PG&E will not give any credit for any overproduction that exceeds the total electrical usage for the year. In other words, PG&E will never owe the customer money; however, the customer's PG&E costs can be zero. Over production is generally avoided by designing a solar photovoltaic system to produce 70% to 80% of the estimated electrical usage.

In 2013/14 the total solar photovoltaic electricity production was 570,892 kWh for the 4 sites. The total electrical usage for the same period for the 4 sites was 846,330 kWh. The solar power offset was 67% of the electrical usage at the 4 sites.

Solar Savings

Solar savings at each site can be determined by comparing PG&E costs before the installation of the solar arrays and after the solar arrays were in full production. Each month PG&E sends the Town a net energy metering (NEM) statement that shows the electrical consumption, production, and costs. Every year PG&E creates a "true-up" statement that adds up all of the energy consumption, solar production, and costs, for an annual billing amount for the Town that indicates the annual electrical cost for the site.

Using PG&E's billing information between May 2013 to April 2014, the Town saved **90%** of the cost of energy for the 4 sites. Reducing the total bill from \$154,323 to \$18,516. This \$138,747 savings is very close to the 2012 Feasibility Study first year savings of \$145,000. A comparison between the chart for Diablo Vista Park and the Sycamore Valley Park shows how the first 3 months of the Sycamore Valley Park solar production was about half of what it should have been due to a maintenance operation that reduced the Sycamore Park production.

Solar Photovoltaic System

Table 1. Solar Photovoltaic System Savings for 2013/14

Site	2013/14		2013/14		Savings	
	PG&E Cost*	Solar Power Sold	Net Cost	Net Cost		
Diablo Vista Park	\$23,389	\$23,389	\$0	100%	\$23,834	
Service Center	\$26,134	\$26,134	\$0	100%	\$26,632	
Sycamore Valley Park	\$61,888	\$43,372	\$18,516	70%	\$44,551	
Town Offices	\$42,912	\$42,912	\$0	100%	\$43,730	
Total	\$154,323	\$138,747	\$18,516	90%	\$138,747	

*The PG&E 2011/12 cost was increased by 7% to estimate today's cost.

The solar power production produced a return on our investment in solar power of 8.7%. The break-even point where the savings offsets the cost remains at year 8. Next year the results will improve due to the full production of all the solar arrays.

In Table 1, the estimated electrical cost for each site prior to the installation of the solar arrays is shown in column 2 for the period between April 2013 to May 2014. Columns 3 and 4 show the production and net cost of electricity for the period of April 2013 to May 2014. Column 5 shows the percent savings of electricity during the same period. The last column shows the savings for each site and the total savings for all of the sites.

The PG&E calculation of the price of electricity is based on the season and time of use. Summer at mid-day (summer peak) is the most expensive at \$0.49 per kWh and winter nights, weekends, and holidays

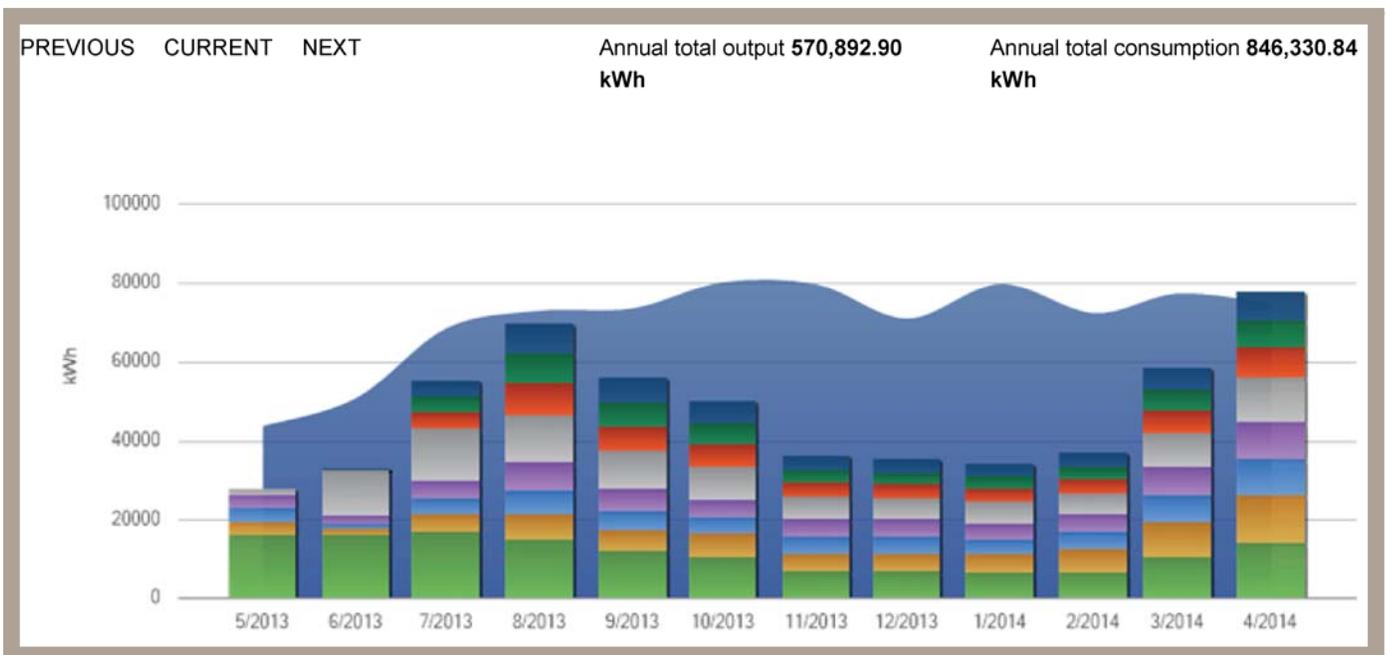


CHART 1. COMBINED SOLAR PRODUCTION AND FACILITY CONSUMPTION FOR 2013/14

Solar Photovoltaic System

are the least expensive at \$0.14 to \$0.24 per kWh. This price difference can create a condition where the solar arrays are producing and selling electricity at the peak price and the facility is using and buying electricity at a lower price. Diablo Vista Park is an example of this buy-low-sell-high condition where electricity is produced (sold) during the summer day and consumed (bought) during the winter night when the field lighting is on. Table 1 illustrates this situation where 3 of the 4 sites produced about 70% of the power but offset 100% of the cost. (Note that due to Sycamore Valley Park’s technical issue during the summer peak, production of 67% of the consumed electricity only offset 70% of the cost.)

Reading the Charts

The charts are taken from SolarCity’s website and use production and consumption values from the solar arrays at each site. The solid blue background represents the electricity consumed at the site over the year. The bars represent the solar array production. For sites with more than one array, the production from each array is shown with a different color in the bar. The charts clearly show how the weather and season affects the consumption and production amounts.

Chart 1 shows the combined annual production and consumption of all 4 sites. It also shows how the production varies with the seasons and how the consumption remains fairly flat over the year.

Charts 2 through 5 show the production and consumption for each site. Chart 2, is a very good illustration of seasonal production, with over-production in April through September and under production in the winter.

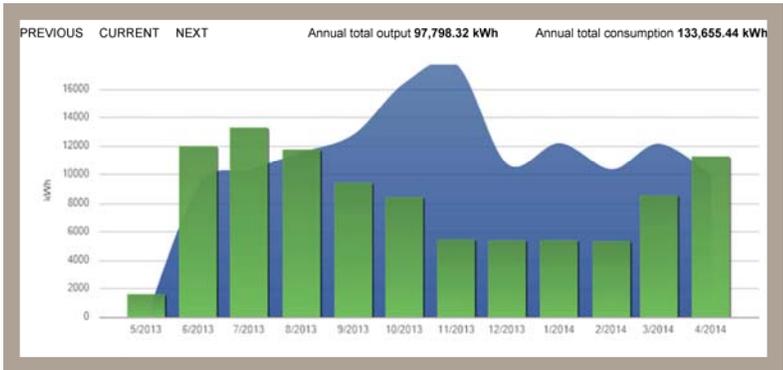


CHART 2. DIABLO VISTA PRODUCTION AND FACILITY CONSUMPTION

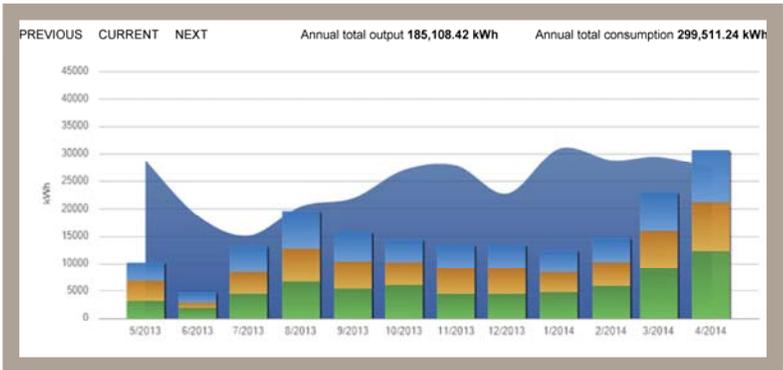


CHART 3. SYCAMORE VALLEY PARK SOLAR PRODUCTION AND FACILITY CONSUMPTION



CHART 4. SERVICE CENTER PRODUCTION AND FACILITY CONSUMPTION



CHART 5. TOWN OFFICES SOLAR PRODUCTION AND FACILITY CONSUMPTION

The Projects

The aerial photos from Google Earth show how the solar projects were integrated into the project site. Careful attention was given to making sure that the solar arrays architecturally matched the facilities onsite.



AERIAL 1. THE SOLAR PROJECT AT THE TOWN OFFICES

Over the last year there have been many compliments about the project. Feedback from our Town residents about the solar arrays have included comments about parking in the shade under the solar arrays and reducing the time and energy needed to cool their cars in the summer. Others share how proud they are to see the Town reducing greenhouse gas emissions and, at the same time, creating a cost savings to the Town. ■



AERIAL 2. THE SOLAR PROJECT AT THE SERVICE CENTER AND SYCAMORE VALLEY PARK



AERIAL 3. THE SOLAR PROJECT AT DIABLO VISTA PARK

