



# SunMizer™ Residential Value Proposition Case Study

Selective installation of SunMizer on residential PV system demonstrates payback in less than 5 years

## Summary

Residential photovoltaic installations experience shade, which can result in significant power loss. Deploying SunMizer units only on shaded panels recovers over 50% of the potential power loss due to shade. This "Selective Installation" minimizes the cost of optimizing array output and the recovered energy provides payback in less than 5 years.

Figure 1. 6.4 kW Installation: Arrows show shade locations



Figure 2: Seven panels experience shade from eave



Figure 3: Upper panel shades panel below



## Installation Description

**Size:** 6.4 kW residential installation in Sonoma, CA

**Panels:** 32 Kyocera KC200GT 200W

**Inverter:** SMA Sunny Boy SB6000U

**String:** Two (2) strings (16 modules each string)

**Monitoring:** Energy Recommerce

## Problem

Prior to installation of SunMizer the performance output was modeled both in PVWatts and PV\*Sol® for power output without shade. The array was then modeled again using Solmetric SunEye™ data to predict potential power loss due to shade. Array output was then measured for the month of June, 2009.

Table 1. Annual Energy Recapture Potential

	June Output w/o Shade	June Output w/Shade	Annual Energy Recapture Potential
PVWatts Model	1,097 kWh	*845 kWh	2,355 kWh
PV*Sol Model	1,112 kWh	*871 kWh	2,222 kWh
Actual (Measured)	N/A	841 kWh	N/A

\*Based on Solmetric SunEye™ shade data

As seen in Table 1, the predicted array output with shade correlated very closely with the measured output for June. Using this modeled output to predict annual energy production reveals the opportunity to recapture more than 2,000 kWh of energy annually. More than 2,000 kWh is currently being lost due to shade.

The panels shaded during daylight hours with the highest power production potential, or "peak sun-hours" (9:00AM to 5:00PM) are shown in Figures 2 and 3. These panels have the greatest impact on power production because they experience shade when array energy production is at its highest levels.

## The SunMizer Solution

SunMizer isolates the shaded panel from the string and performs localized maximum power point tracking to extract maximum power from the panel. It independently adjusts the output current and voltage provided to the string to maximize the energy generated by the PV array. By optimizing panel output, SunMizer ensures the shaded panels do not degrade the performance of the array. This optimized power condition recaptures energy that was previously lost.





In Figure 4, array power output is compared before and after SunMizer installation. The performance data shows increased power production during "peak sun-hours."

Figure 4. Array power output with and without SunMizer

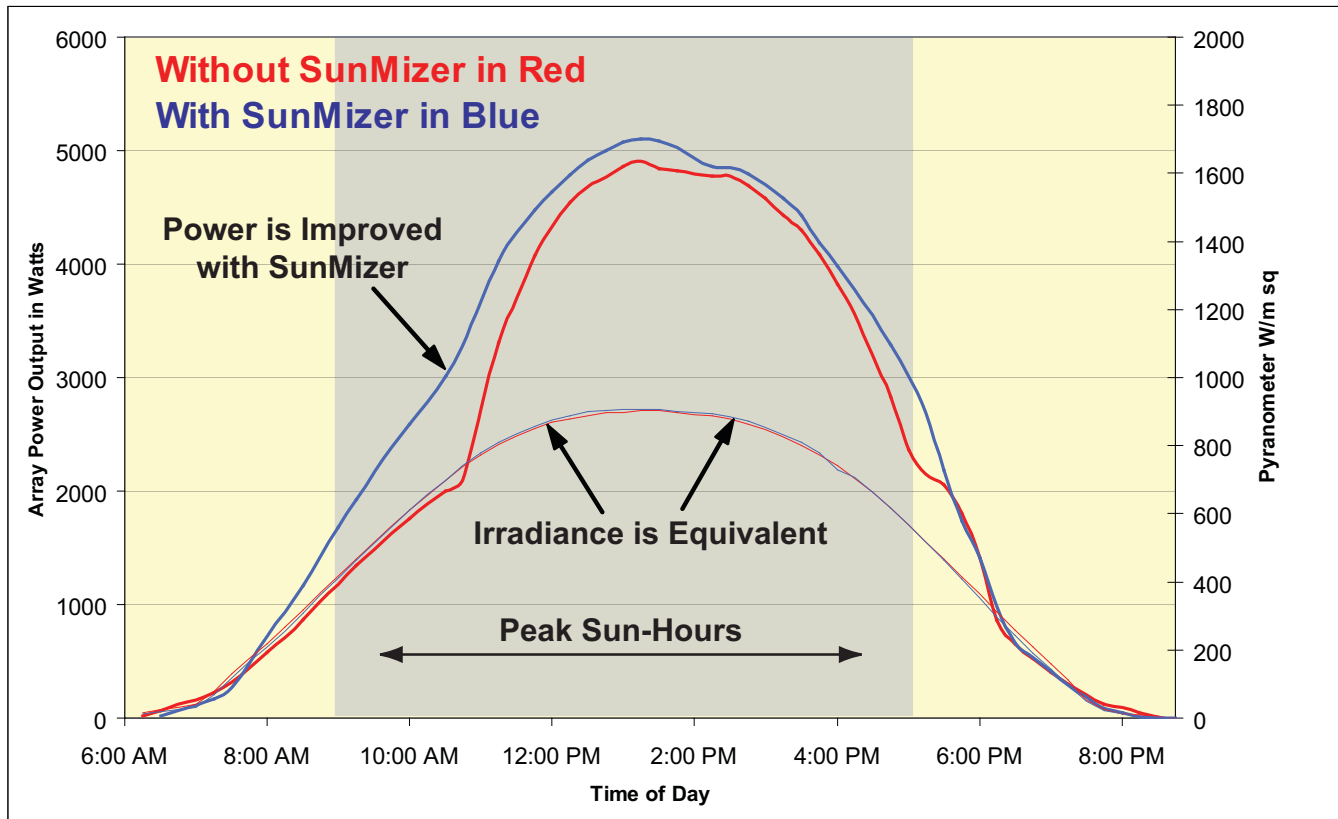


Figure 5 shows normalized energy (daily kWh production / daily insolation) prior to SunMizer installation and after SunMizer optimization. The increase in energy production as a result of selectively installing SunMizer equates to over **1,200 kWh** of energy recaptured annually, or over 50% of more than 2,000 kWh that was lost due to shade. **As a result of SunMizer's selective installation on only 8 shaded panels, payback is unmatched at less than 5 years.**

Figure 5. Array normalized energy production

