

Case Study:

SEMITROPIC WATER DISTRICT



System Stats

System capacity	979.2 kWp
Type of system	Single-axis tracker
Product	SQ 85 Wp solar panels
Date of Commissioning	May 2005
Location	Semitropic Water District; Wasco, CA

This 979 kWp system serves the Semitropic Water District in Wasco, California. The system has been producing energy to support the water district's treatment facilities since May of 2005 with exceptional performance. It has exceeded predicted energy output by 7% in the hot, dusty climate of the Central Valley of California.

Average annual energy yield (kWh/kWp)	1,833
Performance ratio	79.74%
Actual/predicted energy output	107%

NOTE: Values above are based on monitoring data spanning 4 consecutive years in service. Normalization based on measured irradiance values was used in the analysis. SolarWorld is not responsible for the O&M of this system.

The Key Metrics of Solar

The revenue generated from a PV system is wholly dependent upon its energy output, over the full 25-year lifespan of the system. Therefore, the key metrics for evaluating a PV system and a solar panel should be based on:

- Energy output
- Real-world performance

Two key parameters that provide this information are the **Energy Yield** for a particular site and the **Performance Ratio** of a solar panel or system. Both of these measures are based on data collected from systems in the real world, and both measures account for energy produced—not power measured at standard test conditions. By using standard performance parameters and system ratings based in reality, it is easier for investors to evaluate different proposals and technologies, giving them greater confidence in their own ability to procure and maintain reliable, high-quality systems while generating expected project returns.



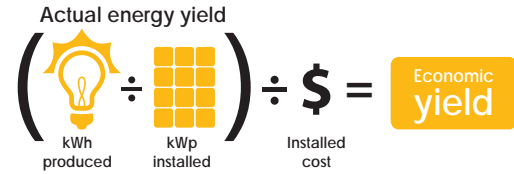
Energy Yield

The Semitropic system has delivered an average energy yield of 1833 kWh/kWp during its past four years of service. For every 1 watt of power installed, on average, almost 2 kWh of energy were produced.

About Energy Yield

The value of a project is driven by the amount of energy that can be produced from the amount of power installed. Energy Yield (kWh / kW) is a proven metric to evaluate system performance, and compare the predicted and actual energy produced by PV systems of differing size for a given site. It is based on

real-world conditions, with site-specific solar radiance and weather conditions taken into account, which makes it a better predictor of true performance than efficiency measured in laboratory conditions. The yield on energy has a direct impact on the financials of a project and can be used to calculate the “Economic Yield” of the system:



Performance Ratio

At the time when the SQ 85 Wp modules were installed at Semitropic, the solar industry was making a fundamental shift from largely off-grid installations to on-grid. While these modules represent a previous generation of solar panels, they are still comprised of quality materials, sound technology and were manufactured according to best practices – all of which are at the core of SolarWorld’s values. An average performance ratio of approximately 80% for a PV system installed more than 7 years ago is no small feat – many modules produced today would struggle to have this level of performance.

Current industry standards – 80%



SolarWorld modules (6 year exposure) – 80%

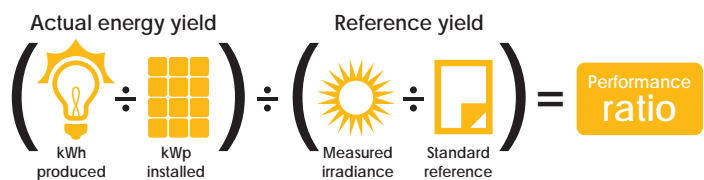
About Performance Ratio

Another good measure of real-world performance is the Performance Ratio (PR). The PR essentially normalizes the Energy Yield for a system over the irradiance measured at the location of the system. This allows an investor or EPC

to compare systems that may differ in design, technology and geographic location.

By normalizing the data with respect to the actual irradiance, it quantifies the overall effect of losses on the rated output potentially caused by inverter inefficiency, wiring, soiling and more. Unlike efficiency, PR uses real-world data to judge the performance of a module and power plant. Because of this, PR provides more confidence in ultimate financial returns when selecting solar panels for a project.

The industry standard for a high-performing system is up to 80%. The closer the PR value is to 100%, which cannot be achieved due to unavoidable losses, the more efficiently the PV plant is operating.



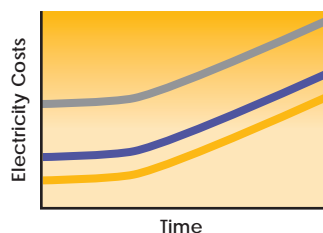
Predicted vs. Actual Performance

Engineering, procuring and constructing a large-scale PV system is a complex undertaking. It also comes with a certain level of risk in terms of delivering on the expected energy output and revenue. Sound system design that follows industry best practices and the selection of reliable equipment for each project are paramount to meeting stakeholder expectations.

Over the past four years, the Semitropic system on average has outperformed the predicted design by

7%. This incremental, extra output of energy:

- Provides additional unexpected revenue
- Improves the ROI for the project
- Reduces the payback period



Electricity costs without solar
Electricity costs with solar
Electricity costs with solar producing an additional 7%