

## Case Study

### Fire Station Public Works



The solar system at Throckmorton Ridge Fire Station is a major sustainable element of the Fire Station, providing over 40% of the station's energy needs through clean, renewable energy.

#### FEATURES

- The Throckmorton Ridge fire station not only has a 38 kW AC solar photovoltaic (PV) system, it also uses recycled materials in a variety of its building components, with a goal of becoming one of the few LEED certified fire stations in the country.
- The system is comprised of 232 Kyocera 200-watt solar PV panels, and 10 Fronius IG-4500 inverters.
- The panels are tilted at 22-degrees in order to collect the most sunlight year-round, while showcasing an aesthetically-pleasing design.
- The new fire station has a lobby/reception area, gym, living quarters including bedrooms, full bathrooms with showers, kitchen and dining room and a large apparatus space to accommodate 3 full-size fire engines and one utility vehicle.

#### BENEFITS

- The solar PV system offsets over 40% of Throckmorton's annual electricity load at the site and is expected to produce 67,962 kWh annually.
- Solar energy is a clean, renewable source of energy that produces zero emissions of harmful greenhouse gases.
- The system helps to insulate the fire station from utility energy price hikes.
- The system provides the amount of energy that the fire station would normally take from the utility grid, thus alleviating the demand and subsequently freeing up energy for use by neighbors connected to the grid.

### 38 Kilowatt AC Solar PV System Throckmorton Ridge Fire Station Mill Valley, California

2007

“ This station reflects two important goals of the County; to provide for a sustainable future and encourage community partnerships. From concept to completion, these values helped to drive the project forward. Needless to say, this station will serve as a model for other fire departments to emulate across the state and country.”

- Ken Massucco  
Marin County Fire Department Chief

#### SITUATION

The Throckmorton Ridge fire station is one of 6 stations within the Marin County Fire Department, located on the slopes of Mt. Tamalpais - a critical location to respond to wildland fires on the southern and west Marin coast, Mt. Tamalpais, and in the urban-interface areas above Mill Valley. Protecting the community of Muir Beach, the station also responds to Muir Woods National Monument, Mt. Tamalpais State Park, and the Marin Municipal Watershed, Marin's primary water source.

Energy costs are one of the largest expenses in running a fire station. The Throckmorton Ridge station runs 24 hours a day, 7 days a week, year round. The County of Marin was getting prepared to tear down and rebuild the Throckmorton Ridge station, there since the 1950's, to build a new and improved station that was ADA (Americans with Disabilities Act) compliant and incorporated sustainability measures with the goal of attaining LEED (Leadership in Energy and Environmental Design) certification - a nationally accepted benchmark for the design, construction, and operation of high performance green buildings.

#### ANALYSIS

The County of Marin made it a high priority to utilize environmentally friendly practices in the design and construction of the new fire station for Throckmorton Ridge. The County wanted an energy solution that would help the Fire Department control its energy costs, while allowing them to conserve power and minimize pollution. A solar photovoltaic (PV) system would provide renewable energy that is clean and reliable, producing zero emissions—air, ground, or water. It would be a major element to help Throckmorton gain LEED certification and also allow the station to avoid purchasing the utility's most expensive peak electricity through the implementation of California's Net Energy Metering Program (NEM). The new station had the ideal site for solar: an unobstructed roof area and plenty of sunshine.



## SOLAR SOLUTION

SPG Solar, Inc. (SPG) proposed a 38 kilowatt (kW) AC solar PV system that would significantly reduce Throckmorton's annual electric bill by over 40%, and have the potential to offset over 2 million pounds of greenhouse gas emissions over the next 25 years.

SPG Solar designed and built the solar PV on the station's roof-top. The system is comprised of 10 inverters and 232 solar panels, oriented at a 22-degree tilt, in order to maximize the collection of sunlight year-round. Excess heat from the sun can cause electrical resistance in solar panels, reducing their efficiency. SPG's system design is not only sleek and low-profile, but allows for adequate ventilation of the solar panels which reduces excess heat.

With a panel degradation warranty for 25 years, in addition to the system's 40+ year expected lifespan, the system at Throckmorton will continue to provide energy long after it pays for itself.

In addition to the solar PV system, the station also has a geothermal system, is bicycle accessible, and uses recycled materials in building and construction such as rubber flooring for its workout room and recycled components in the structure steel, insulation, and drywall, all contributing to its application for LEED certification.

## NET ENERGY METERING

SPG Solar's PV system for Throckmorton is connected to the local power grid to take advantage of California's Net Energy Metering (NEM) program with Pacific Gas & Electric (PG&E). Under this program, the utility company credits the station for any surplus electricity sent back onto the grid. On sunny days, when the system produces more electricity than is used, the electric meter spins backwards and credit is earned. At night or on rainy days, the utility grid provides the power, and the station taps into the credit its system earned while the sun was shining. The electricity produced, combined with utility credits, is designed to significantly reduce the station's net annual electric bill.

**SPG Solar, Inc. (SPG)** is the industry's most experienced developer, designer, and installer of solar photovoltaic (PV) systems for homes, businesses, and large-scale commercial and government facilities. SPG is committed to building the highest-performing solar PV systems with the highest return on investment. The result is clean, reliable electricity that reduces or eliminates customers' electric utility costs.

SPG's Turnkey Services Include:

- Feasibility Studies and Needs Analysis
- System Design and Engineering
- Permitting
- Construction Management and Installation
- System Performance Monitoring\*
- Customer Care and System Warranty

\*Customers with large-scale systems have the option of purchasing SunSpot®, a real-time, web-enabled monitoring system and optional interactive kiosk.

SPG Solar, Inc. is a licensed and bonded General B, Solar C-46, and Electrical C-10 Contractor, CA Lic. 759086. SPG's designers are certified by the North American Board of Certified Energy Practitioners (NABCEP).

### The Green Line

The 38 kW AC solar PV system at Throckmorton prevents 94,799 lbs. of carbon dioxide from being emitted into the atmosphere annually by a fossil fuel power plant. It takes 116 acres of tropical rainforest to filter this much CO<sub>2</sub> from the atmosphere each year. This is equivalent to removing 100 barrels of oil from production annually.



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