

When it came to Solar, PG&E chose Premier Power



Background

When it comes to installing photovoltaic systems on commercial roofs, and across parking lots for that matter, who would argue the benefits these solar electric systems provide? Clean, renewable energy has never been more popular and given the meteoric rise in energy prices, that trend will likely continue.

While these systems require capital expenditure up front, their long-term cost savings are indisputable. Even if the price for a kilowatt-hour (kWh) were by some miracle to remain constant for the next 30 years, an appropriately sized commercial system could eventually pay for itself. No two ways about it, lowering electrical expenses looks good on a company's financial documents.

California's largest public utility with one of the nation's largest portfolios of clean energy projects, Pacific Gas & Electric Co. (PG&E) has a different row to hoe when it comes to installing a PV system on one of its buildings. The clean renewable energy is important, but PG&E, in this case, is not looking at financial payback. The electricity generated at its Harrison Street Service Center in San Francisco goes directly into the grid. However, the PV system's purpose is two-fold; it supplies power to the grid, and it is a visible demonstration of the utility's commitment to renewable energy.

Project Overview

Project location San Francisco, CA
System Completion August, 2007
Solar System Types Solar Façade,
. Roof mount and Single-axis trackers
Total System Size 203.35 kW-DC

Solar Façade System Details

Solar Façade size in kW-DC 31.2kW-DC
PV modules used 150 Sharp 208W
Solar System Tilt 90°
Solar System Orientation 180° South

Solar Roof Mount System Details

Solar Roof Mount Size in kW-DC 48.67kW-DC
Solar System Roof mount solar system
PV modules used 234 Sharp 208W
Solar System Tilt 22°
Solar System Orientation 180° South

Solar Trackers System Details:

Total System Size in kW-DC 123.48kW-DC
Solar System Single Axis Solar Trackers
PV modules used 588 Sunpower SP210
Solar System Tilt Tracking
Solar System Orientation Tracking

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Your solar electricity specialists

“We are always looking for innovative new ways to provide clean power to our customers” said Katie Romans, environmental news representative for PG&E. “Whether it is measured in kilowatts or megawatts, every watt of renewable energy that goes into the grid has a positive impact on our energy future.”

But wait, most commercial rooftops are flat. How could a commercial rooftop PV system be visible except from above? After all, the point here is visibly demonstrating PG&E’s commitment – customers need to see it.

To this end, when PG&E brought five of California’s largest solar installation and integration companies to its Harrison Street building, its plan was simple. Show them the roof, point to the parking lot and find out what kind of a photovoltaic system each would recommend. Four came back with basic plans, flat system on the roof, carport systems in the parking lot; one came back with something much more innovative – the “solar bling”.

“On the ride back to the office, we were discussing the project, and no offence to our competitors, but we just knew they would all come back with the biggest system they could install and then compete on price,” said Kevin Logue, senior solar analyst for Premier Power Renewable Energy. “I knew we could do better. We envisioned raising the system up and having it ‘flow’ over the parapet and down the front façade in a ‘waterfall’ effect. We wanted to make it productive, visible and pretty.”

The raising and tilting of the rooftop PV array would not only make the system visible to the public, it would increase system productivity by about 15 percent (71,385 kWh/yr) over a similarly sized vertically mounted flat roof system (62,021 kWh/yr) and by more than 85 percent over original plans (38,577 kWh/yr). However, PPRE still needed to flow the PV panels over onto the façade, which by itself, could not support the panels and meet the city’s seismic code. In addition, the parking lot had its own set of challenges, ranging from the seismic stability of the land itself to whether PG&E’s own trucks would clear the structures.

“This installation was not a typical photovoltaic job. The project consisted of three separate systems types. There is a building façade system, a rooftop system and a ground mounted single access tracking system for the employee parking lot down the street. The latter was Kevin’s idea

as well and the first time I had heard the term ‘solar bling,’” said Don Peek, chief electrician at PPRE. “While the original plan called for covering the lot in front of the building with a PV system, the possibility of one of the service trucks clipping a panel seemed too great. That’s when Kevin suggested the employee parking lot and the tracking system. PG&E agreed, giving the utility three highly functional and visible PV systems.”

The Façade Challenge

The Harrison Street Service Center building uses a banded-window design encased above and below by banded-panels of concrete attached to the building’s frame. Due to the lightweight construction, it would not be possible to attach the solar panels directly to the concrete. PPRE’s engineers designed custom attachment devices that allowed it to drill through the lightweight concrete, attach to the steel frame beneath and seal the penetration with a weatherproof, flexible compound. Not only did this technique assure the façade panels would stay in place, it satisfied all seismic requirements.

Additionally, the transition from the roof-mounted system to the façade array required a custom-designed mount and racking system that literally hung the first row of panels over the parapet while assuring their seismic integrity via ballasted mounting points secured directly to the flat roof. The result is a 48.67kW roof array that blends seamlessly with a 31.2kW façade array.

The Final Bit of “Solar Bling”

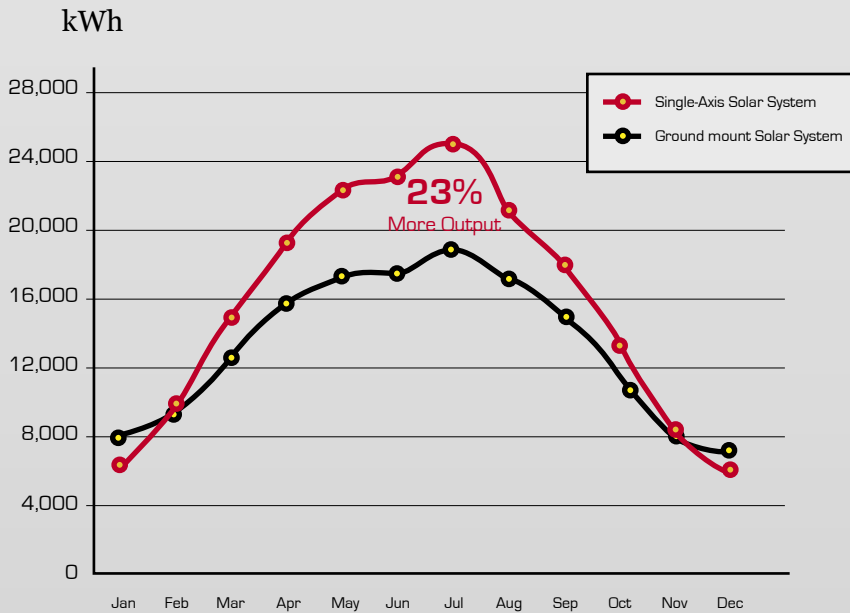
PG&E’s site for the solar tracking system was once a wetland area. Now being mostly backfill, the city of San Francisco required PPRE’s engineering team to design and construct foundations measuring seven feet, by seven feet by four feet deep. Each of these foundations, totaling 30 in all required a full truck of concrete to fill.

The PG&E tracking system uses 588 flat mounted solar modules on single tracking systems that move with the path of the sun from east to west. Electric motors drive the trackers as electronic sensors set the optimum position. This system not only shows off PG&E’s innovative approach for creating and delivering renewable energy to the grid, it increases the overall productivity of the panels from approximately 160,031 kWhs per year to an expected output of more than 190,800 kWhs per year, an increase of 23 percent.



High output shaded parking Specifications and details

Estimated Annual output of Single-Axis Tracker System vs. Equivalent Tilted Roof Mount PV System

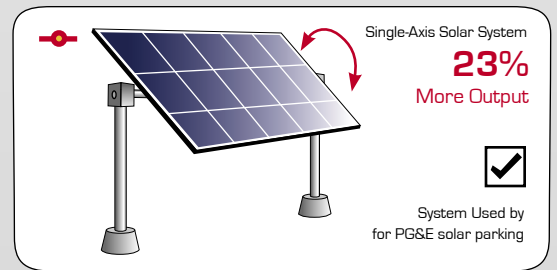
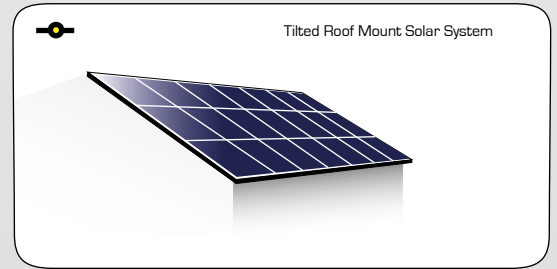


Performance Facts

- Single Axis Solar Station annual output190,800 kWh
- Equivalent Roof Mount Solar System annual output160,031 kWh

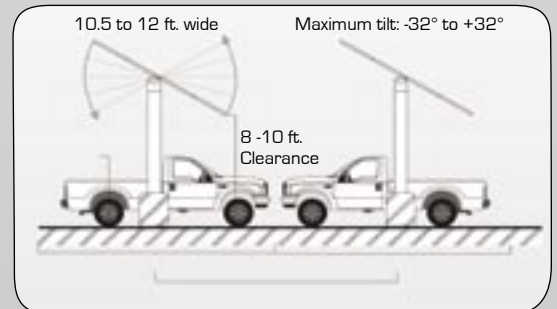
This chart shows advantages of the innovative single-axis solar tracker design that enables solar arrays to automatically follow the sun throughout the day to maximize electricity production. As a result the total electricity output can be up to 23% more than fixed solar systems.

Because weather patterns vary from year-to-year, the values in the tables are better indicators of long-term performance than performance for a particular month or year. PV performance is largely proportional to the amount of solar radiation received, which may vary from the long-term average by ± 30% for monthly values and ± 10% for yearly values. How the solar radiation might vary for your location may be evaluated by examining the tables in the Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors (http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/).



Specifications and details

- Tracking type..... Single Axis
- Tilt angle..... +/-32°
- Number of modules96 - 4 groups of 24 kW per tracker..... 16-20kW
- Parking stalls 16 normal stalls (6x17.5 ft)
- Minimum separation 18.2 ft. in California
- Clearance 8 to 10 ft.
- Dimensions135 ft. x 12 ft.



CASE STUDY

“My experience with Premier Power has been fantastic! Premier Power handled the design, engineering, permitting, sub-contracting, materials procurement, and construction management for this first ever solar installation on PG&E facilities in a manner that has distinguished themselves as one of the leading full-service photovoltaic installation companies in California.”

Fernando Aguilar, PG&E, Senior Project Manager



“At the end of the day, it was not PG&E’s goal to have a “utility-looking” solar system that would just get noticed; it wanted a system that would blend in with the building. PPRE embraced this challenge and delivered some highly functional, highly visible solar ‘bling’ in the form of a solar ‘waterfall’ and highly productive tracking system,” added Peek. “Combined, the three systems are expected to send enough electricity into grid to power about 100 homes each year.”



Performance*

Estimated annual production (TOTAL) . . . 286,140 kWh
Solar Parking annual production 190,800 kWh
Faade & Roof annual production 95,340 kWh

Environmental benefits, annually†

Greenhouse gases reduction (CO₂) 452,452 lbs
Cars not driven 37 cars
Gasoline not consumed 23,304 gallons
Oil not consumed 477 barrels
Coal not burned 1 railcars
Offset CO₂ emissions from electricity
use from homes 27 homes

Sources:

* PV Watts Solar Energy Calculator (<http://www.pvwatts.org>)

† U.S. Environmental Protection Agency
(<http://www.epa.gov/cleanenergy/energy-resources/calculator.html>)



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