

West County Wastewater District extends its environmental stewardship with **Solar**



WEST COUNTY WASTEWATER DISTRICT TRACKS THE SUN FOR MAXIMUM ENERGY PRODUCTION

Founded more than 85 years ago, the West County Wastewater District, with offices and a treatment plant located in Richmond California, provides sewage collection, treatment and disposal services for nearby cities and unincorporated parts of Contra Costa County's western areas.

Protecting the Planet

WCWD provides an important service for its more than 120,000 ratepayers, but for the board of directors, employees and customers of WCWD, it is more than that – its operations help to protect the environment.

As the West County Wastewater District created its operating plans and budget for 2008, it began looking at ways to extend its environmental stewardship. The board of directors of WCWD evaluated not only the energy usage but also the possibility of bringing clean, renewable solar power into the daily operation of the water district.

Going Solar

As a part of its research, WCWD studied other solar installations, evaluated different designs and available financing options. However, because WCWD is a public entity, the management knew they would not be able to take advantage of the available tax incentives or depreciation on the solar installation if WCWD purchased it outright.

Project Overview

Project location **Richmond, CA**
 System Completion **December, 2008**
 Solar System Type **Dual-Axis trackers**
 Total System Size **1013.6 kW-DC**
 Power Purchase Agreement . . **Solar Power Partners**

System Configuration

Number of trackers **.89**
 kW per tracker **11.2 kW (59 trackers)**
 **11.76 kW (30 trackers)**
 Tracker Dimensions **37' x 25'**
 Horizontal tracking angle range **240°**
 Vertical tracking angle range **60°**
 PV Modules used per tracker **56**
 Tracker Type **Dual-Axis ET Solar**
 Total PV modules used **4984**
 PV Modules types . . **59 Trackers w/ Suntech 200W**
 **30 Trackers w/ Suntech 210W**
 Inverters **SatCon 75kW**
 **SatCon 100kW**
 **SatCon 500kW**
 **Advanced Energy Solar 333kW**

Performance¹

Estimated annual production (total) **1,904,404 kWh**

Source:

¹ PV Watts Solar Energy Calculator (<http://www.pvwatts.org>)

“In terms of using renewable energy to help run our treatment plants, there is no debate. One of our main tasks is to promote environmental responsibility and compliance. As a public agency, however, the upfront costs for purchasing a solar energy system were high and difficult to justify since we could not take advantage of federal tax credits,” said E.J. Shalaby, General Manager at the West County Wastewater District.

Challenges...

While a Power Purchase Agreement (PPA) provided WCWD with its best option, in order for the project to make financial sense, the to-be-built solar installation faced other challenges:

- ✱ *It would have to be big enough to produce at least 35 percent of WCWD's annual electricity needs.*
- ✱ *It would not be possible to interrupt operations during installation.*
- ✱ *Given the available land, they would have to make dual use of a storm-water holding pond for about one-third of the installation.*

Only the top solar integration and installation companies in the state were invited to assess the site and asked to propose a solar electric system capable of performing at the level needed. Many declined to participate due to the soil challenges, seismic restrictions and conditions of the holding pond.

...and Solutions

A dual-axis tracking system capable of keeping the high-efficient solar modules at the optimum angle to the sun was the clear choice as this would increase energy production by about 35 percent over a fixed tilt design. However, the pond area provided a unique set of challenges, as the foundations of the trackers would be subject to submersion and settling as the pond collects and disperses storm-water throughout the year.

Premier Power's engineers calculated the high-water line for the pond then used a concrete ballast system that would spread the weight and raise the foundations, keeping the tracking mechanisms steady and above water at all times. With the placement and estimated distances between trackers calculated, the project management and installation team developed and followed a schedule that allowed Premier Power to install the trackers without delays or cause any interruption of WCWD's operations.

In addition, because the foundation's design places it on top of the soil, not in it, at the end of the project's life,

WCWD can remove the trackers and ballasts, returning the land to its original state, leaving no trace of the structures. Premier Power experts also implemented a string-level monitoring system, enabling WCWD to keep a constant watch on performance of each photovoltaic array in the system, ensuring that it can track and maintain maximum production from the system.

“I was pleased how quickly the units were assembled; having something assembled of this magnitude under a tight time constraint is pretty impressive.” stated E.J. Shalaby, General Manager of WCWD.

Some interesting facts about West County Wastewater District dual-axis trackers:

- ✱ *Dual-axis trackers keep the PV modules at the optimum angle to the sun during the day.*
- ✱ *There are 61 dual-axis trackers sitting on the land.*
- ✱ *There are 28 trackers rising above the waterline in the storm water storage pond.*
- ✱ *Each tracker measures approximately 24-by-39 feet and contains 56 PV modules at capacity of 11.2kW (59 trackers) - 11.76 kW (30 trackers).*
- ✱ *Premier Power designed the system to produce ² approximately 1,904,404 kilowatt-hours (kWh) of electricity annually, about 35 percent more kWh than a similar sized fixed mounted array.*
- ✱ *The tracking units sit above ground on 22-ton concrete ballasts, designed specifically to distribute the weight for application in wetlands.*



Source:

² PV Watts Solar Energy Calculator (<http://www.pvwatts.org>)

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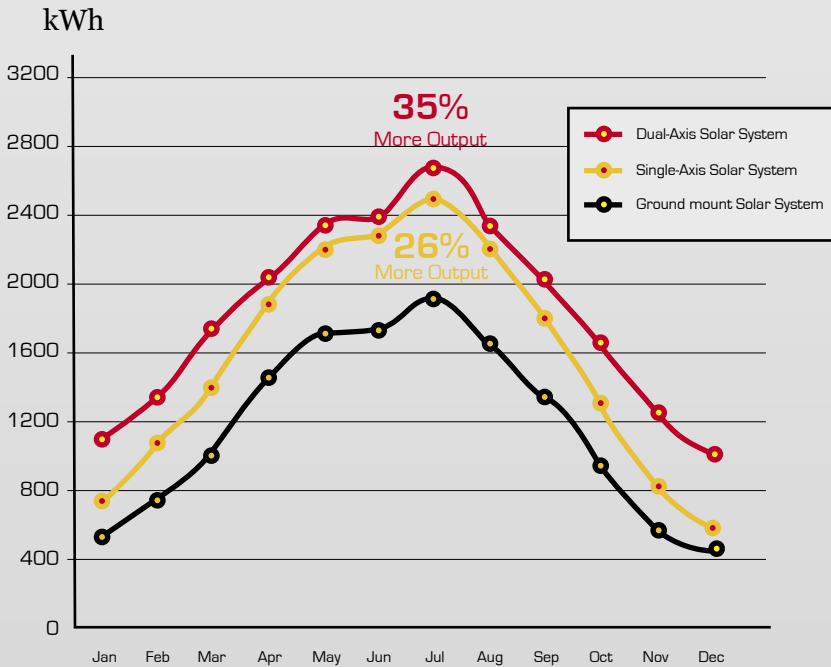


Premier Power
“Your Solar Electricity Specialists”

Dual-Axis Solar Trackers

Specifications and details

Estimated Annual output of 11.2 kW Dual-Axis Tracker vs. Equivalent Single-Axis Tracker and Fixed Mount System



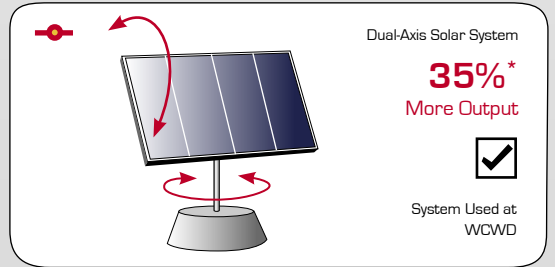
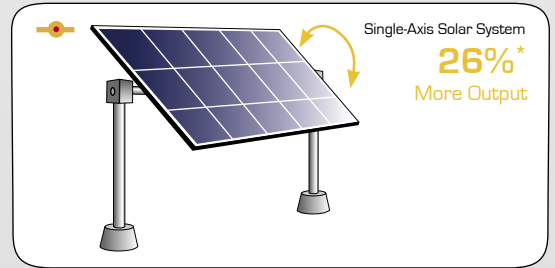
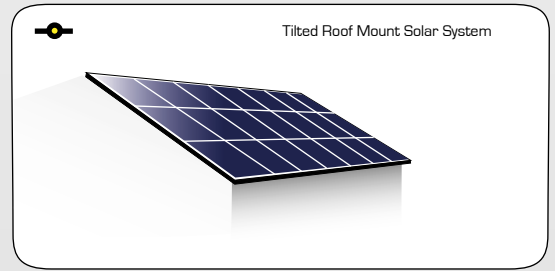
Performance Facts

- 11.2 kW Dual Axis Solar Tracker annual output 21,800 kWh
- Equivalent Single Axis Solar Tracker annual output . . . 19,097 kWh
- Fixed Ground Mount Solar System annual output. 14,074 kWh

This chart shows advantages of the innovative dual-axis solar tracker design that enables solar arrays to follow the sun automatically throughout the day, maximizing electricity production. As a result, the total electricity output can be 35% more than fixed solar systems and 9% more than single axis solar systems, which follow the sun moving in one direction only.

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/).

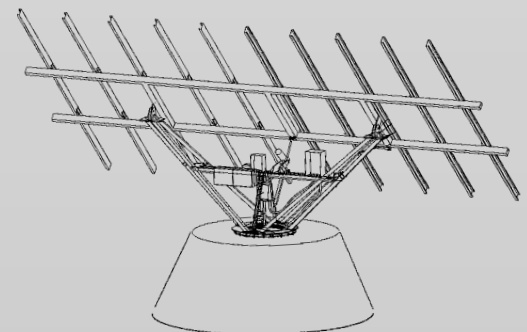
Different Solar Systems



*Estimated production was calculated for Richmond, California and may vary for other locations.

Specifications and details

- Tracking type. Dual Axis
- Tracker Dimensions 37' x 25'
- Horizontal tracking angle range 240°
- Vertical tracking angle range 60°
- PV Modules used per tracker 56
- kW per tracker 11.2 kW - 11.76 kW



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E.J. Shalaby, General Manager of WCWD



Environmental benefits, annually³

Greenhouse gases reduction (CO ₂)	2,987,610 lbs
Cars not driven	248 cars
Gasoline not consumed	153,820 gallons
Oil not consumed	3,152 barrels
Coal not burned	7.1 railcars
Offset CO ₂ emissions from electricity use from homes	179 homes
Offset CO ₂ emissions from the energy use from homes	120 homes
Forest preserved from deforestation	9.5 acres
Avoid greenhouse gases by recycling waste instead of sending it to landfill	467 tons
Offset CO ₂ emissions from propane cylinders used for home barbeque	56,465 cylinders

Source:

³ U.S. Environmental Protection Agency
(<http://www.epa.gov/cleanenergy/energy-resources/calculator.html>)



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