South San Joaquin Irrigation District (SSJID)
Grid-Direct Photovoltaic

Project Description

The South San Joaquin Irrigation District (SSJID) water treatment plant project is the industry's first known solar tracking system to feature cost-effective, thin-film modules. Its prototypical nature presented an array of unique challenges that are now providing substantial rewards for the owner and system installer.

The two-phased project features a durable, utility-grade design that minimizes the amount of drive motors to reduce long-term maintenance demands for the system owner. One of the project's first challenges was getting each of the system's 2 hp motors to effectively drive over 60,000 pounds of modules and steel as it followed the trajectory of the sun each day. This was achieved through a 30-ton screw jack and engineered counter balance.

Phase 1 features Conergy 175-watt crystalline modules, which were chosen for their durability and value. It is comprised of 6,720 modules whose array brings total dc watts to 1,176,000.

Market-tested First Solar thin-film modules were selected for the **Phase 2** solution because they perform at a lower cost-per-watt than traditional crystalline. Early indications show the output per dc kW of First Solar thin-film is about 10% higher than that of crystalline.

While First Solar's thin-film solution optimized output, its smaller size warranted nearly double the number of modules it would have taken if using the larger, crystalline 175's. There was serious deliberation over whether labor costs for installing the higher quantities of thin-film modules would exceed any realized savings over the crystalline option.

And then there was the consideration of module durability. The tracker rack had to demonstrate superior stability in order to keep module vibration to a minimum — and for Conergy to meet the requisite quality assurance standards to sustain First Solar's warranty.

The outcome was that module design coupled with the means by which the First Solar thin-film modules are attached to the rails brought the thin-film at cost parity with crystalline — but with enhanced output.

The final challenge was interconnection. California Public Utilities Commission (CPUC) rules mandate that only 1000kW of solar can be installed per meter, yet final system size was nearly 1.6 Megawatts. After deliberation with the utility, it was determined that the water treatment plant could have a second meter installed. Output was engineered so that it could accommodate SSJID's range of power needs while ensuring proper loads flow to each of its two meters.

The project's main goal was to stabilize electrical costs to deliver water at the lowest possible cost to SSJID customers. It provides nearly all of the power the SSJID needs to operate its adjacent water treatment plant and is anticipated to save the district around $400,000 in annual electricity costs.

"Water is an increasingly precious commodity in drought-ridden California, where Governor Schwarzenegger has declared a state of water emergency. The SSJID's proactive desire to find innovative ways to cut water processing and delivery costs should serve as a bellwether for water authorities everywhere, particularly in these economic times," said David Vincent, Project Development Manager for Conergy.

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Project Profile

	Phase 1	Phase 2
Overview		
System Type	Commercial / Government grid-direct PV	
Designer	Rick Holz, Director of Engineering, Conergy Projects Group	
Project Developer	David Vincent, Project Development Manager, Western U.S., Conergy Projects Group	
Project Manager	Andrew Begley, Operations Manager, Western U.S., Conergy Projects Group	
Location	Oakdale, California, Latitude = 37.858	
Solar Resource	Average of 7.1 Sun hours per day	
ecord Low / Average High Temperature	Record low 18, average high 94	
Date Commisioned	May 2008	March 2009
Installation Time-frame	4 months	3 months
Array Capacity	14179 kW stc	417 kW stc
Average Annual Production	2100mWh	800mWh
Equipment Specifications		
Modules	6720 Conergy 175MU, 175 watts stc, pwr tol. = +/- 3%, Imp= 4.95 amps, Vmp= 35.2, Isc= 5.2 amps, Voc= 44.2	5760 First Solar FS-272, 72.5 watts stc, pwr tol.= +/- 5%, Imp= 1.07, Vmp= 67.9, Isc= 1.19, Voc= 90
Inverters	5 Xantrex GT-250, 250kW, VDC Max Input = 600v, Operating range= 300-480 vdc, 3 phase, VAC output = 480v	Xantrex GT-250, 250kW, VDC Max Input = 600v, Operating range= 300-480 vdc, 3 phase, VAC output = 480v
Additional Inverter Information	96% efficiency	96% efficiency
Array	5 inverter circuits/subarrays), (inverter/subarray 4@ 252,000W STC, 422.4 Vmp,594 Imp, 624Isc, 530.4Voc & 1@ 168,000W STC,422.4 Vmp, 396 Imp, 416Isc, 530.4Voc(number of series strings per inverter 4@ 120 strings 1@ 80 Strings), (series string 2100W STC, 422.4Vmp, 4.95Imp, 5.2Isc, 530.4Voc)	
Additional Array Configuration Information		
Array Installation	Single Axis Tracking Conergy-designed (array azimuth 180 in degrees), (45 to -45 east to west tracking)	
Additional Array Installation Information	Recipient, AGA Hot-Dip Galvanizing Excellence Award, Electrical, Utility & Communication. Also, this system's solar tracking capabilities are optimized using software whose origins are based in military operations.	
Array Combiners	Solar Boss & SMA 10-15 amp fuses	
System Monitoring	Fat Spaniel. The prototypical nature of this project compelled Conergy to install data collection systems to conduct side-by-side comparisons of the thin-film tracking system versus traditional crystalline systems. Noteworthy results should be available in one year.	
Interconnection	System is stepped up to 4160 volts and interconnected to medium voltage.	