



# CSI RD&D Solaria Alameda County Santa Rita Jail Installation Completion Report

---

## **Solaria Solar Electric Low-Concentration Solar Tracker**

This project is supported with assistance from the California Solar Initiative (CSI) Research, Development, Demonstration, and Deployment (RD&D) Program. The purpose of this program is to help achieve the goal of creating a vibrant solar industry. This program makes investments to fund solar research and demonstration projects that will measurably reduce the cost and accelerate the installation of solar and other distributed technologies that could employ solar for generation, storage, or that could reduce the use of natural gas. This project's primary goal is to drive down the installed cost of solar.

## **Project Summary**

Solaria, a California Corporation, has developed photovoltaic modules that use 50-67% less silicon than other silicon modules and are designed to not have compromises in performance or reliability. Solaria modules are the first flat plate PV module to use optical concentration and the first low-concentration module to receive UL and IEC certification. Solaria's module is optimized for large-scale commercial and utility tracking applications.

The goal of this CSI RD&D project is to perform detailed analysis and reporting on the performance of Solaria low-concentrating photovoltaic installations that incorporate innovations to reduce costs, increase reliability, and improve system production and efficiency. Solaria is using CSI RD&D funds to support installing and operating PV test systems to demonstrate that the technology is financeable. The project will also provide performance and reliability data of Solaria's products on different tracking systems totaling 350 kWpDC for two installations of which 240 kWpDC will be installed at Alameda County Santa Rita Jail (SRJ) located in Dublin, CA, and 110 kWpDC were installed at the Solaria manufacturing facility located in Fremont, CA.

This report describes the installation of the 240 kWp solar electric low-concentration solar tracking system at the Alameda County Santa Rita Jail located in Dublin California. This installation includes a 220 kWp azimuth tracker system broken into two separate arrays, the 'Hillside Array' and the 'Fenced Array' and a 20 kWp dual-axis tracker system.



*'Hillside Array' Azimuth Tracker System*



*Dual-Axis Tracker System*



*'Fenced Array' Azimuth Trackers*

## **Design & Permitting**

Preliminary design to support an open bidding process was performed by BEW Engineering. When the design was complete, the County hired the experienced mechanical and electrical contractor Harris Electric of Dublin, CA. to install all aspects of the system including the electrical inner-connection. Alameda County was a valuable partner because of their excellent track record of procuring, managing, constructing and operating multiple megawatts of solar PV systems in California. Alameda County has installed over 3 MW of solar PV on multiple sites in the County. The permitting process was streamlined for the SRJ system because the installation was self-permitting.

## **Construction**

Construction of the 240 kWp system began with a small amount of civil work to grade the area for the dual-axis trackers. After the grading was complete, the subgrade was installed, compacted, and the forms for the foundations were constructed. The azimuth tracker is valuable for its lack of civil engineering work and grading required for installation. The tracker is capable of being installed on various grades up to 12%. The foundations for the azimuth tracker were drilled and the piers formed to be installed in concrete. On typical large scale azimuth tracker systems the pier foundations would be driven with a vibratory hammer machine significantly decreasing system installation time and reducing system costs.



*Dual-Axis Tracker Foundation*



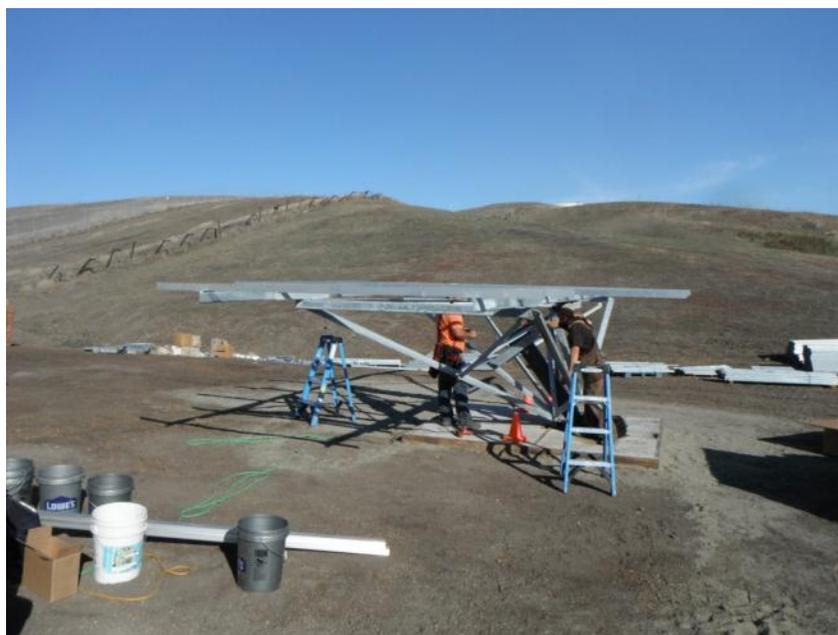
*'Hillside Array' Azimuth Tracker Foundation*

After the installation of the tracker foundation was complete, metal erection for the azimuth and dual-axis trackers was begun. The dual-axis trackers contain 24 modules per tracker totaling 20 kWp.



*Dual-Axis Tracker Installation*

The azimuth tracker is optimized as an 'erector set' design so that it can be assembled, including module installation, connections made and wire management installed between modules in a controlled assembly area. This assembly is then 'flowed' by grade-all tractor or other means out to the foundation. Once at the foundation, the panel and tracker assembly simply need to be fastened to the foundations and electrically connected to the trenched wiring.



*Azimuth Tracker Assembly*



*'Hillside Array' Azimuth Tracker Installation*

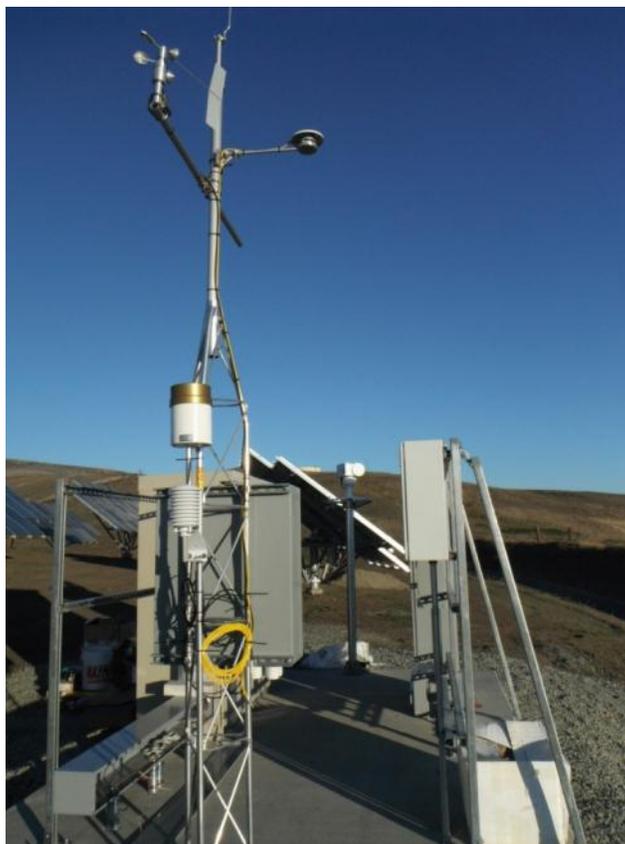


*Complete Azimuth Tracker 'Flown' to Foundation*

During the tracker installation and trenching, conduit and service pads for the electrical enclosures, disconnects, inverters and data acquisition equipment were installed.



*Equipment Pad Construction*



*Equipment Pad Installation*



## System Commissioning

After the project was operational and substantially complete Solaria partnered with Next Phase Solar of Berkeley CA to perform system commissioning, which included a thorough system inspection. In addition, Solaria hired GroundWork Renewables to perform calibration on the complete data acquisition system to confirm that the performance results obtained are accurate and reliable. Detailed results from this commissioning and calibration efforts are contained in the report entitled *CSI RD&D Solaria Santa Rita Jail System Commissioning and Calibration Report*.

## Conclusions

The Alameda County Santa Rita Jail system was a success in many aspects. Once the contract was in place with the general contractor, the project remained on schedule. It was a valuable project for the contractor who was hired to expand their already extensive experience in electrical contracting with solar PV. In addition, the project provided an opportunity for Solaria to develop the rail and module mounting technology. These improvements will drive down future installation costs related to solar PV module installation and decrease required time for PV installations.

The Santa Rita Jail system will directly provide a substantial amount of renewable energy to this county run institution. In addition, the data acquired from the system will provide valuable performance data from various tracking products. This data will continue to provide valuable information which will support the continued development for low-concentration PV technology. Performance data from the CSI RD&D Solaria project will continue to be reported on and published on the CSI website located at:

<http://calsolarresearch.ca.gov/solicitation2-solaria.html>