Stellar Energy
Lightstorm Entertainment

Courtesy Stellar Energy (4)

Overview

DESIGNER: Chris Pettigrew, senior commercial PV designer, Stellar Energy, stellarenergy.com

LEAD INSTALLERS: Jim Nash, project manager, Stellar Energy; Steve Foster, project manager, CSI Electrical Contractors, csielectric.com

DATE COMMISSIONED: June 13, 2012

INSTALLATION TIME FRAME: 113 days

LOCATION: Manhattan Beach, CA, 33.9°N

SOLAR RESOURCE: 5.6 kWh/m²/day

ASHRAE DESIGN TEMPERATURES: 78.8°F 2% average high, 39.2°F extreme minimum

ARRAY CAPACITY: 960 kWdc

ANNUAL AC PRODUCTION: 1,667 MWh

In June 2012, Stellar Energy commissioned a 960 kW roof-mounted PV system that provides clean energy for James Cameron's Lightstorm Entertainment production studio. The Lightstorm team wanted to make a significant statement by powering 100% of the filming and production of the *Avatar* movie sequels with solar energy. Installed at the MBS Media Campus in Manhattan Beach, California, the system required close cooperation between Lightstorm; the property owner, the Carlyle Group; and the property manager, Raleigh Studios.

Stellar Energy worked with Lightstorm Entertainment to determine the amount of energy the *Avatar* franchise would consume over a 5-year production period based on the facility's historical energy consumption, which included the energy used to produce the first film. Stellar Energy designed the system, which utilizes 3,692 Yingli Solar 260 W modules and three Solectria SGI central inverters, to generate a projected 1,667 MWh annually. The system will allow the filmmakers to achieve their goal of producing 100% solar-powered *Avatar* sequels.

The 212,481-square-foot array is distributed over three buildings. The barrel roofs presented a design challenge requiring Stellar Energy to develop a unique penetrating racking system that fans over the roof surfaces. The adjustable racking system conforms to the curve of the buildings' roofs and

minimizes the impact of the roof surfaces' varying heights.

The custom-designed racking system was economical and easy to install. The majority of the system utilizes self-tapping Tek screws that do not require pilot holes—the tip of the screw drills a hole before the threads engage with the mating structural member. Stellar Energy minimized the number of required mounting penetrations by connecting two rows of racking using long C-channel beams. Instead of the typical two rows of penetrations (front and rear) for each row of modules, the system that Stellar Energy developed has three rows of penetrations (front, center and rear) for every two rows of modules. This design resulted in a 25% reduction in the total number of roof penetrations.

Working at a busy studio that was in full production during the PV system installation required accommodating the client's security, privacy and noise restriction policies to minimize disruption. To eliminate any unwanted noise on the roof, installation crews would stop and start on different roof sections as the studio directed. The racking system's design helped meet the client's requirement to avoid noise pollution inside the studio.

An additional design complication was the limited ground space available for the three Solectria central inverters. To maintain the studio's limited parking spaces, Stellar Energy installed one inverter on each of the three roofs. Make sure to check out Stellar Energy's video of the project, which includes an interview with James Cameron, at stellarenergy.com/case-studies/commercial-solar/item/lightstorm-entertainment.html.

> "The Lightstorm Entertainment project presented us with multiple engineering challenges. There was not a racking system on the market that could accommodate the slopes of the buildings' barrel roofs. Stellar Energy designed and fabricated a custom racking system with angular beam connections that allowed multiple small arrays to pivot around the roof surface."
> *—Chris Pettigrew, Stellar Energy*

Equipment Specifications

MODULES: 3,692 Yingli Solar YL260C-30b, 260 W STC, +5/-0 W, 8.46 Imp, 30.8 Vmp, 8.91 Isc, 38.6 Voc

INVERTERS: 3-phase 277/480 Vac service, two Solectria SGI 266 (266 kW, 625 Vdc maximum input, 300–500 Vdc MPPT range), one Solectria SGI 300 (300 kW, 625 Vdc maximum input, 300–500 Vdc MPPT range), one roof-mounted inverter per each of three buildings

ARRAY: 13 modules per source circuit (3,380 W, 8.46 Imp, 400.4 Vmp, 8.91 Isc, 501.8 Voc), 9–12 source circuits per combiner; eight combiners each for SGI 266 inverters, nine combiners for SGI 300 inverter; 960 kWdc array total

ARRAY INSTALLATION: Penetrating roof mount, 3-ply Class A built-up roof, custom racking system, 180° azimuth, 15° tilt

ARRAY COMBINERS: 25 Bentek Solar Basic 200 A, 15 A fuses

SYSTEM MONITORING: DECK Monitoring with weather station (environmental data shared between three arrays)