PROJECTS

System Profiles

Freedom Solar Power

Whole Foods Market, The Domain

Courtesy Freedom Solar Power (4)

Overview

DESIGNER: Chad Preece, chief operating officer, Freedom Solar Power, freedomsolarpower.com

LEAD INSTALLER: Adrian Buck, founder and chief installation officer, Freedom Solar Power

DATE COMMISSIONED: January 2014

INSTALLATION TIME FRAME: 35 days

LOCATION: Austin, TX, 30.3°N

SOLAR RESOURCE: 5.4 kWh/m^2/day

ASHRAE DESIGN TEMPERATURES: 99°F 2% high, 23°F extreme minimum

ARRAY CAPACITY: 186.3 kWdc

ANNUAL AC PRODUCTION: 242,635 kWh

Whole Foods Market has installed PV on several of its retail locations across the US. The recently commissioned 186 kW array at its new flagship store in the Domain shopping center in Austin, Texas, is the largest yet. Whole Foods chose to showcase this system by installing a third of the array on a mechanical screen that faces the store's parking lot and is highly visible from the adjacent expressway. In the store's lobby, a real-time display allows customers to view the system's status as they check out. The eGauge monitoring system displays system parameters including the amount of electricity that the PV system is generating compared to the total building consumption.

During the initial site survey, Freedom Solar Power noted that an existing rooftop mechanical screen rendered a large portion of the total roof area unusable for a roof-mounted array. The screen is composed of 10-by-10-by-½-inch–thick galvanized steel structural members and rises 12 feet above the roof surface. To meet the client's desire to maximize the overall capacity of the PV array while simultaneously making the array visible to its customers, Freedom Solar designed a custom racking solution that utilizes the structural elements of the mechanical screen. Its metal decking was replaced with 248 Suniva 270 W modules.

The balance of the array is installed on the flat TPO membrane roof using the DynoRaxx Evolution fiberglass ballasted-mounting system. The DynoRaxx product offered a clean solution, quick and flexible layout, and tool-free assembly. The fiberglass mount eliminates the requirement to electrically bond the mounting units together. Modules are bonded using DynoRaxx grounding clips.

Freedom Solar procured the system's nine SMA Sunny Tripower

inverters from Gexpro; they are some of the first Tripower units installed in the US. The inverters offer several features that were utilized during the project's design and installation, including a wide operating MPPT window that allows for either 600 Vdc or 1,000 Vdc nominal arrays. While the inverters are listed for 1,000 Vdc applications, Freedom Solar chose a 600 Vdc maximum system voltage to avoid needing to procure and install 1,000 Vdc–rated BOS equipment, then navigate the related *Code* requirements. The Tripower inverters ship with a dc connection unit that enables a *Code*-compliant and clean installation, streamlines source-circuit aggregation and provides a disconnecting means for the inverter.

Freedom Power installed an SMA Cluster Controller in addition to the eGauge monitoring system. The unit offers centralized monitoring and control of up to 75 Tripower inverters. It integrates with SMA's Sunny Portal web-based system to provide inverter-level system performance and diagnostic information and alarms. The SMA system enables both Freedom Solar and the building operators to monitor the system's status performance data.

> "The unique system we created for Whole Foods allowed us to fully utilize the building's roof space and maximize array capacity. The company's willingness to be creative allowed us to design a system that will meet its 2015 goal of reducing the building's energy consumption by 25% per square foot."
>
> *—Bret Biggart, managing director, Freedom Solar Power*

Equipment Specifications

MODULES: 690 Suniva OPT270-60-4-100, 270 W STC, +4.99/-0 W, 8.68 Imp, 31.2 Vmp, 9.15 Isc, 38.5 Voc

INVERTERS: 3-phase 277/480 Vac service, one SMA Sunny Tripower 15000TL-US (15 kW, 1,000 Vdc maximum input, 300–800 Vdc rated MPPT range, 150–1,000 Vdc operating MPPT range), seven SMA Sunny Tripower 20000TL-US (20 kW, 1,000 Vdc maximum input, 380–800 Vdc rated MPPT range, 150–1,000 Vdc operating MPPT range), one SMA Sunny Tripower 24000TL-US (24 kW, 1,000 Vdc maximum input, 450–800 Vdc rated MPPT range, 150–1,000 Vdc operating MPPT range); 179 kW inverter capacity total

ARRAY: 14 modules per source circuit, (3,780 W, 8.68 Imp, 436.8 Vmp, 9.15 Isc, 539 Voc), six source circuits per inverter typical (22,680 W, 52.1 Imp, 436.8 Vmp, 54.9 Isc, 539 Voc); 186.3 kW array capacity total

ARRAY INSTALLATION: Ballasted roof mount, TPO membrane roofing, DynoRaxx Evolution fiberglass mounting system; 442 modules at 160° azimuth, 10° tilt; 248 modules on custom cantilevered racking system, multiple azimuths and tilt angles

SOURCE-CIRCUIT COMBINERS: Nine SMA Connection Unit 600-US-10 combiners, 15 A fuses

SYSTEM MONITORING: eGauge EG3010 system monitoring, SMA Cluster Controller and SMA Sunny Portal web interface for remote inverter-level monitoring and control

Do you have a recent PV or solar heating project we should consider for publication in *SolarPro?*

Email details and photos to: projects@solarprofessional.com