



U.S. Department of
Energy Headquarters
Washington, D.C.



Photo courtesy of SunPower Corporation

205 kW Photovoltaic (PV) System Installed on the U.S. Department of Energy's Forrestal Building

The Forrestal PV system will provide a clean, domestic, renewable source of energy for the U.S. Department of Energy (DOE), and provide leadership in meeting Federal goals for increasing the use of renewable energy technologies.

Project Description

The Energy Policy Act of 2005 (EPA 2005), the Energy Independence and Security Act of 2007 (EISA 2007), and Presidential Executive Order 13423 all contain requirements for Federal facilities to decrease energy consumption and increase the use of renewable energy by the year 2015. To provide leadership in meeting these requirements, DOE, in partnership with the General Services Administration (GSA), has installed a rooftop solar electric, or PV, system on the roof of DOE's headquarters in Washington, D.C.

The 205 kilowatt (kW) installation is one of the largest of its kind in the Nation's capital. A display in the Forrestal building will show the power output of the PV system during the day and the energy produced over

time. This information will educate the public, provide valuable information to Federal and local agencies, and demonstrate the commitment of the Federal Government to both address its own energy use and commercialize renewable energy technologies.

The Forrestal PV project helps meet the goals of the Transformational Energy Action Management (TEAM) Initiative, created by Secretary Samuel W. Bodman, to generate a minimum of 7.5 percent of DOE's energy from renewable sources and as much energy as possible from on-site renewable energy generation. The Forrestal PV system will generate up to 8 percent of the building's peak energy needs. In addition to the 205 kW PV system, DOE has installed a technology showcase to test and evaluate multiple new PV technologies that can be swapped out over time.

Highlights

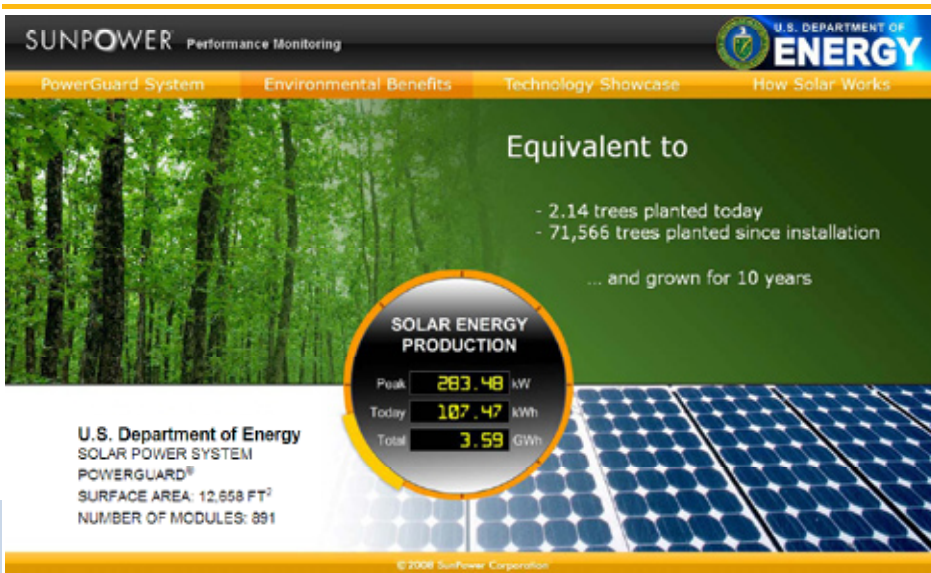
PV SYSTEM

The 205 kW system is made up of 891 individual PV modules. The crystalline silicon modules, rated 230 watts each with an efficiency of 18.5 percent, are among the highest efficiency modules available on the market. This allows maximum electricity to be generated within the available Forrestral roof area. The power generated by the PV modules is converted to conventional alternating current power using a 250 kW inverter. The total system is approximately 40-50 times the size of a typical PV system installed on a residence.

SYSTEM OUTPUT

The system will generate approximately 200 MWh of electricity annually, saving DOE \$26,000 on its electricity bill in the first year. The annual expected CO₂ reduction is 186 metric tons per year.

PV System Monitoring, like the example shown below, will be available both in the building lobby and on the Internet.



INSTALLATION

Each module has a *tongue and groove* design that allows them to fit together like a puzzle. The *ballasted* system secures the modules without rooftop penetrations, reducing the chance of roof leaks. Insulation integrated with the module provides an additional savings by reducing the building's heating and cooling load.

TECHNOLOGY SHOWCASE

The Showcase consists of four, 1 kW PV systems each using different PV module technologies: crystalline Si, copper indium gallium diSelenide (CIGS), amorphous silicon and cadmium telluride.

Did you know...

- Photovoltaics are specialized electronic materials that convert light from the sun or other source into electricity for use in residential, commercial or portable applications.
- The components of a PV system may change based on its intended use. Typically, PV systems consist of PV modules (groups of PV cells); an inverter to convert DC into AC electricity; wiring; and mounting hardware. Batteries and a charge controller are required to provide additional electricity in the absence of sunlight.
- Most PV technologies will continue to produce power from diffused light on cloudy days, but at a diminished rate. The amount of power produced depends on the weather conditions at the specific site. Negligible amounts of electricity will be produced during periods of heavy rain or cloud cover.
- A PV system that is designed, installed, and maintained correctly can operate for more than 30 years. The basic PV module has no moving parts. The best way to ensure and extend the life and effectiveness of your PV system is by having it installed and maintained properly. For grid-connected systems, the inverter will need to be replaced over the system lifetime. Storage technologies may also need to be replaced over the lifetime of a PV system.
- Since there are no moving parts in PV panels, overall system maintenance is minimal. It is good practice to keep solar panels free from dust and debris and to trim trees that could grow up and shade the PV system. If storage technologies, such as batteries, are used, they typically require maintenance as well.