

Hybrid Electric Power Plants

Martin Next Generation Solar Energy Center, Indiantown, FL

One of the challenges with generating electricity from solar energy is that people consume electricity 24 hours a day, but the sun only shines a portion of that time. One strategy to overcome that challenge is to build a hybrid facility. A hybrid facility is an electric generating plant that uses both renewable and nonrenewable energy sources in order to meet the electrical demand of the local community.

Florida Power and Light Company (FPL) has a combined-cycle natural gas power plant in Indiantown, FL. In 1989, a portion of the site was licensed for a coal-powered generation unit that was not constructed. Instead, ground was broken in 2008 to use 500 acres of the site for a solar-thermal array that transforms the sun's energy into electricity.

The center uses more than 190,000 parabolic mirrors to harness the sun's energy. Using motors, the mirrors rotate to track the sun and take full advantage of daylight hours. At full peak, estimated electricity generation each year is 155,000 megawatt-hours, enough to power 11,000 homes. This makes the Martin Next Generation Solar Energy Center the largest solar thermal power plant in the eastern United States.

The FPL Martin Next Generation Solar Energy Center is the first hybrid solar facility in the world to connect a solar plant to an existing combined-cycle natural gas power plant. Steam produced by the concentrated solar thermal system is transferred to the same steam turbine that the natural gas plant uses. The electricity generated in this process is then sent out onto the grid through existing transmission lines. Connecting the solar plant to the natural gas plant reduced the cost to build the solar facility. This will allow FPL to reduce its natural gas use by 1.3 billion cubic feet each year, saving customers \$178 million in fuel costs over the life of the solar facility. Over its lifetime, the center will also prevent 2.75 million tons of greenhouse gases from entering the atmosphere—the equivalent of removing more than 18,500 cars from the road every year for 30 years.

When constructing any energy facility, engineers and planners must take many things into account. When building the Martin Next Generation Solar Energy Center, plant engineers had to consider Florida's hurricane season. The motors that move the mirrors also allow the mirrors to flip upside down for protection. The mirrors are built on an advanced aluminum truss system that can sustain winds up to 130 miles per hour.

The FPL Martin Next Generation Solar Energy Center showcases how utilities are bringing all energy sources into their generation plans and finding ways to connect renewable and nonrenewable energy sources to provide the electricity needed night and day.

PARABOLIC TROUGH SYSTEM

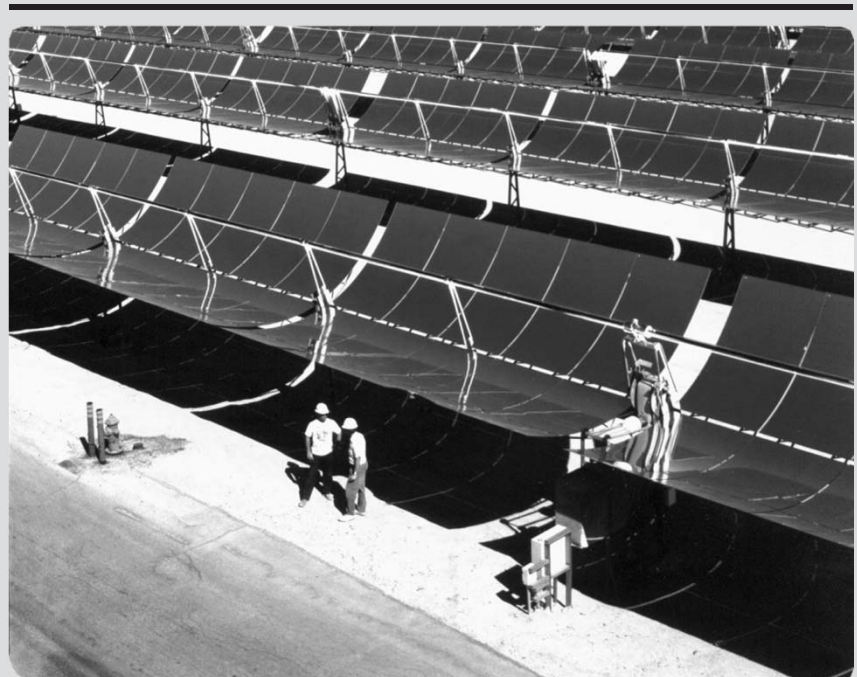


Image courtesy of U.S. Department of Energy