Copper Crossing
Solar Ranch

Project Overview

The Copper Crossing Solar Ranch is located in Florence, in Pinal County, Arizona, about 65 miles southeast of Phoenix. The facility began construction in late 2010 and reached

commercial operation in August of 2011. The approximately 66,000 photovoltaic (PV) modules will generate 20 megawatts (MW) of clean, renewable energy and contribute jobs and tax revenue to the local community. SRP (Salt River Project) will purchase all of the solar energy produced at the Copper Crossing Solar Ranch.

Project Details

Capacity:	20 megawatts (MW)
Technology:	SunPower 320W and 425W panels
Panels:	66,384 panels (10-14 panels per string)
Strings:	5,400
Trackers:	Single axis trackers with 2-4 motors/MW that follow the path of the sun
Inverters:	30 (10 SMA 500CP (Compact Power); 20 SMA 760CP)
Drive motors:	56
Piers:	12,864
Acreage:	144 acres of former agricultural land now owned by SRP
Homes powered:	3,700

Jobs during construction: 200

Local companies employed during construction: 18

Local vendor expenditures during construction: approximately $1 million

Estimated annual production: Over 54,000 MWh

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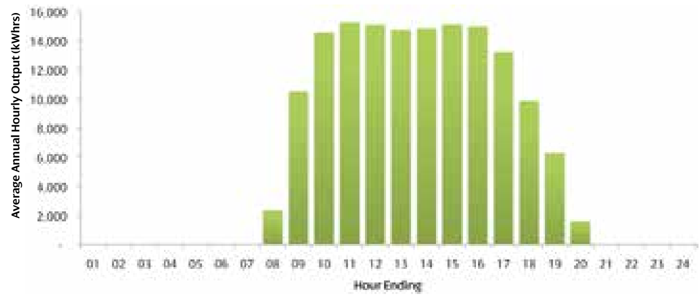
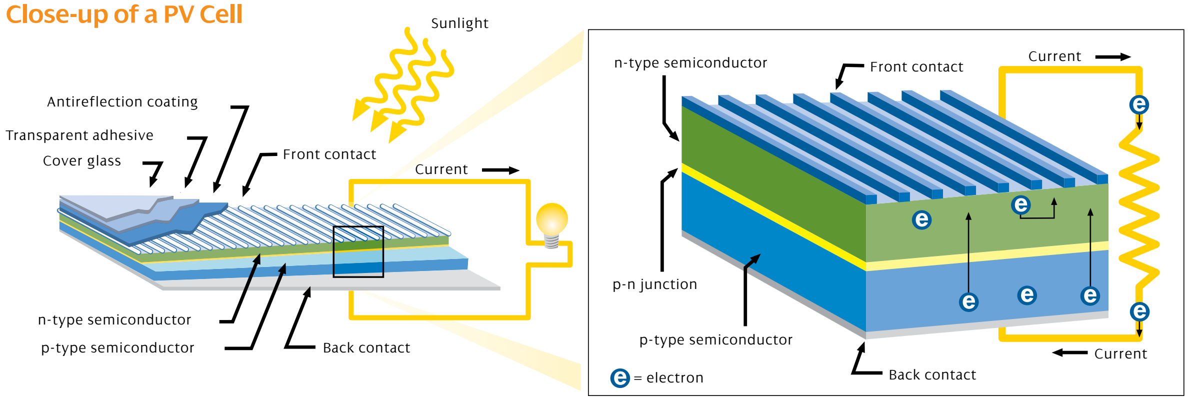
COPPER CROSSING Solar Ranch

Projected Generation – Monthly

Projected Generation – Hourly



Close-up of a PV Cell



Source: Illustration of a traditional silicon cell from Aaron Thomason/SRPnet.com

How the Energy from the Sun Produces Electricity

The most important components of a PV cell are two layers of semiconductor material generally composed of silicon crystals. On its own, crystallized silicon is not a very good conductor of electricity, but when impurities are intentionally added—a process called doping—the stage is set for creating an electric current. The bottom layer of the PV cell is usually doped with boron, which bonds with the silicon to facilitate a positive charge (P). The top layer is doped with phosphorus, which bonds with the silicon to facilitate a negative charge (N).

The surface between the resulting "p-type" and "n-type" semiconductors is called the P-N junction (see the diagram above). Electron movement at this surface produces an electric field that only allows electrons to flow from the p-type layer to the n-type layer.

When sunlight enters the cell, its energy knocks electrons loose in both layers. Because of the opposite charges of the layers, the electrons want to flow from the n-type layer to the p-type layer, but the electric field at the P-N junction prevents this from happening. The presence of an external circuit, however, provides the necessary path for electrons in the n-type layer to travel to the p-type layer. Extremely thin wires running along the top of the n-type layer provide this external circuit, and the electrons flowing through this circuit provide the cell's owner with a supply of electricity.

Most PV systems consist of individual square cells averaging about four inches on a side. Alone, each cell generates very little power (less than two watts), so they are often grouped together as modules. Modules can then be grouped into larger panels encased in glass or plastic to provide protection from the weather, and these panels, in turn, are either used as separate units or grouped into even larger arrays.

Source: http://www.ucsusa.org/clean_energy/technology_and_impacts/energy_technologies/how-solar-energy-works.html

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