

The Basics of Standalone Solar Billboards

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By Kevin Conlin

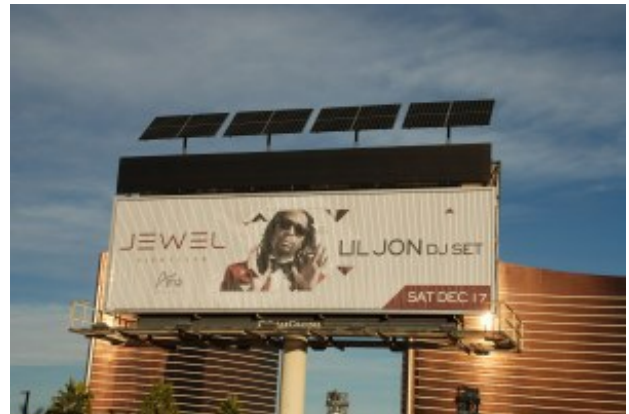
A standalone solar system is not connected to the grid; it generates and stores its own power. In this segment, I'll clear up some myths and misconceptions about solar lighting systems.

A solar generator has three key components: a **solar array** for generating power, a **charge controller** for managing the power, and **batteries** to store the power.

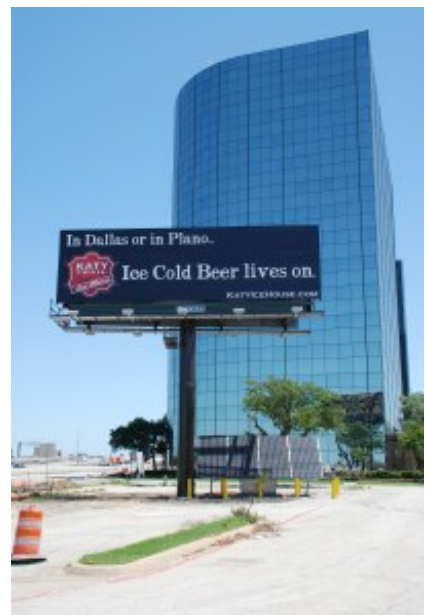
The **solar array** consists of one or more solar photovoltaic (PV) panels. A PV panel is a solid-state device that uses thin silicon wafers to generate DC electricity when exposed to sunlight. These wafers, or solar cells, are wired in series, usually in groups of 60 or 72 cells to create a durable, long life solar module. Constructed entirely of glass, silicon, aluminum and stainless steel, they typically have a life expectancy of at least 30 years, and are covered by a 25-year warranty. The best solar modules are manufactured by what are called Tier 1 manufacturers, large established companies like Sharp, Hyundai, LG, Panasonic, Kyocera and others.

The **charge controller** regulates the raw power coming out of the solar modules, converting it to the optimum voltage for charging the batteries, typically a nominal 24VDC. The most efficient charge controllers are MPPT devices, which stands for Maximum Power Point Tracking, and they typically operate at 95% efficiency or better, and harvest 20-30% more energy than older PWM charge controllers.

This energy is then stored in **batteries**, typically lead acid, which are about 80% efficient. This means for every 100 watts of energy used at night, the solar array must produce 120 watts of power during the day. This is a very important consideration, often overlooked, when sizing the solar array. Adding in the charge controller efficiency of 95%, battery charging



5 KW Clear Channel Outdoor solar billboard in Las Vegas powers 10 lights as well as Trivision rotating panels.



efficiency of 80% and other system losses of 5%, a good solar system is about 70% efficient. (We'll cover these factors in a future installment on sizing the solar array)

This Ralson Outdoor billboard used solar because overhead power was not available when the board was built and an underground connection was too expensive.

Our next installment will cover batteries, the true **"heart"** of any solar system.

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