

MGE Solar Energy Exhibit

Energy use plays a big role in our community's impact on the environment and our quality of life. Burning fossil fuels to produce electricity affects our air and water quality. As our use of energy grows, we need to find ways to reduce the impacts.

Capturing energy from the sun is one option. Solar energy is clean: fewer emissions are produced in manufacturing and generating electricity from solar systems.

This solar energy exhibit builds on MGE's 18 solar demonstration projects throughout our community. It raises the visibility of solar power and shows how these systems work.

Electricity from two arrays on the roof is fed into batteries which store the energy until needed. When needed, the power flows through an inverter which changes the direct current (DC) electricity into alternating current (AC) electricity, the kind of power used in our homes and businesses. These batteries will store up to 10 kilowatt-hours (kWh) of electricity. This is enough to power four compact fluorescent bulbs (the lighting equivalent of four 100-watt incandescent bulbs) for 100 hours.

When the exhibit is not in use, and the sun is shining, we plug it into MGE's office building and replace some of the electricity from the grid needed for the building with solar power. When the solar system is operating at peak capacity, it can generate about 2.2 kWh per

day, or about one-tenth of an average MGE electric customer's daily electricity needs.

How much power this exhibit actually provides will depend on the weather, where we park it and how much of the time it is set up.

Solar will play an important role in future energy generation. Through our Clean Power Partners program, MGE is purchasing electricity generated from customers' solar systems to help make investing in solar more affordable in the near-term. We hope this will help to grow the local solar market.

Focus on Energy provides site assessment and financial assistance as well as a list of qualified solar installers.

Find more information at mge.com/solar or call the MGE Home Energy Line at (608) 252-7117.

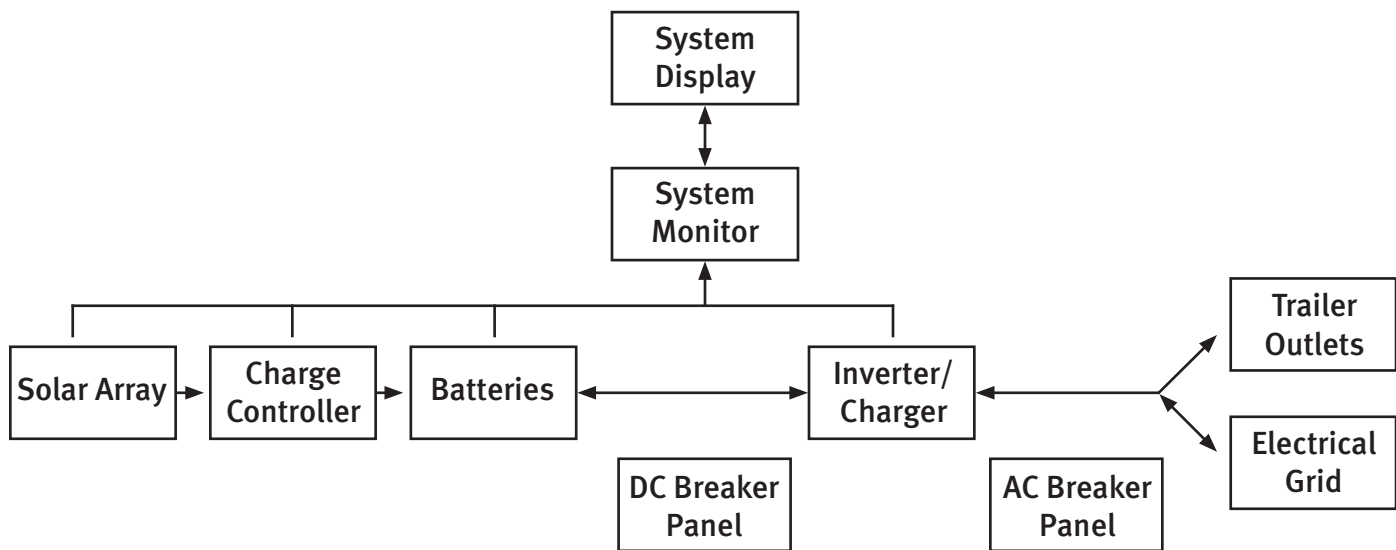


Project features

- Fixed photovoltaic (PV) panels are mounted on an aluminum rack at a 45 degree angle. The rack can be lowered for transport.
- We used two different PV technologies for these arrays. One is a 240-watt amorphous silicon (thin

film) array, which is 8.2% efficient. The other is a 400-watt hybrid thin film and crystalline silicon cell array, which is 17.4% efficient.

- Batteries are absorbent glass mat, gel cell batteries. They can be charged either from the solar arrays or using power from the grid.



Solar Arrays

The trailer has four PV modules that make up two arrays:

- Two 120-watt, thin film modules with an efficiency of 8.2%, rather than the typical 5%.
- Two 200-watt, hybrid modules that use both crystalline cells and amorphous silicon layers which are up to 17.4% efficient.

These are among the highest efficiency modules on the market today. Together they can produce about 2.2 kWh of AC power per day in our climate.

Charge controllers

Each of the two arrays on the roof of the trailer supplies a separate battery charge controller. The output of the charge controllers feeds the battery bank.

DC breaker panel

The DC breaker panel serves to control the flow of DC power inside the trailer. DC power can flow in both directions between the inverter/charger and the batteries.

Batteries

The battery bank consists of eight batteries and is sized to store 10 kWh of electricity. This represents about one-half the daily electrical use of our average residential customer.

Inverter/charger

DC power from the batteries flows to the inverter/charger that changes it into AC power. The trailer and any other 120-volt loads we wish to plug into the trailer use AC power. We can power any device that you could normally “plug in” at your home. If the trailer is connected to our building at MGE and the batteries are charged and the sun is shining, excess energy will be pushed back into MGE to be used by our main office building. The inverter/charger can also act as a battery charger from the grid. If it is plugged into the building and the sun is not shining and the batteries are low, the inverter/charger will change AC grid power into DC power and store it in the batteries.

MATE system display

This device displays the operating parameters of the solar system. It also is used to program the various components so they operate correctly. Many screens and menus are available for data input and system monitoring.

System monitor

This device pulls together all the operating parameters and sends it to the MATE system display. It is the communications center of our solar system.

AC breaker panel

The AC breaker panel distributes AC voltage throughout the solar trailer. It functions just like the AC breaker panel found inside your home.