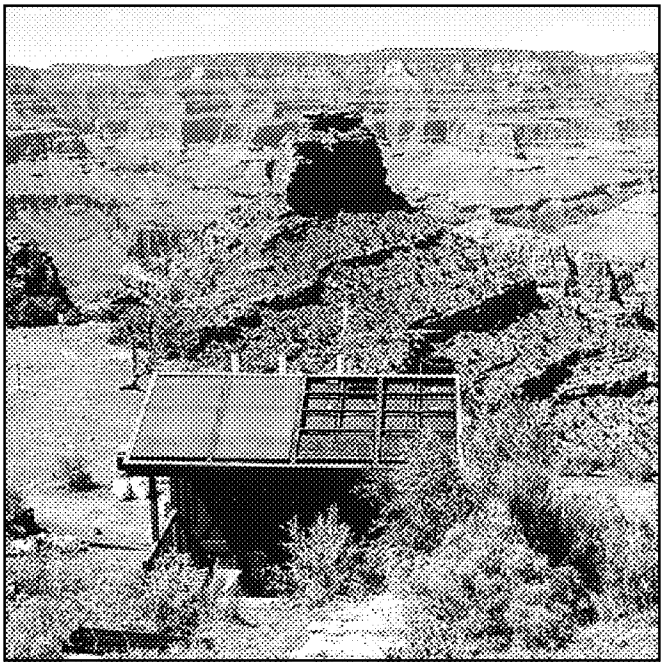
Phoenix Electrical Loads & Photovoltaics



An ACS photovoltaic system under construction in Grand Canyon National Park at Cedar Ridge along the Kaibab Trail.

Rugged, twin-walled Lexan polycarbonate glazing protects the photovoltaic array, and does double duty as weatherproof roofing. Lexan covers the left half of the roof. Right, photovoltaic panels are being installed

Off grid optimized. The Phoenix has extremely low electrical requirements, and thus is ideal for off-the-utility-grid installations. This is by design.

Typical loads. The Phoenix's 12-volt-d.c., five-watt ventilation fan nominally consumes 120 watt hours each day. A 24-volt fan is optional. During periods of low use, such as midnight to dawn, the fan can be slowed to a two-watt draw, reducing daily energy consumption by 10–20 percent.

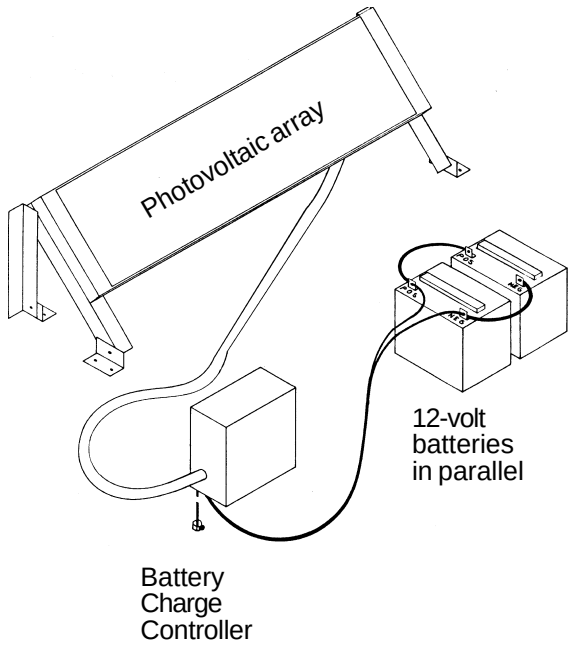
Photovoltaics. In reasonably sunny locations, a single 75-watt photovoltaic array and matched lead-acid battery and charge controller can power both the Phoenix and small loads such as lamps. An additional panel, and/or auxillery generator, may be necessary in cloudier situations, and/or more northerly latitudes during winter.

Wind and micro-hydro. Even the smallest systems usually can handle the Phoenix with ease, and without requiring significant adjustments in electricity consuming activities.

Hydrocarbon fueled generators. Although less friendly from an environmental standpoint, these are viable options both as backups for renewable energy systems and as primary systems. Even a small generator can recharge a battery in an hour or two.

How we can help. We design, manufacture, and install photovoltaic systems that are reliable, efficient, and affordable. We can supply individual components such as photovoltaic panels, battery charge controllers, batteries, mounting hardware, inverters, and hard-to-find d.c. lights and pumps.

Typical configuration for charging 12-volt storage batteries with a photovoltaic array



Which is best — low voltage d.c. or inverter supplied 120-volt a.c.?

There is no simple answer. Each system has its advantages, as do hybrid systems. Which system you should choose depends on your situation.

Low voltage direct current. Twelve and 24-volt d.c. systems have the advantages of greater efficiency and reliability and, usually, lower cost. A system cannot go down from an inverter failure if an inverter is not part of the system. All of the Phoenix's electrical components are powered by d.c., and we use d.c. for the lights and pumps in all off-grid toilet buildings.

Inverter supplied alternating current. Standard 120-volt a.c. requires smaller wires than 12 or 24-volt d.c. for a given load, an important consideration for long runs of wire. Some electronic and motorized equipment requires a.c. And many maintenance electricians are more comfortable with a.c. The disadvantage is that the inverter reduces system reliability and (usually) efficiency, and adds considerably to the cost.

Hybrid systems. We recommend starting with d.c., adding an inverter only if 120-volt a.c. is unavoidable.