

Solar power on a low budget

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The solar panels are installed on my south-facing roof.

In 2006, I moved into the desert, away from the city with all its trials — and all its amenities. I sponged off some friends while building my own little secret lair in the boondocks.

Since I didn't know what I was doing and had no money, the project took years. At first, the plan was very simple: just a private little shack with an outhouse. But the longer it took, the more elaborate the project became. In working with others, I gained a little skill with planning and building a proper framed cabin. Running water became available, which made an actual flush toilet possible (which added months to the project, but hey, it's indoor plumbing).

I gave my "Lair" lights and electrical outlets but had no idea how I'd ever power it. The neighbors used wind generators and solar, and I watched their troubles and triumphs with interest. Wind generators work day and night when the wind's blowing, but never seem to work as well as advertised — plus they have a bad habit of flying apart in the gale-force wind we are often gifted with. They also attract lightning, which does terrible things to their innards. As years went by, the desert ridgetops sported fewer and fewer whirligigs. Solar, with its delightful lack of moving parts, seemed the way to go. We've got lots and lots of sunlight most of the time. The big problem with solar was cost. Money, unlike sunlight, doesn't fall from the sky.

But as years passed, my scrounging skills grew — and the cost of good solar panels fell. I made my first solar power system entirely from scrounged parts. It didn't work very well, but it got me through my first winter with lights at night and it taught me a very great deal about what I needed and how to get it.

The second year in the Lair, I decided to build a

second power system but now I had a much better idea how to go about it. With the help of some good neighbors, I built the system I have now. Total cash outlay for a 4000-watt system came to less than \$400. Everything else was scrounged or bartered.

I got a pair of six-volt 186 amp/hour batteries free in exchange for some labor. They had been sitting for a while, were low on electrolytes, and partially sulfated, but not yet ruined. I desulfated them with a BatteryMINDER®, and they served me well for more than a year until one of the cells shorted. Even then, they limped along while I raised the money to replace them.

Scrapped RVs are a wonderful source of parts for a small-scale power system. I got an old 4000-watt Trace inverter from one. Again, I got it free in exchange for some labor. One thing a retired hermit has in abundance is time to spend working on other people's projects. The remote controller turned out not to work at all, but the inverter itself is fine.

I've never been very good at math, so much of what I did was by cut and try. I got the first of my two 170-watt solar panels from another labor swap and thought it would be enough to charge my two batteries, but it proved not so. Fortunately, solar panel prices had come down a lot, and buying its twin was just barely within my means. A dollar a watt! (Someday I'll scrape up the money to finish siding my poor Lair.)

The final major component was a charge controller for the voltage from the solar panels to the batteries. You can spend a lot of money on these, but on a small system like mine you don't need to. This is the only part I paid full retail for. I bought it locally for \$160.

Once I had my parts in hand, I started trenching and building. Everything in my first improvised system was in the Lair or attached to it, and for various reasons this turned out to be a bad idea. A neighbor wanted an old pantry building torn down: I dismantled it carefully, transported it to the Lair, and it became my new power shed. Then I trenched between the shed and the Lair and laid down my cabling.

My neighbors often get together for projects that need multiple sets of hands, and by this time I'd built up some goodwill. So two knowledgeable friends came over to help me wire things up.

The batteries, inverter, and charge controller went into my still-embryonic power shed, and the solar panels went on my south-facing roof.



These six-volt 186 amp/hour batteries and this old 4000-watt Trace inverter came from scrapped RVs.

I was even able to scrounge some proper racking! It's wonderful, living in a place that's so far off-grid that solar power is part of the spoken language.

This system has worked so well that it hasn't changed substantially since that day.

One of those scrounged batteries did give up the ghost after about 18 months of service, so I replaced both of them with two new Interstate 230 amp/hour batteries. My existing solar panels had enough surplus capacity that installing larger batteries didn't cause any trouble. And I got tired of only being able to measure battery voltage with my multimeter, so I bought a retro voltage gauge from an auto parts store and installed it over the charge controller.

I have tried to run a small refrigerator, but neither the panels nor the batteries are up to cooling it down from full-hot. It's possible it would work when already cold, but the draw from the compressor is just too much. So I have no refrigeration, but I do run a normal complement of interior lights (all CFL), my laptop, a fan when it's hot, a coffee grinder, and the usual small battery chargers for cell phones, rechargeable flashlights, and that sort of thing. I can run a circular saw continuously for about half an hour, but by then my batteries are down about 70% which is as much as I like to drain them without serious need. With healthy batteries, I've never completely run out of power on a string of cloudy days. I just try to keep mindful of the fact that the supply is not infinite.

This is a much smaller system than you'll find in most desert households, and it has limitations. It serves a hermit's lair quite well, but it wouldn't be for everybody. Still, it goes to show what can be done on the cheap, with a little perseverance and creativity.

Editor's note: Any project that involves installing or modifying electrical equipment including solar power systems, battery backup systems, generators, and all electrical power wiring should be installed per county and state building codes and the National Electrical Code, even if located in a remote or off-grid application. All wiring should be properly grounded and sized and fused for the currents and voltages involved to reduce the risk of fire or even electrocution. A licensed electrician should always be consulted.



This charge controller was the only component I paid full retail for.



After about 18 months I replaced the scrounged batteries with these two new Interstate 230 amp/hour batteries.