

## Off Grid Solar Power

So, you want to build an off-grid Solar System?

Recently there has been some interest in building an Off-Grid solar system, so I was asked to provide some hints/ideas for doing that.

I would like to say upfront that I'm not a solar engineer. In another life I was a telephone engineer/planner and solar was in its infancy and we weren't really using it at that time.

What really sparked my interest in an off-grid system was when Harbor Freight started advertising a small 45 watt system. It looked like it was too small to be much more than a demonstration thing and not big enough to power much ham gear. What I have learned since then was just doing a lot of looking around the Internet.

Ok what are the major components of an off-grid system? There are three major components, solar panels, controller, and batteries. Plus, a bunch of minor ones.

Before you get started you need to decide just what you want to do with your system. Just be available for power failures or 24/7/365. That will make a big difference in just what you buy. My system powers my whole ham station radios all the time.

Let's look at the components first.

Solar panels are available in many sizes (wattage and dimensions) that will take up a bit real estate. That could be a problem if you don't have space to put the panels and do you have a clear view to the sky for at least part of the day. No sun, no power. There are two types of panels. Mono-crystal and poly-crystal. Mono-crystal are a bit more efficient and a little more expensive, not a lot more.

Controllers come in many wattages and there are two main types. PWM (pulse width modulation) and MTTP (Maximum Power Point Tracking). MPPT controllers are more expensive but will give you more power in the long run.

Batteries are available in several configurations and capacities. If your batteries are going to be inside, you should be using AGM type batteries. Lead acid batteries will often pose a threat of hydrogen being released and that can cause an explosion and fire.

Once you have decided what you are going to be using your system for it is time to start looking at the components. One of the first considerations will be where will you put all the "parts"?

You will need a place for the panels and where will you put the batteries? The controller is not too big, but you will need to have access to connect the panels and the batteries.

Connecting everything requires a couple of different cables. I highly recommend using Anderson power poles for the connections to the batteries and the loads. The solar panels are setup for cables with MC4 type connectors.

A source for all of these will depend on just how you shop. I have found that all the parts I get can usually be found on Amazon or powerwerx.com and at rigrunner.com. Some things are available locally but sometimes more expensive.

Anderson power poles really need the right tools. If you buy your own it can cost a few bucks, but you may find that other hams may have them and will help you there. The West Valley Ham Shack has the tools and much of the wire you will need for no cost.

The wire gauge you use may make a difference. I usually use 10 gauge for the solar panels especially if there long runs. In the shack 12 or 14 may work ok if the demand isn't too high.

I have used meters on my system that monitors everything but that is expensive and not necessary in most cases.

Now the big question. How do I determine what I need to buy for my system?

First how are you going to use it?

If you want something to use for your VHF/UHF to use during a power failure or do you want to be able to be a contester where you will be on the air for many hours at a time or something in the middle?

For a short time use during a power failure it won't take much. A 50-watt solar panel will be able to keep your battery charged if you only connect the radio when it is being used. The rest of the time it will just be charging. A 20-watt controller would be more than enough for that. A 20 Ah or 25 Ah battery could provide more than enough power. Hopefully you have your station using power poles to make it easy to switch over to emergency power.

If you operate a lot more, you need to look at just how much power your radios need. A couple of hundred watt HF rig will need more power and more if used a lot. When I got my off-grid system I started with one 150-watt panel, a 20 watt MPPT controller, and 75 Ah battery. That ran my whole station. Later I added to it so I have some parts of it that I could use as a portable power unit for field days and such.

If you are interested in any of this I am willing to help answering questions and talk more about it. I'm not a real expert, only have made a few mistakes and will like to help you from making the same ones. They may end up costing you money unnecessarily.

If we get enough interest, we can set up classes at the Shack. Just let the Club or Shack people know.

One more thing. Be sure everything is fused. Batteries have a lot of power and cause a fire quickly.

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