The Issues with Going Solar

Anyone who has been around prepping for any length of time has a general idea of just how critical electrical power is to modern society. A large part of what we prepare for is the effects of losing our electric grid, because we have a pretty good idea of just how much else we'll lose when that happens. The worst TEOTWAWKI event that most of us can imagine, is a loss of the electric grid.

But even with all this understanding, few of us actually have enough power generating capacity to make much of a difference, should the grid go down. Most preppers I've seen have a solar panel or two, or perhaps one of those "solar generators" which consist of a solar panel and a car battery; but I've hardly seen anyone who has a considerable amount of electrical generating capacity, unless it is a full-blown commercial installation. Even then, those aren't really installed for prepping; but to supposedly save money.

I have a few problems with solar panel manufacturers, as well as installers that provide turnkey installation services, which I'd like to talk to you about. As with any other industry out there, where the public is not well educated, it appears that solar power companies aren't 100% honest with their clients. What they tell us they're selling us and what they're delivering don't always seem to line up all that well.

The Solar Panels Themselves

Solar panels are made of a number of solar cells, hooked together electrically and mounted together in a case. The case usually has a glass front, so that light can get in and an

aluminum frame to give it rigidity and protect the glass and fragile solar cells inside. Even though the cells produce electricity individually, all that most of us deal with is the output of the entire panel.

If you shop for solar cells, as opposed to panels, you'll find that they all put out 0.5 volts DC. But the panels put out anywhere from 12 to 24 volts, depending on who manufactured them and how they put the panels together. Let's use 18 volts DC, as a good average. That number is important, because it is higher enough than the nominal voltage of 12-volt car batteries that it can charge them, even when not working at 100% efficiency. Car batteries, or actually, deep cycle lead-acid batteries, which are often referred to as "marine and RV batteries" are often used to store the power produced.

How do they get from 0.5 volts to 18 volts? That's easy; you connect the solar cells together in series, like batteries in an old-style flashlight. In series means that the negative end of one battery (or solar cell) is connected to the positive end of the next. Each additional solar cell is connected to the string the same way. When you do this, the voltage of the individual solar cells (or batteries) adds up. So, if you connect 36 solar cells together in series, you get 18 volts (36 x .05 = 18).

I've built solar panels from scratch, and an 18-volt solar panel made of 3"x 6" solar cells, needs to be about 26" x 32". Most commercially manufactured solar panels are larger than that; but not so much larger that they could fit 72 of those solar cells. I have a couple of commercially manufactured solar panels here, which measure 20"x 44". They contain 60 cells, but the individual cells are 2"x 6".

Besides volts, electricity is also measured in power consumption or power provided, which can be measured in amps or watts. There's a technical difference between the two of these, but for our purposes right now, it doesn't matter. We

can use the two terms more or less interchangeably, even though they are different measurements.

- To convert from watts to amps, divide the watts by the voltage.
- To convert from amps to watts, multiple the amps by the voltage.

I said that when we connect the solar cells in series, we add the voltage that they produce. When we do this, the wattage or amperage that those cells produce stays the same. to get wattage to add, we need to connect those solar cells in parallel, kind of like jump-starting a car, positive-to-positive and negative-to-negative.

A quick look at solar cells being sold online shows us that they typically produce 1.8 watts. Some higher efficiency ones claim to produce as much as 4.68 watts. But since they are connected together in series, the wattage doesn't add. So then, how can we get a 100-watt solar panel, with those cells connected in series? My homemade solar panels are only producing 1.8-watts at 18-volts. Looking at the commercial panels I have here, I see 60 cells connected in series. That would indicate that the panels can produce a maximum of 30 volts. But the cells are smaller, at 2"x 6", so the wattage that each cell produces is less. Yet they sell a panel like this as a "100-watt solar panel." The math doesn't add up.

Here we find the first thing to watch out for with solar panels. That is, what they claim to put out and what they actually put out aren't the same. Manufacturers cover themselves on this, by stating that the specifications given are under ideal conditions; but those ideal conditions pretty much never exist.

Solar Panel Installation

For solar panels to produce the maximum possible power, both in watts and volts, they need to be pointed directly at the sun, both horizontally and vertically. Unless you have them mounted on a stand with a solar tracker, following the sun through the sky, that’s not going to happen. What most people who do their own installations do instead, is aim them true south. That’s slightly different than magnetic south, as the magnetic south pole is actually in a different place than the true south pole. To find it, you need to find the magnetic declination for where you live and offset the reading on your compass by that many degrees.

As for vertical angle on the panels, that needs to change throughout the year. During the summertime the sun is more directly overhead, while in the winter, it is further to the south. Ideally, you should adjust the angle of the panels for each season, to point towards the sun’s track during that season. To avoid all that work, most people install their panels to match their latitude, which puts them at the average angle for all four seasons.

But this isn’t really what solar contractors do, if you have them install your panels. They want to get the job done for the least amount of labor possible. So, what they do is to mount the solar panels on the southmost roof slope, not caring if it isn’t really pointed south. The panels will also be mounted flush to the roof’s surface, rather than at the angle they need to be for optimum efficiency. Mounted like this, they will never provide the best possible output and they won’t bother telling you.

Using that Power

The scheme that most solar power companies use for selling their products is to tell you that they will install enough

panels to equal your average energy usage. The idea is that when you are creating more electricity than you need, you can sell it to the power company. Then, when you need more electricity than you are producing, you can buy it from the power company. They'll show you their calculations, making it look like you won't pay more than $20 per month in electricity costs.

There are just two problems with this. First, the power company will sell you electricity at retail, while buying it from you at wholesale. Once again, the math doesn't work out. You'll likely need to pay more for electricity than their calculations; but they'll be long gone and that will be your problem.

The second problem is that such a scheme doesn't take into account electricity needs during an emergency. With your solar panels connected directly to your home's wiring, if the grid goes out, every bit of electricity your panels are producing will go right into the grid. You won't get to use any of it. In order to be able to use it, you need those panels to be charging a battery bank and drawing the power out through a voltage inverter for use.

There's another problem here, which hardly anyone talks about. That is, the batteries are storing electricity at 12-volts DC, while your home uses it at 120-volts AC. To get from one to another, a voltage inverter is used. That's not a problem, as voltage inverters are readily available. However, in order to boost the voltage ten times, from 12-volts to 120-volts, the voltage inverter needs to draw ten times as much wattage. So, if you are going to power a device that draws 5 amps of electricity (600 watts), you will have to draw 50 amps of electricity (6,000 watts) from the batteries. That's a lot of power. It takes a lot of batteries to store that much power and a lot of solar panels to charge that many batteries.

Save Yourself Some Money

This may sound like I’m against solar power; but I’m not. I’m just trying to protect you from those who want to take your money, without giving you what you need. For survival purposes, you probably don’t need a full-blown system that is supposed to provide power for your entire house, but won’t. What you need is enough solar panels and batteries to provide power for your critical electrical needs. What are those?

- Refrigeration
- Well pump (if you have a well)
- Medical equipment (if anyone in the family needs powered medical equipment)
- Some lighting
- Some communications
- Security

You don’t need 30 solar panels to do that, but you will probably need somewhere between 10 and 20. You’ll also need several batteries, as the solar panels will really only provide power for an average of 8 hours per day, assuming you install them for maximum efficiency. You also have to take into account that you will likely have bad weather some days, reducing the amount of electricity you can produce.

To get your panels, you can save a lot of money by buying used commercial panels. These are panels which were originally installed in solar farms, but which have been replaced with newer, more efficient ones. They’re still better than much of what is sold for consumer use and the prices you can get them for are considerably better. Look online for “used solar panels for sale” and you’ll be surprised at what you can find.

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