



GRID-TIED, OFF-GRID OR BEHIND-THE METER

Which is for you? GRID-TIED, OFF-GRID OR BEHIND-THE-METER?

We are frequently asked what happens when the grid is down and about batteries, etc. So let's review three types of solar systems; grid tied, battery backup and off grid. Which is for you?

GRID-TIED

This is by far the most common, requires the least maintenance, and is the least expensive. It also receives the TVA Green Power Providers premium. However grid tied systems are required to disconnect from the grid in the event of a power outage. This means you won't have any power either. Whether this is an issue for you depends on the individual. If you only lose power 2 or 3 times a year for an hour or 2 this shouldn't be a problem. You can go out to dinner, see a movie, or just light a candle and have a glass of wine. Or you may be asleep or out of the house during the outage and not even know it happened, except for resetting a clock or two.

On the other hand, if you require electricity for medical purposes or live in an area with more frequent and sustained power outages, or live at the end of the distribution line (these are the last places to be restored), you may want to consider the other options.

OFF-GRID

Off grid systems have no connection to the grid at all. This requires a life style that most people in the US aren't used to, living without unlimited power on tap 24/7. Still thousands of people live this way because they make the right choices for it to be a viable life style. If you aren't willing to live without central heat and air, a dishwasher, and some other electrical energy appliances you may want to reconsider. I'd say the biggest factor is: do you understand electrical energy? Because you will have a limited amount, understanding kWh and amp hours is vital to a successful system.

So the solar power is stored in batteries and inverted with a special inverter that can also charge the batteries. Because more power is needed around the winter solstice, or December of each year, and this is also the period with the shortest days, most people use a generator during this period to assist the solar generation. Specifically because the days are shorter - more light is needed. Because of wet and cold weather people are inside more and using kitchen appliances, lighting, fans moving heat around, cooking, etc.

Myth: Off grid is cheaper than the electric company.

Sometimes people want to go off grid because its cheaper than the electric company. Wrong! If you want cheap stay with the electric company. There are situations where the electric company wants say \$50,000 to bring power lines to your remote location and this can be a factor. If you have other reasons plow ahead. Remember you will be the plant operator and have full responsibility for your system, how much power you use and how you maintain it (especially the batteries).

Off grid is easier with vacation homes, get away retreats, hunting cabins etc. because they are not occupied 24/7 you can save up power during the week for use on the weekend. The battery pack can be oversized relative to the PV to store electricity during the week for the weekends.

Most of our installations are grid tied. Next is battery backup and last is the occasional off grid system. Having trouble deciding? We can install a grid tied system and come back in the future to convert it to an AC coupled battery backup system. To do this you keep all your existing equipment and we add a battery inverter, appropriate transfer switches, batteries, battery enclosure, battery monitoring, emergency panel, transfer circuits to the emergency panel and all the required electrical gear for a safe battery based backup system. By AC coupling the system the solar panels don't have to be rewired to a different voltage and you still get the benefit of the production incentive in the TVA Green Power Provider program

So what is it you are looking for? What is your situation and what do you want to accomplish? Our job is to help you pick the right type system for you. Let us know how we can help you get a system up and generating and join the rapidly growing group of fuel free solar power generators.

BEHIND-THE-METER

This type system is grid tied but has batteries which provide battery real-time energy or back-up emergency power. This is more expensive than grid-tied because of the need to have not only the batteries but equipment to charge the batteries, regulate them, provide over current protection and disconnecting means, an enclosure, more wiring, an emergency panel, transferring emergency circuits from the existing panel to the emergency panel, and possibly an additional transfer switch. So if this significant expense is worth it to you, keeping in mind the batteries will have to be replaced in 5 to 10 years, then this may be a viable option for you. These systems will be a little less efficient than grid tied systems because the chemical reaction that charges the batteries takes energy. Additionally energy is lost in the chemical conversion from the battery to the inverter when the batteries are drawn upon to provide electricity.

These backup systems are of 2 basic types, AC Coupled and DC Coupled. This refers to the coupling between the PV and the batteries, whether they connect to the system on the AC side or the DC side.

In a DC coupled system the PV can charge the batteries directly with DC current via a charge controller. In this type system you may have one inverter with both grid tied and battery charging capabilities. The disadvantage to DC coupled is your strings (panel groupings) are usually limited to 150 volts, so you may only have 3 panels per string for example. This means more wiring and if there is too much distance between the panels and the batteries, as is frequently the case, you will need larger wire and conduit. One advantage to this system is it can be done with one inverter. However these type inverters are less efficient and you will probably need 2 of them if you want 240 volts to feed through a Green Power Providers meter.

AC coupled systems on the other hand go from the PV to a grid tied inverter. Here the electricity is inverted to AC which will run loads that are present and at the same time send AC to a battery inverter that has a battery charger built in. Besides providing charge control to the batteries this inverter inverts the batteries to AC which feeds an emergency panel in the event power goes out. This type setup has the advantage of operating at a higher voltage on the DC side, in the range of 350 volts DC. This translates to less material required to wire the panels together and get that power to where its going. It also provides the added benefit of more efficient transmission of power over a distance. For example if its 200' or 300' feet from the array to the batteries we can run a much smaller wire size than if we are going to a charge controller.