

Green Energy for your Home ~ A Series ~ Part 9 –

Synergy – Self Sufficiency ON-GRID

While thinking about the subject for this article the word synergy kept plastering itself on the windshield of my mind. I know what synergy means but it's a word I rarely use and it reminds me of something hard, corporate or academic, not a word that is comfortably organic, blending into the casual company of friends. But finally I looked it up to make sure I fully understood it's meaning and was surprised to discover that it's origin is the Greek word sunergos from sun and ergon which loosely translated means work. Hey, I thought, there is a connection here! We're talking about energy, energy comes from the sun, and energy availability makes work possible.

In these days of increasing uncertainty about everything many of us who live in a grid-connected world have more than passing thoughts about what would happen if the power from the grid were to quit. Not just for a few hours or days but maybe for several days, even weeks. There are certainly enough known scenarios that could lead to such an eventuality without delving into the fringe territory of conspiracy theories or paranoid fear about the unknown. We just have to review the events of the last year to find many examples where people living in civilized, sophisticated circumstances have suddenly found themselves rendered helpless in the face of natural or man made disasters.

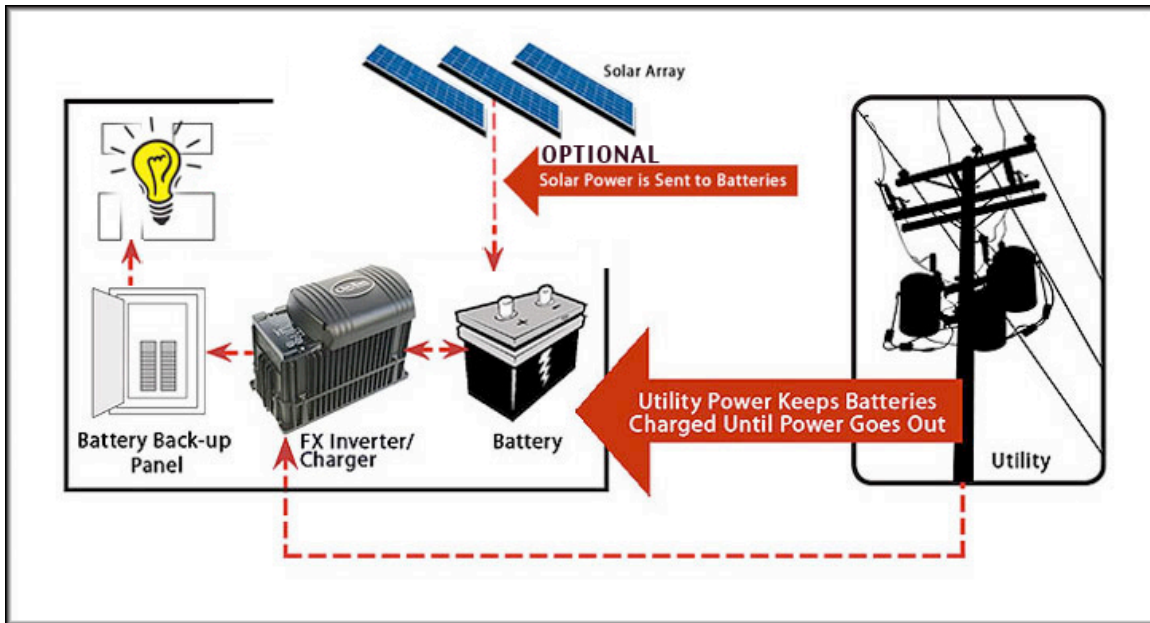
Lets explore what we can do to provide some self-sufficiency in terms of power in the face of an extended power outage. The options vary depending on your circumstances but here's the meat of the matter: you want to be able to store some power for future use in case the continuous supply provided by your electric utility is interrupted. The simple answer is a battery because that is the simple device available to us for storing power.

You may already be familiar with the all in one battery/inverter packs sold by some major retailers. They are useful portable devices that you can carry around for camping or to emergency start your vehicle, to provide a little light or operate a power tool. They consist of a battery, an inverter that changes the battery voltage from DC to AC, and they have built in outlets. However they don't have much storage capacity and they will only give you a few hours of light duty loads such as lights or a radio. These battery packs are not useful for running larger loads like water pumps, microwaves etc. They are also disposable with a limited life expectancy, especially if you don't keep them properly charged.

You may also be familiar with the typical RV solar power system where a solar panel or two on the roof of the RV charges a storage battery and the stored energy is provided on demand either for DC loads or AC loads for small appliances. These types of systems have much larger capacity than the portable devices but can still be

limited in terms of longer-term requirements.

But as you can see the essential ingredients to a back-up power source are a storage battery, a way to charge the battery, and a way to use the power from the battery. For a household application you first need to do some critical thinking about what appliances in the household you can do without and which ones are essential. Then you will separate the essential loads into circuits in a sub panel that can be powered externally, either by electricity from a stored battery or other means of generation.



Here are some examples of essential loads:

Water: In a city with water and sewer services you can't do much about supply and these services often keep working even if the power is out. But if the water utility also loses power then you will have to fend for yourself. Your hot water tank will store up to 200 liters of water, which you can drain, and use. Just make sure to turn off the hot water tank breaker so you don't burn out the heating elements when the power comes back on. The drain tap is at the bottom of the tank close to the floor and it can be difficult to fill a container from the drain so a short length of hose is useful. You can use this water for drinking, cooking or flushing a toilet.

If you're in a rural area you will need to power your well pump unless it's a shallow well and easily accessible for hand bucketing.

Lights: When the lights go off everything gets more difficult. Highly efficient light bulbs are available now that only use a fraction of the power older incandescent bulbs use. If you haven't changed your household to compact fluorescents or LED lights then put that at the top of your to-do list. CF and LED bulbs use anywhere from one watt to twenty watts compared to 60 and 100 for old style bulbs and last

considerably longer. For emergency use the LED bulbs use so little energy as to be inconsequential although they are still a little expensive.

Heat: Heating with stored battery power is not an option. Heating consumes far too much power and you will have to consider other emergency heating options such as propane or wood.

Cooking: Similar to heating cooking takes a great deal of power and must be accomplished by other means than stored electricity. Have a propane or wood alternative available for emergency use. The exception is microwave cooking. Although I am not a fan of microwaves they have their place in an emergency. Microwaves use power for much shorter periods of time than an electric burner and can be used sparingly.

Medical: Consider medical appliances that need power such as CPAP machines or dialysis machines, or if refrigeration is required for medicines.

Refrigeration: Most refrigerators or freezers will maintain their temperatures for at least one day if they have not been opened. However, like stoves and heaters refrigerators and freezers are power hungry and stored battery power will quickly be depleted. Consider a small energy efficient model that can be used for essentials. We supply many of our off-grid customers with refrigerators and freezers that will run off a single solar panel and a 12v battery. A new model has just become available that will maintain cold temperatures for 4 – 5 days without power.

Communications: Whether it's a cell phone, computer, TV or radio you will need some way to connect with the outside world. Most of these devices consume small amounts of power and can be sustained for long periods on stored battery energy.

Having identified the essential loads in your house that will need power during an emergency, and installed a sub panel that can be powered externally, you now need to consider how to provide that power. A deep cycle storage battery can be set up on an inverter/charger with an automatic transfer switch and wired directly to your sub panel. The transfer switch determines if there is power coming in from the grid and if there is it will divert a small amount of that power to keep your storage battery fully charged. When the grid-power goes off the inverter/charger immediately supplies power from the storage battery to power the sub panel loads.

The size of the storage battery is determined by the length of time you want to be able to power the essential loads. You need to determine how many amp-hours your essential loads use each day and multiply that by the number of days you will want for an emergency reserve. If you have solar panels a wind generator or a fuel generator you can re-charge the batteries when depleted and thus use a smaller storage battery.

Our modern definition of the Greek word synergy is the interaction or cooperation

between two or more things to produce a combined effect greater than the sum of their separate effects. So by combining the continuous supply of our on-grid power with a back-up storage capacity we have achieved synergy, a result that gives us more benefit than either of those things used separately. An additional device such as a solar panel can further strengthen that synergism. It's nice when things work out.

Please feel free to email me with questions at: info@solareagle.com. The complete series of articles is available at our website: <http://www.solareagle.com>
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Ron Young is a Renewable Energy professional operating the earthRight store in Williams Lake, BC selling and installing RE systems