



May 2010 Newsletter



Spring has come to Idaho and everyone is busy planning their renewable energy systems; fine-tuning anything that didn't work out quite right over the winter; and perhaps planning for back-up power due to outages they may have experienced. We have devoted this issue to grid-tie back-up power due to the increased volume of questions that we are getting from our customers. Our focus still is and always will be off-grid homeowners, but as the utility expands we want to make sure that people still have the option to be self-sustaining when the power goes out.

Have fun reading!

IN THIS NEWSLETTER:

- PLANNING FOR GRID-TIE BACK-UP POWER
- GRID TIE with BATTERY BACK UP COMPONENTS
- SPECIAL ON XANTREX XW SYSTEM- FREE SCP with FULL SYSTEM PURCHASE!!
- CATALOG COVER CONTEST WINNER
- CUSTOMER STORY: Our Off-Grid Homestead



PLANNING FOR GRID-TIE BACK UP POWER

Whatever the cause of a power outage, people are always calling us looking for a way to keep critical (and some not-so-critical) loads operating. There are several different ways that you can prepare for a power outage that lasts from hours to days. A battery-based inverter system, a solar powered battery/inverter system, or back-up generator systems are all possible solutions. These options can help maintain your lights, refrigeration, security system and even the television like a UPS (un-interruptible power supply) for your computer, these systems for your home will keep the lights on, when everyone else's are off.

1. **Limited power battery/inverter system.** Most of us won't be interested in powering all the loads we might have in our home in an emergency. We'll prioritize important loads that we always want available and isolate them from the main 200 amp service panel that typically runs an entire home's electrical circuits. In this type of system, the grid power from your utility is connected to a DC to AC inverter and batteries. The inverter's built-in battery charger will use grid power to keep the batteries fully charged, ready to use; and the utility power will be "passed through" the inverter to the "sub-panel" to power those dedicated loads. Once the grid fails, the inverter will continue to supply power. It will be using the DC power stored in the batteries and converting it to AC power. Correctly sizing the battery bank will be crucial to providing adequate back-up power for your loads and maintaining the battery's health. You'll need to calculate the daily watt-hours you want to provide for once the power goes out. And you'll need to plan for the number of days you expect to need the power. Remember, the more loads you have and the longer you power them, the more the system will cost.
2. **Limited power battery/inverter system with Solar back-up.** This system would be like the above, but would incorporate solar modules and a charge controller to help extend the autonomy of the system. The solar array may be roof mounted or pole mounted in the yard, with full sun exposure. The output would be wired to the charge controller and connected to the battery bank for battery charging when the sun was shining. This is a system similar to the one many Backwoods customers already enjoy to power their homes- with the grid acting as the back-up power source instead of a generator as in typical off-grid systems. More expensive than #1, this system would allow continued operation in the case of longer outages.
3. **Limited power generator back-up.** This would entail a smaller gasoline powered generator that would be used to run the items you wanted to power when the grid went down. Size the generator for the maximum loads necessary, and allow room for the starting surge of appliances. The loads may run directly from the onboard outlets on the generator through an extension cord and switched outlet strip for minimal lighting, television and refrigeration. The new Honda "inverter" series of generators has a variable speed throttle that is very fuel efficient and reduces noise. As the load increases, so too does the RPM of the generator to provide the needed power. Of course, storing the gasoline can be problematic, and depending on the outages may be scarce once the outage occurs. Consider adding batteries and an inverter to allow smaller loads (lights and TV perhaps) to be on without the noise or expense of running the generator for every little load.
4. **Retrofitting an existing grid-tie system without batteries.** Although it is always better to plan your system to include all of the components that are right for you and your home, a number of grid-tie systems have been installed without batteries and although cutting your electric bill is great, when the grid goes down you are still without power. There are a number of ways that you can add batteries to an existing grid-tie system through the addition of an inverter/charger that allows for AC coupling. This is a tricky modification and should only be done by a certified installer or electrician with experience and the right components.

Looking at example #1 more closely, a homeowner might want several room lights, television, refrigerator, microwave and other items to run if and when the power goes out. So, removing those specific circuits from the main service panel and rewiring them into a "sub-panel" will allow them to always be available to the homeowner. The 120V AC input for that "sub-panel" will be grid power or inverter power depending on whether the grid is operational or not. A circuit from the main service panel will be wired to the inverter. That will allow grid power to

pass through the inverter to the sub-panel to power those fulltime loads, while at the same time using the internal battery charger in the inverter to maintain the batteries at a full charge. Once the inverter breaker in the main service panel is shut off, or if the power goes out, the inverter will draw DC power from the batteries to convert into AC output to power the sub-panel. So the chosen circuits will not lose power. You'll have lights and refrigeration while others in the neighborhood don't. Just as in an off grid application, the correct sizing of the inverter and battery bank is critical to the function and performance of the back-up system you are creating. So knowing the total watt-hours per day that will need to be provided for, and the simultaneous wattage used is necessary.

In a grid connected home, if someone chose to run the circuits in two bedrooms and the kitchen for instance, you could estimate the daily emergency usage fairly easily. We'd plan for the following emergency loads- four CF lights on 5 hours each day (15 watts each x 4 lights x 5 hours = 300 watt hours per day), a refrigerator (1500 watt-hours per day), television and radio (maybe 80 watts x 2 hours = 160 watt hours), microwave (1200 watts x ½ hour = 600 watt hours). We'd add another 10% to be sure they could alter their uses if needed and not adversely impact the autonomous run time. Based on those loads the home would need a battery bank that would provide for roughly 2800 watt hours each day (about 116 amp-hours used per day @ 24VDC), the amount of time expected to be without power. For two days of battery back-up it would need 4 Concorde B2120L batteries (420 amp-hour capacity @ 24 VDC) with a depth of discharge (DOD) of around 55%. Maybe you'd want 4 days of autonomy (464 amp-hours used), that would require 8 Concorde B2580 L deep cycle batteries (1020 amp-hour capacity @ 24 VDC). A Xantrex XW Power System with a XW inverter, XW System Control Panel, and XW Power Distribution Panel would handle all the loads we were considering running while the grid was down. If there are 240V AC loads that need to be powered, the XW Power System even offers 240v AC output from a single inverter so that saves on cost and complexity of the system by not requiring dual inverters and/or a transformer. You can also decide to have less days of autonomy, use less power, or supplement with solar to extend the length of autonomy and any of those changes would affect the size and cost of the back-up system.

Components for the above system would include but are not limited to the following:

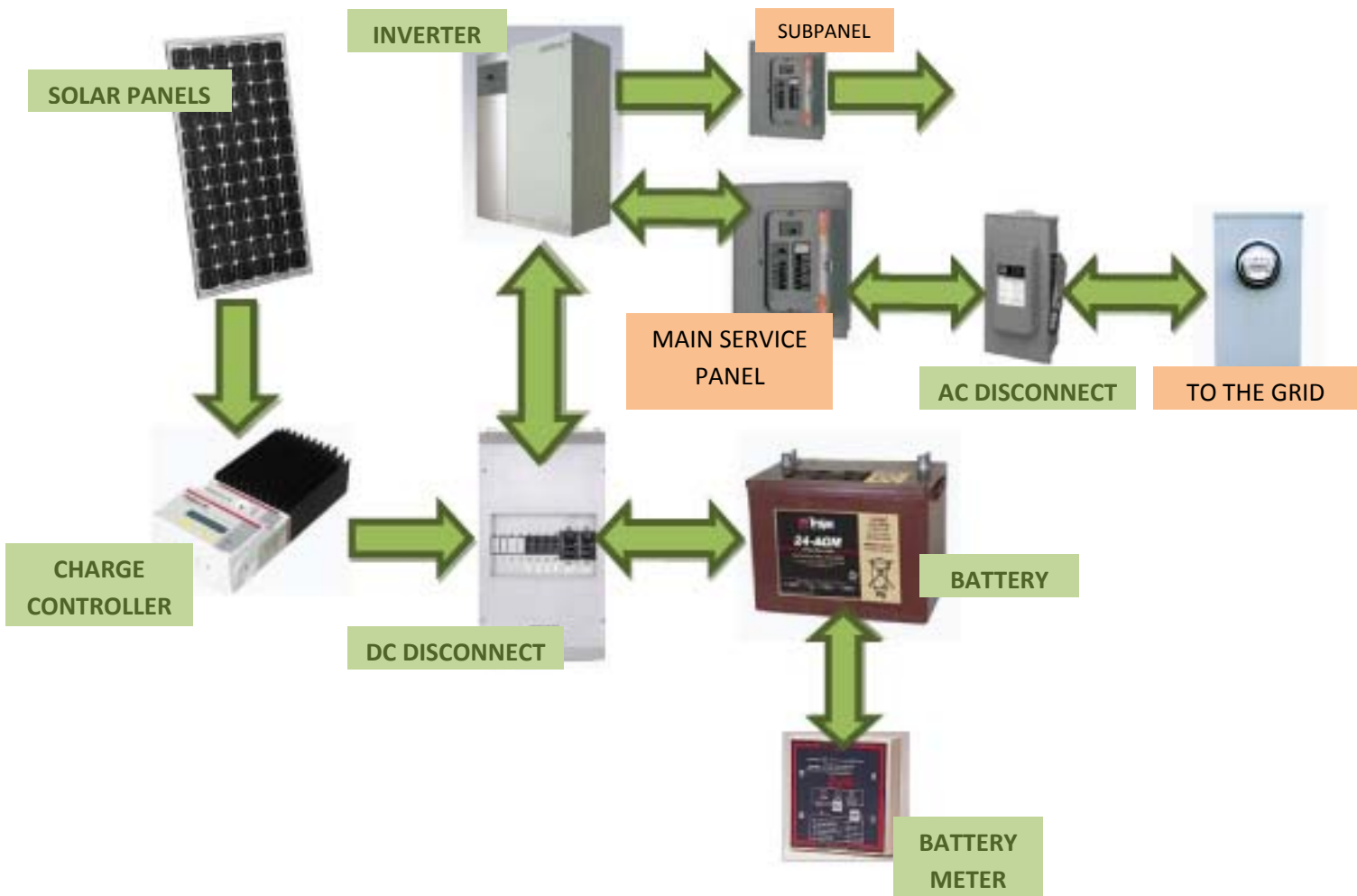
- 1 Xantrex XW4024 inverter: **\$3240.00**
- 1 Xantrex XW System Control Panel: **\$270.00**
- 1 Xantrex Power Distribution panel: **\$1200.00**
- 4 Concorde B2120L batteries: **\$1888.00**
- Total: \$6598 plus shipping/crating**



So making the best of a bad situation doesn't have to mean huddling in the dark. **Call Backwoods Solar for help in preparing your system.** Integrating alternative energy products into your home system can be a great hedge against what Mother Nature throws at you. As our off-grid customers already know, there is nothing like being your own power company, especially when the big storm hits!

COMPONENTS OF A GRID-TIE WITH BATTERY BACKUP SYSTEM

More information can be found on our website about all of the components you see listed above. Just click the links below



**XANTREX XW GRID-TIE SPECIAL!!!
Through May 31st**

Purchase a full Xantrex XW system (must include at least one XW inverter and XW Power Distribution Panel) and receive a \$270 System Control Panel for free. Call today to have us design a system that meets your needs! For more information on the components, [click here](#)

2010 CATALOG COVER CONTEST WINNER



Crisp Point Lighthouse is Located in the North East corner of Luce County in Michigan's Upper Peninsula along the south shore of Lake Superior. In 2009, the Crisp Point Light Historical Society built a visitors center that houses two restrooms and a display area. Since the closest accessible power grid is nearly 20 miles away, the society chose to install solar equipment to generate the power needed to run the 120 volt water pump that supplies water to the flush toilets. The solar equipment currently consist of two Mitsubishi 125 watt solar panels, a Xantrex C35 Controller with the optional Digital Display, four floor sweeper batteries (donated by a member) and a Shurflo P-SF AC 120 volt water pump.

"When it came time to consider a vendor for our equipment Backwoods Solar was recommended by a CPLHS member. It turned out to be a good recommendation. All the staff from sales to technical support were very friendly and helpful. We would definitely recommend Backwoods Solar for your Solar off grid power needs." says Rick Brockway, President of the CPLHS

For more information on the Crisp Point Lighthouse please visit crisppointlighthouse.org

RENEWABLE ENERGY "HELPERS" NATIONWIDE NEEDED

We have found that the vast majority of our customers want to install their own systems and would actually like to visit or speak with or write a "neighbor" that has a renewable energy system in place, prior to their installation. To facilitate this interaction, Backwoods Solar has compiled a list of people nationwide that have renewable energy systems that are willing to let interested individuals contact them. We maintain this list of Renewable Energy Helpers on our website and only release the information approved by the Renewable Energy Helper. This information may include a physical address, a phone/fax number, an email address or any combination of these details. We respect the privacy of anyone willing to share their renewable energy system with others and we want it to happen on their terms.

You may find that your county inspector requires a licensed electrician to sign off on your installation and you may want that electrician's assistance in general. We know that the experience gained by "doing-it-yourself" is invaluable. You will remove the mystery of running your own power station and you will develop an intimate understanding of each component. This familiarity simply doesn't happen if you do not participate in the installation process.

So if you share our opinion and would be willing to open your home to those folks that are new to this renewable energy arena, please let us know.

OUR OFF-GRID HOMESTEAD

submitted by: Tomas Kujat & Two Moons

We began our odyssey to address one of human kinds two basic needs with a 13' diameter round stone house modeled somewhat on the slip form procedures of Scott and Helen Nearing. Stone is a ubiquitous material here, so stone is what we used. We attached two other additions (mostly of stone) before we began tiring of candles, kerosene and Aladdin lamps. We could see the grid power lines a half mile away across the valley, but access to it came with a higher price than we were willing to pay. My spouse and I were to learn early on in our off-grid history, in the mountains of southwest New Mexico, that barring a few exceptions, local Alternative Energy Dealers often sell you what they have and not what you really need. However, a lot of thanks to where we are today has to be given to the folks at Backwoods Solar Electric. I've always been greeted by their knowledgeable staff; have been given good advice; and I have never been pressured to commit to any purchase. Backwoods has an impeccable reputation here in southwest New Mexico.



At the time, what we needed to do besides the basics was to power a washing machine: front loading, water miser, electronically controlled. The counter help at our nearest big city renewable energy store assured us that the Trace DR series inverter could handle it. It would be no problem. Right. It wasn't until about the third load that according to the washing machine factory technician, "the electronics refused to accept the modified sign wave." After repeated rebuffs from the big city R.E. dealer, we realized we were on our own...well, almost. The locals who considered our power system, "not *real* electricity" referred us to another one of "us" living off-grid 30 miles away. Between this fellow and another one in our area, we evolved at our own pace from a 200 watt photovoltaic system and a 660 Ah battery storage system with an 1800W inverter to a 670 watt solar system with 880 Ah of battery storage and a full sine wave 2500W inverter. Not much of a change over 10 years, as you can see, but our quality of life has increased immeasurably.

We've added electric water kettles, coffee roaster, toaster, aquarium pumps, two computers, DVD player, stereos, phone answering machines, battery chargers, a refrigerator, and a small electric water heater that we control with a timer. What we've learned ourselves is to be frugal with our energy use. Compact fluorescents (with a few rheostats and regular light bulbs for ambience in dining and tub rooms), switchable outlets, and paying attention to what the sun is doing are the rule. It is very seldom that I (the energy "policeman") has to tell the other resident or guests to shut down or start shedding loads. As well, we are also decreasing our use of natural resources, such as propane, by using a solar cooker and solar thermal water heaters. Our greenhouse is also heated with passive solar.



What our off grid friends provided us with was encouragement and pole mounting ideas for our PV array; taking the array off the roof and putting it on cast off framework from old satellite TV dishes, and using manual trackers for a pittance of the cost of factory built automatic trackers. The manual tracking has allowed us to add all our electric items listed above, and an added bonus was, no more climbing up on the roof to brush snow off during the winter months. Believe it or not, even the in the southwest we actually have snowy, cold days, and at 6700 feet, some as low as -10 degrees Fahrenheit.

In retrospect, we believe people who are considering off grid living should first begin consuming less. Little things like changing from incandescent lighting devices to compact fluorescents, turning off electronics and lights when not in use, and dismantling the TV with a large blunt object, can make an amazing difference. Then when you establish this habit, start looking at the energy use of all your major and minor appliances and replace them with Energy Star ones, by attrition. By throttling back before you make the leap into off-grid power, you'll be much more likely to live comfortably and simply. And while we're all living simply, other can simply live.

If you have a story of your own, feel free to submit in writing your account of how renewable energy has been a part of your life. If we publish your story in our newsletter you will receive a \$150 credit on your Backwoods account.