# Solar Power Essentials

There are a few essential components to living with solar power. The components you need will be dependant on wheather you are grid-tied or off-grid. Grid-tied means that your solar panels are connected to your electrical box, and any power you do not use gets sold back to the power company. Off-grid refers to being completely disconnected from a power company, meaning you produce all the power yourself. Both of these methods require the use of solar panels, but being off-grid requires you to have more equipment.

The most important factor they both share has to be energy efficiency. Producing your own power can get expensive if you do not have an energy efficient home. Keep in mind that your AC unit requires a lot of power to run. An efficient home should only need to use at most 5Kwh per day (and that is a high number). Most homeowners can use that in a few hours during the summer. The first place to start would be Weatherization. Weatherization is the process of keeping the outside air outside. This includes sealing your windows and doors. Obviouly there is more to it, so visit our section on Weatherization to learn more. There are many other steps to be taken to create an energy efficient home, like Passive Solar Heating, which is using the sun to heat your home in the winter. Passive Solar Cooling, using alternate means to cool your home in the summer. You should also make sure that your appliances are Energy Star rated. Energy Star ratings ensure that your appliance uses the least amount of energy to get the job done. To learn more about Energy Star visit http://www.energystar.gov.

## Phantom Loads

What is a phantom load? These are caused by appliances you really don't think use much power. Digital clocks, microwaves, remote control TVs, VCRs, electric toothbrushes, cordless phones, cell phone chargers, and so many other common appliances add up to create these phantom loads on your electrical system. All your appliances that have clocks on them like VCRs and microwaves are using power all the time. If you include a home theater system in your off-grid appliacation it is a good idea to plug your equipment into a electrical power bar with an integrated switch. This way when you are not using the equipement they can be completely turned off. Keep in mind that these phantom loads do not cause a problem when you are tied to the grid, only about $5 per month, but in an off-grid system it is unacceptable. The biggest reason this poses a problem for your off-grid system is inverter waste. When you decide to go to sleep, and turn off the last light in the house, your inverter will continue to run because these phantom loads are draining precious power. Along with the waste you must consider that if the inverter does not get a rest it might not last as long as it could.

A possible solution for this is to have another circuit with a small inverter tied to it, something in the range of just 100 watts. This inverter can be tied to specially marked outlets in your home to be used for charging cell phones, fax machines, or any other small items you would like. Keep in mind you do not want to go overboard with this, or you will be replacing that small inverter on a regular basis.

## Detemining How Much Power You Use

This is a very easy process. Simply grab your electric bills from the previous year, and average your total Kwh consumption. Now this number is going to be quite staggering for a solar powered home. In order for a solar powered home to produce enough power to perform all the needs of the homeowner it can not use the same amount of power as it did when it was powered by the power company. The cost involved to produce that much solar power would be outrageous. After you have determined wheather or not you can live with less power than usual it is time to determine which method of solar power is best for you.

## Grid tied Solar Power

The grid-tied application is easier and less expensive to accomplish because once the sun goes down, your home will automatically use the power provided by your power company. Usually a grid-tied application will simply suppliment the power you are already using, and has the potential for you to earn energy credits from your power company for the power you sell back to them. Most grid-tied applications have an ROI (return on investment) of about 10 years. This means that it will take about 10 years of selling power back to the power company to overcome your investment in solar power equipment. This is one of the key factors in determining how much power you need. Most grid-tied applications produce around 2.5Kwh per day (this is the norm for most applications used in California). This will generally run you

about $10, 000. If your power company is only paying you the same amount they charge you per Kwh (about $4/Kwh. Visit SolarGenerations to find out the buy pack price for Nevada Power users.) it is going to take a bit of time to earn your money back. Grid-tied applications are most effective to lesson the chance of a power failure during peak usage hours which is the same time your photovoltaic cells are their most effective.

These systems have become popular in California because of the demands placed on their power companies. During the summer when usage is at its highest grid-tied applications help support the California power companies to ensure there is enough power for everyone. We here in Nevada do not have this problem right now, so there is time to do more research about this. Initially the cost is quite high, but the benefits outweigh the costs if you plan to live in your home for more than 10 years.

Off-grid Solar Power

The major reason for someone to choose an off-grid application is if the person lives in a remote area it is usually cheaper to use solar power than to pay to run power from the closest point it is offered. In some areas you can expect to pay over $20,000 just to run the power lines to your home. So what is involved in creating your own "Solar Power Plant"?

Obviously you will need an array of Photovoltaic (PV) cells. These are used to collect the energy given off by the sun, and produce useable electrical power for your home. Along with this PV array you are going to need a storage device for when the sun does not shine like during the night. How do we do this?...with batteries of course. Now I am not talking about the normal batteries that power small appliances, you will need a bank of deep-cycle batteries. These batteries are similar to the ones used by RVers when there can not be connected to grid power. Now there are going to be times when the sun is not shining enough to suitably charge your battery bank, so it is also important to have a back-up generator that is powered by propane or bio-diesel. These back-up generators will also help support your PV array when power usage is at its highest, like during the hot summer months in the desert.

Now that you have the basics for the system there are a few more items to purchase to make this system work. PV arrays and your back-up batteries produce DC voltage. The same voltage as your vehicle. Your home appliances use AC power, so how do we convert DC power to AC power? Well you also need an Inverter. These inverters use electrical components to convert the DC power coming in to AC power so you can power your home's appliances. Back in the first days of off-grid appliacations most people had to resort to going down to their local RV supplier and purchase lights and appliances that ran off DC voltage. I do not recommend this for anyone. With the cost of high power inverters gettting lower by the day, this is one thing I will call an essential. Next on the list is a charge controller. The battery bank you purchase to store power with is not cheap. A charge controller will help to ensure a long life for your batteries. Other routine maintenance services are required to ensure the life of your batteries, but a charge controller will make sure that the batteries will not be over-charged which could damage or shorten the life of your batteries. Another item to consider is a meter. You should know how much power you are producing. Though it is not something that you will want to watch everyday, it is a good idea to include one in your off-grid system.

After you have done your homework, and determined what your needs are it is a good idea to consult a solar electrical contractor. Nevada Power provides this list for you.

Nevada Solar Contractors and Consultants

This has to be the first step you should follow before you purchase anything. This way you can ensure that you are not spending money on things that you will never use. Solar power is a big investment with an equally big reward. Do your research, ask a lot of questions and consult the pros, this will make your solar experience and enjoyable and profitable one.