

Powering Your Home with Solar Energy

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Introduction:

It has been estimated that within 20 years there will be a 50% higher demand for more energy. One great solution is to use a form of energy that is not only unlimited in its potential, but it is also free, renewable, and clean.

That energy is solar power and has more people taking a second look.

This free ebook describes what solar power is and what methods can be used to save money on the power bills at home.

Feel free to give out this guide to friends and colleagues and spread it around to as many people as you want. All I ask is that you leave everything in tact as it is.

Chapter 1: Solar Panels: How Do They Work?

There are two basic types of solar panels:

- One kind makes electricity,
- The other kind generates heat.

It's important to know which kind you need for the job you have in mind, because they are not interchangeable. But both kinds can save you money and help you live a greener lifestyle.

Solar thermal collectors use the sun's energy to heat water and other fluids, like oil. They typically use plastic tubing, hoses or coils in the panel. The liquid runs through the coils and is heated by the sun. These types of panels are ideal for heating swimming pools, spas, hot tubs and hot water for homes and businesses. They can also heat building interiors by using baseboard heating units and hot water flooring systems. Once they are installed, there is usually no need for additional heating fuels. But the systems usually require some kind of motorized pump to circulate the fluids.



electricity is only generated from the panels during the day when they are interacting with direct sunlight.

Solar photovoltaic cells create DC (direct current) electricity. Most typically, they use semi-conductor material (silicon) in the panel, which interacts with sunlight to create electricity. The electricity then can be used to power computers and appliances, or the entire house, if you build the system big enough. The

Storing that Solar Energy

In order to use a photovoltaic system at night or during cloudy days, the electricity must be stored in a battery storage system. You can use inexpensive lead-acid batteries (like you car uses), but you will need to make sure they are filled with distilled water in order to maintain their charge. You can also use more expensive batteries. Sealed AGM (absorbent glass mat) batteries don't require maintenance to retain their charge. Gel batteries are good choices for cold climates because of their freeze-resistance.

Both the thermal collector and the photovoltaic systems typically use glass panels to encase their collection systems, and both require access to direct sunlight. The panels are ideally situated in a location that faces south and allows maximum exposure to sunlight during the entire day. They can be used anywhere to harness the sun's energy, but they are less effective in regions that typically have a lot of cloudy days throughout the year.

Even in mostly sunny regions, it's always a good idea to add a backup generator to both kinds of solar panel system. Backup generators can be fueled with biodiesel to maintain your green lifestyle. And the generators can be used if your battery storage fails, or whenever there is an unexpected stretch of cloudy days.

Chapter 2: Build Your Own Solar Panels: How Hard Can It Be?

Your utility bills are getting higher every month, so you've been thinking about installing solar panels on your home. You know how to use a screwdriver and drill, and you're wondering...how hard could it be to build your own solar panels? This chapter will give you an overview of the process so you can make a good decision.

To clarify, we're talking here about building solar panels that will deliver electricity to your home. (These are not the same as "solar energy" devices that

will heat water, but won't deliver electricity). The most widely used solar panel designs for generating electricity are photovoltaic arrays. They convert sunlight directly into electricity.

There are at least two popular ways to build do-it-yourself solar panels:

- First, there are solar panel kits. These are straightforward designs and can be built by anyone who has moderate handy-man skills.
- Second, there are built-from scratch-solar panels. These are a bit more complex, and are better projects for more adventurous people who don't mind experimenting.

Solar Panel Kits:

You can buy these from various local or online suppliers. Use the search engines to look for "solar cell kits". You'll find hundreds of websites that offer books, online videos or DVDs of plans and instructions, along with the materials you'll need.

Check out some [solar power kits on ebay right here](#).



The kits basically supply you with the photovoltaic cells, the wiring, the assembly hardware and the mounting devices. They're somewhat like putting together a computer desk kit from the hardware store. But you'll need to check your local building codes to determine whether or not you need permits and a licensed installer.

Build Your Cells From Scratch:

This is an inexpensive, but labor-intensive way to build your solar cells from scratch. It uses raw copper sheeting, like the copper flashing available at hardware stores, and a heat source. You need to heat the copper for about a

half hour, or long to cause the chemical reaction that produces copper oxide on the surface of the copper sheet.

After the copper panel is cooled properly, combine it with other similar-sized non-oxidized copper panel, add salt water solution and encase all of the components in a shatterproof glass panel. Add wiring and mounting components after the panel is assembled. This produces a low-voltage panel. You'll need to make a lot of them in order to have an array that produces enough electricity to power household devices.

Building your solar panels from scratch is relatively cheap, but takes a lot of time and space. Solar kits are a good solution if you like to work on projects around the house, but don't have the time for building solar panels from scratch. Either way, be sure to check your local building codes for installation requirements.

If you are looking for detailed step-by-step instructions for building a solar panel, you can find the only guide I recommend on this by [clicking here](#). This is the guide I personally used to build my own solar panels and the plans were very detailed and easy to follow. Saved me a ton of money from buying new ones too.

These instructions will also show you how to make wind turbines from home as well, and give you all kinds of tips for using renewable energy at your residence.

Chapter 3: Solar Panels: Can You Go Off the Grid Now?

If you install solar panels on your home, can you go "off grid" and never have to deal with the electric company again? Being energy independent is a nice thought. No more triple digit electric bills. No more hassle with the utility companies for any reason. Is this possible for you and your family? It depends on where you live, and how much money you're willing to commit to maintain your own energy system.

First, consider where you live.

Are you in a part of the world that gets lots of sunlight all year long, or do you have lots of gray and overcast days? Even when you install solar panels on your home, they only create electricity while the sun is shining on them. That means you have to use batteries to store electricity in order for it to be available at night and during overcast days.

Here's where your system can start getting expensive. You'll need to buy and maintain enough large DC (direct current) batteries to store enough electricity to get you through one to three days of cloudy weather. You'll need plenty of storage space for all of those batteries, and you'll have to plan for the expense of replacing them periodically.

It's also a good idea to keep a backup generator just in case you have a long stretch of cloudy weather that lasts beyond your battery storage capacity. Your generator will need fuel, so you'll have to store that, too. Generators usually use either gas or diesel fuel. But that seems to defeat the purpose of a solar panel system, so you'll probably want to use biodiesel. So, yes it is possible to get "off grid", but it's not a simple or cheap project.

Net Metering: Another Way to Go "Off Grid"

For most people, it makes more sense to look into "net metering". Find out if it's offered by your local electric utility company. Net metering is a great way to cut down on your electricity bills, yet still have power available at night and during long spells of gray, cloudy days. Net metering allows you to credits back from the electric company for excess electricity that your solar panels produce during the day. Then you simply use the electricity from your local utility company at night and on days when there is not enough direct sunlight. You won't need to store banks of DC batteries in your basement or garage. You won't be completely "off grid", but you can save significant amounts of money on your monthly electric bills. Some months you may even have a zero balance.

So if you live on a large parcel of land and have an extra barn or outbuilding to store your DC batteries in, going "off grid" could be a reality for you. But if you live in a subdivision, have no basement, and you're already parking your car on the street because the garage is too full, "net metering" will probably be your best bet.

Chapter 4: Off-Grid Solar Electric System Explained

If you have ever dreamed of being completely energy independent, then your ultimate goal is to live "off grid". Most people who live off grid are located in remote areas where electric utility service is not even available. But more and more people are considering it as a personal lifestyle choice.

There are two main factors involved in living off-grid.

- First, you'll need to become very aware of when and how you use electricity. You won't have to live without it, but you won't want to waste it, either.
- Second, you'll want to become familiar with how your solar power system works, and what kind of maintenance is required.

It would be best if you become an expert on your particular system, so you can troubleshoot anything unexpected that arises. Becoming an expert is not that hard to do since there is so much information on solar energy available now. But it will require time and commitment on your part.

A basic off-grid system is made up of 9 components.

- First, the photovoltaic array and mounting rack. Wikipedia describes the array as "a linked collection of photovoltaic modules, which are in turn made of multiple interconnected solar cells". The mounting rack allows you to attach them the roof and point them toward the sun.
- Second, the array DC disconnect. This is basically a breaker between the array and the rest of the system. It allows you to disconnect from the system in order to troubleshoot problems with the array.
- Third, the charge controller keeps the batteries from overcharging.

- Fourth, the battery bank stores excess electricity. You will usually need enough batteries for 2-3 days worth of stored electricity in case of a cloudy period.
- Fifth, the system meter is like your car's dashboard. It reports how the various components in your system are doing,
- Sixth, is the main DC disconnect. This is a breaker between the storage batteries and the inverter.
- Seventh, is the inverter. This is the component that transforms the DC (direct current) electricity, which is generated by the array and stored in the batteries, into the AC (alternating current) electricity that can be used by your household appliances.
- Eighth, the AC breaker panel. This is the same kind of breaker panel that the electric company uses to connect your house wiring to its electrical source.
- Ninth, your backup generator. This is in case you have a stretch of cloudy days that outlast the electricity stored in the batteries. You can use traditional fossil fuels, but you'll probably want to use biodiesel to maintain your green lifestyle.

Now that you've seen the components of the photovoltaic system, you can see why it's not that complicated to become your own expert. Each component is relatively simple. The only moving parts are in the backup generator, and you hopefully won't be using that very much.

Chapter 5: Passive Solar Ways to Light Your Home

When you think of solar lighting, do you automatically think of using solar panels to power your light bulbs? Most people do. But that's not the only way to use the sun's power to help light your home.

Here are four more ways you can use solar lighting around the house.

1. Skylights are the most common passive lighting sources found in homes. They are a great source of natural light, especially for rooms that have small or no windows. Skylights can sometimes deliver more natural light to a room than windows, because their rooftop location exposes them to the sun throughout the day.
2. Solar light tubes are a really effective way to light dark hallways, closets, interior bathrooms and garages that have no windows of their own. Although this technology seems modern, it was actually used by the ancient Egyptians, so it has a long and proven history. Solar light tubes are usually smaller than skylights, sometimes only 9 to 12 inches in diameter. They are installed in the roof, and use reflective material in the tube to enhance the amount of light they deliver. The reflective material allows them to be effective even on cloudy days, since they don't require direct or bright sunlight to be useful. It is easiest to plan for them and build them into new construction. But they can be added to most existing roofs without too much difficulty.
3. Solar exterior lighting is extremely practical. It is powered by small solar cells that collect sunlight during the day, then store it for use at night. The solar cell can be mounted in a sunny place and wired to the lighting fixture if its location doesn't receive enough direct sunlight during the day to power it.

Almost any type of exterior lighting is available in a solar-powered version. Porch lights, patio lights, spot lights and security lights that include motion detectors can all be powered by solar cells. This is an

especially good feature for security lighting because it will work even during electrical blackouts or system-wide power outages.

4. Solar landscaping lights are both practical and attractive. They come in a variety of styles, sizes and uses. Spotlights can be used to light trees, garden sculpture or fountains. Low level lighting can be used to outline driveways and garden borders. Taller lighting fixtures will illuminate outdoor living areas like patios or gazebos. Mid-level lighting with non-glare screens are a good choice for lighting sidewalks or footpaths. Party

lights can be used for special occasions or to create an atmosphere for outdoor living areas.

Passive solar lighting is one of the easiest ways to use solar energy. You can start with some inexpensive garden lights. When you buy your next house, or your next new roof, you can plan for the bigger-budget skylights.

Chapter 6: Solar Energy: Which is Better, Active or Passive?

Solar energy is a hot topic in the news these days. But if you're not already familiar with the terms, it can be confusing. What's the difference between active and passive solar energy systems? And which one is better?

Active solar technology uses electrical or fuel-driven mechanical equipment to perform some of its functions. For example, some solar swimming pool heating systems use electric pumps to move the heated water from the coils in the solar panels into the pool. Large off grid solar electrical systems that provide 100% of the electricity to buildings usually use diesel or gas-powered generators as part of their backup systems.

Some solar electric systems use motors to allow their photovoltaic arrays to track the sun's movement throughout the day in order to maximize the amount of sunlight they capture. Grid-tied solar electrical systems are also considered to be active systems because they rely on the electric company as a backup source.

Passive solar technology does not use additional mechanical or electrical devices to deliver heat or electrical energy. There are no additional fuel or utility costs, and no added environmental impacts. For this reason, many people think that passive solar technology is superior to active solar technology.

The most common passive solar application is solar water heating. A truly passive solar hot water system can provide enough hot water for washing and bathing. It usually consists of a collector tank located on a south or west-facing

wall or on the roof, and a plumbing system that delivers the water using gravity. These types of systems are most successful in moderate climates where temperatures don't get cold enough to cool the water in the storage tank.

It's also possible to combine passive and solar energy systems to get the benefits of both. Any of the active systems that use electric motors can also use solar cells to create the electricity. For example the motors that move photovoltaic arrays can easily be powered by solar cells. And solar cells can also power the electric pumps that move the water in solar swimming pool heaters, and in water heating systems used in buildings.

Some active solar electric systems, like off grid systems, need external generators. They are part of the system to provide backup energy during long periods of cloudy days when there is no direct sun. Solar cells won't work under those conditions. But it's still possible to stay green by using bio-diesel fuel to power the generator.

Chapter 7: Concentrating Solar Power Systems



If you have ever seen a field with several mirrors pointing toward the sun you may be looking at a solar power system. These systems work to concentrate the sunlight to one area and use the heat to heat up the liquid that flows along the pipes. This system is called Parabolic-trough system. This type of system

heats oil that is flowing through the pipe. The oil is hot and that is why it is used to boil water to power a steam generator which in turns powers electricity.

The reason that this system works so well is because the U-shaped mirrors attracts and collects the suns heat which is then transferred onto the receiver. The receiver absorbs the heat and transfers into fluid which helps to power the engine. The heat causes the fluid to swell up against the piston and that produces mechanical power.

This type of power can be used to run things like generators or even an alternator that will produce electricity. This system works great when because it uses molten salt that flows through the receiver. When the salt heats up it can generate electricity through the steam generator. The salt holds in the heat for several days before it has to be converted into electricity. Because this system uses so many panels it is mainly used for industrial solar power where acres of land can be donated to the Parabolic Trough.

There can be enough power in the network that can create energy for several days or more. Because this system is so large that it allows the heat that it saves to be transferred days later.

Through this project and other solar power projects we can understand fully how solar power works. When we see how much solar power is conserved using these U shaped mirrors we can also understand how much energy is lost. Using concentrating solar power systems are beneficial to the businesses that use them because they won't have so much time down when the power fails. Machinery is their only major concern and as long as their machines are taken care of there should be no problems.

Industrial type of solar power can attract and trap a lot of heat from the sun during the day, especially using mirrors that will reflect the sunlight.

Scientist are continuously studying this theory as businesses use it to power their machinery. Steam power was what was used from the beginning with solar power and is still what most systems depend on to service their production needs. In the future, fields may eventually be full of mirrors that somewhat point up to the sky in hopes of generating enough sunlight to heat the world. Until then we will use the traditional methods of heating water, heating our homes and powering our electricity.

Chapter 8: Solar Panels: Will They Work For Your Pool?

Have you been thinking of installing solar panels to heat your swimming pool? Good news! Solar panels that heat water are relatively inexpensive to buy. You can even build them yourself for less than \$100 in materials and less than a weekend's worth of your time. The best news is that once you have paid for the cost of installation, you won't have any ongoing fuel bills.

Check this out if you just want to [buy cheap solar pool heaters](#) now.



But before you decide, you'll need to answer some questions. First, will your solar panel system get enough sunlight during the day? The solar panels used for heating pools are simple passive collectors. They're typically made of plastic coils filled with water and sandwiched between sheets of shatter-resistant glass. As water collects in the coils, it gets heated by the sun then pumped into the pool.

If your lot is covered with tall trees that shade your house and yard, it may not get enough sunlight for a passive pool heater. But an unobstructed rooftop that faces south or west is a perfect location for solar panels to get full exposure to the sun throughout the day.

Next, how much difference is there between the outside air and the temperature you want the pool to be? For example, if you're thinking about heating an outdoor pool in Minnesota to 80 degrees during a below-zero winter, stick with pool covers and a heavy-duty gas heating system. But if you want to heat an outdoor pool in California to 80 degrees during a 50-degree winter, a solar pool heating system is ideal.

Even with your new solar heater installed and working, you'll want to use a solar cover or blanket whenever the outside air is colder than your pool's water temperature. Anytime you see steam rising from the pool, it's wise to use the pool cover to keep the heat in. That way, the heat will stay in the water instead of dispersing it into the air.

Chapter 9: Solar Water Heaters for Your Home

When you use solar power to heat your water you may find that you will need to purchase a solar powered water heater in order to do that. You may be able to make adjustments to your existing one but whatever steps you take to turn it into solar power it will be worth it.

There are several different ways to heat your water using solar power. You can even make your own solar power source. The water runs through pipes before it enters your home. Heating water using solar power will occur before the water gets into your home as it passes by the solar source that attracted the light. You may also have a tank to store the water in that can heat the water up. In order to heat your water successfully you will need to have both a solar collector and a storage tank.

A flat plate collector is the most common collector. It is designed to be a thin, flat rectangular box that has a see through cover and it can carry fluid to be heated.

This fluid could be the water or it may be a solution, such as antifreeze that will prevent the water from freezing.

Next the water moves through the tubes to an absorber plate. This plate is painted black to attract and absorb the heat from the sun. When the collector gets hot, it will heat the fluid that passes through the tubes. As the water passes through the tubes it goes into the storage tank. The storage tank holds the heated water. It is usually well insulated so the water will stay warm longer.

Then the water flows into the home on demand.

Active solar water heating is the more common than passive because it is quicker and more efficient. The passive system relies on gravity to feed the water from the flat plate collector to the storage tank. This may be slow at times and may not be sufficient enough to keep up with the demand. Both ways are logical and may be more of a choice of preference for you.

Another thought that you need to consider is that if your flat plate collector and your storage tank is not angled right it may be hard for the gravity to feed the liquid through.

Heating water using solar power is very affordable and can be installed with minimal effort. Choosing to heat your water using solar power is a wise choice and a first step in making a choice to help preserve our environment. We know how easy it is to use solar power to do a lot of things, including heating our water.

There are all kinds of instruction plans on ebay for building your own solar water heater too.

[Check out some solar water heater guides on ebay now.](#)

Conclusion:

There are many ways you can use solar power to save on energy costs at home. Determining what you actually want to power will also determine the kind of solar power system you will need. A combination of passive and active solar power can meet most needs. I hope you enjoyed this free ebook.

Learning how to make solar panels can be very beneficial because you can power anything in your home with this kind of renewable energy.

As I mentioned before, you can get the best step-by-step guide for making solar panels using materials around your house by [clicking here](#).



Great Solar Power Resources for You to Check Out:

Websites with Energy Saving Products that are Green:

www.ChangeforGreen.com

www.GreenandMore.com

Suggested Guides to Help you Make Solar Power at Home:

[Earth4Energy](#)
[HomemadeEnergy](#)
[Power4Home](#)
[Efficient Planet](#)

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