



Your Must Have Guide To Making Your Own Solar Energy

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Resources for Solar Energy Information

HOME MADE ENERGY

EARTH FOR ENERGY

POWER FOR HOME

GREEN DIY ENERGY

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Introduction

Someone once said energy makes things happen. This is absolutely true. Light energy helps us see and when we feel warm during cold days this is all thanks to the energy called heat. But, have you ever wondered where most of this energy came from?

Most of the energy that the Earth receives comes from the Sun. The Sun is the biggest source of energy in our lives. It gives off enormous amount of heat and light energy in all directions that some of its energies reach the Earth. We call this energy solar energy meaning energy from the Sun.

Solar energy makes life on Earth possible. Without the sun, the earth would be cold and dark that no living things can live on it. Another thing is that, life depends on water. The heat from the Sun causes the water to constantly move between the Earths' surface and the atmosphere. This process is called the water cycle. With this, water is properly distributed all over the globe.

Another importance of the solar energy is that it gives plants the energy they need to make food in a process called photosynthesis. During this process plants take in sunlight, use water and release oxygen into the air.

Uses Of Solar Energy

If you are to list down the uses of the Sun's heat and light energy in your daily life, you will see that even a piece of paper is enough. Sometimes the most common things in this world are the things ignored by most people. For many years now, man has utilized almost everything in this planet. This ranges from the minerals under the Earth's surface to gases up in the sky. But, the suns' heat and light energy, which in fact the most abundant and most common on Earth has been ignored.

The suns heat and light energy have many uses. It is used to grow plants; some people use it to dry their clothes after washing and some even use it to cook food or boil water. In ancient times, people used solar power to dry food, animal skin and clothes. They even discovered that sunlight can cause fire if focused using a piece of glass. Another interesting thing about our sun is that, when it is processed, it can produce the energy we need in our homes-the electricity.

Solar Power Plus Technology

Technology is the application of what a person knows about something important. Some are simple, some are complicated but no matter what it may be, they are the product of humans intellectual capabilities. The car running down the road is technology, the TV you watch movies on is also technology, the stove you use to cook food is another example of technology. But this technology cannot function without energy. As what I have quoted earlier, energy makes things happen. If this is the case I think it would be better to determine the source of all this energy.

For an industrialized country, coal and oil have been the main source of energy. These were processed to produce different kinds of energy and the most common is the electrical energy. The question is, can we really rely on these sources forever? I mean can these sources be enough for the next generations needs. The answer is NO. Coal and oil were non-renewable materials. When these materials were used up, they are gone for good. What will we do if these materials are gone? Can we survive if we do not have energy to use? Imagine yourself with no electricity to light up the house, no fuel to run cars and no energy to cook food.

For many years now, we are dependent on coal and oil for our energy supply and because these materials were limited and the usage of these became expensive. But what can we do, we can't just stop utilizing these sources right? But wait, aren't we forgetting something? The sun is the most common source of energy on Earth. Instead of using coal and oil which are non renewable materials and were very expensive to produce the energy we need, why not use the sun?

Just recently a breakthrough about the suns' power exploded like an active volcano. It is like a dream come true for many people. Something was created to convert the suns' energy into energy useful to humans. An American engineer Russell Ohl created the first solar cell in 1941. This one of a kind invention paved the way of obtaining free energy for our household. Many years had passed since the solar cell was invented and as the years go by, many technologies were also developed to take advantage of the suns' rays in as many ways as possible.

Putting Solar Energy To Work

We can put solar energy to work in many ways. It just depends on how creative you are when it comes to innovation. If we summarize the ways to utilize the sun's energy, there are two main methods. These are the active method and passive method. Active method uses electrical or mechanical equipment to do work. For the passive method, this is the most natural method. It uses little or no electrical and mechanical help to do work. An example of a passive method is a greenhouse. It simply converts sun's energy without any type of equipment.

For converting solar power to electricity we also have two basic ways to do that. If we used the sun's light to have electricity one should use a solar cell. This method is also called the photovoltaic method. "Photo" means light and "voltaic" which refers to electricity. The other method to making electricity is called thermal method. This method uses the sun's heat to run a machine that generates electricity.

Photovoltaic Cell

Photovoltaic cells are made of special materials called semiconductors such as silicon, which is currently used most commonly. Basically, when light strikes the cell, a certain portion of it is absorbed within the semiconductor material. This means that the energy of the absorbed light is transferred to the semiconductor. The energy knocks electrons loose, allowing them to flow freely. This electric field acts as a diode, allowing (and even pushing) electrons to flow from the P side to the N side, but not the other way around. It's like a hill -- electrons can easily go down the hill (to the N side), but can't climb it (to the P side).

When light, in the form of photons, hits our solar cell, its energy breaks apart electron-hole pairs. Each photon with enough energy will normally free exactly one electron, resulting in a free hole as well. If this happens close enough to the electric field, or if free electron and free hole happen to wander into its range of influence, the field will send the electron to the N side and the hole to the P side. This causes further disruption of electrical neutrality, and if we provide an external current path, electrons will flow through the path to the P side to unite with holes that the electric field sent there, doing work for us along the way. The electron flow provides the current, and the cell's electric field causes a voltage. With both current and voltage, we have power, which is the product of the two.

Things To Consider

The first thing you should consider in using PV cells is the amount of sunlight you receive each year and your current electricity usage. This is to determine how much sunlight you should collect to power up your home. Once you've done this you can now make a list of the things you will need to install your own PV cells. To help you minimize decision time, here are some materials you might consider using:

Solar Collectors

The first process to convert the sun's rays into useful electrical energy is to get it and this is done by solar collectors. Before anything else, let us first know some features of the solar collector to further understand how it really works. Basically, there are two major parts of the collector.

The Frame

Solar collector uses frames to support the whole system. It is made of stainless steel or aluminum. This metal is used for solar collectors because these metals are not vulnerable to natural disaster and they do not get rusty.

The Absorber Plate

The next very important part of the sun collector is the absorber plate. This is the most interesting part of the solar collector. In this part of the solar collector, the sun's energy was magnificently converted to electrical energy which we later on used in our homes. The absorber plate is made up of copper or aluminum metals. These metals are made into fin tubes that later on will absorb the energy from the sun, and thus give the essence of the solar collector.

The Grid

In installing your PV cells, you have the option to either go off grid or on grid. This depends if you like to use a battery for your cell. If you go off grid, you will be using the battery. This will supply power when solar energy is not available. Having a battery for your solar cell can be somewhat expensive. They require a lot of maintenance plus the price of the battery itself, but if you look at its brighter side, you will see that it can be of great help especially during those long periods of cloudy days.

On the other hand, if you choose to be on the grid you need to know what your local laws are all about and how to follow the power company's regulation.

The Batteries & Charge Controller

When you really want to go off grid you will surely need a battery and there is no alternative. Now, in choosing a battery make sure to choose the battery made of either lead acid or nickel-cadmium. It has been proven that these batteries last longer and is appropriate for your solar power system.

Additionally, you have to purchase a charge controller. This will increase the life span of your battery by 150% than those that don't. What the charge controller does is it regulates the charge of the battery. It monitors the battery by preventing charge draining or overcharging. When the battery is full the charge controller stops the charging to prevent overcharging. On the other hand, when the battery drained too low, the charge collector stops drawing energy from the battery to increase its life.

Generators

For those that want to go completely off-grid, a generator is essential to back up the battery. If the power is low and the batteries are starting to lose their charge, you'll need a generator to recharge the batteries or provide emergency power. If your power output suddenly overwhelms the inverters, you will also need a generator to supply backup power.

A good generator should be directly connected to the inverter, so that when you turn on the generator, the inverter will immediately recognize the new power source and switch the entire load to it. Generators come in many options including gasoline, diesel, and gas. Gasoline powered generators are the most common because they are the least expensive and the easiest to get fuel for.

Parts To Complete

The parts stated above were very important, but there are still a few things you need, to complete the system which includes:

- **Wiring** – This varies depending on the size of the system and the number of panels.
- **Grounding Equipment** – It is the vital safety consideration and is required for all electrical work.
- **Over Current Protection** – Regulates and protects the power supply from excess current and shortages.
- **Junction Boxes** – Junction boxes will protect and preserve your conduits and cables from the elements and other outside factors like bugs or rodents.
- **Disconnects** – The DC disconnect shuts down the Direct Current from the Solar Cells – usually mounted outside the house for quick access in the event of an emergency, while the AC Disconnect shuts down the Alternating Current from the inverter, generator, or power grid.

Permits

Before you start your project on solar energy system, contact first your local municipality and learn if there are any permits required. This is to avoid any problems with the authorities in the future. Heating systems are

usually more straightforward, while PV cell systems might require a lot of paperwork, especially if you plan to be on the grid.

Consider also the legal things you can do on your own. If you're planning on running wires and changing how your house connects to the power grid, you absolutely need an electrician, and an inspector to look at the finished product and sign off on all safety regulations. This should not be of any problem; in fact the government want people to use renewable energy. This is just a prevention of any trouble in the future. The bright side here, if you follow the rules, use the right materials and file all your permits, they'll help you along in the process every step of the way.

Advantages Of Photovoltaic Cells

- Grid-connected solar electricity can be used locally thus reducing transmission/distribution losses (transmission losses were approximately 7.2% in 1995)
- Once the initial Capital cost of building a solar power plant has been spent, operating costs are extremely low compared to existing power technologies.
- When grid-connected, solar electric generation can displace the highest cost electricity during times of peak demand (in most climatic regions), can reduce grid loading, and can eliminate the need for local battery power for use in times of darkness and high local demand; such application is encouraged by net metering. Time-of-use net metering can be highly favorable to small photovoltaic systems.

- Facilities can operate with little maintenance or intervention after initial setup.
- Solar power is pollution free during use. Production end wastes and emissions are manageable using existing pollution controls. End-of-use recycling technologies are under development. The 89 terawatts of sunlight reaching the earth's surface is plentiful - almost 6,000 times more - compared to the 15 terawatts of average power consumed by humans. Additionally, solar electric generation has the highest power density (global mean of 170 W/m²) among renewable energies.

Disadvantages Of Photovoltaic Cells

- Solar cells produce DC which must be converted to AC (using a grid tie inverter) when used in currently existing distribution grids. This incurs an energy loss of 4-12%.
- Limited power density: Average daily insolation in the contiguous U.S. is 3-7 kW·h/m and on average lower in Europe.
- Solar electricity is not available at night and is less available in cloudy weather conditions. Therefore, a storage or complementary power system is required.
- Solar electricity is almost always more expensive than electricity generated by other sources.

Solar Thermal Energy

Another way to harness the sun's rays is by using STE or solar thermal energy. By the name itself, you will know that this method is using thermal energy or heat.

Water & Space Heating

The method of heating water and space using the sun's energy is one of the simplest ways to harness the power of the sun. It also requires a sun collector, a tank to store the water and some connections to circulate the heated water into our homes. This is way much cheaper than the first method using the photovoltaic cells. It is about 80% cheaper than PV cells and pays itself in not more than 3 years instead of 20 years using PV cells.

Things To Consider

Beyond the solar collector – which will be between 4 and 12 feet long – you'll need the following parts to complete a solar heating installation:

- **Storage Tanks** – For active systems using evacuated tubes, storage tanks hold the potable water away from the roof. This allows you to heat the water in a separate location more safely in cold temperatures.
- **Water Heater** – This is important if you choose to be on the grid, with the option to use solar energy to heat your water. Most people remain connected to the grid to be sure they never run out of hot water.
- **Heat Exchanger** – If you are using a coolant in your solar collectors, you'll need pipes or coils to transfer the heat from the coolant to your water, usually inside your storage tanks.

- **Water Pumps** – This is only applicable when you use active method. If you use the passive method, you don't have to worry about the water pumps.
- **Valves & Controls** – These are used in active systems as well. Controls will determine where water is pumped and when to turn on your hot water tank.

Advantages Of Solar Thermal Energy

- **Inexpensive:** Using the sun's thermal energy to heat water or even your homes can dramatically reduce your electricity bill. Instead of using an electric hot water heater, many homes have solar hot water heaters that not only heat water but pump it through the house.
- **Unlimited source of energy:** Unlike fossil fuels, coal and oil, the sun's thermal energy is in no short supply.
- **Environmental Friendly:** this is absolutely true. Solar powered systems do not have any negative by products unlike coal and oil.

Disadvantages Of Solar Thermal Energy

The disadvantages of this technology may be observed during the mass production of this product. The manufacturers of this the technology use a lot of our limited source of energy.

Secondly there are some storage issues about these products. But this has nothing to do with homeowners. This problem can be observed on large solar power plants.

Lastly, solar thermal systems obviously produce electricity only when the sun is shining, making cloudy days and nighttime hours a hindrance to the steady flow of electricity.

Conclusion

Consider the technology using solar power. This is a technology that harnesses the unlimited source of energy - the sun. No worries about it being drained because as long as the sun is out there and the world turning on its axis, we will always have energy. This is the reason why there is no reason in asking why this innovation became very popular.

This answers the needs of the people to slash some of their expenses like electric bills. Just imagine a life with no worries about the electric bill. You can use every appliance in your household like the TV, fridge, air conditioner and a lot more for little to no fee.

Even if you spend some bucks to make solar panels, the benefits of these solar powered systems is great. When you start using it and see the results, you can say that you've got more than what you've paid for.

With the above choice, it is really up to you whether you want to choose the PV cell, solar cell, or the solar thermal energy systems. What you have to do now is to plan what and how can you obtain these systems. If you want to live a stress free life saving mega bucks, then you need to take action.

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