

Emergency Power Preparedness Guide & How To Prepare.

When the power goes out, it is easiest to stay calm knowing that you are prepared. While most of us have experienced a brownout or blackout at some point in our life, knowing the difference between a brownout vs blackout, and having the right equipment for either scenario is vital to your safety.

This is especially true today, when so much of our lives depend on having continued access to electricity for work, food, security, or medical reasons.

Here at Shop Solar Kits, we've pieced together this comprehensive list of questions and answers so you can be ready for the unexpected.

In this article, we will cover the key differences between a brownout vs a blackout and recommend some of the best equipment to be prepared for either scenario.

What is a Blackout?

A blackout is the complete loss of power to your home or general area. When talking about a brownout vs blackout, blackouts are potentially more serious.

This means that during a blackout, you will not be able to run any electricity-dependent devices or appliances including refrigerators, electric stoves, lights, electronics, internet routers etc.

During a blackout you will also not be able to recharge any portable electronic devices such as cell phones, tablets, or laptops.

What causes a blackout?

The most common cause of blackouts is damage to transformers and power lines, or power plant failures. These are often due to natural causes such as severe weather, high winds, or lightning.

Damage to power lines and electrical equipment leading to a blackout can also be caused by human error and even excessive power demands.

How long do blackouts usually last?

A majority of blackouts are brief, lasting only a few minutes to a couple hours. Yet, in more serious cases, you could be without power for days or even weeks at a time. It is during these times that investing in a solar generator kit can keep your life uninterrupted, saving you tremendous amounts of stress.

What is a Brownout?

A brownout is the partial or temporary reduction of power.

Sometimes brownouts can be intentional, used as a way for electric companies to reduce the overall energy output.

During a brownout your lights will dim due to reduced power and certain appliances and devices may not be able to function. When differentiating between brownouts vs blackout, brownouts have the potential to damage your appliances if they are not unplugged.

What causes a brownout?

While there can be multiple causes for brownouts and blackouts, brownouts are most commonly caused due to a demand for electricity that exceeds the production limit.

In order to prevent a total blackout, electric companies will occasionally reduce the voltage output to your home. Unintentional brownouts can occur when there has been damage to electrical equipment.

How common are brownouts?

Brownouts normally occur when energy consumption reaches its peak. This is common during summer or winter months when the energy needs for appliances like air conditioners and heaters are high.

In the case of brownouts vs blackouts, both can lead to troublesome situations. Those who work from home may find it difficult dealing with brownouts and blackouts, seeing as internet service and computer function will be affected.

What should I unplug during a brownout?

The change in voltage can be harmful to certain electronics. Computers, T.V.s, phone chargers, microwaves, and other similar devices should be unplugged to avoid damage.

Some devices may be equipped with a brownout reset circuit (BOR), which causes them to reboot when the power supply is too low.

Power strips with surge protectors can help to reduce the risk associated with brownouts. However, having a renewable backup generator with a UPS function (uninterrupted power supply) is the best way to avoid any possible brownout or blackout issues.

What are the key differences between a brownout vs a blackout?

The main differences between a brownout vs a blackout is the total energy loss associated with each situation. A blackout means you will be without any power for an undetermined amount of time, while a brownout means there will be power reduction.

Another key difference between brownouts vs blackouts is their potential to damage appliances. Blackouts actually pose less of a threat since electricity is cut off entirely.

As mentioned in the previous section, some electronics are not equipped to handle the drop in electricity and can malfunction during brownouts.

How to Prepare for a Brownout vs Blackout

Taking the necessary steps to prepare for a brownout vs blackout will help you feel secure and confident when you find yourself without power for an extended time.

Having the essential emergency items, being able to communicate with others, and installing a safe reliable solar generator system are ways to prevent major problems.

Emergency Preparedness Materials For a Brownout vs Blackout

When it comes to a brownout vs blackout you'll want to make sure you have the necessary emergency items. Let's take a look at some of the most useful emergency materials when dealing with the loss of power.

- Flashlights with spare batteries
- First aid kit
- Two-way radios and battery powered radio
- Extra drinking water
- Supply of Non-perishable food
- Matches or lighters
- Portable chargers
- Emergency blankets
- Hygiene products

Communication Devices For a Brownout vs Blackout

Cell phones may still work during brownouts or blackouts, but without a reliable way to recharge them, their usable time may be limited. It is important to have a backup crank or battery powered radio so you can be aware of any updates or instructions regarding your situation.

Battery powered two-way radios are another reliable way to communicate with others during emergency blackout or brownout scenarios.

Entertainment

During a brownout or blackout you might be faced with some unexpected downtime. Reading, playing cards, or playing board games can be great forms of entertainment, and can help pass the time.

However, by choosing to prepare for these situations by setting up a renewable solar energy generator, you'll still be able to use your computer, tv, and other electronics without delay.

Types of Emergency & Disaster Situations Solar Powered Generators Are Good For.

With so much uncertainty these days when it comes to power outages, viruses and natural disasters, you can never be too prepared. Especially when it comes to having the proper **emergency power supply** in place should you experience any sort of emergency or disaster situation.

Thousands of Americans live in areas where they can be affected by natural disasters multiple times per year. From wildfires on the west coast, floods on the east coast or tornados in the heartland, it's safe to assume that if you're reading this, odds are you've been personally affected in one way or another by a natural disaster or know someone who has.

Wondering how one should prepare for situations like this? Especially when simply picking up and moving is not an option... Keep reading to find out why we believe a **solar powered generator** should be a top priority when preparing for emergency situations. Because let's face it, our entire life can't just be uprooted and moved to a new town, state or country on a whim. The reality then becomes how do we properly prepare for the inevitability of emergency and disaster situations...

How Does a Solar Powered Generator Help Me?

A quick google search for tips on preparing for emergencies and dealing with natural disasters will provide you with plenty of ideas on the immediate steps to take when disaster strikes. From signing up for severe weather alerts to buying food and water provisions, you've probably done something like this before if you live in an area where natural disasters can be common place.

However, what you might not be so well versed on are all the the ways in which a solar generator can be of use when the grid goes down and SHTF. Even if you aren't in the direct path of disastrous weather, or the

heart of a lockdown, you can still be without power for days at a time which is where a **solar powered generator** can be the answer to your problems.

This article covers what & how a solar generator works as well as the main benefits of a solar generator as well as outlines our top 6 solar powered generator options for preparing to handle whatever disaster life throws our way.

What is a solar powered generator?

A **solar generator or portable power station** is more or less a battery in a box. The reason it's been given the name generator or power station is because it works exactly the same as a fuel generator, however instead of pouring fuel into it, just plug a few solar panels into it and voila, it will recharge/keep your solar generator charged.

PLUS you can just plug your appliances, electronics and more right into the front of it as they come with standard outlets and USB ports. So you can actually be pouring solar power into the generator (through the panels) while you use that power to survive and thrive whenever and wherever.

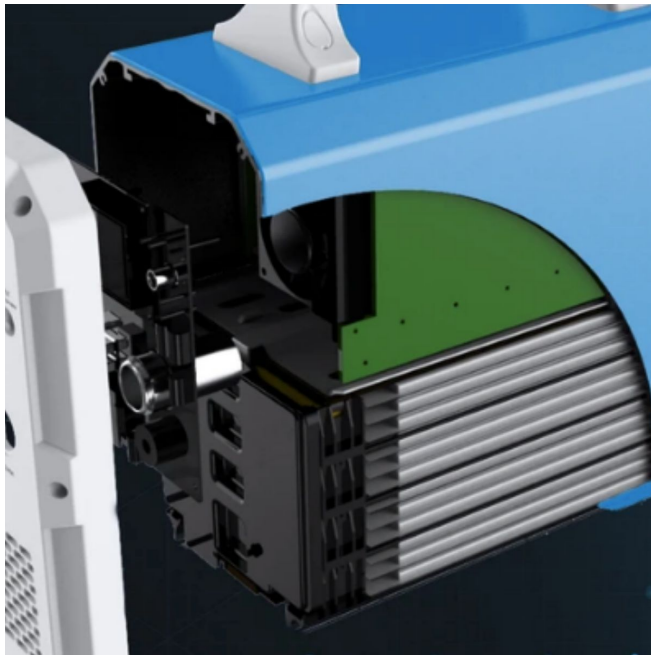


EcoFlow Delta Wiring Diagram For Connecting Four 100 Watt Solar Panels

What's Inside a Solar Powered Generator?

To keep things simple, a solar generator is just a battery in a box along with a charge controller/regulator and a power inverter (with a few other parts and pieces). The charge controller regulates the amount of power coming in from your solar panels so that we don't fry the battery.

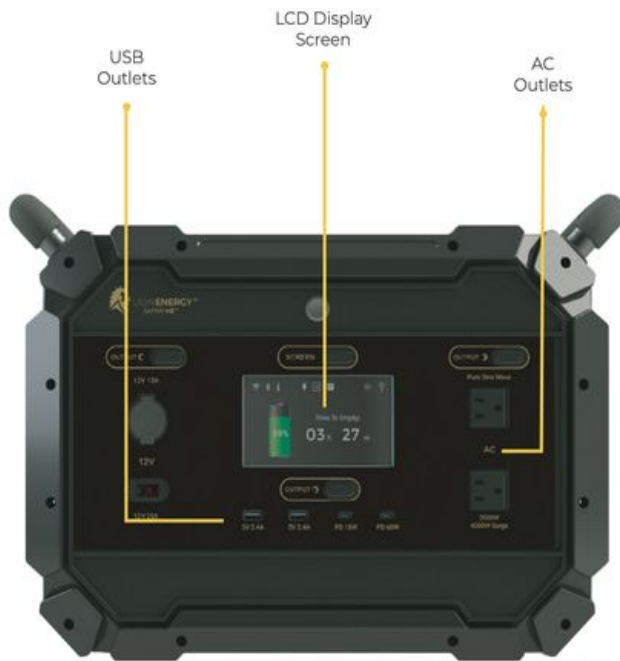
The battery then holds the energy we're generating from the sun and from there, the power inverter is hooked up between the battery and the outlets, thus allowing us to use the power we're generating and storing in the batteries.



Hope that makes sense, if not feel free to [reach out](#) and we'd be happy to explain further.

What's on the outside of a solar powered generator?

On the outside of a solar generator, depending on which option you go with, there are a range of outlets for everything from standard appliances and USB ports to cigarette lighter ports and plugins for your solar panels. So you can just plug stuff in and away you go. It really is that simple!

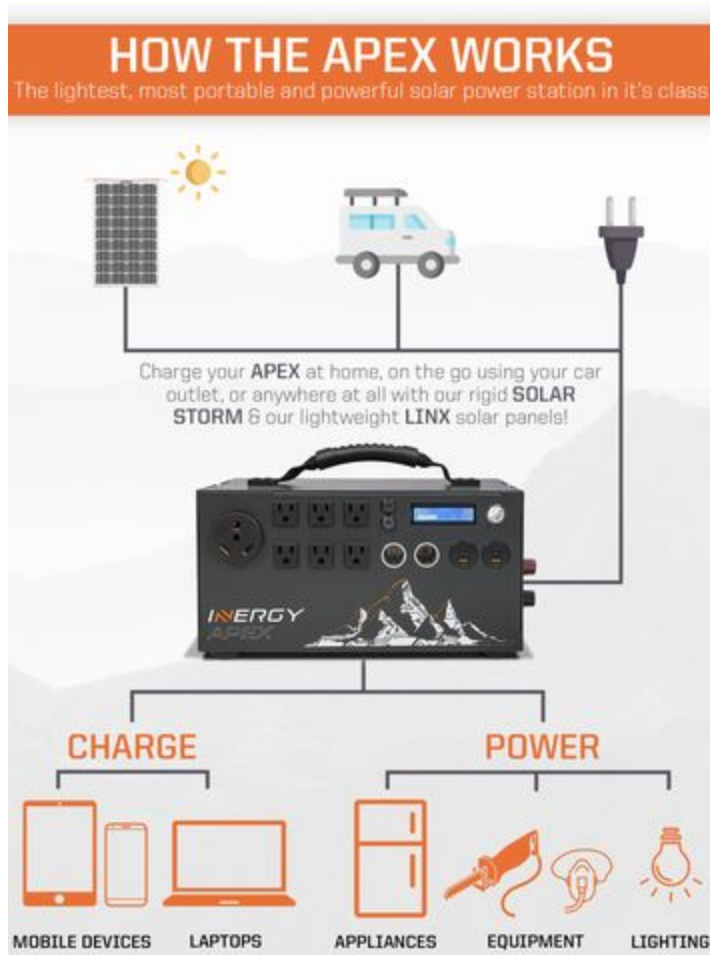


Lion Safari ME Solar Powered Generator (Above)

How Do You Use A Solar Powered Generator?

The reason solar generators are so popular for emergency preparedness is due to their ease of use and what we call their "plug-and-play" capabilities. All you do is place your solar generator near your living quarters so that you can plug everything in and from there, plug your solar panels in and place them in the sun.

Most solar generators come with 30-50 foot solar panel cables so that you can have the solar panels in the sun, while the actual solar generator is near where you need it/inside the house. The image below gives you a visual of how you can charge your solar generator as well as use it to power your electronics and appliances.



The 5 MAIN Benefits of a Solar Powered Generator in Emergency Situations:

1. No Need to Procure Fuel (Ever!)
2. Clean, Renewable power
3. Portability
4. Unlimited Free Recharging
5. Silent Operation

Solar Powered Generators = No Need to Procure Fuel (Ever!)

In a real life disaster situation the ability to find and procure fuel could be a dangerous proposition. So the ability to run your solar generator without the need for gas is not only a huge benefit, but could mean the difference between having power or not (and life or death).

After hurricane Maria in 2018, Puerto Rico was without power in some places for nearly 11 months! While 11 months is definitely longer than usual for power to be restored, its not uncommon for people in the continental US to wait huge amounts of time before the power is restored. After hurricane Michael hit Florida in late 2018, parts of the state went multiple weeks without power at all. This is where your fuel-free, solar powered generator will shine.

In the aftermath of hurricane Michael it was impossible for people to simply drive down the street and pick up gas for their generators. Unless you have a huge store of fuel (which is dangerous & expensive) odds are you're going to need to figure out a way to keep your generator running. If you have a **solar generator kit** (something that comes with panels and all necessary wiring) you can be harnessing power all day when the sun is out.

You can keep your essential appliances running and light your house until the grid power is restored. This means your food wont go bad, your lights can stay on, your phones charged up etc.

Solar Powered Generators = Clean Source of Power

The fact that solar generators do not produce toxic fumes and gasses is often overlooked when it comes to disaster situations. We all know that solar energy is clean and renewable but in a situation where you need to flee your home or hide in the basement for prolonged periods of time, your gas generator can't come

with you. You may need to charge your phone, power some lights or run a fridge in your hideout and good luck doing that with your gas generator.

A solar generator allows you to simply pack up your panels and head wherever you need to go. If you wanted to keep your generator beside your bed to charge up your phone, ham radio, laptop or even just run a light, no problem; **Yes, a solar generator is completely safe for indoor use!** You can literally put your solar generator on the dining room table while it powers all of your devices inside the home via regular extension chords. This is why people who are properly prepared for disasters love solar generators. You can keep them in a confined space worry free.

Solar Powered Generators = Portability

What makes solar generators so portable is that wherever you go, your solar generator can go as well. From your car to your basement, you're free to take them with you and run them 24/7. In real world scenarios, especially after disasters hit, they are much more versatile than a gas generator. The only thing you can count on after a real disaster situation is the sun shining, meaning that wherever you need to go, you'll have power.

There is no guarantee that you will be able to find fuel or that the grid will return in a reasonable amount of time. Being able to take advantage of a sunny day can be the difference between life or death, literally. [Check out this video](#) where Inergy donates generators to families in need after Hurricane Maria. A perfect example of how a solar generator is your best option in disaster scenarios.

Solar Powered Generators = Recharge For Free

Another obvious benefit to a solar generator that extends even beyond a disaster scenario is that it recharges for free. While some of the price points below might seem expensive, especially compared to the price of gas or diesel generators, it's only the initial cost that is expensive; you have zero upkeep/fuel costs over the lifetime of your unit because sunshine is free.

On top of this, if the city goes into lockdown or disaster strikes, the availability of fuel may not be an option. So while others fight and riot over the remaining fuel sources, you'll be able to rest easy knowing you can survive with your solar generator.

As is the case with anything when it comes to solar, your initial investment is big, but it's in the interest of long term savings. Something like the [Bluetti EB240 solar generator](#) can last for well over 10+ years or 2,000 cycles which means you'll have this system for a long time and not need to buy one lick of gas to power it.

Solar Powered Generators = Silent

Building off of being a clean, free source of power, they are also **DRAMATICALLY** more quiet than their gas generator counterparts. The cooling fans will kick on once you start drawing significant amounts of power, but compared to loud, dirty and messy gas generators its a welcome change. This also means that your solar generator can be used inside, while you sleep or hunker down during a disaster situation.

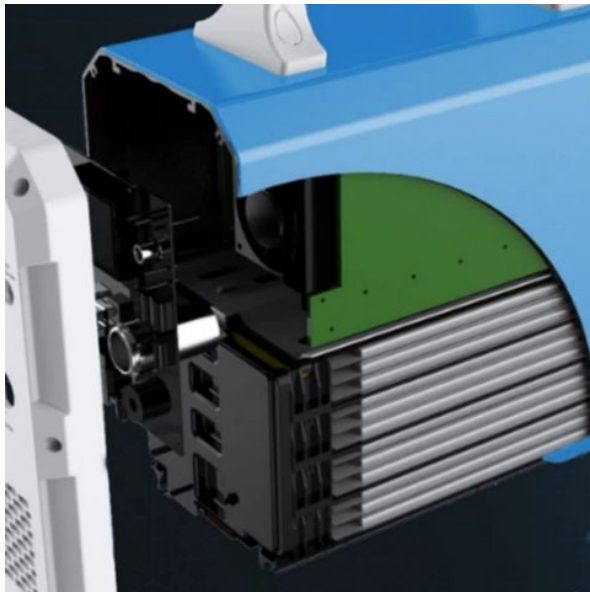
It also means that if you're ever in a situation where you need to remain stealth and hidden from others, you can use the power without drawing attention to yourself.

Thousands of Americans already keep their solar generators in their mobile homes with them when they sleep. The level of noise they produce is similar to a desktop computer or laptop.

Now that we have addressed some of the major benefits of Solar Generators when it comes to disaster situations, we will outline our top 5 solar generator kits for emergency situations. This list is not exhaustive, there are many other great options available, so if you need help selecting a unit that works for your needs, [you can reach out](#) to us with any questions or concerns.

How Do Solar Generators Work?: The Components of a Solar Generator (What's Inside)

Okay, now that we know what a solar generator is, the pros and cons compared to gas generators, let's get technical! Solar power can seem both confusing and complicated, but a solar generator is actually a fairly simple machine and the goal of this guide is to dumb things down. We'll go over each part inside a solar generator and then tie it all together at the end.



The Battery (Usually Lithium)

We all know gas generators have a fuel tank that you pour gas into, right? Well a solar generators “fuel tank” is simply the lithium battery inside of it. The bigger and more expensive the generator, usually the bigger the lithium battery or fuel tank. The battery size of your solar generator will determine the length of time you can use it, before having to recharge the system again. Most commonly, the size of the battery is measured in watt hours (Wh).

Today, most solar energy is stored in a lead acid or lithium ion battery. For solar generators, lithium batteries are the best choice. This is because they can be discharged to full capacity, used in any position, require no maintenance, and have longer, more efficient lifespans.

We will dive into how to figure out which battery size makes the most sense for you and “how long it will last” further down in the guide.

Inputs & Charging

You can input power into a solar generator via solar panels (DC power), your car cigarette port (DC Power) or from any standard wall outlet (AC power) and being able to charge your solar generator from multiple sources is a huge advantage.

In general, most solar generators come with MC4 (or MC-4) cable adapters that allow you to easily connect any standard solar panel. An MC4 cable is the most widely used wiring for DIY solar energy systems. With some generators or panels, an adapter may be required. This could be included with your product or may need to be purchased separately. Most people opt for a solar generator kit since these include EVERYTHING you need.

The Solar Inverter (Outputs / Pure Sine)

Solar energy is always generated and stored as direct current (DC) electricity. Direct current is a form of electricity that only flows in one direction, making it ideal for small, closed systems like the battery of a cell phone or a flashlight. Most of what you will want to power with your solar generator though will require AC power.

Alternating current (AC), is a form of electricity that can travel any direction. Because of this, it is able to power many different devices at a variety of voltages. For this reason, AC power is what is most commonly used in homes.

So the solar panels input DC charge into your battery and the power inverter inside the generator takes the power off of the battery and allows you to suck out AC power into common household appliances.

All solar generators have different size power inverters, which are usually measured in watts (W). The size of the inverter in the generator will determine what sort of appliances you can and can't run. A coffee maker or air conditioner for example will require an inverter of at least 1000 watt or more, whereas cell phones and light recharging, may only require a 500 watt inverter.

Outputs / Plugs

Obviously, solar generators have many plugs and ports so that the energy stored within can be used. Most solar power stations have a variety of USB ports (type A and C) for charging small devices like phones, laptops, and portable speakers.

You will also find one or more standard 110V AC wall-plug outlets to power standard devices. Some power stations also include a 12V DC outlet, similar to the "cigarette lighter" in a vehicle.

These plugs are what allow you to suck power out (via the inverter).

Solar Charge Controller (MPPT)

In order to prevent the battery from becoming overcharged and damaged from any of the 3 charging methods we mentioned before (Solar panels, AC wall outlet, car port), most modern solar power stations come with a built-in charge controller.

The job of a charge controller is simple: to limit the amount of electricity being sent to the battery, even if the solar panels are generating electricity while plugged in and operating in the sun, in order to "protect the battery" from over charging. There are a few different names for solar charge controllers and they are sometimes simply known as "regulators."

You've probably seen people talking about MPPT charge controller vs PWM charge controllers, but for sake of simplicity, you want to get a solar generator with an MPPT charge controller. This a more efficient, newer technology that will mean your generator will last longer.

The third and final number you'll see people talking about when it comes to solar generators is the amount of solar input, usually measured in watts. Some solar generators can handle 100 watts input and some can handle 2000 watts of solar input.

The more solar input, the faster the battery will charge and the more power you'll be able to use up during the day. We recommend going with a solar generator that has at least 200-300 watts of solar input.

Battery Monitoring System

With energy constantly being pushed in and out of the battery, a battery monitoring system (BMS) is a fancy word for a system that protects the battery from over voltage and other situations. It also works to allow screen displays, which provide you with a full detailed report of the battery's current capacity level, current power input and output. A quality solar generator should allow you to see the rate at which electricity is being generated or used.

Bonus Features

As their popularity grows, different solar generator manufacturers are included with interesting bonus features to make their products stand out in the marketplace. For most portable systems, a solar generator will include a handle or strap to make carrying a miniature power plant nice and easy. Some solar energy generators even include built-in LED lights or disntic operating modes.

How to Use & Maintain a Solar Generator

Without over-complicating things, using a solar generator is as easy as pressing the "on" button. Whenever the battery is charged, a solar powered portable power station is extremely user-friendly, in that it is incredibly easy to use.

From the simplest models to the high-powered machines, solar generators typically have a power switch and a number of outputs and ports. Simply flip the switch and plug in your electronic devices. From there, use the system's monitoring capabilities to see when your battery will run out.



Solar generators can be recharged when the battery is completely dead, or while the battery is partially full and the system is in use. In this sense, they can be used continuously in the sunlight, or charged and taken to a remote location to be used overnight.

We recommend storing your solar generator fully charged and checking them every three to six months in order to ensure everything is working properly. It can also help to use them for a day every three to six months to keep them fresh and ready for when you need them most!

How to Charge Your Solar Generator's Battery

As we've alluded to earlier, a solar generator gets its name from the ability to be recharged with solar energy. However, with new technologies developing daily, modern solar generators can also be charged using AC power from your home, or DC power from your vehicle.

Charging a Solar Generator with Solar Panels

Connecting solar panels to a solar generator is the best way to create a truly off-grid, renewable electricity system. With solar panels, you can recharge your portable power station anywhere in the world, so long as the sun is shining.

Each solar generator has a manufacturer's input rating, which recommends the maximum amount of solar power that can charge the battery without causing any damage. For small systems, a typical solar generator may be rated to handle anywhere from 50W to 500W of maximum solar input. Of course, there are outliers, as tiny systems may only handle 20W, while high-powered generators can handle upwards of 1000W of solar energy input.

Charging a Solar Generator with an AC (wall) Outlet

If you are headed out for a weekend of camping or tailgating, plugging your solar generator into an electrical outlet in your home is a great way to charge the battery. Although this may take a long time (Up to 20 hours for the Yeti Goal Zero) with some models, overnight charging is a convenient way to prepare your portable power station.

New solar generators, such as the EcoFlow Delta, have rapid AC (wall outlet) charging speeds as low as 2 hours to fill the battery to capacity. With this in mind, solar generators are now one of the best ways to quickly ready and deliver large amounts of electricity in an emergency or simply recreational situation.

Charging a Solar Generator with a Vehicle

For those on the go, whether as a full-time van-lifer or a weekend warrior, having a solar generator that can be charged with your vehicle is a convenient way to generate power on the road. Although some models may require a separate adapter, many solar powered generators have a DC input port, of which you can connect to your automobiles auxiliary power outlet.

Although this source of 12V DC electricity was originally designed for a cigarette lighter, it can be used to steadily charge a solar generator's battery. Because solar energy is stored as DC electricity, some generators DC charging may be faster than plugging the system into our home AC wall outlet.

What Type of Solar Panels Can You Use With a Solar Generator?



Solar energy has been harvested from the sun to create electricity for decades, which means that the technology has been (and still is) evolving. With that being said, solar generators can be recharged with pretty much any kind of modern solar panel. This includes:

- Rigid Solar Panels Photovoltaic [PV]
- Flexible Solar Panels
- Foldable Solar Panels (Solar Suitcases & Blankets)

Flexible vs. Rigid Solar Panels? (Pros and Cons)

We are constantly asked, which is better, flexible or rigid solar panels? And to tell the truth, there is no correct answer. Like many of the individualized nuances that go into building the best solar energy system, there are instances in which flexible or rigid solar panels are the best choice.

Flexible solar panels are, well, flexible. They are ultra-thin and can be contoured to angles typically around 30 degrees. Because of these features, they are great for contouring to curved surfaces, such as the roof of an RV or the bow of a boat. Flexible solar panels are also very lightweight and easy to install or detach.



So although flexible solar panels will save you space and money on installation costs, they are also generally less efficient than rigid solar panels. Throughout its lifetime, a flexible solar panel is also much more likely to get scratched or damaged, which will limit its output potential.

Rigid solar panels are more commonly used in larger applications for their efficiency and durability. In general, rigid panels are permanently mounted on a fixed location, however new technologies like “solar suitcases” have made portable rigid panels a possibility. Although they are heavier and may require permanent installation, a rigid solar panel will almost always outperform a flexible solar panel over the course of its lifetime.

Standard Solar Panels vs Folding Solar Suitcases & Solar Blankets

You may have heard the term solar suitcase or solar blanket while doing your research on solar generators. Solar suitcases are basically just two solar panels, hinged together and that come with a handle so that when you fold them together (like a suitcase) they are extremely portable and easy to maneuver.

Solar suitcases also come with stands or legs already built-in, making them super simple to setup and angle into the sun. No leaning them up against the deck, house or picnic table and no need to mount them anywhere permanently.



Solar blankets on the other hand, are generally super slim solar panels that fold up like a blanket into the size of the blanket that would sit on the couch in your living room. These are generally less powerful but are a great portable option for trickle charging your generator while camping or outdoors.

Warning (Charge Controllers): Most solar suitcases have a built-in charge controller - when it comes to using these with solar generators, you must either remove the charge controller manually OR buy a solar suitcase with NO charge controller (because the solar generator already has a built-in charge controller).

Monocrystalline vs Polycrystalline Solar Panels (Pros and Cons)

To get into even more detail, within both flexible and rigid solar panels, options are available for monocrystalline and polycrystalline solar panels. Both mono and poly, as they are sometimes abbreviated as, are both types of high efficiency photovoltaic (PV) solar panels.

The difference between these two types of panels comes down to how they are constructed. Monocrystalline panels are built with solar cells all made up of one single crystalline silicon. Conversely, polycrystalline solar cells are created by melting together multiple fragments of the different silicon crystals.

Monocrystalline solar panels are generally more efficient and consequently more expensive than their polycrystalline counterparts. Generally speaking, mono solar panels are darker (usually black) than poly solar panels, which tend to be more blue in color.

Solar Panels That Cannot Be Used with a Solar Generator

What's important to understand is that only photovoltaic (PV) solar panels can be used with a solar generator to create and store electricity. There are many people who are more familiar with thermal solar panels, which use solar energy to create heat. Thermal solar panels are generally used to heat a home's water tank and cannot be used with a solar power generator to create electricity.

You must also pay attention to the amount of volts and amps that each solar generator is capable of handling since they generally can't take a full size residential panel.

How to Wire Solar Panels for your Solar Generator

Connecting your solar generator to one or more solar panels is not difficult, but can be intimidating for those without any experience. Thankfully, you do not need to be a licensed electrician to wire solar panels for an off-grid, DIY setup. Here, we will outline the different ways to connect your generator to a solar power source.

Wiring a Single Solar Panel to a Solar Generator

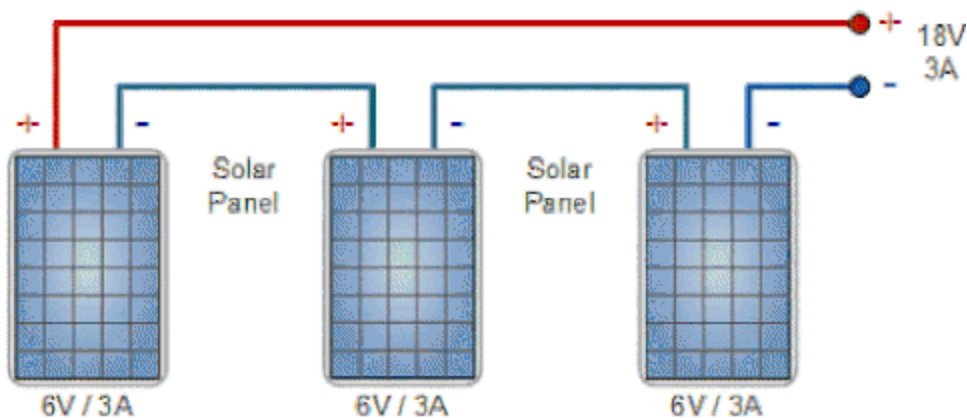
For most small solar generator setups, wiring solar panels is extremely simple. If you are connecting one solar panel (or multiple small panels packaged as one unit), to a solar generator, it is as simple as plugging your television into a wall.

For most standard setups, it is extremely easy to connect your solar panels and your solar generator with an MC4 (sometimes written as MC-4) cable. Plug the opposing connections into the panels and generator, and voila, you are now operating a small, off-grid electric power plant.

Of course, like a battery, solar panels have a positive and negative terminal. In general (like on your car's battery), solar wiring is color-coded in that positive is red and negative is black. It's critical to plug-in the correct terminals to prevent damage to the system.

Solar Panels In Series vs. Parallel Connection for Solar Generators

For a little more power, many people connect multiple solar panels together in order to maximize the charging speed of their generator's battery. There are two ways to connect multiple solar panels: series and parallel circuits.

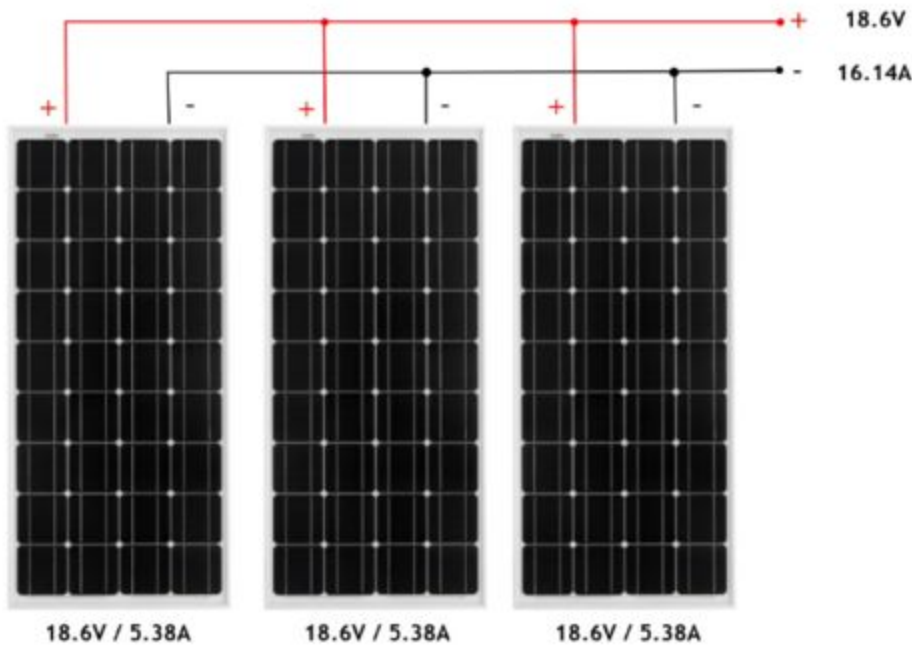


The image above is of a series circuit. Here, the solar panels are connected as essentially one large panel. Series connections are the easiest way to wire together solar panels. In a series, all of the solar panels are required to have the same voltage and amperage rating, while being connected with a consistent wire gauge.

A series connection is achieved by connecting the solar generator to the positive terminal of the first panel and the negative terminal of the last panel. In between, connect all of the positive and negative terminals of each neighboring panel. To calculate the total input levels of your solar system, you can add up the wattages and voltages of the panels, whereas the total amperage remains at the level of one single panel.

In a series, solar energy follows the saying that a chain is only as strong as its "weakest link." Series-tied solar panels are aligned in a continuous, closed loop that requires the current to travel in one direction through the system before heading to your generator. Therefore, if one solar panel were to malfunction and brake, the entire series would no longer generate electricity.

Solar Panels In Parallel



Alternatively, the image above showcases solar panels in a parallel connection. The difference here is that each panel is free to generate electricity as its own, separate unit. In a parallel circuit, the electricity is free to move directly from each panel to your solar generator.

In order to wire a parallel circuit, you must connect all of the panel's positive terminals together, as well as all of the panel's negative terminals together. Generally an MC4 "branch connector" is used to connect a generator's positive or negative input to the output from multiple panels.

Here, the amperage of the entire system can be found just the same as the wattage. For each measurement, simply add together the solar panels' individual ratings to get the total amperage or system wattage. The difference here is that the total system voltage is equal to each individual panel's ratings.

Solar Panel Series vs. Parallel Connections (Pros and Cons)

For solar panels wired in a series, here are the main advantages:

- Less Wiring
- Low Amperage (current)
- Low Levels of Electricity Lost Across Long Wiring Set-ups

With those in mind, it is important to understand that series connected solar panels are only limited to performance of the lowest panel's output. If your panels are mounted on a vehicle or receive partial shade coverage throughout the day, then a series connection is not ideal. Additionally, wiring together too many panels in a series may overload your solar generator's voltage input rating.

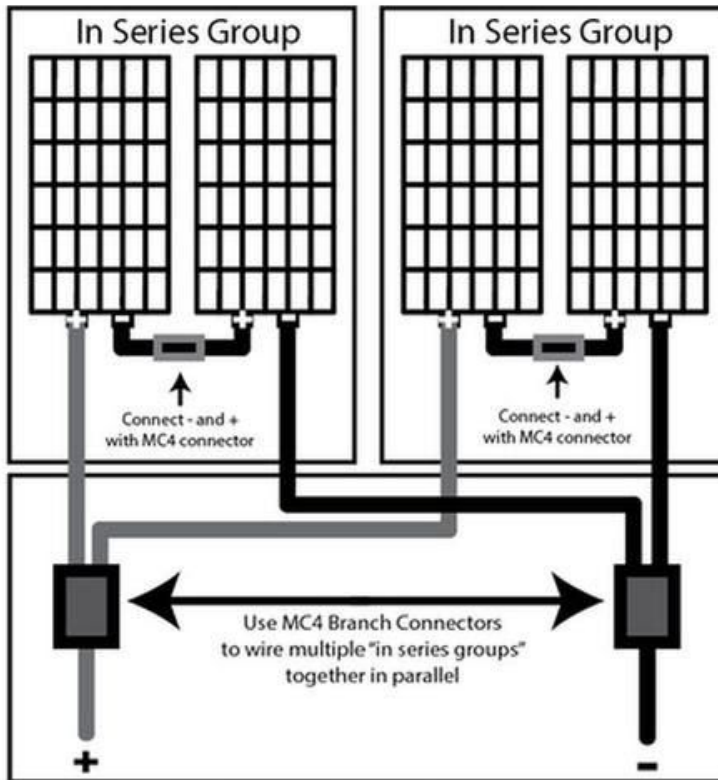
Alternatively, let's take a look at the pros of wiring solar panels in a parallel circuit:

- Panels Perform Individually (Great for Partially Shaded or Mobile Systems)
- Low Total System Voltage
- Protected Against Single Panel Malfunctions

Here, it is clear that parallel connections are the best for instances in which solar panels may be receiving different amounts of sunlight. However, most large residential systems are wired in a series. This is mainly to prevent wiring costs from escalating while panels are typically arranged and installed to receive the same amount of sunlight per day. Of course, with smaller DIY systems attempting to squeeze every bit of electricity from the sun, parallel connections are more popular for solar generator set-ups

Series AND Parallel (Combination) Solar Panel Connections

Okay, ready to get a bit more complicated? If you are looking to get the maximum amount of solar charging on a van, RV, or skoolie, then you may want to consider wiring your solar panels in a series and parallel connection. By combining the two of these methods together, you are able to generate the most electricity in varied-sunlight environments without overloading your systems amperage. For most people, a series and parallel combination is well worth the extra cost of wiring.



Above, you can see the simplest version of a “series + parallel” connection. Here, sets of two solar panels are connected in “series groups.” From there, each series group is connected together in a parallel, using an MC4 branch connector to receive the positive and negative terminals from each series group. In the image below, you can see how this system can be scaled to incorporate 8 solar panels.

Here, each solar panel group can function as a separate unit, generating its own maximum amount of electricity in varying sunlight conditions. Additionally, wiring together multiple panel groups in a parallel connection limits the systems overall amperage. In the image above, each series has an output of 5 amps, which combined together create 20 amps in a parallel connection. If each panel was only connected in a parallel (rather than in 4 different series), then the total amperage would be 40 amps. This would require a heavier wire gauge, which would not only cost more money upfront, but also increase the risk of power loss while being transferred.

How to Mount Solar Panels & Use with Your Solar Generator



We get asked a lot of questions about how to set up and mount solar panels so that they can be used to charge a solar generator. The truth is, solar panels can be positioned in any way shape or form, so long as they are facing the sun. This means that solar generators can work with both mounted and portable solar panels.

Permanently Mounting Rigid Solar Panels

Depending on what you are mounting it to, solar panels can be permanently installed using a few different methods. Most commonly these include the use of:

- Z brackets
- L brackets
- Rail Systems
- Tile Hooks (for tile roofs)
- And more

Solar panels can be permanently installed on roofs, ground mounted poles, large vehicles, boats and RV's and used to charge the battery of a solar generator. If desired, a solar generator can easily be unplugged and transported to be charged or used in another location.

Mounting Flexible Solar Panels



Flexible solar panels are very easy to install, and can be done in a variety of ways. They are a practically attractive option for RV owners who do not wish to drill a hole in their roof.

Most commonly, flexible solar panels can be temporarily (or permanently) installed with specially designed two-sided tape. This allows the solar panels to contour to a curved surface and makes it easy to attach and reattach.

Setting Up Portable Solar Panels for Solar Generators



Of course, portable power stations sometimes work best with portable solar panels. Foldable and suitcase solar panels are becoming a popular way to transport high efficiency, rigid solar panels. Fairly often, portable solar panels come with attached hardware that make it easy to set up at an angle towards the sun.

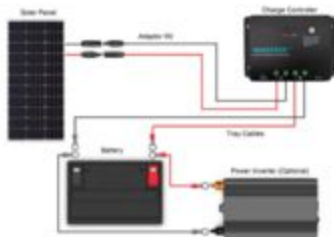
Monitoring and Maintaining Your Solar Generator

One of the best things about a solar generator is that it is extremely easy to maintain. There are no moving parts in a solar generator and you will never have to worry about heading to the store to get more “fuel.”

Today's top solar generators are generally warrantied under long periods of guaranteed use. As with any commercial product, it is not recommended to try and fix a solar generator on your own. Instead, it is advised to send the device back to the manufacturer in the event of a system malfunction.

Solar Generators vs. DIY Hard Wired Solar Power Systems (RV's, Van Life & Off-Grid Homes)

As you can see from its components, a solar generator is nothing more than an all-in-one solar energy system or a mini off grid solar system in box. For those looking for renewable energy in remote locations, there is always the option to simply build your own DIY solar energy system by sourcing and installing each of the components. Below, we will outline the advantages and disadvantages to using a DIY solar energy system vs a solar generator.



vs.



Pro: Portability

Overall, portability is the one clear advantage that solar generators have over DIY solar energy systems. Solar generators are meant to be charged and taken to remote locations as easily as possible. Even if your solar panels are permanently mounted to your roof, you can still plug in your solar generator to charge and bring it elsewhere when it is full.

Here, standalone DIY solar energy systems are limited in that they can only be used where they are installed. Even in small spaces like cabins or RV's the ability to bring your power station wherever you need is completely invaluable.

Pro: Multiple Ways to Charge

Of course, in addition to charging with sunlight, solar generators can also generally power their batteries with AC or DC power. If you've got a standalone solar energy system, then you are limited to electricity generated from sunlight.

Whereas this may be enough for low use or ideal locations, it is always a good idea to have a backup plan. With a portable power system, the battery can be recharged in a pinch if there is limited sunlight available.

Pro: Ease Of Use

More than anything, however, solar generators are designed to be flat out easy to use. As everything is packed into one convenient device, solar generator users do not have to worry about excess wiring or the quality and performance of individual components.

In addition to the helpful display screens, generating electricity with a solar power station is extremely user friendly. For the most part, all you have to do is set up your solar panels and then plug in the devices you need to power.

If you're on the road as a full time van-lifer, or in an emergency situation, the last thing you will want to worry about is any extra step necessary to power your lifesaving equipment. Compared to a standalone solar energy system, solar generators take the time and stress away from installing and maintaining individual electrical components.

Con: Cost

Unfortunately, it is true that a quality solar power generator may cost you more than you were hoping to spend. If you are only looking for a small bit of electricity, then you may be able to find all of the low-cost components of a DIY solar energy system at a fraction of the cost of a solar generator.

So, if you're not afraid or too busy to install the components yourself, you will likely be able to lower your investment costs with a standalone DIY system. Of course, some solar generators come at a tremendous bang for the buck. In some cases, solar generators may even cost less than the sum of their components.

Con: Power Limitations

As we mentioned above, solar generators may not be the best option for powering an entire home. Although there are some devices capable of it, full-household setups are usually better as traditional solar energy systems.

With the freedom to size a battery and inverter to exact specifications, standalone solar energy systems can be sourced and installed to meet any residential demand. If portability or ease of use is not a factor, DIY systems may deliver the best overall ROI.

Emergency Power Supply - Conclusion

Ultimately, by having a backup source of power, you will be more prepared in an emergency situation. With modern technology, solar panels and solar power generators are a few of the best ways to utilize clean, renewable energy for prolonged periods of time. We hope this article was helpful to you in choosing the best products for your emergency power backup systems.