



# How to Build Your Energy Stockpile

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# How To Start Your Electrical Energy Stockpile

Let's face facts. Technology is not everybody's cup of tea and is somewhat intimidating to some of us. Emergency preparedness is a hobby to many of us, meaning that this is not how most of us make our living. Hobbies are something we do to relax and unwind after work or weekends and we like our hobbies to be fun and convenient.

The good news is that getting started with renewable energy has never been as simple, convenient or fun as it is today.

But make no mistake, if you are into emergency preparedness, you know that prepping and traveling the path of self-reliance is the very definition of do-it-yourself

### Start Small

Even the most epic of journeys begin with a single step. Just as you go about learning to shoot or garden or backpack, start small when you prepare your energy independence.

Start with the basics, but start now! Whether you rate yourself as an electrical engineer or a novice, admitting and embracing what you do not yet know is the first step to learning. From there, you will naturally begin to ask the right questions and truly learn.

### A Simple Path

A simple path to energy independence for most folks is to start with powering small, portable, USB consumer electronics.

Then move up to recharging and maintaining small batteries like AA and AAA. From there, work up to a more comprehensive solar solution.

By this point, most people find they already understand the basics of renewable energy well enough to choose a generator to add to make a simply scale them up to the size of trailer, cabin or home.

Once you understand the basics with solar, you can apply what you know to wind, thermal, fossil fuels, steam, micro-hydro, geothermal or anything else and add them to your energy solution.

You will continue to learn all along the way, but each step builds upon the last. Just take it a little at a time. Unfortunately, I cannot squeeze all this info here, but I can show you the way and get you started on the path to energy independence. Getting there is a process as opposed to an event.



You cannot simply purchase self-reliance. You must learn it. Skills trump gear because being trumps having.

### **Don't Over-Plan**

A word to the wise. Sometimes people tend to over-plan their emergency preparedness in an effort to budget or economize. For most people, it is more important to overcome the inertia of getting rolling than create a detailed roadmap from beginning to end right from the get go. This usually ends in too much planning and not enough doing.

Do not worry about planning your purchases in great detail from beginning to end because the path I have laid out starts off with lower cost purchases and works up to the more expensive ones. By the time you get to them, you will know a lot more than you do now.

If you try to for too detailed a plan through to the end right from the start, most of you will end up trashing your earlier plans and doubling your time planning. And that's because you will choose different products later on than you would now since technology is always improving. Most of you will understand the features better down the road so you will probably choose different features anyway.

### **USB**

For most of us, the most meaningful place to start is by powering a useful tools most of us know and use every day: battery powered consumer electronics charged through USB ports such smart phones.

Smartphones are not the only things charged via USB, MiniUSB or MicroUSB, but they are something most people can relate to.

The primary difference between these ports (at this stage) is the size and shape of the connector. They can all provide power and all manner of devices are being adapted to accept power via USB and store that power in internal batteries.

Proprietary batteries, especially ones not meant to be user-replaceable used to be something to avoid like the plague. With the advent of Li-Ion battery technology, they can be recharged thousands of times and are becoming more practical.

Still, devices you can buy extra batteries or expanded capacity for are a plus if you would like the device to continue working for a decade or more. You can now find pretty much any small consumer electronic device powered by USB. The primary benefits of charging devices via USB are standardization and convenience.

To name just a few, USB devices include:

- Lighting including LED Flashlights, Headlamps, Tactical Lights & Lanterns
- Smart Phones now have many apps and integrated component that will still be useful even if Internet connectivity is unavailable, but be conscious of what will and will not work without internet access. Survival applications of smartphones include accessing enormous libraries of locally-stored information via book readers and .PDF readers, ballistic calculators for precision long-range shooting, cameras, video cameras, note taking, MP3 Players, audio recorders, nearly anything you can think of and likely a few things you have not yet considered are readily obtainable.
- GoTenna is capable of sending encrypted, self-destructing text messaging via radio with range about like a GMRS radio. This means the ability to send secure short-range communications to other users using your cell phone even if the cell grid is completely down. This will be huge for survivalists and preppers. Many other more mundane, but still very useful radio technology that can be recharged very conveniently using USB is also available.
- UV Water Purification with SteriPEN
- eBook Readers like Kindle and kin

- Small Fans
- Personal Locator Beacons or PLB's and GPS's. Some of these can be recharged by USB and some of them (like the DeLorme Explorer) can send email and text messages via satellite in areas without cell coverage or where the cell grid is down, for a small monthly fee. Earlier devices could only send preprogrammed messages such as "SOS" or "I'm OK" along with your GPS coordinates.

Your choice was between that and an expensive satellite phone plan. Now you can create messages on your phone and send them up to satellites through the Explorer containing messages you write on the fly, such as, "The expedition is going as planned, but Paulo dunked the TP again, so we could use some more. We also need antifungal cream, benzoin tincture and another raft patch kit at the next resupply point..."

P.S. No fish so we've been eating snakes and monkeys and would kill for some more hexamine, Mountain House and a little chocolate. That is much better than being forced to choose "We're OK" or no communications at all over "SOS", which would trigger search and rescue.

## Small Batteries

Once you have the ability to charge USB devices, add the ability to charge and maintain small batteries such as AA, AAA, D, 9v and CR-123A batteries.

To do this you'll need some quality rechargeable batteries, and a good charger or two. I strongly recommend that preppers invest in quality batteries and chargers that have auto-diagnostic and battery maintenance capability. It will save you money in the long run.

I'll get you pointed in the right direction, so read the following recommendations.

Quality NiMH batteries such as Panasonic eneloop are rated for 2100 charge cycles and the brand has maintained 5 star ratings on Amazon for year and years.

This very unusual for consumer electronics as they are normally prone to generous helpings of end-user error that eventually lowers ratings of even the highest quality products, so buy with confidence.

There are plenty of other companies trying get in on the act though. Apple is even taken a stab at it now, so if you stand in line to turn over your privacy and money every time they release a new product, you're in luck.

Most folks buy mostly AA and AAA rechargeable batteries and use spacers to use the smaller cells in anything that takes less-common C and D cells in order to simplify logistics.

Li-Ion batteries have also made their way onto the rechargeable scene but are not yet cost-effective for most applications other than proprietary and special high-output cells for high performance flashlights.

In choosing battery chargers there are many factors to consider.

Most preppers would do well to start with a Universal Battery Charger/Analyzer/Tester.

You can find a quality model that will charge Ni-MH, Ni-Cd and Li-ion starting at about \$50.



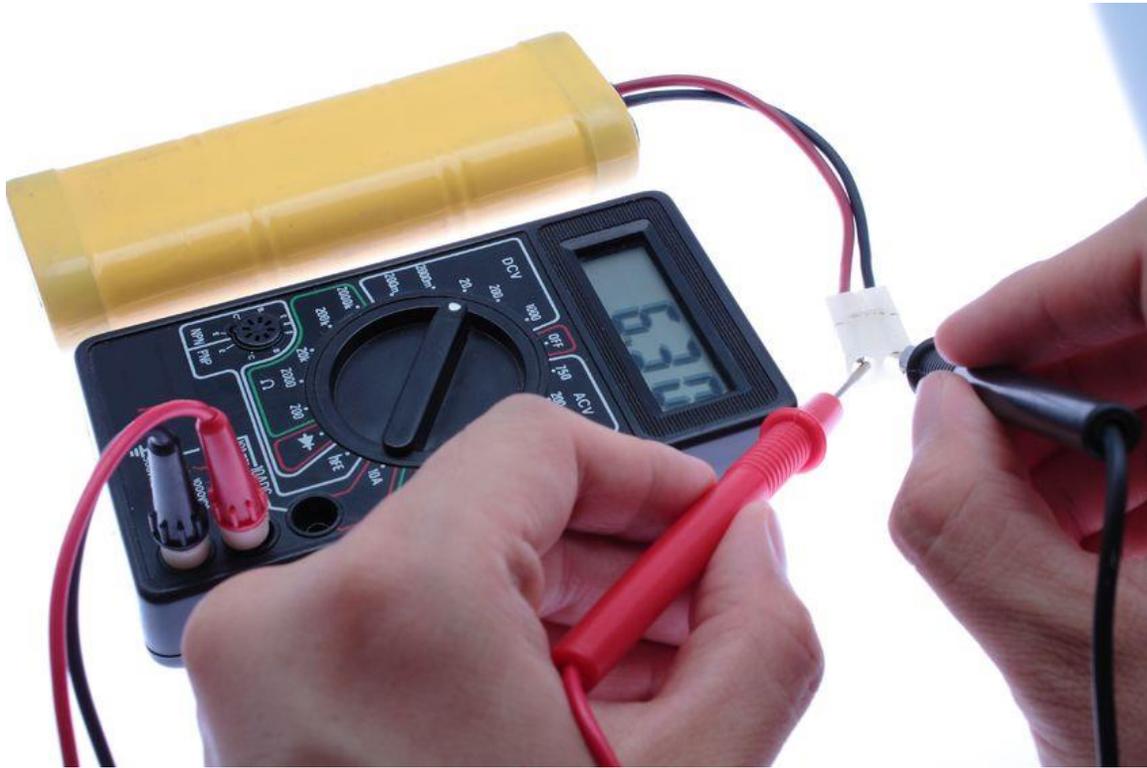
[amazon.com](https://www.amazon.com)

Like anything else, some models are much better than others. Some features to consider when choosing a battery charger are:

- Power input. Can you use it with both 12v DC and 120 AC?
- What sizes of batteries do you use?
- Intelligent auto cutoff charge function protects cells from overcharging.
- Does it need to be portable or will it never leave a wall socket?
- Does it have faulty cell detection?

- Does it monitored each cell individually or in banks? This aids in finding a faulty cell.
- Does it have selectable charging programs with adjustable charging currents? The more current you charge with, the hotter the battery gets during charging and this shortens the life of the cell so it's better to trickle charge batteries if you have the time.
- Do you want to also have USB Ports? Universal USB ports can detect and switch to the amperage a USB product was designed to be charged with. USB port ports were all 5v DC at 1 amp. Then power-hungry Apple products appeared designed for 2.1 amps. If you charge a mixture of devices, universal USB charging simplifies this for you so you do not have make sure that 2.1 amp products and 1 amp products plugged into ports that output the correct amperage for them.
- Does it detect overheating?
- Does the LCD display data for each cell independently or will it force you cycle through multiple screens to read it?
- How is the product rating and how many people have purchased it and rated it?
- What is your budget relative to your needs?
- What is the charger's battery capacity limit?
- Can it condition and maintain cells? This can sometimes revive cells that test faulty, which is important on long-term.

Considering these facts, there is one advice to take into account: make a reasonable investment in your energy independence.



# What Type of Batteries to Choose for Survival?

Once you figure out how to generate electricity using solar, wind, water, or some other method, you have truly achieved a milestone.

Your job is less than half done now because you still need a way to store excess power. You will also need to control and stabilize current flow so that it does not damage devices attached to the power source.

Today, most people in off-grid situations or preparing for long term survival rely on batteries. Unfortunately, there is no such thing as a perfect battery for every person, let alone one battery type that will suit every need for your bug out location.

As you learn more about these battery types, take the time to make sure you know as much as possible about your current and projected energy usages.

Will you be starting off with conventional appliances and power needs? Are you planning to have a small farm that will eventually utilize tractors and other equipment?

How will your energy usage plans change to accommodate growing food indoors, purifying water, and dealing with weather pattern changes?

Unless you have all of these scenarios firmly in mind, it will be very hard to gauge power usage and find the best batteries for your needs.

### **Choosing the Best Batteries**

Before you start shopping for energy storage batteries, make a list of all the devices you will need to power. If you have LED arrays, small netbook computers, cell phones, and other relatively low drain devices on your list, you can save a good bit of money by buying shallow cycle batteries.

You can also connect shallow voltage batteries together and combine with joule thieves in order to reduce drainage while powering mid-range devices such as small, low wattage appliances and some that work in RVs.

The number of batteries you use will depend on the power rating for each appliance, the recommended output for each battery, and the condition of each battery. For larger drain appliances such as water pumps, washing machines, and refrigerators, you will still need deep cycle batteries or look to versions that do not run on electricity.

### **Types of Batteries to Choose From**

But let's see what the choices are, and the questions to ask when choosing between common types of batteries.

### Lead Acid Batteries

This battery type uses acid as an electrolyte between to different types of metal.

As ions are exchanged, the negative terminal (US versions) of the battery gives off electrons.

Power generating devices such as alternators, solar panels, or other devices feed electrons into the positive terminal in order to start the ion exchange all over again.



- Common uses – automobile ignition systems, RV and boating systems.
- Variations – shallow cycle batteries are used in ignition systems because they produce large amounts of power in short bursts. Deep cycle variations produce less power over a longer period of time.
- Average lifespan – shallow cycle batteries can last from 3 – 5 years of light duty. Deep cycle batteries can be charged and discharged to 45% of their capacity for 3 – 5 years or more depending on quality of the materials and thickness of the plates used.
- Can they be rebuilt or refurbished? Yes, they can.
- Advantages for off grid power storage – Lead-acid batteries are cheap and readily available. They can be hooked up in parallel or series banks and provide power for most needs.
- Disadvantages for off grid power storage – Emit hydrogen gas that can start an explosion or fire. This is especially important to consider if you try to store batteries in a closed in area or one where heat builds up quickly.

Be wary of advice on deep cycle vs shallow cycle batteries. You can do more with a mix of battery types rather than rely just on deep cycle variants.

In situations where the weather is very cold, a deep cycle battery may fail when you need it most unless you spend more for ones that provide sufficient cold cranking amps.

### **Gel Batteries**

Instead of using water to suspend electrolyte, gel batteries use a silica based gel instead.

- Common uses – They can be used in automobiles, but are most often found in marine boats and RVs.
- Variations – n/a
- Average lifespan – 500 – 6000 cycles
- Can they be rebuilt or refurbished? No, they can't.
- Advantages for off grid power storage – Allow more current to be pulled from the battery as long as it is not in massive quantities. Gel batteries also produce less hydrogen and are less prone to spilling if the case is damaged.
- Disadvantages for off grid power storage – Overcharging or adding too much power at one time can cause the batteries to fail. Gel batteries also do not perform well in cold weather.

### **AGM (Absorbed Glass Mat) Batteries**

Instead of using gel or water to hold electrolytes in place, AGM batteries use glass mats that allow electrons to move from one plate in the battery to the opposite one.

- Common uses – marine boats and motorcycles.
- Variations – n/a
- Average lifespan – 3 – 8 years.
- Can they be rebuilt or refurbished? They will require desulfating. Some methods may work better than others. A great deal depends on the damage to the internals of the battery and how many times it has been over charged or drained to deeply.

- Advantages for off grid power storage – They require very little maintenance while in use. AGM batteries also have a lower risk of exploding. You can also cycle them as deeply as 70 – 85% if the battery is good quality.
- Disadvantages for off grid power storage – They are more expensive than other battery types and harder to recondition.

### Lithium Ion Batteries

Small Lithium Ion batteries are most often found in electronic devices.

While there are large scale versions available for RV and marine use, they are still very expensive.

- Common uses – powering electronic devices
- Average lifespan – 1 to 10 years
- Can they be rebuilt or refurbished? No, they can't.
- Advantages for off grid power storage – Lithium Ion batteries weigh less and take up less space than wet or gel batteries.



They can also produce sharp, fast peaks in current as well as lower and slower supplies.

- Disadvantages for off grid power storage – These batteries are very expensive. In addition, they do not do well when over charged, or excessively deep cycled. Lithium Ion batteries also require a complex management system that to prevent them from being damaged.

At the current time, there are no management systems on the market for off grid applications. If you decide to use Lithium Ion batteries for this purpose, you will need to design your own management and monitoring systems.

### NiCd Batteries

NiCd batteries utilize Nickel and Cadmium to store electricity.

They differ from other batteries in terms of their ability to deliver a steady charge even if there are almost out of power.

- Common uses – electronic devices, cordless power tools.
- Variations – wet and dry versions.
- Average lifespan – up to 2000 cycles.
- Can they be rebuilt or refurbished? No, they can't.
- Advantages for off grid power storage –  
They can be recharged very quickly and are known for supplying a very steady level of current. They are also more tolerant of cold weather than other batteries.
- Disadvantages for off grid power storage –  
They are very expensive, will be ruined if they are not charged up and used on a regular basis. Excessive deep cycling can ruin them. NiCd batteries also have a low tolerance for erratic charging; which makes them somewhat unsuitable for solar and other renewable fuel applications.



You will need a battery management solution that smooths out the current flow before it enters the battery.

Also it should be noted that NiMH batteries are similar to the NiCds in the sense that they also require a special power management system.

### Edison Batteries

Edison Batteries use nickel and iron plus an electrolyte to store electricity. They are considered “wet cells” since the electrolyte is in the liquid form as opposed to gel or solid.

- Common uses – forklifts, mining, and other applications where heavy amounts of voltage must be drawn for long periods of time. They also tend to be favored by off-gridders despite many problems.
- Variations n/a
- Average lifespan – 10 years to over 30 years.
- Can they be rebuilt or refurbished? No, they can't.
- Advantages for off grid power storage – temperature resistant, can store and discharge large amounts of current as long as it is done slowly. They are also environmentally safer than other batteries because they do not contain lead or other heavy metals.
- Disadvantages for off grid power storage – They can be damaged by rapid charging, very large and heavy, do not respond well to massive and sudden power drains.

### Auto Batteries

When it comes to cheap, readily available rechargeable batteries, few can rival those in automobile systems.

Knowing which type of battery you are dealing with will go a long way to helping you determine how best to use the battery and keep it in good condition.

Even after a crisis, you should be able to find batteries in abandoned vehicles that can be scavenged for battery acid or other materials that can be used to rebuild existing batteries.

Therefore, even if you decide to use some other battery type for energy storage, knowing how to manage, maintain, and get the most from automobile batteries should form a key part of your energy independence plans.

As an added bonus, if you decide to maintain a vehicle after a crisis, knowing how to maintain batteries will always be of benefit.



### How to Tell the Difference between Shallow and Deep Cycle Batteries

In order to start your car, the ignition system must provide enough power to enable the starter's pinion to engage a second pinion located on the engine. Once the engine turns over, the starter has no further use until you want to start the car up again.

Even though the starter may not run more than two to four seconds, the battery must provide a lot of power in that time period.

A shallow cycle battery works well in these situations because it can produce several amps of power in a short period of time without causing damage to the battery.

As long as a shallow cycle battery is not fully discharged or forced to drain large amounts of current for long periods, it should last for several years.

You can recognize shallow cycle batteries because they usually have a higher CCA (Cold Cranking Amps) rating. They are also usually found under the hood in cars and trucks and tend to be smaller than deep cycle versions that would produce the same current and amperage.

In a time of need, you are likely to find shallow cycle batteries far more plentiful than deep cycle ones.

A deep cycle battery is made of the exact same parts as a shallow cycle battery, with the exception being the metal plates are significantly thicker. Some also use gel or other thickening agents to reduce water loss while keeping the electrolyte suspended between the plates.

This enables the battery to discharge more power over a longer period of time without being damaged. The trade off with a deep cycle battery is that it does not work as well when it must deliver a large amount of current in a short period of time. Perhaps it can be said that shallow cycle batteries are like sprinters while deep cycle versions are more akin to distance marathon runners.

Typically, deep cycle batteries are found in forklifts, motorized wheelchairs, RVs and other places that require steady voltage over long periods of time. They are also commonly used in solar, wind, and other off-grid power systems.

### Shallow Cycle Batteries Can Be Used with Limitations

Many people don't realize that automobile batteries are constantly charging and discharging while the vehicle is in operation, and also when the ignition is shut off. For example, if you have a clock or alarm system on your car, these devices will feed off the battery even if it is not being charged by the alternator.

Likewise, when you have the lights on, the power comes from the battery even if the engine is running and turning the alternator. Since the alternator is the only charging source for the battery, you will find that the battery is constantly being charged and discharged at the same time.

This is very similar to an energy storage system where you may be generating power from solar, wind, water, or magnetic power even as you are using electric devices that feed from the batteries. As long as you keep the drain low, you can, indeed, use a shallow cycle battery for storing power and a steady discharge.

As a general rule of thumb, I look for devices with a similar power rating to automobile headlamps; which I've kept running on the same solar to shallow cycle battery system

for years. You can also use joule thieves to pump out more power for slightly higher drain devices.

### Deep Cycle Batteries – Recommended for Power Storage, but Not Perfect

If you have ever had a car battery suddenly “die” as soon as cold weather hits, then you already know that an automobile battery may be suddenly called upon to put out much more power than it takes in. When the weather gets cold, a weak battery cannot discharge as efficiently as it can in warmer weather.

Once the temperature warms up, these same batteries will once again seem to work perfectly. As you consider the seasonal changes in your bug out location, never forget that even a 10 degree change in temperature can cause an old, or poorly maintained battery to fail. As with trying to start your car in cold weather, rest assured that you will not be able to run electrical devices feeding off that particular battery.

Unfortunately, most “deep cycle battery” enthusiasts feel that the cold cranking amp rating on a battery is not as important as its capacity to discharge fully or deliver steady current for long periods of time. If you discharge a deep cycle battery fully, it will wear out and be ruined.

Typically, they should not be discharged more than 45% of their carrying capacity. While this is a 35% improvement over shallow cycle batteries, you still don't have full use of the power in the battery. In addition, remember that lower cold cranking amps will still spell trouble as the battery gets older and weaker.

## Maintaining and Reviving Batteries

One of the biggest problems with batteries is that you can't just store them away and then use them at some point in the future. Even the best battery will corrode or develop other problems if not used on a regular basis. Therefore, once you buy batteries for survival needs, make sure you are ready to use them on a daily basis, and also know how to maintain them. This includes:

- Always check terminals for corrosion and remove it as soon as you see it starting to build up. This one step alone will add years to the life of the battery and improve its performance.
- Make sure that each cell has enough fluid to cover the metal plates. Use distilled water when refilling flooded or “wet cell” batteries. Do not use water to refill gel or ADM batteries.
- Do not refill batteries unless they are fully charged.
- Make sure your battery tester accurately measures acid activity levels. Keep acid on hand, but do not use unless you are prepared to either rebuild the battery or intend to scrap it fairly soon. Adding extra acid can keep the battery going for a bit longer, however, it will not solve issues related to plate wear.
- Keep batteries as cool as possible. If they heat up while charging, allow them to cool before using.
- Keep safety equipment, tools, and materials on hand that will allow you to rebuild plates or even replace them as needed. Taking the time to learn how to do these things now will save you an enormous amount of trouble decades from now when all the existing batteries are no longer usable. Remember, in a serious crisis, it may take more than decades before it becomes possible to start making new batteries again.

### **What about “Maintenance Free” Batteries?**

If you have a newer vehicle, then you may already know there is no getting into it to add water or even check the electrolyte levels. It should be noted that even a gel battery (which make their own water) will still need some maintenance for long term use.

Unfortunately, once these batteries die out, they may well be useless.

Do not waste your time buying these batteries for survival needs. Instead, look for older styles where you can get into the cells, add water, and perform other maintenance as needed. Individuals that want to try reviving or learning how to maintain these batteries

can look up for tutorial on how to do so on Youtube, where there are plenty of examples.

During the process of preparing a bug out location, it is very easy to be fooled by early successes in various aspects of your plans. In particular, if you already purchased deep cycle batteries for power storage, any number of things can still cause them to fail several years down the road.

If society is not in a condition where you can buy new ones, you will be stuck with no way to repair them and regain what was lost.

From that perspective, never underestimate the value of scavenged shallow cycle batteries, or anything else that you can use to store power.

## Are There Mechanical Alternatives to Batteries?

Even though I have been tinkering with energy systems for several years, I have yet to find a battery or battery spec that suits all my requirements.

This, in turn, often makes me wonder if there are better, and untapped way to store power using purely mechanical (as opposed to chemical) means. For example, ropes twisting around each other on an axis with a central gear might be used to store and release power generated by a wind turbine.

While converting between mechanical power and electricity has its share of challenges, perhaps thinking outside the battery box will yield some interesting results.

It can be said that modern off gridders are living with a false sense of security because they do not truly know how long their power storage batteries will remain functional. As you can see, some batteries have an expected lifespan of five years, while the most durable ones may not last an entire human life span.