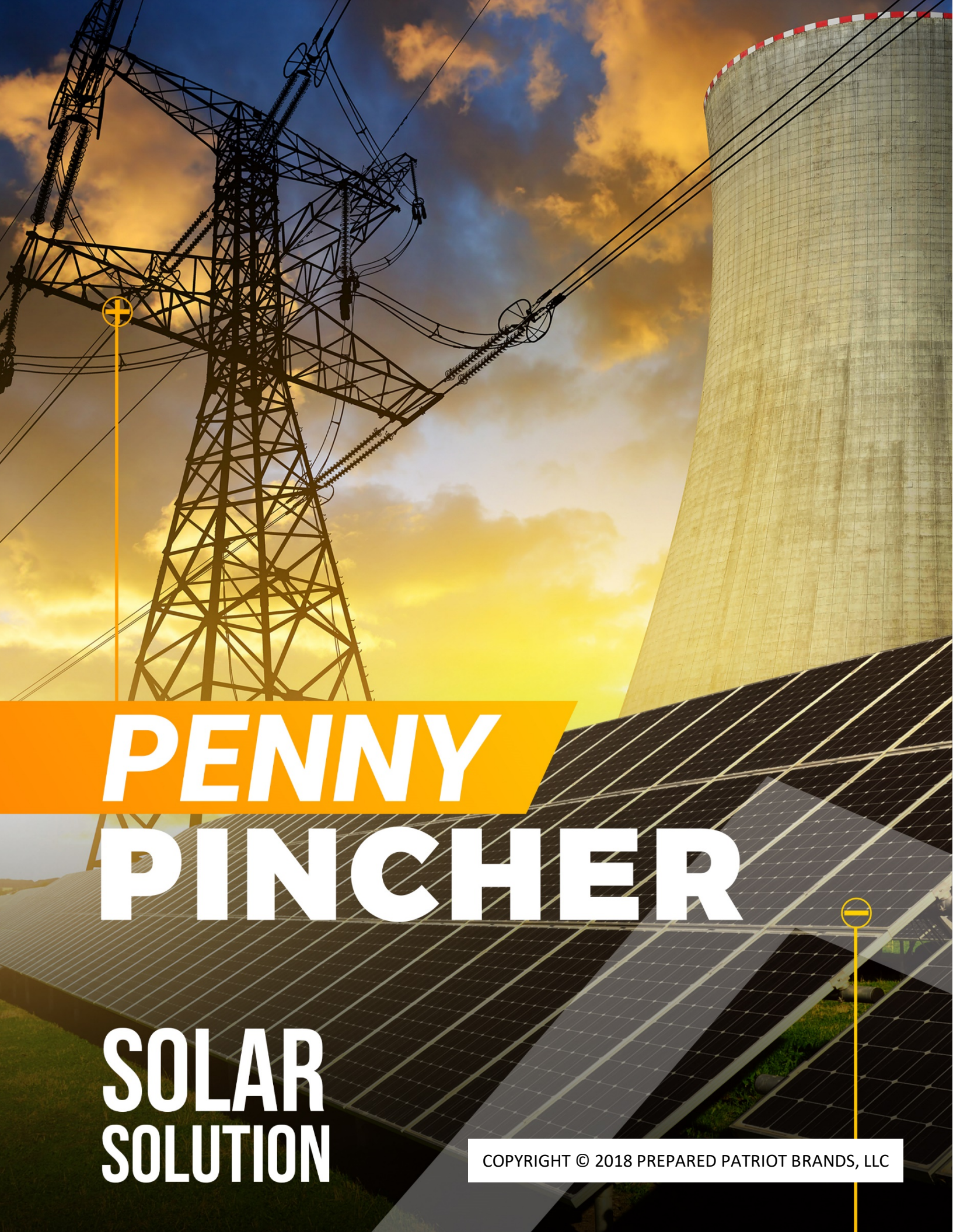


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# Power: The Ultimate Guide To Charging Up Your Electronics, Solar Panel, Body, And Anything Else That Needs Power

You need power to succeed. That's in all aspects of life, including:

- Mental
- Physical
- Status
- Money
- Security

In general, the more power you have the better off you'll be when poop hits the fan.

(*Side Note:* I'm not a big fan of "shit hitting the fan." It's much funnier and lighter when poop hits the fan. So if we could all change the acronym to PHTF that would make me happy. If not, that means I don't have much power to create change. Whoa.)

## Ways To Charge Up Your Body

### How To Increase Speed

- Master the basics first.
- Develop explosive power.
- Refine the skills.
- Load the skills.
- Then you're able to do full-speed training.

The more relaxed your muscles are the better. But start with the basics first and go slow.

It's also about timing. When do you take, when do you wait, and when do you create an opportunity for a hit?

## Hydrate For Better Performance

Drink at least an entire 32 oz. bottle of water for every 2 pounds you lose in an hour-long workout. Make sure to also drink a few ounces of water before the workout for optimal performance.

## How To Breathe

Breathe from the abdomen. Most of us Westerners breathe from the chest, giving us less oxygen and more opportunities to lash out at other people. However, a breath from the stomach gives you more oxygen.

Inflate the abdomen like a balloon when inhaling, and tense the abs slightly to get the air toward the pelvis. Then slowly release the air, keeping a slight tension in your abs.

Make sure to breathe through the nose while doing this.

This breathing style will help ensure you're more grounded and can respond to any threat appropriately. You'll also be getting more oxygen, a lower center of gravity, and better balance. Your mind will also be able to stay more focused on the present moment.

## What's The Best Diet?

It depends. In the end, do what works best for you. Experiment with different ones, keep going when you get results, and change things up when it's no longer working. In the meantime, ask yourself how you're feeling, and whether you're groggy or alert and ready for the day. Keep in mind that, with most anything, moderation is best.

## Some Plyometric Exercises For Power

- Drop Jumping — Drop from a box and immediately jump to another box.
- Bounding — Stride over objects on the ground or skip a few stairs as you climb.
- Push-Ups With Hand Claps — Do a push-up. Then explode off the ground when you reach the top and clap your hands.
- Medicine Ball — Have a partner throw a medicine ball at you. Catch it and throw it back, pushing the ball away from your chest.

Make sure to do a warm-up and a cool-down after each session. Don't do these on a cement floor - shoot for grass or a resilient surface.

## Improve Your Lactic Acid Threshold

You'll want to go on long, steady runs to develop aerobic capacity.

However, you'll also need to do sprints to build up your lactic acid threshold (LT).

Here are some exercises you can do to build up your LT:

- Sprint for 200 meters — 8 times — Recover for 4 minutes between each.
- Sprint for 75 seconds — 4 times — Recover for 5 minutes between each.
- Sprint for 60 seconds — 5 times — Recover for 2 minutes 30 seconds between each.

# Mental Imagery Is Mentally Good For You

First relax with meditation.

Lie down comfortably and close your eyes.
Relax all muscles, from the feet to your face.
Breathe through the nose, and try to count the number of breaths you take in before you lose count. Then start again. Focus on your breath.
Once you lose concentration, give yourself positive reinforcement and keep counting.

If you're already an under-excited person without a lot of energy, your goal will be to gain more energy. This exercise is best if you're an over-excited person and have tons of energy all the time.

## Mental Imagery

Take a mental image and imagine how the situation will play out.

You can use this mental imagery to…

- See yourself succeed.
- Motivate yourself.
- Perfect your skills.
- Familiarize yourself with your surroundings.

- Set the stage.
- Refocus.
- And more.

It’s also helpful for strengthening your imagination.

Practice these mental exercises every day. Make it so you can almost taste and feel exactly what it’s like to be in that specific situation - even though you’re not even there. Even if you’re sitting in your room or near the kitchen sink during these exercises, it doesn’t matter. Visualize your situations before they happen to help you become more powerful.

# How To Build Your Very Own Solar Panel

## How Do Solar Panels Work?

Essentially, multiple solar cells create an entire solar panel.

Each cell has two layers:

- N-layer — creates a negative charge. Made from silicon and phosphorus.
- P-layer — creates a positive charge. Made from boron.

Between each layer is the P/N layer, or the positive and negative junction. The P/N layer creates a neutral charge, and allows the electrons to go from the P-layer to the N-layer.

The sun's rays contain tiny photons of light, which are essentially balls of energy. Once they hit the solar panel, they knock the extra electrons in the P-layer free in each individual solar cell.

Electrons then go from the negative charge to a positive charge (- to +), which means they move from the P-layer to the N-layer. In order to travel back, they need a conductor, like silicon, boron and phosphorus.

Once the electrons are flowing to and from each layer, that's called electricity.

Since the sun provides the excitement of the electrons, it needs to be sunny in order for the solar panel to work. Duh.

There are 3 solid types of solar cells:

- Monocrystalline
- Polycrystalline
- Amorphous

The monocrystalline cells are the most efficient and the most popular. However, you'll want to make sure each cell is clear and perfect. Even a tiny crack in one can ruin the entire panel.

## The Greatest Equation Of All Time

Voltage x Amperage = Wattage

V x A = W

## How To Connect

- Series — Connect positive electrode to negative electrode of next cell (+ to -)
- Parallel — Connect positive electrode to positive electrode of next cell (+ to +)

For Series, you add the voltage and keep the current (amperage) the same.

For Parallel, you add the current (amperage) and keep the voltage the same.

## Which Parts Should You Have?

*Deep-Cycle Battery*

These last for 6 years and look like car batteries.

*Charge Controller*

This regulates the flow of energy to the battery, and decides how much energy to pull at night (or when it's cloudy outside). Program it so that it reaches a certain depth of discharge (DOD) - around 50% of the battery's capacity.

*Inverter*

Most household appliances are hooked up to alternating current (AC) loads. So you need a converter to convert the direct current (DC) loads from the solar panel to your appliances.

Also, if you're going to connect to the grid, have a professional install the inverter for you, since there are certain laws about making your own solar panels.

*Breaker Panel*

The breaker panel better be able to handle the backfed current from the grid (if you're using a grid-tied solar panel system).

Here's the math:

- Take the busbar rating on the inside cover
- Multiply by 1.2
- Subtract the main breaker size

The maximum continuous output current of the inverter multiplied by 1.25 should be less than the number you calculated above.

***Example:***

200 Amp breaker panel allows for 40 Amp for backfeeding
(200 x 1.2) - 200 = 40
Most 7,000 watt inverters have a maximum output current of 32 Amps.

Questions? Check the spec sheet or call the manufacturer.

## Best Location For PV Panels

Your panels should get 6 hours of unobstructed sun between 9 am and 6 pm.

And if you want the exact location of where to direct your panels, check out the National Renewable Energy Laboratory's (NREL) website. You can input how big your solar panel is, the angle of the panel and where you live. The site will give you the estimated kilowatt hour (kWh) output each month.

http://www.nrel.gov/rredc/pvwatts/

Try to put your panels on the roof. If you can't, keep them close to home so that your wires don't run too long and you lose all your hard-earned power.

# The Amazing Building Process

**Materials**

- *Solar Cells*
- *Connecting Wire*
- *Wood/Other Panel Material*
- *Panel Cover (Plexiglass)*
- *Solder*
- *Clear Silicone Caulk*
- *Stainless Steel Screws*
- *UV-Protective Paint/Primer*

**Tools**

- *Saw*
- *Caulk Gun*
- *Screwdriver*
- *Knife*
- *Protective Eyewear*
- *Soldering Gun*
- *Flux Pen*
- *Paint Brush*
- *Multimeter*
- *Gloves*

## Step 1: Measure The Solar Cells

Using a multimeter, take the voltage and amperage readings of each solar cell. Once these measurements have been taken, you can measure the power of the cells in watts (V x A = W).

Hold the cell perpendicular to the sun, and connect the negative and positive leads of the multimeter to the negative and positive electrodes on each cell.

Each cell needs to be around 0.5 volts. The current rating will depend on the size of the cell. So if it's a 3" x 6" cell (normal size), you'll find it being 4 amps and 0.5 volts. But if you cut it into fourths, it'll show 1 amp and 0.5 volts for each cell.

Measure the current first, since most of the cells should be close to 0.5 watts. Make sure to only keep the best ones.

## Step 2: How Much Power Do You Need?

If you're charging a 12-volt battery, you'll want to build an 18-volt panel.

An 18-volt panel needs 36 cells in series (36 x 0.5 V = 18 V). The amperage is the same (for this solar panel, we will expect 3.5 A). If you want more amps, connect them in parallel.

## Step 3: Solar Panel Dimensions

Using 3" by 6" cells, you'll want to make either 4 rows of 9 cells or 3 rows of 12 cells.

You'll want 1/4" in-between each row. Make sure to add more space along the top and bottom of the panels so you can wire each string of cells together.

In essence, for an array of 4 rows of 9 cells, you'll need about a 25" x 32" space. Use this dimension for the substrate that you're attaching the cells to with liquid silicon.

You'll need a little extra for the panel backing on each side (so about 29" x 36" for the panel backing).

You want the cell substrate large enough to secure all the cells to it, but small enough for it to fit within the panel backing and side walls.

*25" x 32" — substrate*
*29" x 36" — panel backing*

## Step 4: Construct Panel Frame

Use wood for the frame. It's easier than aluminum or pre-formed plastics.

Cut the panel backing out and sand the edges. Cut thin pieces of wood for the side walls, and cut them down to match the size of the panel backing.

Cut the substrate and either glue/nail/screw down the side walls to the panel backing. Use glue for a temporary fix until you're ready to nail or screw down the panel cover.

You'll want three coats of UV-protective paint and primer on the wood. Paint each individual piece before you secure them together. Lighter colors are better, since the solar panels perform better at lower temperatures.

## Step 5: Solder Cells Together

This is the fun part - unless you get the pre-tabbed cells (the ones with the thin tab ribbon coming off the face). Then you only need to solder the cells together on the negative (back) side.

But if you got the untabbed cells… congrats.

Apply solder to the tab ribbon, and connect the tab ribbon to the front electrodes that are running from the lower part of the cell to the upper part. Do this twice for each cell, and allow enough lead to attach it to the back side of the next cell. Basically, you'll want it to be twice the height of the cell, and you can crimp the tab ribbon leads above the cell.

Once that's all done, flip the cells over and do it all over again. Keep the cells wired in a straight row and evenly space them out.

On the negative side of the first cell in each string, solder a little bit of tab ribbon lead to the end so that it connects to the last cell in the previous string (or to the controller later).

## Step 6: Attach Cells To Substrate

Position all four strings of cells on the substrate, and mark the four corners of each string with a fine-point pen. Flip each string over, and add a little silicon caulk to the

back of each cell. Lay them caulk-side down, and make sure you rotate the strings so that the positive leads are next to the negative leads on the next string.

When handling the cells, use latex gloves to make sure you don't put fingerprints on the panel. This is especially if you commit a crime near the solar panels… and to ensure you don't make them so dirty the panels no longer work.

Press down on the cells to the substrate, and let it dry for a while.

## Step 7: Finish Wiring And Secure Substrate To Panel

Wire all four strings together. The two strings at the end should have negative and positive lead. These are your "home run" wires that will come out of the back and connect to the controller (and other things).

Take the opposite end of the first string from the home run wire end, and straight out the tab ribbons off that cell. Do this to the string next to it as well. With a piece of copper wire, connect the leads off the cells by bending them over the copper wire (or bus ribbon) for a good electrical connection.

Using a little bit of solder, cover the exposed copper wire.

Now repeat at the end of the second and third strings. The ends of the third and fourth strings should be on the same end of the substrate as the first connection.

Boom. All cells should now be connected in series. Now it's time for the home run connections.

Make sure the side walls don't shade the outer cells when it's late morning and early evening. Once that's taken care of, screw the substrate to the panel backing. Take the copper wire and attach the positive and negative leads coming off the two remaining cells (on top of the panel on opposite ends). Bend the leads over the wire ends (like you did before), and solder into place.

You'll want enough wire to stick out the back — at least 6" (but more is better *wink wink*).

Attach a blocking diode to the positive home run wire so that the current won't flow out of the batteries at night and into the panel.

Then drill a hole in the top middle of the substrate for the home run connections to exit the panel.

## Step 8: Attach Clear Cover

Give the silicon a day or two to dry. Then buy plexiglass for the clear cover, unless you have tempered glass with the correct dimensions (but be careful it doesn't get damaged with hail and debris!).

Make sure the plexiglass is UV-protected, because you don't want your panels to get a yellow cover and lose their efficiency.

Drill a pilot hole into the plexiglass and use stainless steel screws to attach the cover to the panel. Hand-turn the last couple of threads so you don't shatter the cover.

## Step 9: Seal With Clear Silicone Caulk

Apply this stuff liberally (not conservatively) to the outer edges of the panel. Seal the gaps and holes between the cover, panel walls, backing, and any other spaces you see. You can also seal the inner edge of the panel backing and walls - but do that before the substrate is in place.

Make sure the sealant is dry before you put on the panel cover.

## Step 10: Test It Out

Go into the full sun, and put the panel perpendicular to the sun's rays. Using a multimeter, attach the negative lead to the negative home run wire, and do the same with the positive lead. You should see at least 18 volts - but you'll see the number dip if the cells heat up throughout the day.

Then measure the current, which should be about 3.5 A.

Multiply by 18, and you should have about 63 watts of power.

### Step 11: Pat Yourself On The Back

You did it, damnit. Go get some ice cream.

## How To Secure Your Home Properly

Get secure before anything happens. Crime is everywhere. And you're vulnerable.

### What To Look For

Most burglaries happen in the summer months between July and August, when people are on vacation. They're often committed by males younger than 25 years old - and these robbers are looking for small, expensive items that can be quickly converted into cash.

These items include:

- Cash
- Jewelry
- Guns
- Watches
- Laptops
- Phones

Most burglars want to take the easy way in through a door or a window. But some use force if they absolutely need something. And they typically select certain houses that…

- Are unoccupied.
- Have easy access.
- Have the greatest amount of cover.
- Have the best escape routes.

Fun fact: only 13% of all burglars are caught.

## Five Types Of Burglars

*Opportunist*

They look for easy targets. And they don't steal much, because it's usually on a whim. They're likely to think, "Oh, this person's window is open. Let's check it out... "

*Smasher*

They're probably on drugs (or need drugs). So they're looking for cash, and leave behind the more valuable possessions.

*Prowler*

They will plan more than the other two, and organize their crimes to gain more from each robbery. Prowlers have the connections for smuggling stolen goods.

*Targeter*

The Prowler graduates to the Targeter, where they target certain houses and high-value items. They have moles on the inside (usually working in insurance) so they know exactly how much an item is worth. They're also probably part of a Ring, where they can sell these items through their connections across state lines.

*Professional*

The Ph.D program for robbery is the Professional Thief. They are so good they will steal every item in your house from a moving truck. Think *Ocean's 11* but in real life.

To protect yourself from all of these burglars, you'll need a great security system.

## Strengthen Your Doors

Ideally, you should have a steel-encased door. But a solid wood door without windows will still suffice.

Make sure there are at least the following on your door:

- Three hinges
- Locking doorknob
- Deadbolt

For the hinges, get screws long enough to go through the door frame and into the stud. Install the hinges on the interior side of the door.

The door stop moulding is the strip of wood that runs the height of the door, and it prevents the door from swinging too far. When you slam the door, it produces that "wham" sound. And if it's outside, someone with a crowbar can pry it up and get access to the bolts and locks.

Instead, take out the nails and remove the door stop mouldings. Then use wood glue and longer nails to re-install the stop mouldings.

Deadbolts also need to be at the right spot. How do you know where the strike box should be? (The strike box is the metal box in the door frame where the bolt slides into.)

Here's a trick. Take some old lipstick and color the end of the bolt. When you close the door, lock the door with the deadbolt so it pushes against the frame. Open the door, and boom — there's the location of your strike box. Just make sure to get long enough screws.

Some robbers get a jigsaw to saw around the deadbolts. To make sure that doesn't happen, install metal rods into the solid wood door.

## How To Make Your Door Impossible For Saws To Cut Through

**Tools**

- *Electric Drill*
- *12" Thin Drill Bit*
- *Hammer*
- *Nail Set*
- *1/4" Unthreaded Steel Rods (about 7-8" long)*

Drill holes on each side of the lock side of the door. Have a couple holes above and below each deadbolt and doorknob. Make the holes deep enough for the steel rods to fit through, with about 1/2" more space.

Then drive the steel rods into the door, and use a nail set to drive the nails past the edge of the door. Fill with wood putty.

## If You Live In An Apartment Or Rental Space…

**Tools**

- *Metal Brackets*
- *2x4 Piece Of Wood*
- *Long Screws*
- *Lag Bolts*

- *Cordless Drill*
- *Drill Bits*
- *Screws*

Put metal brackets on the side of the door frame with long screws or lag bolts going into the studs. Put a 2x4 (or thick piece of wood) into the brackets. Screw the brackets with a cordless drill (and keep it charging).

Keep in mind this only works if the door opens to the interior.

### Patio Doors

Put a wooden dowel in the track at the bottom of the patio door so it doesn't slide open. Remember that burglars can still smash through the glass, so make sure to get glass with shatter-resistant plastic.

### Garage Doors

Some garage doors come with a bar lock. Others come with a sliding latch, where a piece of flat metal slides through a hole in the track and stops the door from going up. Use these to your advantage.

## Strengthen Your Windows

Get shatter-resistant plastic windows like Lexan. Buy them in sheets and cut the shape of your window with a jigsaw.

For double-hung windows, drill a hole through the window sashes and slide a nail smaller than the hole. The hole (which is 1/2" into the bottom of the top sash) should be angled down. Do this twice for each window.

Casement windows are already hard to open up, so add special latches that need a key to open them.

***NOTE:*** Keep in mind you're also trapping yourself if there's a fire in your home. Sure, no more robberies, but you may also die because you can't get out of your own house. Do this with caution.

### Window Grilles

Put bars over your windows - but only if everyone else in your neighborhood is doing it. If not,it'll look suspicious - which is what you *don't* want if you want your home secure.

When installing, use strong lag bolts to drill into the most solid part of the wall. Then round off the heads with a handheld grinder so that no one can remove them.

### Strengthen Walls

A sledgehammer can easily destroy simple siding and a pressboard in a couple minutes. This is very rare for someone to come through, since it's easier to get through doors and windows.

You can also get a brick exterior wall. Yes, burglars can still get in, but it'll take longer to get through the brick. Plus it's protection against gunfire.

## Which Security System Should I Get?

You can either choose a wireless security system or a wired system. Wireless systems are easier to install, but wired systems require less maintenance. Plus, most modern security systems are wireless and hired professionals can easily install the system for you.

However, hardwired systems are better for larger houses, since they are monitored to support multiple zones and can expand as your house expands. But if you move to a different state, a wireless system is much better at portability.

***Bonus Tip:*** Don't get a system that auto-dials 911. There are thousands of false alarms from these systems every year. And by the way, you can do everyone a favor by letting the cops go get the other bad guys, rather than finding out your nine-year-old son forgot

to disarm the alarm when he got home. In some communities, you can get fined for doing this and becoming “the boy who cried wolf.”

## Layers Of Security

Entry Triggers — When an intruder opens a door or window.

Motion Sensors — Turns on the light when there’s movement.

Panic Button — Typically placed near a nightstand. Produces an annoying sound when pushed to deter robbers from entering. It also might contact the monitoring company.

Duress Code On Control Panel Of The System — Press these buttons and the police will arrive.

## Where To Put The Wireless System

Professionals can sniff out where your security system is, so make it harder for them by hiding it…

- Inside the hallway closet.
- Inside the wall of a kitchen cabinet.

Or get a two-piece alarm system. The first part looks like a regular alarm system, but it only has a keypad. The real circuitry is inside a locked box.

## In Essence…

Just buy a security system that makes you feel the most, well, secure. If you can deal with a cheap $10 security system without a monitor or sensors, then that’s your system. Or if you want a high-powered wireless system with cameras and a central control panel (like the ones in the movies) then go for it.

Do some of your own research to find which security system is best for you.

For me? I don’t have much stuff, so I don’t care if someone steals something. If they’re that desperate and need the money, I’ll gladly hand over some of my stuff to them.

But keep in mind you also want it to look like you *don't have valuable items* in your place. By looking like a poor bastard lives there, not one burglar will want to rob your house. After all, it looks just like their place!

# How To Build A Wind Generator

## Location First

Make sure your location has enough wind to harvest the wind power you need. The average wind speed should be about 10 miles per hour. If it's windy only a few times out of the year, and it barely gets above 3 mph, then don't pay thousands of dollars for a wind generator.

Usually the wind comes from the southwest in the summer, and from the northwest in the winter due to the Coriolis Effect. But, to be sure, ask the local farmers or your nearest airport. They'll have a Wind Rose that shows the wind's direction in that area. The longer the line on the Rose, the greater the frequency the wind comes from that direction.

The NASA Surface Meteorology website can help too.

In an ideal situation, you'll want your wind generator on an open site with little ground clutter (trees, cats, zombies, etc.). The rotor should be 30 feet above the tallest obstacle within a 500-foot radius of the wind turbine.

You can also follow these instructions:

1) Determine the prevailing wind direction.
2) Find a location for the tower upwind of any major obstacles.
3) Have less wire coming down from the turbine to the controller and inverter.
4) Contact a pro to help you out.

## Before You Start… Safety First

Wear protective clothing. Keep your workspace tidy.

And just be careful in general. Don't die.

**Basic Parts**

- *Generator*
- *Blades*
- *Mounting to keep turned into wind*
- *Tower*
- *Batteries and Charger Controller*

- *Motor as generator **OR** Generator*
- *Large Plastic Pipe (4' or more for blades)*
- *Square Metal Tube for base*
- *Couple Pieces of Scrap Metal*
- *Nuts and Bolts*
- *Pipe/Pole for tower*

- *Power Drill/Drill Bits*
- *Straight Edge (Ruler) and Pencil*
- *Jigsaw (Band Saw)*
- *Compass and Protractor*

- *Wrenches*
- *Socket Set*
- *Screws*
- *Protective Equipment*
- *Love*

## Step 1: Acquire A Motor/Generator

This will be the core of the wind turbine. The best kind is a permanent magnet brushed or brushless motor. The Ametek 30 is not cheap, but it does the job. You'll want to find the RPM and working voltage. Then divide the RPMs by the voltage to get the RPM/volt. The number you want is 25 RPM/volt.

You'll also need to get a motor with the hub attached. You should be able to generate at least some power when you crank it with your hand. Once you know it works, hook it up to a lathe or a drill press to increase the motor speed. If you can't get any voltage from this, the wind won't do anything for you. So make sure to test it out first.

## Step 2: Building The Blades

You want the thickest material possible, preferably from ABS or PVC pipes.

Here's how to make 24" blades out of 4' ABS pipe

1. Take the 24" ABS pipe and a ruler (or straight edge) and push them tight next to each other. Make a line where they touch - that's Line 1.
2. Tape three (3) sheets of loose-leaf notebook paper (8.5" x 11") together along the bottom and top of each sheet, so that it looks like a giant scroll. Wrap these sheets around the pipe at the line you just made. Mark a line at the top and bottom edge of the paper. These will be Lines 2 and 3.
3. Start at the intersection of Lines 1 and 2. Along the length of the pipe, mark every 5 1/2" until the very end, where it should be 4 1/2".
4. Do the same for Line 3.
5. Cut along the lines with a jigsaw or band saw.
6. Cut a notch for the bolt that's at least 1 1/2" wide and 1 1/2" long.
7. You should end up with four (4) blades — there's gonna be one left over in case the other three suck for some reason.

## Step 3: Sanding Blades

Sand the blade to get better airflow, increased efficiency and a quieter generator. Make the angled (leading) edge rounded, and keep the straight (tailing) edge pointed. Make all sharp corners slightly rounded to reduce noise.

## Step 4: Getting Blades On The Hub

1. Make a template of the hub on a piece of paper (using a compass and protractor).
2. Mark 3 holes, about 3” from the center of the circle, at equal distance from each other.
3. Place the template over the hub, punch a starter hole through the paper and onto the hub at each hole.
4. Drill the holes to 1/4” or 3/8”.
5. If you’re good at tapping holes, do that — if not, use nuts — lock the washer to keep them secure.
6. Bolt the blades onto the hub (even though the outer holes aren’t drilled yet).
7. Measure the distance between the straight edge of the tips of each blade — adjust so they’re equal distance from each other — and then mark and punch each hole on the hub through the empty hole in each blade.
8. Label the blades and hub to match which blade goes where.
9. Remove the blades and then drill and tap these outer three holes.
10. Bolt the blades back on.

## Step 5: Protect The Generator

You’ll want to protect the generator with either a large PVC pipe, or a lot of aluminum that’s sealed with RTV.

## Step 6: Mount And Tail

This is where you weld the mount to the yaw pipe. If the tail vibrates, add another bolt. For the base, get a 1” x 1” stainless tube. And if you have no good mounting holes, get some large U-bolts or hose clamps to hold it in place.

The tails aren't the biggest deal - but the bigger the tails, the better. And you'll want them square with the blades that point straight into the wind.

## Step 7: Balancing Blades

Spin the rotor with the blades on. If one blade is heavier, it'll fall to the bottom. Trim the ends or sand the edges until all the blades are even.

## Step 8: Set Up The Tower

Screw together the 1-3/4" threaded water pipes. Bury the tower and cement base, and install a guy wire twice the height of the tower.

*Mast*

Steel tubing is easier to find, but you can also get a water pipe or tube for your central mast. Weld the pipes together instead of threading them. And for every 3 feet of the size of your turbine rotor, use at least a 1-1/2" steel pipe.

- A 6-foot rotor will need at least a 3" steel pipe.
- A 9-foot rotor will need at least a 4.5" steel pipe.
- A 12-foot rotor will need at least a 6" steel pipe.

*Tower Hinge*

This needs to be put up with the day-to-day wind force and the abuse of rising and lowering the entire weight of the tower. With at least 5" in a reinforced concrete foundation, embed part of the hinge in the concrete, or bolt it to the foundation. Get two base plates and two tower plates (with center holes drilled) for the locking pin to fit into. You'll want 1/2" or 1" bolts for this part.

*Gin Pole*

You want the steel pipe to be the same diameter as the tower pipe. The longer the gin pole, the easier it is to lift the tower. This pole is optional, but well-worth it. It should be perpendicular to the main mast.

*Guy Wires*

Take 3/16” galvanized wire rope and make 3-4 guy wires per layer, spaced around the tower evenly. You’ll want to connect them at least 18 feet away from each other.

- A 20-foot tall tower has one layer of guy wires at 18 feet above the ground.
- A 30-foot tall tower has two layers: one at 12 ft. and another at 25 ft.

For the anchors, put them half the distance from the base as they are up the tower. If the first set of guy wires are 18 feet above the ground, place the anchor at least 9 feet above the base.

*Yawing*

To yaw, slip the larger sized tube over the end of the tower tube (or the other way around). They’re snug, but they can move freely. Weld a plate on the top and bottom of the mount, and let the cable hang down the middle of the tube.

## Step 9: Wiring System

Get the electricity out of the motor and off the tower. Have the proper gauge of wire, and run it down and inside the tower. Then connect to the wind turbine.

## Step 10: Connect Batteries And Charge Controller

**Basic Parts**

- *Wind Turbine*
- *One + Batteries to store power from turbine*
- *Blocking Diode (prevents power from batteries being wasted)*
- *Secondary Load (dumps power from turbine when batteries are fully charged)*
- *Charge Controller (runs everything)*

The controller monitors the voltage of the batteries. If it drops, the controller switches to turbine power. If it rises, it'll dump the turbine power to a dummy load.

## 103 Tips To Go Green And Save Energy

**Commit**

"Don't half-ass two things; whole-ass one thing." — Ron Swanson

**Turn Off The Lights**

They don't consume much electricity, but little things can add up quickly.

**Turn Off The Lights At Bedtime**

Sleeping is important. Having a dark room will help you sleep at night. Turning off your lights at night will also save energy - but I'm more worried about your sleeping patterns.

**Buy LED Lights**

It's what the cool kids are doing - and it's energy-efficient.

**Add Timers To Your Lights**

If you forget to turn the lights off, guess who won't forget? The timers you installed.

**Turn Off The Guest Room Light**

Great, you have guests coming over. But that's very rare, so make sure their room is shut off and closed off from the rest of the house. Make it look haunted — until the guests show up.

**Turn Off Decorative Lights**

Instead of having them on all the time, only use the nice lights for guests or a huge party.

**Use A Skylight If You Own A Business**

Instead of having drop-ceiling lights, get skylights to light up your warehouse and store. This is a great way to save money and use the sunlight's natural energy to your advantage.

**Get Solar Lights For The Driveway**

Don't leave your porch lights on all the time - use solar lights for the driveway.

**Get Compact Fluorescent Light Bulbs**

Traditional incandescent light bulbs produce heat - which is not good in the summer. However, fluorescent light bulbs can work just as well while consuming less energy.

**Make Motion Sensors Work For You**

Get motion sensors for your outdoor lighting. That way, the light only comes on when a robber comes through — or when your neighbor needs sugar in the middle of the night.

**Replace Air Filters**

A clean filter can make your home more energy-efficient. Ask your electrician or technician when the best time is to clean your filters.

**Clean Furnace Filters**

Dirty filters work harder. Don't make your furnace work harder - clean those bad boys.

**Dirty Coils Work Harder In Fridges And A/C**

Fridges have coils that get dirty quickly. Once dirty, they have to work much harder to cool your food at the desired temperature. Get them cleaned and you'll be saving money in no time.

Also, make sure to clean the coils in your A/C unit for the same reason.

**Close Windows**

This tip is mostly for wintertime. You don't want your heating system to work harder than it needs to.

**Open The Windows In Summer**

Surround your house with trees, and open up those windows for a cooler breeze to come strolling in. The trees will also help block the sun, making your home cooler.

**Use The Timer On Your A/C**

Before going to bed, set the timer on your A/C unit to shut it off while you're sleeping.

**Quit Opening The Door**

Whenever warm air from the outdoors comes in, your A/C has to work a lot harder to cool the house down. Do yourself a favor by keeping all doors shut as much as possible.

**Cut Off Certain Rooms From The A/C**

Keep certain rooms warm in the summer - particularly ones you rarely use (like the guest room). This will minimize the area your A/C needs to cool off, and will help you save money on your energy bill.

**Set The A/C At Comfortable Levels, But No Lower**

Much like with anything else, don't make your A/C work harder than it has to. Set your thermostat to 80º F in the summer and 65º in the winter. Sure, you may not be the coolest/warmest you've ever been, but you'll be saving energy (and money).

**Use A/C Alternatives**

You don't have to solely depend on your air conditioning unit to stay cool. For instance, placing a bowl of ice cubes in front of an electric fan works well too. Get creative to find cheap alternatives to stay cool.

**Buy Energy-Efficient A/C Units**

Especially ones with a timer.

**Turn Off Heat Sources In The Summer**

Various lights, appliances and electrical items produce heat and can warm up your house in no time. Turn off things like George Foreman grills, ovens, and more while it's hot outside, and use them sparingly.

**Block The Summer Light**

Install awnings, shades or blinds for the windows. This will help protect your home from the sun's rays.

**Clean Your A/C Regularly**

A/C units need to be regularly maintained to work efficiently. Hire someone to come clean the inside and outside of your A/C unit (not the filters — you can do that yourself).

**Only Use The A/C On Very Hot Days**

People die when it's humid and very hot. But if it's mild outside, open the windows and let nature cool your house down. This is especially true if you have a tree planted in your yard (like we told you before).

**Choose The Perfect Space For A Window A/C Unit**

Window units use a lot of horsepower. So pick the perfect room(s) to put it in, such as a community space (like the living room) or the bedroom. Also, be sure to buy the right size unit for the room you plan on using - you don't want to pay for more than you need. Do some research to find out which unit is perfect for your home.

**Install Your A/C Unit Properly**

Hire someone to install it to make sure it's done right (no offense).

**Set The Window A/C Fan On High**

Unless there's high humidity, set the fan on low. Fun fact: Keeping a low fan setting in the winter can also remove moisture from the air.

**Don’t Set A TV Or Lamp Near The A/C Thermostat**

That’s because the thermostat will pick up the heat coming off these hot items, making the A/C think it has to work harder.

**Unplug The A/C In The Winter**

Make sure to cover it up too. This will help preserve your precious cooling resource for the summer, and will help save you money in the winter.

**Check The Seal Between The A/C Unit And The Window**

This seal can get moisture damage, especially on a window A/C unit. This causes cool air to escape from the house - and the seal will do more damage by flopping around and barking and… oh, different kind of seal. Anyway, make sure to get that fixed.

**Solar Energy**

Either build your own solar power unit or have a professional help you out. These can be a godsend.

**Hang Your Clothes To Dry**

The clothes dryer produces a lot of energy. Go oldschool and let the sun dry out your clothes — naturally.

**Unplug Unused Electronic Devices**

Even when sitting idle, your devices will still suck up electricity from the outlet. Unplug them before you go to bed to save energy.

**Buy An LCD Computer Monitor**

Replace your old, clunky computer monitor with a newer, lighter LCD one. These save energy and don’t hurt your eyes nearly as much (especially the brand new ones).

**Turn Off The Computer**

Turning your computer off and on won't waste energy, especially when using the newer models. However, keeping your computer turned off until you need it will help keep energy costs low.

**Going On Vacation? Cross Off These To-Do List Items**

1. Turn off all appliances and unplug them (except the fridge).
2. Turn off the water heater.
3. Leave the porch or living room light on. This will make potential robbers think you're still home (and this will save you the hassle of having to replace your stuff!).

**Get A Swimming Pool**

Cool off in a pool instead of using the A/C. As long as your water pump isn't running for 24 hours, it'll save energy. About 6-8 hours a day is all you need to run the swimming pool.

**Fix Leaky Faucets**

The more water you use, the more your water heater has to work. And leaky faucets ensure you waste this precious resource. Let your water heater take a break and fix your leaky faucets. This will also help you save money on your water bill.

**Check Electrical Wirings**

What if a mouse chewed up your wires, and that's why your stove doesn't work? Have an electrician check out your wires to make sure everything's running as smoothly as possible.

**Reduce The Humidity**

Use a dehumidifier to stay cool in the hot, sticky summer.

**Don’t Use The Shower Heater As Much**

Want to really cool off and save money? Turn off your shower heater in the summer.

**Open The Fridge Sparingly**

Every time you open your fridge, cool air escapes and makes your fridge work harder. Close the fridge door and remind your children to keep it closed.

**Fill Your Fridge**

Believe it or not, having more food in your fridge is actually more energy-efficient. A half-full fridge (or the sparsely populated fridge of a bachelor) will force it to cool more of the empty space inside. Fill it up, and use the most of your space to keep everything cold.

**Move The Fridge**

The temperature around the fridge will affect its energy consumption. Don’t let it stand near a stove or oven (or where sunlight can hit it).

**Defrost Your Fridge Regularly**

Prolong its life by defrosting the fridge. You can either do this yourself or get the newer models that self-defrost.

**Cover Or Wrap Foods In The Fridge**

Most foods release moisture in the fridge, making your compressor work harder. Cover or wrap your food to reduce this.

**Turn Off The Butter Conditioner In Your Fridge**

What?! That’s right -there’s a butter conditioner in certain refrigerator models. Check yours to see if it’s there, and turn it off. Fun fact: It’s actually a heater.

**Get Rid Of The Old Fridge**

It may be in the garage, but just buy a new one. The older models consume a ton of energy, and will break down more easily.

**Set Your Fridge To The Perfect Temperature**

Dedicate one section of your fridge for your cheeses and meats, and have a thermometer to make sure they're at the right temperature. Do this for other types of food as well. Also, don't cool the food to the point that it's frozen. Do some research to see which foods can be stored at which temperatures, and adjust your stock accordingly.

**Make Sure The Refrigerator Door Seals Tightly**

Don't let cool air out. Let a piece of paper hang out of the door - if you can pull it through, the seal isn't tight enough.

**Keep An Exhaust Fan In The Kitchen**

Get that hot air out by using an exhaust fan in the summer.

**Air-Dry Dishes**

Just like with clothes, air-dry your dishes after washing them. This will help you save energy - especially since you won't be using the "heat dry" option on your dishwasher.

**Use A Lid While Cooking**

This prevents heat from escaping from the pot and heating up your home. It also helps heat your food faster.

**Cook With An Electric Oven**

When you're almost done cooking on the electric stove top, turn it off. There will still be some residual heat left to continue cooking your food (same thing for the oven).

**BBQ Every Weekend**

Get that grill out and cook up some steaks to save on electricity. Yes, you're using propane gas, but you're also a man. Grill it up.

**Turn Off Kitchen Fans**

Turn your kitchen fans off in the summer. You don't want hot air all over the house.

**Pressure Cooker**

Buy one (like the Instant Pot). They're hugely popular right now - partly because they save energy. Since it uses pressure, it cooks a hot meal in just minutes (even if it includes raw meat). Whereas a slow cooker would take hours to cook the same meal.

**Don't Open The Oven Door**

Here's something you maybe didn't know. Every time you open the oven door, the temperature drops 25 degrees. Don't do it. Trust the process. Or turn the light on inside the oven to check it.

**Soak Beans Overnight**

If you're cooking beans in the morning for breakfast, soak them in water the night before. They'll absorb the water and take less time to cook in the morning.

**Boil Small Amounts Of Water In The Microwave**

Making tea? Fill a cup of water and boil it in the microwave rather than on the stove to save energy.

**Boil Only What You Need**

How many of us boil a gallon of water for a single cup of coffee/tea? This takes a lot longer to heat up, and you usually don't use all the water in the kettle/pot. Measure the water out and boil only what you need - this saves time and energy.

**Clean Data From Computer**

Delete old files from 1956. A faster computer is a happy computer that doesn't use much energy.

**Watch TV In The Living Room ONLY**

Instead of having a TV in every room, force the family to watch a few programs in one room. Yay, family bonding and energy saving.

**Get Energy Efficient Appliances**

Sure, they're more expensive, but they'll save you money in the long-run (even with repairs and maintenance costs).

**Charge Your Phone When The Battery's Close To Dying**

Instead of charging your phone when there's still 50% battery remaining, wait until it's about ready to die. You'll use less energy from the wall socket, and you'll force yourself to conserve battery life on your phone.

**Use The Exact Amount Of Soap/Detergent**

For both the dishwasher and washing machine, measure out the amount of detergent/soap you need. Read the directions for measurements - don't just dump it in.

**Hand Wash Dishes In A Dishpan**

Washing dishes the old-fashioned way will save electricity. Plus, if you get a dishpan and leave soapy water in it, you won't have to keep the water running while you wash.

**Don't Over-Dry Your Clothes**

This is a waste of energy, and you risk burning your clothes.

**Get Smaller Appliances**

Smaller appliances (like 3 qt crockpots and 1-2 person George Foreman grills) use less energy than their larger counterparts. Unless you have a ton of people in your family (or you're inviting Sasquatch to eat with you) just use the smaller ones if you can.

**Shower > Bath**

Showering is less time-consuming and more energy-saving than baths. Especially if you get a low-flow shower head.

**Avoid Hot Water**

The hot water heater has to work hard enough as it is. Let it chill and relax. And don't worry - by avoiding hot water you'll get used to showering in the refreshing cold water in no time. Only use hot water for really dirty clothes and towels.

**Insulate The House**

Do your research to make sure your house has the right insulation. If not, hire someone to install it for you.

**Walk Or Bike**

If you're within walking or biking distance of wherever you're going, then walk or bike. Don't be American and drive everywhere.

**Reuse Your Shopping Bags**

Buy a sturdy reusable food bag for your groceries.

**Carpool**

Ask your friends if they need a ride. This will save gas a couple times a week and increase bonding time.

**Arrange Furniture The Right Way**

Make sure your furniture doesn't block the house's vents and air ducts.

**Use A Fireplace**

During the winter months there's no need to blast the heater when your fireplace is a good source of warmth. Also, it's nice to look at.

**Check Car Tires Weekly**

A properly inflated tire can make your car more fuel-efficient. Check your tires every week to ensure they're at peak performance.

**Read Books & Play Games**

Instead of staring at a magical black box and waiting for the TV to entertain you, entertain yourself with white pages and black words. Or create your own games.

**Drain Water From The Hot Water Tank**

Sediments inside your hot water tank can reduce efficiency. Clear out a quart every 2-3 months.

**Have Ceiling Fans**

Turn them on if you don't want to use your A/C. They'll keep air moving, which is what we really wanted in the first place.

**Install Tempered Glass For The Fireplace**

Reduce the amount of heat loss from the fireplace with a tempered glass door.

**Small Portable Heaters Are Amazing**

These are great for short-term use. But if you're looking for something long-term, get a baseboard heater.

**Get A New Thermostat**

The newer ones are better at keeping energy costs down.

**Only Use The Dishwasher When It Has A Full Load**

This also uses less water than manually washing dishes.

**Use The Right Setting On Your Washing Machine**

You could ruin delicate clothes by using the wrong setting on your washing machine. Check your clothing tags and make sure you're washing them at the proper water temperature and spin rate.

**Dry Towels And Linens In A Separate Load**

Drying towels and linens uses up a ton of energy - especially when they're wet. Either dry them in a separate load or air-dry them.

**Read The Owner's Manual On Everything**

Especially with ovens. Keep in mind there are other ways to cook food easier and faster, while saving money on your energy bill. Research your options. Also, make sure you're using your existing appliances to their fullest energy-saving capacity.

**Involve Your Family**

Persuade your family to help you out with saving energy. If everyone's on the same page, they'll feel like they're a part of the team. And teams win games. And games are won by everyone contributing to the overall goal.

Which is saving energy.

**Quit Using Snail Mail**

It's nice to get a letter from grandma every now and again through the mail. But you don't have to pay bills through snail mail anymore. Go online to pay your bills, and pull the money directly out of your checking account.

**Use Recycled Paper**

If you do mail a letter to grandma, use recycled paper. There are tons of notebooks that have recycled paper in them. Also, get recycled napkins and paper towels, and use them thoroughly before throwing them away. Also, use both sides of the paper if you're printing out a report for your boss.

**Get On Public Transportation**

You can do work while traveling to work. Look at you, Mr. Productive.

**Buy A Hybrid**

Most hybrid cars are environmentally friendly, like the…

- Honda Civic

- Mini Cooper
- Ford Focus
- Honda Fit
- Anything that rhymes with “Tesla”

**Do Natural Composting For Your Yard**

Those store-bought fertilizers contain some nasty chemicals that can harm your dogs or children. With natural compost, you will have longer roots in your grass, helping it survive in the harshest of seasons.

**Water Your Plants In The Morning**

Turn on your sprinklers in the early morning. If you do this at night, this might cause fungus to grow in your yard. And that’s worse than a barren yard full of dead grass.

**Put Mulch On The Soil**

Water won’t run away if you put mulch over the soil.

**Remember That Some Weeds Are Good**

Leave them in - especially the edible weeds. Pull out the bad ones and get them at the roots.

**Try a Reel-Type Mower**

Instead of a gas-powered mower, use those old-school mowers that look like oversized razor blades. They’re quiet, give you a great workout and cost as little as $40.

If you’re not able to push the reel one, get an electric mower. There are some nice ones out there on the market.

**Drink Water In Reusable Containers**

Also, recycle the plastic bottles you use.

**Donate Leftover Paint**

Lots of organizations will gladly accept your leftover paint cans, including:

- Church groups
- Community organizations
- Local programs

You can also donate it to your neighbors.

**Use Sunscreen Cream**

Don't buy those aerosol cans. Get the ones where you have to rub sunscreen on your face and body for almost 60 seconds. That'll protect you more (and help save the environment).

## How To Build A Box For Solar Applications

**Tools**

- *Pliers*
- *Cable Cutter*

- *Flat and Cross Screwdriver*
- *Cable Crimper Fliers*
- *Decorticator Pliers*
- *Box Cutter Knife*
- *Sliding Measuring Calipers*
- *Fixed Wrenches*
- *Plastic Cable Ties*
- *Hand Drill*
- *Drill Bits*
- *Multimeter*

**Components**

- *Solar Panel Cable Coupling*
- *Power Inverter (12V — 110V (220V) at 800W)*
- *Solar Charger Controller*
- *Electrical Cables for wiring (Red and Black) — 1.5-2mm, 3.5 ft (10 m)*
- *Metallic Coupling for solar panel fixing*
- *Screws, Washers, Nuts (6", 2.4", 1.6", 1")*
- *Connectors*
- *ON/OFF Switch*
- *Socket for 110V or 220V*
- *Car Lighter Socket 12V*
- *USB Socket*
- *2 — Threaded Metal Rods*
- *Tripod (solar panel support)*
- *2 — 40/50W Solar Panels*
- *2 — Smaller-Sized Car Batteries **OR** 1 — Big One*
- *1 — Toolbox*

**Testing**

- *2 — Halogen x 10W Bulbs*
- *2 — 10W Bulbs*
- *8 — 100W Bulbs connected in parallel*
- *Cell Phone (other household devices)*

## Step 1: Assemble The Tripod

Just get a normal tripod (the one construction workers use for spotlights). With a permanent marker and measuring tape, measure from the middle of the aluminum frame that will hold the two solar cells. Make sure the threaded rod doesn't touch the surface of the solar cell. Drill carefully, and don't puncture the solar cell. Do the same on the other side, and smooth out any edges.

## Step 2: Attach Tripod To Frame

With a washer and nut at one end of the threaded rod, tighten them in place with another nut. Add an additional nut on the middle of the pipe to secure the connection. To balance the tripod, center or skew the metallic coupling to one side. And avoid any contact between the metal objects and the solar panel.

Make sure the connections aren't covered, tangled or deteriorated. Cut off the excess.

Attach the metallic connectors or couplers with 1" screws. Tighten the screws (you may need to have a friend help you out).

## Step 3: Connect Solar Cells In Parallel

This will generate the most current in your system.

With each positive and negative wire, decorticate (cut off the end) the wire, insert a tightening sleeve and coupling, and tighten them all. Use a mom connector, which means you should connect the red cable onto an interior pin.

You'll want all of your wires to connect to a negative and positive base.

## Step 4: Make The Prepping Box

You'll want a tough plastic box to mount multiple things inside. A tool box works well. But it should fit…

- Normal Socket (110V)

- Car Lighter Socket (12V)
- ON/OFF Switch
- USB Socket
- Charge Controller
- Power Inverter
- Battery
- Excess Cable

Make a hole in the lid with either a box cutter or a drill. Clean the edges of the hole and position each socket. Hold in place with a couple screws after connecting the wiring. After drilling each hole, use a plastic or metallic O-ring to cover the hole.

Use styrofoam to keep the inverter in place.

## Step 5: The Wiring Process

Set the box in its final position. Place the inverter first, then the charge controller, then the battery. Connect the battery, and use the connectors as the bases. Put the red wire on the positive base. Connect the blue on the negative base, and the black connectors on the solar panel.

Measure the wires to make sure they're not tense when the lid is open or closed. Cut four pairs of wire, one for each connection couple with the same type of connector.

Then, connect it all up. Here's the order:

1. Inverter to Battery
2. Inverter to Socket
3. ON/OFF Switch
4. Controller to Battery
5. Solar P anel to Controller

**IMPORTANT:** Make sure you connect the controller to the battery first, THEN the panel to the controller.

Also, red to red first, then black to black.

And make sure the socket bases are connected before you connect it to the battery base.

## Step 6: Testing

Connect the box to the panels, and then to the different sockets.

Try out lightbulbs, phone chargers and anything you can get your hands on. It'll take about 4-6 hours to charge. And you'll probably get about 800 watts of power.

## Step 7: Drink A Healthy Drink (Or An Ice Cold Beer)

Because you're done.