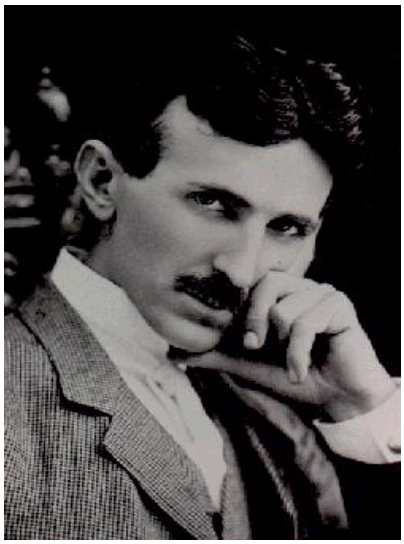


DEDICATED TO THE FATHER OF MODERN CIVILIZATION, WITHOUT HIM WE WOULD STILL BE IN THE STONE AGE. NIKOLA TESLA 1856-1943

THE POOR MAN'S FREE ENERGY COOKBOOK

MAY THIS BOOK SCARE THE HELL OUT OF EVERY LARGE CORPORATION AND GOVERNMENT THAT ABUSE THE CONSUMER AND CITEZENS IN THEIR ABUSIVE STRANGLE HOLD OF POWE AND GREED.

NOTE: The author of this book is in no way is responsible for any accidents that occur while building any of the projects or plans on free energy contained in this book. All projects and plans contained in this book are the notes and actual process of a built free energy device's that is in operation today. We can not be responsible for any accidents that occur while building any or these plans. Please use your head and follow strict safety guidelines in your venture to becoming energy independent.
"May GOD Bless the free in spirit, for they shall rule the dominion of the advanced World"
Nikola Tesla

Build your own wind generator, save on utility bills and prepare for the coming disaster's .

Full plans to building your own Energy system.

Our Wind Generator was designed to be simple and efficient with fast and easy construction. There are no limits to what you can do with wind power. There is nothing more rewarding and empowering than making a wind powered generator from scrap materials. Most of the tools and materials in this manual can be found in your local hardware shop or junk pile

step 1TOOLS

TOOLS

- Drill
- Drill Bits (7/32", 1/4", 5/16")

• Jigsaw with a metal blade
• Pipe Wrench
• Flat Head Screwdriver
• Crescent Wrench
• Vise and/or Clamp
• Wire Strippers
• Tape Measure
• Marker Pen
• Compass + protractor
• 1/4" #20 Thread Tapping Set
• An extra person helps a lot!

step 2 MATERIALS

Mount

• 36" of 1" Square Tubing
• 2" Floor Flange
• 2" X 4" Nipple
• 3 X 3/4" Self-tapping Screws

NOTE: if you have access to a welder, you can weld a 4" section of 2" pipe onto your square tubing instead of using the flange, nipple and sheet metal screws.

Motor

• 260 VDC, 5 A continuous duty Treadmill Motor with a 6 inch threaded hub
• 30 - 50 Amp Blocking Diode (one-way)
• 2 x 5/16" x 1 3/4" Motor Bolts
• 3" X 11" PVC Pipe

Tail

• 1 sqft (approx) lightweight material (metal)
• 2 X 3/4" Self-tapping Screws

Blades

• 24" length of 8" PVC Pipe (if it is UV resistant, you will not need to paint it)
• 6 X 1/4" X 20 Bolts
• 9 x 1/4" washers

• 3 sheets A4 paper and tape

step 3BLADES

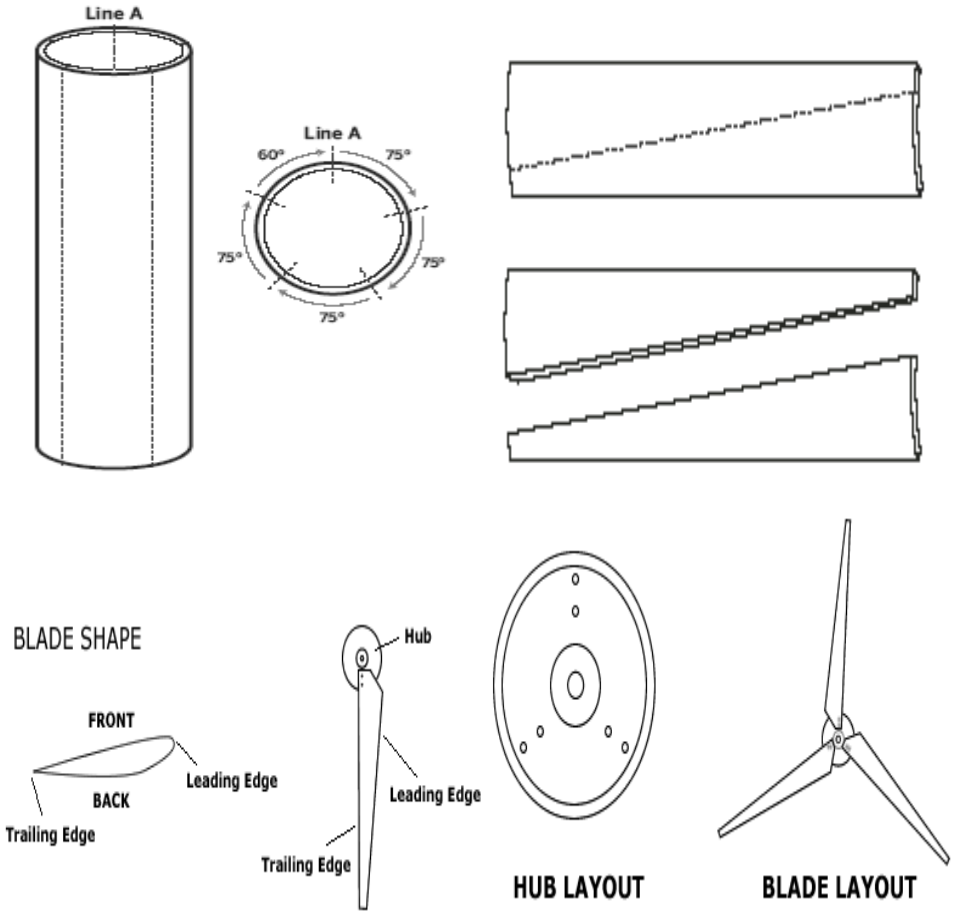
Cutting Blades - makes 9 blades (or 3 blade sets) and a thin waste strip.

1. Place the 24" Length of PVC pipe and square tubing (or other straight edge) side by side on a flat surface. Push the pipe tight against the tubing and mark the line where they touch. This is Line A.
2. Make a mark near each end of Line A, 23" apart.
3. Tape 3 sheets of A4 paper together, so that they form a long, completely straight piece of paper. Wrap this around the section of pipe at each of the two the marks you just made, one then the other. Make sure the short side of the paper is straight along Line A and the paper is straight against itself where it overlaps. Mark a line along the edge of the paper at each end. Call one Line B and the other Line C.
4. Start where Line A intersects Line B. Going left around Line B, make a mark at every 145 mm. The last section should be about 115 mm.
5. Start where Line A intersects Line C. Going right around Line C, make a mark at every 145 mm. The last section should be about 115 mm.
6. Mark each line using a straight edge.
7. Cut along these lines, using the jigsaw, so that you have 4 strips of 145 mm and one strip about 115 mm.
8. Take each strip and place them with the inside of the pipe facing down.
9. Make a mark at one end of each strip 115 mm from the left edge.
10. Make a mark at the other end of each strip 30 mm from the left edge.
11. Mark and cut these lines, using the jigsaw.
12. Place each blade with the inside of the pipe facing down.
13. Make a mark along the angled line of the blade, 3" from the wide end.
14. Make another mark on the wide end of the blade, 1" from the straight edge.
15. Connect these two marks and cut along the line. This prevents the blades interfering with the others' wind.

Sanding the Blades

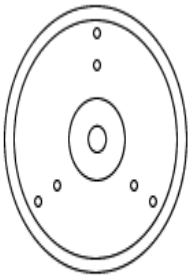
You should sand the blades to achieve the desired airfoil. This will increase the efficiency of the blades, as well as making them quieter.

The angled (leading) edge wants to be rounded, while the straight (tailing) edge wants to be pointed.
Any sharp corners should be slightly rounded to cut down on noise.

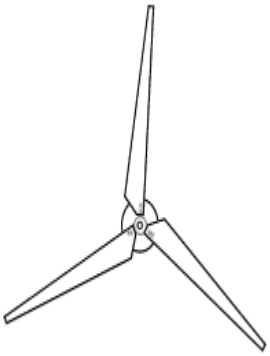


step 4HUB AND MOUNT
Cutting Tail
The exact dimensions of the tail are not important. You want about one square foot of lightweight material, preferably metal. You can make the tail any shape you want, so long as the end result is stiff rather than floppy.
Drilling Holes in Square Tubing - using the 5/16" drill bit
1. Place the motor on the front end of the square tubing, so that the hub part hangs over the edge and the bolt holes of the motor face down.
2. Roll the motor back so you can see the bolt holes, and mark their position on the square tubing.
3. Drill a 5/16" hole at each mark all the way through the square tubing.
Floor Flange Holes
This will be dealt with in the assembly section of this manual, as these holes are what determine the balance.
Drilling Holes in Blades - using the 1/4" drill bit
1. Mark two holes at the wide end and along the straight edge of each of the three blades. The first hole should be 3/8 " from the straight edge and 3/8 " from the bottom. The second hole should be 3/8 " from the straight edge and 1 1/4" from the bottom.

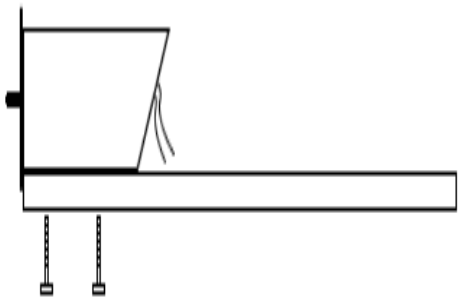
2. Drill these 6 holes.
Drilling and Tapping Holes in Hub - using the 7/32" drill bit and 1/4" tap
1. The Treadmill motor comes with the hub attached. To take it off, hold the end of the shaft (which comes through the hub) firmly with pliers, and turn the hub clockwise. This hub unscrews clockwise, which is why the blades turn counter-clockwise.
2. Make a template of the hub on a piece of paper, using a compass and protractor.
3. Mark 3 holes, each of which is 2 3/8" from the center of the circle and equidistant from each other.
4. Place this template over the hub and punch a starter hole through the paper and onto the hub at each hole.
5. Drill these holes with the 7/32" drill bit.
6. Tap the holes with the 1/4" x 20 tap.
7. Bolt the blades onto the hub using the 1/4" bolts. At this point, the outer holes have not been drilled.
8. Measure the distance between the straight edge of the tips of each blade. Adjust them so that they are all equidistant. Mark and punch each hole on the hub through the empty hole in each blade.
9. Label the blades and hub so that you can match which blade goes where at a later stage.
10. Remove the blades and then drill and tap these outer three holes.
Making a Protective Sleeve for the Motor
1. Draw two straight lines, about 3/4" apart, along the length of the 3" x 11" PVC Pipe. Cut along these lines.
2. Make a 45 degree cut at the end of the pipe.
3. Place needle nose pliers inside the strip that has been cut out, and pry the pipe apart.
4. Making sure the bolt holes of the motor are centered in the middle of the missing strip of PVC pipe, push the motor into the pipe. An extra person will make this a lot easier.



HUB LAYOUT



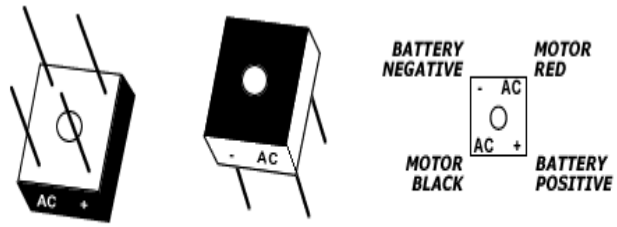
BLADE LAYOUT



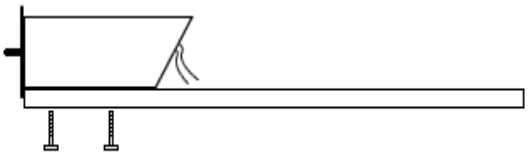
MOUNTING MOTOR SIDE VIEW

step 5ASSEMBLY
1. Place the motor on top of the square tubing and bolt it in, using the two 5/16" x 1 3/4" bolts.
2. Place the diode on the square tubing, about 2" behind the motor, and screw it into position using the self-tapping metal screw.
3. Connect the black wire coming out of the motor to the positive incoming terminal of the diode (Labeled AC on the positive side).
4. Connect the red wire coming out of the motor to the negative incoming terminal of the

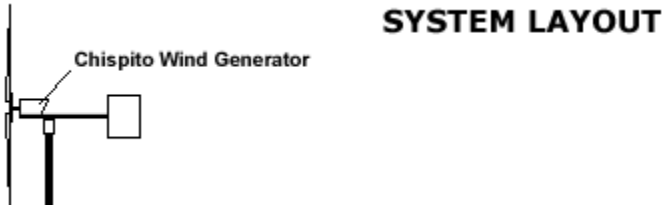
diode (Labeled AC on the negative side).
5. Center the tail over the square tubing, at the back end. Clamp your tail onto the side of the square tubing.
6. Using 2 self-tapping screws, screw the tail in place.
7. Place each blade on the hub so that all the holes line up. Using the 1/4" bolts and washers, bolt the blades to the hub. For the inner three holes, use two washers per bolt, one on each side of the blade. For the outer three holes, just use one washer next to the head of the bolt. Tighten.
8. Hold the end of the shaft of the motor (which comes through the hub) firmly with pliers, and turn the hub counterclockwise until it tightens and stops.
9. Screw the nipple tightly into the floor flange using a pipe wrench.
10. Clamp the nipple in a vice so that the floor flange is facing up and level.
11. Place the square tubing (and everything that is on it) on top of the floor flange and move it so that it is perfectly balanced.
12. Through the holes of the floor flange, mark the square tubing at the point of balance.
13. Drill these two holes using a 5/32" drill bit. You will probably have to take off the hub and tail to do this).
14. Attach the square tubing to the floor flange with two sheet metal screws.
For a longer life span of your wind generator, you should paint the blades, motor sleeve, mount and tail.

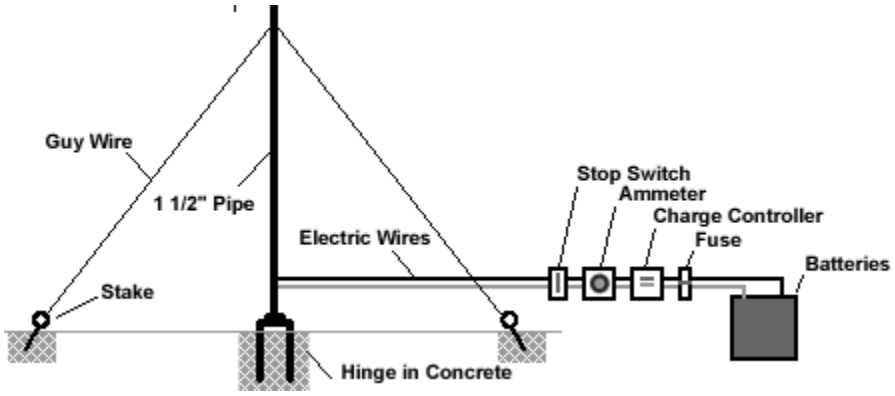


DIODE TOP VIEW DIODE BOTTOM VIEW DIODE WIRING



MOUNTING MOTOR SIDE VIEW





Wind Systems

Wind energy is a renewable and efficient means for electricity production. For the small-scale
user, wind power is inexpensive, easy to construct, and simple to maintain. The ease of wind systems comes from the straightforward design of such a system. It works just like the alternator in your car. Blades transform wind into mechanical energy, and this mechanical energy turns a generator that transforms the mechanical energy into electricity

Wind systems come in many shapes, sizes, and configurations. There are Horizontal Axis Wind Turbines (HAWT) and Vertical Axis Wind Turbines (VAWT). Vertical machines are easy to build, but because most work on the concept of drag, instead of lift, their speeds and efficiency are limited.

The most common type of wind turbine is the Horizontal Axis. You see these machines in the large wind warms in the western United States, as well as in the water-pumping mills. The blades are perpendicular to the direction of the wind, and a tail keeps the blades lined up. The blades are designed as an airfoil to actually use lift, rather than drag, to make the blades move. This approach is very attractive, as your blades can travel faster than the wind speed. Blades of this type are usually tapered and slightly twisted to help With

Wind Generator Installation

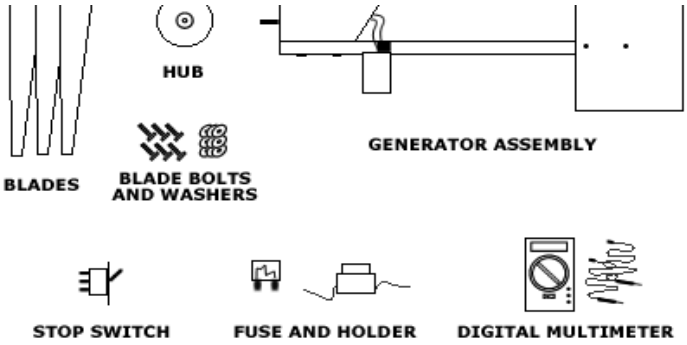
Welcome to the exciting world of energy production. You have taken a step towards self sustainability.

We hope that you completely enjoy the Wind Generator and that it
provides your power system with a dependable and renewable source of energy.

The Wind Generator is a 100 Watt machine. It outputs 14 volts at 275 rpm, so it will start putting power into your batteries in low wind speeds.

a perfect addition to an existing solar, or other alternative energy, home system. On its own, it will power lights, radio, and conservative usage of appliances such as computer, satellite, blender, drill, and much more!

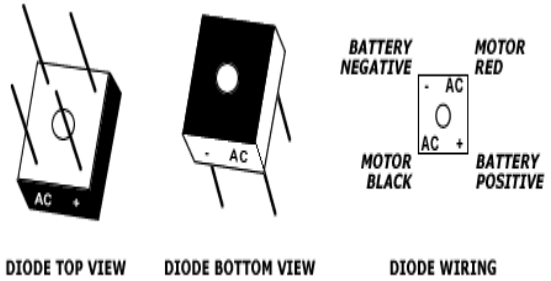
Included In This Package



In addition to this kit, you will need: spade connectors, a tower, #10 (or thicker) stranded wire, a shunt type charge controller (using a MPPT charge controller will not only prevent your batteries from overcharging, it will also convert extra volts into amps, increasing the rated output of your power source), batteries, and an inverter if ac appliances are to be used.

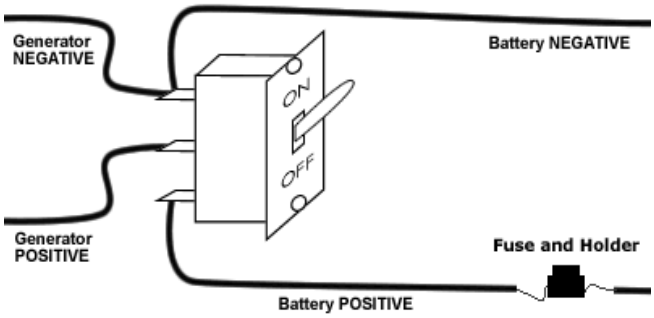
ASSEMBLY

1) Line up the holes of each blade with the holes on the hub.
2) Using the ¼" bolts and washers, bolt the blades onto the hub. For the inner three holes, use two washers per bolt, one on each side of the blade. For the outer three holes, just use one washer next to the head of the bolt. Tighten. Do not attach the blade assembly to the motor yet.
3) Have your tower ready, with a positive and negative #10 (or thicker) stranded wire coming out the top of the 1 ½" tower pipe, which should be lowered to a manageable height (at least 2 ½' off the ground).
4) Strip the ends of the wires and crimp a spade connector onto each wire.
5) Make sure the two wires coming out of the bottom of the tower pole are wrapped together, to form a closed circuit. This is a safety precaution; it puts a load on the wind generator to prevent it from spinning around fast while you're working on it.
6) Grease the outside of the top of the tower pole, where the wind generator will go.
7) Hold the main wind generator unit close to the tower pole, so that the mounting pipe is lined up with the tower pipe.
8) Thread the two wires from the tower through the mounting pipe of the generator, and slip the mounting pipe over the tower pipe.
9) Connect the wires to the one-way diode, as shown below.



10) With needle nose pliers or channel locks, hold the back of the motor's shaft (located under the PVC motor sleeve, near the diode) securely.
11) Place the hub assembly onto the front part of the motor's shaft, and turn counterclockwise until it tightens and stops. Release the needle nose pliers or channel

locks.
12) Raise the pole of the tower to an upright, level position, and then secure that position using guy wires and turnbuckles (please consult the tower section of this manual for a full description of building and raising a hinged tower).
13) Unwrap the two wires at the bottom of the pole and wire them into the stop switch, as shown below



14) Wire up the rest of your power system, including stop switch, fuse, charge controller, batteries and inverter. This Wind Generator is best suited for 12 or 24 volt systems.
15) Turn the stop switch to the on position.

SAFETY CONSIDERATIONS

Electricity, especially when spinning blades are also involved, can be extremely dangerous.
The user of this information and product assumes full responsibility for his/her safety. Here are some of the things you need to consider:
· Always ground and fuse your electrical system, as well as each component within it.
· Always stand upwind when viewing the wind generator to avoid debris in case of failure.
· Always attach safety ropes and/or cables when erecting your tower and/or wind generator.
· Always wire connections securely with proper insulation such as heat shrink tubing and/or electrical tape.
· Never touch the positive and negative wires at the same time while they are connected to the battery.
· Never leave your wind generator unconnected to anything, unless it is on the ground. It must be connected to a battery or other load. Or you can short it out by crossing the positive and negative wires FROM THE WIND GENERATOR together, to provide a closed circuit. If you do not do one of these, it can spin freely and attain dangerous speeds.
· Never expose batteries to heat, sparks or flames. Do not smoke near batteries. They can ignite and explode easily.

TOWER

The tower is one of the most important components in your wind generator system. It must be strong, stable, level, easily raised and lowered, and well anchored. This is the system we use, and can recommend.
The higher the tower, the more wind your generator will be exposed to. This design is based on a 20’ tower (the minimum we recommend). For each additional 20’ length of

tower, you will need an extra set of guy wires and the stakes will need to be further from the base.

You will need:

1x 20'section of 1½" Steel Pipe, threaded at one end
1x 1½" U-bolt, to attach guy wires (instead of u-bolt, we weld on a heavy chain)
1x 6"x1¼" threaded Steel Nipple
2x 1¼" Steel Elbows
2x 2' x 1¼" Steel Nipples
1x 1½" Steel T
4x Guy stakes (we use rebar bent into a W shape)
4x Turnbuckles
4x 25' lengths of 1/8" (minimum) Steel Cable
8x 1/8" (minimum) Cable Clamps
Approx. 10' of Steel Wire
2x 30' Safety Ropes (needed only to attach guys to turnbuckles; they can then be removed)
At least two people

The Base

1) Dig a hole, 1' around and 2' deep.
2) Feed the 6'x1¼" nipple through the horizontal part of the 1½" T.
3) Screw the two 1¼" elbows into each end of the 6"x1¼" nipple, making sure the elbows point in the same direction.
4) Screw the two 2'x1¼" nipples into the free ends of the elbows.
5) Set this base into your hole, so that the T just clears the ground.
6) When the T is perfectly level and the 2' nipples point straight down, fill the hole with concrete.

The Stakes

1) Mark out where you want your stakes:
- They must be evenly spaced from the center (the base) and from each other.
- They must follow the direction of the T, so that the line between one set of opposite stakes cuts through the horizontal part of the T, and the line between the other set of opposite stakes cuts through the vertical part of the T.
- They must be at least 50% of the tower's height away from the base.
2) Dig a hole, 2' deep, at each spot marked, and concrete in the stakes.
3) Attach a turnbuckle to each stake, using several wraps of steel wire.

Wait at least a full day for the concrete to set up.

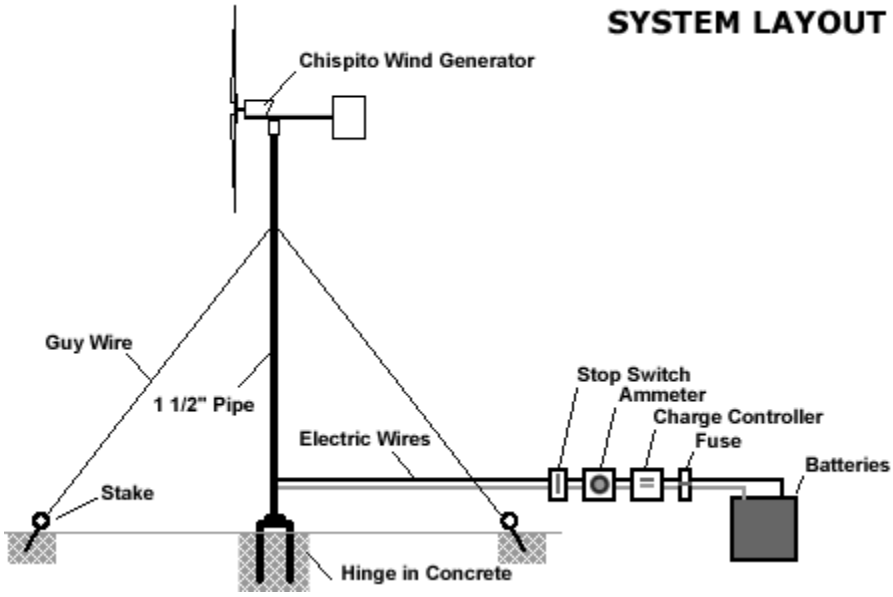
The Pole

1) Drill a large hole, about 1' from the bottom of the 1½" tower pipe, for the wires from the generator to exit the pipe.
2) Screw the pipe into the vertical part of the base's T.
3) Make four strong, flexible rings out of steel wire, about 5" in diameter. For each ring, loop the wire around several turns and twist it closed.
4) Place the 1½" U-bolt around the pipe, 3' from the top.
5) Thread the four wire loops around the U-bolt, lining each one up with one of the stakes.
6) Tighten the bolts of the U-bolt.

7) Thread one end of a 25’ length of steel cable through each loop, and secure each one using a cable clamp.
8) Thread a safety rope through each of the two loops that face the two directions the pole can fall.

Raising the Tower

It is a good idea to raise and secure the tower for the first time without a wind generator on it, as it will be lighter.
1) Raise the pole in the air and tie the safety ropes to something solid (a truck or building, for example).
2) Get the pole fairly level and attach the guy wires to the turnbuckles. Secure using the other four cable clamps.
3) Turn the turnbuckles to tighten the guys and level the pole exactly.
4) Mark the turnbuckle you will be releasing. Then release it and lower the pole.
5) Remove the safety ropes.
6) Mount the wind generator and raise the tower.
7) Screw in the turnbuckle up to the mark you made.



Banks of Batteries

Storing the electrical energy that has been converted by your source is the hardest part of the home-energy process. Most systems use lead-acid batteries, which can not be constructed very easily in your average home workshop. Still, they are efficient compared to the cost, and along with conservative energy use, deep cycle batteries can play a very important role. Lead-Acid battery systems can be any voltage, but most people use either 12 or 24 volts.
So, what is a battery? A battery converts the electrical energy from your generator or solar panel into chemical energy by means of a specific chemical reaction. When you need to use electricity, the battery reverses the chemical reaction and releases electricity.

Batteries come in all shapes and sizes, but for most small home systems, deep cycle lead acid batteries are used. These batteries can be found in most cities, and have many applications including golf-carts, forklifts, and telephone lines. Lead-Acid Batteries are rated in Amp-Hours, which means they contain a certain amount of time at a particular electrical draw. A 200 amp-hour battery with a 20 amp draw will be discharged in 10 hours of use. So, if you had a lamp that pulled 2 amps, you could light a room for 100 hours.

Most batteries in this class come in 6 volt sizes, but most appliances are at least 12 volt. To get around this, we use two 6 volt batteries, wired in series, to get one 12 volt battery. Then, our 12 volt batteries are wired in parallel to give us more amp hours.

Because batteries are expensive, you will want to make them last as long as possible. Checking the water level regularly is vital, and should be part of your general maintenance schedule. Another key factor in the lifespan of your batteries is not leaving them drained too low for too long. We have learned the hard way, and it has cost us dearly. Now, we try not to drain our system below 12.0 volts (a battery is full at 12.6 volts), and so far we have been very pleased with the performance of our battery bank.

One thing to note, when reading the level of your batteries, is that you will only get a true voltage reading when there is no power coming in. For example, if there is no wind or sun, and hasn't been for a while, your voltage reading will tell you exactly what your batteries are sitting at, 12.6 volts being the maximum. However, when the wind is blowing, your voltmeter might read anywhere up to 14.6 volts. This is because you are reading an average of what your batteries are sitting at and what is coming in. The closer the batteries are to full, the less they act as a voltage buffer, and the voltage rises faster.

What is the difference between a normal lead-acid car battery and a deep cycle battery? People who have recreational vehicles (RVs) and boats are familiar with deep cycle batteries. These batteries are also common in golf carts and large solar power systems (the sun produces power during the day and the batteries store some of the power for useat night). If you have read the article How Emergency Power Systems Work, then you also know that an alternative to gasoline-powered generators is an inverter powered by one or more deep cycle batteries.

Both car batteries and deep cycle batteries are **lead-acid** batteries that use exactly the same chemistry for their operation (see How Batteries Work for more information). The difference is in the way that the batteries **optimize** their design:

- **A car's battery is designed to provide a very large amount of current for a short period of time.** This surge of current is needed to turn the engine over during starting. Once the engine starts, the alternator provides all the power that the car needs, so a car battery may go through its entire life without ever being drained more than 20 percent of its total capacity. Used in this way, a car battery can last a number of years. To achieve a large amount of current, a car battery uses thin plates in order to increase its surface area.
- **A deep cycle battery is designed to provide a steady amount of current over a long period of time.** A deep cycle battery can provide a surge when needed, but nothing like the surge a car battery can. A deep cycle battery is also designed to be deeply discharged over and over again (something that would ruin a car battery very quickly). To accomplish this, a deep cycle battery uses thicker plates.

A car battery typically has two ratings:

• **CCA** (Cold Cranking Amps) - The number of amps that the battery can produce at 32 degrees F (0 degrees C) for 30 seconds
• **RC** (Reserve Capacity) - The number of minutes that the battery can deliver 25 Typically, a deep cycle battery will have two or three times the RC of a car battery, but will deliver one-half or three-quarters the CCAs. In addition, a deep cycle battery can withstand several hundred total discharge/recharge cycles, while a car battery is not designed to be totally discharged

Additional Resources:

• *Fundamentals of Electricity* http://cipco.apogee.net/foe/fb.asp
• - *Excellent description and illustrations of the concepts of electricity*
• *Electricity Overview http://www.ndted.org/EducationResources/HighSchool/Electricity/hs_elec_index.htm*
• - *Complete overview with formulas, concepts, and good description.*

Safety

Safety should be our highest priority. Human life is more important than electricity, so please follow any and every safety guideline you come across. Wind generators, hydro systems, and even solar panels can be very dangerous, with fast moving parts, electrical sparks, and violent weather conditions. Some things to consider
• Keep work area clean, as cluttered areas invite accidents.
• Always ground and fuse your electrical system, as well as each component within it.
• Use common sense and be aware of what is around you. Keep work area well lit and avoid using electrical components near flammable gases or liquids.
• Always use proper wire sizes and types.
• Always wear goggles, gloves, and protective clothing.
• Always stand upwind when viewing the wind generator to avoid debris in case of failure.
• Always attach safety ropes and/or cables when erecting your tower and/or wind generator.
• Always wire connections securely with proper insulation, such as heat shrink tubing and/or electrical tape.
• Never touch the positive and negative wires at the same time while they are connected to the battery.
• Never leave your wind generator unconnected to anything, unless it is on the ground. It must be connected to a battery or other load. Or you can short it out by crossing the positive and negative wires FROM THE WIND GENERATOR together, to provide a closed circuit. If you do not do one of these, it can spin freely and attain dangerous speeds.
• Never expose batteries to heat, sparks or flames. Do not smoke near batteries. They can ignite and explode easily.
• Always protect wires and run them through conduit.

Safety is important, and the above listed warnings are just a few that can help you prevent an accident. Your most useful tool is your head, so use it in every project.

LIST OF PARTS AND COMPONENT SELLERS ON THE INTERNET.

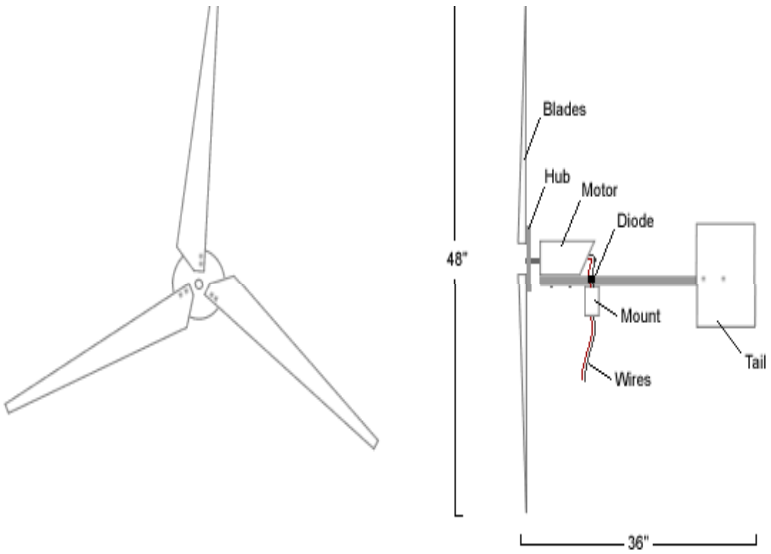
http://www.kansaswindpower.net/

FANTASITIC SITE, everything alternative.

http://www.windstuffnow.com/main/
Great educational site, sales of parts.
http://www.ecobusinesslinks.com/wind_generator_plans.htm
Plans , parts, seminars.
http://www.tricotcwind.com/trico_general.asp
Everything electric motors.
http://www.otherpower.com/otherpower_wind.html
Everything wind power, good site.
http://dragonflypower.com/DragonBlerb.htm
More information and plans.
http://www.lookout2000.com/windpower/
Check out the wind generator parts.
http://www.magnet4less.com/?gclid=CPTJuMeYgI8CFSasGgodpxLN3Q
Huge selection of parts.
http://www.electricgeneratorsdirect.com/?source=goog&kw=BMelectric_generator
Check out the inverters , large selection
http://www.bitterrootsolar.com/wind/lakota/lakota.htm
They have it all.
http://www2.northerntool.com/product-1/200320201.htm
Everything wind and solar.

BASIC OVERVEIW (STEP BY STEP)

HOW TO BUILD A WIND GENERATOR



NOTE: THE ARTICLE SHOWS THE BLADES BEING CUT FOR A CW ROTATION. IF YOU ARE USING THE TREADMILL MOTOR MENTIONED IN THE ARTICLE PLEASE CUT THE BLADES PER THE WEBSITE INSTRUCTIONS.

INTRODUCTION

Wind power is abundant, clean, inexpensive and easy to do. It is our belief that anyone can be in control of where his or her electricity comes from. There is nothing more rewarding and empowering than making a wind powered generator from scrap materials. Most of the tools and materials in this manual can be found in your local hardware shop or junk pile. We highly recommend you search your local dump and/or junkyards for the materials required. If you live in a city, do a search on www.freecycle.org for salvaged parts.

Safety should be our highest priority. Human life is more important than electricity, so please follow any and every safety guideline you come across. Wind generators can be very dangerous, with fast moving parts, electrical sparks, and violent weather conditions.

The Wind Generator was designed to be simple and efficient with fast and easy construction. There are no limits to what you can do with wind power. For more information and inspiration on wind generator construction, please visit otherpower.com

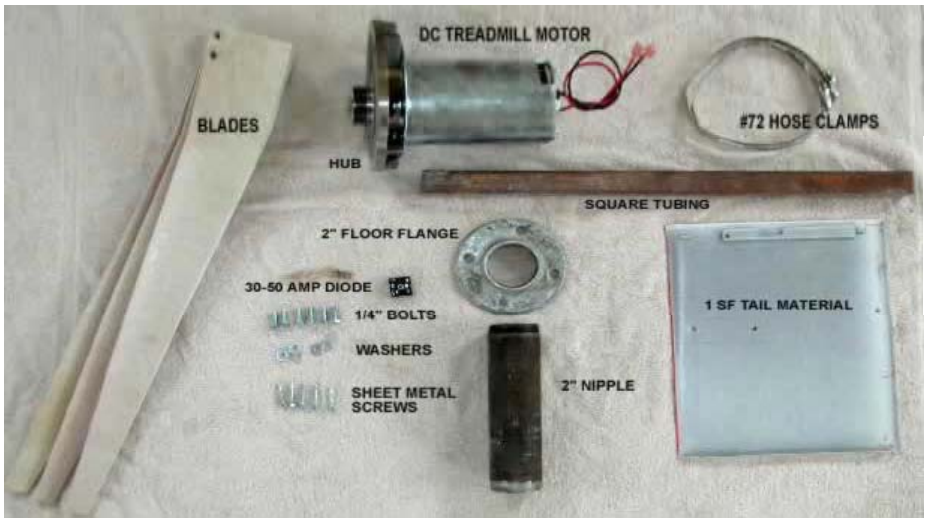
SUPPLIES

This manual is based on using a 260 VDC, 5 A continuous duty Treadmill Motor with a 6 inch threaded hub. These motors are available for under from most motor surplus stores. We are getting about 7 amps in a 30 mph wind. In other words, it is a simple, cheap little machine to get you started.

You may use any other simple permanent magnet DC motor that returns at least 1 V for every 25 rpm and can handle upwards of 10 amps. If you do, there will be certain changes to this supply list (for example, you will have to find a hub - a circular saw blade with a 5/8" shaft adaptor will work).

- Drill
- Drill Bits (7/32", ¼", 5/16")
- Jigsaw with a metal blade
- Pipe Wrench
- Flat Head Screwdriver
- Crescent Wrench
- Vise and/or Clamp
- Wire Strippers
- Tape Measure
- Marker Pen
- Compass + protractor
- ¼" #20 Thread Tapping Set
- An extra person helps a lot!

Materials



Mount

- 36" of 1" Square Tubing
- 2" Floor Flange
- 2" X 4" Nipple
- 3 X 3/4" Self-tapping Screws

NOTE: if you have access to a welder, you can weld a 4" section of 2" pipe onto your square tubing instead of using the flange, nipple and sheet metal screws.

Motor

- 260 VDC, 5 A continuous duty Treadmill Motor with a 6 inch threaded hub
- 30 - 50 Amp Blocking Diode (one-way)
- 2 x 5/16" x ¾" Motor Bolts
- 3" X 11" PVC Pipe

Tail

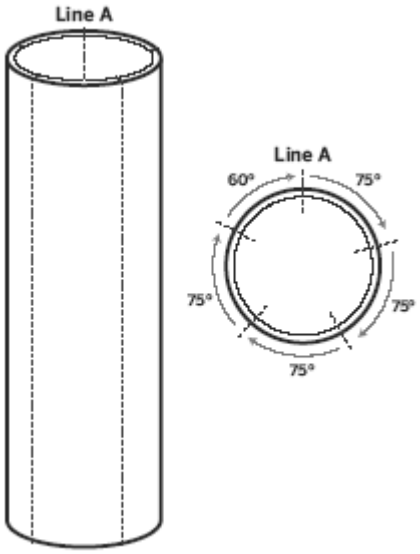
- 1 sqft (approx) lightweight material (metal)
- 2 X ¾" Self-tapping Screws

Blades

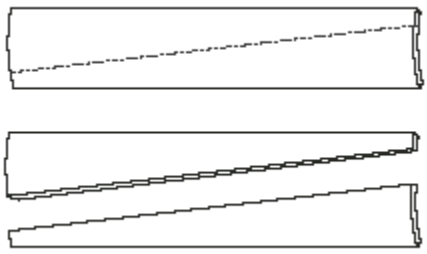
- 24" length of 8" PVC Pipe (if it is UV resistant, you will not need to paint it)
- 6 X ¼" X 20 Bolts

- 9 x ¼" washers
- 3 sheets A4 paper and tape

PREPARATION

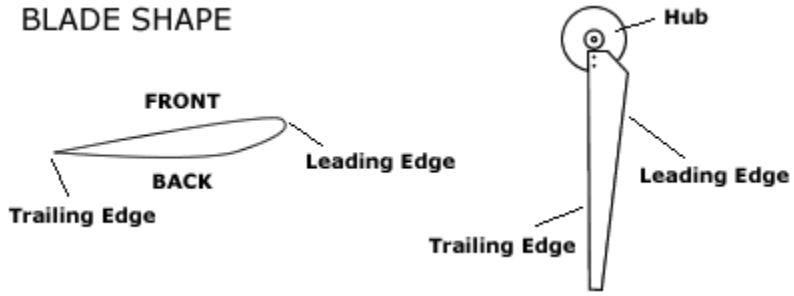


Cutting Blades - makes 9 blades (or 3 blade sets) and a thin waste strip.
Place the 24" Length of PVC pipe and square tubing (or other straight edge) side by side on a flat surface. Push the pipe tight against the tubing and mark the line where they touch. This is Line A.
Make a mark near each end of Line A, 23" apart.
Tape 3 sheets of A4 paper together, so that they form a long, completely straight piece of paper. Wrap this around the section of pipe at each of the two the marks you just made, one then the other. Make sure the short side of the paper is straight along Line A and the paper is straight against itself where it overlaps. Mark a line along the edge of the paper at each end. Call one Line B and the other Line C.
Start where Line A intersects Line B. Going left around Line B, make a mark at every 145 mm. The last section should be about 115 mm.
Start where Line A intersects Line C. Going right around Line C, make a mark at every 145 mm. The last section should be about 115 mm.
Mark each line using a straight edge.
Cut along these lines, using the jigsaw, so that you have 4 strips of 145 mm and one strip about 115 mm.



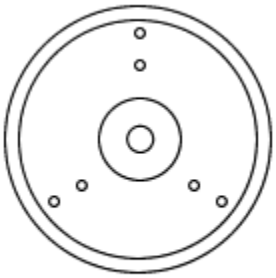
Take each strip and place them with the inside of the pipe facing down.
Make a mark at one end of each strip 115 mm from the left edge.
Make a mark at the other end of each strip 30 mm from the left edge.

Mark and cut these lines, using the jigsaw.
Place each blade with the inside of the pipe facing down.
Make a mark along the angled line of the blade, 3" from the wide end.
Make another mark on the wide end of the blade, 1" from the straight edge.
Connect these two marks and cut along the line. This prevents the blades interfering with the others' wind

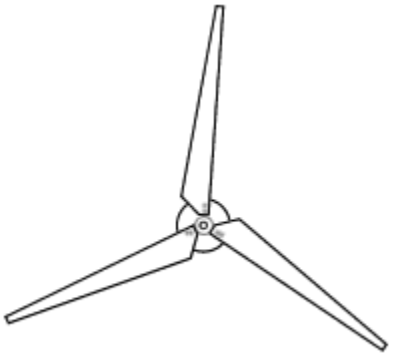


Sanding the Blades
You should sand the blades to achieve the desired airfoil. This will increase the efficiency of the blades, as well as making them quieter.
The angled (leading) edge wants to be rounded, while the straight (tailing) edge wants to be pointed.
Any sharp corners should be slightly rounded to cut down on noise.
Cutting Tail
The exact dimensions of the tail are not important. You want about one square foot of lightweight material, preferably metal. You can make the tail any shape you want, so long as the end result is stiff rather than floppy
Drilling Holes in Square Tubing - using the 5/16" drill bit
Place the motor on the front end of the square tubing, so that the hub part hangs over the edge and the bolt holes of the motor face down.
Roll the motor back so you can see the bolt holes, and mark their position on the square tubing.
Drill a 5/16" hole at each mark all the way through the square tubing.
Floor Flange Holes
This will be dealt with in the assembly section of this manual, as these holes are what determine the balance.
Drilling Holes in Blades - using the ¼" drill bit
Mark two holes at the wide end and along the straight edge of each of the three

blades. The first hole should be 3/8 " from the straight edge and ½ " from the bottom. The second hole should be 3/8 " from the straight edge and 1 ¼" from the bottom.
Drill these 6 holes.
Drilling and Tapping Holes in Hub - using the 7/32" drill bit and ¼" tap



HUB LAYOUT

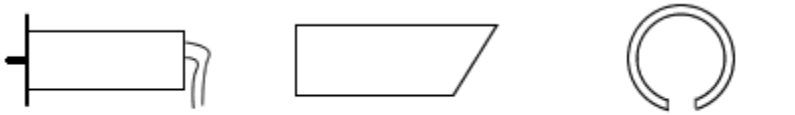


BLADE LAYOUT

The Treadmill motor comes with the hub attached. To take it off, hold the end of the shaft (which comes through the hub) firmly with pliers, and turn the hub clockwise. This hub unscrews clockwise, which is why the blades turn counter-clockwise.
Make a template of the hub on a piece of paper, using a compass and protractor. Mark 3 holes, each of which is 2 3/8" from the center of the circle and equidistant from each other.
Place this template over the hub and punch a starter hole through the paper and onto the hub at each hole.
Drill these holes with the 7/32" drill bit.

Tap the holes with the ¼" x 20 tap.
Bolt the blades onto the hub using the ¼" bolts. At this point, the outer holes have not been drilled.
Measure the distance between the straight edge of the tips of each blade. Adjust them so that they are all equidistant. Mark and punch each hole on the hub through the empty hole in each blade.
Label the blades and hub so that you can match which blade goes where at a later stage.
Remove the blades and then drill and tap these outer three holes.

Making a Protective Sleeve for the Motor

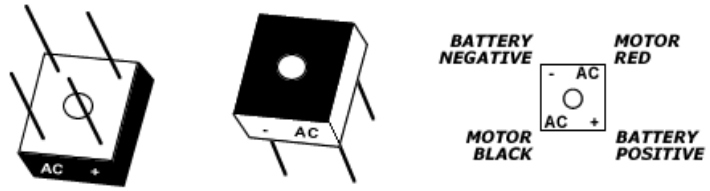


MOTOR SIDE VIEW SLEEVE SIDE VIEW SLEEVE FRONT VIEW

Draw two straight lines, about ¾" apart, along the length of the 3" x 11" PVC Pipe. Cut along these lines.
Make a 45º cut at the end of the pipe.
Place needle nose pliers inside the strip that has been cut out, and pry the pipe apart.
Making sure the bolt holes of the motor are centered in the middle of the missing strip of PVC pipe, push the motor into the pipe. An extra person will make this a lot easier

ASSEMBLY

Place the motor on top of the square tubing and bolt it in, using the two 5/16" x ¾" bolts



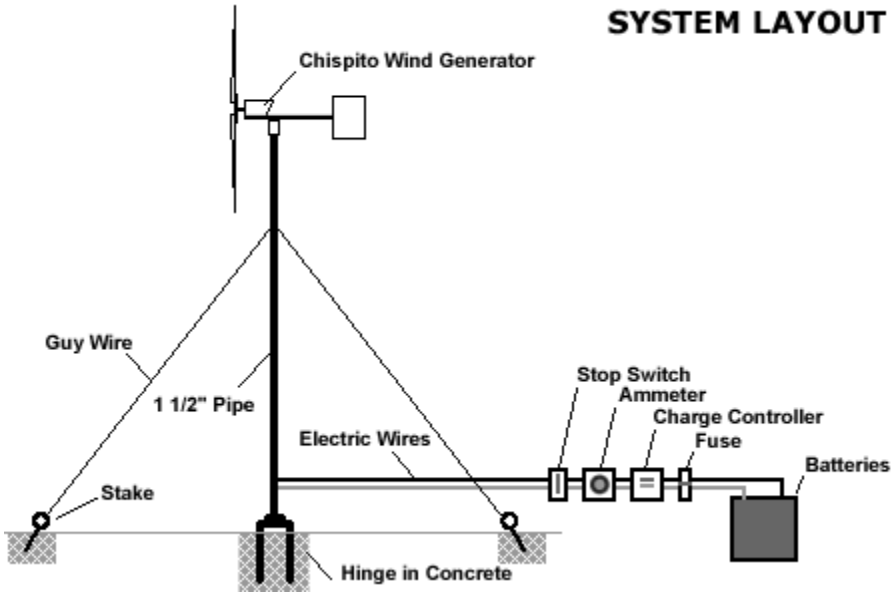
DIODE TOP VIEW DIODE BOTTOM VIEW DIODE WIRING

Place the diode on the square tubing, about 2" behind the motor, and screw it into position using the self-tapping metal screw.
Connect the black wire coming out of the motor to the positive incoming terminal of the diode (Labeled AC on the positive side).
Connect the red wire coming out of the motor to the negative incoming terminal of the diode (Labeled AC on the negative side).

Center the tail over the square tubing, at the back end. Clamp your tail onto the side of the square tubing.
Using 2 self-tapping screws, screw the tail in place.
Place each blade on the hub so that all the holes line up. Using the ¼" bolts and washers, bolt the blades to the hub. For the inner three holes, use two washers per bolt, one on each side of the blade. For the outer three holes, just use one washer next to the head of the bolt. Tighten.
Hold the end of the shaft of the motor (which comes through the hub) firmly with pliers, and turn the hub counterclockwise until it tightens and stops.
Screw the nipple tightly into the floor flange using a pipe wrench.
Clamp the nipple in a vice so that the floor flange is facing up and level.

Place the square tubing (and everything that is on it) on top of the floor flange and move it so that it is perfectly balanced.
Through the holes of the floor flange, mark the square tubing at the point of balance.
Drill these two holes using a 5/32" drill bit. You will probably have to take off the hub and tail to do this).
Attach the square tubing to the floor flange with two sheet metal screws.
For a longer life span of your wind generator, you should paint the blades, motor sleeve, mount and tail.

ADDITIONAL INFORMATION



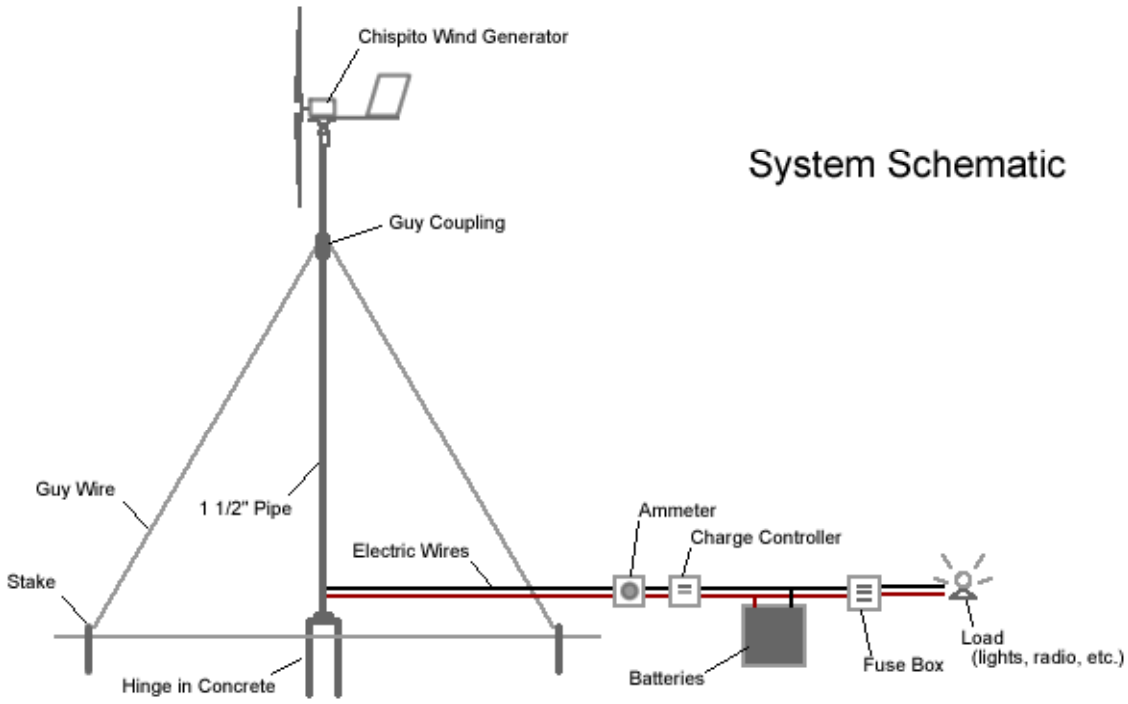
Use of Wind Generator

You will need a tower, wire, ammeter, charge controller/regulator, and a battery bank for your Wind Generator.

Tower

The tower is one of the most important components in your wind generator system. It must be strong, stable, easily raised and lowered, and well anchored. The higher your tower is, the more wind your generator will be exposed to. Guy wires must be placed at least every 18 feet of tower height. Guy wires must be anchored to the ground at least 50% of the height away from the base.

How to Build a Tower for a Wind Generator



SUPPLIES

Tools

- Pipe Wrench
- Vise
- Shovel
- Wheel Barrow (mix concrete)
- Wire Strippers
- Drill and Drill Bit

- **Materials**

Base

- 2 X 2' X 1 ¼" Steel Pipe Nipple
- 6" X 1 ¼" Steel Pipe Nipple
- 2 X 1 ¼" 90 elbow
- 1 ½" Steel Pipe T

Pole

- 10 - 30 ft piece of 1 ½" Steel Pipe
- 2 pieces #8 Copper Stranded Wire (must be long enough to go through the pole to the batteries)

Guy System

- 1 ½" U-bolt
- 4 X Guy Wires, at least 25ft long (must be long enough to go from pole to stakes)
- 4 X Stakes
- 4 X Turnbuckles

ASSEMBLY

Base

Dig a hole about 1 ft in diameter and 2 ft deep.
Feed the 6" X 1 ¼" Steel Pipe Nipple through the horizontal part of the 1 ½" Steel Pipe T
Screw the elbows onto each end of the 6" X 1 ¼" Nipple.
Screw the 2 ft X 1 ¼" Steel Pipe Nipples into the elbows.
Set the hinge base in the hole, so that the T clears the ground. The horizontal

part of the T should be level.
When the base is plumb and level in the hole, pour concrete into the hole.

Pole

Drill a large hole about one foot from the bottom of the 10 - 30 ft 1 ½" Steel Pipe for the wire to exit.
Screw the pipe into the vertical part of the T.
Make 4 loops of wire, each loop consisting of several turns of wire.
Place the 1 ½" U-Bolt round the pipe, 3 feet from the top of the pipe, threading it through the four loops you just made.
Move the loops so that they are equally spaced.
Tighten the nuts of the U-Bolt.
Secure a guy wire to each of the loops on the U-Bolt.

Guys

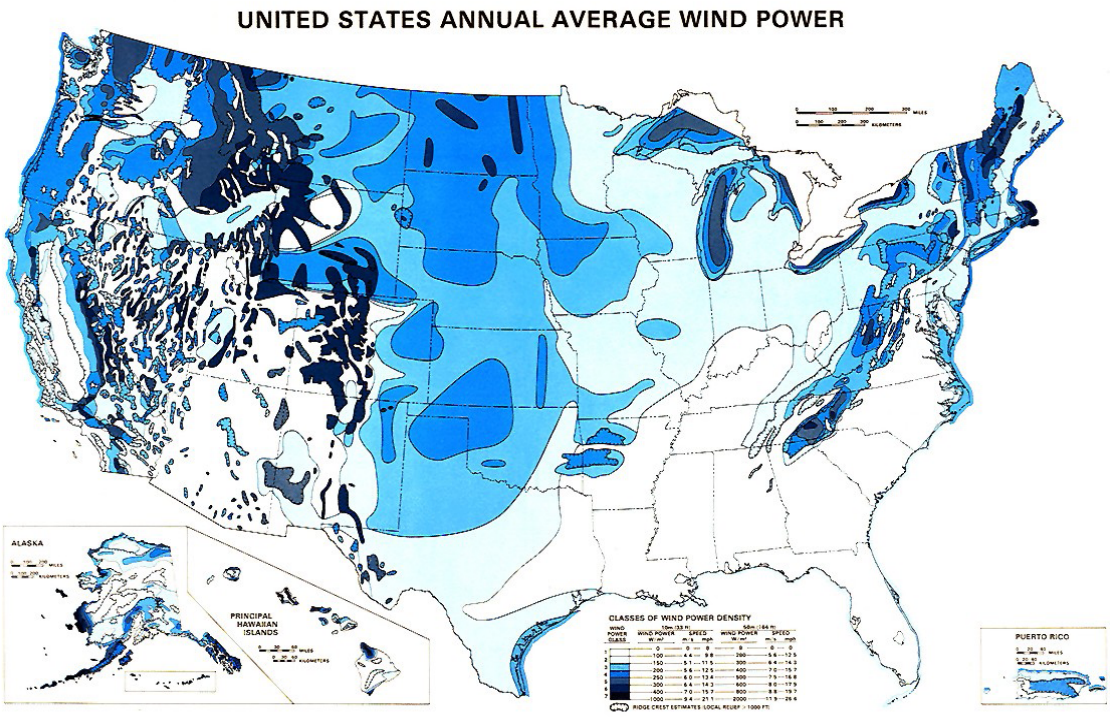
Put the four stakes (spaced evenly apart) about 12 feet from the base.
Drive each stake firmly into the ground, slightly angling them away from the base.
Wire a turnbuckle to each stake, using several strands of wire.
Raise the pole upright and level.
Attach the guys to the turnbuckles.
Hold the pole level and tighten all turnbuckles to ensure a secure fit.
Mark the front turnbuckle for future reference.

Wiring

Release the front guy and lower the pole to the ground.
Feed the #8 wires down through the pole an out through the hole in the bottom of the pipe.
Wrap the bottom ends of the wires together to provide a closed circuit.

Mounting the Wind Generator

Slide THE UNIT over the top of the pole.
Pull the wires up through the unit.
Wrap the positive (red) wire from wing generator to the positive (red) wire going through the pole. Secure the connection, and use either wire nuts or heat shrink connectors. Do the same for the negative wires.
Raise the pole by pulling the front guy into place. Tighten the front guy to the mark made earlier.
Unwrap the ends of the wires and connect them to the positive and negative terminals of your battery bank. If you have a charge controller and/or ammeter, please refer to manufactures instructions for system wiring.



Before you begin, you will want to make sure you are in an area that has enough wind to make this a worthy endeavor. Here is a wind map of the U.S. Since the chart is not really legible, let me just say that if you are in a white zone, this
may not be a project for you. The darker the color, the more steady wind and at higher average speed is recorded for the area. If you appear to be in a white zone, you can always buy an anemometer to measure wind speed and keep a log over time.

FOR YOUR HEALTH AGAINST THE COMING BIRD FLU

Make Your Own Colloidal Silver

Make high-quality electrolytic colloidal silver cheaply and easily at home with just a few simple components.

Colloidal silver is the result of a process that pulls submicroscopic particles of solid silver into a liquid, such as water. The term 'colloid' refers to a substance consisting off ultra-fine particles that don't dissolve but instead remain in suspension dispersed in a continuous medium. These are then held in suspension by a tiny electrical charge placed on each particle. The particles are animated by what is known as Brownian movement, which keeps them in suspension almost indefinitely.

Much debate exists over the subject of colloidal silver, and I did months of internet cross-checking and personal interviews to try and get a gist of what's true and what's not true before I put any in my own mouth... So should you.

Independent studies and toxicology reports seem to indicate that the external and internal use of a solution of less than around 100 PPM of electrolytic colloidal silver (NOT silver chloride or silver salts) in distilled water is not harmful to humans.

All heavy metals are dangerous in large amounts, but in trace amounts the body requires certain of them, like iron, to function properly. While human beings don't need trace amounts of silver to survive, it does occur naturally in drinking water and some foods, and some people do claim health benefits from a supplement. Most of the silver we ingest daily is almost completely excreted in the urine and feces within about 24 hours.

Colloidal silver works as a catalyst, disabling enzymes that all one celled bacteria, fungi and other micro-organisms use to metabolize oxygen. In short, the silver makes it so they just can't breathe. Colloidal silver is generally considered non-toxic, making it safe for humans, pets and plants. Here is what the U.S. Environmental Protection Agency has to say about silver:

"No pathologic changes or inflammatory reactions have been shown to result from silver deposition. Silver compounds have been employed for medical uses for centuries. In the nineteenth and early twentieth centuries, silver arsphenamine was used in the treatment of syphilis; more recently it has been used as an astringent in topical preparations. While argyria occurred more commonly before the development of antibiotics, it is now a rare occurrence."

Argyria is a permanent but benign bluish-grey tinge to the skin which can develop after taking large and consistent doses of silver, although you pretty much have to be eating silver porridge every morning and evening before that ever happens. Here's some more info.

Use your colloidal silver on kitchen sponges, trash cans and toothbrushes. Use it externally on burns, cuts, fungal infections and acne to disinfect and help speed healing. Gargle with it, or use it in small amounts to keep drinking water potable for long periods.

As with anything, make sure you RESEARCH colloidal silver before you start taking it internally. If made improperly or with low quality ingredients, it may end up containing silver chloride, nickel and other toxic impurities. If you intend to take your colloidal silver internally, use distilled water.

step 1What You'll Need
You can buy pretty much everything you need to make lots of colloidal silver for under $20.

- **Three 9-volt batteries** ($3 at the dollar store)

- **Two alligator clips** (I had some of my own but they're cheap)

- **Distilled water** (A few dollars at Safeway, filtered tap water is also fine but will contain more impurities)

- **A nylon scrubber** or equivalent for cleaning your wires (Mine came 'free' with my electrodes)

- **An 8oz glass** (I'm using a clean recycled Nutella container that comes with a plastic lid and doubles as a storage container. Be sure to use a glass container as plastic may build up a static charge)

- **Pure silver wire electrodes** (Mine are a pair of six inch long 99.99% pure silver 14 gauge wires purchased from this shop on eBay for about $12 including shipping to Canada. If you live in the States, buy the silver wire by the foot instead of the 'electrodes' for a better price. These were as cheap as I could find, but you may find a better deal at a local jewelers.)

The silver electrodes are the most important part of making quality colloidal silver. DO NOT use sterling silver and try to obtain at LEAST 99.9% pure silver wire for your electrodes. Less impurity in the silver means less impurities in your colloid.

step 2Bend, Clean and Insert Electrodes
You want your electrodes to have as much surface area under the water as possible to facilitate electrolysis, so I just bent mine in half and stuck them both into the plastic lid.

Try to arrange them so they hang parallel inside the glass, and make sure they're far enough apart that they don't touch each other. Now remove them and clean them gently with your scrubber until they are bright and shiny. Wipe off any residue with a clean soft cloth and reinsert.

This cleaning step is really the only reason your wires will eventually need replacing as

the actual electrolysis doesn't appreciably diminish them... so don't over scrub!

step 3Get the Glass Ready
Make sure your glass is really really clean and fill it up with distilled water leaving about an inch of air space at the top. Loosely place the lid with the electrodes on top and attach your alligator clips, one per wire.

It's important that you don't use a tight-fitting lid during the electrolytic process as hydrogen will be released and build up inside... Give it some room to escape!

step 4Hook Up the Batteries
As it turns out, 27 volts is great for making colloidal silver. As it also happens, we can easily get ourselves some 27 volts from three 9-volt batteries.

The easiest way to hook them up is to line up two batteries so that the third can be attached to their tops, always in the correct orientation of negative to positive and vice versa, leaving one positive and one negative terminal left for our alligator clips to attach to.

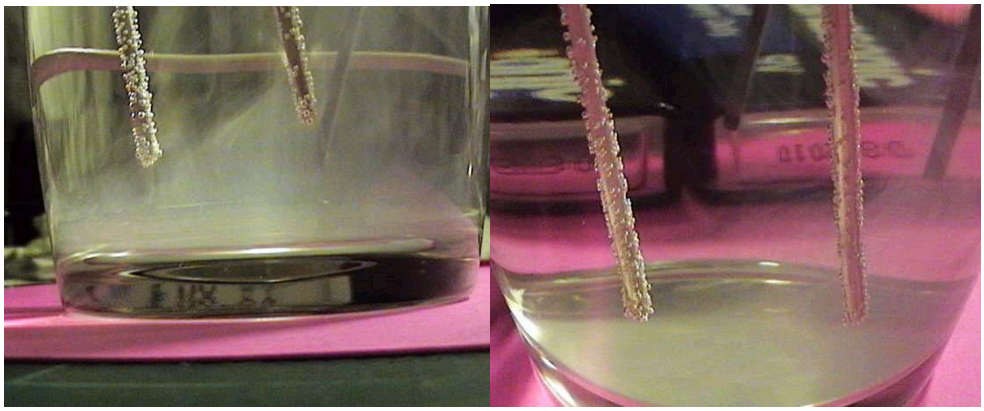
step 5Electrolize!
Now simply attach one clip to each of the two exposed battery terminals, creating an anode (positive) and cathode (negative) out of your two wires.

After about 30 seconds you'll notice little hydrogen bubbles forming around your negative electrode, and a milky white or yellowish substance coming from your positive electrode. If using distilled water instead of filtered tap water as I did, the milki-ness may be much less pronounced. The best quality colloidal silver is usually clear and yellowish.

Don't worry about stirring, it's not necessary. If you must stir, be sure to use a wooden implement.

After about 10 to 15 minutes you may start to notice a thin yellowish 'thread' beginning to form between the two electrodes. This means you're ready to stop.

First remove the negative electrode from the glass and then remove the alligator clip from the positive electrode to allow the rest of the silver atoms to pour off it into the water. Remove the positive wire after about two minutes and give your electrodes another cleaning before storing them away from light.



step 6You're Done!
Allowing your generator to run for about 15 minutes in 8 ounces of room temperature filtered tap water should produce a solution with a concentration of about 15 parts per million. You can check exactly how much silver is in there by purchasing a TDS or PPM tester for about $20 on eBay.

You can also pretty much double the amount of silver (or halve the amount of processing time) in your colloid by heating your water before you proceed.

Store your colloidal silver away from light and heat and don't refrigerate it. It's best when used fresh but it will keep for several weeks. It does have a very faint metallic taste.

Enjoy your colloidal silver, it could save your life.

How to MAKE PV Solar Panels

This is not "How to make PV Solar Cells".
It is possible to home-make Copper Oxide and other kinds of materials but that is a whole nother story which I may do in the future.

I may be a little bit ambitious to try to show you how I made PV Solar panels out of various types of cells I collected and how and where I obtained them rather inexpensively, and some of the differences in the various kinds, but most of all, how to work with them to get free electricity under the light of the sun and other sources of light.

In essence, this involves ways to connect cells, which may produce more or less than one volt, and not only try to increase power output but also decrease the load, that is, efficiently conserve the energy whether it is meager or significant.
For example, even the weakest solar panels can run watches, calculators, radios, charge batteries, and if a computer were specifically designed to, it would be as solar-powerable as a calculator.

Here are some pictures of Solar Panels which I have constructed.

Supplies and Sources
What you may be able to use to build a useful solar panel:

"Broken" solar cells. They are very cheap and they work, they are just randomly shaped. They are usually crystalline silicon ones, which ALWAYS (ha!) look broken even when they are not.

Surplus solar cells. Amorphous silicon printed on glass (check) are excellent, usually producing more than a volt, and much sturdier than the thin ones that break in bulk quantities. If these break, we can fix them, usually.

Indium Copper Selenide Cells. These are "new" and are conveniently sold as glass tiles with easy to solder tabs.

Any of the above, sold as cells prepared for assembly into panels; in other words, complete and solder - ready or with wires and tabs. (I will explain how to prepare inferior quality cells in this instructable.)

Miscellaneous items:
Wire Glue - There is already another instructable for using wire glue on Broken solar cells. (link)

Brass extrusions, bracket |_| shaped - Convenient for connecting to glass cells.

Solder
Soldering Iron - low wattage
Small flat-head screwdriver
Thin (around 20 AWG or less) stranded copper wire

Lamp cord or Speaker Wire
Alligator clips

Deep Picture Frames or Shadow Boxes (Enclosure)
-look for imported frames at the El Cheapo store and pray a machine made them

Acrylic/Lexan/Plexiglas/Etc clear polymer sheets
Router or Dremel to cut out the middle of one out of three sheets
RTV (Silicone Glue) - or :
High Temperature Hot Melt Glue (Caution-you don't want the sun to melt it!)

Rectifier Diode such as 1N4001 or 1N4004

Voltage doublers or multiplier circuits (you can make) to increase voltage output.
-examples: ICL7660, MAX1044, MAX232, etc.

Wide Sticky Tape
Double Sticky Foam Tape

Rechargeable Nickel Batteries
Gel Cells or Car Battery (you got one, might as well use it until it's useless)
-Li Ion not recommended because they are harder to charge

Analog volt meter (only because it doesn't need batteries like a digital one)

AC Inverter - if you are charging a powerful battery and would occasionally run some mains-powered appliance. Some UPS's can be easily modified to be inverters, if they can be turned on after a power failure.

Sources:
Broken Solar Cells:
Herbach and Rademan
Silicon Solar
Electronic Goldmine

Glass (Amorphous) Solar Cells:
Electronic Goldmine
Note: Other links here may also supply Glass Solar Cells

Indium Copper Selenide Cells:
All Electronics
Edmund Scientific
Electronic Goldmine

Other sources:
Cheap weather damaged solar powered outdoor night lights
-(common failures are circuit corrosion and defective batteries, not the solar cells)
Defective solar calculators, solar charged flashlights, etc.

Perhaps a little off topic:
For a reasonably good deal on Complete and Useful Solar Panels I recommend "Solar Car Battery Chargers" that are about 1 or 2 watts and between $20 and $30, whenever an opportunity to get some arises. But those are what I am trying to show how to Make an approximate equivalent of.

How to use "broken" cells
They are the crystalline ones that Always look broken, but if they really are, then they have not been fully prepared for use. It is an extra challenge to solder wires onto them but this is how I do it:

Look for the wide line on the pieces, and sort out ones that only have thin lines. The thin line ones might be useful with Wire Glue but are too hard to solder.

Then sort the pieces with wide lines by how big they are. They will all be about 0.55 volts but the larger pieces make more current than the smaller pieces and it's nice to have a panel with consistent current, especially the one you make with the biggest pieces.

Let's save the big pieces until we learn to do the small pieces.

Strip apart a short length of stranded wire and put the now loose strands in a small box just so you can find them and so they don't wander into another project and cause a short circuit.
ACTUALLY another option may be to use wire-wrap wire instead of bare strands, if you don't mind stripping the end of each piece.

The broken cells have a very thin conductive layer on the blue side and a very rough thicker one on the other. It will be more challenging to solder onto them than on perfect cells but this is how.
First the blue side...

Preparing Broken Cells
If you can solder onto the cells then they are higher quality than the ones I have
so you can skip these preparing steps:

On the blue side, scratch the thick line with a very small flat screwdriver with just a little force
so that the cell doesn't break, and the line should turn from white to shiny unless it's already
shiny and ready to solder. Try to make a little shiny circle. We will solder there.
Make the flat edge of the screwdriver completely touch the scratched area so it rubs wide.
Mostly push back and forth so that the rubbing removes the thin oxidation.
After scratching the line, turn the cell and scratch the circle back and forth again.
Maybe turn it once more and scratch it once more.

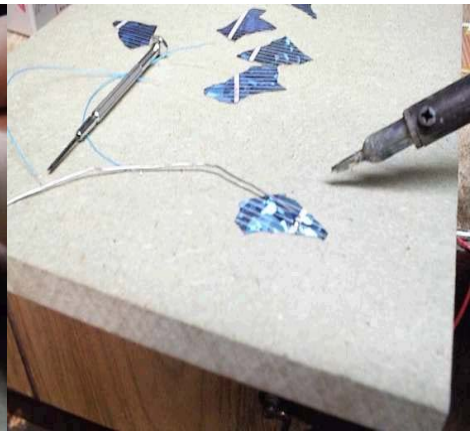
Now flip the cell over and notice the rough stuff on the back. If there appears to be
two different rough nesses or shades of grey, we are going to scratch in two places.
Again, turn the cell and scratch it in one or two little circles by pushing the edge of the
screwdriver up and down to remove the coating that solder won't stick to.

Now back to the blue side. Try to get a solder ball to stick.
If it does not stick, and rosin gunk’s up the area, scrape it off and try again,
and if it seems hopeless, scrape another part of the wide line on the cell.
I did not have the problem because of practice.

Now try to put a bump of solder in the two places scratched on the bottom of
the cell. I was only able to get one bump to stick. There are areas on the
bottom where solder just won't stick. But if neither spot sticks, try scraping the
rosin off the spots and soldering again, or carefully scratching another spot.
If you have a bump on the blue side, it's good but you can't lay the cell flat now.
The spot that worked was rougher and thicker than the one that didn't, and
that means there's a lot more silver there, and more likely it will solder.

Now that you have two solder bumps, you can attach two thin wires,
either strands from stranded wire, or thin wire-wrap wire.
What about thicker wire? It can pull the lines off the cell and then you can
forget about soldering it. Put it in the "wire glue" bin.

Now that there are two wires on the cell, test it with a meter. The Blue side of the cell will make up to 0.55 Negative volts, so connect the meter PLUS to the wire on the silver-gray bottom of the cell. My cell isn't getting much light but the meter needle is indicating that it is making electricity.


"Broken" or "crystalline" Cell Panels

In the last step I mentioned that the Blue side is Negative and the silver side is Positive.

Now all you have to do is solder your cells in Series to get more voltage. To do that you only need one more wire for each additional cell you add.
Remember each cell makes up to half a volt, so consider a 12 volt panel to have 24 or more cells. A few extra is good. One reason for that is a diode lowers the voltage just a little bit, and another is that it's nice to have 12 volts for charging batteries when it's not the sunniest time of day. A diode is used when the

panel charges batteries, so the batteries don't give any power back to the panel in the dark. That would be a waste of free power.

Because the cells are so fragile, it would be good to install them in a deep picture frame (shadow box) with double stick foam tape or RTV glue. Be careful, this is permanent. You could make it less permanent with hot-melt glue also.

At this point you don't need to think that the cells are "already broken", and you will have a well working panel. You could hide the shard-shapes with fluorescent lighting diffraction plastic over the framed panel if you like. Perhaps you've seen a shard-cell panel just like that being sold before.

 Preparing Glass (Amorphous) Cells

I received a surplus glass cell with instructions on how to use copper mesh to make a connection to the glass cell. The glass cell was pre-scratched in the area where the mesh and wires were supposed to go. But... even with the copper mesh, it didn't stick. It was doable, but hard to do, and not very strong. All the wires pulled off. Some of you may have had success with using copper mesh soldered to scratched areas of glass cells, but there is an easier way.

Perhaps you have a broken / damaged glass cell. You may still be able to use it, unless the damage has made the glass transparent, in which case there is severe damage to the photovoltaic part of the cell.

One interesting thing about the glass cells. Looking at them, you see lines, just as you may on "broken" or "crystalline" cells, but those lines are not current-collecting conductors. They are gaps between areas of the glass cell that each make about half a volt. So, glass cells can be expected to have 2 lines for every volt of output. And they can make 6 or 9 or 12 or 20 volts.

So, we want to connect the wires to places with the most amount of lines between them

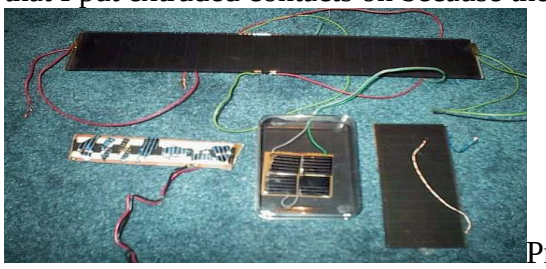
to get the highest voltage. And out the wires on the silver side, of course.

Scratch the silver (probably aluminum) near the edges and test the voltage and polarity, for your information. I usually use a red wire for Plus and a black or green for Negative.

Easy connection method:
You need two brass extrusions, carefully cut with a dremel (safety goggles!),
and wires soldered on this side of the extrusions ---> C
The extrusion must have enough space inside it for the glass cell to fit.
The extrusion is then crushed a little (before putting it on the glass)
so that it will bite the glass with some pressure and make contact with the scratched edge.

Slide the crushed extrusion onto the glass. If it's too crushed it won't go on, so pry it open. If it's not crushed enough it falls off, so crush it more. When it bites, and there is voltage in the light across the two extrusions, put sticky tape or just a little plastic cement over the extrusion to help it stay there.

The Glass cell is now ready to use.
The long one shown is actually two 9-volt ones on one glass, and is the one that I put extruded contacts on because the copper mesh wouldn't stick..


Preparing Copper Indium Selenide cells.
These are rather well prepared already.
They have easy to solder tabs, and are marked which end is Negative with a dash of a black marker.
The ones I got, I mounted in frames and in an acrylic polymer sheet sandwich.
Three in series ... in parallel with three more in series ... makes nice 12 volts.

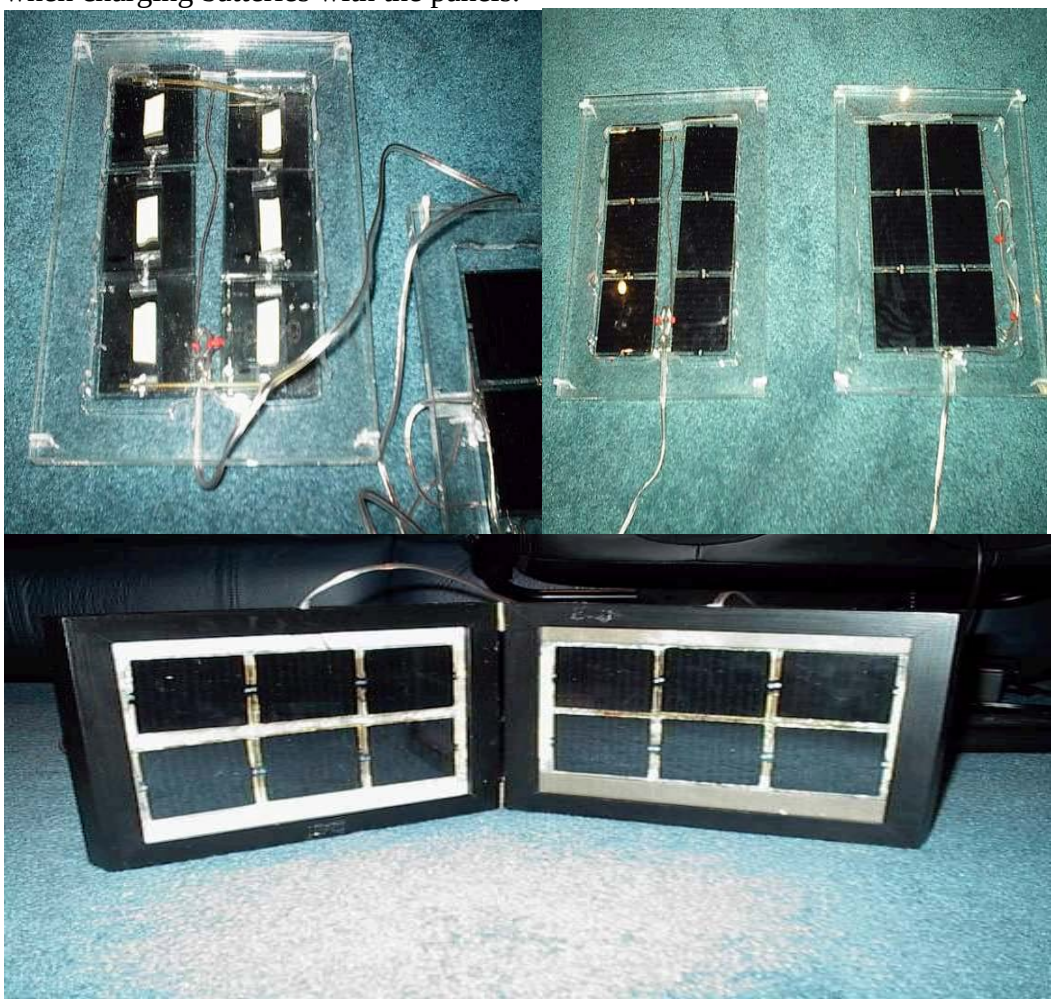
I have been advised that these cells undergo some kind of reaction if first exposed to full sun with no load for about 15 minutes, and that the result is good. I'm told that the result generates more output than if they are not treated this way. Just FYI. I didn't notice the difference between the panel that had pre-sunned cells and another that didn't.

The cells are glass tiles that appear to be made similar to the Amorphous glass, but they are more efficient, and produce around 4.5 volts and 100ma each in full sun, approximately. As they say, your mileage may vary. I have no advice for broken CIS cells.

It is very easy to connect CIS cells together. Peel back the tabs a little, which point to each other under the cell, and start to peel back the sticky tape that holds it on,

just enough so that you can solder them in series.
And watch the polarity! I goofed it up a couple of times.
No damage done, but I had to do it over.
When soldering, wet the ends of the tabs with solder, then press down quickly
with a popsicle stick or something to flatten them against the bottom of the cells.
The cells go together nicely like tiles.
With moderate carefulness, you don't need to worry much about ruining them yourself,
just don't leave them alone with curious people until your panel is done and safe inside
a solid frame. I've fastened them with both RTV Silicone and double-sticky-foam-tape.
I prefer the Silicone glued result, with the cell tiles grouted against the glass from behind.
(No silicone between the cells and the frame glass)
DSFT (foam tape) is more likely to (it has, in fact) let go of a couple of the cells.

As mentioned before, although I don't know if it's necessary for CIS cells, use a diode
when charging batteries with the panels.



Applications for small solar panels
The solar panels I made and pictured generate around 1 or 2 watts generally.

These are the applications I use them for:

Charging batteries.
In the blackout of 2003, those batteries ran our blackout party,
which included black lights, fans (it was a hot day), radio, small TV, and low voltage lights.
And an AC inverter.
(I go to the rechargeable battery recycle bins with a meter and if they are not really dead then I borrow them until they are. I didn't buy any of these batteries.)

Solar night lights - nowadays a very common thing where I live.

Solar powered fans - although my solar panels run computer fans directly when it's hot,
(The sun makes it hot, and the sun runs the fans!)
I notice that solar charged battery powered fans are MUCH MORE POWERFUL.

Solar Flashlights

Solar powered radios - including my ham radio shack.

ABOUT SOLAR POWERED COMPUTERS
I guess people don't leave their laptops in the sun...
My approach to designing a solar powered computer,
(and my definition of computer is a processor with memory
and a keyboard and a screen that runs not-necessarily-an-operating-system)
is to use very high resistance CMOS chips which use very little electricity,
just like watches and calculators... a computer is also a calculator with lots
of memory, and CMOS memory is a common thing!
At night time, the computer has not used up all it's solar power so it uses
what is stored in the rechargeable battery.
There is simply no demand for the solar powered computers,
nor any obstacle to solar powering a PDA or a laptop with similarly sized panels.

DUTY CYCLES:
In simple theory, if you get eight hours of sun and need one hour of power,
you can get by with one eighth the solar power by saving it up in batteries.
Also, if LED lights should run all night, it's easy to collect more than enough
solar power during the day in batteries with the right sized panel.

Getting more practical power from your panel
It is very easy to get a few solar cells and put them together into a panel, but sometimes it gets expensive to get enough cells to make a useful voltage.

If you obtained one or two large cells, you may have a whole watt or two, but only a volt or less, and that's sad. Not too many things run on less than a volt.

Perhaps you got enough big broken cells to make 6 volts , but wouldn't it be nice to have 12 volts? Then maybe you could keep a battery charged and occasionally run an inverter on it.

In the last step I mentioned how time could be used to save up power for another time when it will be used. And a small panel can make enough power over a long time to run a big load for a short time.

In this step I am talking about matching the voltage of the panel, whatever it may be, to the voltage that you find useful. Or generally, matching supply and demand in a satisfying practical way.

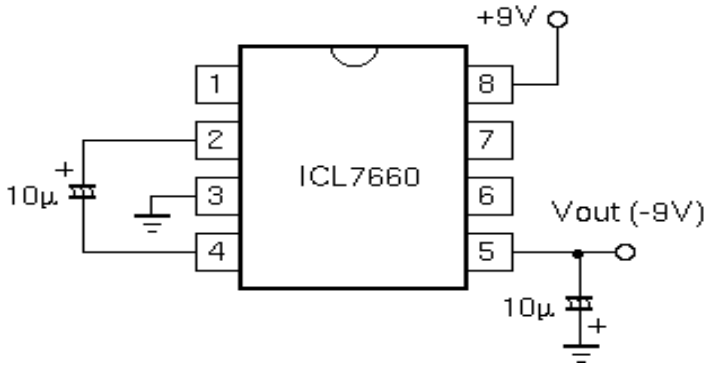
It may be possible to design a 2 volt circuit for a 2 volt panel, but unnecessary.

It is possible, although as far as I know, using obsolete Germanium transistors, to get any voltage out of a big half-volt cell, and I don't know a modern way, so I'll leave that idea alone.

But there are many voltage doublers or multiplier circuits that work at slightly higher voltages, and I see that I've made a few panels around 6 volts which I'd like to get 12 out of. There is a voltage doublers chip still available called ICL7660 or MAX1044 that is very convenient to use. So I will use it as an example, since I'd rather have around a watt at 12 volts than at 6 volts.

There is something else I did that was very obvious in the picture for step 1, where I had 3 "broken cell" panels around 6 volts and put them in series to get around 18 volts... and since the cells were large that array has a lot of current.

But if I use just one 6 volt panel and want 12 volts, I use the voltage doublers and get twice the voltage in exchange for half the current. AC transformers do the same thing... almost the same power goes out as goes in, but at a more useful voltage. Some circuits that do this are called "DC to DC converters".



Solar Thermal Water Heater For Less Than Five Dollars

This project will create a DIY solar hot water heater for less than five dollars (if you have access to a garbage dump). It will allow you to see the principles of solar water heating in action, and is highly customizable.

Its a great way to learn about using the renewable energy of the sun to produce useful effects, in this case hot water. You can use these instructions to build a device that will actually heat enough water to use in the home, but it would require modifications.

This device is more useful for camping or as a science experiment and teaching tool. A word of caution it is possible to create very hot water with this technique and you should be careful not to burn yourself. You can find this and more great DIY projects relating to renewable energy, solar cooking, and sustainable design at The Sietch

By using the sun instead of fossil fuels to heat your water you will be preventing dangerous greenhouse gasses from being released into the atmosphere, helping to prevent global warming

Materials

Materials needed

- Water
- 2 buckets
- Drill (with both drill bits and screw bits)
- Some scissors
- A saw (a simple hand saw will do)
- Some wood
- A pane of glass.
- The back of a small refrigerator.
- 12 feet of air pump hose used in fish tanks
- Backing material (we used an old door mat)
- A box of wood screws
- Aluminum Foil
- Role of duct tape
- Angle Cutter (or hack saw)

Time:

This project took about 3 hours of constructions time. It took a couple weeks to find all the parts.

Collection Of Materials

After our first attempt at a home built proof of concept solar thermal panel, we were a bit disappointed with the results. It took about 4 hours before the thing started work, and was a bit costly (at over 50 dollars) to make.

I knew it could be done better and cheaper. My first mistake with the first one was purchasing everything new. With ample reusable resources at the local town dump I knew it could be done on the cheap.

Another flaw from the first panel was using pond liner as our collection medium. Pond liner is plastic, does not absorb heat as well as other materials (like metal) and is harder to work with as you have to use glue or tape to create an air pocket to hold the water. It leaked the first couple of times we used it and took extensive repairs to make it work.

We solved this problem by using a ready made collector. Something that was already designed to distribute heat, and made of metal.

The last major flaw in our first panel was using Plexiglas for the cover. Its hard to work with as it will crack, and using two pieces left a hard to close crack in the middle.

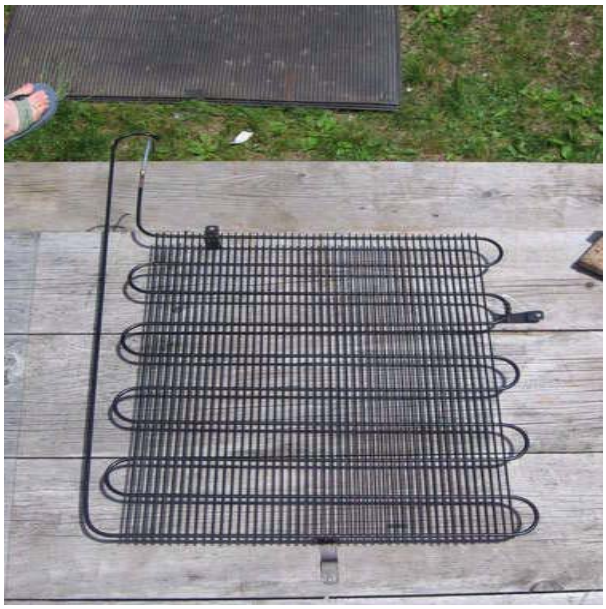
We solved this problem by using good old fashion window glass.

Now onto the project. The first thing we did was collect all of the parts.

Our local dump has a coolant removal program that has refrigerators and dehumidifiers that they remove old Freon from. With this in mind I found the perfect heat collector. The back of a fridge is basically a heat dispersal system, with a slight modification is can be used to collect large amounts of heat.

Make sure that the Freon, or other coolant has been removed, and cut the grill off at the base, near the large coolant holder.

Collector Prepared
This is what it looks like after you have it off the fridge. Note the two tubes, make sure you leave ample leads on the end for attaching the water hoses to later.



The Rest Of The Parts

There was an old couch that had been run over by one of the large dump plows, the inside wood was the perfect size for the frame. I found a pane of glass and an old rubber door mat that made the perfect backing and front. The glass was a real find, and may be the only part of the panel that may need to be purchased. Make sure your glass is big enough to fit over your collector and have enough room to attach it to the frame.

Preparing The Back

The door mat was HUGE, so I had to cut it in half. Funny thing seems there was a lot of nasty black goo, and a metal sheet in the middle. Who knew. Remove the metal plate (or cut it in half as well) and leave the goo.

Making The Frame

Once The backing was cut to size, it was time to start building the frame. As you can see I sort of built the frame around the collector, leaving enough backing to hold it all together.

The frame is held on by building a similar frame on the back and driving large wood screws through the front frame, the backing and into the back frame.

I added some foil to the backing. The reason for this is that counter to what you would think, you do not want the backing to warm up. You only want the collector to absorb heat (it was so nice of the fridge company to paint it black for us). The foil will take any sun that was not absorbed by the collector on the first pass and bounce it back over the collector for another try at absorption. The glass cover will help keep the heat inside the

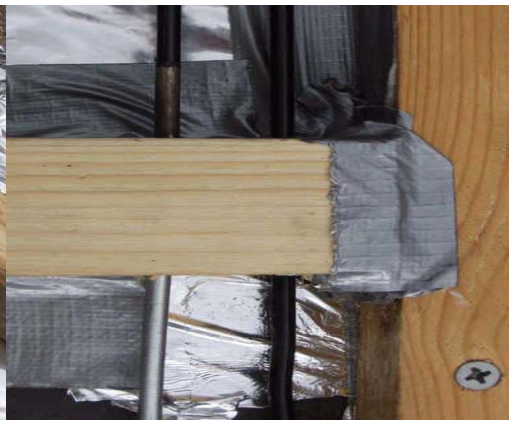
panel for further absorption.

Light can pass through glass, but heat has a hard time getting through glass, think greenhouse. If you were going to make your backing out of metal instead of rubber, you would skip the foil and instead attach the collector directly to the metal backing. The reason for this is that the metal back (painted black) would absorb heat and transfer it to the collector, the rubber mat however is not a very good heat transfer agent. If you use a metal backing consider using insulation on the back of the panel to try and keep as much heat in your collector box as possible.

Notice how duct tape was used on the inside to seal all cracks, you could use caulk but I didn't have any so I used the cheapest option. It worked well, and held the foil in place.

Attaching Collector To Frame

Next we cut some notches for the entry and return ports to the collector. Note again the use of duct tape to seal cracks.

Finishing Touches

I got some air pump hose from the local fish store and attached them to the end of the entry and return ports.

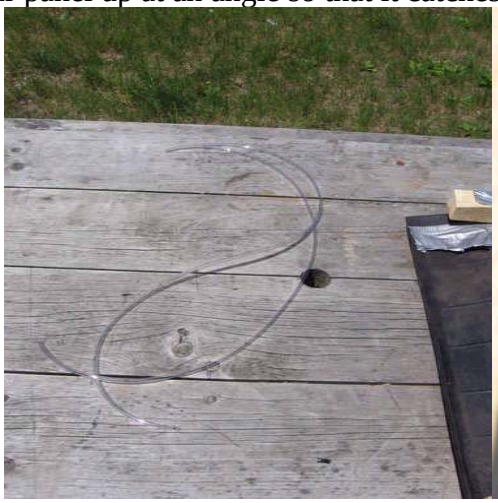
The duct tape was applied to make sure it was a tight fit, it was later removed as it was not needed.

Next we attached the collector to the backing, using the mounting brackets that came on the fridge and some duct tape. If you wanted you could use some screws and wood, but I found the tape and the natural tension of the construction to be enough to hold it in place.

Lastly we attach the glass to the top. This serves to trap all the infrared radiation from the sun inside our panel where our collector will absorb it. Again light can pass through glass, but heat can not easily escape

As you can see simple duct tape is enough to hold it on. I would recommend using some sort of mounting bracket however as after a couple days in the sun the tape started to droop allowing the glass to slide off. A few screws would solve this, but I am cheap so I just put new tape on.

Set your panel up at an angle so that it catches the most sun.







Wrap-up

Here is the gross part, put one end of the hose into your bucket of cold water, and make sure it is at the bottom of the bucket, next grab the return hose and start sucking. That's right, unfortunately you have to prime the panel by getting some water into it. This can be done without getting water in your mouth, but inevitably I sucked just a little too hard and ended up with a mouth full of nasty water. I would recommend having a friend do this part. :

Set your cold water bucket (source) up higher than your warm water bucket (return) and the whole thing will gravity siphon.

A word of warning, this panel works VERY WELL. We tested it on a very sunny day and within seconds the water coming out of the panel was hot enough TO SCALD. I burned my fingers. This very hot water is only formed when the water inside the panel is allowed to sit for about a minute without moving. If the water is moving (do to the gravity siphon) the water exiting the return pipe is about 110 degrees, and while hot, will not burn you.

The water does not flow through the panel very fast (as the pipes are very small) but that is sort of a good thing as it allows the water to heat up a lot on its journey through the collector. It does take a while to heat up a 5 gallon bucket of water, I ended up building an insulated return bucket that was all black and sealed on the top except for the port where the water tube enters. This kept the returned hot water hot long enough to be of use. Simply pour the heated water back into the "cold" bucket and send it through the collector a second time for even hotter water.

I let this guy run for a couple of hours one hot sunny day and heated up a five gallon

bucket of cold water (measured at 70 degrees F) to over 110 degrees F. The temp that day was about 76 degrees F. If the water is allowed to sit in the panel for several minutes and then forced out (by blowing in one of the hoses) the water was measure at 170 degrees F. All in all we are much happier with the performance (and cost) of this panel. It performs much better than the previous one.

Our next modifications to this design will be to alter the return port so that it will thermo siphon, in this way the return hose can be fed into the source bucket and the water will continually circulate in the panel getting hotter and hotter. We have also talked about adding mirrors to the panel to concentrate more heat. Our goal is to boil water. This entire project cost less than five dollars, as I already had the screws, and the duct tape. The only thing I purchased was the air hose, which cost $3.76.

Enjoy the hot water.

Run Your Car on Hydrogen from Aluminum Soda Cans and Lye

Here's how it works.

Soda cans are dumped into a tank of Lye (sodium hydroxide and water).
The sodium hydroxide peels off the aluminum oxide surface from the aluminum allowing water to come into contact with aluminum metal. The aluminum immediately oxidizes, ripping the water's oxygen atoms away to make aluminum oxide. That releases the hydrogen which bubbles out to be burned in the Lincoln's engine.
Here's the reaction: H2O + Al -> AlO2 + H2 + heat

Lye tank and water bubbler
Here's James with the lye tank. The aluminum cans go in here.
His left hand is on the hydrogen vent hose. The gas that bubbles out of it is hot and steamy and has a fair amount of powdery white aluminum oxide in it. So next it goes into a pipe to the bottom of the white bubbler tank, where it bubbles through water. That makes it cool and clean.
Just like in a hookah or bong.

Storage Bag
From the water bubbler bong the hydrogen goes into this black garbage bag for storage. The reaction can take place at high pressures, so in future the lye tank and other parts of the gas generator will be pressure vessels leading into a high pressure storage tank.

Engine Air Intake Duct
From the storage bag the hydrogen goes to the car's air intake.

James has gotten the car to run on hydrogen concentrations between 5% and 70%, so the mix is pretty forgiving. Here it's controlled by a tuna can resting on top of the aluminum duct tee.

In the future setup it'll be replaced by a proper butterfly valve to set the mixture to some optimum.

Soda Cans and Lye in Action
Here's what it looks like when cans dissolve in lye.

The white powdery stuff is mostly aluminum oxide with a bit of sodium hydroxide. The water has to be replenished often as it gets cracked away to oxidize the aluminum and release hydrogen.

The lacquer and labels on the cans are a bit of a nuisance, they block the lye from getting to the outside of the cans. Shredded cans might be better.

If you want to make your own sodium hydroxide, you can leach it out of ashes

How to make Hydrogen

Throughout this article I will show you how to create, store and use your hydrogen.

The hydrogen you will be making utilizes the hydrogen producing reaction between NaOH
(Sodium Hydroxide) and Al (Aluminum) in the presence of water. I will not go into the
chemistry here, however, if you wish, Google will hold the answers.

Materials

You will need the following materials to make, store and use hydrogen.

1. Drain Cleaning Crystals (Sodium Hydroxide (NaOH))
2. Aluminum Foil (1Meter or so will do)
3. A Beverage in a GLASS bottle
4. Balloons
5. Ignition source
6. Water
7. **AND MOST OF ALL SAFETY EQUIPMENT**

In total all this cost me less than $15 dollars

Preparation Step 1
Drink Beverage.

 Preparation step 2 - 3

Setting up the Reaction Chamber (filling the bottle)

1. Get yourself to a well ventilated area.
2. Get a bucket of water and grab some safety glasses if you wish.
3. Pour about two tablespoons of the Drain cleaner into the bottle depending on the size of the bottle and strength of drain cleaner.
4.Get a reasonable length aluminum foil
5. Fold this foil into a long bar and force into bottle (don't worry if most of the foil is not touching the NaOH as it will eventually fall in. And If all the foil was at the bottom the reaction would be too vigorous)




Starting the reaction

1. 1/3 fill the bottle with water
2. Watch the reaction go.

The reaction takes a while to start however, within seconds the water will be almost boiling(this is an extremely exothermic reaction).
If the reaction gets too hot most of the gas released will be Steam (which is pretty much useless).

In order to slow the reaction tip water on the sizes of the bottle or place the
bottle in a water bath.

On the other hand if the reaction is to slow you may need to make sure that you add more aluminum and NaOH next time.

I have also included a video of the reaction bubbling away for your interest.

Collecting your hydrogen

Ok to collect your hydrogen you need to immediately place a balloon over the top of your bottle after pouring in the water.

If you do this right your balloon will be lighter than air however due to the steam produced in the vigorous reaction from the foil used you will get better results using solid aluminum.

When your balloon looks full pull it off. WEAR GLOVES then tie it off and now you have your own mini Hindenburg (Watch out though blowing up this balloon should be done at a safe distance and is really loud).

Here is a balloon that was filled a year ago
Imagine the possibly of making your own
Energy.

Ok your pretty much done
However, if you want more fun you can always put more
reactants into the chamber (bottle) and light the top.
Depending on the rate of reaction and the amount of steam produced you
should
have a self sustaining hydrogen lantern.
This lasts about 10 minutes maximum.

CHECK OUT THESE HYDROGEN CONVERSION KITS

Bob Lazaar's hydrogen kit company **Switch2Hydrogen.com**
IntergalacticHydrogen.com
Hydrogen-Boost.com - 5-25% increase efficiency

Biodiesel

The diesel engine was originally designed to run on vegetable oil so farmers could grow their own fuel. Bear in mind the cost of growing crops. Only when waste/excess organic matter is used can BioDiesel be considered a "renewable" energy source.

BioDiesel Kit

Biodiesel kit is necessary equipment for bio-diesel production in order to use the biodiesel as an alternative energy for home consumption. You can build it by yourself or buy the full bio diesel kit. The major reason that I see for buying a biodiesel kit is safety. The built in safety elements in a bio-diesel kit are very important. Just to understand what kind of safety features I am talking about, let us take the sealed system processor as an example. This protection feature is not allowing any fumes to leak out when the chemical reaction occurs and of course these fumes are toxic.

Biodiesel kit processor comes in several sizes and scales and therefore has a wide price range. I have seen prices that start from $800 up to $5000. Before buying a bio diesel processor kit, you should check what are your needs? What is your required quantity and how frequent will you need it?

Bio-Diesel is Economical

Let's say it loud and clear, making biodiesel saves money! If you make biodiesel at home, you can save more than 50% of your petrodiesel expenses. The fact that making biodiesel procedure is an easy process encourages more and more people to use biodiesel.

Make your own biodiesel

Anybody can make biodiesel. It's easy, you can make it in your kitchen -- and it's BETTER than the petrol-diesel fuel the big oil companies sell you. Your diesel motor will run better and last longer on your home-made fuel, and it's much cleaner -- better for the environment and better for health. If you make it from used cooking oil it's not only cheap but you'll be recycling a troublesome waste product. Best of all is the GREAT feeling of freedom, independence and empowerment it will give you. Here's how to do it -- everything you need to know.

Three choices

There are at least three ways to run a diesel engine on biofuel using vegetable oils, animal fats or both. All three are used with both fresh and used oils.

- Use the oil just as it is -- usually called SVO fuel (straight vegetable oil) or PPO fuel (pure plant oil);
- Mix it with kerosene (paraffin) or petroleum diesel fuel, or with biodiesel, or blend it with a solvent, or with gasoline;
- Convert it to biodiesel.

The first two methods sound easiest, but, as so often in life, it's not quite that simple.

1. Mixing it

Vegetable oil is much more viscous (thicker) than either petro-diesel or biodiesel. The purpose of mixing it or blending it with other fuels is to lower the viscosity to make it thinner so that it flows more freely through the fuel system into the combustion chamber.

If you're mixing veg-oil with petroleum diesel or kerosene you're still using fossil-fuel -- cleaner than most, but still not clean enough, many would say. Still, for every gallon of vegetable oil you use, that's one gallon of fossil-fuel saved, and that much less climate-changing carbon in the atmosphere.

People use various mixes, ranging from 10% vegetable oil and 90% petro-diesel to 90% vegetable oil and 10% petrol-diesel. Some people just use it that way, start up and go, without pre-heating it (which makes veg-oil much thinner), or even use pure vegetable oil

without pre-heating it.

You might get away with it with an older '80s Mercedes 5-cylinder IDI diesel, which is a very tough and tolerant motor -- it won't like it but you probably won't kill it. Otherwise, it's not wise.

To do it properly you'll need what amounts to an SVO system with fuel pre-heating anyway, preferably using pure petrol-diesel or biodiesel for starts and stops. (See next.) In which case there's no need for the mixes.

Blends with various solvents and/or with unleaded gasoline are "experimental at best", little or nothing is known about their effects on the combustion characteristics of the fuel or their long-term effects on the engine.

Higher viscosity is not the only problem with using vegetable oil as fuel. Veg-oil has different chemical properties and combustion characteristics from the petroleum diesel fuel for which diesel engines and their fuel systems are designed. Diesel engines are high-tech machines with very precise fuel requirements, especially the more modern, cleaner-burning diesels (see **The TDI-SVO controversy**). They're tough but they'll only take so much abuse.

There's no guarantee of it, but using a blend of up to 20% veg-oil of good quality with 80% petrol-diesel is said to be safe enough for older diesels, especially in summer. Otherwise using veg-oil fuel needs either a professional SVO solution or biodiesel.

Mixes and blends are generally a poor compromise. But mixes do have an advantage in cold weather. As with biodiesel, some kerosene or winterized petrol-diesel fuel mixed with straight vegetable oil lowers the temperature at which it starts to gel. (See **Using biodiesel in winter**)

More about fuel mixing and blends.

2. Straight vegetable oil

Straight vegetable oil fuel (SVO) systems can be a clean, effective and economical option.

Unlike biodiesel, with SVO you have to modify the engine. The best way is to fit a professional single-tank SVO system with replacement injectors and glow plugs optimised for veg-oil, as well as fuel heating. With the German Elsbett single-tank SVO system for instance you can use petro-diesel, biodiesel or SVO, in any combination. Just start up and go, stop and switch off, like any other car. Journey to Forever's Toyota TownAce van has an Elsbett single-tank SVO system. **More**

There are also two-tank SVO systems which pre-heat the oil to make it thinner. You have to start the engine on ordinary petroleum diesel or biodiesel in one tank and then switch to SVO in the other tank when the veg-oil is hot enough, and switch back to petrol- or biodiesel before you stop the engine, or you'll coke up the injectors.

3. Biodiesel or SVO?

Biodiesel has some clear advantages over SVO: it works in any diesel, without any conversion or modifications to the engine or the fuel system -- just put it in and go. It also has better cold-weather properties than SVO (but not as good as petrol-diesel -- see **Using biodiesel in winter**). Unlike SVO, it's backed by many long-term tests in many countries, including millions of miles on the road.

Biodiesel is a clean, safe, ready-to-use, alternative fuel, whereas it's fair to say that many SVO systems are still experimental and need further development.

On the other hand, biodiesel can be more expensive, depending how much you make, what you make it from and whether you're comparing it with new oil or used oil (and depending on where you live). And unlike SVO, it has to be processed first.

But the large and rapidly growing worldwide band of biodiesel home brewers don't mind that -- they make a supply every week or once a month and soon get used to it. Many have been doing it for years.

Anyway you have to process SVO too, especially WVO (waste vegetable oil, used, cooked oil, also called UCO, used cooking oil), which many people with SVO systems use because it's cheap or free for the taking. With WVO food particles and impurities and water must be removed, and it probably should be deacidified too.

Biodieselers say, "If I'm going to have to do all that I might as well make biodiesel instead." But SVO types scoff at that -- it's much less processing than making biodiesel, they say.

Costs and prices: Biodieselers using waste oil feedstock make biodiesel for 50 cents to US$1 per US gallon.

Most people in the US use about 600 gallons of fuel a year (about 10 gallons a week), costing about US$1,800 a year (mid-'07). Petro-diesel costs about three times more in the other industrialized countries (in the UK in mid-'07 it cost the equivalent of US$7.37 for a US gallon of petrol-diesel) but those countries generally use less fuel than the US.

Biodieselers will be paying $300-360 for their fuel, while a good processor can be set up for around $100 up. An SVO system costs from about $500 to $1,200 or more. So with an SVO system you'll be ahead of fossil-fuel prices within a year, not a long time in the life of a diesel motor, but you're probably still behind the biodieselers.

Will the engine last as long with SVO? Yes, if you use a good system

(Note: Small quantities of methanol can cost the equivalent of US$8 to $10 per US gallon, but experienced biodieselers invariably buy it in bulk for about $2-3 per gallon.)

Biodiesel

Converting the oil to biodiesel is probably the best all-round solution of the three options

(or we think so anyway).

You could simply **buy** your biodiesel. Most major European vehicle manufacturers now provide vehicle warranties covering the use of pure biodiesel -- though that might not be just *any* biodiesel. Some insist on "RME", rapeseed methyl esters, and won't cover use of soy biodiesel (which isn't covered by the Euro biodiesel standard). Germany has thousands of filling stations supplying biodiesel, and it's cheaper there than ordinary diesel fuel. All fossil diesel fuel sold in France contains between 2% and 5% biodiesel. New EU laws will soon require this Europe-wide. Some states in the US are legislating similar requirements. There's a growing number of US suppliers and sales are rising fast, though biodiesel is more expensive than ordinary diesel in the US. In the UK biodiesel is taxed less than petrodiesel and it's available commercially.
But there's a lot to be said for the GREAT feeling of independence you'll get from making your own fuel!

If you want to make it yourself, there are **several good recipes** available for making high-quality biodiesel, and they say what we also say: some of these chemicals are dangerous, take full **safety** precautions, and if you burn/maim/blind/kill yourself or anyone else, that will make us very sad, but not liable -- we don't recommend anything, it's nobody's responsibility but your own.

On the other hand, nobody has yet burned/maimed/blinded/killed themselves or anyone else making homebrewed biodiesel. Large numbers of ordinary people all over the world are making their own biodiesel, it's been going on for years, and so far there have been NO serious accidents. It's safe if you're careful and sensible.

"Sensible" also means not over-reacting, as some people do: "I'd like to make biodiesel but I'm frightened of all those terrible poisons." In fact they're common enough household chemicals. Lye is sold in supermarkets and hardware stores as a drain-cleaner, there's probably a can of it under the sink in most households. Methanol is the main or only ingredient in barbecue fuel or fondue fuel, often sold in supermarkets and chain stores as "stove fuel" and used at the dinner table; it's also the main ingredient in the fuel kids use in their model aero engines. So get it in perspective, there's no need to be frightened. See **Safety** and **More about methanol** for further information.

Where do I start?

Start with the **process**, **NOT** with the processor. The processor comes later.

Start with **fresh unused oil**, **NOT** with waste vegetable oil (WVO), that also comes later.

Start by making a small, 1-litre test batch of biodiesel using fresh new oil. You can use a spare blender, or, better, make a simple **Test-batch mini-processor**.

Keep going, step by step. Study everything on this page and the next page and at the links in the text. There are checks and tests along the way so you won't go wrong.

Go on, do it! Thousands and thousands of others have done it, so can you. Get some methanol, some lye and some new oil at the supermarket and go ahead -- it's a real thrill!

Here's the recipe. Or just keep reading, you'll get to the recipe in a minute anyway.

What's next?

Learn, one step at a time. It's all quite simple really, very few biodiesel home brewers are chemists or technicians, there's nothing a layman can't understand, and do, and do it well. But there is a lot to learn. You'll find everything you need to know right here. We've tried to make it easy for you. You start off with the simplest process that has the best chance of success and move on step by step in a logical progression, adding more advanced features as you go.

- "I am a pipe welder who knew nothing about chemistry but I have learned a lot from this website. It's set up for someone who has never had a chemistry class (me). If I can understand this anyone can." -- Marty, Biofuel mailing list, 23 Oct 2005

- "For anyone starting out or still in the R&D phase of scaling up and tweaking the process to improve quality, disregard anything other than the tried and tested directions at JtF. Print them out. Read them and then re-read them. Follow the instructions, don't add or subtract anything and you will be making quality biodiesel." -- Tom, Biofuel mailing list, 5 Nov 2005

- "My best advice is to follow explicitly the instructions on the J2F website starting from the beginning and you will do just fine. In my own journey of discovery I learned this. You cannot afford to cut corners. Don't be tempted to use less than accurate measures and think that it will be alright. There is no cheating." -- Joe, Biofuel mailing list, 4 Jan 2006

This is how it works -- comment from a Biofuel list member:

> "Your website is very well done. I appreciate the layers of technical complexity. You have progressively more technical information layered in an escalating and logical fashion. I like the links as each new item is introduced, the user can click for more specific information on a topic and it opens in a new window. This eliminates the tediousness of having to constantly backtrack to where the new concept was introduced."

The process

Vegetable and animal fats and oils are triglycerides, containing glycerin. The biodiesel process turns the oils and fats into esters, separating out the glycerin. The glycerin sinks to the bottom and the biodiesel floats on top and can be siphoned off.

The process is called transesterification, which substitutes alcohol for the glycerin in a chemical reaction, using lye as a catalyst. See **How the process works**

Chemicals needed

The alcohol used can be either methanol, which makes methyl esters, or ethanol (ethyl esters). Most methanol comes from fossil fuels (though it can also be made from biomass, such as wood), while most ethanol is plant-based (though it is also made from petroleum) and **you can distill it yourself**. There is as yet no "backyard" method of producing methanol. But the biodiesel process using ethanol is more difficult than with methanol, it's not for beginners. (See **Ethyl esters**.)
Ethanol (or ethyl alcohol, grain alcohol -- EtOH, C2H5OH) also goes by various other well-known names, such as whisky, vodka, gin, and so on, but methanol is a poison. Actually they're both poisons, it's just a matter of degree, methanol is more poisonous. But don't be put off -- methanol is not dangerous if you're careful, it's easy to do this safely. Safety is built-in to everything you'll read here. See **Safety**. See **More about methanol**.

Methanol is also called methyl alcohol, wood alcohol, wood naphtha, wood spirits, methyl hydrate (or "stove fuel"), carbonyl, colonial spirits, Columbian spirits, Manhattan spirits, methyl, methyl hydroxide, hydroxymethane, monohydroxymethane, pyroxylic spirit, or MeOH (CH3OH or CH4O) -- all the same thing. (But, confusingly, "methylcarbinol" or "methyl carbonyl" is used for both methanol and ethanol.)

You can usually get **methanol** from bulk liquid fuels distributors; in the US try getting it at race tracks. With a bit of patience, most people in most countries manage to track down a source of methanol for about US$2-3 per US gallon.

For small amounts, you can use "DriGas" fuel antifreeze, one type is methanol (eg "HEET" in the yellow container), another is isopropyl alcohol (isopropanol, rubbing alcohol), make sure to get the methanol one.

Methanol is also sold in supermarkets and chain stores as "stove fuel" for barbecues and fondues, but check the contents -- not all "stove fuel" is methanol, it could also be "white gas", basically gasoline. It must be pure methanol or it won't work for making biodiesel. See **Methanol suppliers**

Methylated spirits (denatured ethanol) doesn't work; isopropanol also doesn't work.

The **lye** catalyst can be either potassium hydroxide (KOH) or sodium hydroxide (caustic soda, NaOH).

NaOH is often easier to get and it's cheaper to use.

KOH is easier to use, and it does a better job. Experienced biodieselers making top-quality fuel usually use KOH, and so do the commercial producers. (KOH can also provide potash fertilizer as a by-product of the biodiesel process.)

With KOH, the process is the same, but you need to use 1.4 times as much (1.4025). (See **More about lye**.)

You can get both KOH and NaOH from soap makers' suppliers and from chemicals suppliers.

NaOH is used as drain-cleaner and you can get it from hardware stores. It has to be pure NaOH. Shake the container to check it hasn't absorbed moisture and coagulated into a useless mass, and make sure to keep it airtight.

The Red Devil-brand NaOH lye drain-cleaner previously sold in the US is no longer made. Don't use Drano or ZEP drain-cleaners or equivalents with blue or purple granules or any-coloured granules, it's only about half NaOH and it contains aluminum -- it won't work for biodiesel.

CAUTION:
Lye (both NaOH and KOH) is dangerous -- don't get it on your skin or in your eyes, don't breathe any fumes, keep the whole process away from food, and right away from children. Lye reacts with aluminum, tin and zinc. Use HDPE (High-Density Polyethylene), glass, enamel or stainless steel containers for methoxide. (See **Identifying plastics**.) See **Safety**

See also **Making lye from wood ash**.

Chemicals for WVO

Isopropanol for titration is available from chemicals suppliers. Some people have used the other kind of Dri-Gas, which is isopropanol, but they found that it's unreliable. Best get 99% pure isopropanol from a chemicals supplier. 70% pure isopropanol is also said to work, but we found it didn't give satisfactory results.

Contrary to rumor, "phenol red", sold by pool supply stores and used for checking water, won't work for titrating WVO, its pH range isn't broad enough. Use **phenolphthalein** indicator, specifically 1% phenolphthalein solution (1.0w/v%) with 95% ethanol. Phenolphthalein lasts about a year. It's sensitive to light, store it in a cool, dark place. You can get it from chemicals suppliers.

Make your first test batch

Here's what you need:

- 1 litre of new vegetable oil, whatever the supermarket sells as cooking oil
- 200 ml of methanol, 99+% pure
- lye catalyst -- either potassium hydroxide (KOH) or sodium hydroxide (NaOH)
- blender or mini-processor
- scales accurate to 0.1 grams, preferably less -- 0.01 grams is best
- measuring beakers for methanol and oil
- half-litre translucent white HDPE (#2 plastic) container with bung and screw-on cap
- 2 funnels to fit the HDPE container

- 2-litre PET bottle (water or soft-drinks bottle) for settling
- two 2-litre PET bottles for washing
- duct tape
- thermometer

All equipment should be clean and dry.

For methanol, you can use "DriGas" fuel antifreeze from an automotive store. One type of DriGas is methanol, another is isopropanol, make sure to get the methanol one. Also try "stove fuel" from hardware stores or home centers (but check the contents to make sure it's pure methanol, it could also be "white gas", which is gasoline and doesn't work), or try a chemicals supply company. See **Methanol suppliers**

You can get lye at hardware stores, or from soap makers' suppliers (try online). KOH lye (potassium hydroxide) works better than NaOH (sodium hydroxide). "Red Devil" NaOH lye drain-cleaner is no longer made. Don't use Drano or ZEP drain-cleaners or equivalents with blue or purple granules or any-colored granules, it's only about half NaOH and it contains aluminum, it won't work for biodiesel. Shake the container to check it hasn't absorbed moisture and coagulated into a useless mass, and make sure to keep it airtight.

Safety

Read and observe the **Safety** instructions below.

2. Lye

You need to be quick when measuring out the lye because it very rapidly absorbs water from the atmosphere and water interferes with the biodiesel reaction.

Measure the lye out into a handy-sized lightweight plastic bag on the scales (or even do the whole thing entirely inside a big clear plastic bag), then close the lid of the container firmly and close the plastic bag, winding it up so there's not much air in it with the lye and no more air can get in. Have exactly the same kind of bag on the other side of the scale to balance the weight, or adjust the scale for the weight of the bag.

How much to use. NaOH must be at least 97% pure, use exactly 3.5 grams. If you're using KOH it depends on the strength. If it's 99% pure (rare) use exactly 4.9 grams (4.90875). If it's 92% pure (more common) use 5.3 grams (5.33), with 90% pure use 5.5 grams (5.454), with 85% pure use 5.8 grams (5.775). Any strength of KOH from 85% or stronger will work.

3. Mixing the methoxide

Use the "**Methoxide the easy way**" method -- it's also the safe way. Here's how to do it.

Measure out 200 ml of methanol and pour it into the half-liter HDPE container via the

funnel. Methanol also absorbs water from the atmosphere so do it quickly and replace the lid of the methanol container tightly. Don't be too frightened of methanol, if you're working at ordinary room temperature and you keep it at arm's length you won't be exposed to dangerous fumes. See **More about methanol**.

Carefully add the lye to the HDPE container via the second funnel. Replace the bung and the screw on the cap tightly.

Shake the container a few times -- swirl it round rather than shaking it up and down. The mixture gets hot from the reaction. If you swirl it thoroughly for a minute or so five or six times over a period of time the lye will completely dissolve in the methanol, forming sodium methoxide or potassium methoxide. As soon as the liquid is clear with no undissolved particles you can begin the process.

The more you swirl the container the faster the lye will dissolve. With NaOH it can take from overnight to a few hours to as little as half-an-hour with lots of swirling (but don't be impatient, wait for ALL the lye to dissolve). Mixing KOH is much faster, it dissolves in the methanol more easily than NaOH and can be ready for use in 10 minutes.

4. The process

Using a blender. Use a spare blender you don't need or get a cheap second-hand one -- cheap because it might not last very long, but it will get you going until you build something better.

Check that the blender seals are in good order. Make sure all parts of the blender are clean and dry and that the blender components are tightly fitted.

Pre-heat the oil to 55 deg C (130 deg F) and pour it into the blender.

With the blender still switched off, carefully pour the prepared methoxide from the HDPE container into the oil.

Secure the blender lid tightly and switch on. Lower speeds should be enough. Mix for 20-30 minutes.

Using a mini-processor. Follow the instructions here and improvise where necessary -- there are many ways of building a processor like this.

Proceed with processing as above, maintain temperature at 55 deg C (130 deg F), process for one hour.

4. Transfer

As soon as the process is completed, pour the mixture from the blender or the mini-processor into the 2-litre PET bottle for settling and screw on the lid tightly. (As the mixture cools it will contract and you might have to let some more air into the bottle later.)

5. Settling

Freshly made biodiesel, 20 minutes after processing

Allow to settle for 12-24 hours.

Darker-colored glycerin by-product will collect in a distinct layer at the bottom of the bottle, with a clear line of separation from the pale liquid above, which is the biodiesel. The biodiesel varies somewhat in color according to the oil used (and so does the by-product layer at the bottom) but usually it's pale and yellowish (used-oil biodiesel can be darker and more amber). The biodiesel might be clear or it might still be cloudy, which is not a problem. It will clear eventually but there's no need to wait.

Carefully decant the top layer of biodiesel into a clean jar or PET bottle, taking care not to get any of the glycerin layer mixed up with the biodiesel. If you do, re-settle and try again.

Quality

Proceed to the wash-test to check the quality. If your biodiesel doesn't pass the test, here's what to do next.

7. Washing

If it passes the wash-test then wash the rest of the biodiesel. See **Washing**. For washing

use the two 2-litre PET bottles in succession, with half a litre of tap water added for each of the three or four washes required. Pierce a small 2mm hole in the bottom corner of each of the two bottles and cover the hole securely with duct tape.

Pour the biodiesel into one of the wash bottles. Add the half-litre of fresh water.

a. Bubble-washing. See instructions here. Use a small aquarium air-pump and an air-bubbler stone -- cut the threaded lid off the wash bottles if necessary to get the stone in. After washing and settling, drain off the water from the bottom of the bottle by removing the duct tape from the hole. Block it again with your finger when it reaches the biodiesel. Transfer the biodiesel to the second wash bottle, add fresh water and wash again. Clean the first bottle and replace the duct tape. Repeat until finished.

b. Stirring. See instructions here. If you have a small enough paint stirrer and a variable-speed drill, cut the lids off the bottles as above to accommodate the stirrer. Stir until oil and water are well mixed and appear homogenous. Settle for two hours or more, drain as above for bubble-washing, repeat until finished.

If you don't have a stirrer, don't cut the lids off the wash bottles. Add the biodiesel and the water as above. Screw the cap on tightly. Turn the bottle on its side and roll it about with your hands until oil and water are well mixed and homogenous. Settle, drain as above for bubble-washing, repeat until finished.

8. Drying

When it's clear (not colorless but translucent) it's dry and ready to use. It might clear quickly, or it might take a few days or up to a week. If you're in a hurry, heat it gently to 48 deg C (120 deg F) and allow to cool.

9. Congratulations! You have just made high-quality diesel fuel. Say goodbye to Exxon Mobil & Co., you don't need them anymore.

ETHANOL as FUEL

Some argue that it consumes more energy to make than is derived from its burning. When derived from what would otherwise be waste, then we have a net gain.

'The Fuel Man' site provides instruction on how to make your own ethanol and convert your fuel-injected or carbureted car to run on homemade fuel. **Electronic Bi-Fuel Converter**

In Brazil, Ethanol fuel is produced from sugar cane which is a more efficient source of fermentable carbohydrates than corn as well as much easier to grow and process. Brazil has the tropical climate that is required for the productive culture of sugarcane. Brazil has the largest sugar cane crop in the world, and is the largest exporter of ethanol in the world. High government sales taxes on gasoline, as well as government subsidies for

ethanol, have cultivated a profitable national ethanol industry. Nearly all fueling stations in Brazil offer a choice of either gasoline type C or hydrated ethanol. NOTE: Ethanol generates 35% more energy than it takes to produce, due to the use of solar energy to grow the corn, according to a study by Argonne National Laboratory.

COLD FUSION

What is cold fusion and what does it mean to science and society?

Cold fusion is important because it promises to be a new source of pollution-free, inexhaustible energy. In addition, it is important because it reveals the existence of a new way nuclei of atoms can interact that conventional scientific theory predicts is impossible. What then is this phenomenon that offers such promise?

Energy can be obtained from the atomic nucleus in two different ways. On the one hand, a large nucleus can be broken into smaller pieces, such as is experienced by uranium in a conventional nuclear reactor and by the material in an atom bomb. This is called fission. On the other hand, two very small nuclei can be joined together, such as occurs during fusion of two light elements known as deuterium and tritium in a Hot Fusion reactor as well as in a hydrogen thermonuclear bomb. This process, called fusion, also takes place in our Sun and stars to produce much of the light we see.

The fission reaction is caused to happen by adding neutrons (one of the components of an atomic nucleus) to the nucleus of uranium or plutonium to make it unstable. The unstable nucleus splits into two nearly equal pieces, thereby releasing more neutrons, which continue the process. As every one now knows, this process produces considerable dangerous waste that is highly radioactive. The uranium used as fuel also occurs in limited amounts in the earth's crust. As a result, this source of energy is not ideal, although widely used in electricity nuclear generating plants at the present time.

Fusion reactions bring together two atomic nuclei and force them together to combine into one. This takes a large amount of energy to overcome the natural electromagnetic repulsion between the nuclei, but when they combine, the resulting single nucleus has a mass slightly less than the two original ones. This difference in mass (m, say) converts into energy (E, say), as predicted by Einstein and described by his famous equation, $E=mc^2$, c being the speed of light. Lighter nuclei are easier to fuse than heavier ones, so hydrogen, the most abundant element in the universe, is the best fusion fuel. The normal hot fusion reaction requires the nuclei of two deuterium or tritium atoms to be smashed together with great force or energy. This is accomplished by raising their temperature. However, this temperature is so high that the interacting materials cannot be held in a solid container which would obviously melt at such high temperatures, but must be contained in space by a magnetic field. This process has proven to be very difficult to accomplish for a time sufficient to generate useable energy. In spite of this difficulty, attempts have been under way for the last 40 years and with the expenditure of many billions of dollars. Success continues to be elusive while the effort continues.

For many reasons, fusion power is seen by many as the "natural" long-term universal power source. Some suggested advantages of commercial fusion reactors as power producers are:

- An effectively inexhaustible supply of fuel (i.e., hydrogen obtained from water)
- A fuel supply that is available from the oceans to all coastal countries and therefore cannot be interrupted by other nations

- No possibility of "nuclear runaway" (excursions or criticality accidents)
- No chemical combustion products as effluents
- No use of weapons grade nuclear materials, thus no possibility of diversion for purposes of blackmail or sabotage
- Low amount of radioactive by-products produced with a significantly shorter half-life relative to fission reactors.

Some argue that fusion is the best option for a truly sustainable or long term energy source because the fuel is virtually inexhaustible

Cold fusion, on the other hand, attempts to achieve the same result, but by using solid materials as the container held at normal temperatures. The container consists of various metals, including palladium, with which the deuterium is reacted to form a chemical compound. While in this environment, the electrical barrier between the deuterium nuclei is reduced so that two nuclei can fuse without having to be forced together. Because the process causing this to happen is not well understood, the possibility is rejected by many conventional scientists. Difficulty in producing the process on command has intensified the rejection. While this difficulty is real, it has not, as many skeptics have claimed, prevented the process from being reproduced hundreds of times in laboratories all over the world for the past 13 years. Indeed, the process continues to be reproduced with increasing ease using a variety of methods and materials.

More Cold Fusion Information

short introduction Cold Fusion for Dummies

"A Science Tutorial" This is a basic layman's introduction to nuclear physics

"It Started in 1989 . . ." This is an overview of the field and its early history

How to make money online: build your own 100% free website.

How to make money online: build your own 100% free website.

This intractable will show you how to build a 100% free website (including free domain name, and free email addresses) with virtually no computer knowledge. Hopefully, you can turn in a profit too!

However, this is not a get rich quick method: building up content and traffic for a website takes time and sustained effort. If you follow these suggestions, you will make some money; just how much depends on how hard you are prepared to work at it, and how popular your initial idea is.

I have built two websites using this method, which I will be using as examples:

The first website (condition yellow) generates approx. 20,000 views a month, and these have been increasing gradually since it was launched under its current format on May 16 2007. I have just started promoting the latest one (lock yourself to a tree).

To date, they have brought up just under $6,000 in revenue, from advertising and pay-per-view schemes.

You can check the websites out for yourself, they offer an example of what can be done:

My first website: condition yellow

My most recent one: lock yourself to a tree

I'm not going to make any false promises: this has been hard work. But I have done it in my spare time, through trial and error, and I have also enjoyed the process. Should you decide to give it a go, you can benefit from my findings, but also from my mistakes, which will shorten the process.

Finally, this instructable also has its own site, at 100percentfeesite , on which you will find many additional tips and updates. If you are serious about building your own 100 percent free website, bookmark it and follow the step-by-step method it suggests. Of course, this is also 100 percent free!

One last thing: if you like this instructable, please digg it, using the digg button underneath. A lot of time, effort, and thought went into it.
Figures - advertising strategy - what you will need
FIGURES
The idea for both my sites was to generate a profit from advertising.
I chose to do that through three methods: online videos, Google ad sense, and smaller schemes such as amazon.com affiliates. Each of these will be discussed later on in this instructable.

Here's a summary of my earnings from the three methods:
Online videos: metacafe.com - $5,330.11 revver.com - $317.16
Google Ad sense: $17.54
Amazon affiliates: $0

ADVERTISING STRATEGY:
Your advertising strategy will essentially be dictated by the main focus of your website. But mainly, your earnings will either be generated by advertising and referrals, or through product sales (in which case, it is your site that needs to be advertised).

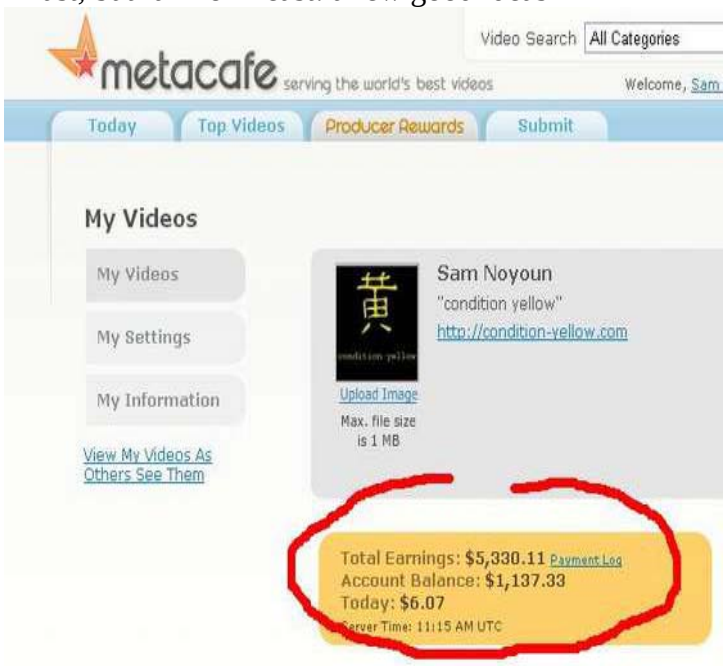
Let's take lockyourselftoatree.com as an example first. Most of the revenue from this site was generated by the videos it features. The site hopes to cash in on the success of the first video, to generate views (and clicks) for user-submitted videos (from which I will derive a profit through revver's sharers program). Targeted ads, and Amazon referrals supplement that income.

If product sales is your main focus however, then you will probably have very different priorities for your site - generating targeted traffic being the main one. Ad sense and referrals will not be particularly useful (ad sense could even be detrimental, by sending customers to the competition!). Online videos could prove very effective at raising your site's profile however.

Finally, if your site is centered around a forum, or if it is a blog which does not feature your own material, then advertising and referrals will be your main source of revenue.

I have altogether stayed cleared of Adwords (search words you can purchase from Google - another form of advertising), as my main aim was not to spend any money on building my sites.

WHAT YOU WILL NEED:
Very little actually.
- A computer and an internet connection are the main thing.
- If you plan to make online videos, a simple digital camera can be enough. Or a camcorder. Or even, a simple webcam. You can also quite easily find some free editing software.
- Last, but far from least: a few good ideas



Setting up the site
There are a variety of free site providers out there that offer different packages. None of them, however, were satisfactory by themselves for my purposes.

Here's what I wanted:
- a free domain name (I wanted to have email addresses in my domain name)
- free site hosting
- the ability to use html code in order to set up adsense and other referral packages.

Bandwidth on the other hand was never an issue for me, as both my sites were mostly to feature videos hosted elsewhere, which I subsequently would embed on my pages.

I decided to build my websites around a combination of two sites, to get around the limitations of the free schemes I found.
For instance, Microsoft Office Live Basics offered a free domain name (which you can still purchase at a later date if you want), but did not offer the opportunity to use HTML, third-party design tools, or to upload an existing site). This meant I could not use

adsense.

On the other hand, blogs such as Blogger were perhaps rather limited in their customizability, but they also were particularly appealing because of their ease of use (in particular, setting up adsense on blogger could not be easier).

The simple answer, to overcome these limitations, was to use Microsoft Office Live Basics for my front page, and to link from there to Blogger, where I could use bits of HTML.

The one drawback of this method however, is that I cannot get any reliable traffic statistics. Users might bookmark either the front page, or the main page, and thus it is hard to know where they are coming to the site from. It is also hard to tell in exactly what manner they navigate the site.
Also, the site is less likely to feature in the alexa rankings because -in the case of condition yellow- it is made of one front page and 6 or 7 different blogs plus a forum, none of which are registered under the same domain name.
This was a limitation I was prepared to live with however: should either site ever become very popular, I could always re-purchase the domain name from Microsoft Office Live Basics, and host it in a unified form.
Building up content
Building up content, in the case of lockyourselftoatree.com was very straight forward. The site relies on the success of an online video I had made some time ago, in order to invite user submissions. It has not been widely advertised yet (I plan to do that through a couple of related videos, and a compilation video), but you can see how simple it is: under its current format, it only consists of two pages. People submitting their Revver videos to the site will benefit from its traffic, and be able to make money through Revver's ad-click program. Revver also has a sharers' programme whereby, by sharing these videos on my site I will make 20% of the videos' profits (40% go to the producer; 20% to the sharer; 40% to Revver).

Building up content for condition-yellow.com was much more time consumming. Fortunately I had a bunch of videos I had made, and some training programmes, and this was going to be the backbone of the site. Once I had a site outline, I filled in the gaps here and there (there are still many), added some forums (which haven't proved popular so far!), and a blog. Most of the site's profits are generated by videos that are my own, so in that sense, it is a much bigger earner than lockyourselftoatree.com . The idea behind the blog and the forums, is that, by being updated frequently, they will keep users coming back daily to see what's new.
However, the site's focus is not very tight, which I suspect is hampering its popularity...

Quality content and regular updates are what will keep users coming back, so this should probably be your main focus in the initial stages... It also has to be fairly original: a blog featuring the best of the net is unlikely to ever become popular, as it is facing so much competition...
Setting up advertising

The main schemes I chose to opt into were online videos, google adsense, and smaller affiliates schemes such as the one run by amazon.com

- Online videos have been by far the biggest source of revenue for me: some websites offer pay-per-view or pay-per-click opportunities, while others may just buy your videos if they like them. Online videos can also generate a big percentage of the traffic to your site ; they will be discussed later on in this instructable, as they offer such tremendous opportunities for revenue and traffic.

- Google adsense is another -much smaller- source of revenue. In my experience, adsense pays around $6 for 10,000 page impressions (every time someone opens a page featuring one of your adsense banners). There are 3 main ways in which adsense can be optimized however:
1. barring some of the ads it offers might help. Not all ads pay the same, and you should probably try to focus on the higher revenue ones.
2. Ads placement is also crucial: ads have to be prominent, but not intrusive. Placing and ad on top of your webpage might get this ad a lot of exposure, but it will also make the page less attractive to your site visitors... Generally, try to place your ads on the side.
3. The color palette you choose might also be important: again, ads have to stand out if people are going to click on them.

Google Adsense offers you the possibility of keeping track of how well each of your invidual ads are doing, by setting custom channels. It is well worth experimenting with this, to come up with the optimal set up for your site.
Adsense also offers a number of extra services from which you can generate income: referrals to google products such as adsense itself, adwords, the google toolbar, and google software.
Adsense also allows you to set a search box on your site, and pays per click on the results displayed.

You might have much more success than I did with adsense by looking into these ways more closely. Adsense not being my main focus, I only use it as a little supplementary income. You can sign up for it by using the link at the very bottom of this page , which will let me benefit from your referral (it does not change anything for you)

- Finally, a variety of sites (such as amazon.com) offer affiliates schemes, whereby you can earn a percentage by referring buyers to their products. This was an obvious choice for me with lockyourselftoatree.com, as the technique the site centers around is described in a couple of books sold on amazon. I have not had much luck with this so far, but it is hardly surprising, this being such a niche market...
Should your website review a variety of electronic goods for instance, amazon.com's affiliates scheme could turn out to be very profitable.

Online videos
WEBHOSTS:
There is a variety of sites out there which will host your videos for free. I have dedicated

a whole page to them in this instructable, because this method has been such a successful little money earner for me.

First of all, well, the industry's giant is obviously youtube . Youtube will not pay for your videos, but if all you want is to generate views for your site, then it is the definite option. Simply feature your site's address prominently in the video, and visitors will often follow. Of course, your video will have to be eye-catching in order to do well on youtube.

break is another site which will generate many views for your videos (possibly even more than youtube , even). However, things are a little more complicated here: break will also pay you $400 for your videos (if they select them, of course), provided they feature original, non-copyrighted content, but provided also that there are no URLs displayed in the videos. Thus, if you have a very good video which you think could earn money on break , do not include a link to your site. However, for the purpose of generating traffic, break also works very well, and it is an option not to be dismissed.

If you want to earn money from your vids AND generate traffic to your site, then metacafe is your best option. metacafe pays $100 once your videos passes 20,000 views. However, if it does not make it that far, you get nothing... The good thing about metacafe though, is that their front page release system means that a lot of people will view your videos if they are good.

Finally, there are two other main sites that will pay for your videos, based on the number of clicks on adverts displayed within your clips: these are revver , and blip.tv . In my experience, revver works better, as the ads it feature simply seem to be more attractive to the viewers. However, the problem with both revver and blip.tv , is that they will not generate views by themselves. You will need to get your videos embedded on blogs and other sites in order to get views.
Here are a few places to get you started however:

general videos
- http://digg.com
- http://www.boingboing.net/
- http://www.ifilm.com/

tech/howto videos
- Gizmodo
- techeblog
- engadget
- newlaunches
- hack a day
- lifehacker
- instructables

funny videos:

- stumbleupon
- crazy party
- bad videos

photography:
- diy photography

magic tricks:
- learnmagictricks.org

Finally, you can also distribute your videos via myspace, facebook, etc... and hope they will spread virally (which they will, if they are good enough.)

Of course, you should embed all your videos on your website, since they will also gain more views there.

For a step-by-step method of how to take best advantage of the possibilities these sites offer, visit my page on 100percentfreesite .

WHAT YOU WILL NEED:
Again, in order to keep this instructable short, I'm going to focus on the basics here. You can find more info on 100percentfreesite .
First of all, here's what you will need:
- a digital camera/camcorder/webcam
- some free software (I'm going to focus on windows users here, as I am not familiar with Macs)

- Windows Movie Maker (comes free with Windows service pack 2)
- RAD video tools ; will allow to convert avi files to wmv format
- http://www.rehanfx.org/products.htm :nifty plug-ins for Windows Movie Maker
- autoscreenrecorder : a screen recorder that will still enable you to make desktop videos, even if you don't own a camera. Useful for software howto videos.

Also, if you intend to use music in your videos, make sure not to use copyrighted music, as pay video sites will only allow original content.
You can make your own music, using easy music composer , or you could purchase some royalty free music for as little as $7 per song. Stock20 is a good site for this. use this link: stock20 , and you will get your first song for free.

HOW TO MAKE A SUCCESSFUL VIDEO:
For the sake of simplicity, I am going to use two of my videos as examples, detailing what makes them good, and not so good.
The main reasons for its success can easily be emulated. They are:
- the title and subject-matter are eye-catching (who hasn't wondered, at some point or other, how this trick was done?)
- the video is relatively short (generally, try to keep all your videos under 2 minutes, or you will loose the viewers attention.

- it combines narration and music to keep things interesting.
- the address to my webpage is prominently displayed.
- a logo is displayed
- it does exactly what it promises.
Here are it's main faults:
- no url is displayed (how are people going to visit my site?)
- the title is boring
- origami is not terribly sexy
- the picture quality is a bit iffy
- Though it is not terribly long, it feels like it is.
- no narration
- the songs -though I do like them- are not very modern
- the punch line is spoiled by an explanation of how to make the boat (was it necessary? who doesn't know how to make a paper boat anyway?)

It may well be worthwhile, for an aspiring videomaker, to take a look at the condition-yellow , to see which videos have been successful, and which haven't...
Also -again- you will find a more in-depth study of how to make profit generating videos on 100percentfreesite .
Building up traffic to your free site.
Building up traffic to your free site can actually be pretty straight forward: if the site is appealing enough and based on an original idea, you will have very little to do: it will most likely spread virally if people like it.
Nonetheless, it will need that initial push.

I relied on a variety of methods to build up traffic to my sites. These were:
- including my site's URL in all my videos... This has brought a fair number of visitors.
- linking to my site in various forums. Careful here: do not spam... people hate spammers! Find relevant threads, and make a relevant post, linking to your site's relevant page. A good forum to start with, if your site is based around your original videos is rotten tomatoes.
- write to other sites, and ask them to link to yours. The more links you can build, the more traffic you will get.
- write to your friends, and ask them to share your site (or your popular videos) via email, facebook... etc.
- build a list of contacts yourself, and consider making a regular newsletter to keep people updated.
- Finally, register for a viral traffic scheme. I found that free viral was probably the best of these. This could potentially bring A LOT of traffic to your site... and it's effortless.

If you have all these ingredients, traffic will build up, and money will follow.
Customizing your site to meet your own needs...
Here are a few thoughts on adapting this method to meet your own needs:

1. decide what your site's main focus is going to be. This should be fairly unique and original.

2. choose an eye-catching, easy to remember domain name.
3. design a site logo... use Photoshop. This will establish your 'brand' image. Take a look at the condition yellow logo underneath.
4. ascertain where your site's revenue is going to come from. If it is online videos, spend your energy establishing your 'brand' with the main video sites. Become a household name.
If you choose adsense, learn to use all its features... Use the custom channels function to establish which ads work best.
5. decide what your main source of revenue is going to be... If, for instance, you do not intend to use Adsense, then there is no need to design a site in Blogger. Your entire site can be built in Microsoft Office Live Basics.
6. If your main aim is to sell a product -this could be ebooks, for instance- use online videos to generate interest. Here's an example how this could be done:
Suppose, for instance, your site is selling ebooks offering tips about msn or yahoo messenger. The following video could be posted on all the major video sites (youtube, break, metacafe, yahoo videos
Simply add a prominent title at the end of the video, saying: "want to learn more messenger tricks? Visit: http://YOURSITEHERE.com "
7. consider adding a forum... This is a good way to keep viewers coming to your site if it is popular. easy free forum is just one of the many sites that will let you do this. I chose it for it's ease of use.
8. build up your site gradually... You do not have to do everything at once. Eventually, you will establish a regular visitors base.
9. If your site features mostly videos, encourage viewers submissions via Revver. You can earn 20% from their videos revenue via Revver's sharers scheme.
10. This is stating the obvious, but make sure your site deals with a subject you truly enjoy. Your enthusiasm will shine through ; you are more likely to keep working at it ; content will be of a better quality (presumably, you will be knowledgeable about it) ; and eventually more and more people sharing a similar interest will come back to it and contribute.

I hope some of you will have been inspired by this instructable... It has its own site, at 100percentfeesite , on which you will find many additional tips and updates. In addition, you will also find a step-by-step method to building your site, 100 percent free!

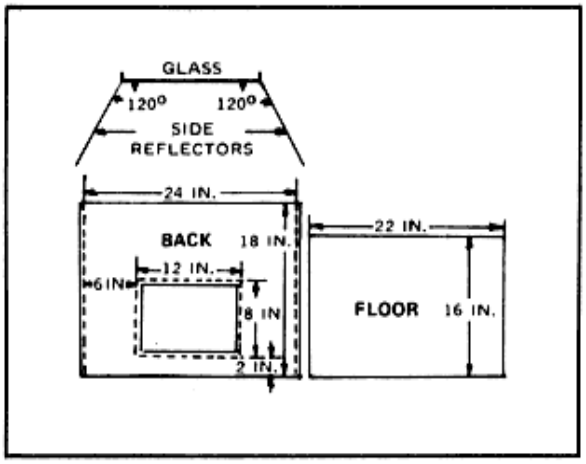
One last thing: if you like this instructable, please digg it, using the digg button underneath. A lot of time, effort, and thought went into it.

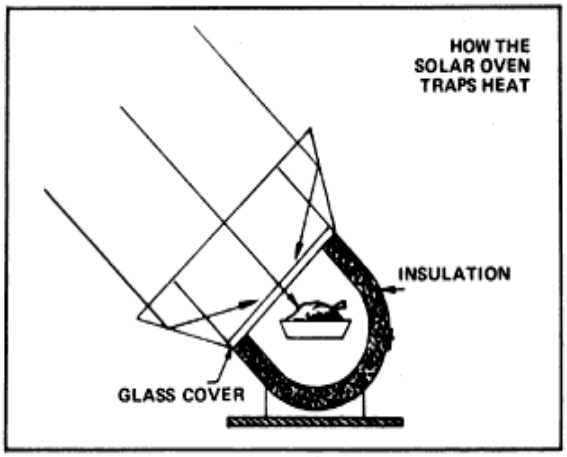
Build your own solar oven

Basically the solar oven consists of a box for the food and a glass cover to admit and trap heat inside the container. The box shown is made from galvanized iron but could as well have been aluminum for lighter weight. The reflector panels are of aluminum.
Besides the sheet metal parts, we need a piece of double-strength window glass, a sealing strip for the pane and three handles. We will insulate the box with spun glass material two inches thick for greater heat retention.
MATERIALS

- 28-gauge galvanized iron (16 square feet)
- No. 6, 3/8-inch sheet metal screws (approximately 24)
- 2-inch fiberglass insulation (12 square feet)
- Double-strength window glass (22 by 24 inches)
- Drawer pulls (three)
- Flat black paint (one spray can)
- 2-inch roofing nails (six)
- Sealer strip (eight feet)
- Aluminum sheet .025 by 22 by 24 inches (four pieces)

Small turn-buttons with installation hardware (four)





It will be a good idea to have all materials on hand before beginning the project. One exception could be the sheet metal for the box, in case you decide to let your local sheet metal shop do the cutting and bending for you. This is a good idea unless you're familiar with metalwork, and will result in a more professional job at little additional cost.

If you want to do all the work yourself, and feel that you can handle the job, this is the way to begin: The bottom of the oven is a rectangle of metal, with the corners notched out to allow bending up flanges all around the sides. These are 3/4-inch flanges and they're bent up 90 degrees ... except for the front edge, which is a closed (acute) 45-degree angle, one inch long, as shown in the drawing.

The right and left side panels may be cut from one rectangle of metal to save material. Lay them out carefully to prevent waste. Again, 3/4-inch, 90-degree flanges are bent onto the front and top edges of each panel. The back and bottom

edges are left flat. Be sure to make the two sets of bends opposite each other so that you'll have a right-hand panel and a left-hand panel, and not two of a kind!
The oven back has 3/4-inch flanges on each side and an opening cut in it for the door. Notch the corners of the opening at 45-degree angles and bend the 1/2-inch stiffener flanges inward. This will strengthen the door opening and also give the back a finished appearance.
Now make the top of the box. This is a channel with one 90-degree flange (to fit the back) and one open—or obtuse—45-degree flange (to match the slope of the glass). Next comes two 3/4-by-one-inch retaining angles, each 18 inches long (to hold the pane of glass). The box is now complete except for a door.

The door is the only difficult part to make and care must be taken to bend it correctly. The double, or "hemmed", edge strengthens the panel, and the flange which is left standing will fit into the opening in the back of the box. A snug fit here will make for a neat, effective door that seals properly and helps keep the heat inside where we want it.
A false bottom is needed to prevent the collapse of the insulation in the floor of the oven. This bottom is a rectangle of metal cut to the size shown in the drawing. Make sure it is not so large that it contacts the front, sides or back of the box. This would cause heat loss by conduction to those parts.
It might be well to mention here that an alternate method of construction can be used, that employs a little ingenuity and the "do it yourself" aluminum sheets and angles available at the hardware store. This approach uses flat sheets, with angles attached to them, instead of flanges bent from the sheets themselves. Of course, the 45-degree angles would have to be eliminated, and a slightly different sealing technique used for the glass, but some builders may prefer giving the idea a try.
Now, with the metal parts formed either in the sheet metal shop or at your own workbench, you're ready to begin assembly of the oven. The simplest way to put the unit together is with 3/8-inch, No. 6 sheet metal screws. They're available at the sheet metal shop, or your hardware store. If you're using aluminum, substitute hardened aluminum screws, since different metals coming in contact with each other may cause a corrosive action.
Mark pencil guidelines 3/8 inch from the bottom edge of the side panels, spaced as shown on the drawing. Center-punch the holes and drill with a No. 40 drill. A hand drill is fine; an electric drill is even better for this purpose.
Now, place the bottom of the oven on a flat surface, and hold the properly positioned side panel against it. Drill through the holes in the side panel and on into the flange of the bottom. It's a good idea to put in a screw as each hole is drilled to insure perfect alignment and prevent shifting of the parts. Notice that the bottom flange overlaps the side but no holes are drilled at this point.
With both side panels attached to the bottom, the back of the box may now be put in place and holes drilled to hold it there. Continue to keep the parts carefully lined up and to insert screws as you progress. The oven is taking shape now, and lacks only its top. Before we put it on, however, we will install the glass in the front of the box. Needless to say, care must be taken during this operation so that the pane will not be broken. Don't cut your fingers on the edges!
Clean the glass carefully with water. Then glue the sealing strip around its edge with cement (Goodyear *Pliobond* works well), following the directions with the adhesive to insure a strong joint. If you were able to find a sealer that fits over the edge of the glass the job will be easy. If you're using the bulb type, additional care will result in a neat assembly.
When the sealing strip is attached and properly "set" the glass may be put in place in the oven. Slide it down through the top, which we have left open for this purpose.

For this operation lay the oven on its front face, being sure to have a perfectly flat surface to work on.

We will now install the 18-inch angles that hold the glass in place. Carefully drill holes in the sides of the box as shown on the drawing, locating them so that they will match the angles when the pieces of metal are put in position. Slip the angles through the opening in the top and set them on the glass with the 1-inch leg flat against the side of the box.

Working from the top, or reaching through the opening in the back of the box, press one angle very lightly against the glass. Do not force the glass so that it flattens the sealing strip, because—in addition to its sealing function—this strip acts as a cushion to prevent breakage of the glass. While holding the angle, mark through the holes in the side to indicate the proper location for the holes in the angle. Remove the angle, drill it, then replace the bracket and anchor it with sheet metal screws. Repeat this process on the other side.

With the glass installed, the oven's top may be put on and holes (for screws) drilled through it and into the back and sides of the cooking unit. Notice that the top fits down over the back and side panels.

The oven is now complete except for the carrying handles on each side and a similar handle on the door. These are attached with screws.

Fit the door into the opening and mark the holes for the turn-buttons that hold the door tight. Drill 3/16-inch holes in the back panel, and install the turn-buttons with nuts, bolts and washers. The washers hold the buttons away from the metal so they will clear the hemmed edge of the door.

The spun glass insulation is now cut to proper shape with a sharp knife or linoleum cutter. Use a straightedge for accurate trimming. Plan carefully so as not to waste material. The bottom piece can be beveled 45 degrees at the front if care is taken. Paint the inside surfaces of the insulation with flat black enamel, using—if you like—a pressure can for convenience.

After the paint is dry, the insulation is glued into the box with Pliobond or its equivalent. To do this, remove and set aside the back of the box. Then, positioning the oven with the glass down, cement the top insulation in place first and allow the adhesive to dry. Next, tip the box right side up and cement the bottom insulation in place. Press five 2-inch roofing nails point-down into the insulation and lay the false bottom over them. This bottom piece is painted flat black too. The side insulation can now be cemented into place and the box is complete except for the back.

Cement insulation to the back panel, cut the small rectangle from the opening and place it on the inside of the door. The back may now be carefully put back and the screws inserted that hold it in place. Lay an oven thermometer inside, fasten the door in place, and you're ready for the reflector panels, which are hinged to the box as shown in the drawing.

In tests the box itself will reach an inner temperature of only about 250 degrees. This is because heat loss to the surrounding air prevents the temperature inside from climbing higher. If we could increase the amount of heat going into the box, however, the oven would get hotter. For this reason we add the aluminum reflector plates shown in the photograph. Use Alclad if it's available Rivet two hinges to each reflector and be sure to mount two reflectors on the ends and two on the sides. If the Alclad sheets have red lettering on one side, use the opposite surface for your reflectors. Attach the hinges to the box with sheet metal screws. Install the bottom reflector first, then the sides, and finally the top. Besides their primary purpose, the reflectors also protect the glass.

Open the side panels 30 degrees to the received rays of the sun to reflect their heat into the box. This angle will always suffice for the side reflectors if you face the oven directly toward the sun. The 45-degree tilt of the glass is a compromise angle that

gives all-around performance. However, a little thought will tell you that for maximum performance the angle of the top and bottom reflectors will vary with the position of the sun in the sky.
The discussion sounds complicated, but in practice adjusting the oven is very simple. Set it out in the open, preferably on a wooden table, and face it toward the sun. Open all the reflectors and swing the top one up and down while you watch the inside of the oven. You'll be able to tell when you have it at the proper angle by the reflection of the sun's rays on the dull black insulation. Bend the end of a piece of galvanized wire to act as a stop, insert this wire into a hole in the top reflector, and wrap the free end around the loosened screw as shown in the photograph.

Swing the side reflectors into position, while you check the angle they make with the glass by means of a cardboard template. Using two wires, attach the movable side panels to the top reflector. Now swing the bottom reflector up while you, again, watch the inside of the oven. When it's properly positioned, fix two wires in place from the bottom reflector to the side reflectors, and your solar baker is ready.
The test oven shown in the illustrations reached a temperature of 350 degrees in 15 minutes. This was in Arizona in mid-January, with the air temperature in the low 60's. The first time it was used, the unit baked a loaf of bread in just over an hour ... and then cooked a three-pound roast in three and a half hours! A whole meal can be prepared in the solar oven. The menu is limited only by your imagination.

Free Electricity in your phone line

The phone company has always had a supply of DC electric power available. Large banks of storage battery's backed up by emergency generators supply 23 to 80ma of power to every operational land line telephone line for you to use no matter where you are. When the phone line is not in use, there still is 48 volts DC power on the phone jack whether you are using the line or not.

What you will be shown is how to convert that 48 Volts Dc power from the modular phone jacks in your home or office to a voltage that can be used to power the electrical items you need to maintain living your lifestyle, especially when there is a power failure and you have no electricity. Some of the causes of loosing you utility power can be from bad weather, hot summer day brown outs, transformer overloads. When the power goes out, you do not need to worry anymore. With **Telco Power** you will be able to power

lights and small appliances even re-charge backup battery's, the uses for Telco power are limitless. Free energy or just utilizing what you already are paying for to your benefit.
Do you remember back lets say 15 years ago and earlier, when the power went off in your home, you were still able to call the power company from your home phone to let them know of the problem. Why was this so? It still is this way today, however most modern home phones are powered with a 110Volt Ac power supply that is converted to 12 Volts DC by a converter in the phones electronics. What does this all mean! A source of alternate electricity, a source of free power that can be harnessed and used to augment your current source of electricity. This concept can have unlimited uses from reducing your electric bill to a back up power source in emergency's.

Today there are products that can be purchased such as reading lights that are powered by converting Telco electricity to power LED lights. LED's tend to be the best source for Telco power, they are low current light emitting sources. Furthermore any DC 12 Volt powered appliance is ideal for Telco Power.

US phone company's supply constant regulated voltage on all their two pair copper wire phone lines. Many of these lines have an abundance of current that the telephone you use does not need. Most land phone lines are buried cable these days, however one hundred years ago, it was common practice to run "aerial cable" down the phone pole network or the utility lines. The phone line was always the lowest cable on the pole because it was spliced into more often, which meant a phone lineman would have to access the "rat pack" or access point for bridging F2's and F3's.
Above is a diagram of the local phone company network. The central office or C.O. is the heart of the system. This is the point of power that charges the telecommunications network to your house phone. Everything outside of the modern RF portable phone in the network is hard wired, making the phone grid similar to the electric company, thus creating a alternate power source.

So knowing that all you need is a phone line from the phone company, you can tap into the supply of free energy with only a component to regulate this power supply. That is what you are about to learn to build. If you have more than one phone line coming into you home or office, that doubles the amount of power available for use. However if home has had more than two lines in the circuit before but now has only one; there is a good chance that voltage

is still on the other line. The phone company disconnects the dial tone by computer programming at the C.O., when service is canceled, but they still leave the voltage on the line, this way no physical connections have to be made if service is re-ordered. If you are already paying for phone service, you will not be paying anymore for the power you use to power your devises with. Furthermore you consumption cost of Telco power stays the same, unlike your electric bill. So let's get going, let delve into the ways power from the phone line can be converted into a viable alternate power source.

How do you light up a incandescent light bulb using a DC Volt source?

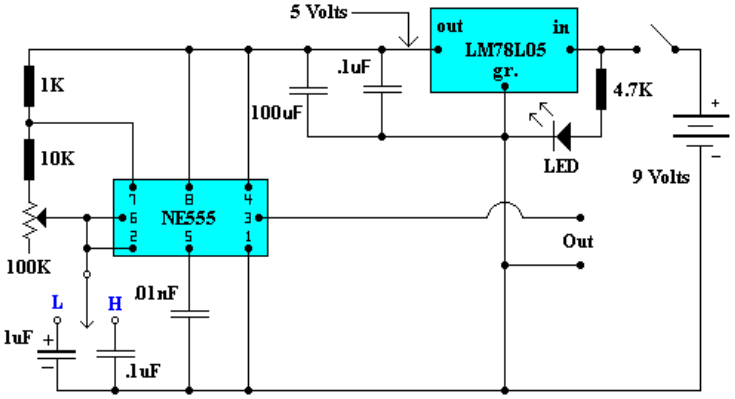
The incandescent light source is on its way out, after 110 years of use, and in a time period today, where all energy sources are expensive Natural gas, electricity and petroleum products. New technology's and some that have been around awhile, are now taking center stage. The plasma gas and LED (light emitting diode) are but a few lighting sources that have found their market in today's energy conscious world.

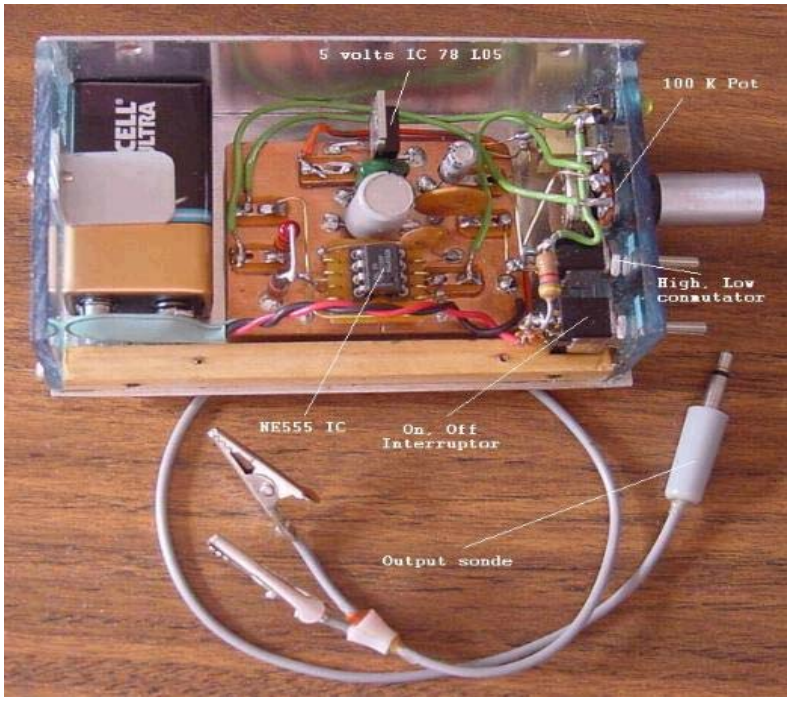
You can light up a few rooms with power from your phone line by using a Series circuit bank of 100 volt capacitors and a diode. It is recommended to use high energy saving or efficient light source such as that of the LED. These light sources are very low wattage users and are ideal for the application used here with Telco power. One of the best sources I have found for these lights are at w.w.w.ccrane.com . The crane company has an extensive collection of these lights along with a large collection of other electronic products. The florescent light bulb is another excellent source of light, also known as the plasma gas light source. However in order to light a neon or florescent bulb you will need more than 50VDC. They light at about 300 to 4000 VAC. You would need a 15,000 volt gas neon transformer that can be purchased at any large home improvement store. You would need to connect the 50VDC phone circuit to a pulse switch, the wind up kind like that of a kitchen timer you buy at the home improvement store. This is than connected to the transformers primary, pulsing the 50VDC. If you have a background in electronics, you could build a transistor pulse generator in lieu of the timer. The result of this circuit is the conversion of VDC to VAC. This voltage is than collected on the secondary terminals of your 15,000 volt transformer.

In lieu of using the transformer, you could hand full charge than series wire (using alligator clips) 20 50 volt capacitors with a 4700 micro farads. A low

amp isolation transformer you can buy from radio shack as well as the capacitors. The transformer negative, is connected to the capacitor primary, while the positive side of the transformer, is connected to the pulse generator. The faster the pulse the more efficient the energy output. The secondary leads of the isolation transformer are than connected to the Florissant light bulb. And as you pulse the positive side to the primary of the transformer you will see the bulb illuminate brightly.

Next is a description of a pulse generator I built using purchased parts from radio shack. It was configured on a copper circuit board, Manhattan style. You can trace the circuit below to design a printed circuit board if you wish.





ABOVE, Pulse generator I built. Detailed parts list below.

Semi-Conductors	Capacitors

NE 555 IC	**.1uF/15v Mylar**
LM 78L05 IC	**100uF/15v Electrolytic**
Diode LED	**1uF/15v Mylar**
.....	**.1uF/15v Mylar or Ceramic**
.....	**.01uF/15v Mylar or Ceramic**
Resistors	**Other Components**
1K 1/4 Watt	**Two Switches SPDT Miniature**
10K 1/4 Watt	**Jack Socket 1/8 Inch Miniature**
4.7K 1/2 Watt	**Cabinet.....Plastic or Metal**
100K Potentiometer	**Nine Volt Battery**

50 volt 4700uf capacitors in series.

Warning… **When working around high voltage, always wear rubber insulated gloves rated for the voltage you are working with, furthermore, wear a leather work glove over the rubber gloves when handling live wires.**

The next method of creating a usable circuit for **Telco Power** is most likely the simplest to build as well as the most efficient. The objective is to reduce the phone line voltage from 48VDC down to 15 to 13 VDC. Using a Electrolytic Capacitor 10 v x 1000 uf 105 C Made by Elna part number 8643.

This will step the line voltage from 48 volts to around 15 VDC at about 1amp of current. You will also need a Power Diode G1 G4g. Next you will need a wind up timer like the one mentioned earlier, or you can use a transistor as a direct current pulser to control a 4 pdt relays.

You will want to let the capacitor charge for 6 seconds, this is accomplished with the transistor as a DC pulser to control a 4 pdt relays; or just use a spring wind up timer for the switching as mentioned earlier.

To obtain more energy to the capacitor faster use the ground side (ring) of the phone line circuit connecting it to an earth ground than placing a power diode G1 G4g, Cathode to earth ground side, anode to the positive side or facing away from the ground.

How to build the circuit

Using a low volt meter, Connect the ring, negative side of the phone circuit to

earth ground. Connect a G1 G4g, Cathode to ground.

Connect the tip side of the phone circuit (positive) to switch # 1 than to a power diode, anode connected towards switch # 2. From Switch # 2 connect another power Diode Cathode towards switch # 2, than connect the anode side of the diode to the positive side of a 12 volt deep cycle Marine Battery.

From switch # 2 connect a lead from the switch 2 were the first diode is connected to the anode side of a 4700uf 10 volt capacitor. From the cathode side of the capacitor (negative), connect a lead to the negative side of the battery.

Let the capacitor charge every 6 seconds using a spring wined up timer for switching or the transistor mentioned earlier.

Note. SW when discharging into 12 volt battery when the capacitor is full. Use a 4 pde magnetic spring switching . 50V input switch #1 should be off when connecting Switch # 2 for discharging into the 12 volt battery.

Telco power ac inverter circuit

Using a 12 VDC deep cycle marine battery and a 110 volt AC inverter, a person can power a 100 watt light bulb, VCR, DVD player, TV, ac motor. Any small electrical appliance, even small microwaves will operate with this circuit.

The circuit that will be explained next works best at night, usually after 10 pm, why! Because you are less likely to receive incoming calls, this allows continued un interrupted flow of energy. However, this circuit can be operated during day time hours just as well and will do no harm when an incoming call comes in.

Here are is a list of the materials you will need to construct this Telco Power circuit. 4 - 35volt 4700 uf electrolytic capacitors. 2 Power diodes G1 G4g. At least 1 12 volt deep cycle marine battery (more than one battery stores more power in reserve). 1 30 second spring timer. Note- a company called small parts sell components and parts that are needed for these circuits just use a search engine with their name small parts.com. You will also need a 24 hour light timer, the kind you plug a lamp and set the hours of operation. These can be purchased at a hardware store.

What you learn next will be three different circuits. Both will but out 5amps at 12 to 15 volts. Pay attention to the placement of the components and when building these circuits make sure to house them in a plastic case or non conductive container. Many homes have two phone lines, one could be used for communications and the other for an alternate energy source that would cut your electrical bill costs as well as be your source of back up power in emergency’s. These circuits work very well in home and make exciting science laboratory experiments especially today where our society is in

search for new idea's for energy and power sources. What these circuits do is show the public of just a few ways that energy we take for granted can be used to benefit us all if built and operated properly. You will not find much information in the library or on the internet on this subject, Telco power for a

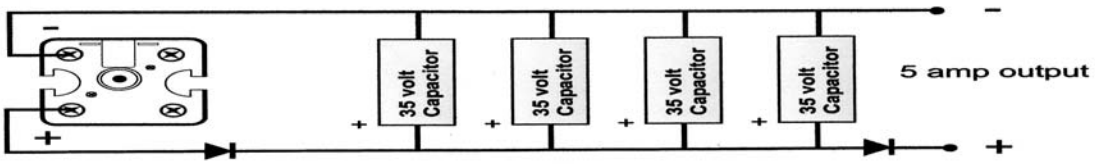
good reason. If everyone knew about Telco power it would through a clog in the wheels of capitol corporate profits. But the time is coming when we will soon start seeing alternatives available other than the 100 year old network AC power grids, and petroleum fuels. The time is near.

The first of the three Telco circuits that will be explained is the most easy to build but the second can be the most efficient. Make sure to never ground the tip side (positive) side of the phone circuit to earth or cassis ground; this can shut off the dial tone for up to an hour at the phone company C.O. and you will have no voltage on the line either, be careful.

Circuit 1 - (High side) With a low voltage electronic meter, measure the voltage from the phone block. Usually solid color wire is the positive (tip and striped wired is negative (ring). Run an alligator clip from the positive side of the phone block to the cathode side of a G1 G4g power diode. Connect another lead from the anode side of the diode to a 35 volt Electrolytic 4700uf capacitor diode to positive side to capacitor. Than connect 4 same type capacitors in series positive to positive, ect. Negative to negative, ect. From the last series connected diode, connect one power diode, (positive to cathode) same type of diode as used earlier. Connect the anode of the diode to the positive (high side) of a 12 VDC Deep cycle marine battery. This completes the high (positive) side of the circuit.
Circuit 1- (low side) Using the ring side (negative) off the phone block, run an alligator clip from the ring to the negative terminal from the first capacitor in series.. Run all negative terminals on the four capacitors in series, negative to negative , as mentioned earlier. Connect the last series connected capacitor negative terminal to the 12 VDC battery negative (low side) terminal. This completes circuit 1. This circuit is used to charge a 12 volt battery, like a trickle charge. You should have 5 amperes to the 12 volt battery when the capacitors are fully charged. This circuit is excellent for powering a battery connected to a low drain supply on a AC inverter, powering a low power out florescent light or LED light bulbs. Can be used with an inverter to power low power appliances like blenders, can openers, mixers, small TV's, VCR, DVD's, lap tops among a few.
Circuit 2- (dawn to dusk) The same components are used in this circuit as are used in circuit 1. Only you will be adding a dawn dusk timer (light fixture Timer) and a 30 second timer as mentioned earlier on page 8. Here is the circuit.

(High side) connect an alligator to the tip side (positive) terminal on the phone

block, connecting the other end to the cathode of a power diode, same as in circuit #1. Next connecting an alligator clip to the power diode's anode side than connecting the other end to the dusk dawn timer's input side. You may have to open up the module to find this side of its circuit, these work like a shunt that opens and closes the continuations circuit. Connect another alligator clip to the output side of the timer and other side of clip to the first of four series connected capacitors, (same capacitor type as in circuit 1) the connection is made to the positive side of the capacitor. On the high side of this circuit everything is wired as would be in the description of circuit #1. Refer to circuit 1 for the completion of the positive side of the positive side of this circuit. Circuit description below.



FOR MORE AND IMPROVED CIRCUITS CHECK OUT THE BOOK TELCO POWER AT http://stores.ebay.com/The-Wonderful-World-of-Palaad

Building a micro solar generator

This is a little solar generator i made for camping and fishing. It could come in handy in a power outage as well.

supplies needed:
1.26w weather proof solar panel $30.00 (cabelas)
12v 7.5amp rechargeable sealed lead-acid battery $30.00 (radio shack)
12v socket $11.00 (Wal-Mart)
cooler $8.00 (Wal-Mart)
nuts/bolts $2.00 (Wal-Mart)
wire plugs $2.00 (Wal-Mart)
super glue $1.00 (dollar store)

TOTAL: $84.00
w/tax around $90.00

tools needed:
drill
utility knife
screw drivers
Wire cutters

Cutting wires and holes

I made no exact measurements for wire length, just guestimation. using a tape measurer i centered the panel on the lid and used the 12v socket for the hole pattern on the side. On the lid I drilled 5 holes, 4 for the panel to mount to the lid and 1 for the panel wire.

Assembly

First I bolted the panel to the lid and ran the wires throw, because of the uneven surface on the underside larger holes were made to make access to the nuts to be placed in the hollow cavity of the lid.

Next the 12v socket was threaded into place.

super glue was applied to the nuts and the 12v socket threading to insure vibration would not cause any thing to come loose.

After the glue set I crimped the wires from the panel and the 12v outlet to quick disconnect tabs.

the final step was dropping in the battery and plugging in the wires.

Testing
Plugged in the power inverter and a lamp with a compact fluorescent bulb to test it out.

Accessories 

WERE TO FIND FREE SOLAR PANELS AND DEEP CYCLE MARINE 12 VOLT BATTERIES AND OTHER FREE STUFF.

Contrary to belief in this day and age if its free it is either broken or the person giving it away is motivated to dump it. I have had pretty good luck locating motivated giver's on www.craigslist.org and on www.villagevoice.com Check these two sites out for your city or state and check them often, patience is the key in your search.

NATUAL GAS SAVINGS

Turn off the pilot flame of your gas furnace in the summer
Most gas furnaces in operation today still have a continuous pilot flame. Turning off the pilot flame in the summer is easy to do and well worth the effort, but very few people do it, mostly because they don't know how and aren't aware that they should.

Materials required: None
Time required: about 2 minutes per year
Savings: $30-$60 per year (depending on your furnace, your location, and gas prices)
GHG reduction: about 0.15 to 0.30 tons per year

I live in a moderate climate (Vancouver, BC, Canada) and only require artificial heat about 7 months of the year (from mid October to mid May). For the other 5 months of the year I turn my furnace off completely, including the pilot flame. There are occasionally some cold days during that period but we usually just wear extra clothing and leave the furnace off. Throughout much of the US the heating season is shorter and potential savings are even higher.

To turn off your furnace completely, look for a valve in the gas line to the furnace. Simply turn the valve handle so it is angled 90 degrees to the pipe. If you like, you can check your furnace to ensure the pilot flame goes out.

To turn your furnace back on, turn the valve handle parallel to the pipe and re-light your pilot flame following the furnace manufacturer's instructions (if you don't have the manual for your furnace you can probably look it up online, or just wing it... they're mostly the same). As a reader has noted, there is no danger if someone turns the gas valve back on but forgets relight the pilot flame. There is a thermocouple that prevents gas flow unless a flame is present. You typically have to hold a button down to get the gas to flow when re-lighting the pilot flame, and keep holding it down until the thermocouple warms up.
That's all there is to it


Parallel and Series Circuit
BASIC AC DC CIRCUITS FOR YOU SURVIVAL

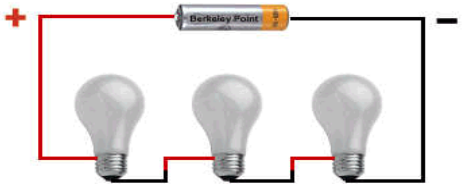
There are two basic types of electrical circuits; series and parallel. A complex circuit can

consist of sub circuits of each kind.

Series Circuit

In a series circuit, the path of electrons from the negative (-) side to the positive (+) side goes through all the electrical components of the circuit. Another way to think of this is that if you open the circuit at one point, on either side of a component, there is no complete path for the electrons to follow from - to + for any of the components. A good example of this for those of you old enough to remember is the old style Christmas lights where if one light were to burn out, the whole series of lights would go out. Series circuits are used extensively in electronics but rarely by someone who is providing power to electrical components such as supplying power to a group of lights as in the case of low voltage LED lights sold by Berkeley Point. A simple schematic of a series circuit containing three electrical components (represented as light bulbs below - icky incandescent light bulbs at that), is illustrated below:

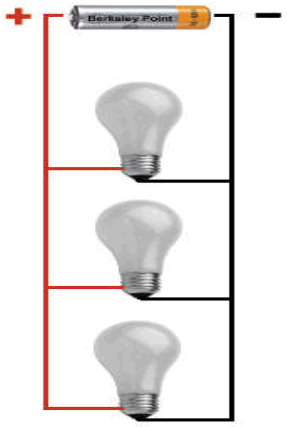
Series Circui



Parallel Circuit

In a parallel circuit, each component has its own direct path to both the negative (-) and positive (+) sides of the circuit. A simple schematic of a parallel circuit is shown below. In actually wiring the LED lights from Berkeley Point, as long as the red leads from the lights are connected to a wire that goes directly to the positive (+) side of the power supply and the black leads are connected to a wire that goes directly to the negative (-) side, you have wired the lights in parallel. If you follow the wire path back from a light to the power supply, it can "T" to other lights but should not go through any other lights. If your feed wire is similar to the Belden wires provided by Berkeley Point in so far as they consist of a red and black wire. In a parallel circuit, you will never have a black wire connected to a red wire (contrasted with example of series circuit shown above). Further, as long as you can follow a path from the red wire of a light back to the positive (+) side of the power supply through red wires and the same through black to the negative (-) side, you have wired in parallel. A group of many lights may have all their red leads connected together with one red (+) feed wire and all their black leads connected together with one black (-) feed wire.

Parallel Circuit:



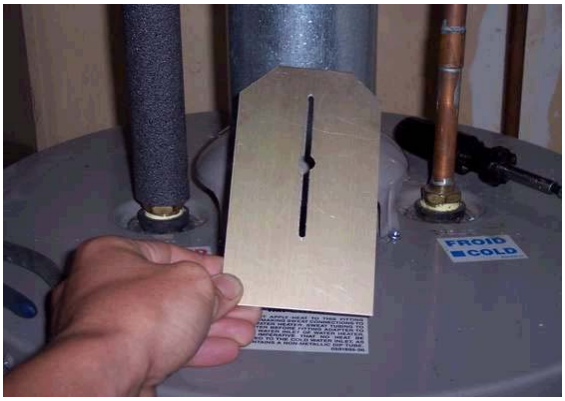
Modify your gas hot water tank for super efficiency

What I found was that over a 24 hour period, the pilot flame alone produces enough heat to warm the hot water tank to an acceptable operating temperature. Therefore if you can restrict your hot water usage to a particular time of day (ex showers each morning) you can operate quite comfortably in PILOT mode (a setting in which the main burner of your tank is disabled).

Performance can be improved even more by building a simple exhaust tube restrictor. In PILOT mode, you only need to pass about 5% of the maximum volume of exhaust gases the tank was designed for. Placing a partial restriction in the exhaust tube increases the amount of heat you can capture from the pilot flame while still safely exhausting all the gases the flame produces.

I have found this to work well for up to 2-3 showers each morning. When our hot water consumption is higher (for example when we have guests staying with us) I simply remove the exhaust restrictor and set the tank back to NORMAL mode for as long as we need.

Construction takes about 10 minutes. Material cost was $0. Lifestyle changes are minimal. The savings for us have been about $160 per year and 0.67 tons of greenhouse gases per year.



Inspiration

If you're not interested in the inspiration behind this project, feel free to skip to the next step.

My original motivation for experimenting with my water tank was that I wanted to install a programmable thermostat for it. I only really need hot water in the morning for a shower, so why waste energy all day maintaining the temperature of a tank that's just dissipating heat to its surroundings. Unfortunately, I discovered there is no such thing as a programmable thermostat for hot water tanks (I could be wrong... if you've seen one, please let me know... but I couldn't find one). There are "on demand" or "tank less" hot water heaters, in both gas and electric models, but no simple programmable thermostat you can retrofit to an existing hot water tank to tell it "Please heat my water up to 40 degrees C at 7:00am and then turnoff for the rest of the day".

Therefore, I thought I would try to make one. But first, I wanted to get to know my hot water heater (how much heat does the pilot flame produce, how much heat does the main burner produce, how much heat goes up the chimney, how much heat is dissipated through the walls, etc) to estimate what kind of savings I could expect from a programmable thermostat. To determine the rate of energy loss of my hot water heater I heated it to normal operating temperature and then turned it off completely and measured the rate at which the temperature dropped. I repeated the test, switching to PILOT mode instead of turning it off completely in order to see how much heat the pilot flame was inputting to the tank. To my surprise, the tank temperature did not decrease. The pilot flame alone was enough to maintain normal operating temperature.

On further investigation I discovered that not only could the pilot flame maintain normal operating temperature, but over a 24 hour period it could heat cold water up almost to normal operating temperature. This was a revelation. It meant that if we only used hot water at a particular time of day (ex showers in the morning) we might be able to operate comfortably in PILOT mode.

Then came another revelation. The exhaust tube through the center of the tank is sized to pass the maximum volume of exhaust gases the main burner will produce. When the main burner is off, a large volume of air still flows through the exhaust tube by natural convection (heated by the tank). My experiments showed this accounted for about 40% of the heat loss from the tank. In PILOT mode, the main burner is never on, so I thought why not reduce the size of the exhaust tube exit as much as possible. By doing so I could conceivably eliminate nearly 40% of the heat loss from the tank.

I tried it. It worked. And the rest of this instructable will show you how to do it too.

Oh... and the programmable thermostat I had originally wanted to build now seems quite pointless. Unless it was capable of extinguishing and re-lighting the pilot flame, it could not consume less gas than when left in PILOT mode. Actually, it would consume more, since it would operate the main burner and would require removal of the exhaust tube restrictor, increasing the convective heat loss from the tank.

Switch your tank to PILOT mode
This is the easy step. On every gas hot water tank there should be a dial to switch the tank between OFF, PILOT, and NORMAL (or ON) modes. Turn the dial to the PILOT setting.

If you don't use much hot water, and restrict most of your consumption to a particular time of day (ex showers in the morning), you will still likely have plenty of hot water, even without installing an exhaust tube restrictor. Try it. If you don't like it, you can always just switch your tank back to NORMAL mode.

If you are at all concerned about modifying your tank further, you should stop here. However, if you want to capture more of the heat from your pilot flame, increasing the temperature of your tank for longer or hotter showers, continue to the next steps and if you are confident you can execute them safely, consider implementing them.

Install a Carbon Monoxide Alarm
In the following steps I describe some modifications to the exhaust system of your hot water tank. Any time you modify the fuel delivery or exhaust system of a gas appliance, there is the potential to leak carbon monoxide, natural gas, propane, etc into your home. These gases are all heavier than air and will affect your children and pets long before they affect adults. Typically hot water tanks are located right next to the furnace. If the hot water tank leaks carbon monoxide or gas, there is the possibility that the furnace will pump it through the heating ducts to the rest of your home. Carbon monoxide has no scent and offers no indication of its presence except that you will become tired and fall asleep (possibly never to wake up). Hundreds of people die from carbon monoxide poisoning and gas related incidents each year.

I highly recommend that you install a carbon monoxide alarm on each floor of your home and near your water tank before proceeding with the remaining steps.

Do not install combination smoke and carbon monoxide alarms. Smoke rises. Carbon monoxide sinks. You want your smoke alarms near the ceiling while you want your carbon monoxide alarms near the floor. Some carbon monoxide alarms plug conveniently into a wall outlet so you never need to change batteries (they do have battery backup for power outages).
In addition to safety concerns, modifying a gas appliance in the way I'm about to describe

is probably illegal in your region.
I accept no liability for the results of your use (or misuse) of the remaining information, but I would be devastated if it resulted in any harm to anyone. So please... **install a carbon monoxide alarm and proceed at your own risk !!!**

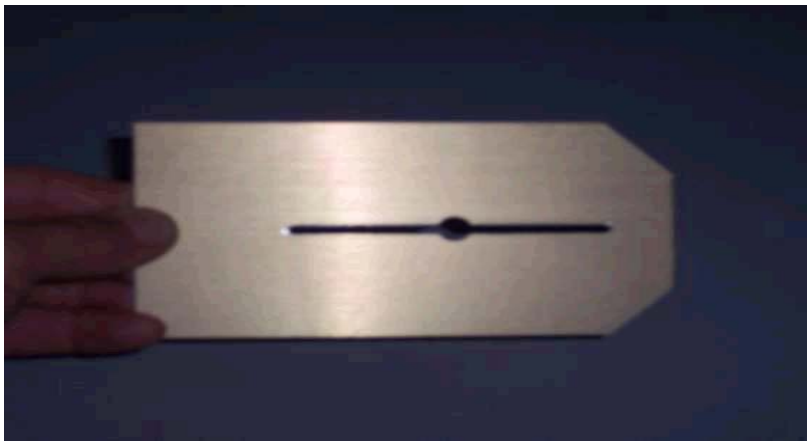
Making the exhaust tube restrictor
A gas hot water tank is basically a cylindrical tank with an exhaust tube running through the center of it. When your main burner is on, this tube conducts heat from hot exhaust gases into the tank. When your main burner is off (like it is most of the time) the heat transfer works in reverse. The tank dissipates heat back into the exhaust tube and the air in the tube heats up and rises, drawing cooler air into the bottom of the chimney from under the tank. This is a significant source of heat loss (about 40% based on my experiments).

The exhaust tube is sized to pass the maximum volume of exhaust gases the main burner will generate. If you are operating in PILOT mode, the main burner is disabled. Therefore, the exhaust tube is oversized for this mode of operation and only serves to waste about 40% of the heat from the pilot flame. You can tell that heat is being wasted, by touching the exhaust duct above your hot water tank. You will find it gets quite warm even in PILOT mode.

At the top of your gas hot water tank you will see that there is a hood leading into your exhaust duct. There is an air gap between the exhaust tube exiting the top of the tank and the exhaust duct hood. Your goal is to make a restrictor that partially covers the exhaust tube exit. This will slow down exhaust flow through the exhaust tube and capture as much of the pilot flame heat as possible while still expelling all of the exhaust gases safely.

A simple restrictor can be made from a small sheet of heavy gauge aluminum foil (like the bottom of a disposable cooking tray). Cut the aluminum foil with scissors to make a shape similar to that shown below, adjusting for the dimensions of the exhaust tube at the top of your own tank. Whatever material you use, make sure it is not flammable. I'm lucky enough to have a machine shop in my garage, so I made my restrictor from a sheet of scrap aluminum about 1mm thick.

You want the restrictor to cover the end of the exhaust tube entirely so all the exhaust gases from the pilot flame go through the slot. The reason I used a slot rather than simply drilling some holes is that there is an obstruction at the end of the exhaust tube that must be avoided (it sticks up through the slot) in order to get the restrictor to sit flush against the top edge of the exhaust tube.



Tuning the restrictor

In the last step, I described an obstruction at the top of the exhaust tube. This obstruction is actually the top end of a baffle that runs through the entire exhaust tube. It's purpose is to agitate the exhaust gases as they rise through the exhaust tube, ensuring maximum heat transfer to the tank. This baffle is loose (it hangs on the top lip of the exhaust tube which causes the obstruction). You will likely need to rotate it by hand so that it aligns with the slot you have cut in your restrictor plate.

Once you have rotated the baffle end, double-check that you are in PILOT mode. Then look under your tank at your pilot flame and take a mental note of what it looks like (color, shape, etc). You want to compare the pilot flame before and after you install the restrictor to ensure you are passing enough exhaust gases that you don't interfere with proper combustion.

Test 1

Slide the restrictor over the exhaust tube end. Wiggle it around until it drops down over the baffle end and sits flush against the exhaust tube edges. Check the pilot flame again. Watch it for a few minutes. If it changes in any way from what it looked like before you installed the restrictor, it means you aren't passing enough exhaust gas. Remove your restrictor, enlarge the slot, and try again.

Test 2

Once you determine that the pilot flame is unaffected, install the restrictor plate and leave the tank undisturbed for several hours with your carbon monoxide alarm sitting on the floor next to the tank. If the alarm goes off or if you smell gas (or anything different from before), increase the size of the slot a bit and try again.

I found that my slot was large enough on the first try, which probably means I could

make it even smaller than it is and achieve even better performance.

Test 3

This is the most important test. In PILOT mode, a gas or carbon monoxide leak is unlikely to be dangerous simply because of the low volume of gas involved (it's basically the equivalent of running a kerosene lamp). The real danger is if you (or someone else) switches the tank back to NORMAL mode without removing the restrictor. **You absolutely MUST test your setup to see what happens in this eventuality.** What you want to happen is for both the main burner and pilot flame to be extinguished immediately (it takes less than a second on my tank) as the exhaust gases back up and prevent oxygen from reaching the flames. Then you want to confirm that the gas flow shuts off automatically as it is designed to in the absence of any flame. If this doesn't happen on your tank, then **DO NOT INSTALL THE RESTRICTOR**. You can still operate in PILOT mode without the restrictor; you will just have slightly cooler water.

Operation and Savings Calculations

Once you have the exhaust restrictor tuned, operation is simple:

To switch to "super efficient mode":

1. Switch the tank to PILOT mode.
2. Insert the exhaust tube restrictor.

To switch back to "gas glutton mode":

1. Remove the exhaust tube restrictor.
2. Switch the tank back to NORMAL mode.

Savings Calculations
Every summer, I turn my home furnace off completely (including the pilot light), so my hot water tank is the only appliance consuming gas. (Learn how to turn of your furnace completely here).Therefore I can compare my hot water tank gas consumption in NORMAL mode and PILOT mode simply by comparing my gas bills.

Operating in NORMAL mode, we averaged around 1.9 GJ of gas per month (see June and July 2006 in the chart).

Operating in PILOT mode, we average around 0.9 GJ of gas per month (see June and July 2007 in the chart.). Note that the consumption should be constant in PILOT mode. The reason June is higher is that we had guests for a week during which I switched back to NORMAL mode.

The savings are roughly 12.0 GJ per year which amounts to about $160 where I live. Green house gas (GHG) emissions from natural gas are about 0.056 tons per GJ. Therefore we have reduced our GHG emissions by about 0.672 tons per year.

Note that the exhaust tube restrictor is not required to achieve these savings. You can operate in PILOT mode without the restrictor. However, the restrictor allows you to capture more of the heat from the pilot flame for longer and hotter showers. I measured the hot water temperature each morning at around 37 degrees C (99 degrees F) without the restrictor. With the restrictor it is around 40 degrees C (104 degrees F).

The construction of the exhaust tube restrictor only took about 10 minutes once I figured out the design. The materials were free. That makes the payback less than 1 month unless your time is worth more than $80/h. This does not include the purchase of any carbon monoxide alarms, which one could argue should be installed regardless of whether you attempt this project.

How to reduce your water heating costs

Use cold water for laundry ,Mark your hot water faucets, Use cold water for rinsing dishes, Adjust your water temperature, Low flow shower head installation, Make sure it really is "low flow".
Gas hot water tank modifications, Switch to "pilot light only" mode, Install an exhaust restrictor to reduce heat loss, Install water pipe insulators, Install additional insulation around the tank, Electric hot water tank modifications, Put your tank on a timer, Install water pipe insulators, Dishwasher modifications, Run your dishwasher in econo-mode.
Water heater replacement with an "on demand" system, Gas "on demand" systems, Electric "on demand" systems, Water heater supplemented by a solar collector.

How to exploit the thermal mass in your home

Everything inside your home (the walls, the floors, your furniture... even the air) is

capable of storing, and re-releasing energy in the form of heat. Effectively, your home is a thermal battery. The battery charges when you allow energy into your home. As the battery charges, the temperature in your home rises. The battery discharges as energy escapes from your home. As the battery discharges, the temperature in your home drops. To make the most effective use of this phenomenon, you should charge your battery with as much energy as possible, as often as possible. Every time you intentionally release energy from your home by leaving a door or window open to help cool a room, you are throwing away free energy that could be stored for another day when you actually needed it. The question is how to store this free energy while maintaining a comfortable temperature inside your home. Here are a few things you can consider:

1. If you anticipate cool weather tomorrow, charge your thermal battery today. Close windows, raise blinds, etc, letting more energy into your home. Maybe it will be a little too hot today and a little too cold tomorrow. But that's a better option than just right today, and so cold tomorrow that you have to use artificial heating.
2. Make *all* the thermal mass in your home count. Rather than opening a windows to cool down rooms in your home that get particularly hot, use fans to circulate air from the warm rooms to the rest of your home. Open windows only once your entire home has reached the maximum temperature you can comfortably tolerate. Even then, don't allow your home to cool significantly below this temperature (ie keep your thermal battery charged).
3. Add more thermal mass. The more thermal mass you have in your home, the more energy you can store without the temperature rising to an uncomfortable level. Certain materials can store more energy per unit volume than others. Water, brick, stone, and concrete are some of the best. If you are remodeling, consider using materials such as these that have high thermal mass (also called "heat capacity" or "specific heat").
4. Adapt to a greater temperature range. If you can tolerate a greater range of temperatures, you can charge your thermal battery more and let it discharge more before relying on artificial heating or cooling.
5. Build a battery within a battery. If you can allow a particular space in your home to get excessively hot (a sun room for example), consider placing a large thermal mass in this room. When the rest of your house cools down, you can use a fan to circulate warm air from the sun room to the rest of your home.

MAKE WATER FROM THE SUN “SURVIVAL”

If you are ever confronted with the situation of having to find a source of drinking water in a emergency survival situation this little technique may save your life. Attempt to obtain a sheet of plastic such as a trash bag, they are all over the planet, the foot print of our culture.Next obtain a holding container such as a cup or bucket. No dig a 2 foot deep hole by 3 feet in circle. Drap the plastic over the top of the hole while placing the container in the middle of the hole. Ankor the plastic with rocks all around the edge of the hole leaving no open gaps for air to enter. You want the plastic to sage down towards the container in the hole so that there is a downward slope running from the holes edge to the middle of of the hole directly over the container. How punture a small hole in the plastic over the container. It is important that the hole be dug when there is a maximum duration

of sun light penetrating the plastic throughout the day.

The best times to check or retrieve your solar made water are at dusk and best at around 9 am. You will find that this method collects more water right after the morning dew starts to evaporat. there is no need to purify the water before drinking sense it is fresh. Any type of morning dew water on leaves or rock crevices can be consumed without worry of contamination. Humans can survivie 3 days without water. This method can yeild up to 2 8 ounce's of water a day depending on the relative humidity.

PLANS FOR A CHEAP SOLAR POWER SYSTEM COST $700

- **Battery Bank**--4 golf cart batteries. 6 VDC, 220 amp/hours, only $45.99 each from Sam's Club. Wired in series and parallel, these give 440 amp/hours of storage. That's more than enough for the minimal loads in the cabin, especially when you consider that the owner is away from home at work during the day, giving the system time to charge back up.
- **Solar Panel**--BP 75 watt, from an internet distributor. $310 new, plus $20 for shipping. Wired to controller and battery bank with #10 Romex.
- **Solar Panel Mount**--Home built from 1 inch aluminum angle, adjustable for summer and winter positions. About $20 total for aluminum stock, nuts, and bolts.
- **Charge Controller**--An industrial model from Jade Mountain, rated for 16 amps (to provide room for adding more solar panels later), and cost only $62. We had to buy 2 fuse holders and 20 amp fuses, mount this controller on a home-made aluminum heat sink and build a cover himself....but for the price he'll be able to add 2 or 3 more solar panels without a new controller.
- **Inverter**--A 350-watt Wagan from Harbor Freight, only $40. Includes fuse on main power cable and overload shutdown.. The only drawback of this model is that the fan is on all the time, and produces a little noise. We plan to turn the inverter off at night, and during the day while he's at work.

Metering--Cheap digital multimeter, only $10. Not real accurate, but enough to determine general battery state of charge. Plus, the controller has an LED to indicate full

c Battery Bank -- 4 Golf Cart Batteries

 Power Panel with Inverter and Charge Controller

 BP 75 Watt solar Panel

SIMPLE HOME BUILT HYDRO POWER GENERATOR AND WATER WHEELS

This machine was built by a neighbor of ours in about 2 hours, 6 years ago. It's been in constant operation since, except when the creek is frozen. He chose a natural dam, which was created when a tree blew across the creek. The tree is approx. 20" diameter.

A slot was cut in the tree to channel the water into the turbine. The turbine was made from a junk squirrel cage fan. The fan housing was bolted to the tree, so that the water

poured into the "output" of the fan, and came out a hole which was cut in the bottom of the fan housing, making for an "undershot" waterwheel. He used the pulley which was already on the fan, and belted it to a surplus computer tape drive motor (the kind they used to use in large computer tape drives, check our Products page for availability). The gear ratio is 1:3-- the generator turning 3 times faster than the water wheel. They make excellent low rpm generators. This system charges 2 amps into a 12 volt battery, 24 hours per day! His only power needs were 2 lights, and a small car stereo, the water wheel provided more than enough. It doesn't work after the creek freezes(4-5 months of the year), and he simply lets it freeze over each year, without any apparent damage.

It's easy power, cost next to nothing to build, and is low maintenance. The front bearing has failed twice (once every 3 years), but no effort was made to keep water out of the bearing--doing so might fix this problem. 2 amps may not seem like much, but consider the cost of solar panels required to produce 576 watt hours per day! Simple improvements could certainly be made to make a machine like this much more efficient. It uses a normal V belt, which introduces a lot of friction and loss. I don't know for sure, by my guess is the V belt may suck more than half the available power here. Gears, or a smaller belt would be interesting. I don't believe he ever took the time to try different pulley combinations either, it's possible there is room for improvement. Since we have been experimenting with them, it seems like a homebuilt wooden alternator or induction motor converted to an alternator (see our experiments page for more information) would work more efficiently by charging at lower rpm. Considering all the room for improvements, it's reasonable to think a unit like this could provide twice or three times the power. 50 watts, 24 hours per day would be an incredible amount of power considering the cost, low maintenance, and only about 20" of head on a small creek. Other simple undershot waterwheels have been made using 55 gallon metal or plastic drums with attached vanes, suspended above a river. Please let us know about your experiences with home built hydro power!

HOMEMADE BATTERIES.

you should get about 1.5 volts DC with a small milliamp current.
The more Bleach you use the more amperage you will get, but the faster the
metals will corrode. The idea is to make your batteries where they only need
to be refueled once every 3 months or so, and the metal will corrode very
little. To do this you will need to use a teaspoon of bleach to every gallon of
water. But this will not be enough amperage to do anything

with so what
you must do is add many cells together in series, counts as one cell
 Just as you would Flashlight batteries. When you refuel, each cell must be
turned over to let the old water solution out. You can refuel up to 6 months if
you use regular tap water with a pinch of bleach, But again the less bleach
the more cells you will need to add to get the voltage and amperage you
want for your particular needs. The Aluminum and copper will last a very
long time, The Aluminum will corrode faster than the copper. to keep your
battery system working at it's best It is suggested that you take out and clean
the metals with water and lightly sand the copper ones and then replace them
back into the containers every 3 to 6 months. We estimate both metals to last
about 4 to 5 years and maybe longer?????
Aluminum can be a bit expensive, But you can cut your cost by using Old
Aluminum cans. The aluminum can will be the Negative DC and the copper
pipe will be the Positive. you will get a much more powerful cell using the can as so.
Notice: Coke cans are clear coated on the inside, you will have to use Hydrochloric Acid to remove the coating. Be careful!

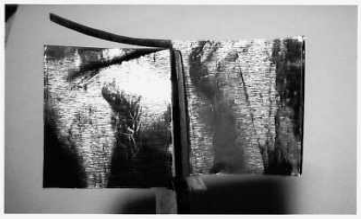
BONUS
Free News!

LAB NOTES, Water Battery 03-06-2001, page 2 of 2

(Details of Plastic Sheath type, -minuture 2"x1.378")

Cut foil design, metal A

Cutting foil, metal B

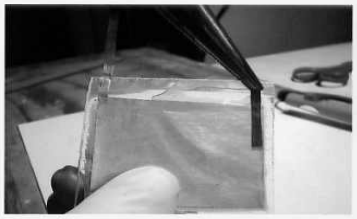


Filling cell with water

Sealing plastic with solder-iron

Shown after sealing/cutting

Bending back metal contacts



Measures .059 mA

Measures .421 vDC

Two cells measures .824 vDC

(Amperage approx. same as MetalSheath type cell shown previous page; but, voltage is less)

THE FUELLESS HEATER
(FREE HEAT FOR YOUR HOME)

The Fuelless Heater is a simple and relatively easy to construct device that
is proven to work! Some critics claim that the heater defies basic laws of
physics. With an efficiency of 100% and more. It is clear that the internal
energy of the atom is being tapped. When you trap an atom and apply
pressure in the form of friction - temp., interesting things start to happen.
Pauli's exclusion principle tells us that two electrons are not allowed to do the
same thing, to follow the same course and especially to get near one
another. Each time that an electron is forced nearer another electron, the
other one must move away, refusing to share an orbit. So each time that an
electron is forced to change orbits or levels, One QUANTA or One PHOTON
of light - HEAT ENERGY is giving off! Each electron changing levels forces a
series of other electrons into the same fate, Like a small chain reaction.
Rotational, Excitational, Vibrational, electronic and other energies that we
may not yet understand are each and all set off like ping pong balls in a room
of self reloading mousetraps.
Every home furnace or space heater uses a electric fan motor to blow the
heated air in and around the rooms or room. we are simply using this same
motor to do another function. To turn the inside rotor drum that will in turn
cause the atomic chain reaction in the liquid that is being used with in the
inner part of the outer drum, reaction as stated above. A 5 amp solar panel
can be used to run the blower fan motor, which will start the atomic
reaction. (

Safe to use) (Cold Fusion ?) It may be possible to use a very small electric
fan motor, 12 vdc x 3 -5 amps and run it by solar energy and back up batteries. For fireplace and space heater use. The Resistance of the inner
drum on the motor is very small. Over the years scientist have tried to invent
a way to heat a home using solar electric panels, but failed, the energy it
takes to heat a home is to much, it would cost a Solar Panel Customer over
$15,000 in solar panels to even come close. and is still not enough to do the
job. This heater is the answer to all our heating problems.
A fuelless Furnace that uses atomic friction instead of fuel to heat an average
size home for only $10 - $15 per month, FREE if the home owner uses one
solar panel to run fan blower motor. or a Free Energy electric motor! I heard
of a man who built this Free Energy Heater out of a 10 year old washing
machine, can you believe that? That's how simple this is to make. He had an
old uninsulated home and it was costing him over $230 to heat. His wife
probably thought he was a nut! but once he built and tested it he hooked it up
to a thermostat and bypassed it into his old Furnace and heated his home for
just 50 cents per day. (True Story!)
PLEASE NOTE: You BUILD at your OWN RISK! we are not responsible for
anything. This information is for research purposes ONLY! In making your
donation you have received this News Worthy information free for your own
research purposes.

HOW IT WORKS!

There are several ways to build a simple working model. The rotor and the stationary parts have
the same geometry. This may be a cone cylinder or a drum shape.
Start if you like with a small model using 2 tin cans. The one that fits inside the other should have
about a 1/8" clearance all around it's sides. and a 1/4" space between the inside of both bottoms.
You can use a hand drill or best to use a small work bench drill press. (You will need one anyway if
you don't have one)
The drill press is used to rotate the inner can which will start the atomic reaction with in the thin oil
that is in the bottom of the can. I built my tin can heater and it produced 92 degrees in just 12
minutes! That's pretty good for just a small tin can model. and the smoother the side of the cans are
the better results I got. Most tin cans have ridges on the sides of them, This is what I used first. but
not recommended Tin cans from the late 50's and 60's would be great to use! I spinned the inner can
at, 1700 rpm’s. This small demo is to prove to you that there is an atomic free energy reaction taking
place inside the oil or water. be sure to make your tin can heater well. use high temp automotive
silicon to attach parts. You can use the old lid to the outer can and glue it back in place with silicon
glue. you will need to drill a hole in the ceneter of the lid for the shaft to ride through.

There is a friction response going on here, but it is not the type you maybe thinking
of. It is of the atomic type. You maybe thinking that the friction from the rotor shaft
riding on the bottom plate pivot hole is producing all of this great heat! WRONG!
Once you have your first prototype built, first try it without oil or water of any kind,
the results will be -0- . You will get nothing. Now try pouring in a small amount of
thin oil on the bottom and turning it again. WOW! see what I mean. There is an
atomic reaction taking place which I believe is cold fusion and it is a safe atomic
reaction as far as my test have noticed. hundreds of people are

already using this
heater with no problems that I have heard of. There are ways to up grade and make it
better!
Another unit was built with about a 30 inch diameter cup shape rotor. It used about
a 1/2 or 3/4 horsepower motor. The cup does not have to rotate at a high speed. (
Remember a cup shape is different than a drum shape.) The temperature can easily
reach 200 degrees or 300 degrees f. This device heated a 16 room mansion for
around $30 per month! (They should have used a free energy motor or Solar Panel
to run the Fan Blower. it would have cost - 0 - $.
I believe that the liquid molecules are set into greater motion due to the rolling
friction between the stationary and the rotating cups. At the outer most diameter the
molecular motion is the greatest and slowly decreases toward the bottom. Aluminum
is the best material to use for the outer drum or cup that does not move. For you
research people: A mechanical resonance can also occur in the liquid at the right
thermal vibration. This will increase the heating action. Other constructions, sizes
and shapes can produce CAVITATION and SHOCK WAVES! The design and
geometry has a lot to do with it's overall performance.
The world is seeing a new type of energy production here using the same old type of
atoms that have been here on the earth since God created the earth. These atomic
cold fusion heaters can be very simple in design and can be operated at very low
speeds as well as high speeds.

TO SEE THE COMPLETE SCHAMATIC AND MATTERIAL LIST FOR THIS AMAZING BREAKTHROUGH GO TO THIS WEBSITE FOR THE FULL DETAILS ON BULDING YOUR OWN. NOTE: IT IS BEST TO COPY AND PASTE THESE URL'S BELOW INTO YOUR WEB BROWSER TO OPEN THE PDF'S.
http://www.ikdoedaarnietaanmee.nl/ebooks/Fuelless_Heater.pdf

THE FUELLESS ENGINE
(The answer to the energy problem)
"NO MORE UTILITY BILLS"

Free Energy Technology is now in your hands! If you decide to build this motor / engine, build it for your own use only and keep it from family, friends and the News Media. The Fuelless Engine is a spin off of the Ed Grey Motor as well as a combination of our own designs as well as The Newman design. This motor is like no other electric motor in the world. You can run this motor on 300 to 1,000 volts dc, (using a special coil design as well as the designs included in these plans.)
Please Keep all of this information to yourself! When Free Energy Electric Motors are allowed to be manufactured here in the USA we will show you how to get even more free energy from your motor than ever thought possible! But for security and Patent reasons we can not reveal to you all our secretes But we will keep your on file and let you know of any updates we can safely share.

FOR FULL PLANS AND SCHEMATICS TO BUILDING YOUR OWN FUELLESS MOTOR COPY AND PASTE THE BELOW URL INTO YOUR WEB BROWSER AND GO.
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HOW TO CONVERT YOUR CAR TO RUN ON WATER, PDF.
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NANOTECHNOLOGY WHITE PAPER, PDF.
http://www.ikdoedaarnietaanmee.nl/ebooks/nanotechnology-white-paper-february-2007.pdf

PERMANANTE MAGNET GENERATOR, PFD.
http://www.ikdoedaarnietaanmee.nl/ebooks/Permanent_Magnet_Generator_Construction_Manual.pdf

PHYSICS OF ZERO POINT FIELD GRAVITATION AND MASS, PDF.
http://www.ikdoedaarnietaanmee.nl/ebooks/Physics_Of_The_Zero-Point_Field_GravitationAndMass.pdf

ZERO POINT ENERGY, STAR GATE, WARP DRIVE, PDF.
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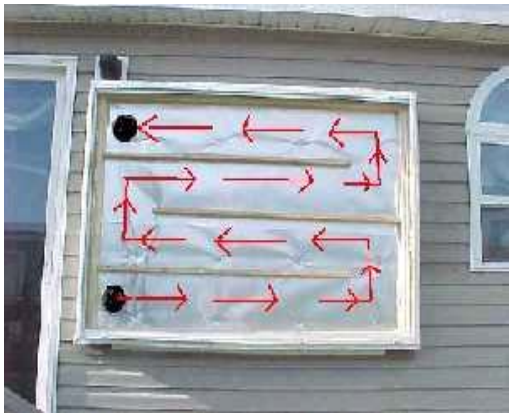
TESLA FUELLESS ENGINE,
PDF.http://www.ikdoedaarnietaanmee.nl/ebooks/Tesla_fuelless_motor.PDF

POORMAN'S FREE ENERGY EXTRA, CHEAP FREE HOME HEAT



When you think "solar", you may first think about those expensive panels designed to create electricity. We are talking about a completely different solar panel. Our solar heating panel is designed to heat air, not create electricity. Other designs include heating liquid.

To heat, air is drawn into the bottom of the panel. The air zigzags through the panel and comes out of the top 10-50 degrees warmer on sunny days. Air moves through the panel either by convection or by a fan located at the top. Sounds like a simple concept, but do one thing wrong and you'll get less than desirable results.

Rules of Thumb

As we share with you how we built our solar heating panel, we'll introduce you to various options and ideas. Soon you'll begin to formulate how your solar panel may look or operate. For a solar heating panel to operate effectively, you must keep in mind the following.

Rules of Thumb

When designing your own solar air heater, these rules will help keep you on the path to success.

1) Don't let the size of the collector exceed 20 percent of the house's heated floor area, assuming the home is reasonably well insulated and you aren't using a heat storage system.

2) Baffle layout should be such that no single "air run," the distance between an inlet and outlet, exceeds 32 feet. Larger collectors should be divided into zones with more than one inlet and outlet, although it could still be powered by a single fan. Or outlets could have openings into various parts of the house or ductwork.

3) Fan-powered air flow should equal an "actual" two cfm per square foot of collector at sea level, and 3 cfm per square foot at an altitude of 7000 feet, because of decreasing air

density. A square foot is defined as 1 foot x 1 foot x 1 inch deep. For a collector that's 4'x5'x2" deep, the formula would be cfm=(4x5x2)x3 for an answer of 120 cfms.
4) The air gap is a function of the air flow (volume over time) and the air velocity (speed over time). The optimal air flow is 800 feet per minute (fpm). Divide the calculated cfm by 800 fpm to get the area (in square feet) of the air gap cross-section. In the example in step 3, 120 divided by 800 = 0.15 square feet. To convert to square inches, multiply 0.15 x 144 for an answer of 21.6 square inches.
The gap (size of pathways) is then found simply by dividing the cross-section area by the width of the collector air way in one direction of air flow. In our example in number 3, the total cross-section width is 48". As we calculated in step 4, each pathway should have an air gap of about 21.6 square inches. Now start dividing. 48 divided by 3 = 16. 16" wide x 2" deep = 32 square inches. Nope, that's more than 21.6 square inches. So divide 48 by 4 and you get 12. 12" wide x 2" deep equals 24 square inches. Now we're getting closer.
To make 4 pathways, you'll need 3 dividers. Let's say those dividers are made from 1x boards which are 3/4" wide. With three dividers, you would subtract 1.5" from the total 48" width for a total width of 46.5". Divide 46.5 by 4 and you get 11.62 inches. Multiply that by two and you get 23.25 square inches which is as close as you are going to get to 21.6 square inches in this example. However you could adjust the depth of the panel to 1.75" to get an even closer air gap of 20.33. If you are custom-cutting your own glass, you can size the collector to the exact measurement. If you are already working from a piece of glass you've found, then all you can do is get as close as possible. Again, adjusting the depth of your panel is also one way to control your air gap. Keep in mind that the narrower your depth, the sooner your panel will heat-up. I would not go deeper than 2.5".
5) The collector inlets and outlets should be of a size equal in area to the air way (between dividers) they serve. For example, our airways in the above example ended up being 23.25 square inches. If you collect to a round duct, you'll need to find a size that gives you the closest area to 23.25 square inches. The formula for determining the area of a round duct, first measure across the duct to get the diameter and then divide by 2 to get the radius. So if you have a 5" duct, the radius would be 2.5". Then plug the radius of 2.5 into this formula to get the area: (radius x radius)x 3.14159 = area OR (2.5 x 2.5)x 3.14159 = 19.63 square inches. If you run the same numbers for a 6" duct, you'll get an area of 28.27. So ideally, you need a 5.5" duct which would give you an area of 23.75 which would almost exactly match the 23.35 square inches you need. But you won't be able to find round ductwork that's 5.5", so you would be OK to either use the 5" or 6" ductwork. If you plan on ducting the air into different areas of the home, I would lean towards the 6" size because your ducts will be longer.
6) Storage. A rule of thumb on storage sizing calls for 50 -- 60 pounds of rock per square foot of collector. Working with Btus, the specific heat of rock is such that one cubic foot stores 20 Btus for every 1 Degree F. it rises in temperature. In the case of a 40 Degree F. rise, a cubic foot would store 20 X 40 or 800 Btus. Let's say also that the collector output is 150,000 Btus per day. In order to store that much heat (at a 40§F. design temperature rise): 150,000 Btu/day/800 Btu/cubic feet of rock = about 187.5 cubic feet of rock needed, or about 18,750 pounds of the stuff. That's roughly seven cubic yards, one cubic yard weighing 2700 pounds. The storage bin also should be proportioned for minimum

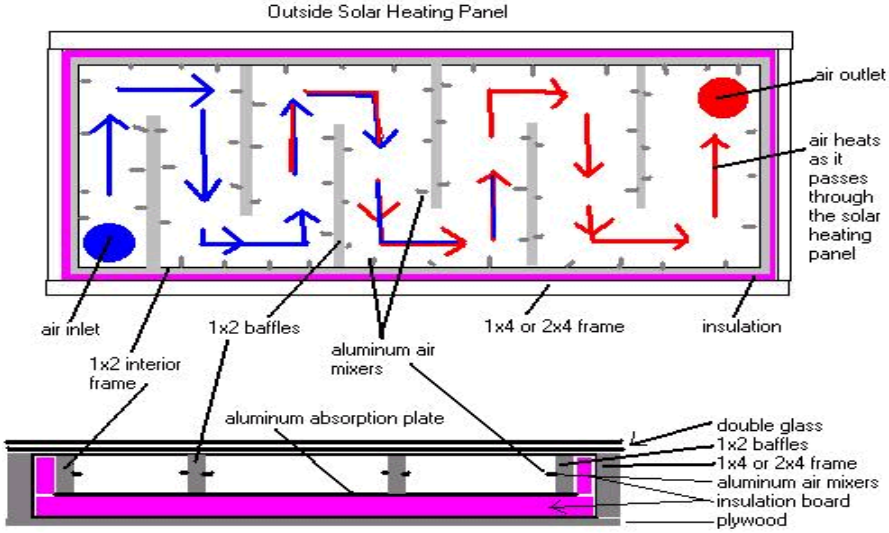
surface area to minimize storage heat loss. It should be stressed that incorporating storage into the collector system is no simple task, and because of space limitations we've by no means included all the information needed to do the work. Only the skilled craftsman who has some experience with forced-air heating systems should make the attempt. A good source of information on these air collectors and storage systems is the Domestic Technology Institute. Their publications available through Solstice Publications, Box 2043, Evergreen, 80439. Ask for publication g BP-044 "Solar Forced Air Heating System Plans," which is a set of six 18 X 24-inch blueprints available $16. Another source of plans for an air heating collector and rock storage system is the Ayer's Cliff Center for Solar Research, Box 344, Ayer's Cliff, Quebec, Canada JOB 1 CO. Phone: 819-838-4871.

7) The ideal angle to tilt the panel for the low winter sun is 62 degrees. With that in mind, it may be better to mount your solar heating panel on a wall than a roof with a low pitch (3/12 roof pitch for example).

8) Aluminum and copper conduct heat much better than regular metal. Whichever you choose, use the same type throughout your panel to prevent corrosion (the reaction between two different metals).

Two Types of Solar Heaters

Depending upon what works best in your case, you can build the solar heating panels in two ways -- to work inside your home or outside your home. Heaters that work outside your home can be fastened to your roof or the south side of your home. Heaters that work inside your home will hang in a south-facing window. Generally, outside heaters will create hotter temperatures and will be bigger than the inside heaters. Outside heaters will have double-pained glass and insulated on all sides. Inside heaters may have single-pained glass and no insulation except for some in the back. For the purposes of this article, we will show you how to build the outside solar heating panel.



Start with the Glass

Glass (or Plexiglas) is the most expensive piece to our solar heating panel. So we look for good discarded windows to help cut costs. Double-insulated glass is a must for outside solar heaters. For the solar panel shown in this article, we found an old double-pained window that measured approximately 4'x5'. If you are building an inside solar heater,

then use Plexiglas so you can build the unit to the size of the window it'll be hung next too.

Add Insulation and the Absorption Plate

Line the back of the panel with 1.5" insulation board. The insulation board comes in 4'x8' sheets and is easily found at most home improvement stores. Cut to fit using a utility knife. Simply set in place. No glue or fasteners needed. Aluminum flashing is used as the heat absorption plate. Aluminum flashing is inexpensive and readily available. If you don't use aluminum, you want something that will conduct heat well, like copper perhaps.

The best absorption plates are those with selective surfaces, such as surfaces plated with nickel, then covered by black chrome. They conduct heat superbly with hardly no long-wave emissive (reflection). But they are also very expensive, so we aren't using them here.

The aluminum flashing is available in many width and lengths. For this project, I used flashing that was 30" wide and 10' long. Cut to fit, overlapping in the middle is OK. No need to glue or fasten.

Screw Window Frame to Panel (optional)

The window I found came with a removable frame. So at this time I decided to screw the frame to the panel. If your window must be permanently screwed to the panel, wait and do that as the very last step.

Keeping everything sealed is important for an efficient working panel. Before I screwed the window frame to the panel, my son put down a layer of weather-stripping.

Set the window frame on the weather-stripping and screw into place. **Add the Baffles**

Add strips of insulation board to the sides of the panel. On this panel, I used 3/4" insulation board.

Add the interior frame boards and baffles. Everything is held in place using these boards. When the glass is added, these boards must seal to the top of the glass. That will make them approximately 2" tall. Double check all measurements.

Screw the interior frame boards directly to the side of the panel. Keep everything at the same height.

If you haven't determined the size of your pathways (area between the baffle boards), you need to do that now. Read the RULE S OF THUMB for help. In our panel, we determined we needed pathways with equal 20 square inches. Our pathways are approximately 10" wide by 2" high.

The baffle boards are screwed in place by first drilling several holes down through the baffles. Apply weather-stripping to the bottom of the baffle boards. Then a 4" screw is driven down the baffles, through the 1.5" of insulation board, then into the plywood at the

bottom.

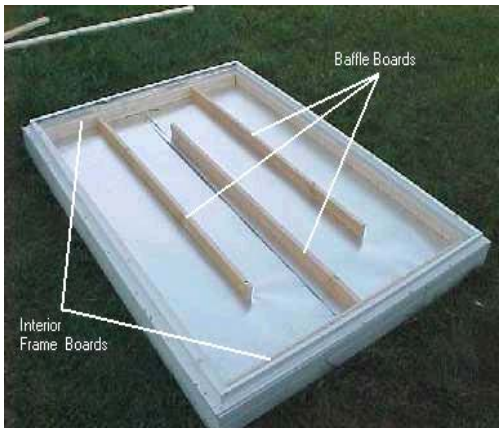
Cut Out the Air Openings

Next step is to cut in the air openings. Normally you would have one opening in the lower left and the other in the upper right (or vice versa). But in our case, we had to put the openings on the same side so they wouldn't interfere with some cabinets on the wall. The opening size should closely match the pathway size. In our case, we used a 5" opening as it's area was about 20 square inches. Again, read the RULES OF THUMB for more information. I used a jigsaw to cut my openings. **Hang the Panel**

Whether you hang your panel on the wall or on the roof, you must first do some preplanning. Figure out where the wall studs or roof rafters are. Your panel will be fastened to these studs or rafters. Plus, your panel needs to be lined up so the air intake and outlet doesn't hit a stud or rafter. In our example, we mounted the panel flat to a south wall. If you wish that the panel be pointed slightly up towards the sun, that needs to be taken into consideration now.

Once we figured out exactly where the panel would be located, we screwed a board to the house which would help hold up and support the panel as we screwed it in place.

We then screwed the panel to the side of the house using 3.5" screwed with washers. Of course the screws went into the stud of the wall.





Air Delivery System


With the panel now secured to your wall or roof, next step is to install the parts needed to deliver air to and from your solar heating panel.
We chose to equip our heating panel with a fan. We used a computer fan and hooked it up to a 20 watt solar panel. Most heating panels will work fine without a fan as the air will move by convection -- meaning cold air will enter the bottom and rise out of the top as it is heated. The air may not move as quick, but it will come out much hotter. If you wish to move even more air, then use a squirrel cage blower instead of a computer fan.
Pictured are most of the parts we used to hook-up our air delivery system. Since we determined that our opening had to be 5", all the parts are made to fit a 5" diameter hole. A couple things not pictured would be a trap door to prevent back-drafts at night and a temperature fan control switch. Pictured to the right is how the pieces would assemble together inside the wall and panel.
The 4.5" computer fan would need to fit snuggly inside the wall plate (right) by removing the back flange (below). A rotary tool works great for this project. Double-check which flange you are cutting so the airflow blows out. No fan is needed for the air inlet (same parts less the fan).



Cut your 5" hole through the wall using a 5.25" hole saw bit in your drill. If you don't have such a bit available, use a jig-saw or saw-all to make the cut.
Measure the distance from the panel to the wall. Add the ear'd connector to the ductwork and slide through hole
Seal around the duct with silicone and bend the ears over to secure in place.
From the inside, add wall plate for a finished look. Secure plate to wall with screws.
Insert the fan into the wall plate and mount the whole assembly into wall and fasten with screws. Next we added an electrical box next to the fan for an on/off switch. Run the wires from the fan to the electrical box. SEE PHOTOS BELOW






Mount the 20 watt solar panel so it faces south and receives full sun. Run the wire through the wall of the house and into the electrical box. Operating your fan with a solar panel makes your heating panel/collector more efficient because the fan will slow or stop on cloudy days keeping cold air from circulating into your home.
Finish wiring the switch and screw on the switch plate. Flip the switch and the fan should run if its mostly sunny outside.

Another option would be to replace the switch with a TEMPATURE CONTROLER BOX (below) so it only comes on when the temperature in the panel is 80 degrees or hotter.

We molded a trap door out of a scrap piece of aluminum. The door is light and easily swings open when the fan is activated. When the fan shuts off, the door closes preventing a back draft which would reverse the air flow and cool air back into the home.

Once the air delivery parts are installed, you should have a very clean, professional look on the inside. Add a filter to the bottom air inlet to stop any dust particles from entering the panel. When you no longer require solar heat, the air inlet at the bottom should be sealed with a plug made of foam or insulation

Black Paint and Air Mixers

With the air delivery system installed, next is to finish the panel and screw on the glass. First paint the insides black. Use a special high-heat flat black. Black absorbs heat and does not reflect it back.

Once the paint dried, we made air mixers out of scrap pieces of aluminum. As the air flows through the panel, the ridges in the aluminum cause some turbulence for mixing. We stapled the aluminum air mixers to the sides of the baffles and the interior frame

Glass

Apply weather-stripping to the top of the baffles and interior frame pieces (see above photos). Use a weather-stripping that can resist UV rays. Screw glass to the panel. In the case of our example, the glass simply set into the frame we earlier added. The glass should set tightly to the weather-stripping on the baffles and interior frame pieces so no air can pass over the top of the baffles. Carefully screw glass in place.
Obviously, this solar heating panel is designed to stay fastened to the home. During the months that heat isn't needed, cover the glass and plug the air inlet and outlet

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