

How to make a wind turbine

1. Before you start

Use a 3D printer and this template to print off the turbine floor and roof

To find out more about [3D printing](#) see our [3D printing tips and tricks](#) at school-gen.co.nz.



2. What you'll need

- * 3D printed turbine floor
- * 3D printed turbine roof
- * 3D printed tower upper axis support
- * 3D printed tower lower axis support
- * Ice-cream sticks x2
- * A wooden kebab skewer
- * Some flat flexible material for the blades (like thick paper or thin plastic)
- * Scissors
- * Optional: ruler, sandpaper, tape, glue, a little block of wood and screw for mounting



3. Get started

* Making the wind turbine and blades

Step 1:

First, we need to make some blades. These connect your turbine floor and roof to capture the wind and make your turbine spin. Work out how long you need the blade to be to fit along the inside of the turbine roof and floor. You'll need a blade for one for each side.

Step 2:

Decide how high you want the blade to be, that's the distance between your turbine roof and floor (you can experiment with this).

Step 3:

Trace the outlines of two blades on your flat flexible material and cut them out.

Did you know wind turbines let us harness the energy from wind to create electricity.

Step 4:

Slide one of the blades into the turbine floor and move it around until it fits. Use some tape to hold it in place if you need to.

Step 6:

Now it's time to fit your turbine roof on top of your blades (this is easier if you ask a friend to help).

Did you know that about 5% of New Zealand's electricity is generated by wind turbines.

Step 8:

With your kebab stick carefully push it pointy side first through the hole in the middle of the turbine roof (this is called the centre axis). This will form the shaft of the turbine. If it won't fit try sanding the kebab stick down or make the hole bigger with a drill bit.

Step 5:

Repeat the process with the other blade into the other half of the turbine floor.

Step 7:

Place your turbine floor on a flat surface and push down on the roof gently to make sure your blades are fitted properly.

Step 9:

Keep pushing your kebab stick through down into the hole in the middle of the turbine floor and out the other side (this is now the shaft of your turbine). The turbine should feel like it fits tightly to the turbine, if it's too loose try adding a drop of PVA or Epoxy glue and give it some time to set.

* Making the tower support

Step 10:

Now you've made your wind turbine and blades it's onto the base. Grab your tower lower axis support (it's the bigger round bit) and slide your icecream sticks on either side. If they don't fit you can sand them down.

Step 12:

Now it's time to slide your kebab stick into the hole in the middle of the upper tower axis support and down to the bottom. If it doesn't reach the bottom you'll need to trim your ice cream sticks until it does. Make sure you leave a little bit of room so the turbine floor isn't touching the upper tower axis support or it won't spin!

Step 14:

So that you don't need to hold it (and to stop it from falling over) you can screw your tower support onto a small block of wood.

Step 11:

Place your upper axis support on top, push down gently to make sure it's secure.

Did you know this type of turbine is known as a Vertical Axis Wind Turbine or VAWT for short

Step 13:

Now you've made your turbines, blades and tower support it's time to test it, hold it on a flat surface and blow gently to check your kebab stick is spinning freely, sand the end if you need to.

Did you know that the first wind farm in New Zealand was built by Genesis Energy in 1996.



4.
Finished?
What's
next

Visit Schoolgen.co.nz to check out other projects you can do.

We've also pulled together some cool challenges to get you thinking and innovating! The easiest ones are at the top of each list, the harder ones at the end for the budding scientists and engineers.

More minds are better than one so get a team together and start throwing some ideas around and come up with a plan of attack. For designing things, we recommend (and use) TinkerCad.

- ✦ Make a map of the windiest places in your backyard using the turbine as a measuring tool - is it on an open field, or up on a hilltop?
- ✦ Make taller and shorter blades to test how they perform in the wind - what is the best height?
- ✦ Design and 3D print two blades to fit the turbine (as they will be quite thin, consider ways to make it stronger).
- ✦ Harness the energy of the spinning turbine to lift a small weight.
- ✦ Make or improvise your own generator to generate electricity.

