



# Power Challenge

## Create

### Video transcript

Kia ora koutou!

I see you've got some pretty sweet turbine blade designs.

Let's turn your ideas into reality and create a turbine prototype.

Here's how to get started:

From your power kit, you'll need:

- A base
- A wooden dowel – the turbine tower
- A 3D printed bracket – the turbine nacelle
- A motor
- A hub
- Some popsicle sticks
- And a wing nut with a screw

You'll also need some recyclable materials to create your turbine blades.

Step one: blades!

Your blades are really important if you want to make a super-powered turbine.

When you create your blades, you need to think about design variables.

Let's recap:

**Design variable tahi:** Blade materials – make sure your blade material is light enough to spin, but still heavy enough to stand strong against the gales.

**Design variable rua:** Blade size – your blades can be as big or as teeny tiny as you want. But they need to catch the wind!

**Design variable toru:** Blade shape – think about aerodynamics when it comes to the shape of your blades. You might create a curved shape, or a flat shape, and you can do a little bit of maths to help.

**And design variable whā:** Blade number – your turbine can hold up to 12 blades. You can choose to add as few as 2 blades, or all 12.

Each one of these variables will affect your turbine's performance.

Let's get into blade creation.

Get out your chosen material, and draw your blade design with a pencil.

Then, cut it out.

Now's the fun part – make the blades your own by decorating the front!

Then, stick your popsicle sticks on the back of the blades with some glue to form the blade's spine.

While we wait for our blades to dry, let's put together the rest of the turbine.

Our turbine needs a nice sturdy structure to stand strong against those blustery gales.

Grab your base, and your wooden dowel and pop them together.

Now for our turbine nacelle – the part of the turbine that houses the generator. Or in our case, the motor.

Slide the motor into the nacelle like this – so the connector cable is facing downwards, and the motor pin is facing out this way.

Then pull the cable through the bottom of the nacelle and place this white part of the cable, into this slot.

Now, let's mount our nacelle on our tower. You can choose where you want it to sit. So, move it up or down to your chosen height and then lock it in place with the screw and wing nut.

At this point, your blades should have dried. So, you can put them into the slots on the hub.

Take a look at the slots. Can you see that they're angled? Why do you think that is?

Make sure your designs are facing this way, then secure your blades in the hub with some blu-tack or tape. Using something less permanent than glue to stick down your blades means you'll have more freedom to test different designs later on.

Finally, slide the hub onto the motor pin.

And there you have it! An incredible wind turbine.

Nice work power champs. It's now time to test.

Let's charge on. Ka rawe!