Power Challenge
Ask

Video transcript
Kia ora koutou! It's Lewis and Cha Cha, back again to talk you through the first stage of the engineering design process – ask. Let's go!
Title: ASK
Engineers come up with solutions to solve problems. And the first step to solve these problems, is to ask lots of pātai, or questions. Things like: I wonder how to create a robot that will do my chores for me? I wonder how to make a cake that's healthy for you? I wonder how to make chocolate appear in my hands right now? Woah!
We know our challenge is to use renewable energy to generate clean green electricity that won't run out. And that we'll be doing this by creating a wind turbine.
So… a good pātai to ask would be – I wonder how turbines work? A wind turbine is made up of a few important bits and pieces: • A sturdy base • A tower • A generator • A nacelle, which is where the generator lives • A hub • And blades

When wind energy moves over the turbine blades, it generates a force called lift. This makes the blades spin, transforming wind energy into rotational energy.

Now we need to transform the energy into electricity.

To do that, we need a generator.

The blades are connected to a generator which lives inside the turbine nacelle. So, when the blades spin, the generator spins.

This transforms the rotational energy into electrical energy.

This electricity travels down a cable, down the turbine tower, into the ground, and to the nearest substation.

It's safe to say, the faster the blades are spinning, the more electricity is generated.

So how can we make sure blades spin fast?

Well, aerodynamics of course!

Aerodynamics is the study of how air moves around an object.

When blades are designed in an aerodynamic way, it helps them generate more lift force. This then helps them get the most out of the wind.

So, you'll need to think about how different blade designs will affect your turbine's performance.

You could consider:

- Blade materials
- Size
- Shape
- And the number of blades.

You can't get out more energy than you are putting in.

So, the more efficient the blade design, the more electricity is generated.

And that's a wrap! Thanks for tuning in e hoa mā, good luck and charge on.