THE REZOURCE FORCE

DESIGN & BUILD
Wind Turbines

Wind

Wind is a renewable resource that comes from moving air. For thousands of years, people around the world have used the wind to sail boats, grind grain, and pump water. First Nations Australians have observed wind patterns for tens of thousands of years, using them to guide travel, manage fires, and understand the seasons.

Today, we use large wind turbines to capture the wind's motion and turn it into electricity. This is called wind energy or wind power.

The Challenge

Design and build your own wind turbine that transforms wind into electricity using a mini generator. You'll need to build a working circuit to capture and measure the voltage produced.

1. Research

Before you build, it's important to understand how wind turbines work, how to create a circuit, how to measure voltage, and how to use a mini generator.

What do you already know? What questions do you have? Use books, videos, websites, and class discussions to explore the science behind wind power. Below is some information to kick-start your own research.

What is a circuit?

A circuit is a path made of wires that electricity can flow through. It has to be complete, like in a race track, because if there's a gap then the race (or the electricity) can't finish!

What is voltage?

Voltage tells us how strong the electrical push is in a circuit. It's like the pressure that moves electricity through the wires and it can be measured with a multimeter or a voltmeter.

What is a Mini Generator?

A mini generator is a small device that converts movement (kinetic energy) into electricity. When the generator's shaft spins, magnets inside move past coils of wire. This creates electricity through a process called electromagnetic induction.

Wind Turbines

Here are some great videos on wind turbines to kick off your research.

How does a wind turbine work? - ACCIONA
- ***https://www.youtube.com/watch?v=DILJJwsFI3w***

Inside a Wind Turbine - Australian Academy of Science
- ***https://www.science.org.au/curious/video/inside-wind-turbine***

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2. Design

Use what you've learned from your research to plan your:

Turbine - what spins and holds your motor
Circuit - how you'll measure or use the electricity it generates

First think about the materials you'll need:

Required materials

- **1–3 V mini generator motor**
- **Voltmeter or multimeter**
- **Alligator clips with lead wire**

Build materials

- **Something to hold your motor and blades in place** (cardboard tubes, plastic bottles, wood offcuts, LEGO)
- **Materials to make the blades** (cardboard, plastic, paddle pop sticks, bottle tops, thick paper)
- **A base or stand to keep your turbine upright and steady**
- **A shaft to spin the blades** (skewers, straws, sticks, dowels)
- **Tools to build with** (tape, glue, pins, blu-tack)

Turbine design

Draw your turbine design and label the important parts, identifying the materials you will use. Think about the blades, the shaft, and how it will stand up and spin easily.

Circuit design

Draw a simple diagram showing how the generator connects to the voltmeter/multimeter to measure voltage. Label the energy flow:

Wind → **Motion** → **Generator** → **Electricity** → **Voltmeter/multimeter**

3. Build

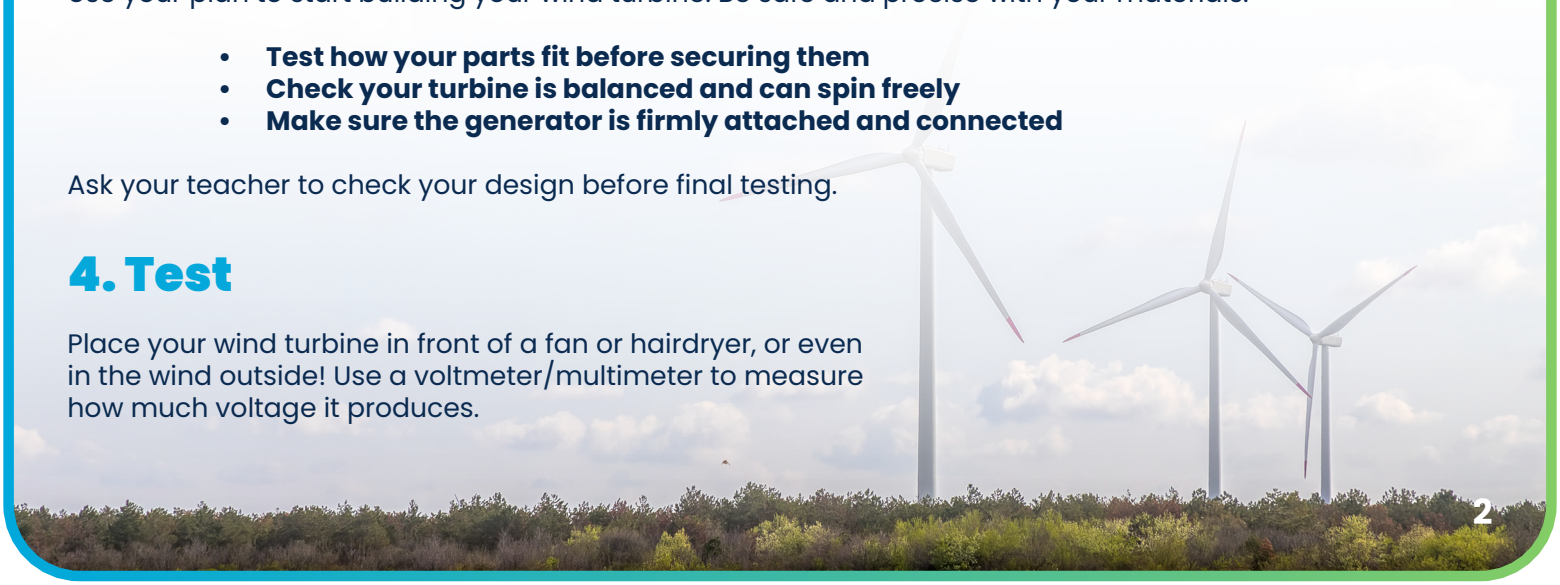
Use your plan to start building your wind turbine. Be safe and precise with your materials.

- **Test how your parts fit before securing them**
- **Check your turbine is balanced and can spin freely**
- **Make sure the generator is firmly attached and connected**

Ask your teacher to check your design before final testing.

4. Test

Place your wind turbine in front of a fan or hairdryer, or even in the wind outside! Use a voltmeter/multimeter to measure how much voltage it produces.



5. Evaluate

How did your wind turbine perform? Think carefully about your design and the results.

- **Did your turbine spin easily?**
- **How much electricity did it generate?**
- **What worked well in your design?**
- **What problems or challenges did you notice?**
- **If you could change one thing, what would it be and why?**

6. Test Again

Engineering is all about designing, testing, evaluating, and testing again. If you have time, improve your design and try again.

- **Can you generate more electricity with a new blade shape?**
- **Does changing the angle, size or number of blades make a difference?**
- **What happens if you change your tower height or reduce friction?**

Make a plan, adjust your design, and run another test. Record your results and compare them to your earlier attempt.

Extension

Want to take your project further? Here are some ideas to inspire you:

- Use your turbine to power an LED light
- Compare different blade materials (paper, plastic, cardboard etc.)
- Combine a group of turbines to see how much electricity they generate together
- Research careers in renewable energy

7. STEM Expo

It's time to communicate your findings at the STEM Expo! Can you come up with a creative way to present your process and discoveries through a report, poster, or even a video? You could:

- **Show your turbine in action with a fan**
- **Compare your first and final designs**
- **Explain how your turbine works**
- **Include photos, diagrams, or a short video**
- **Present as a news report, pitch, or invention showcase**
- **Combine turbines to power a small device**

8. Showcase @ rezourceforce.com.au

Now you can share your project with the REZource Force Online Showcase. This is your chance to show your work to other schools, community members, and professionals working in the renewable energy industry.

Selected entries will be eligible to win prizes for their school!

To enter, use the QR code to fill out a short form and upload photos, videos, or documents that show what you created and what you discovered.

SCAN ME