

Renewable & Alternative Energy Labs

WIND

Safety Information:

1. This wind turbine model has the ability to charge a rechargeable battery. **Danger! Never insert a normal non-rechargeable AA battery into the battery compartment. When charging a normal battery, it could overheat, leak or burst! Only use the included rechargeable battery for this Wind Turbine.**
2. For other safety information about this wind turbine model, please refer to pages 2-3 of the instruction manual.

For full digital instructions, visit: https://thamesandkosmos.com/manuals/full/627929_WP4_Manual_090822.pdf

Assembling your wind turbine:

1. Follow the picture instructions found on pages 6-9 of the instruction manual.

Battery Storage:

1. Once assembled, press the button on the battery pack to alternate between the IN and OUT modes. When the button is set to IN, the turbine is in input charging mode, used for storing electricity in the battery. When the button is set to OUT (output mode), that stored energy in the battery can be used; your generator becomes an electric motor powered by the energy stored in the battery. This electric motor will be used to power the electric car in the *Extension* section.
2. In charging mode, an LED in the button turns red when the wind turbine turns counterclockwise, indicating that the battery is being charged.
NOTE - the turbine will still spin without a rechargeable battery in the device.
3. To prevent damage to your turbine, **do not switch it to output mode while it is being powered (rotated by the wind).**

Experiments with the Wind Turbine:

1. Experiment with the wind turbine inside or outside. Follow the further instructions and suggestions noted on page 10 of the instruction manual.
2. Test out the wind turbine with various experiments, outlined on pages 15-17 of the instruction manual.
 - a. Optimizing the rotor blade angle (p.15)
 - b. Finding the best location for the wind (p.16)
 - c. Researching optimal setup location and wind conditions (p.17)



Extension - Electric Car

If your wind turbine has been charging the rechargeable battery, you can remove the housing from the turbine and build an electric car, with the generator acting as its motor! Follow the instructions on pages 24-26 of the instruction manual.

What is going on with wind energy in Alberta?

Built in 1993, Cowley Ridge (located near Pincher Creek) was Canada's first commercial wind farm. At the end of 2025, Alberta had over 1,700 wind turbines,¹⁶ with a maximum generating capacity of over 5,600 MW¹ and wind energy is the fastest growing form of renewable electricity generation in the province. In 2024, wind power made up about 11% of Alberta's Electricity generation.⁵



What are some cool features of modern-day wind turbines?

- They adjust their position and blade angles according to the direction the wind is coming. This maximizes the amount of wind that's hitting the blades.
- Wind turbines are between 80 and 120 metres tall, where wind speeds are highest since there are no buildings, hills or trees causing obstructions.
- Each blade is around 40m long (that's the length of about 4 school buses!). These large blades are able to capture the wind as efficiently as possible.
- Techniques to limit bird and bat mortality have been implemented at some wind farms, including ultrasonic boxes to deter bats, painting the blades black so they're more visible to birds, and using radar imagery to detect groups of bats and birds that are nearby and shutting off the wind turbines to allow them to safely fly through.

