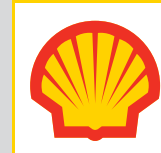


## WITNESSING WIND: CONSTRUCT A TURBINE

NAME \_\_\_\_\_



Wind power is a valuable source of energy for our country, now and in the future. Wind speed is determined by nature and not all places are right for effective wind production. Some places have either too much or too little wind. Scientists can harness wind to create electricity. Scientists test many different sizes and shapes of wind blades to determine which can most efficiently maximize the electrical output at locations where the wind speed is appropriate. Advances in wind blade design have increased the electric output while decreasing cost.

There are many choices when it comes to alternative energy sources; hydropower (water), hydrogen, biomass, and wind are but a few. According to the U.S. Energy Information Administration, in 2011, renewable energy sources accounted for 9% of all U.S. energy consumption. Of these alternative energies, wind energy is one of the fastest growing sources of energy.

**Be sure to wear safety glasses at all times and use care when handling scissors and wire.**

### DIRECTIONS

Work with your team to design and construct two wind turbines.

**Materials** (Enough for groups of two to three students each)

- 2 speed fan or hair dryer
- 1.5 v DC motor
- 0 – 5 v voltmeter
- 100-ohm resistor
- insulated wire
- corks, paper clips, corrugated cardboard, glue
- toothpicks, scissors, rulers

### Steps For Making a Wind Turbine

1. Attach the DC motor to the end of the ruler with tape or a Rubber band.
2. Cut 2 pieces of insulated wire about 40 cm. Long.
3. Strip 1.5 in. of the insulation off each end (pinch the insulation Softly with the scissors slightly cutting it, then pull off the Insulation).
4. Attach the end of one wire to one outlet on the motor.
5. Attach the other wire to the other outlet on the motor.

(cont.)

6. Tape the wires to the ruler at about the halfway point.
7. Attach one wire to one outlet of the voltmeter.
8. Attach the other wire to the other outlet of the voltmeter.
9. Splice the wire and attach the resistor between the motor and Voltmeter.

**Construct the turbine blades.**

10. Pick out 4 round toothpicks.
11. Cut 4 pieces of cardboard 3.5 X 5 cm.
12. Glue or tape the toothpick to the cardboard piece about 2 cm. from end (let dry).
13. Insert the 4 wind blades into the cork near the end. Space the blades evenly around the cork.

**The wind blades are now ready to mount.**

14. Attach the wind blade to the motor shaft by pushing the cork onto the shaft.
15. Be sure the cork fits snugly on the shaft.
16. Turn the fan on low speed in front of the propeller.
17. Record observations and data taken from the voltmeter.

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18. Turn the fan on high speed in front of the propeller.
19. Record observations and data taken from the voltmeter.

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20. As a class, compare data and come to a conclusion.
21. Repeat the activity using a different propeller design, such as folding the blades, or placing the blades at an angle to each other. Different shaped propellers may be made by using six blades.
22. After the propellers are constructed, make a hypothesis about whether this design will work better than your first propeller.

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23. Repeat the activity.

Was your hypothesis true? Explain. \_\_\_\_\_

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As a class, compare data and come to a conclusion. \_\_\_\_\_

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Visit [www.shell.us/energizemyfuture](http://www.shell.us/energizemyfuture) to learn more about how alternative energy resources will help provide energy for the future..