

# The Answer is Blowing in the Wind!

## Grade Level: 4-12 Science

Illinois Learning Standards: 7.A.1a; 9.A.1a; 9.A.1b; 9.A.2a; 9.A.3a; 11.B.1c; 11.B.2c; 11.B.1e; 12.C.1a; 12.C.2a; 12.E.1c

Assessment Framework: 7.3.01; 7.3.02; 9.3.01; 11.4.01; 11.4.02; 12.7.38; 12.7.49

**Learning Objectives:** Upon completion of this lesson students should achieve the following objectives:

- 1) Use directions provided to create a small-scale wind turbine.
- 2) Assess a design to build a prototype.
- 3) Record results from experiment.

## Suggested Reading Materials:

IAITC Renewable Energy Ag Mag and Generating Wind Power by Niki Walker

## Vocabulary:

Energy Electricity Megawatt Kinetic Energy Kilowatt

## Materials:

- 1 8 x 10 ½ inch piece of construction paper
- 3 2 ¾ x 8 ½ inch strips of construction paper in the same color as single sheet
- Ruler Tape Hole Punch Scissors
- 1 Plastic straw with bendable top
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## Introduction:

Using wind for energy can be traced back as early as the 1200's. Windmills were used to grind grains and pump water. The windmills of the early days have evolved into more complex machine and are now commonly referred to as wind turbines. These new super windmills function the same way as early windmills but now their purpose is to collect kilowatts to produce energy. Wind energy is a great resource for our energy needs because it is a widespread, unlimited resource. 46 out of our 50 states have areas within them that are suitable for a wind energy farm. With statistics that show one wind turbine could eliminate the need for 383,000 gallons of diesel fueled power, increased wind energy is a good idea. After reviewing the Renewable Energy Ag Mag have students follow directions to create their own wind turbine. Use this activity to learn how wind is created and what forces it takes to make energy.



## Instructions:

1. First roll the 8 x 10 ½ inch sheet of construction paper on the diagonal. Make sure not to roll the paper too tight. Tape the seam. This creates the base of your wind turbine.
2. Tape or fold into the inside of the base any uneven pieces. With a hole punch, make a hole in the center of the base at the top (this should be the end that is the smallest).
3. Now create the blades of your wind turbine by rolling the 2 ¾ x 8 ½ inch strips of paper on the diagonal just like you did to make the base. These pieces need to be rolled tighter to make smaller blades. Once they are rolled you can pull on the uneven end to elongate the blade. Once the blade is the correct length tape the seam.
4. On the blades, flatten and crease the square end. Now hole punch one hole on each blade on the flattened paper.
5. Then, position the blades in a triangle overlapping the holes you just made.
6. Glue the blades in this position or tape them together in the triangle position.
7. Next run the bendable part of the straw into the hole that you created on the wind turbine base. Tape the remainder of the straw to the base.
8. When your blades are dry, push the center hole over the small part of the straw at the top of the base. To help keep your blades from flying off as you are spinning them, cut two small slits in the end of your straw once the blades are on and then fold them back.

## Review Questions:

1. Are there any factors in the construction of your wind turbine that make the blades spin faster or slower? Do you think the speed of the blades on a real wind turbine is important, if so why?
2. What factors would you need to consider when choosing a location to place your windmill to ensure that it could operate correctly?
3. What might happen to your wind turbine if we were to increase the size of the blades by 3 inches? Decrease?

## Lesson Extenders!

1. Use the students, wind turbines to create your very own wind farm in your classroom. Display the wind turbines on a bulletin board. Label the parts of the wind turbine and its function in making kilowatts. Include information about the crops that are grown around the wind farms, the conditions needed for a wind farm and some of the benefits of a wind farm.
2. Do the research! There are several science kits or instructions on the internet to make your own small classroom wind turbine. A great example can be viewed at <http://www.pbs.org/now/classroom/wind.html>

