



Wind Energy

Contents:

- Four, one-hour lessons
- List of Standards addressed

Afterschool Curriculum:

This material is part of a larger afterschool Wind Energy curriculum developed by a team of students at Wayne State College supported by a grant from NextEra Energy Resources. The resulting curriculum was piloted at Wayne Elementary School. This parent-led activity packet was adapted from that curriculum by Beyond School Bells staff.

Beyond School Bells is very grateful to NextEra Energy Resources and the students and faculty at Wayne State College for developing this material which will be freely shared with afterschool programs across Nebraska.



L1 What Causes Wind?

Lesson 1 of 4

Big Question: What causes the wind?

Set the Stage:

Set fan in corner of room, facing into the room. Blow up balloons of various sizes and place them in a large trash bag. Empty the large trash bag of balloons in front of the fan. The fan will act as a source of wind by blowing the balloons around the room. What caused the balloons to fly around the room? Use guiding questions to lead them to the answer of what causes wind.

Resources: [Introduction to Wind](#) video: 55 seconds (Weather 101)



Activity:

Procedure: After the intro video – Engage

During the following steps of the activity, provide children with the opportunity to predict, ask questions and discuss ideas.

1. Blow the balloon up to stretch it and help make it more flexible. Then let the air out.
2. Place the balloon over the mouth of the empty plastic bottle.
3. Stand the bottle in the center of the container filled with hot water. Wait a few minutes and notice the balloon start to inflate and expand.
4. Remove the bottle from the hot water and place it in the container with cold water and ice. Wait a few moments and notice that the balloon starts to deflate and contract.
5. Repeat step 3 and 4 again. It's amazing!

Note to Parents:

[Here is a site](#) where steps are covered in images and text.



Materials:

- Computer
- internet connection
- Fan
- Trash bag with several blown-up balloons inside
- Two containers, one filled with hot tap water and the other with ice and cold water.
- 1 balloon and a 1.25 liter (or 2 liter) plastic soft drink bottle. The larger the bottle the more room the air has to push up and expand.
- Please do not use boiling hot water. Hot water from the tap will effectively work for this activity.

Standards:

Standards addressed by this activity - BSB – The Do Place: Nebraska: SC.4.4.2.B, SC.4.4.2.C, SC.4.4.2.F, SC.6.4.1.C and SC.6.4.1.D

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L2 Harnessing Wind Energy

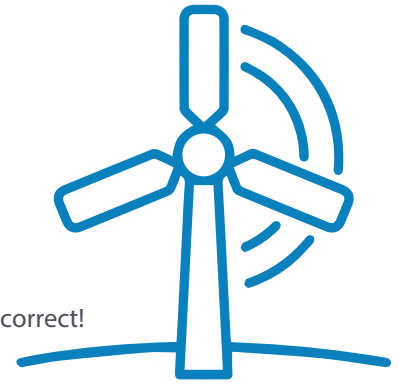
Lesson 2 of 4

Big Question: Can we harness or control wind energy?

Set the Stage:

Do you think we can control the wind and make it work for us? Note: It would be cool to video or audio record children's thoughts. Later, they can reflect to see if their predictions were correct!

Resources: [Types of Energy: Focus on the Wind](#) video: 7 minutes



Activity:

Procedure: After the intro video – Engage

Experiment 1:

- Set up the fan about four feet from your “moveable objects” on a table or counter
- Lay the hammer, dollar bill, pen/pencil, water bottle, and Easter egg side by side across the table or counter.
- Ask for predictions as to which item will move 1st, 2nd, and so on.

Experiment 2:

- Have your child/children help you build the egg lifting machine. Let each child run the experiment
- Add coins to make the egg on the floor heavier. At what point is the egg too heavy to move?

Ask:

Did either of the experiments have parts that surprised you? If so, which ones? What other things can we get wind energy to do around the house?

Note to Parents:

You might want to watch the video ahead of time to set up your experiment stations.



Materials:

- Computer
- Internet connection
- First experiment - Fan, hammer, dollar bill, pencil or pen, plastic Easter egg, empty water bottle. You can use other household items as well.
- Second experiment – 4 plastic spoons cut off just above the scoop part of the spoon, four-foot-long wooden dowel, string, tape, and two more plastic Easter eggs, and coins to make the egg on the floor heavier.

Standards:

Standards addressed by this activity - BSB – The Do Place: Nebraska: SC.4.4.2.B, SC.4.4.2.C, SC.4.4.2.F, SC.6.4.1.C and SC.6.4.1.D



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L3 Building an Anemometer

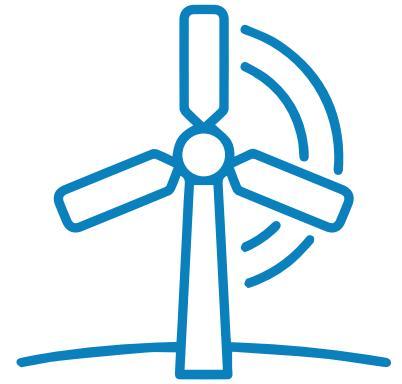
Lesson 3 of 4

Big Question: Can we measure how fast the wind is blowing?

Set the Stage:

Do you think we can measure the wind speed of a fan or of the wind outside? It would be cool to video or audio record kids' thoughts. Later, they can reflect to see if their predictions were correct!

Resources: [Building an anemometer](#) video: 2 minutes, 14 seconds



Activity:

Procedure: After the intro video – Engage

- Use a hole punch or the tip of a sharpened pencil to punch four holes in a paper cup just below the rim, forming a “+” shape (two pairs of holes opposite each other).
- Use a sharpened pencil to poke a hole in the center of the bottom of the cup.
- Use the hole punch or pencil to punch two adjacent holes in each of the other four cups. The holes should be about 2–3 cm apart, and about halfway along the cup’s height.
- Push the end of a straw through the two holes in each one of the cups. Make sure the cups are all facing in the same direction (all clockwise or all counterclockwise). There should be enough friction to hold the cups in place so they do not twist on the straws. If the cups twist easily, use a bit of tape to secure them.
- Push the pencil, eraser end first, through the hole in the bottom of the central cup.
- Press a pushpin lightly through both of the straws and into the eraser. Do not press the pushpin into the eraser all the way, or there will be too much friction and your anemometer will not spin.
- Use the attached sheet to note all data collected.

Note to Parents:

You might want to watch the video ahead of time. Here is a [step by step text and image website](#) for this lesson.



Materials:

- Computer
- internet connection
- Variable-speed fan
- Single-hole punches to share
- Stopwatch
- Markers
- 3 oz paper cups (5)
- Straws (2)
- Pushpin
- Sharpened pencil with eraser

Standards:

Standards addressed by this activity - BSB – The Do Place: Nebraska: SC.4.4.2.B, SC.4.4.2.C, SC.4.4.2.F, SC.6.4.1.C and SC.6.4.1.D



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L4 Building a Wind Turbine

Lesson 4 of 4

Big Question: How can we build a simple wind turbine?

Set the Stage:

How hard/easy is it to build a wind turbine? It would be cool to video or audio record kids' thoughts. Later, they can reflect to see if their predictions were correct!

Resources: [Building a Simple Wind Turbine](#) video: 4 minutes, 57 seconds



Activity:

Procedure: After the intro video – Engage

- Cut the sides of the small cup into four equal parts. Remove the base to create four curved pieces that will be the blades of the wind generator.
- Use hot glue to attach two craft sticks together at the center so they make a plus sign.
- Once the glue is dry, drill a small hole the size of the motor shaft in the center of the craft sticks. This will serve as the frame for your blades
- Glue a blade to each of the craft stick ends, as shown (click to enlarge image). The blade design has the greatest impact on the efficiency of the wind generator; this is just one way to do it. Feel free to try materials other than a cup to construct something you think will best utilize the wind to yield the most rotations per second.
- The hobby motor should have two small prongs sticking out of the back that serve as the terminals where you would normally attach a power source. Instead, attach an LED to the back of your motor by twisting each leg of the LED through a different terminal on the back of the motor. The correct orientation of the LED will depend on whether the blades spin clockwise or counterclockwise, so you will know if you need to switch it once you test the windmill. Slide your blade frame onto the shaft of the motor
- Glue one end of each of the other two craft sticks on either side of the larger cup to make a stand that holds the motor above the cup like chopsticks. Glue the other ends of the craft sticks directly to opposite sides of the motor to hold it in place. Make sure the motor is positioned so that the stand does not obstruct the ability of the blades to turn freely.



Materials:

- Computer
- internet connection
- Small hobby motor, 6-12 volts
- Red, high-intensity LED
- Four craft sticks
- Small paper cup for fan blades
- Medium cup for base
- Hot-glue gun and glue
- Scissors
- Drill and bit that matches the size of the motor shaft
- Fan or windy day

Note to Parents:

You might want to watch the video ahead of time. Here is a [step by step text and image website](#) for this lesson.

Standards:

Standards addressed by this activity - BSB – The Do Place: Nebraska: SC.4.4.2.B, SC.4.4.2.C, SC.4.4.2.F, SC.6.4.1.C and SC.6.4.1.D



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