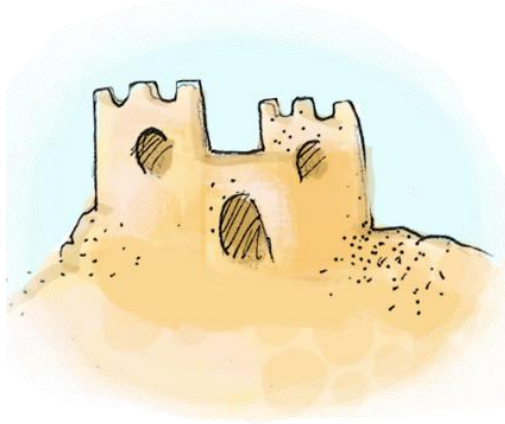


# How Wind Works



**Grade:** 2

**Subjects:** Language Arts, Science, Creativity

**Time:** 50 minutes

**\*Standards:** Students will...

**Science Standard 9:** Understand the sources and properties of energy.

**Benchmark # 1:** Know that the Sun supplies heat and light to the Earth.

**Science Standard 10:** Understand force and motion.

**Benchmark # 1:** Know the effects of forces (e.g., wind) in nature.

**Language Arts Standard 6:** Use reading skills and strategies to understand and interpret a variety of literary text.

**Benchmark # 1:** Use reading skills and strategies to understand a variety of familiar literary passages and texts (e.g., picture books, predictable books).

**Benchmark # 5:** Relate stories to personal experiences.

**Objectives:** Students will be able to:

- Describe air as a mixture of invisible gases that surrounds us.
- Identify wind as air that is in motion.
- Explain that the Sun supplies heat and light to the Earth.

[Please click here to view both the creative artwork for this great lesson and the downloadable PDF.](#)

**Materials:**

- Writing and drawing instruments
- Paper
- A copy or multiple copies of "I Face the Wind" by Vicki Cobb
- "How Wind Works" worksheet (included below)

**Overview:** Wind is caused by the sun's effect on the atmosphere. The sun heats the Earth's surface unevenly, which causes some places to be warmer than others. Land heats up faster than water. As the sun heats the air over land, particles spread out and become less dense – lighter. The lighter air rises, and cold, heavy air fills in the gaps left by the warm, upward moving air. This process creates wind and is

called convection. Wind is a renewable energy source. The wind will blow as long as the sun shines. Currently, wind energy is used primarily to generate electricity.

The earliest known use of wind to produce energy is approximated around 3,500 BC when the Egyptians are said to have used it to propel their sailboats through the water. Some 1,500 years later, as early as 2,000 BC, windmills were used to pump water and by 600 AD to process grains into flour. At some point in the 1300's the horizontal-axis windmill (similar to a pinwheel) appeared in Europe and was used in the Netherlands to drain fields and in France to irrigate them. By the late 1800's windmills were in use across North America pumping water. Steel blades had been introduced to improve efficiency. In 1888 a windmill was used in Cleveland, Ohio to generate electricity for the first time, and the term "wind turbine" was called into use. Now in the 21st century growing concerns regarding environmental problems, such as air pollution and global warming, have moved interests in renewable energy sources, of which wind power is a substantial contributor, to the forefront. 2008 estimates have global wind energy productions exceeding 94,000 megawatts of power.

A wind turbine, a more advanced version of the windmill, is a machine that converts the movement of the wind into electricity. The wind is used to turn the blades of the turbine, which in turn spins the turbine's shaft. The shaft is connected to a generator that changes the energy of the wind into electricity. The electricity is sent through transmission lines to a substation, which routes it to other sources, such as homes and businesses.

One wind turbine can produce anywhere from 100 watts to five megawatts of electricity. To increase output and produce larger amounts of electricity wind turbines can be clustered together in an area. These clusters of wind turbines are known as wind farms. Using wind farms to generate electricity is very economical and considered to be one the most cost effective methods used today.

**Kids Speak:** Wind is created by the sun's heat. The sun heats the Earth's surface unevenly by heating some air and leaving other air cold. Land heats up faster than water. The warm air rises and the cold air fills in behind the warm air. This process creates wind and is called convection. Wind is a renewable energy source used to make electricity.

**Eco-Fact:** The atmospheric winds that circle the earth are created because the land near the earth's equator is heated more than the land north and south of the equator.

#### **Procedures:**

##### **Before Drawing Wind Diagrams**

- Read Vicki Cobb's "I Face the Wind" to the class.
- After the reading, lead a discussion on how wind is created. Distribute included worksheet to help students visualize how wind is formed.
- Allow students to share their own windy experiences with the class.

##### **Making Wind Diagrams:**

- Have students draw a diagram showing how wind works. Tell students to use arrows and simple directional words, such as up and down, to show air movement. Tell students to be creative and include whatever they want in their drawings.

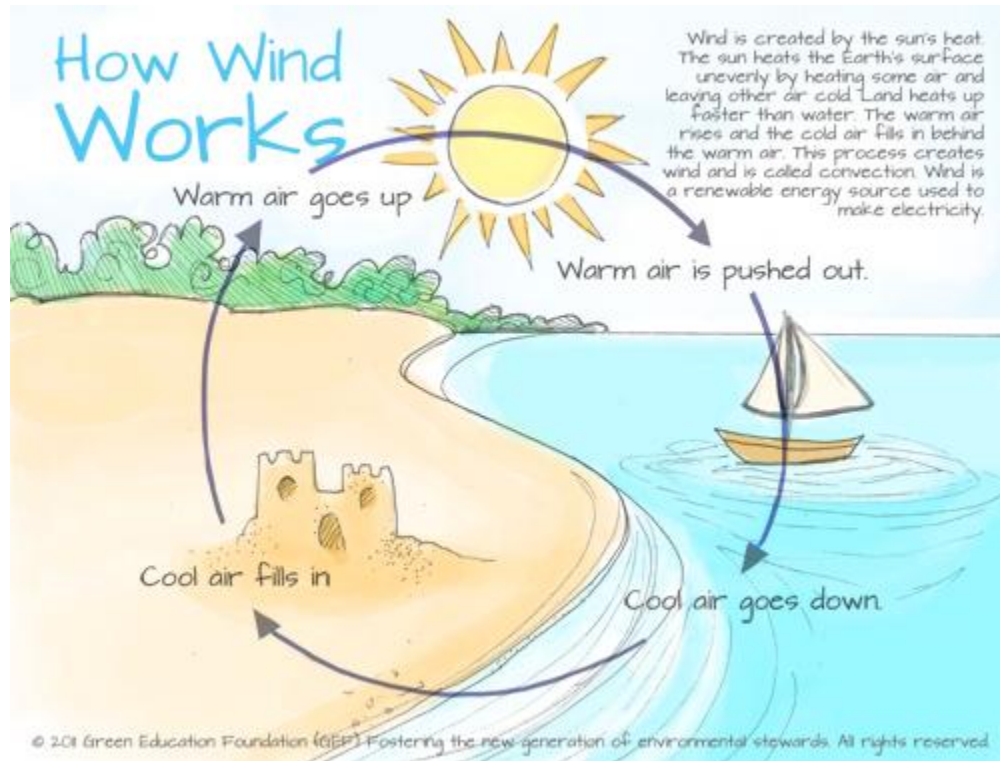
##### **After Drawing Wind Diagrams:**

- Students can present and explain their creations to the class.

**Adaptations:** Higher grades can write an essay to accompany their diagrams.

**Extensions:** Students can dramatize or act out the process of wind creation.

**GEF Community:** Join the GEF Community! First, add your school, class or group as a GEF member. It just takes a minute and your students will learn about technology and social networking all in one. Simply complete the basic information and then join the Green Energy Challenge. On your community page, upload your class's best diagrams and wind stories.



To view full-size lesson plan and print, follow these directions:

1. Click on the image above
2. Click on the small "print" icon at the top left of the lesson
3. Make sure your "Page Scaling" is set to "Fit to Printable Area"
4. Click "OK" and your lesson will be printed!

Click on the second icon from the print button to save your lesson to your computer.

For technical assistance with printing any of the GEF lessons, please contact:

[service@greeneducationfoundation.org](mailto:service@greeneducationfoundation.org)

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documents from a variety of professional subject matter organizations in fourteen content areas. Their result is a comprehensive database that represents what many educational institutions and departments believe to be the best standards research accomplished to date. To access the McREL standards database, or for additional information regarding the supporting documentation used in its development, please visit <http://www.mcrel.org>.