Unit 2
Energy from the Wind

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Unit Objective

- Students will be able to illustrate how wind flows through their school.

Background

The sun is the primary source of energy, and it influences many activities on Earth. The sun heats Earth's surface, and the energy is re-radiated, warming the surrounding air. The warm air is less dense (the molecules are more spread out) and cooler (more dense air) flows in and and displaces warmer, lighter air. This movement of air masses is one of the causes of wind. Therefore, the sun helps create wind. Both a feather floating in the breeze and a tornado blasting through the countryside illustrate that wind has energy. Of the sun's energy that reaches Earth, about two percent is converted to wind energy.

Wind energy has been used for hundreds of years. Farmers and ranchers have used windmills to pump water to fields and livestock in remote locations. Today wind machines provide electricity for operating lights and appliances and mechanical power for pumping water.

For information about the wind, see **Refreshing Refrigerator Experiment** in the activity "What the Wind Does for Me." See also "Facts about Wind Energy" in the appendix of the *KEEP Activity Guide* and the following KEEP activities and Energy Sparks:

- Sun, Wind, Water
- Waterwheels, Windmills, and Turbines
- Windy Wonders

Activities in This Section Address the Following State Academic Standards:

Language Arts

Oral Language

C.4.1 Orally communicate information, opinions, and ideas effectively to different audiences for a variety of purposes

C.4.2 Listen to and comprehend oral communications

C.4.3 Participate effectively in discussion

Mathematics

Mathematical Processes

A.4.1 Use reasoning abilities to
- perceive patterns
- identify relationships
- formulate questions for further exploration
- justify strategies
- test reasonableness of results

A.4.2 Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models

Measurement

D.4.1 Recognize and describe measurable attributes, such as length, liquid capacity, time, weight (mass), temperature, volume, monetary value, and angle size, and identify the appropriate units to measure them

D.4.3 Read and interpret measuring instruments (e.g., rulers, clocks, thermometers)

D.4.4 Determine measurements directly by using standard tools to these suggested degrees of accuracy
- length to the nearest half-inch or nearest cm
- weight (mass) to the nearest ounce or nearest 5 grams
- temperature to the nearest 5
- time to the nearest minute
- monetary value to dollars and cents
- liquid capacity to the nearest fluid ounce

Science

Physical Science

PROPERTIES OF EARTH MATERIALS

D.4.1 Understand that objects are made of more than one substance, by observing, describing, and measuring the properties of earth materials, including properties of size, weight, shape, color, temperature, and the ability to react with other substances

D.4.4 Observe and describe changes in form, temperature, color, speed, and direction of objects and construct explanations for the changes

D.4.5 Construct simple models of what is happening to materials and substances undergoing change, using simple instruments or tools to aid observations and collect data

POSITION AND MOTION OF OBJECTS

D.4.6 Observe and describe physical events in objects at rest or in motion

D.4.7 Observe and describe physical events involving objects, and develop record-keeping systems to follow these events by measuring and describing changes in their properties, including position relative to another object, motion over time, and position due to forces

LIGHT, HEAT, ELECTRICITY, AND MAGNETISM

D.4.8 Ask questions and make observations to discover the differences between substances that can be touched (matter) and substances that cannot be touched (forms of energy, light, heat, electricity, sound, and magnetism)

Earth and Space Science

CHANGES IN THE EARTH AND SKY

E.4.5 Describe the weather commonly found in Wisconsin in terms of clouds, temperature, humidity, and forms of precipitation, and the changes that occur over time, including seasonal changes

E.4.6 Using the science themes, find patterns and cycles in the earth's daily, yearly, and long-term changes

Social Studies

Geography: People, Places, and Environments

A.4.6 Identify and distinguish between predictable environmental changes, such as weather patterns and seasons, and unpredictable changes, such as floods and droughts, and describe the social and economic effects of these changes

Environmental Education

Questioning/Analysis

A.4.1 Make observations, ask questions, and plan environmental investigations

A.4.2 Collect information, make predictions, and offer explanations about questions asked

A.4.3 Develop answers, draw conclusions, and revise their personal understanding as needed based on their investigations

A.4.4 Communicate their understanding to others in simple terms

Knowledge of Environmental Processes and Systems

B.4.1 Describe the flow of energy in natural systems, citing the sun as the source of energy on the earth (e.g., a food chain)

B.4.2 Illustrate how they use energy in their daily lives

B.4.3 List sources of energy, distinguishing between renewable and nonrenewable sources

B.4.4 List the components of an ecosystem, including the qualities of a healthy habitat

B.4.5 Describe natural and human-built ecosystems in Wisconsin

B.4.6 Cite examples of how different organisms adapt to their habitat

B.4.8 Describe and give examples of natural resources (e.g., water, minerals, soils, air)

B.4.9 Distinguish between renewable and nonrenewable resources

B.4.10 Describe how they use natural resources in their daily lives

B.4.11 List jobs in the community that result from or are influenced by processing and using natural resources

Environmental Issues Investigation Skills

C.4.1 Identify environmental problems and issues

C.4.4 Identify some of the decisions and actions related to the issue

Decisions and Action

D.4.1 Demonstrate knowledge of a decision-making process that includes selecting and using data, suggesting possible alternatives, predicting consequences, and being aware of available resources

D.4.2 Identify and give examples of short-term and long-term solutions to a problem