Energy Detectives

(Three Activities)

Grades: 5-8

Topic: Energy Basics

Owner: Project Learning Tree

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Activity 1: Energy Detectives

Students explore the *Where is the energy?* poster and then search their classroom for energy connections. They record the ways they use energy throughout a typical day in an energy detective journal.

LEVELS:

Activity: Grades 3–8
Variation: Grades PreK–2

SUBJECTS:

Science, Visual Arts, Language Arts

ENERGY CONCEPTS:

- Energy is what powers all activities and cycles throughout the world.
- All living things need energy to survive.
- People use energy in many different ways. Their use of energy has social, economic, environmental, and health impacts.
- People's energy use has changed over time and varies across societies.

SKILLS:

Identifying Attributes and Components, Observing, Organizing Information, Comparing and Contrasting

MATERIALS:

Part A: *Where is the energy?* poster, copies of Student Page 30

Part B: two baseball caps (optional), copies of Student Page 31, tape

Part C: copies of Student Pages 32–33, scissors, stapler

OBJECTIVES:

1. Students will identify different energy forms including potential and kinetic energy.
2. Students will identify energy connections in the classroom.
3. Students will record their daily energy uses in a journal.

ASSESSMENT OPPORTUNITIES:

Ask students to identify the sources of energy they use in their daily lives. For example, what sources do we use to heat or cool our homes? To get to school or go on field trips? To wash and dry our clothes? To bake chocolate chip cookies? To watch television? To ride a scooter? To grow tomatoes?

Background

Energy is the ability to do work or make change. Energy is invisible. However, you can tell when energy is there. One way to tell is if something is moving. A person walking down the street, a tree blowing in the wind, and the hands of a clock spinning are all signs of energy. Another giveaway is if you see a light or hear a sound. As a result of energy, a TV turns on, a doorbell rings, and a cat meows. Yet another way to tell is if heat is being produced. Warmth from a candle or a fire is a sure sign that energy is present. Whenever you detect motion, heat, light, or sound, you can be sure that energy is at work.

All energy can be considered to be either potential or kinetic. ***Potential energy*** is stored energy. A tractor filled with fuel, snow at the top of a hill, a student sitting at a desk, and water behind a dam are all examples of potential energy. ***Kinetic energy*** is energy possessed by a moving object. A tractor moving, snow tumbling down a hill, students moving, and water flowing through a dam are all examples of kinetic energy.

Getting Ready

Make one copy of Student Page 30 for each group. Make at least three copies of the Energy Clue Signs (Student Page 31) for each student (there are 12 signs per page). Have tape dispensers available to students or cut small pieces of tape and stick them to the edge of a table. Make one copy of Student Pages 32-33 for each student.

Doing the Activity

Part A
Where Is the Energy?

1. Introduce the students to the word energy. What do they think energy is? Did they use any energy today? List the ways they used energy today.

2. Have the students stand next to their desks. Ask one side of the class to run in place for about one minute. Ask them how they feel after they run. They might mention that they feel warm. Ask the other students if they had the same feeling. Explain that one of the signs that energy is being used is that heat is produced.

3. Identify and explain potential and kinetic energy. Ask each side of the room which form they represented. Use the song "Energy & Me" or "Energia y Yo" from the *Energy & Me* CD to reinforce the meaning of potential and kinetic energy. Have the students list different examples of potential and kinetic energy from the lyrics

(written in both English and Spanish in Appendix III).

4. Explain that people cannot see energy, but we can tell it is there. Ask students to name some ways they might be able to tell that energy is there. (Answers could include seeing something move, hearing a sound, seeing light, feeling heat, or noticing something change.)

5. Review with your class the forms of energy described in the "Background Information for Educators." List the different forms of energy on a board for the class to review. The students will be looking for these different forms of energy on the poster.

6. Divide the students into groups of three or four students. Give each group a copy of the *Where is the energy?* poster. Using Student Page 30, have each group identify the sources or signs of energy and list them in the first column. In the second column, the students then identify the form(s) of energy shown on the poster. How many were they able to list? Which were potential and which were kinetic? What are the forms of energy being shown?

7. What sources or signs of energy are not shown on the poster? What pictures could be added to the poster to represent the missing sources?

8. There are several images on the poster of historical ways energy has been used. Why were these energy sources important then? Are they still used today? Have they been replaced with new technologies? An example would be the old windmill compared to the new wind turbines. The old windmill provided a source of energy at the farm location, usually to pump water. Today the modern wind generator is used to produce electricity that is distributed through the same network of cables and wires that carry electricity from other power stations. This network is commonly called the "grid system."

Variation for Younger Students (PreK–2)

1. Introduce the students to the word energy. Demonstrate some examples by having a student run, turn on a light, make a sound, or ride a bike. These are examples of energy being displayed. Ask the students to give other examples, and make a class list.

2. Show the *Where is the energy?* poster to the students. Have them identify the different types of energy being shown and add to your class list.

3. Play the song "Energy & Me" from the *Energy & Me* music CD. Teach students the lyrics (written in both English and Spanish in Appendix III), and sing the song as a class.

4. Show "Energy & Me" from the *Energy & Me* music and dance video/DVD. Invite the students to sing and dance along.

Part B
Exploring the Energy Around You

1. Put on two baseball caps (one forward and one backward) to mimic Sherlock Holmes. Tell students that you have on your detective hat because they are going to be energy detectives. Hand out the Energy Clue Signs (from Student Page 31) and explain that as students explore the classroom, they should look and feel for clues of energy. When they find an energy clue

(such as lights, sunlight, the heater, the intercom, or students moving), they should tape an Energy Clue Sign to that object. Students should look for as many different clues as they can.

2. After a few minutes, there should be energy clue signs all over the classroom. If you notice that students are having trouble, review the concept of energy, and then have them continue investigating.

3. Call the students together and discuss their discoveries. Have them look around the classroom and describe what they see. (They should see energy clues everywhere.) Have students tell you about the energy clues they found, and begin a list on the board. Ask questions such as: Did students stick a clue to themselves? (If not, have everyone do so.) What is our energy source? (Food.) Where does the energy to produce food come from? (The original source of energy is the sun.) Why is energy important to us? Can we live without it?

Part C
Energy Detective Journals

1. Tell students that they will keep a journal of the things they do during a defined time period. Walk the class through a "typical" morning to get them thinking about all of the things they do and the energy involved. What happens when you wake up? Does an alarm go off? What happens next? What about breakfast? How do you get to school? Now as an energy detective, let's think about energy clues we see in the actions we take. For example, when we have toast for breakfast, what are the energy clues? When looking at these energy clues, you can see how far your class takes them. Students might say it takes energy to toast the bread in the toaster, or they might include more detail, pointing out the energy to grow the wheat, grind the wheat, make and bake the bread, deliver the bread to the store, buy the bread, transport it to the house, and then toast the bread.

2. Give each student a copy of Student Pages 32–33. Have students cut apart the individual pages and staple them together to make a small book. Explain that students should record in their journal what they do over the defined time period. Have them think of some examples for each category, such as:

   - Caring for You: eating, bathing, brushing teeth
   - Having Fun: running, watching television, using the computer, talking on the phone, playing a sport, painting a picture, playing an instrument
   - Learning: writing on paper, reading a book, using the computer, playing an instrument, getting to a music lesson
   - Getting Around: walking, running, riding a bike, riding a scooter, riding in a car or bus

3. Explain that students should record their actions, either in drawings or words, on the appropriate page of the journal. They should then mark with an "*" the things that involve energy.

4. Lead a discussion about their journal entries. Ask students if any of their actions or anything else in the journal does not involve energy. They should begin to see that energy is involved in everything they do.

Integrating Music and Dance

- Play the song "Energy & Me" or "Energia y Yo" from the *Energy & Me* music CD. Teach students the lyrics (written in both English and Spanish in Appendix III), and sing the song as a class.
- Show "Energy & Me" from the *Energy & Me* music and dance video/DVD. Invite the students to sing and dance along. (The video/DVD contains both the music/dance video and a dance instruction segment. See page 79 for the location on the tape and running times.)
- Show "Water Cycle" from the *Energy & Me* music and dance video/DVD. Discuss the water cycle with your students and show how energy from the sun causes the water to evaporate. Invite the students to sing and dance along. (The video/DVD contains both the music/dance video and a dance instruction segment. See page 79 for the location on the tape and running times.)
- With older students, have them listen to "Energy Now, Energy Then" on the *Energy & Me* music CD. This song focuses on energy use in the past and present and how energy is a part of our everyday existence. After learning the song, students could interview their parents or grandparents, asking them about how they used energy in everyday life when they were young. For example, how did they heat their home, cook their food, and travel? What technology was available when they were young? Have the students make comparisons about the quality of life then and now. Compare medicine, food production and preparation, and travel then and now. How does energy impact their quality of life?

Enrichment

- For young children, discuss electrical safety and safe uses of energy.
- Expand Part B of the activity to include the school grounds. When you say the magic word, "Energy," have students run and stand by an energy clue. Ask students to explain their clues and how they show energy. Repeat until you have used all of the clues.
- Have the students make a mural of different energy sources by cutting out pictures from magazines.
- Current events: Challenge students to keep an eye on the news and to report any stories involving energy. Encourage students to research varied opinions to see which stories are balanced and take into account differing views and different sources of data.
- Bring in a variety of toys and games, and have students classify them according to which need energy and which do not. They should also identify the form of energy being displayed.

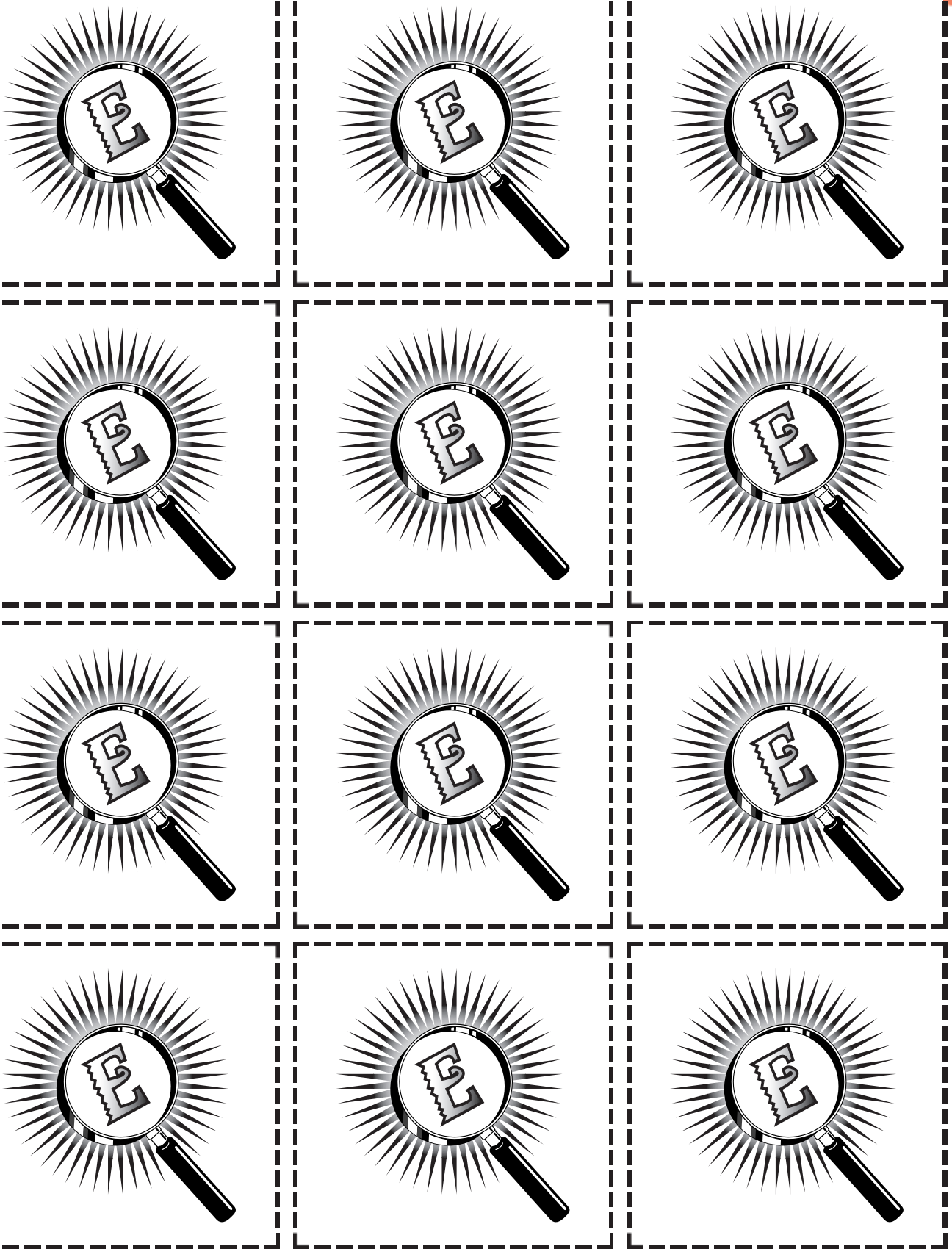
RELATED PLT ACTIVITIES

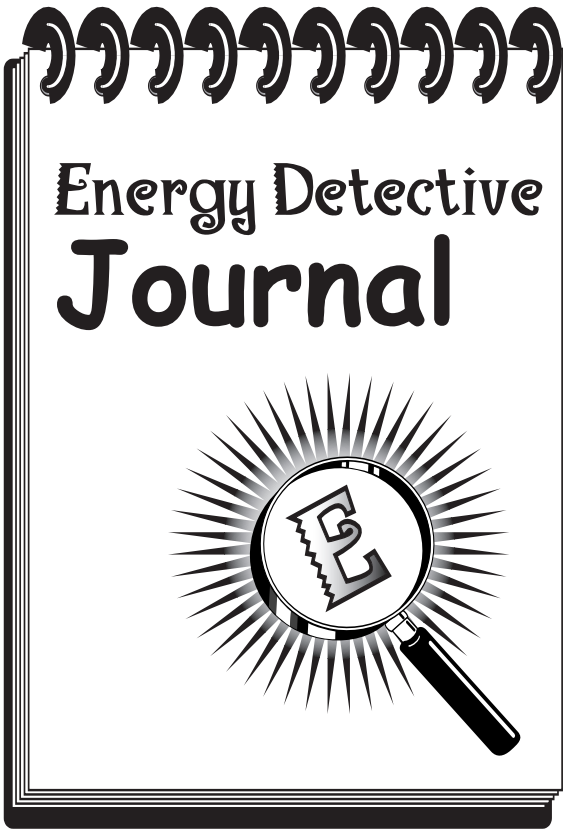
15: *A Few of My Favorite Things*
39: *Energy Sleuths*
45: *Web of Life*
82: *Resource-Go-Round*

Visit **www.plt.org** for resources and supplemental information.

Where is the energy?

Picture–Source or Sign of Energy	Form(s) of energy
Cornfield	Chemical potential energy





Caring for You
Record everything you do to care for your body—like brushing your teeth or eating breakfast. Put an * next to each thing that uses energy.

Learning
Record everything you do for learning—like reading or doing homework. Put an * next to each thing that uses energy.

Getting Around
Record every different way you get around—like walking or riding in a car. Put an * next to each thing that uses energy.

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Student Page

Fun
Record everything you do for fun—like coloring or riding a bike. Put an * next to each thing that uses energy.

Other Energy
Record something else you see or do that uses energy.

Other Energy
Record something else you see or do that uses energy.

Other Energy
Record something else you see or do that uses energy.