Save my ENERGY!

LESSON OVERVIEW

THIS LESSON UTILIZES BEADS AND PAPER CLIPS TO SIMULATE ENERGY CONSUMPTION. STUDENTS THEN EXAMINE THEIR OWN BEHAVIORS RELATED TO ENERGY USE TO DESIGN STRATEGIES FOR WHAT THEY CAN PERSONALLY DO TO CONSERVE ENERGY AND REDUCE THEIR CARBON FOOTPRINT AT HOME AND SCHOOL.

Standards addressed

This lesson plan helps you address multiple Iowa Core standards and Wisconsin Academic Standards. This section identifies the science standards for each state that apply to this lesson plan.

Iowa Core

S.3–5.PS.4

Essential Concept and/or Skill: Understand and apply knowledge of sound, light, electricity, magnetism, and heat.

S.3–5.PS.3

Essential Concept and/or Skill: Understand and apply knowledge of the concept of conservation of mass/ matter.

S.3–5.ES.1

Essential Concept and/or Skill: Understand and apply knowledge of properties and uses of earth materials.

S.3–5.LS.2

Essential Concept and/or Skill: Understand and apply knowledge of environmental stewardship.

RI.4.3

Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

RI.4.6
Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

SL.4.3
Identify the reasons and evidence a speaker provides to support particular points.

RI.5.3
Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

RI.5.6
Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.

Wisconsin Academic Standards

D.8.8 Describe and investigate the properties of light, heat, gravity, radio waves, magnetic fields, electrical fields, and sound waves as they interact with material objects in common situations

D.8.9 Explain the behaviors of various forms of energy by using the models of energy transmission, both in the laboratory and in real-life situations in the outside world

H.8.3 Understand the consequences of decisions affecting personal health and safety

This lesson addresses the following Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects:

Reading Standards for Informational Text K–5

- 4.RSIT.7 Integration of Knowledge and Ideas: Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears.
- 5.RSIT.7 Integration of Knowledge and Ideas: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Desired outcomes

By completing this lesson, students will be able to:

- Gain an understanding of the differences between renewable and non-renewable energy sources
- Make connections between their personal actions and energy use
- Design a personal energy conservation plan using a Venn diagram

Background

This lesson is designed to be used after the class has read and discussed the energy conservation content in *The Energy Zone.* Prior to beginning the activity, it may be helpful for you to review the concepts of renewable and non-renewable energy sources. Renewable sources like the sun, water and wind will never run out. But non-renewable sources, which include fossil fuels like oil, natural gas and coal, are not replaceable.

The point of this lesson is to reinforce the concept that certain behaviors use up energy that could otherwise be saved; and some behaviors help us to conserve energy. Non-renewable energy sources supply most of the energy we currently use, so we should all conserve energy whenever we can. The use of a Venn diagram graphic organizer will help students organize their conservation thoughts into a plan of action.

Time required

50 - 75 minutes, plus 20 minutes prep time

Materials needed

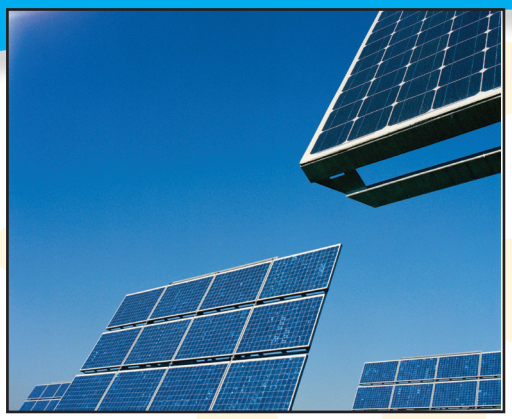
- 2-3 bags of small objects (such as buttons or beads), enough for each student to have 10 plus extra
- One large clear bowl/container and one small clear bowl/container
- Large and small paper clips, enough for each student to have one clip
- Access to the Internet
- *The Energy Zone* magazine

Reproducible

- *I need energy* [page 9]
- *Save my energy!* [page 10]

Important terms

- **carbon footprint:** the total greenhouse gases emitted by a person, group or organization based on their production and consumption of energy
- **energy conservation:** the act of using less energy or saving energy
- **energy efficiency:** products and actions that use less energy due to advanced technology and equipment
- **renewable energy source:** an energy source that can be replenished naturally, such as the sun, wind and water
- **non-renewable energy source:** a resource that is not replaceable once it has been used such as natural gas, oil and coal



Lesson steps

1. Before students enter the room, place a small amount of the beads in the small bowl labeled "Renewable" and the rest of the beads in a large bowl labeled "Non-Renewable." Place both bowls on a table in the front of the room. Distribute the paper clips on student desks, giving half of the students a large clip and half of the students a small clip.
2. Write the word, "energy" on the board. Ask students to share what energy means to them. Record student answers. All answers are acceptable!
3. Direct students to the bowls of beads and tell them to imagine that the beads in the bowls represent all of the energy sources available for us to use. Challenge them to name specific energy sources including the sun, water, wind, coal, gas, oil, biomass and uranium. Write the list on the board. Discuss the difference between renewable (can be replaced and will not run out) and non-renewable (limited in supply and cannot be replaced) energy sources and remind students that the majority of the energy we use today comes from non-renewable sources. Challenge students to indicate which of the energy sources on the list are renewable and which are non-renewable.
4. Set the small bowl aside. Then direct students to the paper clip on their desk. Explain that the large paper clips represent actions that use up lots of beads in the "Non-Renewable" bowl (you may want to take a handful out). Ask: "What types of actions might use up so much energy?" Examples include: leaving lights on all the time, taking long, hot showers, and riding in a car instead of walking or riding a bike. Have each person with a large paper clip volunteer one decision or action that uses up lots of energy. With each example, take more beads out of the bowl.
5. Now explain that the small paper clips represent decisions and actions that help keep the beads in the "Non-Renewable" bowl (you may want to put some beads back.) Ask each student with a small paper clip to share one decision or action that could

help to save energy. Examples include: turning off the television set when they are not in the room, carpooling with others to their soccer game or turning off the water while they brush their teeth. With each example put some of the beads back in the bowl. Ask: "What would happen to the beads in the bowl if everyone in the world acted like the large paper clips and no one or very few people acted like the small paper clips?" Eventually the beads (non-renewable energy sources) would run out.

6. Collect the paper clips and distribute 10 beads from the "Non-Renewable" bowl to each student. Then distribute the *I need energy!* reproducible. In the first column, direct students to list 10 ways they use energy in a typical week. You may need to help younger students jumpstart their list. Ideas include: playing video games, using portable music devices, watching television, riding in a car, taking a shower, cooking dinner, etc.
7. Have students imagine that each of the activities they have listed requires one bead of energy created from a non-renewable resource. Students should place a bead by each task on their paper.
8. Next, challenge students to imagine that our non-renewable resources are limited and they now only have 9 beads of energy they can use each week. They must decide which of the tasks on their list they would give up if there was not enough energy to complete it. Share answers. Then continue to take away beads to help students understand that as we continue to use up non-renewable energy resources, they are gone and cannot be replaced. Which tasks would students be most and least willing to give up? What conclusions can students draw based on their choices? What could help us avoid this scenario? (Using energy produced by renewable resources, using less energy, conserving energy, using energy efficient products, etc.)
9. Review the concept of energy conservation and ask students to share examples of ways they could simply use less energy for each activity rather than having to give one up altogether. For example, turning off a light or carpooling conserves energy. Remind students that using less energy saves money and helps the environment. Have each student share one conservation idea with a partner.

10. Introduce the term, "carbon footprint" with students. Ask if anyone knows what this term means. Our carbon footprint is a measure of how our activities and decisions impact or change the environment. The more of the world's resources we use, the bigger our footprint is. Our goal should be to have the smallest footprint we can. One way we can reduce our footprint is to conserve energy. Ask students if they think they have a large or small carbon footprint. (Students should justify their answers.)
11. Finally, distribute the *Save my energy!* Venn diagram reproducible and ask students to design a personal energy conservation plan using what they've learned. (If students are not familiar with it, you may need to explain how to use a Venn diagram to organize information.) Their plan should include at least two specific strategies they commit to doing over the next month to conserve energy and reduce their carbon footprint at home, two things they plan to do at school and two things they can do at both home and school. They must have their plan signed by one friend and one adult in their lives and be prepared to report back after one month on their progress in executing the plan.
12. If time permits, have each student present their plan to the rest of the class.

Academic extensions and modifications

- If the concept of a carbon footprint is too advanced, skip step 10. Students can still design a conservation plan without discussing the idea of a carbon footprint.
- Have students walk around school and create a list of ideas that could help conserve energy. Arrange to have them discuss their ideas with the school administration to see if any can be implemented.
- For a research project, have students research the energy sources that their community currently uses to produce power. They can find out by going to www.alliantenergy.com.
- Use an online tool such as http://www.readwritethink.org/classroom-resources/student-interactives/venn-diagram-30973.html to model how to create a Venn diagram.

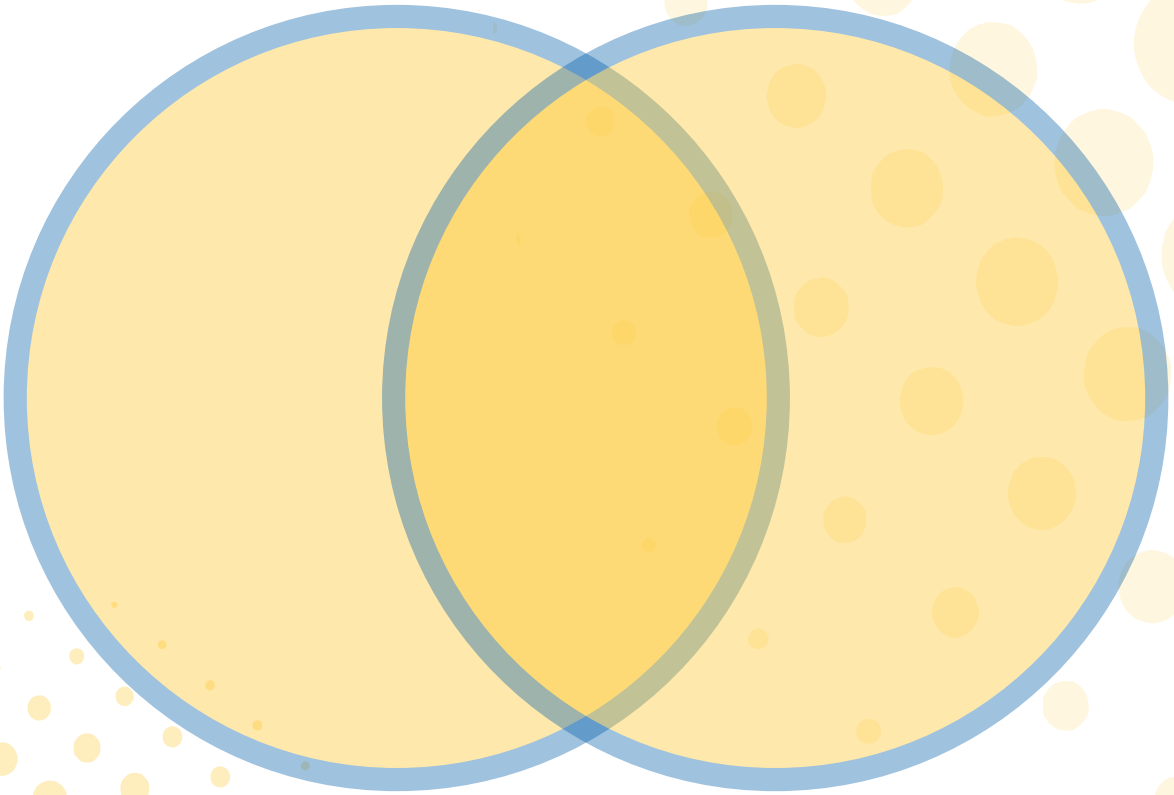
I need energy

We use energy every day, from the time we brush our teeth in the morning to the time we turn off the bedroom light at night. Energy comes from many different sources, including coal, natural gas, oil, water, wind and even the sun. But many energy sources are non-renewable, which means they cannot be replaced. One way we can help preserve the world's energy sources is by conserving energy. Every little bit helps! In the chart below, list 10 ways that you use energy in a typical week.

what i do each week that uses energy
Ex: I watch television.

Save my energy!

Throughout this lesson, you have learned how simple actions you take each day can make a big difference for our future energy supply. Now it's time to take action! In the Venn Diagram below, write a personal energy conservation plan that includes at least two things you pledge to do consistently over the next month to conserve energy at home, two things you pledge to do at school and two things that you could do at both home and school. (Refer to the weekly activity list you just made if you need ideas!) When you have finished writing your plan, sign and date the bottom. Then present your plan to one friend and one adult and ask them to sign and date it. At the end of the month, be prepared to present your progress and hopefully to celebrate your success!



Signature: _____ Date: _____

Friend's Signature: _____ Date: _____

Adult's Signature: _____ Date: _____