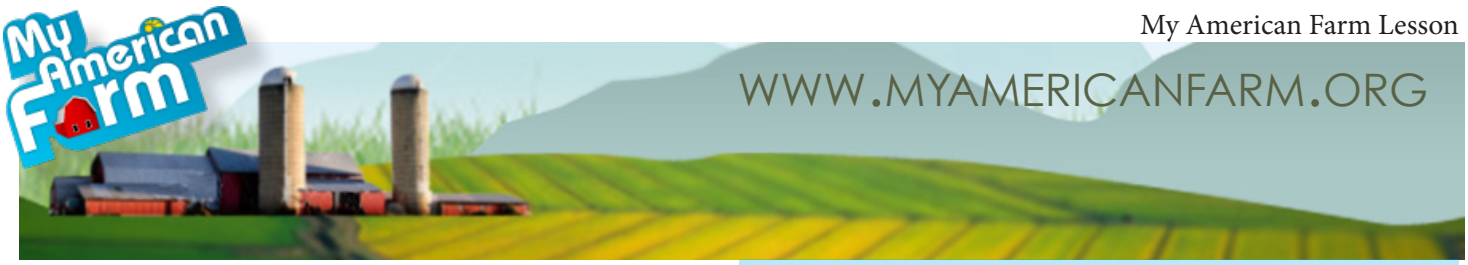

Energy and Agriculture

Lesson Snapshot

Related "My American Farm" Game

"Power Up" available at www.myamericanfarm.org

Grade Levels

- 4th-5th Grade

Content Areas

- Science

Standards

4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat and electric currents.

4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Next Generation Science Standards

Objectives

By the end of this activity, the students will be able to:

- Define agriculture
- Make the connection between energy and agriculture
- Identify sources of energy

Materials

- Balloon task card (1 per pair of students)
- Empty aluminum can (1)
- Whiteboard and markers
- Energy Memory Match cards (1 copy per pair)
- Scissors (1 per pair of students)
- (Optional) Computers and internet access – 1 per student or pair *This is only necessary if you wish to do the My American Farm game in class.
- (Optional) Headphones - 1 per student *This is only necessary if you wish to do the game individually in class.

Preparation

- Visit My American Farm online (www.myamericanfarm.org) to preview the "PowerUp" game.
- Review the lesson. There are a couple of places where you will see an asterisk (*). These are areas where you can choose to modify the lesson. To determine if you need to make these modifications, ask:
  - » How much time would you like to allocate for the activity?
  - » How would you like students to demonstrate what they've learned?

Introduction

Set Context for the Activity

Step 1: Experience Energy

- Kick off the lesson with this hands-on experiment.
- Give each student a balloon and ask them to inflate. Help tie balloons as needed.
- Break students into pairs and give each pair a task card (attached).
- Give students 2 minutes to complete the tasks and record their responses on the task card.
- Collect balloons before discussing. Set two balloons aside for use in final review.
- Debrief: *What happened when you tried to put the balloons together, after you had rubbed them on hair or clothing? Why do you think this happened? (*Rubbing the balloons on fabric creates static electricity. The balloons become negatively charged and repel one another.) *What happened when you placed the balloon near your hair?* (The hair stands up! This is because positively charged particles in your hair are attracted to the negative charge in the balloon.)
- Bring one student forward for a demonstration. Place an empty aluminum can on its side on the table. Have the student rub a balloon on his/her hair or fabric. Have the student hold the balloon next to the can. The can will roll toward the balloon.
- Preview lesson: *We just experienced energy in action. Energy is fun, but did you realize we need it for just about everything*

we do in life? Today you will discover how we need energy to grow our food and make our clothes. Let's jump in!

Body

Main Content

Step 2: Introduce the term "Agriculture"

- Write the word "energy" on one side of a white board, and the word "agriculture" on the other side.
- Ask students what they think of when they hear the word "energy". Write responses on the white board around "energy". Listen for: Energy is the strength or power needed for an activity.
- Ask students what they think of when they hear the word "agriculture". Write responses on the white board around "agriculture". Listen for: farmers, ranchers, food, clothing, shelter, fuel
- Key point: *Agriculture is a term that encompasses all of the industries and processes involved in the production and delivery of food, fiber and fuel that humans need to survive and thrive. In order for farms and ranches to produce these great things, they need some form of energy to power them!*

Step 3: Energy Source Match

- Set context: *Just like we used energy from balloons, people use energy from many different sources across the nation. A good energy plan uses a combination of different energy sources. That way if there is trouble with one source, energy production is not affected.*
- Have students return to original pairs.
- Give each student a copy of the "Energy Memory Match" cards (attached), and a pair of scissors.
- Instruct students to cut out the cards, shuffle, and place face down in a 4x4 grid.
- Students are to take turns within their pair, turning over 2 cards at a time. If the student successfully matches the energy source with the definition, they earn one point and keep the pair of cards.
- After students have completed the activity, review matching key terms. The answer key is included at the end of this lesson.

Step 4: Play Game

- Transition: *We've discovered important sources of energy. Let's put our knowledge to work as we save Energyland in a fun, online game.*
- At this point you may elect to have students play "Power Up", available at myamericanfarm.org. Students can work individually or in pairs.

*You may choose to have students play this game before you arrive, after you have left, or at home with adult permission.

*The game is supported by audio. You may wish to secure headphones for students, or play the game as a class while displaying on a large screen.

Wrap Up

Review, Assess, Challenge

Step 5: Circle Up

- Have all students stand in a circle, shoulder to shoulder, facing in.
- Give one student a balloon, saved from the opening activity.
- Tell students that the challenge is to keep the balloon in the air as long as possible. Only one student may hit the balloon at a time, and students must keep one foot stationary.
- Let students attempt the challenge once.
- Hold the balloon and inform students that, this time, students must yell out a concept or word they recall from the lesson before they hit the balloon.
- Repeat. Add a second balloon if additional challenge is needed.

Step 6: Take it Home

- Remind students that we depend on energy to produce our food, fiber and manage our natural resources. This is all part of the industry we call agriculture.
- Challenge students to go home and share what they learned with their families.

*To extend learning, encourage students to make a list of all the appliances using energy in their home. Create an energy wall at school displaying uses and sources from the matching game to remind students how we harness energy to meet our everyday needs.

Teaching Notes

Energy Memory Match: Answer Key

Petroleum: fuel used for transportation (like cars and trucks) and manufacturing

Natural Gas: flammable gas found naturally underground

Coal: combustible black or dark brown rock used as fuel

Propane: non-renewable gas used for heating things like bar-b-q's

Biomass: things that were alive, like wood and plants

Hydropower: energy captured from water

Wind: energy captured from air moving through turbines and windmills

Solar: energy captured from the heat of the sun

References

*Balloon activity inspired by "Science Experiments for Kids" http://www.sciencekids.co.nz/experiments/staticelectricity.html

Energy Memory Match content derived from National Energy Education Development Project (n.d.). Energy infobooks. Retrieved from http://www.need.org/needpdf/infobook_activities/PriInfo/BiomassP.pdf

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TASK CARD

Task 1: Rub balloons on your hair or clothing. Now hold balloons next to each other. What happened?

Task 2: Rub your balloon on your clothing. Hold next to your partner's hair. What happened?

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Energy Memory Match

Petroleum	Propane	Natural Gas	Fuel used for transportation (like cars and trucks) and manufacturing
Things that were alive, like wood and plants	Flammable gas found naturally underground	Combustible black or dark brown rock used as fuel	Hydropower
Coal	Energy captured from water	Energy captured from air moving through turbines and windmills	Energy captured from the heat of the sun
Wind	Non-renewable gas used for heating things like bar-b-q's	Biomass	Solar