

Lesson Overview	<p>In this lesson students prepare for an Alliant Energy presentation on energy safety. More specifically, the lesson focuses on the hazards that both electricity and natural gas can present when they are not properly handled. The lesson uses energy safety as a way for students to learn about specific examples of hazards. In the end, students survey their peers and family members to discover what they know (or don't know!) about energy safety.</p>
Objectives	<ul style="list-style-type: none"> • To participate in a simulation that illustrates the flow of electricity • To investigate real-world hazards of electricity and/or natural gas • To survey families and peers on their understanding of energy safety
National Standards Addressed	<p><i>K-4 Science Standard B – Light, Heat, Electricity, and Magnetism</i> Electricity in circuits can produce light, heat, sound, and magnetic effects. Electrical circuits require a complete loop through which an electrical current can pass.</p> <p><i>K-4 Personal Health</i> Safety and security are basic needs of humans. Safety involves freedom from danger, risk, or injury. Security involves feelings of confidence and lack of anxiety and fear. Student understandings include following safety rules for home and school, preventing abuse and neglect, avoiding injury, knowing whom to ask for help, and when and how to say no.</p> <p><i>K-4 Language</i> #4 – Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes. #5 – Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.</p>
Desired Outcome	<p>After completing this lesson, students will:</p> <ul style="list-style-type: none"> • Have a better understanding of how electricity and natural gas travel • Recognize that there are many potential hazards associated with using electricity and natural gas • Recognize that there are numerous ways to avoid hazards associated with using electricity and natural gas • Be able to report on the knowledge of their peers and family members regarding energy safety

Time Required	<p><i>Teacher preparation:</i> 20 minutes <i>Class time:</i> Two 30-45 minute classes, plus outside class time for survey</p>
Materials Needed	<ul style="list-style-type: none"> • Teacher and/or student resources such as the following Web sites: www.alliantenergykids.com/playingitsafe/ www.alliantenergykids.com/energybasics/ • Printouts of electricity and natural gas accident articles: www.thehometownchannel.com/news/3821732/detail.html www.franklinfavorite.com/cgi-bin/view.cgi?/200210/17+fatality10-17-02_news.html+20021017+news • Signs labeled “Power Source” and “Switch” • Flashlight • Paper and pencil
Reproducibles	<p>This lesson includes a reproducible to guide students through their surveys of peers and family members. It includes suggestions on how to create survey questions, in part, by providing sample questions. The reproducible also recommends how to conduct a survey.</p> <p>This lesson also includes a reproducible with important vocabulary terms, which are listed in the field below.</p>
Important Terms	<p>Conductor, insulator, circuit, shock, grounded, substation, natural gas, carbon monoxide, flammable, pipeline</p>

Lesson Steps/Activity

1. Tap into prior knowledge and introduce the lesson by asking students how they turn on an overhead light. The first response is likely to simply be: *by turning on a switch*. Probe deeper by asking students if they know what happens when you turn on a switch. They are likely to mention that electricity flows to a light. Hold up the flashlight and the “Power Source” and “Switch” signs and pique students’ interest by telling them that they will role-play a light being turned on.
2. Have students stand in a circle facing inward. One student should wear a sign labeled “Power Source,” and the student immediately to his right should hold the flashlight. A student across from them in the circle should wear a sign labeled “Switch.” Explain that joining hands with the person next to them will indicate that electricity is flowing between the two of them.
3. To begin the role-play activity, have the students from the left of the power source all the way to the switch join hands. (There is a constant flow of electricity between these points.) Announce that you are turning on the switch. Then starting with the “Switch” student, students to the left should join hands one at a time until reaching the “Flashlight” student, who turns on the light. Challenge students to figure out how the electricity flow to the light would change. (Again, the chain should start at the switch, and students should remove their hands until reaching the flashlight, which should then be turned off. **MAKE SURE** students know that in a real situation, electricity travels so fast that the light goes off instantly.) Challenge students to complete the process as quickly as possible. Once they understand how it works, break the circuit in a couple of different places to show that electricity will not flow past a break.
4. When students return to seats, use an overhead to introduce the vocabulary words, initiate a discussion, and give students time to record words in notebook. Be sure that students take note that the terms include some associated with natural gas — another form of energy. Use samples, if possible, of conductors and insulators.
5. Read articles about electricity and natural gas accidents with students, and use these as a lead-in to a discussion of safety hazards. Make sure students understand that electricity *is* dangerous and natural gas *can be* dangerous if not handled properly.

Lesson Steps, continued

6. Guide students to brainstorm possible safety hazards when using both electricity and natural gas. Following are some possible questions to be posed. These are meant primarily to get students thinking about the hazards that they will learn more about in the survey and in the Alliant Energy safety presentation. (Allow students to share answers to the questions, but do not feel like all of the questions need answers at this point. However, DO NOT allow incorrect answers to pass; instead, provide students the opportunity to find the correct answers!)
 - What is the best way to remove toast that is stuck in a toaster?
 - Electricity is delivered to your home by overhead or underground wires. What are some examples of activities in which people should be careful to avoid those wires?
 - How many extension cords can you use and still be safe?
 - What would you do if you came upon someone who might have been shocked?
 - What kinds of materials would you use to attach an electrical cord to a wall or baseboard?
 - Why is it dangerous to light a match if you suspect a natural gas leak?
 - Why can we smell natural gas if it is odorless?
 - What should you do if you smell a natural gas leak at home?
 - When can natural gas be dangerous?
7. Pass out copies of the survey reproducible, which includes some of the above questions. Tell students they will select ten people (other students or adults) and ask them to indicate their answers to the questions. Designate a due date of not more than one week during which students will conduct the survey and write a brief summary of their findings.
8. When the due date arrives, have the class discuss their findings. Identify common responses and unique ones. Ask students to share their impressions of the process of surveying others.

Extensions and Modifications

- You can set up a demonstration for the flow of natural gas in a pipeline. Again, use a line with students holding shoulders. One student can represent a leak and say, "Pee Yew!" when forming a leak, reinforcing the fact that there is an odor present when natural gas leaks from a household pipe.

Extensions and Modifications, continued

- Time permitting, small groups can investigate some of the questions generated for the survey to try to discover answers. Alliant Energy's alliantenergykids.com site provides many answers to these questions.
- Have students conduct their surveys in pairs or small groups in order to allow students who might be shy to have help.
- If you worry about not having enough time to complete this activity, eliminate Step 5. Instead, move from the discussion of vocabulary to speculating on the potential hazards associated with electricity and natural gas.

A Safety Survey

A survey is a way to collect information from a group of people. TV networks conduct surveys to find out who is watching their programs. Phone companies conduct surveys to find out whether their customers are happy with their phone service.



In this survey, you will interview other students, family members, and neighbors about energy safety. You will ask ten people the same set of questions so that you can compare their answers. Use the questions below as a starting point and then add two or three more of your own questions.

To start an interview, tell the person that you're conducting a survey about the best ways to prevent accidents from electricity and natural gas hazards. Let the person know that the results of your survey will be used to help other students learn how to be safe when using electricity and natural gas.

Write down each person's first name and age, and then his or her answers to your questions.

1. What is the best way to remove toast that is stuck in a toaster?
2. How many extension cords can you use and still be safe?
3. What would you do if you came upon someone who might have been shocked?
4. Why is it dangerous to light a match if you suspect a natural gas leak?
5. What should you do if you smell a gas leak at home?

(Add your questions here ...)

6. _____
7. _____
8. _____

Energy Safety: Important Terms

Conductor:

Insulator:

Circuit:

Shock:

Grounded:

Substation:

Natural gas:

Carbon monoxide:

Flammable:

Pipeline: