

Raising a thought-provoking question is a good way to assess the overall depth of student understanding. A couple of suggestions are listed below:

- Is the energy needed to power a car different from the energy that a person needs to move and grow? Why or why not?
- How can we be sure that energy exists? What evidence do we have?
- Is light a form of energy? Explain your answer. Is sound a form of energy?
- Imagine that you lived in a world without electricity. How would your daily life change?
- Why do you think it is important to search for new forms of energy?

### Follow-up Activities

- Divide the students into three groups and have them write and perform skits showing the difference between lifestyles today, 50 years ago and 200 years ago. Have them focus on how lifestyles have changed due to the increased use of energy today.
- Have students go through the classroom or home and list all the things that use electrical energy. Provide magazines and store catalogs for the children to find and cut out pictures that represent the electrical devices on the list. As a group, make a picture chart that describes common electrical energy use in the classroom or at home. Ask some students to look for devices that do not use electrical energy and create a corresponding poster.
- Investigate lightning energy by researching and sharing some ancient legends and myths concerning the nature of lightning. Have the children use library resources to find information on Benjamin Franklin's experiments with lightning and how these experiments led to an "electrical revolution."

### Suggested Internet Resources

Periodically, Internet Resources are updated on our web site at [www.LibraryVideo.com](http://www.LibraryVideo.com)

- [www.miamisci.org/af/sln/frankenstein/](http://www.miamisci.org/af/sln/frankenstein/)  
Frankenstein's Lightning Laboratory teaches elementary students about electricity and electrical safety. This resource, part of the Atoms Family web site developed by the Miami Museum of Science, contains educational activities about energy concepts including the power of the sun, electricity and fossil fuels.

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- [www.ase.org/section/\\_audience/educators/lessons/elem/](http://www.ase.org/section/_audience/educators/lessons/elem/)  
This site from the Alliance to Save Energy provides a list of lesson plans geared to teach students about the ways energy is used and how it can be conserved. Handouts and assessment tools for each lesson can be printed and distributed to students.

### Suggested Print Resources

- Berger, Melvin. *Switch On, Switch Off*. HarperCollins Publishers, New York, NY; 2001.
- Peterson, Christine. *Wind Power*. Children's Press, Danbury, CT; 2004.
- Raatma, Lucia. *Thomas Edison*. Compass Point Books, Mankato, MN; 2004.
- Stille, Darlene. *Electricity*. Child's World, Chanhassen, MN; 2004.
- Webster, Christine. *Energy*. Capstone Press, Mankato, MN; 2005.

### TEACHER'S GUIDE CONSULTANT

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### TITLES

- ALL ABOUT HEAT
- ALL ABOUT THE CONSERVATION OF ENERGY
- ALL ABOUT THE TRANSFER OF ENERGY
- ALL ABOUT THE USES OF ENERGY
- WHAT IS ENERGY?

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# Energy for Children™

## All About the Uses of Energy

Grades K-4

This guide is a supplement, designed for educators to use when presenting this program in an instructional setting.

**Before Viewing:** Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create an "Everything We Know About..." list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they put on their list were scientifically accurate.

**After Viewing:** After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts they put on their "Everything We Know About..." list. Discuss what else they learned and use the followup questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



## Program Summary

Energy is responsible for everything that happens in the world! To move something or make things change, you need the power of energy. From the moment you get out of bed in the morning, you use many forms of energy. The alarm clock goes off. You turn on the light. You use energy to get out of bed, to shower and to dry your hair. A hot breakfast is prepared with a number of devices that use different forms of energy. Electrical energy is used to power many things in our lives today. It's hard to imagine life without it!

Before electricity became available for use in homes, people relied on other sources of energy. People used fire for light and heat. Ancient Romans used water wheels to power machines that ground corn. For thousands of years, sailing ships used wind energy to get from place to place. If you lived 200 years ago, you probably used candles for light and burned fuel like wood or coal for cooking and heating. The discovery of electric energy changed everything! In the late 1800s, the American inventor, Thomas Alva Edison, developed a light bulb that could be used in homes. Before long, electricity flowed into many homes and changed the way people lived.

Where do we get all this electrical energy? Electricity is made at power plants using other types of energy, like the energy in moving water or wind and the energy stored in fuels like gas. The moving energy from blowing wind or falling water is called mechanical energy. This mechanical energy spins special machines called generators that make electricity. Water can also be heated to create steam that turns the generators to create electricity. In most electric power plants, energy from steam is the force behind making electricity. This comes from burning fuels like coal, oil and gas. We can also use nuclear energy from tiny atoms to produce heat energy to make steam.

We also burn fuel to heat our homes. It is the chemical energy stored in the fuel that makes it useful to us and allows us to do all kinds of work. Chemical energy is also found in the foods we eat and can be stored in batteries that power toys and radios! The most powerful form of energy comes from the sun. All the power plants on Earth together could not produce the amount of energy that the sun produces every day. We call this solar energy, and we have learned how to use solar energy to power calculators, heat homes and even run special automobiles. In the future, solar power may be used as the energy source to do many more things. People are always looking for new ways to produce energy. Who knows, someday you may even be using the chemical energy stored in garbage to power your cars!

## Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

**energy** — The ability to make things happen or to do work.

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**work** — To move or change something. Doing work takes energy.

**electricity** — The most popular form of energy, which runs through wires from power plants to our homes, schools and offices.

**heat energy** — The energy produced by the movement of the tiny atoms and molecules of an object. The more they move around, the more heat is produced.

**wind energy** — Energy that is produced when the wind blows. Wind energy turns windmills to generate electricity and is a renewable, nonpolluting energy source.

**Thomas Alva Edison** — (1847-1931) The American inventor who perfected the electric light bulb.

**power plants** — Places where electricity is generated from other forms of mechanical energy.

**mechanical energy** — The energy of moving objects. Things in motion affect other things they touch. Flowing water, blowing wind, falling rocks, sound, moving machines and animals all can do work using mechanical energy.

**generators** — Special machines in power plants that are turned by mechanical energy to make electricity.

**wind farms** — Places where many large windmills are turned by the wind to generate electricity.

**chemical energy** — The energy obtained from releasing energy that is contained or stored in a substance. The sun's energy is released to our bodies when we eat plants. Our bodies use this energy to live. Batteries and burning fuels release chemical energy as well.

**solar energy** — Energy that comes from the sun. Solar energy is the Earth's greatest source of heat and light energy, and is a renewable, nonpolluting energy source.

**solar cells** — Special devices that capture the sun's energy and change it into electricity.

**nuclear energy** — The energy created when atoms are broken apart or forced together. The force that holds atoms together is so strong that breaking atoms apart or forcing them together creates the most powerful form of energy we know.

## Pre-viewing Discussion

Before students generate their list of "Everything We Know About..." this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- What kinds of things use energy?
- Where does energy come from?
- What would life be like without electricity?

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After the class has completed their "Everything We Know About..." list, and before watching the show, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

## Focus Questions

You may wish to ask your class the following questions to assess their comprehension of key points presented in the program:

1. How do things move or change?
2. What are some examples of work?
3. What is energy? What are some different types of energy?
4. Name some things that can happen because of energy.
5. What are some ways we use electrical energy?
6. Where does electricity come from?
7. How does electricity get to our homes and schools?
8. What was life like before electricity?
9. How did the American inventor Thomas Edison help introduce electricity to the world?
10. What is mechanical energy?
11. Explain why blowing wind and flowing water are examples of mechanical energy.
12. How do generators use mechanical energy to make electricity?
13. What is the most popular way to spin a generator?
14. What are wind farms?
15. Why is chemical energy called "stored" energy?
16. What are some examples of stored chemical energy?
17. What is the most powerful form of energy?
18. How is solar energy used on Earth?
19. What is nuclear energy?

## Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their "Everything We Know About..." list. Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised, before viewing the program. *(Continued)*