

## Your Energy Path for a Day



### GRADE LEVEL:

Upper Elementary/Middle School/  
High School (with extensions)

### SUBJECT AREAS:

Sciences, Social Studies, English Lan-  
guage Arts

### DURATION:

Preparation Time: 15 minutes  
(photocopies)

Activity Time: one to two 50-minute  
class sessions

### SETTING:

Classroom

### SKILLS:

Application, Analysis

### KEY WORDS:

Energy, Society, Dependent

### SUMMARY

*Students will analyze the activities of a typical day and explore the energy required to achieve these events. The students will compare the changes in energy use through the years and analyze the level at which our daily routine is dependent on easy access to energy.*

### OBJECTIVES

#### THE STUDENT WILL:

- Create a list of all the ways they use energy over the course of a day.
- Compare and contrast daily energy use today with energy use in the past
- Analyze modern societies depend-  
ency on easy access to energy.

### MATERIALS

- Copies of the energy activi-  
ties worksheet.
- Research materials on alter-  
native energy. (extension)
- Energy conservation Infor-  
mation. (extension)

*"If one has cut, split, hauled, and piled his own good oak, and let his mind work the while, he will remember much about where the heat comes from, and with a wealth of detail denied to those who spend the weekend in town astride a radiator." -Aldo Leopold, 1949*

### BACKGROUND

It is only during the occasional power outage or gasoline shortage that we realize how important energy is to our everyday lives. Most of us take for granted the light bulb that comes on when we flip a switch. We assume our homes will be warm when it's bitterly cold outside. We routinely fuel our cars and travel great distances. We easily cook and prepare our food without gathering wood for heat. Energy is involved in every part of our lives and yet most of the time we do not even notice its role.

Energy is an important part of modern life. Humans began manipulating energy sources thousands of years ago. We learned to control our food supplies through agricultural practices, thus insuring our access to this form of energy. We harnessed energy in the form of fire for cooking our food, for generating warmth and to provide light at night. Winds were harnessed to move sailing ships across entire oceans.

With the advent of the modern industrial age our relationship with energy has become more sophisticated than ever. We are now very dependent on having easy access to complex forms of energy every day. We use energy to drive to work, heat and cool our homes, cook and prepare our food, provide lighting needs, heat our water, and power most of our technology-based tools (computers, televisions and more).



Our ability to control energy has changed our relationship to the Earth. Easy access to energy allows us to routinely cover vast distances, live in very cold or hot climates, and process huge quantities of raw materials required to produce the myriad of products we use in our lives...***we live by manipulating energy.***



## PROCEDURE

### WARM UP

Set the stage by asking the students the following questions:

- How often do you use energy in your daily life?
- How has energy use changed over the last 200 hundred years?
- How dependent are you on daily access to energy?

A brief list of responses can be generated on the board. These questions can be revisited at the end of the activity, allowing

the students to modify or expand their initial efforts.

### IDENTIFICATION OF ENERGY RELATED ACTIVITIES

- Divide the class into five groups.
- Each group should create a list of all the ways they can think of that they use energy over the course of a typical day. (see worksheet)
- Next have the groups create a list of all the ways energy would have been used over the course of a typical day for a pioneer family living in the Western Frontier in the 1800s.
- After the groups have generated their energy paths for modern day and a historical time frame then assign each group one of the following questions:
  1. What were the most common uses of energy during a typical day?
  2. What are the main types of energy used by modern societies?
  3. What were the main sources of energy for pioneer families?
  4. How has access to energy changed our daily lives?
  5. How dependent are modern societies on daily access to energy?
- Each group should review their response to the assigned question with the rest of the class.

### ASSESSMENT

Tell each student to imagine that they have been transported back in time and now are a modern child in a historical time frame. Have each student write an essay

that describes how they would attempt to accomplish their modern energy related activities during the historical time period assigned.

## EXTENSIONS

The majority of the energy used in the world today is obtained from fossil fuels. Close to eighty percent of the electrical power used in Missouri is generated by burning coal. Most homes that do not use electric furnaces for heat (or hot water) meet these needs using natural gas.

Our transportation system is almost exclusively dependent on fossil fuels. Fossil fuels were formed in the crust of the Earth millions of years ago. Supplies of these fuels are limited and some sources predict we will begin to exhaust some of these resources fairly soon.

*What other sources of energy could we use to replace fossil fuels?*

Have the class address the above question by assigning research projects on renewable energy sources to groups of students. The groups can present a brief report on their findings to the class.

## GOING FURTHER

### Energy Conservation:

*Another way to find more energy is simply to use less energy!*

Have students analyze their energy profile of a “typical day” for ways to reduce energy consumption and use energy more wisely.

### **For more information:**

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**SCIENCE GRADE LEVEL STANDARDS:**

**Earth and Space Sciences**

**ESS3 — Earth and Human Activity**

**Concept C: Human Impacts on Earth's Systems**

- **6-8.ESS3.C.1:** Analyze data to define the relationship for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of data include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change.]
- **6-8.ESS3.C.2:** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

**Concept D: Global Climate Change**

- **6-8.ESS3.D.1:** Analyze evidence of the factors that have caused the change in global temperatures over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities.]

**ENGLISH LANGUAGE ARTS STANDARDS:**

**Writing**

**1. Approaching the Task as a Researcher**

**A. Research [K-5 correlation W3A]**

- Conduct research to answer a question, drawing on several sources; integrate information using a standard citation system.

**2. Approaching the Task as a Writer**

**A. Development [K-5 correlation W1A, W1B, W1D, W2A, W2B, W2C]**

- Grade 6—Follow a writing process to produce clear and coherent writing in which the development, organization, style, and voice are appropriate to the task, purpose and audience; develop writing with narrative, expository, and argumentative techniques.

**SOCIAL STUDIES STANDARDS**

**Disciplinary Tools**

**5. People, Groups, and Cultures**

**Theme 1: Tools of Social Science Inquiry**

**6-8 Geography**

- **C.** Compare and contrast the human characteristics within and among contemporary and historic regions over time.

NGSS:

**Earth and Space Sciences**

**MS-ESS3 Earth and Human Activity**

- **MS-ESS3-4:** Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

**Science and Engineering Practices**

**Engaging in Argument from Evidence**

Engaging in argument from evidence in 6-8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

- Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-ESS3-4)

**Disciplinary Core Ideas**

**ESS3.C: Human Impacts on Earth Systems**

- Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3), (MS-ESS3-4)

## **Crosscutting Concepts**

### **Cause and Effect**

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1), (MS-ESS3-4)

### **Influence of Science, Engineering, and Technology on Society and the Natural World**

- All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ESS3-1), (MS-ESS3-4)

### **Science Addresses Questions About the Natural and Material World**

- Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-ESS3-4)





