

# Discovering Ways To Use Energy Wisely



## Target Grade Levels

Third - Fifth

## Time

Three 45 minute sessions

## Materials

- resource list
- display of vocabulary words
- six large sheets of paper with one of the following assessment questions on each sheet:
  - How much energy do we use?
  - Are we using energy wisely?
  - Energy creates pollution.
  - An Energy Revolution
  - Efficiency and conservation saves you money.
  - What do conservation and energy efficiency mean?
- *The Paper Bag Prince* by Colin Thompson, Random House, 1997
- form of assessment questions

## Knowledge and Skills (TEKS)

- Science:
  - Students make wise choices in the use of natural resources and the recycling of materials;
  - Construct explanations;
  - Communicate valid conclusions; Construct graphics, tables maps and charts;
  - Analyze explanations; and
  - Draw inferences related to promotional materials.

## Overview

This lesson's main idea is that everything uses energy, and the more energy we use, the more pollution we create. It also focuses on the roles of efficiency and conservation as ways to reduce overall energy needs. Students will engage in a class discussion, read and discuss a recommended text, create a word wall and work in groups and gather information about specified topics in energy efficiency. Students will present a topic using written explanation, graphics or other visual aids.

## Background Information

Imagine how much energy your family car would use in 156 years. That is how much energy the world uses every second. In the time it takes you to snap your fingers, the world uses the equivalent of 85,000 gallons of gasoline.

To put it another way, every person in the United States use about seven gallons of gasoline every day.

Everything we do requires energy:

- growing our food
- lighting our schools
- cooking our food
- driving to our offices
- manufacturing products
- keeping our homes cool or warm

## Procedure

### 1) Vocabulary

- |                                   |                            |
|-----------------------------------|----------------------------|
| a) carbon dioxide                 | g) equivalent              |
| b) carbon monoxide                | h) illumination            |
| c) compact fluorescent light bulb | i) incandescent light bulb |
| d) conservation                   | j) nitrogen dioxide        |
| e) consume                        | k) pollution               |
| f) efficiency                     | l) sulfur dioxide          |

## 2) Activities

### a) Assess Current Level of Knowledge

- i) Create a way of visually organizing information to display what students already know about conservation and efficiency.
- ii) To assess what students know, prompt a whole class discussion with questions such as: What does it mean to be efficient? Are the classroom surroundings, such as desks, windows, books, etc., created with energy? Do you think that Americans use energy wisely? How is pollution created? Can we do anything to reduce the amount of pollution we create?

### b) Literature Link

Read *The Paper Bag Prince* by Colin Thompson to the class. Either verbally (as a whole class or in groups) or as a written assignment, have your students summarize the story and identify the types and amounts of wasted energy in schools, homes, communities, etc.

### c) Language Arts

- i) Have your students use dictionaries to find the definitions of the vocabulary words and record them in their science notebooks. They should create meaningful sentences with each word that reflect an understanding of the definition.
- ii) As a class activity, review or present the creation of an outline of information. Create and display a model outline during the rest of the unit of study.

### d) Cooperative Group Work

- i) Explain to the class that each group will give a class presentation on one of the six Using Energy Wisely topics. Let the students know that each group must be able to:
  - (1) summarize in clear and concise language the information within its topic;
  - (2) support its summary with details; and
  - (3) present some type of visual aide, different from any found in the Using Energy Wisely fact sheet, to help explain and teach its topic. A written explanation should accompany the visual aide.
- ii) As a class, create clear expectations for presentations by writing down what the students and teacher agree upon to be a quality presentation and what are effective behaviors by listeners during presentations. This could lead into developing a rubric, for grading purposes if the teacher desires.
- iii) Display the six pieces of paper with the topic headings. (These will also be used later in the lesson to assist students in developing an outline of the fact sheet's material.) Divide the class into groups of three or four and assign roles. Suggested roles include: recorder, discussion leader, researcher, and graphics person. Assign or allow groups to choose the topic for which they will be responsible.
- iv) Allow groups adequate time for this part of the assignment. If using only the information in the fact sheet, 45 minutes should be adequate. If additional research

is done through the Internet and reference sources, more time will be needed according to the class' abilities.

- v) Have each group present its topic with the mandatory elements. The listeners should be encouraged to generate questions in order to broaden their scope of understanding. After each presentation, the class as a whole should generate an outline of the information on the chart paper for that topic. If time allows, students can copy the outline into their science notebooks. After each group presents, new information can also be added to the graphic information-organizer that was created at the beginning of the lesson.

### 3) Review

- a) Each group that presents could also submit quiz questions that go along with their presentation. The students can receive a grade based on the quality of the questions they submit and whether or not the answer was given during their presentation.
- b) Students can turn in their notes for each presentation as a graded activity.
- c) Students can be quizzed using the questions submitted by each group, compiled into one large quiz.

### 4) Evaluation

- a) Have the students answer the questions below in complete sentences, reflecting the question in their answers. Alternatively, the class can answer the questions as a group discussion either in place of a written assignment or as a review before a test.
  - i) List five activities that require energy.
  - ii) How is the efficiency of an automobile defined?
  - iii) What effects do sulfur dioxide, nitrogen dioxide and carbon monoxide have on your health and the health of the environment?
  - iv) What are some products now in use that incorporate energy efficient technology?
  - v) How can the consumer make choices to be more conservative with energy?
  - vi) What is the difference between an incandescent light bulb and a compact fluorescent light bulb?
  - vii) Which one is more energy efficient?
  - viii) When determining the overall cost of a product, what are some factors to considered when deciding which product to buy?
  - ix) What are some of the ways people can conserve energy without giving up comfort?
  - x) How is ground-level ozone formed?
- b) Possible answers to assessment questions
  - i) Possible activities that require energy include: lighting buildings, cooking food, drying clothes in a dryer, washing clothes in a washing machine, driving to school, keeping homes cool or warm, and manufacturing products.

- ii) Automobile efficiency is defined by the miles per gallon rating.
- iii) These three chemical compounds are poisonous to living creatures and pollute the air we breathe and the water we drink.
- iv) Some products using energy efficient technologies are refrigerators, clothes dryers, windows, air conditioning and heating units, and compact fluorescent light bulbs.
- v) Consumers who cannot purchase energy efficient products can aim for the same efficiency by turning off lights when not in a room; walking to the store instead of driving; turning off the water while brushing their teeth; keeping the refrigerator door closed when not in use; or drying clothes on a clothes line, and washing only full loads of clothes.
- vi) An incandescent light bulb gives off the same light as a compact fluorescent bulb but uses much more energy. It also has a shorter lamp life, thereby requiring more frequent replacement, and therefore ultimately costs more.
- vii) The compact fluorescent bulb is more efficient.
- viii) How much energy is consumed to utilize the product must be considered, as well as the quantity of environmental pollutants released during its use, and/or manufacture and transportation to site of use.
- ix) Some of the ways people can conserve energy without giving up comfort are: to install fans in their homes and use less air conditioning, to put on a sweater and turn the heat down, and to let the sun and wind dry their clothes.

## 5) Extension

- a) A Day Without Energy —As a homework assignment or an in-class assignment, have the students imagine a day without energy and write a scenario of that day. Instruct them to use as many of the vocabulary words as possible.
- b) Using Less Energy—As a separate assignment, have the students write creative ways in which they will use less energy. This could also be used as part of the final assessment, since synthesis of the concepts would have to be used to create solutions.
- c) Culminating Activity—Using the visual aides developed for the class presentations, have the students create a bulletin board displaying the concepts they learned during their study of this fact sheet. This is a good reviewing tool.

# USING ENERGY WISELY



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THE INFINITE POWER  
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FACT SHEET 3 A RESOURCE FOR CLASSROOMS AND TEACHERS

## Highlights

- ◆ Almost everything uses energy
- ◆ Less energy, less pollution
- ◆ Efficiency revolution
- ◆ Energy efficiency saves money

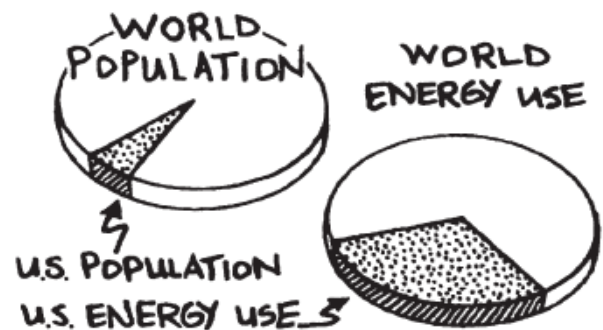
## How Much Energy Do We Use?

Imagine how much energy your family car would use in 156 years. That is how much the world uses every second. In the time it takes you to snap your fingers, the world uses the equivalent of 85,000 gallons of gasoline.

That means that you and I and every person in the United States use an equivalent of seven gallons of gasoline every day.

Everything we do requires energy:

- growing our food
- lighting our schools
- cooking our food
- driving to our offices
- manufacturing products
- keeping our homes cool or warm



**WORLD VS. U.S.** The United States has about 5% of world's population, yet consumes about 25% of world's energy.

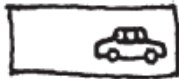
Energy is such a basic part of our lives, we could not make it through the day without it.

Scientists point out that everything from cars, to light bulbs, to factories, to our homes could use energy more efficiently. We could have the same level of comfort while using one-half of the energy we now consume.

### MILES PER GALLON COMPARISON



CHEVY SUBURBAN (15MPG)



FORD ESCORT (29MPG)

HONDA INSIGHT



(64MPG)

**FUEL EFFICIENCY OF DIFFERENT CARS** Some automobiles are dramatically more efficient than most cars we see on the road today. Honda's Insight is more than 4 times as efficient than a Chevy Suburban.

## Energy Creates Pollution

If you burned seven gallons of gasoline at an assembly in your school gymnasium it would make a very dramatic demonstration. It also would create a considerable amount of pollution. The air in your school would be filled with pollutants such as carbon dioxide, sulfur dioxide, nitrogen oxide and carbon monoxide.

Imagine when every person at your school and in your city uses the equivalent of seven gallons of gasoline every day. Using energy creates pollution. Saving energy prevents pollution.

## An Energy Revolution

Students in school today will be the most efficient energy-using generation of Americans in history! The energy efficiency of practically every product is improving. We are starting to use energy more wisely.

New refrigerators are three times as efficient as the oldest refrigerators still found in America's kitchens. Windows are available today that have eight times more resistance to heat loss than standard single-pane windows. You can buy a car today that drives nearly 65 miles on a gallon of gasoline.

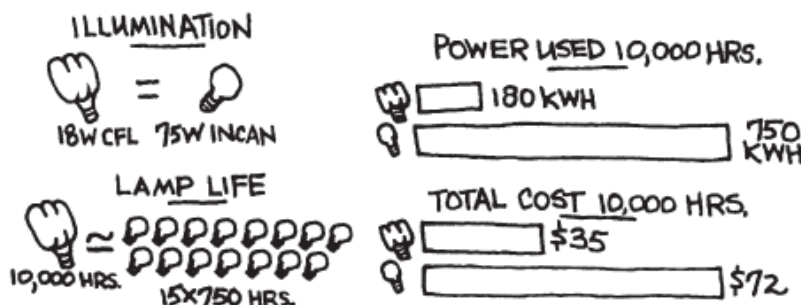
And even more efficient models of these items and others are on the way: cars that can drive from coast to coast on one tank of gas; windows that cloud up on hot days to keep the heat out; and refrigerators that use one-half the electricity of today's most efficient ones. It's truly a revolution in efficiency.

## Efficiency and Conservation Save Money

You have a choice when you use energy. Consider light bulbs. Some bulbs use much less energy than others. You also have a choice in air conditioners, most appliances and cars. Some conserve energy and save money.



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**COMPACT FLOURESCENT BULBS VS. INCANDESCENT BULBS**

You have a choice when you use energy. Light bulbs and many other products are available that save energy and money.

A 75-Watt incandescent light bulb may be replaced with an 18-Watt compact fluorescent light bulb. Both produce the same amount of light, but changing bulbs will mean you save \$37 in energy costs during the 10,000-hour life of the fluorescent bulb.

When the cost of energy is included, the

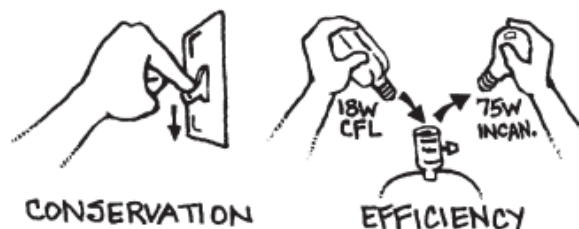
cheapest product is the one with the lowest overall cost to own and operate. Not only does the compact fluorescent light bulb save money, but it also reduces pollution. Look for efficient products and calculate how much energy they will use. Add the cost of energy over the life-time of the products to their purchase price. Choose to use energy wisely.

**WHAT IS ENERGY CONSERVATION AND ENERGY EFFICIENCY?**

Energy conservation is turning off the lights when you leave the room, or setting the thermostat lower in the winter and wearing a sweater around the house. It is using energy without waste.

Energy efficiency is replacing a regular light bulb with a compact fluorescent bulb that uses one-fourth as much energy, or buying an efficient refrigerator. It is substituting improved technology for energy use.

Some people think energy conservation means keeping their house too cold in the winter or too hot in the summer. But it is never neces-



**CONSERVATION**

**EFFICIENCY**

**CONSERVATION & EFFICIENCY** Conservation is using energy without waste. Efficiency is substituting improved technology for energy use.

sary to be uncomfortable when conserving energy or using it more efficiently. When applied intelligently, conservation and efficiency will not even be noticed. In fact, you will be more comfortable in most cases. Energy conservation and energy efficiency are important ways to use our energy wisely.



## A DAY WITHOUT ENERGY: TRY IT!

Imagine how you would spend a day without using any energy. When you wake up (to your wind-up alarm clock) you could mix some water with powdered milk to have with your dry cereal. (Oops. How much energy does it take to make cereal and powdered milk?) You could at least squeeze some oranges for juice.

Remember, no electricity to watch TV or use lights; read only by daylight. No gas for the car; walk or bike everywhere. It's OK to use free, natural energy like sunshine to dry your clothes, but be sure to wash them by hand in cold water.

What other ways do you use energy? What foods require energy to cook or keep fresh? (Remember, ice cream needs electricity to keep it frozen.) How will you get to school? Does your classroom have enough windows to provide light? Will the temperature be comfortable without air conditioning or heat? Would meeting outside under a tree be better?

- Think how you will get through a day without energy.
- Tell the class what you will do all day to use less energy.
- What is the smallest amount of energy you need for a day?

## Resources

### FREE TEXAS RENEWABLE ENERGY INFORMATION

For more information on how you can put Texas' abundant renewable energy resources to use in your home or business, visit our website at [www.InfinitePower.org](http://www.InfinitePower.org) or call us at 1-800-531-5441 ext 31796.

Ask about our free lesson plans and videos available to teachers and home schoolers.

### ON THE WORLD WIDE WEB:

Lighting Energy Brief  
[www.rmi.org/sitepages/pid171.asp](http://www.rmi.org/sitepages/pid171.asp)

School Energy Doctor  
[solstice.crest.org/efficiency/sed](http://solstice.crest.org/efficiency/sed)

The Home Energy Saver [hes.lbl.gov](http://hes.lbl.gov)

Texas Watt Watchers Program  
[wattwatchers.utep.edu](http://wattwatchers.utep.edu)

Sierra Club Suggestions to Reduce Global Warming  
[www.sierraclub.org/globalwarming/tenthings.asp](http://www.sierraclub.org/globalwarming/tenthings.asp)

Florida Solar Energy Center  
[www.fsec.ucf.edu](http://www.fsec.ucf.edu)

### VIDEO:

*Toast*, Bullfrog Films, 1974

*Wake Up Freddy*, Bullfrog Films, 1994

### BOOK:

*Homemade Money*, Richard Heede, Rocky Mountain Institute, 1995