

Energy Hog CHALLENGE



www.EnergyHog.org

Student Guide

Alliance to Save Energy's Green Schools Program

Illustration by Zach Levinson

Introduction to the CHALLENGE

Do the Energy Hog Challenge and discover where energy comes from, how we use energy and why it's so important to save energy.

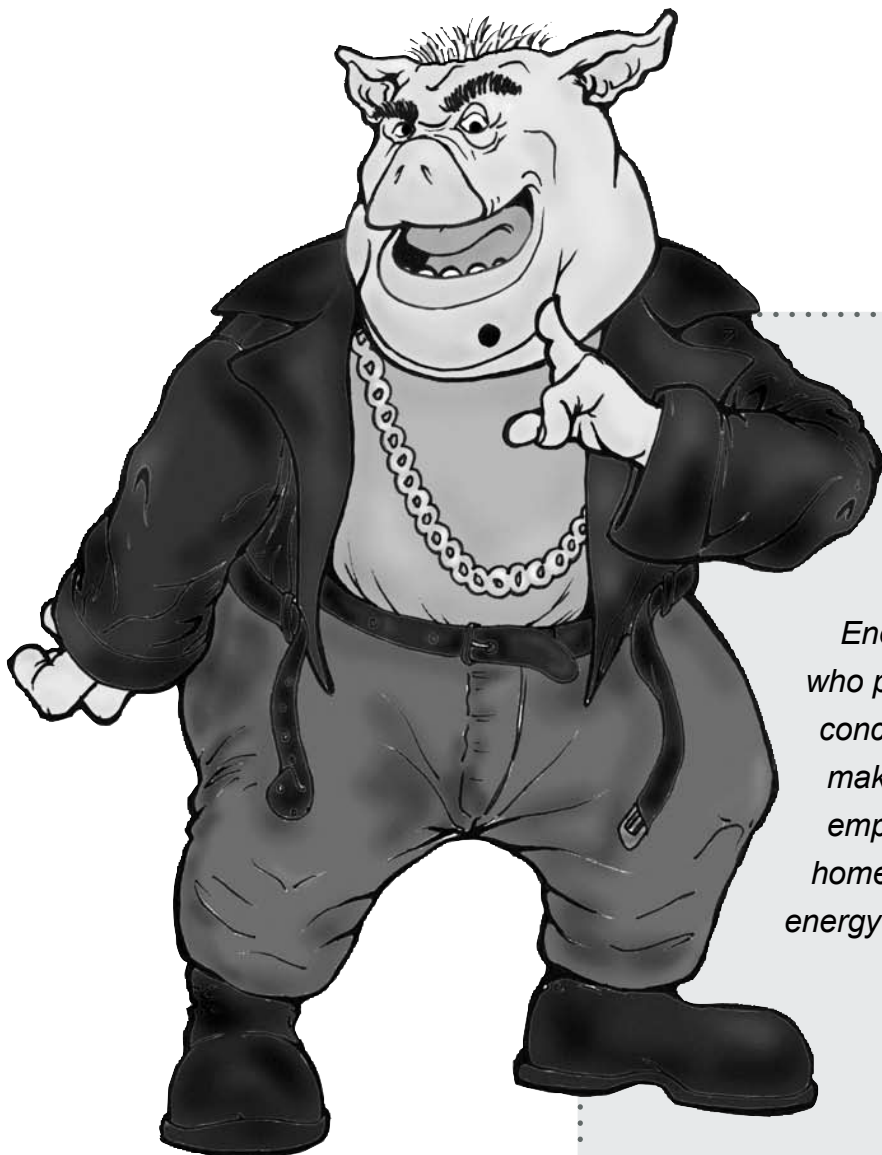


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The Energy Hog

was founded by Energy Outreach Colorado and the Ad Council and is now owned and operated by the Alliance to Save Energy. The Energy Hog is a dastardly character who puts an exciting face to the invisible concept of energy waste. The Energy Hog makes learning about energy fun, while empowering children to take the lead at home by inspiring families to make wise energy choices.

GLOSSARY

BIOMASS: a renewable energy source from organic material of biological origin such as wood, straw, manure, and other by-products from agricultural processes.



COAL: a dark colored, burnable fossil fuel formed by the breakdown of vegetable material trapped underground for years without access to air.



ELECTRICITY: the flow of electrical power. We produce power by converting other sources of energy, like coal, natural gas, oil, or uranium into electricity. Typically, anything plugged into a wall (like a toaster or the TV) uses electricity to run.

ENERGY: the ability to do work or the ability to move an object.

ENERGY STAR®: a government-backed program helping businesses and individuals protect the environment through superior energy efficiency. Appliance and electronics that earn the ENERGY STAR® are more energy efficient than standard models.



FOSSIL FUELS: materials that were formed from ancient plant and animal life that were compressed underground over millions of years. Examples are coal, oil and natural gas.

FUEL: any material that can be used as an energy source.

GEOTHERMAL ENERGY: the heat energy that is produced by natural processes inside the earth. It can be taken from hot springs, reservoirs of hot water deep below the ground, or by breaking open the rock itself.

HYDROPOWER: the energy of moving water. A hydroelectric power plant uses moving water to power a turbine generator to produce electricity.



INSULATION: material that helps keep your home cool in the summer and warm in the winter because it resists the flow of heat. It should be found in places like behind your walls, underneath your floor and in the attic.

NONRENEWABLE ENERGY: fuels that cannot be made (or renewed) in a short period of time. Nonrenewable fuels include oil, natural gas, and coal.

NATURAL GAS: an odorless, colorless, cleaner-burning fossil fuel, usually found underground in fossil fuel deposits.



OIL: raw material from which petroleum products are made.

POWER: the rate at which energy is transferred. For example, electrical energy is usually measured in watts.

PROGRAMMABLE THERMOSTAT: a device that can be programmed to control the temperature in your home for you. It can automatically turn the heat or air conditioning down when you are not home.

RENEWABLE ENERGY: fuels that can be used over and over again and never run out. Renewable fuels include solar, wind, hydropower, biomass, and geothermal energy.

SOLAR: the radiant energy of the sun, which can be converted into other forms of energy, such as heat and electricity.

TURBINE: a device for converting the flow of a fluid (air, steam, water, or hot gases) into mechanical motion. Turbines can be connected to generators that convert the motion of the turbine into electricity.



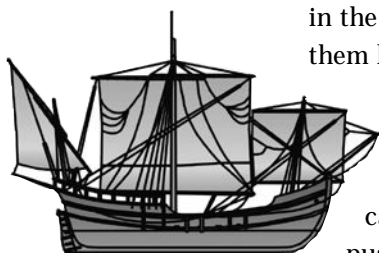
WIND: the term given to any natural movement of air in the atmosphere. It is a renewable source of energy used to turn

The United States gets 93 percent of its energy from nonrenewable sources and 7 percent from renewable energy sources.

Energy History

A long time ago, the Native Americans (Indians) used biomass for energy. Biomass is anything that was alive a short time ago, like plants and animals. They burned wood [biomass] to cook food and warm their homes. Sometimes, they burned dried animal dung [biomass].

Some Indians lived in tents made of animal skins, called teepees. Others lived in rock and mud homes or sometimes in caves. The caves were deep in the earth and stayed warm in the winter. Heat from inside the earth [geothermal energy] kept them warm. Light bulbs didn't exist back then, but the sun gave them light in the day—and their fires and the moon gave them light at night.



Then new people, known as the early settlers, arrived in America. They traveled on boats with sails. The sails captured the energy in the wind and pushed their boats to the New World.

The settlers built houses out of wood. They also burned wood to keep warm and cook their food. They had no electricity for fans or air conditioners to keep them cool in summer. They made candles from animal fat to see in the dark. Most settlers rose at dawn and went to bed when the sun went down.

The settlers learned to use water wheels to capture the energy in moving water [hydropower]. They were able to run sawmills to cut wood by using hydropower.

As the nation grew and became industrialized, people developed many different energy sources, such as coal, oil, hydropower, and natural gas, to make heat and electricity. Later, scientists discovered that uranium from inside the earth could create nuclear energy by splitting atoms. Electricity changed people's lives.



How Do We Use Energy?

We need energy to live. Think about what you did from the moment you woke up today until now. You probably used energy to turn on the lights, heat your shower water, listen to music on the radio, or cook your breakfast.

It takes a lot of energy to heat and cool our homes, and to heat water. Think about how much heat people in Alaska need to stay warm in the winter—or how much air conditioning people in Florida need to stay cool in the summer!

The more energy you use, the more it costs. Energy bills show how much energy you use every month and how much money your family pays for that energy. The pie chart on page 6 shows how the average U.S. home uses energy.

Where Do We Get Energy?

Before we can use energy in our homes, we need to get it from somewhere. So where does energy come from? Some is found underground and some is found above ground. There are two main kinds of energy sources: nonrenewable and renewable.

NONRENEWABLE: Coal, oil, natural gas, and uranium are found underneath the ground. Coal, oil, and natural gas came from dead plants and animals, called fossil fuels, that lived a long time ago and decayed under pressure deep inside the earth. They take millions of years to form. We can dig them up or put a long pipe into the ground to get them out. For example, natural gas and oil move through pipelines underground. We call these sources of energy nonrenewable. Once we use them up, they are gone forever.

RENEWABLE: Scientists have developed ways to get energy from the sun (solar power), the wind (wind power), moving water (hydropower), and plants (biomass). We call these sources renewable because we will never run out of them. The sun is our main source of energy. The sun's energy arrives to earth as light with a

range of wavelengths. Long wavelengths turn into heat when they touch the earth. This heat causes air to rise, creating wind energy. Wind turbines capture the energy from the blowing wind.



We capture energy from the sun and turn it into electricity by using solar panels.

We also use dams to get energy from moving water. Biomass, such as wood, creates heat energy when it is burned.

These sources of energy are turned into electricity which travels through power lines underground or above ground.

LOOKING FOR ENERGY HOGS

An Energy Hog is anything that wastes a lot of energy, like an old refrigerator running in the garage or basement, or a drafty door. If your family uses a lot of energy, you might have Energy Hogs in your home! Some electronics in your home use energy all day long. Did you know that even when you are not using the DVD player, its clock still uses energy? You can help your family save energy by learning about Energy Hogs and how you can bust them. When you save energy at home, your energy bills are lower, and your family saves money.

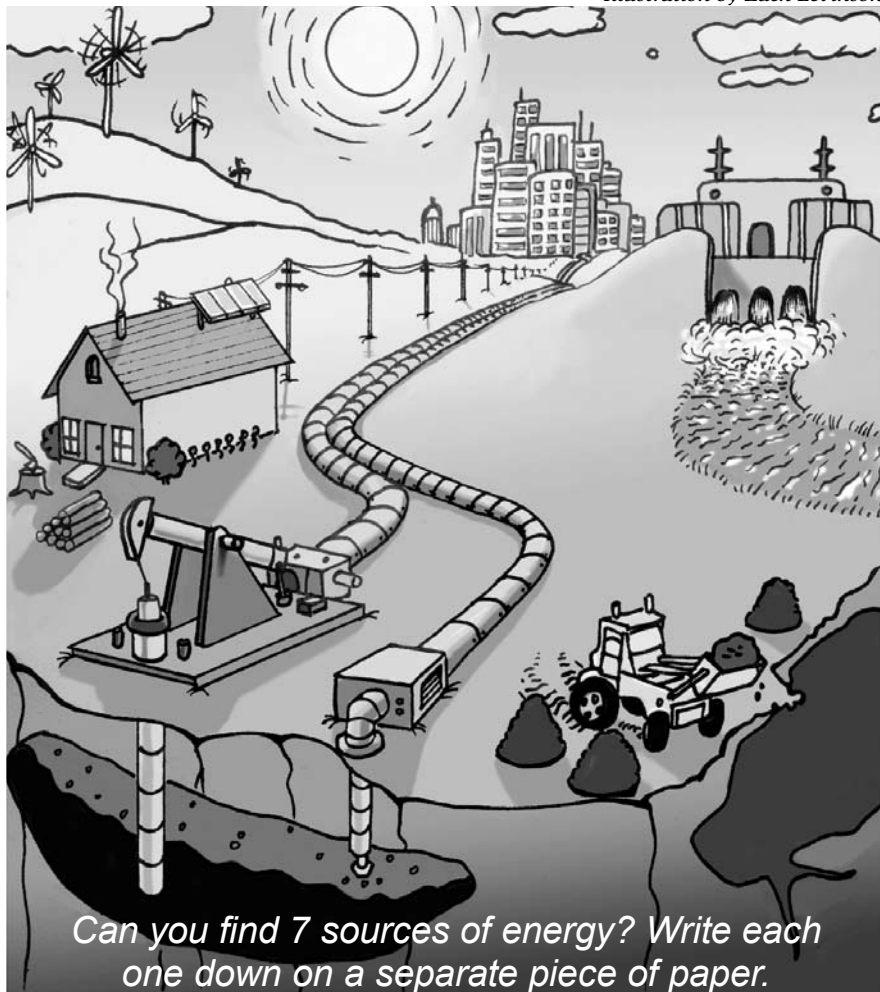
At home, this means doing things like turning off lights and appliances when you are not using them, and taking shorter showers. When you want to warm up in winter or cool down in summer, remember that cranking the thermostat past the desired temperature will not warm or cool your home any faster—and if you forget to put it back you'll waste energy. A programmable thermostat makes this job easy because it automatically adjusts the settings for you. You can also use compact fluorescent light bulbs (CFLs) instead of "old-fashioned" incandescent light bulbs. CFLs use about two-thirds less energy and last up to 10 times longer than regular light bulbs. Over 90 percent of the energy used by incandescent bulbs is wasted heating the bulb. Your family can caulk or weatherstrip around windows to stop air leaks. Weatherstripping looks kind of like tape and

caulk looks like glue. Both are designed to seal gaps or spaces where energy is leaking from your home. Your home also needs plenty of insulation. Insulation is found in walls, in the attic, in floors and in the basement or crawl space. A properly insulated home keeps you cooler in the summer and warmer in the winter.

Your family can replace old appliances and electronics with energy efficient ones that have the ENERGY STAR® label on them. The ENERGY STAR label means that the product uses less energy than other products.

Watching out for the Energy Hogs in your home is easy and fun when you're energy smart. Using energy wisely will save your family money and help the environment too!

Illustration by Zach Levinson

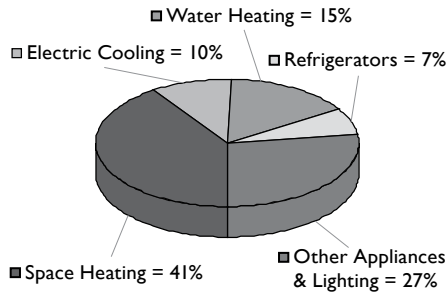


BUSTING THE ENERGY BILL

Help the Swine family understand how they use energy by calculating and graphing their energy use. The Swines saved their monthly energy bills for a year. They added up all the bills and determined they spent a total of \$2,700 on energy. Refer to the pie chart for percentage amounts.

How much did it cost them to: (WRITE ANSWERS ON SEPARATE PEICE OF PAPER)

U.S. Household Energy Expenditures (\$)
Alliance to Save Energy, 2006



The average U.S. household spent more than \$2,000 on home energy bills in 2008. This amount varies significantly depending on your region and climate.

	TOTAL ENERGY BILL	× PERCENT (%)	(=) EQUALS \$ PER YEAR
1) Heat and cool their home?	\$	× % Heating + Cooling	\$
2) Cook, light their home, and run appliances?	\$	× % Other Appliances & Lighting	\$
3) Heat their water?	\$	× % Water Heating	\$
4) Run their refrigerator?	\$	× % Refrigerator	\$

On a separate sheet of paper, create a bar graph (using the example below) showing the cost of each category of energy use. Then make recommendations on how the Swines can lower their energy bill for each item.

\$1,300				
\$1,200				
\$1,100				
\$1,000				
\$900				
\$800				
\$700				
\$600				
\$500				
\$400				
\$300				
\$200				
\$100				
	HEATING & COOLING	COOKING, OTHER APPLIANCES, & LIGHTING	HEATING WATER	REFRIGERATOR



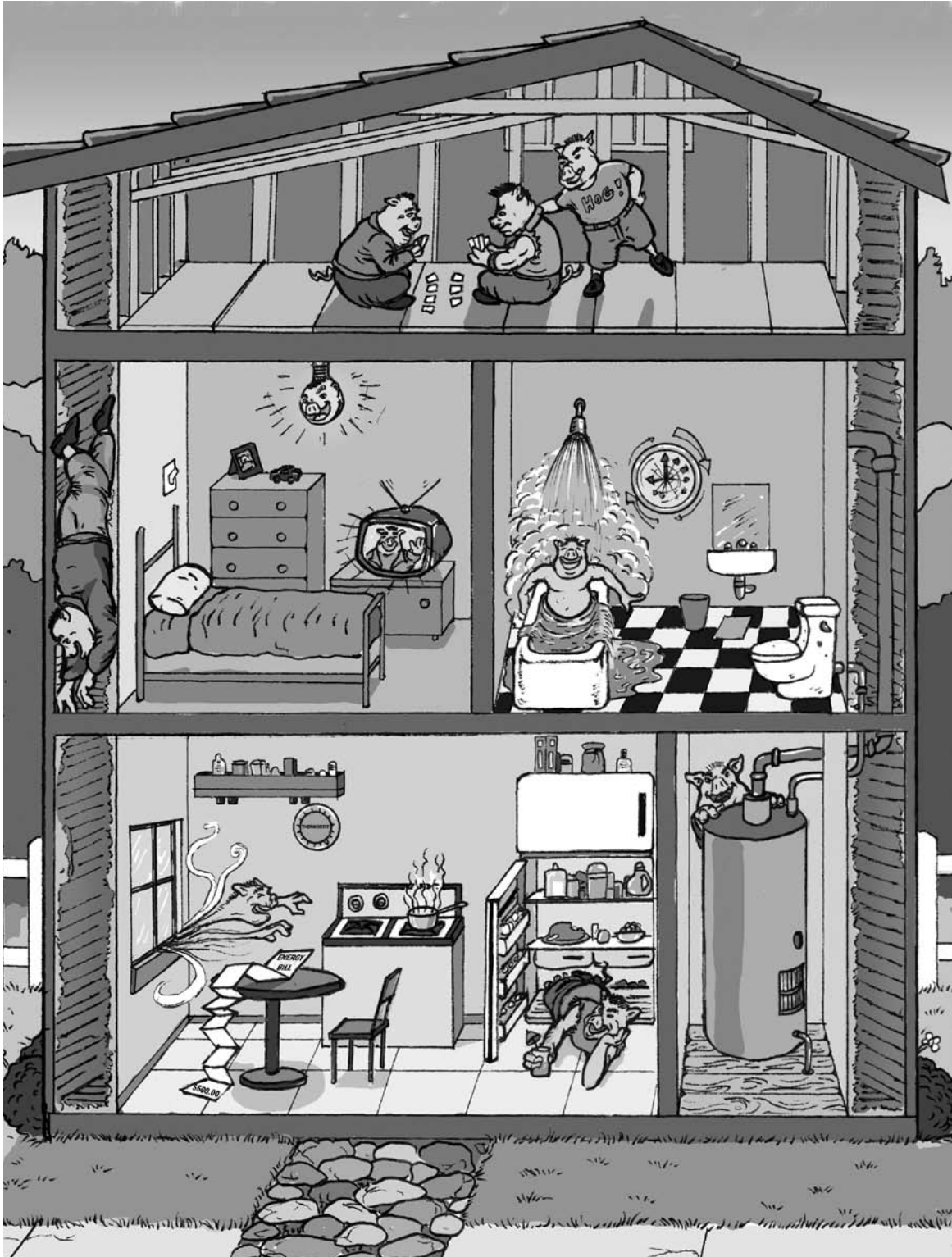
How does your family compare? Use this same exercise with your family's energy bills to estimate how much is spent on energy each month—or year—and how it is used. Maybe you can convince your parents to pass some of the savings on to you if you help lower your energy bills!

Energy Hog Buster HOUSE

Step 1..

Energy Hogs live in homes where energy is being wasted! In the picture below, find and write down on a separate sheet of paper, seven (or more) areas where energy is being wasted in the house. Write down your suggestions for how to solve each

hog problem to keep those hogs out!



Step 2...

On a separate sheet of paper, complete the sentences below. Then use these ideas to help you draw an energy-efficient home.

1. To keep the temperature in my home comfortable I will...
2. My home's energy will come from...
3. For light my home will use...
4. To heat water, my home will use...

Brainstorm a few of your own ideas or ask your teacher...

Step 3...

Now on another piece of paper, draw your own energy-saving home—do not trace or copy the house shown here.

Energy Hog SCAVENGER HUNT

Do the Scavenger Hunt with your family to find out if you have Energy Hogs lurking in your home!

On a separate sheet of paper, write down the answers to the questions below. There are no wrong answers, so be honest. As each home is different, **only answer 10 of the questions that apply to your home.**

1. INSULATION: Ask an adult at home how much insulation you have in the attic.

- 6 inches or less (2 pts.)
- 7–11 inches (4 pts.)
- 12 inches or more (6 pts.)

2. FURNACE FILTERS: Ask an adult at home how often your filters were cleaned or changed in the last year.

- Not at all (2 pts.)
- 1–3 times (4 pts.)
- 4 or more (6 pts.)



3. WINDOWS: How many layers of glass do your windows have?

- Single-pane with no storm windows (2 pts.)
- Single-pane with storm windows or double-pane (4 pts.)
- Double-pane with reflective coating or gas-filled (6 pts.)

4. THERMOSTAT: At what temperature do you set your thermostat when you are home and awake?



In heating seasons (winter):

- 73° or more (1 pt.)
- 70°–72° (2 pts.)
- 69° or less (3 pts.)

In cooling seasons (summer):

- 74° or less (1 pt.)
- 75°–77° (2 pts.)
- 78° or more (3 pts.)

5. WEATHERSTRIPPING: Open your front door and check the condition of the weatherstripping between the door and the door frame.

- None (2 pts.)
- Worn out (4 pts.)
- Good condition (6 pts.)

6. LIGHTS: How often do you turn lights off when you leave a room?

- Almost Never (2 pts.)
- Sometimes (4 pts.)
- Always (6 pts.)

7. LIGHT BULBS: Count the number of compact fluorescent light bulbs (CFLs) you have in your house.

- No CFL bulbs (2 pts.)
- 1–4 CFL bulbs (4 pts.)
- 5 or more CFLs (6 pts.)



8. COOKING: How often does your family keep the lids on pots and pans when cooking meals?

- Almost never (2 pts.)
- Sometimes (4 pts.)
- Always (6 pts.)

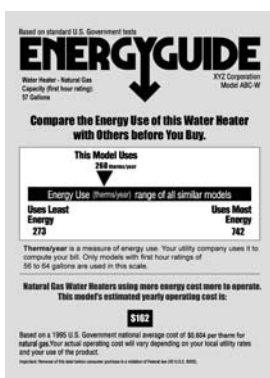


9. ELECTRICITY: Search your house for the **ENERGY STAR®** symbol. (hint: electronics or appliances) How many did you find?



- No **ENERGY STAR®** labels found (2 pts.)
- 1–2 **ENERGY STAR®** labels found (4 pts.)
- 3 or more **ENERGY STAR®** labels found (6 pts.)

10. WATER HEATER: Find the Energy Guide label on your water heater and look at the efficiency rating. How much energy does it use compared to similar models?



efficiency rating. How much energy does it use compared to similar models?

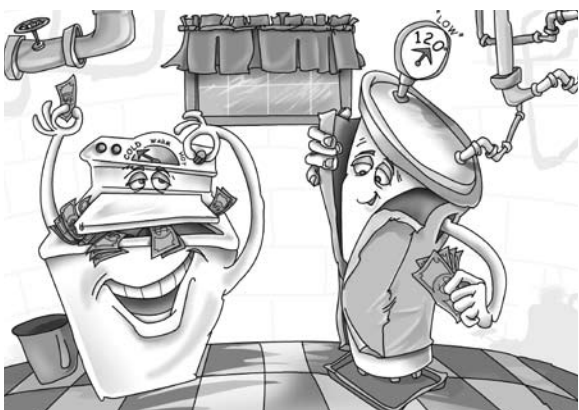
- Uses the most energy (2 pts.)
- Uses average amount of energy (4 pts.)
- Uses the least energy (6 pts.)

11. LAUNDRY: At what water temperature do you wash your clothes?

- Mostly **HOT** water (2 pts.)
- Mostly **WARM** water (4 pts.)
- Mostly **COLD** water (6 pts.)

12. HOT WATER USE (SHOWER): How much time do you spend in the shower?

- 15 minutes or more (2 pts.)
- 10 minutes (4 pts.)
- 5 minutes (6 pts.)



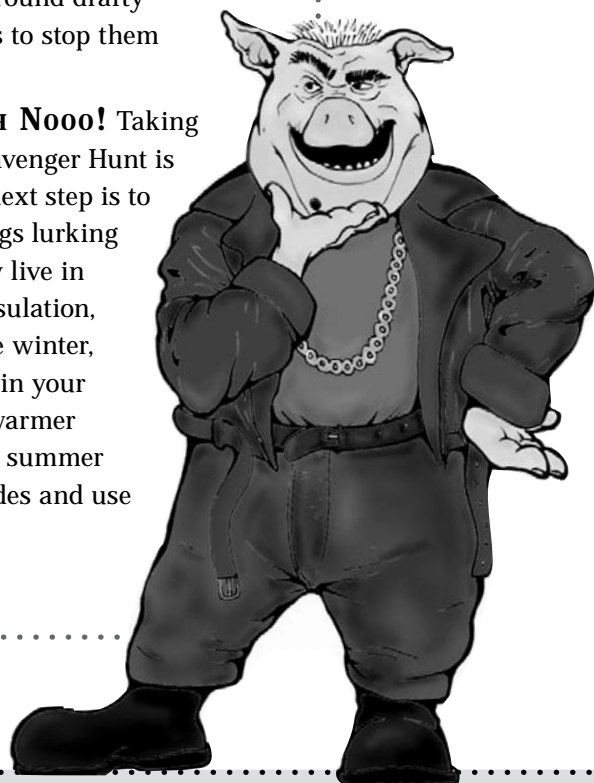
How Did You Score?

Add up points from the 10 questions you answered for your total.

45–60 AWESOME!! You're doing a great job of busting those Energy Hogs in your home. Keep up the good work!

31–44 ALMOST! You're on your way to becoming an Energy Hog Buster, but there's more to do. Those Hogs might be creeping into areas of your house like your attic (think "Insulation!")—or add weatherstripping around drafty doors and windows to stop them from sneaking in.

20–31 OINK! OH NOOO! Taking the Energy Hog Scavenger Hunt is the first step. The next step is to bust the Energy Hogs lurking in your home. They live in places that need insulation, like the attic. In the winter, try to use less heat in your home by wearing warmer clothes. During hot summer days, close the shades and use fans to cool off.



Did you know?!

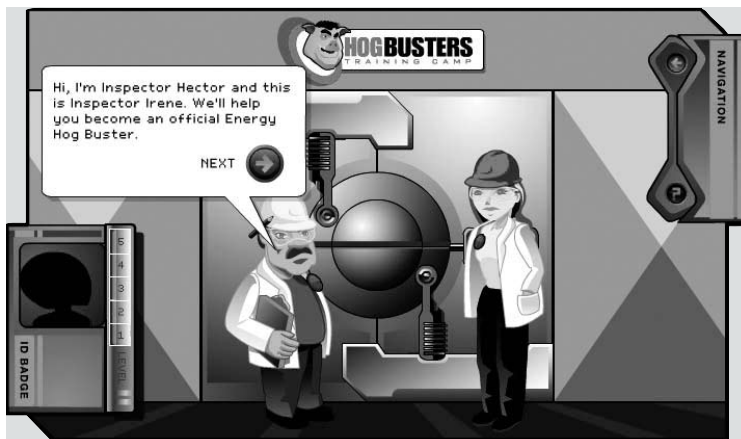
*Incandescent light bulbs are old-fashioned, and 95% of the energy that goes into them is wasted as heat. Replace your most used light bulbs with **ENERGY STAR** compact fluorescent bulbs to save \$30 or more over each bulb's lifetime, plus they last 10 times longer so you don't have to change them as often!*

Student Daily ENERGY JOURNAL

On a separate sheet of paper, keep track of your daily activities and the energy you use for one whole day (use the example below as your guide). Then think of ways you and your family can use less energy, save money, and bust Energy Hogs.

TIME OF DAY	ACTIVITY	KIND OF ENERGY USED: ELECTRICITY, GASOLINE, NATURAL GAS, FUEL OIL, PROPANE, OTHER...	HOW CAN I, OR MY FAMILY, USE ENERGY MORE WISELY...
MORNING	<i>Example: 15 minute shower</i>	<i>Natural gas (water heater)</i>	<i>Take 5 minute shower</i>
MID-DAY			
AFTERNOON			
EVENING			
NIGHT			

USE SEPARATE SHEET OF PAPER



Energy Hog Media Center

Go to www.EnergyHog.org and play the games to become an Official Energy Hog Buster!

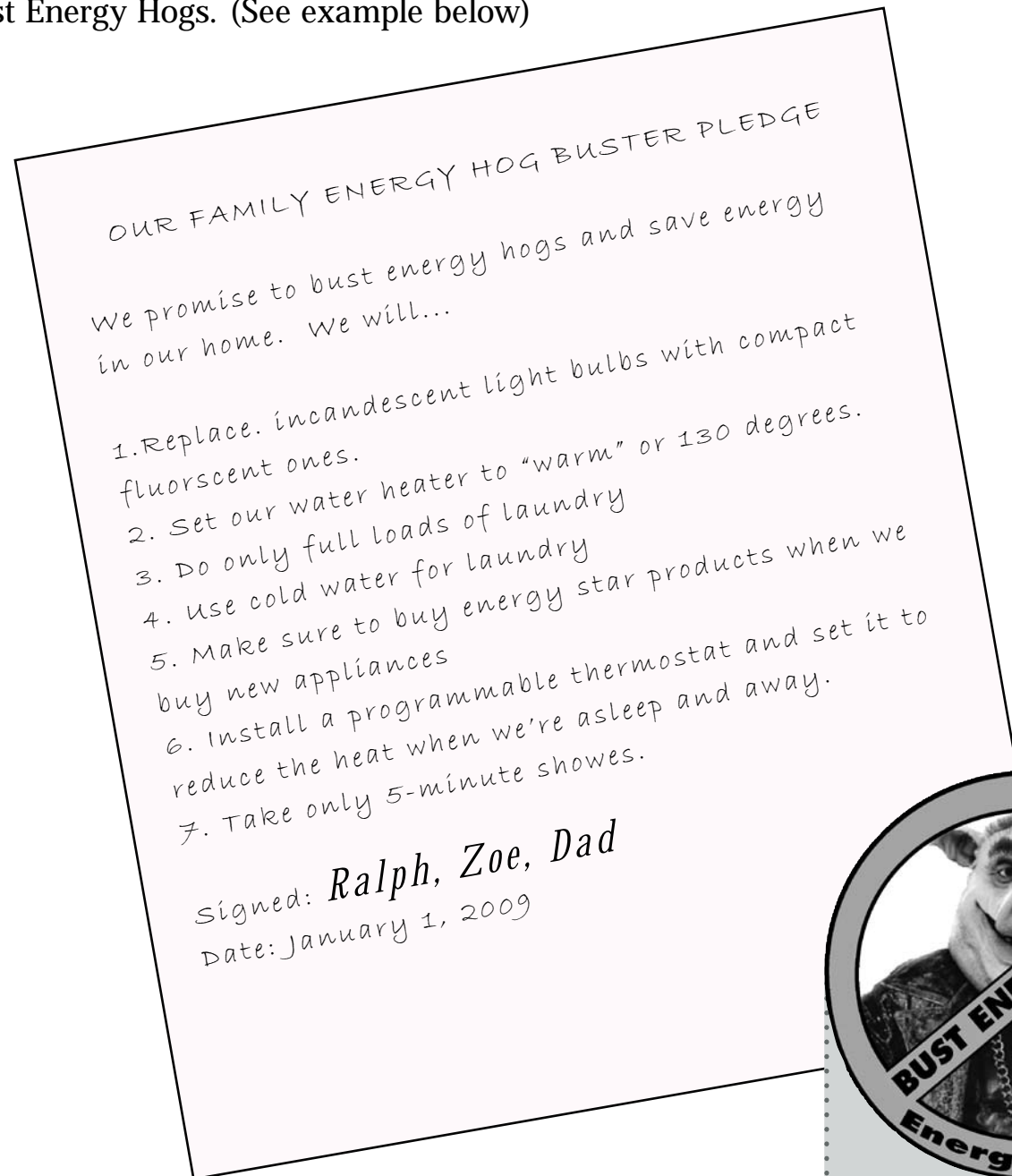
Read through the on-line Energy Hog Busting Handbook and then answer these questions:

1. What are some places where Energy Hogs might hide in your home, and why?
2. How can you keep Energy Hogs out of your attic?
3. What are some ways to use less energy in your home?

FAMILY HOG BUSTER PLEDGE

Talk to your family about ways that you can save energy together.

On a separate sheet of paper, write down the ways that your family agrees upon. Then sign and date your list and hang it on the refrigerator to remind you of your commitment to bust Energy Hogs. (See example below)



BONUS ACTIVITY: *Track your savings!* Look at your energy bills before and after taking the pledge. Compare the energy used in one month to the same month the year before (as shown in kilowatt-hours or therms). If you don't have your previous bills, the past usage may be listed on the current bill, or call the utility company.

For more ways to save energy and lower your bills, go to:
EnergyHog.org/adult/checklist.htm
to get the "Ultimate Checklist".



ALLIANCE TO SAVE ENERGY'S
Green Schools Program
Empowering Schools through Energy Efficiency

The Alliance to Save Energy promotes energy efficiency worldwide to achieve a healthier economy, a cleaner environment, and greater energy security. Energy efficiency is the quickest, cheapest, cleanest way to extend our world's energy supplies.



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The **Energy Hog** was originally founded by Energy Outreach Colorado and the Ad Council.

Tracy Locke and the Ebeling Group/Lobo created and produced the **Energy Hog**.

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