

ENERGY CONSERVATION DETECTIVE



Missouri
Department of
Natural Resources

GRADE LEVEL:

Upper Elementary/Middle
School

SUBJECT AREA:

Science, Mathematics

DURATION:

Preparation time: 30 minutes
Activity time: one to two 50-
minute class sessions plus a
home-based assignment

SETTING:

Classroom (Home-based
energy audit)

SKILLS:

Application, Analysis,
Synthesis

KEY WORDS:

Energy, Insulation, Energy
Conservation, Energy Audit.

CORRELATION'S TO SHOW-ME STANDARDS:

Performance standards
1.3, 1.10, 3.1 3.3 3.5 3.8

Knowledge Standards
SC-1,8
M-1

SUMMARY

Students are introduced to various strategies for reducing energy use in the average American home. The students will conduct an audit of their home looking for ways to improve their home energy efficiency. Each student will prepare a report recommending ways to help their homes conserve both energy and money!

OBJECTIVES

THE STUDENTS WILL:

- ✓ Discuss the application of energy conservation techniques in reducing energy used in a typical American home.
- ✓ Conduct an audit of energy related activities in their own home.
- ✓ Prepare a report recommending ways to make their own home more energy efficient.

- ✓ Construct a simple draft detector.

MATERIALS

- Classroom set(s) of the following energy conservation publications (these are provided in Part 1 of the energy curriculum)

Energy Management Handbook for Homeowners

The Energy-Efficient Manufactured Home

- Each student should get a copy of the home energy audit sheet

Draft Detector

- Tissue paper
- Pencil
- Tape

BACKGROUND

Americans use more energy per person than any other nation on earth. A typical Missouri resident will spend around 11 percent of their personal income on residential energy needs and some lower income families may spend as much as half

of their income on residential energy needs.

The two largest applications of energy by residential buildings are space heating (36 percent) and water heating (14 percent). Of the energy we consume, electrical power makes up 70 percent. Missouri gets 83 percent of its electricity from burning coal. Missouri spends more than \$635 million a year importing coal into the state.

Most homes could reduce the amount of energy they use by implementing simple energy saving strategies. Efforts to improve insulation, decrease infiltration and use energy efficient lighting can significantly reduce the amount of energy required by a typical home.

In this activity the students will hunt down the areas in their own home that could be improved to lower energy use. These efforts will help their family spend less on energy bills and consume less energy, which can result in environmental benefits.

The following two publications provide specific information on how to look at a homes energy use and also recommend ways to improve a homes energy efficiency. These

publications are provided in *Selected Publications* (Section 3) of the energy curriculum.

Energy Management Handbook for Homeowners

The Energy-Efficient Manufactured Home

An additional quick list of energy saving tips is provided below:

- Replace incandescent bulbs with compact fluorescent lightbulbs.
- Look for the Energy Star label when replacing appliances such as refrigerator, dishwasher, clothes washer and dryer.
- Insulate hot water heater.
- Insure that floor and wall vents are not blocked by furniture, rugs, drapes, etc.
- Install white window shades, drapes, or blinds to reflect heat away from the house in summer.
- During the winter keep the drapes and shades on south facing windows open during the day to allow sunlight to enter your home and closed at night to reduce the chill you might feel from cold windows.
- Set the thermostat at 76° F or higher in summer or less than 74° F in winter.
- Install a programmable thermostat.
- Install weather stripping around windows.
- Install weather stripping around doors.
- Clean or replace furnace filter once a month or as needed.
- Keep lights off in all unoccupied rooms.
- Put fans on timers.
- Install storm windows.
- Plant evergreen shrubs and trees as windbreaks around north and west sides of the building.
- Plant deciduous trees on the south side for summer shade and winter sun.

- Caulk cracks and joints around windows, doors, stairways, pipes and electrical wires.
- Caulk spaces for air leaks between the house and its foundation, replace broken windows or rotted boards, and plug other sources of cold air leaks into the cellar or crawl space.
- Seal cracks in walls and foundations.
- Install a double door or insulated storm door at each outside entrance.
- Air dry dishes instead of using dishwasher's drying cycle.
- Use a microwave oven instead of conventional electric range or oven.
- Turn off computer and monitor when not in use.
- Lower the thermostat on hot water heater to 115° F.
- Move lamps or TV's away from air conditioning thermostats. The heat will cause the air conditioner to run longer.
- If you have a fireplace, make sure that the damper is tightly closed when not in use.

PROCEDURE

WARM UP



Set the stage by asking the students the following questions:

- *What are some uses of energy in their homes (a list can be generated on the board)?*
- *What application uses the most energy in your home?*
- *What are the sources of energy used in typical*

home (electricity, natural gas, propane, wood stove, etc.)?

- How much of their parents' income do they guess is spent on energy costs?

THE ENERGY AUDIT

1. Review with the class some basic principals of home energy conservation. The following publications will provide the foundations for such a review:

Energy Management Handbook for Homeowners

The Energy-Efficient Manufactured Home

The instructor may want to break the class up into groups and ask each group to review and report to the class on a specific elements of energy conservation, such as insulation use, air conditioning and heating systems, infiltration, lighting options, water heating, energy efficient appliances, etc.

2. Assign the students the role of home energy conservation consultant.
3. Distribute the Home Energy Audit sheet and

discuss the procedure for recording data on sheet.

4. Have each student build a *draft detector* for use in determining infiltration problems with their home (see instructions for *Draft Hunting* included with this lesson). The students can practice during class by checking the room and school for drafts.

ASSESSMENT

Student will use the results of the home energy audit to write an assessment of their home's current energy use and will then formulate a written plan to increase their homes energy efficiency. This report can be scored using teacher or student created scoring guide.

GOING FURTHER

Have the students conduct an audit of the school and then prepare a list of recommendations on how the school could improve its energy consumption.



IMPORTANT WARNING!

Many home heating systems can leak deadly carbon dioxide gas.

Before decreasing a homes infiltration problems (*unwanted air moving into and out of a home*) it is critical to have the heating and cooling system (*including gas hot water heating units*) checked by a trained professional.

Failure to do so can result in the build up of deadly carbon dioxide in the home.

Carbon dioxide is a deadly odorless gas that can be introduced into the home by an improperly functioning gas heating system.

All such systems should be checked routinely.

ENERGY CONSERVATION DETECTIVE

Home Energy Audit

Interior Checklist	Yes	No
Compact fluorescent lightbulbs		
Refrigerator less than five years old		
Insulated hot water heater		
Floor and wall vents are not blocked by furniture, rugs, drapes, etc.		
Insulated curtains		
Thermostat is set at 76° F or higher in summer or less than 74° F in winter		
Programmable thermostat		
Windows are caulked		
Weather stripping around windows		
Weather stripping around doors		
Furnace filter changed within last three months		
Lights are off in all unoccupied rooms		
Fans are on timers		
Floor is covered with rugs, padding, and carpeting		

Exterior Checklist	Yes	No
Windows are concentrated on the north and south walls		
The roof on the south side extend out from the house far enough to block summer sun from walls and windows		
Storm windows are installed		
Evergreen shrubs and trees planted as windbreaks around north and west sides of the building		
Deciduous trees planted on the south side for summer shade and winter sun		
Cracks and joints around windows, doors, stairways, pipes and electrical wires are caulked		
There are no spaces for air leaks between the house and its foundation, broken windows, rotted boards or other sources of cold air leaks into the cellar or crawl space		
Cracks in walls and foundations are sealed and holes are plugged		
There is a double door or insulated storm door at each outside entrance		

One Months Home Statistics	
Monthly utility costs:	
Natural gas (cubic feet)	
Electricity (kilowatt hours)	
Propane (gallons)	
Square footage of home	

