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ABSTRACT

Presented are 15 energy-related lessons for secondary school home economics students. Typical among these lessons are a home appliance energy audit, an analysis of the energy costs of various foods, and a study of energy conservation strategies in washing clothes and in personal care. The activities are grouped under three headings: (1) clothing and textiles, (2) food, and (3) housing. Each lesson plan includes one to four pages of background information for the teacher. (WB)

ENERGY

PENNSYLVANIA'S ENERGY CURRICULUM FOR THE SECONDARY GRADES

Home Economics

Pennsylvania Department of Education 1980
[illegible]ds Provided by Governor's Energy Council

Commonwealth of Pennsylvania
Dick Thornburgh, *Governor*

Department of Education
Robert G. Scanlon, *Secretary*

Office of Basic Education
Ronald H. Lewis, *Commissioner*
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Bureau of Curriculum Services
David C. Campbell, *Director*

Health, Science and Technology Division
Irvin Edgar, *Chief*
John J. McDermott, *Senior Science Adviser*

Pennsylvania Department of Education
P.O. Box 911, 333 Market Street
Harrisburg, PA 17108

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Much of the materials assembled here are from **Energy Conservation In The Home: An Energy Education/Conservation Curriculum Guide For Home Economics Teachers.** This publication was prepared by the University of Tennessee Environmental Center and College of Home Economics, Knoxville, Tennessee. We appreciate having been given permission to reproduce many of the materials contained within.

INTRODUCTION

Often we are not aware of the attitudes and opinions of those around us. It may be that there are a large number of students in your school who are interested in energy conservation and would make good conservation advocates.

Take a survey of the students in your class or school to determine their attitudes about conserving energy, their role, the government's role, their recommendations and so on. Included in this activity is a survey form and a tally sheet. You may wish to distribute the survey form or place it in your school paper. Feel free to add your own questions.

You might like to administer before-and-after attitude surveys. Take a survey before your class becomes active in learning and providing energy conservation information. Then after your energy conservation campaign, take a second survey. See if attitudes have changed.

ENERGY ATTITUDE SURVEY

1. Do you believe there is an energy shortage? ____yes ____no ____don't know

2. Do you believe you have been given a realistic picture of the energy situation facing the United States? ____yes ____no ____don't know

3. Do you believe most Americans are energy "wasters?" ____yes ____no ____don't know

4. Do you believe most Americans are energy "conservers?" ____yes ____no ____don't know

5. Do you believe Americans are spoiled, self-indulgent, and reluctant to take responsibility for the future? ____yes ____no ____don't know

6. Do you believe it is the responsibility of every U.S. citizen to conserve energy voluntarily? ____yes ____no ____don't know

7. Do you believe Americans will conserve energy only when government controls are imposed? ____yes ____no ____don't know

8. Would you be willing to reduce your standards of living to conserve energy? ____yes ____no ____don't know

9. Do you believe you as an individual can make an impact on energy consumption? ____yes ____no ____don't know

10. Would you conserve energy to save money? ____yes ____no ____don't know

11. Do you think the money saved is worth the inconvenience of conserving energy? ____yes ____no ____don't know

12. Do you think the energy saved is worth the inconvenience of conserving energy? ____yes ____no ____don't know

13. Do you feel technology will "bail us out" of the energy shortage? ____yes ____no ____don't know

14. Do you feel you have any input or participation in the energy usage decisions made by your family? ____yes ____no ____don't know

15. Are you going to *do* something to save energy? ____yes ____no ____don't know

ENERGY-ATTITUDE TALLY

Question	Yes	Percent	No	Percent	Don't Know	Percent
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
Additional questions						

Find the percentages for each response. For example: if on question one 200 students respond; 100 say yes, 60 no and 40 don't know, then the percentage saying yes is $\frac{100}{200}$ or 50%; saying no is $\frac{60}{200}$ or 30%; saying don't know is $\frac{40}{200}$ or 20%. (You may choose to use a calculator, especially if large numbers of students respond).

Suggestions:

1. Survey your class separately to see if the study of Home Economics has an effect.
2. You might print your results in the school newspaper.
3. Survey the teachers and administrators. Do their opinions differ much from those of the students?

I. CLOTHING AND TEXTILES

Clothing Selection

Proper clothing selection can contribute to energy conservation in two ways: (1) by making the wearer comfortable and thereby reducing the need for air conditioning or heating; and (2) by reducing the need for hot water, hot air, and ironing when caring for clothing.

Clothing can act as insulation for the body by keeping a layer of warmth around it or as an air conditioner, allowing the body to cool itself by the evaporation of perspiration. During cool periods, clothing should be selected for its insulative value. Bulky fabrics, such as knit fabrics, hairy fabrics, or napped fabrics, have a great deal of air trapped within their structures which acts as insulation to keep body heat in and cool air out. Fibers such as wool and kinked synthetics are better for cold weather than smooth filament fibers, such as filament nylon or polyester, because they don't pack down and lie flat, eliminating air. The moisture content of wool also aids the feeling of warmth. Wool absorbs more moisture than synthetics or other natural fibers, and by doing so feels warmer.

Check the garment tag for fiber content. Since the heat loss from the arms and legs is the controlling factor in body heat loss, the use of long-sleeved garments and those that cover the legs will help prevent chills.[1] When feeling cool, one should put on a sweater rather than turn up the thermostat.

During warm periods, clothing that permits air to circulate and perspiration to evaporate is desired. Lightweight, loosely woven fabrics and clothing that fits loosely and has a minimum of layers provides for the best circulation of air. Cotton is an excellent fiber for warm weather clothing since it can be loosely woven in thin layers and has the ability to absorb perspiration from the body and pass it to the surrounding air. Most synthetics are poor moisture absorbers. Light-colored clothing also contributes to warm weather comfort by reflecting heat and solar radiation.

Today a wide variety of fiber blends and fabric finishes are available which make clothing easier and less costly to care for. Many fabrics are permanent press and soil repellent. Permanent press items (clothing and linens) can be cold or warm water washed, require lower dryer temperatures and less drying time than regular fabrics, and need no ironing. Thus, they allow a savings of electricity and hot water. Washable woolens may also be washed in cold water, and all synthetics require lower ironing temperatures than natural fibers. Soil repellent fabrics not only require less frequent laundering than regular fabrics, but are easier to clean. Read the garment tag carefully to determine the proper care procedures. Remember, "dry clean only" fabrics are more costly to clean, both in money and energy, transport to the dry cleaner, use of dry cleaning chemicals, mechanical equipment, and plastic bags for protection.

Before buying, always try on ready-made clothing to check for fit, appropriateness of style and color, and defects in manufacture. This will help avoid a trip back to the store to return unsuitable merchandise. When selecting patterns, fabrics, and notions to do home sewing, select everything on the same shopping trip to save fuel for transportation. Your time and energy will also be saved.

Activity I-1

Objective:

The student will make enlightened clothing selections which will foster energy conservation.

What to do?

1. Show film(s) explaining the characteristics of wool and cotton.[1]

2. Have class discussion on the types of clothing one should wear:

   a. to keep warm
   b. to stay cool

3. Have students separate into two groups. One is to do research on cold weather clothing, the other on warm weather clothing. Each group will present their findings in class.

4. Show garment tag transparencies (various types) explaining how one is read and interpreted.

5. Make a bulletin board showing characteristics of wool and cotton.

6. Each student will bring to class an article of clothing he/she recently purchased or was given as a gift.

   a. Examine fiber content.
   b. Examine care directions.
   c. Explain the season of the year clothing is designed for. Why?

7. Examine garment tags for various fabric finishes. Explain the finish and how it relates to energy conservation.

8. Compare time, labor and cost involved in using a home owned electric washer, community laundromat, and commercial laundry service.

9. Visit an appliance store to view the various models of washers and dryers, noting special energy saving features.

10. Make a list of 10 things which can be done in order to save energy while doing the family laundry.

Sources

Clothing Selection

[1]Henry R. Spies and others, 350 Ways to Save Energy and Money in Your Home and Car (New York: Crown Publishers, 1974), p. 50.

Clothing Construction

The uses of energy for clothing construction include electricity for electric scissors, sewing machine, hand iron, and lighting. The major energy user is not the sewing machine but the iron. Therefore, thought should be given to ways to reduce pressing time, the number of pressing sessions, and the temperature setting of the iron.

It is beneficial to stitch as much as possible before pressing. If the same color thread can be used, two or more garments can be worked on at the same time. Several seams should be stitched at the same sitting before pressing. Do as much pressing as possible at one time and turn the iron off between pressing sessions. If the pressing session will require a lot of time, turn off the sewing machine light. Always select the proper temperature on the iron for the fabric you are sewing to reduce the need for repeated pressings and the danger of scorching.

By utilizing natural light, the need for artificial lighting may be avoided. Place the sewing machine near a window and sew during daylight. Natural light may be used for cutting and pressing as well.

Electric scissors use very little energy and provide the advantage of cutting several layers of cloth at the same time. However, use them frugally. They are not appropriate for all cutting jobs.

To operate efficiently, electrical equipment must be properly maintained. Consult the manual for the sewing machine to determine its mantenance requirements. Keep all equipment clean and free of lint.

Activity I-2

Objective:

The student will be able to recognize practices for clothing construction which will help conserve energy.

What to do:

1. Discuss various energy saving short cuts in use of equipment, energy, and time in sewing and pressing of garments.

2. Demonstrate in class the easiest ways to:

   .Put on a facing
   .Hem a garment
   .Put in a placket
   .Put in a sleeve
   .Put on a collar
   .Put in a pleat, tuck, dart, and zipper
   .Put on a waistband

3. Discuss various types of fasteners:

   Buttons
   Hooks and eyes
   Snaps
   Zippers
   Velcro

4. Demonstrate finishing methods:

   Flat-felled seam
   French
   Hong Kong, etc.

Teachers Notes:

Encourage students to practice energy conservation measures during clothing construction in the classroom lab and at home.

Clothing Care

Home care of clothing involves the use of appliances which consume electricity. The largest portion of the energy used for home laundering is used to heat water. Thus a large contribution to energy conserviation in the home could be realized by switching from hot to cold water washing cycles; this could amount to an annual savings of about nine dollars[1] per household, or about 10 percent of the energy used to heat water. A savings equivalent of 100,000 barrels per day (BPD) of oil could be achieved by the nation if cold water washing were adopted.[2] In the U.S., the average hot water temperature is 130 degrees F; warm water temperature is 105 degrees F; and cold water temperature is around 60 degrees F. Water temperatures currently used in home laundering in the U.S. are: hot water, 30 percent; warm water, 50 percent; and cold water, 20 percent.[3]

There are a number of energy conserving features to look for when purchasing appliances such as washers, dryers, and irons:

1. Look for certification seals, such as Underwriters' Laboratories (UL), Association of Home Appliance Manufacturers (AHAM), and American Gas Association Laboratories (AGAL)

2. Inquire about the amount of hot water and electricity required to complete a normal cycle in a washer; there are differences in these respects among the washers on the market.

3. A soak cycle feature on a clothes washer is an energy saver. It can be used to loosen stubborn stains so that heavily soiled clothes need to be washed just once.

4. Select a washer with adjustable water controls which allow the user to select the water level to match the size of the load.

5. Many washers have adjustable wash-time controls. By matching wash-time to load and soil levels, washing longer than necessary can be avoided.

6. The automatic controls on the washer should permit rinsing to be performed in cold water regardless of the temperature selected for the wash.

7. Suds-saver features allow for the reuse of hot and warm water for several loads. These features permit the use of the warm water from the first load for the washing of the second load, and so on. This saves not only energy to heat water, but water and detergent. You can save up to 27 percent on water and 33 percent on detergent for laundering.[4]

8. Permanent press cycles on both the washer and dryer use lower temperatures than regular cycles and are especially designed to avoid wrinkling so that no ironing is necessary.

9. Look for the proper capacity washer and dryer for your specific needs. Large capacity washers and dryers can handle in one load what small ones must do in two, and so save energy. However, an underloaded large washer or dryer will waste energy. Capacity is indicated in terms of pounds of clothes. Portable washers are available which will wash and rinse a load (approximately 1/2 size of the normal load in an automatic washer) in just 22 gallons. However, both the wash and rinse water can be used twice. This can save as much as 63 percent on water used for laundering.

10. Dryers should be equipped with a buzzer to indicate when clothes are dry so they can be removed before wrinkles are set.

11. The most accurate type of control for dryers is a moisture sensor. It automatically shuts off when clothes are properly dry.

12. An "air fluff" cycle dries without heat. This can be a big advantage in drying delicate fabrics or feather pillows.

13. A "damp dry" setting on the dryer saves energy by reducing drying time and allowing clothes to be removed when ready for ironing.

14. Look for an iron with fabric settings to insure the proper temperatures to avoid wasting energy and scorching.

The use and maintenance practices for washers, dryers, and irons should be directed toward the conservation of electricity and hot water. This involves an attempt to reduce operation times and temperature settings to a minimum without sacrificing effectiveness. The units must be properly maintained to avoid operation inefficiencies which will require more energy to do an effective job. The following operation, maintenance, and practice tips will help reduce the energy demand when laundering:

1. Read the operation manuals for your washer, dryer, and iron and take advantage of energy saving instructions. Read maintenance instructions and follow them carefully.

2. The major cost in washing clothes is the hot water used. The more wash that can be done with cold or warm water, the more energy that can be saved. Always rinse with cold water. Sort clothes according to fabric and degree of soil, since permanent press and washable woolens and lightly soiled clothing can be washed in cold water. There are a number of cold water detergents on the market, many with germicides which take the place of hot water for killing bacteria.

3. It is a good idea to locate the washer near the water heater to minimize heat loss in pipes. And be certain there are no leaks between water heater and washer.

4. Both the washer and dryer must be properly loaded. Collect laundry until there is a full load. Automatic washers and dryers go through the same cycle for a full load or a single item, unless they are equipped with a small load or mini-load cycle. Be careful not to overload. Overloading reduces the cleaning action of the washer and the drying action of the dryer as well as resulting in more abrasion, lint, and wrinkling. Varying the size of the garments in a full load allows for freer circulation in washer and dryer.

5. Use the special features on appliances to conserve energy; i.e., short cycles, mini-load cycles, cold water rinse, suds-savers, soak cycles, timers, moisture sensors, selection controls.

6. Use the appropriate water level, water temperature, washing time, drying temperature, and drying time for the type and size laundry load. Separate drying loads into heavy and lightweight items. Since the ligher ones take less time to dry, the dryer doesn't have to be on as long.

7. Dryers should be installed in a warm place to reduce the amount of heat needed; i.e., avoid placing dryers in unheated areas such as garages and utility rooms.

8. Keep the lint screen clean in the dryer; remove lint after each load. If the washer does not clean its lint filter automatically, you must clean it after each load. Check and clean the dryer exhaust on the outside of the house occasionally.

9. Dry clothes in consecutive loads to take advantage of the heat from previous loads. Small items may be dried on the stored heat from a previous load.

10. With the use of an old-fashioned clothes line (a practical solar energy device!), the energy consumption required for drying can be eliminated. Sun-drying also has a germicidal effect.

11. Damp drying saves energy and prepares clothes for ironing without sprinkling. Natural fibers such as cotton, wool, or linen need a small amount of moisture to avoid feeling harsh and becoming wrinkled. Over-dried clothes are difficult to iron.

12. By removing clothing and linens promptly from the dryer and folding or hanging them carefully, many items will require little or no ironing. Some dryers are equipped for several minutes of "fluff only" with intermittent signals as a reminder to remove permanent press items before wrinkles set.

13. Hand irons consume as much energy as ten 100-watt light bulbs. Time can be reduced by ironing large batches of clothes at one time, avoiding heating up the iron several times, ironing fabrics which require low temperatures during warm-up and cool-down periods, and turning off the iron when interrupted for any length of time and when finished.

14. Use the lowest iron temperature required for each fabric. For example, synthetics require the lowest temperature; silk and wool require medium temperature; and cotton and linen require high temperature. Matching the temperature setting to the fabric prevents scorching or underpressing.

Activity I-3

Objective:

The student will be able to select appliances and recognize practices that will foster energy conservation in the care of clothing.

What to do:

1. Have students become familiar with such magazines as **Consumer Report**. Several class members could report to the class concerning articles of interest in energy saving equipment for the home.

2. Read and discuss factors influencing one's purchase of equipment. Is energy conservation taken into consideration before making a final decision?

3. Collect samples of warranties, seals of approval, and guarantees. Study and analyze information given for protection, safety, and length of service.

4. Prepare a bulletin board display of seals of approval found on household equipment.

5. Make a list of all the gas and/or electrical appliances one might find in a modern American home . . . not necessarily needed.

6. Demonstrate the use of laundry equipment, emphasizing the importance of following manufacturer's instructions and mentioning various ways to cut the cost of laundering.

7. Use overhead projector transparencies on how to use laundry equipment.

8. WORD FIND

C	B	E	N	E	R	G	Y	D	F	H	S	G	K	P
L	O	T	O	Z	Y	X	U	V	Y	G	A	E	N	E
O	W	L	A	B	A	R	G	A	I	N	V	Y	O	R
T	L	O	D	P	R	C	O	C	T	D	E	T	F	M
H	I	N	O	W	G	A	I	E	I	Q	T	P	H	A
I	N	S	U	L	A	T	O	R	P	O	I	A	D	N
N	F	Y	L	C	R	T	S	N	C	J	M	H	K	E
G	C	N	F	P	M	T	E	M	O	U	E	R	S	N
O	Y	T	G	K	E	R	V	R	T	O	L	K	R	T
M	K	H	S	J	N	P	R	C	T	J	K	A	Q	P
D	H	E	A	N	T	V	E	Z	O	I	E	D	T	R
B	J	T	G	H	T	Y	S	R	N	C	M	R	O	E
D	N	I	J	T	A	I	N	T	G	H	R	E	U	S
S	O	C	M	M	G	E	O	Q	T	O	V	L	Y	S
K	H	S	I	N	I	F	C	I	R	B	A	F	J	M

Directions:

Find words listed and circle them in box above.

BARGAIN
CIRCULATE
CLOTHING
COLD WATER
CONSERVE
COTTON
ENERGY
FABRIC FINISH

INSULATOR
GARMENT TAG
SAVE TIME
PERMANENT PRESS
SYNTHETICS
TIME
WOOL

Sources

Clothing Care

[1]The Energy Challenge: What Can We Do? (Malvern, PA: Energy Conservation Research, 1974), p. 21.

[2]John George Muller, The Potential for Energy Savings Through Reductions in Hot Water Consumption (Washington, D.C.: FEA, 1975), p. i.

[3]Ibid., p. 22.

[4]Suds Saver Washers, Maytag Technical Bulletin, Number 11.

F.

Personal Care

Bathing and grooming consume energy for hot water and electrical equipment operation. The major consumption is for heating water, offering a significant potential for savings in an area over which the consumer may exercise a great deal of control. Also, the current popularity of a wide variety of grooming and beauty aids which require electricity or hot water increased the demand for energy. Savings can be achieved through energy-conserving fixtures, equipment, purchase practices, and uses.

Bathing

The National Bureau of Standards (NBS) reports that bathing accounts for 42 percent of the daily use of hot water in the home.[1] Approximately 88 gallons of water per day are consumed by the average family in the United States for bathing, and the average point-of-use temperature is 105 degrees F.[2] The energy consumed for hot water in bathing may be reduced through technology and frugal consumer practices.

The average shower uses eight gallons of water per minute. There are showerhead flow control devices which can cut the flow to three gallons of water per minute. The reduced flow rate is compensated for by increased pressure to insure effectiveness. By installing a flow restrictor or a new showerhead with a smaller flow rate and holding the duration of two showers to 5 minutes each, a reduction of 30 gallons per day of hot water could be realized. At present energy rates, this would result in a savings per year of $10.25 for gas-fired water heaters, $20.00 for oil-fired water heaters, and $36.00 for electric water heaters.[3]

Many devices are available to limit the flow of water from showerheads. A simple washer is the least expensive, but more elaborate flow restrictors are available which maintain a constant flow. (If line pressure drops, the device opens wider to maintain a constant flow.)[4]

It is somewhat impractical to expect people to reduce the number or temperature of their baths or showers significantly, but they should be encouraged to reduce the amount of water they use. A significant savings could be achieved if consumers would take short showers as opposed to lengthy showers or tub baths. A short shower uses less hot water, thus less energy.[5]

A full bathtub requires about 36 gallons of water. The minimum water level for a bath (to allow for proper rinsing) is about 10 to 20 gallons. Taking a shower with the water running constantly requires eight gallons per minute without a flow control device. That means 40 gallons for a five minute shower, up to 160 gallons for a twenty minute shower. A flow restrictor can reduce the water for showering to 15 gallons for a five minute shower. By turning the water off while soaping up and using water only for wetting down and rising off, only about 4 gallons will be needed!

The use of hot water at the bathroom lavatory is another source of energy consumption. The typical lavatory faucet permits a flow of five gallons per minute when wide open. With the use of an aerator or spray tap, the flow is reduced (mixing air with water makes the flow seem larger than it is). Aerators can reduce water consumption at bathroom lavatories by 25 percent. Flow restrictors may also be used on lavatory faucets, giving a savings of about 25 percent. It is estimated that a spray tap can save 50 percent over standard faucets.[6] Spray taps are more commonly found on kitchen sink faucets than bathroom lavatory faucets; however, because of their energy savings potential, they may become more popular. (A maximum temperature control device at the point of use may also reduce energy consumption by limiting the flow of hot water. Its main purpose, however, is as a safety device to avoid scalds.) Aerators, spray taps, and flow restrictors, though they vary widely in price and type, are all quite cost-effective.

Of course, every effort should be made to avoid leaks, particularly from hot water faucets. A hot water leak not only wastes water, but also the energy required to heat it.

If consumers demand other methods and improved technology in regard to hot water consumption, several possibilities exist for development. One of these is the improved design of tubs, shower stalls, and lavatories. These fixtures could be insulated, made of a material which feels warm and will not absorb or transmit heat, and shaped to fit the body more closely.

Another way to reduce hot water is by mixing hot and cold water at the water heater instead of adjusting the faucet. This can be accomplished by adjusting the valves on the water heater which are set to determine flow rate and temperature.[7]

Research is now underway in the area of waste water reclamation. It may be possible to reclaim the heat from the waste water from tubs, showers, and lavatories, as well as to reclaim the water for flushing toilets.

Following is a list of several tips for saving energy and hot water when bathing:

1. Take short showers instead of baths.

2. Reduce the duration of showers.

3. Fill the lavatory with warm water, rather than allowing it to run when washing or shaving.

4. During winter, allow the water for baths to cool (releasing heat to the bathroom) before draining.

5. Encourage members of your family to bathe one after the other to take advantage of the warmth of the fixture (and room) from previous use.

6. Avoid drafts near the tub or shower which would encourage the use of a higher water temperature.

7. Check for leaks around fixtures.

Grooming

Grooming involves the consumption of hot water, electricity, and petroleum products. Although the quantity of energy consumed for one grooming process or beauty product may be small, when many pieces of equipment are involved, or when energy is wasted, the costs mount up. The following beauty aids and equipment are commonly used for grooming: electric shavers, electric hair dryers, electric hair curlers and irons, electric toothbrushes, electric water pump tooth-and-gum cleaners, contact lens autoclaves, electric make-up mirrors, electric manicure sets, electric facial misters, and electric shoe buffers/polishers. This does not include the bathroom or dressing area equipment which may be in operation: lights, heaters, ventilators, sun lamps, heat lamps, air conditioners, and dehumidifiers. The popular use of these items, as well as the extravagant use of beauty products (which are petroleum products for the most part), is an indication of the lack of energy conservation awareness which currently prevails in the United States.

The simplest, most direct way to reduce the energy used for grooming is to limit the use of equipment which requires electricity. Another way to reduce energy consumption is to restrict the use of hot water. Also, a reduction in the quantity of petroleum products will indirectly save energy. The following are tips to aid in saving energy while grooming:

1. When no longer in use, equipment should be turned off, disconnected, and stored (out of reach of young children).

2. Electric equipment should be properly maintained. Check for faulty wiring, dials, thermostats, and seals. Keep equipment clean.

3. Use equipment only when necessary. For example, air dry hair when possible, brush your teeth "by hand", and polish your shoes "by hand".

4. Keep light fixtures clean.

5. Keep exhaust fans and ventilators clean.

6. Avoid overheating the bathroom. An exhaust fan may be used to remove excess heat and moisture from a bathroom more efficiently than an air-conditioner.

7. An electric shaver may be more energy conserving than shaving with a blade if a great deal of hot water is used, not to mention shaving cream.

Activity I-4

Objective:

The student will be able to recognize ways in which energy is consumed and may be conserved for bathing and grooming.

What to do:

1. Compare the water used for a bath and a shower. Fill your bathtub (at the temperature and depth you like best) and measure the depth with a yardstick (when you are out of the water). Record the depth: ________ inches. At your next bathing time, take a shower (in the same tub). Keep the drain closed during your shower, but be careful not to overflow the tub. (Do not rush your shower; take your time!.) This time record your bathing time as well as the water depth.

   Beginning Time ____________________ Ending Time ____________
   Duration of Shower __________________ Water Depth ______________

   If you took a short shower, it should have required only about half as much water as your bath.

2. Explore other ways to conserve energy while bathing.

3. Discuss these bathing practices with other members of your family. Who is the most conservative?

4. List five ways to conserve energy while grooming.

Sources

Personal Care

[1]John Muller, **The Potential for Energy Savings Through Reduction in Hot Water Consumption** (Washington, D.C.: Federal Energy Administration, 1975), p. 16.

[2]**Ibid.**, p. 5.

[3]**Ibid.**., p. 17.

[4]**Ibid.**, p. 19.

[5]FEA, **Tips for Energy Savers** (Pueblo, Colorado: Public Document Center, 1974), p. 18.

[6]Muller, p. 20.

[7]**Ibid.**, p. 19.

II. FOOD

Selection and Purchase

The American food industry depends on large quantities of energy to produce, process, transport, store, and prepare a large variety of foods.[1] As a result, advanced agricultural systems are running up an energy deficit. As the geographic distance from producer to consumer lengthens, the degree of processing increases, and energy is substituted for labor and natural soil fertility, the energy deficit increases.

In 1910, the energy content of food produced in the U.S. was slightly greater than the energy used to grow, process, and transport the food. In 1970, however, nine times as much energy was consumed by the food system than was contained in the food produced.[2] In other words, by the time the food reaches the consumer's plate, the total energy expended is many times that contained in the food being eaten. It is the processing, transportation, and distribution of the food that absorbs most of the energy. Therefore, it is wise to select food items carefully, as well as to store and prepare them efficiently.

The home preparation of food accounts for almost four percent of the total U.S. energy consumption. The major in-home energy consumption for food occurs in storage (refrigeration and freezing) and in preparation (ranges, ovens, and small appliances).[3]

The storage and preparation of food includes energy use by appliances both directly and indirectly. There is direct use of energy for refrigeration, cooking, and dishwashing. The indirect use of energy is for hot water, to maintain a comfortable room temperature where appliance are operating, and for manufacturing the appliances. Appliances and equipment account for 33 percent of the energy consumed in the home. The water heater, refrigerator, and range are the top energy users in the appliance category.[4]

Few people realize the extent of the indirect use of energy to produce food–energy consumed in the manufacture of food-related equipment, manufacture and transportation of fertilizer, pesticides, and herbicides; manufacture, maintenance, and operation of farm equipment. The longer the food chain, the more energy is consumed by the product. For example, beef cattle are more energy-intensive than vegetables, and man is more energy-intensive than cattle. In an energy conserving society, a conscious effort would be made to shift from animals raised on feed lots to animals raised on the range; from animal protein to vegetable protein; from meat, fish, poultry, eggs, milk, and cheese to soy products, wheat germ, dry beans, peas, and lentils.

The direct energy costs of preserving, packaging, and transporting food are the most obvious. Drying food to preserve it can require little energy, particularly if this is done by solar energy. Canning uses more energy than drying. Freezing requires even more energy, and energy must be continuously used during storage. To conserve energy, reduce the use of extensively processed foods. Of course, fresh foods eliminate the energy cost for preservation.

A major source of energy waste is in packaging: often more energy is embodied in the container than the food itself contains. One way to reduce this inefficiency is to cut down on disposable containers. Another is to purchase food in bulk. The most energy-intensive food items are in throw-away aluminum cans, plastic bottles, ready-to-heat frozen packages, and aerosol cans.

The packaging makes a great deal of difference; for example, twice as much energy is required to produce a 6-ounce aerosol spray can of cooking oil as an equal amount of bottled cooking oil.[5] The reuse of containers could yield dramatic energy savings. The Envrionmental Protection Agency estimates that if 90 percent of the market used returnable beverage containers, the equivalent of 92,000 barrels of oil per day would be saved.[6]

The greatest single inefficiency in the food system is in transportation of food from the market to the home.[7] The use of a two-ton vehicle–the family car–to transport 30 pounds of food several miles once a week is grossly inefficient. To conserve energy, shopping trips should be carefully planned. It is helpful to write menus for a few days or a week and then make a shopping list. Consult newspapers, radio, and television for bargains. Since freeway driving is nearly twice as economical as driving in heavy city traffic, shopping trips should be carefully combined with commuting trips.[8] Better yet, bike or walk to a store in your immediate area.

Activity II-1

Objective:

The student will be able to make enlightened food selections and practice wise planning, shopping, and buying techniques, fostering the conservation of energy.

What to do:

1. Each student will take a survery of all the trips made to the grocery store in a week, recording date, time, destination, mode of transportation and distance traveled. When survey is complete, the student will prepare a chart including all data. Then have students answer the following:

   a. Do you see possibilities for energy savings?

   b. Are there trips by car of less than half a mile in distance?

   c. Could several trips have been combined into one?

   d. Could shopping be done on the way to or from work or school?

   e. Could marketing have been done closer to home?

   f. Would carpooling for shopping with neighbors be a possibility?

   g. What recommendations would you make to your family for ways to conserve energy when marketing?

2. Discuss price ranges in a home made meal, a frozen meal, and a restaurant meal, providing all meals are well balanced.

3. Give students a limited amount of money. Have them plan a meal and shop for needed food, making sure they stay within the planned budget.

4. Give students a list of items that can be purchased at a supermarket. Divide into as

many groups as there are supermarkets in your area. Have students price the items, then compare the prices in class discussion.

5. Discuss ways of saving money by buying certain items in quantity.

Activity II-2

Objective:

The student will be able to identify energy-consuming steps in the food system and to speculate as to the different ways in which energy could be saved.

What to do:

1. Discuss with students the concept of the "three R" ways of conserving energy.

Re-fuse	-	Don't buy items in packaging that is not needed. Don't buy throw-away bottles and bi-metal cans. Don't buy plastic or styrofoam containers. Don't buy paper products except when made from recycled paper.
Re-use	-	Don't throw things out after you use them. Create a new use for them.
Re-cycle	-	Collect materials in your home and take them to a recycling center in your community, or start one. Cans, glass, paper and aluminum can all be recycled.

2. Have students review the 12 steps listed below for a frozen vegetable and determine which steps could be eliminated to save energy.

12. eat it
11. throw away pack
10. thaw it and cook it
9. take home — put in freezer
8. you drive to market to buy it
7. market keeps it frozen
6. refrigerated truck takes it to market
5. it is frozen
4. it is packaged
3. it is sliced by machine
2. transports it to a processing plant
1. someone else grows a vegetable

Have the students construct similar steps for a bag of potato chips and then make suggestions for steps which might be eliminated to save energy.

Teachers Notes:

This activity, after it has been completed, will serve as a most informative bulletin board idea.

3. Ask the students to plan menus for a day's meals which use the minimum amount of energy, taking into consideration that energy cost includes fertilizers and insecticides used to grow the food, farm equipment, transportation to market, processing, packaging, and preparation.

Teacher Notes:

Bring out the fact that foods without excessive packaging and those in returnable containers usually cost less. Follow this activity with a field trip to a supermarket to compare prices of foods in different kinds of containers. Stress that forming food cooperative groups to buy food in bulk or growing food yourself cuts down on the energy used as well as being cheaper and better for you.

Then have the students put these rules of conservation INTO ACTION. This could be a project with the students reporting on their experiences and reactions at the end.

Sources

Food Selection and Purchase

[1]Deborah Katz and Mary T. Goodwin. **Food: Where Nutrition, Politics, and Culture Meet** (Washington, D.C.: Center for Science in the Public Interest, 1976), p. 151.

[2]Lester R. Brown with Erik P. Eckholm, **By Bread Alone** (New York: Praeger Publishers, 1974), pp. 106-7.

[3]FEA, **Energy Use in the Food System** (Washington, D.C.: GPO, 1975), pp. IV-14.

[4]FEA, **Speaking of Energy** (Washington, D.C.: GPO, 1975), p. 2.

[5]**Energy and Food Wrapped Together**, Center for Science in the Public Interest Newsletter, Vol. 5, No. 2 (Summer, 1975), p. 2.

[6]Environmental Engineering News, XXXII, No. 7, (July 1975).

[7]Brown and Eckholm, p. 110.

[8]FEA, **Don't be Fuelish: Tips for the Motorist** (Washington D.C.: GPO, 1974), p. 4.

Food Preparation

All appliances utilized in the preparation of food require various amounts of energy. Energy can be saved by the proper selection, use, and maintenance of appliances and judicious preparation practices.

The major energy consumer for food preparation is the range, which ranks fourth after the heating/cooling system, water heater, and refrigerator in home energy consumption. Other appliances used for food preparation (blenders, broilers, toasters, coffeemakers) use very little energy compared to the range. Therefore, the range offers the greatest opportunity to conserve.

The first consideration is the selection of a range. Ranges are relatively efficient appliances. Surface units on electric ranges are about 75 percent efficient and approximately 55 percent of all food preparation is done on surface units.[1] Cooking inside the oven is generally a more efficient use of energy; since the heating is intermittent, much heat is retained within the oven walls and there is less convection loss.[2] Due to the necessity for oven ventilation for good baking results, oven efficiency could be increased only minimally. However, self-cleaning ovens, because of their additional insulation, require less energy to operate than standard ovens. Also, microwave ovens are quite efficient for cooking certain types of food. Although ranges do not now have energy consumption fact tags, they will be labeled in the near future just as air conditioners and refrigerators are. For the time being, the consumer must rely on reputable manufacturers and dealers when selecting cooking appliances.

In addition to the efficiency and quality of the unit, the consumer should consider its appropriateness for the family's lifestyle. The use of oversized units is very inefficient. Microwave ovens, toasters, coffeemakers, and other small appliances should be used when appropriate. There has been some question as to how much energy a microwave oven could save, and tests of efficiency are being done now. Consumer's Institute has found that microwaves offer the greatest energy savings in cooking small to medium quantities of concentrated foods such as meats, potatoes, desserts, and TV dinners[3], but their studies indicate some foods actually require more energy in a microwave oven than cooked conventionally. Some of the test results are given here.

Food Cooked in Microwave Oven	Energy Consumption
4 Baked Potatoes	60.7% less than ccm*
1 Frozen TV Dinner (11 1/2 oz.)	79.3% less than ccm
Casserole (4 1/2 cups)	58.4% less than ccm
Summer Squash (16 oz.)	58.4% *more* than ccm
Peas and Celery (3 1/2 cups)	46.1% *more* than ccm
Frozen Broccoli (10 oz.)	30.2% *more* than ccm

Gas range pilot lights have come under recent attack due to their energy consumption (1/3 to 1/2 of the total gas used by the range.)[4] However, in addition to providing a starter flame, pilot lights provide the safety shutoff system for the gas supply and a small amount of space heating in winter. Thus the issue isn't as simple as it might seem at first glance. For instance, if the gas were used to generate electricity, about two-thirds of its energy would be lost at the power plant alone.

*ccm - conventional cooking method

Appliance manufacturers are seeking to reduce the energy waste of pilot lights by using smaller flames. Also, electric ignition is currently available on at least some models produced by the majority of gas range manufacturers.

The key to the cost of operating cooking appliances is the way in which they are used. The consumer has the opportunity to exert a great deal of control over the energy consumption of the range, cooktop, or oven. First, cooking appliances should be used as they were intended:

1. Don't use the range for heating the kitchen. This wastes a lot of energy since the range is not an efficient space heater. It is also dangerous!

2. Don't use the oven as a dryer. It is not economical and it can start a fire.

3. When cooking only small quantities, it is usually more economical to use small appliances rather than the range top or large oven. Toasters, waffle irons, skillets, grills, popcorn poppers, fondue pots, bean pots, and coffeemakers use less energy for their specialized jobs than does the range. If you have both a small and large oven, use the small one whenever possible.

4. Preheating the oven is often unnecessary and may be a waste of energy. When preheating is required, or when baking time is only a few minutes, avoid preheating for longer than 10 minutes.[5] Use a timer as a reminder that the oven is heated. Surface units should not be preheated. Put pots and pans on the range top before the heat is turned on to avoid wasting heat.

5. Don't be an oven peeker. Every time the oven door is opened during operation, the oven temperature drops 25 to 50 degrees.[6] A range with an oven door window might be a good investment for the "peak-a-boo" cook.

6. If food must be kept warm for extended periods, store it in an oven set between 140 degrees F to 200 degrees F. (Caution: Food may become contaminated if kept warm at temperatures below 140 degrees F.[7]) A food warmer built into the range usually requires less energy than the oven or surface unit when used for keeping food heated. Foods, plates, and platters can be warmed with the stored heat remaining in an oven after baking with no additional energy use. A ceramic tile warmed while baking can be used to keep rolls hot during the meal instead of keeping the oven on or using an electric bun warmer.

7. Brown foods on medium high heat and then reduce to medium or low to finish cooking. This will reduce shrinkage and spattering and will consume less energy.

8. Use a timer with a loud bell to avoid overcooking and wasting energy.

9. Take advantage of the heat-sensing elements on gas and electric ranges to control the surface unit. It allows the unit to cut off the energy supply and coast occasionally while still cooking. Electric surface units can be shut off a short period (5 minutes or so) before the food is done. The food will continue to cook from stored energy.

10. Remember to turn off all units immediately after use. A

warning light or buzzer is helpful as a reminder. Establish the habit of turning off the range before removing the utensil.

11. When cooking on top of the range, a vent fan can exhaust heated air directly to the outside and ease the burden on the home's cooling system. But don't let it run needlessly.

The proper selection and use of cooking utensils can afford additional energy savings. The following considerations should be made:

1. Pots and pans should fit the surface unit. The bottom should cover the heating element but not extend more than an inch over the edge. This will help minimize the amount of heat loss to the air. If the pot or pan is too large for the surface unit, it will heat unevenly and heat will reflect down to the range top around the unit and eventually craze it.

2. To ensure minimal heat loss from the pot or pan, it should have a flat bottom, straight sides and a tightly fitting cover. Good utensils allow less heat to escape and lower heat settings to be used. A pressure cooker can cut time and energy even more.

3. Ceramic, glass, and stainless steel utensils retain heat better than other materials. When baking with these materials, the oven setting can be lowered 25 degrees.

4. Slightly lower temperatures can be selected when using teflon-lined utensils for frying or pan broiling on top of the range.

5. Use a tea kettle instead of a pan for heating or boiling water to avoid heat loss through steam.

6. Cover saucepans whenever possible. Food will cook faster and a lower temperature setting can be used. Be sure the lid fits tightly.

Care should be taken not to use energy for cooking appliances unnecessarily. Heating water and thawing foods are the most common causes for waste. The following tips can help avoid unnecessary energy use:

1. When heating or boiling large quantities of water, start with hot tap water where a major part of the heating has already been done more efficiently by the water heater.

2. Large amounts of water use more energy and lessen the nutritional value of foods. Use only enough water to make steam and avoid sticking when cooking vegetables. The water will heat faster and conserve energy. Remember to reduce the temperature to simmer as soon as steaming point is reached and use a pan with a tight lid. Vegetables will retain more vitamins and minerals and taste better.

3. Frozen foods require more energy than completely thawed foods whether cooked in the oven, under the broiler, or on top of the range. For example, a roast that has been defrosted requires 33 percent less cooking time than one that is still frozen.[8] However, exercise caution to avoid bacterial growth.

4. Broiling meat is faster and more efficient than other methods.

Energy-conscious cooks schedule and plan for the most efficient use of their appliances. Cooking several items at the same time and choosing cooking times carefully can conserve energy. The following are suggested ways in which cooking might be better planned and scheduled.

1. Sometimes it is more practical to cook several dishes at once instead of reheating the oven several times during the day. Two or three dishes can be baked with little more energy than one. For example, if three dishes are to be cooked at similar temperatures (325, 350, and 375) pick the average temperature (350) and cook all three, making a small allowance in cooking time. The oven (which is more efficient than the range top) can be used in this manner to prepare the entire meal.

2. Preparing multiple recipes for meals like spaghetti sauce, soups, and stews that take a long time to cook can save energy. Then refrigerate or freeze for future use.

3. By dividing a skillet with foil inserts, several dishes can be prepared simultaneously.

4. When baking or cooking foods with extended cooking times, try to avoid "peak hours" (8-11 a.m. and 4-8 p.m. are usually the peak hours.)[9] During peak hours, utility companies often use less efficient means to provide for the higher demand for electricity.

Proper maintenance of cooking appliances is also important, not only to conserve energy, but also for safety. Clean appliances work more efficiently, more safely, and certainly more hygienically. Proper inspection of equipment will help insure efficient operation. The following steps should be taken to maintain the efficiency of cooking appliances:

1. Keep heat reflection surfaces clean, especially the reflectors below the heating element on top of the range and the entire oven.

2. For the most efficient use of fuel, gas burners should have a steady blue flame. A yellow flame means it needs attention.

3. Make sure the pilot on a gas range is properly adjusted. It may be using more fuel than necessary.

4. Have faulty switches, burners, and thermostats fixed promptly and professionally. Check the oven thermostat every six months with a thermometer.

5. Make sure oven door seals are tight and not leaking heated air.

6. Air filters on exhaust fans must be cleaned periodically to work effectively and efficiently.

Activity II-3

Objective:

The student will be able to select, use, and maintain cooking appliances in order to efficiently conserve energy.

What to do:

Students will determine the energy consumption differences between a conventional and microwave oven. Compare the energy required to cook the following items: cake; tuna casserole; frozen TV dinner; frozen broccoli; and baked potatoes. To determine the energy used to cook each item, calculate the energy used in kilowatt-hours. This can be done by first determining the wattage of the cooking unit (listed on the appliance):

_______ for microwave oven (usually around 1,450 watts)

_______ for conventional oven (usually 12,200 watts)

Then determine the amount of time the unit operates to cook the food item. The operation time of the microwave oven will be easy to determine since it operates continuously and is usually equipped with a timer. The operation time of the conventional oven will be more difficult to determine since pre-heat time must be included, and a conventional oven does not operate continuously. A stop-watch will be needed to determine the operation time. You must time each interval that the oven is operating (most ovens are equipped with a light which indicates when the oven is operating) and add them to arrive at the total time of operation required to cook the food item.

Once the wattage and cooking times are determined, the energy use can be calculated. For example: if a cup of squash requires 30 minutes to cook in a 12,000 watt oven, it requires 6 kilowatt-hours of energy:

$$\underline{12{,}000}\text{ watts} \times \underline{30}\text{ minutes} \times \frac{1^*}{60{,}000} = 6\text{ kilowatt-hr.}$$

* (The conversion factor is $\frac{1}{60{,}000}$ since there are 1000 watts to a kilowatt and 60 minutes to an hour.)

CAKE (use the same recipe in each oven)
Conventional Oven:

$$\_\_\_\_\_\text{watts} \times \_\_\_\_\_\text{ minutes} \times \frac{1}{60{,}000} = \_\_\_\_\_\text{kilowatt-hr.}$$

Microwave Oven:

$$\_\_\_\_\_\text{watts} \times \_\_\_\_\_\text{ minutes} \times \frac{1}{60{,}000} = \_\_\_\_\_\text{kilowatt-hr.}$$

TUNA CASSEROLE
Conventional Oven:

$$\_\_\_\_\_\text{watts} \times \_\_\_\_\_\text{ minutes} \times \frac{1}{60{,}000} = \_\_\_\_\_\text{kilowatt-hr.}$$

Microwave Oven:

$$\_\_\_\_\_\text{watts} \times \_\_\_\_\_\text{ minutes} \times \frac{1}{60{,}000} = \_\_\_\_\_\text{kilowatt-hr.}$$

FROZEN TV DINNER:
Conventional Oven:

$\_\_\_\_\_\_$ watts x $\_\_\_\_\_\_$ minutes x $\frac{1}{60{,}000}$ = $\_\_\_\_\_\_$ kilowatt-hr.

Microwave Oven:

$\_\_\_\_\_\_$ watts x $\_\_\_\_\_\_$ minutes x $\frac{1}{60{,}000}$ = $\_\_\_\_\_\_$ kilowatt-hr.

FROZEN BROCCOLI
Conventional Oven:

$\_\_\_\_\_\_$ watts x $\_\_\_\_\_\_$ minutes x $\frac{1}{60{,}000}$ = $\_\_\_\_\_\_$ kilowatt-hr.

Microwave Oven:

$\_\_\_\_\_\_$ watts x $\_\_\_\_\_\_$ minutes x $\frac{1}{60{,}000}$ = $\_\_\_\_\_\_$ kilowatt-hr.

FOUR BAKED POTATOES
Conventional Oven:

$\_\_\_\_\_\_$ watts x $\_\_\_\_\_\_$ minutes x $\frac{1}{60{,}000}$ = $\_\_\_\_\_\_$ kilowatt-hr.

Microwave Oven:

$\_\_\_\_\_\_$ watts x $\_\_\_\_\_\_$ minutes x $\frac{1}{60{,}000}$ = $\_\_\_\_\_\_$ kilowatt-hr.

Tabulate your Results

Food Item	Energy Used By Conventional Oven	Energy Used By Microwave Oven
CAKE	_____ kilowatt-hr.	_____ kilowatt-hr.
TUNA CASSEROLE	_____ kilowatt-hr.	_____ kilowatt-hr.
TV DINNER	_____ kilowatt-hr.	_____ kilowatt-hr.
FROZEN BROCCOLI	_____ kilowatt-hr.	_____ kilowatt-hr.
BAKED POTATOES	_____ kilowatt-hr.	_____ kilowatt-hr.

Teacher Suggestions:

1. Remember that the quantities and types of foods cooked in the ovens must be the same to provide valid comparisons.

2. What would have been the effect on energy consumption if more than one food was cooked in the oven at once? Would this method of conserving energy be more effective for conventional or microwave ovens?

3. You may wish to choose different foods to test. If so, try to select a range of items from "dense" (such as meat) to "much less dense" (such as squash) to provide dramatic results.

4. A dramatic demonstration of the misuse of the microwave is to compare the time it takes to boil a quart of water, as opposed to boiling a quart of water on top of the range.

Activity II-4

Objective:

The student will be able to indicate the equivalent energy costs of different foods and how wise food choices can save energy.

What to do:

Review the items offered in the Menu on the following page and select your "first preferences" based strictly on likes and dislikes. Place checks beside those items in Column 1. Next, make selections from the menu on the basis of *least* energy consumption. Remember, the energy cost of a food includes: fertilizers and insecticides; equipment; transportation; processing, packaging, and preparation. Place a check by each "low energy" item selected in Column 2. Then refer to the Energy Price List for each item's Energy Cost. Indicate the "price" of each item you choose and determine your total bill. To discover how you might have saved energy, find the differences between the individual items in the two columns and enter those figures in Column 3. The differences will be losses or gains in costs. Add the total "pluses and minuses" in this column to find total energy savings. If you were to select items for Column 1 (preferences) again, would your choices be any different?

ENERGY MENU

APPETIZERS (CHOOSE ONE FROM EACH PAIR)	1 FIRST PREFERENCE	2 LEAST ENERGY	3 DIFFERENCES (+ or -)
Frozen Juice	___ $_____	___ $_____	___ $_____
Fresh Juice	___ _____	___ _____	___ _____
Crackers A (unwrapped, available to the cafeteria in bulk)	___ _____	___ _____	___ _____
Crackers B (wrapped individually, packed in small cartons	___ _____	___ _____	___ _____
	___ _____	___ _____	___ _____
Butter	___ _____	___ _____	___ _____
Margarine	___ _____	___ _____	___ _____

MAIN DISH (PLEASE MAKE A FIRST AND SECOND CHOICE AS WE DO NOT ALWAYS CARRY EACH ENTREE)

Luncheon Meat	______	______	______
Chicken	______	______	______
Turkey	______	______	______
Rice with Vegetables	______	______	______
Beef (grass-fed)	______	______	______
Beef (Grain-fed)	______	______	______

VEGETABLE (SORRY, TODAY WE HAVE ONLY CARROTS, BUT YOU MAY CHOOSE YOUR PREFERRED TYPE)

Fresh Carrots	______	______	______
Dehydrated Carrots	______	______	______
Frozen Carrots	______	______	______
Canned Carrots	______	______	______

DRINKS (PLEASE CHOOSE A FIRST AND SECOND CHOICE AS WE SOMETIMES RUN SHORT OF ONE KIND OF DRINK AT LUNCH)

Soft Drink (in aluminum can)	______	______	______
Soft Drink (in returnable glass bottle)	______	______	______
Milk	______	______	______
Beer (in aluminum can)	______	______	______
Beer (in returnable glass bottle)	______	______	______

DESSERT: CHOOSE ONE

Apples (homegrown in our cafeteria's own garden)	______	______	______
Apples (store-bought)	______	______	______
Walnuts (shelled)	______	______	______
Walnuts (unshelled)	______	______	______
Ice Cream	______	______	______

TOTAL BILL	____	____	____

ENERGY PRICES

(Prices are proportional to actual energy expenditure)

APPETIZERS:

Fresh Juice: 12¢
Frozen Juice: 46¢
(Freezing and processing use a great deal of energy, both initially and for storage)
Cracker A: 10¢
Cracker B: 15¢
(Food excessively packaged or only available in small packages is more energy-intensive than unwrapped foods or foods available in bulk)
Butter: 15¢
Margarine: 5¢

MAIN DISH:

Luncheon Meat:	$1.60
Chicken:	.96
Turkey:	1.06
Rice with Vegetables:	.45
Beef (grass-fed)	1.48
Beef (grain-fed)	2.08

(Animals are inefficient converters of protein. A pound of meat requires about four times the energy to produce and market as a pound of vegetable protein. Some animals are more efficient converters of protein than others.)

VEGETABLE:

Fresh Carrots: 12¢
Dehydrated Carrots: 92¢
Frozen Carrots: 31¢
Canned Carrots: 23¢
(Processed vegetables require more energy than fresh vegetables; freezing and dehydration especially large amounts of energy.)

DRINKS:

Soft Drink (aluminum can):	45¢
Soft Drink (returnable bottle):	31¢
Milk:	34¢
Beer (aluminum can):	50¢
Beer (returnable bottle):	25¢

DESSERT:

Homegrown apple:	3¢
Store-bought apple:	19¢

(Homegrown apple by commercial methods saves commerce and transport; organic methods would save more.)

Walnuts, shelled:	$1.04
Walnuts, unshelled:	39¢
Ice Cream:	60¢

(Large quantities of milk are used; freezing is necessary.)

Source: (adapted from) Energy Menu. **Food: Where Nutrition, Politics and Culture Meet** by Deborah Katz and Mary T. Goodwin

Activity II - 5

Objective:

The student will be able to determine the energy consumption of home appliances and equipment.

What to do:

1. Find the electrical "ratings" information on the back or bottom of the appliance or piece of equipment. You will see several numbers much like those shown below (from the base of a blender):

For Service
Specify No.
850-14A

Model 850
Series UL
Volts 120
Freq. 25-60 cycle
Watts 960 A.C. only JX

The key number is the *wattage* rating, 960 watts in the example above. The wattage is an indicator of the kilowatt-hours of energy used per hour of operation of the appliance. It requires 1 kilowatt-hour per hour of operation for 1000 watts. In the example above:

Appliance: *blender*

960 watts ÷ 1000 $\frac{\text{watts}}{\text{kilowatt-hour per hr. of operation}}$ = 0.96 kilowatt-hour

(Note: You can divide by 1000 by moving the decimal 3 digits to the left.) Now you try it.

Appliance: ____________________

__________ watts ÷ 1000 $\frac{\text{watts}}{\text{kilowatt-hour per hour of operation}}$ = __________ kilowatt-hr.

Appliance: ____________________

__________ watts ÷ 1000 watts / kwt-hr per hr of operation = ____________ kilowatt-hr.

Appliance: ____________________

__________ watts ÷ 1000 watts / kwt-hr per hr of operation = ____________ kilowatt-hr.

Using the table below you can see what the appliances you checked consume in equivalents of oil or coal.

ELECTRICAL APPLIANCE ENERGY TABLE

Appliance Wattage Rating	Kilowatt-Hours of Energy Used per Hour	Ounces of oil Burned per Hour	Ounces of coal Burned per Hour
10	0.01	0.1	0.13
25	0.025	0.25	0.33
40	0.04	0.4	0.5
60	0.06	0.6	0.8
100	0.1	1	1.33
150	0.15	1.5	2
200	0.2	2	2.66
300	0.3	3	4
500	0.5	5	6.66
750	0.75	7.5	10
1000	1	10	13.33
1500	1.5	15	20
2000	2	20	26.66
5000	5	50	66.66
10,000	10	100	133.33

Teacher Suggestions:

1. The teacher may use appliances in the home economics laboratory as examples.

2. Students may be assigned different equipment to insure a wide range and thorough investigation of household appliances.

3. Answers in terms of kilowatt-hours of energy required may be expanded to annual use by determining daily or weekly use and multiplying.

Sources

Food Preparation

[1]Jane Butel, Saving Electricity With Household Appliances, The Journal of Home Exonomics (November 1975). p. 21

[2]Phillip Steadman, Energy, Environment, and Building (New York: Cambridge University, 1975), p. 53.

[3]Butel, p. 22.

[4]The Energy Challenge, p. 17.

[5]Ibid.

[6]Ibid., p. 18.

[7]Horner.

[8]Ibid., p. 17.

[9]FEA, Speaking of Energy, p. 4.

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III. Housing

Energy Efficiency in the Home

There are many ways to save energy in the home; some cost money, but many are absolutely free. They all save the occupants fuel and money as well as keep them comfortable.[1] HUD estimates that each year American homes waste the equivalent of about 223 million barreis of oil which could be saved without sacrificing comfort. Energy can be saved by adding insulation to homes, by proper upkeep of homes and appliances, and by minor interior alterations.

Activity III-1

Objective:

The student will be able to recognize how to improve energy efficiency in the home.

What to do:

1. Use the residential energy checklist to search for energy waste and potentials for conservation.

2. Read and discuss various ways to conserve energy in the home in warm and cold weather.

3. Using current **Consumer Report,** have students do research on various heaters and air-conditioners. They should include their good points, bad points, and best brands to buy.

4. Discuss various preparations done to winterize the home.

RESIDENTIAL ENERGY CHECKLIST

House: The Shell	Yes	No
. Are plants properly located around the house to provide a break against wind and shade against unwanted sun?		
. Are drapes and furniture located so they do not obstruct heating, air-conditioning, or ventilation?		
. Are draperies insulated?		
. Do draperies fit snugly around the window?		
. Are exterior house doors closed quickly after use?		
. Are lights and appliances turned off after use?		
. Do you have storm windows and doors?		
. Are all doors and windows properly caulked and weatherstripped?		
. Are draperies and shades closed at night and on cloudy, windy days during the heating season?		
. Are draperies opened to admit sunlight on sunny days in the heating season?		
. Are draperies and shades closed on sunny days during the cooling season?		
. Is the attic ventilated?		
. Is the attic insultated to 6-8"?		
. Are the walls insulated?		
. Do floors exposed to unheated or cooled air have from 2 to 3-1/2" of insulation?		
. Is the fireplace damper closed when not in use?		
. Is the den, gameroom, or family room oriented to the south?		
. Is the house shaded from the western sun?		
. Does your home have window area equivalent to 10% or less of its square footage?		
. Is your home sealed from drafts? Is it free from cracks and holes?		

	Yes	No
. Does your home have fluorescent lighting where appropriate?		
. Does your home have wall-to-wall carpeting?		
. Do all windows have drapery, shades, blinds, shutters or other coverings?		

Environmental Control

. Are ducts, radiators or air-conditioners closed off in unused rooms or closets?

. Are hot water pipes insulated in unheated and uncooled spaces?

. Are air ducts insulated in unheated and uncooled spaces?

. Is the thermostat set at 65 degrees F or below during the heating season?

. Is the thermostat set at 78 degrees F or above during the cooling season?

. Are heating and cooling filters clean?

. Is the thermostat turned back at night?

. Are windows and doors tightly closed while mechanically heating or cooling?

. Is an attic fan used in the summer?

. Do thermostats indicate correct temperature settings?

. Is an outside air-conditioning unit located on the shady (north) side of the house?

. Is the water heater insulated?

. Is the water heater termperature setting set 140 degrees or less?

. Is the air-conditioning unit properly sized for your needs?

. Do you have a heat pump?

. Do you use natural ventilation as much as possible?

. Are radiators and other heating or cooling equipment clean and dust free?

. Is the water heater located in a heated space?

Housing Selection Yes No

- If you live in an apartment, is it an "inside" apartment?
- If you live in a mobile home, does it have a "skirt"?
- If you live in an older home, have its plumbing, wiring, insulation and chimneys been checked by "experts"?

Food

- Is the frost on the refrigerator and freezer less than 1/4 inch thick?
- Is the refrigerator set at 40 degrees F?
- Is the freezer set a 0 degrees F?
- Are gaskets around refrigerators and freezers tight?
- Is the oven used to bake more than one food at a time?
- Is the gasket around ovens tight?
- Are frozen foods thawed completely before cooking?
- Is the cooking range turned off immediately after use?
- Are dishes washed only when there is a full load?
- Are dishes allowed to air dry?
- Are appliances clean and dust free (particularly cooling coils)?
- Is the oven never used as a dryer or heater?
- Are flat bottom pots and pans used?
- Is a timer used to avoid over-cooking?
- Are pots covered during cooking?
- Is as little water as possible used during cooking?
- Is the heated dry cycle on the dishwater not used?

Clothing

- Does your family dress warmer in cool weather to avoid mechanical heating?

	Yes	No
. Does your family dress cooler in warm weather to avoid mechanical cooling?		
. Are clothes washed only when there is a full load?		
. When washing, is cold or warm water used when possible?		
. Are clothes line dried when possible?		
. Are most of your family's clothes wash-and-wear, permanent press to avoid dry cleaning and ironing?		
. Are clothing always rinsed with cold water?		
. Is the washer located near the water heater?		
. Is the dryer lint screen cleaned after each load?		
Personal Care		
. Do the members of your family take short showers or use only small amounts of water for tub baths?		
. Are all water faucets repaired and not leaking?		
. For washing, shaving, or make-up, is the lavatory filled rather than allowing water to run?		
Entertainment		
. Are entertainment devices turned off when not in use?		
. Do members of your family try to entertain themselves rather than rely on devices?		

- If you answered with 65 or more yes's you are truly an energy conserver and will make a good conservation advocate.
- If you answered with 55 to 65 yes's, you are energy conscious but lack will-power or drive.
- If you answered with 45 to 54 yes's, you are wasting energy but with minor changes could make a conserver.
- If you answered with 35 to 44 yes's, you are an energy waster and should make an all-out effort to reform!
- If you answered with less than 35 yes's, you are making an effort to waste energy and should consider the long range and immediate effects!!

5. Family Roles - The students may divide into groups to roleplay family situations which require reaching decisions based on energy conservation. For example: Should the family go on a vacation or buy a new car? Should the child go to camp or buy a 10-speed bike? Should Mr. Jones buy his wife a dishwasher or dryer for her birthday?

How could the family conserve energy?

How can the family eliminate unnecessary car trips which are a great part of the family life style and consumation of energy?

6. Following is a chart of annual KWH use for each of several home electricity consumers.

	Average KWH
Room air conditioner	935
Washer and dryer	1360
Cooking appliances	1500
Dishwasher	430
Freezer	1500
Lighting	1000
Refrigerator	1400
Color TV	525
B & W TV	360
Water heater	4000
Electric heat	13400
Miscellaneous	1205

Judging from the above figures, in which areas are the greatest savings possible? What are ways of saving in these areas? Which areas are the easiest and most convenient to cut back on? Which is most important in energy conservation - turning off lights or turning back the thermostat in a house with electric heat? Turning off the TV or cutting down on the use of hot water? Cooking or heating? Dishwasher or air conditioner? How can you help people to understand which are the top priority areas for conserving energy?

7. Have students contact your local electrical utility company and ask for the cost per KWH of electricity in your area. Assume that your home uses the amount of electricity in the above activity, and the rate per KWH stays the same. Compute the amount of money your family would save if you cut 10 percent off each of the uses.

Teacher Notes:

1. Distribute these checklists school-wide.

2. Try a before and after approach to using the checklist. Check before your conserving effort and after.

3. Survey students to see if their families are generally conservative or not.

Sources

Energy Efficiency in the Home

[1] Abt Associates, Inc., In the Bank . . Or Up the Chimney? A Dollars and Cents Guide to Energy-Saving Home Improvements(Washington: Government Printing Office, April 1975), p. i.

Insulation

Probably the single most important way to improve energy efficiency in the home is by adding insulation.[1] Most homes are underinsulated; some are not insulated at all! Walls, floors and ceilings should be insulated. Insulation can be easily added by the occupant in most cases. It is usually easiest and most effective to install insultation above the ceiling. Next easiest is under the floor. The most difficult place to add insulation is in walls. Furthermore, the addition of insulation is cost-effective; that is, it will more than pay for itself in energy savings. The following steps should be followed when insulating your home.

1. Determine how much insulation is desirable for the particular climatic region in which the home is located. This is most easily accomplished by asking the local utility company or the State Energy Office. Examples of CURRENTLY recommended minimum R-values are listed below:

	FHA Minimum Standards For Gas Heat	National Mineral Wool Assoc. For Oil Heating	TVA Electric Heating	Studies Based On Minimum Life Cost	Owens Corning
Ceilings	R-19	R-19 or R-22*	R-19	R-30	R-38
Walls	R-11	R-11 or R-13*	R-11	R-20	R-19
Floors over Unheated Space	——	R-11	R-11	R-20	R-22

*special situations

2. Translate the R-value into insulation thickness. As mentioned, insulating materials have differing abilities to reduce the transfer of heat. This is illustrated in the following table:

Insulation					
	Batts or Blankets		Loose Fill (Poured in)		
Material Thickness	Glass Fiber	Rock Wool	Glass Fiber	Rock Wool	Cellulose Fiber
1 inch	R-3.38	R-3.66	R-2.20	R-2.75	R-3.66
2 inches	R-6.76	R-7.32	R-4.40	R-5.50	R-7.32
3 inches	R-10.14	R-10.98	R-6.60	R-8.25	R-10.98
4 inches	R-13.52	R-14.64	R-8.80	R-11.0	R-14.64
5 inches	R-16.90	R-18.30	R-11.0	R-13.75	R-18.30
6 inches	R-20.28	R-21.96	R-13.20	R-16.50	R-21.96
7 inches	R-23.66	R-25.62	R-15.40	R-19.25	R-25.62
8 inches	R-27.04	R-29.28	R-17.60	R-22.0	R-29.28

Note: R-Value is marked on insulation.

3. Determine the level and type of EXISTING insulation, and translate into R-values. As an example, the following information has been determined for a home in Knoxville, Tennessee:

Location	Type of Existing Insulation	R-Value of Existing Insulation	R-Value Recommended for Location	Additional R-Value Needed
Ceiling	4" loose rock wool	11	30	19
Walls	2-1/2" fiberglass batt	8.45	20	11.55
Floor	none	——	20	20

4. Determine what additional insulation is needed using the format of the table above. In the previous example, the ceiling would require seven additional inches of loose rock wool; the floor would require six inches of fiberglass batt; and the walls could not be further insulated due to a lack of space. The additional insulation may be installed by the occupant or by a contractor.

Activity III-2

Objective:

The student will be able to determine if additional insulation is needed in a home.

What to do:

1. Distribute the sheet that follows on the proper location for insulation to the students. Have them then evaluate their homes as to the type of insulation and location of the insulation. If the evaluation shows that insulation is needed in some homes, take the class on a field trip to a supply store. On this trip the following questions can be investigated:

   What type of insulation is required for different parts of the homes?

How can it be installed, by yourself or a contractor?

What are the prices of the different types of insulation and how expensive will it be to make the homes energy efficient?

Teachers Notes:

1. Seek insulation from building supply stores, building contractors, and insulation suppliers.

2. Your local utility company may have an insulation display and demonstration which they would present at your school.

3. Be careful with fiberglass insulation – it is glass and can penetrate the skin, causing a great deal of irritation.

Proper Location of Insulation

1. Exterior walls. Areas sometimes overlooked are the walls between the living space and an unheated garage or storage room, dormer walls, and the portion of wall above the ceiling of an adjacent section of a split-level home. Pack insulation in narrow spaces between jambs and framing.

2. Ceilings with cold spaces above the dormer ceilings. An attic access panel can be insulated by stapling a piece of mineral wool blanket to its top.

3. Knee walls when attic space is finished as living quarters.

4. Between collar beams, leaving open space above for ventilation.

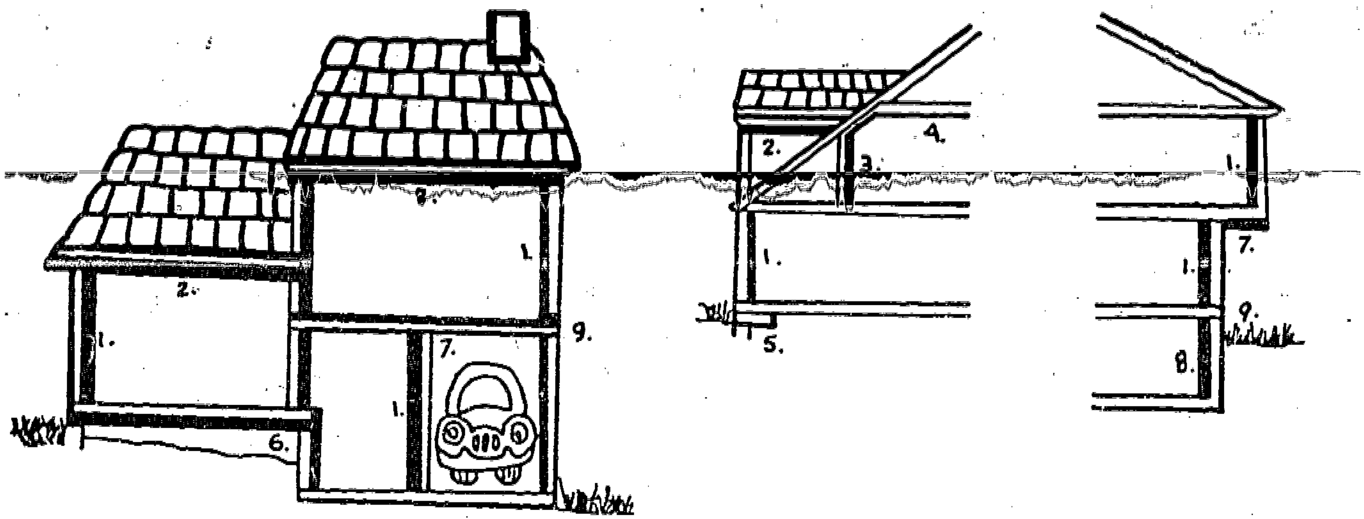
5. Around the perimeter of a slab on grade.

6. Floors above vented crawl spaces. When a crawl space is used as a plenum, insulation is applied to crawl space walls instead of the floor above.

7. Floors over an unheated or open space as over a garage or a porch. The cantilevered portion of a floor.

8. Basement walls when below-grade space is finished for living purposes. Mineral fiber sill sealer between sill and foundation provides an effective wind infiltration barrier.

9. In back of band or header joints.



Sources

Insulation

[1]Henry R. Spies et al., 350 Ways to Save Energy and Money in Your Home and Car (New York: Crown Publishers, Inc., 1974), p. 13.

Upkeep on the Home

It is not enough to start with an energy efficient home and sit back and relax. As the home ages, cracks and crevices form and infiltration increases; insulation tends to settle and degrade. Since the soiling process is a never-ending problem, filters must be changed, windows cleaned, and heating and cooling elements cleaned periodically. In addition, heating, ventilation, and air-conditioning (HVAC) systems, plumbing, and lighting must be maintained.

Every year or two the following steps should be taken to maintain a home's energy efficiency:

1. Check the interior and exterior of the home for cracks and crevices; fill or seal them.

2. Check the weatherstripping and caulking around windows, doors, and chimneys; repair if necessary.

3. Have the heating, ventilation, and cooling systems checked; adjust oil furnace burners at least once a year to avoid wasting fuel.

4. Paint interior and exterior if needed to seal small cracks.

5. Examine the chimney for cracks and deterioration; repair if necessary.

Each fall and spring:

1. Make sure furnace and air conditioning filters are clean. Dirty filters waste fuel and money and will shorten the life of the equipment. Filters should be checked every month if possible.

2. Clean windows to take advantage of solar radiation.

3. Dust radiators and baseboard units thoroughly; dust reduces the efficiency of a unit.

4. Check for water leaks or drips; hot water loss results in both an energy loss and a water loss.

Activity III-3

Objective:

The student will be able to recognize the upkeep practices required to maintain an energy efficient home.

What to do:

1. Discuss kinds of upkeep necessary to maintain housing:

   Checking insulation
   Replacing or repairing screens
   The use of storm windows
   Mending and replacing roofs, gutters, etc.

2. Use the following checklist to determine the condition or existence of weatherproofing at your house.

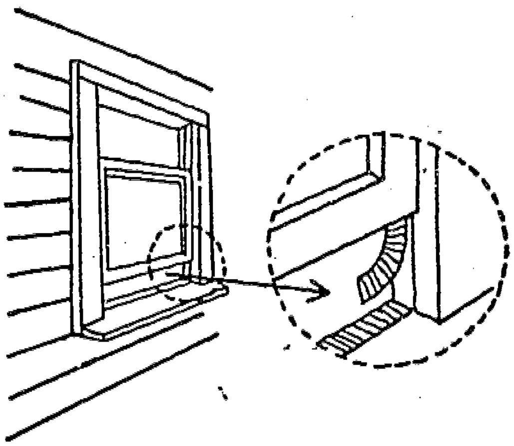
3. Compare rates of the family handyman and the professional service man in relation to home repair.

4. Compare different costs in various types of heating.

5. Assemble as many remodeling projects as possible into a bulletin board display. Include both small and large projects.

WEATHERPROOFING INVESTIGATION

To reduce the heating and cooling costs in a home, it is important to reduce air movement in or out of the home. The cheapest, most effective way to reduce infiltration is with weatherproofing: caulking, putty, or weatherstrips. Below you will see illustrations of several locations where infiltration is likely to occur. Refer to the illustrations and use the checklist to determine the condition or existence of weatherproofing at your house.



WEATHER PROOFING CHECKLIST

1. WINDOWS

   Check the circled areas of your windows.

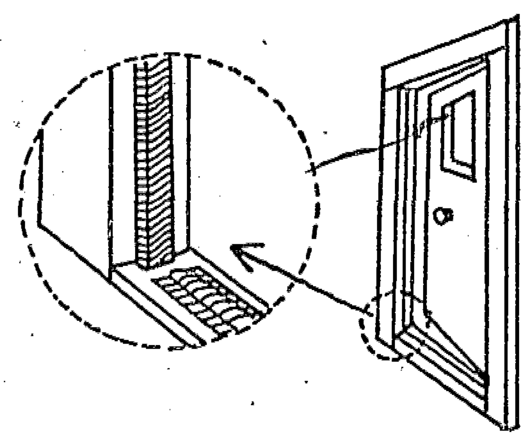
____ OKAY - Good, unbroken weatherstripping in all places with no drafts.

____ FAIR - Weatherstripping damaged or missing in some places and minor drafts.

____ POOR - No weatherstripping at all and very drafty.

2. DOORS

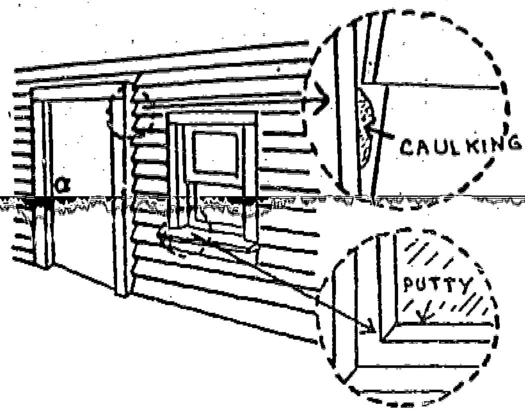
   Check the circled parts of the door.



____ OKAY - Good, unbroken weatherstripping with no drafts.

____ FAIR - Weatherstripping is missing or damaged in places with minor drafts.

____ POOR - No weatherstripping and very drafty.



3. AREA AROUND THE DOORS AND WINDOWS

Look at a typical door and window area and check the circled areas carefully.

____ OKAY - Caulking fills all cracks around the door frame and the putty around the window is unbroken and solid; no drafts.

____ FAIR - Putty and caulking are cracked or missing, causing minor drafts.

____ POOR - No caulking at all and the putty is in very poor condition, causing very bad drafts.

If you checked fair or poor for any of the three areas, then the weatherstripping, caulking, or putty needs to be replaced. If all areas are okay, then you don't need caulking, weatherstripping, or putty.

Upkeep on Appliances

Most people do not worry about the maintenance of appliances until they malfunction, yet great quantities of energy are being wasted each year by poorly maintained equipment. Several maintenance tips are listed below:

1. Each year open the hot water tank valves to draw off bottom water and sediment which has accumulated. (Sediment interferes with transfer of heat to the water.)

2. Defrost refrigerators and freezers regularly and check the gaskets for wear. (Close the door on a piece of paper. If it can be easily pulled out, it's time to adjust or replace the gasket.) Clean the condensing coils -- dust acts as a insulator that reduces efficiency.

3. Clean the clothes dryer lint filter after each load.

4. Clean the dishwasher screen often.

5. Clean the kitchen and bathroom exhasut fan filters often.

6. Keep appliances clean; dust, food, and cleanser build-up interfere with efficiency.

7. Check oven door gaskets for wear.

Activity III-4

Objective:

The student will be able to recognize the upkeep practices required to maintain appliance efficiency.

What to do:

1. Few people realize how many appliances they have, and certainly don't realize how much energy they consume. Following you will find an audit form you can use to record information on the appliances in your home. The audit provides a listing of the most common items as well as their annual energy consumption; it also provides a check for maintenance or condition of the item. Record all the items in your home, check their condition, and then tally the annual consumption rates. Use the cost per kilowatt-hour in your area to determine the annual cost of the appliances in your home. Make recommendations for the maintenance of items from your checklist.

2. Does your clothes dryer waste energy?

   Put a load of wet clothes in the dryer. After 15 minutes, open the dryer door, wait for the drum to stop turning and feel the clothes. They will still be damp. Close the door and restart the dryer.

   Do this again every five minutes until the clothes feel dry to the touch. Look at the time and see how much longer the dryer was set to run. If your dryer is electric, you can figure that every wasted minute burned up about four-fifthes of an ounce of oil (or one ounce of coal) back at the power company. If your dryer runs on gas, figure that every wasted minute burns about 1/10 cubic feet of gas.

   Here are two other energy-saving tips for dryers:

   Make sure that the lint filter is cleaned out every time the dryer is used! Don't dry "half loads" - fill up the machine before using it.

3. You will need a thermometer for this experiment that will register as low as 30 degrees. Put your thermometer inside the refrigerator, close the door and wait about fifteen minutes for the thermometer to reach the inside temperature. Open the door, and working as quickly as you can, read the inside temperature. It will probably be about 40 degrees Fahrenheit.

   Then unplug the refrigerator's power cord from the wall outlet. Make sure that no one opens the door for exactly fifteen minutes. Finally, open the door and take a temperature reading.

   Plug the refrigerator back in (its motor will probably come back on) and wait another fifteen minutes with thermometer inside. Read the thermometer again and repeat the experiment, with one difference, every five minutes open the door for about 30 seconds. Now when you check the thermometer after fifteen minutes what do you find?

What energy-saving tip can you learn from this experiment? Another energy-saving tip: Vacuum the coils on the back of your refrigerator every three months or so for more efficient use of energy.

4. Walk through your home with pencil and paper and see if your lights are in order!

   a. Are bulbs and lampshades free of dust and dirt that block light transmission? Dirty bulbs and shades waste the light produced inside the bulbs, and you may turn on two lights when only one is needed.

   b. Are lampshades translucent (so light can pass through them) rather than solid? Why produce light and then block it with a solid lampshade?

   c. Are ceilings and walls light-colored so they reflect more light?

   d. Does everyone turn off lights when leaving a room? It does not take a lot of energy to start a light bulb, so you are better off turning lights off when they are unnecessary, even it it is for a few seconds

Report findings to the class and have a comparative study between homes where there are more family members than others.

APPLIANCE AUDIT FORM

ITEM	EST. KWH CONSUMED ANNUALLY	QUANTITY	TOTAL EST. KWH CONSUMED ANNUALLY	GOOD CONDITION	DIRTY	BAD FILTER	BAD GASKET	THERMOSTAT PROBLEM	NEEDS DEFROSTING	NEEDS REPAIR	OTHER
Example											
[illegible]	[illegible]										
[illegible]	[illegible]										
[illegible] (Room)	[illegible]										
Bed Covering	[illegible]										
Blender	[illegible]										
Broiler	100										
[illegible]	[illegible]										
Clothes Dryer	[illegible]										
Coffee Maker	106										
Deep Fryer	83										
Dehumidifier	[illegible]										
Dishwasher	[illegible]										
Egg Cooker	[illegible]										
Fan (Attic)	[illegible]										
Fan (Circulating)	43										
Fan (Rollaway)	138										
Fan (Window)	[illegible]										
Freezer (15 [illegible])	[illegible]										
Freezer (15 [illegible]) frostless	[illegible]										
Frying Pan	[illegible]										
Germicidal Lamp	[illegible]										
Hair Dryer	[illegible]										
[illegible]											
Heating Pad											
Heat Pad	[illegible]										
Hot Plate	[illegible]										
Humidifier	163										
Iron (Hand)	144										
Mixer	13										
[illegible]	[illegible]										
[illegible]	[illegible]										
[illegible]	[illegible]										

APPLIANCE AUDIT FORM (CONT'D)

ITEM	EST. KWH CONSUMED ANNUALLY	QUANTITY	TOTAL EST. KWH CONSUMED ANNUALLY	GOOD CONDITION	DIRTY	BAD FILTER	BAD GASKET	THERMOSTAT PROBLEM	NEEDS DEFROSTING	NEEDS REPAIR	OTHER
Range											
with oven	1175										
with self-cleaning oven	1205										
[illegible] cu. ft.	728										
Refrigerator 12 cu. ft. frostless	1217										
Ref./Freezer 14 cu. ft.	1136										
Ref./Freezer 14 cu. ft. frostless	1829										
Roaster	205										
Sandwich grill	33										
Shaver	1.8										
Sun Lamp	16										
Television											
black & white tube type	350										
black & white solid state	120										
color tube type	660										
color solid state	440										
Toaster	39										
Tooth Brush	0.5										
Trash Compactor	50										
Vibrator	2										
Waffle Iron	22										
Washing Machine automatic	103										
Washing Machine non-automatic	76										
Waste Disposer	30										
Water Heater 2475 watt	4219										
Water Heater 4474 watt	4811										

TOTAL CONSUMPTION

________ x $________ = $________
total no. kwh consumed   cost per kwh

How could your family conserve on their appliance energy cost?

Interior Alterations

Interior furnishings and structure should not interfere with or reduce the efficiency of the heating and cooling equipment or the shell of the home as an insulator. In fact, the interior treatments should enhance the energy efficiency of the home.

To avoid reduced efficiency, the following items should be considered in the home:

1. Heating and cooling registers should not be blocked by furnishings.
2. Window coverings should permit opening and closing to utilize solar radiation.
3. Thermostats should not be covered, blocked, or exposed to direct sunlight.
4. Avoid dark interiors which require more artificial lighting.
5. Caulk and seal cracks and crevices at wall, floor, ceiling, tile, and cabinet joints to reduce infiltration.
6. Avoid interior partitioning; walls, furniture, hangings, or cabinets interfere with air circulation. This creates uneven heating and cooling and places a strain on the equipment.
7. Avoid placing refrigerators and freezers in areas where they may be inadequate for circulation of air (corners, closets, cul-de-sacs). These units need good air circulation around their heat exchangers in order to operate efficiently.

To enhance the energy efficiency of a home, the following suggestions are given for alterations:

1. Insulate with drapery or window treatments.
2. Apply vinyl wallcovering inside exterior walls to reduce infiltration.
3. Remove obstructions to air circulation.
4. Install wall-to-wall carpeting for added insulation.
5. Place storage units against exterior walls.
6. When remodeling, place cabinetry, closets, and seldom-used spaces on exterior walls.
7. Replace incandescent lighting with fluorescent lighting where possible.
8. Use light-colored furnishings and finishes where practical.

Activity III-5

Objective:

The student will be able to recognize interior treatments which interfere with the heating and cooling of the home, and how they might be avoided or alleviated.

What to do:

1. Survey your home to see what can be done to enhance the energy efficiency. Follow through with as many necessary alterations as feasible, after having consulted your parents and other family members.