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EC78-2051 The Effective Detective : Finding Energy Savings at Home

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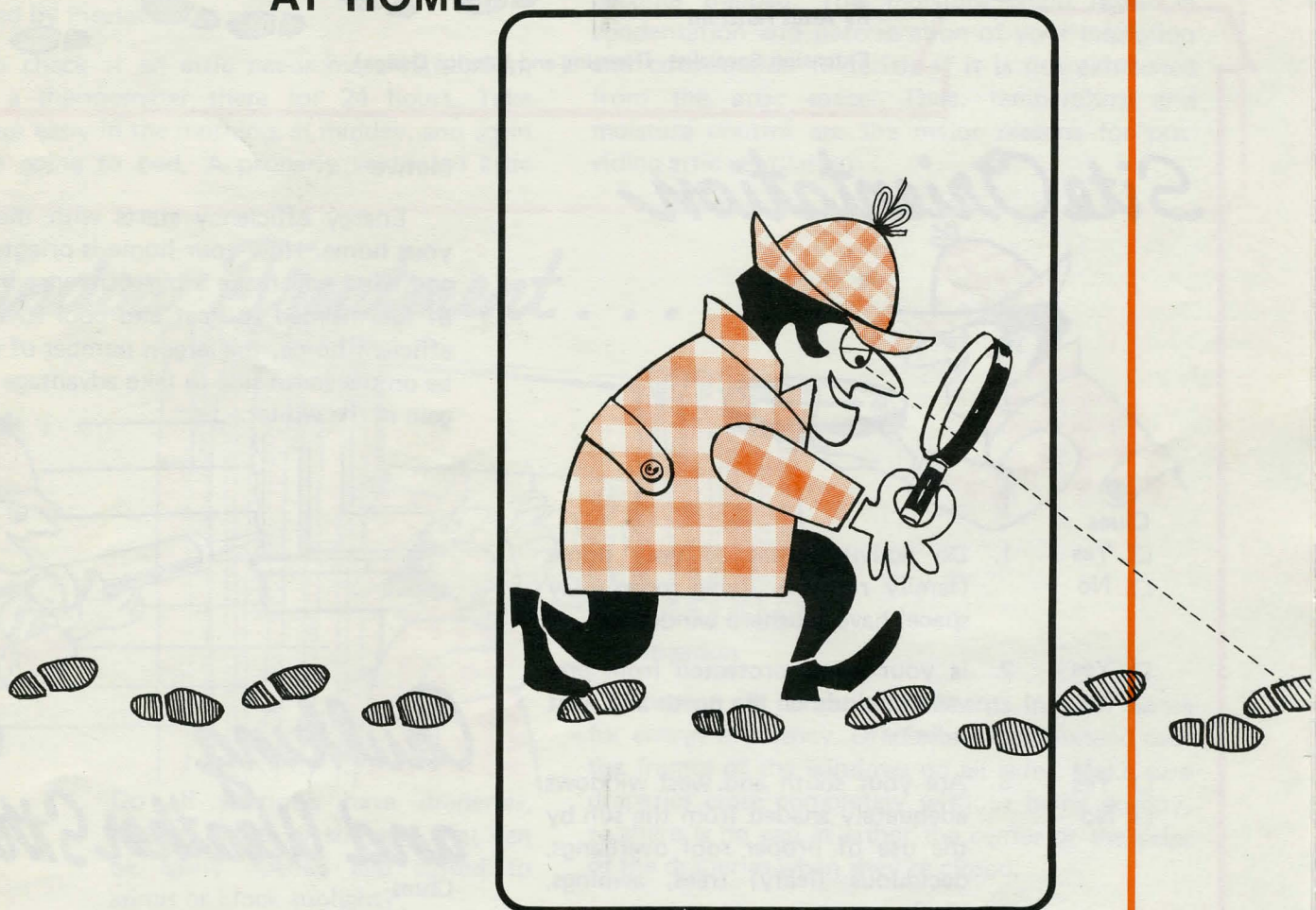
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EC 78-2051

The Effective Detective

FINDING ENERGY SAVINGS AT HOME



EXTENSION WORK IN "AGRICULTURE, HOME ECONOMICS AND SUBJECTS RELATING THERETO,"
THE COOPERATIVE EXTENSION SERVICE, INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES,
UNIVERSITY OF NEBRASKA-LINCOLN, COOPERATING WITH THE COUNTIES AND THE U.S. DEPARTMENT OF AGRICULTURE
LEO E. LUCAS, DIRECTOR

The Effective Detective

FINDING ENERGY SAVINGS AT HOME



By Ardis Hutchins

Extension Specialist (Housing and Interior Design)

Facts of the case:

Did you know that in Nebraska, homes represent the largest area of energy use? Currently, figures show that 25 percent of Nebraska's energy consumption is residential. If you are like most Nebraskans, you're concerned about the increasing cost of energy in and around your home.

Most homeowners pay higher-than-necessary fuel bills because their house does not use energy efficiently.

This energy inventory is designed to help you systematically search for sources of energy waste and savings in areas of your home where you use the most energy. Over two-thirds of your energy use is for heating and cooling. By evaluating three key areas of your home and making the necessary

Site Orientation



Clues

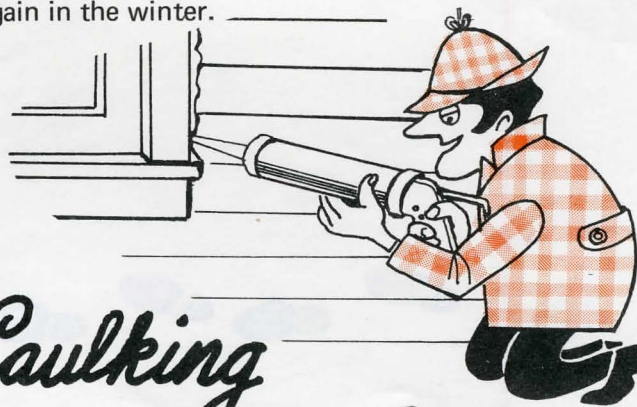
- ☐ Yes 1. Do activity areas of your home (family room or living room, play space) have southern windows?
- ☐ No
- ☐ Yes 2. Is your home protected from prevailing winds on the north and west sides?
- ☐ No
- ☐ Yes 3. Are your south and west windows adequately shaded from the sun by the use of proper roof overhangs, deciduous (leafy) trees, awnings, etc.?
- ☐ No

Investigation

Determine which direction each side of your home faces. If in doubt, use a compass. Investigate the south, east and west sides of your home and determine if the windows are adequately shaded during the summer and exposed during the winter months.

Motive

Energy efficiency starts with the location of your home. How your home is oriented to the sun and wind will make a big difference in the amount of fuel needed to heat and cool it. In an energy-efficient home, the largest number of windows will be on the south side to take advantage of solar heat gain in the winter.



Caulking and Weather Stripping

Clues

- ☐ Yes 1. Have all your windows been caulked and weather stripped within the last 5 years?
- ☐ No
- ☐ Yes 2. Are your doors adequately weather stripped on top, sides and bottom?
- ☐ No
- ☐ Yes 3. Is there caulking on the seam where the walls meet the foundation and where the chimney and walls meet?
- ☐ No

home improvements: 1) caulking and weather stripping, 2) storm windows and doors, and 3) attic insulation, you can cut your energy use dramatically.

By following the step-by-step instructions given here, you'll be able to determine how your home rates in terms of energy efficiency. You'll also have an idea of specific home improvements you can make to reduce your energy use.

It will take some time to be an "effective energy detective," but it will pay off in permanent savings. So get your tools—flashlight, compass, metal tape measure, candle, pad and pencil and gloves. Now you're ready to be an "Effective Detective" and find energy savings in your home.



Investigation

On the outside of the home look for cracks around window and door frames, sills and joints. Also, check the putty around window panes and repair if cracked or worn away.

Check all outside doors including openings to unheated areas (such as attic and basement). Open and close the door. If a tight seal exists, you should feel some resistance when the door is opened or closed. Another test is to insert a piece of paper between the door and door frame. Then close the door and pull out the paper. If it pulls out easily, there are air leaks around your door. Try this on top, sides, and bottom of each door.

On the inside, check all windows for signs of air infiltration. To test, hold a lighted candle by the window. If the flame flickers, you have found an air leak. *Caution: for safety, pull back draperies from the area.*

Motive

To reduce the heating and cooling costs in a home, it is important to reduce air movement in or out of the home.

Air leaks or infiltration account for most of a home's heat loss. Caulking and weather stripping are the most cost effective, yet least expensive means of stopping leaks. This usually is an annual do-it-yourself project.

Storm windows & doors

Clues

- ☐ Yes 1. Do you have storm windows or plastic sheeting on the majority of your windows?
- ☐ No
- ☐ Yes 2. Do you have storm doors on all entrances leading into heated areas of your home?
- ☐ No

Investigation

Check each storm window and door for broken panes or cracked glass. If you have combination screen and storm windows, make sure the glass is lowered during the heating season.

Motive

A storm window or door works by trapping a layer of dead air between itself and the inside window or door. Double pane windows operate under this same principle; however, in the Nebraska climate, it is recommended that storm windows and doors be used along with double panes for greatest energy efficiency.

Insulation....

Clues

- ☐ Yes 1. Does the depth of your attic insulation total R-33 (approximately 10 inches [255 cm] or more)?
- ☐ No
- ☐ Yes 2. Do you have insulation in your side walls?
- ☐ No
- ☐ Yes 3. Is insulation properly installed with vapor barrier placed next to the living area or against the warm side of wall, ceiling or floor?
- ☐ No
- ☐ Yes 4. Are heating ducts and water or steam pipes that pass through unheated areas (attics, crawl space and basements) insulated?
- ☐ No

doors...



Investigation

To get an estimate of the R-value of your attic insulation, measure the depth of insulation between ceiling joists. For this exercise, you will need flashlight, ruler and gloves.

Common Insulating Materials Found in Attic

Cellulose	R = 3.7 per inch (2.5 cm) thickness
Mineral Wool	R = 3.0 per inch (2.5 cm) thickness
Fiberglass	R = 2.5 per inch (2.5 cm) thickness
Vermiculite	R = 2.2 per inch (2.5 cm) thickness

Multiply the R-value per inch (2.5 cm) times the number of inches to get the existing R-values.

To see if your side walls are insulated, turn off the electricity and remove the plate cover from an electrical outlet on an exterior wall. By shining a flashlight into the hole, you may be able to see whether or not insulation is there. If there is any insulation, generally it is not feasible or economical to add more.

Another means of checking for sidewall insulation, is to place a thermometer against the inside surface of an exterior wall and another in the center of the room. Wait 10 to 15 minutes then record the two readings. A difference of 5° (3°C) or more indicates a wall that is not adequately insulated.

When checking the insulation in attic walls, look for a vapor barrier and how it is installed. Vapor barriers should be used on the warm side of all exposed walls, ceilings and floors.

Check for insulation or duct tape on heating ducts and water pipes.



Motive

Basically there are two principles involved in understanding the need for insulation.

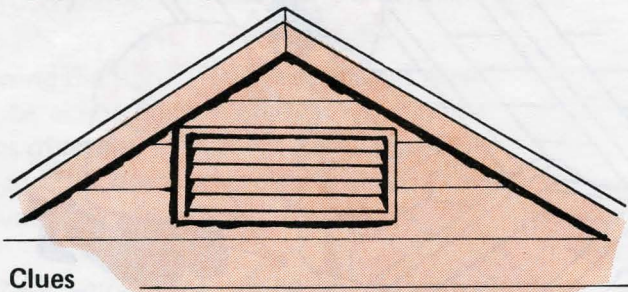
- 1) Warm air moves to cool air
- 2) Warm air rises

Insulation is any material that reduces the passage of heat, and the effectiveness of insulation is measured in R-values. "R" stands for the insulating material's ability to resist the flow of heat.

The higher the R-value, the more effective the insulating material. Therefore, when purchasing insulation, always buy according to the R-value, not by thickness. In Nebraska, an R-value of 33 is recommended in the attic. Walls should have an R-value of 20, which is usually hard to achieve except in new construction. The recommended R-value for a floor over an unheated area is R-22.

A vapor barrier restricts the passage of moisture through walls and ceilings and is a necessity for properly installed insulation. Vapor barriers can be a part of the insulation or a separate film. Commonly used materials include Kraft-backed aluminum foil and a 4-mil plastic sheeting. Oil base paints or vinyl wallpaper are often used in houses which did not have other vapor barriers installed during their construction.

Ventilation . . .



Clues

- ☐ Yes 1. Do you have an attic fan or vents in both the gables and eaves?
- ☐ No

Investigation

Check attic ventilation. Make sure vents are not blocked by insulation.

To check if an attic needs more ventilation, place a thermometer there for 24 hours. Take readings early in the morning, at midday, and again before going to bed. A properly ventilated attic

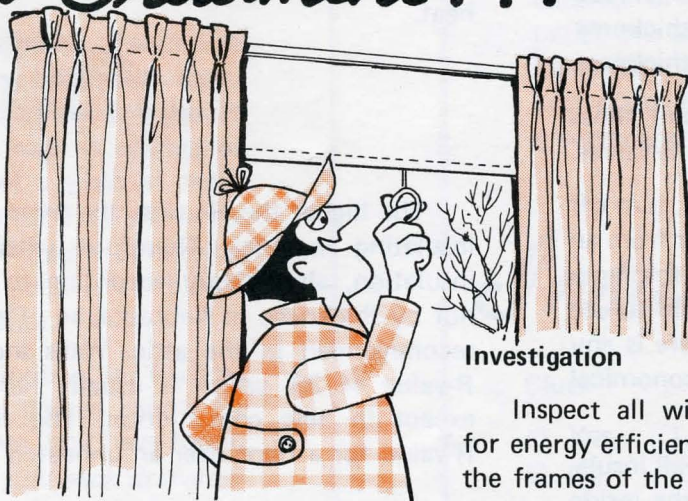
should have temperatures similar to those outside. When taking this temperature during hot summer months, be sure to use a thermometer with a range of at least 150 to 160 degrees (66° C - 71° C).

Motive

Ventilation of residential attic space is important for two reasons.

During the summer, excess heat can build up in the attic space, resulting in high energy costs for cooling. During the winter, moisture produced within the home may move into the attic space and become trapped. This moisture could result in condensation and deterioration of your insulation and construction materials if it is not exhausted from the attic space. Thus, temperature and moisture control are the major reasons for providing attic ventilation.

Window Treatment . . .



Clues

- ☐ Yes 1. Do all windows have draperies, shades, blinds or shutters that can be easily opened and closed to admit or block sunlight?
- ☐ No
- ☐ Yes 2. Have draperies and other window treatments been installed for energy efficiency? (close fit, closed-top cornices, overlays, returns, etc.)
- ☐ No
- ☐ Yes 3. Do your draperies serve as good insulators? (lined draperies, closely woven fabric, insulated liners, etc.)
- ☐ No

Investigation

Inspect all window treatments in your home for energy efficiency. Draperies should extend over the frames of the windows on all sides. Make sure draperies close completely without being skimpy, so there is no gap at either the center or the sides of the draperies when they're closed.

Check to see if drapery fabrics are closely woven by holding them up to the light. If you see light through it, it isn't closely woven.

Motive

For energy efficiency, a flexible window treatment is necessary to allow solar heat gain in the winter and avoid heat build-up in the summer.

During the winter, the greatest heat loss in a home occurs at night. Closed draperies can effectively reduce this heat loss.

If draperies and other window treatments are to act as a means of insulation, they must trap some air between the room and the window. It is the dead air space that does the insulating job. For greatest energy efficiency, drapery fabrics should be closely woven and also lined with another very

closely woven fabric.

Other window coverings can boost the efficiency of your window treatments. An opaque pull shade hung inside the frame of the window can reduce heat loss in the winter and block out heat gain during the summer. Insulated shutters made from rigid insulation and plywood have been shown to be very energy efficient window treatment.

Your Home Energy Rating . . .



If you've answered with **12 or more "yeses,"** your home has many energy-saving features and is basically an energy-efficient home.

If you've answered with **9 to 11 "yeses,"** your home is wasting energy, but with a few minor improvements, it can become more energy efficient.

If you've answered with **6 to 8 "yeses,"** your home is wasting energy. Make an all-out effort to implement some energy-saving steps soon.

If you answered with **less than 5 "yeses,"** reach for your tool box immediately. Your home is losing energy and costing you money. Make some necessary changes now.

Help solve the problem . . .

It's important to remember that we can substantially reduce the amount of energy our homes use today without drastically changing our lifestyles. All the energy-saving measures mentioned in this publication will pay for themselves over time and increase the value of your home.

By making three key home improvements 1) caulking and weather stripping, 2) storm windows and doors, 3) attic insulation, you can greatly cut your energy usage.

. Weather stripping and caulking alone can lower your energy consumption by as much as 10 percent. This is your easiest and most economical first step in making your home more energy efficient.

. Probably the next most valuable thing to do with your house is to add storm windows and doors if you don't already have them.

. Installing insulation if the home has none is extremely important. However, adding insulation to an existing home is not always economically feasible and has a longer payback period than the first two steps.

In this publication, the "Effective Detective" has helped uncover clues to saving energy in and around the home. Solving the energy problems in *your* home is now up to you.

For additional energy-saving information, contact your local county extension office or the Nebraska Energy Office, 4th floor State Office Building, 301 South Centennial Mall, Lincoln, NE 68509.

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