

# Analyzing Energy Audit Data

One of the best ways to reduce the amount of energy we consume is to reduce waste and inefficiency. A good place to start cutting waste is in the home. Increased energy efficiency saves money and conserves fossil fuels, a resource that is in limited supply.

There are many causes of energy inefficiency. Leaky doors and windows are two examples; they let in a lot of cold air in the winter and a lot of warm air in the summer, causing your heating and cooling systems to work harder. Fortunately, such waste can easily be reduced. Weather stripping in the gaps around windows and doors cuts down on the heat loss. Covering windows (which transmit heat much faster than walls or doors) with heavy drapes during very hot or cold weather is another easy, relatively inexpensive way to reduce energy loss.

Many utility companies offer energy audits to their customers. During an energy audit, a house is inspected and evaluated to determine how its energy efficiency can be improved. In this activity, you will conduct an energy audit of your own home or that of a friend. For the sake of safety, work with a partner and follow the procedure carefully.

## OBJECTIVES

**Make observations** about specific features on the inside and outside of the home.

**Identify** potential areas of energy loss in and around the home.

**Plan** ways to make changes in and around the home that would result in increased energy efficiency.

## MATERIALS

- clothes hanger
- clothespin
- flashlight
- metric ruler
- plastic wrap (or tissue paper)



## Procedure

1. Secure permission to carry out the audit from the adult responsible for the home you are checking.
2. Carefully read the energy audit checklist provided. You will use it to carry out the audit. Make sure you understand each item on the list and have a plan for evaluating each item.

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3. Make a draft gauge by attaching a long, thin piece of plastic wrap (or light tissue paper) to a clothes hanger with clothespins. To use the gauge, place it next to the door, window, or fixture to be tested. The wrap or tissue paper will be ruffled by any draft.
4. Carry out the audit with an adult present. Do not touch any electrical wiring.
5. Consider the effectiveness of the insulation in this home. The effectiveness of an insulating material is measured by its R-value, which indicates its resistance to the transfer of heat. The higher the R-value, the better insulator a material is. **CAUTION: Do not enter an attic without the supervision of an adult. In most cases, you can measure the insulation in an attic by leaning in rather than actually going inside.**
6. Answer the following questions about this home's insulation:  
What type of insulation is in the floor and ceiling of the attic?

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How thick is the insulation in the floor of the attic? in the ceiling?

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Based on the table, calculate the R-value of the attic's insulation.

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What could you do to improve the R-value of the attic's insulation?

<b>R-Values of Some Common Materials (per cm of thickness)</b>		
<b>Material</b>	<b>Blankets, boards, or solid</b>	<b>Loose fill (poured in)</b>
Brick or concrete	0.0	—
Gypsum board (sheetrock)	0.24	—
Wood	0.48	—
Fiberglass	1.15	0.87
Rock wool	1.42	1.08
Cellulose fiber	—	1.42
Extruded polystyrene	1.9	—

**Analysis**

1. **Analyzing Data** Based on your audits, what improvements in energy efficiency could be made that would be relatively inexpensive but could result in significant savings?

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**Analyzing Energy Audit Data** *continued*

<b>ENERGY AUDIT CHECKLIST</b>							
<b>Exterior features</b>	<b>Y</b>	<b>N</b>	<b>S</b>	<b>Y=yes, N=no, S=somewhat</b>	<b>Y</b>	<b>N</b>	<b>S</b>
The outside of the house is in good condition, without cracks or holes.				South- and west-facing windows are shaded by overhangs or trees in the summer.			
The roof is in good condition, without cracks or holes.				There are bushes, trees, or structures on the north side of the house to serve as winter wind breaks.			
South-facing windows receive lots of winter sunlight.				Cellar doors and windows (if any) close tightly and do not leak. (Test each with your draft gauge.)			
<b>Windows and doors</b>							
Storm windows in good condition are available for all windows and are used in winter.				North-facing windows have insulated curtains to prevent heat loss in winter.			
Windows fit snugly in their frames and do not admit drafts. (Test each with your draft gauge on a windy day.)				Windows have weatherstripping and do not admit drafts. (Test for drafts with your draft gauge.)			
South- and west-facing windows have shades, curtains, or blinds to keep out summer sun.				Exterior doors are well sealed and have weather stripping at the sides and bottom. (Test for drafts with your draft gauge.)			
<b>Walls, floors, ceilings, attics</b>							
All exterior walls have insulation.				Walls are free of cracks or holes.			
Exterior wall openings such as switches, electrical outlets, and plumbing fixtures do not admit drafts. (Test with your draft gauge.)				The floor and ceiling of the attic are well insulated.			
Ceiling of (unheated) basement is well insulated.				The attic is well ventilated (for summer cooling).			
<b>In the kitchen</b>							
The rubber seal around the refrigerator door is in good condition, not cracked or broken. The refrigerator exterior is not cold to the touch.				The faucet, especially the hot water faucet, does not drip.			
The stove, if gas-powered, has pilotless ignition.				The exhaust fan does not admit a draft. (Test with your draft gauge.)			
<b>Miscellaneous</b>							
The water heater is well insulated. (If it is well insulated, it will not be hot to the touch.)				Pipes carrying hot water from the water heater are insulated.			
The basement, if heated, is well sealed and insulated; its walls contain no cracks or holes.				All bathrooms are equipped with low-flow shower heads. (These use less than 8 L of water per minute. Test to find out.)			
All faucets use water-saving faucet attachments.				Heating, cooling, or air-intake ducts are not obstructed in any way.			
				Unused rooms are closed off, and their heating and cooling vents are shut.			

## Analyzing Energy Audit Data *continued*

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**2. Analyzing Data** What changes would you make if you had an unlimited budget?

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**3. Recognizing Patterns** In what month does your home typically use the most energy? How does this relate to the kind of climate in which you live?

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## Conclusions

**4. Evaluating Data** Carefully review the information you recorded on your energy audit checklist. Write a brief summary of your findings in the form of a report with recommendations.

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