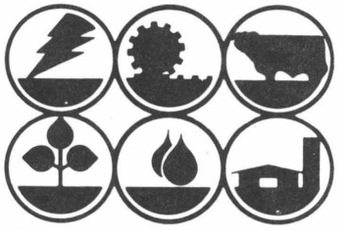
Virginia Cooperative Extension Service

VIRGINIA TECH AND VIRGINIA STATE • VIRGINIA'S LAND GRANT UNIVERSITIES



ENERGY MANAGEMENT SERIES

Publication 324-864 Reprinted October 1982

Prepared for distribution by

Jerome R. Smith

Extension Housing Specialist

ENERGY CONSERVATION IN THE RURAL HOME

Keeping Home Heating and Cooling Equipment In Top Shape

Proper selection, installation, and maintenance of your heating and cooling system can save you money, improve comfort in your home, and improve reliability. When selecting a home heating and cooling system, explore all the available alternatives.

Don't Heat or Cool Space Not Being Used

Perhaps you can operate your home more efficiently by changing your current heating and cooling routine. If you can get along without heat in some areas of your house, turn it off. Some rooms or areas may need only a minimum amount of heat; others may need heating or cooling only occasionally. Regulating the heating in this way can reduce your energy costs significantly.

When practical, heat or cool the rooms in the center of the house and let the outside rooms serve as an insulating barrier.

You can adjust the heating and cooling in rooms by opening and closing registers. If your registers aren't adjustable, consider replacing them. If you have a water system or steam radiators that can't be turned off, install bypass lines or shutoff valves as needed to control the system and protect it against freezing. Thermostatically controlled valves in each room provide the most effective system.

In large homes single-room heating units can help to reduce demand on a central system. The central unit can be operated at a low temperature setting throughout the house while the small units can boost the temperatures in rooms being used the most.

Adjust Thermostat

In the Northeastern United States, 15- to 20-percent savings are possible with a reduction of 5° to 8° F in house temperature.

Setting your thermostat down at night to 55° F or below makes sleeping more comfortable. For the forgetful, clock-controlled thermostats can insure that temperature settings are adjusted on schedule.

Regulate Humidity

In the winter heat (or cold) spreads through your home fastest if the air is moist. However, you need humidity to protect your body from dry hot air in the winter. During the summer, you are more comfortable if you reduce the humidity in your home.

You may use humidifiers to add moisture removed by your hot air furnace system. Too much humidity, however, will cause mold-producing dampness and excessive condensation on windows. Dehumidifiers are good for controlling summer dampness, but are not especially good for comfort control.

The sun streaming through windows increases the load on an air conditioner. You can protect against this by blocking the entrance of the sun's rays. Keep drapes, blinds, and shutters closed when the sun is shining directly on them. Install awnings to shade windows. The overhang, or awnings, should extend far enough to provide full shade in summer but let in the sun in winter. Southern exposures need this protection the most.

Room Ventilation

Proper ventilation of your house can reduce or eliminate the need for summer air conditioning. You can use windows, doors (screened), and other natural ventilation or you can use electric fans. Natural ventilation may not be as cooling, but it may be sufficient and cost less than air conditioning. Ventilate your living space in the evening and/or at night. Do not ventilate when your house is cooler inside than out. Keep the cool air trapped. Open vents or windows near the ceiling if you can to remove trapped hot air. Ventilation fans are particularly useful where evening breezes are not strong enough to move air through the house.

Your attic is a heat trap. While it serves as a buffer for the sun's heat, heat from the attic flows into the living area and increases the air conditioning load. Attics reach temperatures above the outside air early in the day. The attic should be ventilated by a fan as soon as its temperature rises above that of the outside to prevent a heat buildup.

Attics can be ventilated by either natural air currents or by fans. Either way, lots of air must pass through to be effective. Roof vents or louvres should provide a lot of open area for natural ventilation. Most homes have minimal louvre openings, only enough to avoid winter mositure problems.

Frequently a combination of soffit, gable, or ridge vents is used to ventilate attics without using a blower. Soffit and ridge vents are quite effective because the airflow is shorter. The ridge vent exhausts at a higher elevation than a gable opening. This creates a strong natural draft. Gable vent efficiency can be improved by locating a new house to permit prevailing winds to flow through the attic. For winter ventilation, the exhaust vent area (a similar area is needed for intake air) is 1 square foot for every 150 square feet of attic space. Effective summer ventilation requires much larger vent areas.

Ridge vents also increase natural ventilation by providing a short, direct airflow through the attic. The rotating cap of the cyclone acts as a low-capacity turbine. It can utilize wind power from any direction.

Powered fans operated from a thermostat reduce attic temperature levels automatically. The cost of operating the blower should be offset by savings in air conditioning loads. This, however, depends on the amount of insulation in the ceiling between attic and living space. The more the insulation, the less necessary a powered fan will be. When ceiling "R" values are high (above 30), it is still economical to install ventilation that operates on natural air currents.

Maintenance and Care of Equipment

The servicing and repair of furnaces usually require the attention of a serviceman. Homeowners can do some regular servicing and maintenance to keep the system operating efficiently. For safety, always keep the area around the furnace free of flammable material. Things the homeowner should check regularly are:

Air Filters Check the air filters of hot air heating systems every 6 weeks during the heating and cooling season. Clogged filters reduce airflow. This reduces effectiveness and increases energy bills. Some filters may be washed. Others must be replaced.

Electric Motors Follow the manufacturer's instructions for lubricating motor and blower bearings. Some bearings are permanently sealed and need no lubrication. Others need three to six drops of light motor oil every 6 months. Overoiling can damage a motor. Be sure oil holes are capped to keep dirt out. Wipe off excess oil or grease. Use clean rags to wipe dirt off the motor and clean ventilation openings. An accumulation of dust and dirt on the motor acts as insulation and may cause overheating.

Fan Belt A fan belt that's too tight causes excessive wear on the bearings. If it is too loose, it will slip, increasing belt wear and reducing blower efficiency. Allow a ¾-inch depression in the belt for each foot of distance between shaft pulleys when the belt is pressed with a finger midway between the pulleys. Check belt tension and alignment every 6 weeks when the air filters are inspected. If a new belt is needed, purchase the proper size and length. When installing a new belt, release the takeup adjustment on the motor and do not roll the belt onto the pulley. Check the vanes on the fan and remove accumulated dirt.

CAUTION: BE SURE THE POWER TO THE MOTOR IS SHUT OFF SO IT WILL NOT COME ON WHILE YOU ARE WORKING ON THE MOTOR, BELTS, OR FANS.

Humidifiers The major service problem with humidifiers results from mineral deposit buildup. This takes frequent servicing to avoid. As mineral deposits build up on the evaporator, efficiency decreases. Evaporator pads or plates should be cleaned or replaced when the buildup of salts interferes with evaporation.

Thermostat Thermostats may get out of adjustment and indicate the wrong temperature. Check the point at which they go on and off against the reading on a thermometer held near the thermostat. If the thermostat is not operating correctly, have a serviceman see if it needs adjustment, repair or replacement.

Registers and Radiators Dust on radiators, convectors, baseboard heating units, or in ducts acts as insulation and wastes heat. Vacuum them regularly.

If you have a hot water system, bleed air from radiators annually; open each radiator valve, hold a cup under it until water comes out. Don't drain the water. You only need to remove the air inhibiting water circulation.

Paint radiators with special radiator paint for best performance. Metallic paints and casings built around radiators reduce heat as much as 25 percent. If radiator covers are necessary, select ones that have grills over at least 75 percent of their surface. Place aluminum foil behind radiators to reflect heat into the room.

Do not block air inlets and outlets, including radiators, with furniture, drapes, or clothing.

Heating Ducts Inspect heating ducts annually for leaks. Repair them with a quality duct tape.

Cover heating ducts and water for steam pipes that pass through unheated areas, attics, crawl-spaces and basements with duct insulation or unfaced R-11 insulating batts or blankets. If ducts are used for air conditioning as well as heat, use faced insulation and place the vapor barrier to the outside to prevent condensation on the duct.

Care of Fireplaces and Chimneys

Fireplaces are expensive to install and sometimes even cause substantial heat losses. Even the best fireplaces are inefficient as home heating systems. Fireplaces are effective in cool weather when needed to "take the chill" off a room. Air ducting systems that draw from the room into the fireplace and return heated air to the room improve the heating efficiency. Air for combustion should be ducted in from the outside rather than drawn from the room.

If you use a fireplace, arrange for a chimney checkup annually. Hot gases that escape through cracks in a fireplace can harm you and may even cause a fire.

Check the chimney for loose bricks and mortar and the flue lining (the passage through which the air and gases travel) for cracks. Make repairs before using your fireplace.

Be sure that the damper at the top of the fireplace closes tightly; otherwise, warm air will escape when the fireplace is idle.

In summer, keep the damper closed to prevent sooty backdrafts and birds from entering the house.

Soot and creosote accumulations should be cleaned from the flue each year. Do this by pulling a weighted sack of straw up and down the flue. Seal the front of the fireplace before you begin to keep the mess contained.

Selecting or Altering A Heating Or Cooling System

When you replace or alter a heating system you will decide whether to use: (1) Solid, liquid, gaseous, electric, or solar fuels; (2) room units or central systems; (3) separate or combined heating and cooling systems; (4) air or water distribution systems; (5) a gravity or forced air distribution system; and (6) a manual or automatic control system.

Fuels

Fuel availability, costs and delivery charges differ from location to location. To decide on the right fuel, first find its heating value in therms or other energy units. Then determine the efficiency with which a heater can convert fuel to usable heat. Solid and liquid fuels require onsite storage. Electric and natural gas do not. Coal and wood probably will be more economical where they are readily available. Electricity is the cleanest fuel, followed by gas, oil, and solid fuels.

Room Units

Window air conditioners, underwindow heating/cooling units, space heaters, electrical and resistance heating devices are reasonably effective for heating or cooling single rooms. Unless equipped with blowers, large temperature variations may occur between the floor and the ceiling. Distribution of heat or cooling to adjacent rooms is poor.

Central Systems

Central systems heat or cool a whole house or apartment. They provide a uniform temperature distribution but cost much more to buy and install than room units. They require more energy to operate.

Central systems may employ gravity or forced air to distribute hot air, cold air, water, or steam. Although gravity systems are effective, they are difficult to design and the ducts take up a lot of space. Forced air systems generally provide more uniform heat distribution than do gravity systems. Hot water or steam systems require the services of a plumber and usually need more maintenance than other systems.

Heat Pumps

Heat pumps come both as package units that fit into the wall and as connected split systems. Split units are more expensive but more versatile than the smaller units, since the inside unit can be located anywhere in the house. Heat pumps both heat and cool on demand. They are more expensive than other systems, but where the climate is not severe operating costs may be one-third to one-half that of conventional electric heating. However, heat pumps may still cost more to operate than most nonelectric systems.

Control Systems

Most heating units can be either automatically controlled or operated manually. Cost increases with the degree of automation. However, poor manual control can result in overheating.

Distribution of Heating or Cooling

Central heating and cooling systems usually depend on air distribution. Air responds rapidly to thermostatic demand. An air system frequently costs less and is easy to install. Water or steam heating systems are generally more effective in conveying heat from the furnace and control comfort of individual rooms more evenly. A liquid system requires less space than do air ducts but responds slowly to the thermostat. Water heat can add difficult plumbing problems. Liquid systems offer superior efficiency in large buildings.

Agricultural Fact Sheet
United States Department of Agriculture

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, and September 30, 1977, in cooperation with the U. S. Department of Agriculture. Mitchell R. Geasler, Interim Dean, Extension Division, Cooperative Extension Service, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061; M. C. Harding, Sr., Administrator, 1890 Extension Program, Virginia State University, Petersburg, Virginia 23803.