Heating Systems

Heating and cooling your home accounts for approximately 44% of a homes energy use. Deficiencies in these systems can make a great impact on how much extra money you spend on your utility bills. Making sure these systems are running in top shape can increase their efficiencies and save you money.

It is important periodically to evaluate your heating system. It is especially important not to wait until a crisis occurs.

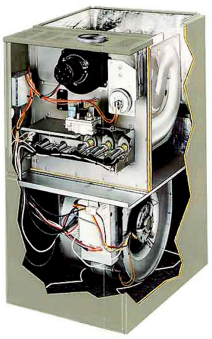
In assessing your present system, compare it with new, improved systems. An old furnace, even when it's running well, may extract only 60 percent of the available heat from the fuel over the heating system. That means only 60 cents of every heating dollar is going into the house as heat; the rest is going up and out the chimney. In contrast, the best of the new furnaces are so efficient that they waste less than a nickel of every dollar spent.

Repair vs. replacement

Your first step is to decide if your present furnace operates properly. If your furnace is old, or has a serious malfunction that will cost several hundred dollars to fix, it may be wise to replace it.

As a general rule of thumb, if your furnace is more than ten years old and costs more than $500 to fix, it should probably be replaced rather than repaired. If your furnace is old but not broken, deciding when to replace it can be difficult. Average life expectancy of furnaces in homes today is between 16 and 20 years. If your furnace is close to this age or older, begin shopping. This holds true for boilers as well, although boilers have a greater life expectancy of 30 years. Be prepared to replace your furnace or boiler. Shopping for a replacement furnace in an emergency does not allow time to get fair market pricing. The design of your house and the size of your utility bills may be deciding factors. Generally, if you have a large house with high heating bills, it could be more cost-effective to purchase a high efficiency furnace now rather than wait for your present furnace to wear out.
If you decide to repair your furnace, look for a heating professional who has experience with your type of heating system.

Buying a new furnace



Whenever you purchase a new heating system the primary factors to consider are: the type of fuel you are going to use, how the heat will be distributed throughout the house, what size furnace to buy and the efficiency rating.

Type of fuel
If you have a choice of fuels, you will want to consider which is the most affordable in the end.

Heat distribution
Consider the opportunities offered by different distribution systems. The primary difference between 'furnaces' and 'boilers' is that a furnace uses air to distribute heat throughout the house and a boiler uses water. Forced air systems allow easy installation of traditional central air conditioning, since the same ductwork can be used to distribute warm or cool air. This makes a forced air system more economical if you plan to install central air conditioning.

Furnace size
Furnace size is almost as important as the efficiency rating. The most common mistake is buying a heating system too large for your home. Remember, the notion that 'bigger is better' does not apply to heating or air conditioning systems. If your heating system is oversized, it can create temperature swings in your home and reduce comfort. Unfortunately, there are no simple rules for furnace sizing. We recommend that you ask a heating professional to do a heat loss calculation to ensure that you are buying the right size. Many municipalities require a heat loss calculation at the time the contractor requests a permit to install your heating system. A heat loss calculation includes factors such as the window area, type of windows, insulating properties of the walls, attic and foundation, and the amount of heat loss through air leakage. Discuss any remodeling plans with your contractor. Ask any contractor who bases estimates solely on the square footage of your house to do a true heat loss calculation. If you are considering buying a central air conditioner at the same time as a new furnace, be

sure that the air conditioner is sized properly. If your cooling unit is sized too large, it will not do a good job of dehumidifying.

Furnace efficiency
We recommend that you look for a furnace with an AFUE (Annual Fuel Utilization Efficiency) of more than 90 percent and be a sealed combustion system. In addition, consider buying a furnace with a variable speed blower motor to improve electrical efficiency. We recommend that furnaces have a minimum AFUE of 90 percent and that boilers have a minimum AFUE of 85 percent., Both furnaces and boilers should be sealed combustion (all combustion air is drawn from outside the home, rather than from the inside). If a high efficiency heating system is out of your price range, consider those furnaces and boilers with mechanical venting. The more efficient a unit, the more heat (Btus) you will receive from your fuel. Remember, however, that an efficient heating system is only one component contributing to your home's efficiency.

Choosing a heating contractor
A new heating system costs money – anywhere from $2,000 to more than $4,500. When buying a new heating system, you should compare prices. It isn't unusual for bids to differ by as much as several hundred dollars. You should receive written bids on the cost of equipment and installation from at least three contractors, and ask each for the names of customers who have had their heating system for a few years. When evaluating bids, look at prices but also pay attention to and compare quality, energy savings, and warranties. If you are putting in a high efficiency furnace or boiler, ask if the contractor has special training in this type of installation. If you think your old heating system is covered with asbestos insulation, discuss this with the contractor. Make sure they follow the proper procedures in dealing with asbestos removal.

A new heating system must be installed properly. Furnaces and boilers should be tuned and a combustion efficiency test performed after installation. Make sure the contractor is fully bonded and insured.

New high efficiency furnaces
A high efficiency furnace with sealed combustion or mechanical venting saves you money over the life of the furnace, reduces the chances of back-drafting furnace gases into the home, and contributes to a healthier environment. The economic benefits can be surprising. For example, if you change from a furnace with 60 percent efficiency to a furnace with a 90 percent or higher efficiency, it is possible to save 30 to 40 percent on your annual fuel costs. Depending on whether you heat with gas, oil or propane, savings could be $250 to $500 per year. From a safety standpoint, efficient furnaces and water heaters with mechanical venting or, better yet, a sealed combustion system, greatly reduce the danger of backdrafting.

Maintaining your furnace and duct system
Keeping your heating system well maintained and properly adjusted is important for every system regardless whether it is new or old. A qualified service person should periodically check, clean, and tune your furnace, not only for energy efficiency but also for safety. Make sure that duct joints are sealed. Sealing ductwork with aluminized duct tape can improve the efficiency of your heating and cooling system. It may be a good idea to ask a heating specialist to balance the heating system. All oil and gas furnaces should be tuned every year, unless the manufacturer directs otherwise. Do-it-yourself maintenance measures include:

- Change the furnace filter once a month.
- Clean the blower at least once a year.
- Make sure registers and furniture or draperies do not block radiators.
- Bleed radiators, baseboard heaters, and other systems that use heat radiation once a year.

Operating your furnace
How you operate your heating system affects how much energy you use. Follow these suggestions to lower your heating bill:

- Turn down thermostats in unused rooms, at night, and when you are going to be gone for more than four hours during the day. Automatic setback thermostats can do this for you.
- Have your heating contractor adjust the fan thermostat for an efficient on-off temperature.

The equipment and alterations that are known to be safe and effective in some situations are:

Automatic setback thermostat

Lowering the thermostat at night or during the day while you are away will save one percent for every one-degree-Fahrenheit per eight hours of setback. Manually resetting the temperature, twice a day will not cost anything, but this can be inconvenient. Instead, you can get an automatic setback thermostat to do the work for you. Some are relatively inexpensive and pay for themselves in a very short time.

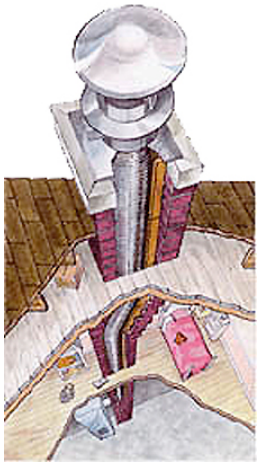
Vent dampers

This device automatically blocks off the vent pipe after the burner shuts off. This prevents warm air from escaping up the vent when the furnace or boiler isn't running. On the average, you will save about six percent on your fuel bills with a vent damper.

Dampers are either thermally or electrically operated. Thermal dampers, the cheaper but least effective of the two, open and close by the change in exhaust gas temperature. Electric dampers are much more effective, since they are timed to go on and off with the burner. They also have a built-in safety feature that prevents the burner from lighting if the damper fails to open.

All vent dampers must pass certain safety standards. If they are not up to standard, or are improperly installed, they can be dangerous. If the damper doesn't open when the burner comes on, combustion gases will build up in the house.

Chimney liners



An oversized chimney wastes heat and drafts poorly. One solution is to put in a correctly sized metallic liner to reduce airflow. A liner also extends the life of masonry chimneys by preventing deterioration from the flue gases. Liners must be properly installed and tested by a qualified service person to make sure combustion gases do not spill into the living space. This is especially important if you are replacing your furnace but not the combustion water heater; in some cases, the chimney liner may have to be replaced to reduce the risk of backdrafting. If you have a gas furnace with a masonry chimney, you must have a metallic liner. Have your contractor inspect for this.

Be wise: weatherize

Whether or not you buy a new furnace, it is a good idea to weatherize your home. Adding insulation and strategically caulking and weatherstripping will make your home more comfortable, save energy, and reduce the size of the furnace you need if you are going to purchase a new system. As your heating load decreases, the size and cost of a heating system required to meet that load also decreases. You might consider having a home energy efficiency analysis performed. Sometimes referred to as an energy audit, this is a detailed examination of your home's energy use. Some utilities offer this service at low or no cost. Check with your utility to see if it provides an audit. If not, look for a professional home energy auditor.

Bibliography

- Minnesota Department of Commerce Energy Information Center, *Techniques, Tactics & Tips, Home Energy Guide to Home Heating.* Energy Information Center publications are available free. They include Combustion Air, Home Energy Guide; *Drafthood Test for Combustion Air,* a check for homeowners; and *Furnace and Boiler Tune-Up,* a checklist for homeowners.
- American Council for an Energy-Efficient Economy (ACEEE) 6th edition, T*he Most Energy Efficient Appliances 1995,* available from bookstores for $8.95 or from 1001 Connecticut Avenue N.W. Suite 801, Washington, D.C. 20036, 202-429-0063 or www.aceee. org
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