

Home heating and cooling 101

Maximize these systems to improve your family budget, comfort



Our heating and cooling systems use more energy and cost more in utilities than any other powered equipment or appliance in the home.

Heating and cooling systems are usually the most expensive mechanical equipment installed in new homes and are the costliest to replace when they reach the end of their service life. Along with these dollar costs, these systems have the biggest overall impact on our families' comfort and health at home. How can you be sure to get the most affordable and effective home heating and cooling systems?

Shop 'cost to operate' over 'purchase price'

Efficiency is key. Every type of heating and cooling equipment is rated on its operating efficiency and this relative efficiency is expressed by an alphabet soup of acronyms. Gas fired furnace efficiency is often rated as Annual Fuel Utilization Efficiency (AFUE). Air source heat pumps measure relative efficiency in several ways, including Heating Seasonal Performance Factor (HSPF), Coefficient of Performance (COP) and Energy Efficiency Ratio (EER). Refrigerated air conditioning systems rank unit efficiency by Seasonal Energy Efficiency Rating (SEER). Evaporative coolers are a breed apart but data can usually be found that will relate their relative cooling efficiency to a refrigerated air system is SEER.

When shopping for any type of heating and air conditioning equipment, it pays to learn how the unit's efficiency is measured and how that efficiency rating will impact your utility costs. Most manufacturers offer estimates on relative costs to operate their equipment in various areas of the country.

A Home Energy Rater can perform calculations to project annual fuel costs for your specific home and location based on a selection of different systems you may wish to install. High efficiency heating and cooling units' utility savings will more than pay for their purchase price being higher than entry level efficiency units over the life of the equipment. This is especially true since we expect utility costs will only increase for the foreseeable future.

Size it right

Homes built within the last five years have less air leakage from the outside, more insulation and better window design than ever before. Air infiltration, quality of insulation and window placement and design are some of the key criteria that determine how big equipment should be to keep a home comfortable. In many cases, industry and installer specifications for sizing heating and cooling equipment are based on construction methods and materials in use 10 or 20 years ago.

The result is equipment that is too



big and inefficient for the newer more efficient home envelope. This is especially true for refrigerated air conditioning and heat pump systems. The cooling load or amount of heat that must be moved into or out of a home to make it comfortable is measured in tons (12 kBtu/h = 1 ton).

If a home has a requirement for 3 tons of cooling load and 5 tons of equipment cooling capacity is installed (which is very typical for homes in this area), efficiency and equipment performance suffers. Every time the oversized equipment starts up it requires more energy than smaller, "right sized" equipment. Since the equipment is too large it will cool the living space very quickly. That sounds OK, but this will create shorter operating cycles.

Help your heating and cooling equipment help you

Make sure your supply and return ductwork is not sending expensive conditioned air to the great outdoors. Have your heating and air conditioning contractor perform a duct leakage test or have it done by a certified Home Energy Rater.

Pull back the shades from south-facing windows in the winter and allow the sun to warm living spaces in your home. Install solar screens or strategically plant trees to shade west and east facing win-



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downs. Summer heat that never enters a home does not have to be removed by expensive electricity and equipment.

Use your programmable thermostat. Most new thermostats can be programmed to come on only when you plan to be home or awake. Your dog and cat probably won't care if it is 65 rather than 72 degrees while you are out this winter.

Maintain your filters. Dirty filters limit air flow and reduce your heating and cooling systems' efficiency and performance. Check them now and change them every three months. Choose higher MERV-rated or smaller micron filters to improve indoor air quality. Check to see that filters fit correctly and stay in place at the return compartment air handler.

Use your new home heating and cooling 101 knowledge to get optimal performance from your current system and before your next heating and air conditioning purchase to insure your home stays comfortable and efficient well into the future.

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Equipment runs best over extended cycles – like your car on cruise control at 60 mph – not when it's constantly starting and stopping. These short cycles suck electricity and will shorten the life of the equipment. During our muggy, late summer season, cooling equipment that is oversized and "short cycling" will not effectively remove latent moisture (humidity) from the air inside the home.

A qualified heating and cooling contractor should perform an analysis of your home's heating and cooling requirements known as a load calculation. It should be done specifically for your new home or your existing home whenever heating and cooling equipment is being selected for purchase and installation. You should ask to see the report generated from the load calculation.

Much of the information will appear to be engineering gibberish (sorry, engineer folks) – but you should be able to see that the main assumptions, such as heated area, amounts of insulation, front door orientation and number of people living in the home are accurate.

Engineers, architects and home professionals, such as Home Energy Raters, may also provide industry approved heating and cooling load calculations. Accurate heating and cooling load calculations combined with equipment capacity sizing will insure the most efficient operation of equipment at every price range and efficiency rating.