



ENERGY SERIES: What about the Heating System?

What is Annual Fuel Utilization Efficiency?

The efficiency of a gas (natural or propane) or oil furnace is measured by the Annual Fuel Utilization Efficiency (AFUE), which describes the heat produced from the energy used. This rating takes into consideration losses from pilot lights, start-up, and stopping. For example, a furnace with an AFUE rating of 80 converts 80% of the fuel it burns into usable heat. New furnaces usually rate in the mid-70s to low 80s, whereas older furnaces will be in the 50s or 60s. ENERGY STAR[®] qualified oil and gas furnaces have annual fuel utilization efficiency (AFUE) ratings of 83% and 90%, or higher, making them up to 15% more efficient than standard models. Unlike the Seasonal Energy Efficiency Ratio (SEER) and Heating Season Performance Factor (HSPF) ratings, the AFUE does not consider the unit's electricity use for fans and blowers.

What is the Heating System Performance Factor?

The Heating System Performance Factor, or HSPF, applies only to heat pumps. HSPF is the ratio of heat provided in BTU per hour to watts of electricity used. This factor considers the losses when the equipment starts up and stops, as well as the energy lost during the defrost cycles. Typical values for the HSPF are 6.8 for standard efficiency, 7.2 for medium efficiency, and 8.0 for high efficiency. Variable speed heat pumps have HSPF ratings as high as 9.0, and geothermal heat pumps have HSPFs over 10.0. The higher the rating, the more efficient the heat pump. ENERGY STAR[®] qualified heat pumps have a higher seasonal efficiency rating (SEER) and heating seasonal performance factor (HSPF) than standard models, which makes them about 20% more efficient than standard new models. The HSPF averages the performance of heating equipment for a typical winter in the United

States, so the actual efficiency will vary in different climates.

What is Coefficient of Performance?

The Coefficient of Performance (COP), is an older standard used prior to HSPF to measure the efficiency of heating systems. By definition, all electric resistance space heaters have a COP rating of 1. A unit with a rating of 3 means that the unit is three times more energy-efficient than electric resistance heating (generally considered the most expensive method of heating).

Will the Fuel I Use Make a Difference in My Energy Costs?

Yes, so check with your local utility before replacing an existing system. Many utilities have a department dedicated to conservation. They can advise you not only on the types of fuel available in your particular location, but also on new technologies that make the most of the fuels available to you.

Keep in mind that fuels are measured and sold in different units such as gallons of oil, therms of natural gas, or kilowatt hours (kWh) of electricity, so comparing the price of dissimilar units is not useful. A more useful comparison is the fuel cost per amount of heat produced.

The Energy Information Administration's Heating Fuel Comparison Calculator

<http://www.eia.doe.gov/ncic/experts/heatcalc.xls>

helps you make this comparison by factoring in the relative price based on the fuel heat content and the efficiency of the heating appliance. The site provides step-by-step instructions, including how to find cost and efficiency data to use with the calculator. In choosing a heating system, don't rely solely on initial costs as many factors will determine the best heating system for your

needs. To help you choose a heating system, the site also provides numerous links to additional information.

Developed as part of the NASULGC/DOE Building Science Community of Practice. The factsheet editors are: Robert "Bobby" Grisso, Extension Engineer, Biological Systems Engineering; Martha A. Walker, Ph.D, Community Viability Specialist, Central District; and John Ignosh, Area Specialist, Biological Systems Engineering.

DISCLAIMER – This piece is intended to give the reader only general factual information current at the time of publication. This piece is not a substitute for professional advice and should not be used for guidance or decisions related to a specific design or construction project. This piece is not intended to reflect the opinion of any of the entities, agencies or organizations identified in the materials and, if any opinions appear, are those of the individual author and should not be relied upon in any event.