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ENERGY FOCUS

Efficient Boilers Offer Savings, Many Choices

By Adam Wasch, Energy Outreach Consultant for CCHRC and CES

Boilers today offer a wide range of customized options to maximize efficiency. If your boiler has an old pilot light that stays lit all the time, you're probably a good candidate for a replacement boiler or, at least, a retrofit. Alaska's many heating days justify paying for the most efficient system possible upfront, since the extra money you spend for efficiency gains will be paid back several times during the system's operating lifetime.

But take care – there is no single perfect system because of the number of variables involved in designing a boiler that is sized and outfitted correctly for your particular home. Looking for an "Energy Star" label is a good start, but there's a lot more to consider. Ensure that whomever you hire to provide, install, or retrofit a system is cognizant of the fine details and performs the necessary calculations. These calculations are especially important if you're installing the sophisticated components and sensors required by today's most efficient boilers.

First, the basics. Boilers heat water, which is pumped throughout a system of pipes and radiators that conduct heat into your rooms. Boiler efficiency is measured by its annual fuel utilization efficiency (AFUE). There is some dispute how useful AFUE ratings are because they do not account well for heat loss from boilers that maintain operating temperatures throughout the day. Also, AFUE does not measure heat loss from boilers or pipes that are located outside of insulated living spaces such attics, basements, and garages. AFUE will not account for room heat that escapes out open flues. Nevertheless, AFUE remains a basic standard.

Most boilers are connected to a baseboard loop system, which is really just a series of low-profile radiators that distribute heat along the length of a pipe in a room before returning water to the boiler. A single thermostat triggers heating cycles. New boilers are required to attain a minimum AFUE rating of 80 percent, which means 80 percent of the heat generated is useful heat instead of heat that escapes up the chimney.

A major design option is to install a radiant floor heating system. In this scenario, loops of pipes are placed into your subfloor to heat from the floor level up. This arrangement can produce more even heat throughout a room than a baseboard system can because the whole of the room's floor space can be crisscrossed with pipes. Also, a radiant floor system has the benefit of producing more thermal comfort

– fewer arguments over whether the room is too hot or cold – because more of the heat is felt in the living space instead of rising to the ceiling.

The next major decision is whether you will install a standard combustion boiler or a condensing boiler. A condensing boiler is more efficient, but more expensive, too. These boilers generate more useful heat by extracting energy from the flue gas and condensing the water vapor created by the combustion process. This process makes possible AFUE ratings of 90 percent or greater. One reason these boilers are more expensive is that they require a stainless steel heat exchanger and a way to drain the condensate.

Boilers that purge system heat at the end of each operating cycle help to minimize wasted heat. Sealed combustion systems may offer further fuel savings. Sealed combustion systems require an exterior air source and a dedicated vent. A boiler fitted with an outdoor reset, which senses outdoor temperatures, can increase efficiency by reducing the boiler system's water temperature as low as possible while still meeting a home's heating demand.

Other fuel-saving strategies include installing a set-back or programmable thermostat that regulates heating according to your daily schedule. Zoning, in combination with two or more thermostats, can regulate what parts of your house are heated more than others depending on use.

Want to improve an existing boiler instead of replacing it? Your options will vary depending on the system's age and type of fuel used. For example, installing vent dampeners that close off a boiler's access to the chimney when it isn't operating can reduce standby heat loss. Electric ignitions eliminate the need for continuous pilot lights. Some older boilers that might have been oversized initially can be "de-rated" to burn less fuel while providing the same amount of useful heat.

Whether new or old, proper sizing and design of a boiler system is critical and is best performed by a professional. Contact CCHRC or CES for more information or take a look at the Department of Energy's website on the subject at: http://www.energysavers.gov/your_home/space_heating_cooling/

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