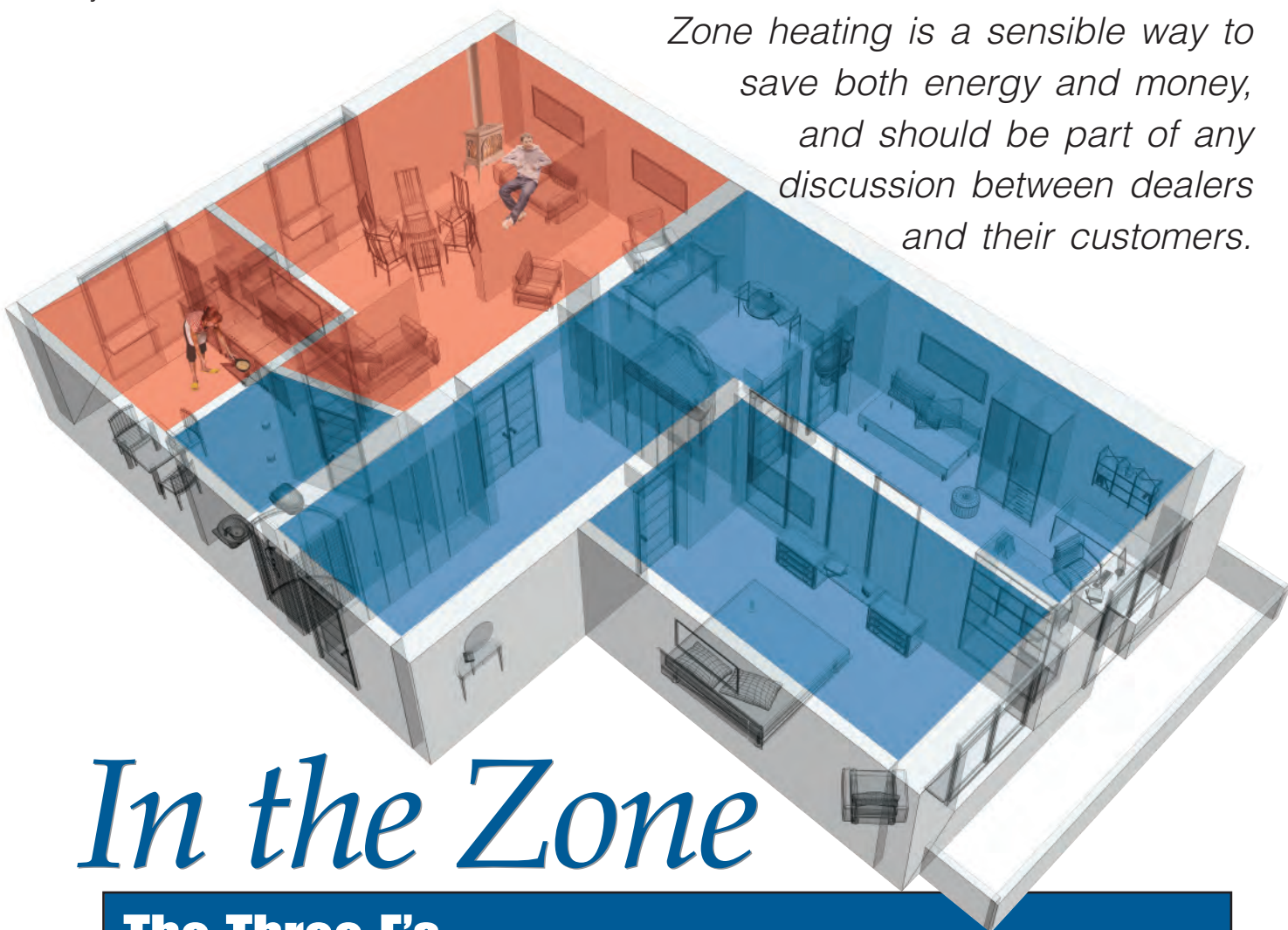


by Dr. James E. Houck

Zone heating is a sensible way to save both energy and money, and should be part of any discussion between dealers and their customers.



In the Zone

The Three E's: Energy, Economy and Environment

Everyone knows how important it is to learn the three R's. Given our current state of affairs, readers would do well to think about the three E's as they relate to their role as responsible business people, as well as, what opportunities the recent turn of events offers for hearth and home products.

Energy – The energy crisis threatens no less than our way of life and our national security. The amount of energy consumed for home space heating is significant. According to the U.S. Department of Energy, five quadrillion Btus of energy were used for home space heating in 2001. This does not even count the amount of

energy needed to deliver those Btus to our homes. As an example, for every kilowatt of electricity used for space heat in a home, about three kilowatts are consumed at the power plant.

Economy – According to a review of space heating published September 15 in *The Wall Street Journal*, “The average household can expect to pay \$2,524 for heating oil this season, up more than 30% from last year. And natural gas bills will increase 19% to \$1,017...”

The media have been replete with stories on how tough it's going to be for many American families to pay for heating their homes this winter. In some cases, compromises will have

to be made among paying for the fundamentals of food, medicine and heat.

What happened to the American dream?

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Sixty-five percent of occupied housing units have just one or two people in them. In contrast, 74 percent of occupied housing units have five or more rooms.

Over the upcoming months *Hearth & Home* will run a series of articles on things we can do to facilitate healthy business for ourselves in light of these market conditions, and to help the nation and the environment at the same time. We welcome generic articles and letters to the editor on novel and innovative ideas (without mention of specific brand names).

The first article in this series is “In the Zone.” It discusses the merits of augmenting centralized furnaces and boilers with zone heaters such as wood stoves, pellet stoves and fireplace inserts.

In The Zone

Zone heaters, sometimes referred to as room heaters, can offer energy and money savings if used to augment centralized heating systems. Households can turn down the thermostat and turn on the room heater when and where it is needed. It should be remembered that the term “room heater” is a bit of a misnomer as most room heaters can augment heat in several rooms where a family spends most of its time.

More than 80 percent of all occupied housing units in the United States have a centralized heating system as their main source of heat. Ninety-eight

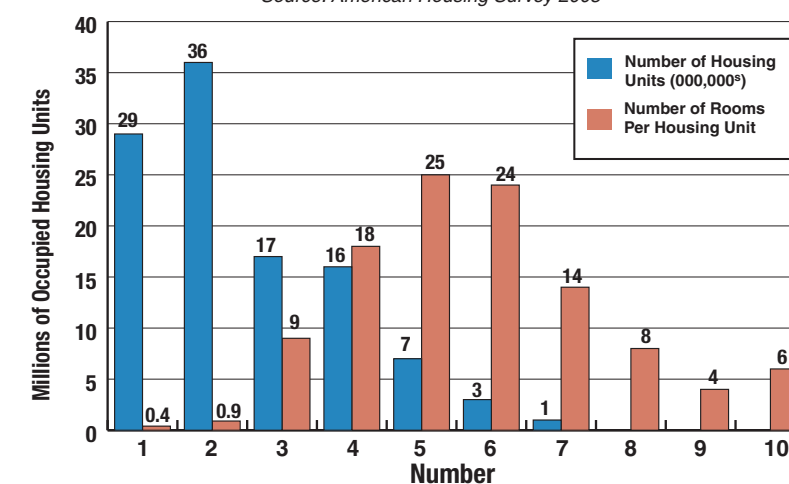


percent of new, one-family houses with construction completed in 2007 have a centralized heating system. Loss of energy in the duct work for warm-air furnaces and in the piping for steam/hot water systems is well documented, particularly for older installations.

It has been found that occupants normally use less than 40 percent of the

Number of Persons and Number of Rooms Per Occupied Housing Unit

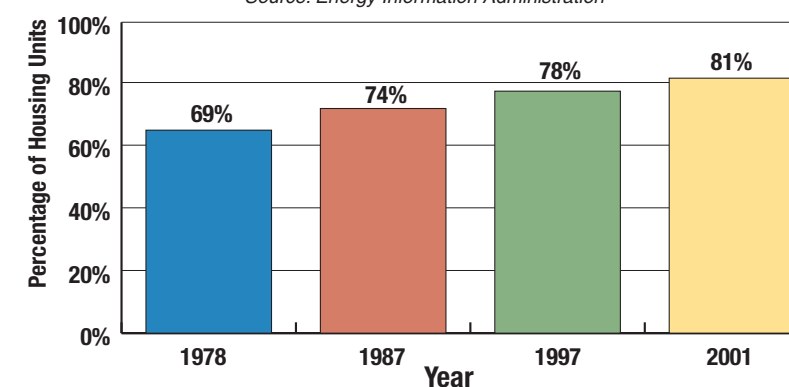
Source: American Housing Survey 2005



Numbers at the bottom of the chart are used two ways: to indicate the number of persons, as well as the number of rooms, per housing unit. For example, in 29 million housing units there is only one occupant, and 400,000 of those units have only one room.

Use of Main Central Heating Systems in U.S. Housing Units

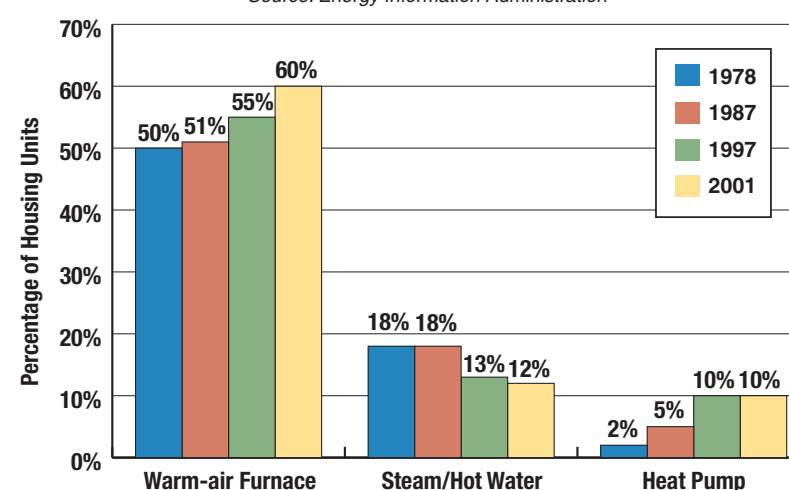
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In 23 years (1978-2001), the percent of U.S. housing units using central systems as their main source of heat rose from 69 to 81 percent.

Main Heating Equipment

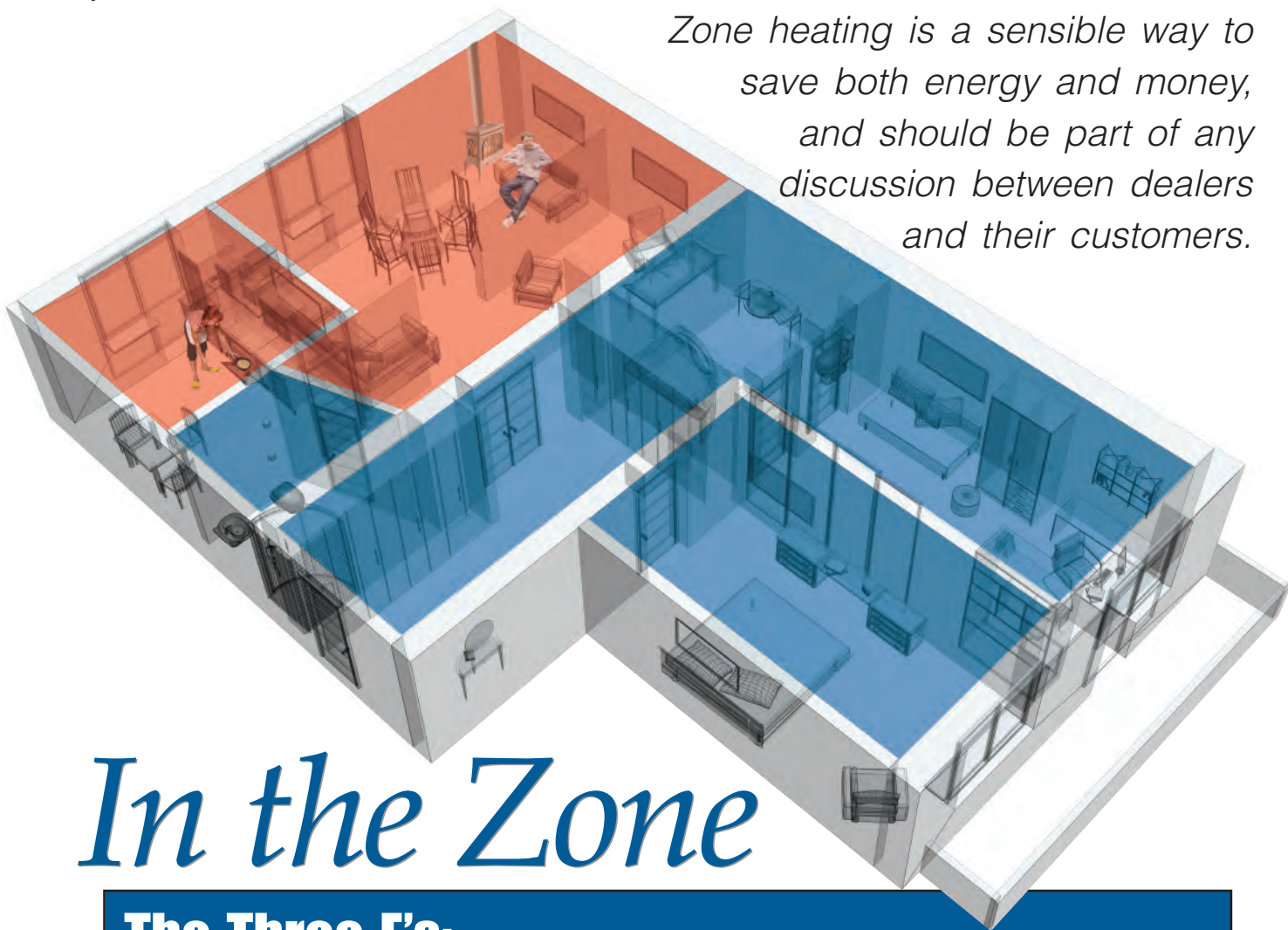
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In 2001, 60 percent of U.S. housing units used a Warm-air Furnace as their main source of heat, compared with 12 percent using Steam/Hot Water and 10 percent using a Heat Pump.

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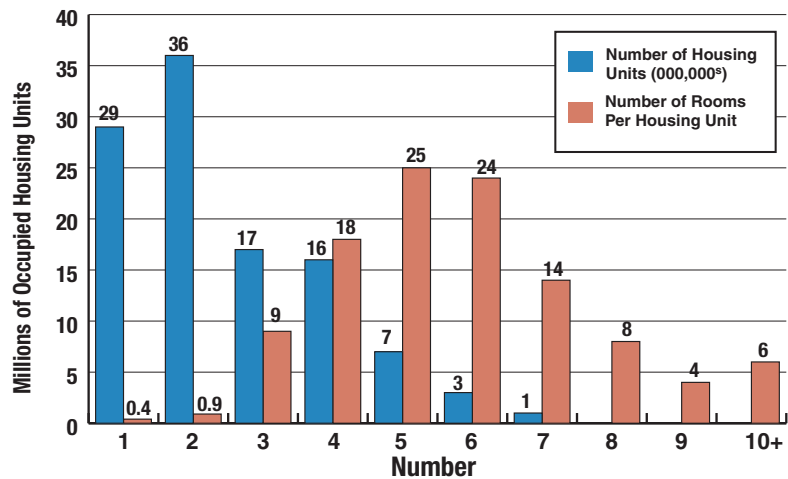


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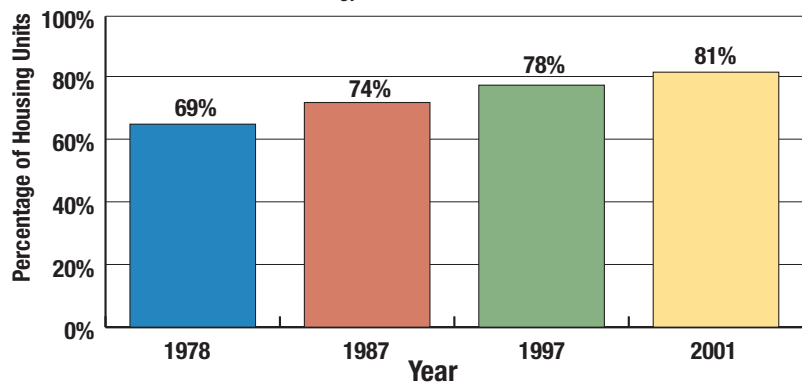
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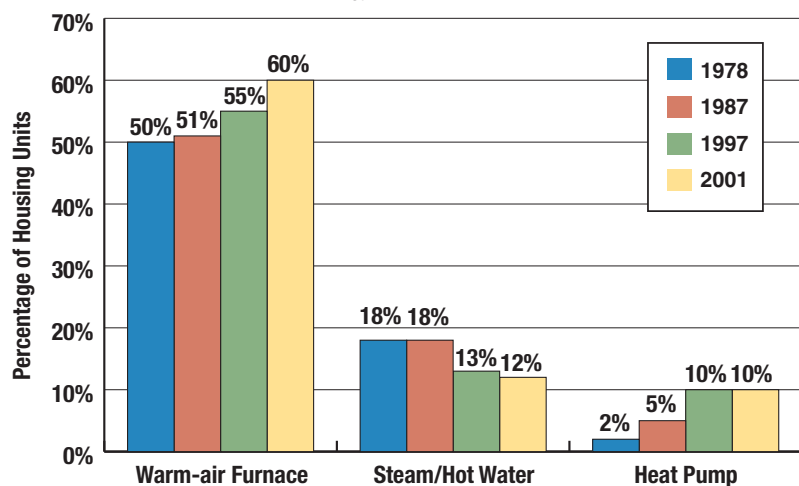
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Main Heating Equipment

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entire home area on a regular basis, and almost always there are far fewer occupants in the house than rooms. Inefficient heat delivery and the heating of empty rooms means wasted energy, wasted money and unwarranted greenhouse gas and air pollutant emissions. In most homes, installation of a zone heater to augment the central heating system would be prudent.

Zone heaters can be fueled with cordwood, pellets, manufactured firelogs, natural gas, propane, oil, coal or corn. They include freestanding stoves, fireplace inserts and masonry heaters. For completeness, it also should be noted that, while not addressed here, portable or permanently installed electric heaters, as well as portable kerosene heaters also fulfill the function of zone heaters.

Heat Loss in Duct Work

Heat loss associated with centralized hot-air furnace duct work is generally estimated at 10 to 20 percent. However, it can be much higher, particularly for older systems. (According to the Energy Information Administration, about 25 percent of main heating equipment is 20 or more years old.) Ducts located outside of the heated spaces, such as attics and crawlspaces, can lose heat capacity by both conduction across duct walls and air leakage.

A study published in *ASHRAE Transactions* found that homes heated with electric furnaces used 21 percent more energy for heating than did homes
(continued on page 30)



Parallel Heating Equipment – “Additional heating equipment for an area not heated by the main heating equipment.”

Supplemental Heating Equipment – “Additional heating equipment for a heated area of the housing unit.”

— Glossary U.S. Department of Housing and Urban Development and U.S. Census Bureau, *American Housing Survey for the United States.*

Heating Category	Occupied Housing Units with Wood Stoves	Occupied Housing Units with Fireplace Inserts*
Main	896,000	131,000
Parallel	985,000	655,000
Supplemental	3,096,000	4,323,000

The value of zone heating is no secret. Wood stoves and fireplace inserts are already mostly used as secondary heating equipment (both as parallel and supplemental heaters) to augment centralized heating systems – not as main heating sources themselves.

*Fireplace inserts include those fueled with all fuel types.

Source of data: *American Housing Survey for the United States: 2005.*

Heating Practices and Problems	Number of Occupied Housing Units
Winter temperature settings are <u>not</u> lowered in daytime when no one is home.	48,500,000
Winter temperature settings are <u>not</u> lowered during sleeping hours.	51,100,000
Daytime winter temperature is greater than 70° F when no one is home.	33,600,000
<hr/>	
Uncomfortably cold for 24 hours or more last winter due to:	
Equipment breakdowns	2,416,000
Utility interruption	1,538,000
Inadequate heating capacity	993,000
Cost of heating	781,000

Zone heaters can break bad habits. It’s easy to leave the thermostat of a centralized heating system on when leaving the house or going to bed. In fact, from survey results it’s clear that a lot of us do just that. A furnace or boiler is something distant, tucked away and not part of the day-to-day living space. In contrast, the regular need for fueling of a wood or pellet stove, or the visible flames of a gas fireplace insert or stove, prominently located in the living space, creates awareness of their existence. For example, it becomes a lot more difficult to leave them on, or to add more fuel, when they are no longer needed.

Zone heaters can be used in a pinch when a centralized heating system fails, for whatever reason, to keep the household warm; based on survey results, that scenario is not uncommon.

Source of data: *Energy Information Administration – 2001 and American Housing Survey for the United States: 2005.*



(continued from page 24)

heated with baseboards. In the same study it was found that homes with baseboards had 41 percent less air infiltration into the home from outside due to pressure effects caused by forced air delivery and return systems of centralized furnaces.

Empty Houses

Sixty-five percent of occupied housing units have just one or two people in

them. In contrast 74 percent of occupied housing units have five or more rooms. In addition, during the week, 50.4 percent of homes are devoid of occupants all day.

Radiant Energy

At rest, humans are comfortable at an air temperature of about 70° F. When we sit in the sun we feel warm even if the air temperature is less than 70° F due to radiant energy. Zone heaters can have the same effect; they can provide warmth without the need of heating the interior of the home to a comfortable temperature. We all know how pleasantly warm it can feel in front of a roaring fireplace even when the surrounding air is cool.

Further heat losses from a structure increase in proportion to the difference between indoor and outdoor temperatures. If all else is equal, radiant heat from a zone heater can be far more efficient than convection heat from a centralized hot-air furnace.

Other Things to Think About

- Zone heaters provide an extra warm

place in the house. With a radiant heater, no matter what the inside temperature is, there can be an extra warm place in the home if someone in the family has a need or preference for warmth. It would not be unusual to find grandma knitting and the family cat curled up in front of a fireplace insert.

- Most centralized heaters are useless during power failures. Many cordwood heaters have no electrical components.
- Many room heaters contribute to the atmosphere and value of the home. A 2006 Hearth, Patio & Barbecue Association survey found that, on the average, a freestanding stove adds \$2,860 and a fireplace insert adds \$4,400 to the value of a home. 🏠

About the author: Dr. James E. Houck is president of OMNI Environmental Services. He can be reached at (503) 643-3788, houck@omni-test.com. Visit www.omni-environmental.com for technical publications and services.