Fuel oil provides heat to more than 12 million homes in the United States, 80% of which are in the Northeast and Midwest. Most oil-heated homes are located in suburban or rural areas, where access to natural gas lines is limited. Nearly half the homes in the Northeast are heated with oil. Residential fuel oil use in the United States averages more than 1 quadrillion Btu (quad—1 exajoule) per year, at a cost of about $10 billion.

The Office of Building Technologies (OBT) of the U.S. Department of Energy (DOE) assists private industry in developing technology that improves the energy efficiency of residential and commercial buildings and reduces their use of scarce fuels. OBT's Combustion Equipment Technology Program concentrates on upgrading the technology used in residential oil-heating systems and similar systems used in half a million small commercial buildings. The program's goal is to reduce energy consumption by 0.35 quad (0.37 exajoule) annually by 2000. Specific objectives are to:

- Improve steady-state and seasonal efficiency by reducing heat-exchanger fouling; reducing chimney, off-cycle, and jacket losses; and improving the controls
- Reduce pollutant emissions by designing innovative burners
- Eliminate factors that degrade performance by developing on-board diagnostic controls that warn of degradation and by developing burner options that eliminate soot fouling in furnaces and boilers
- Develop a model that predicts vent system performance and aids in developing guidelines for safe and efficient venting
- Transfer the technology and information to the oil-heat industry, equipment manufacturers, and consumers.

Improving the Technology

Although work has centered on improving burners, researchers are also working on improving controls and venting. All three efforts allow oil-heating systems to burn cleaner and more efficiently and reduce service calls and expensive repairs.

Burners

The first burner improvement was the pressure-atomized flame-retention-head burner. Use of this burner is current industry practice, with about 6.8 million burners installed in U.S. homes. Each burner, on average, represents a 15% reduction in fuel use compared with the conventional burner it replaced, and a reduction of as high as 40% if the entire heating unit is replaced. The total amount of fuel saved by flame-retention-head burners as of 1995 is estimated at more than 0.9 quad (0.5 exajoule), worth $6 billion. In addition...