

*Low-emissivity coating reduces window heat loss resulting from radiation transfer.*

Consequently, DOE sponsored a broad range of basic research on low-E coatings, including computer simulation of alternative window designs, creation of coating test facilities, and technology transfer programs to disseminate results. DOE's investment in low-E technology research directly stimulated the glass and window industries to invest heavily in advanced coating technology. Low-E windows became commercially available in 1983; and in 1986, 20 manufacturers sold more than 50 million square feet of low-E windows, representing almost 10% of all residential window sales. By 1992, more than 50% of all residential window sales should be low-E windows, and the cumulative value of energy savings should reach \$1 billion.

### Ground-coupled Heat Pumps

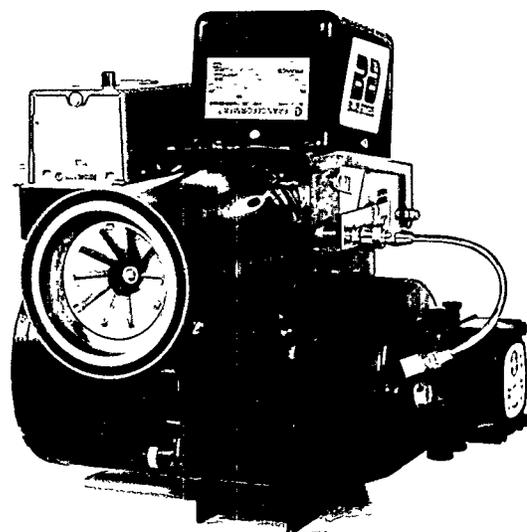
About one-third of new homes are heated and cooled by air-source heat pumps. Because ground-coupled heat pumps can save more than half of the energy used by air source heat pumps, DOE initiated a multifaceted R&D program to develop an advanced ground-coupled heat pump. Analytic design tools were developed, tested, validated, and distributed to the private sector to assist manufacturers in designing more cost-effective ground-coiled heat exchangers and more efficient mechanical packages for the heat pump. These design tools were then used to develop a prototype system.

DOE, a utility company, and a leading heat-pump manufacturer collaborated on the design, fabrication, and field evaluation of two experimental prototypes. The advanced systems improved the cost-effectiveness of ground-coupled heat pumps by reducing the payback period from 6–10 years to 3–5 years. The participating utility company estimates that the improvements should increase sales of these heat pumps by about 60%. Heat pumps using this advanced design will save approximately 0.32 quad by 2010.

### Flame-Retention Oil Burner

The high-efficiency flame-retention-head oil burner, although not a new technology, did not achieve substantial penetration of the oil heating market until DOE investigated its potential in the late 1970s. In a carefully controlled field test, DOE established the energy conservation benefit of this oil burner by studying retrofit options, including the use of the burner alone or in combination with other measures.

A second DOE effort communicated the findings of this research through distribution to the public of more than 70,000 copies of a consumer-oriented information booklet. This booklet covered the energy conservation aspects of flame-retention-head oil burners and other components of oil-fired heating systems. As a result of these efforts, the number of



*Consumer education efforts have boosted the popularity of energy-conserving flame-retention oil burners.*