

areas: (1) wastewater treatment, (2) water treatment and pumping efficiency, and (3) heating and cooling efficiency in municipal buildings. In 1983 the city established the Energy Conservation Reinvestment Plan, to reinvest 50 percent of general fund energy savings in new projects. Phoenix has participated in workshops sponsored by the Energy Task Force to assist other cities in developing conservation programs. The Phoenix program demonstrates that city-wide energy conservation is feasible and economically sound.

### Single-Family Retrofit Research and Technology Transfer Program

In a recent analysis of home ownership costs, the Alliance to Save Energy found that energy costs are the second largest expense after mortgage payments. Reductions in energy costs through greater efficiency therefore would improve housing affordability. DOE, in conjunction with the Alliance, sponsors a program that leverages state and private sector resources to improve conservation programs, provide better technical training, and increase research activities. The program brings together product manufacturers, utilities, national laboratories, local community groups, and private contractors to use the latest research innovations to improve the effectiveness of residential energy conservation efforts. During the past several years, the program has: (1) improved the energy savings and cost effectiveness of 27 state weatherization programs, (2) provided training to 1600 energy auditors and private heating contractors in new efficiency technologies, and (3) developed an innovative approach to leverage state and private sector resources to stretch limited DOE research funds. Over 20,000 homes have been retrofitted through this program.

### Radiant Barriers for Single-Family Housing

In single family housing, 7 to 8 percent of winter heat loss and 17 to 20 percent of summer heat gain

occurs through attics. In a jointly funded effort, DOE and the Tennessee Valley Authority (TVA) performed field tests of a low-cost, easily installed aluminum foil product that promises significant reductions in attic heat transfer, thus saving energy for heating and cooling. The product's two reflective surfaces reduce the radiant component of heat transfer between the attic and the underside of the roof. Most home owners can easily install this radiant barrier material over existing attic insulation. Results of DOE tests of radiant barriers installed in three single-family homes in Tennessee indicate a reduction in cooling energy requirements by 17 percent and in heating energy requirements by 9 percent. Assuming homeowner installation, radiant barriers provide a two-year payback in energy savings. Most effective in hot climates, this product has the potential to save .17 quads per year in the South's 22 million homes. Its benefits also are sufficient to make the radiant barrier marketable in northern climates.

### Acoustic Leak Detection System

Many industries use pipelines to carry steam, water, gas, and oil. The costs of detection and repair of leaks in these pipelines are high in terms of lost productivity and repair time. The District Heating and Cooling Leak Detection Research program, cofunded by Consolidated Edison and the Fluid Conservation Systems Corporation, allowed scientists at Argonne National Laboratory to develop a computer-based acoustic monitoring system that can accurately locate underground pipe leaks. The detector records sounds created when pressurized gas or liquid escapes from a damaged pipe. The data is fed into a computer which provides information on the location, size and type of the leaks. Experiments on district heating pipes demonstrated that water leaks can be detected at a distance of 500 feet and escaping steam at 1,500 feet. Utilities may be able to save thousands of dollars per week by using the acoustic leak detector system for location and repair work.