

## Building Foundation Design Manual

A 1985 DOE study found that more than 95% of existing and 70% of new residential buildings lack foundation insulation. The DOE/Industry Foundations Review Panel suggested that clear information on the cost-effectiveness of foundation insulation in most U.S. climates was not readily available to builders and designers. With the help of extensive industry review and technical support provided by the DOE/Industry Foundations Review Panel, DOE prepared the *Building Foundation Design Manual*, a comprehensive handbook for architects and engineers. The manual covers energy-efficient building foundation design and recommends practices for structure, drainage, waterproofing, radon mitigation, and termite control. The volume includes a simplified method to estimate cost-effectiveness for foundation insulation in all regions of the United States. The residential manual is applicable for small commercial buildings.

The design manual serves as a source document for other products and activities, including future research, the *Builder's Handbook*, the *ASHRAE Handbook of Fundamentals*, the 1989 CABO Model Energy Code, the proposed revision of the Housing and Urban Development's Minimum Property Standards, and several articles in builder magazines. National savings derived from adopting designs recommended in the handbook could approach 0.5 quad annually.

## 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 would improve housing affordability.

DOE, in conjunction with the alliance, has sponsored a program that leverages state and private sector resources to improve conservation programs, provide better technical training of weatherization providers, and increase research activities in the field and in the national laboratories. 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 improved the energy savings and cost-effectiveness of 27 state weatherization programs, provided training to 1600 energy auditors and private heating contractors in new efficiency technologies, and developed an innovative approach to leverage state and private sector resources to stretch limited DOE research funds. More than 20,000 homes have been retrofitted through this program.

## Energy Institutes

**Institutes on Energy and Engineering Education**—The objective of the institutes is to provide engineering educators with a variety of resources to help them teach engineering students how to design, construct, and operate energy-efficient buildings. The program creates a communications link among university faculty, government and industry researchers, and practitioners. Nine 4-day institutes have been held since 1980. About 375 professors from 150 of the nation's engineering schools have attended one or more of these. The institutes and the publication of the model HVAC curriculum used have resulted in the introduction and refinement of building energy topics in engineering courses throughout the country.

Working in teams, institute participants analyze the heat flow patterns and energy budgets of case-study buildings and review building plans and equipment data. Each team then identifies alternative energy conservation options, models its base building, and evaluates the options using the ASEAM-2.1 software. This case study method, which has been successful for educators in their engineering curricula, has accelerated the transfer of knowledge of energy-efficient building technologies to future engineers.

**Summer Institutes on Energy and Design**—The summer institutes provide university faculty with resources to teach architecture students how to design energy-efficient buildings and provide a forum for information exchange among government researchers, private industry, and the academic community. Eight institutes have been held since 1981. Each four-day institute involves a variety of workshops and field trips. The workshops are led by professors of architecture and supported by resource books, which attendees subsequently use in their design courses. About 380 faculty members from more than 90% of the architecture schools in the United States have participated.