

several hundred copies of DOE-2 have been distributed. DOE-2 is recognized in the technical community as the most accurate building energy simulation program available.

Program for the Energy Analysis of Residences (PEAR)

DOE recognized the need for an easy-to-use, nontechnical energy analysis tool to assist residential builders in making choices among energy-conserving building design options. These options include home insulation levels, window types and glazing layers, infiltration levels, amount of thermal mass, and equipment efficiency. PEAR enables builders and designers to estimate the annual energy use of new houses equipped with typical conservation measures such as ceiling, wall, and floor insulation and thermal or storm windows with different infiltration rates. Using PEAR, builders and designers can also determine the effects of innovative measures such as changes in roof and wall color or an attached sun space. PEAR can perform energy analyses for residential buildings throughout the continental United States.

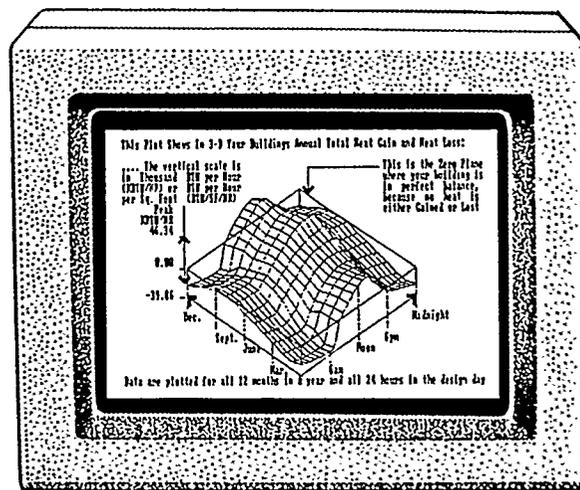
Solar-5

A building's future energy efficiency is often determined in the early stages of the design process, but designers historically lacked a way to assess the effect of different design strategies on energy performance. In response to this need, DOE developed the computer program Solar-5 to provide a visual display of building energy flows in residential and commercial buildings. Solar-5 uses a matrix to display data and quickly provides the results of its energy analysis. This enables users to revise a design and instantly see the results displayed in the matrix. A user can combine up to nine different schemes into one design and see a graphic presentation of the resulting energy flows.

Solar-5 has received the *Progressive Architecture* magazine award citation and a DOE award for excellence. It is the most popular computer program available from the Designers Software Exchange, with approximately 500 copies sold to date.

WINDOW Computer Program

Windows play an important role in the energy efficiency of a building, yet today there is no widely



This computer-generated plot, produced with the Solar-5 program, shows a building's total heat gain and heat loss. Data are plotted for all 12 months and all 24 hours.

accepted standard in the United States for determining the thermal performance of window systems. There is growing industry support for establishing a standard based on calculation procedures validated with laboratory or field tests. Developed by DOE through the Lawrence Berkeley Laboratory, the WINDOW series of IBM personal-computer-based programs is used to calculate numerous thermal and optical properties of windows including thermal transmission, shading coefficients, and surface temperatures of glass. The WINDOW program is expected to become a key element in a national uniform rating system, which might include a window-labeling program.

The program is now widely used in the industry. ASHRAE used WINDOW to calculate new guidelines for window performance and incorporated the guidelines into the *ASHRAE Handbook of Fundamentals*. The program is facilitating the design of Lawrence Berkeley Laboratory's "superwindow" technology. Other uses range from design of more conventional windows by architects and engineers to development of data by manufacturers for product specification sheets.

A Simplified Energy Analysis Method (ASEAM-2)

Architects typically design heating, ventilating, and air conditioning (HVAC) systems for commercial and