

PACKAGE ID - 000173IBMPC00 PEAR2.1

KWIC TITLE - Residential Building Energy Analysis

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LIMITATION CODE -UNL **AUDIENCE CODE** - UNL

COMPLETION DATE - 09/01/1990 **PUBLICATION DATE** - 01/16/1992

DESCRIPTION - PEAR (Program for Energy Analysis of Residences) provides an easy-to-use and accurate method of estimating the energy and cost savings associated with various energy conservation measures in site-built single-family homes. Measures such as ceiling, wall, and floor insulation; different window type and glazing layers; infiltration levels; and equipment efficiency can be considered. PEAR also allows the user to consider the effects of roof and wall color, movable night insulation on the windows, reflective and heat absorbing glass, an attached sunspace, and use of a night temperature setback. Regression techniques permit adjustments for different building geometries, window areas and orientations, wall construction, and extension of the data to 880 U.S. locations determined by climate parameters. Based on annual energy savings, user-specified costs of conservation measures, fuel, lifetime of measure, loan period, and fuel escalation and interest rates, PEAR calculates two economic indicators; the Simple Payback Period (SPP) and the Savings-to-Investment Ratio (SIR). Energy and cost savings of different sets of conservation measures can be compared in a single run. The program can be used both as a research tool by energy policy analysts and as a method for nontechnical energy calculation by architects, home builders, home owners, and others in the building industry.

PACKAGE CONTENTS - NESC Note; Software Abstract; DOE/SF/00098-H3 Vols. 1,2,3;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 5.25 Diskette

METHOD OF SOLUTION - PEAR utilizes a comprehensive database for residential buildings which was compiled using over 10,000 DOE2.1 computer simulations covering five residential buildings in 45 geographical locations, to estimate annual energy use. To increase the flexibility of the database to handle different conservation measures and prototypes, the concept of component loads was developed. Component loads are defined as the net annual contribution of each building component to the heating or cooling loads of the building. They are calculated from regressions correlating the change in loads due to the addition of conservation measures (delta loads) to steady-state parameters for the various building components. For insulation measures, the delta loads are

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METHOD OF SOLUTION - (CONT) regressed against either ceiling and wall conductivity or foundation conductance. For infiltration the delta loads are regressed against air changes per hour, and for windows against window area. To facilitate scaling, component loads are normalized either by square foot (ceilings, walls, and windows), per perimeter foot (foundations), or per cubic foot (infiltration).

COMPUTER - IBM PC

OPERATING SYSTEMS - MS-DOS; PC-DOS

PROGRAMMING LANGUAGES - Turbo Pascal

SOFTWARE LIMITATIONS - 880 cities in all 50 states and the District of Columbia are included. There are five house prototypes: one-story ranch, two-story, split-level, middle-unit townhouse, and end-unit townhouse; four foundation types: slab-on-grade, heated or unheated basement, and ventilated crawl space; and four space-conditioning systems: oil furnace, gas furnace, electric resistance, and heat pump. All heating systems are assumed to be central.

SOURCE CODE AVAILABLE (Y/N) - Y

RELATED SOFTWARE - PEAR utilizes a comprehensive DOE2.1 database for residential buildings. ASEAM2.1 is a modified bin temperature program for calculating the energy consumption of residential and simple commercial buildings.

OTHER PROG/OPER SYS INFO - The PEAR2.1 source is not included.

HARDWARE REQS - PEAR requires an IBM PC or compatible computer with a minimum of 128 Kbytes main memory, one flexible disk cartridge drive, either a second flexible disk cartridge drive or a fixed disk, and either a monochromatic or color monitor. A graphics adapter is required to implement the Bar Chart Option.

REFERENCES - Affordable Housing Through Energy Conservation, A Guide to Designing and Constructing Energy Efficient Homes, PEAR2.1 User's Manual, DOE/SF/00098-H3, Volume 1 of 3, June 1989; Affordable Housing Through Energy Conservation, A Guide to Designing and Constructing Energy Efficient Homes, Technical Support Document, DOE/SF/00098-H3, Volume 2 of 3, June 1989; Affordable Housing Through Energy Conservation, A Guide to Designing and Constructing Energy Efficient Homes, DOE/SF/00098-H3, Volume 3 of 3, June 1989; PEAR2.1, NESC No. 9442, PEAR2.1 Flexible Disk Cartridge Description, National Energy Software Center Note 90-128, September 28, 1990.

ABSTRACT STATUS - Abstract first distributed September 1990. IBM PC version submitted September 1989.

SUBJECT CLASS CODE - T

E S T S C
ENERGY SCIENCE & TECHNOLOGY SOFTWARE CENTER
SOFTWARE ABSTRACT

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KEYWORDS -

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P CODES
ENERGY ANALYSIS
RESIDENTIAL BUILDINGS
PASCAL
COST BENEFIT ANALYSIS
PAYBACK PERIOD

EDB SUBJECT CATEGORIES -

990200 320100

SPONSOR - DOE/CE

PACKAGE TYPE - AS - IS