

THE DOE-2 USER NEWS

PUB-439

*DOE-2: A COMPUTER PROGRAM FOR
BUILDING ENERGY SIMULATION*

Vol. 14, No. 2
Summer 1993

The Simulation Research Group
Energy and Environment Division
Lawrence Berkeley Laboratory
One Cyclotron Road
Berkeley, California 94720

Editor: *Kathy Ellington*
Bldg. 90 — Room 3147



CALENDAR

Oct 24-27 — *New Construction Programs for
Demand-Side Management*

to be held at the Loews Coronado Bay Resort
in San Diego, California.

Contact: Elisa Herrera, ADM Associates, Inc.,
3239 Ramos Circle, Sacramento, California.
Phone (916) 363-8383; fax (916) 363-1788

Nov 1-3 — *CLIMA 2000*

to be held at the Queen Elizabeth II Confer-
ence Centre, London, England.

Contact: Anne Gibbins, CIBSE Headquarters,
222 Balham High Road, London SW12 9BS,
UK. Fax: 44-1-675-5449.

Jan 22-24 — *1994 ASHRAE Winter Meeting*

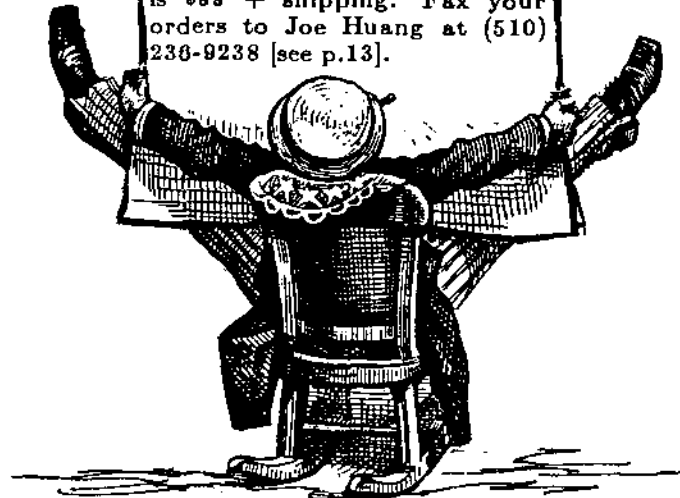
to be held in New Orleans, Louisiana

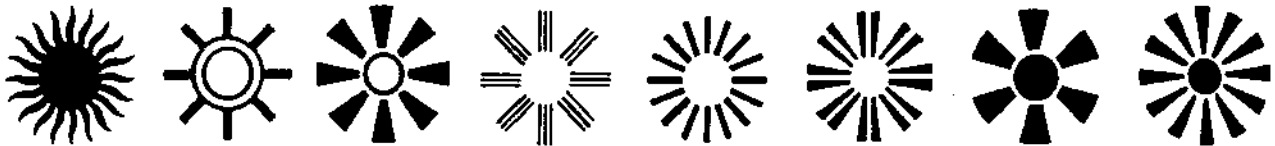
Sponsor/Contact: ASHRAE Meetings Section,
1791 Tullie Circle N.E., Atlanta, GA 30329;
Phone (404) 636-8400, fax (404) 321-5478.

•• Table of Contents ••

- 2 ... Daylighting Design Tool Survey
- 9 ... PRC-Tools
Support Programs for Microcomputer
Versions of DOE-2
- 10 ... Elite Software announces "EZDOE"
- 11 ... DOE-2 Directory
- 16 ... New LBL report:
"Spectrally Selective Glazings...
in Cooling-Dominated Climates"

Late-breaking news about
DrawBDL! DrawBDL is a
graphic debugging and drawing
tool for DOE-2 that was
featured in the Spring
newsletter. Joe Huang, author
of DrawBDL, tells us he's fixed
the final bug in his program
and he's been shipping product.
Introductory cost of the pro-
gram including documentation
is \$99 + shipping. Fax your
orders to Joe Huang at (510)
238-9238 [see p.13].





Daylighting Design Tool Survey

The information contained herein was compiled by Building Technologies Program at LBL. Any corrections or questions about the Survey should be directed to Michael Wilde, MS: 90-3111, Lawrence Berkeley Laboratory.

MAINFRAMES

- ★ **DOE-2.1D** (current official version of DOE-2)
Daylighting and glare calculation integrated with hourly energy simulation and window management.
DOE-2.1E (release imminent)
New window library: solar-optical and thermal properties of 200 currently-available glazings, including low-E, gas fill, heat mirror, superwindows.
Custom glazings: option to add custom glazings to the DOE-2.1E window library by running the WINDOW-4 program with layer-by-layer input.
Improved window U-value calculation: the very accurate WINDOW-4 calculation of window conduction and solar gain has been integrated into DOE-2.1E (includes window frame calculation). Switchable glazing simulation.
Contact Kathy Ellington, Simulation Research Group, Bldg. 90 -- Room 3147, Lawrence Berkeley Laboratory, Berkeley, CA 94720. Phone (510) 486-5711, fax (510) 486-4089.
Hardware: DEC and SUN-4
Software: FORTRAN
Cost and Availability: call or write for information

- ★ **RADIANCE 2.1**
A ray tracing program that accurately predicts light levels and produces photo realistic images of architectural spaces in all sky conditions.
Contact Greg Ward, Lighting Systems Research Group, Lawrence Berkeley Laboratory, Bldg 90 -- Room 3111, Berkeley, CA 94720.
Phone (510) 486-4757, fax (510) 486-4089.
Hardware: SUN, DEC, CRAY, UNIX, Macintosh II (A/UX)
Software: C
Cost and Availability: Free to anyone who wishes to develop further.

- ★ **UWLIGHT**
Useful as an educational tool.
Contact Brian Johnson, Dept. of Architecture, Gould Hall JO-20, University of Washington, Seattle, WA 98105. Phone (206) 543-4180.
Hardware: CDC
Software: FORTRAN 5
Cost and Availability: call or write for information

MICROCOMPUTERS

- * **AAMASKY1 and SKYLIGHT HANDBOOK**
Skylight design analysis with emphasis on optimizing for energy efficiency, incorporating both a worksheet and Lotus spread sheet tool.
Contact the Architectural Aluminum Manufacturers Association (AAMA), 1540 East Dundee Road #310, Palatine, IL 60067. Phone (708) 202-1350.
Hardware: IBM PC or compatible
Cost and Availability: \$50.00/software package. Lotus 1-2-3, \$50.00/handbook, \$100.00/handbook+software (half price for AAMA members)

- * **ADM-DOE2**
Daylighting availability and control, accurate solar shading for individual and whole buildings. Sophisticated window management. Daylighting simulation is on an hour-by-hour basis. PC version of LBL's DOE-2.1D program.
Contact Marla Sullivan, ADM Associates, Inc., 3299 Ramos Circle, Sacramento, CA 95827; phone (916) 363-8383, fax (916) 363-1788.
Hardware: 80386 IBM PC, a 80387 math co-processor, 2 MB extended memory
Software: DOS version 2.0 or better
Cost and Availability: \$295.00 with one weather data file.

- * **AWN SHADE 1.0**
Calculates the unshaded fraction of a rectangular window shaded by an awning for any given solar position.
Contact Ross McCluney, Florida Solar Energy Center, 300 State Road 401, Cape Canaveral, FL 32920. Phone (407) 783-0300 x134, fax (407) 783-2571.
Hardware: IBM PC or compatible
Software: MS QuickBASIC 3.0, MS-DOS
Cost and Availability: \$35.00

- * **BUILDING ENERGY ESTIMATION MODULE (BEEM™)**
Useful in early design stages; evaluates energy impact of different types of windows.
Requests for copies should be directed to your local electric utility company. Ask for the person in charge of commercial lighting programs.
Hardware: IBM PC, IBM PCXT. Needs two disk drives for graphics.
Software: BASIC, 512KB RAM
Cost and Availability: No charge or nominal cost (max \$50.00), EPRI/BEEM support line for registered users.

- * **CONTROLITE 1.0**
Calculates energy savings and cost-benefit of using lighting controls in buildings; incorporates QUICKLITE.
Contact Francis Rubinstein, Lighting Systems Research, Lawrence Berkeley Laboratory, Bldg 90 -- Room 3111, Berkeley, CA 94720; phone (510) 486-4096, fax (510) 486-4089).
Hardware: IBM PC XT/AT or true compatible
Software: 256KB RAM, MS-DOS 2.0 or later
Cost and Availability: \$ Free. No support.

- ★ **DAYLIT**
 Calculates daylight considering fins, overhangs, skylights and light shelves. Calculates electric light for three zones with five control strategies. Plots hourly and annually data, based on IES method.
 Contact Gregg D. Ander, Southern California Edison, Customer Energy Services, 300 North Lone Pine Avenue, San Dimas, CA 91773.
 Phone (909) 394-8734, fax (909) 394-8922.
 Hardware: IBM PC or compatible
 Software: FORTRAN, 256KB RAM - MS-DOS 3.0, Manual on disk.
 Cost and Availability: \$ call for price.

- ★ **DAYLITE 2.2**
 Daylighting design takes into account overhangs, fins, and skylights; calculates electric lighting demand.
 Contact Bill Ashton, Solarsoft/Kinetic Software, 12672 Skyline Boulevard, Woodside, CA 94062; phone (510) 851-4484.
 Hardware: IBM PC or compatible, Macintosh
 Software: PASCAL
 Cost and Availability: \$489.00

- ★ **DOE-24/Comply-24**
 DOE-24 is a special DOE-2 release which is both a state-approved compliance program for California's non-residential energy standards, and a stand-alone version of DOE-2.1D which includes a powerful, user-friendly preprocessor. A free demonstration program is available upon request.
 Contact: Rosemary Howley at Gabel Dodd Associates, 1818 Harmon Street, Berkeley, CA 94703, for information on hardware, software, cost and availability. Phone: (510) 428-0803, fax (510) 428-0324

- ★ **DOE-Plus™**
 DOE-Plus is used to interactively input a building description, run DOE-2, and plot graphs of simulation results. Features include interactive error checking, context-sensitive help for all DOE-2 keywords, a 3-D view of the building that can be rotated, and several useful utilities. DOE-Plus is a complete implementation of DOE-2.
 Contact: Steve Byrne at ITEM Systems, P.O. Box 5218, Berkeley, CA 94705-0218, for information on hardware, software, cost and availability.
 Phone: (510) 549-1444, fax (510) 549-1778

- ★ **ENSAR**
 (custom built) used with physical model; analysis capability flexible to room configurations.
 Contact Greg Franta, Ensar Group, P.O. Box 4164, Frederick, MD 21701.
 Phone (301) 698-9455.
 Hardware: Custom built
 Software: Custom built
 Cost and Availability: call or write for information

- * **FTI-DOEv2.1D**
 Highly optimized version of DOE-2.1D available for the following operating systems: DOS, VMS, ULTRIX, SCO UNIX, RS/6000 (AIX), NeXT and SUN Sparc. Call for more information.
 Contact: Scott Henderson at Finite Technologies, Inc., 821 N Street, #102, Anchorage, AK 99501, for information on hardware, software, cost and availability.
 Phone: (907) 272-2714, fax (907) 274-5379
- * **LUMEN MICRO 6**
 Analyzes complex interior lighting systems including daylight, direct/indirect lighting, mixed and even aimed luminaires. DXF file editor, user friendly input, animated walk-through. Limited to rectangular spaces.
 Contact David DiLaura, Lighting Technologies, 2540 Frontier Street #107, Boulder, CO 80301; phone (303) 449-5791, fax (303) 449-5864.
 Hardware: IBM PC or compatible with high density floppy drive, 8MB hard disk space, 80387 math-coprocessor, VGA or SVGA graphics.
 Software: FORTRAN, 2MB RAM, MS-DOS 3.3 or later.
 Cost and Availability: \$595; \$129 for upgrade from LUMEN-MICRO 5 until December 1993.
- * **MICRO-DOE2**
 Micro version of DOE-2.1D mainframe program, with enhancements.
 Contact Gene Tsai, Acrosoft International, 9745 E. Hampden Avenue #230, Denver, CO 80231. Phone (303) 368-9226. fax (303) 368-5929.
 Hardware: *Regular DOS Version:* IBM 386 or compatible, Intel math-coprocessor *Extended DOS Version:* IBM 486 or compatibles, Intel or Weitek math-coprocessor
 Software: *Regular DOS Version:* 640KB RAM, MS-DOS 2.1 or later.
 Extended DOS Version: 3MB RAM, MS-DOS 3.0 or later.
 Cost and Availability: call
- * **MICROLITE 1.0**
 Analyzes the daylight illumination for rectangular rooms with vertical glazing in exterior walls. Obstructions are not accounted for.
 Contact Harvey Bryan, 48 Agassiz Avenue, Belmont, MA 02178. Phone (617) 484-0854.
 Hardware: IBM PC, APPLE II
 Software: BASIC, IBM 128KB RAM, APPLE: 40KB RAM
 Cost and Availability: \$25.00
- * **PRC-DOE2**
 A fast, robust and up-to-date PC version of DOE-2.1D. Runs in extended memory, is compatible with any VCPI compliant memory manager and includes its own disk caching. 377 weather data files available (TMY, TRY, WYEC, CTZ) for the U.S. and Canada
 Contact: Paul Reeves, Partnership for Resource Conservation, 140 South 34th Street, Boulder, CO 80303, for information on hardware, software, cost and availability.
 Phone or fax (303) 499-8611

- * **QUICKLITE 1.0**
A relatively quick, crude estimator of daylight levels in simple rectangular rooms. See CONTROLITE.

Contact the Building Technologies Program, Lawrence Berkeley Laboratory, Bldg 90 -- Room 3111, Berkeley, CA 94720.

Phone (510) 486-5605, fax (510) 486-4089.

Hardware: TRS 80, TI-59

Software: BASIC, FORTRAN

Cost and Availability: \$ Free. No support.

- * **SUNPATH 1.2**
Calculates solar coordinates, sunrise and sunset, sunpath for a sequence of days, solar-to-standard time conversions and vice-versa. Includes graphic program PATHPLOT and editable library of 233 U.S. cities.

Contact Ross McCluney, Florida Solar Energy Center, 300 State Road 401, Cape Canaveral, FL 32920. Phone (407) 783-0300 x134, fax (407) 783-2571.

Hardware: IBM-PC or compatible. EGA or VGA monitor needed for PATHPLOT screen display, but will output HPGL files for importing into presentation programs with a graphics monitor.

Software: *SUNPATH* requires MS QuickBASIC, *PATHPLOT* requires MS VisualBASIC, 350KB RAM, MS-DOS

Cost and Availability: \$35.00

- * **SUNSPEC 1.1**
Calculates clear sky solar direct and diffuse spectral irradiances on horizontal or tilted planes, integrated broad-band irradiances, luminances and luminous efficacies. Files can be read by WINDOW 4.0. Includes graphic program SPEC PLOT.

Contact Ross McCluney, Florida Solar Energy Center, 300 State Road 401, Cape Canaveral, FL 32920. Phone (407) 783-0300 x134, fax (407) 783-2571.

Hardware: IBM-PC or compatible. EGA or VGA monitor needed for PATHPLOT screen display, but will output HPGL files for importing into presentation programs with a graphics monitor.

Software: *SUNSPEC* requires MS QuickBASIC, *SPEC PLOT* requires MS Visual BASIC, 300KB RAM, MS-DOS

Cost and Availability: \$35.00

- * **SUPERLITE 2.0**
Updated version of SUPERLITE PC 1.01. Now analyzes daylight and electric lighting for various room geometries (maximum 5 windows). Tabulated output, no graphics.

Contact Rob Hitchcock or Werner Osterhaus, Building Technologies Program, Lawrence Berkeley Laboratory, Bldg 90 -- Room 3111, Berkeley, CA 94720.

Phone (510) 486-4154, fax (510) 486-4089.

Hardware: IBM PC or compatible with 8087 or better math co-processor chip

Software: FORTRAN, MS-FORTRAN 3.2 compiler, 640 KB RAM

Cost and Availability: free, no support

★ **WINDOW 4**

A public-domain program developed by Lawrence Berkeley Laboratory for analyzing heat transfer through window systems. U-value and shading coefficient are calculated.

Contact Bostik Construction Products, P.O. Box 8, Huntingdon Valley, PA 19006.

Hardware: IBM PC or compatible.

Software: 256 KB RAM, MS-DOS 2.1 or higher. Math coprocessor decreases calculation time

Cost and Availability: Free

PROTRACTORS/TABLES

★ **CLEAR SKY DAYLIGHT TABLES**

Determines sky component contribution to the illumination of an interior point for a given window geometry and glazing description. Most useful at an early design stage, when scale drawings are not available yet.

Contact Harvey Bryan, 48 Agassiz Avenue, Belmont, MA 02178. Phone (617) 484-0854.

Cost and Availability: \$25.00

★ **CLEAR SKY WALDRAM DIAGRAMS**

Assist in determination of sky component contribution to the illumination of an interior point, accounting for angle of incidence losses for vertical glazing and obstructions. Graphic method is useful in early design stages.

Contact Harvey Bryan, 48 Agassiz Avenue, Belmont, MA 02178. Phone (617) 484-0854.

Cost and Availability: \$25.00

★ **LBL PROTRACTORS**

Allows for determination of the sky component contribution to the illumination of an interior point for an interior point of finite height under overcast sky conditions.

Contact Harvey Bryan, 48 Agassiz Avenue, Belmont, MA 02178. Phone (617) 484-0854.

Cost and Availability: \$25.00

★ **UW GRAPHIC DAYLIGHTING DESIGN METHOD (GDDM)**

Determines daylight patterns for a room based on the proportions of the window openings, providing illumination level, distribution and gradient. For more information, see **Mechanical and Electrical Equipment for Buildings (MEEB)**, 8th Edition, by B. Stein and J. Reynolds, from John Wiley & Sons, New York, NY 1992. Also, **Inside Out**, 2nd Edition, by J. Reynolds, from John Wiley & Sons, New York, NY 1992.

Contact Marietta Millet at the College of Architecture and Urban Planning, Gould Hall JO-20, University of Washington, Seattle, WA 98105. Phone (206) 543-4180.

Cost and Availability: \$ 30.00

NOMOGRAPHS

* DAYLIGHTING NOMOGRAPHS

Assist designers in determining potential daylighting benefits and costs; checking strategy for energy conservation and load management.

Contact the Building Technologies Program, Lawrence Berkeley Laboratory, Bldg 90 -- Room 3111, Berkeley, CA 94720.

Phone (510) 486-5605, fax (510) 486-4089.

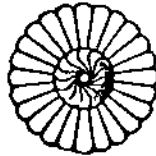
Cost and Availability: Free, no support.

* ENERGY NOMOGRAPHS

Useful in early design analysis on commercial buildings; capable of total building energy analysis, including savings from daylight and heating/cooling loads.

Contact Al Sain at Burt Hill Kosar Rittelmann, 400 Morgan Center, Butler, PA 16001; phone (412) 285-4761.

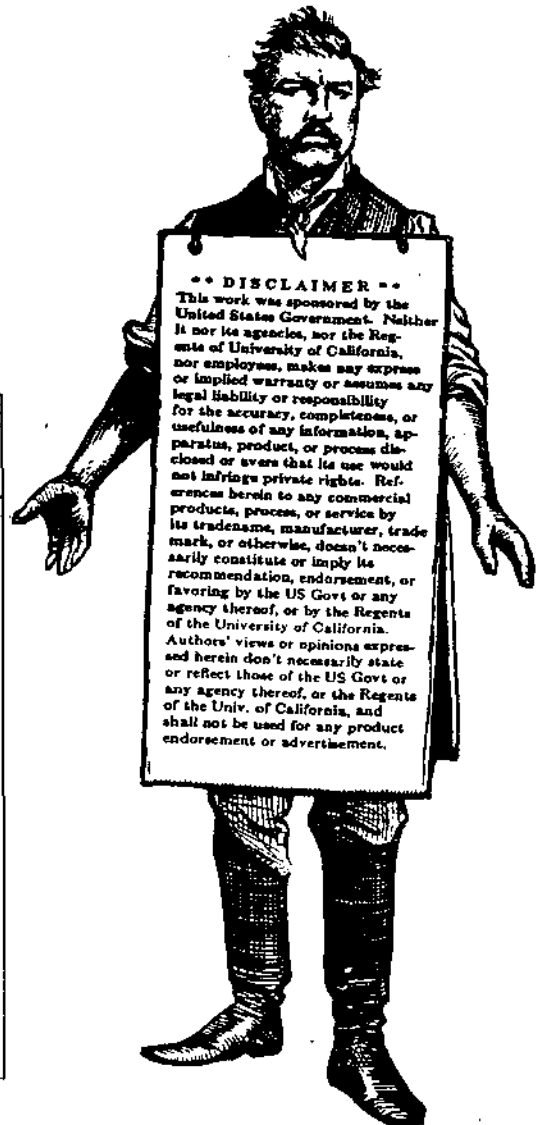
Cost and Availability: \$50.00 for notebook and enlarged, reusable nomograph set from: TVA, Conservation and Energy Management, Commercial and Industrial Branch, 3S D Signal Place, Chattanooga, TN 37401.



DOE-2 Program Documentation		
Document	Order Number	Price
DOE-2 Basics Manual (2.1D)	DE-920-07955	46.00*
BDL Summary (2.1D)	DE-890-17726	29.00*
Sample Run Book (2.1D)	DE-890-17727	69.00*
Reference Manual (2.1A)	LBL-8706, Rev. 2	119.00*
Supplement (2.1D)	DE-890-17728	65.00*
Engineers Manual (2.1A) [algorithm descriptions]	DE-830-04575	55.00*

* Prices shown are approximate; call NTIS for update.
Note that for shipment to foreign countries, double the U.S. prices are doubled.

Order from:
National Technical Information Service Phone (703) 487-4650
5285 Port Royal Road FAX (703) 321-8547
Springfield, VA 22161



**** DISCLAIMER ****
This work was sponsored by the United States Government. Neither it nor its agencies, nor the Regents of University of California, nor employees, makes any express or implied warranty or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or avers that its use would not infringe private rights. References herein to any commercial products, process, or service by its tradename, manufacturer, trademark, or otherwise, does not necessarily constitute or imply its recommendation, endorsement, or favoring by the US Govt or any agency thereof, or by the Regents of the University of California. Authors' views or opinions expressed herein don't necessarily state or reflect those of the US Govt or any agency thereof, or the Regents of the Univ. of California, and shall not be used for any product endorsement or advertisement.

PRC-Tools

Support Programs for Microcomputer Versions of DOE-2

PRC-Tools is a collection of programs written for the personal computer by The Partnership for Resource Conservation. These programs work with any PC version of DOE-2 and have two main functions: assisting in running multiple DOE-2 runs and analyzing hourly output. PRC-Tools is intended to be used by persons familiar with the standard features of DOE-2.1D and who have a working knowledge of DOS computing. Each of the "Tools" programs cost \$195.; the entire set costs \$695. If these programs don't do quite what you need, there's a good chance we can create a custom version that can.

PRC-Run

PRC-Run is a simple text substitution program with some special features that make running DOE-2 parametrics fast and easy. The program reads a "command" file that tells it which DOE-2 input file to use, which variables to modify, and what weather files to use. A single command file can specify any number of parametric runs, and any number of variables can be changed for each parametric run. The program creates multiple DOE-2 input files as well as a batch file which, along with PRC-DOE2, can run all of the input files/weather locations specified with a single command. In order to use PRC-Run, the BDL input file you create must define key variables with the BDL macro commands, ##SET1 or ##DEF1. Typically, these macros are used to specify a variable which is referenced elsewhere in the program, such as the building area, number of stories, chiller capacity, etc. You can use PRC-Run to create and execute hundreds of simulation based upon a single BDL file and one command file. File management and updates become fast and easy.

PRC-Grab

This program opens a specified DOE-2 output file, searches for the report or reports of interest and grabs the data you need. The data is appended to a file so that answers from numerous parametric runs appear as columns of data with the first column identifying the DOE-2 run. The process is easily integrated into your DOE-2 batch files, so that answers are ready to be sorted, compared, and graphed in the spreadsheet of your choice, automatically. Combined with PRC-Run, parametric analysis becomes a snap!

PRC-Hour

The PRC-Hour program extracts hourly data from PRINT formatted DOE-2 hourly output and writes the data to a text file in column format. The month, day and hour are added to each line as separate numbers for compatibility with spreadsheet and database programs; each hourly variable can be scaled separately so that the written data file is in consistent units. Separate hourly reports from the Loads, Systems, and Plant subprograms of DOE-2 can be combined into one file with multiple columns of data. While PRC-Hour is useful for spreadsheet analysis of hourly data, but its true utility is realized when combined with the PRC-Peak program.

PRC-Peak

PRC-Peak was written out of the need to analyze peak-period energy demand by end-use and to create various load shapes for particular end-uses and multiple periods. PRC-Peak reads the hourly data created by PRC-Hour and summarizes the data for up to 24 periods by defined end-use categories. The peak electric demand during each period is broken down into its end-uses. Energy and demand costs can be included in the summary of each end-use. The program can create average, maximum, and peak-day load shapes for each of the periods and for each end-use.

For more information about PRC-Tools contact Paul Reeves at the Partnership for Resource Conservation, 140 South 34th Street, Boulder, CO 80303; phone or fax (303) 499-8611.

Elite Software Announces ...

EZDOE for IBM-PCs!

EZDOE is an exceptionally easy-to-use IBM-PC version of DOE-2.1D. An entirely new program, EZDOE calculates the hourly energy use of a building and its life cycle cost of operation based on the building's location, construction, operation and HVAC System.

EZDOE Features

- ✓ Complete Life Cycle Economic Analysis
 - ✓ Accurate Models Of All Types Of HVAC Systems
 - ✓ Handles Complex And Bldg. Designs & Schedules
 - ✓ Performs 8,760 Hour By Hour Computations
 - ✓ Use TMY Weather Data Files
 - ✓ Full Screen Input & Editing With Mouse Support
- Includes Detailed 1,000 Page Manual And Much More!



Elite Software is the nation's leader in HVAC Software and offers over 30 programs to MEP Engineers.

For Complete Information On EZDOE And Fully Operational Demonstration Versions

Call Elite Software
(800) 648-9523

■ ■ ■ ■ DOE-2 DIRECTORY ■ ■ ■ ■

Program Related Software and Services

Mainframe Versions of DOE-2

<p>DOE-2.1D (Source Code) For DEC-VAX mainframe or SUN-4 mini-computer; contact the Simulation Research Group for directions on obtaining the program.</p>	<p>Simulation Research Group Bldg. 90, Room 3147 Lawrence Berkeley Laboratory Berkeley, CA 94720 Contact: Kathy Ellington Phone: (510) 486-5711 FAX: 486-4089/5172</p>
<p>DOE-2.1D (Source Code) For DEC-VAX, Order #159-D6220-00 DOE-2.1C (Source Code) For IBM-3083, Order #158-I3083-00 For DEC-VAX11, Order #158-DVX11-00 For a complete listing of the software available from ESTSC order their "Software Listing" catalog ESTSC-2.</p>	<p>Energy Science and Technology Software Center P.O. Box 1020 Oak Ridge, TN 37831-1020 Contact: Phone: (615) 576-2606 FAX: (615) 576-2865</p>
<p>* FTI-DOEv2.1D (Source Code) This is a highly optimized and basically platform-independent version of the DOE-2.1D source code. Will compile for most computing systems. The original LBL 2.1D source code is also available in a variety of distribution formats. Site licenses and educational discounts are available. Also available is the full set of program documentation as distributed by NTIS and weather files (TMY and TRY) in a variety of distribution formats. [See <i>User News</i> Vol.12, No.4, p.16 for more information]</p>	<p>Finite Technologies, Inc 821 N Street, #102 Anchorage, AK 99501 Contact: Scott Henderson Phone: (907) 272-2714 FAX: (907) 274-5379</p>

Microcomputer Versions of DOE-2

<p>* ADM-DOE2 ADM-DOE2 (DOE-2.1D) is for professional energy analysts who require a state-of-the-art simulation tool for building energy use. It performs a detailed, zone-by-zone hourly simulation and includes a wide array of modeling features that make it possible to simulate "real buildings". These capabilities offer much greater accuracy and detail than is possible with handbook methods or simplified analysis. [See <i>User News</i> Vol.7, No.2, p.6 for more information]</p>	<p>ADM Associates, Inc. 3239 Ramos Circle Sacramento, CA 95827 Contact: Marla Sullivan, Sales Kris Krishnamurti, Support Phone: (916) 363-8383 FAX: (916) 363-1788</p>
<p>* CECDOEDC (Version 1.0A) A microcomputer version of DOE-2.1D integrated with a pre- and post-processing system designed strictly for compliance use within the State of California. It generates some of the standard compliance forms as output. Order P40091009 for the CECDOEDC Program with Manuals. Order P40091010 for the DOE-2.1 California Compliance Manual. [See <i>User News</i> Vol.12, No.4, p.13 for more information]</p>	<p>Publication Office California Energy Commission P.O. Box 944295 Sacramento, CA 94244-2950</p>

* *Caveat:* We list third-party DOE-2-related products and services for the convenience of DOE-2 users, with the understanding that the Simulation Research Group does not have the resources to check the DOE-2 program adaptations and utilities for accuracy or reliability.

Microcomputer Versions of DOE-2 (continued)

*** "DOE-24/Comply-24"**

DOE-24 is a special DOE-2 release which is both a California-approved compliance program for the state's 1992 non-residential energy standards, and a stand-alone version of DOE-2.1D which includes a powerful yet easy-to-use input preprocessor. A free demonstration program is available upon request.
[See *User News* Vol.12, No.2, p.2 for more information]

Gabel Dodd Associates
1818 Harmon Street
Berkeley, CA 94703
Contact: Rosemary Howley
Phone: (510) 428-0803
FAX: (510) 428-0324

*** DOE-Plus™**

DOE-Plus is used to interactively input a building description, run DOE-2, and plot graphs of simulation results. Features include interactive error checking, context-sensitive help for all DOE-2 keywords, a 3-D view of the building that can be rotated, and several useful utilities. DOE-Plus is a complete implementation of DOE-2.
[See *User News* Vol.11, No.4, p.4 and Vol.13, No.2, p.54 for more information]

ITEM Systems
P.O. Box 5218
Berkeley, CA 94705-0218
Contact: Steve Byrne
Phone: (510) 549-1444
FAX: (510) 549-1778

*** FTI-DOEv2.1D**

Highly optimized version of DOE-2.1D available for the following operating systems: DOS, VMS, ULTRIX, SCO UNIX, RS/6000 (AIX), NeXT and SUN Spare. Call for more information.
[See *User News* Vol.12, No.4, p.16 for more information]

Finite Technologies, Inc
821 N Street, #102
Anchorage, AK 99501
Contact: Scott Henderson
Phone: (907) 272-2714
FAX: (907) 274-5379

*** MICRO-DOE2**

MICRO-DOE2 (DOE-2.1D) has been in use since 1987; it is an enhanced PC version of the DOE-2 program (over 500 users worldwide). Two versions of MICRO-DOE2 are available: a regular DOS version for all IBM-PC compatibles and an extended DOS version for 386 or 486 computers only.
[See *User News* Vol.7, No.4, p.2 and Vol.11, No.1, p.2 for more information]

Acrosoft International, Inc.
Suite 230
9745 East Hampden Avenue
Denver, CO 80231
Contact: Gene Tsai, P.E.
Phone: (303) 368-9225
FAX: (303) 368-5929

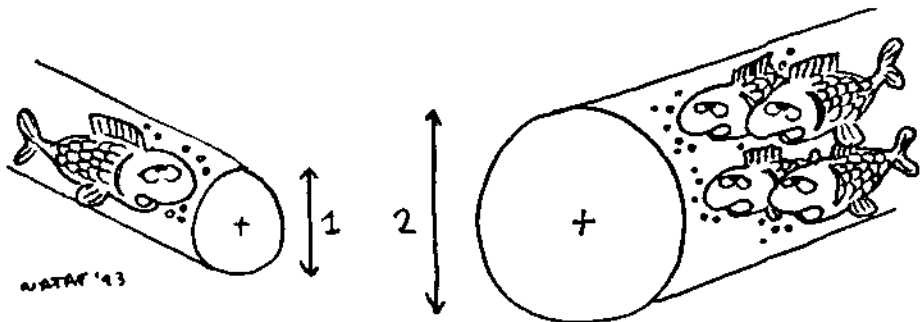
*** PRC-DOE2**

A fast, robust and up-to-date PC version of DOE-2.1D. Runs in extended memory, is compatible with any VCPI compliant memory manager and includes its own disk caching. 377 weather data files available (TMY, TRY, WYEC, CTZ) for the U.S. and Canada
[See *User News* Vol.13, No.4, p.11 for information]

Partnership for Resource
Conservation
140 South 34th Street
Boulder, CO 80303
Contact: Paul Reeves
Phone or FAX: (303) 499-8611

re·bus

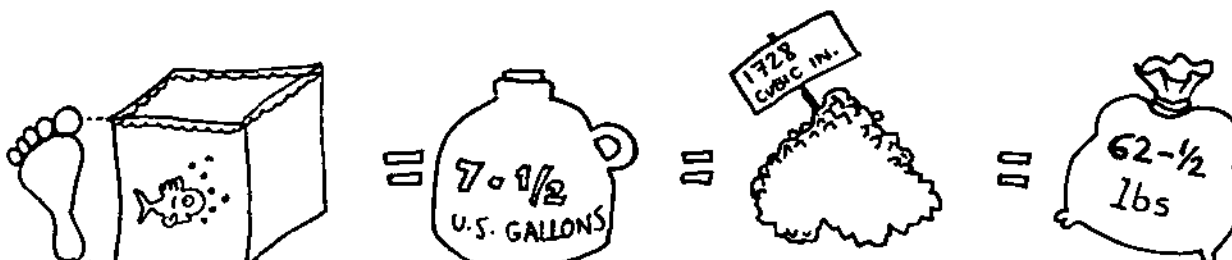
a representation of
a word or phrase by
pictures or symbols
that suggest that
same word or phrase



Doubling the diameter of a pipe increases its capacity four times !!

Pre- and Post-Processors for DOE-2

<p>* DrawBDL Graphic debugging and drawing tool for DOE-2 building geometry [See <i>User News</i> Vol.14, No.1, p.5 for information]</p> <p style="text-align: right;">Fax: (510)236-9238</p>	<p>Joe Huang & Associates 6720 Potrero Avenue El Cerrito CA 94530 Contact: Joe Huang Phone: (510) 559-9067.</p>
<p>* Graphs from DOE-2 [See <i>User News</i> Vol.10, No.3, p.5 for information]</p>	<p>Ernie Jessup 4977 Canoga Avenue Woodland Hills, CA 91364 Phone: (818) 884-3997</p>
<p>* PRC-TOOLS A set of programs that aids in extracting, analyzing and formatting hourly DOE-2 output. Determines energy use, demand, and cost for any number of end-uses and periods. Automatically creates 36-day load shapes. Custom programs also available.</p>	<p>Partnership for Resource Conservation 140 South 34th Street Boulder, CO 80303 Contact: Paul Reeves Phone or FAX: (303) 499-8611</p>
<p>* Pre-DOE (A BDL math pre-processor)</p>	<p>Nick Luick 19030 State Street Corona, CA 91719 Phone: (714) 278-3131</p>
<p>* PrepTM Prep is a batch preprocessor that enables conditional text substitution, expression evaluation, and spawning of other programs. Prep is ideal for large parametric studies that require dozens or even thousands of DOE-2 runs.</p>	<p>ITEM Systems P.O. Box 5218 Berkeley, CA 94705-0218 Contact: Steve Byrne Phone: (510) 549-1444 FAX: (510) 549-1778</p>
<p>* Graphs for DOE-2 2-D, 3-D, hourly, daily, and psychrometric plots [See <i>User News</i> Vol.13, No.1, p.5 for information]</p>	<p>Energy Systems Laboratory Texas A&M University College Station, TX 77843-3123 Contact: Jeff Haberl Phone : (409) 845-6065 FAX: (409) 862-2762</p>



A cubic foot of water contains 7.5 gallons, and weighs 62.5 lbs. !!

R E S O U R C E S

<p>DOE-2 User News Sent without charge to DOE-2 users, the newsletter prints documentation updates and changes, bug fixes, inside tips on using the program more effectively, and articles of special interest to program users.</p> <p>Regular features include a directory of program-related software and services and an order form for documentation. In the summer issue an alphabetical listing is printed of all commands and keywords in DOE-2, and where they are found in the documentation. The winter issue features an index of articles printed in all the back issues.</p>	<p>Simulation Research Group Bldg. 90, Room 3147 Lawrence Berkeley Laboratory Berkeley, CA 94720</p> <p>Contact: Kathy Ellington Phone: (510) 486-5711 FAX: (510) 486-4089 or -5172 e-mail: kathy%gundog@lbl.gov</p>
<p>Help Desk - Bruce Birdsall Call our help desk if you have a question about advanced modeling techniques. If you need to fax an example of your problem, please use the Simulation Research Group's fax number (510-486-4089) and we will forward it. This service is supported by the Simulation Research Group.</p>	<p>Bruce Birdsall Ph: (510) 829-8459. Hours: Monday through Friday 10:00 a.m. to 3:00 p.m. Pacific Time</p>
<p>DOE-2 Training DOE-2 courses for beginning and advanced users.</p>	<p>Energy Simulation Specialists 64 East Broadway, Suite 230 Tempe, AZ 85282 Contact: Marlin Addison Phone: (602) 967-5278</p>
<p>Instructional DOE-2 Video and Manual</p>	<p>JCEM/U. Colorado Campus Box 428 Boulder, CO 80309-0428 Contact: Prof. Jan Kreider Phone: (303) 492-3915</p>
<p>Weather Tapes TMY (Typical Meteorological Year) TRY (Test Reference Year)</p> <p>CTZ (California Thermal Climate Zones)</p> <p>WYEC (Weather Year for Energy Calculation)</p>	<p>National Climatic Data Center Federal Building Asheville, North Carolina 28801 (704) 259-0871 climate data (704) 259-0682 main number</p> <p>California Energy Commission Bruce Maeda, MS-25 1516-9th Street Sacramento, CA 95814-5512 1-800-772-3300 Energy Hotline</p> <p>ASHRAE 1791 Tullie Circle N.E. Atlanta, GA 30329 (404) 636-8400</p>

8/93 975 — (c) 1993 Regents, University of California, Lawrence Berkeley Laboratory. This work is supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technologies, Building Systems and Materials Division of the U.S. Department of Energy under Contract DE-AC03-76SF00098.

■ ■ DOE-2 ENERGY CONSULTANTS ■ ■

<p>Consulting Engineers Charles Fountain Burns & McDonnell Engineers 8055 E. Tufts Avenue, Suite 330 Denver, CO 80237 (303) 721-9292</p>	<p>Consultant Greg Cunningham Cunningham + Associates 512 Second Street San Francisco, CA (415) 495-2220</p>
<p>Microcomputer DOE-2 for European Users Werner Gygli Informatik Energietechnik Weiherweg 19 CH-8604 Volketswil Switzerland</p>	<p>Consultant Jeff Hirsch 2138 Morongo Drive Camarillo, CA 93010 (805) 482-5515</p>
<p>Consultants Charles Eley, Mark Hydeman, Terry Laird Eley Associates 142 Minna Street San Francisco, CA 94105 (415) 957-1977</p>	<p>Computer-Aided Mechanical Engineering Mike Roberts Roberts Engineering Co. 11946 Pennsylvania Kansas City, MO 64145 (816) 942-8121</p>
<p>Mainframe DOE-2 for European Users Joerg Tscherry EMPA, Section 175 8600 Dubendorf Switzerland</p>	<p>Consultant Philip Wemhoff 1512 South McDuff Avenue Jacksonville, FL 32205 (904) 632-7393</p>
<p>Consultant Steven D. Gates, P.E. Building HVAC Design/Performance Modeling 9718-A Fair Oaks Boulevard Fair Oaks, CA 95628 (916) 638-7540</p>	<p>Consultant Donald E. Croy CAER Engineers, Inc. 814 Eleventh Street Golden, CO 80401 (303) 279-8136</p>
<p>Mechanical Engineers Chuck Sherman Energy Simulation Specialists 64 East Broadway, Suite 230 Tempe, AZ 85282 (602) 967-5278</p>	<p>DSM and Energy Engineering Michael W. Harrison, P.E. Energy Resource Management, Inc. 305 West Mercury Butte, MT 59701 (406) 723-4061</p>
<p>Consulting Engineers Jeff Ponsness, P.E. Criterion Engineers 5331 SW Macadam Ave., Suite 205 Portland, OR 97201 (503) 224-8606</p>	<p>Hourly Calibrated DOE-2 Analysis Jeff S. Haberl Energy Systems Laboratory Texas A&M University College Station, TX 77843-3123 (409) 845-6065</p>
<p>Consultant Martyn C. Dodd Gabel Dodd Associates 761 Sir Francis Drake Blvd. San Anselmo, CA 94960 (415) 456-7588</p>	<p>Consulting Engineers Prem N. Mehrotra General Energy Corporation 230 Madison Street Oak Park, IL (708) 386-6000</p>
<p>Energy Management Specialists Hank Jackson, P.E. R,C, & I Engineering Services P.O. Box 2059 Asheville, NC 28802 (704) 254-6080</p>	<p>Consultant/Building Systems Analysis Robert H. Henninger, P.E. ElectroCom GARD Ltd. 7449 N. Natchez Avenue Niles, IL 60714 (708) 647-3252</p>

A new report describes a method of saving energy in cooling-dominated climates through the use of retrofitted spectrally selective glazings. The abstract is printed below. This paper has been submitted for presentation at the ASHRAE 1994 Winter Meeting to be held in New Orleans next January. The paper will be made into an LBL report after the ASHRAE meeting. If you would like to reserve a copy of the LBL report, please fax Pat Ross in the Building Technologies Program at LBL (510) 486-4089 and ask her to reserve a copy of LBL-34455 for you.

Spectrally Selective Glazings for Residential Retrofits in Cooling-Dominated Climates

by

E.S. Lee, D. Hopkins, M. Rubin, D. Arasteh and S. Selkowitz
Building Technologies Program
Energy and Environment Division
Lawrence Berkeley Laboratory
Berkeley, CA 94720

Abstract

Spectrally selective glazings can substantially reduce energy consumption and peak demand in residences by significantly reducing solar gains with minimal loss of illumination and view. In cooling-dominated climates, solar gains contribute 24-31% to electricity consumption and 40-43% to peak demand in homes with single pane clear glazing; standard practice for residential construction built before the implementation of building energy efficiency standards. Therefore, the existing residential housing stock offers a prime opportunity for significant demand side management (DSM), but the energy and cost savings must be weighed against retrofit first costs in order for the technology to achieve full market penetration. Using DOE-2.1D for numerical simulation of building energy performance, we quantify the energy and peak demand reductions, cost savings, and HVAC capacity reductions using spectrally selective glazings for five cooling-dominated climates. The cost-effectiveness of various material and installation retrofit options is discussed. Glazing material improvements for retrofit applications that are needed to achieve prescribed cost savings are also given.

LAWRENCE BERKELEY LABORATORY
SIMULATION RESEARCH GROUP 90-3147
UNIVERSITY OF CALIFORNIA
BERKELEY, CA 94720
U S A

Non - Profit Org.
U.S. POSTAGE
PAID
Berkeley, CA
Permit No. 1123

ADDRESS CORRECTION REQUESTED



Read DOE-2 Documentation:
Fun for the Whole Family!