

THE DOE-2 USER NEWS

PUB-439

DOE-2: THE COMPUTER PROGRAM FOR Vol. 14, No. 4
BUILDING ENERGY SIMULATION Winter 1993



Energy and Environment Division
Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720

02/94 1050 — (c) 1993,94 Regents of the University of California, Lawrence Berkeley Laboratory. This work was supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technologies, Building Systems and Materials Division of the U.S. Dept. of Energy, under Contract No. DE-AC03-76SF00098.

☞ Hands On ☞

☞ DOE-2.1E

DEC-VAX VMS and SUN UNIX versions of DOE-2.1E, plus documentation, are now available from the Energy Science and Technology Software Center; see p.18. To our knowledge the only vendor offering a PC version of DOE-2.1E immediately is the Partnership for Resource Conservation; see p.19.

☞ Exit WinDOE ... Enter PowerDOE!

The WinDOE program, currently being jointly developed by LBL and Hirsch & Associates for the EPRI Division of Customer Services and the DOE Office of Building Technologies, has been renamed "PowerDOE". Based on DOE-2, PowerDOE has a graphical user interface running under Windows that makes it much easier to use than DOE-2 while retaining DOE-2's calculational power and accuracy. Interface features include menu-driven input; on-line help; 2-D and 3-D display of building geometry; graphical results display; building component libraries; and option to automatically generate a building description from type and vintage. There will be more information on PowerDOE in future issues of the User News.

☞ We Finally Break 1,000!

Congratulations to Sharaaz Hosein of the Climate Control Company, in Trinidad, the West Indies; he is the 1,000th subscriber to the User News!! Unfortunately, there is no cash award connected to this honor, but we certainly admire Sharaaz's choice of building simulation software!

☞ Need DOE-2 Help?? Call Bruce!!

Don't forget that Bruce Birdsall is available to answer user questions. You may call him Monday through Friday, from 10:00 a.m. to 3:00 p.m. (PST), at 510-829-8459. This is a free service, supported by the Simulation Research Group.

Table of Contents

- 1 ... Hands On (items of interest)
- 2 ... The Heat Exchanger: Reports
- 3 ... Index to the User News
- 7 ... DOE-2 Training
- 8 ... Elite Software's EZ-DOE Program
- 15 ... IBPSA Conference 1993:
 A Sampling of Abstracts - Part II
- 16 ... An "Enhanced" DrawBDL
- 18 ... DOE-2 Directory
- 22 ... DOE-2 Energy Consultants
- 24 ... "Advanced Lighting Guidelines: 1993"

The User News is produced by Lawrence Berkeley Laboratory's Simulation Research Group. Comments and submissions should be directed to Kathy Ellington, 90-3147, LBL, Berkeley, CA 94720.
Ph: (510) 486-5711 • Fax: (510) 486-4089
Email: kathy%gundog@lbl.gov

■ ■ ■ ■ ■ The Heat Exchanger ■ ■ ■ ■ ■

"Reports"

Question:

The electricity consumption shown in my BEPS report is higher than the electricity consumption reported in ES-D. Which one is correct? What's going on? Help!!

Answer:

I ran the DOE-2.1D input which you kindly sent me on 3-1/2 inch floppy disk. My result was the same as yours: electricity usage in BEPS was significantly higher than shown in ES-D. Other Plant reports such as PS-A and PS-B agree with ES-D. But BEPS turns out to be correct!

Part of the problem is due to your input and part to a DOE-2 bug. Your input shows that you have a number of zones denoted ZONE-TYPE = PLENUM in your SYSTEMS input and that these zones consume electricity (input via LIGHTING-W/SQFT and EQUIPMENT-KW in LOADS). This is OK, but you have forgotten to put these zones in the PLENUM-NAMES list in the SYSTEM command. This means these zones will not get simulated in SYSTEMS when the fans are on, and the incorrect electrical consumption will be passed to PLANT and ECONOMICS. BEPS is correct since it gathers its "LIGHTS" and "MISC EQUIP" numbers directly from LOADS. Note that DOE-2 issues no error message when plenum zones are omitted from the PLENUM-NAMES list. But the situation is more complicated than a simple input error. Even when the missing plenum zones are added to the PLENUM-NAMES list, PS-A, PS-B, and ES-D still disagree with BEPS, although the results are much closer. It turns out that DOE-2 simulates plenums in different places in SYSTEMS depending on whether the system fans are off or on. If the fans are off, the plenums are simulated with the rest of the zones, in the order of the ZONE-NAMES list. But the program fails to add the electricity used in the plenums into the system total electrical

consumption. If the fans are on, the plenums are simulated after all the other zones in the system. In this case the accounting is done correctly. Reports PS-A, PS-B and ES-D are missing the electricity consumed in the plenums when the system fans are off.

So, to summarize:

- 1) in DOE-2.1D the BEPS report will disagree with PS-A, PS-B, and ES-D when electricity is consumed in the plenums;
- 2) the number reported in BEPS is correct;
- 3) be sure to check that all plenums are in a PLENUM-NAMES list as well as in the ZONE-NAMES list.

Since the Economics subprogram was rewritten for DOE-2.1E, the reports problem no longer exists.



Index to the DOE-2 User News

Volume 1, No. 1 (August 1980) through Volume 14, No. 4 (Winter 1993)

KEY: The Index lists *User News* volumes, issues, and page numbers as follows: Name of Article, program version that was current when article appeared, then Volume, Number (No. 1=Spring, No. 2=Summer, No. 3=Fall, No. 4=Winter), and page number.

For example, the entry "Advanced Simulation (2.1C)...7:4,4-8" tells the reader that the article titled "Advanced Simulation", which appeared when DOE-2.1C was the current version of the program, will be found in *User News* Volume 7: Number 4, on pages 4 through 8.

ADVANCED SIMULATION

Advanced Simulation (2.1C)...7:4,4-8
DOE-2 and the Next Generation (2.1C)...6:4,1-2
IBPSA (2.1C)...8:2,4-7
IBPSA Conference 93/Abstracts...14:3,13

BUGS

in DOE-2.1

About bugs...1:1,3
BDL...1:1,4-6; 1:2,6
LOADS...1:1,6
SYSTEMS...1:1,7; 1:2,7-8
PLANT...1:1,9-10; 1:2,8
Weather...1:2,6

in DOE-2.1A

All bugs...3:4,3-6
BDL...2:1,3-6; 2:2,9-10; 2:3,5;
3:1,9-10; 3:1,13; 3:3,3
LOADS...2:1,7; 2:3,5; 3:1,10
SYSTEMS...2:1,8-12; 2:2,10-11; 2:3,5;
3:1,10-12; 3:2,5; 3:3,3
PLANT...2:1,12-14; 2:3,5; 3:1,12
ECON...2:2,11
Weather...2:1,6

in DOE-2.1B

All bugs...5:4,3-6
BDL...4:4,5; 5:1,4
LOADS...4:4,6; 5:1,5
PLANT...4:4,6; 5:1,5
SYSTEMS...4:4,6; 5:1,5
Weather...4:4,6; 5:1,5

in DOE-2.1C

All bugs...9:3,4-16
BDL...7:1,9-33; 9:1,4; 9:2,2
ECON...7:1,9-33
LOADS...7:1,9-33; 7:3,13-14; 8:1,6; 8:4,5
PLANT...7:1,9-33; 8:4,6
Reports...7:1,9-33; 8:1,6
SYSTEMS...7:1,9-33; 8:4,4-5; 9:1,3-5
Weather...7:1,9-33; 8:2,3

in DOE-2.1D

BDL...11:1,5; 11:3,17,20
LOADS...11:3,11,17,19
PLANT...11:3,12
Reports...11:3,17,20
SYSTEMS...11:3,11-15,21-23

DAYLIGHTING

Glazing Optimization Study (2.1A)...3:3,4-5
Daylighting Design Tool Survey ...11:2,12-17; 12:3,19-24,
14:2,2-8
Daylighting Network of North America (2.1C)...6:1,1-2
Daylighting with Multiple Skylights (2.1D)...13:2,2-5
Modeling Complex Daylighting (2.1C)...11:1,6-15
Optimizing Solar Control in a Commercial
Building (2.1D)...14:1,16
Seeing Daylight in So. Calif. (2.1C)...6:3,1
Spectrally Selective Glazings in Cooling-Dominated
Climates (2.1D)...14:2,16
Sunspace/Atrium Model in 2.1C...5:4,1-2
SUPERLITE (2.1C)...8:2,1
Switchable Window Modeling (2.1D)... 14:3,12

DOCUMENTATION

Basics Manual...12:3,1,28-29
Plant...12:4,10
System type: HP...11:1,21-22
System type: PIU...11:1,16-20
System type: PMZS...11:2,5-7
System type: PSZ...11:2,2-4
System type: PTAC...11:3,2-4
System type: PVAVS...11:2,8-10
System type: RESYS...11:3,8-10
System type: SZRH...10:4,2-5
System type: TPFC...11:3,5-7
System type: VAVS...11:1,23-25
BDL Summary...1:1,11-14; 1:2,9-12; 2:1,15; 4:4,3;
6:4,4; 9:4,2-3; 11:3,1,27; 12:1,21-24; 12:2,51
Engineers Manual...7:1,7-8; 13:2,6-14
Engineers Manual Update
Gas Heat Pump Calculations (2.1D)...14:3,9-11
Reference Manual...1:1,11-14; 2:1,16-20
4:1,4; 4:4,3; 5:1,3; 5:4,7
Sample Run Book...1:1,11-14; 8:3,5; 9:4,2-3
Supplement...4:4,3; 5:1,3; 6:4,4; 11:4,2-3; 12:3,1,31;
13:3,16
Loads: Negative Time Zone Bug (PC) (2.1D)...14:1,15
Users Guide...1:1,11-14; 2:1,16

DOE-2 - ALL VERSIONS (program-general topics)

Analyze DOE-2 Outputs Quickly (2.1C)...10:2,7-12
ASHRAE/IES Standard 90 (2.1C)...6:1,3
CECDOEDC California Compliance Tool...12:4,1,12-14
COMPLY24 (California Compliance Tool)...12:2,2-6

Cooling Towers, Hot Tips for...13:3,2-3
 Discovering the Unexpected w/DOE-2 (2.1C)...7:1,3-6
 DOE-2 and CCIP (2.1E)...12:3,16-18
 DOE-2 and Research at LBL (2.1A)...3:2,1-8
 DOE-Plus Pre- and Post-Processor (2.1D)...11:4,4-13
 DOE-SCAN Output Interpreter (2.1D)...12:4,2-3
 Electric Ideas Clearinghouse...11:3,1
 Energy Analysis of the Texas State
 Capitol Restoration...13:4,2-10
 Energy Efficiency in Singapore (2.1B)...5:1,1-2
 The Energy FinAnswer (2.1D)...14:1,2
 Energy Science & Technology Center...12:4,1
 EPRI/DOE Collaboration...12:4,4-5
 Graphical Tools Calibrate DOE-2...13:1,5-14
 Guidelines for Simulation of Bldgs...13:3,4-8
 National Energy Software Center...11:2,11
 New Features in 2.1A ...2:1,1; 2:2,1
 New Features in 2.1D...9:2,3-6
 Plant Operating Strategies (2.1D)...12:3,2-15
 PG&E's Pacific Energy Center...13:1,15
 Release of DOE-2.1E...14:3,2-8
 Sky Simulator at LBL (2.1B)...4:2,3
 Southern California Edison's "Design
 Assistance Program" (2.1D)...12:2,4,8
 Start Thinking Metric!...14:1,8-9
 Thermal Properties of Food...14:3,19
 Using DOE-2 in the Design Process (2.1A)...3:2,4
 Utah's Building Design Center...13:2,5,3

DOE-2 - ALL VERSIONS (program-specific topics)

Alphabetical cross index of commands and
 keywords (2.1D)...12:2,7-46
 Atrium Buildings, How to Model (2.1C)...7:3,2-7
 BDL fix: "symbol table full" (all)...9:2,2; 11:1,5
 COMBINE (2.1D)...11:2,1
 Cooling Systems, How to Size (2.1C)...10:1,2-8
 Custom Weighting Factors (CWF)
 Automatic CWF (2.1A)...2:2,2-3
 Input Guidelines (2.1)...1:1,15-16
 Caution and Error Messages (2.1)...1:2,2-3
 DSNFIL, File structure for (2.1A)...3:1,6-8
 Economic Evaluation Methods (2.1A)...3:1,3-5
 ECONOMICS, Electric Rate Structure (2.1C)...5:3,1-3
 Electrical Generation Strategies (2.1B)...4:2,1-2
 Functional Values, Development of (2.1B)...3:4,1-2
 Functional Values, Example Inputs (2.1D)...12:1,2-4
 Glazing Optimization Study (2.1A)...3:3,4-5
 Graphs from DOE123 (2.1C,D)...10:3,5-7
 Hourly reports...13:1,4
 LOADS: High heating loads with low cooling
 loads (2.1C vs D)...12:2,4,7
 Ice Storage Systems, How to Model (2.1C)...8:1,2-5
 Input Macros for Residential Windows (2.1D)...12:1,5-17
 LDSOUT, File structure for (2.1A)...3:1,6-8
 Metric Option in 2.1C...4:3,1
 Optimizing Solar Control in a Commercial
 Building (2.1D)...14:1,16
 Output Reports (2.1A)...2:2,4-6
 PLANT, Direct Cooling in (2.1A)...3:1,2
 Powered Induction Units (2.1B)...4:1,2
 Reading Measured Schedule Values From a
 File (2.1D)...14:1,3-4
 Reports (Upgraded) in 2.1B...4:4,1-2
 Schedules, Preparation of (2.1B)...4:1,3; 4:2,4; 9:3,2-3
 Systems, Developments in (2.1C)...5:3,3-4

SYSTEMS, Sizing Option in (2.1A)...2:3,3
 Stud Wall Construction (2.1A)...2:3,4
 Sample Run Book Overview (2.1C)...6:2,1
 Spectrally Selective Glazings in Cooling-Dominated
 Climates (2.1D)...14:2,16
 Sunspace/Atrium Model in 2.1C...5:4,1-2
 VAV: Elevated Supply Air Temps (2.1B)...4:3,2-3
 VAV: Fan Sizing (2.1A)...2:2,7-8
 Weather, Processing Nonstandard (2.1C,D)...10:3,2-6

DOE-2.1

Articles related to Version 2.1

CWF Input Guidelines...1:1,15-16
 Caution and Error Messages...1:2,2-3
 WRISC...1:2,4

Bugs

About bugs...1:1,3
 BDL...1:1,4-6; 1:2,6
 LOADS...1:1,6
 SYSTEMS...1:1,7; 1:2,7-8
 PLANT...1:1,9-10; 1:2,8
 Weather...1:2,6

Documentation Updates

BDL Summary...1:1,11-14; 1:2,9-12
 Reference Manual...1:1,11-14
 Sample Run Book...1:1,11-14
 Users Guide...1:1,11-14

LOADS

EQUIPMENT-KW...1:1,19
 verification reports...1:1,17-18
 passed from SYS to PLT...1:1,17
 SHADING COEF...1:1,17
 schedules ...1:2,14

PLANT

BEPS (report)...1:1,20
 minimum input...1:1,20
 HOT-WATER...1:2,13

SYSTEMS

COOL-CONTROL...1:2,13
 EQUIPMENT KW...1:1,19
 MIN CFM RATIO...1:1,19
 RETURN CFM...1:2,13
 PTAC...1:2,13
 SYSTEM-FANS...1:2,13
 thermostat...1:2,14

WEATHER

Tapes...1:1,17

DOE-2.1A

Articles related to Version 2.1A

Automatic Custom Weighting Factors...2:2,2-3
 CIRA...3:2,2
 Direct Cooling in PLANT...3:1,2
 DOE-2 vs BLAST Comparison...3:3,1-3
 DOE-2 vs CERL Data for VAV and Reheat...3:2,3
 DOE-2 on a Microcomputer...2:3,1-2
 DOE-2 and Research at LBL...3:2,1-8
 Economic Evaluation Methods...3:1,3-5
 Fan Sizing for VAV Systems...2:2,7-8
 File Structure for LDSOUT and DSNFIL...3:1,6-8
 Glazing Optimization Study...3:3,4-5
 Output Reports...2:2,4-6
 New Features in 2.1A...2:1,1; 2:2,1
 Sizing Option in SYSTEMS...2:3,3
 Stud Wall Construction...2:3,4

Using DOE-2 in the Design Process...3:2,4

Bugs

All bugs...3:4,3-6

BDL...2:1,3-6; 2:2,9-10; 2:3,5; 3:1,9-10;
3:1,13; 3:3,3

LOADS...2:1,7; 2:3,5; 3:1,10

SYSTEMS...2:1,8-12; 2:2,10-11; 2:3,5;
3:1,10-12; 3:2,5; 3:3,3

PLANT...2:1,12-14; 2:3,5; 3:1,12

ECON...2:2,11

Weather...2:1,6

Documentation Updates

BDL Summary...2:1,15

Reference Manual...2:1,16-20

Users Guide...2:1,16

ECONOMICS

symbol table...2:1,21

INCREMENTAL-INVESTMENTS...2:2,13

LOADS

building shades...2:3,6

DHW heater...2:1,22

DHW temp...2:1,12

heat recovery...2:2,12

MULTIPLIER...2:3,6

symbol table...2:1,21

PLANT

BEPS (report)...2:3,6

cooling towers...2:2,12

equipment combinations...3:2,6

symbol table...2:1,21

SYSTEMS

ABORT command...2:1,22

DDS system...3:1,13

residential ground water heatpump...3:2,6

sizing/behavior of systems...2:1,22-23

symbol table...2:1,21

DOE-2.1B

Articles related to Version 2.1B

Electrical Generation Strategies...4:2,1-2

Elevated Supply Air Temps: VAV...4:3,2-3

Energy Efficiency in Singapore...5:1,1-2

Functional Values, Development of...3:4,1-2

New Features in 2.1B...2:1,1; 2:2,1

Powered Induction Units...4:1,2

Preparing Schedules...4:1,3; 4:2,4

Sky Simulator at LBL...4:2,3

Upgraded Reports in 2.1B...4:4,1-2

Bugs

All bugs...5:4,3-6

BDL...4:4,5; 5:1,4

LOADS...4:4,6; 5:1,5

SYSTEMS...4:4,6; 5:1,5

PLANT...4:4,6; 5:1,5

Weather...4:4,6; 5:1,5

Documentation Updates

BDL Summary...4:4,3

Reference Manual...4:1,4; 4:4,3; 5:1,3; 5:4,7

Sample Run Book...8:3,5

Supplement...4:4,3; 5:1,3

LOADS

daylighting...5:4,7

hourly report variables...4:1,5

PLANT

BEPS (lighting)...5:4,6

ice storage...5:4,7

SYSTEMS

cooling/heating, LOADS to PLANT...4:1,5

dual systems...3:4,7

fan coil units...5:4,6

heating/cooling unit ventilation...4:2,6

kitchen exhaust...4:2,5

radiant panel heating/cooling...4:2,5

startup controls...3:4,7

steam radiation, with vent...4:2,5

steam radiation, without vent...4:2,5

DOE-2.1C

Articles related to Version 2.1C

A Minute Per Zone on PC's...11:1,2-4

ADM-2...7:2,6-9

Advanced Simulation...7:4,4-8

ASHRAE/IES Standard 90...6:1,3

Discovering the Unexpected w/DOE-2...7:1,3-6

Cooling Systems, How to Size...10:1,2-8

DOE-2 and the Next Generation...6:4,1-2

Functional Values, Development of...3:4,1-2

Metric Option in 2.1C...4:3,1

MICRO-DOE2...7:4,2-3

Microcomputer Update...6:1,2

Modeling Atrium Buildings...7:3,2-7

Modeling Complex Daylighting...11:1,6-15

Modeling Ice Storage Systems...8:1,2-5

PC-DOE Overview...7:2,2-3

New Elec. Rate Structure, ECONOMICS...5:3,1-3

Sample Run Book Overview...6:2,1

Seeing Daylight in Southern California...6:3,1

Sunspace/Atrium Model in 2.1C...5:4,1-2

Systems, Developments in 2.1C...5:3,3-4

Using PC-DOE...7:2,4-5

Validation of DOE-2: the Collins Building...8:3,2-4

Weather Data for DOE-2...7:4,9-14

Weather Processor Update...7:3,8-10

Weather Utility Program...7:3,10-12

BDL

schedules...9:3,2-3

symbol table full...9:2,2

BUGS

All bugs...9:3,4-16

BDL...7:1,9-33; 9:1,4

ECON...7:1,9-33

LOADS...7:1,9-33; 7:3,13-14; 8:1,6; 8:4,5

SYSTEMS...7:1,9-33; 8:4,4-5; 9:1,3-5

PLANT...7:1,9-33; 8:4,6

Reports...7:1,9-33; 8:1,6

Weather...7:1,9-33; 8:2,3

Documentation Updates

BDL Summary...6:4,4

Engineers Manual...7:1,7-8

Supplement...6:4,4

LOADS

run times 2.1B vs 2.1C...7:1,2

SET-DEFAULT, ROOF + EXT-WALL...8:3,5

SYSTEMS

bypass system...6:1,3

specifying occupancy...6:4,2

BEPS (hourly report variable)...6:4,2

warmup cycle...8:3,5

VVT systems...9:1,2

DOE-2.1D

Articles related to Version 2.1D

Alphabetical cross index of commands and keywords ...12:2,7-46
BDL Summary...9:4,2-3
CECDOEDC California Compliance Tool...12:4,1,12-14
Cooling Towers, Hot Tips for...13:3,2-3
DOE-Plus Pre- and Post-Processor...11:4,4-13
Energy Analysis of the Texas State Capitol Restoration...13:4,2-10
Energy FinAnswer...14:1,2
Functional Values, Example Inputs...12:1,2-4
Evaporative Cooling ...12:4,1
Graphical Tools Calibrate DOE-2...13:1,5-14
Hourly reports...13:1,4
Input Macros for Residential Windows ...12:1,5-17
LOADS: High heating loads with low cooling loads (2.1C vs D)...12:2,47
New Features in 2.1D...9:2,3-6
Optimizing Solar Control in a Commercial Building...14:1,16
Plant Operating Strategies (2.1D)...12:3,2-15
Reading Measured Schedule Values From a File...14:1,3-4
Reports...14:4,2
Sample Run Book...9:4,2-3
Southern California Edison's "Design Assistance Program" ...12:2,48
Spectrally Selective Glazings in Cooling-Dominated Climates...14:2,16
Switchable Window Modeling...14:3,12

BDL

symbol table full (2.1D)...11:1,5

Documentation Updates

Basic Manual

System type: HP...11:1,21-22
System type: PIU...11:1,16-20
System type: PMZS...11:2,5-7
System type: PSZ...11:2,2-4
System type: PVAVS...11:2,8-10
System type: SZRH...10:4,2-5
System type: VAVS...11:1,23-25
BDL Summary...11:3,27; 12:1,21-24
Supplement...11:4,2-3; 12:3,31

ECONOMICS Subprogram - ALL VERSIONS

INCREMENTAL-INVESTMENTS (2.1A)...2:2,13
New Electrical Rate Structure (2.1C)...5:3,1-3
symbol table (2.1A)...2:1,21

LOADS Subprogram - ALL VERSIONS

building shades (2.1A)...2:3,6
EQUIPMENT-KW (2.1)...1:1,19
Daylighting (2.1B)...5:4,7
Daylighting with Multiple Skylights (2.1D)...13:2,2-5
DHW heater (2.1A)...2:1,22
DHW temp (2.1A)...2:1,12
heat recovery (2.1A)...2:2,12
high heating loads with low cooling loads (2.1C vs D)...12:2,47
hourly report variables (2.1B)...4:1,5
MULTIPLIER (2.1A)...2:3,6
run times 2.1B vs 2.1C...7:1,2
schedules (2.1)...1:2,14
SET-DEFAULT, ROOF + EXT-WALL (2.1C)...8:3,5

SHADING COEF (2.1)...1:1,17
symbol table (2.1A)...2:1,21
SYSTEMS to PLANT (2.1)...1:1,17
verification reports (2.1)...1:1,17-18

DOE-2.1E

Articles related to Version 2.1E

New Features in 2.1E...13:1,2-3
Release of DOE-2.1E 14:3,2-8

MICROCOMPUTER PROGRAMS

DOE-2 Related

A Minute Per Zone on PC's...11:1,2-4
CECDOEDC California Compliance Tool...12:4,1,12-14
COMPLY24 (Calif Compliance Tool)...12:2,2-6
DOE-2 on a Microcomputer (2.1A)...2:3,1-2
DOE-Plus Pre/Post-Processor (2.1D)...11:4,4-13;13:2,54-56
DRAWBDL A Graphic Debugging and Drawing Tool for DOE-2.1D...14:1,5-7
Elite Software announces EZDOE (2.1D)...14:2,10
EPRI/DOE Collaboration...12:4,4-5
Evaporative Cooling ...12:4,1
Graphs from DOE123 (2.1C,D)...10:3,5-7
MICRO-DOE2 (2.1C)...7:4,2-3
PC-DOE Overview (2.1C)...7:2,2-3
PRC-DOE2 Description (2.1D)...13:4,11
PRC-Tools: Support Programs for Microcomputer Versions of DOE-2.1D...14:2,9
Quick Analysis of Outputs (2.1C,D)...10:2,7-12
Using PC-DOE (2.1C)...7:2,4-5

Other

ADM-2 (2.1C)...7:2,6-9
CIRA (2.1A)...3:2,2
Daylighting Design Tool Survey ...11:2,12-17;12:3,19-24, 14:2,2-8
Elite Software's EZDOE...14:4,8-14
Microcomputer Update (2.1C)...6:1,2
SUPERLITE (2.1C)...8:2,1
WINDOW-2.0 (2.1C)...8:4,2-3
WINDOW-3.1 (2.1C,D)...10:2,5-6
PEAR (2.1C)...8:2,2
WRISC (2.1)...1:2,4

PLANT Subprogram - ALL VERSIONS

BEPS (report) (2.1)...1:1,20
BEPS (report) (2.1A)...2:3,6
BEPS (lighting) (2.1B)...5:4,6
cooling towers (2.1A)...2:2,12
Direct Cooling in PLANT (2.1A)...3:1,2
equipment combinations (2.1A)...3:2,6
HOT-WATER (2.1)...1:2,13
ice storage (2.1B)...5:4,7
minimum input (2.1)...1:1,20
Plant Operating Strategies (2.1D)...12:3,2-15
symbol table (2.1A)...2:1,21

SYSTEMS Subprogram - ALL VERSIONS

ABORT command (2.1A)...2:1,22
BEPS (hourly report variable) (2.1C)...6:4,2
bypass system (2.1C)...6:1,3
COOL-CONTROL (2.1)...1:2,13
cooling/heating, LOADS to PLANT (2.1B)...4:1,5
DDS system (2.1A)...3:1,13
dual systems (2.1B)...3:4,7
EQUIPMENT KW (2.1)...1:1,19

fan coil units (2.1B)...5:4,6
 Gas Heat Pump Calculations (2.1D)...14:3,9-11
 heating/cooling unit ventilation (2.1B)...4:2,6
 kitchen exhaust (2.1B)...4:2,5
 MIN CFM RATIO (2.1)...1:1,19
 PIU (2.1D)...11:1,16-20
 PMZS (2.1D)...11:2,5-7
 PSZ (2.1D)...11:2,2-4
 PTAC (2.1D)...1:2,13
 PVAVS (2.1D)...11:2,8-10
 radiant panel heating/cooling (2.1B)...4:2,5
 residential ground water heatpump (2.1A)...3:2,6
 RETURN CFM (2.1)...1:2,13
 sizing/behavior of systems (2.1A)...2:1,22-23
 specifying occupancy (2.1C)...6:4,2
 startup controls (2.1B)...3:4,7
 steam radiation, with vent (2.1B)...4:2,5
 steam radiation, without vent (2.1B)...4:2,5
 symbol table (2.1A)...2:1,21
 SYSTEM-FANS (2.1)...1:2,13
 SYSTEMS, Sizing Option in (2.1A)...2:3,3
 SZRH...10:4,2-5
 thermostat (2.1)...1:2,14
 VVT systems (2.1C)...9:1,2
 Warmup cycle (2.1C)...8:3,5

VALIDATION - ALL VERSIONS

Validating DOE-2: Collins Bldg (2.1C)...8:3,2-4
 DOE-2 vs BLAST Comparison (2.1A)...3:3,1-3
 DOE-2 vs CERL Data: VAV and Reheat (2.1A)...3:2,3

WEATHER - ALL VERSIONS

Data for DOE-2 (2.1C)...7:4,9-14
 Nonstandard Weather Data (2.1C,D)...10:2,2-6
 Processor Update (2.1C)...7:3,8-10
 Tapes (2.1)...1:1,17
 Weather Utility Program (2.1C)...7:3,10-12

*** * * International DOE-2 Training * * ***
Sponsor: Kuwait Institute for Scientific Research

Session I:
April 16-20, 1994
DOE-2.1E "Basic" Course

Session II:
April 23-27, 1994
DOE-2.1E "Advanced" Course

Classes organized and sponsored by the Engineering Division, Energy Department, of the Kuwait Institute for Scientific Research, 13109 Safat, Kuwait.

For information and reservations, please contact Ms. Hind Al-Jassem or Mr. Anwar Al-Rashed at KISR. Phone: +965 484-5769 or Fax +965 483-4898.



DOE-2 Training Sessions

Instructor: Marlin Addison of Energy Simulation Specialists, Inc.

April 28-30, 1994
Contact Britt Reed
Utah Dept. of Natural Resources
3 Triad Center, Suite 450
Salt Lake City, Utah 94180-1204
Phone: (801) 538-5428

Late May, 1994
Contact Pete Gonzales
Washington State Energy Office
925 Plum Street S.E., Suite 4
Olympia, Washington 98504-3165
Phone: (206) 956-2044

EZDOE

An Easy to Use PC Version of DOE 2.1D

By
William W. Smith, President
Elite Software
P.O. Drawer 1194
Bryan, TX 77806
1-800-648-9523

DOE-2 has long been recognized as one of the most capable building energy analysis programs in the world. Unfortunately, DOE-2 has also gained a reputation of being difficult to use with a steep learning curve. The perceived ease of use problems with DOE-2 has limited its popularity somewhat and slowed its growth into mainstream engineering design firms.

In August of 1990, Elite Software made a decision to freeze the development of its own energy analysis program called ENERGY, and start work on a modern, user friendly, data entry system for DOE-2 that would automatically create an error checked BDL file without requiring the user to know anything about keywords or BDL file format. The new, easy to use, IBM PC compatible program called EZDOE would also seamlessly incorporate the full DOE-2 FORTRAN calculation modules as maintained by Lawrence Berkeley Labs. At the time, no one at Elite Software fully realized the magnitude of the task and it was thought that EZDOE would be completed by the Fall of 1991. Finally, complete with a 750 page user manual, EZDOE was released in November 1993.

In the development of EZDOE, there were many difficult and critical features needed to make DOE-2 easy to use by the average designer. Well organized, error checked, "fill in the blank" style data entry screens, electronic mouse support, context sensitive help for every input item, compatibility with Elite Software's ASHRAE based commercial hvac load calculation program (CHVAC), extensive weather data, pie charts, line graphs, a comprehensive user manual, and full customer support were the major objectives of the EZDOE program.

Of the above features, the most difficult to achieve was the optimal layout and organization of data entry screens. DOE-2 provides for thousands of input possibilities, often with excruciating detail. For example, DOE-2 provides over 20 items of information that can be specified for an exterior roof or wall. However, of these 20 items, only about five items (construction number, height, width, azimuth and tilt) are of primary importance. The remaining items are important, but their values don't change as much from wall section to wall section.

By analyzing every single input component and ranking the items of information for those components in terms of primary and secondary importance, Elite Software was able to create data entry screens that emphasized the most important information while still providing access to the more esoteric data for each component. The great benefit of this approach is that a designer can see at a glance all the important information that applies to a single space for example. Using page up and down keys, the user can scroll through the spaces of an EZDOE project file and quickly check on roof, wall, windows, doors, lights, people, equipment, area, and many other such values. Figure 1 shows a sample Space Overview Data screen from EZDOE.

EZDOE		ELITE SOFTWARE ENERGY ANALYSIS PROGRAM				C:EXAMPLE	
SPACE OVERVIEW DATA							
SPACE #:	1	AREA:	600	ACTIVE:	Y	LIGHT:	0.60 (kW)
U-NAME:	Accounting	VOLUME:	4800	TEMP:	73	EQUIP:	0.30 (kW)
AZIMUTH:	0	PEOPLE:	8	MULT:	1	TYPE:	1 CONDITIONED
WALLS/ROOFS				WINDOWS/DOORS			
NO.	TYPE	CON	HEIGHT	WIDTH	AZI	TILT	
1.	R	1	30	20	0	0	
2.	W	2	8	30	315	90	
3.	W	2	8	30	135	90	
4.	W	2	8	20	225	90	
5.	/	0	0	0	0	90	
6.	/	0	0	0	0	90	
7.	/	0	0	0	0	90	
8.	/	0	0	0	0	90	
9.	/	0	0	0	0	90	
10.	/	0	0	0	0	90	
NO.	TYPE	CON	HEIGHT	WIDTH	MULT	REF	
1.	W	3	3	6	2	2	
2.	W	3	3	4	1	4	
3.	W	3	3	6	1	3	
4.	D	4	7	3	1	3	
5.	/	0	0	0	1	0	
6.	/	0	0	0	1	0	
7.	/	0	0	0	1	0	
8.	/	0	0	0	1	0	
9.	/	0	0	0	1	0	
10.	/	0	0	0	1	0	
F2-DELETE SPACE		F3-COPY SPACE		F1-KEY HELP		F10-INPUT HELP	
F4-DETAILED DATA		F5-MISC. SPACE DATA		F6-DAYLIGHT DATA		ESC-EXIT SCREEN	

Figure 1 Space Overview Data Screen

Systems

A similar situation exists with systems as with spaces. There are numerous data about systems that can be ranked and separated for easier viewing. Figure 2 shows primary system data with function keys F5 and F6 used to view and edit details on the system equipment and fan.

EZDOE		ELITE SOFTWARE ENERGY ANALYSIS PROGRAM				C:EXAMPLE	
SYSTEM EQUIPMENT							
SYSTEM NO: 1				U-NAME: DRAW_THRU			
SYSTEM TYPE: 24 PSZ - Packaged Single Zone System				F7-MISC. DATA			
COOLING CAPAC:	0 (BTUH)	HEATING CAPAC:	0 (BTUH)				
COOL CAP FT:	0 DEFAULT	HEAT CAP FT:	0				
COOLING EIR:	0.360 (BTU/BTU)	HEATING EIR:	0.370 (BTU/BTU)				
COOLING EIR FT:	0	HEATING EIR FT:	0				
COOL EIR FPLR:	0	HEAT EIR FPLR:	0				
COOL SENS H CAP:	0	FURNACE AUX:	800 (BTUH)				
COOL SENS H FT:	0 DEFAULT	FURNACE HIR:	1.350 (BTU/BTU)				
COIL BYPASS FAC:	0.190	FURN. HIR FPLR:	0 DEFAULT				
COIL BF FCFM:	0 DEFAULT	FURN. OFF LOSS:	0 DEFAULT				
COIL BF FT:	0 DEFAULT	RATED CCAP FCFM:	0 DEFAULT				
COOL FT MIN:	0 (°F)	RATED SH FCFM:	0 DEFAULT				
MAX HP SUPP T:	40 (°F)	RATED HCAP FCFM:	0 DEFAULT				
MIN HP TEMP:	15 (°F)	RATED CEIR FCFM:	0 DEFAULT				
HP SUPP HT CAP:	0	MIN UNLD RATIO:	0.250				
HP SUPP SOURCE:	1 HOT WATER	MIN HGB RATIO:	0.250				
DEFROST TEMP:	40 (°F)	DEFROST DEGRADE:	0 DEFAULT				
F4-SYSTEM		F6-FAN		ESC-EXIT SCREEN		F1-KEY HELP	
F9-ZONE						F10-INPUT HELP	

Figure 2 Sample System Equipment Screen

While the concept of organizing and ranking data for faster viewing and editing does not on the surface seem extraordinary, the approach used by many other programs is to simply view and edit one component at a time in full detail. That approach makes it very difficult and slow to overview the primary data for a space or system, and it requires many more keystrokes and mouse clicks to access the relevant data.

Schedules

Besides organizing space data for fast and efficient data entry, schedule information was optimized as well. DOE-2 uses the hierarchical concept of a schedule which may contain up to 52 week schedules each of which may contain up to seven day schedules. EZDOE uses data entry screens to make it easy to assign week schedules to schedules and day schedules to week schedules. Calendar information can also be displayed whenever desired by pressing a function key. EZDOE even provides a quick schedule maker that automatically assigns a day schedule to a new week schedule and the new week schedule to a schedule. Figures 3, 4, and 5 illustrate the schedule entry screens of EZDOE.

EZDOE		ELITE SOFTWARE ENERGY ANALYSIS PROGRAM				C:EXAMPLE	
SCHEDULE NUMBER: 1		SCHEDULE		JAN	FEB	MAR	APR
U-NAME: FULL_ON				1234567	1234567	1234567	1234567
DESCRIPTION: FULL WEEKDAY SCHEDULE				8901234	8901234	8901234	8901234
				5678901	5678901	5678901	5678901
				2345678	2345678	2345678	2345678
				901		901	90
NO.	THRU	W-SCH		MAY	JUN	JUL	AUG
1	JAN 1 - DEC 31	W_FULL_ON		1234567	1234567	1234567	1234567
2	0 -	0		8901234	8901234	8901234	8901234
3	0 -	0		5678901	5678901	5678901	5678901
4	0 -	0		2345678	2345678	2345678	2345678
5	0 -	0		901	90	901	901
6	0 -	0					
7	0 -	0		SEP	OCT	NOV	DEC
8	0 -	0		1234567	1234567	1234567	1234567
9	0 -	0		8901234	8901234	8901234	8901234
10	0 -	0		5678901	5678901	5678901	5678901
11	0 -	0		2345678	2345678	2345678	2345678
12	0 -	0		90	901	90	901
F2-DEL		F3-COPY		F4-DAY SCH		F5-WEEK SCH	
				F9-CALENDAR		ESC-EXIT F10-HELP	

Figure 3 Sample Schedule

EZDOE		ELITE SOFTWARE ENERGY ANALYSIS PROGRAM				C:EXAMPLE	
WEEK-SCHEDULE NUMBER: 2		WEEK-SCHEDULE					
U-NAME: W_OCCUP							
		DAY SCHEDULE					
		MONDAY:		2 D_OCCUP			
		TUESDAY:		2 D_OCCUP			
		WEDNESDAY:		2 D_OCCUP			
		THURSDAY:		2 D_OCCUP			
		FRIDAY:		2 D_OCCUP			
		SATURDAY:		3 D OFF			
		SUNDAY:		3 D OFF			
		HOLIDAYS:		3 D OFF			
F2-DEL		F3-COPY		F4-DAY SCH		F6-SCHEDULE	
				F9-CALENDAR		ESC-EXIT F10-HELP	

Figure 4 Sample Week Schedule

EZDOE	ELITE SOFTWARE ENERGY ANALYSIS PROGRAM								C:EXAMPLE
DAY-SCHEDULE									
DAY-SCHEDULE NUMBER:	2								
U-NAME:	D_OCCUP								
HOUR:	1	2	3	4	5	6	7	8	
VALUE:	0	0	0	0	0	0	0	1	
HOUR:	9	10	11	12	13	14	15	16	
VALUE:	1	1	0.70	0.70	0.70	1	1	1	
HOUR:	17	18	19	20	21	22	23	24	
VALUE:	0.60	0.30	0	0	0	0	0	0	
F2-DEL F3-COPY F5-WEEK SCH F6-SCHED F7-QUICK SCHED F9-CALENDAR								F10-HELP	

Figure 5 Sample Day Schedule

Other data, such as the plant and economic information is similarly simplified and arranged so that as much of the primary data can be seen and edited as possible on a single screen.

Reports

EZDOE provides all the standard report options as standard DOE-2. There are scores of report options for loads, systems, plants, and economics. These reports can be selected for printing to the screen, printer, or disk file. When reports are selected to the screen, they can be scrolled forwards and backwards as well as left and right. In this way, wide column output can still be viewed on the screen. Figure 6 shows just some of the report options available.

EZDOE	ELITE SOFTWARE ENERGY ANALYSIS PROGRAM								C:EXAMPLE		
REPORT OPTIONS											
LOADS VERIFICATION REPORTS					LOADS SUMMARY REPORTS						
BUILDING INPUT	(LV-A)	Y	SPACE PEAK LOADS SUMMARY	(LS-A)	Y	SUMMARY OF SPACES	(LV-B)	Y	SPACE PEAK LOAD COMPONENTS	(LS-B)	Y
DETAILS OF SPACE	(LV-C)	Y	BUILD. MONTHLY LOADS SUM.	(LS-D)	Y	DETAILS OF EXTERIOR SURFACES	(LV-D)	N	SPACE MONTHLY LOAD COMP.	(LS-E)	Y
DETAILS OF UNDERGND SURFACES	(LV-E)	N	BUILD. MONTHLY LOAD COMP.	(LS-F)	Y	DETAILS OF INTERIOR SURFACES	(LV-F)	N	SPACE DAYLIGHTING SUMMARY	(LS-G)	N
DETAILS OF SCHEDULES	(LV-G)	N	% LIGHTING REDUCTION SPACE	(LS-H)	N	DETAILS OF WINDOWS	(LV-H)	N	% LIGHTING REDUC. BUILDING	(LS-I)	N
DETAILS OF CONSTRUCTIONS	(LV-I)	N	DAYLIGHT ILLUMINANCE FREQ.	(LS-J)	N	DETAILS OF BUILDING SHADES	(LV-J)	N	SPACE INPUT FUELS SUMMARY	(LS-K)	Y
WEIGHTING FACTOR SUMMARY	(LV-K)	N	MANAGEMENT & SOLAR SUMMARY	(LS-L)	N	DETAILS OF BUILDING SHADES	(LV-J)	N			
DAYLIGHT FACTOR SUMMARY	(LV-L)	N				REPORT FREQUENCY:		1 (1-HOURLY, 2-DAILY, 3-MONTHLY, 4-YEARLY)			
DOE-2 UNITS TABLE	(LV-M)	N				SAVE HOURLY DATA:		N (Y,N)			
F2-LOADS F3-SYSTEMS F4-PLANTS F5-ECONOMICS					PGUP-PREV ESC-EXIT SCREEN						
F6-REPORT BLOCK F7-HOURLY REPORTS					PGDN-NEXT F10-INPUT HELP						

Figure 6 Sample Report Options Screen

In addition to the standard DOE-2 reports, EZDOE also provides 10 different pie charts and graphs. These graphic reports include a peak load components pie chart, monthly load summary bar graph, monthly energy summary bar chart, monthly fuel and utility cost graph, building energy performance pie chart and many others. Figures 7, 8, 9 and 10 show some of the graphic reports available from EZDOE.

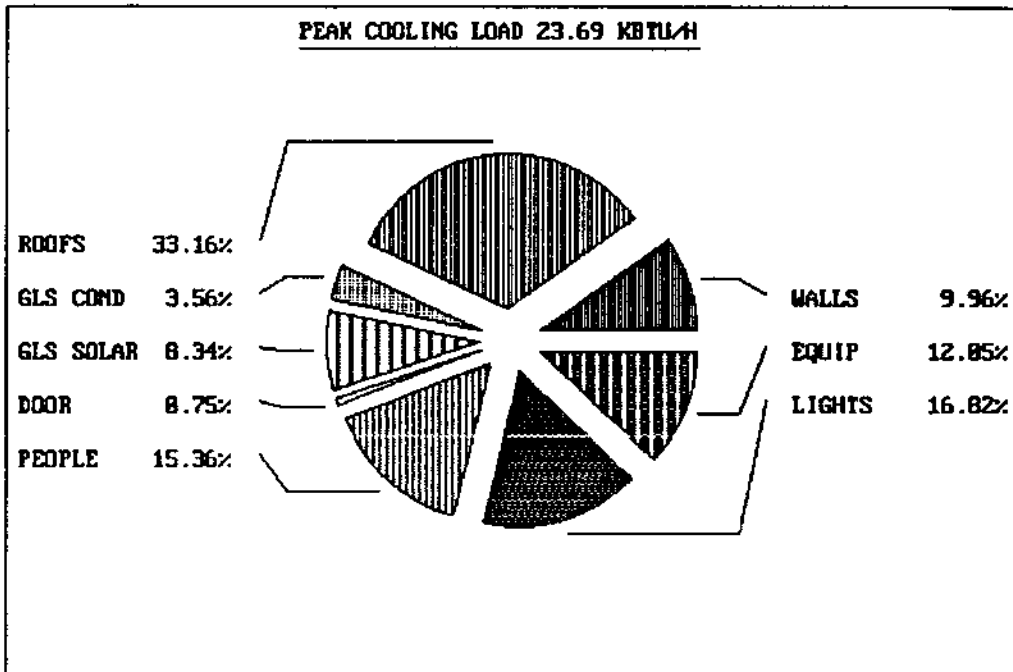


Figure 7 Pie Chart Showing Percentage of Components in Peak Cooling Loads

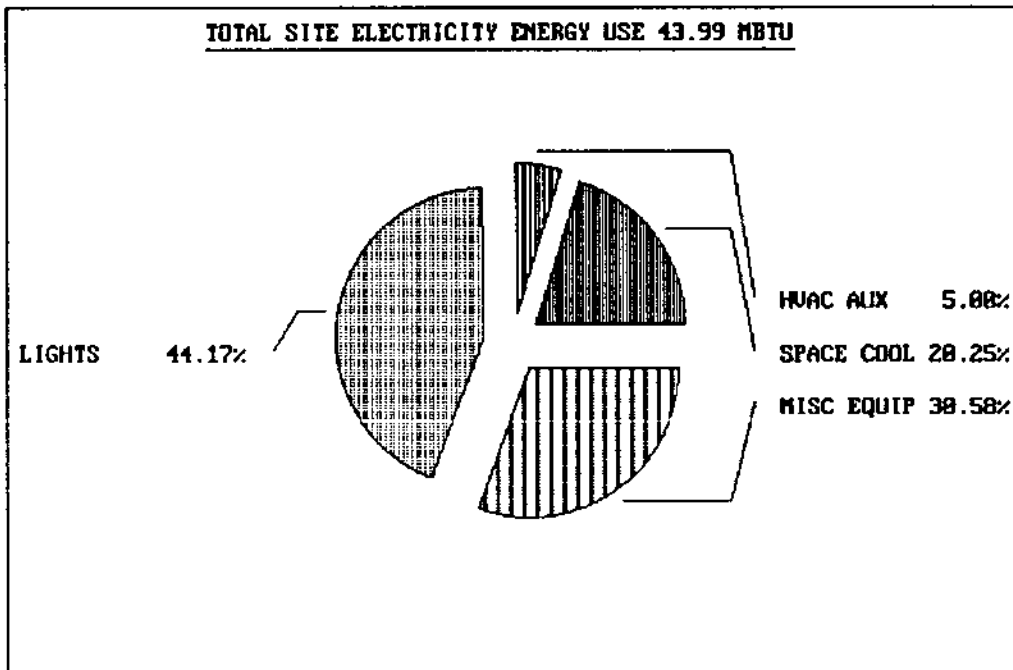


Figure 8 Pie Chart Showing Percentage of Electrical Energy Usage

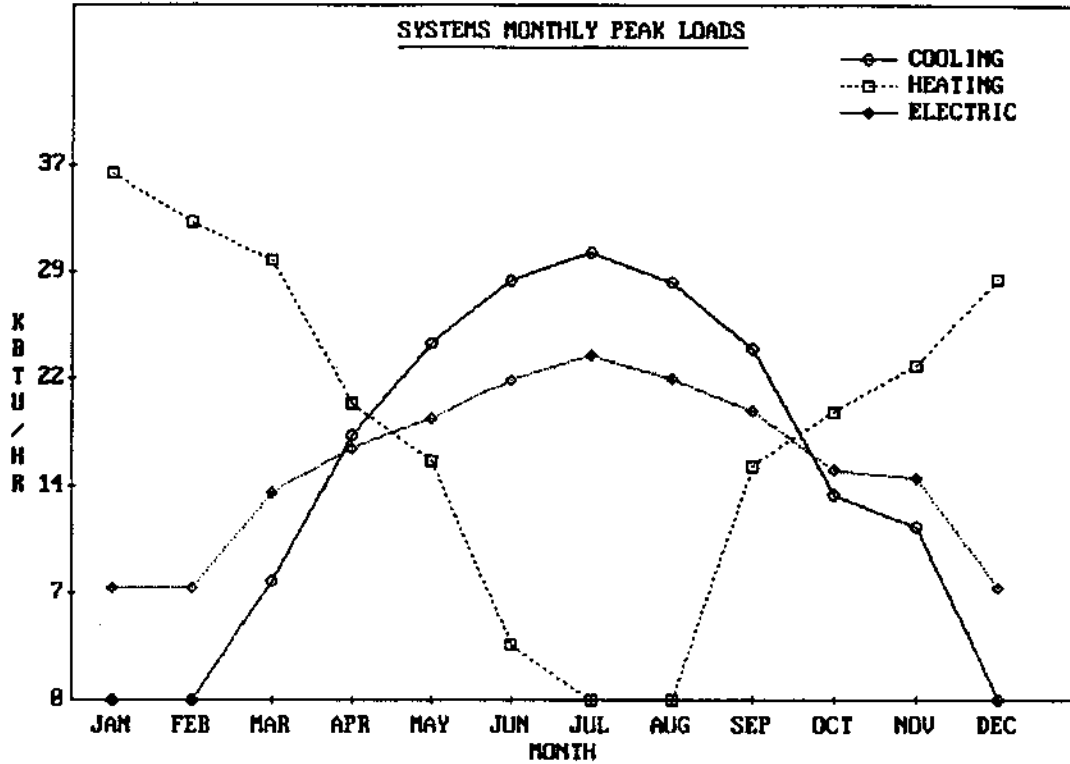


Figure 9 Graph of Monthly Peak Energy Use

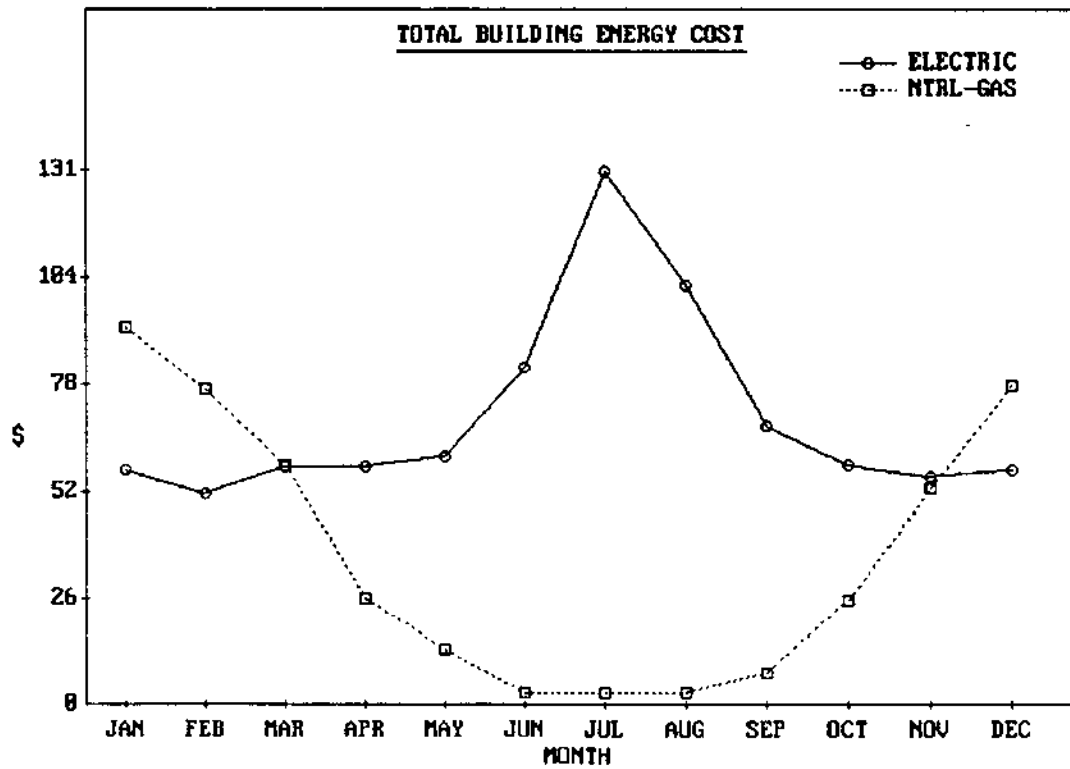


Figure 10 Graph of Monthly Total Building Energy Cost

Summary

EZDOE makes DOE-2 significantly easier to use without any compromise of the full DOE-2 capabilities. EZDOE performs both dynamic and relational error checking so that data entry errors are caught as they are made. The fully supported offering of EZDOE by Elite Software will greatly expand the use and popularity of DOE-2 throughout the building design community.

Like all Elite Software programs EZDOE will continue to be enhanced and kept in sync with all future versions of DOE. Future enhancements will include more graphic reports, a native Windows version, and the ability to calculate from an AutoCAD drawing file.

EZDOE System Requirements

EZDOE requires a math coprocessor equipped 80386 or higher IBM compatible computer with at least 4 megabytes of memory, 20 megabytes of free hard disk space, and DOS 5.0 or higher.

What's Included

The \$1,250 price of EZDOE includes everything a designer needs. Besides the integrated EZDOE data entry and calculation program modules, also included are the TMY weather data files for one DOE region of your choice, all the standard DOE weather data file management utility programs, a 750 page user manual containing tutorials and all the important information from the DOE Reference Manual, Supplement, Basics Manual, and BDL Summary, and full customer support. Master input sheets are also provided for the easy organization of input data.

Literature and Demo Disks

Literature on EZDOE is available free of charge and it can be faxed or mailed as desired. A functional demonstration package is also available for \$49 plus shipping. The functional demo includes all the same materials as supplied with the full version of the program. The only limitation on the functional demo is the size of the project that can be analyzed. Specifically, the limitations are three spaces, maximum wall dimensions of 10 x 35 feet, and maximum roof dimensions of 35 x 35 feet. In all other respects, the demo is the full version of the program.

If you like how the demo works and would like to upgrade it to the full version, Elite Software can issue a password that unlocks the demo into the full program. The demo cost is then credited to the full price of \$1,250.

How to Order

To ask questions, order literature, demos, or full versions of EZDOE, call Elite Software toll free at 800-648-9523. The fax number is 409-846-4367 and the technical support line is 409-846-2340. All major credit cards and C.O.D. are accepted. Send written correspondence to Elite Software, P.O. Drawer 1194, Bryan, TX 77806.

IBPSA Conference 1993: A Sampling of Abstracts

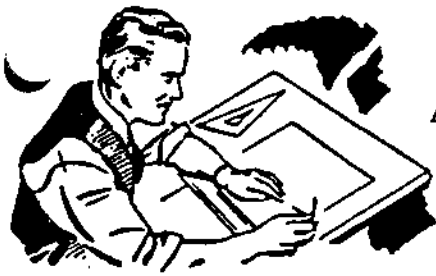
The International Building Performance Simulation Association (IBPSA) held its third international conference in Adelaide, Australia, this past August. Below we present a sampling of some of the papers that featured DOE-2. Write or email Philippe Geril (email: Philippe=Geril%biomath%fltbw.RUG@vinnarc01.rug.ac.be) for cost of the proceedings:

Philippe Geril
IBPSA Secretariat
Dept of Math, Biometrics and Process Control
University of Ghent
Coupure Links 653
9000, Ghent BELGIUM



INTERNATIONAL
BUILDING
PERFORMANCE
SIMULATION
ASSOCIATION

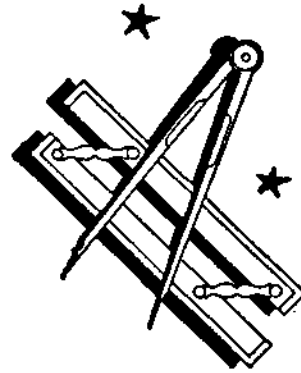
- **Computer Simulation of the Energy Performance of the Commercial Buildings in Hong Kong** by Joseph Lam and Sam Hui, City Polytechnic of Hong Kong, Kowloon, Hong Kong.
Abstract Computer-based simulation methods offer a powerful and flexible tool for building energy analysis. This paper presents a research study on the thermal and energy performance of commercial buildings in Hong Kong, using computer modeling techniques on a microcomputer-based platform. A database of energy simulation results has been generated using a personal computer version of DOE-2.1D, with a generic base case model building and weather files developed for Hong Kong. A parametric analysis was then conducted to explore the energy-related design factors of commercial Hong Kong buildings. Research results showing the key parameters that influence the energy performance these buildings are presented. The present situation of energy conservation activities in Hong Kong and the potential of detailed energy simulation methods for building energy analysis are also discussed.
- **The Impact of Variations in Building Parameters and Operating Conditions on Commercial Building Energy Use and Load Shapes** by Joe Huang and James Hanford of Lawrence Berkeley Laboratory, and Mike Piraino of the Gas Research Institute, Chicago, IL.
Abstract Assessments of the applicability of equipment, or the benefits of conservation measures within a building sector, are frequently done using energy simulations of prototypical buildings with average physical and operational characteristics. Because of the large variations in size, hours of operation, energy-use intensity, and fuel-electric ratios even among buildings of the same type, vintage and location, such analysis often risks the danger of missing "niche" markets for strategies (such as cogeneration) that may be attractive only under specialized conditions. The object of this study is to analyze the impact that variations in building conditions have on its energy use patterns, and to develop procedures to account for these variations in assessing market potentials. This study presented herein uses a set of 481 prototypical commercial and multifamily buildings in 13 U.S. cities, which were simulated using DOE-2.1D to create a data base of energy use and hourly load shapes. We first compare the adequacy of these "average" prototypes to capture the range of conditions within a building sector and then modify the building parameters of the prototypes to study how atypical conditions affect building energy use patterns. A procedure was then developed to account for variations in building parameters in assessing the market potential for specialized applications.



An "Enhanced" DrawBDL

by

Joe Huang*



DrawBDL is a Windows-based graphics program that allows DOE-2 modelers to visualize and debug their DOE-2 inputs for building geometry.** It runs independent of DOE-2, and translates BDL inputs into colored renderings of the building in axonometric, plan, and elevation views from any angle.

After the initial release of the program, enhancements have been added to make DrawBDL more useful for debugging purposes. These enhancements include: suppressing the drawing of selected building surfaces, and zooming, printing, and displaying surfaces by Building Space. For example, a building floor plan can be produced by suppressing the drawing of roofs and then selecting the plan view option (see Fig. 1).

Since the release of DrawBDL, I have received many helpful suggestions from users, as well as a growing collection of detailed input files showing how intricate DOE-2 modeling can be. Figure 2 shows a

DrawBDL rendering of a sports arena (same building as in Fig. 1). Figure 3 is a high-rise office, and Fig. 4 is a secondary school. These carefully-modeled buildings must have required numerous iterations to arrive at the polished state shown here. Figure 5 shows a more typical result from an early iteration (with apologies to a friend) !

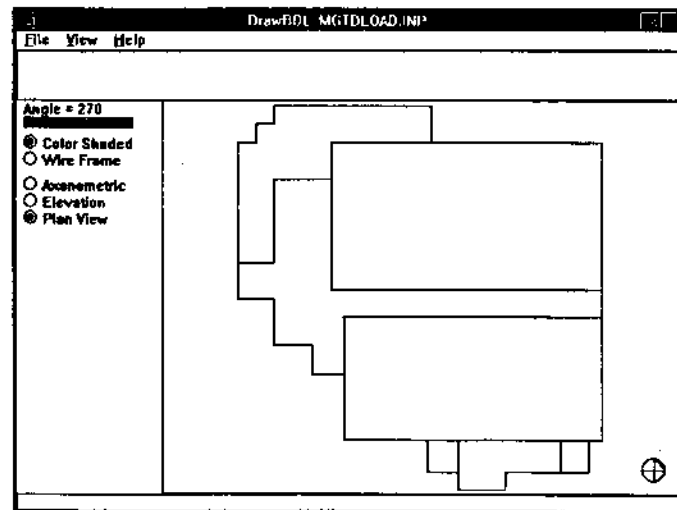


Figure 1: Floor plan for the World Ice Sports Center, Anaheim (Eley Associates)

* The DrawBDL program is available from Joe Huang & Associates, 6720 Potrero Avenue, El Cerrito, CA 94530. Phone/Fax (510) 236-9238. The price for DrawBDL remains \$99, plus tax and shipping; a demonstration diskette is available for \$2 US or \$4 International.

**For more information on DrawBDL, refer to User News, Vol. 14, No. 1, p.5-7.

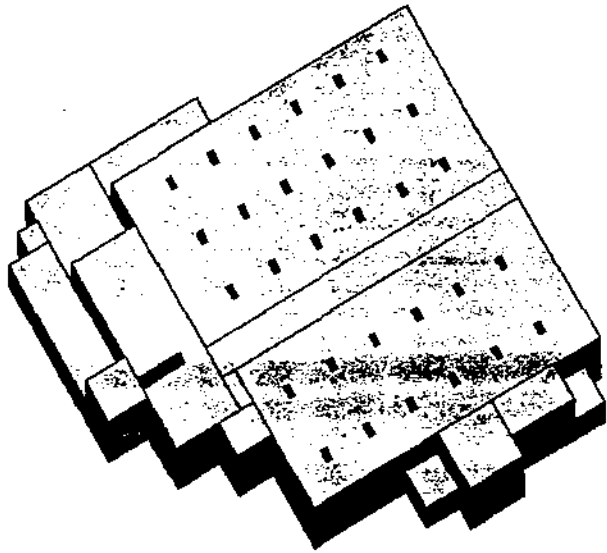


Figure 2: World Ice Sports Center, Anaheim (Eley Associates)

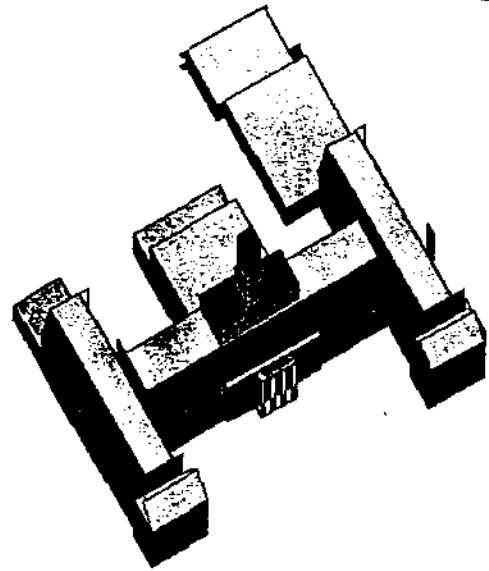


Figure 4: Livingston Manor Central School (Steven Winter Associates)

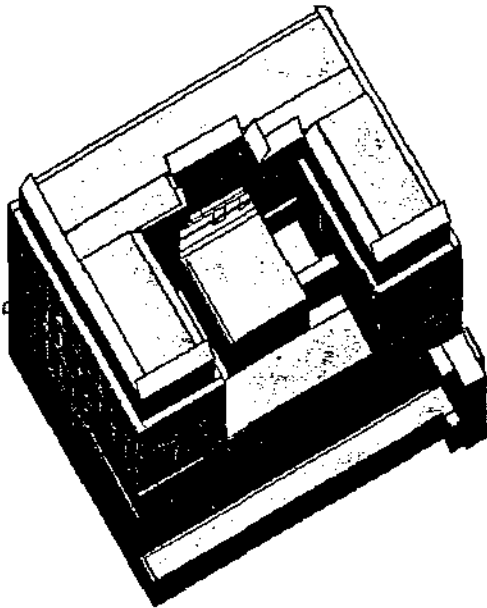


Figure 3: Massachusetts State Office Building (Steven Winter Associates)

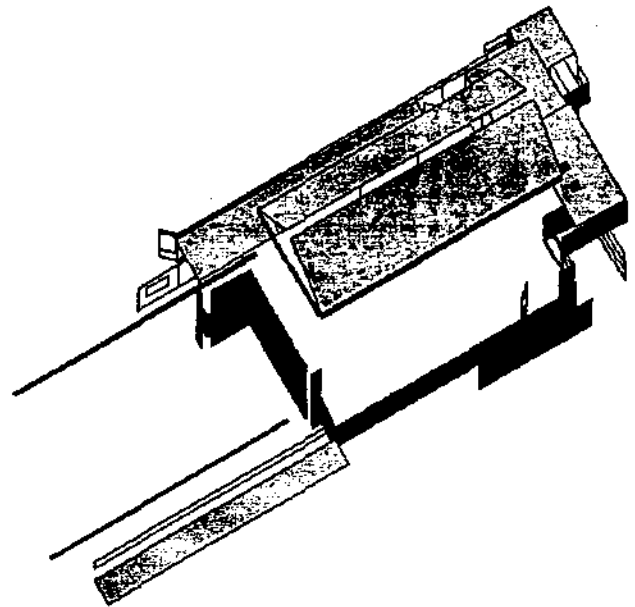


Figure 5: Intermediate modeling input for library



■ ■ ■ ■ DOE-2 DIRECTORY ■ ■ ■ ■

Program Related Software and Services

Mainframe and Workstation Versions of DOE-2

<p>DOE-2.1D and 2.1E (Source code, executable code and documentation) For 2.1E DEC-VAX, Order #000158-DOVAX-02 For 2.1E SUN-4, Order #000158-SUN-0000 For 2.1D DEC-VAX, Order #000158-D6220-01 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 Phone: (615) 576-2606 FAX: (615) 576-2865</p>
<p>* FTI-DOEv2.1D (Source code and documentation) 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)

<p>* 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 <i>User News</i> Vol.12, No.2, p.2 for more information]</p>	<p>Gabel Dodd Associates 1818 Harmon Street Berkeley, CA 94703 Contact: Rosemary Hawley Phone: (510) 428-0803 FAX: (510) 428-0324</p>
<p>* 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-2.1D. [See <i>User News</i> Vol.11, No.4, p.4 and Vol.13, No.2, p.54 for more information]</p>	<p>ITEM Systems 1402 - 3rd Avenue, #901 Seattle, WA 98101 Contact: Steve Byrne Phone: (206) 382-1440 FAX: (206) 382-1450</p>
<p>* EZDOE EZDOE is an easy-to-use PC version of DOE-2.1D that provides full screen, "fill in the blank" style of data entry, dynamic error checking, context-sensitive help, mouse support, graphic reports, a 750-page user manual, extensive weather data, and comprehensive customer support. EZDOE seamlessly integrates the full calculation modules of DOE-2 into a powerful, yet easy-to-use full implementation of DOE-2 on DOS-based 386 and 486 computers. Contact Elite Software for complete information on EZDOE including a fully operational demonstration diskette. [See <i>User News</i> Vol.14, Nos.2,4 for more information]</p>	<p>Elite Software, Inc. P.O. Drawer 1194 Bryan, TX 77806 Contact: Bill Smith Phone: (409) 846-2340 FAX: (409) 846-4367</p>
<p>* 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. [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>
<p>* 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 <i>User News</i> Vol.7, No.4, p.2 and Vol.11, No.1, p.2 for more information]</p>	<p>ERG International, Inc. 1626 Cole Boulevard #250 Golden, CO 80401-3306 Contact: Gene Tsai, P.E. Phone: (303) 233-4453 FAX: (303) 233-4234</p>
<p>* PRC-DOE2 A fast, robust and up-to-date PC version of DOE-2.1E. 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 <i>User News</i> Vol.13, No.4, p.11 for information]</p>	<p>Partnership for Resource Conservation 140 South 34th Street Boulder, CO 80303 Contact: Paul Reeves Phone or FAX: (303) 499-8611</p>

Pre- and Post-Processors for DOE-2

<p>* D O E 1 2 3 Uses Lotus 1-2-3 to graphically display DOE-2.1D output as barcharts, pie charts, and line graphs. [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>* DrawBDL Graphic debugging and drawing tool for DOE-2 building geometry. DrawBDL reads your BDL input and makes a rotatable 3-D drawing of your building with walls, windows and building shades shown in different colors for easy identification. Runs on PC's under Microsoft Windows. [See <i>User News</i> Vol.14, No.1, p.5 for information]</p>	<p>Joe Huang & Associates 6720 Potrero Avenue El Cerrito CA 94530 Contact: Joe Huang Phone: (510) 559-9067 Fax: (510) 236-9238</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>
<p>* PRC-TOOLS A set of PC 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 math pre-processor for BDL.</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 1402 - 3rd Avenue, #901 Seattle, WA 98101 Contact: Steve Byrne Phone: (206) 382-1440 FAX: (206) 382-1450</p>

***** DISCLAIMER *****
 This document was prepared as an account of work sponsored by the US Government. Neither the US Government nor any agency thereof, nor the Regents of the University of California, nor their employees, makes any express/implied warranty or assumes legal liability or responsibility for the completeness, accuracy, or usefulness of information, apparatus, product, or process disclosed, or represents that use thereof would not infringe privately owned rights. References herein to specific commercial products, process, or services by tradenames, trademarks, manufacturers, etc., does not necessarily constitute or imply its endorsement, recommendation, or favoring by the US Government or any agency thereof, or the Regents of the University of California. Views and opinions of the authors expressed herein don't necessarily state or reflect those of the US Government or agencies thereof, or the Regents of the University of California, and shall not be used for advertising or product endorsement. So there!!



R E S O U R C E S

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.

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.

Simulation Research Group
Bldg. 90, Room 3147
Lawrence Berkeley Laboratory
Berkeley, CA 94720

Contact: Kathy Ellington
Phone: (510) 486-5711
FAX: (510) 486-4089
e-mail: kathy%gundog@lbl.gov

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 it will be forwarded to Bruce.

This service is supported by the Simulation Research Group.

Bruce Birdsall
Ph: (510) 829-8459.
Monday through Friday
10a.m. to 3p.m. Pacific Time

DOE-2 Training

DOE-2 courses for beginning and advanced users.

Energy Simulation Specialists
64 East Broadway, Suite 230
Tempe, AZ 85282
Contact: Marlin Addison
Phone: (602) 967-5278

Instructional DOE-2 Video and Manual

Takes you step-by-step in DOE-2.1D input preparation and output interpretation.

JCEM/U. Colorado
Campus Box 428
Boulder, CO 80309-0428
Contact: Prof. Jan Kreider
Phone: (303) 492-3915

Weather Tapes

TMY (Typical Meteorological Year)

TRY (Test Reference Year)

CTZ (California Thermal Climate Zones)

WYEC (Weather Year for Energy Calculation)

National Climatic Data Center
Federal Building
Asheville, North Carolina 28801
(704) 259-0871 climate data
(704) 259-0682 main number

California Energy Commission
Bruce Maeda, MS-25
1516-9th Street
Sacramento, CA 95814-5512
1-800-772-3300 Energy Hotline

ASHRAE
1791 Tullie Circle N.E.
Atlanta, GA 30329
(404) 636-8400

■ ■ DOE-2 ENERGY CONSULTANTS ■ ■	
Consulting Engineers Charles Fountain Burns & McDonnell Engineers 8055 E. Tufts Avenue, Suite 330 Denver, CO 80237 (303) 721-9292	Consultant Greg Cunningham Cunningham + Associates 512 Second Street San Francisco, CA (415) 495-2220
Consultant Philip Wemhoff 1512 South McDuff Avenue Jacksonville, FL 32205 (904) 632-7393	Consultant Jeff Hirsch 12185 Presilla Road Camarillo, CA 93012 (805) 532-1045
Consultants Charles Eley, Mark Hydeman, Terry Laird Eley Associates 142 Minna Street San Francisco, CA 94105 (415) 957-1977	Computer-Aided Mechanical Engineering Mike Roberts Roberts Engineering Co. 11946 Pennsylvania Kansas City, MO 64145 (816) 942-8121
Consultant Steven D. Gates, P.E. Building HVAC Design/Performance Modeling 11608 Sandy Bar Court Gold River, CA 95670 (916) 638-7540	Consultant Donald E. Croy CAER Engineers, Inc. 814 Eleventh Street Golden, CO 80401 (303) 279-8136
Mechanical Engineers Chuck Sherman Energy Simulation Specialists 64 East Broadway, Suite 230 Tempe, AZ 85282 (602) 967-5278	DSM and Energy Engineering Michael W. Harrison, P.E. Energy Resource Management, Inc. 305 West Mercury Butte, MT 59701 (406) 723-4061
Consulting Engineers Alan Cowan, P.E. Criterion Engineers 5331 SW Macadam Ave., Suite 205 Portland, OR 97201 (503) 224-8606	Hourly Calibrated DOE-2 Analysis Jeff S. Haberl Energy Systems Laboratory Texas A&M University College Station, TX 77843-3123 (409) 845-6065
Consultant Martyn C. Dodd Gabel Dodd Associates 761 Sir Francis Drake Blvd. San Anselmo, CA 94960 (415) 456-7588	Consulting Engineers Prem N. Mehrotra General Energy Corporation 230 Madison Street Oak Park, IL (708) 386-6000
Energy Management Specialists Hank Jackson, P.E. R C I Engineering Services P. O. Box 2059 Asheville, NC 28802 (704) 254-6080	Consultant/Building Systems Analysis Robert H. Henninger, P.E. ElectroCom GARD Ltd. 7449 N. Natchez Avenue Niles, IL 60714 (708) 647-3252
Consulting Engineers Susan Reilly Enermodal Engineering 1554 Emerson Street Denver, CO 80218 (303) 861-2070	Technical Real World Analysis David J. Schwed Romero Management Associates 1805 West Avenue K, #202 Lancaster, CA 93534 (805) 940-0540
Energy Codes - DSM Doug Mahone The Heshong Mahone Group 4610 Paula Way Fair Oaks, CA 95628 (916) 962-7001	Consulting Engineers Gregory Banken, P.E. Q-Metrics, Inc. P.O. Box 3016 Woodinville, WA 98072 (205) 915-8590

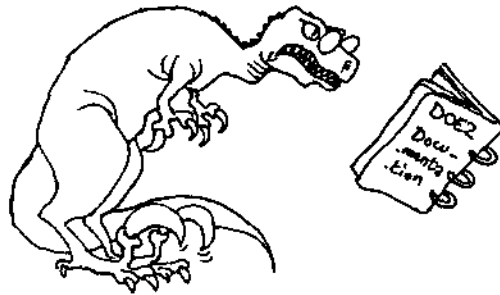
■ DOE-2 ENERGY CONSULTANTS - INTERNATIONAL ■

Mainframe DOE-2 for European Users
 Joerg Tscherry
 EMPA, Section 175
 8600 Dubendorf
 Switzerland

Space Available

Consultant
 Werner Gygli
 Informatik Energietechnik
 Weiherweg 19
 CH-8604 Volketswil Switzerland

Consultant, Distributor for FTI-DOEv2.1D
 Andre Dewint
 rue de Livourne 103/12
 B-1050 BRUXELLES
 Belgium



DOE-2 Program Documentation		
Document	Order Number	Price
DOE-2 Basics Manual (2.1D)	DE-920-07955	44.50*
BDL Summary (2.1D)	DE-890-17726	27.00*
Sample Run Book (2.1D)	DE-890-17727	77.00*
Reference Manual (2.1A)	LBL-8705, Rev.2	126.00*
Supplement (2.1D)	DE-890-17728	61.00*
Engineers Manual (2.1A) [algorithm descriptions]	DE-830-04575	52.00*

* Prices shown are approximate; call NTIS for update.
 For shipments to non-U.S. addresses, double the prices listed above.

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

A new report is available from the Building Technologies Program at LBL; please fax your request to Pat Ross at (510) 486-4089, and be sure to reference both the title and report number (DOE/EE-0008).

Advanced Lighting Guidelines: 1993

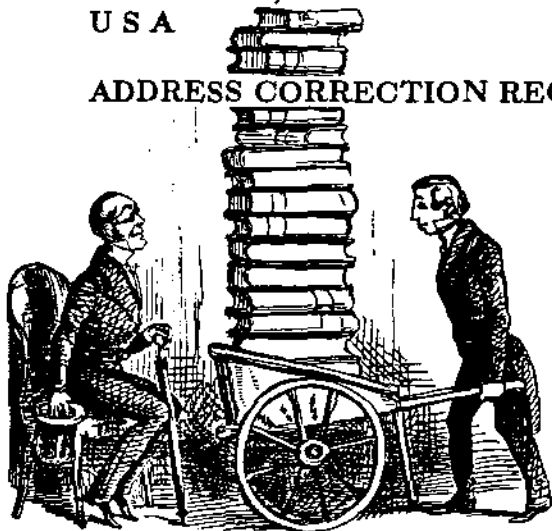
Abstract

The 1993 *Advanced Lighting Guidelines* document consists of twelve guidelines that provide an overview of specific lighting technologies and design application techniques using energy efficient lighting practice. The first guideline, *Lighting Design Practice*, assesses energy efficient lighting strategies, discusses lighting issues, and explains how to obtain quality lighting design and consulting services. The second guideline, *Luminaires and Lighting Systems*, surveys luminaire equipment designed to take advantage of advanced technology lamp products and includes performance tables that allow for accurate estimation of luminaire light output and power input. The additional ten guidelines are these: *Computer Aided Lighting Design*, *Energy Efficient Fluorescent Ballasts*, *Full Size Fluorescent Lamps*, *Tungsten-Halogen Lamps*, *Metal Halide and HPS Lamps*, *Daylighting and Lumen Maintenance*, *Occupant Sensors*, *Time Scheduling Systems*, and *Retrofit Control Technologies*. Each guideline provides a product technology overview, discusses current products on the lighting equipment market, and provides application techniques.

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



< LABEL >

"New DOE-2 documentation just arrived, Sir. Shall I put it in the warehouse with the other manuals?"