

BUILDING ENERGY SIMULATION

FOR USERS OF ENERGYPLUS, SPARK, DOE-2, BLAST, GENOPT,
BUILDING DESIGN ADVISOR, ENERGY-10 AND THEIR DERIVATIVES

U S E R S E R V I C E S N E W S

What's New ?

EnergyPlus Beta 3

The third of four planned beta test versions of EnergyPlus is expected to be available in July; find out about the new features on p. 2.

To get a no-cost license for Beta 3 go to www.gard.com/eplustest.htm.

If you already have a license for Beta 1 or 2 you don't need a new license for Beta 3; you'll be informed when Beta 3 is ready for downloading.



Beta Test This Software Now!

- Genopt 1.1: Beta 2 of is ready; instructions are on p. 13.
- Energy-10: Version 1.3 (includes *WeatherMaker*) is available; p. 12.

News from the Czech Republic

- Ing. Zuzana Krtokova is the new head of the DOE-2 Resource Center in the Czech Republic.
- To learn about energy efficiency issues in the Czech Republic, go to www.svn.cz and read the excellent newsletter *SEVEN*.

What's Inside ?

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EnergyPlus Beta 3

The third of four planned beta test versions of EnergyPlus is expected to be available in July. To get a no-cost license for Beta 3 go to www.gard.com/eplustest.htm. If you already have a license for Beta 1 or 2 you don't need a new license for Beta 3; you'll be informed when Beta 3 is ready for downloading.



New features in Beta 3 include:

- Simpler surface input
- Integration of COMIS airflow program
- Thermal comfort models
- Window calculations:
 - Frames and dividers
 - Spectral input for glass
 - Window constructions Reference Data Set
- EP-Macro program for input macros
- Circulation loop fluid properties
- HVAC components:
 - unit ventilator
 - unit heater
 - furnace
 - hot water heater
 - window air conditioner
- HVAC systems:
 - Two-pipe fan coil
 - Four-pipe fan coil
 - Single-zone reheat

Beta 4 (mid-October) will include:

- Improved ground heat transfer
- Improved interior surface convection
- PV simulation
- Energy meters
- Moisture absorption/desorption
- DOE-2 input translator
- Heat pumps
- Cooling tower
- Absorption chiller
- Electric generator
- Electric generator
- Auto-sizing
- Heat recovery
- Evaporative cooling
- DX coil
- Series powered induction
- High-temperature radiant heating
- Low-temperature radiant heating/cooling
- System input templates

The EnergyPlus version 1.0 release is targeted for January 2001.

EnergyPlus is being developed by University of Illinois, CERL, Oklahoma State Univ. and Lawrence Berkeley National Laboratory, with the assistance of the Florida Solar Energy Center, GARD Analytics, Krarti Associates, Penn. State University, and the University of Wisconsin.



The *Building Energy Simulation User News* is published bi-monthly and distributed electronically by the Simulation Research Group at Lawrence Berkeley National Laboratory with cooperation from the Building Systems Laboratory at the University of Illinois. Direct comments or submissions to Kathy Ellington, MS: 90-3147, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, or email KLEllington@lbl.gov or fax us at (510) 486-4089. Direct BLAST-related inquiries to the Building Systems Laboratory, email support@blast.bso.uiuc.edu or phone (217) 333-3977. © 2000 Regents of the University of California, Lawrence Berkeley National Laboratory. This work was supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technology, State and Community Programs, Office of Building Systems of the U.S. Dept. of Energy, under Contract No. DE-AC03-76SF00098

DESKTOP RADIANCE

A NEW TOOL FOR COMPUTER-AIDED DAYLIGHTING DESIGN

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Introduction

The use of daylight for the illumination of building interiors has the potential to enhance the quality of the environment while providing opportunities to save energy by replacing or supplementing electric lighting. Moreover, it has the potential to reduce heating and cooling loads, which offer additional energy saving opportunities, as well as reducing HVAC equipment sizing and cost. All of these benefits, however, assume proper use of daylighting strategies and technologies, whose performance depends on the context of their application. On the other hand, improper use can have significant negative effects, such as increased glare and cooling loads, on both comfort and energy requirements. To ensure proper use, designers need tools that model the dynamic nature of daylight and accurately predict performance with respect to a multitude of performance criteria that extend beyond comfort and energy to include aesthetics, cost, security and safety.

Background

Research and development efforts during the last 25 years have resulted in a number of computer-based daylighting tools, with varying degrees of modeling capabilities and prediction accuracy. Some of them, such as SuperLite [Modest 1982] and Lumen Micro [Baty 1996], are limited to daylighting computations with strict bounds on their modeling capabilities. Others, such as Radiance [Ward & Shakespeare 1998] and Lightscape [Khodulev and Kopylov 1996], can model environments of arbitrary complexity and extend beyond daylighting and lighting computations to generate rendered images that are most helpful for the evaluation of lighting quality and aesthetics. Radiance is the most accurate tool for predicting daylighting performance, mainly because its calculations are based on true energy balance equations.

The development of Radiance began in 1988 in an effort to accurately predict the distribution of light in architectural spaces; it has been continuously refined, enhanced and validated since then. Radiance uses a combination of ray tracing and radiosity algorithms to determine luminance or illuminance values, which are then further processed to produce photometrically accurate renderings. Radiance was developed as a collection of many interrelated UNIX processes, capitalizing on the capabilities of the UNIX operating system. All Radiance functionality is accessed through sequences of UNIX commands, while the description of the scene to be rendered is expected in the form of a file that contains special keywords and alphanumeric entries that describe the geometry of surfaces along with the optical properties of materials and light sources. This type of input requires considerable time investment in learning the required keywords and syntax. Moreover, even experienced Radiance users need significant time to describe a building or a space in terms of keywords and xyz coordinates. As a result, Radiance is mostly used on large architectural projects that can support the associated expenses.

Current Development

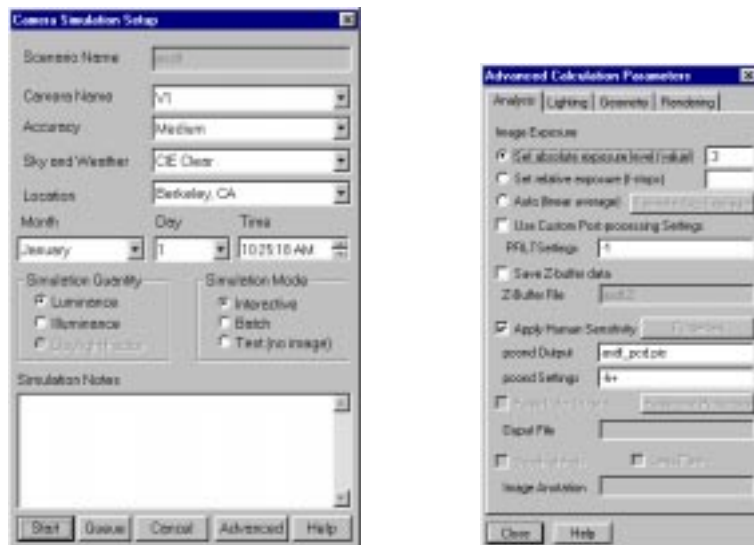
Desktop Radiance is being developed to make the Radiance simulation engine easy to use on desktop computers used by the majority of building designers. The strategy to achieving this goal is based on porting the Radiance engine from UNIX to Windows and developing an AutoCad-based front end along with libraries of materials, glazings, electric lighting luminaires and furniture. These libraries are

FIGURE 1
GRAPHICAL USER
INTERFACE
ALLOWS DESKTOP
RADIANCE USERS
TO SELECT
MATERIALS,
GLAZINGS,
LUMINAIRES AND
FURNITURE FROM
CORRESPONDING
LIBRARIES.



accessible through a graphical user interface (Fig. 1) and include an editor for user-defined materials. The overall package includes a simulation control interface (Fig. 2) and an interactive rendering module that allows quick view and control of the rendered image while it is being computed (Figs. 3a, b, c). There is also an application that allows viewing of Radiance images and their further manipulation with respect to changing exposure, generating isolux and false color images, and adjusting the image to account for the sensitivity and dynamic range of the human eye (Fig. 4).

FIGURE 2
ALL SIMULATION
CONTROL OPTIONS
IN DESKTOP
RADIANCE ARE
SET THROUGH A
GRAPHICAL USER
INTERFACE.



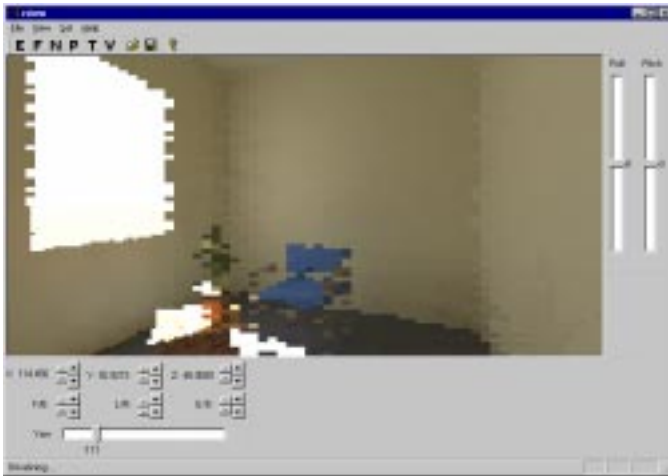


FIGURE 3A

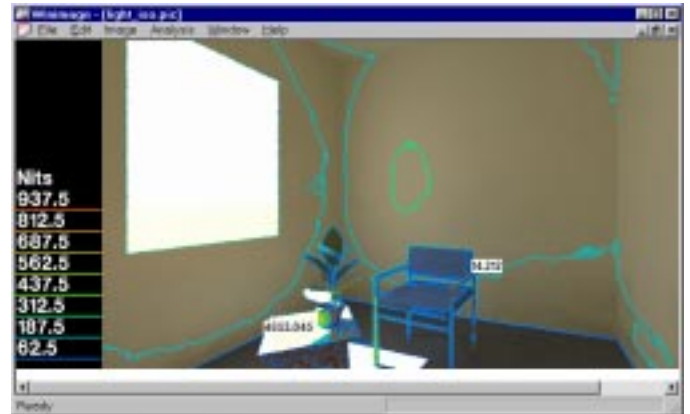


FIGURE 3B



FIGURE 3C

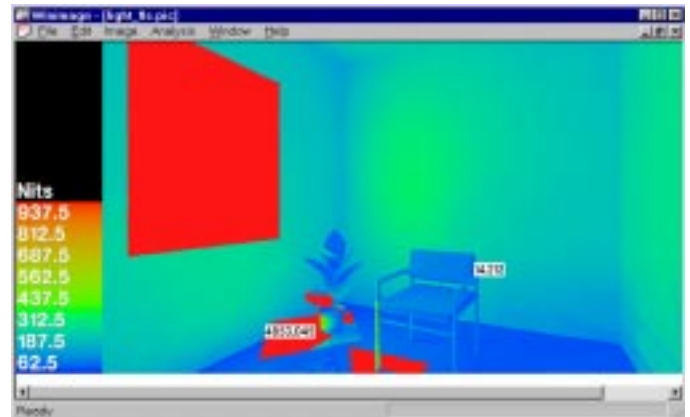


FIGURE 4

FIGURE 3 (A, B, C) DESKTOP RADIANCE IMAGES SHOWING INCREASING LEVELS OF DETAIL AS THE IMAGES ARE BEING GENERATED. SIMULATION PARAMETERS CAN BE CHANGED AT ANY POINT DURING THE IMAGE GENERATION PROCESS. FIGURE 3B SHOWS SUPERIMPOSED ISO-ILLUMINATION CURVES THAT GIVE A QUANTITATIVE INDICATION OF ILLUMINATION LEVELS.

FIGURE 4 DESKTOP RADIANCE INCLUDES A MODULE THAT ALLOWS YOU TO VIEW PRECOMPUTED RADIANCE IMAGES AND DISPLAY THEM IN FALSE COLORS THAT INDICATE LIGHT LEVELS.

Finally, Desktop Radiance includes a *simulation manager* that allows management and control of multiple simulation runs (Fig. 5). Through the simulation manager, users can duplicate and modify prior simulations to explore alternative scenarios with respect to accuracy, time of the day, sky conditions, etc.

Future Development

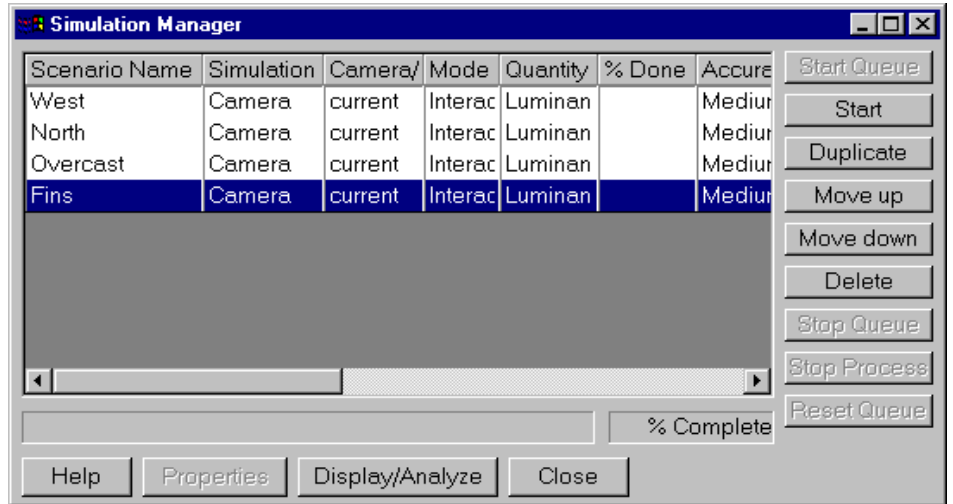
Current efforts focus on the development of editors for user-defined materials, glazings, luminaires and furniture, the specification of user-defined sky luminance distributions, and the development of links to additional CAD software.

Availability

Desktop Radiance 1.0 is available free of charge from <http://radsite.lbl.gov/deskrad>.

FIGURE 5

**THE SIMULATION MANAGER
ALLOWS YOU TO MANAGE
AND CONTROL MULTIPLE
SIMULATION RUNS QUICKLY
AND EASILY. YOU CAN
MODIFY AND RERUN
SIMULATIONS FOR DIFFERENT
SCENARIOS.**



Acknowledgments

The development of Desktop Radiance is being funded by the Pacific Gas & Electric Company through the California Institute for Energy Efficiency (CIEE), a research unit of the University of California. Publication of research results does not imply CIEE endorsement of or agreement with these findings, nor that of any CIEE sponsor.

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4. G. Ward and R. Shakespeare. *Rendering with Radiance: The Art and Science of Lighting Visualization*. Morgan Kaufman, 1998.



Energy Professionals



**Steven Winter Associates, Inc.
Building Systems Consultants**

Energy Professionals with 5-30 years experience in energy-efficient design or analysis for award-winning firm specializing in green buildings and cutting-edge projects. Candidates will have a solid background in HVAC and an understanding of simulations using major energy software such as DOE-2 or TRACE. Alternately, candidates will be very experienced in energy analysis and have a basic familiarity with HVAC. Duties may include energy audits, simulations, writing reports, quality control, management, and business development. Responsibilities within the firm commensurate with experience from project manager to principal track. Excellent opportunity for growth.

Address inquiries to Jacqui Ham at Steven Winter Associates, Inc., 50 Washington Street, Norwalk, CT 06854 fax (203) 852-0741, email: swinter@swinter.com, web: www.swinter.com



13-15 August 2001

BUILDING SIMULATION

Rio de Janeiro, Brazil



The **International Building Performance Simulation Association (IBPSA)** aims to advance and promote the science of building performance simulation in order to improve the design, construction, operation and maintenance of new and existing buildings worldwide. Any good quality paper related to this mission will be acceptable.

Topics under discussion at this conference will be modeling and simulation of:

- **building physics** including heat, air and moisture flow, heating and cooling loads, electric and day lighting, acoustics, smoke transport ...
- **heating, ventilation and air-conditioning systems** ...
- **energy supply systems** including renewable energy systems, thermal storage systems, district heating and cooling, combined heating and power systems ...
- **human factors** including health, productivity, thermal comfort, visual comfort, acoustical comfort, indoor air quality ...
- **building services** such as lighting systems, sound/vibration control systems, fire/smoke and emergency control systems, cold/hot water supply systems, sewerage systems ...
- **advances and recent developments in modeling and simulation technology** including coupling with CAD, product modeling, software interoperability, user interface issues, validation and calibration techniques ...

All these topics may be addressed

- *at different levels of resolution*
- *for different stages in the building life cycle*

Timeline

Abstracts due	September 15, 2000
Abstract acceptance	November 15, 2000
Manuscript due	February 15, 2001
Papers acceptance	April 15, 2001
Final papers due	June 1, 2001
Pre-registration deadline	June 30, 2001

For complete details, please go to the Building Simulation 2001 web site:

[HTTP://WWW.LABEEE.UFSC.BR/BS2001/](http://www.labeee.ufsc.br/bs2001/)

If you are interested in Building Simulation 2001, please complete the online registration form at www.labeee.ufsc.br/bs2001/. Alternatively, please return this form by fax. The second announcement, which will include detailed information about registration and accommodations, will be mailed using the details provided below.

Surname	<input type="text"/>	
First Name	<input type="text"/>	
Title	<input type="text"/>	
Affiliation	<input type="text"/>	
Mailing Address	<input type="text"/>	
City with Zip Code	<input type="text"/>	
State	<input type="text"/>	
Country	<input type="text"/>	
Phone	<input type="text"/>	Fax <input type="text"/>
Email	<input type="text"/>	

I am interested in Building Simulation 2001 I plan to attend Building Simulation 2001

I intend to submit an abstract/paper for this theme:

I want to demonstrate software I want to demonstrate commercial products or services at the exhibition

I will be accompanied by _____ person(s) I am interested in cultural tours

Fax or send to:

Prof. Roberto Lamberts, Secretariat Building Simulation 2001
Universidade Federal de Santa Catarina
Departamento de Engenharia Civil
Núcleo de Pesquisa em Construção
Campus Universitário - CTC/ECV
88040-900 Florianópolis, SC
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www.labeee.ufsc.br/bs2001

Fax: +55 48 331-9770

Email: bs2001@labeee.ufsc.br

Building Design Advisor

Decision making through integrated use of multiple simulation tools and databases

The **Building Design Advisor (BDA)** is a Windows 95/98/NT application that acts as a **data manager** and **process controller** to support the integrated use of multiple simulation tools and databases. The objective of the BDA is to make the use of simulation tools quick and easy, from the initial, schematic phases of building design. BDA uses a single, expandable building model, which is expanded incrementally to accommodate the data needs of simulation tools and databases. The latest public release of BDA (version 2.0b3) is linked to three main applications:

- A **Schematic Graphic Editor (SGE)**, for graphic input of building components and systems,
- **DElight**, a simplified daylighting simulation tool, and
- the **DOE-2.1E** building energy simulation program.

Current research and development efforts are focused on the development of links to:

- **Desktop Radiance**, a Windows 95/98/NT version of the **Radiance** lighting/daylighting simulation and rendering software, and
- **Athena**, a life-cycle analysis of embodied energy and environmental impact of materials.

The final release of the 2.0 version was scheduled for the end of May 2000. To learn more about the BDA software and to download a copy of the latest public version, please visit <http://kmp.lbl.gov/BDA>. The BDA source code is available for licensing; if interested, please contact Dr. Papamichael at K_Papamichael@lbl.gov.



VisualSPARK

Available for Beta Testing



VisualSPARK allows you to build models of complex physical processes by connecting calculation objects. It is aimed at the simulation of innovative and/or complex building systems.

<http://SimulationResearch.lbl.gov> > SPARK

The main elements of VisualSPARK are a *user interface*, a *network specification language*, an *HVAC toolkit* containing calculation modules for building components, a *solver* for solving the set of simultaneous algebraic and differential equations that correspond to the physical problem being simulated, a *results display processor* for graphically plotting results and an *interactive graphical editor* (not available in the initial beta release of VisualSPARK). With the network specification language or the graphical editor you link the calculation objects into networks that represent a building's envelope and/or HVAC systems.

The UNIX version of VisualSPARK runs under the SunOS, Solaris, Linux and HPUNIX operating systems. The PC version of VisualSPARK runs under the Windows 95, 98 and NT operating systems

There is no charge for the beta version of VisualSPARK; however, a signed beta test license agreement must have been received by the Simulation Research Group at Lawrence Berkeley National Laboratory prior to testing. The agreement and all the instructions may be downloaded from the web address listed above. After the agreement is received, you will be emailed a password. If you would like to get an idea of what the program does before testing it, you can review the SPARK User's Manual, which can be downloaded from <http://SimulationResearch.lbl.gov> > SPARK > SPARK User's Manual.

VisualSPARK was developed by the LBNL Simulation Research Group and Ayres Sowell Associates, with support from the U.S. Department of Energy.

blastnews

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The Building Loads Analysis and System Thermodynamics

(BLAST) system is a comprehensive set of programs for predicting energy consumption and energy system performance and cost in buildings. The BLAST system was developed by the U.S. Army Construction Engineering Research Laboratory (USACERL) under the sponsorship of the Department of the Air Force, Air Force Engineering and Services Center (AFESC), and the Department of the Army, Office of the Chief of Engineers (OCE). After the original release of BLAST in December 1977, the program was extended and improved under the sponsorship of the General Services Administration, Office of Professional Services; BLAST Version 2.0 was released in June 1979. Under the sponsorship of the Department of the Air Force, Aeronautical System Division, and the Department of Energy, Conservation and Solar Energy Office, the program was further extended; BLAST Version 3.0 was completed in September 1980. Since 1983, the BLAST system has been supported and maintained by the Building Systems Laboratory at the University of Illinois at Urbana-Champaign.

BLAST can be used to investigate the energy performance of new or retrofit building design options of almost any type and size. In addition to performing peak load (design day) calculations necessary for mechanical equipment design, BLAST also estimates the annual energy performance of the facility, which is essential for the design of solar and total energy equipment design, BLAST also estimates the annual energy performance of the facility, which is essential for the design of solar and total energy (cogeneration) systems and for determining compliance with design energy budgets. Repeated use of BLAST is inexpensive; it can be used to evaluate, modify, and re-evaluate alternate designs on the basis of annual energy consumption and cost.

The BLAST analysis program contains three major subprograms:

- The **Space Load Prediction** subprogram computes hourly space loads in a building based on weather data and user inputs detailing the building construction and operation.
- The **Air Distribution System Simulation** sub-program uses the computed space loads, weather data, and user inputs describing the building air-handling system to calculate hot water, steam, gas, chilled water, and electric demands of the building and air-handling system.
- The **Central Plant Simulation** subprogram uses weather data, results of the air distribution system simulation, and user inputs describing the central plant to simulate boilers, chillers, on-site

power generating equipment and solar energy systems; it computes monthly and annual fuel and electrical power consumption.

Heat Balance Loads Calculator (HBLC)

The BLAST graphical interface (HBLC) is a Windows-based interactive program for producing BLAST input files. HBLC allows the user to visualize the building model as it is developed and modify previously created input files. Within HBLC, each story of the building is represented as a floor plan which may contain several separate zones. Numerous other building details may be investigated and accessed through simple mouse operations. On-line help provide valuable on-the-spot assistance that will benefit both new and experienced users. HBLC is an excellent tool which will make the process of developing BLAST input files more intuitive and efficient. You can download a demo version of HBLC (for MS Windows) from the BLAST web site (User manual included!).

HBLC/BLAST Training Courses

Experience with the HBLC and the BLAST family of programs has shown that new users can benefit from a session of structured training with the software. Such training helps to define the steps necessary to produce accurate and consistent output from BLAST and its auxiliary programs and gives users a solid foundation from which they can explore the more advanced features of the program with confidence. The Building Systems Laboratory offers such training courses on an as needed basis typically at our offices in Urbana, Illinois and lasting 2 or 3 days depending on the specific needs of the participants. Call the Building Systems Laboratory for additional information on pricing and availability.

WINLCCID 98

LCCID (Life Cycle Cost in Design) has been a standard in the DOD community since its initial release in 1986. LCCID was developed to perform Life Cycle Cost Analyses (LCCA) for the Department of Defense and their contractors, yet it goes far beyond being just a DOD study tool by providing many features of a general purpose life cycle costing tool. With LCCID, it's easy to carry out "what-if" analyses based on variables such as present and future costs and/or maintenance and repair costs. LCCID allows an analysis based on standard DOD procedures and annually updated escalation factors as well as Energy Conservation Investment Program (ECIP) LCCA. You can download a demo version of WINLCCID 98 (for MS Windows) from the BLAST web site <http://www.bso.uiuc.edu> [see *User News* Vol. 16, No. 4, p. 5]

To order BLAST-related products, contact the Building Systems Laboratory at the address above.

Program Name	Order Number	Price
PC BLAST Package The standard PC BLAST Package includes: BLAST, HBLC, BTEXT, WIFE, CHILLER, Report Writer, Report Writer File Generator, Comfort Report program, Weather File Reporting Program, Control Profile Macros for Lotus or Symphony, and the Design Week Program. The package is on a single CD-ROM and also includes soft copies of the BLAST Manual, 65 technical articles and theses related to BLAST, nearly 400 processed weather files with a browsing engine, and complete source code for BLAST, HBLC, etc. Requires an IBM PC 486/Pentium II or compatible running MS Windows 95/98/NT.	3B486E3-0898	\$1500
PC BLAST Package Upgrade from level 295+	4B486E3-0898	\$450
WINLCCID 98: executable version for 386/486/Pentium	3LCC3-0898	\$295
WINLCCID 98: update from WINLCCID 97	4LCC3-0898	\$195

The last four digits of the catalog number indicate the month and year the item was released or published. This will enable you to see if you have the most recent version. All software will be shipped on 3.5" high density floppy disks unless noted otherwise.



These reports are available from the Simulation Research Group's web site at <http://SimulationResearch.lbl.gov>. To locate these .pdf files, click on "The Latest News" or "Reports" under Publications.

LBNL-46002

EnergyPlus: Energy Simulation Program

Drury B. Crawley⁶, Linda K. Lawrie⁵, Frederick C. Winkelmann³ and Curtis O. Pedersen²

Abstract

EnergyPlus is a new building performance simulation program that combines the best capabilities and features from BLAST and DOE-2 along with new capabilities. EnergyPlus comprises completely new code written in Fortran 90. It is primarily a simulation engine—there is no formal user interface. Both BLAST and DOE-2 have many user interfaces developed by independent third-party developers. We have invited these same developers to work on graphical user interfaces for EnergyPlus.

LBNL-46004

A Modular Loop-Based Approach to HVAC Energy Simulation and Its Implementation in EnergyPlus

Daniel E Fisher¹, Russell Taylor², Fred Buhl³, Richard J Liesen² and Richard K Strand⁴

Abstract

This paper presents the new EnergyPlus HVAC simulation environment, which differs from existing energy analysis programs in three key respects. First, the EnergyPlus HVAC simulation is based on a "manager-interface" protocol that supports multiple solution techniques within the overall context of the simulation. Second, the EnergyPlus HVAC simulation is based on high level component connectivity. Third, the EnergyPlus simulation and component modules enforce a high degree of data encapsulation. These three features, together with input and output processing services provided by the environment, result in a simulation tool that is ideally suited for collaborative development of component models, evaluation of solution techniques and design of HVAC sub-systems. This paper describes the features of the simulation environment, discusses currently implemented algorithms and includes an example of the type of results that can be expected.

Recent LBNL Reports

LBNL-46005

Linking the COMIS Multi-Zone Airflow Model with EnergyPlus

Joe Huang³, Fred Winkelmann³, Fred Buhl³, Curtis Pedersen², Daniel Fisher¹, Richard Liesen², Russell Taylor², and Richard Strand⁴, Drury Crawley⁵ and Linda Lawrie⁶

Abstract

This paper describes an effort to link the COMIS 3.0 multi-zone airflow model with the EnergyPlus building energy simulation program. COMIS 3.0 is a network-based multi-zone airflow model developed by a multinational team in the framework of International Energy Agency's Annex 23 for simulating airflows through the building fabric due to infiltration or natural ventilation, and from zone to zone, as well as the interactions of the HVAC system, ducts, and exhaust hoods and fans. EnergyPlus is a new whole-building energy simulation program being developed for the United States Department of Energy that combines the best features of the DOE-2 and IBLAST programs. The EnergyPlus program is modular in structure and uses the heat balance technique to simulate building thermal loads. The EnergyPlus program calls COMIS from the Air Heat Balance Manager module and passes to COMIS the ambient weather conditions and zone air temperatures from the previous time step. COMIS uses these as boundary conditions to calculate the airflows, which are used by EnergyPlus in the subsequent heat balance simulation. The paper will describe how this linkage was implemented and discuss issues such as convergence, time steps, program run time, and alternate solution methods.

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4. School of Architecture, University of Illinois at Urbana-Champaign, IL
5. U.S. Department of Energy, Washington, DC
6. U.S. Army CERL, Champaign, IL

DOE-2 DOE-2 DOE-2 DOE-2 DOE-2

PC Version of DOE-2.1E from ESTSC

DOE-2.1E (version 107) for Windows (including associated user manuals) is available from the Energy Science and Technology Software Center (ESTSC). Previously, ESTSC licensed only UNIX and VAX versions. This updated version of DOE-2 incorporates bug fixes and new features such as a Cooled Beam HVAC system and polygon input for walls, floors and ceilings. Like previous DOE-2.1E products from ESTSC, this version accepts textual BDL input but does not have a graphical user interface. Cost of DOE-2.1E-WIN (Version 107) is:

- \$ 300 U.S. Government, non-profit Educational
- \$ 575 U.S., Mexico, Canada
- \$ 1075 Other Foreign

To order, call Ed Kidd or Walt Kelly at ESTSC (423) 576-2606, or email to estsc@adonis.osti.gov.

DOE-2.1E Documentation Update

Corrections to Appendix A (Hourly Report Variables) of the DOE-2.1E *Supplement* may be downloaded from the SRG web site (<http://SimulationResearch.lbl.gov>). Click on "Documentation" under DOE-2 in the left menu. You want "Update Package #3."

DOE-2 Help Desk

Bruce Birdsall - Phone/Fax: (925) 671-6942, M-F 10 a.m. to 3 p.m. PDT.

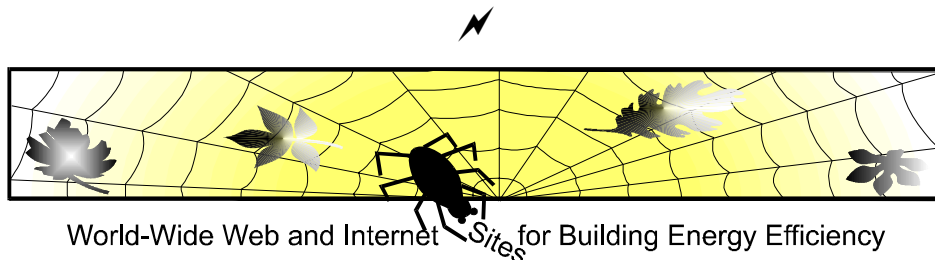
Contact Bruce if you have a DOE-2 problem or question. If you need to fax Bruce, please be sure to phone him first. This is a free service, supported by the U. S. Department of Energy.

DOE-2 Training

DOE-2 courses for beginning and advanced users: phone Marlin Addison at (602) 968-2040, or send email to marlin.addison@doe2.com

DOE-2 DOE-2 DOE-2 DOE-2 DOE-2

Can't afford a vacation this year? Tour the Ozone Hole from the comfort of your armchair - go to www.atm.ch.cam.ac.uk/tour/index.html



www.iea-shc.org/

IEA Solar Heating and Cooling Programme

oee.nrcan.gc.ca/

Canadian Office of Energy Efficiency

www.ens.dk/uk/index.asp

Danish Energy Agency

GenOpt[®] 1.1: Beta 2 Version

The Beta 2 version of GenOpt 1.1 has been released. It contains an additional algorithm for multi-dimensional optimization, new algorithms for one-dimensional optimization, and an algorithm for parametric runs in a multi-dimensional space. The new version also allows processing of multiple function values and has an improved graphical user interface.

GenOpt 1.1 is a multi-parameter optimization program, available free of charge from LBNL. It automatically finds the values of user-selected design parameters that minimize an *objective function*, such as annual energy use, calculated by an external simulation program like DOE-2, BLAST, TRACE, SPARK, TRNSYS, etc. GenOpt can be used with any simulation program that has text-based input and output. It also offers an interface for adding custom optimization algorithms to its library.

GenOpt 1.1 and its user manual may be downloaded from <http://SimulationResearch.lbl.gov> > GenOpt.



ENERGY-10, Version 1.3

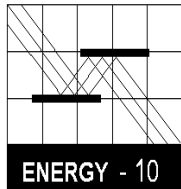
Version 1.3 of ENERGY-10 is now available; it includes the much-anticipated **WeatherMaker** function. *WeatherMaker* allows users to create their own weather files based on information available from nearly 4,000 weather stations throughout the U.S. Revisions to the program itself include some minor fixes, an improved and expanded Help section, and greater clarity in titling and identification of various sections. Contact the Sustainable Buildings Industries Council for more information, or to order your upgrade disc (the cost is \$15, which covers production and shipping).

ENERGY-10, written in C++, is a design tool for smaller residential or commercial buildings that are less than 10,000 ft² floor area, or buildings that can be treated as one- or two-zone increments. It performs whole-building energy analysis for 8760 hours/year, including dynamic thermal and daylighting calculations. ENERGY-10 was specifically designed to facilitate the evaluation of energy-efficient building features in the very early stages of the design process.

Input: Only four inputs required to generate two initial generic building descriptions. Virtually everything is defaulted but modifiable. As the design evolves, the user adjusts descriptions using fill-in menus (utility-rate schedules, construction details, materials).

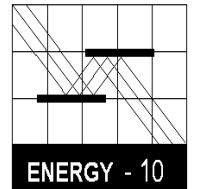
Output: Summary table and 20 graphical outputs available, generally comparing current design with base case. Detailed tabular results also available.

Platform: PC-compatible, Windows 3.1/95/98, Pentium processor with 16 megabytes of RAM is recommended.



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1331 H Street, NW, suite 1000
Washington, D.C. 20004 USA
Ph: (202) 628-7400 ext 210

Fx: (202) 393-5043
PSICouncil@aol.com
www.psic.org/energy10.htm



Meetings, Conferences, Symposia

Healthy Buildings 2000

To be held August 6-10, 2000 in Espoo, Finland

Contact: info@sisailmayhdistys.fi

Ms. Leila Sarajärvi (www.hb2000.org)

P.O. Box 25

FI-02131 ESPOO

Finland

Tel: +358.9.4355 x5612 / Fax: +358.9.4355 x5655

2000 ACEEE Summer Study:

Efficiency & Sustainability

To be held August 20-25 in Pacific Grove, CA

Contact rlunetta@erols.com

Rebecca Lunetta, Conference Manager

P.O. Box 7588

Newark, DE 19714-7588

Tel: 302.292.3966 / Fax: 302.292.3965

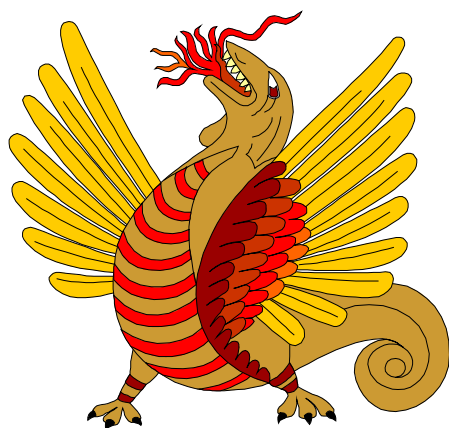
Software Available From Lawrence Berkeley National Laboratory

Downloads	
BDA (Building Design Advisor) Beta 3 (for building decision-makers)	kmp.lbl.gov/BDA
COMIS (multi-zone air flow and contaminant transport model)	www-epb.lbl.gov/comis
EnergyPlus™ (new-generation whole-building energy analysis program, combining best features of BLAST and DOE-2:)	To beta test EnergyPlus for Windows, go to SimulationResearch.lbl.gov > EnergyPlus
GenOpt® (generic optimization program)	SimulationResearch.lbl.gov > GenOpt
RADIANCE (analysis and visualization of lighting in design)	radsite.lbl.gov/radiance/license.html
Desktop Radiance (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14)	radsite.lbl.gov/deskrad
RESEM (Retrofit Energy Savings Estimation Model) (calculate long-term energy savings directly from actual utility data)	eetd.lbl.gov/btp/resem.htm
SPARK (Simulation Problem Analysis and Research Kernel) (build simulations of innovative building envelope and HVAC systems by connecting component models)	<i>Beta test VisualSPARK</i> - for Windows, SUN-UNIX and Linux operating systems, go to SimulationResearch.lbl.gov > SPARK
SUPERLITE (calculate daylight illuminance distribution for room geometries)	eetd.lbl.gov/btp/superlite20.html
THERM (model two-dimensional heat-transfer effects in building components where thermal bridges are of concern)	windows.lbl.gov/software/therm/therm.html
WINDOW 4.1 (thermal analysis of window products)	windows.lbl.gov/software/window/window.html

Request by Fax from 510.486.4089	
RESFEN 3.1 (choose the most energy-efficient and cost-effective window for a given residential application)	windows.lbl.gov/software/resfen/resfen.html

Web Based	
Home Energy Saver (quickly compute a home's energy use)	hes.lbl.gov

Purchase	
ADELINE 2.0 (daylighting/lighting performance in complex spaces)	radsite.lbl.gov/adeline/HOME.html



Run for safety, foolish pedestrians!

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DOE-2 Directory of Program Related Software and Services¹

ESTSC Versions of DOE-2

Program Name	Description	Support	Cost			
DOE-2.1E (Ed Kidd and Walt Kelly) estsc@adonis.osti.gov Energy Science & Technology Software Center P.O. Box 1020 Oak Ridge, TN 37831-1020 Ph: 423-576-2606 / Fx: 576-2865 www.doe.gov/html/osti	Source code, executable code and complete current documentation for:	<u>Support</u> From ESTSC, limited operational support (telephone assistance concerning installation, media or platform questions). Help with modeling available free of charge from Bruce Birdsall at (925) 671-6942 10am to 3pm Pacific time.				
	DOE-2.1E/Version 107 for Windows and SUN-UNIX		Govt/Educ	\$ 300	\$455	\$500
	DOE-2.1E DEC-VAX		US Mexico Canada	\$575	\$1365	\$1835
	Operating System: Windows, SUN-UNIX, DEC-VAX		Other Foreign	\$1075	\$2120	\$2716

Commercial Versions of DOE-2

Program Name	Description	Input	Output	Support	Cost
ADM-DOE-2 (Richard Burkhart) ADM Associates adm_asc@ns.net 3239 Ramos Circle Sacramento, CA 95827-2501 Ph: 916-363-8383 Fx: 363-1788	Compiled for use on 386/486 PCs with a math co-processor and 4MB of RAM. The package contains everything needed to run the program: program files, utilities, sample input files, and weather files. More than 300 weather files available. Based on J.J. Hirsch DOE-2.1E. Operating System: DOS, Windows 95	<u>Input</u>			\$395 + \$15/SH including one set weather data (your choice) and documentation
		<u>Output</u>			
		<u>Support</u>			
Compare-IT (Matt Brost) info@rlw.com RLW Analytics, Inc. 1055 Broadway, Suite G Sonoma, CA 95476 Ph: 707-939-8823 Fx: 939-9218 www.rlw.com	Compare-IT allows DOE-2 professionals to add value to their projects by giving clients "what-if" scenarios using DOE-2. The interface is designed for novice energy analysts and the GUI can be customized for each client's particular interests. Based on J.J. Hirsch DOE-2.1E. Operating System: DOS, Windows (98, 95, NT)	<u>Input:</u> Customizable windows GUI dynamically built based on DOE-2 macros.			\$500 consultant \$2000 client Documentation available
		<u>Output</u>			
		<u>Support</u>			

¹ We list third-party DOE-2-related products and services for the convenience of program 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.

Commercial Versions of DOE-2 (continued)

Program Name	Description	Cost
DOE-Plus (Steve Byrne) byrne @ item.com Item Systems 321 High School Road NE #344 Bainbridge Island, WA 98110 Ph: 206-855-9540 / Fx: 855-9541 www.halcyon.com/byrne	Complete support for all DOE-2 commands. Utility programs included: Prep, Demand Analyzer, weather processor. Over 500 worldwide weather files. Imports BDL files created with a text editor or other program. Based on J.J. Hirsch DOE-2.1E. Operating System: DOS, Windows (3.1, 95, NT)	Input Interactive, graphical, fill-in-the-blanks \$895 with DOE-2 and doc \$495 without DOE-2
		Output Customizable tables and graphics Source code not available.
		Support Unlimited, except modeling advice. On-line help.
EnergyPro (D. Vonderkulen) demian@energysoft.com Gabel Dodd/EnergySoft LLC 100 Galli Drive #1 Novato, CA 94949-5657 Ph: 415-883-5900 / Fx: 883-5970 www.energyspro.com	Performs nonresidential load calculations for HVAC equipment sizing. Electronically exports forms to AutoCad for inclusion on blueprints. On-line help. 344 weather files for the U.S. and Canada. Operating System: DOS, Windows (95, NT) For California Users: Performs Title 24 compliance calculations, includes state-certified HVAC and DHW Equipment directories, Title 24 tailored lighting calculations. Based on ESTSC DOE-2.1E	Input: Graphical DOE-2 Module: Non-residential \$ 700 ^{1,2} Residential \$ 250 ^{1,2} Program Interface \$ 195 ³ ¹ price reflects cash discount ² includes documentation ³ required
		Output: Graphs, forms
		Support Unlimited support
EZDOE (Bill Smith) bsmith @ elitesoft.com Elite Software P.O. Box 1194 Bryan, TX 77806 Ph: 409-846-2340 / Fx: 846-4367 www.elitesoft.com	Provides full screen, fill-in-the-blank data entry, dynamic error checking, context-sensitive help, mouse support, graphic reports, a 750-page user manual, and extensive weather data. Full implementation of DOE-2 on DOS-based 386 and higher computers. On-line help. Some weather files. Based on J.J. Hirsch DOE-2.1E. Operating System: DOS	Input Fill-in-the-blanks \$1295 w/documentation Source code not available.
		Output Standard DOE reports plus some custom graphic reports
		Support Unlimited phone support
FTI/DOE2 (Scott Henderson) info @ finite-tech.com Finite Technologies Inc. 3763 Image Drive Anchorage, Alaska 99504 Ph: 907-333-8937 Fx: 333-4482 www.finite-tech.com	FTI/DOE is 100% compatible with LBNL version. Source code versions will compile with most F77-compliant compilers. On-line help: 344 weather files for the U.S. and Canada. Based on ESTSC DOE-2.1E. No demo, 30-day trial period Operating System: DOS, Windows (3.x, 95, NT) AIX, ULTRIX, VMS, Linux, NeXTStep,	Input Version 2.x: text based Version 3.x: graphical \$ 995.99 US w/documentation \$1066 Int'l w/documentation \$4999.99 Source code
		Output All standard DOE-2 reports Run time and status graphics
		Support 90-days free; then cost is \$ 35 each email per incident \$ 55 per hour per incident \$125 per hour for engineering advice. Bugs reported free.

Commercial Versions of DOE-2 (continued)

Program Name	Description	Cost
PRC-DOE-2 (Paul Reeves) Paul.Reeves@DOE2.com Partnership for Resource Conservation 140 South 34 th Street Boulder, CO 80303 Ph: 303-499-8611 / Fx: 554-1370	Text-based version of DOE-2 includes documentation. Extensive information on new features, including information on new system types, new commands, new options, etc., added to later versions of 2.1E. Operating System: DOS, Windows (95, NT)	<u>Input</u> Standard text-based \$ 495 w/documentation
		<u>Output</u> Source code not available.
		<u>Support</u> Unlimited support.
VisualDOE 2.61 (Eric Kolderup) support@eley.com Charles Eley Associates 142 Minna Street San Francisco, CA 94105 Ph: 415-957-1977 Fx: 415-957-1381 www.eley.com	Dramatically faster construction of building geometry using pre-defined blocks and/or drawing interface. Import zone shapes from CADD file (dxf format). Point-and-click to define zone properties and HVAC systems. Rotatable 3-D image of model. Custom hourly output reports and customized graphs. On-line help. 400+ weather files for the U.S., 12+ weather files for Canada, plus selected locations around the world. Operating System: DOS, Windows (3.1, 95, NT)	<u>Input</u> Graphical Version 2.61 is \$495 w/documentation Source code not available.
		<u>Output</u> Graphical
		<u>Support</u> 90 days free phone and email support.; thereafter \$195/hear

Pre- and Post Processors for DOE-2

Program Name	Description	Cost
DrawBDL Joe Huang & Associates 6720 Potrero Avenue El Cerrito, CA 94530 Ph/Fx: 510-236-9238	DrawBDL , Version 2.1, is a graphic debugging and drawing tool for DOE-2 building geometry . DrawBDL reads your BDL input and makes a rotateable 3-D drawing of your building with walls, windows, and building shades shown in different colors for easy identification. Operating System: DOS, Windows (3.1, 95, 98, NT) [Works with 2.1E]	\$125.00 plus shipping
PRC-TOOLS (Paul Reeves) P R C 140 South 34 th Street Boulder, CO 80303 Ph: 303-499-8611 / Fx: 554-1370	<i>PRC-Tools</i> aid in extracting, analyzing, and formatting DOE-2 output . <i>PRC-Grab</i> automates the process of extracting any number of answers from DOE-2 standard output files. <i>PRC-Hour</i> and <i>PRC-Peak</i> format the hourly output and create Peak-Day and Average-Day load shapes for any number of periods and for any combination of hourly values. Operating System: Windows (95, 98, NT) [Works with 2.1E]	\$99.00
Visualize-IT (Matt Brost) mattb@rlw.com RLW Analytics, Inc. 1055 Broadway, Suite G Sonoma, CA 95476 Ph: 800-472-6716 Fx: 707-939-8823 www.rlw.com	Visualize-IT 2.0 is a Windows application designed to help you explore and summarize short-interval time series data, e.g., measurements taken once every 15 minutes over a period of weeks, months or years. Visualize-IT has been developed specifically for electric and gas load data measuring class profiles, market-segments, individual customer sites or specific end uses. Customized DOE2.1e hourly output importer. Vizualize-IT is highly useful and informative for looking at DOE2 output and/or comparing to interval metered data. It is equally useful for other time series measurements such as weather, industrial process control, and water quality. Operating System: Windows 95, 98 and NT	\$500.00 per set Volume Discounts Available

Special Versions of DOE-2

Program Name	Description	Cost
DesiCalc GRI-98/0127 (Doug Kosar) www.desicalc.com Order from: GRI Fulfillment Center Ph: 773-399-5414 / Fx: 630-406-5995	DesiCalc screens desiccant cooling applications. It estimates annual or monthly energy loads, using hour-by-hour simulations, and costs for 11 typical commercial buildings in 236 geographical locations in the US. Includes the latest TMY2 meteorological database [Based on DOE-2.1E] Operating System: Windows 3.1, 95, 98, NT	\$295 with documentation +8.75% tax in IL +4.5% tax in VA Shipping and Handling \$20
Energy Gauge USA (Danny Parker) Florida Solar Energy Center 1679 Clearlake Road Cocoa, FL 32922 Ph: 407-638-1405 /Fx: 407-638-1439	Energy Gauge USA allows the simple calculation and rating of residential building energy use in the US. The simulation calculates a six-zone model of the residence (conditioned zone, attic, crawlspace, basement, garage and sunspace) with the various buffered spaces linked to the interior as appropriate. TMY weather data for the program are available for 239 US locations. [Based on DOE-2.1E] Operating System: Windows 95, 98, NT	Contact Danny Parker at FSEC for availability.
Home Energy Saver (Residential DOE-2) http://hes.lbl.gov	Calculates heating and cooling consumption using DOE-2.1E. The program performs a full annual simulation for a typical weather year (involving 8760 hourly calculations) from 239 locations around the United States in about 10-20 seconds. [Based on DOE-2.1E] Operating System: Web-based	Free! Interactive web site at hes.lbl.gov
PERFORM 98 California Energy Commission P.O. Box 944295, MS-13 Sacramento, CA 94244-2950 Ph: 916-654-5385	Created for the State of California Energy Commission's, Title 24 energy code . Perform 98 is an interface shell with DOE-2 as the engine. Standard text-based input. Output is only California Title 24 compliant. Technical support available for \$100/year from Gabel-Dodd Energy Soft LLC, 100 Galli Drive #1, Novato, CA 94960. Call 415-883-5900 for details. [Based on DOE-2.1E] Operating System: DOS	\$250 including PERFORM 98, Version 100 program and manual. (VISA/MC) Order #P440960006
RESFEN-3.1 Building Technologies, MS 90-3111 Lawrence Berkeley Laboratory Berkeley, CA 94720	RESFEN calculates the energy and cost implications of a building's windows compared to insulated walls . The relative energy and cost impacts of two different windows can also be compared against each other. RESFEN calculates the heating and cooling energy use and associated costs, also the peak heating and cooling demand for specific window products. [Based on DOE-2.1E] Operating System: Windows 95, 98, NT	Free! Download from windows.lbl.gov/software/resfen



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INTERNATIONAL DOE-2 RESOURCE CENTERS

The people listed here have agreed to be primary contacts for DOE-2 program users in their respective countries. Each resource center has the latest program documentation, all back issues of the User News, and recent LBNL reports pertaining to DOE-2. Users may make arrangements to photocopy the new material for a nominal cost. We hope to establish centers in other countries; please contact us if you want to establish a center in your area.

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