

BUILDING ENERGY SIMULATION

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

U S e r N e w s

What's New ?

EnergyPlus Beta 3

The third of four planned beta test versions of EnergyPlus was released 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.



Building Simulation in the Classroom.....

Educators: We need your help in bringing the next-generation building software to the next generation of engineers and architects. Please read about an exciting new collaboration on p. 9.

Efficient Windows Collaborative.....

Read their excellent electronic newsletter, *Word on Windows*, at www.efficientwindows.org/newsletters.html

More software to Beta Test

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

What's Inside ?

Features

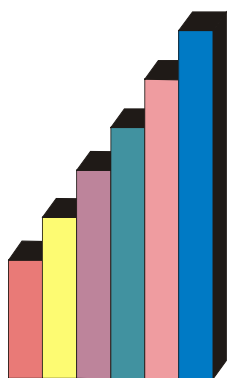
- 2 EnergyPlus meets BESTEST
- 9 Calling all Simulation Educators
- 10 U.S. DOE Launches High-Performance Building Project
- 12 Release of BDA 2.0

Software

- 18 BLAST News
- 12 Building Design Advisor
- 9 DOE-2.1E
 - 9 Help Desk, Training
 - 19 Directory of Software and Services
 - 22 Special Versions of DOE-2
 - 23 Resource Centers, Consultants
- 13 ENERGY-10 1.3 (with WeatherMaker)
- 10 GenOpt 1.1
- 11 VisualSPARK
- 15 Software from Lawrence Berkeley Lab

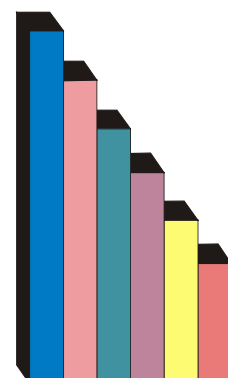
Departments

- 13 *Blueprint*, the newsletter of the California Energy Commission
- 14 Web sites for Building Energy Efficiency: Energy Design Tools from UCLA's School of the Arts and Architecture
 - SOLAR-5.7
 - TMY CLIMATE DATA
 - SOLAR-2
 - OPAQUE
 - DAYLIT
 - DATALIT
- 16 IBPSA's *Building Simulation 2001*



EnergyPlus meets BESTEST¹

The Benchmark for Building Energy Simulation Programs



BESTEST (Building Energy Simulation TEST) is a comparative testing procedure for thermal building simulations primarily related to the building envelope. These tests build upon each other and evaluate a range of model effects including thermal mass, direct solar gain windows, window-shading devices, internally generated heat, infiltration, sunspaces, earth coupling, and deadband and setback thermostat control. In addition, a large number of diagnostic tests can be run if the program fails any of the primary tests. The tests start with the basic structure (a “shoebox” shape) which is then manipulated by moving the windows, adding exterior shading, changing the wall constructions, modifying the coupling with the ground, adding sunspaces, etc.

Background

Numerous software programs are available to simulate energy performance in buildings. But these programs often produce widely divergent results — even on the same building. Consequently, architects and engineers have not trusted the programs and have continued to design buildings without focusing on energy use.

BESTEST was created to systematically compare whole-building energy software programs and diagnose the sources of prediction differences. Originally designed to help software developers produce reliable energy software, BESTEST is also used to assure potential software users (architects and engineers) that a particular simulation program gives reasonable results or that a program is appropriate for their particular application.

The BESTEST technique applies a series of carefully specified test case buildings that progress systematically from the extremely simple to the relatively realistic. Output values for the cases—such as annual loads, temperature ranges, and peak loads—are compared and diagnostic logic used to pinpoint the algorithms responsible for prediction differences.

The more realistic cases, although geometrically simple, test the ability of the programs to model effects such as thermal mass, direct solar gain windows, window-shading devices, internally generated heat, infiltration, sunspaces, earth coupling, and deadband and setback thermostat control. The more simplified cases facilitate diagnosis by allowing excitation of certain heat transfer mechanisms.

¹ BESTEST is the result of a collaboration between the International Energy Agency (IEA) and the U. S. National Renewable Energy Laboratory (NREL). Please direct technical questions to Ron Judkoff of NREL (R_Judkoff@nrel.gov).

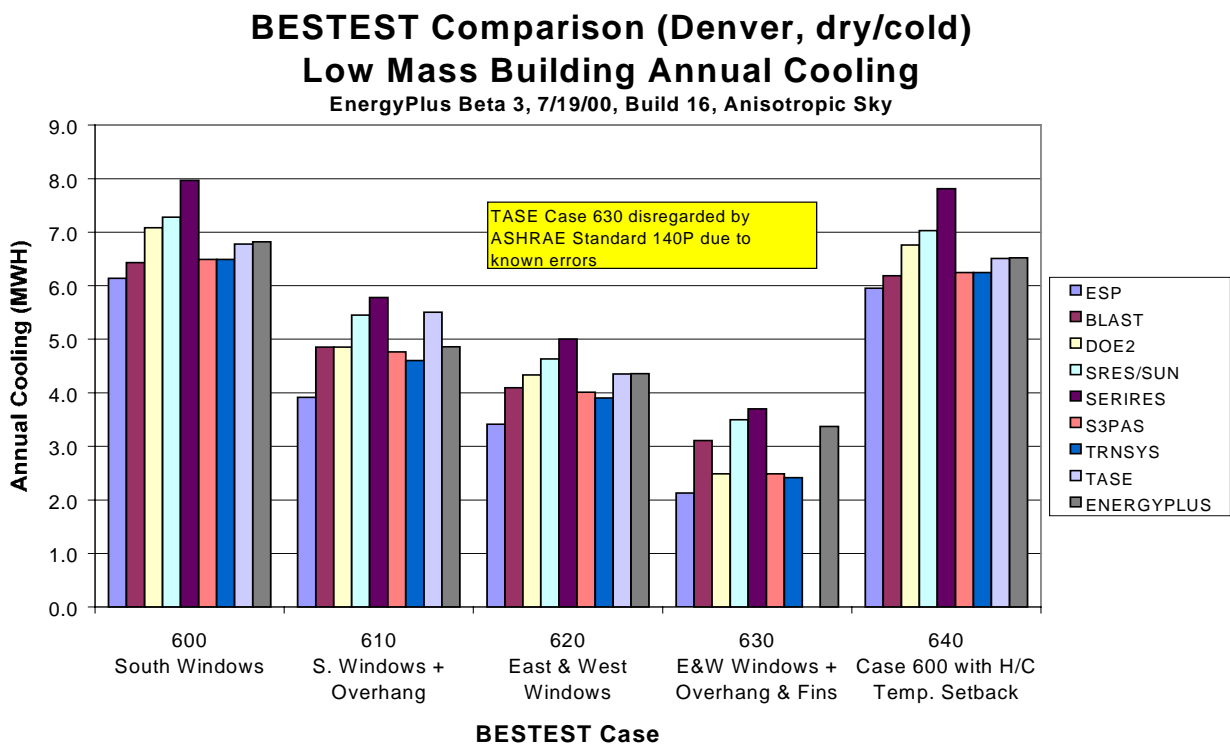
Field trials of the method were conducted with a number of "reference" programs selected by the IEA researchers to represent the best of the state-of-the-art detailed simulation capability in the US and Europe. These included BLAST, DOE-2, ESP, SERIRES, S3PAS, TASE, TRNSYS, CLIM2000, and DEROB.

Three versions of BESTEST are currently available:

- IEA BESTEST (detailed hourly (or shorter) time-step simulation programs),
- HERS BESTEST (detailed and simplified programs with an emphasis on modeling houses), and
- Florida BESTEST (hot-humid climates).

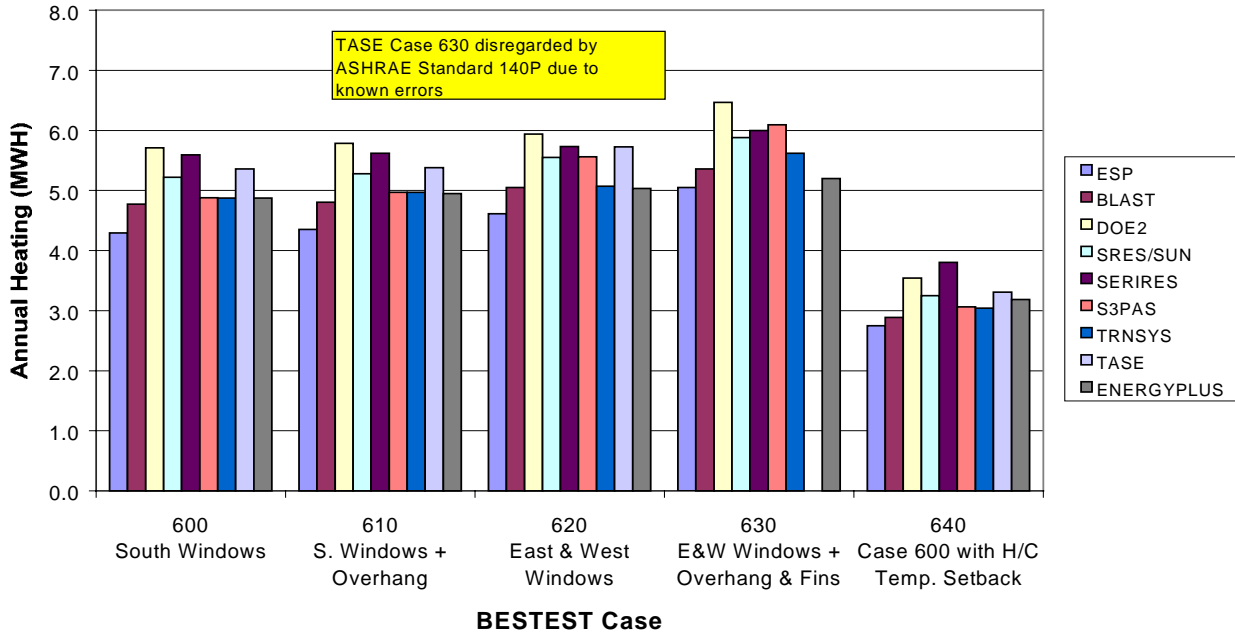
EnergyPlus BESTEST Results

In July the EnergyPlus program (Beta 3) was run by GARD Analytics on the BESTEST cases. The results are shown in the next 11 figures. (The DOE-2 values shown in these figures were obtained by GARD Analytics using the Windows version of DOE-2.1E available from ESTSC, p. 19.)



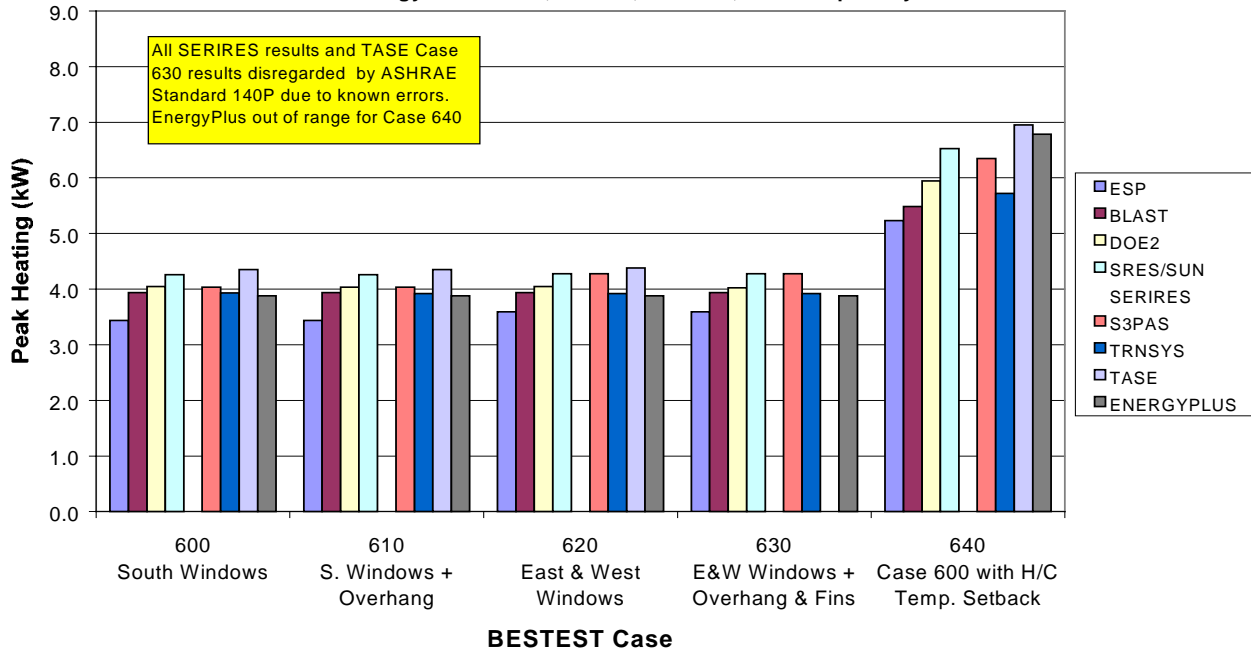
BESTEST Comparison (Denver, dry/cold) Low Mass Building Annual Heating

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



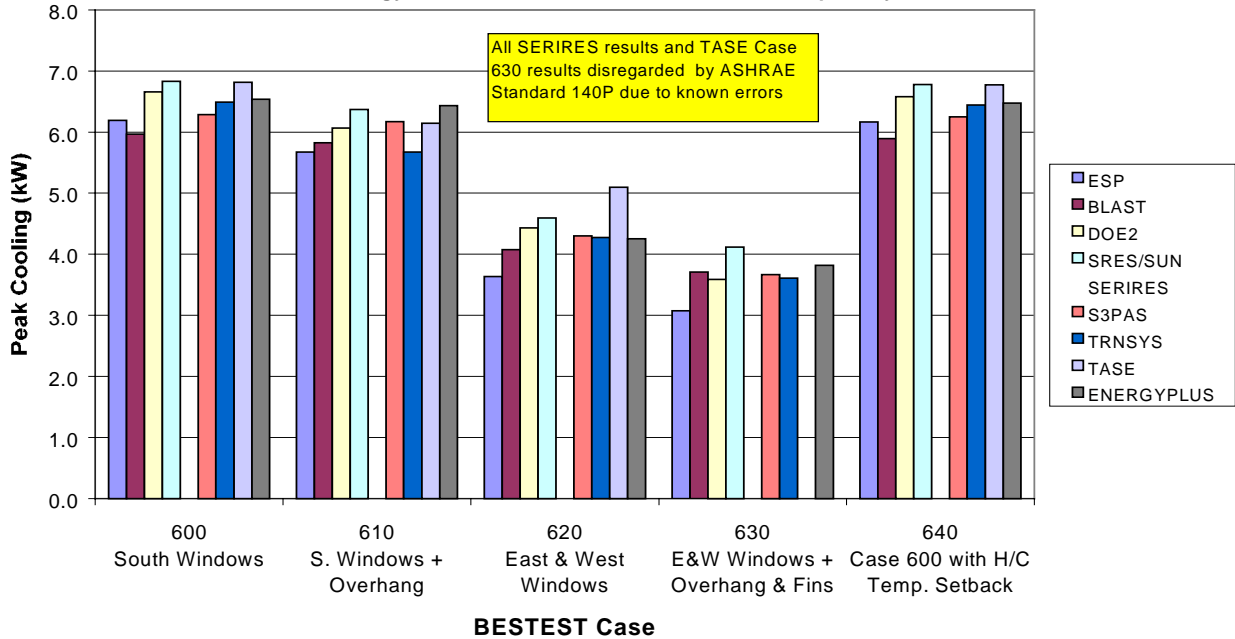
BESTEST Comparison (Denver, dry/cold) Low Mass Building Peak Heating

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



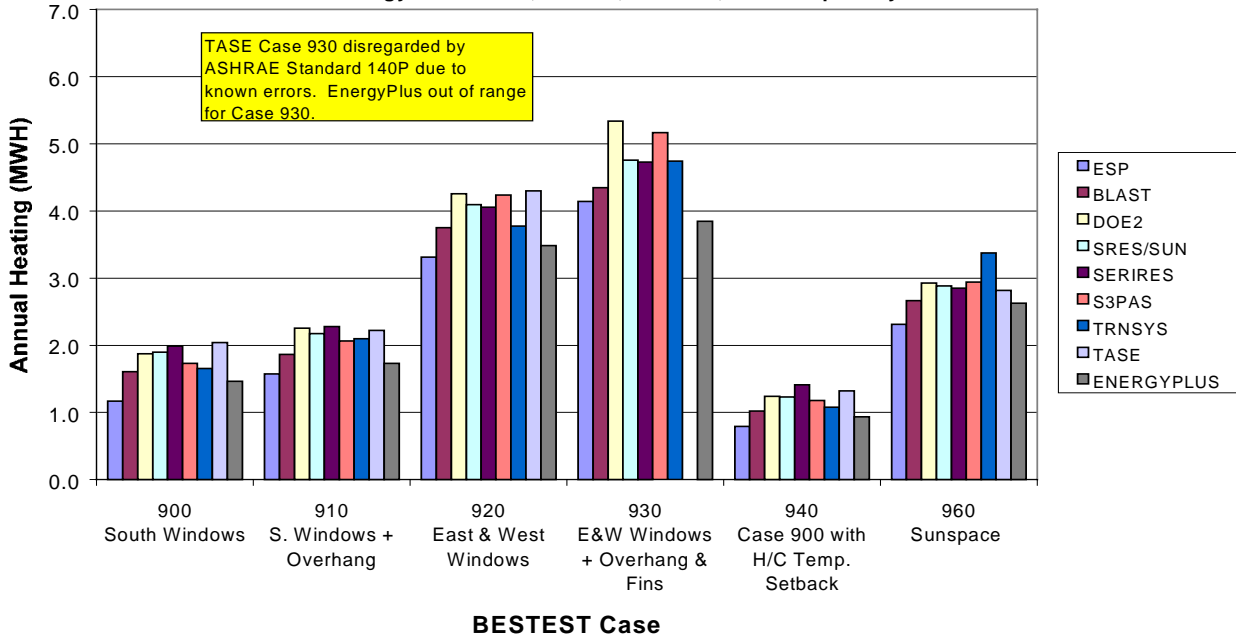
BESTEST Comparison (Denver, dry/cold) Low Mass Building Peak Cooling

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



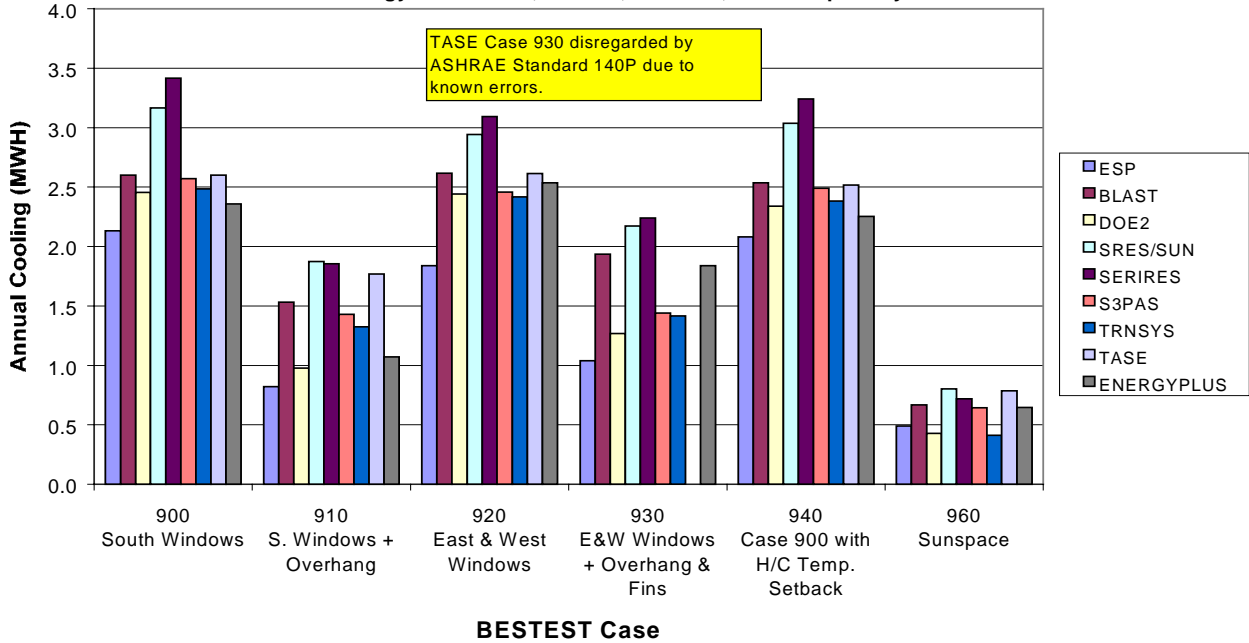
BESTEST Comparison (Denver, dry/cold) High Mass Building Annual Heating

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



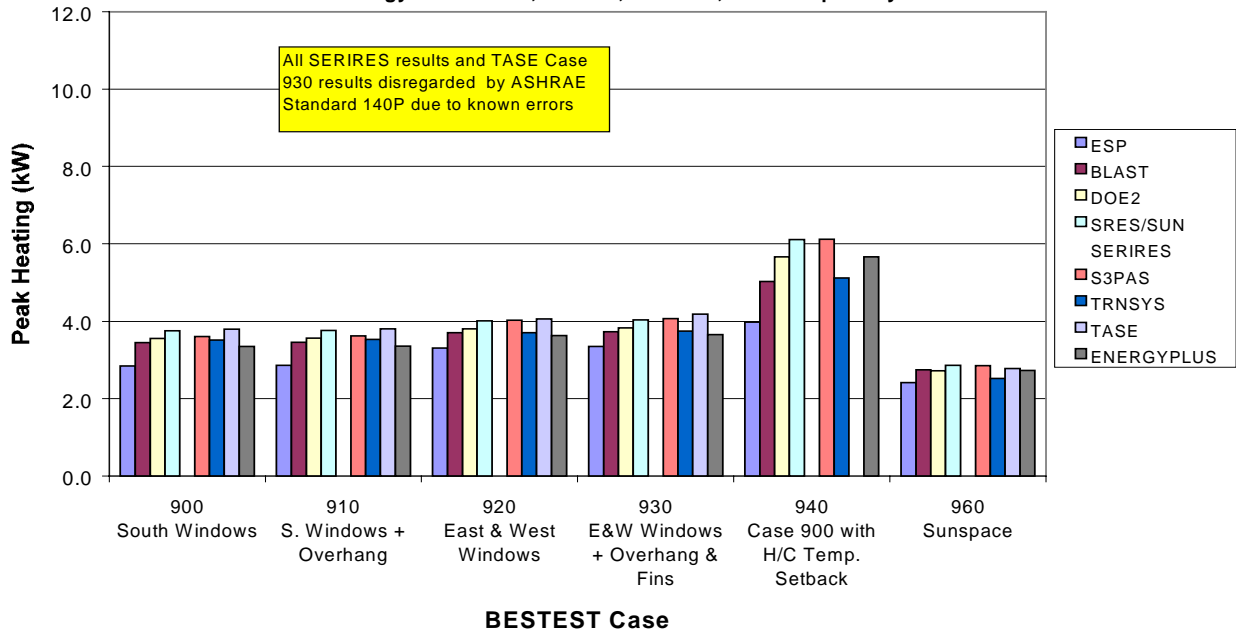
BESTEST Comparison (Denver, dry/cold) High Mass Building Annual Cooling

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



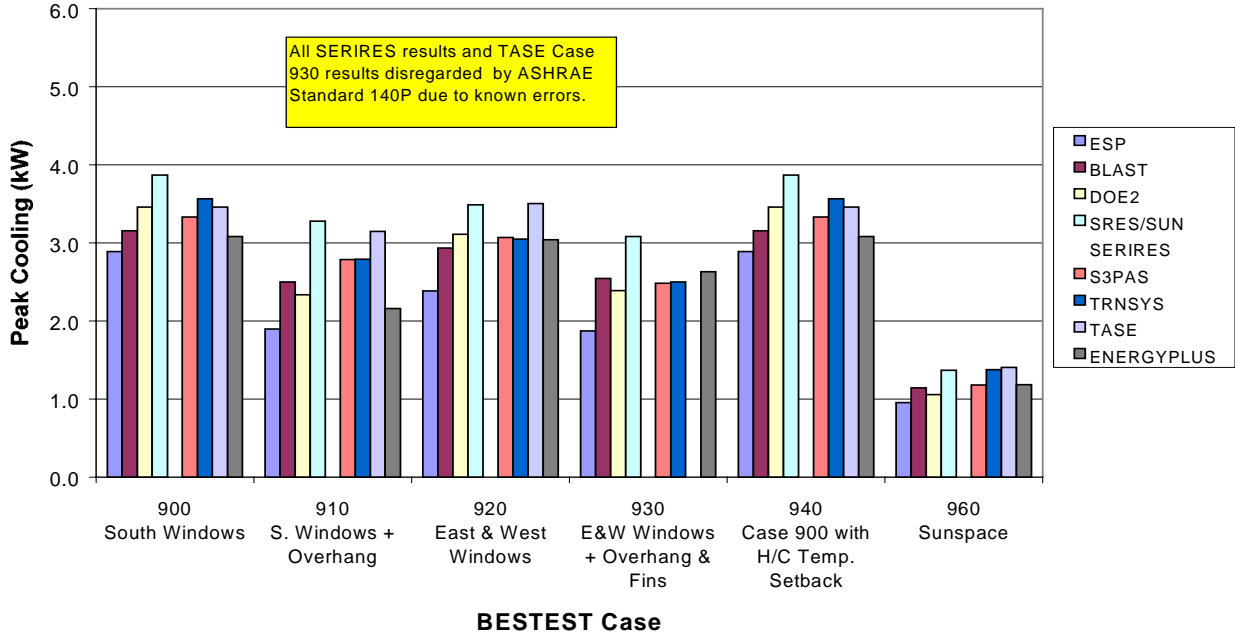
BESTEST Comparison (Denver, dry/cold) High Mass Building Peak Heating

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



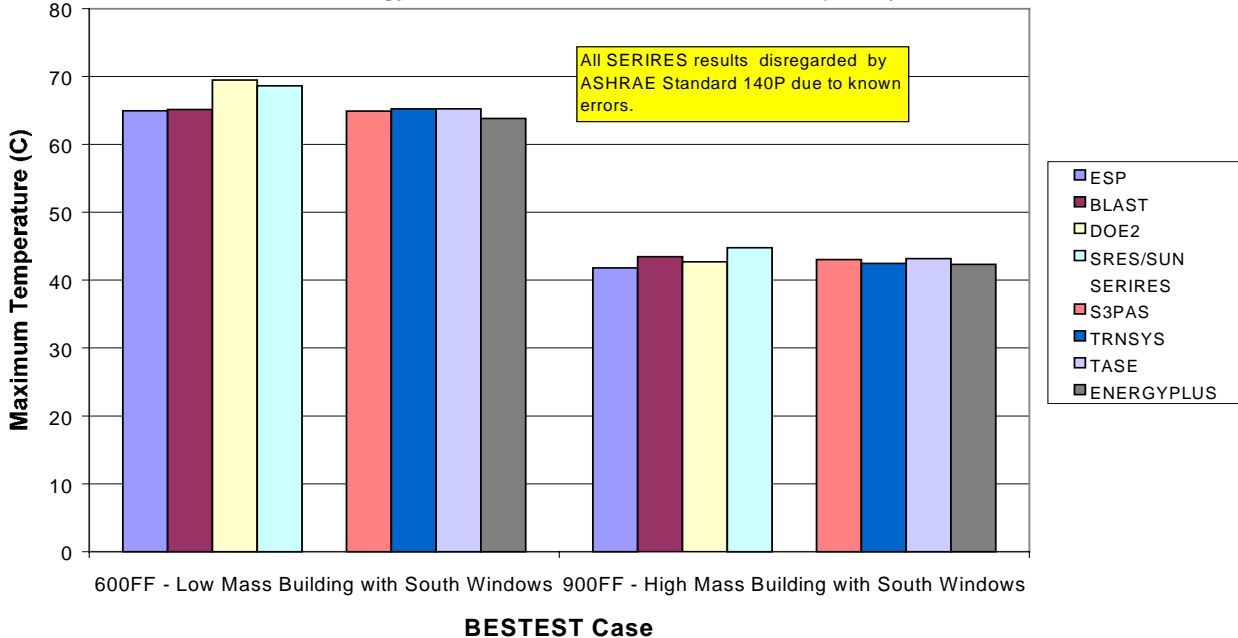
BESTEST Comparison (Denver, dry/cold) High Mass Building Peak Cooling

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



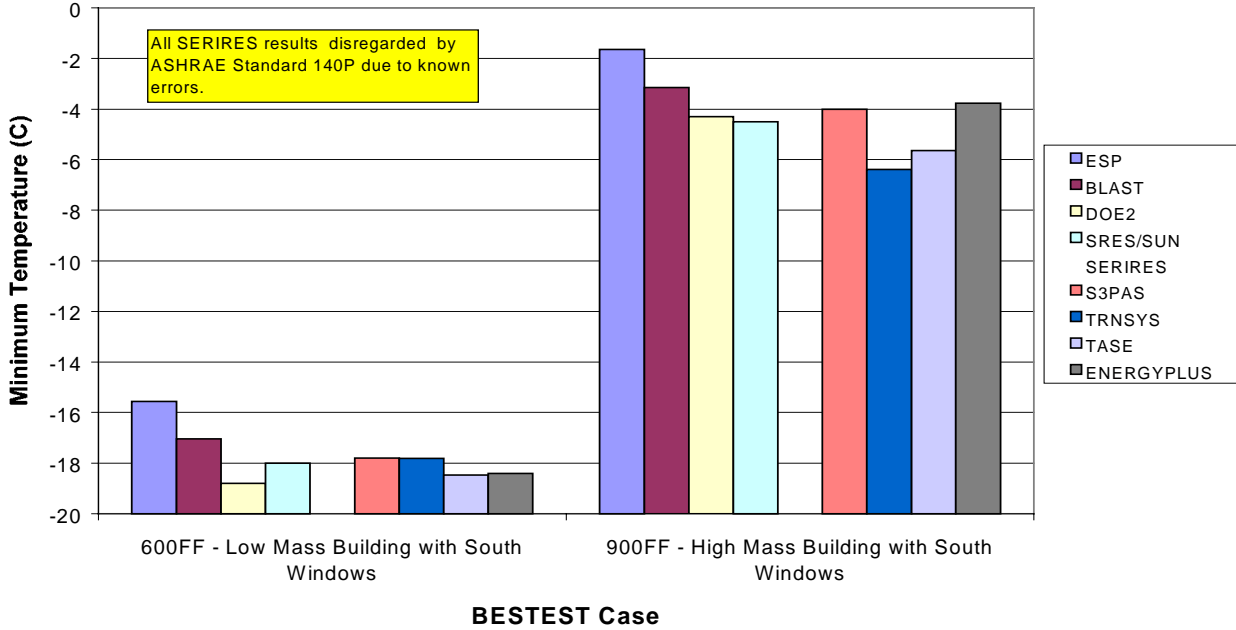
BESTEST Comparison (Denver, dry/cold) Free Floating Maximum Temperature

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



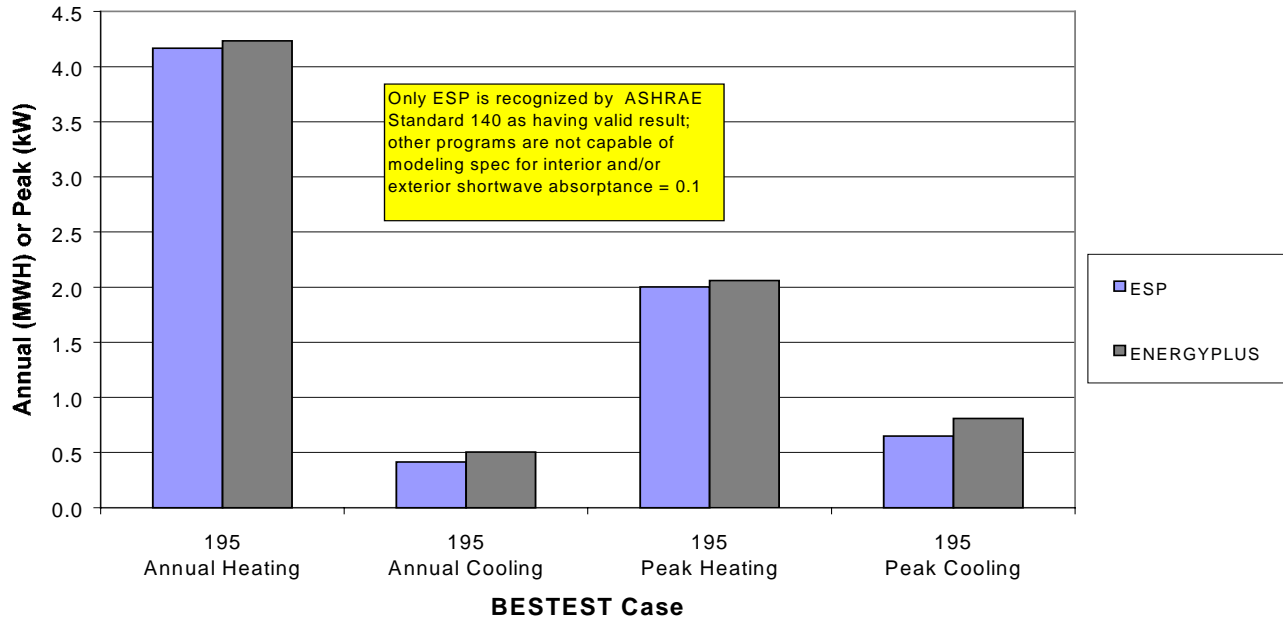
BESTEST Comparison (Denver, dry/cold) Free Floating Minimum Temperature

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



BESTEST Comparison (Denver, dry/cold) Low Mass Building (low absorptances, no windows)

EnergyPlus Beta 3, 7/19/00, Build 16, Anisotropic Sky



Calling all Simulation Educators

The U.S. Department of Energy (DOE) is seeking advice from building simulation educators who currently use DOE-2, BLAST or similar programs in the classroom.

We envision a collaboration to plan and develop curricula for teaching building simulation in the future. The curricula would present basic simulation methodologies and abstraction techniques and would be suitable for teaching either as one- or two-semester courses in engineering or architecture schools. All information would be shared on a common web site.

Of particular interest to DOE is extending a basic curriculum to include how to use the soon-to-be released EnergyPlus simulation program in university classrooms.

DOE proposes to facilitate the development of building simulation curricula through a series of

conference calls among interested educators. Conference calls will begin in Fall 2000; dates and times will be established to accommodate the majority of educators. These conference calls will discuss the most effective way to develop appropriate documentation for teaching building simulation (and EnergyPlus).

Interested educators should contact Jeff Haberl (JHaberl@esl.tamu.edu) at Texas A&M University. In the email, please include the phrase "EnergyPlus Educator Forum" in the title to speed the assembly of the list of participants.

Any questions, please contact either Dru Crawley (Drury.Crawley@ee.doe.gov) or Jeff Haberl.

We look forward to hearing from you.

Dru Crawley
U.S. Department Of Energy



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 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. To order, call Ed Kidd or Walt Kelly at ESTSC (423) 576-2606, or email to estsc@adonis.osti.gov. Cost of DOE-2.1E-WIN (Version 107) is broken down as follows:

\$ 300 U.S. Government, non-profits and \$ 575 U.S. public, Mexico, Canada \$ 1075 Other Foreign educational institutions

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-hand 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 send a fax, 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

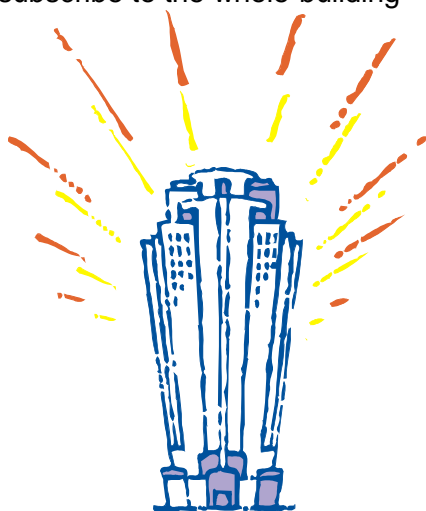
DOE-2

U.S. DOE Launches High-Performance Building Project

The U.S. Secretary of Energy, Bill Richardson, has announced that the Department of Energy (DOE) is creating a Commercial High-Performance Buildings project to increase the energy efficiency of commercial buildings. The effort, a joint partnership between the private sector and DOE, will also focus on improving the utility, comfort, quality and cost-effectiveness of commercial buildings.

"Thirty-two percent of the electricity generated in the United States goes to heat, cool, ventilate and light commercial buildings," said Richardson. **"The actions we are taking to decrease building energy use will save businesses money and reduce the impact of energy generation on global climate change and environment."**

The project will identify and publicize innovative 'whole building' approaches that increase the quality and efficiency of commercial buildings. Architects who subscribe to the whole-building



approach consider the structure as a complete system, rather than as a collection of independent components. This can have significant effects on design and construction, resulting, for example, in a smaller, more

efficient and less costly heating and cooling system.

The joint venture is part of DOE's Commercial Whole Buildings Roadmap initiative (www.eren.doe.gov/buildings/technology_roadmaps/), which is bringing together diverse groups involved in the design and construction of commercial buildings as a means of accelerating the adoption of new energy efficient building technologies. DOE and its partners are inviting participation by building industry representatives and allied groups on a national basis. The project is being managed by Steven Winter Associates, Inc., an architectural research and consulting firm.

This article was extracted from the June 2000 issue of ISDesignNET, the online version of Interiors & Sources Magazine (www.isdesignet.com/)

www.eren.doe.gov/buildings/highperformance/

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 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, Beta 2 (with user manual) may be downloaded from

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

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.

The main elements of VisualSPARK are a *user interface*, a *network specification language*, an *HVAC toolkit* containing calculation modules, a *solver* for solving the set of simultaneous algebraic and differential equations that correspond to the physical problem being simulated, and a *results display processor* for graphically plotting results. With the network specification language you link the calculation objects into networks that represent a building's envelope and/or HVAC systems. The solver solves this network for the user-specified time step and run period.

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.

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



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

Disclaimer: The Building Energy Simulation User News was prepared as an account of work sponsored by the United States Government (USG). While this document is believed to contain correct information, neither the USG nor any agency thereof, nor the Regents of the University of California (RUC), nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process or service by its trade name, trademark, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the USG or any agency thereof, or the RUC. The views and opinions of authors expressed herein do not necessarily state or reflect those of the USG or any agency thereof or of the Regents of the University of California

Building Design Advisor 2.0

*Decision making through the
integrated use of multiple
simulation tools and
databases*

The **Building Design Advisor (BDA)** is a Windows program that addresses the needs of building decision-makers from the initial, schematic phases of building design through the detailed specification of building components and systems. The BDA is built around an object-oriented representation of the building and its context, which is mapped onto the corresponding representations of multiple tools and databases. It then acts as a **data manager** and **process controller**, automatically preparing input to simulation tools and integrating their output in ways that support multi-criterion decision making. The latest public release of BDA (version 2.0) 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.

The following **enhancements** have been made to BDA 2.0 (as of 09/15/00):

- Greater flexibility in project development with features such as "Save as.."
- Greater user control over object properties with editing of Solution and Story properties, building azimuth, etc.
- User interface enhancements which allow easier navigation of the building model, with less ambiguities.
- Several bug fixes.
- Extended documentation.

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

- A new **Electric Lighting module** with simplified calculations for workplane illuminance due to electric lighting,
- **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.

With the completion of these development efforts BDA will have links to advanced as well as simplified tools for daylighting and electric lighting, and advanced tools for energy analysis and life-cycle analysis.

The minimum and recommended system **requirements** to run the BDA software are as follows:

Minimum

Pentium 75
Windows 95, 98, NT 4.0.
16 / 32MB RAM under Windows 95
30 MB of larger hard disk space.
640x480 or higher screen resolution.

Recommended

Pentium 200 or better.
Windows 95, 98, NT 4.0.
24 / 64MB RAM under Windows NT 4.0.
60 MB of larger hard disk space.
1024x768 or higher screen resolution.

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.

ENERGY-10, Version 1.3

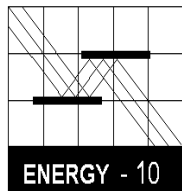
Version 1.3 of ENERGY-10 is now available; it includes the much-anticipated *WeatherMaker* function. *WeatherMaker* allows users to create their own weather files based on information available from nearly 4,000 weather stations throughout the U.S. Revisions to the program itself include some minor fixes, 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).

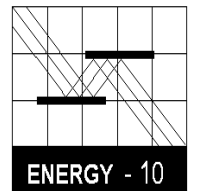
Output: Summary table and 20 graphical outputs available, generally comparing current design with base case. Detailed tabular results also available.

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



Sustainable Buildings Industries Council
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

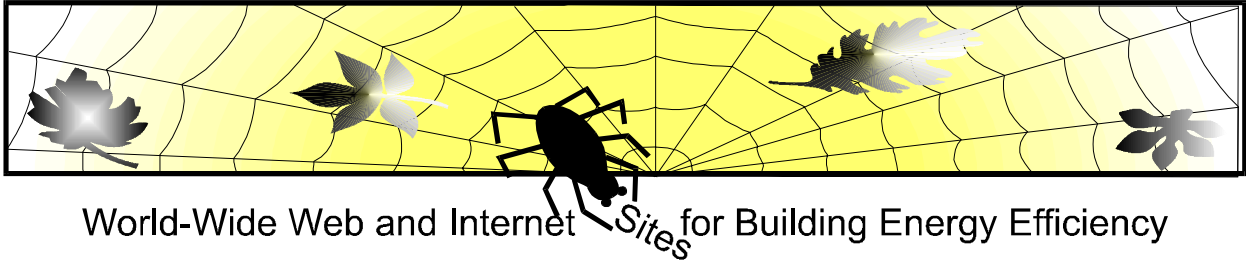


New construction in California?? Be sure to read the



Blueprint is the newsletter of the California Energy Commission and its Energy Efficiency Division's Efficiency Standards Office. It focuses on California's Title 24 Building Efficiency Standards, which took effect July 1, 1999. Always informative, *Blueprint* features a question-and-answer column for residential and non-residential building code issues, along with training schedules, new publications, etc. Read the current and past issues at:

<http://www.energy.ca.gov/efficiency/blueprint/index.html>



World-Wide Web and Internet Sites for Building Energy Efficiency

From the University of California at Los Angeles - School of the Arts and Architecture

ENERGY DESIGN TOOLS: <http://www.aud.ucla.edu/energy-design-tools/>

All the Energy Design Tools are fast, easy to use, and highly graphic. Each has a built-in demonstration. SOLAR-5 also includes a tutorial and prints its own Users Manual. Each program has an INSTALL routine and a READ.ME file explaining how to use it. They run on PC compatible microcomputers with DOS 3.1 or higher including Windows 95/98/NT unless stated otherwise.

SOLAR-5.7 Displays 3-D plots of hourly energy performance for the whole building or for any of 16 different components. It also plots heat flow into/out of thermal mass, and indoor air temperature, output of the HVAC system, cost of electricity and heating fuel, and the corresponding amount of air pollution. It uses hour-by-hour weather data, and can call RATES in the background to calculate detailed electricity costs. It has many special commands like overlay, post-it, and compare. Also included is **RATES**, a utility that contains over 170 residential and commercial electric rates. It lets SOLAR-5 show ratepayers a detailed picture of their energy costs. A manual for RATES is included in WordPerfect format.

TMY CLIMATE DATA You can convert any of the 239 TMY2 (Typical Meteorological Year 2) data files into a format that will run on Climate Consultant 2.0 and Solar 5.4; two of UCLA's Energy Design Tools. These sites include cities in all 50 states in the U.S. and some of its territories were developed at the Natural Renewable Energy Laboratory.

SOLAR-2 Plots sunlight penetrating through a window with any combination of rectangular fins and overhangs. Also plots hour-by-hour 3-D suns-eye view 'movie' of the building. Prints annual tables of percent of window in full sun, radiation on glass, etc.

OPAQUE Draws a detail of wall or roof sections, calculates U-value, Time Lag, and Decrement Factor. It plots temperature drop through the section. Draws 2-D daily and 3-D annual plots of Outdoor and Sol-Air Temperatures, Normal and Total Surface Radiation, and Heat Flow through the envelope. It was originally called SOLAR-3.

DAYLIT For any combination of up to four different skylights or windows with fins, overhang, light shelf, reflecting sill. Draws a section of the room, then plots illumination perpendicular to the window. It can also include electric lighting in up to three zones with manual or photocell-control. It also provides 3-D annual plots of illumination at various points in the room, plus total KWHR and thermal loads. It uses the IES Lumen Method of Sidelighting. Prints its own 60 page manual.

DATALIT Automatically manages experiments to periodically record light levels in an actual room, or in a model. Displays illumination distribution on a room section drawing.

Software Available From Lawrence Berkeley National Laboratory

Downloads	
BDA (Building Design Advisor)	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 go to SimulationResearch.lbl.gov > EnergyPlus
GenOpt® (generic optimization program)	SimulationResearch.lbl.gov > GenOpt
RADIANCE (analysis and visualization of lighting in design) Desktop Radiance (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14)	radsite.lbl.gov/radiance/license.html radsite.lbl.gov/deskrad
RESEM (Retrofit Energy Savings Estimation Model) (calculates 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)	For Windows, SUN and UNIX operating systems, go to SimulationResearch.lbl.gov > SPARK
SUPERLITE (calculate 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 energy-efficient, cost-effective windows for a given residential application)	windows.lbl.gov/software/resfen/resfen.html
---	--

Web Based

Home Energy Saver (quickly compute home energy use)	hes.lbl.gov
--	--

Purchase

ADELINE 2.0 (day/lighting performance in complex spaces)	radsite.lbl.gov/adeline/HOME.html
SPARK (Simulation Problem Analysis and Research Kernel) (build simulations of innovative building envelope and HVAC systems by connecting component models)	For Windows and UNIX operating systems, go to SimulationResearch.lbl.gov > SPARK



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
BRAZIL

www.labeee.ufsc.br/bs2001

Fax: +55 48 331-9770

Email: bs2001@labeee.ufsc.br

blastnews

Building Systems Laboratory (BSL)

30 Mechanical Engineering Building
University of Illinois
1206 West Green Street
Urbana, IL 61801

Telephone: (217) 333-3977 / Fax: 244-6534
support@blast.bso.uiuc.edu / www.bso.uiuc.edu

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.

DOE-2 Directory of Program Related Software and Services¹

ESTSC Versions of DOE-2

Program Name	Description	Cost																
DOE-2.1E (Ed Kidd or 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: DOE-2.1E/Version 103 for Windows and SUN UNIX DOE-2.1E DEC-VAX Operating System: Windows, SUN UNIX, DEC-VAX	<table border="1"> <thead> <tr> <th></th> <th>Windows</th> <th>SUN-UNIX</th> <th>VAX</th> </tr> </thead> <tbody> <tr> <td>Govt/Educ</td> <td>\$ 300</td> <td>\$455</td> <td>\$500</td> </tr> <tr> <td>US, Mexico, Canada</td> <td>\$575</td> <td>\$1365</td> <td>\$1835</td> </tr> <tr> <td>Other Foreign</td> <td>\$1075</td> <td>\$2120</td> <td>\$2716</td> </tr> </tbody> </table>		Windows	SUN-UNIX	VAX	Govt/Educ	\$ 300	\$455	\$500	US, Mexico, Canada	\$575	\$1365	\$1835	Other Foreign	\$1075	\$2120	\$2716
		Windows	SUN-UNIX	VAX														
Govt/Educ	\$ 300	\$455	\$500															
US, Mexico, Canada	\$575	\$1365	\$1835															
Other Foreign	\$1075	\$2120	\$2716															
<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.																		

Commercial Versions of DOE-2

Program Name	Description	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	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	\$395 + \$15/SH including one set weather data (your choice) and documentation	
			<u>Input</u>
			<u>Output</u>
Compare-IT (Matt Brost) RLW Analytics, Inc. info@rlw.com 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)	\$500 consultant \$2000 client Documentation available	
			<u>Input:</u> Customizable windows GUI dynamically built based on DOE-2 macros.
			<u>Output</u>
DOE-Plus (Steve Byrne) Item Systems byrne @ item.com 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)	\$895 with DOE-2 and doc \$495 without DOE-2 Source code not available.	
			<u>Input</u> Interactive, graphical, fill-in-the-blanks
			<u>Output</u> Customizable tables and graphics
	<u>Support</u> Unlimited, except modeling advice. On-line help.		

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
EnergyPro (D. Vonderkullen) demian@energysoft.com Gabel Dodd/EnergySoft LLC 100 Galli Drive #1 Novato, CA 94949-5657 Ph: 415-883-5900, Fx: 883-5970 www.energysoft.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	<u>Input:</u> 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
		<u>Output:</u> Graphs, forms	
		<u>Support:</u> 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	<u>Input:</u> Fill-in-the-blanks	\$1295 w/documentation Source code not available.
		<u>Output:</u> Standard DOE reports plus some custom graphic reports	
		<u>Support:</u> 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,	<u>Input</u> Version 2.x: text based Version 3.x: graphical	\$ 995.99 US w/documentation \$1066 Int'l w/documentation \$4999.99 Source code
		<u>Output</u> All standard DOE-2 reports Run time and status graphics	
		<u>Support</u> 90-days free; then cost is \$ 35 each email per incident \$ 55 per hour per incident \$125 per hour for engineering advice.	
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 Source code not available.
		<u>Output:</u>	
		<u>Support:</u> Unlimited support.	

Commercial Versions of DOE-2 (continued)

Program Name	Description	Cost
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	Fast 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 outputs, custom-ized graphs. On-line help. 400+ US weather files, 12+ for Canada, plus selected locations around the world. Operating System: DOS, Windows (3.1, 95, NT)	Version 2.61 is \$495 w/documentation
		Source code not available.
		<u>Input</u> Graphical
		<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) 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) RLW Analytics, Inc mattb@rlw.com 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. Visualize-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

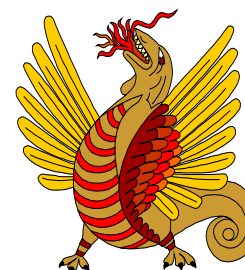
Special Versions of DOE-2

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 w/doc +8.75% tax in IL +4.5% tax in VA S/H add \$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. DOS 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]	\$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

How to contact us:

Simulation Research Group
MS: 90-3147
LAWRENCE BERKELEY NATIONAL LABORATORY
Berkeley, CA 94720-0001 U.S.A.

Fax: (510) 486-4089
Email: KLEllington@lbl.gov
Web: <http://SimulationResearch.lbl.gov>



Run for safety, foolish pedestrians!

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.

Australasia

P. C. Thomas, SOLARCH, University of New South Wales, Sydney 2052, Australia
Tel: +61 2 9385 6373 / Fax: +61 2 9385 6735, email PC.Thomas@unsw.EDU.AU www.fbe.unsw.edu.au/units/solarch

Australia

Murray Mason, ACADS BSG, 16 High Street, Glen Iris, VIC. 3146, Australia / Tel: +61 885 6586 / Fax: +61 885 5974

Brazil

Prof. Roberto Lamberts, Universidade Federal de Santa Catarina, Campus Universitario-Trindade, Cx. Postal 476, 88049-900 Florianopolis SC, BRASIL
lamberts@ecv.ufsc.br / Tel: +55 48 331 9272/ Fax: +55 48 331 9770

Czech Republic

Ing. Zuzana Krtkova, Faculty of Civil Engineering, Dept. of Environmental and Building Services Engineering, Czech Technical University in Prague, Thakurova 7, 166 29 Praha 6, CZECH REPUBLIC krtkova@fsv.cvut.cz Tel: +42 2 2435 4327

Egypt

Dr. Ossama A. Abdou, Center for Building Environmental Studies and Testing (C-Best), 15-EI-Shibani Street, Almanza, Cairo, Egypt Tel: +20 2 391 1137 or +20 2 417 4583 / Fax: +20 2 519 4343 / oabdou@hotmail.com

Germany

B. Barath or G. Morgenstern, Ingenieurbüro Barath & Wagner GmH, Postfach 20 21 41, D-41552 Kaarst, Germany
Tel: +49 2 131 7574 9012 G. Morgenstern / Fax: +49 2 131 7574 9029

Hong Kong, China, Taiwan, Japan

Dr. Sam C. M. HUI or K.P. Cheung, Dept of Architecture, University of Hong Kong, Pokfulam Road, Hong Kong (SAR), CHINA / cmhui@hku.hk or kpcheung@hku.hk / <http://arch.hku.hk/research/BEER/DOE-2/DOE-2.htm>
Tel: +852 2859 2123 Sam Hui / Fax: +852 2559 6484

India

Jiten Prajapati or Anil K. Anand, Energy Systems Engineering, IIT-Mumbai, Powai, Mumbai 400 076, INDIA
Tel : +91 022 578 2545 x7378

Italy

Marco Rapella, Via Bonfadini 33, I-23100 Sondrio, ITALY Tel: +39 031 230373 or 230370 cenergia@tin.it

Korea (Chungnam)

Dr. Jun Tae Kim, Department of Architectural Engineering, Kongju National University, 182 Sinkwan-dong, Kongju, Chungnam 314-701, Republic of Korea / jtKim@knu.kongju.ac.kr / Tel: +82 416 850 8653 / Fax +82 416 856 9388

Korea (Taejon)

Dr. Euy-Joon Lee and Jong-Ho Yoon, Passive Solar Research Team, Bldg 2, Room 202, Korea Institute of Energy Research, Daeduk Science Town, 71-2 Jang-Dong, Yusong-Gu, Taejon 305-343, Republic of Korea, Lee: ejlee@kier.re.kr, Yoon: yesru@kier.re.kr
Tel: +82 42 860 3514 / Fax: +82 42 860 3132

INTERNATIONAL DOE-2 RESOURCE CENTERS (continued)

New Zealand

Tan Yune, Architecture Department, The University of Auckland, Private Bag 92019, Auckland, New Zealand tanyune@ccu1.auckland.ac.nz / Tel: +64 9 373 7999
x5647 / Fax: +64 9 373 7410

Portugal, Spain, Italy, and Greece

Antonio Rego Teixeira, ITIME, Unidade de Energia, Estrada do Paco do Lumiar, 1699 Lisboa, Portugal
art@itime.ineti.pt / Tel: +35 11 350 2931 / Fax: +35 11 716 4305

Singapore, Malaysia, Indonesia, Thailand, and the Philippines

WONG Yew Wah (Raymond), Nanyang Technological University, School of Mechanical and Production Engineering, Nanyang Avenue, Singapore 2263, Republic of
Singapore, mywwong@ntu.edu.sg / Tel: +65 790 5543 / Fax: +65 791 1859

South Africa

Prof. L. J. Grobler, School of Mechanical and Materials Engineering, University of Potchefstroom, Private Bag X6001, Potchefstroom 2520, South Africa,
mgiljg@puknet.puk.ac.za / Tel: +27 148 299 1328 / Fax: +27 148 299 1320

Switzerland

René Meldem, Meldem Energie SA, Avenue de Cour 61, CH-1007 Lausanne, Switzerland
Tel: +41 21 401 4090, Fax: +41 21 401 4091, meldem.energie@bluewin.ch

INTERNATIONAL DOE-2 ENERGY CONSULTANTS

Australia

P. C. Thomas, Sustainable Building & Energy Consultants, 6/52 Houston Road, Kingsford NSW 2032, Australia.
Tel/Fax: +61 2 9662 0205, Mobile +61 417 405 478, pc_thomas@iname.com

Belgium

Andre Dewint, S.A. Alpha Pi n.v., Av Winston Churchill 232 Box 7, B-1180 Bruxelles, BELGIUM
Tel: +32 2 343 4251 / Fax: +32 2 343 0377

Canada

Curt Hepting, P.Eng. EnerSys Analytics, 2989 Delahaye Drive, Coquitlam, B.C. V3B 6Y9 Canada enersys@infoserve.net / www.enersys.bc.ca/homepage / Tel:
(604) 552-0700 / Fax (604) 552-0713

Dejan Radoicic, D. W. Thomson Consultants, Ltd., 1985 West Broadway #200, Vancouver, BC V6J 4Y3, Canada Tel (604) 731-4921 / Fax (604) 738-4420

Neil A. Caldwell, PE, DukeSolutions Canada, Inc., 1730 - 401 West Georgia St., Vancouver, BC V6B 5A1 Canada ncaldwe@duke-energy.ca

Dr. Stephane Bilodeau, PE, President, Groupe Enerstat, Inc., 79 Wellington North #202, Sherbrooke (Quebec) J1H 5A9, Canada
sbilodeau@groupeenerstat.com / Tel: (819) 562-8040 / Fax (819) 562-5578

Gordon Shymko, G.F. Shymko & Associates, Inc., 129 Evergreen Crescent S.W., Calgary, Alberta T2Y 3R2, Canada

Germany

Jens Grundt and Ludwig Michel, GMW-Ingenieurburo, Die Planer Villa, Bünteweg 10a, 30559 Hannover, Lower Saxony, Germany
Tel: +49 0511 58 59 48 -11/Fax +49 0511 58 59 48 -48 www.gmw-ingenieurbuero.de j.grundt@gmw-ingenieurbuero.de

INTERNATIONAL DOE-2 ENERGY CONSULTANTS (continued)

Ireland

Paul Overy, Overy + Associates, Mechanical and Electrical Consulting Engineers, 43 Parnell Street, Clonmel, Co Tipperary, Ireland
Tel: +353 (0)52-27667, Fax: +353 (0)52-29238 www.overy-assoc.com

New Zealand

Paul Bannister, Energy Group, Ltd., 14a Wickliffe Street (P.O. Box 738), Dunedin New Zealand eglstaff@earthlight.co.nz
Tel: +64 3479 0148, Fax: 3479 0759

Switzerland

René Meldem, Meldem Energie SA, Avenue de Cour 61, CH-1007, Lausanne, Switzerland.

Tel: +41 21 401-4090, Fax: +41 21 401-4091, meldem.energie@bluewin.ch

Philip Schluchter, Institut für Bauphysik Klein, Urs Graf-Strasse 1, CH-4052 Basel, Switzerland

Gerhard Zweifel, Hochschule Technik + Architektur Luzern, Technikumstrasse 21 Abt. HLK, CH-6048 Horw, Switzerland gzweifel@ztl.ch

Tel: +41 349 3349, Fax: 349 3960

Markus Koschenz, Building Equipment Section 175, EMPA, 129 Überlandstrasse, CH-8600 Dübendorf, Switzerland

Markus.Koschenz@empa.ch, Tel: +41 1823 5511, Fax: 821-6244

United Kingdom

Dr. Peter Simmonds, Ove Arup and Partners, Ltd., 13 Fitzroy Street, London W1P 6BQ, UNITED KINGDOM.

Tel: +44 20-7465-3637 / Fax: 7465-3667, peter.simmonds@arup.com / www.arup.com

U.S. DOE-2 ENERGY CONSULTANTS

Arizona

Henny van Lambalgen, P.E. henny@questenergy.com	Quest Energy Group, LLC www.questenergy.com	4324 East Pearce Road	Phoenix, AZ 85044	(480) 753-5590 fax 753-1215
Marlin S. Addison marlin.addison@doe2.com	M. S. Addison & Associates	1215 West 12th Place	Tempe, AZ 85281	(480) 968-2040 fax: 968-2053
Chuck Sherman ces@essinc.com	ESSengineering	2141 East Broadway, #211	Tempe, AZ 85282	(480) 784-4500 fax: 784-4800
Sarat Kanaka nexus@nexusenergy.com	EcoGroup, Inc., Suite 301	2085 E. Technology Circle	Tempe, AZ 85284	(602) 777-3000

California

M. Gabel, R. Howley office@gabelenergy.com	Gabel Associates, LLC www.gabelenergy.com	1818 Harmon Street	Berkeley, CA 94703	(510) 428-0803 fax: 428-0324
George Marton John R. Aulbach, PE jrascab36@earthlink.net	1129 Keith Avenue 23508 Naffa Avenue		Berkeley, CA 94708 Carson, CA 90745	(510) 841-8083 (310) 549-7118
Leo Rainer lirainer@davisenergy.com	Davis Energy Group, Inc. www.davisenergy.com	123 C Street	Davis, CA 95616	(916) 753-1100

U. S. DOE-2 ENERGY CONSULTANTS (continued)

California (continued)				
L. Heshong and D. Mahone lheshong@h-m-g.com dmahone@h-m-g.com	The Heshong Mahone Group www.h-m-g.com	11626 Fair Oaks Blvd, #302	Fair Oaks, CA 95628	(916) 962-7001 fax: 962-0101
Cliff Gustafson	Taylor Systems Engineering, Inc. www.tse-inc.net	9801 Fair Oaks Blvd., #100	Fair Oaks, CA 95628	(916) 961-3400 fax: 961-3410
Tom Lunneberg, PE info@ctg-net.com	Constructive Tech. Group www.ctg-net.com/main.htm	16 Technology Dr., #109	Irvine, CA 92618	(714) 790-0010
David J. Schwed rma@as.net	Romero Management Associates www.asnet/~rma/index.htm	1805 West Avenue K	Lancaster, CA 93534	(805) 940-0540
Martyn C. Dodd support@energysoft.com	Gabel Dodd/EnergySoft, LLC www.energysoft.com	100 Galli Drive, # 1	Novato, CA 94949	(415) 883-5900 fax: 883-5970
Jim Kelsey, Kevin Warren info@kw-energy.com	KW Energy Engineering www.kw-energy.com	175 Filbert Street #205	Oakland, CA 94607-2541	(510) 834-6420 fax: 834-6373
Patrick Nkwocha, PE UPat@worldnet.att.net	Global Tech Services	3360 Foothill Blvd., #108	Pasadena, CA 91107	(626) 583-8205 fax: 583-8206
James Trowbridge, PE Greg Cunningham gwc@essinc.com	Trowbridge Engineering EnerSys Solutions LLC www.essinc.com	8240 Caribbean Way 114 Sansome St., #1201	Sacramento, CA 95826 San Francisco, CA 94104	(916) 381-4753 (415) 296-9760 fax: 784-9761
Charles Eley, T. Tathagat info@eley.com	Eley Associates www.eley.com	142 Minna Street	San Francisco, CA 94105	(415) 957-1977 fax: 957-1381
John F. Kennedy, PE info@geopraxis.com	GeoPraxis, Inc. www.geopraxis.com	18850 Robinson Road	Sonoma, CA 95476	(707) 996-9408 fax: 939-8702
Chandra Shinde, PE	Envirodesign Group	19613 El Camino Esplanade	Walnut, CA 91789-2138	(909) 598-1980
Colorado				
Fred Porter	Architectural Energy Corp	2540 Frontier Ave, #201	Boulder, CO 80301	(303) 444-4149 fax: 444-4304
Dr. Ellen Franconi ellenf@schiller.com	Schiller Associates www.schiller.com	1401 Walnut Street, #403	Boulder, CO 80302	(303) 440-4343 fax: 440-6644
Paul Reeves	PRC	140 South 34 th Street	Boulder, CO 80303	(303) 499-8611
Susan Reilly denver@enermodal.com	Enermodal Engineering	1554 Emerson Street	Denver, CO 80218	(303) 861-2070 fax: 830-2016
Charles Fountain	Burns & McDonnell www.burnsmcd.com	8055 E. Tufts Avenue, #330	Denver, CO 80230	(303) 721-9292
Joel Neymark, PE	J. Neymark & Associates	2140 Ellis Street	Golden, CO 80401	(303) 384-3672
Norm Weaver, PE	Interweaver Consulting	P.O. Box 775444	Steamboat Springs, CO 80477	(970) 870-1710
Connecticut				
Adrian Tuluca swa@swinter.com	Steven Winter Associates www.swinter.com	50 Washington Street	Norwalk, CT 06854	(203) 852-0110 fax: 852-0741

U. S. DOE-2 ENERGY CONSULTANTS (continued)

District of Columbia				
Kurmit Rockwell, PE	XENERGY, Inc., Suite 1110 www.xenergy.com	1025 Connecticut Ave., N.W.	Washington, DC 20036	(202) 872-1626
Florida				
Philip Wemhoff	1512 South McDuff Avenue		Jacksonville, FL 32205	(904) 632-7393
Dr. Paul Hutchins PE,CEM	Reynolds Smith & Hills, Inc. www.rsandh.com	4651 Salisbury Road	Jacksonville, FL 32256	(904) 279-2277 fax: 279-2491
Georgia				
Lung-Sing Wong, PE lswong@bpe-inc.com	Building Performance Engrs. www.bpe-inc.com	3060 Wanda Woods Drive	Atlanta, GA 30340	(770) 270-0100
Glenn L. Bellamy gbellamy@heery.com	Heery International, Inc. www.heery.com	999 Peachtree St., N.E.	Atlanta, GA 30367-5401	(404) 946-2208 fax: 875-1283
Illinois				
Gary H. Michaels, PE	G.H. Michaels Associates	1512 Crain Street	Evanston, IL 60202	(847) 869-5859
Prem N. Mehrotra	General Energy Corp.	230 Madison Street	Oak Park, IL 60302	(708) 386-6000
Robert Henninger, PE rhenninger@gard.com	GARD Analytics, Inc. www.gard.com	1028 Busse Highway	Park Ridge, IL 60068-1802	(847) 698-5686
Kansas				
Dr. Brian A. Rock, PE barock@ukans.edu	A/E Dept, Marvin Hall	University of Kansas	Lawrence, KS 66045-2222	(785) 864-3603
Massachusetts				
C. Kalasinsky PE, T.Chan	R.G. Vanderweil Engrs., Inc. www.vanderweil.com	274 Summer Street	Boston, MA 02458-1113	(617) 423-7423 fax: 423-7401
Mark Mullins mmullins@hecenergy.com	HEC Energy & Design Services www.hecenergy.com	24 Prime Parkway	Natick, MA 01760	(508) 653-0456 fax: 653-0266
Michael Andelman andelman@jrma-ae.com	JRMA & Associates www.jrma-ae.com	421 Watertown St.	Newton, MA 02210	(617) 964-8889 fax: 964-7881
Missouri				
Mike Roberts	Roberts Engineering Co.	11946 Pennsylvania	Kansas City, MO 64145	(816) 942-8121
Bruce A. Leavitt, PE	Wm. Tao & Associates Inc.	2357-59 th Street	St. Louis, MO 63110	(314) 644-1400
Montana				
Michael W Harrison, PE	Harrison Engineering	139 Bluebird Lane	Whitehall, Montana 59759	(406) 287-5370
Nebraska				
Philip M. Schreier, PE FEI-OMA@worldnet.att.net	Farris Engineering www.nebraska.org/4/4/01/00/co.htm	11239 Chicago Circle	Omaha, NE 68154-2634	(402) 330-5900 fax: 330-5902

U. S. DOE-2 ENERGY CONSULTANTS (continued)

New York				
Robert E. Gibeault gibeault@pbworld.com	PB Power, Inc. www.pbworld.com	1873 Western Avenue #201	Albany, NY 12203	(518) 862-0012 fax: 862-1608
J. Fireovid, K. Yousef	SAIC Energy Solutions Div. www.saic.com	1 Marcus Boulevard	Albany, NY 12205	(518) 458-2249
Dave Pruitt, Scott Frank	Jaros, Baum & Bolles www.jbb.com	80 Pine Street	New York, NY 10005	(212) 530-9300
H. Henderson henderson@cdhenergy.com S. Carlson carlson@cdhenergy.com	CDH Energy Corporation www.cdhenergy.com	P.O. Box 641 (132 Albany Street)	Cazenovia, NY 13035	(315) 655-1063 or (315) 655-1058
North Carolina				
Gopal Shiddapur, PE gsshidda@duke-energy.com	DukeSolutions (MC: ST05A) duke-energy.com	230 S. Tryon Street, # 400	Charlotte, NC 28202	(704) 373-4439 fax: 373-4872
Hank Jackson, PE hzjackson@juno.com	R, C, & I Engineering Services Inc. www.geoexchange.com/public/oppor tunity/JACKSON.html	P.O. Box 675	Weaverville, NC 28787-0675	(704) 691-0785 fax: 658-0474
Oregon				
Carol Gardner gems@teleport.com	Gardner Energy Management Services	PO Box 12549	Portland, OR 97212-0549	(503) 223-4847 fax: 223-8486
J. Karasaki, PE, jpkarasa@cbg-engrs.com B. Thornton bathornt@cbg-engrs.com	CBG Consulting Engineers www.cbg-engrs.com	6650 SW Redwood Ln., #355	Portland, OR 97224	(503) 620-3232
Texas				
Jeff S. Haberl jhaberl@esl.tamu.edu	Energy Systems Laboratory esl.tamu.edu	Texas A&M University	College Station., TX 77843-3123	(409) 845-6065
Virginia				
Dave Walker walkeng@swva.net	Walker Engineering www.swva.net/walkeng	P.O. Box 366	Staffordsville, VA 24167	(540) 921-4544 fax: 921-4548
Washington				
Steve Byrne byrne@item.com	ITEM Systems, suite 344 www.halcyon.com/byrne/item.htm	321 High School Road NE	Bainbridge Island, WA 98110	(206) 855-9540
Gregory J. Banken, PE gbanken@qmetrics.com	Q-Metrics, Inc. www.qmetrics.com	P.O. Box 3016	Woodinville, WA 98072-3016	(425) 825-0200 fax: 825-0136