BUILDING ENERGY SIMULATION

For Users of EnergyPlus, SPARK, DOE-2, BLAST, Genopt, Building Design Advisor, ENERGY-10 and their Derivatives

Users News

What's New ?

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."

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 like 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.

Beta Test EnergyPlus Now! ....

The second of four planned beta test versions of EnergyPlus was released in April. There is a lot of EnergyPlus news starting on p. 2. To get beta test instructions go to

http://SimulationResearch.lbl.gov > EnergyPlus

New International Energy Consultant ....

Dr. Peter Simmonds of Ove Arup and Partners, Ltd. is the newest DOE-2 consultant. Arup is a global organization of consulting engineers, planners and project managers involved in all areas of the built environment.

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What's Inside ?
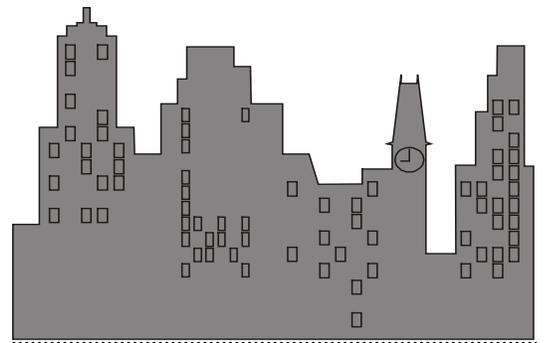
Go to http://SimulationResearch.lbl.gov for

▪ **Latest information on**
   EnergyPlus
   DOE-2
   SPARK
   GenOpt

▪ **Weather Data Sources**

▪ **DOE-2 Documentation**
   Where to purchase
   Downloadable updates

▪ **Web sites for Building Energy Efficiency**

EnergyPlus: Beta 2 Now Available!

EnergyPlus is a new-generation building energy simulation program that builds on the most popular features and capabilities of BLAST and DOE-2. EnergyPlus will include innovative simulation capabilities including time steps of less than an hour, systems simulation modules that are integrated with a heat balance-based zone simulation, and input and output data structures tailored to facilitate third-party interface development. Other planned simulation capabilities include solar thermal calculation, multizone air flow, and electric power simulation including photovoltaic systems and fuel cells.
If you want to beta test EnergyPlus or become an EnergyPlus developer, go to http://SimulationResearch.lbl.gov and click on EnergyPlus. The latest information on EnergyPlus can be found at http://www.eren.doe.gov/buildings/energy_tools/energyplus.htm.

Highlights of Beta 1:
- Simultaneous simulation of zone loads and HVAC systems
- Daylighting
- Simple input and output processing
- Simple input file editor capabilities
- BLAST translator to EnergyPlus input files
- Weather processing (initial)
- Basic HVAC simulation
- Example input files

Highlights of Beta 2:
- WINDOW 5 calculations replace previous glass calculations
- Thermal comfort modeling and reporting based on Fanger model
- Revised HVAC modeling, including branch-based input and flow resolver
- Simple launch program for EnergyPlus
- Exhaust fan
- Fan control, fan motor placement
- Simple input and output preprocessor
- Material and construction libraries

Features planned for Beta 3 and 4 releases:

- More example HVAC input files
- DOE-2 input file translator
- Energy meter capability (for reporting)
- COMIS integration (interzone air flow, natural ventilation)
- Window library
- Photovoltaics
- Unit ventilator
- Unit heater
- Furnace
- Hot water heater
- Window air conditioner

- Moisture calculations
- Additional thermal comfort modeling and reporting (KSU, Pierce 2-node)
- More accurate ground heat transfer modeling
- Heat pump simulations, including ground source
- High temperature radiant heating
- Low temperature radiant heating/cooling
- Cooling tower
- Heat recovery
- Evaporative cooling
- Absorption chiller
- Electric generators
- DX coil

EnergyPlus Beta Release Schedule		
Version	**Scheduled**	**Actual**
Alpha	Fall 1998	4 December 1998
Beta		
Beta 1	December 1999	17 December 1999
Beta 2	April 2000	05 April 2000
Beta 3	July 2000	
Beta 4	October 2000	
Release of Version 1.0	January 2001	

Frequently Asked Questions about the EnergyPlus Program

General

Q: Why are you developing EnergyPlus ? Aren't BLAST and DOE-2 good enough?

A: Both BLAST and DOE-2 are very difficult to maintain and upgrade. They also have some fundamental shortcomings; for example, the Loads, Systems and Plant calculations are not integrated and they won't do time steps less than one hour. EnergyPlus will have the best calculations available and will be modular so that new simulation features will be easier to add.

Q: Are you developing a Graphical User Interface (GUI) for EnergyPlus ?

A: No, we are concentrating on developing the simulation engine. It is expected that other organizations will develop a variety of GUI's for EnergyPlus.

Q: Have you tested EnergyPlus with all versions of Windows? (3.1, 95, etc.)?

A: The beta version is compiled for a 32-bit platform, so Windows 3.1 is not an option. However, extensive testing has been done on Windows 95, 98, and NT. We endeavor to have the same results on each platform.

Q: Is there a link with TRNSYS envisioned?

A: Yes. This has already begun. A photovoltaic module has been completed that links with TRNSYS. The PV module will be included in Beta 4. A link with SPARK is also planned.

Q: Will EnergyPlus accept building loads calculated by an external source; e.g., estimated hourly loads. The thought here is to utilize EnergyPlus for Plant and Econ simulation only.

A: The loads and systems portion of EnergyPlus are much more tightly coupled than in either DOE-2 or BLAST. Loads are calculated on a time step basis and passed directly to the HVAC portion--loads not met are passed back and result in zone temperature/humidity changes for the next time step. The short answer--it probably can be done but we haven't set EnergyPlus up to explicitly accept outside input. The input function capability that was in DOE-2 will also be available in EnergyPlus.

Input

Q: Do you have input units and ranges in the input data definition?

A: As noted in the Interface Developers document, we have set up conventions for commenting the IDD (Input Data Dictionary), including minimum, maximum, other information. EnergyPlus, however, does not process this information directly--it is supplied for the convenience of the interface developers.

Q: Is there a particular order required for the Input Data File (IDF)?

A: Objects in the IDF may be in any order. EnergyPlus input routines process the information as it is needed by the simulation and reorder if the internals of EnergyPlus require a particular order.

Q: Is there a limit on the number of Zones, Surfaces, Lighting, etc statements?

A: Technically speaking, there is no limit to the number of Zones, Surfaces, etc. that EnergyPlus can process. The input routines allocate according to how many of these the user enters. Practically speaking, your simulation may take longer with more complex / larger numbers of these items.

Q: Is the RunPeriod command optional or required?

A: RunPeriod is not required if design days are defined, but is required to access data from a weather file. There can be more than one RunPeriod.

Q: To what depth are the GroundTemperatures applied?

A: The ground temperature will be applied to the outside surface of any surfaces for which Exterior Environment = Ground. So you may need to add a layer of soil to your surfaces which are in contact with the ground.

Q: On the Zone command, what are Zone North Axis, Zone Origin, Zone Multiplier, etc?

A: The building north axis is specified relative to true north in degrees clockwise (N=0, E=90, S=180, W=270). The zone origin and zone north axis are relative to the building north axis. All surface coordinates and angles are relative to the zone origin and zone north axis. Zone type is not used yet, it should always be set to 1. Zone multiplier allows one to describe a repetitive zone only once and then specify a multiplier (for instance, the south-facing zone on floors 2-9 of a ten-story building can be described only once with a multiplier of 8). Zone volume is used to establish the heat capacity of the air in the zone.

Q: On the People statement, what does the Activity Level describe?

A: Activity level is the amount of heat generated by one person. Note that there are two schedules used to describe people and activity level. The first schedule is a fractional multiplier on the number of people (you enter the maximum number of people as the first numeric entry). Then the activity level schedule allows you to further specify the activity level of one person during a 24 hour period.

Q: On the Lights statement, what is Return Air Fraction, Fraction Replaceable?

A: Return air fraction is the fraction of lighting power which goes directly into the return air stream. Fraction replaceable is related to daylighting and indicates the maximum fraction of the lighting power that may be turned off and replaced with daylighting. Fraction radiant is the portion of lighting energy that is emitted as thermal (non-visible) radiation.

Q: In the Daylighting statement, what are Daylighting Reference Points?

A: Daylighting reference points are the points at which the amount of available daylighting is calculated, essentially the place where a daylighting control sensor would be placed. The lighting in a zone can be controlled by one or two sensors and the fraction of lighting assigned to each sensor is specified.

Output

Q: There is a .dxf file produced as one of the optional outputs. What can I do with this file?

A: DXF is a generally recognized exchange format in the CADD world. DXF is an acronym for Data Exchange Format. Many programs are available that can read a .dxf file and produce a viewable picture of the, in this case, building. Most CADD programs, for example, can read the file. Programs that have been tested as capable of reading the EnergyPlus produced .dxf file are: QuickView Plus, Microstation, Visio, and Autodesk products. Autodesk was the originator of the DXF format and has produced a downloadable, free viewer called VoloView Express. This file is available from the Autodesk web site (http://www.autodesk.com), by following the links to Products/Support.

Q: The output generated by EnergyPlus is extensive -- how can I read it?

A: A simple output processing program is available and included with the Beta release. It is called ReadVarsESO and takes a simple input file as directives on which of the variables to include in its output file. This output file (default name: eplusout.csv) can be readily accepted by Spreadsheet programs, such as Excel. More information is included in the Input/Output Reference document.

Weather Data

Q: The weather data for EnergyPlus is in text-based format. Are there any utility programs or ways to prepare the weather files from raw data (usually one file per parameter), DOE-2 or BLAST weather files, and TMY/TMY2 files?

A: We are creating a weather utility (in Java!) that should read and translate TMY2, WYEC2, IWEC (new ASHRAE format), TD1440, DOE-2, BLAST, and ESP-r text formats. It should be ready by Beta 3.

Q: EnergyPlus allows and reads subsets of years and even sub-hourly (5 minute, 15 minute) data. Does it mean we can input a set of sub-hourly data to carry out the simulation? Will the simulation algorithms and outputs be affected by such way?

A: Yes, sub-hourly data can be entered in the weather file. The simulation will use the data as entered (at the time step level).

Q: Can EnergyPlus accept multiple year weather data for its simulation (i.e. simulation for more than one year continuously)? Can I do this by compressing the weather data into sub-hourly?

A: No, multiple year weather data would have to be in separate weather files.

Q: Will weather data files for international locations (e.g. Hong Kong) be provided at the final release of EnergyPlus?

A: ASHRAE TC 4.2 (Weather Information) has a project to develop 200 non-North American locations in a format slightly modified from TMY2 (Y2K and a few other minor changes). We intend to process those locations for EnergyPlus as they become available.

Q: How are the "holidays" being defined in the weather files? Can I specify local holidays in the files using the commands?

A: Holidays are specified in the weather files and can be overridden by commands in the input files. Holidays can be specified as rules such as '1st Monday September', specific dates '5 September' or julian day '230'. Note: these are the limited inputs directly into EnergyPlus -- the processing program may be capable of further user specifications.

More information on EnergyPlus can be found at
http://www.eren.doe.gov/buildings/tools_directory/ > EnergyPlus

Meetings, Conferences, Symposia	
Healthy Buildings 2000	2000 ACEEE Summer Study: Efficiency & Sustainability

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
	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

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

ENERGY-10

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.
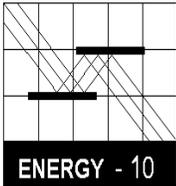
Sustainable Buildings Industries Council

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
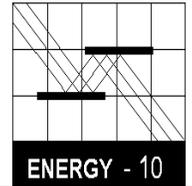
VisualSPARK

Available for Beta Testing

http://SimulationResearch.lbl.gov > SPARK

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 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.

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 is 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 now available for licensing. If interested, please contact Dr. Papamichael at K_Papamichael@lbl.gov.

Optimize your Building Designs with ...

GenOpt®: Generic Optimization Program

GenOpt 1.0, a multi-parameter optimization program, is available 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.

The Genopt 1.0 program and user's manual may be downloaded from http://SimulationResearch.lbl.gov > GenOpt.

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blastnews

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 helps 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]

Program Name	Order Number	Price
To order BLAST-related products, contact the Building Systems Laboratory at the address above.		
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.		

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; developed by University of Illinois, CERL, Oklahoma State Univ. and LBNL)	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 AudoCAD Release 14)	kmp.lbl.gov/dt-rad
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)	*To beta test VisualSPARK* - for Windows, SUN or 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 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

Simulation Research Group

MS: 90-3147

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Berkeley, CA 94720-0001 U.S.A.

Fax: (510) 486-4089

Email: KLEllington@lbl.gov

Web: http://SimulationResearch.lbl.gov
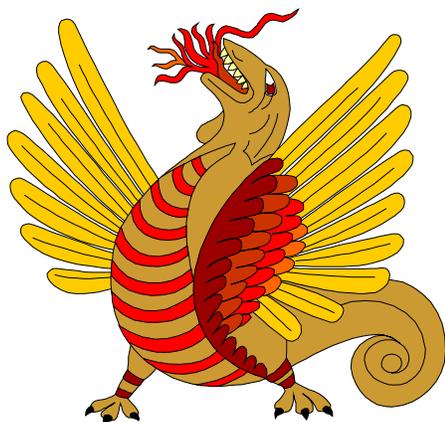
Run for safety, foolish pedestrians!

DOE-2 Directory of Program Related Software and Services[1]

ESTSC Versions of DOE-2

Program Name	Description		Cost			
DOE-2.1E (Ed Kidd and Walt Kelly) **Energy Science & Technology Software Center** P.O. Box 1020 Oak Ridge, TN 37831-1020 Ph: 423-576-2606 / Fx: 576-2865 estsc@adonis.osti.gov 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	<u>Support</u> Limited "operational" support, which includes telephone assistance concerning installation, media or platform questions.		**Windows**	**SUN-UNIX**	**VAX**
			Govt/Educ	$ 300	$400	$500
			US Mexico Canada	$575	$1305	$1835
			Other Foreign	$1075	$2000	$2716

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	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> --- <u>Output</u> --- <u>Support</u>	$395 + $15/SH including one set weather data (your choice) and documentation
Compare-IT **(Ed Erickson)** RLW Analytics, Inc. 1055 Broadway, Suite G Sonoma, CA 95476 Ph: 707-939-8823 / Fx: 939-9218 Info@rlw.com or 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. <u>Output</u> Tables/graphs exportable to MS Excel 97. Custom reports dynamically generated (Word 97). <u>Support</u> Negotiable; online help.	$500 consultant $2000 client Documentation available
DOE-Plus **(Steve Byrne)** Item Systems 321 High School Road NE #344 Bainbridge Island, WA 98110 Ph: 206-855-9540 / Fx: 855-9541 byrne @ item.com	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)	<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.	$895 with DOE-2 and doc $495 without DOE-2 Source code not available.

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[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)

EnergyPro (D. Vonderkulen) Gabel Dodd/EnergySoft LLC 100 Galli Drive #1 Novato, CA 94949-5657 Ph: 415-883-5900 / Fx: 883-5970 demian@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	Input: Graphical Output: Graphs, forms Support Unlimited support	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
EZDOE (Bill Smith) Elite Software P.O. Box 1194 Bryan, TX 77806 Ph: 409-846-2340 / Fx: 846-4367 bsmith @ 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 Output Standard DOE reports plus some custom graphic reports Support Unlimited phone support	$1295 w/documentation Source code not available.
FTI/DOE2 (Scott Henderson) Finite Technologies Inc. 3763 Image Drive Anchorage, Alaska 99504 Ph: 907-333-8937 / Fx: 333-4482 info @ 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 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.	$ 995.99 US w/documentation $1066 Int'l w/documentation $4999.99 Source code
PRC-DOE-2 (Paul Reeves) Partnership for Resource Conservation 140 South 34th Street Boulder, CO 80303 Ph: 303-499-8611 / Fx: 554-1370 Paul.Reeves@DOE2.com	Text-based version of DOE-2 includes documentation (2.1E Supplement, 2.1E BDL Summary; original Reference Manual). Extensive information on new features is included on the disk as well, including information on new system types, new commands, new options, etc., added to later versions of 2.1E. **Operating System**: DOS, Windows (95, NT)	Input Standard text-based Output Support Unlimited support.	$ 495 w/documentation Source code not available.
VisualDOE 2.61 (Eric Kolderup) Charles Eley Associates 142 Minna Street San Francisco, CA 94105 Ph: 415-957-1977 / Fx: 957-1381 support@eley.com - 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)	Input Graphical Output Graphical Support 90 days free phone and email support.; thereafter $195/hear	Version 2.6 is $495 w/documentation Source code not available.

Special Versions of DOE-2

Program Name	Description	Cost
DesiCalc GRI-98/0127 (Doug Kosar) 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)	**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! 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 #P400-98-006
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! windows.lbl.gov/software/resfen

Pre- and Post Prcessors 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
Visualize-IT (Visual Data Analysis Tools) **RLW Analytics, Inc. (Ed Erickson)** 1055 Broadway, Suite G Sonoma, CA 95476 Ph: 707-939-8823 / Fx: 939-9218 Info@rlw.com / www.rlw.com	The *Energy Information Tool* is used to **review and understand metered or DOE-2.1E hourly output** data; ability to see all 8760 (or 35040) data points for a year's worth of data. Use *Energy/Print* to get an overview of the data and then apply a variety of tools (load shapes, load duration curves, etc.). *Calibration Tool* compares DOE-2.1E hourly output data to total load and/or end-use metered data. Both programs requires a 486 or higher computer and SVGA graphics capabilities. **Operating System**: Windows 3.1 [Works with 2.1E]	
PRC-TOOLS (Paul Reeves) **Partnership for Resource Conservation** 140 South 34th Street Boulder, CO 80303 Ph: 303-499-8611 / Fx: 554-1370	*PRC-Tools* aid in **extracting, analyzing, and formatting DOE-2 output**. *PRC-Grab* automates the process of extracting any number of answers from DOE-2 standard output files. *PRC-Hour* and *PRC-Peak* 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

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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U. S.   DOE-2   E N E R G Y   C O N S U L T A N T S (continued)

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U. S.   DOE-2   E N E R G Y   C O N S U L T A N T S (continued)

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U. S. DOE-2 E N E R G Y C O N S U L T A N T S (continued)

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