

*EnergyPlus*SPARK*DOE-2* EnergyPlus*VisualSPARK*EnergyPlus*DOE-2*GenOpt*EnergyPlus*
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BUILDING ENERGY SIMULATION ★ USER NEWS

*EnergyPlus*SPARK*DOE-2* EnergyPlus*VisualSPARK*EnergyPlus*DOE-2*GenOpt*EnergyPlus*
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Highlights

- 2 ... [EnergyPlus, Version 1.4.0](#)
- 3 ... Ask an **EnergyPlus** Expert
 - 3 One Large zone vs Many Small Zones
 - 3 Zone Multiplier
 - 3 Weather Files
 - 4 Airflow, Ventilation
 - 5 Shading Devices and WINDOW-5
 - 5 Plenums
 - 6 Air-Handling Unit (AHU)
 - 6 Multiple Air-Handling Units (AHU)
 - 7 Low Temperature Radiant System Hydronic
- 7 ... New Version of **Climate Consultant** (Free) from UCLA
- 7 ... Solar Software Tools (Free) from the University of Oregon
- 10 ... NREL's *Geographic Information System* Software
- 11 ... **EnergyPlus** and **DesignBuilder** Training in January, 2007
- 12 ... New **DOE-2** Consultant: James F. Dolan, New York
- 14 ... Position Available on the **EnergyPlus** Team at LBNL

Recent Reports

- 8 ... From SimBuild 2006 Conference held August 2-4, 2006
 - "Automated Multivariate Optimization Tool for Energy Analysis"
 - "Simulation Model for Energy Performance and User Comfort Evaluation of Atrium Buildings"
 - "Performance of High-Performance Glazing In IECC-Compliant Building Simulation Model (DOE-2)"
 - "An Analysis of Building Envelope Upgrades for Residential Energy Efficiency in Hot and Humid Climates"

Regular Features

- 13 ... [Big List of FREE!](#)

The Buzz

Ask an EnergyPlus Expert
All 2006 questions and answers for the "Ask an EnergyPlus Expert" column have been compiled into a PDF file.
Download here:
http://simulationresearch.lbl.gov/dirpubs/un_articlePO6.pdf

DOE-2 User Questions
All 2006 questions and answers about the DOE-2 program have been compiled into a PDF file.
Download here:
http://simulationresearch.lbl.gov/dirpubs/un_articlees06.pdf

Energy Tech Net
New from U.S. DOE!
A new one-stop destination for developers and commercializers of advanced energy technologies. Go to www.EnergyTechNet.com

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Release of EnergyPlus 1.4.0

The thirteenth major version of EnergyPlus (1.4.0) was released on October 12, 2006 and is now available in versions for both the Windows and Linux operating systems. Download at no cost from the EnergyPlus web site at <http://www.energyplus.gov>.

What's New in Version 1.4.0 ??

A few of the new features in EnergyPlus V 1.4 are listed below — for a complete list of new features added in this and previous versions please go to <http://www.energyplus.gov/features.html>

- NEW water manager to control and report water use throughout the building including HVAC components, zone-level water end-use objects that allow hot and cold water mixing at the tap, zone latent gains, drain-water heat recovery, rain-water collectors for harvesting precipitation, ground-water wells with pumping, water storage tanks for storing and reusing reclaimed water.
- New Zone thermostatic control options including operative temperature and thermal comfort control using Fanger PMV values as setpoints.
- New simple duct leakage model for VAV system with return plenum
- New reformulated version of the DOE 2.1E EIR chiller based on the PG&E Cool Tools project.
- Window and door multipliers and triangular doors are now allowed.
- Exterior window screens can now be modeled more accurately.
- New predefined reports to aid in complying with beyond-code programs such as the new commercial building tax deduction including input verification and results, climate, envelope and equipment summaries.

And many other enhancements and significant speed improvements throughout.

EnergyPlus Training Workshops

We are planning workshop on the west coast in late 2006 or early 2007. For more information, please see: <http://www.gard.com/training.htm>

EnergyPlus Support Group at YahooGroups

Are you a commercial or academic user of EnergyPlus? Join more than 1050 EnergyPlus users in an email group on YahooGroups--a place to ask your questions of and share information with other EnergyPlus users. The YahooGroup also provides a searchable archive of all 5-1/2 years of discussion--more than 7000 email messages (search there first to find an answer to your question). You can also upload files to share with other users. This group supplements but does not replace the primary support email address of EnergyPlus-Support@gard.com.

The main web page for the group is: groups.yahoo.com/group/EnergyPlus_Support

To subscribe, send an email message to: EnergyPlus_Support-subscribe@yahoogroups.com

Ask an EnergyPlus Expert

ONE LARGE ZONE VS MANY SMALL ZONES

I'm modeling a workshop with a large area and no partitions. However, the temperature in different areas of the space will be very different. Should I partition the workshop into many small zones and compute each temperature gain? Is this possible using EnergyPlus?

Answer

Yes, it's possible. You'll get some warnings about Zones that don't have six surfaces but these can be ignored. The HVAC system(s) will need to condition each zone separately. This can cause some simulation run time issues if you go with too many separate zones. Also note the 50 zone limit on multizone systems.

A simple way to model the effect of air exchanges among adjacent open plan zones is to use pairs of Mixing objects (if you can guess what the air flow rates might be). Otherwise there is the Airflow Network.

Note that thermal radiation cannot (yet) be exchanged across separate thermal zones (so an inner work area won't be modeled as exposed to a cold or hot window in the adjacent zone).

ZONE MULTIPLIER

I successfully modeled a three-story building, designating one floor as one zone (which included a cooling water loop, condenser loop, hot water loop, and primary air loop). Can I use the zone multiplier to expand the one zone to, say, 50 zones in a future simulation?

Answer

Yes, you can use the zone multiplier to expand the building. However, all it does is multiply the load sent to the HVAC system. If your original building had one air loop, the new building will still have one air loop. If everything is auto-sized, then the air loop flow rates, capacities, etc. will increase to meet the larger load.

WEATHER FILES

Which application opens the .epw file so I may read it?

Answer

Use the "WeatherConverter" to convert an epw file to "csv" format, which organizes the data and adds column headers to identify the data. Then open the csv file in a spreadsheet program. Note that EnergyPlus does not use all of the columns of data that are present in the epw files. Read more about weather data in the Auxiliary Programs document. There are also Report Variables in EnergyPlus which report some of the weather data (see the rdd output file).

(Start --> Programs --> EnergyPlusV1-3 Programs --> WeatherConverter)

Ask an EnergyPlus Expert

AIRFLOW, VENTILATION

I am simulating Natural Ventilation with Airflow Networks and Ventilation Control Mode = Temperature. I want to have only two conditions: closed windows (opening factor = 0) and open windows (opening factor = 1). I have set Limit Value on Multiplier for Modulating Venting Open Factor = 1, and all opening factors equal to 1 as well. However, when I output hourly results, my Opening Factor and Opening Factor Multiplier for Venting Modulation vary between 0 and 1. I tried changing my time-steps and reporting frequency, but this had no effect. Right now, I have my time-step set to 1 and my report frequency set to time-step. I also tried letting all of the fields default to disable the modulation, but this had no impact either.

Answer

What you have done is correct; to make all opening factors either 0 or 1. Output results are also correct at "time-step" report frequency. There are two time-steps used in EnergyPlus: zone time-step and system time-step.

- zone time-step is your input from the TIME-STEP IN HOUR object.
- system time-step is used internally and is determined by zone temperature difference between previous time-step and current time-step.

If the difference is more than 0.3C, the system time-step is shorter than the zone time-step. The AirflowNetwork model is performed at the system time-step level. If you use "detailed" report frequency, you can see opening factors are either 0 or 1.0. When "time-step" report frequency is used, the opening factors are given as an average value over a zone time-step when system time-step < zone time-step. That is why you see opening factors vary between 0 and 1.0.

Question

Also, I am trying to model cross ventilation, but the opposite windows are not always opening at the same times. Is there any way to model ventilation with temperature control and force the windows to open simultaneously?

Answer

The window opening with the temperature control option (ventilation control mode) is determined by the temperature difference between indoor and outdoors only. It is possible that a window is opened in a minute and closed at the next minute, because the minimum system time-step is a minute. The AirflowNetwork model does not consider any opening duration. According to your input file the two opposite windows belong to two different zones. Since the window opening is determined by the temperature difference between a zone and the outdoors, two windows will not open at the same time if two zones have different temperatures. Although you have options to select a ventilation control mode, you only can select one of them, not both, such as constant and temperature control options.

EnergyTechNet from the U.S. Department of Energy -- <http://www.EnergyTechNet.com>

Energy TechNet is a core collection of information and resources for anyone engaged in developing and commercializing advanced energy technologies. From idea development to market assessment, intellectual property protection to financing, this Web site addresses each stage of technology development and commercialization. There's also a free e-newsletter!

Ask an EnergyPlus Expert

PLENUMS

I have a large building with seven floors, each floor with a plenum. All the return air from the zones enters the plenum before entering the air handling unit in the mechanical room and this happens for every floor. One side of the air handling unit sucks the return air from the plenum and sends fresh air from its other end into the supply duct as supply air to the zones. My questions are these:

Should I model the plenum as a separate zone? I am actually using EP-Quick to build my zones but unfortunately EP-Quick does not have the capability of building plenums.

Should I just ignore the plenum and treat it as return air duct that carries return air from zones to the air handler in mechanical room?

Answer

Two members of the EnergyPlus team weighed in with answers:

For calculating building energy consumption, modeling the plenums as separate zones is generally not very important. And, yes, there are cases where it will be important: a one-story building with a large roof area and considerable outside air, for instance. However, for a multi-story office building it isn't important.

Should you model plenums? It depends largely on the specific goals of the analysis. If you decide to ignore the plenums, you must make the conditioned zones tall enough to include the plenum height so that the total area of exterior wall is accounted for. If you choose to model the plenums, then the plenum is modeled as a thermal zone. With EP-Quick it may be possible to create two buildings - one that is seven stories with a floor-to-floor height of the conditioned space only, and then another which is seven stories with a floor-to-floor height of the plenum space only, and then mix the two together. All of the surface coordinates should be OK except for the z values which could be easily modified to stack things up correctly. Note that the plenum floors will come out of EP-Quick as multiple zones, but these can be combined into a single zone simply by reassigning the interior environment for the plenum surfaces and deleting the extra interior surfaces that would be created in the plenum. Well, it may not be a real simple task, but it is doable.

SHADING DEVICES AND WINDOW-5

I want to model controlled interior shades and movable exterior shading devices for windows in a multi-story residential building. I specified window systems with WINDOW-5 and used the WINDOW-5 data file in EnergyPlus. I specified MATERIAL:WINDOWSHADE as the shading device, but I don't know how to integrate that shading device into my WINDOW-5 data.

Answer

For this case, in the WindowShadingControl object, leave "Name of construction with shading" blank and specify the shade material name in "Material Name of Shading Device."

Ask an EnergyPlus Expert

AIR-HANDLING UNIT (AHU)

I'm trying to control an AHU that consists of:

Fresh Air → Cooling Coil → Heating Coil → Supply Fan → Zone

The run period takes place over seven days. The AHU is a constant volume system. The cooling coil cools the air to 11.5C. The heating coil heats the air back up to 16C.

Unfortunately, the heating coil does not engage adequately. After numerous attempts, it seems that the heating coil does not *sense* that the air has been cooled to 11.5C. The heating coil is only engaged when the outside air is below 16C (it does not realize that the air has been cooled by the cooling coil).

All additional heating in the zone is supplemented by a baseboard heater system and the zone is maintained at 23C. The system is a full fresh air constant volume system. Regardless of the outside conditions, I require the air to be cooled to 11.5C and heated to 16C before it hits the supply fan. It is supplied directly to the zone after this. Can anyone spot how I may fix this problem?

Answer

The Controllers on the water coils operate sequentially. In this case the cooling coil controller needs to go first, and the HW coil controller second. So change your input as follows:

from:	to:
CONTROLLER LIST,	CONTROLLER LIST,
AHU1:ControlList, !- Name	AHU1:ControlList, !- Name
Controller:Simple, !- Controller Type 1	Controller:Simple, !- Controller Type 2
HC:Controller, !- Controller Name 1	CC:Controller, !- Controller Name 2
Controller:Simple, !- Controller Type 2	Controller:Simple, !- Controller Type 1
CC:Controller; !- Controller Name 2	HC:Controller; !- Controller Name 1

MULTIPLE AIR-HANDLING UNITS (AHU)

I'm trying to model a 165,000-ft² four-story building that has four large AHU, each with heating and cooling coils. The AHU use hot water and chilled water that is supplied from a central plant. The system is a VAV with reheat at the terminals. I'm not sure how to set it up. Is there an EnergyPlus sample file I can use?

Answer

I don't think there is an example file with more than one AHU (or Air Loop in EnergyPlus); however, you could start with the example file named LgOffVAV.idf. Then replicate the entire set of objects that describe the air loop to have four AHUs instead of one. The single central plant can serve all the various demands by setting the splitter/mixer/branches to include all the coils in the different air loops. But if all the AHUs are all similar (in terms of operation, loads served, recirculation, outdoor air, etc.), then -- depending on your goals -- it may be okay to simplify the energy model to have a just a single AHU. Simpler models run faster.

Ask an EnergyPlus Expert

LOW TEMPERATURE RADIANT SYSTEM HYDRONIC

I want to simulate a low temperature radiant system hydronic using purchased heating and without any other equipment. I only have a plant loop and want to see the energy consumption of the whole system. I know that the heating demand of the building should be 6.4kW (external calculation), so I set the purchased heating to that value. I want to simulate the temperature pattern in the four zones as a result of the calculated heating power. The problem is that EnergyPlus uses the value of the heating load range based operation. If I set the value to 6400W the program turns off the simulation because the demand is higher than the entered value. Is there a chance that the program only uses the purchased heating value even if the demand is higher than that value?

Answer

In any LOAD RANGE BASED object, it is recommended that the last load range value be a very large number. This way the equipment will operate, even if it is not large enough to meet the current load (or accumulated load if the loop setpoint is drifting). So, if you set this to be something like 10MW, the system should never shut off due to load range.

In your input file, the PURCHASED:HOT WATER capacity is set to 4000W. The simulation should meet the hot water loop demand up to 4000W. If the demand exceeds 4000W, then the loop temperature will fall and the space temperature will fall. When the demand becomes lower, then the temperatures should recover.

New Version of Climate Consultant (UCLA) -- FREE Software

A new version of Climate Consultant 3 (written in Java) that runs on both PCs and MACs has been released. It replaces the older, popular DOS version. Climate Consultant 3 reads climate data in the EnergyPlus format for which hundreds of stations are available worldwide. Climate Consultant 3 displays 2-D and 3-D plots of all kinds of climate data, including sun charts and psychrometric charts with a third variable overlaid in color. It also contains a new graphic tool called Wind Wheel that shows in animation the wind direction and velocity correlated with temperature and humidity. Climate Consultant 3 can be downloaded at no cost from www.aud.ucla.edu/energy/desgin/tools

Solar Software Tools

- The University of Oregon's Solar Radiation Monitoring Laboratory offers downloadable solar tools such as the Sun Path Chart Program, Data Plotting Program, Solar Position Calculator, and Photovoltaic Performance Calculator. For these, and many more tools and links, please go to:

<http://solardata.uoregon.edu/SoftwareTools.html>

University of Oregon
Solar Radiation Monitoring Laboratory

Recent Reports

Proceedings of SimBuild 2006, held at MIT in Cambridge, Mass., August 2-4, 2006

 [Download this paper](#)

AUTOMATED MULTIVARIATE OPTIMIZATION TOOL FOR ENERGY ANALYSIS

Peter G. Ellis¹, Brent T. Griffith¹, Nicholas Long¹,
Paul Torcellini¹ and Drury Crawley²

¹National Renewable Energy Laboratory, Golden, CO

²United States Department of Energy, Washington, DC

ABSTRACT

Building energy simulations are often used for trial-and-error evaluation of “what-if” options in building design—a limited search for an optimal solution, or “optimization.” Computerized searching has the potential to automate the input and output, evaluate multiple options, and perform enough simulations to account for the complex interactions among combinations of options. This paper describes ongoing efforts to develop such a tool. The optimization tool employs multiple modules, including a graphical user interface, a database, a preprocessor, the **EnergyPlus** simulation engine, an optimization engine, and a simulation run manager. Each module is described and the overall application architecture is summarized.

 [Download this paper](#)

SIMULATION MODEL FOR ENERGY PERFORMANCE AND USER COMFORT EVALUATION OF ATRIUM BUILDINGS

Özgür Göçer¹ Aslıhan Tavil², Ertan Özkan¹

¹Faculty of Engineering and Architecture, Beykent University, Istanbul, Turkey

²Faculty of Architecture, Istanbul Technical University, Istanbul, Turkey

ABSTRACT

In recent years highly glazed spaces and atriums are seen as a sign of advanced technology. An atrium is the social center of a building where people gather for social activities; it is also a significant element of passive building systems if designed properly to provide user requirements. Estimation of energy use and thermal performance is difficult because of the complex thermal phenomena occurring at the atrium space due to its large size and high solar gains through the fenestration. It is not easy to obtain comprehensive results for evaluating the performance of the atrium building with a single simulation program. This paper introduces a performance-based model for energy use and user comfort evaluation of atrium buildings with the use of multiple building performance simulation tools; Window 5.2, **EnergyPlus**, Comis, DELight, Gambit and Fluent and the resulting outputs, which support the methodology.

Recent Reports

Proceedings of SimBuild 2006, held at MIT in Cambridge, Mass., August 2-4, 2006

[✧ Download this paper](#)

PERFORMANCE OF HIGH-PERFORMANCE GLAZING IN IECC COMPLIANT BUILDING SIMULATION MODEL (DOE-2)

Jaya Mukhopadhyay, Jeff S. Haberl, Ph.D., P.E.
Energy Systems Laboratory,
Texas Engineering Experiment Station, Texas A&M University

ABSTRACT

Current specifications for glazing in the 2000 IECC code adopted by Texas imply the use of low-E glazing. However, the trends in the development of high performance glazing technology indicate that windows have the potential to provide net positive energy benefits, making it inevitable that future versions of the IECC to incorporate high-performance glazing. This study examines the performance of a number of such glazing options when incorporated in the IECC compliant residential building. The results show that in some cases the resultant energy consumption obtained from installing high-performance windows was lower than the energy consumption of a base-case windowless house (approximately 6% total energy savings, and 40% heating).

[✧ Download this paper](#)

AN ANALYSIS OF BUILDING ENVELOPE UPGRADES FOR RESIDENTIAL ENERGY EFFICIENCY IN HOT AND HUMID CLIMATES

Mini Malhotra¹, Jeff Haberl²
¹Research Assistant, Department of Architecture, Energy Systems Laboratory
²Professor, Department of Architecture, Energy Systems Laboratory
Texas A&M University, College Station, Texas

ABSTRACT

This paper presents the results of the analyses of various envelope upgrades for residential energy efficiency in hot and humid climates. The building components considered for the upgrades include: building shape, construction type, roof and exterior walls, and windows. A **DOE-2** simulation model of a 2000/2001 IECC code-compliant house in Houston, Texas, was used for the analysis. The results demonstrated the effect of incremental changes in these properties on the building's energy use, and showed that combining potential envelope upgrades can accomplish a 55% cooling energy use reduction, a 100% heating energy use reduction, and a 16% total energy use reduction for code-compliant houses in hot and humid climates.

We still have a few (hundred) copies of the 2-ft by 6-ft mega-poster "Energy and Buildings in the 20th Century" available free of charge. If you'd like a copy please email klleington@lbl.gov. Think about it. Christmas is coming. You might need wrapping paper, an extra tablecloth, an emergency present for an unexpected visitor. I'm just saying ... K.E.

NREL's Geographic Information System (GIS)

NREL's GIS team analyzes renewable energy resources to determine which energy technologies are viable solutions in the United States and inputs the data into a Geographic Information System (GIS). GIS is a computer-based system used to manipulate, manage, and analyze multidisciplinary geographic and related attribute data. The GIS system is composed of hardware, software, data, and expertise. All information in GIS is linked to a spatial reference used to store and access data. GIS data layers can be recombined or manipulated and analyzed with other layers of information.

<http://www.nrel.gov/gis/maps.html>

Maps -- NREL's GIS team develops maps for renewable resources using [ArcIMS](#).

[Solar Maps](#)



Maps of solar radiation resources are available for several photovoltaic collector orientations in the United States. Some of the maps available are: PV Solar Radiation Maps, Direct Normal Solar Radiation Maps, Map of U.S. Solar Measurement Station Locations, and the United States Solar Atlas.

[Federal Energy Management Program Maps](#)

Federal energy management program maps showing the market potential for various solar technologies at federal facilities throughout the country.

[Biomass Maps](#)



Maps showing the technical biomass resources available in the United States by county. These maps estimate the biomass available from various feedstock categories: crop residues, methane emissions from manure management, methane emissions from landfills and wastewater treatment facilities, forest residues, primary and secondary mill residues, urban wood waste, and dedicated energy crops.

[Wind Maps](#)



Maps showing wind resource potential based on wind power density. These maps estimate wind energy resources for the United States and its territories, and indicate general areas where a high wind resource may exist.

[Renewable Energy Atlas of the West](#)

The Renewable Energy Atlas of the western United States is an 80-page, full-color presentation of the renewable energy resources in the West, including wind, solar, geothermal, and biomass power.

Change of address – EnergyPlus and DOE-2 Consultant

[Daniel A. Katzenberger, P.E. LEED-AP](#)
[Engineering, Energy, and the Environment, LLC.](#)
420 N. 5th St. #305
Minneapolis, MN 55401-1348
Tel: (612) 327-4210

Please visit our website at <http://SimulationResearch.Ibl.gov>

EnergyPlus Version 1.4.0

Download a free copy of the program

<http://www.energyplus.gov/>

Support Tools

Support software is listed on the main EnergyPlus website: www.energyplus.gov

Weather Data from http://www.eere.energy.gov/buildings/energyplus/cfm/weather_data.cfm

Weather data for more than 800 locations are now available in EnergyPlus weather format. See the write-up on how to [create Meteorom files for EnergyPlus](#)

Ask an [EnergyPlus](#) Expert

Questions from EnergyPlus users are answered promptly via email by program developers. To submit questions, join the EnergyPlus User Group (details below). A selection of questions/answers are compiled (yearly) into a downloadable PDF document: Q and A for [2002](#) for [2003](#), for [2004](#), for [2005](#), for [2006](#)

Are you an [EnergyPlus](#) Consultant ?

If you are an EnergyPlus consultant and would like to be listed in this newsletter and on our website, please send details to klellington@lbl.gov

Join the [EnergyPlus](#) User Group

The developers of EnergyPlus have formed a support group to foster discussion and maintain an archive of information for program Users. To join, go to http://groups.yahoo.com/group/EnergyPlus_Support/

Testing and Validation <http://www.eere.energy.gov/buildings/energyplus/testing.html>

EnergyPlus is being developed by University of Illinois and Lawrence Berkeley National Laboratory, with the assistance of DHL Consulting, C. O. Pedersen Associates, Florida Solar Energy Center, GARD Analytics, the National Renewable Energy Laboratory, Oklahoma State University and others. Development of EnergyPlus is supported by the U. S. Department of Energy, Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technologies Program (Program Manager, Dru Crawley).

The December issue of the State of California's energy newsletter, the *Blueprint*, is ready to be downloaded. December is all about roofs: barrel, cool, sloped -- you name it, they've got Q&A about it! Read it today at <http://www.energy.ca.gov/efficiency/blueprint/>

EnergyPlus Training

"ENERGYPLUS AND THE DESIGNBUILDER INTERFACE"

JANUARY 10 - 12 , 2007

<http://www.iit.edu/~archdoc/energyseminar.html>

COLLEGE OF ARCHITECTURE, ILLINOIS INSTITUTE OF TECHNOLOGY



DOE-2.1E



DOE-2.1E (version 124) 1,000-Zone version for Windows from ESTSC; other vendors of DOE-2 based programs are listed on our website: <http://SimulationResearch.lbl.gov/>.

Cost is as follows:

\$ 300 U.S. Government/Non-Profits/Education

\$ 575 U.S. Public, Mexico, Canada

\$1129 to \$1268 Other Foreign

DOE-2 Documentation on a CD from ESTSC - Cost US\$100

What is included on the CD?

DOE-2 Reference Manual (Part 1) and (Part 2)

DOE-2 BDL Summary (2.1E)

DOE-2 Engineers Manual (2.1A)

DOE-2 Supplement to the Reference Manual (2.1E)

Order Software and ESTSC Documentation

Ed Kidd or Kim Buckner
NCI Information Systems, Inc.
Energy Science and Technology Software Center (ESTSC)
P.O. Box 1020, Oak Ridge, TN 37831

Phone: 865/576-1037
Fax: 865/576-6436
Email: estsc@adonis.osti.gov

Purchase DOE-2 Documentation

DOE-2 Sample Run Book (2.1E) -- The Sample Run book is the only DOE-2 manual not available electronically. It must be purchased separately from NTIS; ordering information may be found at <http://SimulationResearch.lbl.gov> > DOE-2 > Documentation

Free DOE-2 Documentation (<http://simulationresearch.lbl.gov/>> DOE-2 > Documentation)

DOE-2 Basics Manual (2.1E)

Update Packages: Update Packages are not cumulative; each one contains different information. Download all four packages then print and insert the pages into your existing DOE-2 manuals.

Update Package #1: DOE-2.1E Basics, the Supplement and BDL Summary

Update Package #2: BDL Summary and Supplement.

Update Package #3: Appendix A of the Supplement.

Update Package #4: (1000-zone DOE-2.1E) BDL Summary.

DOE-2 Modeling Tips (pdf files) [for 2006](#) [for 2005](#) [for 2004](#) [for 2003](#) [for 2002](#)

A compilation of all the "how to" and "DOE-2 Puzzler" articles from the newsletter.

[Changes and Bug Fixes to DOE-2.1E \(txt file\)](#)

Description of all changes and bug fixes in a text document.



New DOE-2 Consultant:

[James F. Dolan, P.E., LEED AP.](#)

O'Dea, Lynch, Abbattista Consulting Engineers, PC
50 Broadway, Hawthorne, NY 10532

www.olace.com

tel 914.747.2800 x247
fax 914.747.0453

The Big List of Free

Free!!! Books

2005 Buildings Energy Data Book	http://buildingsdatabook.eere.energy.gov/
Daylight in Buildings (book on CD)	klellington@lbl.gov
Residential Lighting Design Guide (California)	http://www.cltc.ucdavis.edu/

Free!!! Building Energy Software *

BDA 3.1	http://gaia.lbl.gov/BDA
"Best Practices" Software from the U.S. Department of Energy	http://www1.eere.energy.gov/industry/bestpractices/software.html
Climate Consultant	http://www.aud.ucla.edu/energy-design-tools
COMIS	http://www-epb.lbl.gov/comis
EnergyPlus 1.4.0	http://www.energyplus.gov/
GenOpt 2.0	http://SimulationResearch.lbl.gov
Optics 5.2	http://windows.lbl.gov/materials/optics5/
HEED, SOLAR 5.7, OPAQUE, etc.	http://www.aud.ucla.edu/energy-design-tools
HOMER (off-grid and grid-connected power systems)	http://www.nrel.gov/homer/
RADIANCE 3.5	http://radsite.lbl.gov/radiance/
RESFEN 3.1	http://windows.lbl.gov/software/resfen/resfen.html
THERM 5.2	http://windows.lbl.gov/software/therm/therm.html
VisualSPARK 2.0	http://SimulationResearch.lbl.gov
WINDOW 5.2 (window thermal analysis)	http://windows.lbl.gov/software/window/window.html

* See also the "big daddy" of building energy software lists, compiled by Dru Crawley of USDOE, at http://www.eere.energy.gov/buildings/tools_directory/ -- some software on the USDOE list is not free ☹

Free!!! Memberships

IBPSA-Australasia	veronica.soebarto@adelaide.edu.au
IBPSA-Switzerland	http://www.ibpsa.ch
IBPSA-USA	peter_ellis@nrel.gov

Free!!! Newsgroups (Mailing Lists)

BLDG-SIM	BLDG-SIM-SUBSCRIBE@GARD.COM
EnergyPlus User/Support Group	http://groups.yahoo.com/group/EnergyPlus_Support/
GARD Analytics (http://www.gard.com/) for:	
ASHRAE 4.7 Energy Simulation	tc47-l-subscribe@gard.com
ASHRAE 2.8 Building Environmental Impacts/Sustainability	tc28-l-subscribe@gard.com
Standards Project - Test for Building Energy Analysis Software	spc140-l-subscribe@gard.com

Continued Next Page

Please visit our website at <http://SimulationResearch.lbl.gov>

The Big List of Free -- Continued

Free!!! e-Newsletters

Architecture Week	http://www.architectureweek.com
ASHRAE	http://www.ashrae.org/template/enewsletterlanding
BLUEPRINT (State of California)	http://www.energy.ca.gov/efficiency/blueprint/
eNews (Energy Design Resources)	http://www.energydesignresources.com/publication/en/
FSEC (Florida Solar Energy Center)	http://www.fsec.ucf.edu/bldg/resources/newsletter/
IBPSANews	http://www.ibpsa.org
Lighting Link (Calif Lighting Technology Center)	http://169.237.101.18:8080/cltc/the-lighting-link
Rocky Mountain Institute	http://www.rmi.org
SBSE (Society of Building Science Educators)	http://www.sbse.org

Free!!! Weather Data

Real Time Weather Data	http://www.eere.energy.gov/buildings/energyplus/cfm/weatherdata/weather_request.cfm
California Climate Zones on GoogleEarth™ Download, install and launch GoogleEarth then download and open the Climate Zones CA-CZ.kmz 120 kb file.	http://earth.google.com/

Free!!! Web Tools

Home Energy Saver (home energy use)	http://hes.lbl.gov
Mechanical Engineering – world wide virtual library	http://dart.stanford.edu/vlme/
ORNL Building Envelope Calculators	http://www.ornl.gov/sci/roofs+walls/index.html

Free!!! Stuff

Poster: "Energy and Buildings in the 20 th Century"	kl Ellington@lbl.gov
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Position Available at Lawrence Berkeley National Laboratory

Computational Scientist -- Req No. 019491

For a full position description and instructions on how to apply, please go to <http://jobs.lbl.gov/LBNLCareers/details.asp?jid=19491&p=1>



Uncle Fred Wants You!

IF you have problems uploading your resume on the LBNL website, please contact Kathy Ellington at (510) 486-4931 or kl Ellington@lbl.gov.

Please visit our website at <http://SimulationResearch.lbl.gov>