



BUILDING ENERGY SIMULATION

For Users of EnergyPlus, VisualSPARK, DOE-2, BLAST, GenOpt, BDA, ENERGY-10 and their Derivatives

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Position Available in Building Science Research

Lawrence Berkeley National Laboratory seeks an experienced professional to lead the Simulation Research Group (EnergyPlus, DOE-2, VisualSPARK, and GenOpt). Click [here](#) for the position description or email klleington@lbl.gov.

EnergyPlus Version 1.2.2

To download a free copy of the program go to

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



• • Features of 1.2.2 • •

HVAC

- Simplified definition of HVAC - compact HVAC allows user to specify a generic system type which is then automatically expanded into the traditional branches and nodes
- Refrigerated cases and associated compressor racks
- Variable speed cooling tower model with either user-selectable or user-defined performance based on either the CoolTools or YorkCalc correlation
- Three new setpoint managers for single zone heating, single zone cooling, and outside air pretreatment
- Evaporative coolers can now be included in outside air path
- Desuperheater heating coil with heat source from fixed percentage of DX cooling coil waste heat or refrigerated case compressor rack
- DXSystem:AirLoop can now be used as outside air equipment
- DX heating coil can be defined with a biquadratic curve
- Added electric consumption of forced draft fan (or other parasitic load) to Boiler:Simple
- Link to SPARK for simulating complex equipment and systems not currently supported by EnergyPlus

Geometry/Windows/Walls/Shading

- New special case of heat transfer surfaces - Exterior Vented Cavity - allows modeling of ventilated photovoltaic roof paver systems and other cladding systems

On-Site Energy Supply

- Transpired solar air collectors

HVAC (continued)

- Multimode DX coil added to model 2-stage, subcool reheat and partial bypass
- Compressor selection, latent degradation and antifreeze mixture models added to water-to-air heat pump
- Water mains temperature based on correlation or schedule as input for domestic hot water and water heater
- Water Heater: Mixed object can interact with zone heat balance, has off- and on-cycle parasitic load inputs, PLR curve, and can model tankless/instantaneous water heater
- Domestic hot water can be run stand-alone
- Domestic hot water and plant load profile now accept fractional schedules and supply temperatures can default to water mains temperatures
- Dehumidification controls added to DXSystem:AirLoop
- New Component Setpoint-based Operation control scheme added for Plant Loop for Chiller and Boiler control. This control scheme allows control of constant flow equipment to an outlet setpoint that is set by a Scheduled Setpoint Manager. The design flow rate for the components specified in the control scheme can be autosized along with the component.
- Automatic intelligent setting of controller convergence tolerance
- Improved night ventilation capability

Zone Model

- User can specify sensible fraction of load due to people
- New room air model for natural cross ventilation (coupled to COMIS)
- Outside face temperature of zone surfaces can now be specified with a schedule

• • continued on the next page • •

EnergyPlus 1.2.2 --- continued

Input

- Schedule data can now be read from an outside file
- New dataset for commercial customer utility tariffs
- System convergence limits now allow the user to set minimum system time step and maximum HVAC iterations (can significantly reduce execution time)
- New control option for Exterior Lights that turns them off when the sun is up
- Updated dataset of measured input parameters from the Solar Rating and Certification Corporation for 115 different solar thermal (hot water) collectors
- Example input files for all new features (more than 200 example files available)
- More than 200 new international weather locations including Bangladesh, Brazil, China, Ethiopia, Ghana, Kenya, Italy, and Nepal in the EnergyPlus/ESP-r weather format (more than 900 locations in 100 countries available worldwide)

Output

- Heating and cooling loads and energy due to ventilation now can be reported
- Standard water heater ratings reported including energy factor and recovery efficiency
- Improved reporting of error context throughout
- Many other new variables now can be reported

Utilities

- IDF Editor
 - All file size limits have been removed
 - Allow multiple objects to be copied and pasted
 - Supports autosize as default
- Weather converter
 - TMY3 (SWERA) format can be processed
 - "Custom" format processing
 - Better "missing data" controls for user (can specify to an extent)
- WinEPDraw – Windows version
 - Allows some more control over >4-sided figure drawing
 - Will execute "Drawer" from inside program

Environmental Impacts

- Source energy factors can vary using a schedule
- Title 24 Time Dependent Valuation (TDV) factor schedules in Datasets

Documentation and Guides

- Input/Output Reference and Engineering Reference have been updated and extended for all new features and updates
- Revised Guide for Module Developers
- Revised Programming Guide
- More than 2200 pages of documentation

• • And speed improvements throughout • •



QuickLinks to EnergyPlus Documents



[Input/Output Reference \(PDF 4.2 MB\)](#)

[Output Details and Examples \(PDF 493 KB\)](#)

[Engineering Document \(PDF 4.5 MB\)](#)

[Module Developer's Guide \(PDF 539 KB\)](#)

[Interface Developer's Guide \(PDF 200 KB\)](#)

[Programming Standard \(PDF 168 KB\)](#)

EnergyPlus



NEW WEATHER FILES FOR INDIA

58 weather files for locations throughout India, which were developed by the Indian Society of Heating, Refrigerating and Air-Conditioning Engineers (ISHRAE), are now available on the EnergyPlus web site: http://www.eere.energy.gov/buildings/energyplus/cfm/weather_data3.cfm/region=2_asia_wmo_region_2/country=IND/cname=India

ISHRAE developed the source TMY2-format weather files specifically for use with building energy performance simulation programs. ISHRAE has granted DOE permission to distribute versions of the individual ISHRAE files in converted format suitable for EnergyPlus (EPW) and make those files available to users at no cost via the EnergyPlus web site.

The ISHRAE weather data are © 2005 Indian Society of Heating, Refrigerating and Air-Conditioning Engineers, New Delhi, India. www.ishrae.org.in.

Our thanks to ISHRAE for making these data available to the EnergyPlus simulation community. This provides a much needed extension of Indian locations and brings the number of locations available for India to 66, including the eight IWEC locations.

The EnergyPlus team



All weather data are available on the international weather page of the EnergyPlus web site: http://www.eere.energy.gov/buildings/energyplus/cfm/weather_data.cfm.
If you know of other typical weather data that could be shared with EnergyPlus users, please contact [Dru Crawley](#) or [Linda Lawrie](#) directly.



Ask An EnergyPlus Expert



NO TEMPERATURE CONTROL

This is my first attempt at an idf and it's not working. I can't control the heating and cooling coil. I'm trying to model a very tightly controlled gallery storage area, which is supposed to have an RH of 50% ± 5%.

Answer

1. SET POINT MANAGER:SINGLE ZONE MAX HUM is placing a set point on node "AHU1 Humidifier Outlet Node," but the cooling coil controller's control node is "AHU1 Fan Outlet Node." You need to place the maximum humidity set point on the same node "AHU1 Fan Outlet Node."
2. SINGLE DUCT:VAV:NOREHEAT will not modulate the air volume flow rate to the zone for heating control; it only controls for cooling. If you want variable volume heating, then use SINGLE DUCT:VAV:REHEAT with Damper Heating Action set to Reverse Action.

We would suggest turning on report variables for "System Node Temp," "System Node Humidity Ratio," "System Node Setpoint Temp," "System Node Humidity Ratio Min," "System Node Humidity Ratio Max," and "System Node VolFlowRate" for key nodes in the system to observe how the system is responding to the control.



Ask An EnergyPlus Expert



2-PIPE FAN COIL

Can I create a 2-Pipe Fan Coil Unit with EnergyPlus?

Answer

Yes. Use the 4-pipe fan coil object, and set the availability schedules on the heating coil and cooling coil so that only one can be active at any given time.

DESIGN COOLING/HEATING MASS FLOW

What is the meaning of the design cool/heat mass flow in eplszsz.csv? And can the report frequency of the eplszsz.csv be changed?

Answer

These are the "calculated" results of the zone sizing calculations in EnergyPlus. You can read about these calculations in the Engineering Documentation (see the link to documentation on p. 3). The purpose of the sizing calculation is to obtain for each zone a calculated design flow rate for cooling and a calculated design flow rate for heating. Also, the design heating and cooling loads for each zone. The zsz file shows the design flow sequences. They are useful for plotting to see the load or design flow shapes over a day. You cannot change the report frequency.

LOADS REPORTS ON HEAT TRANSFER SURFACES

I need a report variable that will tell me the heating and cooling loads of the various heat transfer surfaces. (Similar to the LS-B report in DOE-2)

Answer

It is very difficult to separate envelope loads from the total zone load, because a heat balance is performed at each surface which includes incident solar and long-wave radiation. There is no report variable with such a value. Surfaces interact with the zone air heat balance by convection. The ultimate load from the surfaces is $(\text{SurfaceInsideTemperature} - \text{ZoneAir Temperature}) * \text{SurfaceArea} * \text{SurfaceInsideConvectionCoefficient}$, but this includes the solar gains and radiant internal gains which are absorbed by the surfaces. The best way to approximate the contribution from the envelope is to take the total load and subtract off the gains from windows, internal loads, infiltration, and ventilation. The remainder will approximate the impact of the envelope.

PURCHASED:CHILLED WATER

I would like to create a Cooling Coil:Water which is only fed by purchased chilled water. Would you please advise me about the plant loop? I created these objects: purchased:chilled water, branch, branch list, plant equipment list. Do I have to create the whole water path (supply and demand sides, plant loop, etc.)? Which objects are essential?

Answer

With Purchased:Chilled Water, you need all the same components as you would with a chiller. See the 5ZoneAuto example file.



Ask An EnergyPlus Expert



AIR-TO-AIR HEAT EXCHANGER INPUT DATA

I would like to simulate the performance of an air-to-air heat exchanger based on manufacturing data. However, the rating conditions from the catalog data are different from those of the ARI standard. Does EnergyPlus mimic the actual performance of the exchanger with the effectivenesses calculated under different rating conditions?

Answer

From the manufacturer's rating point, an air-to-air heat exchanger's effectiveness varies much more with changes in air flow than it does with variations in temperature (or humidity when considering latent effectiveness). The ARI 1060 Standard provides a fixed rating point so that all manufacturers are reporting the same information to consumers. You will notice from manufacturers data that the heating and cooling effectiveness does change, but not dramatically. This change is due to a change in the temperature difference between the supply air and exhaust air streams. So the information you have is probably adequate for simulation purposes as long as the delta T for heating and cooling are similar to the ARI standard.

The ARI 1060 Standard uses a 19.3C temperature difference (0.00408 kg/kg humidity ratio difference for latent effectiveness) for heating and an 11C temperature difference (0.00726 kg/kg humidity ratio difference for latent effectiveness) for cooling. You can plot the heating and cooling effectiveness versus delta T (or delta W for latent effectiveness) for the data you have and then draw a line through these points to extrapolate or interpolate and find the corresponding ARI rating points. You will see that the effectiveness data do not change significantly.

Since the variation in effectiveness is small for different delta T's (or delta W's), EnergyPlus assumes a constant effectiveness in cooling and heating. The cooling effectiveness inputs (100% and 75% air flow) are used when the supply air temperature (usually outdoor air) is greater than the exhaust air temperature (usually zone air). The cooling effectiveness inputs are used for calculating exiting conditions until the supply air temperature falls below the exhaust air temperature, when the heating effectiveness inputs are then used.

In addition, the effectiveness for air-to-air heat exchanger wheels is impacted by leakage through the seals. If you choose to simulate a wheel, use the "net" effectiveness values (~2 % lower than the thermal effectiveness) provided by the manufacturer.

OVERHANG

I compared two (almost) identical rooms, one of which has an overhang. For the report variable I chose "Zone Transmitted Solar" but the amount of solar radiation entering the zone was the same for each room.

Answer

In the BUILDING object, check the Solar Distribution field. The overhang will not work if the field is set to "MinimalShadowing." If it is set to one of the FullExterior options, then turn on REPORT, Surfaces, Details and check the tilt and azimuth of every surface. Also, check the TransSchedShadowSurf field on the shading surface. If this is always 1, the surface transmits all solar and has no effect. This schedule should be 0 for opaque shading surfaces.

Lonely??? Bored??? Why Not Peruse the Visual Dictionary of Famous Plane Curves!!

http://xahlee.org/SpecialPlaneCurves_dir/specialPlaneCurves.html

New EnergyPlus Consultants

Tom Brooks, President
Certified Energy Consultant
Energy Conservation Systems
13302 Dogwood Court
Prospect, KY 40059
tom@EnergyCSI.com

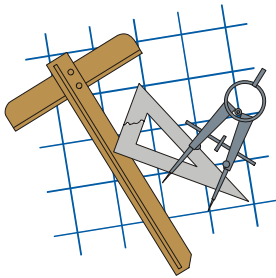


Felipe Agustin
GHD | MANAGEMENT ENGINEERING
ENVIRONMENT
Level 8, 180 Lonsdale Street
Melbourne Vic 3000, Australia
felipe_agustin@ghd.com.au

Update to the WINDOW 5.2 Program

WINDOW 5.2 is a publicly available computer program for calculating total window thermal performance indices (i.e. U-values, solar heat gain coefficients, shading coefficients, and visible transmittances). WINDOW 5.2 provides a versatile heat transfer analysis method consistent with the updated rating procedure developed by the National Fenestration Rating Council (NFRC) that is consistent with the ISO 15099 standard. The program can be used to design and develop new products, to assist educators in teaching heat transfer through windows, and to help public officials in developing building energy codes. Download from <http://windows.lbl.gov/software/window/>

WINDOW 5.2.17a is an updated version of the program (bug fixes for DOE-2.1E and EnergyPlus Files);
<http://windows.lbl.gov/software/window/52/window5217aUpdate.htm>



Building Energy Tools Directory

The web-based Building Energy Tools Directory contains information on more than 270 building-related software tools from around the world.

For each tool in the directory, a short description is provided, along with information about technical expertise required, users, audience, input, output, validation, computer platforms, programming language, strengths, weaknesses, technical contact, availability and cost.

Know of a tool (yours?) that isn't in the directory? Visit http://www.eere.energy.gov/buildings/tools_directory/about.cfm or contact Dru Crawley at Drury.Crawley@ee.doe.gov.

GenOpt 2.0

Generic Optimization Program

GenOpt is an optimization program for the minimization of a cost function, such as annual energy use, that is evaluated by an external simulation program. **GenOpt** can be used with any simulation program -- such as EnergyPlus, SPARK or DOE-2 -- that has text-based input and output. It also offers an interface for adding custom optimization algorithms to its library.

GenOpt processes discrete independent variables, such as different window constructions, either for optimization problems with mixed discrete and continuous independent variables or for doing parametric studies. Some simulation programs, such as EnergyPlus, cannot pre-process the independent variables or post-process values that are computed during the simulation. For such situations, *input function objects* and *output function objects* can now be used without having to modify *GenOpt's* source code.

GenOpt 2.0 (with documentation) may be downloaded free of charge from

<http://SimulationResearch.lbl.gov>

EnergyPlus Version 1.2.2

To download a free copy of the program go to

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



EnergyPlus is an R&D 100 Award Winner, named one of the 100 most technologically significant new products of the year.

EnergyPlus Support Tools

Support software is listed on our website (http://SimulationResearch.lbl.gov/EP/ep_tools.html) and in Section 2 of this newsletter.

EnergyPlus 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 — 295 locations in the USA, 55 locations in Canada, and more than 450 locations in 93 other countries throughout the world. See also the write-up on how to [create Meteororm 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 at http://groups.yahoo.com/group/EnergyPlus_Support/. A selection of questions/answers are compiled (yearly) into a downloadable PDF document: Q and A for [2002](#), Q and A for [2003](#), Q and A for [2004](#).

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

Are you an EnergyPlus Consultant ?

If you are engaged in EnergyPlus consulting, and would like to be listed in the *Building Energy Simulation User News* and on our website (<http://SimulationResearch.lbl.gov>), 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. We invite questions about program usage and suggestions for improvement to the code. Go to http://groups.yahoo.com/group/EnergyPlus_Support/

Translate EnergyPlus Web Pages

A new link on the main EnergyPlus web page (www.energyplus.gov/) allows you to view the pages in any of eight languages. Unfortunately, the translator doesn't work with PDF files. Look for the fish at the bottom of the web page. Pages may be translated into Chinese, French, German, Italian, Japanese, Korean, Portuguese and Spanish.

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).



NEW VALIDATION AND TESTING REPORTS



[From Dru Crawley and the EnergyPlus Development Team:](#)

An important ongoing part of EnergyPlus development is testing, using industry standard methods, as major builds are completed. Our goal is to make EnergyPlus as bug-free as possible. Three major types of tests are conducted:

1. Analytical tests (HVAC tests, based on ASHRAE Research Project 865, Building fabric tests, based on ASHRAE Research Project 1052).
2. Comparative tests (ANSI/ASHRAE Standard 140-2004, International Energy Agency Solar Heating and Cooling Programme (IEA SHC) BESTest (Building Energy Simulation Test) methods).
3. Release and executable tests.

The results of testing for ASHRAE Research Project 1052; ANSI/ASHRAE Standard 140-2004 Envelope, HVAC E100-200, and HVAC E300-500 test suites; and the IEA SHC Furnace BESTest are available for EnergyPlus version 1.2.2 build 30. The BESTest suite compares the results of multiple simulation programs for a series of load-related attributes. For more information on IEA SHC Task 34/Annex 43 (BESTest), visit the IEA SHC Programme Web site.

- ANSI/ASHRAE Standard 140-2004 (Envelope, HVAC E100-200, HVAC E300-500)
- IEA SHC Task 34 Furnace BESTest results
- ASHRAE Research Project 1052

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

[EnergyPlus Testing with Building Thermal Envelope and Fabric Load Tests from ANSI/ASHRAE Standard 140-2004](#)

EnergyPlus Version 1.2.2.030 was used to model a range of building specifications as specified in ANSI/ASHRAE Standard 140-2004 - Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs and in the Building Energy Simulation Test (BESTEST) and Diagnostic Method.

[EnergyPlus Testing with HVAC Equipment Performance Tests Part 1 -- E100 to E200 from ANSI/ASHRAE Standard 140-2004](#)

EnergyPlus Version 1.0.0.023 and subsequent versions up through the most recent release, EnergyPlus 1.2.2.030, were used to model a range of HVAC equipment load specifications as specified in ANSI/ASHRAE Standard 140-2004 Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs which builds upon work done previously as part of the International Energy Agency Building Energy Simulation Test and Diagnostic Method for HVAC Equipment Models (HVAC BESTEST).

[EnergyPlus Testing with HVAC BESTEST • Part 2 -- Tests E300 to E545](#)

EnergyPlus Version 1.0.0.023 and subsequent versions up through the most recent release, EnergyPlus 1.2.2.030, were used to model a range of HVAC equipment load specifications as specified in International Energy Agency Building Energy Simulation Test and Diagnostic Method for HVAC Equipment Models (HVAC BESTEST), Volume 2: Cases E300 – E545.

[EnergyPlus Testing with Fuel-Fired Furnace HVAC BESTEST](#)

EnergyPlus Version 1.2.2.030 was used to model a range of HVAC specifications for a fuel-fired furnace as specified in International Energy Agency Building Energy Simulation Test for Heating, Ventilating, and Air-Conditioning Equipment Models (HVAC BESTEST), Fuel-Fired Furnace Test Suite.

[EnergyPlus Testing with ASHRAE 1052-RP Toolkit – Building Fabric Analytical Tests](#)

EnergyPlus Version 1.2.2.030 was used to model a series of analytical tests for building envelopes as specified in ASHRAE 1052-RP report titled Development of an Analytical Verification Test Suite for Whole Building Energy Simulation Programs – Building Fabric.



Southern California Gas Company

Educational Programs

September • October • November 2005

Register at http://www.socalgas.com/business/resource_center/erc_seminar_info.shtml

September	Event	I.D. No.
Tue 6	EnergyPro Training: 2005 Nonresidential Title 24 Standards	14129
Wed 7	2005 Non-Residential Title 24 Standards: Compliance & Beyond	14128
Thu 8	EnergyPro Training: 2005 Nonresidential Title 24 Standards	14130
Thu 8	Boiler Basics-Energy Resource Center	12907
Thu 15	Certified Permitting Professionals' Update	13823
Thu 29	Thermal Displacement Ventilation and Underfloor Air Distribution	14131
Tue 6	EnergyPro Training: 2005 Nonresidential Title 24 Standards	14129

The Gas Company's Energy Resource Center, 9240 Firestone Blvd., Downey, CA

The Forecast Looks Favorable for ...

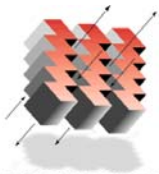
(Free!) Weather Data on Demand

You can access archived weather data from around the world through this U.S. DOE web interface:

www.eere.energy.gov/buildings/energyplus/cfm/weatherdata/weather_request.cfm

Hourly weather data is continuously collected and stored into a local database, available through this web interface. Most stations have information for dry bulb temperature, wet bulb temperature, wind speed/direction, atmospheric pressure, visibility, cloud conditions, and precipitation type.

VisualDOE and LEED Training ☘ October 19-21, 2005



ARCHITECTURAL ENERGY
CORPORATION

Integrated Engineered Solutions

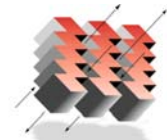
- Architectural Energy Corporation is pleased to announce a VisualDOE 4.0 and LEED energy savings calculation training session on October 19-21, 2005 in Chicago.
- The seminar includes two days focused on DOE-2.1E, the VisualDOE interface, VisualDOE 4.0 new features, and general energy simulation skills. The third day covers LEED energy savings calculations for green buildings. The LEED module covers LEED-NC 2.1 as well as proposed calculation methods for LEED-NC 2.2.

No prior energy modeling experience is required.

VisualDOE 4.0 is available at a discount to training attendees. However a free one-month license for VisualDOE 4.0 is included with the training.

For questions, please email vdoetraining@archenergy.com or phone (415) 957-1977 ext 111.

To register or get more training information, please go to <http://www.archenergy.com/products/visualdoe/training/>



ARCHITECTURAL ENERGY
CORPORATION
Integrated Engineered Solutions

Recent Reports

Over the last few years, the National Renewable Energy Laboratory has been evaluating the operating energy performance of six low-energy buildings for the U.S. Dept. of Energy. These case studies compare the measured energy consumption of each building with the design goals and identify successes and lessons learned for each. A summary of lessons learned from the test buildings as well as the analysis and monitoring research is under preparation.

[Adam Joseph Lewis Center for Environmental Studies](#), Oberlin College
13,600 ft² college building located in Oberlin, OH.

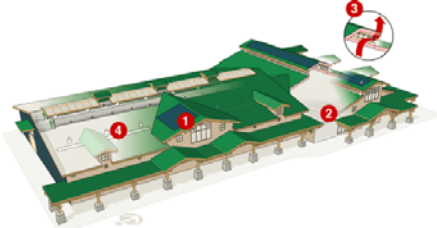


[Zion National Park Visitor Center](#)
8,800 ft² (817 m²) Visitor Center with retail, office, and interpretative displays located in S.W. UT.



1. roof-integrated PV panel
2. radiant floor heating
3. computer-controlled operable windows
4. compact fluorescent lighting combined w/daylighting

[BigHorn Home Improvement Center](#)
42,366 ft² (3,936 m²) hardware store, warehouse, and lumberyard in the mountains of CO.



1. roof-integrated PV panel
2. radiant floor heating
3. computer-controlled operable windows
4. compact fluorescent lighting combined with daylighting

[NREL Thermal Test Facility](#)
10,000 ft² (929 m²) mixed office/light laboratory building in Golden, CO.



[Pennsylvania Department of Environmental Protection Cambria Office Building](#)
34,500 ft² (3,205 m²) office building, LEED Gold certification, located in Ebensburg, PA.



[Chesapeake Bay Foundation's Philip Merrill Environmental Center \(headquarters\)](#)
31,000 ft² (2,880 m²) office building, first LEED Platinum certification, located in Annapolis, MD.

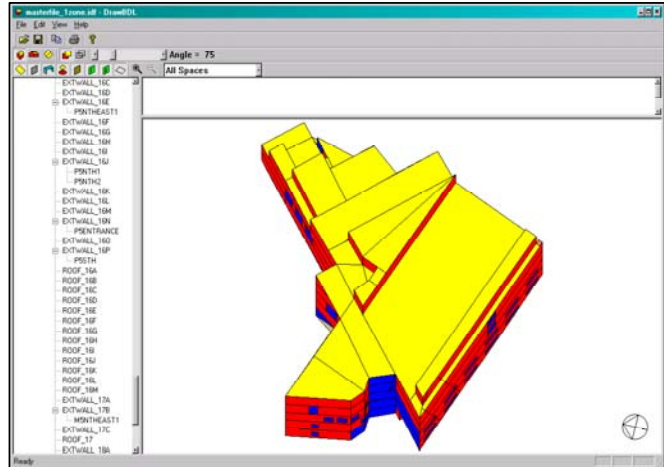


The "Plus" in DrawBDL+ 3.1 refers to EnergyPlus . . .

DrawBDL+3.1

Joe Huang and Associates has both added a "Plus" (+) to the program name, as well as increased the version number to 3.1 to emphasize the ability of *DrawBDL+* to read and display *EnergyPlus* IDF files, as well as to convert the building surface descriptions from *DOE-2* BDL to *EnergyPlus* IDF. For Version 3.0, completed in March 2003, we completely rewrote *DrawBDL* using C++ to run in a native 32-bit environment such as Windows 95/2000/NT. In addition to a different "look and feel" from earlier versions, 3.1 has the following improvements:

1. New user interface with a hierarchical tree showing all building surfaces.
2. No limit on the number of building surfaces.
3. For building surfaces, the expanded data window shows not only the input values, but also their locations in the global coordinate system; for spaces, the data window shows the gross and net areas of walls, windows, doors, roofs, and skylights.
4. Displays surfaces as 2-D or 3-D polygons.
5. Ability to change the sort order of building surfaces used in the display; this allows users to "touch up" the shaded drawings for use in presentations.
6. Interprets both *EnergyPlus* IDF files as well as *DOE-2.1* BDL files.
7. Surface data is output as an *EnergyPlus* IDF file. This allows *DrawBDL+* users to convert their *DOE-2* building descriptions to *EnergyPlus* with a single mouseclick. However, since *DrawBDL+* processes only building geometry data, the converted IDF file is a partial file containing only the inputs for building surfaces.



Example of the *EnergyPlus* input file for the Te Papa Tongarewa Museum (New Zealand)*



Night view of the completed building

The price for *DrawBDL+3.1* remains \$125 plus shipping (shipping charge only applies to mailed diskettes). Updates from previous *DrawBDL* Versions 1.X or 2.X cost \$62.50 plus shipping. Shipping costs are \$5 US, \$10 international.

For more information about *DrawBDL+* or to order, please contact

Joe Huang and Associates
31 Sarah Lane
Moraga CA 94556-2563
Phone 925-247-9180
mail to: joe@drawbdl.com

**DrawBDL+* example was kindly provided by Sam Roose of Energy Solutions, Ltd., New Zealand (<http://www.energyvsolutions.co.nz/>)

◆ www.drawbdl.com ◆ www.drawbdl.com ◆ www.drawbdl.com ◆



DOE-2



DOE-2.1E (v. 121) 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)
- DOE-2 Reference Manual (Part 2)
- DOE-2 Supplement to the Reference Manual (2.1E)
- DOE-2 BDL Summary (2.1E)
- DOE-2 Engineers Manual (2.1A)

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 remaining 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 2003 for 2002

A compilation of all the "how to" and "DOE-2 Puzzler" articles from the *Building Energy Simulation User News*.

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

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

DOE-2 listings are continued on the next page



DOE-2 (continued)



DOE-2 Training

Private or group DOE-2 courses for beginning and advanced users.
Contact Marlin Addison at (602) 968-2040, marlin.addison@doe2.com

DOE-2 Help Desk

Email (klellington@lbl.gov) or fax the Simulation Research Group with your questions. Fax: (510) 486-4089

New DOE-2 Energy Consultants

Pongsak Chaisupparasmikul, Ph.D
Illinois Institute of Technology (Architecture)
3140 South Michigan Avenue, #604
Chicago, IL 60616-3807 U.S.A.
pongsak_archenergy@sbcglobal.net
<http://www.pongsak-chaisupparasmikul.com/>

Derek Hengeveld, P.E.
BTU Engineering, Inc.
3727 Western Ave.
Brookings, SD 57006
hengeveld@BTU-Engineering.com
<http://www.btu-engineering.com>

Tom Brooks, President
Certified Energy Consultant
Energy Conservation Systems
13302 Dogwood Court
Prospect, KY 40059
tom@EnergyCSI.com

Felipe Agustin
GHD | MANAGEMENT ENGINEERING ENVIRONMENT
Level 8, 180 Lonsdale Street
Melbourne Vic 3000, Australia
felipe_agustin@ghd.com.au
<http://www.ghd.com.au>

BLASTnews

www.bso.uiuc.edu

Building Systems Laboratory
University of Illinois, 30 Mechanical Engineering Building,
1206 West Green Street, Urbana, IL 61801
Tel: (217) 333-3977 - Fax: (217) 244-6534
support@blast.bso.uiuc.edu

The Building Loads Analysis and System Thermodynamics (BLAST) program predicts energy consumption, energy system performance and cost for new or existing buildings.

BLAST contains three major sub-programs:

Space Load Prediction computes hourly space loads based on weather data and user inputs detailing the building construction and operation. **Air Distribution System Simulation** uses the computed space loads, weather data, and user inputs. **Central Plant Simulation** computes monthly and annual fuel and electrical power consumption.

Heat Balance Loads Calculator (HBLC)

Graphical interface for producing BLAST input files.

Training Courses

Offered on an as-needed basis in Urbana, IL, USA..

WINLCCID 98

LCCID (Life Cycle Cost in Design) performs Life Cycle Cost Analyses.

Program Name and Description	Order Number	Price
PC BLAST 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 single CD-ROM includes soft copies of the BLAST Manual, technical articles and theses related to BLAST, nearly 400 processed weather files with a browsing engine, and complete source code for BLAST, HBLC, etc.	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.

Recent Reports

LBNL – 56637 (Rev.)

<http://eetd.lbl.gov/emills/PUBS/Cx-Costs-Benefits.html>

LBNL – 56637 (Rev.) -- <http://eetd.lbl.gov/emills/PUBS/Cx-Costs-Benefits.html>

THE COST-EFFECTIVENESS OF COMMERCIAL-BUILDINGS COMMISSIONING

*A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and
New Construction in the United States*

[Evan Mills](#)¹, Hannah Friedman², Tehesia Powell³, Norman Bourassa¹, David Claridge³, Tudi Haas², Mary Ann Piette¹
¹Lawrence Berkeley National Laboratory, ²Portland Energy Conservation Inc.,
³Energy Systems Laboratory, Texas A&M University

Summary (abridged)

Building performance problems are pervasive. Deficiencies such as design flaws, construction defects, malfunctioning equipment, and deferred maintenance have a host of ramifications, ranging from equipment failure, to compromised indoor air quality and comfort, to unnecessarily elevated energy use or under-performance of energy-efficiency strategies. Fortunately, an emerging form of quality assurance—known as building commissioning—can detect and remedy most deficiencies.

Scattered case studies and anecdotal information form the basis of the conventional wisdom among energy-management professionals that commissioning is highly cost-effective. However, given the lack of standardized information on costs and benefits of detecting and correcting deficiencies, it is perhaps of no surprise that the most frequently cited barrier to widespread use of commissioning is decision-makers' uncertainty about its cost-effectiveness.

Designed as a “meta-analysis,” this report compiles and synthesizes extensive published and unpublished data from building commissioning projects undertaken across the United States over the past two decades, establishing the largest available collection of standardized information on commissioning experience. We analyzed results from 224 buildings across 21 states, representing 30.4 million square feet of commissioned floor area (73 percent in existing buildings and 27 percent in new construction). These projects collectively represent \$17 million (\$2003) of commissioning investment. The new-construction cohort represents \$1.5 billion of total construction costs.

We developed a detailed and uniform methodology for characterizing, analyzing, and synthesizing the results. For existing buildings, we found median commissioning costs of \$0.27/ft², whole-building energy savings of 15 percent, and payback times of 0.7 years. For new construction, median commissioning costs were \$1.00/ft² (0.6 percent of total construction costs), yielding a median payback time of 4.8 years (excluding quantified non-energy impacts).

We found that commissioning is one of the most cost-effective means of improving energy efficiency in commercial buildings. While not a panacea, it can play a major and strategically important role in achieving national energy savings goals—with a cost-effective savings potential of \$18 billion per year or more in commercial buildings across the United States. Commissioning is under-attended in public-interest deployment programs as well as research and development activities. As technologies, controls, and their applications change and/or become more complex in an effort to capture greater energy savings, the risk of under-performance will rise and with it the value of commissioning. Indeed, innovation driven by the desire for increased energy efficiency may itself inadvertently create energy waste if those systems are not designed, implemented, and operated properly. The ultimate impact of energy efficiency research and development portfolios, as well as deployment programs, lies in no small part in the extent to which they are coupled with cost-effective quality assurance.

This link might not be strictly related to building simulation but . . .

<http://floatingworldweb.com/EARTHLINGZ/GALLERIES/CLONES/>

Building Energy Software

from the Environmental Energy Technologies Division of Lawrence Berkeley Laboratory

Free Downloads

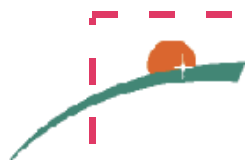
BDA 3.0 (Building Design Advisor) (building decision-making from design through completion)	gaia.lbl.gov/BDA
COMIS (multi-zone air flow and contaminant transport model)	www-epb.lbl.gov/comis
EnergyPlus 1.2.2 (new-generation whole-building energy analysis program, based on BLAST and DOE-2)	www.energyplus.gov/
GenOpt[®] 2.0 (generic optimization program)	SimulationResearch.lbl.gov
Optics 5.1.02 (for analyzing optical properties of glazing systems)	windows.lbl.gov/materials/optics5/
RADIANCE 3.5 (analysis and visualization of lighting in design)	radsite.lbl.gov/radiance/
Desktop Radiance 2.0β (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14)	radsite.lbl.gov/deskrad/
Radiance Control Panel (automates some Radiance tasks once the model has been created)	www.squ1.com/site.html
THERM 5.2 (models two-dimensional heat-transfer effects in building components where thermal bridges are of concern)	windows.lbl.gov/software/therm/therm.html
VisualSPARK 2.0 (Simulation Problem Analysis and Research Kernel) (connect component models to simulate innovative building envelope and HVAC systems)	SimulationResearch.lbl.gov
WINDOW 5.2 (thermal analysis of window products)	windows.lbl.gov/software/window/window.html

Free Software / 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
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Web Based (free)

Home Energy Saver (quickly computes home energy use)	hes.lbl.gov
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Visit the Environmental Energy Technologies Division (LBNL) blog at

<http://bleer.lbl.gov>

PG&E Educational Programs for September and October 2005



For a complete listing of classes or to register call 415.973.7268 or go to www.pge.com/pec

H V A C

Thu, Sep 29	Title 24 2005 Nonresidential Mechanical Requirements and Acceptance Tests
Thu, Oct 20	Specifying Controls for Campuses

ARCHITECTURE

Tue, Sep 13	Skylighting in Big Box Buildings and Beyond: New in Title 24
Wed, Sep 14	Lighting Fundamentals
Thu, Sep 15	Basics of Photovoltaic (PV) Systems for Grid-Tied Applications
Tue, Sep 20	Lighting for Offices
Fri, Sep 23	Developing and Sharing Green Design Expertise - Models from the Field
Tue, Sep 27	Cool Roofing
Wed, Sep 28	Title 24: Overview Of 2005 Nonresidential Standards
Wed, Oct 5	Shedding Light on Lumens
Wed, Oct 5	Glazing Materials and Daylighting Showcase
Wed, Oct 12	Photovoltaic (PV) Site Analysis and System Sizing
Wed, Oct 19	Glazing Materials and Daylighting Showcase

LIGHTING

Tue, Sep 13	Skylighting in Big Box Buildings and Beyond: New in Title 24
Wed, Sep 14	Lighting Fundamentals
Tue, Sep 20	Lighting for Offices
Wed, Oct 5	Shedding Light on Lumens
Wed, Oct 5	Glazing Materials and Daylighting Showcase
Wed, Oct 19	Glazing Materials and Daylighting Showcase

RENEWABLES

Thu, Sep 15	Basics of Photovoltaic (PV) Systems for Grid-Tied Applications
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RESIDENTIAL and WHOLE HOUSE

Tue, Oct 11	Biggest Energy Mistakes Made in Residential Construction
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TITLE 24 (CALIFORNIA ENERGY CODE)

Wed, Sep 28	Title 24: Overview Of 2005 Nonresidential Standards
Thu, Sep 29	Title 24 2005 Nonresidential Mechanical Requirements and Acceptance Tests
Wed, Oct 26	EnergyPro Residential Building Energy Analysis

Chinese language version of [VisualDOE 4.0](#)

Architectural Energy Corporation (AEC) has developed a Chinese language version of VisualDOE 4.0, in collaboration with Taiwan's Industrial Technology Research Institute. Those interested in this product may contact Dr. Hong (thong@archenergy.com) or Mr. Lee (haochuan_lee@itri.org.tw) for more information.