



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 kllellington@lbl.gov for details.

Release of EnergyPlus 1.2.2 - New Features

EnergyPlus Version 1.2.2

To download a free copy of the program go to

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



• • Features of the New Release • •

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 • •

Release of EnergyPlus 1.2.2 - New Features -- 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

Chinese Typical Year Weather (CTYW)

Developed for use in simulating building heating and air conditioning loads and energy use, and for calculating renewable energy utilization, this set of 57 weather files is based on a 1982-1997 period of record with data obtained from the U. S. National Climatic Data Center. These data were developed by Joe Huang of Lawrence Berkeley National Laboratory. The original data set was created by Prof. Zhang Qingyuan of Tsukuba University Japan, in collaboration with Joe Huang. Development of the original typical year weather files is documented in Zhang Qingyuan and Joe Huang, 2004. *Chinese Typical Year Weather Data for Architectural Use* (in Chinese). ISBN 7-111-14810-X. Beijing: China Machine Press.

Italian Climatic data collection "Gianni De Giorgio" (IGDG)

Developed for use in simulating renewable energy technologies, this set of 66 weather files is based on a 1951-1970 period of record. The data were created by Professor Livio Mazarella, Politecnico di Milano, and is named in honor of Gianni de Giorgio.

Solar and Wind Energy Resource Assessment (SWERA)

The Solar and Wind Energy Resource Assessment project, funded by the United Nations Environment Program, is developing high quality information on solar and wind energy resources in 14 developing countries. Previously typical year hourly data were available for 37 locations in Belize, Cuba, El Salvador, Guatemala, Honduras, and Nicaragua. Also available are an additional 119 locations in Brazil, China, Ethiopia, Ghana, Kenya, Maldives, Nepal, and Sri Lanka.

Hong Kong

We are pleased to announce that a typical meteorological year weather file for Hong Kong is now available. The Hong Kong TMY file was jointly developed by Dr T. T. Chow and A. L. S. Chan of the City University of Hong Kong, supported by a CERG grant from the Research Grants Council of the Hong Kong Special Administrative Region, China. Our thanks to Dr Chow for sharing this file with the EnergyPlus simulation community.

Portugal

Two weather files for Portugal developed by Ricardo Aguiar of Instituto Nacional de Engenharia, Tecnologia e Inovação (INETI) are now available on the EnergyPlus web site--for Lisboa and Funchal (Madeira Islands). The INETI synthetic data set is based on spatial interpolation of public climatic data published by Instituto de Meteorologia 1951-1980 combined with INETI owned data and other freely available data sources. INETI has granted DOE permission to distribute versions of the individual INETI files in converted format suitable for EnergyPlus (EPW) and to make those files available to users at no cost via the EnergyPlus web site.

Our thanks to Ricardo Aguiar and INETI for making these data available to the EnergyPlus community. This fills an important location (Lisbon) missing from previously available data and brings the number of locations available for Portugal to eight, including the six IWECC 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



COMIS ☆ WIND CONDITIONS

In the COMIS air flow is it necessary to define the wind condition? And if it is not defined, does the program get wind condition from weather file?

Answer

COMIS gets the wind speed and direction from the weather file. However, to translate that to wind pressures on the building and building openings, the user must input Pressure Coefficients for each facade by wind direction. For simple box geometries, EnergyPlus has a feature to calculate Pressure Coefficients automatically using equations developed from wind tunnel tests.

COMIS ☆ INTERNAL AIR VELOCITIES

Does EnergyPlus give internal air velocities when COMIS is used for a naturally-ventilated house?

Answer

COMIS will calculate the amounts of bulk air flow from the outside and from zone to zone. It does not calculate internal air velocities, for which some type of CFD program would be necessary. It is possible to crudely estimate the air velocities immediately in front of a large opening by making a number of simplifying assumptions.



China to Use EnergyPlus to Develop New Building Energy Standards



Under the leadership of the Air-Conditioning and Building Physics Institutes of the China Academy of Building Research (CABR), the Chinese Ministry of Construction (MOC) has since the late 1990's sponsored and adopted a series of energy standards for residential and public (commercial) buildings throughout China. Starting in 2005, the MOC has authorized CABR to update the three current regional residential energy standards, and combine them into a single national energy standard for residential buildings. To develop this new national standard, the Compilation Committee has decided to use EnergyPlus.

As in previous code development efforts dating back to 2000, Lawrence Berkeley National Laboratory will provide technical assistance, this time training CABR researchers in the use of EnergyPlus. For more information, please contact Prof. Lang Siwei (siweilang@yahoo.com.cn) of the Air-Conditioning Institute of CABR or Joe Huang (YJHuang@lbl.gov) at LBNL.

U.S. DOE Contact: Dru Crawley, (Drury.Crawley@ee.doe.gov)



Ask An EnergyPlus Expert



WINDOW AND GLASS QUESTIONS

What do P, S-C and G-C mean in DOE-2.1E? For example:

```
GT-WIN-1 =GLASS-TYPE P=1 S-C=.45 G-C=7.75
```

And do I input the glass parameters such as solar transmittance, solar reflectance and visible transmittance in the IDF of EnergyPlus according to these data in DOE-2?

Answer

P, S-C and G-C are DOE-2 shortcuts: P is for panes, S-C is for shading coefficient, G-C is for glass conductance (center of glass). They do not translate at all to EnergyPlus inputs because these are overall properties of a complete window construction. In the EnergyPlus Datasets folder, WindowConstructs.idf contains predefined window constructions from the DOE-2.1E window library and lists, in comments, the corresponding glass type code, u-value, shading coefficient, etc. The materials listed are defined in WindowGasMaterials.idf and WindowGlassMaterials.idf

Question

Okay, then what is the relationship between the Glass-Conductance (G-C) in the DOE-2.1E INP file and Conductivity {W/m-K} in the MATERIAL:WINDOWGLASS in the IDF file of EnergyPlus?

Answer

DOE-2

GLASS-CONDUCTANCE (G-C) is used to specify the heat conductance of the total window except for the outside film coefficient. This keyword is part of the GLASS-TYPE command which describes a complete window construction which may be made of one or more panes (layers) of glass. (From the DOE-2.1 Reference Manual, p. III.49)

EnergyPlus

MATERIAL:WINDOWGLASS describes a single layer (pane) of glass. The Conductivity of this layer is just the conductivity of the glass and does not include interior or exterior film (convection) coefficients.

Single-Pane Window

For a single-pane window in EnergyPlus, MATERIAL:WINDOWGLASS-Conductivity would be equivalent to the GLASS-CONDUCTANCE minus the inside film coefficient in DOE-2.1E.

Multi-Pane Window

For multi-pane windows, the DOE-2.1E value is the conductance of all glass panes and all air gaps combined, so it is very different from the EnergyPlus Conductivity.

From the [Society of Building Science Educators](#) (SBSE) newsletter ★ ★ ★

Journal of Green Building ★ College Publishing of Glen Allen, VA, has announced that the inaugural edition of the *Journal of Green Building* will be published in Fall 2005. Edited by Annie Pearce of Georgia Tech, the peer-reviewed, technical journal will provide a high-quality, interdisciplinary forum for advancing the state of knowledge about green buildings. Submission guidelines and information about the journal are available online at <http://www.collegepublishing.us/journal.htm> or from the editor at greenbuilding@collegepublishing.us.



Ask An EnergyPlus Expert



DAYLIGHTING

I am interested in the daylighting algorithm described in the Engineering Auxillary Manual and by Winkelmann and Sellkowitz (1985). What are the criteria for selecting the sky conditions (there are four in EnergyPlus and two in DOE-2.1E), and what specific parameters are these conditions a function of?

Answer

The sky type is selected using a sky weighting factor determined by SkyClearness and SkyBrightness:

```
3.0 < SkyClearness < 4.0 --> interpolate between "clear sky" and "clear turbid sky"
  SkyWeight = MIN(1.0,(SkyClearness-3)/3)
  ...if SkyWeight = 1, then it's a clear sky

1.2 < SkyClearness < 3.0 --> interpolate between "clear turbid sky" and "intermediate sky"
  SkyWeight = (SkyClearness - 1.2)/1.8
  ...if SkyWeight = 1, then it's a clear turbid sky

1.0 < SkyClearness < 1.2 --> interpolate between "intermediate sky" and "overcast sky"
  SkyWeight = MIN(1.0, MAX(0.0, (SkyClearness-1)/0.2, (SkyBrightness-0.05)/0.4))
  ...if SkyWeight = 1, then it's an intermediate sky
  ...if SkyWeight = 0, then it's an overcast sky
```

"Sky Clearness for Daylighting Calculation" and "Sky Brightness for Daylighting Calculation" are output variables that you can report out, if you wish. The final daylighting factors are interpolations/weighted averages (using SkyWeight) between the daylight factors calculated for each discrete sky type.

SkyClearness is calculated using BeamSolarRad and DifSolarRad come from the weather file:

```
Zeta = 1.041*SunZenith**3
SkyClearness = ( (DifSolarRad + BeamSolarRad)/(DifSolarRad + 0.0001) + Zeta
)/(1.+Zeta)
```

SkyBrightness is calculated as follows:

```
SkyBrightness = (DifSolarRad * 93.73)* AirMass / ExtraDirNormIrr(1,Month)
```

```
REAL, PARAMETER, DIMENSION(12) :: ExtraDirNormIrr= &      ! Monthly exterrestrial direct
normal illuminance (lum/m2)
  (/131153.,130613.,128992.,126816.,124731.,123240., &
  122652.,123120.,124576.,126658.,128814.,130471./)
```

Also, the criteria are described quite well in the Engineering Document under the heading "Time-Step Luminance." The reference is Perez et alia, ["Modeling Daylight Availability and Irradiance Components from Direct and Global Irradiance."](#) Solar Energy 44, pp 271-289, 1990.

Here are links to the publications containing the daylighting algorithms in your question:

- [LBL-18508, DAYLIGHTING SIMULATION IN DOE-2](#), by F.C. Winkelmann and S. Selkowitz, October 1984, published in Energy and Buildings, 8, 271 (1986) and
- [LBL-11353, DAYLIGHTING CALCULATION IN DOE-2](#), (Chapter III.2.9 of the DOE-2 ENGINEERS MANUAL), F.C. Winkelmann. May 1983. Simulation Research Group, January 1983.



Ask An EnergyPlus Expert



PID CONTROLLERS

Is it possible to develop dynamic models for HVAC components for use in EnergyPlus? Are there PID controllers in EnergyPlus?

Answer

EnergyPlus does not explicitly simulate any kind of feedback controller: proportional, PI or PID. In EnergyPlus, what CONTROLLER:SIMPLE and other controllers do is to enable the simulation of idealized control in which HVAC equipment, with no dynamics, closely follows the set-point, subject only to capacity constraints. This approach enables the efficient simulation of energy performance since the time step can be long, relative to the closed loop dynamic response time of the real equipment. This approach does not allow the use of dynamic models of HVAC components in EnergyPlus.

There are a number of simulation environments that allow the explicit modeling of HVAC dynamics and control; one is the SPARK program (a free download from <http://simulationresearch.lbl.gov/>). A unique attribute of SPARK is that it is in the process of being integrated with EnergyPlus, the aim being to allow selected components and subsystems to be simulated on short time scales within an EnergyPlus simulation. Unfortunately, this capability may not be available soon enough to meet your needs.

DX COOLING AND HEATING COIL INPUTS

Some of the inputs for DX heating and cooling coils include Capacity, rated COP and rated air volume flow rate. The InputOutputReference document states that these inputs must be at particular rated conditions. What if the specifications I have are taken at different rated conditions? Is there any way I can adjust for this in EnergyPlus?

Answer

The rated conditions for the DX Cooling Coil is 26.67 C (80 F) inlet air dry-bulb temperature and 19.44 C (67 F) inlet air wet-bulb temperature with 35 C (95 F) air temperature entering the condenser. The rated inlet air conditions are used to determine the rated air mass flow rate through the DX cooling coil which is, in turn, used to calculate a rated bypass factor (approach) for the coil at the "Rated SHR" specified by the user. If you knew the Rated SHR for the DX cooling coil at this condition (26.67 C Entering DryBulb, 19.44 C EWetBulb, 35 C OutdoorDB) you should be able to enter that value along with your performance information (Capacity, COP, rated air volume flow rate, and normalized performance curves giving a value of 1.0 at your rating point). There are limitations on rated air volume flow rate per watt of rated total cooling capacity (0.00004027 - 0.00006041 m³/s or 300 - 450 cfm/ton) so you would want to at least be near the rating point. Since the SHR of a DX heating coil is 1.0, the bypass factor is not required and you should be able to input DX heating coil performance information at your rating point (the only check made on a DX heating coil is the flow per watt test and there are less stringent air volume flow rate per watt of total heating capacity requirements for a DX heating coil).

Since EnergyPlus specifies the rating point, this is the only work-around available when using off-design performance information. Manufacturers typically provide the performance information at the rating point specified above, which is why that particular rating point is used.

Education's Purpose is to Replace an Empty Mind with an Open One



Ask An EnergyPlus Expert



TIME STEP CLARIFICATIONS

What is the difference between the time step indicated in the Time Step In Hour object and the variable time step indicated in the HVAC simulation (Engineering Documentation)?

Answer

The Time Step In Hour object specifies the basic time step for the simulation. This is used in the Heat Balance calculation as the driving time step. When the HVAC portion of the simulation begins its solution for the current time step, it uses the basic time step as its maximum but then can reduce the time step, as necessary, to reach the solution.

The technical details of the approach are explained in the Engineering Documentation, under "Integrated Solution Manager."

Users can see the effect/actual HVAC time step used if they select the "detailed" option on an HVAC report variable (e.g. Zone/Sys Air Temp). To contrast, the "Zone" variables will only be reported on the Heat Balance time step (e.g. Mean Air Temperature).

Question

Time steps recommended in EnergyPlus are 4 for non-HVAC and 6 for HVAC calculations. Does this mean that using a time step of 1 will cause EnergyPlus to diverge or sacrifice accuracy?

Answer

Actually, 4 or 6 time steps per hour are necessary for the HVAC calculations. The heat balance simulation will give reasonable results at 1, 4, or 6 Time steps per hour.

Remember that the Time Step value must be evenly divisible into 60 -- therefore is limited to:
1,2,3,4,5,6,10,12,15,20,30,60

Question

Okay, so then how do the Loads and Systems modules handle time step settings?

Answer

This scheme is discussed in detail in the EnergyPlus Engineering Documentation (Integrated Solution Manager and sections following) and the papers that are referenced there. The entire Predictor-Corrector is based on this zone-system connection and needs pages to describe its connection. However, in a nutshell, the system tries to simulate lock step with the heat balance time step. When temperature instabilities are determined, the HVAC systems reduce their simulation time steps to something shorter than the heat balance time step, currently with a one minute minimum. The systems simulate at this shorter time step until the end of the heat balance time step, then they update and the entire simulation moves forward in time.



For more information, please see the discussion of Time Steps previously published in the *Ask an EnergyPlus Expert* section of the newsletter:

[Vol. 25, No. 1 January/February 2004](#), "Time Step Reduction" page 7

[Vol. 24, No. 5 September/October 2003](#), "Time Steps" page 6



Ask An EnergyPlus Expert



ENERGYPLUS CASE STUDY

I'm looking for any case studies of real buildings done using EnergyPlus?

Answer

Here's a new report from the National Renewable Energy Laboratory (NREL) where EnergyPlus was used in an energy performance evaluation of the Philip Merrill Environmental Center, headquarters of the Chesapeake Bay Foundation, in Annapolis, MD.

Analysis of the Energy Performance of the Chesapeake Bay Foundation's Philip Merrill Environmental Center

B. Griffith, M. Deru, P. Torcellini, and P. Ellis

National Renewable Energy Laboratory, 1617 Cole Boulevard, Golden, Colorado 80401-3393

The Chesapeake Bay Foundation (CBF) is dedicated to restoring and protecting the resources of the Chesapeake Bay, North America's largest estuary and a seriously threatened ecosystem. In 2000, CBF built the 31,000-ft² (2,880-m²) Philip Merrill Environmental Center on a 31-acre (12.5-ha) site in Annapolis, MD, to serve as foundation headquarters. CBF incorporated numerous high performance energy-saving features (including a ground-source heat pump system to heat the building in winter and help cool it in summer) into the building to minimize its environmental effects on the bay. Large, south-facing windows provide additional passive solar heating and reduce lighting loads by allowing more use of natural light (daylighting). Building daylighting is monitored by sensors that automatically dim some lights when daylighting is sufficient to displace electric lighting. Manually and motor-operated windows attempt to use the Chesapeake Bay's breezes for natural ventilation. An energy management system tracks the outdoor temperature and humidity and uses this information to control the building's heating, ventilation, and air-conditioning system. The National Renewable Energy Laboratory (NREL) selected the Merrill Center as a technical case study after being contacted by CBF to provide an unbiased energy performance evaluation. Because the center has attracted much attention in the sustainable design community, an unbiased evaluation was necessary to help designers replicate successes and identify and correct problem areas. This report focuses on the monitoring and analysis of the building's overall energy performance. (April 2005 • NREL/TP-550-34830)

Download document (145 pages) <http://www.nrel.gov/docs/fy05osti/34830.pdf>

EP-Quick

EP-Quick creates an EnergyPlus input file for a building, without HVAC. Simple templates are used for the shape and zone layout.

Get EP-Quick from <http://www.glazersoftware.com>

EP-Quick creates input files for any sized buildings using templates for the shape and zone layout. By using templates for commonly shaped buildings and zone layouts, the time needed to create an EnergyPlus input file is greatly reduced. You may download EP-Quick and give it a try. The version you download is a demo and only generates EnergyPlus input files for triangular buildings.

Once purchased and registered, EP-Quick will generate EnergyPlus input files based on 26 different templates. Please see the web site for additional information.

EP-Quick costs \$89 for a single user license and \$39 for an academic license.

EnergyPlus may be freely downloaded from:

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

Questions and comments may be directed to Jason Glazer of Glazer Software at jglazer@gard.com



Ask An EnergyPlus Expert



HEAT RECOVERY SET UP

Is there any plant equipment able to use the heat recovery loop to recover energy from equipment other than a water heater? In the EnergyPlus heat recovery example file the plant loop, rather than the heat recovery loop, is used to set up the heat recovery loop. Does this mean that the heat recovery object in the plant-condenser loops is unusable? Is there another example file that uses the heat recovery loop to specify the loop?

Answer

In development we are heading toward a general loop structure and not specifically-typed loops. We view loops as a collection of piping that allows fluid to flow through and connect components. Thinking in this manner the heat recovery loop object has been made obsolete and replaced with the more general loop structure connecting components together that can facilitate heat recovery. We have several example files that show this:

HeatRecoveryElectricChiller.idf
HeatRecoveryPlantLoop.idf
HeatRecoverywithStorageTank.idf

Yes, the water heater was used in these examples to allow for storage of the recovered heat, but it is not necessary. You could connect the heat recovered from generators directly to heating coils, for instance. Look in the Engineering Documentation in the "Heat Recovery Loop Systems" section for more information.



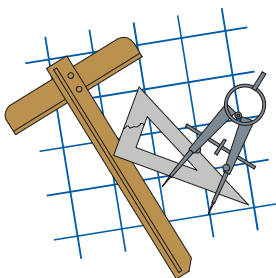
EnergyPlus Training August 19th



There will be a One-Day EnergyPlus Training Session on August 19, after the IBPSA-Canada Conference.

The class will provide an introduction to EnergyPlus, its utilities and the range of interfaces available. Participants will obtain hands-on experience running EnergyPlus (and will receive a series of exercises to try after the workshop). Class will be held at École Polytechnique de Montréal. Desktop computers with all the required software will be provided. The number of participants is limited to 20. For more information, or to register, go to <http://ibpsa.ca/bs2005/courses.htm>.

The course will be taught by Drury B. Crawley, program manager for Analysis Tools at the U. S. Department of Energy, Washington, DC, USA.



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/your_software_here.html or contact Dru Crawley at Drury.Crawley@ee.doe.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).

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

DrawBDL+3.1

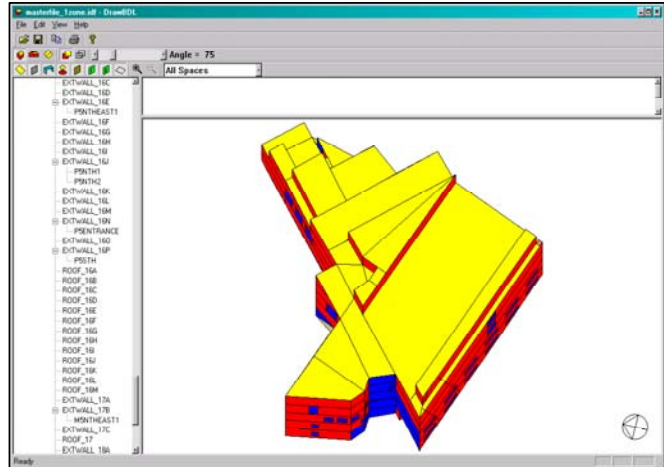
Joe Huang and Associates has both added a "Plus" (+) to the program name, as well as increased the version number to 3.1 to emphasize the ability of *DrawBDL+* to read and display *EnergyPlus* IDF files, as well as to convert the building surface descriptions from *DOE-2* BDL to *EnergyPlus* IDF. For 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.

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



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



Night view of the completed building

**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 ◆



Southern California Gas Company Educational Programs ▶◀ July and August, 2005

To register go to http://www.socalgas.com/business/resource_center/erc_seminar_info.shtml

July	Event	I.D. Number
Tue 12	IHACI - System Design (Part 1 Duct Design)	13768
Thu 14	IHACI - System Design (Part 2 Components)	13769
Tue 19	IHACI - System Design (Duct Design) (Part 1)	13726
Tue 19	Lamp & Ballast Basics	14059
Thu 21	IHACI - System Design -(Components) - (Part 2)	13727
Thu 21	Gas Engines: Testing and Tuning for AQMD Compliance	14020
Fri 22	Insulated Concrete Walls: Energy Efficiency Meets Sustainability	13877
Wed 27	Modular Boiler Installation for Greater Gas Savings	14056

August	Event	I.D. Number
Tue 2	IHACI - Air Balance - Beginners - Chatsworth (Part 1)	13835
Wed 3	IHACI - Air Balance - Beginners - Chatsworth (Part 2)	13836
Tue 9	IHACI - Air Balance - Beginners (Part 1)	13728
Tue 9	EnergyPro Training: Envelope/Lighting/Windows	14123
Wed 10	IHACI - Air Balance - Beginners (Part 2)	13729
Wed 10	EnergyPro Training: Mechanical	14126
Thu 11	EnergyPro Training: Advanced	14127
Tue 16	Advanced Lighting Technologies	14060

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

From the [Society of Building Science Educators](#) (SBSE) newsletter * * *

ECS text available on CD * *Environmental Controls Systems (ECS)* (McGraw-Hill 1993) is now out of print. The book has been converted to PDF format, available on a CD at no cost to instructors who wish to consider using it as a text. Extensively illustrated by the author, *ECS* is an introduction to the systems used to control the thermal and luminous environment in buildings. Also included is a companion instructor's manual, with an extensive bibliography, questions and answers, and projects. Email author Fuller Moore at efmoore@tampabay.rr.com to request a CD copy.

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.

GenOpt 2.0

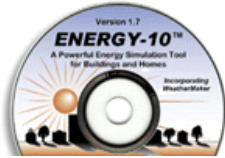
Generic Optimization Program

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>



ENERGY-10™ VERSION 1.7

It's here—Upgrade today!

This upgrade to the Council's popular energy simulation software includes a new window construction dialogue, two new HVAC system types, international weather data, and a new 3D bar graph display.

Douglas K. Schroeder
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Fax: 202.383.5043
www.sbicouncil.org

Sustainable Buildings Industry Council (SBIC)



San Diego Gas & Electric Company
<http://seminars.sdge.com/>

Date	Event	Event ID
July 2005		
Wed 13	Electrical Energy Efficiency	5242
Tue 19	Chilled Water Systems	5243
Tue 26	System Design Part I	5239
Wed 27	System Design Part II	5240
August 2005		
Tue 16	Air Balance - Beginners Part I	5244
Wed 17	Air Balance - Beginners Part II	5245
September 2005		
Tue 20	Air Balance - Intermediate / Advanced Part I	5246
Wed 21	Air Balance - Intermediate / Advanced Part II	5247

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 1.2.1 (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) Desktop Radiance 2.0β (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14) Radiance Control Panel (automates some Radiance tasks once the model has been created)	radsite.lbl.gov/radiance/ radsite.lbl.gov/deskrad/ 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
Web Based (free)	
Home Energy Saver (quickly computes home energy use) and Home Improvement Tool (simplified Home Energy Saver)	hes.lbl.gov and hit.lbl.gov

Those Who Are Contented Are Never Poor



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

The DOE-2 Puzzler: Irradiation on an Inclined Plane

Regarding the radiation models described in the DOE-2.1A Engineering reference manual ... is irradiation on an inclined plane still used in the latest version of DOE-2.1E?

Answer

If you are asking about the diffuse radiation, the algorithm has changed.
Here is the current code -- **Fred Buhl**



```
C      PEREZ MODEL FOR DIFFUSE RADIATION ON SLOPED SURFACES.
C      SEE R. PEREZ, R. SEALS, P. INEICHEN, R. STEWART, AND
C      D. MENICUCCI, "A NEW SIMPLIFIED VERSION OF THE PEREZ
C      DIFFUSE IRRADIANCE MODEL FOR TILTED SURFACES", SOLAR
C      ENERGY 39,221-231,1987.  COMMUNICATED BY A. ZELENKA,
C      SWISS METEOROLOGICAL INSTITUTE, ZURICH, VIA ISIDORE
C      MARCUS OF EMPA, DUBENDORF, SWITZERLAND.
```

```
C      PARAMETER LIST                                DOE-2 VARIABLE
C      -----
C      GH      = GLOBAL HORIZONTAL (MEAS OR CALC)    SOLRAD
C      DH      = DIFFUSE      "      "      "      BSCC
C      COSI    = COS(INCIDENCE ANGLE OF DIR BEAM)    ETA
C      COSA    = COS(SURFACE TILT ANGLE)             GAMMA
C      ZD      = SOLAR ZENITH ANGLE (DEGREES)
C      DB0     = ANNUAL AVERAGE SOLAR CONSTANT (BTUH/SF)
C      AM      = RELATIVE AIRMASS (KASTEN)
```

```
C      FFS0 = 0.
C      IF(DH.LE.0.) GO TO 7
```

```
C      Z = PIOVR2 - PHSUN
C      ZD = 90.0 - PHSUND
C      THC = ACOS(COSI)
```

```
C      RELATIVE AIR MASS (BALTIT/3281 IS BUILDING ALT IN KM)
```

```
C      AMH = 1.0-.1*BALTIT/3281.
C      AM  = AMH/COSZ
C      IF(ZD.GT.75.) AM = AMH/(COSZ + 0.15*(93.885-ZD)**(-1.235))
```

```
C
```

Irradiation on an Inclined Plane (continued on the next page)

Irradiation on an Inclined Plane (continued)

```

C           MODEL PARAMETERS
C
C           DB = (GH-DH)/COSZ
C           EPS = (DB+DH)/DH
C           DELT = DH*AM/DB0
C
C           CIRCUMSOLAR (F1P) AND HORIZON (F2P) BRIGHTENING COEFFS
C
C           DO 1 K=1,7
C           IF(EPS.LT.EPSL(K)) GO TO 2
1 CONTINUE
2 F1P = F1(K,1) + F1(K,2)*DELT + F1(K,3)*Z
  F2P = F2(K,1) + F2(K,2)*DELT + F2(K,3)*Z
C
C           GEOMETRY OF (ALSO PARTLY HIDDEN) 25-DEG HELIOS ON SLOPE
C           NOTE: COSI<0 ALLOWED
C
C           IF(Z.LT.PIHMAW) THEN
C             GHIH=COSZ
C             PSIH=1.
C           ELSE
C             PSIH=(PIHPAW-Z)/ZAW
C             GHIH=PSIH*SIN(AW*PSIH)
C           END IF
C
C           IF(THC.GT.PIHPAW) THEN
C             GHIC=0.
C           ELSE
C             IF(THC.GT.PIHMAW) THEN
C               PSIC=(PIHPAW-THC)/ZAW
C               GHIC=PSIH*PSIC*SIN(AW*PSIC)
C             ELSE
C               GHIC=PSIH*COSI
C             END IF
C           END IF
C
C           SKY FORM FACTOR (WITHOUT SHADING) FOR THIS WALL AND FOR
C           WINDOWS AND DOORS IN THIS WALL
C
C<>  FFS0 = 0.5*(1.+COSA)*(1.-F1P) + GHIC*F1P/GHIH + F2P*<SXSTLT>
C           FFS0 = 0.5*(1.+COSA)*(1.-F1P) + GHIC*F1P/GHIH + F2P*AA(MX+31)
C
C           7 CONTINUE
C
C           GROUND FORM FACTOR (WITHOUT SHADING)
C
C           FFG0 = 0.5*(1.0-GAMMA)
C
C           FORM FACTORS WITH SHADING FOR THIS WALL (FORM FACS FOR
C           WINDOWS AND DOORS W/SHADING CALCD IN CALWIN, CALEXT)
C           HERE, EWSKYFF AND EWGNDFD ARE RATIOS OF SHADED TO
C           UNSHADED INCIDENT RADIATION (SEE SUBR FFDIF)
C<>  FFS = FFS0*ABS(<EWSKYFF>)
C           FFS = FFS0*ABS(AA(MX+19))
C<>  FFG = FFG0*ABS(<EWGNDFD>)
C           FFG = FFG0*ABS(AA(MX+20))
C           320 RDIF = FFS*BSCC + FFG*BG
C           CALCULATE TOTAL SOLAR ON WALL
C           RTOT = RDIR + RDIF

```

We'll drink to that!! Free winery tool reduces energy and water costs

The BEST Winery Tool



California wineries now have an easy-to-use, computer-based tool and a handbook to help them reduce energy and water costs, thanks to researchers at Lawrence Berkeley National Laboratory who worked with Fetzer Vineyards on the project. BEST (Benchmarking and Energy and Water Savings Tool) Winery Tool compares the performance of a target winery to a similar reference winery.

Development of BEST Winery was supported by the Public Interest Energy Research Program of the California Energy Commission. BEST Winery applies to small to medium scale wineries. It is available for free to all California wineries.



[Download the BEST Winery Guidebook \(LBNL-3184\) \(pdf\) May 2005](#)

[Download the software \(xls\)](#)

**BEST Winery Guidebook:
Benchmarking and Energy and Water Savings Tool for the Wine Industry**

[Christina Galitsky](#), Ernst Worrell, Anthony Radspieler
Lawrence Berkeley National Laboratory

Patrick Healy and Susanne Zechiel
Fetzer Vineyards

ABSTRACT

Not all industrial facilities have the staff or the opportunity to perform a detailed audit of their operations. The lack of knowledge of energy efficiency opportunities provides an important barrier to improving efficiency. Benchmarking has demonstrated to help energy users understand energy use and the potential for energy efficiency improvement, reducing the information barrier. In California, the winemaking industry is not only one of the economic pillars of the economy; it is also a large energy consumer, with a considerable potential for energy-efficiency improvement. Lawrence Berkeley National Laboratory and Fetzer Vineyards developed an integrated benchmarking and self-assessment tool for the California wine industry called "BEST (Benchmarking and Energy and Water Savings Tool) Winery. BEST Winery enables a winery to compare its energy efficiency to a best practice winery, accounting for differences in product mix and other characteristics of the winery. The tool enables the user to evaluate the impact of implementing energy and water efficiency measures. The tool facilitates strategic planning of efficiency measures, based on the estimated impact of the measures, their costs and savings. BEST Winery is available as a software tool in an Excel environment. This report serves as background material, documenting assumptions and information on the included energy and water efficiency measures. It also serves as a user guide for the software package.



SPARK is an equation-based simulation environment that allows you to build customized models of complex physical processes by connecting calculation objects that represent system components like walls, fans, heat exchangers, chillers, ducts, mixing boxes, controls, etc. It is aimed at the simulation of innovative and/or complex building systems that are beyond the scope of whole-building programs like DOE-2 and EnergyPlus. VisualSPARK adds a graphical user interface to SPARK to simplify its use.

Download VisualSPARK Free of Charge From

<http://simulationresearch.lbl.gov/>

Please go to our website to download new VisualSPARK documentation:

- **New Features, Bug Fixes, And Changes**
- **Frequently Asked Questions**
- **How To Port Atomic Classes To Spark 2.X**
- **Theoretical Speed-Up Using Spark**

SPARK was developed by the Simulation Research Group at Lawrence Berkeley National Laboratory and by Ayres Sowell Associates, with Support from the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technologies Program of the U.S. Department of Energy, Program Manager Dru Crawley.

From the BLDG-SIM Newsgroup

Benchmark Utility Consumption Data

Does anyone know of published benchmark utility consumption studies for office, labs, and manufacturing plants? I'm looking for normalized utility usage (kWh/sf-yr, MBTU/sf-yr) for generic buildings.

Answer

There are some national U.S. data compiled for energy use intensity (EUI) index that you can obtain from DOE and Pacific Gas and Electric. Here are some URLs:

- <http://buildingsdatabook.eere.energy.gov>
- <http://www.eia.doe.gov/emeu/consumptionbriefs/cbecs/pbaweb/site/summarytable.htm>
- http://www.eia.doe.gov/emeu/cbecs/detailed_tables_1999.html
- http://www.pge.com/docs/pdfs/biz/energy_tools_resources/building_survey/CEUS_1999.pdf

BLDG-SIM is a mailing list for users of building energy simulation programs like EnergyPlus, DOE-2, Trace-600, HAP, ESP, BLAST, SERIRES, ENERGY-10, etc. Users of all levels of expertise are welcome and are encouraged to share their questions and insights about these programs. The web page for BLDG-SIM is <http://www.gard.com/bldg-sim.htm>. Jason Glazer, P.E. of GARD Analytics, Inc. is the list administrator.

To subscribe to the BLDG-SIM mailing list, send a blank email to BLDG-SIM-SUBSCRIBE@GARD.COM



Solar Energy International

Renewable Energy for a Sustainable Future



Workshop Name	Date	Location
July		
Photovoltaic Design & Installation	Jul. 11-22	SEI, Carbondale, CO
Advanced Photovoltaics	Jul. 25-29	SEI, Carbondale, CO
August		
PV Industry Week	Aug. 1-5	SEI, Carbondale, CO
Micro-Hydro Power	Aug. 1-5	SEI, Carbondale, CO
Solar Water Pumping	Aug. 6-7	SEI, Carbondale, CO
Residential Wind Power	Aug. 8-19	SEI, Carbondale, CO
Biodiesel Fuel	Aug. 11-14	Kakwa Ecovillage, McBride, BC, Canada
Photovoltaic Design & Installation	Aug. 22 - Sep. 2	SEI, Carbondale, CO

<http://www.solarenergy.org/workshops/schedule.php>

Recent Reports

From the Florida Solar Energy Center

Validation of EnergyGauge® USA Using the HERS BESTEST

Philip Fairey and Susan Wichers
Florida Solar Energy Center (FSEC)

Abstract

This report presents results from the testing and validation of the EnergyGauge USA home energy rating software conducted using the HERS BESTEST procedures. The results show that EnergyGauge USA is an excellent and verifiable simulation program capable of meeting all national requirements for home energy rating software tools.

<http://www.fsec.ucf.edu/bldg/pubs/bestest/index2004.htm>

Assessing Six Residential Ventilation Techniques in Hot and Humid Climates

Neil Moyer, Dave Chasar, Dave Hoak, Subrato Chandra
Florida Solar Energy Center (FSEC)

Abstract

The addition of mechanical ventilation air to “tight” homes in hot and humid climates may adversely impact health, building durability, comfort and energy use by raising indoor humidity levels (RH) above 50%. High indoor humidity has been linked to microbial growth, building material decay, discomfort, and increased energy use. High indoor humidity in “tight” homes with mechanical ventilation has been documented in various Building America projects in hot humid locations.

The research described here quantifies the energy use, and humidity impacts of six mechanical ventilation strategies installed serially in a new, Energy Star Manufactured home laboratory (MHLab) with typical air tightness (5.4 ACH50) and simulated occupancy for a period of 14 days. Only one strategy (Case 4-Dehumidifier) provided ventilation meeting ASHRAE Standard 62 and maintained the indoor humidity lower than 50%.

http://www.fsec.ucf.edu/bldg/pubs/six_tech/index.htm



Another information-packed issue of FSEC's newsletter, [Buildings Research Post](#), is yours for the download!

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 (pre-retrofit) buildings.

BLAST contains three major sub-programs:

- **Space Load Prediction** computes hourly space loads in a building 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)

The BLAST graphical interface (HBLC) is a Windows-based interactive program for producing

BLAST input files. 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. The Building Systems Laboratory offers such training courses on an as needed basis typically at our offices in Urbana, Illinois.

WINLCCID 98

LCCID (Life Cycle Cost in Design) was developed to perform Life Cycle Cost Analyses (LCCA) for the Department of Defense and their contractors.

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

Program Name	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.

A Website That Makes You Say WOW!

The coolest website of the month (or the entire year, for that matter) has to go to the Human-Building-Interaction project being developed by the Building Simulation Group (School of Design) at the University of Pennsylvania in Philadelphia, PA.

Here's a description of their "human-building-interaction" project

We present an interactive speech and gesture recognition-based, immersive Augmented Reality (AR) model designed to visualize and interact with buildings and their thermal environments. This project introduces a Human-Building-Interaction (HBI) model that allows for the efficient exploration of Computational Fluid Dynamics (CFD) datasets in real time.

Check it out at: www.gsfa.upenn.edu/bsg/hbifinal/