The 🐝 *Buzz*

Ask an EnergyPlus Expert
All 2006 questions and answers (PDF)
http://simulationresearch.lbl.gov/dirpubs/un_articleEP06.pdf

DOE-2 User Questions
All 2006 questions and answers (PDF)
http://simulationresearch.lbl.gov/dirpubs/un_articles06.pdf

2006 Building Energy Data Book (Download)
http://buildingsdatabook.eere.energy.gov/

In Memoriam

Bruce E. Birdsall

July 24, 1924 ⌘ January 28, 2007

Bruce was a member of the Simulation Research Group at Lawrence Berkeley National Laboratory from 1982 until his retirement in 1997.

A 1951 graduate in Industrial Engineering from the University of Illinois, he brought years of expertise and practical experience to the DOE-2 development project. Bruce came to us from Ohio State University, after a distinguished teaching and engineering career. He had worked in the HVAC industry since 1946 and he liked to say that he grew up in it, as his father was a residential/commercial heating contractor.

During his time at the laboratory, Bruce worked primarily on the DOE-2 building energy simulation program; he headed the user support office, wrote documentation and technical reports, and provided advice on HVAC design, control and construction. Bruce was responsible for DOE-2 inputs for specific projects such as PNL's ASHRAE/IES STD 90A Revision project and BPA's Commercial Buildings Project. His interest in computers, as they related to the HVAC industry, began by writing the algorithms for the APEC HCC III Loads program. Bruce held two U.S. patents with Carrier Corporation (1954) that were subsequently patented in 20 foreign countries. He was a member of ASHRAE and served on TC 4.7 from 1969 to 1981. In addition, Bruce was principal author of the Standard Evaluation Technique (SET) for the BEPS program.

Bruce was unfailingly good-humored, patient, generous and upbeat, despite ongoing health problems. He enjoyed helping students and young engineers get established, and he acted as a mentor to many researchers and visitors during his 15 years at the laboratory.

Those friends and colleagues who would like to write something in Bruce's memory, please follow this direct link to his guest book:
http://www.legacy.com/TimesHeraldOnline/GB/GuestbookView.aspx?PersonId=86453385

http://www.legacy.com/TimesHeraldOnline/DeathNotices.asp?Page=LifeStory&PersonID=86453385

Ask an EnergyPlus Expert

ZONE MULTIPLIER

I simulated a 7-story building, with each floor having two zones. I used a zone multiplier to multiply my middle floor by 5 times. Do I need to divide every resulting value for the middle floor by 5 in order to obtain a value just for a typical middle floor?

And about infiltration. Should I input infiltration values only for a typical middle floor, assuming that EnergyPlus automatically multiplies the given infiltration value by 5 times, or do I need to input an infiltration value 5 times that of a typical middle floor?

Answer
Those are good questions. The zone multiplier is applied when loads are passed to the HVAC system and when energy use is metered. For the energy meters, you can see in the MTD file where the multipliers have been applied.

For example:

```
Meters for 5037,PER-1I LIGHTS 1:Lights Electric Consumption [J]
 * 4 (Zone Mult = 4, Zone List Mult = 1)
```

In general, zone-level objects, such as lights, people, infiltration should not be multiplied upon input and will not be multiplied upon output. Only HVAC output and meter output is multiplied. So, you do not need to multiply the infiltration values. And the window heat gain should be the un-multiplied value. But I would recommend changing the multiplier and confirming that the window heat gain does not change.

CONTIGUOUS ZONES

Is it possible to create two contiguous zones in such a way that there is no surface dividing them? I want to do this in order to visualize the difference between thermal comfort of the people who work next to the windows and those who work in the core of the building, away from sunlight.

Answer
Not really. You can define two zones without a dividing surface, but there will be no exchange between the zones where they meet. If you add an interzone window, you can pass solar gains from one zone to the next. And if you add MIXING or CROSS MIXING, you can create an air exchange between the zones. But there is no radiant exchange from one zone to the next. If you want to report thermal comfort for two locations, it would be better to model the two areas in the same zone and use two different PEOPLE objects. By using Angle Factor List(s), you can change the mix of surfaces by which each PEOPLE object is affected. Note that solar gains incident on the PEOPLE are not included in the thermal comfort models. Only the inside surface temperature of the window impacts the reported thermal comfort values.

**A new issue of the e-newsletter, *Science at Berkeley Lab,* is available at
http://enews.lbl.gov**

Ask an EnergyPlus Expert

HEAT PUMP

Which field controls the heating/cooling operation of the heat pump? And are the modes shifted by the difference between the indoor air temperature and the setpoint? In my simulation (one internal zone and four external zones) I assigned one heat pump per zone. I wanted the heat pump in the internal zone to cool the space (which has large heat gains) in the winter, while the others in the outside zones deliver heat.

Answer
Heat pump is controlled by the zone thermostat. The heat pump will try to provide cooling when the thermostat calls for cooling, likewise for heating. You can schedule individual coils, so it is possible to disable cooling or heating with a schedule if desired.

Question
If I may continue with this theme: If a center zone still demands cooling from the individual heat pump during a cold winter, how does the Heat Pump deliver the cooling air? The supply air in question has a temperature lower than the ambient temperature (-5C). Shouldn't the supply air in the evaporator always be cooler than the outdoor condenser in the cooling cycle? Or is the heat pump using imaginary cool air to meet the cooling load against possible ice-cold air coming into the zone?

Answer
In this case, the supply air temperature will be whatever the mixed air temperature happens to be. If the outside air fraction is high, then this system will deliver very cold air to the zone. If you anticipate that this might be too cold, then a preheat coil must be added to warm the cold outdoor air or to warm the mixed air.

ZONE MULTIPLIER – UNIFORM ZONES

If I have several zones that are going to have the same loads (i.e., similar sized zones with exactly the same number of people in each, on the same schedule, etc.) is there a way to assign multiple zones to one load definition object? I want to avoid having to come up with unique names for each load object.

Answer
Not exactly, you'll need separate People objects with unique names for each zone (try using the zone name as part of the name to get unique names).

If your zones are really uniform (same sizes, internal gains, orientation, etc.), then you could go an even simpler route, which is to use zone multipliers. This way, you define a single zone just one time and then give it a zone multiplier. The resulting loads will be amplified by the multiplier.

To EnergyPlus Documentation
http://www.eere.energy.gov/buildings/energyplus/documentation.html

Ask an EnergyPlus Expert

FLOOR AND ROOF TILT – PART I

How do I check that the tilt for floors and roofs is correctly defined?

Short Answer
Put in a `Report, Surface, Details;`
and review the results in the eplusout.eio file. That will tell you the computed tilts and facing (azimuth) for all surfaces. Results are easily importable into a spreadsheet program.

Longer Answer
For Tilt of roofs and floors, you have to specify the coordinates in the order you have given in the "SurfaceGeometry" object. All of the EnergyPlus example files use "counter clockwise" to specify the coordinates. If you specify them "clockwise" instead, you will get a 180 degree tilt from what you want. Or another way to think of it is to "look" from the outside of the roof and specify the coordinates that way.

For instance, if you have a flat roof at 4.5 meters above horizontal, specifying (counter clockwise):
```
(0.0 , 15.24 , 4.5)
(0.0 , 0.0 , 4.5)
(5.24 , 0.0 , 4.5)
(15.24 , 15.24 , 4.5)
```
will give you a flat roof of the proper tilt.

whereas:
```
(0.0 , 15.24 , 4.5)
(15.24 , 15.24 , 4.5)
(5.24 , 0.0 , 4.5)
(0.0 , 0.0 , 4.5)
```
will give you a roof of improper tilt. Look up Tilt or SurfaceGeometry in the documentation for an extended explanation.

FLOOR AND ROOF TILT – PART II

The EnergyPlus example files show differing tilt angles for ceiling and similar for floor. What should the tilt angle be for a floor and a ceiling and how does this affect the calculations?

Answer
Floors are usually flat and tilted 180 degrees. Ceilings would usually be flat as well and tilted 0 degrees. Roofs, of course, can be gabled and, therefore, tilted at other angles. Since EnergyPlus uses coordinate input, it derives the "tilt" angles from those. Tilt angle will affect calculations since tilt angle will be the "outward facing angle" for the surface. Floors that are tilted 0 degrees can't view the walls that surround it, for example. Azimuth or facing angle is also derived from coordinates and depends (for floors and roofs) on which corner is selected.

Blog On, Energy Simulation Enthusiasts, at http://bleer.lbl.gov

Ask an EnergyPlus Expert

ILLUMINANCE MAP

I'm trying to work with the illuminance map, on a model with white walls and ceiling. But the values are too high even when there isn't direct sunlight. For example, at the end of the day, in the back of a 5m room, there is a value higher than 800lx. What could be the problem? And does the program consider external reflectances? For example, the reflected light at a nearby building?

Answer
Check the coordinates for the illuminance map, noting that all daylighting coordinates are relative to the zone origin (even if WorldCoordinates is specified for geometry.)

EnergyPlus can model external reflectances, but this feature is off by default. See BUILDING "Solar Distribution," and Shading Surface Reflectance.

One other factor contributing to the higher than expected values you are seeing "at the back of the room" might be the split-flux method used to calculate the daylight contribution to interreflected light at reference points. This method "splits" the incoming daylight into "upward" and "downward" proportions and then evenly distributes the interreflected light based on area weighted average surface reflectances in these portions of the space. The result is that the interreflected contribution is the same at all reference points, regardless of location in the space. If this component is large relative to the direct contribution, as with highly reflective surfaces (white walls and ceilings) and no direct sunlight, this can skew the results.

CHILLED BEAM SYSTEM

I need to model the chilled beam system using EnergyPlus. Any hints?

Answer
Unfortunately, at this time there are no chilled beam examples. It has been suggested that chilled beam systems can be modeled using the low temperature radiant system (with chilled water in the slabs) and then manually increase the convection coefficient on the ceiling surfaces (using the CONVECTION COEFFICIENTS object). For an example of radiant slab cooling systems, see ExampleFiles\RadLoHydrHeatCoolAuto.idf.

Alternatively, chilled beams could be modeled as fan coils with zero fan power, since their output is predominantly convective.

New EnergyPlus Consultant

Northern Utah and Southern Idaho Area. (Ogden)

ray.worthen@hill.af.mil

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Morgan, Utah 84050

Message from Dru Crawley, USDOE, to the EnergyPlus community,

As of January 9, 2007, the current release (V 1.4) of EnergyPlus topped 3000 downloads in the shortest time ever. More than 46,000 copies of EnergyPlus have been downloaded in the last 5-1/2 years.

The next release of EnergyPlus will be Version 2.0 in April. From that point forward, we will be concentrating our efforts to add new features that support low-energy buildings.
Here are a few of the key things we know V 2.0 will include:

- *finite difference conduction -- allows modeling of phase-change materials*
- *energy management system (more controls to follow in V 2.1, October 2007)*
- *refrigerated cases with evaporative condenser (refrigerant loops on the way)*

We may also see green roof modeling, with research and model development by Portland State University.
<div align="center">Dru and the EnergyPlus Team</div>

PS As we move forward with V 2.0 and future releases, we definitely need your feedback on new modeling capabilities. Please send email directly to Dru Crawley (drury.crawley@ee.doe.gov) with your suggestions.

EnergyPlus Version 1.4.0

http://www.energyplus.gov/

Support Tools

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

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

Weather data for more than 800 locations are now available in EnergyPlus weather format.
See the write-up on how to create Meteonorm Files

Ask an EnergyPlus Expert

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

Are you an EnergyPlus Consultant ?

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

Join the EnergyPlus User Group

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

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

EnergyPlus is being developed by University of Illinois and Lawrence Berkeley National Laboratory, 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).

DOE-2.1E

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

Cost is as follows:
$ 300 U.S. Government/Non-Profits/Education
$ 575 U.S. Public, Mexico, Canada
$1129 to $1268 Other Foreign

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

What is included on the CD?
DOE-2 Reference Manual (Part 1) and (Part 2)
DOE-2 BDL Summary (2.1E)
DOE-2 Engineers Manual (2.1A)
DOE-2 Supplement to the Reference Manual (2.1E)

Order Software and ESTSC Documentation

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

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

Purchase DOE-2 Documentation

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

Free DOE-2 Documentation http://gundog.lbl.gov/dirsoft/d2getdoc.html

DOE-2 Basics Manual (2.1E) http://gundog.lbl.gov/dirpubs/BASIC/basiclist.html

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

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

Update Package #2: BDL Summary and Supplement.

Update Package #3: Appendix A of the Supplement.

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

DOE-2 Modeling Tips (pdf files)   for 2006 2005 2004 2003 2002
A compilation of all the "how to" and "DOE-2 Puzzler" articles from the newsletter.

Changes and Bug Fixes to DOE-2.1E (txt file) -- All changes and bug fixes in a text document.

Architectural Energy Corporation will offer VisualDOE-4.1 and LEED Training on April 19-20 in their San Francisco office. Get all the details from the VisualDOE training page at http://www.archenergy.com/products/visualdoe/training/. Free VisualDOE-4.1 demo from http://www.archenergy.com

Recent Reports

EVALUATION OF DEMAND SHIFTING STRATEGIES WITH THERMAL MASS IN LARGE COMMERCIAL BUILDINGS

Peng Xu
Lawrence Berkeley National Laboratory

ABSTRACT
Building thermal mass can be used to reduce the peak cooling load. For example, in summer, the building mass can be pre-cooled during non-peak hours in order to reduce the cooling load in the peak hours. As a result, the cooling load is shifted in time and the peak demand is reduced. The building mass can be cooled most effectively during unoccupied hours because it is possible to relax the comfort constraints. While the benefits of demand shift are certain, different thermal mass discharge strategies result in different cooling load reduction and savings. The goal of an optimized discharge strategy is to maximize the thermal mass discharge and minimize the possibility of rebounds before the shed period ends. A series of filed tests were carefully planned and conducted in two commercial buildings in Northern California to investigate the effects of various precooling and demand shed strategies. Field tests demonstrated the potential of cooling load reduction in peak hours and importance of discharge strategies to avoid rebounds. **EnergyPlus** simulation models were constructed and calibrated to investigate different kind of recovery strategies. The results indicate the value of pre-cooling in maximizing the electrical shed in the on-peak period. The results also indicate that the dynamics of the shed need to be managed in order to avoid discharging the thermal capacity of the building too quickly, resulting in high cooling load and electric demand before the end of the shed period. An exponential trajectory for the zone set-point during the discharge period yielded good results and is recommended for practical implementation.

THE ENERGY PERFORMANCE OF THE COLD-FORMED STEEL-FRAME AND WOOD-FRAME HOUSES DEVELOPED FOR THAILAND

Prechaya Mahattanataw, Charunpat Puvanant and Darunee Mongkolsawat
Faculty of Architecture, Silpakorn University, Bangkok, Thailand
prechaya@hotmail.com, puvanant@su.ac.th, mdarunee@gmail.com

ABSTRACT
This paper presents the energy consumption of a two-storey detached house in Thailand constructed by three different systems: concrete-frame house, steel-frame house, and wood-frame house. The **EnergyPlus** software was used to simulate the energy performance of the houses. Different methods for simulating framing construction were compared in order to choose the appropriate one. The energy consumption of the houses was then investigated based on the selected method. The construction cost and electricity cost of different types of houses were analyzed to determine the economical system.

Recent Reports

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

EXPERIENCE TESTING ENERGYPLUS WITH THE IEA HVAC BESTEST E300-E545 SERIES AND IEA HVAC BESTEST FUEL-FIRED FURNACE SERIES

Michael J. Witte[1], Robert H. Henninger[1], and Drury B. Crawley[2]
[1]GARD Analytics, Inc., Park Ridge, IL
[2]U.S. Department of Energy, Washington, DC

ABSTRACT

The **EnergyPlus** building energy simulation software has been tested using the IEA HVAC BESTEST E300- E545 series of tests and the IEA HVAC BESTEST Fuel-Fired test series. The first is a series of comparative tests for a single-zone DX cooling system which tests a program's ability to model hourly loads over an expanded range of performance conditions for various air mixing, infiltration, thermostat set-up, overload conditions, and various economizer control schemes. The second is a series of analytical/semianalytical comparative tests for a single-zone fuel-fired furnace which tests a program's ability to model steady state performance, varying outdoor and indoor conditions, and circulating and draft fan operation. Each of these HVAC BESTEST series were used to test EnergyPlus prior to new public releases. The application of these tests proved to be very useful in several ways: a) revealed algorithmic errors which were fixed, b) revealed algorithmic shortcomings which were improved or eliminated through the use of more rigorous calculations for certain components, and c) caught newly introduced bugs before public release of updates.

2007 ENERGY EFFICIENT BUSINESS SEMINARS

Presented by San Diego Gas and Electric Company
http://www.sdge.com/training

March 22	Introductory eQUEST 5420	
March 27	System Design Part 1 5421	
March 28	System Design Part 2 5422	

Meetings – Conferences – Symposia

2007		
May 21-25	CIB World Building Congress 2007	cdejager@saice.org.za
June 10-14	CLIMA 2007	http://www.clima2007.org/portal/
June 13-15	Roomvent 2007	http://www.roomvent2007.org
June 23-27	ASHRAE Annual Meeting (Long Beach, CA)	http://www.ashrae.org
September 03-06	Building Simulation 2007 – IBPSA China	http://www.ibpsa.org

March 2007 Educational Programs

Pacific Gas & Electric Company

San Francisco, California

CONTROLS

Mar 01   Specifying Direct Digital Controls

Mar 14   Optimizing the Dry Side: Research on Ducts, Controls, and Terminal Units

H V A C

Mar 01   Specifying Direct Digital Controls

Mar 14   Optimizing the Dry Side: Research on Ducts, Controls, and Terminal Units

TITLE 24

Mar 05   Advanced EnergyPro Calculations for Energy Star + Tax Credits

Mar 06   EnergyPro Nonresidential Software for Beginners

SOFTWARE

Mar 05   Advanced EnergyPro Calculations for Energy Star + Tax Credits

Mar 06   EnergyPro Nonresidential Software for Beginners

RENEWABLES

Mar 27   Understanding Financial Analysis Methods for Photovoltaic (PV) Systems

Mar 28   Solar Water Heating Systems

American Council for an Energy-Efficient Economy (ACEEE)

July 24-27   2007 Summer Study on Energy Efficiency in Industry
to be held in White Plains, NY

March 19-21   National Symposium on Market Transformation
to be held in Washington, D.C.

April 12-13   Energy Efficiency Finance Forum
to be held in New York City

__I really enjoy Building SImulation!__

__Me, too!!__

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

The Big List of Free

Free!!! Books

2006 Buildings Energy Data Book	http://buildingsdatabook.eere.energy.gov/
Daylight in Buildings (book on CD)	klellington@lbl.gov
Residential Lighting Design Guide (California)	http://www.cltc.ucdavis.edu/

Free!!! Building Energy Software *

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

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

Free!!! Memberships

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

Free!!! Newsgroups (Mailing Lists)

BLDG-SIM	bldg-sim-subscribe@gard.com
EnergyPlus User/Support Group	http://groups.yahoo.com/group/EnergyPlus_Support/

GARD Analytics (http://www.gard.com/) for:
  ASHRAE 4.7 Energy Simulation
  ASHRAE 2.8 Building Environmental Impacts/Sustainability
  Standards Project - Test for Building Energy Analysis Software
	tc47-l-subscribe@gard.com
	tc28-l-subscribe@gard.com
	spc140-l-subscribe@gard.com

Free!!! Weather Data

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

Continued Next Page

The Big List of Free -- Continued

Free!!! e-Newsletters

ACEEE American Council for an Energy-Efficient Economy	http://www.aceee.org/about/newsletter.htm
Architecture Week	http://www.architectureweek.com/
ASHRAE	http://www.ashrae.org/template/enewsletterlanding/
BLUEPRINT (State of California)	http://www.energy.ca.gov/efficiency/blueprint/
Buildings Research Post (FSEC)	http://www.fsec.ucf.edu/en/news/newsletters/brpost/
Conservation Update (by state)	http://www.eere.energy.gov/state_energy_program/update/
EERE Network News (USDOE)	http://www.eere.energy.gov/news/newsletters.cfm
e-FFICIENCY NEWS (Alliance to Save Energy)	http://www.ase.org/section/_audience/e_fficiency
Energy Chronicle (FSEC)	http://www.fsec.ucf.edu/en/news/newsletters/echron/index.htm
eNews (Energy Design Resources)	http://www.energydesignresources.com/publication/en/
Green Energy News	http://www.nrglink.com/index.html
IBPSANews	http://www.ibpsa.org
Lighting Link (Calif Lighting Technology Center)	http://169.237.101.18:8080/cltc/the-lighting-link
Rocky Mountain Institute	http://www.rmi.org
SBSE (Society of Building Science Educators)	http://www.sbse.org
Science @ Lawrence Berkeley Lab	http://enews.lbl.gov
Setting the Standard (standards and guidelines USDOE)	http://www.energycodes.gov/news/
Steven Winter Associates	
Buildings Inside and Out (SBIC)	**http://www.swinter.com/Services/06Tech_Trans/co_sbic.html**
CARB-News (Consortium for Advanced Residential Bldgs)	**http://www.carb-swa.com/carbfax.html**
Party Walls (multi-family bldgs)	**http://www.swinter.com/Services/06Tech_Trans/co_partywalls.html**
RUSH (HUD projects)	**http://www.swinter.com/Services/06Tech_Trans/co_rush.html**
WinterGreen	**http://www.swinter.com/Services/06Tech_Trans/co_wintergreen.html**

Free!!! Web Tools

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

Free!!! Stuff

Poster: "Energy and Buildings in the 20th Century"	klellington@lbl.gov

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2007 TECHNICAL SEMINARS

Presented by Southern California Gas Company
Located at the Energy Resource Center in Downey, California

http://www.socalgas.com/business/resource_center/erc_home.shtml

March 07	New Building Commissioning 16571	
March 21	LEED for New Construction Technical Review	

Southern California Gas Company