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BUILDING ENERGY SIMULATION ★ USER NEWS

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The Buzz

2006 Building Energy Data Book -- FREE!
Download the 2006 Building Energy Data book
<http://buildingsdatabook.eere.energy.gov/>

Ask an EnergyPlus Expert

All 2006 questions and answers in one PDF file.
http://simulationresearch.lbl.gov/dirpubs/un_articl_eEPO6.pdf

EnergyPlus Consultants
See p. 8 for eight new EnergyPlus consultants!

DOE-2 User Questions
All 2006 questions and answers in one PDF file.
http://simulationresearch.lbl.gov/dirpubs/un_articl_es06.pdf

DOE-2 Consultants
See p. 8 for two new DOE-2 consultants!

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PUB-439

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.

Dru and the EnergyPlus Team

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.

Introduction to EnergyPlus and DesignBuilder

March 13-15, 2007 in Irvine, California

For details and to register, go to
<http://www.gard.com/training.htm>



Ask an EnergyPlus Expert

UNITARY EQUIPMENT

Is there any way to convert a compact HVAC unitary system to a VAV system? I would like to simplify my input process by using this compact object, but I want to specify a VAV.

Answer

To model a unitary VAV system, it would be easiest to start with COMPACT HVAC:*:VAV objects and skip the plant loops. Run this (EnergyPlus will fail, but that's OK) and take the resulting expidf file and make the following changes:

1. In the main branch of the air loop, put in a DXSystem:AirLoop instead of the chilled water coil.
2. Delete the chilled water cooling coil object and its branch and controller, and delete the controller from the controller list.
3. Add a DXSystem:AirLoop and COIL:DX:MultiSpeed:CoolingEmpirical and related objects.

That should do it. Use example file 5ZoneAutoDXVAV.idf as a guide.

Ask an EnergyPlus Expert

WATER HEATER SOURCE SIDE CAPABILITIES

I am trying to model the supply side of a heat recovery loop with a pump (as the supply inlet branch), a water heater (source side), and an exit pipe. Although the branches pass integrity testing, I receive a node connection error at the water heater inlet node with the statement that the inlet node did not find an appropriate matching "outlet" node. The same was true for the supply exit pipe. In the supply side of the loop, I have 15 m/s in-flow and 0 m/s out-flow. Does the source side of a water heater:mixed require a bypass?

Answer

No, a bypass is not required. You say the "branches" (plural) pass integrity testing. If you have the pump, the water heater and the pipe on separate branches, do you have a splitter connecting the inlet branch to the water heater branch? And a mixer connecting the water heater branch to the exit pipe branch? If not, this is most likely the source of the errors. An alternative approach is to place the pump and the water heater on a single branch (see example file TRHConstFlowChillerOneBranch.idf for a similar case with a chiller and pump).

Reply

Thanks! Creating a single branch worked.

CONTROLS

If I have a warm air system (fan, heater battery, supply ductwork) operating in winter to warm a factory to 20C during the day, but I want to avoid the temperature dropping below 12C overnight, can I control the fan and heater so that it is normally off overnight but comes on when room temperature drops below 12C?

Answer

Take a look at System Availability Manager:Night Cycle. The InputOutput Reference describes this manager pretty well. It will do what you want to do.

DAYLIGHTING, SHADING

I am simulating the daylight in three rooms of a three story house with almost-west facing windows. My model includes shading from a nearby building. I am comparing the average values of zone light maps for two conditions:

1. the existing shade building,
2. the existing shade building with a slightly higher roof.

Generally I have the expected result; that is, there is less light in my building when the shading building is taller. However, late in the year the first floor is indicating more light in the room for some hours when the shade building is taller. I don't see any input parameters for the shade building color. Is there a ground reflectance associated with the shade building that would cause more light to enter the first floor window when the shade building is taller?

Answer

That does seem non-intuitive. It is possible to add reflections from shading surfaces, but the default is no reflections (see BUILDING and SHADING SURFACE REFLECTANCE).

Ask an EnergyPlus Expert

WINDOW CALCULATION FATAL ERROR

I'm trying to simulate a simple 5-zone single level Compact VAV block with windows and shades on all sides; however, the model failed to run stating:

```
*** Fatal ** Singular matrix in LUdecomposition, window calculations"
```

What am I doing wrong?

Answer

Remove the shades from the windows first to make sure it is not a problem with the windows. If the same error occurs you have a problem with the window construction. If the simulation completes successfully, add in a single shade and try again. Check the example file WindowTests.idf for examples of proper window and window/shade constructions.

CONNECTED SURFACE WARNING

EnergyPlus issues a warning if two connected internal surfaces do not have the same area; and I do understand that this should not be the case for most of the surfaces in a building. Can anyone tell me what actually happens within EnergyPlus in this case? Does it take the average surface area for the heat transfer calculation? Also, what happens if one of the surfaces has a different tilt than the other one?

Answer

EnergyPlus links the outside surface temperature for interzone surfaces. For example, assume Surface A and Surface B are linked. When Surface A is simulated, its outside surface temperature is set to be the inside surface temperature of Surface B. When Surface B is simulated, its outside temperature is the inside surface temperature of Surface A. Because the link is made by temperature, and not by heat flux, mismatched areas can result in violating conservation of energy. Mismatched tilt or azimuth will not cause an error if the areas match. However, error messages are generated because it may indicate that the wrong pair of surfaces has been linked to each other.

ZONE AIR – HEAT BALANCE EQUATION

I am trying to understand how EnergyPlus deals with the air heat balance equation. Even though it is described in detail I still don't know if the EnergyPlus heat balance equation takes into account the energy stored in the zone air.

Answer

Yes, the thermal mass of the zone air is included in the zone heat balance.

Question

And how do I plot the components of the air heat balance (assuming no heat transfer from inter-zone air mixing)?

Answer

You must compute the convective heat transfer from the zone surfaces by reporting Surface Inside Temperature, Surface Int Convection Coeff, and Zone Mean Air Temperature. The gain for each surface is $Area * ConvCoeff * (T_{surf} - T_{air})$.

Ask an EnergyPlus Expert

DOMESTIC HOT WATER ENERGY USE

I'm trying to create a detailed model of annual domestic hot water energy use with EnergyPlus, similar to how it is done with DOE-2.

Answer

I'm assuming the example file you are talking about is DHWPurchHeating.idf which features the DOMESTIC HOT WATER object. To model hot water usage with this object, it is coupled as a component in the plant loop simulation. The plant loop supply-side equipment (usually a water heater or boiler) provides the heating and determines the loop hot water temperature. The DOMESTIC HOT WATER object sets the flow rate of water that is used and lost down the drain. The object also sets the return water temperature (presumably from the water mains), or if blank, the WATER MAINS TEMPERATURES object set the temperature.

If you are looking for something similar to the "DHW-" keywords under the PLANT-ASSIGNMENT command in DOE-2, I suggest using the WATER HEATER:MIXED object in "stand-alone" mode -- that means with no plant loop connections. See the example file WaterHeaterStandAlone.idf. In "stand-alone" mode, the water heater will accept a water use flow rate schedule that will allow you to set the DHW demand. See the documentation for more on this object. With the WATER HEATER:MIXED object you should find capabilities equivalent to DOE-2 and beyond.

For those EnergyPlus users who recall the energy balance bug that was identified with WATER HEATER:MIXED, please note that the **object does work correctly** when in stand-alone mode. The energy balance bug only occurs when the water heater is coupled to a plant loop. The WATER HEATER:MIXED bug was fixed in EnergyPlus 1.4; that means water heaters will function correctly for both stand-alone and plant-coupled applications.

MACROS

I am trying to create a macro that would run a number of simulations in EnergyPlus sequentially and save the output files, using unique file names, with each run. Ideally, I want the macro to:

- Change a certain number of parameters within an input file
- Simulate the input file within EnergyPlus
- Save the resulting output files, with specific names
- Begin the process anew

Is this do-able within EnergyPlus?

Answer

In the files area: http://tech.groups.yahoo.com/group/EnergyPlus_Support/files/Examples/ there is an example called Parametric-5ZoneWarmest.zip which will illustrate a simple way to do this using the macro capability and EP-Launch (which will take care of the separate folders for outputs).

Ask an EnergyPlus Expert

SCHEDULES

I have a question about Schedules used with annual energy calculations, coupled with Design-Day calculations. For instance, if I have 100 zones and they all have the same annual schedule for heat gain, then I am able to define a single schedule and reference this schedule for all zones. If, however, I want to use different schedule data for the design summer or winter day for a room, this design-day data must be defined as a design-day schedule and referenced as the SummerDesignDay or WinterDesignDay in a WEEKSCHEDULE and then in a year SCHEDULE. If I have slightly different design-day schedules for each room, but the same annual schedules, must I then define different annual and weekly schedules for each room, in order to get the different design-day schedules defined? Or is there some other means of tagging rooms with just design-day schedule data and using common annual schedules for the annual calculation.

Answer

Your understanding is correct. You need a different annual/week schedule for each unique combination of design-day and regular-day schedules. You may find it easier to generate this using the SCHEDULE:COMPACT approach rather than DAYSCHEDULE/WEEKSCHEDULE/SCHEDULE.

RESIDENTIAL BOILER

I'm trying to model a simple residential house with three zones -- living, attic and garage. It's an older home with a central, coal-fired boiler used for heating. My problem is that I don't know how to 'connect' the boiler with convective heat exchangers in the three zones.

Answer

In the ExampleFiles folder, see WindACAUTO.idf - Window air conditioners with hot water convectors served by purchased hot water (substitute a boiler for the purchased hot water). Run the example file and view the svg output file to see the types of components used to connect the hot water loop. Review the input file to see the input objects used to describe those components. See also 5ZoneAirCooled.idf - Example with a boiler.

2007 Energy Efficient Business Seminars Presented by San Diego Gas and Electric Company <http://www.sdge.com>

January 23	Installation Best Practices (part 1 of 2) 5411
January 24	Installation Best Practices (Part 2 of 2) 5412
February 07	Implementing Energy Efficiency Projects 5415
February 20	Heat Pumps Part 1 5416
February 21	Heat Pumps Part 2 5417
March 27	System Design Part 1 5421
March 28	System Design Part 2 5422

EnergyPlus Version 1.4.0

Download a free copy of the program

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

Support Tools

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

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

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

Meetings - Conferences - Symposia

2007

March 06	IBPSA England Symposium	http://www.ibpsa-england.org
March 22-23	Canadian Conference on Building Science + Technology	http://www.nbec2007conference.com/
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

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

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Community Environmental Center, Inc.	
<u>Residential Projects:</u> Alexander MacFarlane amacfarlane@cecenter.org Tel: 718 784 8347 x113 Community Environmental Center Inc., 43-10 11th Street Long Island City, N.Y. 11101 http://www.cecenter.org	<u>Commercial and industrial Projects:</u> Julien LaFond ALTANOVA LLC 700 Fort Washington Avenue, Suite 1C New York, N.Y. 10040 jlafond@cecenter.org Phone: 718 784 1444

*Newsletter!! ----- e-News #58: To read the current issue, please click here:
[e-News #58: Lighting Automation Strategies for Commercial Buildings](#)
To learn more about other energy efficiency topics, visit www.EnergyDesignResources.com.*

New Doe-2 Consultants	
Nick Malik, P.E. Sebesta Blomberg Associates, Inc. 9550 West Higgins Road, Suite 300 Rosemont, IL 60018 Tel: (847) 692-4780 Fax: (847) 692-4784 nmalik@sebesta.com	Yi Jiang, P.E., LEED AP Sebesta Blomberg Associates, Inc. 150 Presidential Way, Suite 330 Woburn, MA 01801 Tel: (781) 721-3927 Fax: (781) 721-7221 yjiang@sebesta.com



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.



Howdy! Y'all need to check out "eCalc," the Energy & Emissions Toolkit from the Energy Systems Laboratory at Texas A&M University. eCalc is a collection of Texas-centric, web-based (DOE-2) calculators that allows users to design and evaluate a wide range of projects for energy savings and emissions reduction potential. Mosey on over to <http://ecalculator.tamu.edu/>

Recent Reports

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

SIMULATION STRATEGIES FOR HEALTHCARE DESIGN TO ACHIEVE COMFORT AND OPTIMIZE BUILDING ENERGY USE

Shruti Narayan, Isabelle Lavedrine and Maurya McClintock
Arup, 901 Market Street, Suite #260
San Francisco, CA 94103

ABSTRACT

The principle purpose of a building's design is to provide conditions for human comfort through the optimization of solar control, daylight performance, and subsequent provision of supplemental heating, ventilating, air conditioning and lighting systems. Medical facilities are a building sector where there is an inherent concern for occupant well-being and comfort while still being mindful of operational energy efficiency. Façade configurations are the most important interface to the external environment, and they play a significant role in setting occupant comfort levels within the space. This paper therefore focuses primarily on solar control aspects of façade system alternatives and their impact on minimizing energy use and optimizing comfort within the space. This is achieved through a proposed design process that utilizes comfort simulation alongside operational energy saving calculations to validate and refine integrated architectural, envelope interior planning and perimeter zone supplemental mechanical and lighting systems from a holistic perspective. The paper illustrates the use of this process on four recent healthcare projects in California. It also highlights the importance of design team interaction from an early stage. In this scenario, the success of this process was due to the participation of the architect, mechanical engineer, façade consultant and the energy analyst from the schematic design stage.

THE APPLICATION OF BUILDING ENERGY SIMULATION AND CALIBRATION IN TWO HIGH-RISE COMMERCIAL BUILDINGS IN SHANGHAI

Yiqun Pan¹, Zhizhong Huang¹, Gang Wu², Chen Chen³

¹Tongji University, Shanghai, China

² East China Architectural Design & Research Institute, Shanghai, China

³ Shanghai Real-estate Science Research Institute, Shanghai, China

ABSTRACT

The method of calibrated computer simulation is summarized and introduced based on related literatures and guidelines, which is used to analyze the energy consumption of two high-rise commercial buildings in Shanghai, China. The detailed data of the buildings and systems are collected and input to build up models with **DOE-2**, then the output of simulation is compared to the measured energy consumption data to refine and calibrate the models. Several energy conservation measures (ECMs) are analyzed based on the calibrated models, including using variable speed chilled water pumps instead of constant variable speed ones, using free cooling during winter and mild seasons, replacing old low efficiency cooling towers with new high efficiency ones, decreasing lighting power densities. Energy saving performance is simulated and calculated to find out which ECM is the best option for each building.

Recent Reports

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

IMPLEMENTATION OF AN EARTH TUBE SYSTEM INTO ENERGYPLUS

[Kwang Ho Lee](#) and Richard K. Strand
University of Illinois at Urbana-Champaign, Champaign, IL

ABSTRACT

A new module was developed for and implemented in the **EnergyPlus** program for the simulation of earth tubes. This paper describes the basic concepts, assumptions, and algorithms implemented into the **EnergyPlus** program to predict the performance of an earth tube. Using the new module, a parametric analysis was carried out to investigate the effect of pipe radius, pipe length, air flow rate and pipe depth on the overall performance of the earth tube under various conditions. Pipe length, air flow rate and pipe depth are predicted to have more influence on the performance than pipe radius. In addition, pipe length and pipe depth turned out to affect the overall cooling rate of the earth tube, while pipe radius and air flow rate mainly affect earth tube inlet temperature.

EVALUATION OF METHODS FOR DETERMINING DEMAND-LIMITING SETPOINT TRAJECTORIES IN COMMERCIAL BUILDINGS USING SHORT-TERM DATA ANALYSIS

[Kyoung-ho Lee](#) and [James E. Braun](#)
Ray W. Herrick Laboratories, School of Mechanical Engineering
Purdue University, West Lafayette, IN

ABSTRACT

This paper presents the evaluation of three different methods for determining zone temperature setpoint variations that limit peak electrical demand in buildings. The methods were developed in a companion paper (Lee and Braun 2006b) and are evaluated in the current paper through simulation for two different buildings. One of the buildings houses the Iowa Energy Center and is representative of a small commercial building. This building was modeled using a detailed inverse model that was developed in a previous study. The other building is the Santa Rosa Federal building, which is representative of a large commercial building. This building was modeled using **EnergyPlus**, which was calibrated using test data. All three methods worked well in terms of peak demand reduction. In addition, two of the methods provided good predictions of peak load reduction for both buildings.

Building Codes Illustrated:

A Guide to Understanding the International Building Code, 2nd Edition

Authored by Francis D. K. Ching, and Steven R. Winkel.

An easy-to-use illustrated guide to the 2006 edition of the International Building Code (IBC). The newest edition of Building Codes Illustrated thoroughly covers the 2006 updates to the IBC by providing an easy-to-understand interpretation in both words and illustrations.

www.iccsafe.org/news/nr/2006/1121codes_illustrated.html -- product No. 9024S06

Recent Reports

Proceedings ACEEE Summer Study on Energy Efficiency in Buildings, August 13-18, 2006 • Pacific Grove, CA

Assessment of the Technical Potential for Achieving Zero-Energy Commercial Buildings

Brent Griffith, Paul Torcellini, and Nicholas Long, National Renewable Energy Laboratory, Drury Crawley and John Ryan, U.S. Department of Energy

ABSTRACT

The U.S. Department of Energy's (DOE) Building Technologies Program has adopted the goal of making zero-energy commercial buildings (ZEBs) marketable by 2025. The National Renewable Energy Laboratory (NREL) conducted an assessment of the entire commercial sector to evaluate the technical potential for meeting this goal with technology available in 2005 and projected forward to possible technology improvements for 2025. The analysis looked at the technical feasibility of ZEBs, limitations in market penetration and utility grid structures notwithstanding. The core of the evaluation was based on creating 15-minute, annual simulations based on 5,375 buildings in the 1999 Commercial Buildings Energy Consumption Survey Public Use Data and the current ANSI/ASHRAE/IESNA Standard 90.1-2004. These baseline-building models were then used to develop alternate ZEB scenarios by applying sets of available technologies and practices and projected improvements after 20 years. The results show that the ZEB goal is technically achievable for significant portions of the commercial sector. Using today's technologies and practices, the technical potential is that 22% of the buildings could be ZEBs. With projected 2025 technologies, the technical potential is that 64% of the buildings could be ZEBs. If excess electricity production could be freely exported to the grid, then with the projected 2025 technology in every building, the commercial sector could generate as much as 37% more energy than it consumes. The results suggest that the ZEB goal is feasible for the sector as a whole and that research should be implemented to overcome hurdles to achieving the goal.

Dynamic Controls for Energy Efficiency and Demand Response: Framework Concepts and a New Construction Case Study in New York

Sila Kiliccote, Mary Ann Piette, David S. Watson, LBNL
Glenn Hughes, New York Times

ABSTRACT

Many of today's advanced building control systems are designed to improve granularity of control for energy efficiency. Examples include direct digital controls for building heating, ventilation, and cooling systems (HVAC), and dimmable ballasts for continuous dimming for daylighting applications. This paper discusses recent research on the use of new and existing controls in commercial buildings for integrated energy efficiency and demand response (DR). The paper discusses the use of DR controls strategies in commercial buildings and provides specific details on DR control strategy design concepts for a new building in New York. We present preliminary results from EnergyPlus simulations of the DR strategies at the New York Times Headquarters building currently under construction. The DR strategies at the Times building involve unique state of the art systems with dimmable ballasts, movable shades on the glass facade, and underfloor air HVAC. The simulation efforts at this building are novel, with an innovative building owner considering DR and future DR program participation strategies during the design phase. This paper also discusses commissioning plans for the DR strategies. The trends in integration of various systems through the EMCS, master versus supervisory controls and dynamic operational modes concepts are presented and future research directions are outlined.



Solar 2007

July 7-12, 2007 -- Cleveland, OH

<http://www.ases.org/solar2007/participate.htm>

The Big List of Free

Free!!! Books

2006 Buildings Energy Data Book	http://buildingsdatabook.eere.energy.gov/
Daylight in Buildings (book on CD)	kl Wellington@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	tc47-l-subscribe@gard.com
ASHRAE 2.8 Building Environmental Impacts/Sustainability Standards Project - Test for Building Energy Analysis Software	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™ Download, install and launch GoogleEarth then download and open the Climate Zones CA-CZ.kmz 120 kb file.	http://earth.google.com/

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The Big List of Free -- Continued

Free!!! e-Newsletters

Architecture Week	http://www.architectureweek.com/
ASHRAE	http://www.ashrae.org/template/enewsletterlanding/
BLUEPRINT (State of California)	http://www.energy.ca.gov/efficiency/blueprint/
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-EFFICIENCY NEWS (Alliance to Save Energy)	http://www.ase.org/section/audience/efficiency
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 (green 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
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://ecalculator.tamu.edu/

Free!!! Stuff

Poster: "Energy and Buildings in the 20 th Century"	kllellington@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

January 30	EnergyPro Training: Indoor & Outdoor Lighting 16567
January 30	EnergyPro Training: Envelope and Windows 16566
January 31	EnergyPro Training: Advanced 16569
January 31	EnergyPro Training: Mechanical 16568
February 01	2005 Non-Residential Title 24 Standards: Compliance, TDV & Beyond 16570
February 21	Striving for Nothing: A New Approach for Integrated Building Systems Design 16536
March 07	New Building Commissioning 16571
March 21	LEED for New Construction Technical Review

New Technical Report from Lawrence Berkeley National Laboratory



Zero Energy Windows

by

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and Marc LaFrance²

¹Lawrence Berkeley National Laboratory

²U.S. Department of Energy

Abstract:

Windows in the U.S. consume 30 percent of building heating and cooling energy, representing an annual impact of 4.1 quadrillion BTU (quads) of primary energy¹. Windows have an even larger impact on peak energy demand and on occupant comfort. An additional 1 quad of lighting energy could be saved if buildings employed effective daylighting strategies.

The ENERGY STAR[®] program has made standard windows significantly more efficient. But, even if all windows in the stock were replaced with today's efficient products, window energy consumption would still be approximately 2 quads. However, windows can be "net energy gainers" or "zero-energy" products. Highly insulating products in heating applications can admit more useful solar gain than the conductive energy lost through them. Dynamic glazings can modulate solar gains to minimize cooling energy needs and, in commercial buildings, allow daylighting to offset lighting requirements. The needed solutions vary with building type and climate. Developing this next generation of zero-energy windows will provide products for both existing buildings undergoing window replacements and products that are expected to be contributors to zero-energy buildings.

This paper defines the requirements for zero-energy windows. The technical potentials in terms of national energy savings and the research and development (R&D) status of the following technologies are presented:

- Highly insulating systems with U-factors of 0.1 Btu/hr-ft²-°F
- Dynamic windows: glazings that modulate transmittance (i.e., change from clear to tinted and/or reflective) in response to climate conditions
- Integrated façades for commercial buildings to control/ redirect daylight

Market transformation policies to promote these technologies as they emerge into the marketplace are then described.

Download Paper Here



<http://btech.lbl.gov/papers/60049.pdf>

