BUILDING ENERGY CODES PROGRAM

Setting the Standard

U.S. Department of Energy • Office of Energy Efficiency and Renewable Energy

July 2007

Energy Codes 2007

July 24-27, 2007
Pittsburgh, Pennsylvania

Attend Energy Codes 2007!

Energy Codes 2007, previously referred to as the National Workshop on State Building Energy Codes, will be held in Pittsburgh, Pennsylvania, July 24-27, 2007, at the Sheraton Station Square Hotel.

Learn about energy codes and standards-related topics

Participants can attend local building tours as well as educational and training sessions on topics such as:

- the International Energy Conservation Code®
- the American Society for Heating, Refrigerating and Air-Conditioning Engineers building energy Standard 90.1
- the U.S. Department of Energy's code compliance software tools, RES*check*™ and COM*check*™
- training methods
- building energy codes advocacy
- regional groups and their efforts in the states
- green buildings and above-code programs
- activities to integrate codes and standards in states and communities.

Network with the energy codes community

Energy Codes 2007 is an opportunity to network with the building community, sharing codes- and standards-related successes and challenges and interacting face-to-face at formal and informal meetings. Last year, more than 250 people from 35 states and territories attended this annual event, including:

- architects
- builders
- code officials
- engineers
- federal government employees
- energy code advocates
- product manufacturers
- utility personnel.

Learn more about and register for Energy Codes 2007 at www.energycodes.gov/news/ecodes2007.

Photo courtesy of Britt-Makela Group

New Code Pushes Envelope

The 2006 International Energy Conservation Code® (IECC) has been on the street for just over a year, and early adopters are beginning to feel the effects of its new efficiency provisions for residential buildings. While the 2006 code is similar to its predecessors in many ways, and was designed to achieve national equivalent efficiency, its differences have some noticeable effects on builders, who are discovering that complying often requires slightly more efficient envelopes for many popular home configurations.

Primarily because of two changes in the 2006 – the decoupling of envelope requirements from window-to-wall (percent of glazing) ratio and the switch to energy cost (as opposed to site energy) as the comparison metric in the performance path – builders are finding it harder to trade away the code's prescriptive envelope efficiency requirements. The former change means that homes with average and lesser glazing areas no longer qualify for substantial reductions in envelope efficiency. The latter change means that improvements to fossil-fuel heating efficiency allow for less extensive envelope efficiency reductions because cooling loads are now recognized for their full cost impact and represent a larger fraction of a home's performance target.

Officials in several states considering adoption of the new code have discovered that the 2006 IECC will likely effect a change in standard construction practices, as have their local builders, who are finding it more difficult to achieve code compliance with some favorite construction practices. Building Energy Codes Program (BECP) technical support staff have received numerous comments from states that have recently adopted the 2006 IECC where builders are finding it harder to meet code with 2x4 wall construction because the new code requires a bit more to make up for reducing wall R-values from 19 to 13 in climate zones 5 and above. The comments typically cite tradeoffs allowed under the previous code that are no longer permitted under the 2006 IECC. For example, some of the comments have been regarding homes that met the 2003 IECC, but do not meet 2006 IECC compliance. The 2003 IECC's envelope requirements varied with window-to-wall ratio; therefore, for homes with a low glazing percentage, such as 13%, the insulation requirements were less stringent, and meeting compliance with 2x4 wall construction was somewhat easy. In the 2006 IECC, window-to-wall ratio is not a compliance factor, and the builders are now noticing their construction practices might need to change.

The format of the 2006 IECC was designed to mitigate a number of problems with the previous format, not the least of which was an excessive volatility in code requirements as a function of house type, size, shape, and glazing area. Some houses, such

2006 IECC Prescriptive Requirements

Climate Zone	Fenestration U-factor	Skylight U-factor (2)	Glazed Fenestration SHGC	Ceiling R-value	Wood Frame Wall R-value	Mass Wall R-value	Floor R-value	Basement Wall R-value (3)	Slab R-value, Depth (4)	Crawlspace Wall R-value (3)
1	1.20	0.75	0.40	R-30	R-13	R-3	R-13	R-0	R-0	R-0
2	0.75	0.75	0.40	R-30	R-13	R-4	R-13	R-0	R-0	R-0
3	0.65	0.65	0.40 (5)	R-30	R-13	R-5	R-19	R-0	R-0	R-5/13
4 *except marine*	0.40	0.60	NR	R-38	R-13	R-5	R-19	R-10/13	R-10, 2 ft	R-10/13
5 *and marine 4*	0.35	0.60	NR	R-38	R-19 or 13+5 (7)	R-13	R-30 (6)	R-10/13	R-10, 2 ft	R-10/13
6	0.35	0.60	NR	R-49	R-19 or 13+5 (7)	R-15	R-30 (6)	R-10/13	R-10, 4 ft	R-10/13
7 and 8	0.35	0.60	NR	R-49	R-21	R-19	R-30 (6)	R-10/13	R-10, 4 ft	R-10/13

1. R-values are minimums. U-factors and SHGC are maximums. R-19 shall be permitted to be compressed into a 2x6 cavity.
2. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
3. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.
4. R-5 shall be added to the required slab edge R-values for heated slabs.
5. There are no SHGC requirements in the Marine zone.
6. Or insulation sufficient to fill the framing cavity, R-19 minimum.
7. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25% or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25% of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

as those with higher-than-average glazing area, had efficiency requirements beyond cost-effective levels while others had requirements so lenient as to possibly result in comfort issues or moisture problems. The new format ensures that all new houses achieve a reasonable median efficiency regardless of their fundamental design. State officials may find it tempting to grease the squeaky wheels by selectively lowering efficiency for some house styles without balancing those changes with increased efficiency in other styles. The U.S. Department of Energy (DOE) therefore encourages states that adopt the 2006 IECC to avoid local changes that upset the balance and result in a code that is less efficient overall than the 2003 edition.

DOE wants to hear your comments and suggestions about the upcoming code cycle. To participate in this discussion, contact BECP Technical Support at techsupport@becp.pnl.gov.

Residential Compliance for the 2006 IECC

To help the energy codes community understand the requirements of the new 2006 International Energy Conservation Code® (IECC), the Building Energy Codes Program (BECP) offers many resources through its website, www.energycodes.gov, including software, webcasts, training, and articles.

Download software

The latest desktop version of BECP's easy-to-use compliance software, RES*check*™ version 4.0.1, supports the 2006 IECC.

View webcasts

BECP's webcasts are recorded for the energy codes community to view at their convenience. Each recorded webcast is a 60-minute presentation. Viewers can earn American Institute of Architects/Continuing Education System learning units and International Code Council (ICC) continuing education credits toward ICC certification renewal.

- *Residential Requirements of the 2006 IECC* provides an overview of the residential requirements of the 2006 IECC.
- *RES*check *for the 2006 IECC* provides an overview on how to use RES*check* to show compliance with the 2006 IECC.

Use the Resource Center

Search BECP's Resource Center for articles, presentations, graphics, and more. Frequently asked questions and answers like the ones that follow are found in the Resource Center. They address 2006 IECC issues raised by the energy codes community during the live *RES*check *for the 2006 IECC* webcast.

RES*check* 2006 IECC frequently asked questions

1 After the 2003 IECC, multifamily is not an occupancy option. Do mixed-use projects need to be broken out with separate checks (RES*check* and COM*check*) for the separate portions?

Answer 1: *Yes, in the 2006 IECC, mixed-use buildings must show compliance separately based upon type of occupancy. Furthermore, low-rise multifamily buildings in the 2006 IECC must meet the same building envelope requirements as single-family dwellings.*

2 My RES*check* project complied with the 2003 IECC. Why does it fail under the 2006 IECC?

Answer 2: *The 2006 IECC has been completely redesigned, and several of the new code characteristics may cause your house to fail. The most important difference between earlier editions and the new edition is that the 2006 IECC envelope requirements are not coupled to the home's glazing area percentage. A home with modest glazing area, say 13% of floor area, will likely require a more efficient envelope for 2006 IECC compliance. Conversely, a home with larger glazing area, say 20% of floor area, may achieve 2006 IECC compliance with less insulation.*

The 2006 IECC also implements a new climate zone system. The new system introduces more homogeneity across climates, resulting in less variation in the envelope requirements from location to location. Therefore, some locations have slightly different (higher or lower) efficiency requirements under the 2006 IECC than under the previous codes.

3 Why is there a message "invalid conditioned floor area," and what does this mean?

Answer 3: *The conditioned floor area is a new input in the project tab of RES*check. *Enter the total conditioned floor area of all conditioned floors in the house. Go to the envelope tab, make sure nothing is highlighted in red in your project, and click on the new check compliance button in the bottom left corner of the screen.*

Raising the Standard of Energy Efficiency

In 2006, the American Society for Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) president, Terry Townsend, issued a challenge to ASHRAE members and specific direction to the committees responsible for developing ANSI/ASHRAE/IESNA[1] Standard 90.1 to incorporate greater energy efficiency measures into the Standard. Goals for the next generation of ASHRAE Standard 90.1, to be released in 2010, include:

- achieving up to 30% more efficiency than Standard 90.1-2004
- offering a whole-building, linked-criteria compliance path
- providing more usability than previous versions.

[1] The American National Standards Institute/ASHRAE/Illuminating Engineering Society of North America

Commercial buildings across the United States will be affected by the new ASHRAE Standard 90.1. DOE uses the Standard as the basis for its energy savings determinations, and states are obligated by the Energy Conservation and Production Act, as modified by the Energy Policy Act of 1992, to adopt a new commercial energy code equivalent to the new version of Standard 90.1 within two years of DOE issuing a positive determination.

The U.S. Department of Energy (DOE) supports ASHRAE's move toward greater energy efficiency and is providing technical assistance to help ASHRAE achieve its goals. As part of this assistance, the Building Energy Codes Program will work with ASHRAE committees to:

- develop an energy savings estimator for mechanical system and equipment changes
- develop replacement regression equations for an envelope requirements generator
- update opaque element first-cost data used in spreadsheet analyses to set requirements
- support development of a prototype advanced lighting power density method, using point-to-point illumination simulations
- develop a current practice database for lighting controls
- develop a lighting equipment cost database, which can be used with new scalar ratio and fuel price information derived by other ASHRAE working groups
- develop prototype alternative approaches to lighting requirements, involving energy use and/or efficacy instead of lighting power density
- fund development of a proposal to develop a linked-criteria-based version of Standard 90.1.

Learn more about ASHRAE's leadership team, and read the president's Issued Challenges at www.ashrae.org/aboutus/page/30.

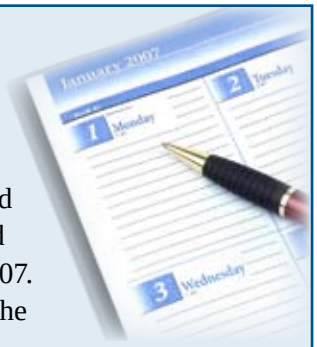
Training

Earn Learning Units and Education Credits

Webcast viewers can earn American Institute of Architects/Continuing Education System learning units and International Code Council (ICC) continuing education credits toward ICC certification renewal! Registration for live events is limited and fills up quickly. Interested viewers are encouraged to organize groups to allow more people to participate in the webcasts. All webcasts are recorded and the majority of them continue to offer continuing education credits and learning units.

Recent additions to the Building Energy Codes Program recorded webcast library include, *RES*check *for the 2006 International Energy Conservation Code* and *Residential Requirements of the 2006 International Energy Conservation Code*, as well as the information-only webcast, *Comply! Energy Code Tools You May Be Missing.*

Training Events



The Building Energy Codes Program's (BECP's) webcast series about meeting the American Society for Heating, Refrigerating and Air-Conditioning Engineers Standard 90.1-2004 was broadcast in spring 2007. Commercial code experts presented the series in three parts.

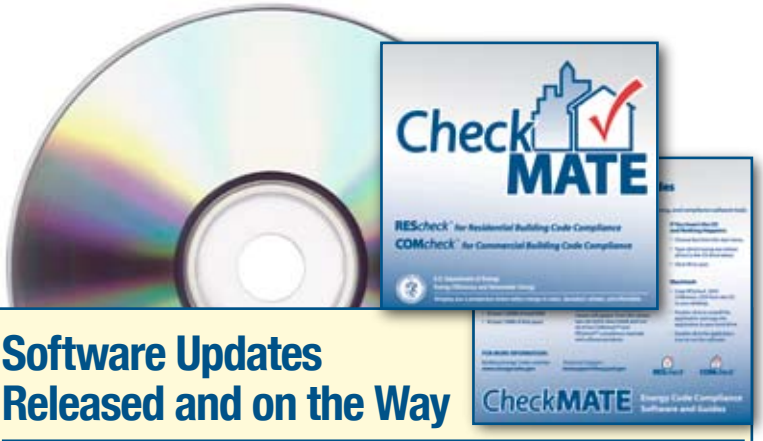
Lighting Overview – presenter Eric Richman, Pacific Northwest National Laboratory

Mechanical Overview – presenter Mark Hydeman, Taylor Engineering, LLC

Envelope Overview – presenter John Hogan, city of Seattle, Department of Planning and Development

Access all of BECP's videos, including this webcast series, at www.energycodes.gov/training/onlinetraining/videos.stm.

Visit www.energycodes.gov/events/index.php for a calendar of upcoming events.



Software Updates Released and on the Way

What's New?

An updated desktop version of RES*check*™ with support for the 2006 International Energy Conservation Code® (IECC), RES*check* 4.1.0, is available for download.

The Windows® and Macintosh® operating systems desktop versions of COM*check*™ for the 2006 IECC are now available. Visit www.energycodes.gov to download the newest software.

Coming Soon!

Upcoming software releases include:

- 2006 IECC in RES*check*-Web, which will provide access for Mac users
- 2006 International Residential Code in RES*check*.

Ask an Expert

Every month, the Building Energy Code Program's (BECP's) Technical Support team responds to over 300 code compliance inquiries from builders, architects, engineers, and code officials around the country. Starting with this issue of *Setting the Standard* and continuing as a regular newsletter feature, BECP will provide a top commercial and top residential frequently asked question and answer.

Commercial – How do I demonstrate compliance in a remodel or alteration?

COM*check*™ desktop versions 3.2.0 and higher are best for demonstrating compliance for commercial alterations and additions. The software is applicable to American Society for Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 90.1-1999 and later editions, but does not address International Energy Conservation Code® (IECC) alterations because the IECC alteration requirements are not significantly different from the standards for new buildings.

Steps for using the COM*check* alteration feature follow – note that documentation can be done by hand rather than by using the software, but would need to be approved by the code official in the jurisdiction.

- From the project tab, select Alterations; for adding a new, conditioned space (new square feet), choose Addition. Add information in the Area Category section only if it is necessary to show compliance for a lighting alteration. Note that this feature is a separate part of the software, and it is not possible to return to New Construction from Alterations.
- Switch to the envelope tab, and enter the components that will be altered or replaced. Follow the software instructions for each component. Watch the information in the Alteration Details column for a summary. Enter the proposed R-value or U-factor information for each component in the software unless it is exempt. Component requirements (non-exempt) are based on the prescriptive requirements of the ASHRAE standard.
- If there is a lighting alteration, switch to the lighting tab. Input existing and new fixtures for each space where the lighting is being altered or replaced, but only if there is not a qualification for lighting exemptions. If the Area Category section was filled in the project tab, some information will be pre-populated in the lighting tab.

Sunroom requirements based on previous codes, such as the 2003 IECC, can be viewed in BECP's Resource Center at http://resourcecenter.pnl.gov/cocoon/morf/ResourceCenter/article//1369.

- If altering the heating, ventilation, and air conditioning system, switch to the mechanical tab. Input the systems that are being altered or replaced. The requirements of this section are fairly simple – either an exemption is gained (such as for repair) or the new equipment requirements in the code must be met.
- Print or email the compliance reports for review by the local code official. As with any code compliance issue, the code official has the final decision on all the changes in the building.

Residential – Are sunrooms exempt from RES*check* compliance?

RES*check*™ cannot be used for thermally isolated sunrooms. The 2006 IECC has separate insulation requirements for sunrooms as follows:

- minimum ceiling insulation value is R-19 for climate zones 1-4
- minimum ceiling insulation value is R-24 for climate zones 5-8
- minimum wall insulation value is R-13 for all climate zones.

A new wall (or walls) separating a sunroom from a conditioned space shall meet the building thermal envelope requirements. For fenestration, the U-factor in climate zones 4-8 is a maximum of 0.50; for skylights it is 0.75. Any new windows and doors separating the sunroom from conditioned space shall meet the building envelope requirements.

Additions can be shown using RES*check* because additions in the 2006 IECC must meet the same requirements as the building envelope requirements for new construction.

Email questions about residential and commercial energy codes to BECP Technical Support at techsupport@becp.pnl.gov, or submit an inquiry at www.energycodes.gov/support/helpdesk.php.

Advocacy for States

The Building Codes Assistance Project (BCAP) provides building energy code advocacy assistance to states on behalf of the U.S. Department of Energy (DOE). BCAP provides tailored advocacy assistance where it is often needed most – at the state or local level where building energy codes are adopted and enforced. Recognizing that building energy codes are an easy and cost-effective way to help consumers save energy and money, make housing more affordable, and reduce air pollution, BCAP:

- assists state and local regulatory and legislative bodies with advocacy-focused activities
- helps coordinate stakeholders representing environmental interests, consumers, labor, and industry to support building energy code advocacy activities
- helps states that request advocacy assistance upon approval from DOE.

For more information, visit the BCAP website at www.bcap-energy.org/home.php.

U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Building Energy Codes Website:
www.energycodes.gov
Tech Support:
www.energycodes.gov/support

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Editor: Loel Kathmann
www.energycodes.gov
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