



**Building Energy Codes**

U.S. Department of Energy

# Enhancing Energy Efficiency Nationwide

Fiscal Year 2008 Annual Report



U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy

ENHANCING ENERGY EFFICIENCY NATIONWIDE:

# Less Energy. Less Cost. Less Carbon.

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*The end result of BECP's work is new homes and businesses with **reduced** energy consumption, **lower** energy bills, and a **smaller** carbon footprint.*

## Dear Stakeholders,

In 2008, Americans witnessed the beginnings of a national energy and economic crisis—for example, \$4.00 per gallon gasoline and an economic downturn of such proportion as to merit governmental intervention. Greater energy efficiency is one of many important variables in the solution to this crisis. Effective and enforceable building energy codes and standards are a critical energy efficiency measure.

The U.S. Department of Energy's (DOE's) Building Energy Codes Program (BECP) was established in 1991 to improve residential and commercial building energy codes and standards. The end result of BECP's work is new homes and businesses with reduced energy consumption, lower energy bills, and a smaller carbon footprint. Since its inception, BECP is estimated to have saved the nation over \$11 billion, in 2008 dollars, in energy costs.

As directed by law, BECP's code development staff work with the primary code developers—the International Code

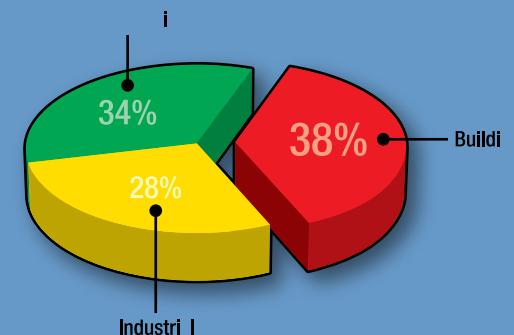
Council® and American Society of Heating, Refrigerating and Air-Conditioning Engineers—as well as other energy efficiency advocates to drive building codes and standards toward higher levels of energy efficiency. In addition, BECP provides free software tools as well as education and training resources that make adopting, implementing, and enforcing more energy efficient codes and standards easier for the energy codes community.

Recognizing the important role of building codes, DOE has stepped up its efforts to strengthen code requirements. Our most important commitment is to increase the level of efficiency of residential energy codes by 30% by 2012 and of commercial energy codes by 30% by 2010. At this time when energy efficiency is more important than ever, we are proud to share with you the strides we've made in the last fiscal year to increase the energy efficiency of America's buildings. Every member of the energy codes community makes a difference. Thank you for your continued efforts to support energy efficiency.

1 Energy Information Administration, *Annual Energy Review 2007*, Table 12.2, Carbon Dioxide Emissions from Energy Consumption by Sector, 1980-2006. <http://tonto.eia.doe.gov/FTP/ROOT/multifuel/038407.pdf/>.

2 Energy Information Administration, *Annual Energy Review 2007*, Figure 2.1a, Energy Consumption by Sector Overview. <http://tonto.eia.doe.gov/FTP/ROOT/multifuel/038407.pdf/>.

## Building a Case for Energy Codes



▲ Total Carbon Dioxide Emissions from Energy Consumption by Sector (2006)

BECP has made substantial progress, and more must be done to make buildings more energy efficient. Residential and commercial buildings together emit more carbon dioxide and use more energy than either the industrial or transportation sectors.<sup>1,2</sup>

## Looking Ahead

Read on to learn more about BECP's work in FY08 to increase energy efficiency in our nation's buildings.

- ✓ 30/30 Vision: Residential
- ✓ 30/30 Vision: Commercial
- ✓ Software Support
- ✓ Education and Training



ENHANCING ENERGY EFFICIENCY NATIONWIDE:

## 30/30 Vision: Residential

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*Implementation of DOE's duct sealing proposal is estimated to reduce **energy consumption** regulated by the IECC in new American homes by **8 to 12 percent.***

In Fiscal Year 2008 (FY08), Building Energy Codes Program (BECP) staff provided substantial support to DOE's 30% Residential Codes Initiative. The Initiative focuses on improving the energy efficiency of the residential energy code adopted by most states—the International Energy Conservation Code® (IECC)—by 30%, relative to the 2006 IECC, by the year 2012.

Due in part to BECP's contributions, the 2007/2008 Code Development Cycle of the International Code Council® (ICC) yielded a new edition of the IECC—the 2009 IECC—that will be **at least 15 percent more stringent** than its predecessor, the 2006 IECC. This increase in energy efficiency from one generation of building energy code to the next is unprecedented in the IECC.

### Big Impact—Duct Testing

The 2007/2008 Code Development Cycle concluded in September 2008 with the Final Action Hearings of the IECC decision-making body, the ICC. At the Hearings, most of DOE's code change proposals were approved. Most notably, DOE's approved proposal for prohibiting leaky ducts with verification by testing, EC71, is estimated to single-handedly reduce energy consumption of energy code-covered measures in new American homes by an average of 8 to 12 percent.

ICC's approval of EC71 will help make sure that ducts in unconditioned attics, basements, and crawlspaces are effectively sealed and

do not leak. EC71 may result in the most significant energy savings of any single code change in IECC history.

### Homeowner Benefit

American homes built to the 2009 IECC will consume less energy, and families who live in those homes will have lower energy costs. In addition, owners of 2009 IECC-compliant homes will achieve positive cash flow with respect to first cost within a few short years.

### Community Connection

DOE worked closely with several partners throughout the 2007/2008

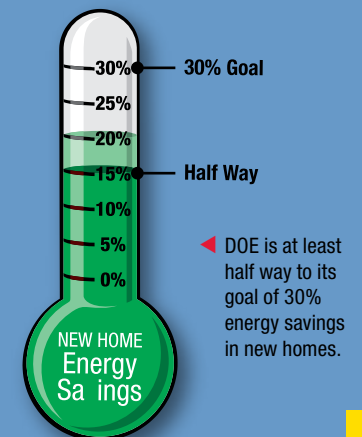
Code Development Cycle to achieve greater energy efficiency in the 2009 IECC. The effort included collaboration with the Energy Efficient Codes Coalition, the Advanced Building Coalition, the National Association of Home Builders, and other key stakeholders.

### What's Next?

The 2008 Final Action Hearings was the first opportunity to effect change on the way to DOE's 2012 goal. Looking forward, BECP's residential team began work on future code change proposals for the IECC.

## ICC Final Action Hearings Results: Many High-Impact Proposals Approved

Proposal #	Outcome
EC71	Pressure testing is required in residential construction to verify duct sealing, achieving an average of 8 to 12% energy savings in new, 2009 IECC compliant homes.
EC84	At least 50% of installed lighting must be as efficient as compact fluorescent lights.
EC18	Vertical fenestration U factor requirements are reduced from 0.75 to 0.65 in Climate Zone 2, 0.65 to 0.50 in Climate Zone 3, and 0.40 to 0.35 in Climate Zone 4.
EC22/26	The maximum allowable solar heat gain coefficient is reduced from 0.40 to 0.30 in Climate Zones 1-3.
EC91	Trade offs between equipment efficiency and building thermal envelope measures are no longer permitted.





ENHANCING ENERGY EFFICIENCY NATIONWIDE:

## 30/30 Vision: Commercial

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*Achieving DOE's 30% commercial goal will **prevent** as much **carbon dioxide emission** in the year 2030 as is generated by driving nearly **20 million** of today's cars for one year.*

DOE teamed with the primary commercial code-making body, the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), in FY07 to achieve 30% savings in new commercial buildings by developing ANSI/ASHRAE/IESNA<sup>3</sup> Standard 90.1-2010 to be 30% more energy efficient than its 2004 predecessor. This strong partnership continued in FY08, with BECP commercial experts serving on ASHRAE committees and as committee chairs, actively participating in the ASHRAE Standard development process.

DOE and ASHRAE have a two-fold focus in working toward their 30% goal:

(1) developing addenda to make the three major components of building systems—lighting, mechanical, and envelope—more energy efficient and (2) developing ways to measure progress, such as simulations.

### Addenda

Publication of ASHRAE Standard 90.1-2007 in FY08 was the first major stepping stone toward DOE and ASHRAE's 30% savings goal to be met in Standard 90.1-2010. Three major addenda supported by DOE and incorporated into Standard 90.1-2007 are “v,” “ac,” and “ar.”

- » Addendum “v” saves energy by requiring demand control ventilation in more commercial spaces, thus reducing ventilation loads when those spaces are not occupied.

- » Addendum “ac” strengthens HVAC system design by specifying how fan power limitations are to be applied to complex mechanical systems in laboratories and hospitals.
- » Addendum “ar” saves energy by requiring part load fan control on smaller fan motors.

Two major energy-saving addenda supported by DOE and incorporated into ASHRAE's Supplement to Standard 90.1-2007 are “i” and “h.”

- » Addendum “i” saves energy by minimizing unnecessary exterior lighting and optimizing the kind of lighting used based on location (e.g., city versus rural).
- » Addendum “h” helps minimize the energy required per Standard 90.1

to heat or cool the volume of ventilation air that must be provided to a breathing space per ASHRAE Standard 62.1.

### Simulations

In FY08, BECP staff worked with collaborators at DOE and the National Renewable Energy Laboratory to define 17 prototype buildings called Benchmarks. The Benchmarks were subjected to extensive review by representatives from ASHRAE and the design community to be sure that the building models used for needed energy simulation work represent modern construction. Benchmarks will be used to develop new proposals for Standard 90.1 and to provide DOE and ASHRAE feedback on progress toward the 30% goal.





ENHANCING ENERGY EFFICIENCY NATIONWIDE:

## Education and Training

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*Since 1996, BECP has addressed as many*  
**Technical Support**  
*inquiries as the number*  
*of people who could fill*  
**Radio City Music**  
**Hall almost six times.**



BECP's website [www.energycodes.gov](http://www.energycodes.gov) is the gateway to a wealth of no-cost educational and training resources for the energy codes community, including:

- » Webcasts, self-paced training, and videos
- » Information and registration about our annual training event, *Energy Codes*
- » *Setting the Standard* newsletter, a key tool for information exchange among building professionals, state and local code officials, architects, designers, and engineers
- » Additional articles and Code Notes to clarify code issues
- » Code analysis and development information
- » Technical support—we respond to every inquiry in a timely manner.

### Online Training

BECP's online training tools include webcasts and self-paced training. Over 10,000 members of the energy codes community participated in our webcasts during FY08, an increase of 35 percent compared to FY07.

FY08 webcast topics included:

- » Exterior Lighting in COMcheck
- » A three-part series on ANSI/ASHRAE/IESNA Standard 90.1-2007
- » A three-part series on ASHRAE's Advanced Energy Design Guides.

Through our online training tools, over 1,000 professionals earned American Institute of Architects (AIA)/Continuing Education System learning units in FY08. This is four times as many as in FY07.

### In-Person Training

Every year, hundreds of members of the energy codes community benefit from BECP's one-of-a-kind training event, *Energy Codes*. These training sessions provide an opportunity to learn about a wide variety of energy codes- and standards-related topics and to network face-to-face through formal and informal meetings. *Energy Codes 2008* was held in St. Paul, Minnesota in July 2008. Attendance remained strong compared to past years, with 226 attendees representing 41 states and territories.

Two days of meetings at *Energy Codes 2008* included plenary sessions as well as residential and commercial technical tracks. Presenters discussed DOE's efforts to make codes and standards 30% more stringent, methods for designing and building with energy efficiency in mind, the challenges of code enforcement, and more. In addition, training event participants were treated to a tour of buildings with energy efficient and green features, including the Minneapolis Public Library, which was designed by world-renowned architect Cesar Pelli, and the St. Paul District Energy Plant.

### Education and Training Data (FY08)

Website Hits	43,335,675
Newsletter Subscribers	90,651
Webcast Participants	10,212
Technical Support Inquiries	3,671
AIA Credit Recipients	1,068
State Technical Assistance Provided	6 States



ENHANCING ENERGY EFFICIENCY NATIONWIDE:

## Software Support

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*BECP's code compliance software were accessed over 200,000 times via the Web in FY08.*





## User Friendly

BECP's code compliance software, REScheck™ and COMcheck™, are available at no cost to the energy codes community through [www.energycodes.gov](http://www.energycodes.gov). Designed to support the IECC and ANSI/ASHRAE/IESNA Standard 90.1, which are the basis for most state codes, Check software makes complying with energy codes and standards easy. To supplement REScheck and COMcheck, BECP also provides free user guides, videos, training materials, and compliance manuals.

## User Focused

We continually update our software to meet the needs of the energy codes community.

In FY08, REScheck was upgraded to include:

- » Additions and alterations functionality for the 2006 IECC

- » Revised Georgia and New Hampshire state codes
- » Upgraded Beyond Code Advisor.

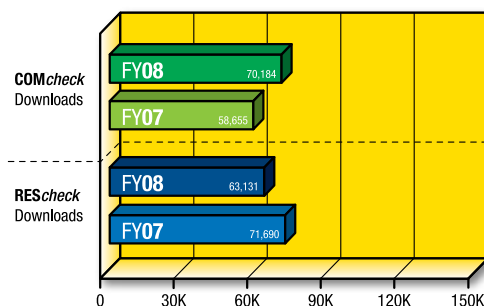
In FY08, COMcheck was upgraded to include:

- » ANSI/ASHRAE/IESNA Standard 90.1-2007
- » Revised Georgia and New Hampshire state codes.

## User Approved

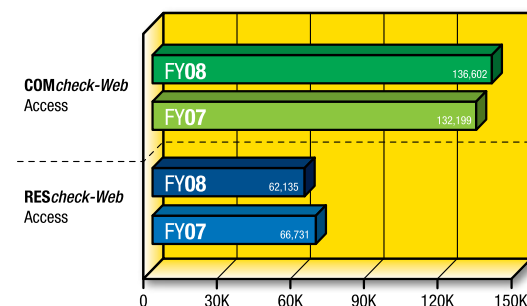
Overall software use remained steady in FY08 compared to FY07. In FY08, REScheck and COMcheck were downloaded over 133,315 times compared to 130,347 in FY07. REScheck-Web and COMcheck-Web were accessed via [www.energycodes.gov](http://www.energycodes.gov) 200,737 times from 27,173 active, registered users compared to 195,930 from 22,153 users in FY07.

## Software Downloads



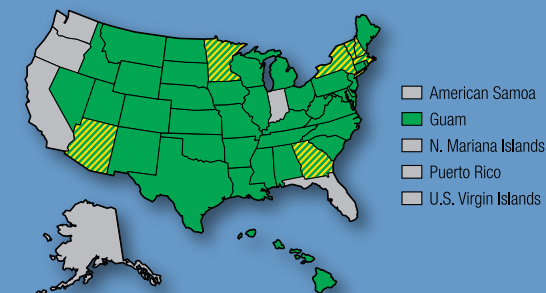
▲ COMcheck desktop and REScheck desktop were downloaded a total of 133,313 times in FY08.

## Software Web Access



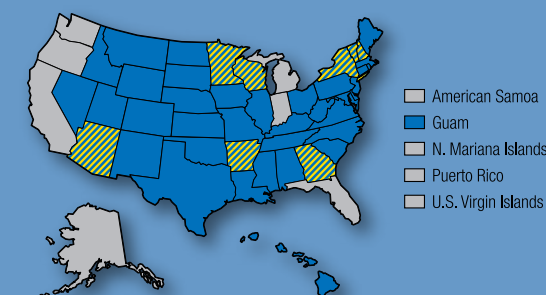
▲ COMcheck-Web and REScheck-Web were accessed a total of 200,737 times in FY08.

## COMcheck supports code compliance across America



- States and U.S. territories supported by COMcheck software at the end of FY08
- State/jurisdiction-specific codes supported by COMcheck software at the end of FY08
- States not supported by COMcheck software at the end of FY08

## REScheck supports code compliance across America



- States and U.S. territories supported by REScheck software at the end of FY08
- State/jurisdiction-specific codes supported by REScheck software at the end of FY08
- States not supported by REScheck software at the end of FY08

## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



# Building Energy Codes

U.S. Department of Energy

The U.S. Department of Energy's Building Energy Codes Program is an information resource on national model energy codes. We work with other government agencies, state and local jurisdictions, national code organizations, and industry to promote stronger building energy codes and help states adopt, implement, and enforce those codes.

BECP Website:

[www.energycodes.gov](http://www.energycodes.gov)

BECP Technical Support:


[techsupport@becp.pnl.gov](mailto:techsupport@becp.pnl.gov)

[www.energycodes.gov/support/helpdesk.php](http://www.energycodes.gov/support/helpdesk.php)



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