

Residential Energy Efficiency Savings from Improvements to 2012 IECC

As Adopted by the ICC
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Governmental Officials Adopt Historic Efficiency Boost to America's Model Energy Code Governing Residential Construction and Renovation

In 2007, the Energy Efficient Codes Coalition established the goal of improving the residential model energy building code by 30% over the 2006 version and authored the first “Thirty Percent Solution” to achieve it. Just over three years later, in October 2010, hundreds of governmental officials voted to make this goal a reality at “Final Action Hearings” held in Charlotte, NC by the International Codes Council (ICC).

If adopted and implemented by states and localities, the newly-adopted residential chapter of the 2012 International Energy Conservation Code (IECC), will boost energy savings (heating, cooling, lighting and hot water heating) by 30% over the 2006 IECC. The result is unprecedented and – including the substantial gains achieved in the 2009 IECC – represents the second consecutive residential model energy code to post substantial efficiency improvements.

EECC praised the unprecedented number of governmental officials who showed their interest in the nation's energy future by participating in the Charlotte hearings. “The ICC has a fair and rigorous code development process that gives governmental officials the final say in the model energy code their jurisdictions will hopefully adopt. The greater the active participation of eligible voting members at the hearings, the more meaningful and significant the results – this is the essence of representative democracy,” said EECC Executive Director William Fay. “By their votes, they were very clear in their support for energy efficiency.”

A Single Model Energy I-Code: IRC's Energy Efficiency Chapter Now References the IECC

There is no longer a separate– and historically weaker – set of energy efficiency requirements in the International Residential Code, or IRC. When the 2012 codes are published, the IRC will simply reference the IECC.

Rejected “Weakening” Proposals

Voting delegates also rejected measures that would *reduce* energy efficiency, such as a proposal to reinstate the mechanical equipment “trade-off” eliminated in the 2009 IECC (historically this trade-off was used to give credit for substituting efficient HVAC systems that would be installed anyway in lieu of much longer-lasting envelope improvements) and a proposal that would have eliminated the window trade-off maximums that encourage the use of energy efficient windows and play an important role in improved residential comfort & energy efficiency.

“Life-Cycle Energy Savings” is the New Intent of the IECC

ICC voting representatives adopted an EECC proposal making the **stated intent of the IECC the effective use and conservation of energy, not just in the first year of operation, but over “the life of the building.”**

New 2012 IECC Embraces “Whole House” Efficiency Improvements

As the following ICF Analysis shows, the residential efficiency improvements in the 2012 IECC will affect nearly every aspect of home construction – some of the more important include:

- A better thermal envelope (windows, insulation, etc.)
- Insulated hot water piping
- Less duct leakage in HVAC distribution systems
- Increased percentage of energy efficient lighting
- Tighter thermal envelopes from better air leakage testing & improved air barriers and sealing
- Improved homeowner information

Outcome of 2012 IECC Residential Chapter Final Action Hearings

Analysis of ICF International

Based on estimates from the measures that were approved by the ICC's Government Membership, the threshold of 30% energy savings of the 2012 IECC beyond the 2006 IECC was met or surpassed. Significant adopted changes to the IECC include:

1. *A better thermal envelope – i.e., window, door, insulation – in all Climate Zones.*

In 2006, the number of climate zones in the IECC was reduced to eight in an effort to shorten the IECC, make it easier to use and employ a common map for both commercial and residential codes. The simplified map (shown for the continental US) replaced many pages of maps and commercial envelope tables and allowed IECC users to easily determine the requirements that apply anywhere in the US. Note: Hawaii, Guam, Puerto Rico and the Virgin Islands are in Climate Zone 1; Alaska is in Climate Zones 7/8).



Final changes to insulation & fenestration component requirements are listed below (improvements over 2009 IECC are shaded in green):

Insulation*	Ceiling R-value		Wood Frame R-value		Basement R-value		Crawl Space R-value	
	2009 IECC	2012 IECC	2009 IECC	2012 IECC	2009 IECC	2012 IECC	2009 IECC	2012 IECC
1	30	30	13	13	0	0	0	0
2	30	38	13	13	0	0	0	0
3	30	38	13	20 or 13+5**	5/13***	5/13	5/13	5/13
4 exc. Marine	38	49	13	20 or 13+5	10/13	10/13	10/13	10/13
4 Marine & 5	38	49	20 or 13+5	20 or 13+5	10/13	15/19	10/13	15/19
6	49	49	20 or 13+5	20+5 or 13+10	15/19	15/19	10/13	15/19
7 & 8	49	49	21	20+5 or 13+10	15/19	15/19	10/13	15/19

* Floor and Slab insulations levels remain unchanged.

** Commonly available insulation in 2x6 cavity (R20) or in 2x4 cavity with sheathing (R13+x)

*** R5 continuous insulation or R13 for framed cavity insulation

Fenestration	Window U-Factor		Skylight U-Factor		Window SHGC	
	2009 IECC	2012 IECC	2009 IECC	2012 IECC	2009 IECC	2012 IECC
1	1.20	0.65	0.75	0.75	0.30	0.25
2	0.65	0.40	0.75	0.65	0.30	0.25
3	0.50	0.35	0.65	0.55	0.30	0.25
4 exc. Marine	0.35	0.35	0.60	0.55	NR	0.40
4 Marine & 5	0.35	0.32	0.60	0.55	NR	NR
6	0.35	0.32	0.60	0.55	NR	NR
7 & 8	0.35	0.32	0.60	0.55	NR	NR

2. **Less duct leakage in HVAC distribution systems.** As with the 2009 IECC, duct leakage testing is mandatory unless HVAC equipment and ducts are within the thermal envelope. The 2012 IECC requires total duct leakage testing (unless ducts and air handler are located within building thermal envelope), instead of leakage to the outside. Building cavities are prohibited from being used as ducts or plenums. The leakage limits have been reduced with the 2012 IECC, as follows:

Construction Phase	Total Duct Leakage CFM25 per 100 ft ² CFA	
	2009 IECC	2012 IECC
Post-Construction	12	4
Rough-in	6	4
Rough-in if air-handler not yet installed	4	3

Note: Duct Leakage is measured in cubic feet per minute (CFM) at a pressure of 25 Pascals for every 100 square feet of conditioned floor space (CFA)

3. **Tighter thermal envelopes through:**

- **Stronger home air leakage rate testing requirements.** Unlike the 2009 IECC, the 2012 IECC will require all homes to have substantially reduced air leakage demonstrated by testing. Air leakage is required not to exceed 5 ACH50 (Air Changes per Hour at 50 Pascals) for climate zones 1-2 and 3 ACH50 for the remaining climate zones.
- **Improved thermal enclosure system.** These requirements are similar to the Fully-Aligned Air Barriers and Air Sealing sections of EPA's ENERGY STAR Homes checklist. Some noteworthy requirements include: a continuous air barrier, insulated headers, insulated corners, sill-plate sealing, top-plate sealing, and wind baffles.

4. **Hot water piping must be insulated to at least R-3 if the piping falls in one of the following groups:**

- Piping is larger than 3/4" in nominal diameter,
- Piping serves more than one dwelling unit,
- Piping runs from water heater to kitchen outlets,
- Piping is located outside of conditioned space,
- Piping runs from water heater to a distribution manifold,
- Piping is located under a floor slab,
- Piping is buried,
- Supply and return piping is in recirculation systems other than demand recirculation systems
- Piping run lengths exceed the following maximum run lengths for a nominal pipe diameter:

Nominal diameter of largest pipe diameter in run	3/8"	1/2"	3/4"	> 3/4"
Max run length	30 ft	20 ft	10 ft	5 ft

5. **75% of lighting must be energy efficient (CFLs or equivalent).** Increased from 50% in 2009 IECC.

6. **Additional information to initial and future homeowners** Builders or design professional must complete and post a certificate that includes results from duct system and air leakage tests in addition to current requirement for insulation R-values, fenestration U-factors & SHGCs, and heating equipment type & efficiency.