

Closing the Gap Between Residential Construction Practices and Innovative Energy Code Proposals

Summary

In 2009, the International Code Council progressed through its standard code development cycle and reached the Committee Approval phase; including allowing an open period for interested parties to submit code change proposals. The International Energy Conservation Code (IECC) Committee reviewed over 200 proposals, passing 46 residential proposals and 29 commercial proposals in this round of the code development hearings. BCAP has selected the most impactful proposals, efficiency-wise, to review and summarize as those that states might consider for adoption in current energy code adoptions or upgrades.

The IECC proposals are reviewed below in terms of their potential energy efficiency impact and how they might fare in adoption across the nation. This overview can serve as a guide for targeting education efforts, promoting related technologies to help increase market expansion, and informing the advocacy process for adoption of 2012 IECC provisions.

A number of these proposals have been added to the BCAP [Code Builder](#) tool on OCEAN for consideration by states or jurisdictions that wish to explore options for improving their current energy codes prior to publication of the 2012 IECC. (NOTE: To access the full text of all the 2012 IECC proposals, please go to this link: <http://www.iccsafe.org/cs/codes/Documents/2009-10cycle/ProposedChanges/IECC.pdf>)

Residential Code Proposals

(Links to full text for these proposals can be found on [OCEAN](#).)

ADM 24 – Life Cycle Costing:

This administrative change sets the stage for acknowledgement of Life Cycle Costing (LCC) rather than simple payback for any cost considerations used in energy code development. LCC is the construction industry standard and it provides a more realistic metric, such as mortgage length (i.e. 30 years) or building life to assess proposed code changes. ADM 24 may be popular in states that wish to start including consideration of cost-effectiveness in future energy code adoptions but face problems with simple payback rules that limit code changes (e.g., MI, PA, NY).



Courtesy of DOE/NREL, Credit-IBACOS

EC 18 - Prohibits continuously burning (standing) pilot lights in lighting (similar to EC 125 below)

This proposal prohibits the use of continuously operating (standing) pilots in lighting in both the IECC and in the IRC. This is consistent with the ban on standing pilots for pool heaters currently found in the IECC. Under a new federal

rulemaking, gas cooking equipment will also not be allowed to have continuously burning pilot lights.

This proposal will achieve significant energy savings. Typical gas lighting uses 18 therms per month, most of that due to the pilot light (about 2,500 Btu/hr for many systems). At a national average cost of \$1.20 per therm, the cost to a typical consumer is \$21.60 per month, or \$259.20 per year. With advanced controls (electronic spark ignition, for example), the standby energy losses are eliminated, and the consumer saves at least \$200 annually (assuming lights are turned off 80% of the time; if the lights operate for 50% of the time, the savings are \$129.60 per year). Note: this data is from the full proposal text, which can be consulted for greater detail or clarification.

This proposal will slightly increase the cost of construction and, as a result, will likely meet appliance industry resistance nationwide. Standing pilots in lighting and appliances waste energy and are potentially dangerous sources of carbon monoxide when used in appliances and heating equipment in homes. This proposal could be modified to cover all gas-burning appliances. This requirement applies across climate zones and BCAP does not anticipate objections at the state level.

EC 125 - prohibits continuously burning (standing) pilot lights in fireplace systems (similar to EC 18)

Like EC 18, this proposal can achieve significant energy savings by eliminating standby energy losses and save the average consumer approximately \$96/year. According to the Hearth, Patio, and Barbecue Association, between 1.0 and 2.1 million gas fireplace systems are shipped to North America every year. For a fireplace with a pilot light using 1,000 Btu/hr that is in stand-by mode for 8,000 hours per year (a fireplace is generally used 5 hours per day for 150 days of the year), the pilot light uses 8 million Btu's or 80 therms. At a national average cost of \$1.20 per therm, the cost of a standing pilot light is approximately \$96/year for a typical consumer. This requirement applies across climate zones and BCAP does not anticipate objections at the state level.

EC 20 – High efficiency lighting becomes a “mandatory” requirement.



Courtesy of DOE/NREL, Credit-FSEC/IBACOS

This proposal is a placeholder to add a mandatory requirement that can be approved for the IECC in this cycle as well as moving requirements for high-efficacy lighting into the mandatory provisions of future codes. High-efficacy lighting requirements for all lighting are perhaps the most cost-effective improvement in the IECC proposals and should be adopted for all new permanently wired fixtures nationwide. This requirement has not proven to be a difficult measure to adopt due to its cost-effectiveness and the high market availability of qualifying fixtures.

EC 22 – Builder or Designer completes compliance certificate.

This is a simple requirement that clarifies and assigns responsibility for completing a code compliance certificate to either the builder or design professional. This requirement is likely to result in improved compliance verification, as the responsibility for providing the final compliance information is made clear to all parties rather than being left to interpretation. This proposal is a placeholder, intended to be added into the mandatory requirements that will be approved in the IECC at the Final Action Hearings. This requirement applies across climate zones and BCAP does not anticipate objections at the state level.

EC 39 - Improves fenestration U-factor to 0.32 in climate zones 5-8.

U-.31 glazing now dominates the U.S. market, so upgrading window performance from the U-.35 requirement now in place in the North to U-.32 is achievable. Lowering the U-factor to 0.32 in these cold climates would guarantee

significant energy savings year-round in every home. Cost analysis indicates that the additional per window cost would be low (in the neighborhood of \$10 additional cost for a 3'x5' window).

EC 47 - Increases wall R-values in climate zones 3-4

This proposal would increase R-values to R-13+5 or R-20 in wood frame walls (steel-frame assembly equivalent) and increase mass wall R-value to R-8/13 in climate zones 3-4 (R-8 applies to continuous insulation, usually exterior sheathing, and R-13 applies to cavities in wood framing). This would improve the thermal envelope efficiency through improved insulation in walls. Unlike many building components, wall insulation can last for the life of the building, delivering consistent energy savings far longer than many other energy savings measures. This proposal will be a tough sell and very difficult to promote in most Southern states. Builders have been using 2x4 framing for a long time; they'd have to change practices and start installing exterior sheathing or 2x6 framing. There will be considerable resistance to this proposal as either a stand-alone provision or as part of the **omnibus proposal, EC-13**.

EC 48 - Increases wall R-value in climate zones 6-8

This proposal, either as a stand-alone or as part of the Omnibus proposal EC-13 raises wood frame wall R-values to R-20+5 or 13+10, establishes a steel-frame assembly equivalent, and increases mass wall R-value in R-15/20 in zones 6-8. This proposal considerably improves the thermal envelope efficiency in climate zones 6, 7 and 8 through improved insulation in walls. Unlike many building components, wall insulation can last for the life of the building, delivering consistent energy savings far longer than many other energy savings measures. In addition, it is extremely difficult and costly to add additional wall insulation after the home is constructed. The failure to adequately insulate the walls imposes needlessly higher energy costs on homeowners for decades to come. On the other hand, this proposal would require builders to install exterior sheathing; a requirement which is likely to meet with resistance.

EC 50 - Increases basement and crawl space wall insulation in climate zone 5-8

This proposal would increase foundation wall insulation in climate zone 5 to 15/19 and in zones 5-8 would increase the crawlspace wall R-value to 15/19. This requirement is very doable in climate zones 5-8 and has considerable energy efficiency impact. Many opponents challenge the cost effectiveness of these requirements. Demonstrating the efficiency impacts and clearly delineating the costs and benefits will be crucial in order to get these improvements adopted in the impacted climate zones. Developing state-by-state analyses will be especially valuable. If adopted, this provision will require implementation support through training on the practical approaches for meeting these levels, especially with regards to crawlspaces.

EC 63 - Requires installation of wind wash baffle for air permeable insulation in vented attics.

Wind wash baffles prevent the wind from blowing through air permeable insulation at the soffit vent areas. This is a time consuming but relatively inexpensive practice that pays huge dividends in energy efficiency and lowering thermal degradation caused by wind-washing. Wind-washing is the primary cause of ice-damming in many parts of the

country and a major source of insurance losses in housing. While this requirement is fairly simple, it may face opposition due to the time it takes to do the installation and the resulting costs it imposes on builders. Greater research, outreach and training on the advantages of installing baffles, including quantifying the energy savings and insurance loss prevention potential, needs to accompany efforts to support adoption.

EC 68 - Enhances insulation requirements and fenestration U-factors for (thermally isolated) sunrooms

This proposal vastly improves the requirements for and exceptions to sunroom requirements. Currently, sunroom additions are allowed to have far worse window fenestration U-values and insulation levels. This proposal editorially clarifies that the lower requirements apply only to thermally-isolated sunrooms and that all other sunrooms must comply with all of the requirements of the energy code. The exception requirements are also tightened.

This proposal is likely to face considerable opposition from the sunroom industry, which enjoys the loose allowances of the current interpretation. Consumer and builder awareness campaigns may be needed to offset this opposition, which will likely occur nationwide. Further, education/outreach should be conducted on the benefits of constructing passive solar homes and additions wherever possible. Passive solar can provide a source of heat in the winter and significantly lower cooling costs in the summer.

EC 79: Requires testing for air leakage

This proposal requires whole-house infiltration testing, and provides additional details to be included in the air barrier and insulation installation checklist. The air leakage limit is set at 7 air changes per hour (ACH) in climate zones 1 and 2, and 5 ACH for climate zones 3-8. The provision would allow code officials to require testing and a written report by a third party and would also allow sampling in groups of 7 or more buildings of similar design. Finally, the proposal states that ventilation must meet the requirements of IRC Section M1507 mechanical ventilation requirements.

These code changes would substantially improve the energy performance of residential buildings by reducing air infiltration and ensuring that performance is achieved through mandatory testing. This proposal, as part of the Omnibus Proposal EC13 or as a stand-alone, will be hotly contested both nationally and in states. Assuring that there are sufficient professionals available to provide cost-effective testing will be key to the success of adopting this provision at any level. Encouraging jurisdictional or state adoption prior to 2012 will greatly enhance the potential for this proposal to be successful.

EC 86 - Clarifies that the thermal envelope must contain a continuous air barrier.

An editorial change, this proposal would delete language prohibiting the use of the "airtight drywall approach" (a common detail for providing air sealing) and add language stating, "Exterior thermal envelope contains a continuous air barrier," to clarify that the building envelope must include a continuous air barrier.

EC 92: Requires recessed luminaires to be labeled as having air leakage rate no more than 2.0 cfm.

This requirement finally requires tested performance level and labeling for this much-desired lighting detail that is one of the greatest causes of building air leakage in homes. Recessed luminaires installed in the building thermal envelope must be sealed to limit air leakage between conditioned and unconditioned spaces.

This proposal is likely to be resisted by the lighting industry and builders alike as recessed lighting is a popular consumer product and this will probably increase the cost of products initially. Research to uncover the costs and savings of this proposal would be valuable.

EC 97 - Eliminates fenestration U-factor and SHGC caps.

This proposal eliminates the fenestration U-factor and SHGC caps that establish performance minimums for vertical fenestration and skylights; these must be met when using tradeoffs under the UA alternative (Section 402.1.4) or under the performance compliance path (Section 405).

This proposal, if passed, could negatively impact occupant comfort, fenestration resistance to moisture condensation, and may also increase peak cooling load. Builders in states that fully utilize a performance compliance approach are likely to support the proposal while energy efficiency advocates and some industries are likely to oppose it.

EC 99 – Efficiency levels for mechanical ventilation systems.

This proposal provides energy efficiency levels for exhaust fans and central fans/blowers as part of whole-house mechanical ventilation systems. Studies of ventilation, distribution, and conditioning energy show that energy consumption for whole-house mechanical ventilation systems can be 630 kWh to 4500 kWh more than for a base case

without mechanical ventilation. The most logical way to reduce the amount of energy consumed by residential mechanical ventilation systems is to address the power consumption of the fans that are powering the system.

This proposal begins to address ventilation systems and the need to ensure that the energy for ventilation is used efficiently. There may be opposition from ventilation manufacturers, but it is not likely. The better manufacturers that already promote energy efficient equipment will be supportive.

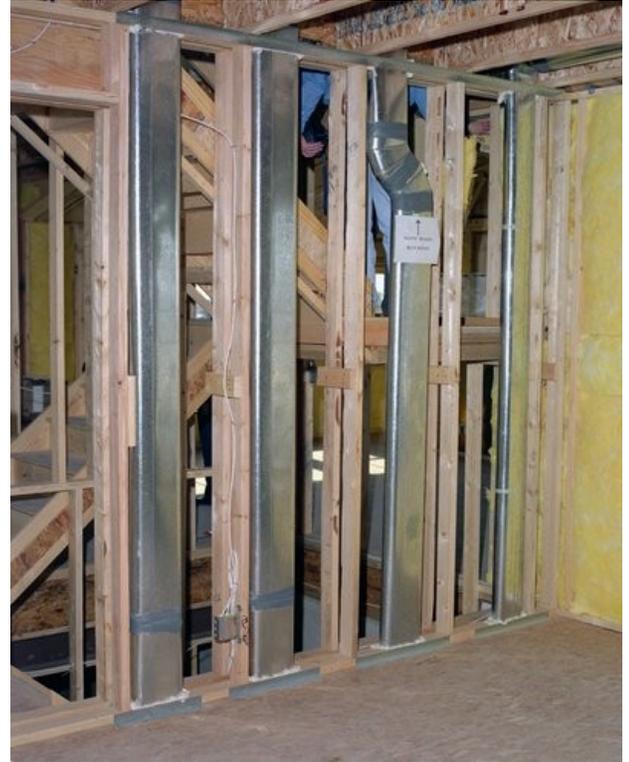
EC 107 – Duct leakage maximums

This proposal sets duct leakage maximums at 6 cfm for a post construction test, 4 cfm at rough-in, or 3 cfm if the air handler is not installed at time of testing. This proposal is more stringent than **EC – 103**, which was disapproved but may get further play in Final Action Hearings.

This proposal will limit the leakage test to total leakage, simplifying the code and giving a better picture of total duct leakage and duct sealing overall. As with most duct sealing requirements, this requirement will likely face opposition from builders nationwide. Nonetheless, it is a critical element of achieving the next 15% increase in efficiency through the IECC.

EC 109 - Prohibits the use of building framing cavities as ducts or plenums.

Using building framing cavities as ducts or plenums is not an effective technique due to insulation requirements for the ducts, insulation requirements for the thermal envelope, and the difficulty in sealing such against air leakage.



Courtesy of DOE/NREL, Credit-Warren Gretz

Builders across-the-board will oppose this requirement as it essentially eliminates the use of building cavities for ALL ductwork, including returns, which is very common practice and allowable under the IECC currently. Supporting this proposal with education as to the downfalls of using building cavities as ducts is critical to seeing this code change accepted and complied with in the field. Builders, HVAC contractors and related stakeholders will need this training.

EC 129 - Requires at least 75% of lamps or 75% of permanent fixtures to contain high-efficiency bulbs.

CFLs are up to four times as efficient and last up to 10 times as long as incandescent bulbs. Although initially more expensive, consumers will save money in the long run because CFLs. A single 18-watt CFL used in place of a 75-watt incandescent will save about 570 kWh over its lifetime. This proposal and code requirement should be a slam-dunk; moving to 100% CFLs is the next logical step and/or improvement to this requirement