

**Columbia/Boone County Environment and Energy Commission
Report on Building Codes Related To Residential Energy Efficiency
August 24, 2010**

Recommended action:

The Environment and Energy Commission (EEC) recommends that the City Council **adopt the Energy Code in Chapter 11 of the 2009 International Residential Building Codes verbatim**. The EEC recommends this option as the optimum balance between savings and expense for the City and the consumer, and because it is in the best interest of the citizens of Columbia.

Discussion:

There are 4 possible options for residential energy efficiency codes that have been considered.

1. Adopt the Energy Star rating standards as recommended in the Integrated Resource Plan done for the Columbia Water & Light Department (CWL) in 2008.
2. **Adopt chapter 11 of the 2009 International Residential Building Code**, which is the recommendation of the EEC.
3. Adopt the chapter 11 of the 2009 International Residential Building Code with specific modifications.
4. Adopt an alternative compliance standard instead of Chapter 11 of the International Residential Building Code.

The Environment and Energy Commission believes that promoting energy conservation in housing is in the best interests of the City of Columbia and consumers who buy housing within the City. We also believe that adopting the International Residential Building Code (IRBC) is critical to attracting future economic development within the community.

Burns & McDonnell in the Integrated Resource Plan done for Columbia in 2008 gave **“improve building code standards”** as their second of nine recommendations for the most cost efficient way for Columbia Water & Light (CWL) to meet Columbia’s projected energy needs:

“ 2. Work with the City to **improve building code standards** for commercial and residential structures that have a minimum energy consumption goal of an Energy Star rating. Programs to encourage higher Energy Star ratings should be developed.” (Page ES-20, Bold added for emphasis)

They point out that

“Without more stringent building code standards, it will be difficult for CWL to see significant changes in the future average demand and energy required for residential and commercial buildings. Continuation of current standards will also continue the approach whereby CWL is constantly trying to entice owners of

buildings that were constructed to lower standards to increase their efficiency. **Retrofit costs are almost always more costly than incorporating efficiency into the initial construction.**" (Page ES-19, Bold added for emphasis)

Energy efficient buildings save money for all Columbia's citizens by reducing the amount of electric generating capacity, which the City will need to construct, not just saving money for the individuals using the buildings.

The Energy Code in Chapter 11, which was reviewed jointly by the Building Codes Commission and EEC, is well below the Energy Star rating recommended by Burns & McDonnell. As a Commission EEC believes that an ideal goal for the City would be to adopt building codes that exceed the chapter 11 efficiency standards.

However, **a positive, effective step toward this goal would be for the City Council to adopt the Energy Code in Chapter 11 of the International Residential Building Codes verbatim.** This standard is a nationally and internationally accepted code, adopted by many cities across the country, and conserves the consumer's tight budget by achieving a 11.6% savings in energy costs over the previous 2006 energy codes (Ref: "Energy and Cost Savings Analysis of the 2009 IECC Efficiency Improvements", Page 2 of the Executive Summary, http://www.thirtypercentsolution.org/solution/EECC-Savings_Analysis-Jan-2009.pdf).

The Environment and Energy Commission has worked with the Building Codes Commission for 9 months, discussing compromises in this international standard. Attached as appendix A, is a list of compromise changes to Chapter 11 of the Residential Building Code, which the EEC agreed would have minimal negative impact on a home's energy efficiency. These changes were the result of concerns from the Building Codes Commission of anticipated increased costs to builders that they anticipate would be passed on to homebuyers. The EEC believes that these costs would be paid back in energy savings to the consumer, and would be a good investment for the buyer of the house as well as for the community.

A major point of disagreement with the Building Codes Commission was over the deletion of testing for duct leakage of heating and air conditioning ductwork from the proposed energy codes (See Appendix B). The EEC believes that duct leakage testing is an important step to an efficient building. Three studies around the country, in Colorado, Massachusetts, and Washington State have demonstrated very high rates of duct leakage in newly constructed residential housing. (Washington State Energy Code Duct Leakage Study Report, Dec. 2001, WSCUCEEP01105, Cooperative Extension, Washington State University, Energy Program) Duct leakage into unconditioned attic or crawl space sends the most expensive air into the outside environment. In some cases over $\frac{3}{4}$ of the air was being wasted. Even modest leakage here can eliminate all the rest of the energy savings of Chapter 11. This is why the EEC believes that duct leakage testing is an important item to require as it is stated in the International code. We note that some heating and airconditioning contractors in Columbia already carry out duct leakage tests as a standard service. Without the deletion of duct leakage testing, the compromises listed in

Appendix A are a viable option, but it is important for the Council to understand that **adopting this compromise option will cost consumers money in increased energy costs, and will limit the total demand side management efforts called for in the cities recent Integrated Resource Plan.**

The EEC thanks the Mayor and Council for their interest in the energy efficiency of Columbia's future building stock. We have done our best in this recommendation to lay out a series of options that would protect citizens, impact the building community in a positive way and position Columbia for future economic development. Columbia needs to strive towards having the most energy efficient building stock possible. To move forward toward achieving this goal we recommend that Columbia **adopt the Energy Code in Chapter 11 of the 2009 International Residential Building Codes verbatim.**

Dan Goldstein
Chair Environment and Energy Commission

Appendix A

Possible compromise changes to chapter 11 of the **International Residential Building Codes** that the EEC feels would have minimal effects on the overall energy saving to residents and the City. **It is important for the Council to understand that adopting this compromise option will cost consumers money in increased energy costs, and will limit the total demand side management efforts called for in the cities recent Integrated Resource Plan.**

{Underscored items are proposed additions, strike through items are proposed deletions}

Part IV --- Energy Conservation

Chapter 11

Energy Efficiency

Section N1101

General

N1102.2.7 Basement walls.

Exterior walls associated with conditioned basements shall be insulated from within 6 inches of the top of the *basement wall* down to 10 feet (3048 mm) below grade or to the *basement* floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections N1102.1 and N11.2.2.6.

N1102.4.5 Recessed lighting.

Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as meeting ASTM "insulation contact rated". ~~ASTM E-283 when tested at 1.57 psi (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the *conditioned space* to the *ceiling cavity*.~~

All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall of ceiling covering.

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Table N1102.4.1
AIR BARRIER AND INSULATION INSPECTION

COMPONENT	CRITERIA
Recessed lighting	Recessed light fissures are airtight <u>insulation contact rated</u> , IC rated and sealed to drywall. Exception--- fixtures in conditioned space.

N1103.1.1 Programmable thermostat.

Where the primary heating system is a forced air furnace, at least one thermostat per *dwelling unit* shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain sole temperatures down to 55°F (13°C) or put to 85°F (29°C). The thermostat ~~shall~~ should initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

N1104.1 Lighting equipment.

A minimum of 50 percent of the lamps in permanently installed lighting fixtures ~~shall~~ should be *high-efficacy lamps*.

Appendix B

The following section of the 2009 International Residential Building Codes, Chapter 11 discusses duct leakage testing. The Environment and Commission feels that if this section is removed from the adopted code the potential energy saving to residents could be severely reduced. Therefore **we strongly recommend that this section not be removed from the adopted code.**

N1103.2.2 Sealing.

Ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4. Duct tightness shall be verified by either of the following:

1. Post-construction test: Leakage to outdoors shall be less than or equal to 8 cfm (3.78 L/s) per 100 ft² (9.29m²) conditioned floor area of a total leakage less than or equal to 12 cfm (5.66 L/s) per 100 ft² (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler end closure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-in test: Total leakage shall be less than or equal to 6 cfm (2.83 L/s) per 100 ft² (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inch w.g (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (1.89 L/s) per 100 ft² (9.29 m²) of conditioned floor area.

Exception: Duct tightness test is not required if the air handler and all ducts are located within *conditioned space*.