Residential Requirements for the 2009 IECC

Workshop 1:
Focus on Awareness and New Construction
Introductions

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Code officials:
Name
Municipality
Status of Residential Codes
Overview

Project funded by the Missouri Department of Natural Resources (MDNR) with American Recovery and Reinvestment Act of 2009 (ARRA) funding.

2 Locations:

- St. Louis
- Springfield

*Objective of the Workshop:* Work with municipalities and counties across the state to identify opportunities to adopt or enhance compliance with the 2009 International Energy Conservation Code (IECC) at a local level.
# Agenda

<table>
<thead>
<tr>
<th>Topic</th>
<th>Approx. Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction, Project Background, Workshop Overview</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Homeowner/Contractor Awareness of 2009 IECC</td>
<td>20 minutes</td>
</tr>
<tr>
<td>2009 IECC Highlights</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Break</td>
<td>15 minutes</td>
</tr>
<tr>
<td>2009 IECC Highlights (cont.)</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Resource Inventory</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Summary/Questions</td>
<td>10 minutes</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2 hours 10 minutes</strong></td>
</tr>
</tbody>
</table>
Some Important Points

Overall
• Focused on residential
• Discussion-based
• Forum for ideas and practices

What can you expect?
• Code citations in [ ]
• Printed slides
• Links to Department of Energy and Building Codes Assistance Program (BCAP) resources

Before we get started...
• Cell phones
Topic 1

Awareness of the 2009 IECC
Topic 1 Objectives

- Implementation of the code
- Identify benefits that result from adopting, implementing, and enforcing the 2009 IECC
  1. Municipality
  2. Homeowners
  3. Contractors
- Identify potential challenges from adopting, implementing, and enforcing the 2009 IECC
- Identify the cost impact to homeowners/contractors of compliance
- Identify options to promote awareness of the 2009 IECC
Overview - Residential State Energy Code Status (*)

(*) as of November 1, 2011, DOE – Building Energy Codes Program
Overview - Missouri Residential Energy Efficiency

State Level:
• No mandatory efficiency code

Local Level:
• St. Louis City and County – 2009 IECC
• Clay County – 2006 IRC
• Springfield – 2006 IRC with 2012 IRC hopeful in January
Benefits of the 2009 IECC

Important points about energy codes

• Marketplace does not guarantee energy-efficiency
  – Upfront cost vs. long-term, operating costs
• Comfort
• Energy consumption and emissions
• New construction is a unique opportunity
Benefits of the 2009 IECC - Municipality

In your opinion, what are the benefits to a municipality that result from adopting, implementing, and enforcing the 2009 IECC?

• What are the advantages of compliance with the 2009 IECC?
• What are disadvantages or risks of non-compliance?
Benefits of the 2009 IECC - Municipality

• Optimal utilization of fossil fuels and non-renewable resources for communities\(^1\)
  – Reduces strain on energy and utility resources

• Create economic opportunities for business and industry by promoting new, energy-efficient technologies

• Shifts construction costs away from materials and towards labor\(^2\)
  – Job creation/enhance skills of workforce

Benefits of the 2009 IECC - Homeowner

In your opinion, what are the benefits to a homeowner that result from owning a home that complies with the 2009 IECC?

• What are the advantages of compliance with the 2009 IECC?
• What are disadvantages or risks of non-compliance?
Benefits of the 2009 IECC - Homeowner

- Homeowners
- Utility savings
  - Average $2,150/yr on home energy bills\(^1\)
  - Average savings ~ $300/yr\(^1\)
- Improved thermal comfort
- Reduces the risk of long-term financial burden that can result from short-term design and construction decisions
  - Testing requirement, installation of “hidden” materials (e.g., insulation)

\(^1\) Alliance to Save Energy, U.S. Household Energy Expenditures, 2010
Benefits of the 2009 IECC - Contractor

In your opinion, what are the benefits to a contractor that result from building a home that complies with the 2009 IECC?

• What are the advantages of compliance with the 2009 IECC?
• What are disadvantages or risks of non-compliance?
Benefits of the 2009 IECC - Contractor

• Customer satisfaction and recommendations
  – Increases comfort
  – Fewer call-backs
• Competitive advantage in the marketplace
  – Advertising can be used to explain energy-efficiency advantages
  – Can leverage available incentives and increase revenue
• Common basis for education and practice
Topic 1 Objectives

• Identify benefits that result from implementing and enforcing the 2009 IECC
  1. Homeowners
  2. Contractors
  3. Municipality
• Identify potential challenges from implementing and enforcing the 2009 IECC
• Identify the cost impact to homeowners/contractors of compliance
• Identify options to promote awareness of the 2009 IECC
• Identify possible questions to test contractors’ understanding
Potential for Challenges of the 2009 IECC

Affected Professions\textsuperscript{1}:

- Architects
- Carpenters
- Brick masons, stonemasons, block masons
- Cement masons and concrete finishers
- Roofers
- Electricians
- Engineers
- Insulation Workers
- Energy modelers

\textsuperscript{1} Institute for Market Transformation, IMT Research on Jobs for Energy Codes
Potential for Challenges of the 2009 IECC

- Limited staff/availability to attend trainings
- Public perception of energy codes
- Accuracy and ability to enforce the code
Potential for Challenges of the 2009 IECC

**Builder/Contractor:**
It’s always been done this way…deal with it.

**Builder/Contractor:**
Come on, that’s not necessary.

**Builder/Contractor:**
They won’t pay for that price!

**Homeowner:**
I’d rather have the granite countertops…
Topic 1 Objectives

- Identify benefits that result from implementing and enforcing the 2009 IECC
  1. Homeowners
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Costs of the 2009 IECC

- Analysis of Costs and Benefits of 2009 IECC
- Determine difference in construction costs and energy savings resulting from implementing IECC 2009 compared with the current practice
- The Building Codes Assistance Project (BCAP) estimates 18-26% in energy savings or annual savings between $337-559 (compared with current practices), money that could be spent on upgrading their house or fed into the local communities
 Costs of the 2009 IECC

- Costs, savings and payback\(^1\)

<table>
<thead>
<tr>
<th>Incremental Construction Costs</th>
<th>IECC 2009 vs. Current Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,608</td>
<td></td>
</tr>
</tbody>
</table>

| Annual Energy Cost Savings     | $459                          |
| Simple Payback (years)         | 3.5                           |

\(^1\)The Building Codes Assistance Project: Incremental Construction Cost Analysis for New Homes – Building to the 2009 IECC
Costs of the 2009 IECC

- Mortgage Details

<table>
<thead>
<tr>
<th>Increase of a 20% Down Payment</th>
<th>$322</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase of Monthly Payment (30 year mortgage, 7% interest rate)</td>
<td>$8.56</td>
</tr>
<tr>
<td>Average Monthly Energy Savings</td>
<td>$38.25</td>
</tr>
<tr>
<td>Mortgage Becomes Cash Positive</td>
<td>11 months</td>
</tr>
</tbody>
</table>
Topic 1 Objectives

- Identify benefits that result from implementing and enforcing the 2009 IECC
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- Identify possible questions to test contractors’ understanding
Promoting Awareness of 2009 IECC

• Where is our municipality relative to our neighbors?
• Utilizing your municipality’s website
• Distributing handouts to applicants as early as possible
Promoting Awareness of 2009 IECC

General Resources

- [Top 10 Reasons for Building Energy Codes](#), U.S. Dept. of Energy
- [Duct Leakage Frequently-Asked Questions](#), U.S. Dept. of Energy
- [Bigger is not always better with HVAC systems](#), U.S. Dept. of Energy

- These and other sources are included in a resource inventory (spreadsheet)
Promoting Awareness of 2009 IECC

Contractor awareness

- Inform contractors with the energy code
  - Create cheat sheet, require short training, or quiz contractors
- Identify and address knowledge gaps upfront to enhance compliance with the 2009 IECC
- Possible to require registration
- Create opportunities to promote awareness
Assessing Contractors on the 2009 IECC

Summary of Mechanical Requirements

- Size and select appropriate heating and cooling systems – submit documents to city prior to installation
- Seal all duct connections
- Do not use cavities for supply ducts
- Install furnace and ducts in conditioned space

- If ducts cannot be fully located in conditioned space
  - Insulate supply ducts to R-8 and all others to R-6
  - Test for duct tightness and meet requirements
Topic 1 Summary

- There are several benefits that result from energy codes, to all stakeholders
- The challenges of implementing the 2009 IECC can easily be overcome
- The payback for compliance is less than five years
- There are several options available which municipalities can use to promote awareness of the 2009 IECC
- Look for ways to inform contractors of the 2009 IECC requirements
Topic 2

Highlights of the Residential portion of the 2009 IECC
Topic 2 Objectives

• Overview
• Compliance
  – Mandatory Provisions
• Compliance Paths
  – Prescriptive [402.1]
  – U-Factor [402.1.3]
  – UA Alternative [402.1.4]
  – Simulated Performance Alternative [405]
Overview

2009 IECC

• Chapter 1 - Administration
• Chapter 2 - Definitions
• Chapter 3 - General Requirements
• Chapter 4 - Residential Energy Efficiency
• Chapter 5 - Commercial Energy Efficiency
• Chapter 6 - Referenced Standards
Overview

**RESIDENTIAL BUILDING.** For this code, includes R-3 buildings, as well as R-2 and R-4 buildings three stories or less in height above grade.

- Single family house
- Duplex/townhouse
- Triplex (or larger units if 3 stories or less in height above grade)
- Apartment Buildings (if 3 stories or less in height above grade)
- Assisted Living Communities (if 3 stories or less in height above grade)
Overview

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of “Residential buildings.”
Overview

• An 10 unit, 2 story apartment complex?

• References the IBC (IRC is for one- and two-family dwellings or townhouses)

• Still the residential portion of the IECC per the ICC definitions
Overview

Relationship between IRC (International Residential Code) and IECC

- IECC addresses only energy (commercial and residential)
- IRC addresses all topics (structural, plumbing, etc.)
- IRC allows compliance with IECC as an alternative to Chapter 11 [N1101.2]
  - Energy requirements in IRC and IECC almost identical
  - IRC has less stringent foundation requirements in northern zones
  - Other minor differences
  - IRC does not have a simulated performance alternative path
Overview

Applicability
- Code applies to residential buildings
- New construction, additions, alterations, renovations or repairs
- Additions can comply alone or in combination with existing building

Exempted Buildings
- Existing buildings
- Buildings designated as historic
- Buildings (or portions of) that are neither heated or cooled (e.g. garage)

Exempted Alterations
- Eight exceptions for alterations
Overview

8 Exceptions

1. Storm windows installed over (E) window.
2. Glass only replacements in an (E) window.
3. (E) cavities are filled with insulation.
4. (E) cavity is not exposed.
5. Roofing for roofs were neither the sheathing nor the insulation is exposed.
6. Replacement of (E) doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door.
7. Alterations that replace less than 50% of the luminaires in a space.
8. Alterations that replace only the bulb and ballast w/in the (E) luminaires in a space.

The IECC “is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.”
Overview

Mandatory Provisions

- Air-seal house and install “tight” fixtures in the building envelope
- Programmable thermostat must be installed for each system
- Ducts must be sealed and building cavities may not be supply ducts
- If ducts are not in conditioned space they must be verified to be “tight”
- Heating and cooling equipment shall be sized to ACCA Manual J and S
- There are others but the above are the main items

ACCA - Air Conditioning Contractors of America
Manual J – Residential Load Calculation
Manual S – Residential Equipment Selection
Overview

Two options [402.4.2] to meet the building envelope tightness and verification

• Testing option [402.4.2.1]
• Visual Inspection option [402.4.2.2], using Table 402.4.2 Air Barrier and Insulation Inspection Component Criteria

BEST PRACTICE: Testing is now required in the 2012 IECC. Third party testing might be easier than inspectors trusting builders and/or verifying each item on the checklist.
## Overview

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air barrier and thermal barrier</td>
<td>Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material. Air-permeable insulation is inside of an air barrier.</td>
</tr>
<tr>
<td>Ceiling/attic</td>
<td>Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.</td>
</tr>
<tr>
<td>Walls</td>
<td>Corners and headers are insulated. Junction of foundation and sill plate is sealed.</td>
</tr>
<tr>
<td>Windows and doors</td>
<td>Space between window/door jambs and framing is sealed.</td>
</tr>
<tr>
<td>Rim joists</td>
<td>Rim joists are insulated and include an air barrier.</td>
</tr>
<tr>
<td>Floors (including above-garage and cantilevered floors)</td>
<td>Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.</td>
</tr>
<tr>
<td>Crawl space walls</td>
<td>Insulation is permanently attached to walls. Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.</td>
</tr>
</tbody>
</table>
Duct joints and seams:

• Sealed – mandatory requirement

If air handler and all ducts are fully located in conditioned space then

• No insulation
• No duct tightness test

BEST PRACTICE: Furnace and ducts in conditioned space
Compliance

Mandatory Provisions

AND

Compliance Path

(Four Options)
Compliance

Mandatory Provisions

AND

A. Prescriptive
B.1 U-Factor
B.2 UA Alternative
C. Simulated Performance Alternative
Compliance Path – Prescriptive Approaches

There are a few additional requirements when doing a prescriptive approach (Prescriptive, U-Factor, and UA Alternative)

1. Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts (outside of the conditioned space) shall be insulated to a minimum of R-6.

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

Alternative: The Simulated Performance Alternative path:

- No requirement for high-efficacy lighting
- All ducts to be insulated to a minimum of R-6
Lighting efficacy prescriptive requirement

• At least 50% of permanently installed lighting fixtures shall be high-efficiency [404.1]

• What is high-efficacy?
  – Defined in Chapter 2 Definitions - Compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:
    » 60 lumens per watt for lamps over 40 watts,
    » 50 lumens per watt for lamps over 15 watts to 40 watts, and
    » 40 lumens per watt for lamps 15 watts or less
Allowances in the prescriptive path:

- One door (24 ft$^2$) can be exempt of the prescriptive requirements (e.g. decorative main entry wood panel door)
- 15 ft$^2$ can be exempt of the prescriptive requirements (e.g. block glass in shower instead of typical code compliant window)
- 500 ft$^2$ or 20% of the ceiling area, whichever is less, can be reduced to R-30 when ceiling assembly does not allow sufficient space for the required insulation (e.g. small sun room with a vaulted ceiling that the structural engineer wants sized with 2x10 rafters)
Compliance

Mandatory Provisions

AND

A. Prescriptive

B.1 U-Factor

B.2 UA Alternative

C. Simulated Performance Alternative
Compliance Path - Prescriptive

- R-values and U-factors dependent on climate zone
- *Insulation and Fenestration Requirements by Component* [Table 402.1.1]
- Could cite values directly from code
- No software needed
- No trade offs
## Compliance Path – Prescriptive

### Table 402.1.1

**INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT**

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>FENESTRATION U-FACTOR&lt;sup&gt;b&lt;/sup&gt;</th>
<th>SKYLIGHT&lt;sup&gt;b&lt;/sup&gt; U-FACTOR</th>
<th>GLAZED FENESTRATION SHGC&lt;sup&gt;d&lt;/sup&gt;,&lt;sup&gt;e&lt;/sup&gt;</th>
<th>CEILING R-VALUE</th>
<th>WOOD FRAME WALL R-VALUE</th>
<th>MASS WALL R-VALUE&lt;sup&gt;f&lt;/sup&gt;</th>
<th>FLOOR R-VALUE</th>
<th>BASEMENT&lt;sup&gt;c&lt;/sup&gt; WALL R-VALUE</th>
<th>SLAB&lt;sup&gt;d&lt;/sup&gt; R-VALUE &amp; DEPTH</th>
<th>CRAWL SPACE&lt;sup&gt;c&lt;/sup&gt; WALL R-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.2</td>
<td>0.75</td>
<td>0.30</td>
<td>30</td>
<td>13</td>
<td>3/4</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.65&lt;sup&gt;l&lt;/sup&gt;</td>
<td>0.75</td>
<td>0.30</td>
<td>30</td>
<td>13</td>
<td>4/6</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0.50&lt;sup&gt;l&lt;/sup&gt;</td>
<td>0.65</td>
<td>0.30</td>
<td>30</td>
<td>13</td>
<td>5/8</td>
<td>19</td>
<td>5/13&lt;sup&gt;f&lt;/sup&gt;</td>
<td>0</td>
<td>5/13</td>
</tr>
<tr>
<td>4 except Marine</td>
<td>0.35</td>
<td>0.60</td>
<td>NR</td>
<td>38</td>
<td>13</td>
<td>5/10</td>
<td>19</td>
<td>10/13</td>
<td>10, 2 ft</td>
<td>10/13</td>
</tr>
<tr>
<td>5 and Marine 4</td>
<td>0.35</td>
<td>0.60</td>
<td>NR</td>
<td>38</td>
<td>20 or 13&lt;sup&gt;h&lt;/sup&gt;</td>
<td>13/17</td>
<td>30&lt;sup&gt;g&lt;/sup&gt;</td>
<td>10/13</td>
<td>10, 2 ft</td>
<td>10/13</td>
</tr>
<tr>
<td>6</td>
<td>0.35</td>
<td>0.60</td>
<td>NR</td>
<td>49</td>
<td>20 or 13&lt;sup&gt;h&lt;/sup&gt;</td>
<td>15/19</td>
<td>30&lt;sup&gt;g&lt;/sup&gt;</td>
<td>15/19</td>
<td>10, 4 ft</td>
<td>10/13</td>
</tr>
<tr>
<td>7 and 8</td>
<td>0.35</td>
<td>0.60</td>
<td>NR</td>
<td>49</td>
<td>21</td>
<td>19/21</td>
<td>38&lt;sup&gt;g&lt;/sup&gt;</td>
<td>15/19</td>
<td>10, 4 ft</td>
<td>10/13</td>
</tr>
</tbody>
</table>
Compliance Path – Prescriptive

- Mandatory notes
- Insulation schedule
- Building Sections specifying insulation
- High-efficacy lighting

### Efficiency Schedule

<table>
<thead>
<tr>
<th>Energy Details - Climate Zone 4</th>
<th>2009 IECC Compliance - Prescriptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement Walls</td>
<td>2x4 with R-13 cav. (FB)</td>
</tr>
<tr>
<td>Above Grade Walls</td>
<td>2x6 with R-20 cav (BC)</td>
</tr>
<tr>
<td>Floor Over Garage</td>
<td>11.875&quot; TJ with R-43 cav (BC)</td>
</tr>
<tr>
<td>Ceiling - Attic</td>
<td>R-50 (BC)</td>
</tr>
<tr>
<td>Windows</td>
<td>All U-Factors equal or below 0.30</td>
</tr>
<tr>
<td>Lighting</td>
<td>75% or more to be CFL</td>
</tr>
</tbody>
</table>

FB - Fiberglass Batt (R-3.7/inch)
BC - Blown Cellulose (R-3.66/inch)
Compliance Path – Prescriptive

Example Building Sections

Foundation/floor connection

http://www.greenbuildingadvisor.com

Wall/roof connection
Compliance

Mandatory Provisions

AND

A. Prescriptive
B.1 U-Factor
B.2 UA Alternative
C. Simulated Performance Alternative

Prescriptive Approaches
Compliance Path – U-Factor

• U-factors dependent on climate zone
• Alternative to the R-value in Table 402.1.1
• *Equivalent U-Factors* [Table 402.1.3]
• Could cite values directly from code
• Can use software for help with basic U-Factor calculations
• No trade offs
## Compliance Path – U-Factor

### TABLE 402.1.3

**EQUIVALENT U-FACTORS**

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>FENESTRATION U-FACTOR</th>
<th>SKYLIGHT U-FACTOR</th>
<th>CEILING U-FACTOR</th>
<th>FRAME WALL U-FACTOR</th>
<th>MASS WALL U-FACTOR$^b$</th>
<th>FLOOR U-FACTOR</th>
<th>BASEMENT WALL U-FACTOR</th>
<th>CRAWL SPACE WALL U-FACTOR$^c$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.20</td>
<td>0.75</td>
<td>0.035</td>
<td>0.082</td>
<td>0.197</td>
<td>0.064</td>
<td>0.360</td>
<td>0.477</td>
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<tr>
<td>2</td>
<td>0.65</td>
<td>0.75</td>
<td>0.035</td>
<td>0.082</td>
<td>0.165</td>
<td>0.064</td>
<td>0.360</td>
<td>0.477</td>
</tr>
<tr>
<td>3</td>
<td>0.50</td>
<td>0.65</td>
<td>0.035</td>
<td>0.082</td>
<td>0.141</td>
<td>0.047</td>
<td>0.091$^c$</td>
<td>0.136</td>
</tr>
<tr>
<td>4 except Marine</td>
<td>0.35</td>
<td>0.60</td>
<td>0.030</td>
<td>0.082</td>
<td>0.141</td>
<td>0.047</td>
<td>0.059</td>
<td>0.065</td>
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<td>0.030</td>
<td>0.057</td>
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<td>0.033</td>
<td>0.059</td>
<td>0.065</td>
</tr>
<tr>
<td>6</td>
<td>0.35</td>
<td>0.60</td>
<td>0.026</td>
<td>0.057</td>
<td>0.060</td>
<td>0.033</td>
<td>0.050</td>
<td>0.065</td>
</tr>
<tr>
<td>7 and 8</td>
<td>0.35</td>
<td>0.60</td>
<td>0.026</td>
<td>0.057</td>
<td>0.057</td>
<td>0.028</td>
<td>0.050</td>
<td>0.065</td>
</tr>
</tbody>
</table>
Compliance Path – U-Factor

- Mandatory notes
- Insulation schedule
- Wall Sections specifying insulation
- High-efficacy lighting

### Efficiency Schedule

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<td>2x4 with empty cav and 2&quot; of PI Foam on exterior [U-Factor - 0.059]</td>
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</table>

FB - Fiberglass Batt (R-3.7/inch)
BC - Blown Cellulose (R-3.66/inch)
PI - Polyisocyanurate Rigid Foam (R-6.25/inch)
Break

• 15 minutes
• We’re going to start topic 2 again at ____
Compliance

Mandatory Provisions

AND

A. Prescriptive

B.1 U-Factor

B.2 UA Alternative

C. Simulated Performance Alternative
Compliance Path – UA Alternative

Total UA Alternative [402.1.4]

- Total UA is the sum of all the construction type areas multiplied by their respective U-factor
- Allows for trade offs between different portions of building envelope
- There is a hard limit on trade-offs
  - Area-weighted U-Factor of windows must be 0.48 or less
- REScheck – Department of Energy
Compliance Path – UA Alternative

Vaulted Ceiling
U-Factor – 0.030
Eq. to R-38 cav

ABG Walls
U-Factor – 0.082
Eq. to R-13 cav

Basement Walls
U-Factor – 0.059
Eq. to R-13 cav

Max UA

Vaulted Ceiling
2x12 w/ R-30 cav

AGW Walls
2x6 w/ R-20 cav

Basement Walls
2x4 w/ R-13 cav

Design UA
Compliance Path – UA Alternative
Compliance Path – UA Alternative

<table>
<thead>
<tr>
<th>Component</th>
<th>Assembly</th>
<th>Gross Area</th>
<th>Cavity Insulation R-Value</th>
<th>Continuous Insulation R-Value</th>
<th>U-Factor</th>
<th>UA</th>
<th>SHGC</th>
<th>Wall Height (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling 1</td>
<td>Cathedral Ceiling</td>
<td>779 ft²</td>
<td>30.0</td>
<td>5.0</td>
<td>0.029</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling 2</td>
<td>Flat Ceiling or Scissor Truss</td>
<td>385 ft²</td>
<td>25.0</td>
<td>13.0</td>
<td>0.026</td>
<td>10</td>
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<tr>
<td>Wall 1</td>
<td>Wood Frame, 16&quot; o.c.</td>
<td>2571 ft²</td>
<td>20.0</td>
<td>0.0</td>
<td>0.059</td>
<td>124</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window 1</td>
<td>Wood Frame: Double Pane</td>
<td>271 ft²</td>
<td></td>
<td></td>
<td>0.3</td>
<td>81</td>
<td>0.40</td>
<td></td>
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<tr>
<td>Window 2</td>
<td>Wood Frame: Double Pane</td>
<td>146 ft²</td>
<td></td>
<td></td>
<td>0.6</td>
<td>88</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Door 1</td>
<td>Solid</td>
<td>54 ft²</td>
<td></td>
<td></td>
<td>0.5</td>
<td>27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall 2</td>
<td>Wood Frame, 16&quot; o.c.</td>
<td>50 ft²</td>
<td>0.0</td>
<td>0.0</td>
<td>0.238</td>
<td>0</td>
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<td></td>
</tr>
<tr>
<td>Window 3</td>
<td>Wood Frame: Double Pane</td>
<td>48 ft²</td>
<td></td>
<td></td>
<td>0.3</td>
<td>14</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>Basement Wall 1</td>
<td>Solid Concrete or Masonry</td>
<td>573 ft²</td>
<td>13.0</td>
<td>0.0</td>
<td>0.075</td>
<td>43</td>
<td>7.0</td>
<td></td>
</tr>
</tbody>
</table>
**CONDITIONED SPACE.** An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*. 
Compliance Path – UA Alternative
Compliance Path – UA Alternative

![REScheck](image)

<table>
<thead>
<tr>
<th>Component</th>
<th>Assembly</th>
<th>Gross Area</th>
<th>Cavity Insulation R-Value</th>
<th>Continuous Insulation R-Value</th>
<th>U-Factor</th>
<th>UA</th>
<th>SHGC</th>
<th>Wall Height (ft)</th>
<th>Depth Below Grade (ft)</th>
<th>Depth of Insulation (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling 1</td>
<td>Cathedral Ceiling</td>
<td>779 ft²</td>
<td>30.0</td>
<td>5.0</td>
<td>0.029</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling 2</td>
<td>Flat Ceiling or Scissor Truss</td>
<td>365 ft²</td>
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<td>13.0</td>
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<tr>
<td>Wall 1</td>
<td>Wood Frame, 16&quot; O.C.</td>
<td>2571 ft²</td>
<td>20.0</td>
<td>0.0</td>
<td>0.059</td>
<td>124</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window 1</td>
<td>Wood Frame:Double Pane</td>
<td>271 ft²</td>
<td></td>
<td></td>
<td>0.3</td>
<td>81</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window 2</td>
<td>Wood Frame:Double Pane</td>
<td>146 ft²</td>
<td></td>
<td></td>
<td>0.6</td>
<td>80</td>
<td>0.50</td>
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<tr>
<td>Door 1</td>
<td>Solid</td>
<td>54 ft²</td>
<td></td>
<td></td>
<td>0.5</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Wall 2</td>
<td>Wood Frame, 16&quot; O.C.</td>
<td>50 ft²</td>
<td>0.0</td>
<td>0.0</td>
<td>0.238</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>Window 3</td>
<td>Wood Frame:Double Pane</td>
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<td></td>
<td>0.3</td>
<td>14</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basement Wall 1</td>
<td>Solid Concrete or Masonry</td>
<td>573 ft²</td>
<td>13.0</td>
<td>0.0</td>
<td>0.075</td>
<td>43</td>
<td>7.0</td>
<td>3.5</td>
<td>7.0</td>
<td></td>
</tr>
</tbody>
</table>
Compliance with the 2009 IECC can be demonstrated using the Total UA (“Trade-Off”) Alternative or the Performance Alternative. The UA Alternative is currently selected. The compliance method can be changed in the Options menu.

The UA Alternative does not consider mechanical systems so mechanical inputs are not available. Under the Performance Alternative, mechanical systems can be specified and may impact the results, however no trade-off credits for high efficiency mechanical equipment are allowed.

Press F1 for more information.
Compliance Path – UA Alternative
Compliance Path – UA Alternative

REScheck Software Version 4.4.2
Compliance Certificate

Project Title: Jefferson City Home

Energy Code: 2009 IECC
Location: Jefferson City, Missouri
Construction Type: Single Family
Glazing Area Percentage: 18%
Heating Degree Days: 6301/2
Climate Zone: 4

Construction Site:
1234 ABC Lane
Jefferson City, MO 65103

Owner/Agent: Designer/Contractor:

Compliant: Passes using UA trade-off
Compliance with 2009 IECC R-values Passed: 87%
Minimum UA: 423
Your UA: 416

Gross Area or Perimeter

<table>
<thead>
<tr>
<th>Assembly</th>
<th>Gross R-Value</th>
<th>Cont. R-Value</th>
<th>Glazing U-Factor</th>
<th>UA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling 1: Cathedral Ceiling</td>
<td>770</td>
<td>20.0</td>
<td>0.0</td>
<td>23</td>
</tr>
<tr>
<td>Ceiling 2: Flat Ceiling or Sloped Truss</td>
<td>285</td>
<td>25.0</td>
<td>15.0</td>
<td>10</td>
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<tr>
<td>Wall 1: Wood Frame, 10&quot; o.c.</td>
<td>3711</td>
<td>20.0</td>
<td>0.5</td>
<td>124</td>
</tr>
<tr>
<td>Window 1: Wood Frame/Double Pane with Low-E</td>
<td>271</td>
<td>0.30</td>
<td>0.0</td>
<td>21</td>
</tr>
<tr>
<td>Window 2: Wood Frame/Double Pane with Low-E</td>
<td>145</td>
<td>0.50</td>
<td>0.0</td>
<td>27</td>
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<tr>
<td>Door 1: Solid</td>
<td>94</td>
<td>0.0</td>
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<td>8</td>
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<td>Wall 2: Wood Frame, 10&quot; o.c.</td>
<td>60</td>
<td>0.0</td>
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<td>0</td>
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<tr>
<td>Window 3: Wood Frame/Double Pane with Low-E</td>
<td>45</td>
<td>0.30</td>
<td>0.0</td>
<td>14</td>
</tr>
<tr>
<td>Basement Wall 1: Solid Concrete or Masonry</td>
<td>573</td>
<td>13.0</td>
<td>0.0</td>
<td>43</td>
</tr>
</tbody>
</table>

Compliance Statement: The proposed building design described here is compliant with the building plans, specifications, and other calculations submitted with the permit application. The proposed building has been designed to meet the 2009 IECC requirements in REScheck Version 4.4.2 and to comply with the mandatory requirements listed in the REScheck Inspection Checklist.
Compliance Path – UA Alternative

REScheck Software Version 4.4.2
Inspection Checklist

Ceilings:
- Ceiling 1: Cathedral Ceiling, R-30.0 cavity + R-5.0 continuous insulation
  Comments:
- Ceiling 2: Flat Ceiling or Slotted Truss, R-25.0 cavity + R-13.0 continuous insulation
  Comments:

Above-Grade Walls:
- Wall 1: Wood Frame, 16" o.c., R-20.0 cavity insulation
  Comments:
- Wall 2: Wood Frame, 10" o.c., R-0 (uninsulated)
  Comments:

Basement Walls:
- Basement Wall 1: Solid Concrete or Masonry, 7.0' ht. / 3.5' bg / 7.0' insul. R-13.0 cavity insulation
  Comments:

Windows:
- Window 1: Wood Frame Double Pane with Low-E, U-factor: 0.300
  For windows without labeled U-factors, describe features:
  Panes: _______ Frame Type: _______ Thermal Break?: Yes ___ No ___
  Comments:
- Window 2: Wood Frame Double Pane with Low-E, U-factor: 0.800
  For windows without labeled U-factors, describe features:
  Panes: _______ Frame Type: _______ Thermal Break?: Yes ___ No ___
  Comments:
- Window 3: Wood Frame Double Pane with Low-E, U-factor: 0.500
  For windows without labeled U-factors, describe features:
  Panes: _______ Frame Type: _______ Thermal Break?: Yes ___ No ___
  Comments:
This document or a similar one needs to be installed near the main electrical panel.
Compliance

Mandatory Provisions

AND

A. Prescriptive

B.1 U-Factor

B.2 UA Alternative

C. Simulated Performance Alternative

Prescriptive Approaches
Compliance Path – Simulated Performance

• Simulated performance analysis
  – Heating, cooling, service water heating energy only
• Design shown to have less than or equal to annual energy cost of standard reference design [405.3]
• Standard reference design [Table 405.5.2(1)]

<table>
<thead>
<tr>
<th>BUILDING COMPONENT</th>
<th>STANDARD REFERENCE DESIGN</th>
<th>PROPOSED DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above-grade walls</td>
<td>Type: mass wall if proposed wall is mass; otherwise wood frame. Gross area: same as proposed U-factor: from Table 402.1.3 Solar absorptance = 0.75 Emissivity = 0.90</td>
<td>As proposed</td>
</tr>
<tr>
<td>Basement and crawl space walls</td>
<td>Type: same as proposed Gross area: same as proposed U-factor: from Table 402.1.3, with insulation layer on interior side of walls</td>
<td>As proposed</td>
</tr>
<tr>
<td>Above-grade floors</td>
<td>Type: wood frame Gross area: same as proposed U-factor: from Table 402.1.3</td>
<td>As proposed</td>
</tr>
<tr>
<td>Ceilings</td>
<td>Type: wood frame Gross area: same as proposed U-factor: from Table 402.1.3</td>
<td>As proposed</td>
</tr>
<tr>
<td></td>
<td>Type: composition shingle on wood sheathing Gross area: same as proposed</td>
<td>As proposed</td>
</tr>
</tbody>
</table>
Climate Zone 4

Vaulted Ceiling
U-Factor – 0.030
Eq. to R-38 cav

ABG Walls
U-Factor – 0.082
Eq. to R-13 cav

Basement Walls
U-Factor – 0.059
Eq. to R-13 cav

Vaulted Ceiling
2x12 w/ R-30 cav

AGW Walls
2x6 w/ R-20 cav

Basement Walls
2x4 w/ R-13 cav
Compliance Path – Simulated Performance

- No skylights
- 15% Window to floor area ratio or proposed if below 25%
- 40 sq.ft. of door
- Climate Zone 4
- 16 sq.ft. of skylights
- 25% Window to floor area ratio
- 54 sq.ft. of door

Reference Design
2009 IECC

Proposed Design
Compliance Path – Simulated Performance

Climate Zone 4

ACH of 0.00036 SLA

Mechanical same as proposed

Reference Design
2009 IECC

ACH not tested then same as reference OR actual value down to 0.35 OR actual value if mechanically ventilated

Proposed Design

Mechanical as proposed
Compliance Path – Simulated Performance

Heat + Cool + Hot Water = $917

Heat + Cool + Hot Water = $770
Compliance Path – Simulated Performance

Differences between UA and Performance
• Performance takes into consideration weather
• Performance does not require 50% high efficacy lighting
• Performance allows for R-6 duct insulation, instead of R-8 for supply ducts
• Performance has limits to doors and windows
  – Glass house could be compliant in the prescriptive paths but not compliant in the performance path

Main Software
• REScheck
• REM/Design or REM/Rate (considers air infiltration and duct tightness)
Compliance Path – Simulated Performance

Compliance with the 2009 IECC can be demonstrated using the Total UA Alternative (Section 402.1.4), or the Performance Alternative (Section 409). However, neither of these alternatives allow credit for high efficiency mechanical equipment.

The performance alternative is based on the simulated performance of your proposed building as compared to an equivalent code building. Both simulations are based on the proposed mechanical equipment efficiency that you enter. The compliance index may not always seem consistent with changes you make in equipment efficiency due to the complex interactions between the building envelope (including window SHGCs and U-factors), the building and wall orientation, and mechanical equipment efficiency.

Using the performance alternative requires additional inputs including conditioned floor area, orientation of the building, a minimum of four walls having unique orientations, and a minimum of one roof and floor.

Press ‘F1’ or see Help for additional information.
## Compliance Path – Simulated Performance

### REScheck™

**Building Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Assembly</th>
<th>Gross Area</th>
<th>U-Factor</th>
<th>Wall Height (%)</th>
<th>Depth Below Grade (%)</th>
<th>Depth at Insulation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling 1</td>
<td>Cathedral Ceiling</td>
<td>779 ft²</td>
<td>0.030</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling 2</td>
<td>Flat Ceiling or Soffit</td>
<td>1265 ft²</td>
<td>0.029</td>
<td>16</td>
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<tr>
<td>Wall 2</td>
<td>Wood Frame, 16&quot; R.C.</td>
<td>100 ft²</td>
<td>0.039</td>
<td>40</td>
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<tr>
<td>Window 3</td>
<td>Wood Frame, Double Pane</td>
<td>48 ft²</td>
<td>0.039</td>
<td>40</td>
<td></td>
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<tr>
<td>Wall 4</td>
<td>Wood Frame, 10&quot; R.C.</td>
<td>429 ft²</td>
<td>0.050</td>
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<td>Window 5</td>
<td>Wood Frame, Double Pane</td>
<td>106 ft²</td>
<td>0.039</td>
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<td>Wall 6</td>
<td>Solid</td>
<td>20 ft²</td>
<td>0.039</td>
<td>30</td>
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<tr>
<td>Window 7</td>
<td>Wood Frame, Double Pane</td>
<td>106 ft²</td>
<td>0.039</td>
<td>30</td>
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<td></td>
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<tr>
<td>Door 8</td>
<td>Solid</td>
<td>11 ft²</td>
<td>0.039</td>
<td>30</td>
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<td>Wall 9 copy 1</td>
<td>Wood Frame, 16&quot; R.C.</td>
<td>114 ft²</td>
<td>0.039</td>
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<tr>
<td>Window 10</td>
<td>Solid</td>
<td>8 ft²</td>
<td>0.039</td>
<td>30</td>
<td></td>
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</tr>
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</table>

**Check Compliance**
Compliance Path – Simulated Performance

<table>
<thead>
<tr>
<th>Component</th>
<th>Assembly</th>
<th>Gross Area</th>
<th>Orientation</th>
<th>R-value</th>
<th>R-value</th>
<th>R-value</th>
<th>R-value</th>
<th>U Factor</th>
<th>UA</th>
<th>SHRSC</th>
<th>Wall Height (ft)</th>
<th>Depth Below Grade (ft)</th>
<th>Depth of Insulation (ft)</th>
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<tr>
<td>Building</td>
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<td>1 - Ceiling 1</td>
<td>Cathedral-Ceiling</td>
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<td>2 - Ceiling 2</td>
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<tr>
<td>3 - Wall 1</td>
<td>Wood Frame, Left Side</td>
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<td>4 - Wall 2</td>
<td>Wood Frame, Right Side</td>
<td>429</td>
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<td>5 - Wall 3</td>
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</tr>
</tbody>
</table>

Compliance Method: Performance Alternative

Passes: Compliance based on performance alternative - 5.4% Better Than Code
Compliance Path – Simulated Performance

**REScheck Software Version 4.4.2**

**Compliance Certificate**

Project Title: Jefferson City Home

- **Energy Code:** 2009 IECC
- **Location:** Jefferson City, Missouri
- **Construction Type:** Single Family
- **Building Orientation:** Bldg. faces 90 deg. from North
- **Conditioned Floor Area:** 3898 ft²
- **Glazing Area Percentage:** 18%
- **Heating Degree Days:** 5302
- **Climate Zone:** 4

Construction Site:
1234 ABC Lane
Jefferson City, MO 65101

**Compliance** Passes using performance alternative
Compliance: 5.4% Better Than Code

<table>
<thead>
<tr>
<th>Assembly</th>
<th>Gross Area or Perimeter</th>
<th>Cavity R-Value</th>
<th>Cont. R-Value</th>
<th>Glazing or Door U-Factor</th>
<th>UA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling 1: Cathedral Ceiling</td>
<td>779</td>
<td>30.0</td>
<td>5.0</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Ceiling 2: Flat Ceiling or Scissor Truss</td>
<td>385</td>
<td>25.0</td>
<td>13.0</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
Compliance Path – Simulated Performance

- REScheck [405.6.1] minimum capabilities of the software
- REM/Design or REM/Rate

BEST PRACTICE: Homeowners and Builders should push for a third party inspector or HERS rater that is looking out for the owner, similar to an owner’s representative. A HERS rating is the standard that most homes striving for ENERGY STAR or LEED follow and is the standard tool that is currently used to certify tax rebates from the IRS. HERS raters will typically use REM/Rate as their software.
Compliance Path – Simulated Performance
Compliance Path – Simulated Performance
Compliance Path – Simulated Performance

2009 IECC ANNUAL ENERGY COST COMPLIANCE

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Jefferson City Home</th>
<th>Date: November 18, 2011</th>
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</thead>
<tbody>
<tr>
<td>Owners Name</td>
<td></td>
<td>Builder's Name:</td>
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<tr>
<td>Property</td>
<td>1234 ABC Lane</td>
<td>Weather Site: Columbia, MO</td>
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<tr>
<td>Address</td>
<td>Jefferson City, MO 65101</td>
<td>Filename: Missouri_Home_REM.lbl</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual Energy Cost ($)</th>
<th>2009 IECC</th>
<th>As Designed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating:</td>
<td>583</td>
<td>483</td>
</tr>
<tr>
<td>Cooling:</td>
<td>239</td>
<td>208</td>
</tr>
<tr>
<td>Water Heating:</td>
<td>95</td>
<td>70</td>
</tr>
<tr>
<td><strong>SubTotal - Used to Determine Compliance:</strong></td>
<td><strong>917</strong></td>
<td><strong>770</strong></td>
</tr>
<tr>
<td>Lights &amp; Appliances:</td>
<td>751</td>
<td>751</td>
</tr>
<tr>
<td>Photovoltaics:</td>
<td>-0</td>
<td>-0</td>
</tr>
<tr>
<td>Service Charge:</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>1788</strong></td>
<td><strong>1641</strong></td>
</tr>
</tbody>
</table>

Window U-Factor Check (Section 402.6):
- Window U-Factor (Design must be equal or lower): 0.480 vs. 0.330

Home Infiltration (Section 402.4.2): PASS
Duct Leakage (Section 403.2.2): PASS

This home MEETS the annual energy cost requirements and verifications of Section 405 of the 2009 International Energy Conservation Code based on a climate zone of 4A. In fact, this home surpasses the requirements by 16.0%.
Topic 2 Summary

• Difference between the IECC and the IRC in how they pertain to residential buildings
• Applicability of the IECC
• Clarified some points of confusion about the IECC, building and duct tightness, and lighting efficacy
• Discuss compliance paths for applicants to meet the code
  – Actually four paths for compliance
Topic 3

2009 IECC Resource Inventory
Topic 3 Objectives

- What is the Resource Inventory?
- How can code officials use the inventory?
- What topics are covered by resources listed in the inventory?
- How can the inventory be maintained over time?
2009 IECC Resource Inventory

What is it?

- Compilation of resources
- Living document

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential/Commercial</td>
<td>REScheck and COMcheck</td>
<td></td>
<td>Building Energy Codes Online Training</td>
<td>This website provides links to a variety of courses, including information about REScheck, the requirements of the 2009 IECC, etc.</td>
<td><a href="http://www.energycodes.gov/moodle-REScheck.html">http://www.energycodes.gov/moodle-REScheck.html</a></td>
</tr>
<tr>
<td>Residential</td>
<td>Additions and Renovations and the 2009 IECC</td>
<td>Transcript</td>
<td>Residential Requirements of the 2009 IECC</td>
<td>Transcript for a presentation given by the U.S. DOE on the residential requirements of the 2009 IECC (pg. 7 is relevant to additions and renovations).</td>
<td><a href="http://www.energycodes.gov/training/pdfs/2009_iecc_residential_transcript.pdf">http://www.energycodes.gov/training/pdfs/2009_iecc_residential_transcript.pdf</a></td>
</tr>
<tr>
<td>Residential</td>
<td>Compliance</td>
<td>Frequently-Asked Questions</td>
<td>Frequently Asked Questions - Module 3 provided by ICC</td>
<td>Frequently-asked questions around the residential energy code, includes answers to questions about the 2009 IECC and roofs, wood-burning fireplaces, windows, thermal envelopes, etc.</td>
<td><a href="http://media.raccole.org/res/docs/FAQ_Module_3.pdf">http://media.raccole.org/res/docs/FAQ_Module_3.pdf</a></td>
</tr>
<tr>
<td>Residential/Commercial</td>
<td>General Code Information</td>
<td>Fact Sheet</td>
<td>Policy Maker Fact Sheet, Building Energy Code Compliance: October 2010</td>
<td>One-page tool that provides answers to questions such as: What are energy codes? (2) What are the benefits of building energy codes? (3) What can policy makers do to enhance code compliance and enforcement?</td>
<td><a href="http://www.raccole.org/files/PolicymakerFactSheet_EnergyCodeCompliance.pdf">http://www.raccole.org/files/PolicymakerFactSheet_EnergyCodeCompliance.pdf</a></td>
</tr>
<tr>
<td>Residential/Commercial</td>
<td>Mechanical</td>
<td>Article</td>
<td>Bigger is not always better with HVAC systems</td>
<td>Article describes why sizing appropriately is of importance, links to article regarding how to size equipment correctly, and to diagrams outlining the mechanical systems covered by the IECC.</td>
<td><a href="http://resources.raccole.org/coolconoco/moc_RFResourceCenter/article/136">http://resources.raccole.org/coolconoco/moc_RFResourceCenter/article/136</a></td>
</tr>
<tr>
<td>Residential/Commercial</td>
<td>Mechanical</td>
<td>Articles, web tools, photos, presentations</td>
<td>Building Codes Energy Resource Center</td>
<td>Numerous sources for information regarding HVAC systems and the IECC. Use “browse topic” drop down menu at upper right to choose “mechanical.”</td>
<td><a href="http://resources.raccole.org/coolconoco/moc_RFResourceCenter/article/136">http://resources.raccole.org/coolconoco/moc_RFResourceCenter/article/136</a></td>
</tr>
</tbody>
</table>
2009 IECC Resource Inventory

Why is it useful?
• Central location
• Sort-able
• Variety of resources
  – Presentations
  – Pamphlets
  – Factsheets
  – Articles
  – Guides
  – Websites

Sources
• Reports
• Frequently-asked questions

U.S. Department of Energy
International Code Council
Other states and municipalities
High-Level Topics

Topics:
• Code requirements
• REScheck and COMcheck
• Additions/renovations
• Duct pressure testing
• Mechanical systems
• Inspections
• Incentives available

Interpretation questions
• Website: http://www.iccsafe.org/cs/Pages/opinions.aspx
• Phone: 1-888-ICC-SAFE (422-7233) - ext. 338077

US Department of Energy
• Website: http://www.energycodes.gov/help/
2009 IECC Resource Inventory

Maintaining the Resource Inventory

• Where will the Resource Inventory “live?”
• Who will update the Resource Inventory?
• Who will have access to the Resource Inventory?
Topic 3 Summary

- Variety of resources, topics and types
- Using and maintaining the inventory
Overall Summary

- Topic 1 Awareness of the 2009 IECC
- Topic 2 Highlights of the Residential 2009 IECC
- Topic 3 Resource Inventory

- Questions?
Next Steps

• Adoption of the 2009 IECC
  – How are current practices different?
  – Obstacles to implementing the code?
  – Solutions?
  – 2012 IECC
Next Steps

2012 IECC is already published (major changes)

- Prescriptive Items:
  - Increase in Insulation and Fenestration requirements
  - Hot water pipe insulation and length requirements

- Mandatory Items:
  - Air Infiltration test/verification
  - Mechanical ventilation and must be efficient
  - 75% high-efficacy lighting
  - Duct leakage is more stringent for systems outside of conditioned space
Next Steps

2012 IECC Insulation and Fenestration Requirements

TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENTa

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>FENESTRATION U-FACTORb</th>
<th>SKYLIGHT U-FACTOR</th>
<th>GLAZED FENESTRATION SHGCd,e</th>
<th>CEILING R-VALUE</th>
<th>WOOD FRAME WALL R-VALUE</th>
<th>MASS WALL R-VALUE</th>
<th>FLOOR R-VALUE</th>
<th>BASEMENT WALL R-VALUE</th>
<th>SLABd R-VALUE &amp; DEPTH</th>
<th>CRAWL SPACEc WALL R-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 except Marine</td>
<td>0.35</td>
<td>0.60</td>
<td>NR</td>
<td>0.40</td>
<td>49</td>
<td>20 or 13+5h</td>
<td>8/13</td>
<td>19</td>
<td>10/13</td>
<td>10/13</td>
</tr>
<tr>
<td>5 and Marine 4</td>
<td>0.35</td>
<td>0.32</td>
<td>NR</td>
<td>0.60</td>
<td>0.55</td>
<td>38</td>
<td>13</td>
<td>5/19</td>
<td>10/13</td>
<td>10/13</td>
</tr>
</tbody>
</table>

Next Steps

Workshop 2

- Discuss Additions and Remodels
  - Applicability
  - Exemptions
- Implementing the code
  - Prior to submittal
  - Plans review process
  - Inspections
Thank You – comment card

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