2012 Energy Code Recommendations

Environment & Energy Commission (EEC)
City of Columbia/Boone County
June 17, 2013
Summary

• Letter dated April 17, 2003 to City Council outlines EEC code recommendations with BCCC recommendations referenced.

• This presentation analyzes three issues:
  – Attic insulation
  – Wood frame wall insulation
  – Slab-on-grade foundation perimeter insulation
Analysis Assumptions

• 2000 square foot (SF) ranch slab-on-grade
  – 187 linear feet (LF) wood frame exterior wall
  – 187 LF on-grade slab perimeter
  – 1683 SF wood frame wall insulation (9’ walls)

• 2000 SF ranch walkout w/ 9’ walls both levels
  – 280 LF wood frame exterior wall
  – 80 LF on-grade slab perimeter (walkout portion)
  – 2520 SF wood frame wall insulation

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Analysis Assumptions

• Incremental costs
  – 2x6 wall vs 2x4 wall blown cellulose: $0.10/SF
  – Attic blown cellulose R-49 vs. R-38: $0.25/SF
  – Wall framing lumber (2x6 vs. 2x4): $3.63/LF
  – R-10 rigid foam insulation: $1.73/SF; $3.04/LF
  – Foam installation labor: $1.50/LF
  – Trim coil for foam cover: $1.73/LF
  – Trim coil foam cover/termite labor: $3.50/LF

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Ranch Slab Incremental Cost

• Attic insulation (R-49 from R-38): $500
• Wall insulation (R-20 from R-13): $847
• Slab perimeter insulation: $1829
  – Foam insulation installed: $850
  – Trim coil foam cover/termite barrier: $979
• Total Incremental Cost $3176
Ranch Walkout Incremental Cost

• Attic insulation (R-49 from R-38): $500
• Wall insulation (R-20 from R-13): $1268
• Slab perimeter insulation: $781
  – Foam insulation installed: $363
  – Trim coil foam cover/termite barrier: $418
• Total Incremental Cost $2549

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Third Party Testing

• Blower Door Test: $400
• Duct Leakage Test: $200
Cost/Benefit Summary

• Ranch On-grade 2000 SF Slab House
  – Incremental Cost w/o 3rd party test: $3176
    • 30 yr amortized annual cost @ 4%: $182
    • 30 yr amortized annual cost @ 5%: $205
    • 30 yr amortized annual cost @ 6%: $228
  – Annual Utility Savings per MEEA*: $294

*MEEA: Midwest Energy Efficiency Alliance
Cost/Benefit Summary

• Ranch On-grade 2000 SF Slab House
  – Incremental Cost w/ 3rd party test: $3776
  – 30 yr amortized annual cost @ 4%: $216
  – 30 yr amortized annual cost @ 5%: $243
  – 30 yr amortized annual cost @ 6%: $272
  – Annual Utility Savings per MEEA*: $294
  – Annual Energy Use Reduction (MMBTU)*: 34 MMBTU
  – City wide Energy Use Reduction (793 starts)**: 26,962 MMBTU

* MEEA: Midwest Energy Efficiency Alliance.
** 793 one and two family residential permits issued in 2012 in Columbia. Source: Construction Permit Survey at www.gocolumbiamo.com
Cost/Benefit Summary

• Ranch Walkout 2000 SF House
  – Incremental Cost w/o 3\textsuperscript{rd} party test: $2549
    • 30 yr amortized annual cost @ 4\%: $146
    • 30 yr amortized annual cost @ 5\%: $164
    • 30 yr amortized annual cost @ 6\%: $183
  – Annual Utility Savings per MEEA*: $230

*MEEA: Midwest Energy Efficiency Alliance
Cost/Benefit Summary

• Ranch Walkout 2000 SF House
  – Incremental Cost w/ 3rd party test: $3149
  – 30 yr amortized annual cost @ 4%: $180
  – 30 yr amortized annual cost @ 5%: $203
  – 30 yr amortized annual cost @ 6%: $227
  – Annual Utility Savings per MEEA*: $230
  – Annual Energy Use Reduction (MMBTU)*: 25.9 MMBTU
  – City wide Energy Use Reduction (793 starts)**: 20,539 MMBTU

* MEEA: Midwest Energy Efficiency Alliance.
** 793 one and two family residential permits issued in 2012 in Columbia. Source: Construction Permit Permit Survey at www.gocolumbiamo.com
Cost/Benefit Summary

• Length of payback depends on increased construction cost and energy savings

• Simple payback only considers initial costs and annual energy cost savings

• Lifecycle cash flow analysis considers costs in relation to 30 year mortgage
  – Increased down payment and monthly mortgage payments vs. reduced annual energy costs

• U.S. Dept of Energy uses lifecycle cash flow analysis
  – Climate Zone 4 average incremental cost: $2,035 (2400 sq ft house slab-on-grade)
  – Climate Zone 4 shows positive net cash flow within 1 year

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Final Thoughts

• Adoption of 2012 IECC means:
  – More energy efficient home
  – Better quality home (improved indoor air quality, improved comfort)
  – Technology and techniques already available and in wide use
  – Once a home is built, it is what it is for 75 to 100 years! Not economically feasible to significantly improve energy efficiency once built.
  – Increasing energy efficiency features in new construction much more cost effective than retrofit.

• Affordability is neutral with 22 SF decrease in walkout and 37 SF decrease in slab.