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

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

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**

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 3rd 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**

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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

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** 793 one and two family residential permits issued in 2012 in Columbia. Source: Construction 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

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.