Great Plains Energy Codes Conference

Compliance Pilot Study for Nebraska
How are we doing?

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The State of Nebraska received $3.1 billion in State Energy Program through the American Recovery and Reinvestment Act (ARRA). As a condition of receiving the funds, the State of Nebraska was required to make assurances regarding building energy codes.

Section 410.2.C of the Act requires: “A plan for achieving compliance with the Energy Code within 8 years of the enactment of the Act (2017) in at least 90 percent of new and renovated residential and commercial building space. The plan is to include active training and enforcement programs and measurement of the rate of compliance each year.”
The 2003 International Energy Conservation Code (IECC) was established as the Nebraska Energy Code in 2004 and was enacted on July 1, 2005.

The Energy Office determined that working to establish Nebraska’s “baseline” compliance with the Nebraska Energy Code would be the best way to:

▸ provide an accurate snapshot of compliance with the current state-wide energy code
▸ quantify educational needs within the construction industry
▸ help to establish a direction and scope for future industry training, and
▸ clarify Nebraska’s best options as we proceed with future evaluations verifying 90% compliance.
Nebraska’s Compliance Study included:

- On-site evaluations statewide on 100 single family residences constructed in 2010
- Evaluations completed with the assistance of a RESNET Certified Home Energy Rater
- $250 stipends for the home owners of the 100 selected homes for allowing inspectors into their homes
- Compiling of the inspection results for the agency’s use in determining current compliance levels
- Included home evaluations located geographically across the state consistent with the state-wide construction data available from the U.S. Census for 2010
Nebraska’s Compliance Study:

- In the larger metro areas home evaluations were located geographically across the city covering various price ranges and builders.
- A compliance checklist developed from the Residential Data Collection Checklist for the 2009 IECC - Climate Zone 5 and Marine 4 - developed by the Pacific Northwest National Laboratory’s (PNNL) - Building Energy Codes Program (BECP) as part of their State Compliance Evaluation Procedures.
- When RESCheck documentation was made available to the evaluator, information including building envelope R and U-values and HVAC equipment efficiency information was included in the evaluation documentation. The 2003 IECC allowed the equipment efficiency “trade-off” which has been utilized by a number of Nebraska’s builders, in conjunction with a RESCheck analysis. In these homes the building envelope R and U-values that may vary from the “prescriptive” requirements and the HVAC system efficiencies were documented for compliance.
- Two additional columns in the Checklist that allowed the evaluators to make compliance determinations based on their experience and/or other factors encountered during the inspection.
A Checklist was developed for each of Nebraska’s 2003 IECC Climate Zones that included specific Code Section requirements for verification.
Each of the Code Sections was assigned a point value based on its Impact Tier consistent with PNNL’s - Building Energy Codes Program Compliance Evaluation Procedures.
Nebraska’s Evaluation Results:

**Statewide**
- The overall average compliance score was 64.7 percent
- The highest rated home scored 83.67 percent and was located in a community in central Nebraska
- The lowest rated home scored 42.55 percent and was located in a community in northeast Nebraska.

**By Region**
- **Northeast Region:**
  - 51 houses were evaluated in 8 counties
  - The high score was 80.85 percent
  - The low score was 42.55 percent
  - Average score: 66.63 percent
- **Southeast:**
  - 39 houses were evaluated in 4 counties
  - The high score was 69.39 percent
  - The low score was 57.06 percent
  - Average score: 61.26 percent
- **Central/Western:**
  - 10 houses were evaluated in 6 counties
  - The high score was 83.67 percent
  - The low score was 55.32 percent
  - Average score: 68.72 percent
Nebraska’s Evaluation Results:

The evaluation identified areas where builders were generally consistent in complying with the energy code as well as specific areas that were consistently non-compliant.

Areas of Success:
- Installing the doors and windows that meet minimum efficiency code requirements
- Sealing ductwork
- Installing the appropriate amount of insulation in floors and ceilings
Nebraska’s Evaluation Results:

Areas Needing Improvement:

• Installing insulation according to the manufacturers' specification and in sufficient thicknesses in all of the building envelope areas
• Caulking and sealing holes throughout the home's building envelope
• Specifying, documenting and installing appropriately sized heating/cooling equipment
Nebraska’s Evaluation Results:

Additional Evaluation Specifics:

• Drawing and Documents were available on 94 of homes
• RESCheck documentation was available on 58 homes evaluation
• Verifying the presence of slab edge insulation in homes that are completed required that the "edge" of the insulation be visible which is not typical construction practice in Nebraska, most builders trim the “edge” of the insulation at a 45° as allowed in Section 502.2.1.4 of the Code
• Documentation regarding HVAC load calculations is not collected by any of Nebraska’s local code jurisdictions - this impacts the evaluation negatively by 3.8%
• On-site verification by local jurisdictions that the appropriately sized HVAC equipment is being installed is being installed is not being completed - this impacts the evaluation negatively by 5.7%
• Duct Sealing and Insulation impact the evaluation by 1.25%
As Nebraska looks toward the 2017 deadline we will need to focus on the results of our 64.7% compliance “snapshot”

- Educational needs, direction and scope will be paramount:
  - appropriate documentation submission requirements and review within the local jurisdictions
  - effective air sealing techniques, review and verification by inspectors, raters or entities trained in the use of blower door technologies
  - accurate HVAC sizing, installation and field verification
  - appropriate residential plan development and specification

- Training and informational updates of new technologies and Code options or mandates