Agenda

• PNNL Pilot Study
• Code Enforcement in Wisconsin
• Structure of Compliance Evaluation Work
• Obstacles in Completing Work
• Results
• Recommendations
Background on PNNL Methodology to Measure Compliance

- American Recovery and Reinvestment Act Calls for States to Develop Plan to Achieve 90% Compliance with the 2009 IECC/ASHRAE 90.1-2007
- States Need Methodology/Tool to Measure Compliance
- PNNL Developed Tool to Meet this Need.
Pilot Studies

• PNNL Provided Funding for 10 States to do Pilot Studies on the Methodology.

• Purpose of Pilot Study to Test Drive the PNNL Methodology:
  – How Much Would it Cost
  – How Long Would it Take?
  – What are the Obstacles to Completion?
  – What Problems Could be Identified in the Performing the Evaluations?
PNNL Methodology

• PNNL Protocol calls for Evaluation of 44 New Residential; 44 New Commercial; 44 Existing Residential and 44 Existing Commercial

• Residential and Commercial Checklists Developed for Each Climate Zone

• Evaluation targets chosen Randomly using a Random Site Generator

• Results Inputted into a Tool called “Store and Score” which Generates a Score as well as Aggregating Results to Give Information About the Type of Compliance/Non-Compliance
Background on Wisconsin

• Wisconsin Chosen as One of the Pilot States
• Focus on Evaluation of New Commercial Construction
• Wisconsin Positioned to Meet Aggressive Schedule
• Wisconsin has Experienced/Capable Staff
Enforcement In WI

• WI Codes Uniform and Statewide Includes Energy
• All Plan Reviews done by Building and Safety Division except for Madison, Milwaukee, and Janesville.
• 25 Plan Reviewers @ 5 Regional Offices
• Inspection by 10 State Inspectors supplemented by 220 Delegated Municipalities
• Coordination between State and Delegated Munis
Wisconsin Commercial Code Enforcement

- Plans Submitted to Central Office and Regional Office
- Wisconsin Maintains Database of Submitted Commercial Plans
- Plan Review and Inspection Done by State Inspectors or By Accredited Municipalities
Evaluation Methodology

- Wisconsin Code Agency Used Random Generator to Determine Number of Inspection in a Given County; then Used its Sortable Database to Generate the Specific Project
- 28 Small; 10 Medium; 4 Large and 2 X-Large
  - Original 44 Building Selected Had to be Partially Revised Because Projects Abandoned due to Economy
- Plan Review/Inspections Done by 2\textsuperscript{nd} Parties i.e. State Employees who were not assigned to the specific region.
- Staff Working on Evaluations Specifically Trained on How to Evaluate Level of Compliance in Buildings.
Obstacles to Completion

• Season Mattered. Construction Stopped During the Winter. Made Completion Difficult.

• Evaluation Done During the Recession. Many Construction Projects Abandoned.

• Particularly Large Projects Were not Completed Within Time Frame Given to do Evaluation.
Areas of Compliance/Non-Compliance

• **Highest Compliance Rates**
  – Heating and Cooling to Each Zone Controlled by Thermostat Control
  – Temperature Controls have Following Features: dead band controls, setpoint overlap, off-hour controls, automatic shutdowns and setback controls
  – Installed Lamps and Fixtures Consistent w/ Lighting Drawings

• **Lowest Compliance Rates**
  – Fenestration and Doors Labeled for Air Leakage
  – Fenestration Products Rated in Accordance with NFRC
  – Insulation on Automatic Circulating Hot Water Systems and First Eight Feed of Non-Circulating Systems w/o Integral Heat Traps

• **Most Frequently Not Observed**
  – Doors/Fenestration Meeting Maximum Air Leakage Requirements
  – Return Air and Outdoor Air Dampers Meet Minimum Leakage Requirements.
Observations

• 98% of Projects Used ComCheck
• Use Minimum Number of Auditors to Conduct Study
• Use Two Different Time Spans (Small vs. Large Projects)
• Train Inspectors to Pay Attention to Small Details
• Compare HVAC and Envelope Calculation
• Pay Attention to Potential Problems in R-value (comparison between plans and ComCheck worksheet)
Recommendations

• Rearrange Checklist to Include Both Plan Review and Inspections
• Edit Sheets to Match IBC Requirements
• Allow for the use of Different R-Values/U-Values for Different Sections of an Element
• Avoid Use of Negative Questions
• Allow for On-Site Visual Inspections
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