

Technical Assistance: Increasing Code Compliance

2014 Building Technologies Office Peer Review



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

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Project Summary

Timeline:

Multi-year program in support of DOE statutory requirements

Key Milestones:

1. REScheck Update Including Enhancements (Aug 2014)
2. 90.1-2013 Training Materials (Aug 2014)
3. Revised Compliance Methodology (Sept 2014)
4. 2015 IECC Training Materials (Dec 2014)
5. COMcheck Update Including Support for 90.1-2013 (Jan 2015)
6. State-Level Code Benefit Assessment (Feb 2015)

Budget:

Total DOE \$ to date:

FY12	FY13	FY14
\$3.9M	\$1.8M	\$1.8M

Total future DOE \$: TBD

Target Market/Audience:

Policymakers, code officials, designers, industry, builders, home and building owners

Key Partners:

Code implementation stakeholders: (e.g., states, national/regional organizations)

Program Goal:

Near-term goal is to assist states and localities in adopting, complying with, and enforcing the model energy codes resulting in higher-performing buildings that maximize cost-effective energy savings.

Mid-term goal is to achieve primary energy savings of 1.1 quads annually by the year 2020, representing a cumulative savings of 10.2 quads.

PNNL's Technical Support

Development

Standard 90.1
International Energy Conservation Code (IECC)
Analysis supporting DOE code proposals and Determinations

Adoption

Collaboration with stakeholders
State technical assistance
State-level energy & cost analysis
Code impacts analysis

Compliance

Guidance to states
Compliance software tools & resources
Help Desk
Online and in-person trainings

U.S. Department of Energy | Energy Efficiency & Renewable Energy | Building Technologies Program

Measuring State Energy Code Compliance

REPORT released March 2010
subject to further development

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U.S. Department of Energy | Energy Efficiency & Renewable Energy

Measuring State Energy Code Compliance

Step-by-Step Companion Guide

Building Energy Codes

General building information only required if different than above

Date: _____ Name of Evaluator(s): _____ Building ID: _____

Building Contact (optional): Name _____ Phone _____ Email _____

Building Name _____ Address _____ Conditioned Floor Area _____

Compliance Approach (check all that apply): Prescriptive Trade-Off Performance

2012 IECC Section #	Foundation Inspection	Prescriptive Code Value	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
402.1.1 [FO1]	Slab edge insulation R-value	Unheated R-10 Heated R-15	R _____ Unheated <input type="checkbox"/> Heated <input type="checkbox"/>	R _____ Unheated <input type="checkbox"/> Heated <input type="checkbox"/>	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
302.2, 402.2.9 [FO2]	Slab edge insulation installed per manufacturer's instructions		Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.1 [FO3]	Slab edge insulation depth/height	2 ft	R _____	R _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.1 [FO4]	Conditioned basement wall insulation R-value. Where thermal insulation is used, verification may need to occur during inspection. Not required if earth/foundation locations in Climate Zone 3.	Continuous R-15 Cavity R-19	R _____ R _____	R _____ R _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
302.2 [FO5]	Conditioned basement wall insulation installed per manufacturer's instructions		Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.2.8 [FO6]	Conditioned basement wall insulation depth of board or distance from top of wall	10 ft or to basement floor	R _____	R _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.2.10 [FO7]	Unvented crawl space wall insulation R-value	Continuous R-15 Cavity R-10	R _____ R _____	R _____ R _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
302.2 [FO8]	Unvented crawl space wall insulation installed per manufacturer's instructions		Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.2.10 [FO9]	Unvented crawl space continuous vapor retarder installed over exposed earth, joints overlapped by 6 in. and sealed, extending at least 6 in. up and attached to the wall.		Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.2.10 [FO10]	Unvented crawl space wall insulation depth of board or distance from top of wall	To finished grade, 1/2 in. vertical and/or horizontal	in _____	in _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
302.2.1 [FO11]	A protective covering is installed to protect exposed exterior insulation and extends a minimum 6 ft in. below grade.		Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.8 [FO12]	Smoke and fire-blocking system controls installed.		Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	Comply <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable <input type="checkbox"/>	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not Comply <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

U.S. Department of Energy | Energy Efficiency & Renewable Energy | BUILDING TECHNOLOGIES PROGRAM

ACE

ADOPTION, COMPLIANCE & ENFORCEMENT

LEARNING SERIES

Building Energy Codes OVERVIEW



PNNL's Approach

Provide tools to increase code compliance and thereby realize actual energy savings

- Continue to implement the latest codes/standards into *REScheck* and *COMcheck*
- Use *REScheck* and *COMcheck* to streamline the energy code compliance process
- Revise the compliance evaluation methodology based on stakeholder feedback
- Provide education and training materials in support of the most recent building energy codes
- Provide technical analysis of field-collected data

Key Issues and Distinctive Characteristics

Key Issues:

- Energy codes typically have a lower priority in jurisdictions than other codes as they do not qualify as life-health-safety
- Energy savings associated with the energy codes are only realized with actual compliance with the requirements
- As the codes become more complex, compliance challenges increase

Distinctive Characteristics:

- Leverage extensive codes domain knowledge across all key program areas: development, adoption, and compliance
- Expand the use of existing, successful compliance tools (*REScheck* and *COMcheck*) to streamline the process and increase compliance
- Establish a quantitative relationship between investment and return related to energy code compliance

Progress and Accomplishments

Three key activities aimed at increasing energy code compliance

- Compliance tools (*REScheck* and *COMcheck*)
- Streamlined compliance process
- Revised compliance evaluation methodology

Progress and Accomplishments

Compliance Tools

FY13:

- Implemented IECC and 90.1 mandatory requirements into the *REScheck* and *COMcheck* user interfaces (previously only in reports)
 - Ensures submitters are aware of mandatory requirements
- Added additional support for difficult code requirements in *COMcheck*
 - Fan systems
 - Fenestration performance

FY14:

- Implement 90.1-2013 in *COMcheck* (including the new envelope tradeoff compliance option based on whole building energy simulation)

Progress and Accomplishments

Streamlined Compliance Process

Realign and enhance current Check tools to

- Eliminate data duplication between various states of demonstrating, documenting, and ensuring compliance
- Maintain an audit trail of plan review and field inspection actions
- Enable access to project and compliance data for analysis

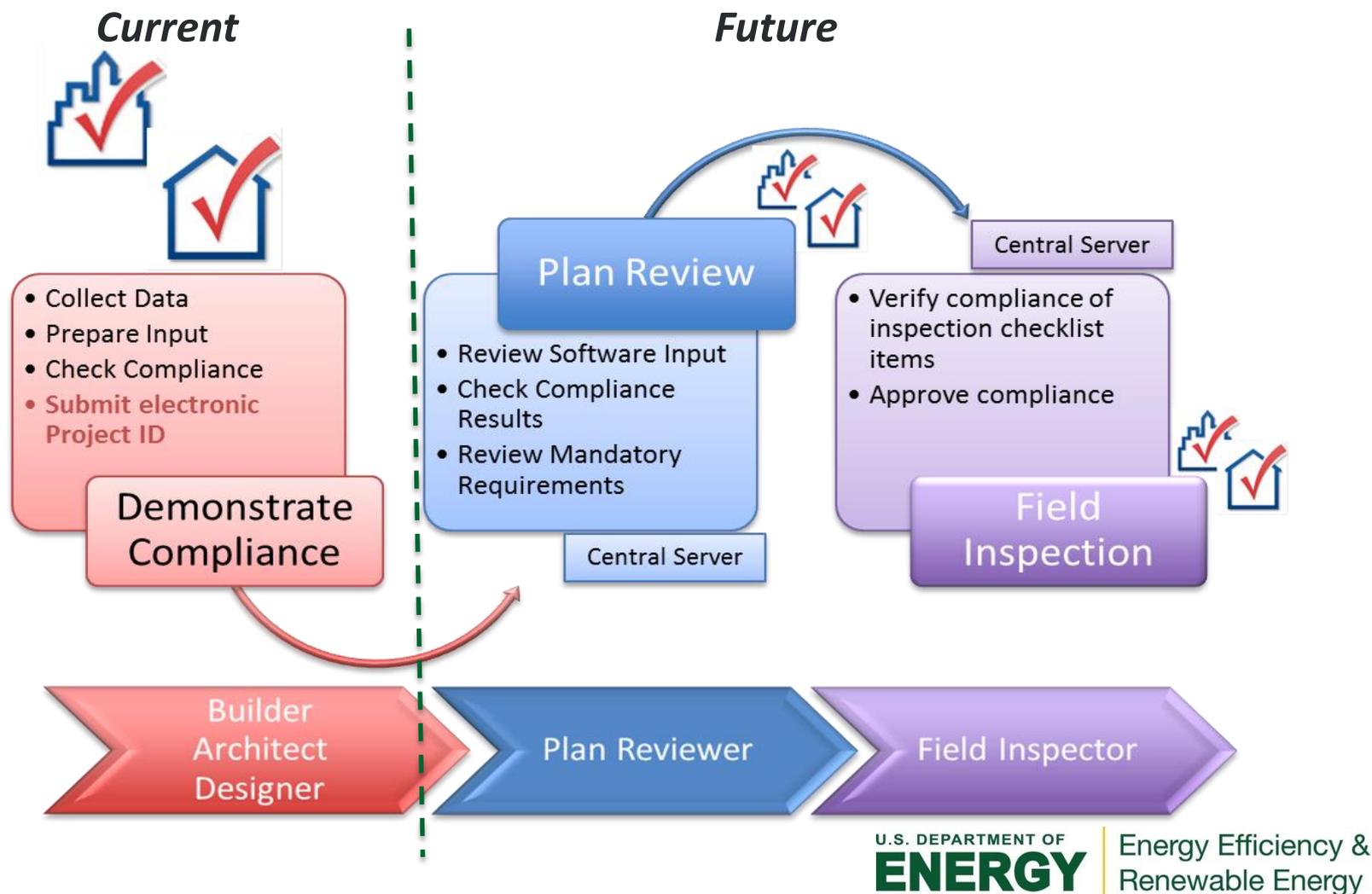
Progress and Accomplishments

Streamlined Compliance Process (cont'd)

- Presented the concept to a total of over 100 stakeholders at four events
 - Idaho Codes Collaborative, Sept 2013
 - Nevada Codes Collaborative, Sept 2013
 - Nebraska Codes Collaborative, Sept 2013
 - NEEP Annual In-Person Codes Working Group, Oct 2013
- Overall, received positive response to the concept
- Some concerns expressed
 - Keep *REScheck* and *COMcheck* easy to use and as unchanged as possible for existing users not yet ready to take advantage of additional functionality
 - Will be several years before some jurisdictions will be ready to take advantage of additional functionality
 - Provide project-specific checklists
 - Keep data secure

Progress and Accomplishments Streamlined Compliance Process (cont'd)

PNNL's Compliance Tools Long-Term Strategy



Progress and Accomplishments

Streamlined Compliance Process (cont'd)

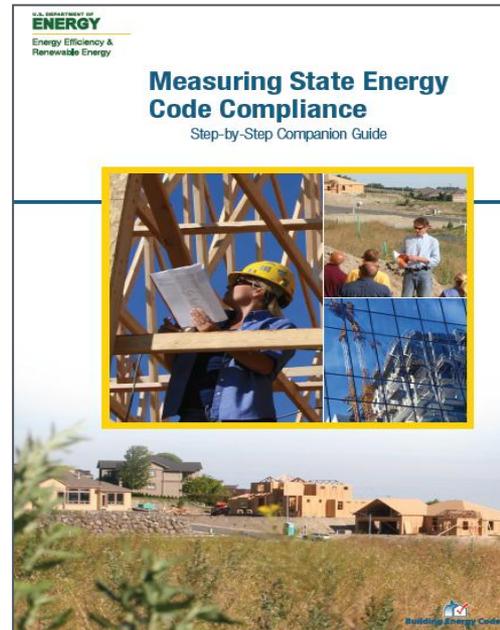
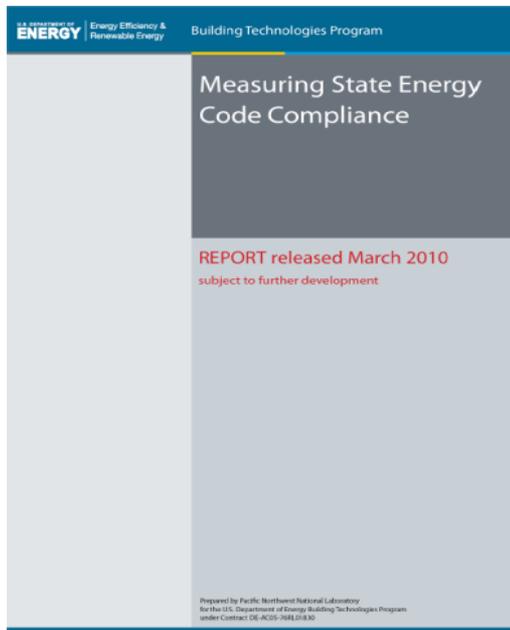
Data Benefits

- Assess compliance across a jurisdiction, state, region, or nationally
- Identify problem areas associated with compliance and target training and technical support to resolve the issues
- Assess geographic construction trends

Progress and Accomplishments Compliance Methodology

Developed current methodology (March 2010)

- Developed as a method states could use for code compliance evaluations under the Recovery Act
- Used in 8 pilot studies in 9 states
- Used (in part) in several state compliance studies
- Received feedback from pilot study participants



<http://www.energycodes.gov/compliance/evaluation>

Progress and Accomplishments Compliance Methodology (cont'd)

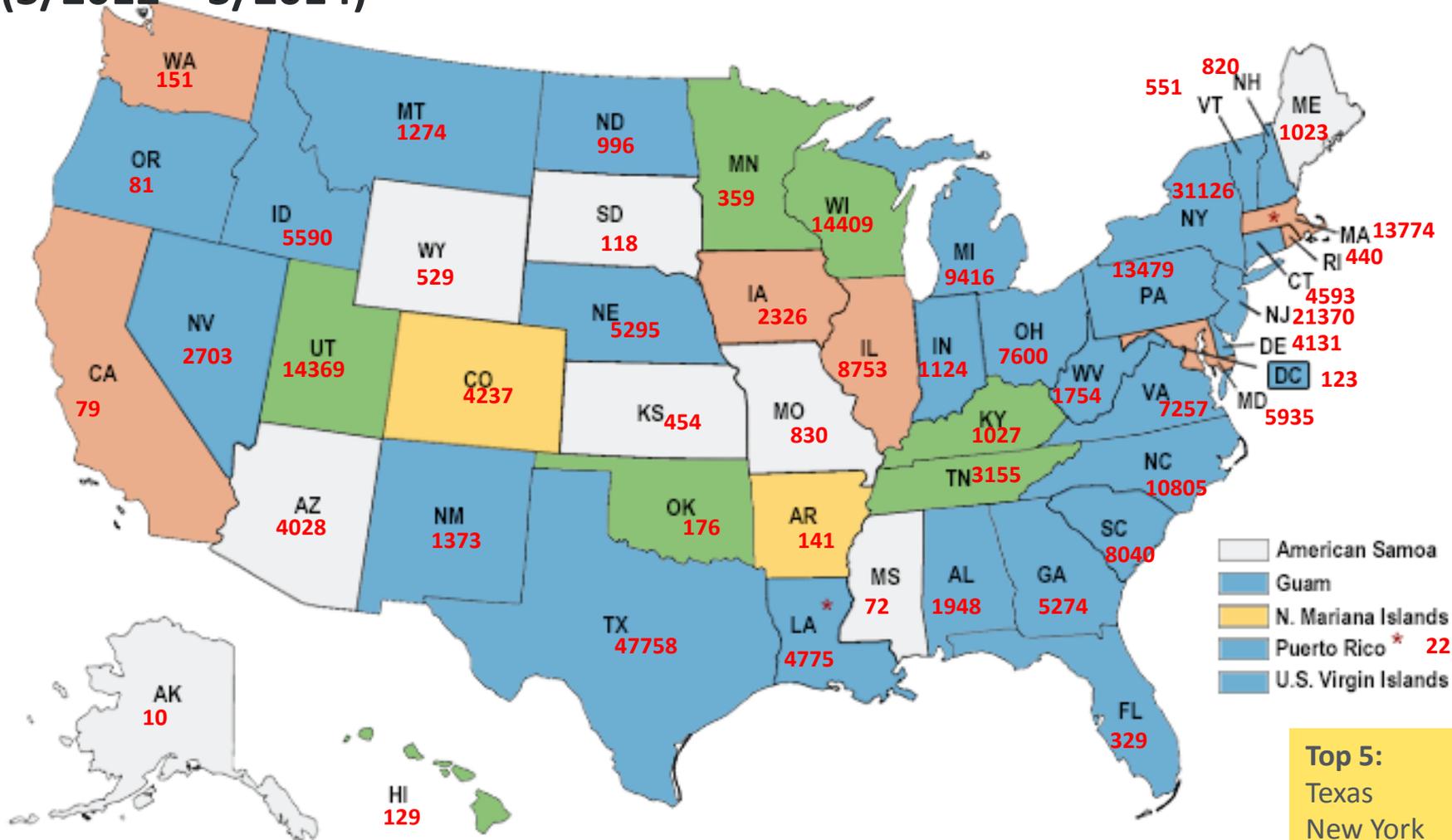
Received and reviewed stakeholder input on compliance methodology via Request for Information (September 2013)

- 376 comments from 39 commenters
- Commenters represent a wide range of stakeholders, including
 - Build/design community
 - States
 - Consultants
 - Inspectors/raters
 - REEOs
 - Utility organizations
 - Manufacturers
 - Advocates

Common themes in RFI responses:

- There are a number of roles for DOE to play in compliance evaluation
- Compliance evaluation is costly and lack of resources is a key barrier
- Modifications are needed to the existing compliance evaluation methodology
- REScheck/COMcheck software is a good starting point for demonstrating energy code compliance
- More training is needed, especially for tradespeople and others who actually build the buildings

Market Impact: REScheck Projects by State (3/2012 – 3/2014)



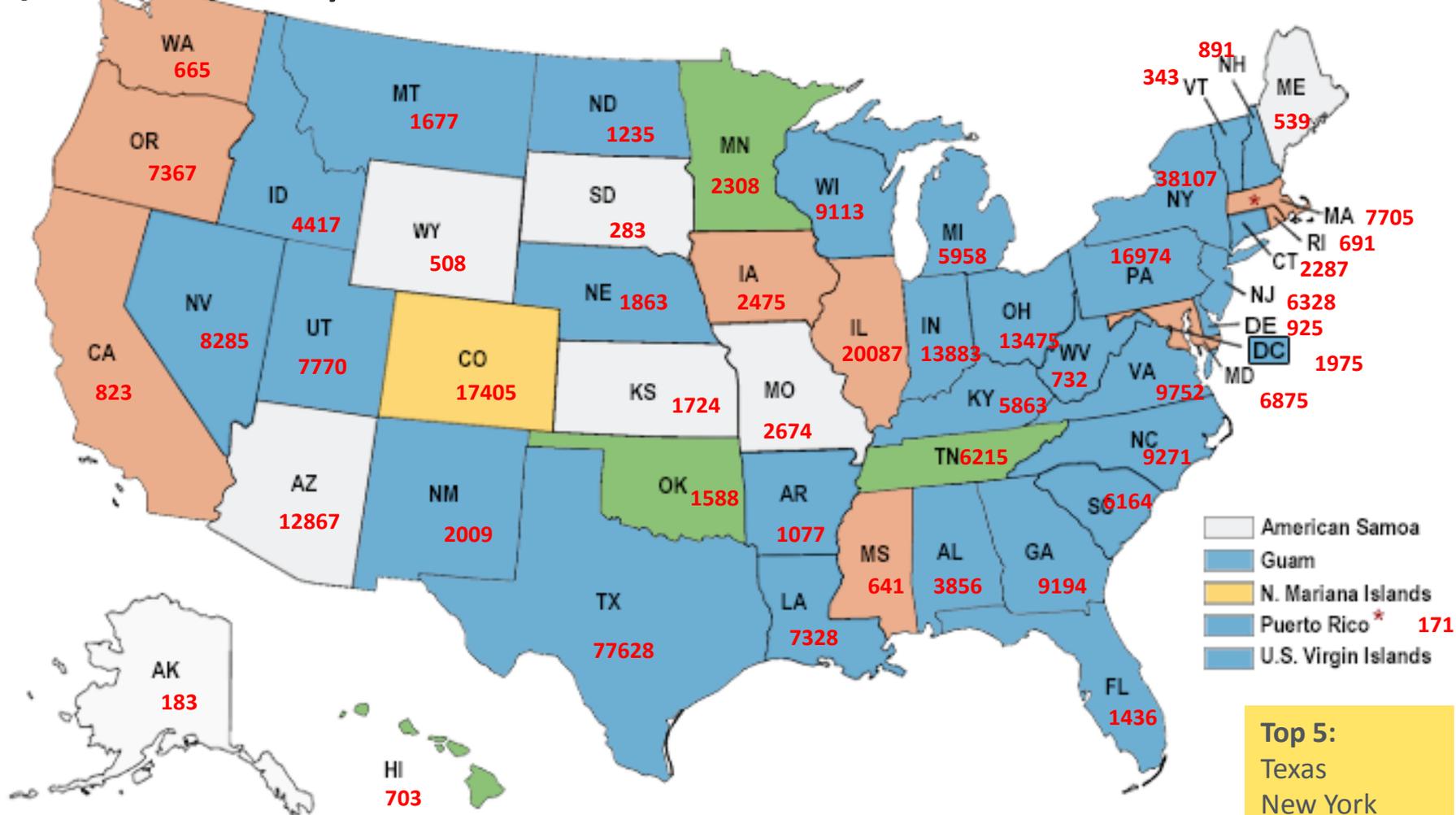
Top 5:
 Texas
 New York
 New Jersey
 Wisconsin
 Utah

7 IECC 2012, equivalent or more energy efficient	29 IECC 2009, equivalent or more energy efficient	8 IECC 2006, equivalent or more energy efficient
3 IECC 2003, equivalent or less energy efficient	9 No Statewide Code	

Total projects = 276,131

As of March 2014

Market Impact: COMcheck Projects by State (3/2012 – 3/2014)



- American Samoa
- Guam
- N. Mariana Islands
- Puerto Rico*
- U.S. Virgin Islands

Top 5:
 Texas
 New York
 Illinois
 Colorado
 Pennsylvania

9	ASHRAE 90.1-2010/2012 IECC equivalent or more energy efficient	33	ASHRAE 90.1 - 2007/2009 IECC equivalent or more energy efficient	4	ASHRAE 90.1 - 2004/2006 IECC equivalent or more energy efficient
2	ASHRAE 90.1 - 2001/2003 IECC equivalent or less energy efficient	8	No Statewide Code		

Total projects = 364,323

As of March 2014

Recognition

Compliance Tools

“...on the credibility aspect the fact that REScheck and COMcheck are DOE tools is something the private side cannot match. Even in conservative states and users, they respect the credibility of DOE.”

- *Isaac Elnecave, MEEA*

“...the COMcheck software has been a good and valuable resource for evaluating compliance with energy code...”

- *Joe Chappell, Design Engineers*

Compliance Methodology

- “The Iowa evaluators followed the BECP procedures and tools closely in completing site evaluations, and felt they were easy to use, clear, and understandable”
- “The checklists developed by BECP were valuable tools for third-party evaluators, and could be valuable tools for state and local staff involved in code compliance during their normal course of code enforcement”

Integration and Collaboration

- Provide objective information resources and technical guidance to states and localities to increase code compliance
- Actively engage stakeholders across the build community through various mechanisms to get immediate market feedback
- Participate with NASEO, BCAP, and the REEOs in the National Energy Codes Collaborative
- Provide training at key events and collect participant feedback on BECP resources
- Communicate planned activities in meetings, webinars, and on program's website
- Leverage extensive codes domain knowledge internally across all key BECP areas: development, adoption, and compliance
- Collaborate across BTO programs including CBI (e.g., fenestration performance in *COMcheck*) and Building America (Codes and Standards Innovation)

Next Steps and Future Plans

Compliance Tools

- Implement 90.1-2013 in *COMcheck*
- Implement 2015 IECC in *REScheck*

Streamlined Compliance Process

- Develop code officials' user interface
- Revise database structure to accommodate plan review and field inspection data

Compliance Methodology

- Revise current methodology based on stakeholder feedback, including an energy metric
- Request stakeholder feedback on revised methodology
- Finalize revised methodology for state energy code compliance

REFERENCE SLIDES

Project Budget

Project Budget: see table below

Cost to Date: \$640K (October 2013 through March 2014)

Budget History					
FY2013 (past)		FY2014 (current)		FY2015 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
\$1.8M	\$0	\$1.8M	\$0	TBD	\$0

Project Plan and Schedule

Project Schedule												
	Completed Work											
	Active Task (in progress work)											
	Milestone/Deliverable (Originally Planned)											
	Milestone/Deliverable (Actual)											
	FY2014				FY2015				FY2016			
Task	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)
Current/Future Work												
Q4 Milestone: REScheck Update Including Enhancements												
Q4 Milestone: Revised Compliance Methodology												
Q4 Milestone: 90.1-2013 Training Materials												
Q1 Milestone: 2015 IECC Training Materials												
Q2 Milestone: COMcheck Update Supporting 90.1-2013												
Q2 Milestone: State-Level Code Benefit Assessment												