BUILDING ENERGY CODES

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Compliance with Energy Codes

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Presentation Overview

Purpose: To provide an update on DOE Building Energy Code Program (BECP) activities that are related to *compliance* with building energy codes

- Compliance Pilot Studies
- Compliance Path Report
- Available BECP Compliance Resources

Expected Outcome: Increased understanding and use of results to enhance energy code compliance

How do we determine compliance with energy codes and where are we now? Better off?

What is *Compliance*?

By Definition:

"Realization that what is desired has been achieved"

In Our World:

"A building is designed, constructed, commissioned and operated to satisfy all mandated regulations and stated requirements"

com·pli·ance *noun* \kəm-ˈplī-ən(t)s\

Definition of COMPLIANCE

1 **a :** the act or process of complying to a desire, demand, proposal, or regimen or to coercion

b : conformity in fulfilling official requirements

2 **:** a disposition to yield to others

3 **:** the ability of an object to yield elastically when a force is applied **:** FLEXIBILITY

See compliance defined for English-language learners »
See compliance defined for kids »

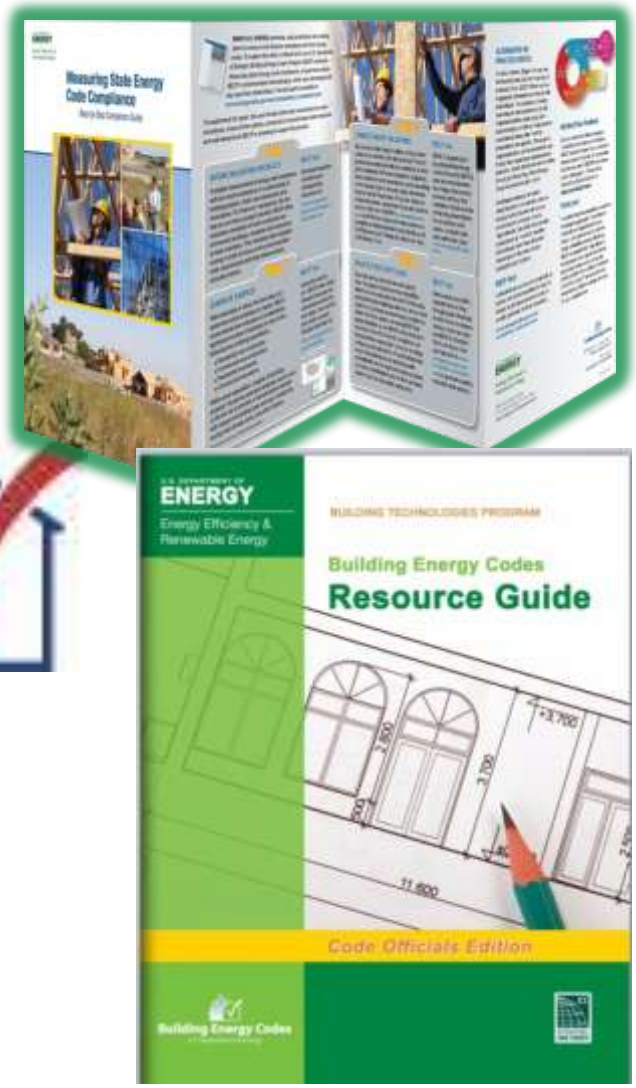
Examples of COMPLIANCE

- She was rewarded for her *compliance*.
- There has been a low rate of *compliance* with the new law.

Compliance Resources

BECP guidelines and tools to use in measuring compliance with building energy codes:

- ✓ foster uniformity and objectivity in measuring compliance rates
- ✓ eliminate need for each state to develop their own procedures and tools
- ✓ provide tools that states can adapt for their own preferred use



Compliance Resources

- **Procedures** for measuring compliance – *"Measuring State Energy Code Compliance"*
- A short companion step-by-step **"quick-start" guide** summarizing these procedures
- **Informational flyers** to help states approach jurisdictions to schedule an onsite evaluation
- A **jurisdictional survey** for evaluating compliance related processes at each jurisdiction
- The **Sample Generator** online tool to be used for generating a valid sample set
- Compliance evaluation **checklists and instructions** tailored to various codes and standards
- The **Score and Store** online tool for collecting, storing, and analyzing the resulting onsite evaluation data, and for calculating state-wide scores

Compliance Resources

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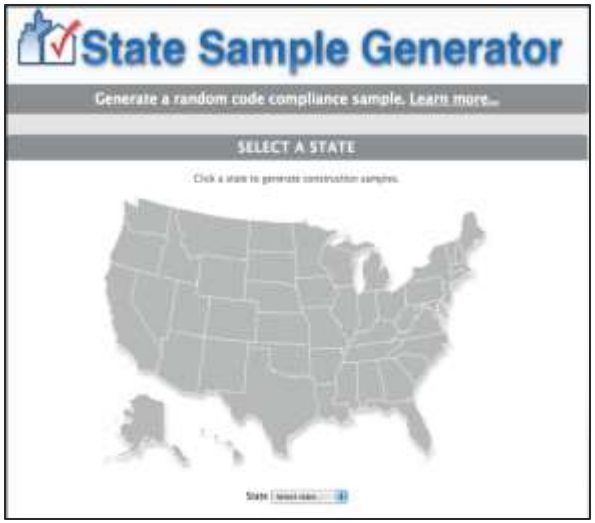

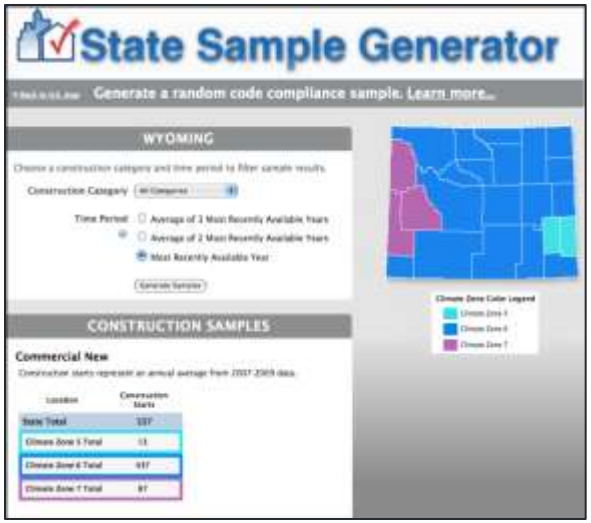

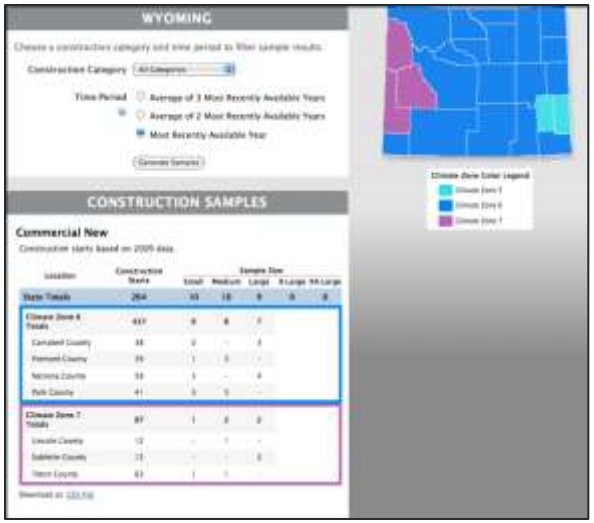

Web-based application provides *statistically valid random sampling* guidance for states by county based on construction start data:

http://energycode.pnl.gov/SampleGen/

Compliance Resources

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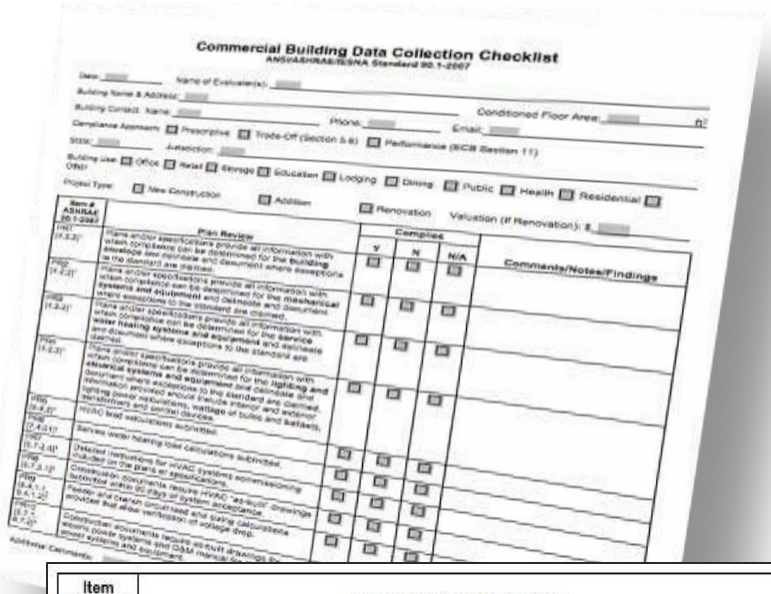
Compliance Checklists:

- Determine installed energy efficient features comply with a code or standard provision

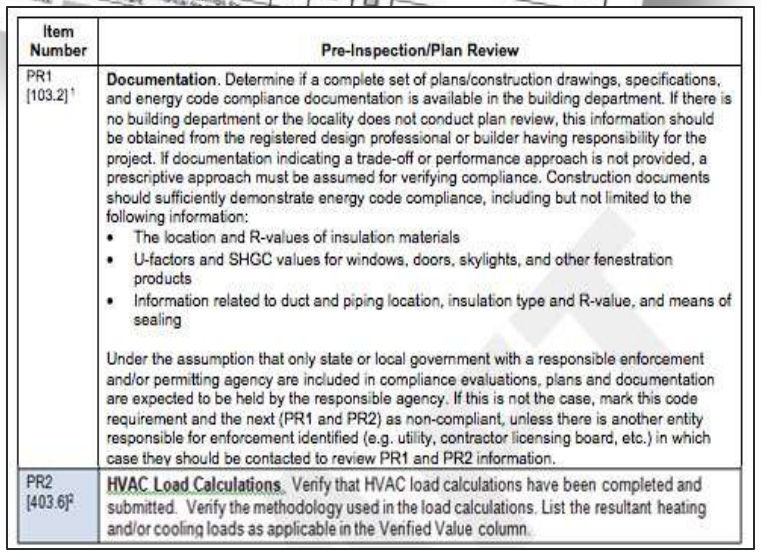
- Based on typical construction progression and inspections
  - Plan review, foundation, rough-in, final

- Developed and available for:
  - *ASHRAE Standard 90.1*-2004 and *2007*
  - *IECC 2009* (Residential)
  - IECC 2006 (Residential)
  - IECC 2009 (Commercial)
  - IECC 2006 (Commercial)


Commercial Building Data Collection Checklist

ANSI/ASHRAE/IESNA Standard 90.1-2007

Item # ASHRAE 90.1-2007	Plan Review	Complies Y	Complies N	Complies N/A	Comments/Notes/Findings
	Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.				
	Plans and/or specifications provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed.				
	Plans and/or specifications provide all information with which compliance can be determined for the service water heating systems and equipment and document where exceptions to the standard are claimed.				
	Plans and/or specifications provide all information with which compliance can be determined for the lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Lighting power calculations, including interior and exterior luminaires and general diagram.				
	HVAC load calculations submitted.				
	Service water heating load calculations submitted.				
	Detailed instructions for HVAC systems commissioning included on the plans and specifications.				
	Commissioning documents require HVAC "as-built" drawings submitted within 90 days of system acceptance.				
	Balancing and shutdown instructions for HVAC systems provided but allow verification of voltage drop.				
	Construction documents require exit signs and lighting controls, power systems and O&M manuals.				



Item Number	Pre-Inspection/Plan Review
PR1 [103.2][1]	**Documentation.** Determine if a complete set of plans/construction drawings, specifications, and energy code compliance documentation is available in the building department. If there is no building department or the locality does not conduct plan review, this information should be obtained from the registered design professional or builder having responsibility for the project. If documentation indicating a trade-off or performance approach is not provided, a prescriptive approach must be assumed for verifying compliance. Construction documents should sufficiently demonstrate energy code compliance, including but not limited to the following information: • The location and R-values of insulation materials • U-factors and SHGC values for windows, doors, skylights, and other fenestration products • Information related to duct and piping location, insulation type and R-value, and means of sealing Under the assumption that only state or local government with a responsible enforcement and/or permitting agency are included in compliance evaluations, plans and documentation are expected to be held by the responsible agency. If this is not the case, mark this code requirement and the next (PR1 and PR2) as non-compliant, unless there is another entity responsible for enforcement identified (e.g. utility, contractor licensing board, etc.) in which case they should be contacted to review PR1 and PR2 information.
PR2 [403.6][2]	**HVAC Load Calculations.** Verify that HVAC load calculations have been completed and submitted. Verify the methodology used in the load calculations. List the resultant heating and/or cooling loads as applicable in the Verified Value column.

Compliance Resources

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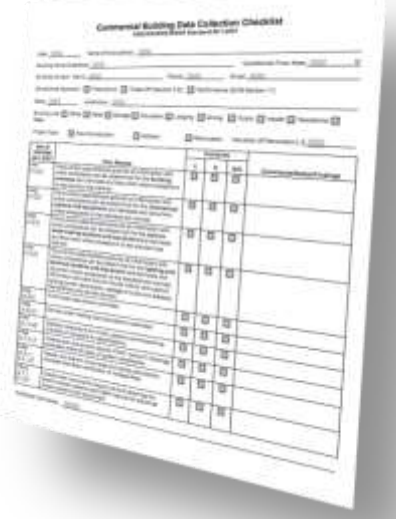
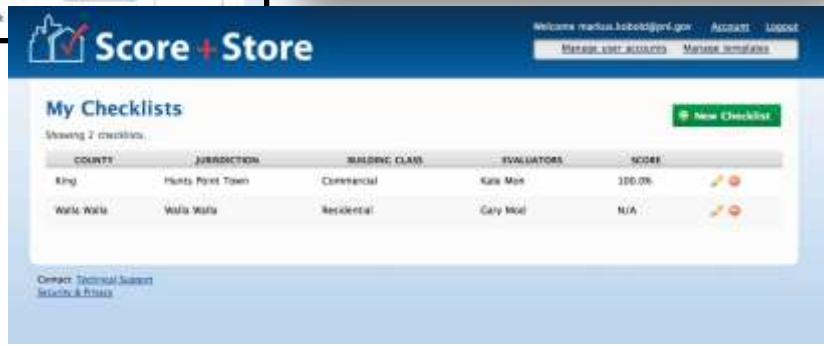
Score and Store™





- Web application collects building evaluation data gathered
- Data scoring and analysis across states

www.energycodes.gov/ScoreStore/login

Project Spotlight

Topic: Building Energy Code Compliance

1. Compliance Pilot Studies
2. Compliance Path Report

Project Spotlight

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1. **Compliance Pilot Studies**
2. Compliance Path Report

Compliance Pilot Studies

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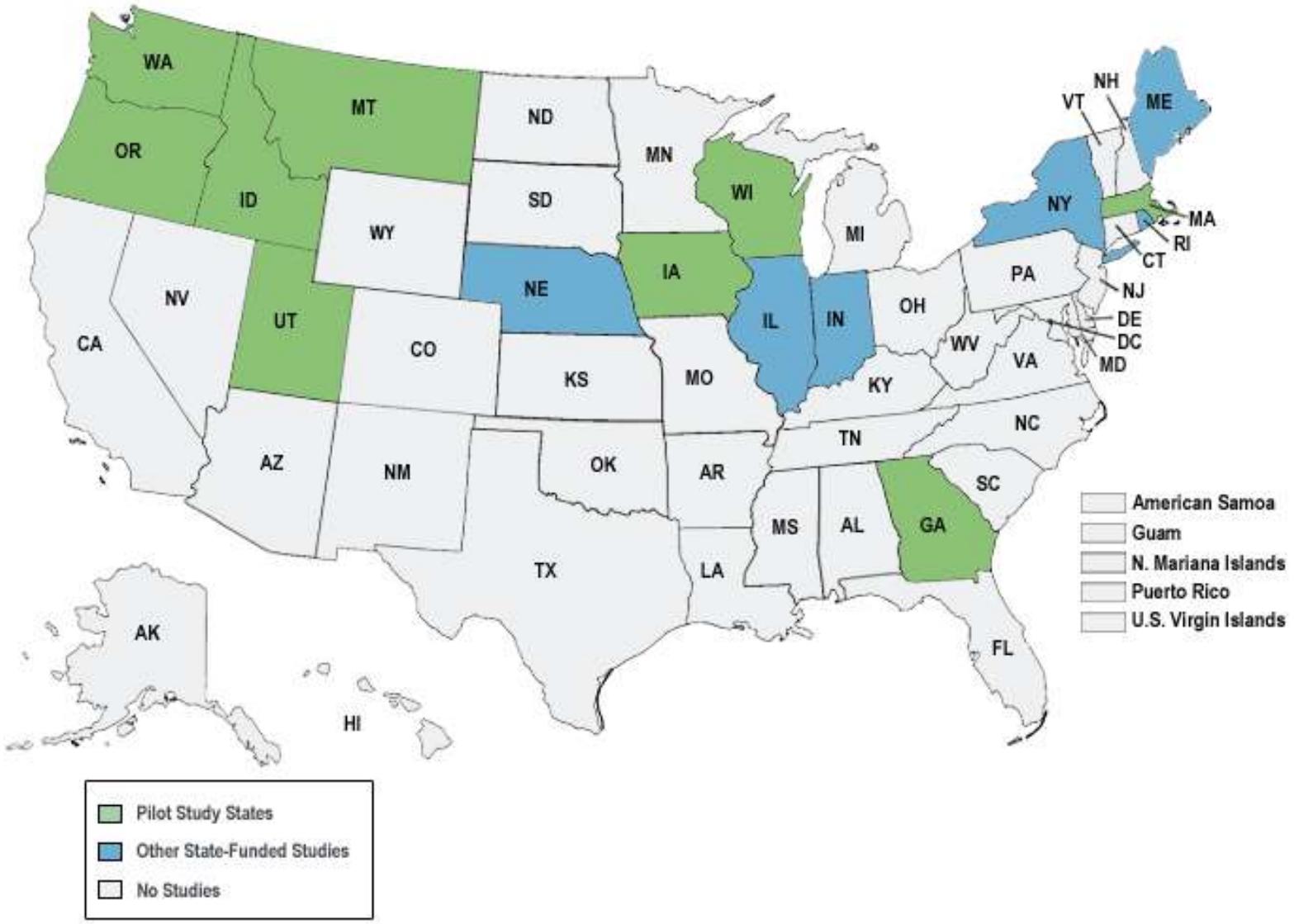

Compliance Pilot Studies

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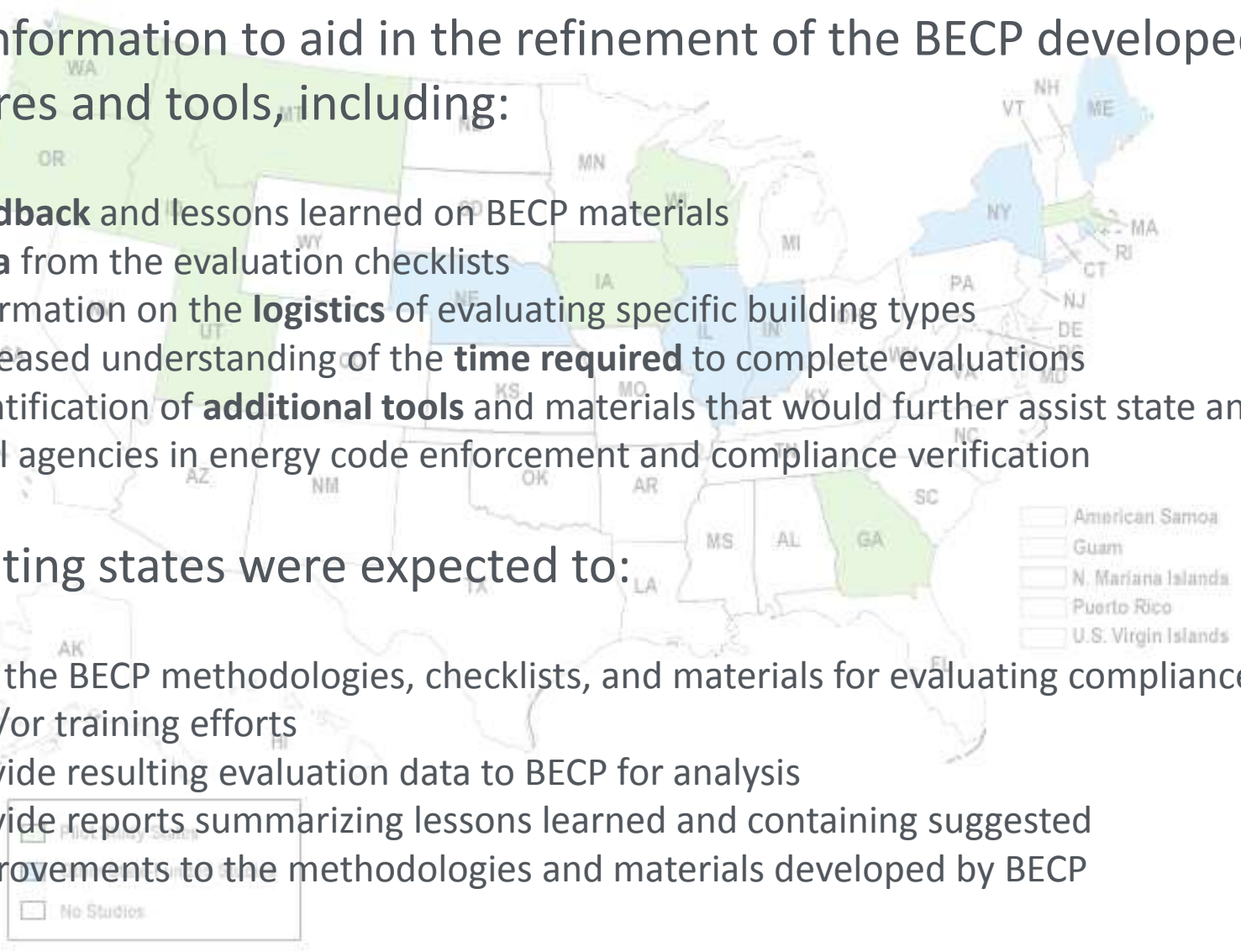
Secure information to aid in the refinement of the BECP developed procedures and tools, including:

- **Feedback** and lessons learned on BECP materials
- **Data** from the evaluation checklists
- Information on the **logistics** of evaluating specific building types
- Increased understanding of the **time required** to complete evaluations
- Identification of **additional tools** and materials that would further assist state and local agencies in energy code enforcement and compliance verification

Participating states were expected to:

- Use the BECP methodologies, checklists, and materials for evaluating compliance and/or training efforts
- Provide resulting evaluation data to BECP for analysis
- Provide reports summarizing lessons learned and containing suggested improvements to the methodologies and materials developed by BECP



Compliance Pilot Studies

***Goal**: Enhance BECP tools and procedures based on feedback*

BECP final report aggregating results and summarizing findings:

- Most commonly found code "passes" and "fails"
- Code requirements most often unable to observe
- Evaluation times and level of effort to conduct a building compliance assessment
- Alternative approaches for compliance verification taken by states
- Summarized/aggregated results from survey and inspection data
- Analysis of the data, to include summarization of compliance rates by building type, size and system across various states

Better understanding for participating states:

- Their compliance rates and individual jurisdiction/state needs
- Where training might be appropriately focused

Identification of common code compliance issues:

- Inform states on where to focus compliance efforts
- Identify potential issues with the code itself

Compliance Pilot Studies

Initial Overall Study Results:

- Residential Compliance – 70 to 87%
- Commercial Compliance – 80 to 95%

Results still being submitted, assessed and aggregated

Additional results from non-pilot states also being added

Final report expected available October 2011

Compliance Pilot Studies

Project Findings:

- Studies to measure and express rates of compliance can be costly
- In an effort to reduce costs, post-construction evaluations were implemented but may necessitate development of alternative assessment procedures
- Access to buildings under construction is a major problem in some locations, and a potential source of bias, addressed by early engagement with local government to secure their cooperation
- Timing of onsite visits is difficult for evaluators other than state or local agency staff
- Consistency is difficult to obtain across studies and across individual evaluators suggesting the need for evaluator training and appropriate quality assurance to ensure consistent results
- Even with quality assurance, some code requirements are extremely subjective and difficult to quantify as meeting or failing code

Compliance Pilot Studies

- Some data sources that are appropriate for generating sample sets are not accurate or those needed are not available
- Valid sample sets were more difficult to create due to the impact of the economy on construction and the fact that new housing starts are significantly lower than past data predicts
- The checklists developed by BECP for third party evaluators were deemed valuable tools for jurisdictional enforcement staff as well
- Enhancements to the Score and Store tool could grow the utility of the tool and provide value for other related energy code efforts
- The top barrier to compliance is availability of training, followed by lack of resources and lack of compliance information on submitted plans and specifications
- Additional guidance and instructions may be needed for BECP procedures and tools, including suggestions for quality assurance of information submitted by evaluators

Project Spotlight

Topic: Building Energy Code Compliance

1. Compliance Pilot Studies
2. **Compliance Path Report**

Compliance Paths Report

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Purpose: Explore processes, or paths, for ensuring compliance with building energy codes

Expected Outcomes:

Enhance compliance verification approaches associated with traditional prescriptively based codes.

Recommendations for new approaches to drive identification and development of new paths through which compliance can be verified and/or enhanced

Status: *Final Report to be released October 2011*

Variables Affecting a Compliance Path:

- Means of code adoption
- Scope of the code
- Code format
- Responsible party for validating compliance
- Methods for verifying compliance
- Project stages when compliance verification is necessary
- Existence of penalties and incentives
- Available resources to support compliance
- Level of compliance desired

Compliance Paths Report

Sample Paths:

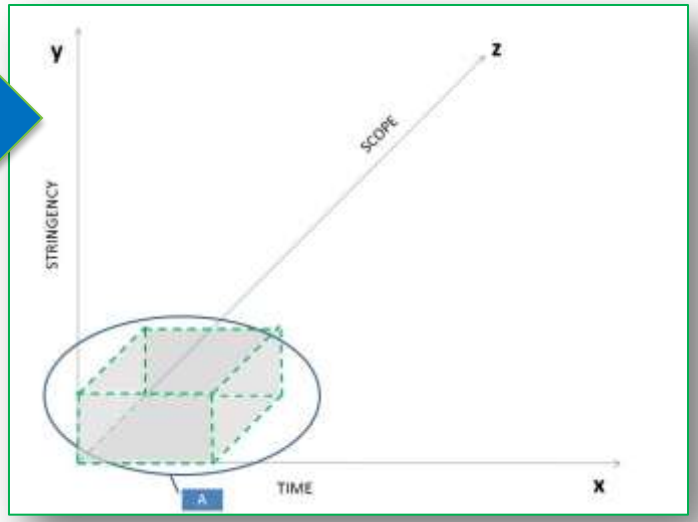
- *Traditional* scope, format, adoption, plan review and construction inspection (typically prescriptive-based—possible performance or tradeoff avenue)
- Traditional with Peer Review
- Traditional with Self Certification
- Adoption and Compliance through Licensing
- Adoption and Compliance through Utility Service
- Compliance through Voluntary Sector Programs that exceed minimum code

Compliance Paths Report

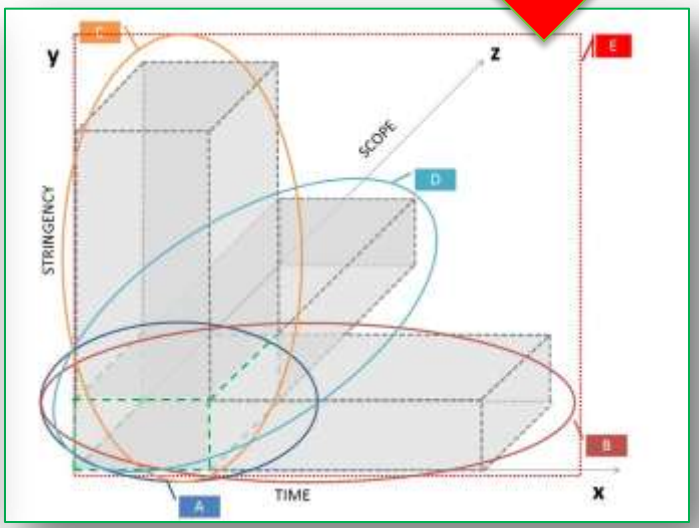
New Formats = New Compliance Paths

- Outcome Based Energy Use Intensity
- Energy Use Capacity Limits
- Design, Construction and Energy Performance Disclosure
- Accreditation by Joint Commission

Traditional



New



BECP Resources

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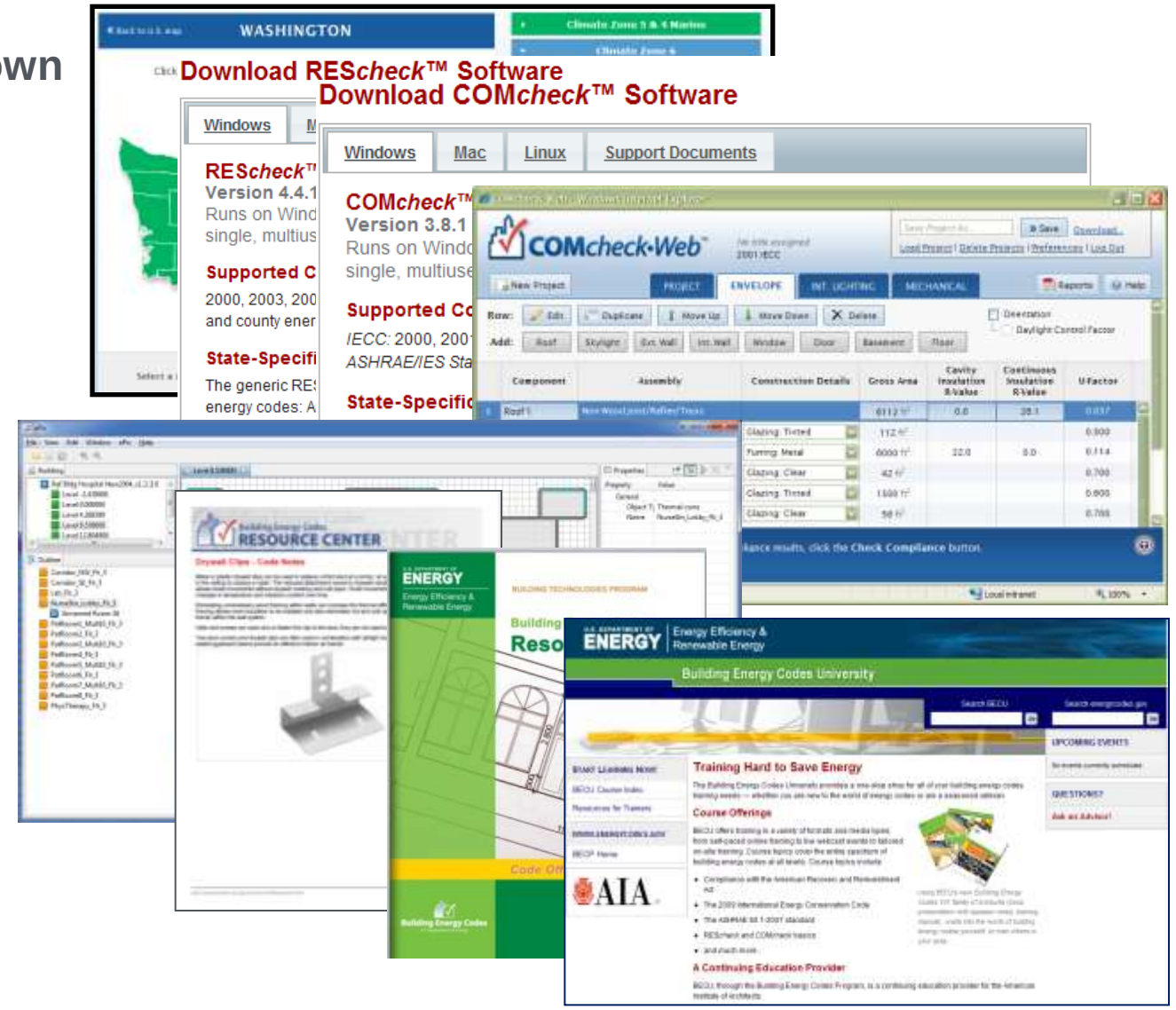
- Prescriptive drill down
- Software
- Web-based tools
- COMcheck Plus
- Technical support
- Publications
- Code notes
- Resource guides
- Training programs



Thank You.

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