DOE Technical Assistance Program

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

The Parker Ranch installation in Hawaii

Energy Code Compliance and Enforcement Best Practices

October 14th, 2010 - 2:00-3:00 PM EST

Jim Meyers, Eric Makela, Bruce Dimmig

Southwest Energy Efficiency Project

Pacific Northwest National Laboratory

PROject Resource Origins

- Facilitated by: Curtis Framel, SWEEP

Webinar Overview

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

- Technical Assistance Project (TAP) Overview
- Part 1: Assess Current Practices
- Part 2: Compliance Best Practices
- Part 3: Enforcement Best Practices
- Resources
- Q&A

Logistics

- Questions and discussion after presentation
- Have your questions ready
- To ask a question/make a comment
  - If you want facilitator to read your question – Type your question in “questions” box, specify speaker to address
  - If you want to speak – use “Raise hand” function *and* type question in “questions” box, when you are recognized you will be un-muted

What is TAP?

DOE's Technical Assistance Program (TAP) supports the Energy Efficiency and Conservation Block Grant Program (EECBG), the State Energy Program (SEP) and the Better Buildings grantees by providing state, local, and tribal officials the tools and resources needed to implement successful and sustainable clean energy programs.

How Can TAP Help You?

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TAP offers:

- One-on-one assistance
- Extensive online resource library, including:
  - Webinars
  - Events calendar
  - TAP Blog
  - Best practices and project resources
- Facilitation of peer exchange

On topics including:

- State and local capacity building
- Energy efficiency and renewable energy technologies
- Program design and implementation
- Financing
- Performance contracting

Provider Network Resources

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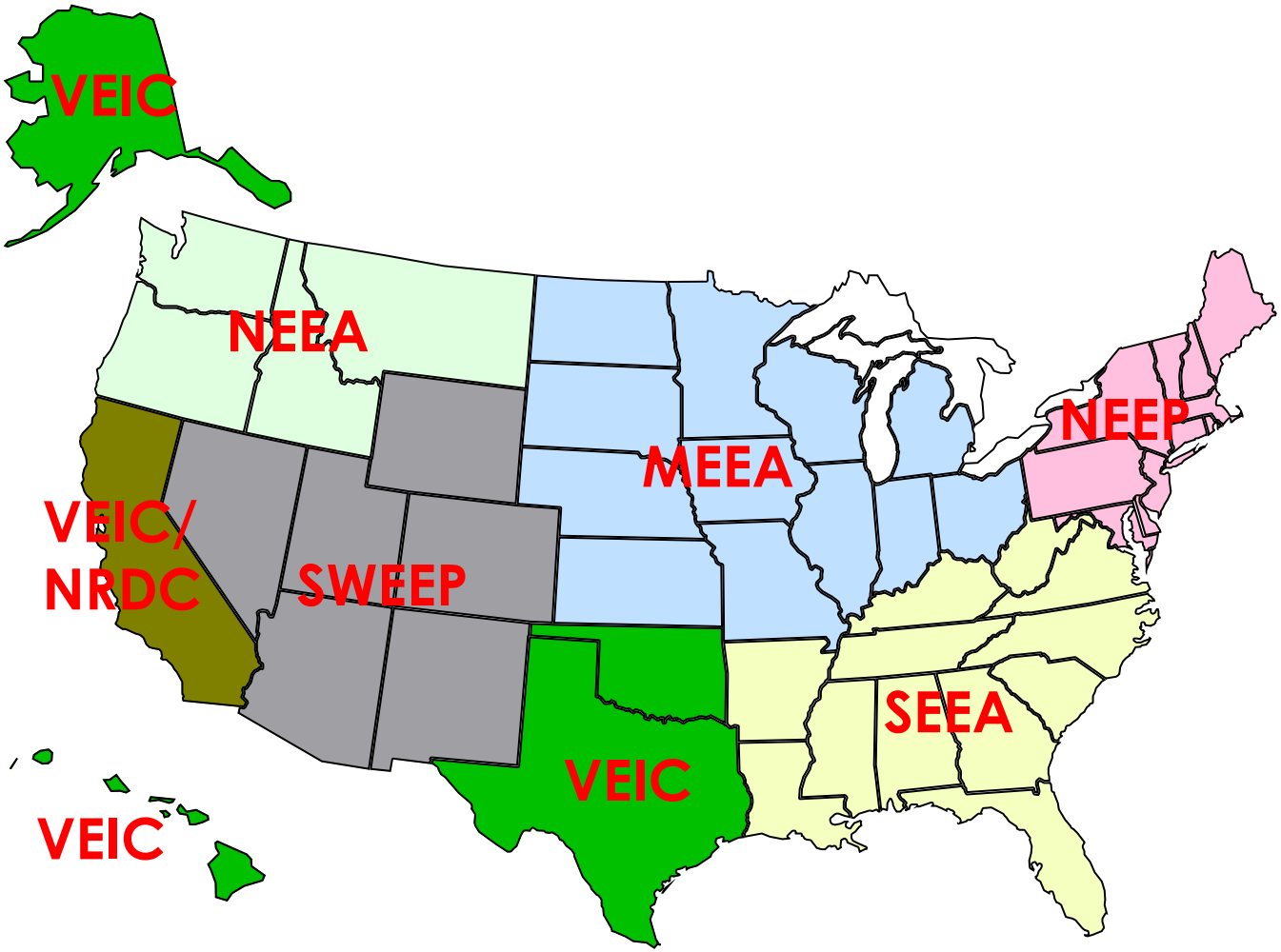
State and Local Capacity Building	• Trainings • Workshops • Peer-to-peer matching
Technical	• Renewable energy siting and development • Review of technical specs for RFPs • Strategic planning, energy management, and conservation strategies • Green building technologies • Building codes
Program Design and Implementation	• **Policy and program development** • **Coordinating rate-payer funded dollars with ARRA projects and programs** • **Sustainable community and building design** • **State and regional EE and RE assessments and planning** • **EE and RE portfolio program design elements**
Financial	Program design support and guidance on financing mechanisms such as: • Revolving loan funds (RLFs) • Property-assessed clean energy (PACE) • Loan loss reserves and enhanced credit mechanisms
Performance Contracting	• Designing and implementing a performance contract • Leveraging private investment • Reducing institutional barriers • Tracking and comparing programs

Who We Are: Team 4



ACEEE, NRDC: National Support

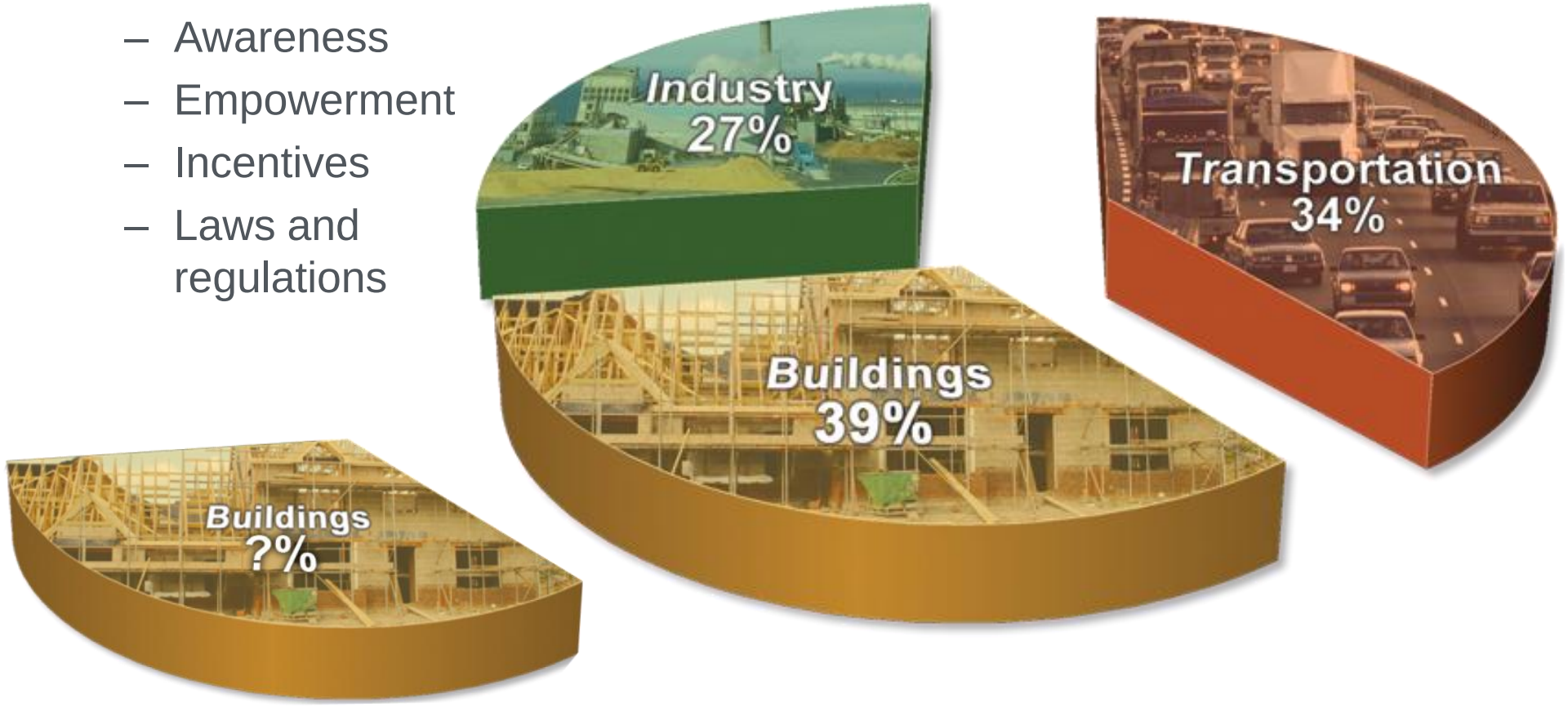
Goals of This Webinar

- Gain a general understanding of the purpose of energy codes, standards, and programs
- Understand compliance and enforcement requirements for energy codes
- Understand energy code relationship with Section 410 of the American Recovery and Reinvestment Act (ARRA)

Buildings Use Energy

- Buildings use 40% of our nation's energy

- Changes in human behavior will reduce energy use
  - Awareness
  - Empowerment
  - Incentives
  - Laws and regulations



What is an Energy Code / Standard?

- Addresses the integration of building components into a system
- In some cases it addresses the design and construction practices
- Building enclosure (walls, windows, floor, ceiling)
- Heating and cooling equipment
- Sizing of the equipment
- Building and mechanical system leakage
- In some cases materials

Energy Code Universe

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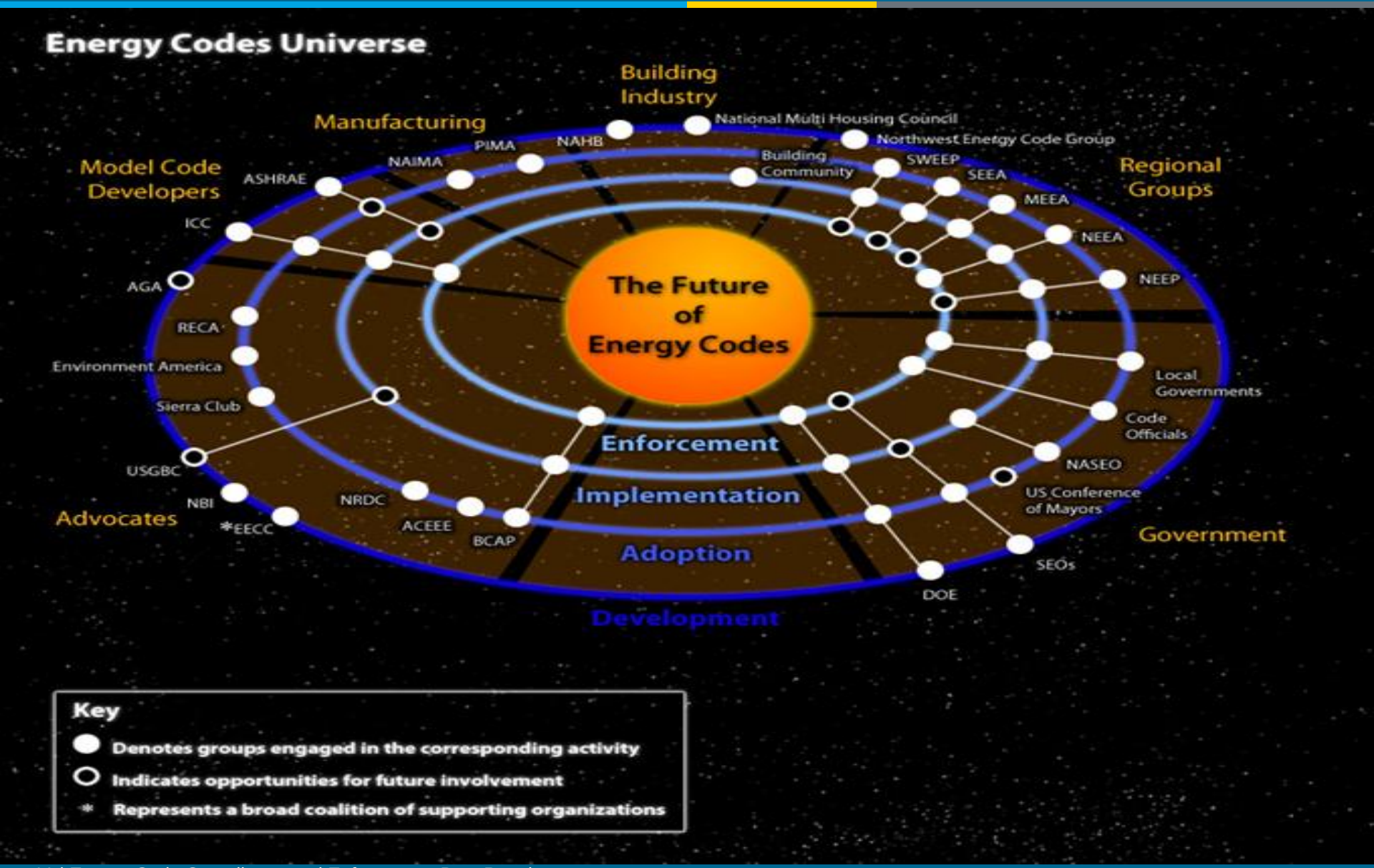
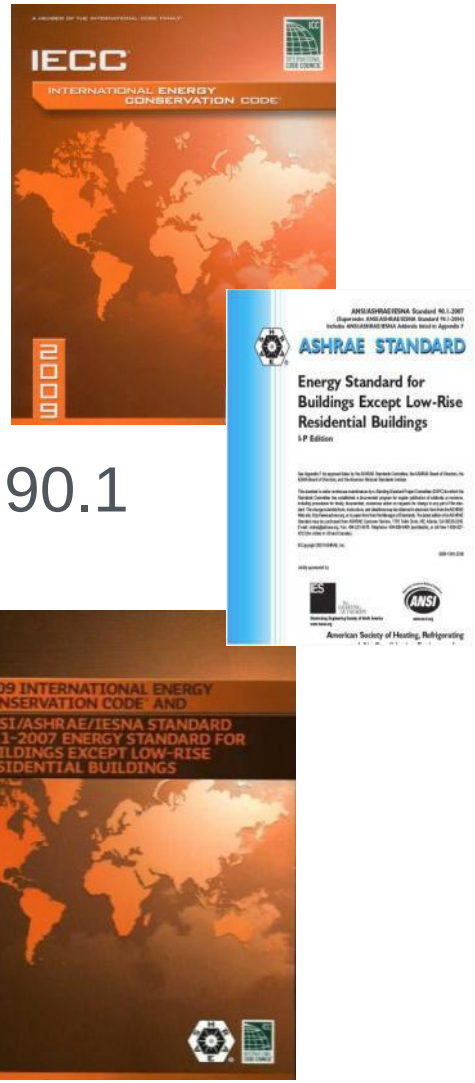


Energy Code and Standards Development

- International Code Council – International Energy Conservation Code (IECC)
  - 3 year cycle – latest release 2009
- American Society of Heating, Refrigerating and Air-Conditioning Engineers - Standard 90.1
  - 3 year cycle – latest release 2010 (late October publication)



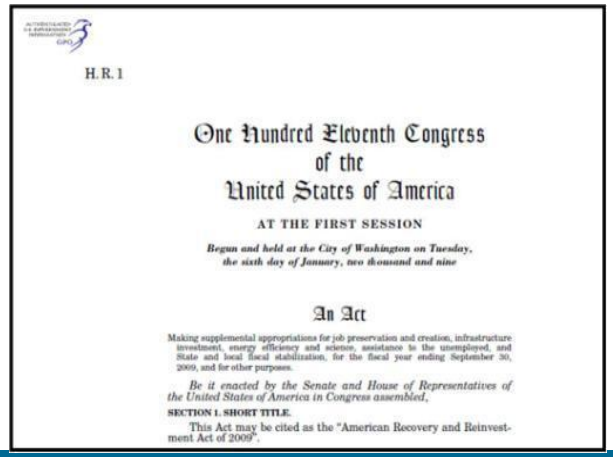
Why Adopt?

- Why do some jurisdictions adopt the energy codes when no mandates exist?
  - ICC
  - ASHRAE
  - COMcheck and REScheck

- Products, materials, and practices
- Many localities and states are expressing increased interest in energy codes in response to the ARRA

ARRA Requirements (Section 410)

- The State, or the applicable units of local government that have authority to adopt building codes, will implement the following:
  - A building energy code (or codes) for residential buildings that meets or exceeds the most recently published International Energy Conservation Code, or achieves equivalent or greater energy savings.
  - A building energy code (or codes) for commercial buildings throughout the State that meets or exceeds the ANSI/ASHRAE/IESNA Standard 90.1-2007
  - A plan to achieve 90 percent compliance with the above energy codes within eight years



H.R. 1

One Hundred Eleventh Congress
of the
United States of America

AT THE FIRST SESSION

Begun and held at the City of Washington on Tuesday, the sixth day of January, two thousand and nine

An Act

Making supplemental appropriations for job preservation and creation, infrastructure investment, energy efficiency and science, assistance to the unemployed, and State and local fiscal stabilization, for the fiscal year ending September 30, 2009, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "American Recovery and Reinvestment Act of 2009".

Part 1: Assess Current Practices

Assess Where Your Community is Today

- Understand where you are today
- Answer these four questions:
  - What is your current energy code?
  - Are there plans to adopt a newer energy code?
  - Why do you want to adopt an energy code?
  - What are the most significant barriers to code adoption and compliance in your locality?

Additional Background Information

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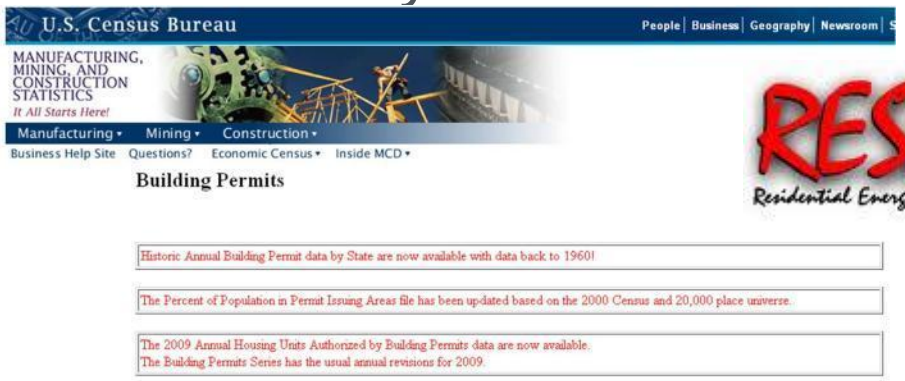
- Population
- Identify strengths and weaknesses (across building industry)
- Additional resources available in the region/state
- New single family housing starts
- Commercial construction permits
- Are there voluntary programs operating in your community



RESNET
Residential Energy Services Network

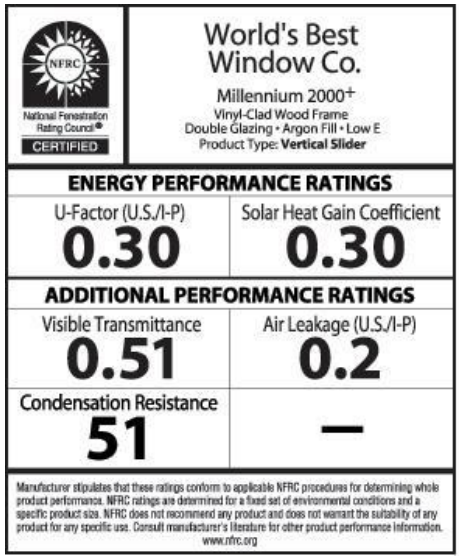
U.S. GREEN BUILDING COUNCIL

What is Your Current Compliance and Enforcement Process?

- Permitting
- Plan Review
- Field Inspection
- Certificate of Occupancy
- Staff Certification Requirements
- Third-party infrastructure

Jurisdictional Needs to Support Compliance and Enforcement

- Education, training
- Building department staff
- Building industry, knowledge, understanding
- Suppliers, example of windows and tax credit



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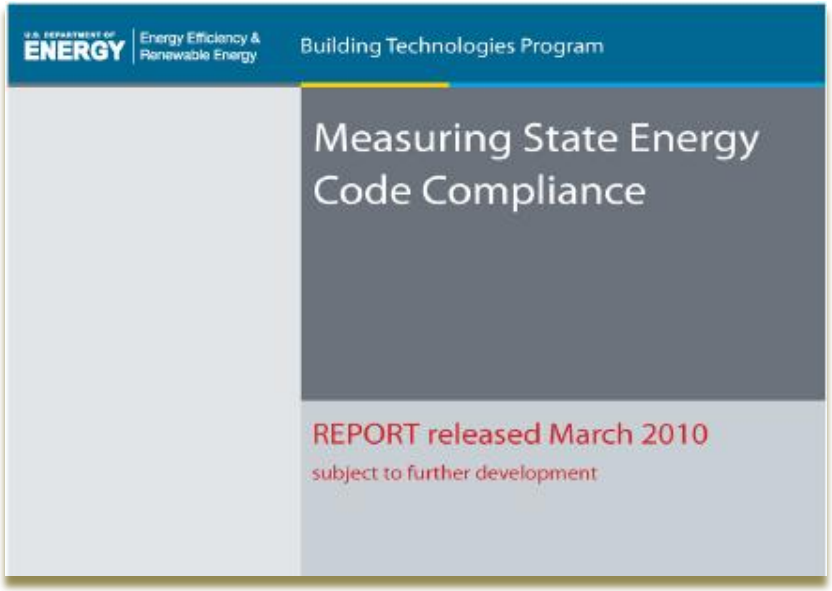
Part 2: Energy Code Compliance Best Practices

Recovery Act Requirements Adoption and Compliance

Measuring State Energy Code Compliance

- Contents
  - Code Adoption and Equivalency
  - Annual Measurement
  - Planning for Compliance Evaluation
  - Onsite Compliance Evaluation Procedures (includes generating the sample sets)
  - Evaluation Checklists



- **http://www.energycodes.gov/arra/compliance_evaluation.stm**

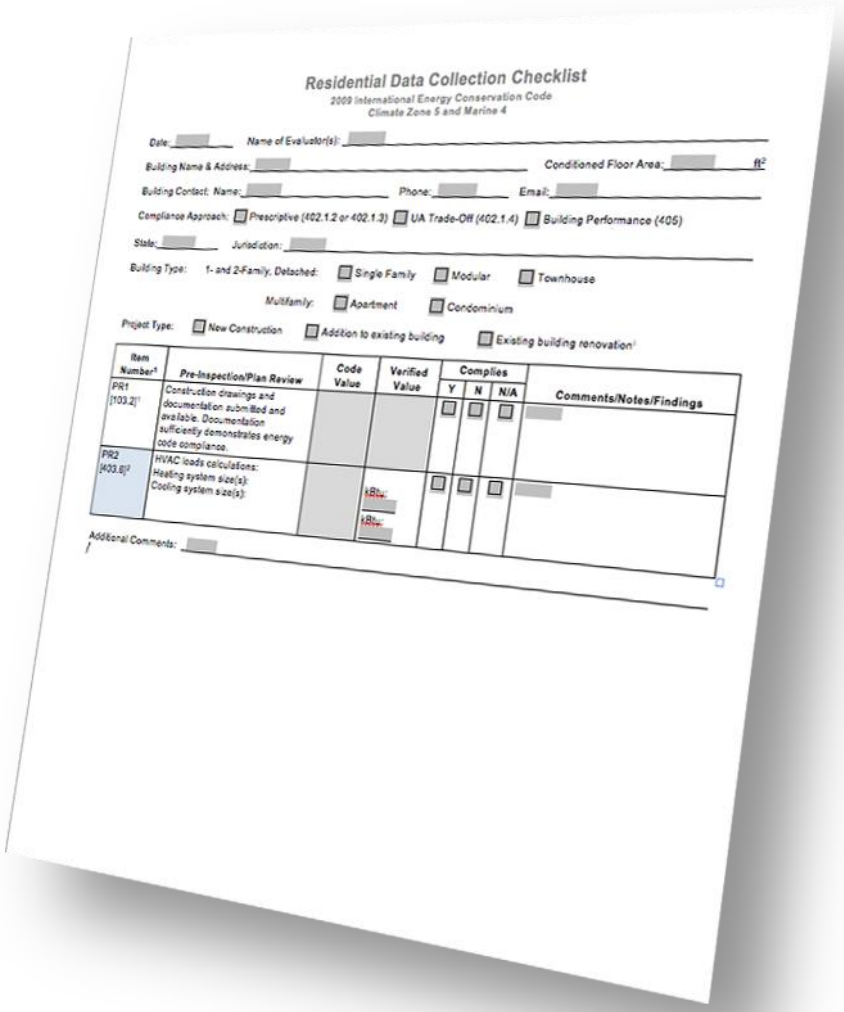
Supported Codes

- Checklists and instructions available for:
  - 2009 IECC Residential (Chapter 4)
  - 2009 IECC Commercial (Chapter 5)
  - 90.1-2007 Commercial
- Alternative checklists for other codes may be requested
- Evaluator training covers use of checklists

http://www.energycodes.gov/arra/documents/compliance_checklists.zip

Residential Checklist

- Developed by climate zone
- Contain prescriptive requirements for each climate zone
- Contain instructions for each requirement



Residential Data Collection Checklist

2009 International Energy Conservation Code
Climate Zone 5 and Marine 4

Date: _____ Name of Evaluator(s): _____

Building Name & Address: _____ Conditioned Floor Area: _____ ft²

Building Contact: Name: _____ Phone: _____ Email: _____

Compliance Approach: ☐ Prescriptive (402.1.2 or 402.1.3) ☐ UA Trade-Off (402.1.4) ☐ Building Performance (405)

State: _____ Jurisdiction: _____

Building Type: 1- and 2-Family, Detached: ☐ Single Family ☐ Modular ☐ Townhouse

Multifamily: ☐ Apartment ☐ Condominium

Project Type: ☐ New Construction ☐ Addition to existing building ☐ Existing building renovation[1]

Item Number[1]	Pre-Inspection/Plan Review	Code Value	Verified Value	Complies Y	Complies N	Complies N/A	Comments/Notes/Findings
PR1 [103.2][1]	Construction drawings and documentation submitted and available. Documentation sufficiently demonstrates energy code compliance.			☐	☐	☐	
PR2 [403.6][2]	HVAC loads calculations: Heating system size(s): Cooling system size(s):		kBtu: kBtu:	☐	☐	☐	

Additional Comments: _____

Commercial Checklist

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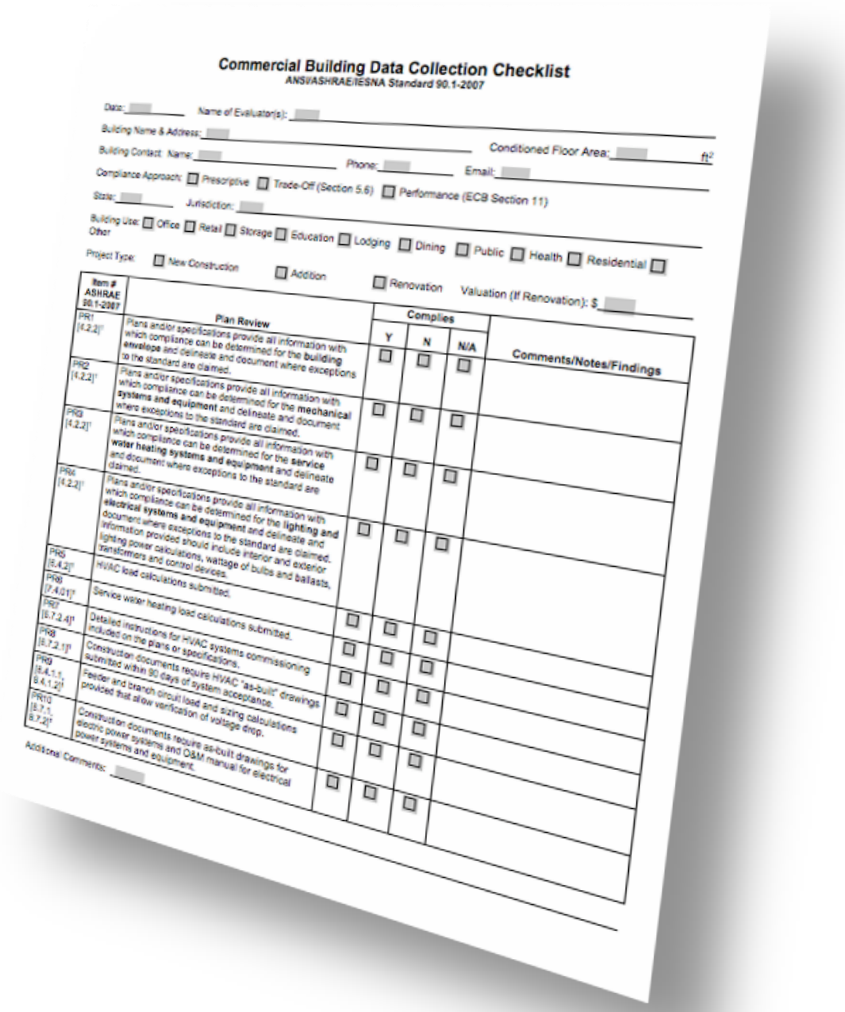
- One checklist for all climate zones
- Expectation of evaluator knowing and/or having the code or standard



Commercial Building Data Collection Checklist

ANSI/ASHRAE/IESNA Standard 90.1-2007

Date: _____ Name of Evaluator(s): _____

Building Name & Address: _____

Conditioned Floor Area: _____ ft²

Building Contact: Name: _____ Phone: _____ Email: _____

Compliance Approach: ☐ Prescriptive ☐ Trade-Off (Section 5.6) ☐ Performance (ECB Section 11)

State: _____ Jurisdiction: _____

Building Use: ☐ Office ☐ Retail ☐ Storage ☐ Education ☐ Lodging ☐ Dining ☐ Public ☐ Health ☐ Residential ☐ Other

Project Type: ☐ New Construction ☐ Addition ☐ Renovation Valuation (If Renovation): $ _____

Item # ASHRAE 90.1-2007	Plan Review	Complies Y	Complies N	Complies N/A	Comments/Notes/Findings
PR1 [4.2.2]	Plans and/or specifications provide all information with which compliance can be determined for the **building envelope** and delineate and document where exceptions to the standard are claimed.	☐	☐	☐	
PR2 [4.2.2]	Plans and/or specifications provide all information with which compliance can be determined for the **mechanical systems and equipment** and delineate and document where exceptions to the standard are claimed.	☐	☐	☐	
PR3 [4.2.2]	Plans and/or specifications provide all information with which compliance can be determined for the **service water heating systems and equipment** and delineate and document where exceptions to the standard are claimed.	☐	☐	☐	
PR6 [4.2.2]	Plans and/or specifications provide all information with which compliance can be determined for the **lighting and electrical systems and equipment** and delineate and document where exceptions to the standard are claimed. Information provided should include interior and exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐	☐	☐	
PR5 [5.4.2]	HVAC load calculations submitted.	☐	☐	☐	
PR8 [7.4.0.1]	Service water heating load calculations submitted.	☐	☐	☐	
PR7 [6.7.2.4]	Detailed instructions for HVAC systems commissioning included on the plans or specifications.	☐	☐	☐	
PR9 [6.7.2.1]	Construction documents require HVAC "as-built" drawings submitted within 90 days of system acceptance.	☐	☐	☐	
PR4 [8.4.1.1, 8.4.1.2]	Feeder and branch circuit load and sizing calculations provided that allow verification of voltage drop.	☐	☐	☐	
PR10 [8.7.1, 8.7.2]	Construction documents require as-built drawings for electric power systems and O&M manual for electrical power systems and equipment.	☐	☐	☐	

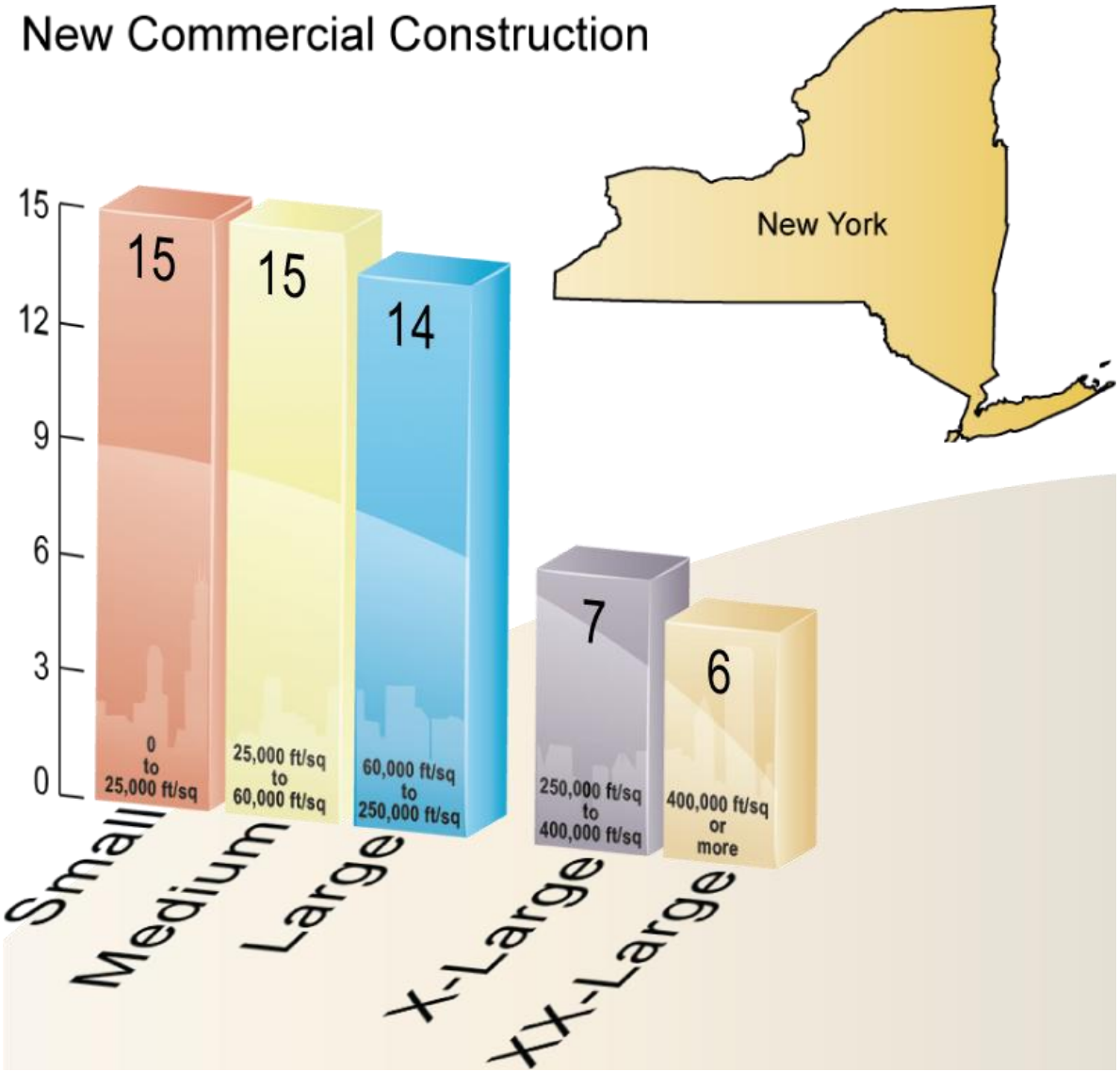
Additional Comments: _____

BECP Recommended Procedures

- Evaluate a statistically valid sample of 44± buildings in the state in each of the following 4 populations:
  - New residential
  - New commercial
  - Residential renovations
  - Commercial renovations

New Commercial Buildings

Extra samples may be required for X-Large and XX-Large buildings.



State Sample Generator

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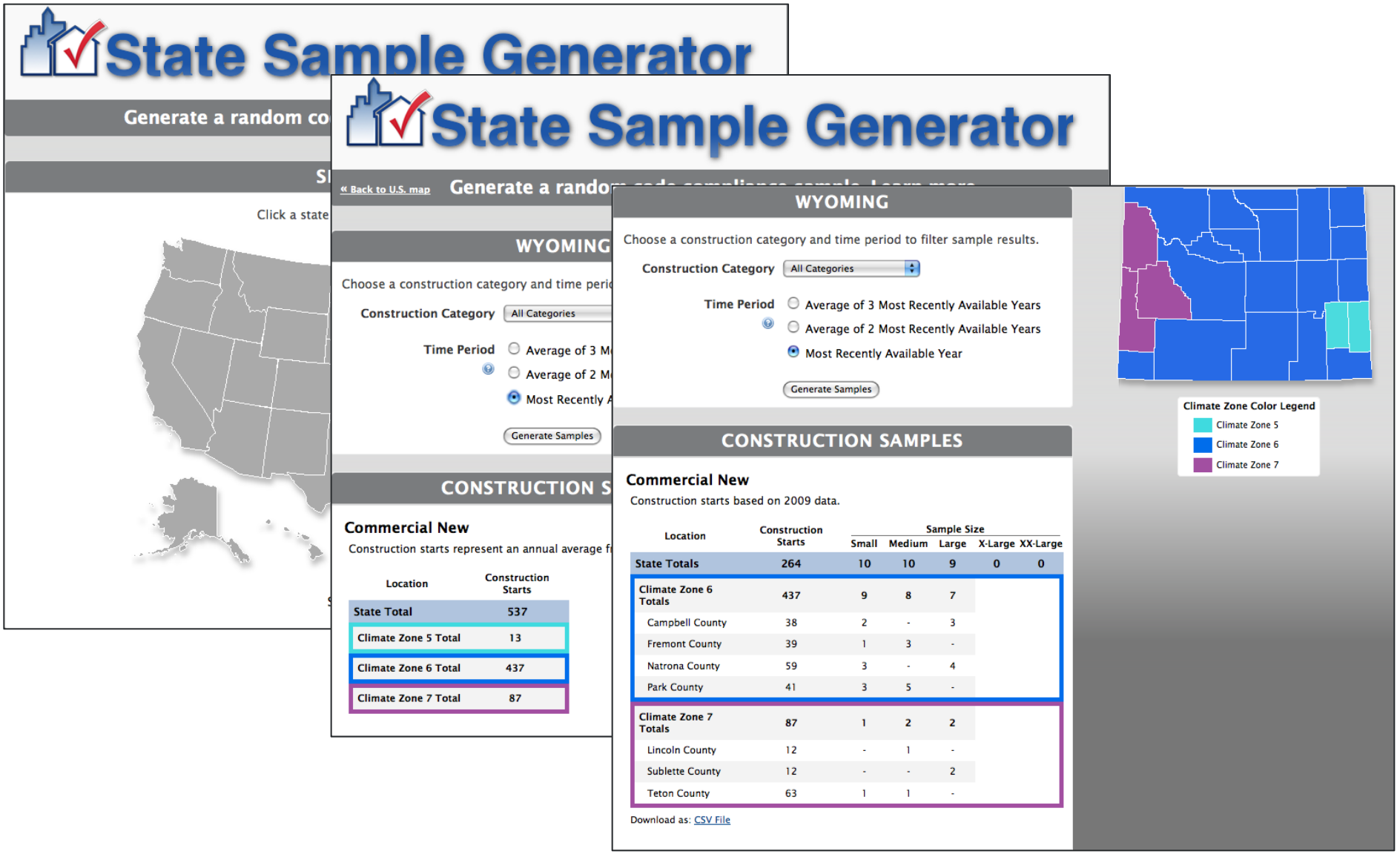
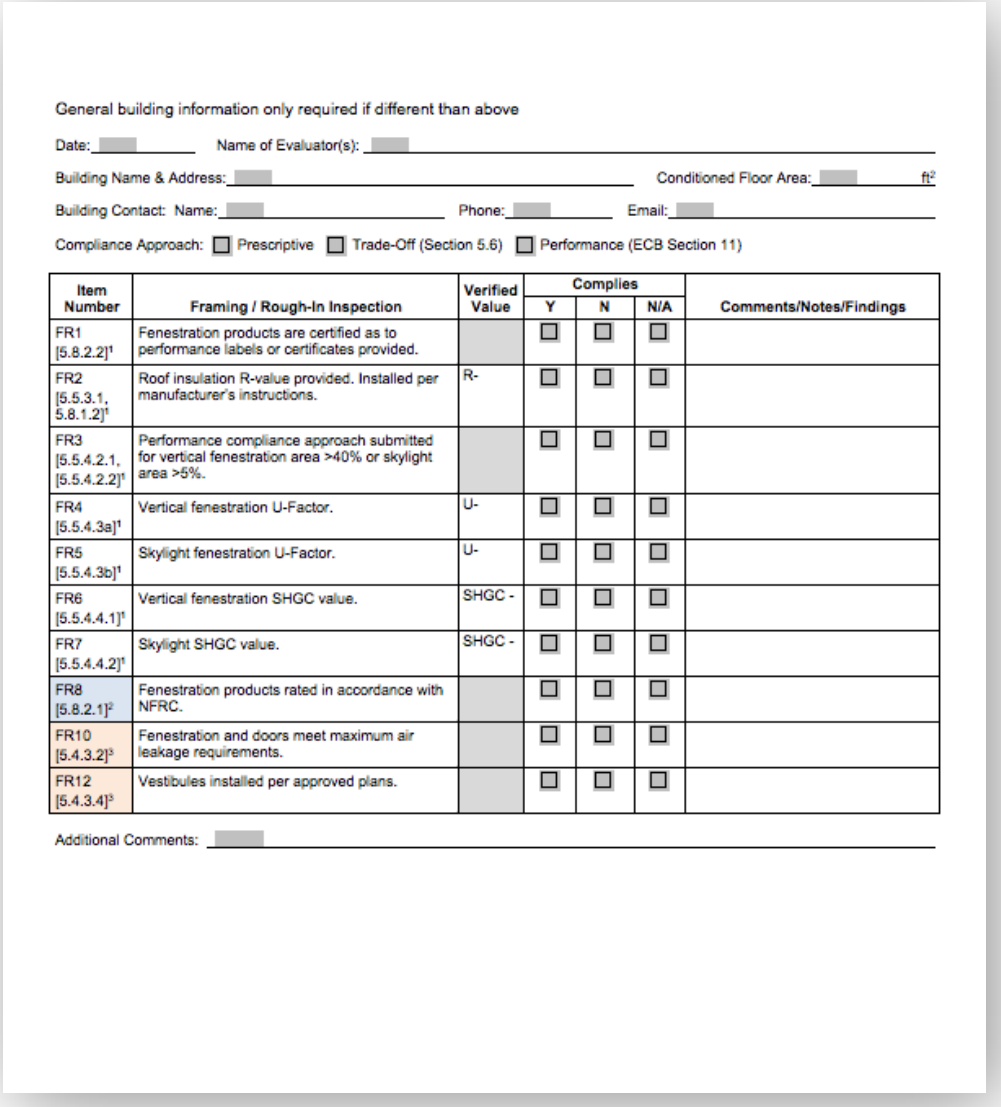


Evaluator Training

- Goal of evaluator training
  - Provide the tools needed and specific training on those tools to evaluate statewide residential and commercial compliance with the 2009 IECC or ASHRAE 90.1-2007
  - Ensuring that the evaluators have the knowledge of the program at large to go into the field and perform an effective evaluation (interact with the locals and gather the data and schedule additional visits if necessary)
- Target audience for training
  - 3rd-party contractors
  - Building officials
  - State Energy Office staff
  - Others interested in providing evaluation services to states

Analyze the Data

- New construction scored differently than renovations
  - Individual buildings for new construction receive individual building scores
  - Renovations are scored at state level only
- Checklist items are ranked and scored according to impact
    - Tiers 1-2 for residential
    - Tiers 1-3 for commercial
- State scores for new commercial construction are weighted by building size



General building information only required if different than above

Date: _____ Name of Evaluator(s): _____

Building Name & Address: _____ Conditioned Floor Area: _____ ft²

Building Contact: Name: _____ Phone: _____ Email: _____

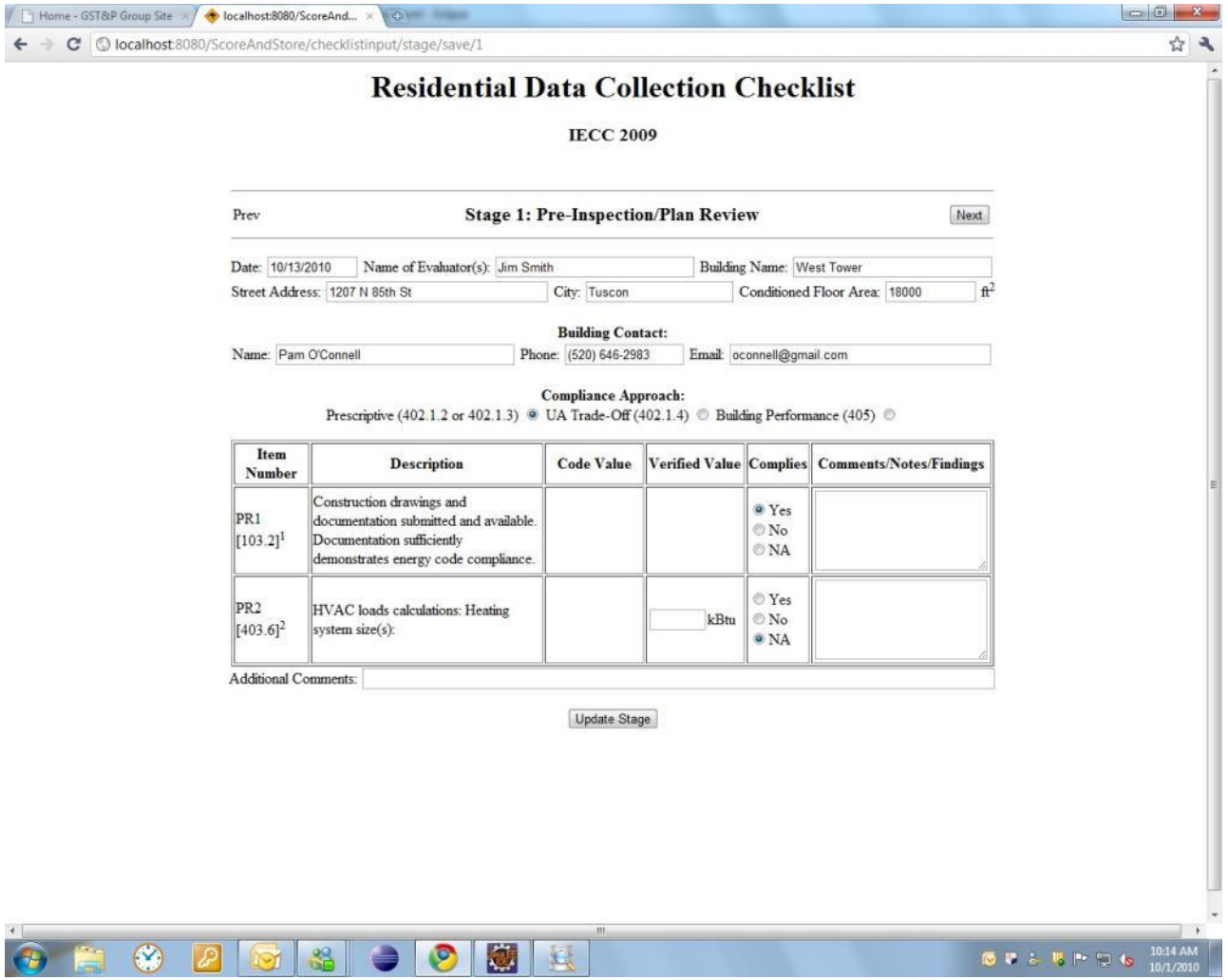
Compliance Approach: ☐ Prescriptive ☐ Trade-Off (Section 5.6) ☐ Performance (ECB Section 11)

Item Number	Framing / Rough-In Inspection	Verified Value	Complies Y	Complies N	Complies N/A	Comments/Notes/Findings
FR1 [5.8.2.2][1]	Fenestration products are certified as to performance labels or certificates provided.		☐	☐	☐	
FR2 [5.5.3.1, 5.8.1.2][1]	Roof insulation R-value provided. Installed per manufacturer's instructions.	R-	☐	☐	☐	
FR3 [5.5.4.2.1, [5.5.4.2.2][1]	Performance compliance approach submitted for vertical fenestration area >40% or skylight area >5%.		☐	☐	☐	
FR4 [5.5.4.3a][1]	Vertical fenestration U-Factor.	U-	☐	☐	☐	
FR5 [5.5.4.3b][1]	Skylight fenestration U-Factor.	U-	☐	☐	☐	
FR6 [5.5.4.4.1][1]	Vertical fenestration SHGC value.	SHGC -	☐	☐	☐	
FR7 [5.5.4.4.2][1]	Skylight SHGC value.	SHGC -	☐	☐	☐	
FR8 [5.8.2.1][2]	Fenestration products rated in accordance with NFRC.		☐	☐	☐	
FR10 [5.4.3.2][3]	Fenestration and doors meet maximum air leakage requirements.		☐	☐	☐	
FR12 [5.4.3.4][3]	Vestibules installed per approved plans.		☐	☐	☐	

Additional Comments: _____

Analyze the Data

- Store and Score Tool



What Data Can Tell Us

- What is your state compliance rate?
- Which building systems have the lowest compliance rates?
- Which building use types have the highest rate of compliance? The lowest?
- Which energy code requirements most often fail? By how much and what is the impact?
- Which energy code requirements almost always comply?
- What percentage of building compliance is demonstrated under each of the compliance approaches (prescriptive, trade-off, performance)?

Step-by-Step Companion Guide

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BECP Solutions & Help Center: www.energycodes.gov/help/

Part 3: Energy Code Enforcement Best Practices

Code Enforcement

- ***Where enforcement begins:***
  - **Knowledge**
    - Training/Education
      - Code Institutes, ICC Hearings, Continuing Education (in-house and out), webinars and Certifications
    - Books/Publications
      - Proper number of the currently adopted and referenced code books, standards, regulations
    - Additional Resources
      - Internet access, Trade Organizations, copies of past code editions, adequate support staff and software

Code Enforcement - Jurisdictions

- ***Jurisdictional support for enforcement:***
  - Adoption
    - Don't amend out portions of the code, they are more effective as a complete package
  - Budgeting
    - Provide proper funding for the items and processes needed to conduct enforcement in a holistic manner
  - Additional Items
    - Foster cooperation amongst the jurisdiction's departments involved in the enforcement process
    - Third party enforcement

Enforcement – Plan Review

- ***Prior to Permitting:***
  - **Plan Review**
    - Review plans for conformance to the codes and standards
    - Evaluate any alternate methods and/or materials submitted
    - Include requirement to have contract document submittals provide COMcheck, REScheck or other energy programs
    - Confirm submittal compliance with ICC ES (Evaluation Services) reports
    - Evaluate and approve any Special Inspections/Inspectors
    - Review any manufacturer's material submitted

Code Enforcement - Permitting

- ***During Permitting:***
  - Hold a Pre-Construction Conference that includes jurisdictional staff, owner, General Contractor and the subs
  - Verify that correct number and types of inspections are performed
  - Verify that all the required approvals have been obtained
  - Set up procedure for how to handle the inevitable changes, etc. that occur during construction
  - Evaluate and accept any third party (LEED, IGCC, etc.) required documentation to be submitted to the jurisdiction

Code Enforcement - Construction

- ***Post Permitting (Construction):***
  - Hold major system conferences (roofing, etc.) that includes jurisdictional staff, owner, architect, G.C. and the major subs
  - Perform the correct number and types of inspections
  - Maintain coordination/interaction between field personnel and office personnel of jurisdiction and the contractor.
  - Maintain the relationship between the jurisdiction and the owner/architect/contractor
  - Evaluate and accept any third party (LEED, IGCC, etc.) required documentation

Code Enforcement - Occupancy

- ***Post Permitting/Occupancy:***
  - Commissioning
    - This is to verify that the systems are installed and will operate as designed
  - Renovations/Remodels
    - Provide and maintain archived documents so they can serve as a baseline for proposed changes
  - Additional thoughts
    - Enforcement of energy efficiency and renewable energy needs to continue over a structure's life span

Related Resources

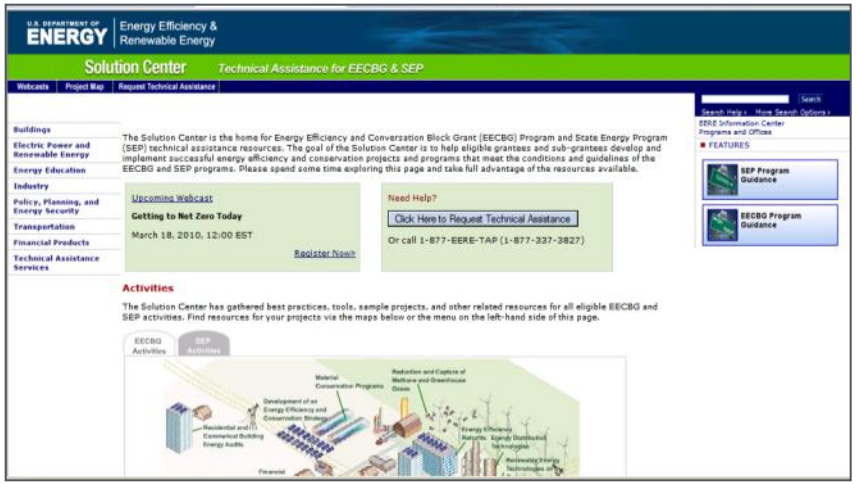
- Learning from Each Other – Network
- International Code Council, iccsafe.org
- ASHRAE, ashrae.org
- Regional Chapters ICC and ASHRAE
  - ashrae.org/members/page/607
  - iccsafe.org/gr/content/Pages/gr-map.aspx
- BCAP-OCEAN.org
- energycodes.gov (BECP website)
- codecollegenetwork.com (buildingmedia.com)

Accessing TAP Resources

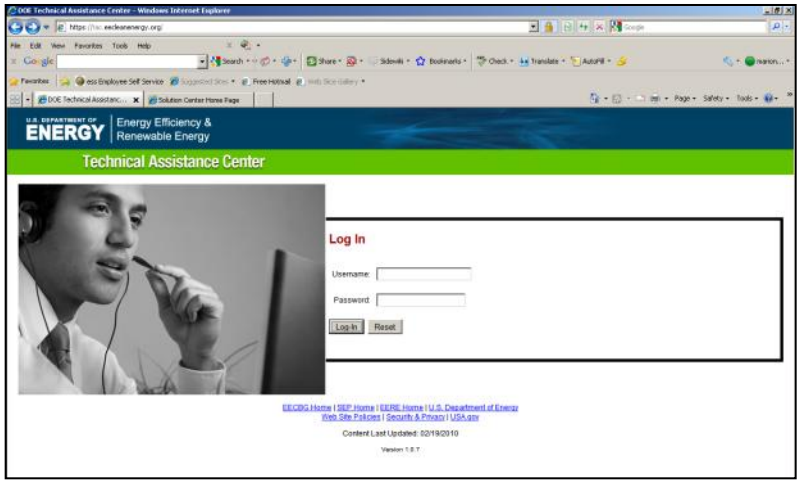
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

We encourage you to:

1) Explore our online resources via the Solution Center

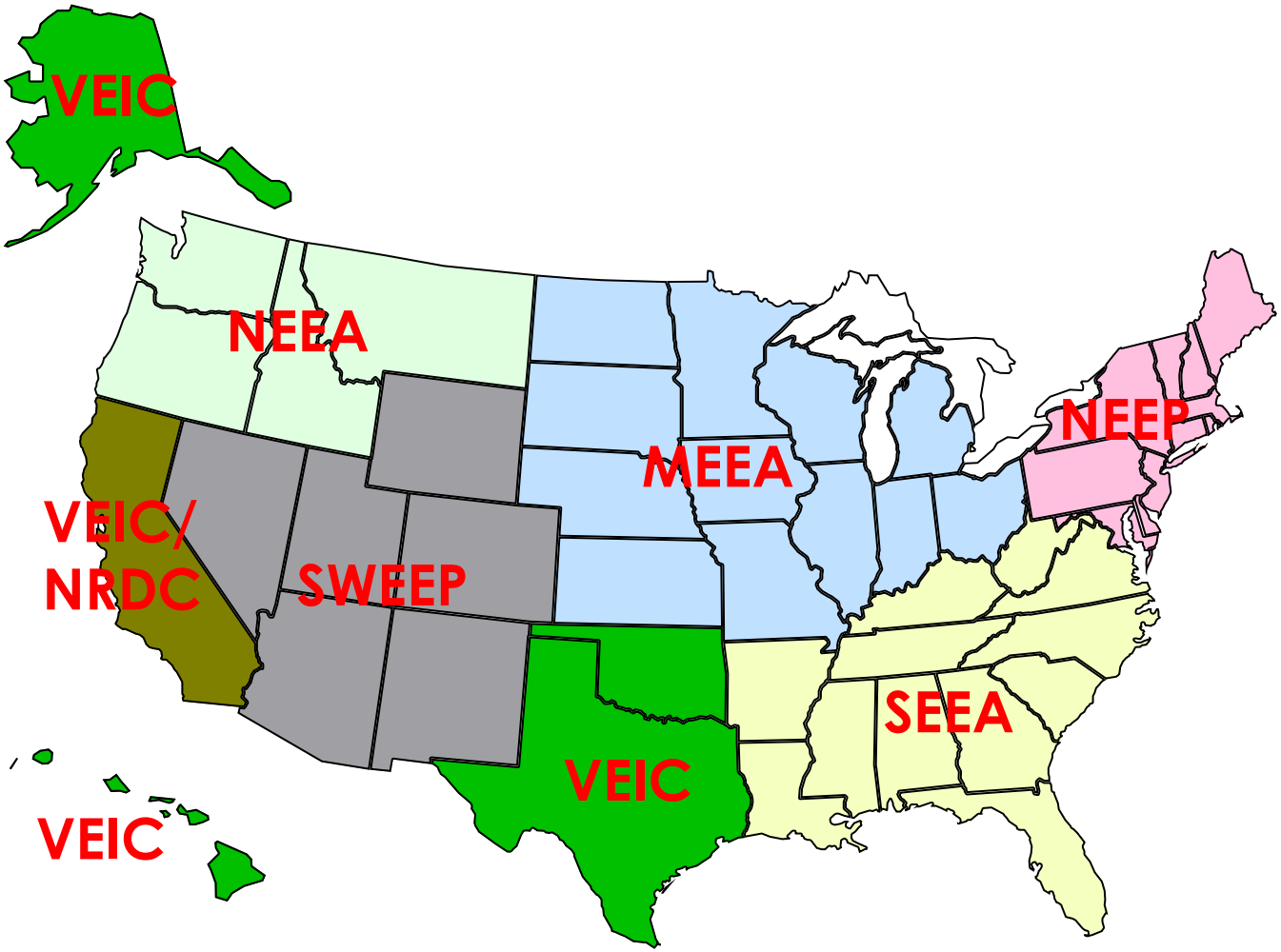


2) Submit a request via the Technical Assistance Center



3) Ask questions via our call center at 1-877-337-3827 or email us at solutioncenter@ee.doe.gov

Who We Are: Team 4



ACEEE, NRDC: National Support

Technical Assistance Contacts

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

TEAM 4

VEIC: Dan Quinlan, dquinlan@veic.org, 802-488-7677 (**Team 4 Lead**)

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NEEP: Ed Londergan, elondergan@neep.org, 781-860-9177

NEEA: Dave Kresta, dkresta@nwalliance.org, 503-827-8416

SWEEP: Curtis Framel, cframel@swenergy.org, 303-447-0078

SEEA: Jolyn Newton, jolyn@seealliance.org, 615-612-9592

ACEEE: Eric Mackres, emackres@aceee.org, 202-507-4038

NRDC: Lara Ettenson, lettenson@nrdc.org, 415-875-6100

EFG: Richard Faesy, rfaesy@energyfuturesgroup.com, 802-482-5001

QUESTIONS?

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

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Upcoming Webinars

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

Please join us again:

Title: **Energy Management Systems: Maximizing Energy Savings**
Host: Sara Lisauskas, ICF International
Date: October 15, 2010
Time: 12:00-1:30 EST

Title: **Driving Demand #2: Lessons from the Field**
Host: Merrian Fuller, Lawrence Berkeley National Lab
Date: October 19, 2010
Time: 2:00-3:15 EDT

Title: **Overcoming Common Pitfalls: Energy Efficient Lighting Projects**
Host: Jeffrey Schwartz, ICF International and Heidi Steward, Pacific Northwest National Lab
Date: October 21, 2010
Time: 12:00-1:30 EDT

Title: **Tips and Tools for Promoting Your Energy-Efficiency Project**
Host: Nancy Raca, ICF International and Jim Arwood, NASEO
Date: October 22, 2010
Time: 12:00-1:00 EDT

Title: **Quality Assurance for Residential Retrofit Programs**
Host: David Keefe and Jim Grevatt, VEIC
Date: October 26, 2010
Time: 2:00-3:00 EDT

Title: **RETScreen Training 101**
Host: Sarah Busche and Jimmy Jones, NREL
Date: October 27, 2010
Time: 3:00-4:15 EDT

Title: **Benchmarking Your Building's Energy Using EPA's ENERGY STAR Portfolio Manager**
Host: Peter Flippen, ICF International
Date: October 28, 2010
Time: 12:00-1:00 EST

For the most up-to-date information and registration links, please visit the Solution Center webcast page at www.wip.energy.gov/solutioncenter/webcasts