DOE Technical Assistance Program

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

The Parker Ranch installation in Hawaii

Polices and Procedures for Enhancing Code Compliance

May 31, 2011

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Today's Presenters

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What is TAP?

DOE's Technical Assistance Program (TAP) supports the Energy Efficiency and Conservation Block Grant Program (EECBG) and the State Energy Program (SEP) 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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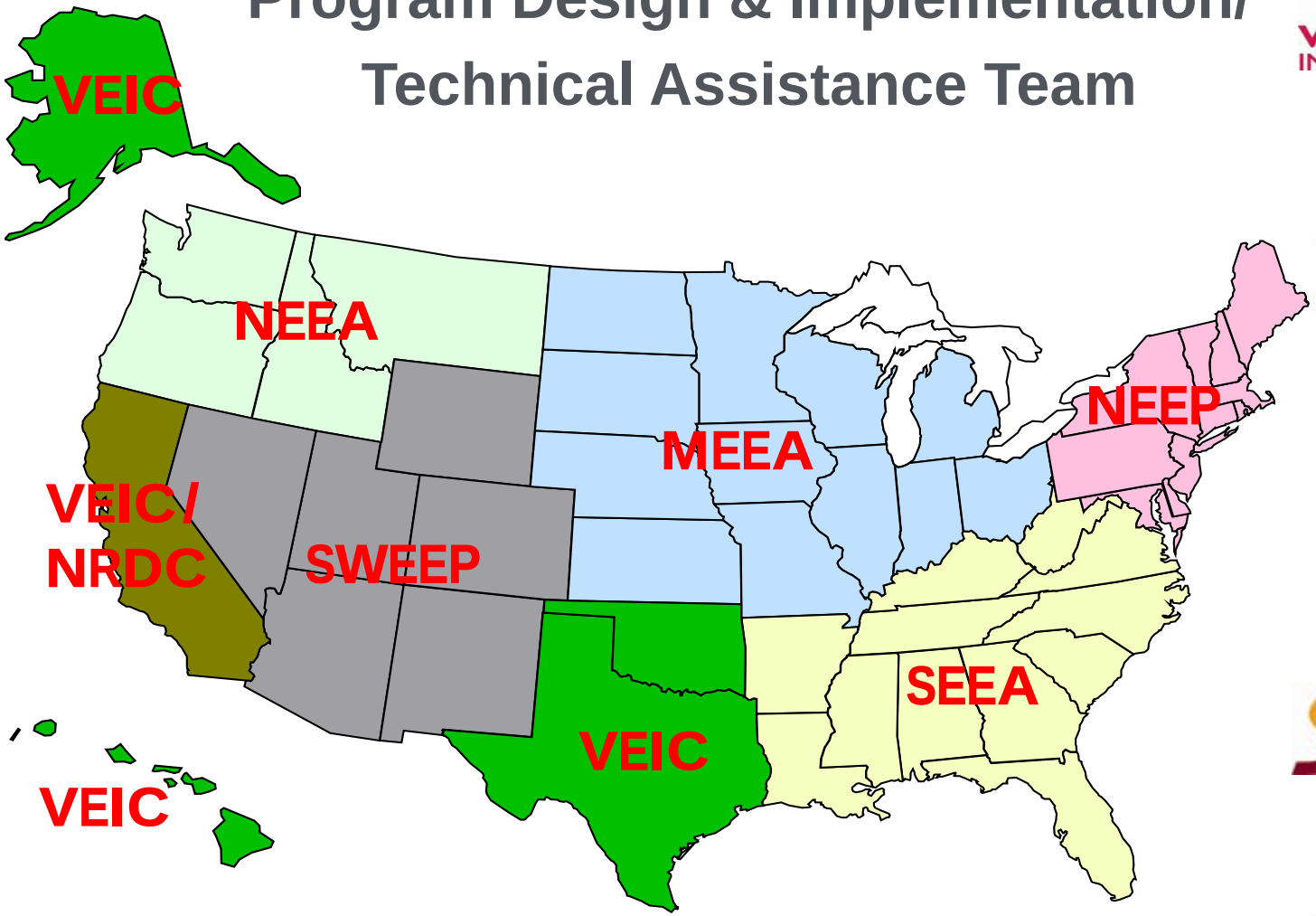
State and Local Capacity Building	• Trainings • Workshops • Peer-to-peer matching
Technical	• Renewable energy siting and development • Review of technical specs for RFPs • Strategic planning, energy management, and conservation strategies • Green building technologies • Building codes
Program Design 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

Program Design & Implementation/ Technical Assistance Team



VERMONT ENERGY INVESTMENT CORPORATION

ENERGY FUTURES GROUP

MEEA Midwest Energy Efficiency Alliance

neep

SWEEP

NORTHWEST ENERGY EFFICIENCY ALLIANCE

seea

NRDC THE EARTH'S BEST DEFENSE

ACEEE American Council for an Energy-Efficient Economy

ACEEE, NRDC: National Support

Agenda

- What is Code Compliance?
  - Definition
  - Benefits are Energy Savings
- Example Compliance Assessment – Score + Store
- Enhancing Compliance
  - Compliance Evaluation
  - Third Party Plan Review/Inspection
  - Utility Code Programs
- Resources
- Q&A

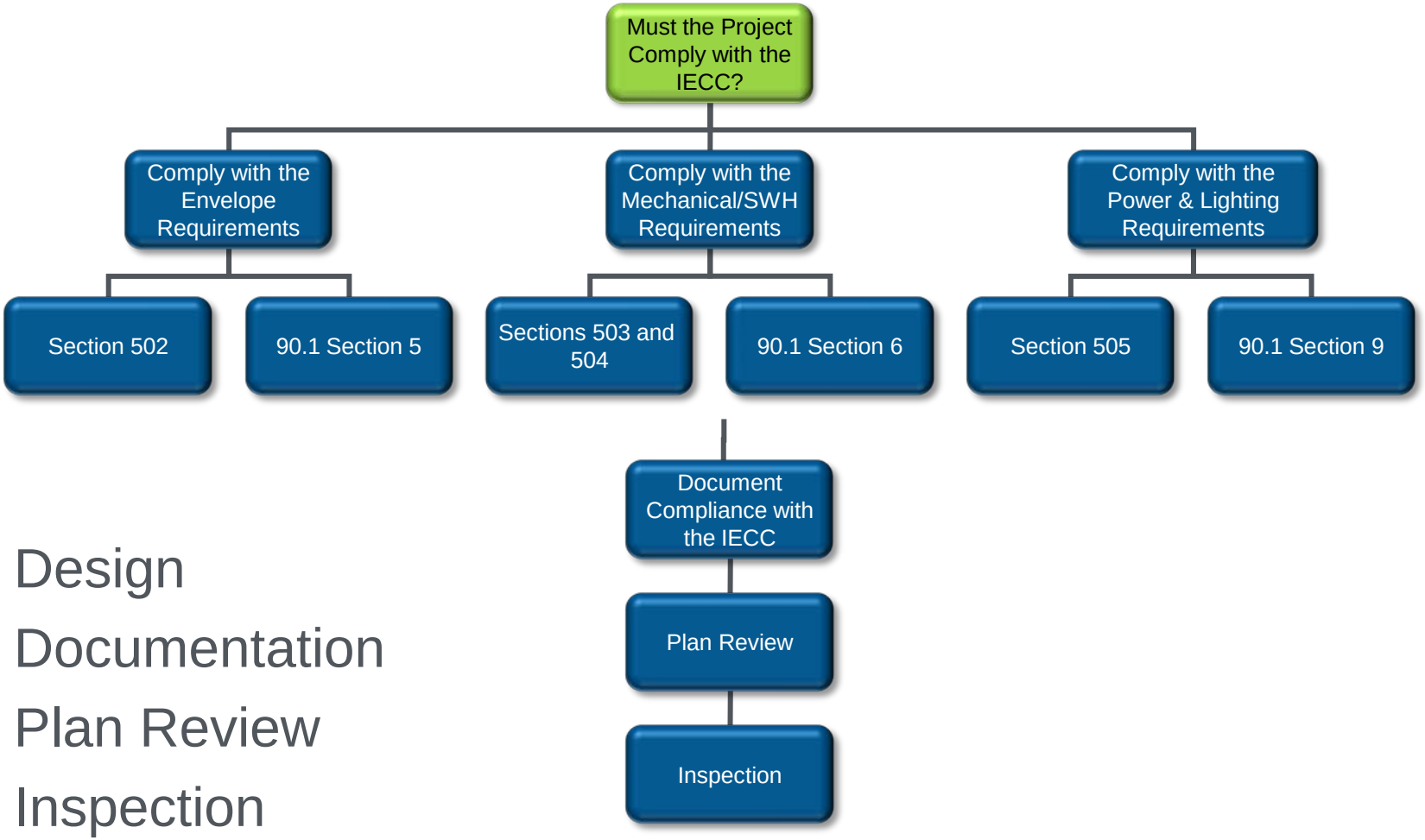
Image Courtesy of Madison County, IL

Compliance Working Definition

- Compliance (AKA conformity) – making sure what is adopted is satisfied
  - Any activity to determine directly or indirectly that a process, product or service meets relevant standards and fulfills relevant requirements
  - Determining if the energy code or standard that is adopted is actually complies with the constructed work
- Enforcement is the act of policing the code or standard
  - May leverage a fine or stop work order when conformance is lacking

Image Courtesy of PNNL

What is Compliance Assessment?



- Design
- Documentation
- Plan Review
- Inspection

Benefits of Energy Codes

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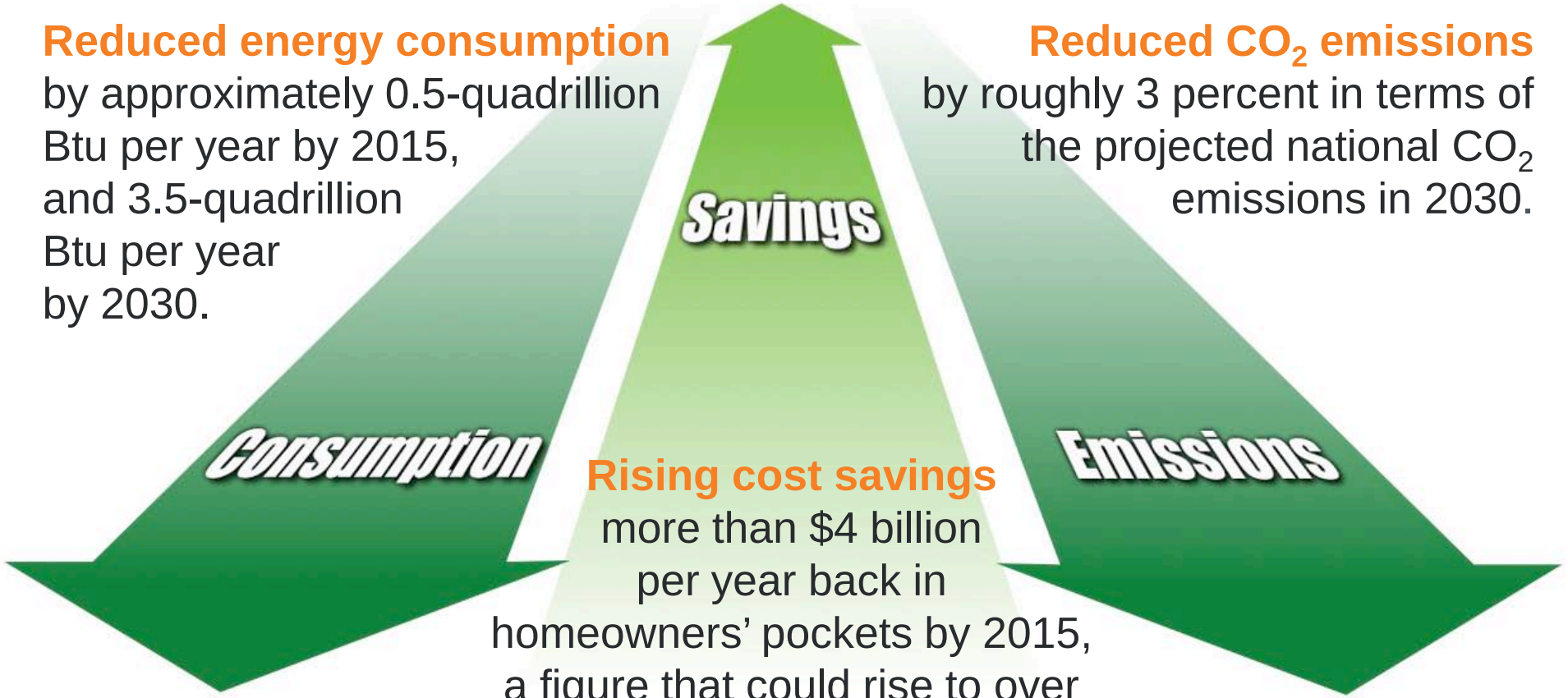
Reduced energy consumption by approximately 0.5-quadrillion Btu per year by 2015, and 3.5-quadrillion Btu per year by 2030.

Reduced CO_2 emissions by roughly 3 percent in terms of the projected national CO_2 emissions in 2030.



Rising cost savings more than $4 billion per year back in homeowners' pockets by 2015, a figure that could rise to over $30 billion per year by 2030

Online Web Tools for Compliance

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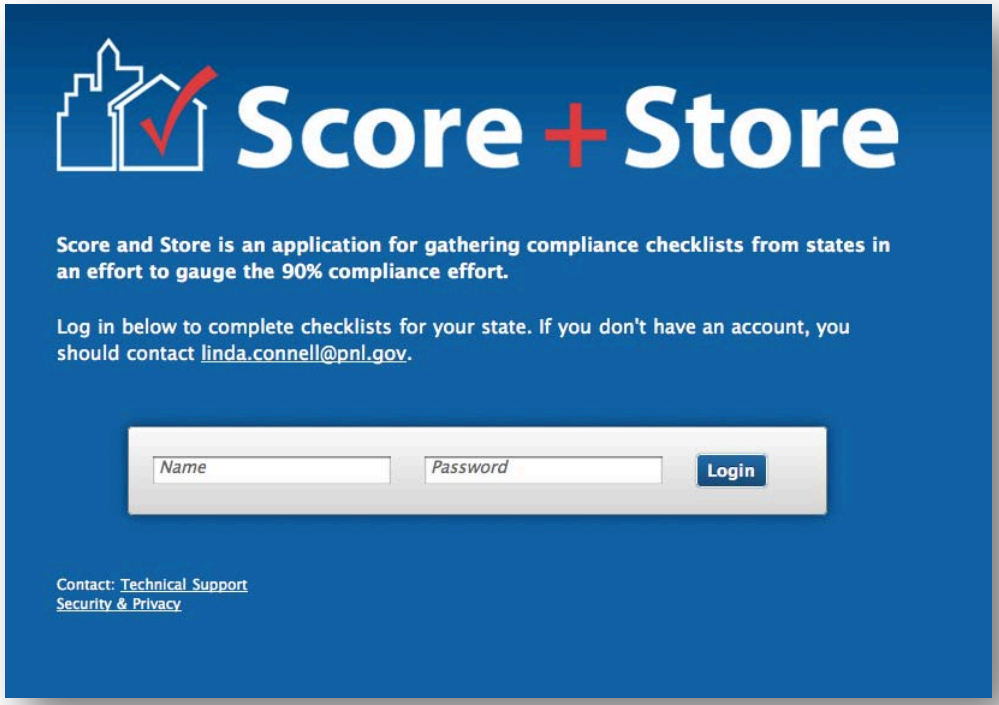
The Checklist Score and Store online tool is available to states for storing building evaluation data collected in the field.

The individual building data will be scored for compliance, and state scores will be generated based on the guidelines explained in Measuring State Energy Code Compliance. State, regional, and national metrics and summaries will be generated from the tool.



Online Web Tools for Compliance

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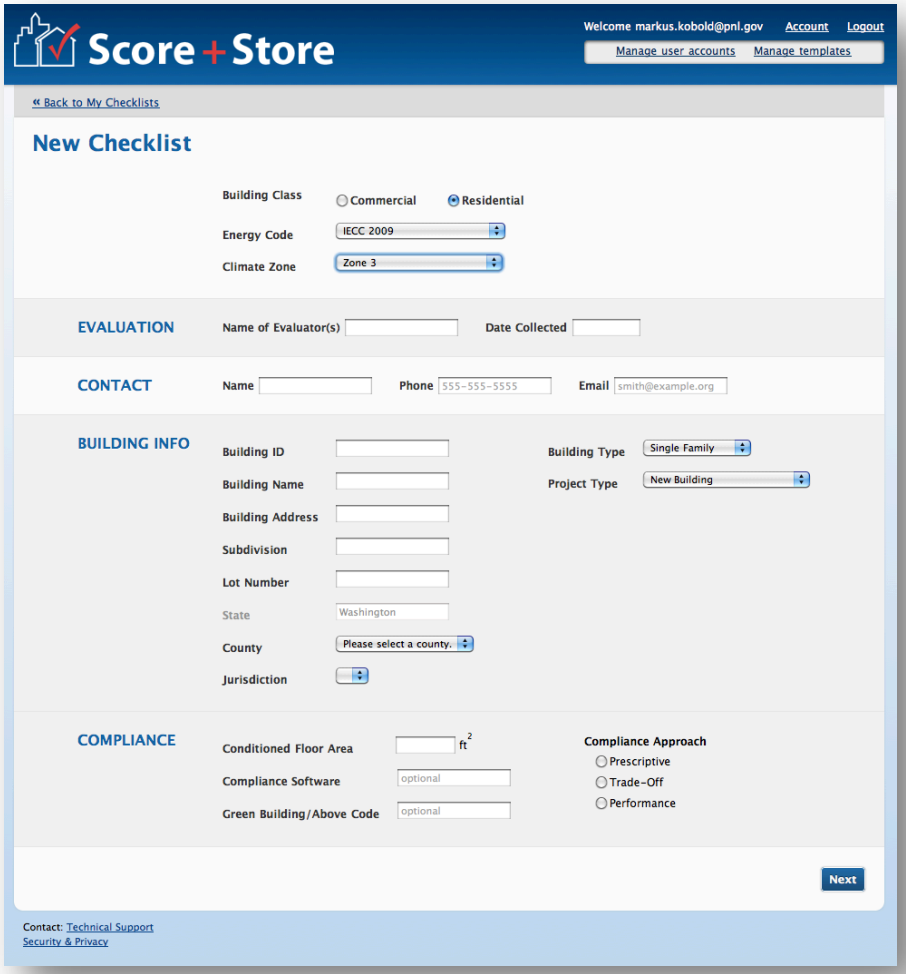

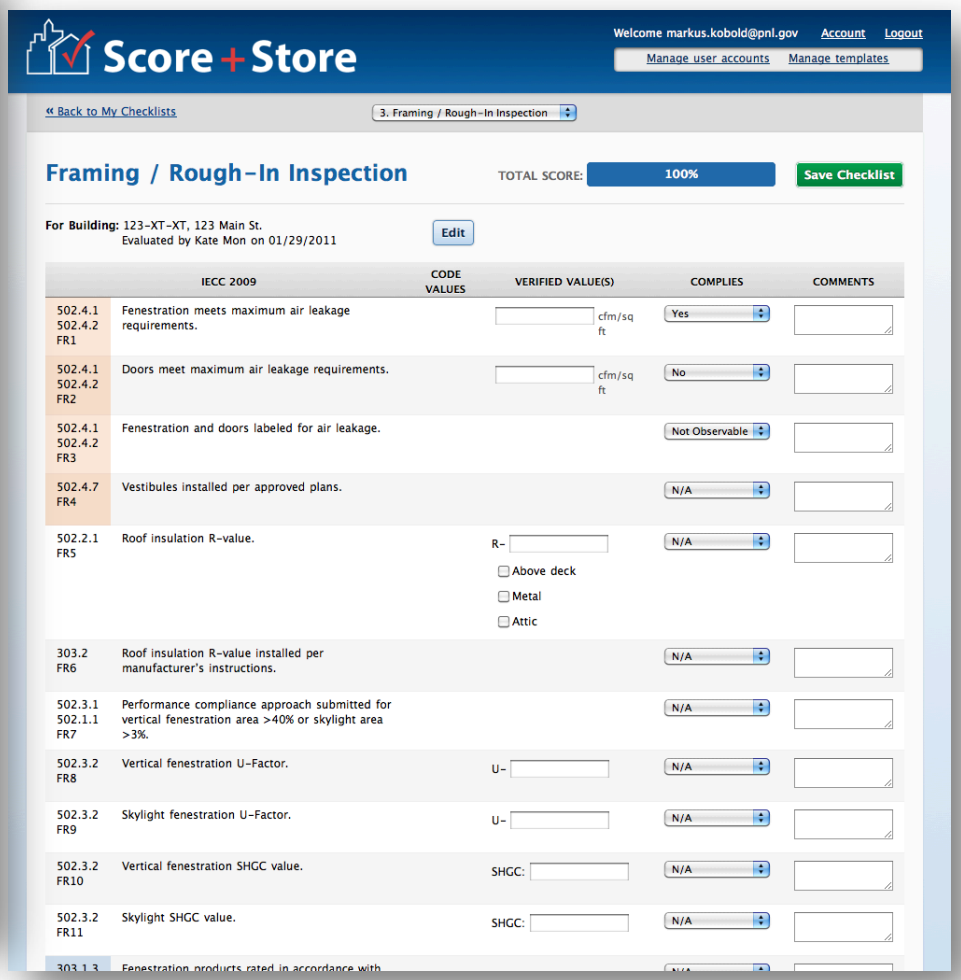

Online Web Tools for Compliance

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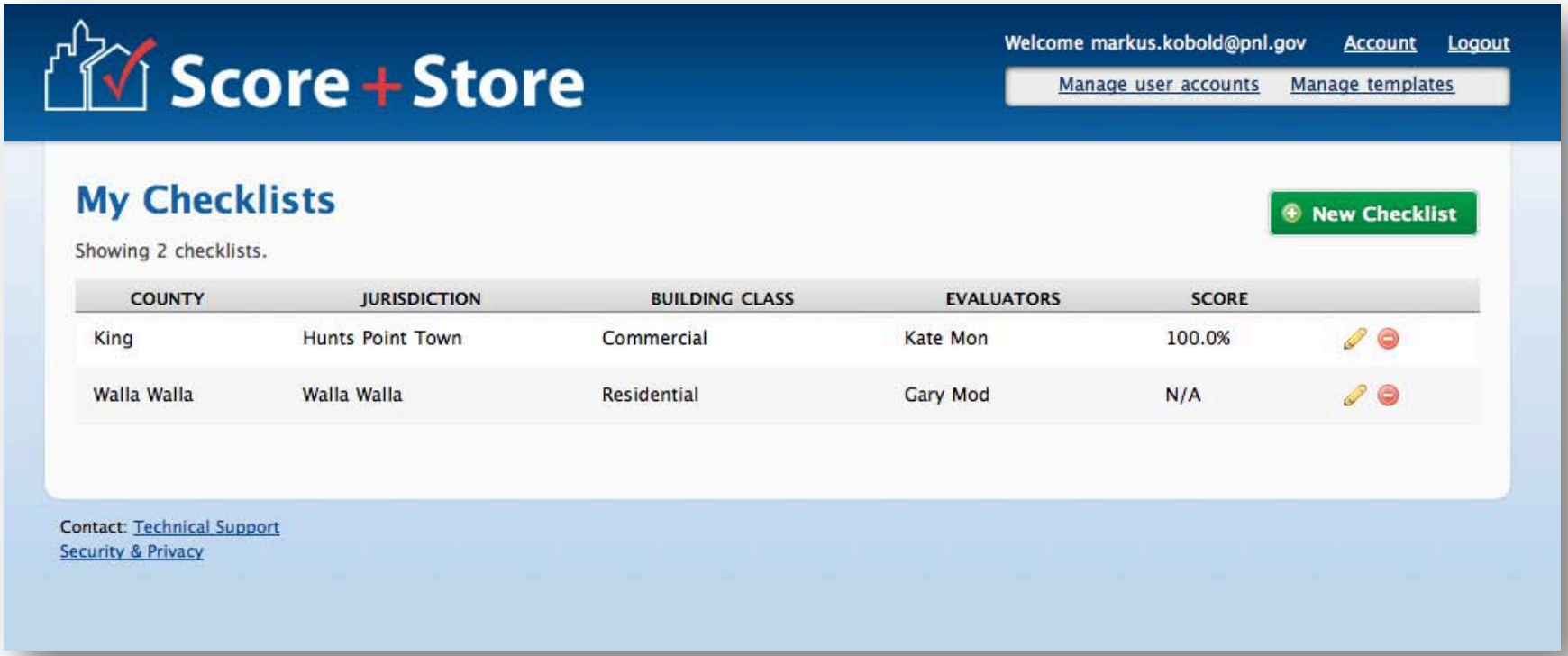


Online Web Tools for Compliance

Store + Score Sample Results

Checklist Metrics

Code Requirements with Highest Compliance Rate (Top 3)

PR6 - [8.4.1.1] Feeder connectors sized in accordance with approved plans.

PR7 - [8.4.1.2] Branch circuits sized for maximum drop of 3%.

ME8 - [6.4.4.1.2] HVAC ducts and plenums insulated.

Code Requirements with Lowest Compliance Rate (Top 3)

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.

FR3 - [5.4.3.2] Fenestration and doors labeled for air leakage.

FR2 - [5.4.3.2] Doors meet maximum air leakage requirements.

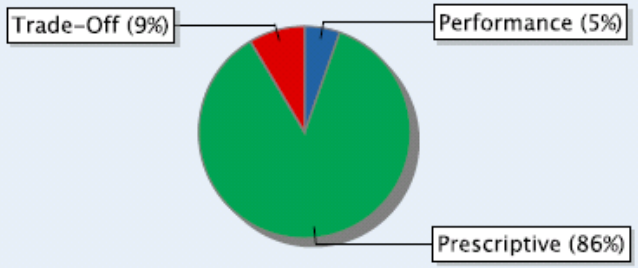
Code Requirements Most Frequently Not Observed (Top 3)

FR14 - [5.8.2.3,5.5.3.6] U-factor of opaque doors associated with the building thermal envelope meets requirements.

FR12 - [5.8.2.1] Fenestration products rated in accordance with NFRC.

FR13 - [5.8.2.2] Fenestration products are certified as to performance labels or certificates provided.

Compliance Approach Breakdown



Raising Compliance Rates

- **To Raise Compliance Rates, First Implement the Basics:**
  - Communicate the value of energy codes to all interested and affected parties
  - Ensure enforcement mechanism(s) are in place
  - Leverage industry developed tools
  - Ensure that necessary resources are in place to support compliance, such as:
    - Workforce
    - Budget
  - Ensure that training and technical support are in place

Image Courtesy of PNNL

Three Examples of Ways to Enhance the Implementation of Building Compliance to the Energy Code:

1. Compliance Evaluation
2. Third Party Plan Review/Inspection
3. Utility Code Programs

Image Courtesy of NREL

Compliance Evaluation

ARRA Code Compliance Requirement

American Recovery and Reinvestment Act (ARRA) of 2009 requires states who received funding under ARRA to achieve 90% compliance with at least the 2009 IECC for residential and ASHRAE 90.1-2007 for commercial buildings by 2017.

Pacific Northwest National Laboratory developed a protocol and has initiated through the four regional alliances a series of pilot studies to study the methodology of measuring compliance.

Code Compliance Evaluation

State Pilot Compliance Studies Goals:

1. Confirm actual compliance rates. Evaluation studies, until now, lacked a consistent methodology.
2. Assist in determining patterns of compliance, i.e., what code requirements are consistently met and those which are often missed.
3. Create comprehensive protocols to follow, including detailed checklists, to evaluate compliance for each individual requirement.
4. Produce best practices for building departments to follow when designing training programs that target the most difficult compliance requirements.

Pilot Study Participating States

- The PNNL Pilot Study States Include:
  - Utah
  - Massachusetts
  - Georgia
  - Iowa
  - Wisconsin
  - Montana
  - Washington
  - Oregon
  - Idaho

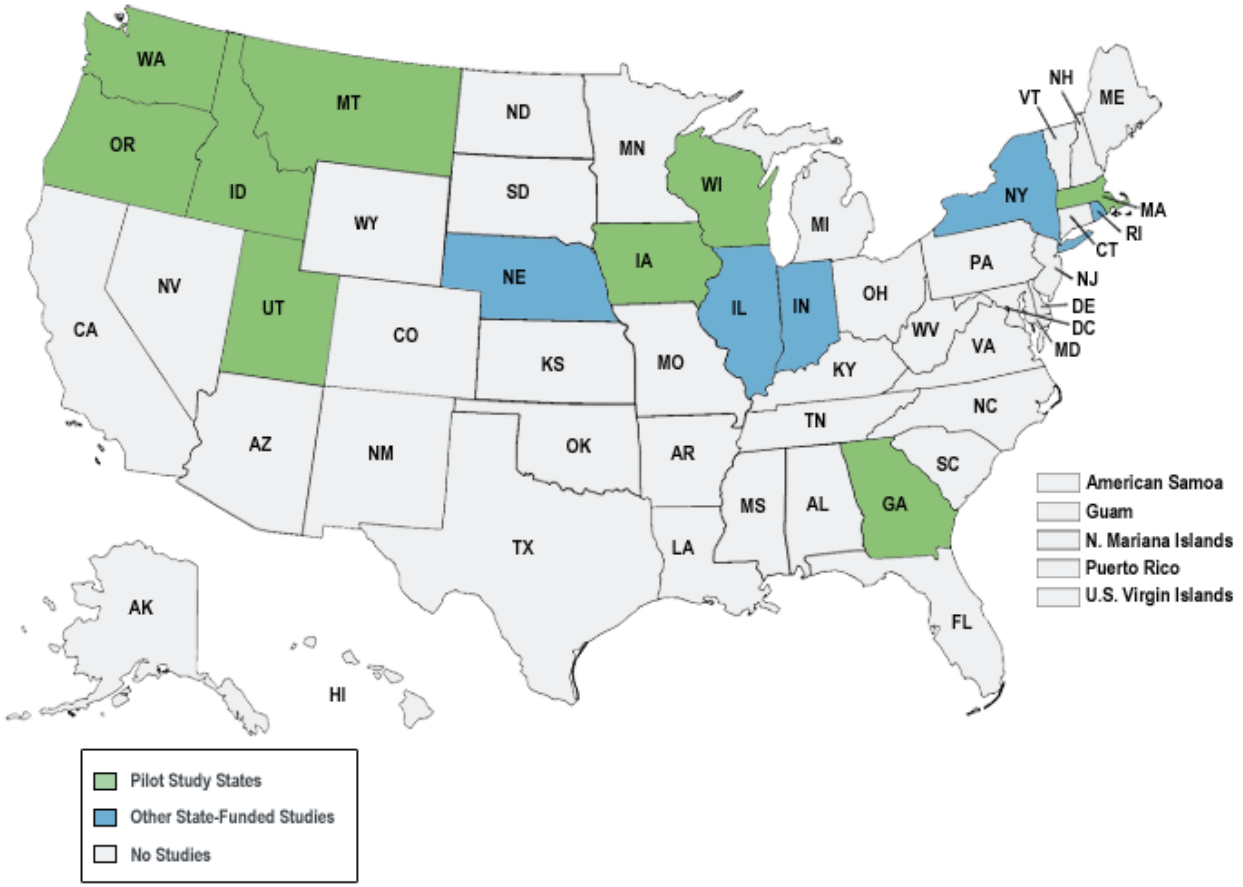


Image Courtesy of BECP

Utah Preliminary Findings

1. Lack of knowledge, awareness, and education of the energy code
2. Some stakeholders view the energy code as voluntary
3. All jurisdictions required COMcheck
4. Building department staff and building industry struggle with COMcheck
5. Energy code information does not match submittal paperwork
6. ACCA Manual J, D, and S, are not well understood and prove difficult to enforce
7. During plan review, REScheck and Manual J input details are not compared or match

Image Courtesy of NREL

Utah Preliminary Findings Cont.

8. Plan review and field inspection quality reflected the amount of training each Building Dep't has completed
9. Additional building plan review training is needed
10. Local training is preferred over chapter training
11. Contractors and trades are unfamiliar with some products and consistently install products incorrectly
12. Some homebuilders are already submitting and building to 2009 IECC or better
13. 90% Compliance - Residential Checklist works very efficiently
14. Commercial Checklist can be intimidating - field input indicates checklist maybe too detailed

Iowa Preliminary Findings

Additional Preliminary Findings from Iowa:

1. Rural Areas Present a Significant Challenge
2. Questions about when Renovation and Sunroom Requirements are Triggered.
3. Energy information is not typically on drawings.

Image Courtesy of Iowa Building Code Bureau

EPA Thermal Bypass Checklist

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Using developed tools to increase compliance

ENERGY STAR

Thermal Bypass Checklist with Code References

By Robby Schwarz and Gil Rossmiller

Home Address:_____ City:_____ State:_____

Thermal Bypass	Inspection Guidelines				Code Reference
1. Overall Air Barrier and Thermal Barrier Alignment	**Requirements:** Insulation shall be installed in full contact with sealed interior and exterior air barrier except for alternate to interior air barrier under item no. 2 *(Walls Adjoining Exterior Walls or Unconditioned Spaces)*				
	All Climate Zones:				
	1.1 Overall alignment throughout home				N1101.6
	1.2 Garage band joist air barrier (at bays adjoining conditioned space)				402.4.1 (#7)
	1.3 Attic eave baffles where vents/leakage				R806.1 & R806.3
	Only at Climate Zones 4 and Higher:				
	1.4 Slab-edge insulation (A maximum of 25% of the slab edge may be uninsulated in Climate Zones 4 and 5.)				Mentioned in code but can be traded off in rating
	Best Practices Encouraged, Not Req'd.:				
	1.5 Air barrier at all band joists (Climate Zones 4 and higher)				N/A
	1.6 Minimize thermal bridging (e.g., OVE framing, SIPs, ICFs)				N/A
2. Walls Adjoining Exterior Walls or Unconditioned Spaces	**Requirements:** • Fully insulated wall aligned with air barrier at both interior and exterior, **OR** • alternate for **Climate Zones 1 thru 3**, sealed exterior air barrier aligned with R-5 XPS Grade 1 insulation fully supported • Continuous top and bottom plates or sealed blocking				
	2.1 Wall Behind Shower/Tub				402.4.1 (#8)
	2.2 Wall Behind Fireplace				402.4.1 (#5) & N1101.6
	2.3 Insulated Attic Slopes/Walls				402.4.1 (#6) & R806.1
	2.4 Attic Knee Walls				402.4.1 (#6)
	2.5 Skylight Shaft Walls				402.4.1 (#2)
	2.6 Wall Adjoining Porch Roof				402.4.1 (#10)
	2.7 Staircase Walls				402.4.1 (#10)
	2.8 Double Walls				402.4.1 (#5)
3. Floors between Conditioned and Exterior Spaces	**Requirements:** • Air barrier is installed at any exposed insulation edges • Insulation is installed to maintain permanent contact with sub-floor above • **Optional until July 1, 2008**, insulation is installed to maintain permanent contact with air barrier below				
	3.1 Insulated Floor Above Garage				402.4.1 (#7) & 402.2.5
	3.2 Cantilevered Floor				402.2.5

Third Party Plan Review / Inspection

Third Party Plan Review/Inspection

What is Third Party Review/Inspection?

- Completion of code review and inspection by individuals who are not directly in the employ of the authority having jurisdiction (AHJ).
- The third party either has a contractual commitment with the AHJ or is hired directly by the developer

Advantages:

- Third party plan reviewers/inspectors can focus on energy code.
- Allow regular Inspectors to focus on life/safety issues by supplementing efforts of regular inspectors.
- Can relieve budgetary pressure
  - Include fees for plan review/inspection
  - Developer pays for third party inspector directly
- Can often help speed up the plan review/inspection process

Examples of Third Party Plan Review/Inspection

- *Commercial - County of Fairfax Virginia*
- *Commercial - Washington State*
- *Residential - City of Denver*

Image Courtesy of DOE Build America Program

Case Study - County of Fairfax, VA

Utilized Third Party Plan Review/Inspection Structure:

1. County Applied Policy to only Commercial Buildings
2. Project supervision by Registered Design Professional
3. Private Inspection Firm hired must not have financial interest in project.
4. Oversight - County Commercial Inspection Division enforces the code and gives final approval.

http://www.fairfaxcounty.gov/dpwes/publications/thirdpartyinspections.pdf

Case Study - Washington State

Key Aspects of Program:

1. Use of Specialized Plan Examiner/Inspector (SPE/I)
2. Based on Section 1704 of the International Building Code
3. Training and certification program developed by an organization funded by major utilities in the state (the Utility Codes Group).
4. Training and certification program was administered by the Washington State Building Officials (WABO)
5. WABO kept a list of certified SPE/Is
6. Training program open to inspectors from local jurisdictions as well.
7. Jurisdictions could opt into the program.
8. Compliance rates rose from 55% to 94%.

http://www.energycodes.gov/publications/research/caseStudies/case_certify.stm

Incentivizing Third Party Plan Review / Inspection

- Third Party Energy Raters provide energy code inspections
- Reduces building department staff time to inspect home
- Builder receives permit fee reduction by using the performance path in the code
- City Department maintains control via enforcement

Utility Code Programs

Utility Code Programs

States such as California and Massachusetts have implemented (or will implement in the case of MA) a program that allows utilities to claim savings for code enhancement activities (both adoption and compliance).

To have this happen:

1. Utilities must provide code enhancement services.
2. Utilities must receive credit towards energy efficiency goals.

See the upcoming webinar in August for more details.

Working with Utilities

Possible Utility Compliance Enhancement Activities:

1. Funding/Administering
   a. Training and Certification Programs
   b. Third Party Enforcement Programs
2. Assisting local jurisdictions with the implementation of tools that streamlines enforcement
3. Providing funding for the purchase of diagnostic equipment
4. Compliance evaluation assistance
5. Support for adoption of energy codes at local level

Image Courtesy of DOE

Related Resources

- **Compliance Best Practices Manual**

  http://bcap-ocean.org/resource/best-practices-municipal-energy-code-compliance-and-enforcement
- **State Compliance Evaluation Procedures**

  http://www.energycodes.gov/arra/compliance_evaluation.stm
- **Score + Store Program:**

  https://energycode.pnl.gov/ScoreStore/login
- **Building Energy Codes Resource Center**

  http://resourcecenter.pnl.gov/cocoon/morf/ResourceCenter
- **Case Studies**

  http://www.energycodes.gov/publications/research/codes_compliance_studies.stm

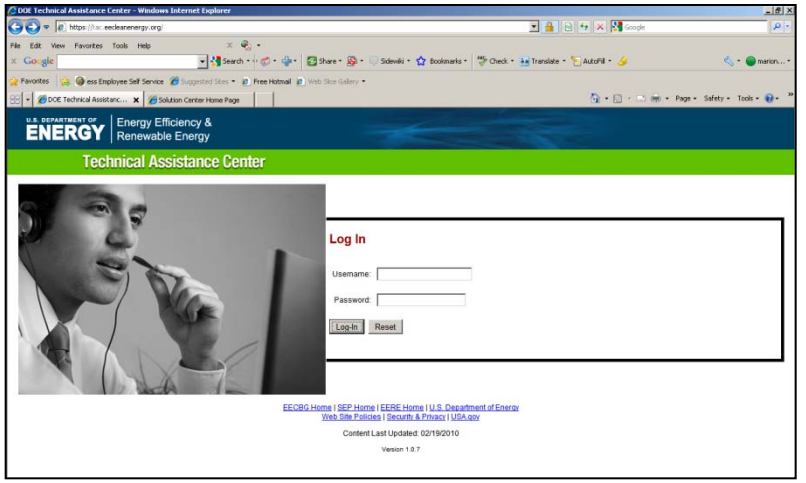
Accessing TAP Resources

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

Upcoming Webinars

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

Please join us again:

Geothermal Heat Pumps
Presenters: Cherryl Mesko and Mark Vaughan, City of Eagan, Minnesota; Keela Bakken, Harris Companies; and Steve Lutz, TRAK International
June 23, 2011
3:00 – 4:15 p.m. ET

Utility Partnering
Presenters: Keith Freischlag, SWEEP, Chuck Goldman and Merrian Fuller, LBNL
June 24, 2011
2:00-3pm ET

Interior Lighting Efficiency for Municipalities
Presenters: Chad Bulman, MEEA, Carol Jones and Eric Richman, PNNL
June 29, 2011
2:00-3:00pm ET

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

Questions and Answers

Questions???

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Image Courtesy of City of Waukegan IL

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