How Building Energy Codes Can Support State Climate and Energy Planning

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

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This short presentation is intended give states and their stakeholders a vision for what it would look like to include building energy codes in their climate and energy plans.

Building Energy Codes as an Emission Reduction Approach

Possible Leads

- State code administrator
- State energy office
- Utility
- NGO

E-Savings

- # new code or beyond code built bldgs. X reduction in kWh per bldg. from code in 2012

Potential Program Components

- Stretch Code Programs
- ENERGY STAR New Homes
- Zero Energy Ready Homes

Activities	EM&V
Energy Savings Approaches	
• State energy office, utility, or NGO generate energy savings from: - Education - Training - Enforcement activities	• Recent resources provide guidance, including: - DOE Building Energy Codes Program (BCEP) - *Achieving Energy Savings and Emission Reductions from Building Energy Codes: A Primer for State Planning* - *BCEP multi-state in field evaluation (to be released soon)*
State Policy Options	
• Could include: - Legislation to require adoption of latest national model energy code upon update - Legislation to require reduction in building energy use by date (e.g., 70% by 2030)	
Low Income Opportunities	
• Building code adoption and compliance in low income neighborhoods	

Why Building Energy Codes?

How Building Energy Codes Work

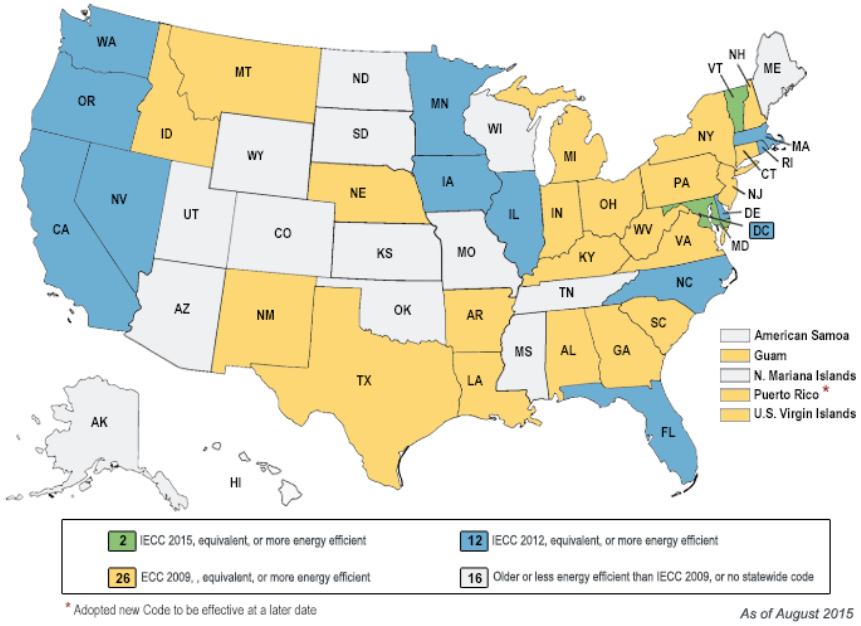
- Energy codes and standards set minimum efficiency requirements for new and renovated buildings to achieve reductions in energy use and emissions over the life of the building.
- Energy codes are a subset of building codes, which establish baseline requirements and govern building construction.
- Code-built buildings are more comfortable and cost-effective to operate, in addition to generating energy, economic and environmental benefits.

Benefits of Building Energy Codes

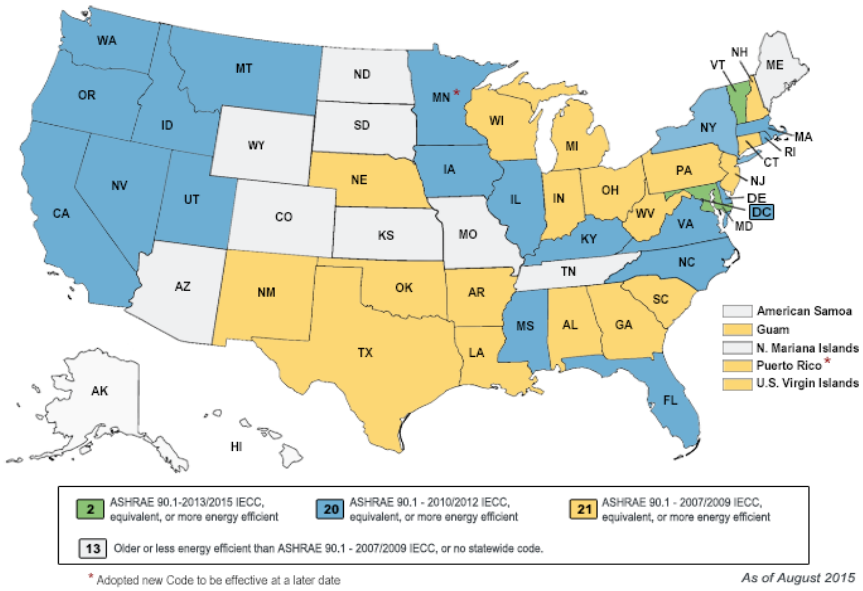
- Building energy codes save U.S. building owners about $5 billion annually in energy costs, and many times that amount over the lifetime of the buildings
- It is much less expensive to incorporate energy efficiency features into a building while it is being constructed rather than retrofitting in later years. Energy codes present a unique opportunity to achieve savings through efficient building design, technologies, and construction practices.
- Making investments in energy efficiency at construction will pay dividends to owners and occupants for years into the future.

Current Status of Building Energy Codes

- **44 states have adopted at least the 2006 energy code**
- **DOE provides support to all states**



Residential Code Adoption Status



Commercial Code Adoption Status

Some states are “home rule,” meaning that local municipalities are responsible for code adoption as opposed to the adoption of a single statewide code. The home-rule states are Arizona, Colorado, Kansas, Missouri, South Dakota, and Wyoming

State and Local Role in Building Energy Codes

Building energy codes require state and local action

- There is no U.S. national energy code or standard. Building energy codes are adopted and implemented at the state and local levels.
- A designated state agency (e.g., energy office), local government agency (local code administrator), or both are responsible for code development, adoption, and enforcement.

Policy Actions:

- Adoption of new building energy codes can occur directly by legislative action or through regulatory agencies authorized by the legislature.
- The most effective state adoption processes include legislation triggering an automatic review and update process when new codes are available.

Implementation Actions:

- Actual energy savings are achieved through code compliance, not code development or adoption.
- State and local building officials enforce the code by verifying that what is built actually complies with the energy code.
- Adopting jurisdictions must educate and support code officials to enforce the energy code.
- State and local governments can speed adoption by helping to prepare the building design and construction communities to comply with new energy codes.

Best Practices in Code Implementation

- Compliance/enforcement is the critical element that leads to realizing actual energy savings. Codes can be developed and adopted but if they are not complied with, the energy savings do not materialize.
- Training and technical assistance on compliance and enforcement for builders, contractors, and local code officials is necessary to achieve savings.
- Compliance is the responsibility of builders and contractors. Best practices include:
  - Understanding the requirements of the energy code
  - Meeting the established building energy requirements
  - Demonstrating that these requirements have been satisfied
- Enforcement is the responsibility of local code officials. Best practices include:
  - Knowing the requirements of the energy code
  - Identifying the code compliance paths used for the building
  - Reviewing the design
  - Inspecting the building during and after construction
  - Observing, reviewing, and ensuring testing, commissioning, and owner documentation
  - Getting help when needed

Savings Examples from Select States

Following are rough estimates of projected annual energy savings in TBTU (trillion BTUs) and billion kWh in 2030 for several high-potential states if they adopt the latest national model codes (2015 IECC and ASHRAE 90.1- 2013) in 2017

State	Annual Total Energy Savings in 2030 (Trillion BTUs)	Annual Electricity Savings in 2030 (billion kWh)
Texas	25.9	5.82
Florida	20.1	4.99
Massachusetts	13.5	2.24
North Carolina	12.3	2.40
New York	11.0	2.05
Georgia	10.7	2.54
Pennsylvania	10.2	1.97
Virginia	9.6	1.92
Arizona	7.3	1.72
Illinois	7.2	1.42

Achieving Energy Savings an Emission Reductions from Building Energy Codes: A Primer for State Planning, DOE (April 2015)

Building Energy Codes Are Cost-Effective

- Codes are one of the most cost-effective EE investments
  - Adoption costs are primarily salaried employees managing code adoption process
  - Compliance costs are borne by local government and supported by permit fees

- DOE provides each state an estimate of expected cost savings resulting from the adoption of each new published model code (assumes 100% compliance with both the old and the new code)
  - Example: *Energy cost savings from adopting the 2015 code for Indiana are estimated to be on the order of nearly $240 million annually by 2030.*

- Incremental construction costs to implement recent building energy codes are cost effective
  - Residential buildings: incremental costs are about $1,152 to $2,718 per house
  - Commercial buildings: incremental costs primarily range from $0.53/ft^2 to $5.38/ft^2, resulting in net life-cycle-cost savings

EM&V Methods for Building Energy Codes

DOE is determining projected and evaluated savings through field-based research on a statistically valid sample representing all buildings constructed under the code being studied. Data from the studies will be used to create computer simulations of as-built annual building energy use and compared to simulations representing "to code" energy use.

Residential

- Now piloting a DOE-developed research protocol that determines the amount of potential energy savings in newly constructed homes relative to a code baseline.
  - Designed for states and utilities to adapt and adopt
  - Results to be based on an **energy metric** and reported at the **state-level**
  - Focuses on **individual code requirements** within **new single-family** homes
  - Designed with **statistically significant** results in mind

Commercial

- Development of a comprehensive strategy will be completed in 2016.
  - Currently gathering data that will assist in the development of a research methodology.

DOE Support for Building Energy Codes

- DOE's Building Energy Codes Program supports the development, adoption, and implementation of market-based model energy codes with the twin goals of:
  - increasing cost-effective minimum requirements in the codes themselves
  - increasing compliance rates after codes are adopted

- BECP fills these roles by working closely with energy efficiency organizations, code development bodies, building design and construction representatives, the code enforcement community, product manufacturers, and the general public.

- BECP empowers those who seek to improve energy codes by providing research, analysis, tools, and materials, as well as by developing cost-effective, technically evaluated code change proposals.

Resources for States

Full Suite of Resources at https://www.energycodes.gov/

- **Compliance software and tools**
- **Technical assistance includes:**
    - Comparative analysis of future code options
    - Customized education materials
    - Web-based or in-person training programs
- **Resource guides and technical support documents**

Achieving Energy Savings And Emission Reductions From Building Energy Codes: A Primer For State Planning – provides a basic methodology for calculating savings and highlights effective state/local approaches to codes

New Release from SEE Action

Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution, and Meet Energy Needs in the Power Sector

- For state air regulators and other state policy makers / administrators and their stakeholders
- Practically-oriented, covering:
  - Established policy and program options to advance demand-side energy efficiency (both ratepayer-funded and non-ratepayer-funded)
  - Case studies of existing regional, state, and local policies and programs with sources for where to go for more information
  - Tools and methods that allow states to understand the range of expected savings from energy efficiency and common protocols for documenting savings