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# How **Building Energy Codes** Can Support State Energy Planning

[energy.gov/eere/slsc/EEopportunities](https://energy.gov/eere/slsc/EEopportunities)

# About this Presentation

## Slide Overview

- Summary
- State-Level Savings Estimates
- Purpose and Benefits
- Current Status
- State and Local Role
- Best Practices in Implementation
- Complementary / Related Programs
- Cost-Effectiveness
- Evaluation, Measurement, & Verification (EM&V)
- DOE Support
- Additional Resources

**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 energy plans.**

# Building Energy Codes as an Energy Savings Approach

## Possible Lead

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

## Energy Savings

- # new code or beyond code built buildings X reduction in kWh or Btu per building from code in baseline year

## Potential Program Components

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

## Opportunity:

12,824 trillion Btu national energy savings in 2040  
19 to 2,269 trillion Btu per state

## Activities

### Energy Savings Approaches

- State energy office, utility, or NGO generate energy savings from:
  - Education
  - Training
  - Enforcement

### 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)

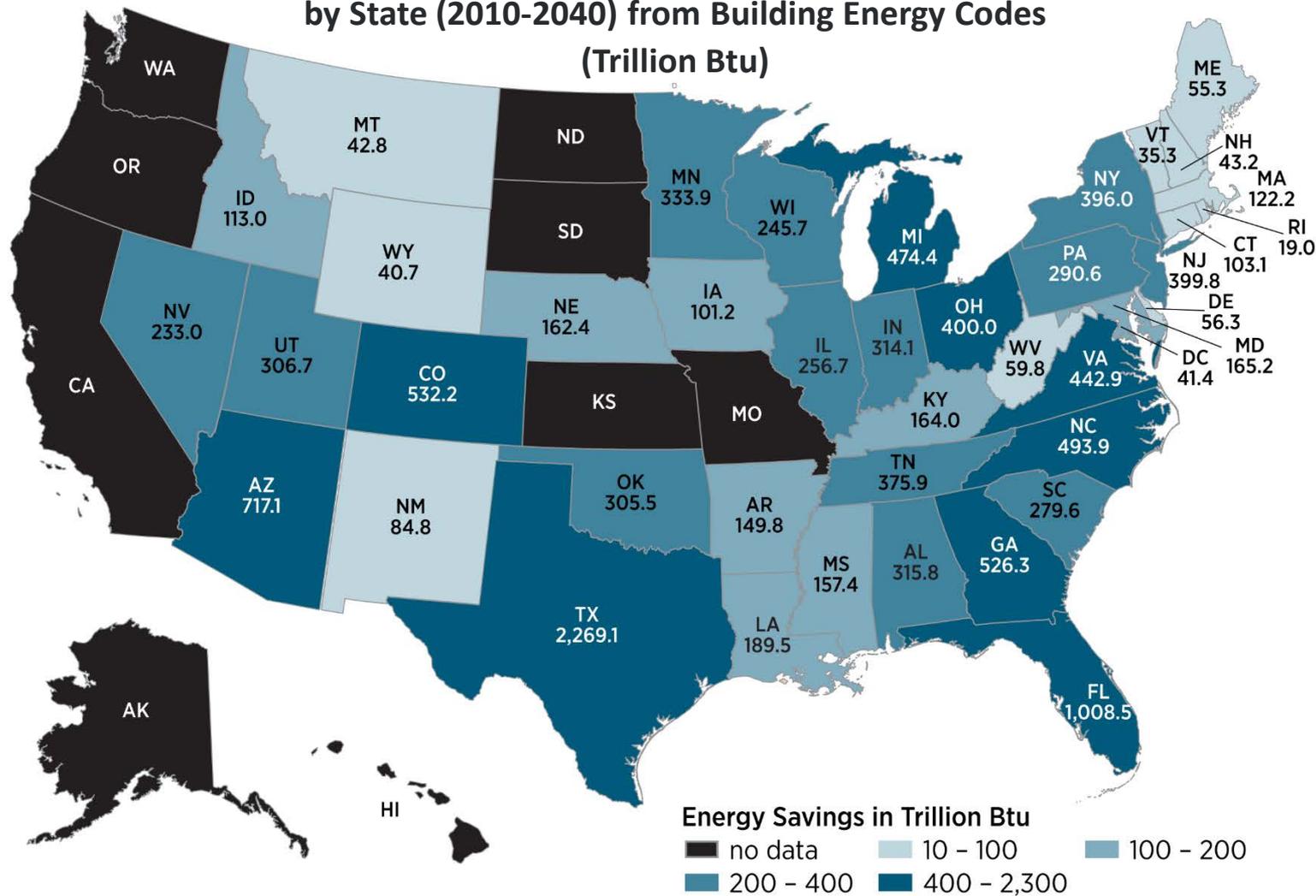
## EM&V

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 [residential energy code field study](#)

# Sizable Opportunity: Achievable Potential Savings in States

Estimated Achievable Potential Total Energy Savings  
by State (2010-2040) from Building Energy Codes  
(Trillion Btu)



# Why Building Energy Codes?

## How Building Energy Codes Work

- Energy codes 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

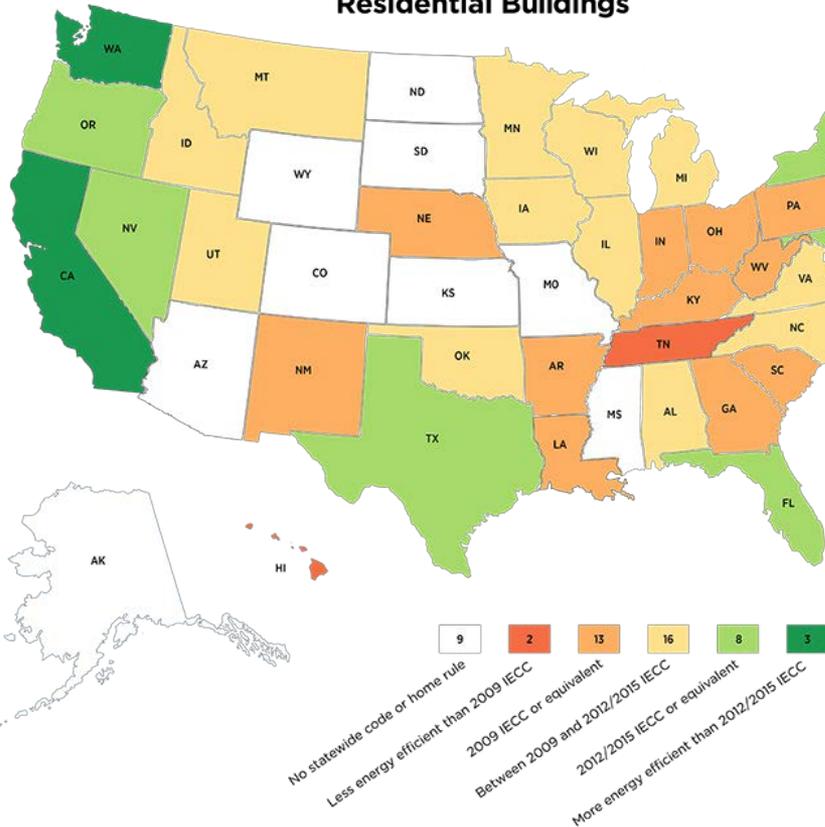
- Building energy codes save U.S. building owners about \$5 billion annually in energy costs, and many times that amount over the lifetime of the buildings.
- It is much less expensive to incorporate energy efficiency features into a building while it is being constructed—energy codes present a unique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

*More information on building energy codes is available at <http://www.energycodes.gov/>.*

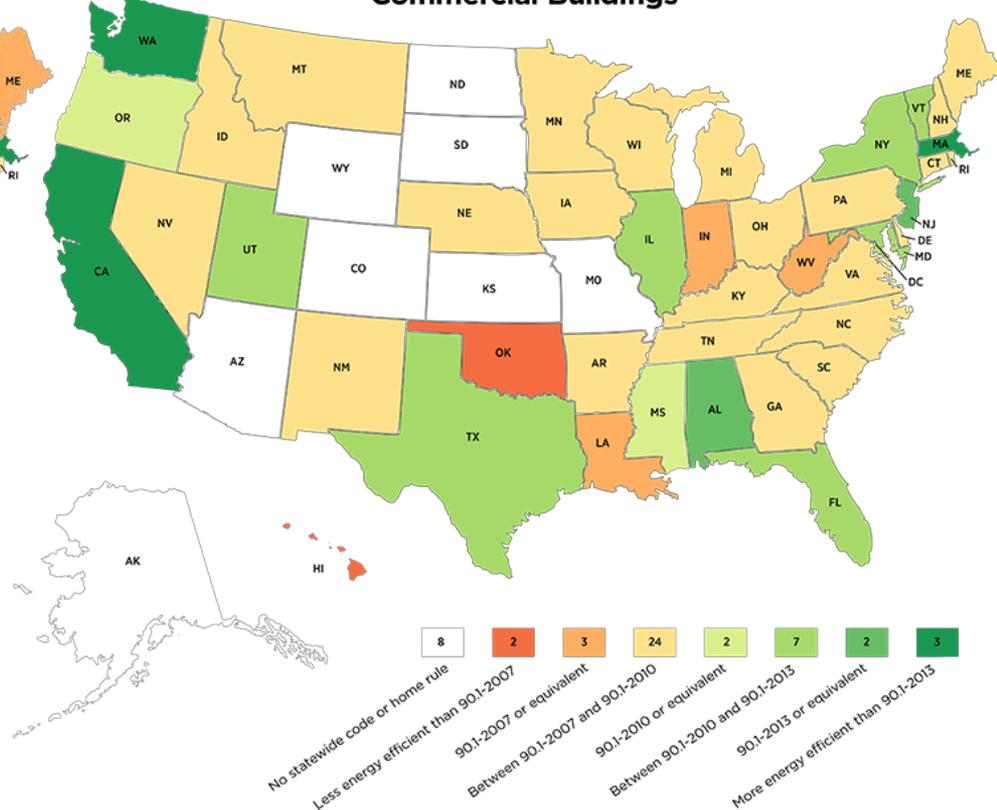
# Current Status of Building Energy Codes

The vast majority of states have adopted an energy code—recent editions of the IECC and Standard 90.1 provide over 30% energy savings.

### Residential Buildings



### Commercial Buildings



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

# State and Local Role in Building Energy Codes

## Building energy codes require state and local action:

- Model energy codes, such as the IECC and Standard 90.1, are developed at the national level, and then adopted and implemented at the state and local levels.
- A designated state agency (e.g., energy office), local government agency (local building departments), 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 authorized regulatory agencies.
- 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 only assured through code compliance, not solely code development or adoption.
- States & localities must educate, train and support local stakeholders complying with code (e.g., designers, builders and code officials).
- State & local building officials enforce the code by verifying that what is built actually complies with the energy code.

*More information on energy code implementation is available at [www.energycodes.gov](http://www.energycodes.gov).*

# 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 and inspecting the building during and after construction
  - Observing, reviewing, and ensuring testing, commissioning, and documentation
  - Getting help when needed

# Complementary / Related Programs

## Several options exist for going *above* code:

- Many states & localities implement programs that successfully reach beyond minimum energy-efficiency requirements:
  - [Stretch code programs](#)
  - [ENERGY STAR for Homes](#)
  - [Zero Energy Ready Homes](#)
- When implementing codes, consider these additional programs to encourage greater energy savings and sustainability.
- These programs can also help better link minimum codes to broader or more advanced energy conservation policies.

# 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](#): Life-cycle cost savings range from \$4,418 to \$24,003 per house based on climate zone (2015 vs. 2009 IECC)
  - [Commercial buildings](#): Life-cycle cost savings range from \$0.53/ft<sup>2</sup> to \$5.38/ft<sup>2</sup> based on climate zone and building type (90.1-2013 vs. 2010)

# EM&V Methods for Building Energy Codes

DOE is developing a standardized methodology to assess the energy savings available through increased energy code compliance.

- Historically, compliance has been evaluated through a variety of approaches, often yielding inconsistent results that can not easily be equated to statewide energy use.
- This new approach allows states to more easily, dependably, and affordably identify the savings available to home and business owners through increased compliance.

**Residential:** In 2015, DOE released its single-family residential methodology:

- Designed for states and utilities to adopt
- Provides statistically significant results
- To date, has been used in more than a dozen states
- Available free of charge at [energycodes.gov](http://energycodes.gov)
- A low-rise multifamily methodology is also currently under development (target 2018)

**Commercial:** DOE is currently developing a comparable methodology for commercial buildings:

- Multi-state pilot initiated in 2016
- Draft methodology targeted for 2017
- Field data collection will continue through 2019

# DOE Support for Building Energy Codes

DOE's [Building Energy Codes Program](#) (BECP) supports the development, adoption and implementation of market-based energy codes with the goals of:

- increasing cost-effective minimum requirements in the model codes
- encouraging state and local adoption of model energy codes
- helping to ensure compliance and successful implementation

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

## BECP provides a full suite of resources:

- Compliance [software](#) and [tools](#)
- Various forms of **technical assistance**, such as:
  - Comparative [analysis](#) of future code options
  - [Status of state energy code adoption](#)
  - A collection of [educational & training materials](#)
  - [Pro Desk](#) to assist individuals with questions
- [Resource Center](#) featuring guides and other publications

## *Featured Publications:*

- [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
- [Impacts of Model Building Energy Codes](#) – Presents an analysis of the prospective impacts of national residential and commercial model building energy codes from 2010 through 2040 at national and state-levels.

# Get More Information on This Pathway and Others

Visit: [energy.gov/eere/slsc/EEopportunities](https://energy.gov/eere/slsc/EEopportunities)

## [How Energy Efficiency Programs Can Support State Energy Planning](#)

Overview and individual presentations on features and benefits associated with including energy efficiency in state energy plans, covering:

- National and state-level electricity savings potential estimates for 2030 and beyond
- Current activity at the national and state levels, best practices, energy savings examples, cost-effectiveness, measurement approaches, and DOE support for:
  - Building energy codes
  - City-led efficiency efforts
  - Combined heat and power
  - Energy savings performance contracting
  - Industrial efficiency, including superior energy performance
  - Ratepayer-funded programs
- Technical assistance available

## [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](#)

State and Local Energy Efficiency Action Network (SEE Action) resource presents pathways thru:

- Case studies of successful regional, state, and local approaches
- Resources to understand the range of expected savings from energy efficiency
- Common protocols for documenting savings
- Sources for more information