

# Building Energy Codes

SWEEP

5th Annual Southwest Regional  
Energy Efficiency Workshop

Denver, Colorado

November 14, 2008



# BCAP — Building Codes Assistance Project

- Non-profit advocacy group based in D.C. since 1994
- A joint project of the Alliance to Save Energy, the National Resource Defense Council, and the American Council for an Energy Efficient Economy
- Provide *resources, education & advocacy assistance* for the adoption, implementation, & advancement of effective energy codes on behalf of **US Department of Energy**



# Impact of Buildings

- Building energy consumption is almost 40% of total energy use in the US  
~65.2% of total U.S. electricity consumption
- Buildings are the nation's largest source of global warming pollution  
Responsible for 40% of CO<sub>2</sub> emissions



The average home emits twice as much ghg as the average car

In 2006, 2.3 million housing units permitted in US (NAHB)



# VALUE of Energy Codes

## Affects ALL new buildings

By 2010:

- Almost **5 million** new housing units
- Over **233 billion sq feet** commercial floor space

By 2020:

- **23.4 million** new housing units
- Over **1 trillion** sq feet commercial floor space

By 2030:

- Over **41 million** new housing units
- Over **2 trillion** sq feet commercial floor space

Source: EIA, Annual Energy Outlook 2008



# Buildings are critical in addressing energy and climate

## Efficient buildings

- Reduce stress on power grid and natural gas supplies
- Improve air quality and public health
- Avoid global warming
- Save consumers money
- Reduce foreign oil dependency



# IECC part of the International Family of Codes



**IECC: A Required  
Minimum Level of  
Energy Efficiency In  
New Residential  
and Commercial  
Construction**

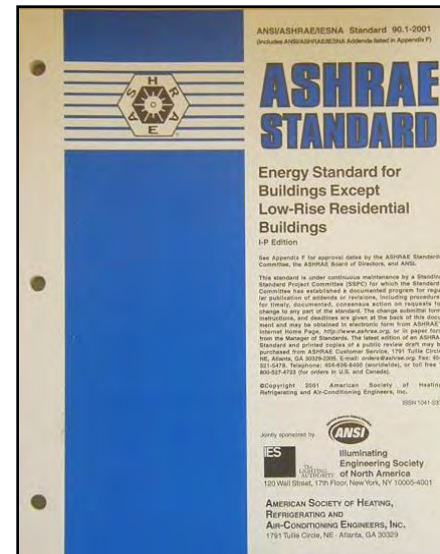
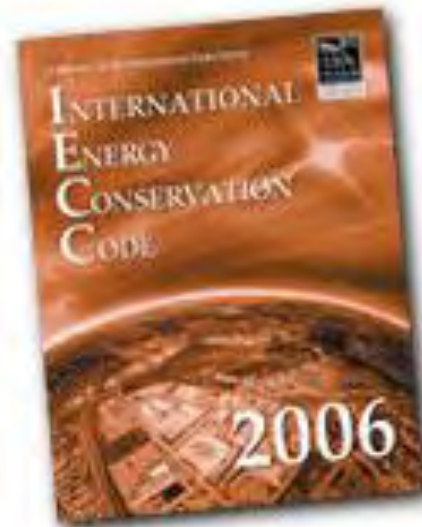
**Coordinated family of  
International Codes**



# Commercial Building Compliance

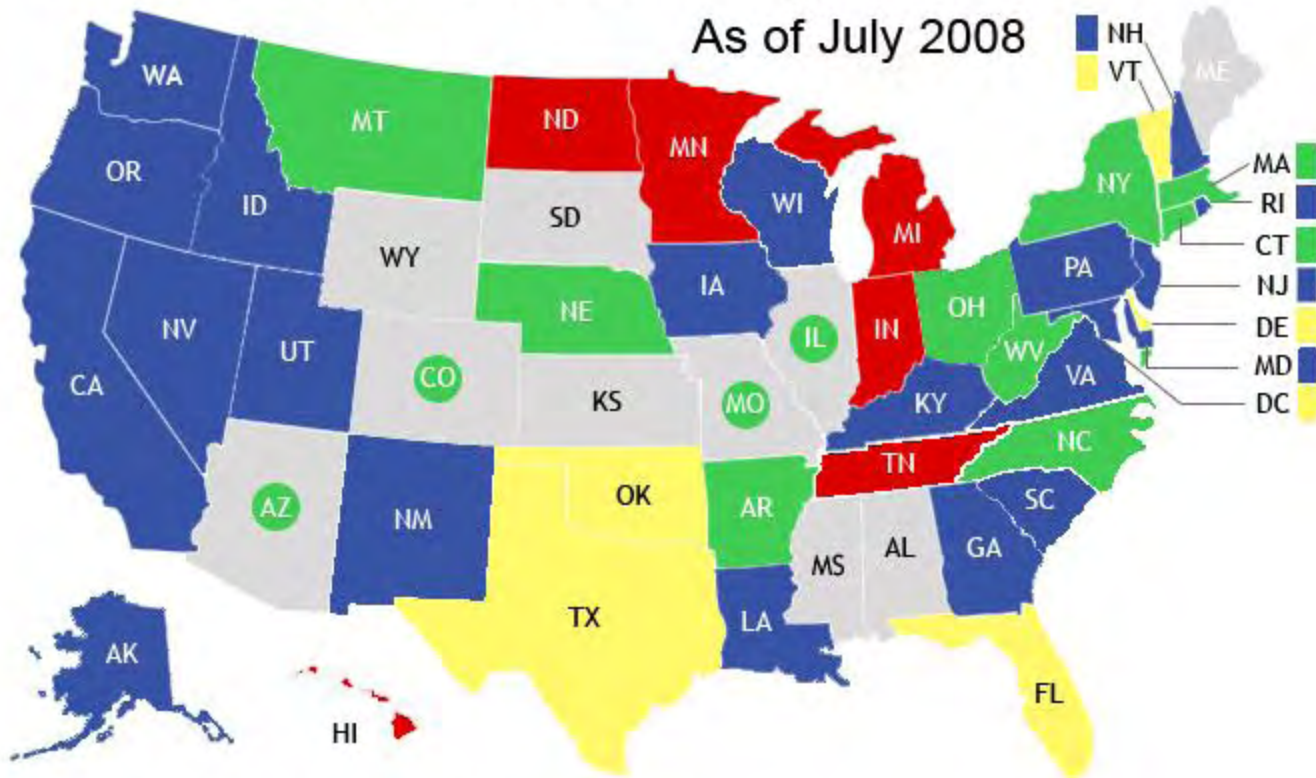
IECC  
Chapter 5 Can Be  
Used to Demonstrate  
Compliance

ASHRAE  
Chapter 5 of the  
IECC References  
ASHRAE 90.1-2004  
as an option to  
Demonstrate  
Compliance



# Residential State Energy Code Status

As of July 2008



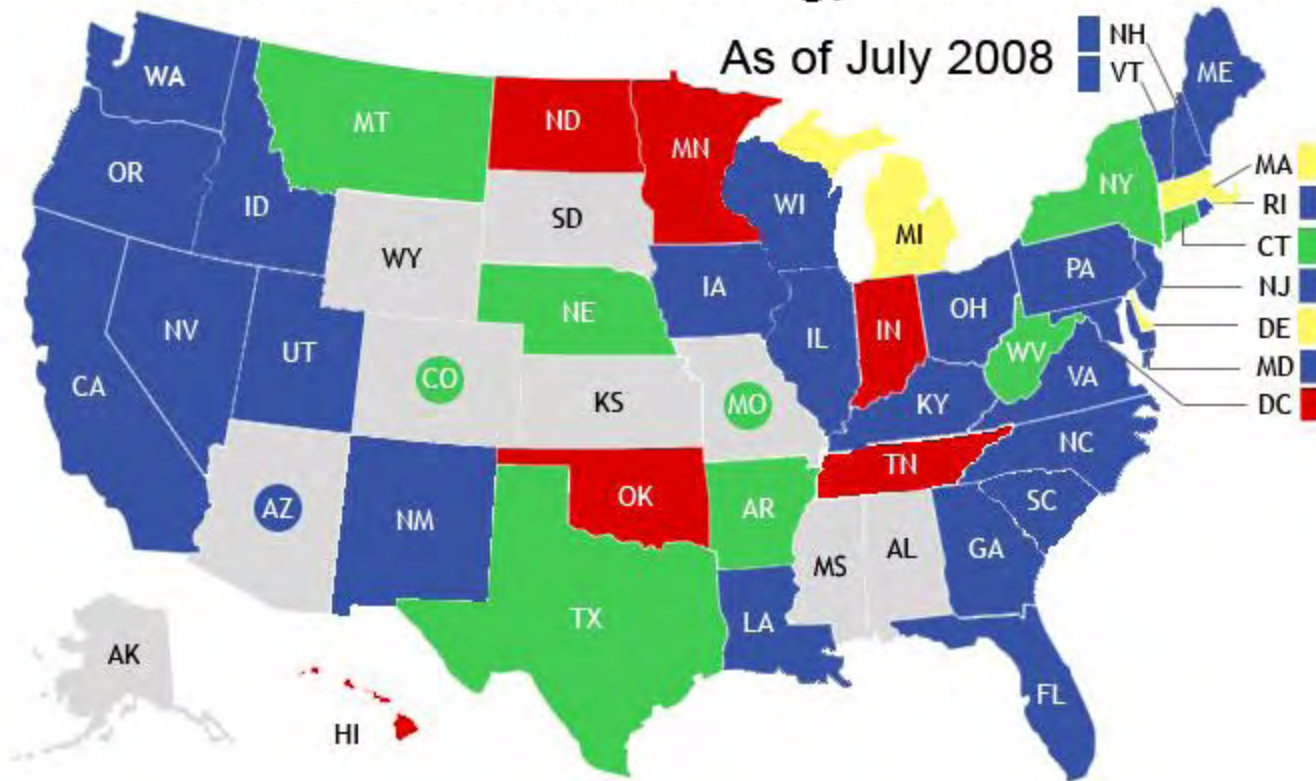
- Adopted code meets or exceeds 2006 IECC or equivalent
- Meets 2003 IECC or equivalent
- Meets 1998-2001 IECC or equivalent (meets EPCA)
- Precedes 1998 IECC or equivalent (does not meet EPCA)
- No statewide code
- New code soon to be effective
- Significant adoptions in jurisdictions

Source:  
Building Codes Assistance Project  
[www.bcap-energy.org](http://www.bcap-energy.org)



# Commercial State Energy Code Status

As of July 2008



- Adopted code meets or exceeds 2006 IECC / ASHRAE 90.1-2004 or equivalent
- Meets 2003 IECC / ASHRAE 90.1-2001 or equivalent
- Meets 2001 IECC / ASHRAE 90.1-1999 or equivalent (meets EPCA)
- Precedes ASHRAE 90.1-1999 or equivalent (does not meet EPCA)
- No statewide code
- New code soon to be effective
- Significant adoptions in jurisdictions

Source:  
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# Expanding Scope of Building Codes and Standards

- Minimum requirements to safeguard public health, safety and general welfare

- Structural strength
- Means of egress
- Stability
- Sanitation
- Adequate light and ventilation
- Safety to life and property from fire

- Accessibility
- Energy conservation
- Water conservation
- Other hazards attributed to the built environment



# VALUE of Energy Codes

Establish a foundation  
for *energy and green*  
programs:

- ENERGY STAR,
- LEED homes and commercial buildings,
- ASHRAE Standard 189
- NBI Core Performance
- ASHRAE Advanced Energy Design Guides
- Building America/ federal tax incentive
  
- Net Zero



# Architecture 2030

- This fossil fuel reduction standard for the operation of all new buildings must be increased to:
  - 60% in 2010
  - 70% in 2015
  - 80% in 2020
  - 90% in 2025
  - carbon-neutral by 2030 (meaning they will use no fossil fuel energy to operate).

[www.architecture2030.org](http://www.architecture2030.org)



# National Level - National Model Building Energy Code & Standards

**COMMERCIAL** *ASHRAE Standard 90.1* 30 % Improvements  
underway

***RIGHT NOW:***

90.1-2007,

LEED,

Advanced Energy Design  
Guides,

Core Performance,

ENERGY STAR



# National Level - National Model Building Energy Code & Standards

## RESIDENTIAL

*International Energy Conservation Code (IECC) Improvements made on  
an 18 month cycle.*

### *RIGHT NOW:*

2009 IECC -several significant new provisions to boost energy efficiency,  
including:

- Increased insulation in basements, floors and walls;
- Improved window efficiency;
- Reductions in wasted energy from leaky heating & cooling ducts;
- Reductions in tradeoffs that fail to capture energy savings from efficient heating & cooling equipment;
- High-efficiency lighting; and
- Improved air sealing within the building envelope.

ENERGY STAR  
LEED RESIDENTIAL  
BUILDING AMERICA



# Codes are a Critical Element of Energy and Climate Plans

**AND produce savings**

## **SCENARIO:**

If all states implemented a national energy code that is strengthened by 30% starting in 2010 and by 50% around 2020:

**In 2030 our nation could save 2.6 quadrillion BTUs of energy - the equivalent Virginia's annual energy consumption**

**By 2050, cumulative energy savings would reach approximately 111 quadrillion BTUs. = more than the TOTAL US ENERGY CONSUMPTION in 2005 (100.3 quads)**

Estimates are under development and subject to change based on further analysis of EIA and other available building data; data is based on 2005 state energy consumption; Energy Information Administration



# **ADVANCING ENERGY CODES**

## **Programs and Recommendations**



# Let's Talk LEED

Various LEED initiatives including legislation, executive orders, resolutions, ordinances, policies, and incentives are found in **44** states, including **163** localities (**107** cities, **29** counties, and **27** towns), **31** state governments, **12** federal agencies or departments, **15** public school jurisdictions and **39** institutions of higher education across the United States.



# Across the U.S.

San Francisco's ordinance requires that all new construction, including homes, and the renovations of large commercial spaces meet standards for conserving energy and water.

More than a dozen cities and counties did the same, including Chandler, Ariz.; El Paso; Tampa; Monterey, Calif.; Fairfax County, Va., Normal Il, and Starkville, Miss.

Chamblee and Doraville, GA buildings >20,000 sq. ft. And all city owned buildings

Atlanta, GA LEED-NC Silver certification for commercial buildings > 20,000 square feet and mid-rise multi-family dwellings (3 to 6 stories) beginning in 2010. All new construction except low-rise residential dwellings would be subject to the ordinance beginning in 2012.

Long island NY 13 cities adopt Energy Star as residential code, many more looking to follow suite.

Rohnert Park, CA Green building ordinance – green tiered – self certify <50,000 sq.ft



# Evolving Green Building Standards For Single Family Dwellings

City Code or 3rd Party Program	Percentage above 2006 IECC	Performance Testing		Thermal By-Pass Inspection	Lighting Efficiency	Water Heating	Appliances	Indoor Water Efficiency	Indoor Environmental Quality
		Ducts	Envelope						
City of Scottsdale Building Code	15%	No Req'mts	No Req'mts	Partial	No Req'mts	Recir. pump	No Req'mts	No Req'mts	No Req'mts
City of Scottsdale Green Building Program	15%	Optional points	Optional points	Partial	Task Lighting	Recir. pump	No Req'mts	50% High Efficiency Toilets	Seal Ducts during constr.; Low VOC Paints; MERV 8 Air Filters; CO Detectors
Energy Star Program	15%	Req'd	Req'd	Yes	Optional	No Req'mts	Optional	Not Addressed	Not Addressed
LEED for Homes Program	15%	Req'd	Req'd	Yes	4 Energy Star labeled fixtures or bulbs	Optional points	Optional points	Optional points	MERV 8 Air Filters; CO Detectors
Environments for Living – Certified Green Program	20%	Req'd	Req'd	Yes	50% High Efficacy	Energy Efficiency Rating Factor (EF)	100% Energy Star labeled	100% High Efficiency Fixtures	Very Low VOC Paints; Carpet must have Green Label; CO Detectors
City of Austin Building Code	30% by 2009	Req'd	Req'd	Partial	90% High Efficacy by 2009	Restriction on electric	No Req'mts	Not Addressed	MERV 6 Air Filters
City of Boulder Building Code	30% to 75%	Optional points	Optional points	Yes	Optional points	Optional points	Optional points	Optional points	Optional points
City of Albuquerque Building Code	30%	No Req'mts	No Req'mts	Yes	70% Energy Star labeled	Energy Star Labeled by 2009	Energy Star labeled washers	No Req'mts	Not Addressed

Courtesy of Anthony Floyd City of Scottsdale AZ



# Local Governmental Policies for Private Sector Green Building Standards

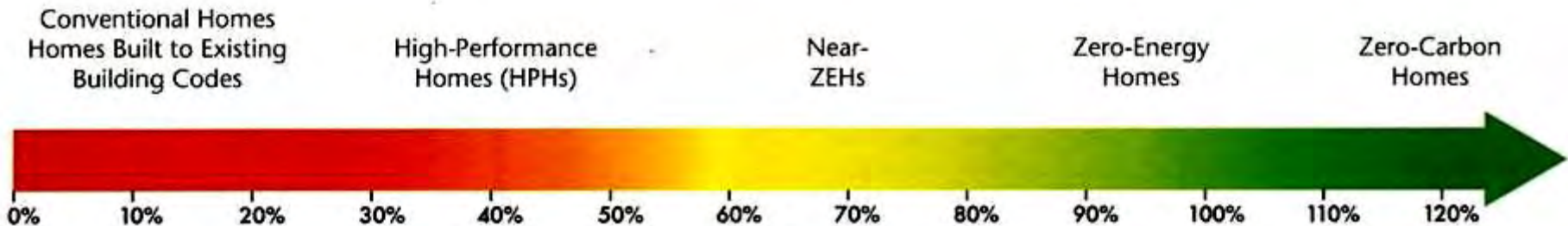
JURISDICTION	TYPES OF PROJECTS COVERED		GREEN BUILDING CRITERIA		EFFECTIVE DATE
	SINGLE FAMILY RESIDENTIAL	MULTI-FAMILY AND COMMERCIAL	SINGLE FAMILY RESIDENTIAL	MULTI-FAMILY AND COMMERCIAL	
ARLINGTON COUNTY, VA	N/A	Projects that request density bonus	N/A	LEED certified level	2004
ASPEN/PITKIN COUNTY, CO	Projects that are over 1,000 sq. ft.	Projects that are over 1,000 sq. ft.	Local rating checklist w/ optional measures	Local rating checklist w/ optional measures	2003
AUSTIN, TX	Projects that are part of PUD and special development zones including downtown	Projects that are part of PUD and special development zones including downtown	Local rating checklist w/ optional measures	Local rating checklist w/ optional measures	2003
BOSTON, MA	N/A	Projects over 50,000 sq. ft. that are subject to the city's Large Project Review process	N/A	LEED with additional local criteria	2007
BOULDER, CO	All homes	N/A	Local rating checklist w/ optional measures	N/A	2001, 2008 update
FRISCO, TX	All homes	N/A	Local prescriptive measures	N/A	2001, 2007 update
PASADENA, CA	N/A	Multi-family over 4 stories and projects over 25,000 sq. ft.	N/A	LEED certified or silver level for projects over 50,000	2008
SAN FRANCISCO, CA	All homes	All multi-family and other projects over 5,000 sq. ft.	Local rating checklist w/ optional measures	LEED certified or silver level for projects over 25,000	2008 - 2012 Phase In
WASHINGTON, DC	N/A	All projects over 50,000 sq. ft.	N/A	LEED or equivalent rating system	2009 - 2012 Phase In
SCOTTSDALE, AZ	All homes	All projects	Homes must be at least 15% better than 2006 IECC	Buildings must be at least 15% better 2006 IECC	2007

Courtesy of Anthony Floyd City of Scottsdale AZ



# New Housing Energy Continuum

## Percentage of Projected Energy Savings



### Conventional homes

Complies with existing energy codes with 100% reliance on utility supplied energy.

### High performance homes

Saves 30 to 50% of utility energy costs over conventional homes using efficiency and renewable energy technologies.

### Near-zero energy homes

Saves 60 to 90% utility energy costs over conventional homes.

### Net-zero energy homes

Produces as much energy as it uses, saving 100% utility energy costs.

### Zero-carbon homes

Produces more energy than it uses and exporting at least 20% electricity to the grid.

Courtesy of Anthony Floyd City of Scottsdale AZ



# Advanced Codes get a Boost this year.

- DOE awards \$2.6 million to six states
  - Grants will assist states in developing and implementing plans that will achieve model building codes representing a 30 % improvement over ASHRAE 90.1-2004 and/or the 2006 International Energy Conservation Code (IECC).



# Critical Policy Elements:

- An effective code/”foundation”
- Update process
- Clear/ unambiguous adoption language
- Requirements for local adoption and enforcement
- Effective enforcement policy
- Financial support for training and education and enforcement



# Thank you

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