



2015 Building Codes

Presented to:
EESE Board – February 19, 2016



RESILIENT BUILDINGS
— GROUP —
Superior energy performance

Paul Leveille
High Performance Buildings Specialist

Who Are We?



- Non-Profit organization
- Reduce energy use in buildings
- Public policy and program design
- Founded in 1995

RESILIENT BUILDINGS

— GROUP —

Superior energy performance

- For-profit company, majority owned by The Jordan Institute
- Scale-up number of energy-efficient buildings
- Expand available EE services - projects in the field including energy-centric construction management

2013 Strategic Plan
& Reorganization

2014+ Policy and
Program Design



Why Codes and Standards?

- Life-Safety – consumer protection, consistency, guidance, fire, cost-effectiveness
- Technology, techniques, products, expectations are always changing
- Baseline – minimum standard – of safety, performance, and cost-effectiveness expectations
- Important for consumers - and insurance, mortgage, assessors/appraisers, real estate professionals

Examples

- Snow loads for roofs
- Stair geometry
- Accessibility
- Egress dimensions
- Efficiency of equipment
- R-values for insulation;
U-factors for windows
- Amount of acceptable air infiltration
- Lighting - % installed of high-efficiency; energy performance of lighting; brightness



Seabrook, NH February 15, 2015,
photo courtesy NH Union Leader

Examples

- Seismic codes for regions prone to earthquakes
- Chile continues to avoid mass calamity because of robust building codes despite daily earthquakes
- Haiti is still recovering from its 7.0 earthquake in 2010. No building codes.



Photo courtesy wikipedia

Examples

- Oklahoma, now site of several earthquakes a day, adopted the 2009 family of codes which includes seismic requirements.
- They are also requiring braces to be retrofitted into existing buildings.



Photo courtesy wikipedia

It's a dynamic world

- Environmental changes necessitate code updates
- New technologies are adopted by the market place and codes provide guidance on how to integrate them safely
- Consumers expectations evolve
 - ie new construction should be:
 - cost-effective to operate
 - shouldn't be drafty
 - shouldn't rot
 - should NOT have ice dams
 - should be SAFE



Photo courtesy L. Richardson

International Code Council - Overview

- Member focused association, est. 1994
- Dedicated to developing model codes and standards, appropriate for different climate zones – vetting, compromise, diverse stakeholder involvement
- “Building codes benefit public safety and support the industry’s need for one set of codes without regional limitations”
- Priorities: safe, sustainable, affordable, resilient structures
- Ongoing review, technical opinions, interpretation committees
- www.iccsafe.org



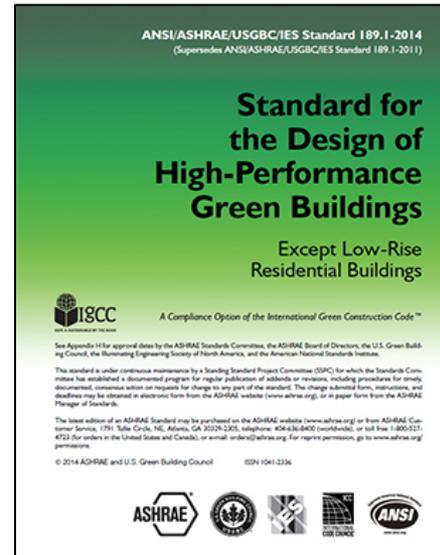
ICC – Interconnected Codes

1. International Fire Code
2. International Electrical Code
3. International Residential Code
4. International Building Code
5. International Existing Building Code
6. International Plumbing Code
7. International Mechanical Code
8. International Energy Conservation Code
9. International Swimming Pools & Spas Code
10. International Green Construction Code
11. International Property Maintenance Codes
12. International Fuel Gas Code



ASHRAE Standards

- American Society of Heating, Refrigeration, and Air-conditioning Engineers
- Advancement of indoor-environmental control technology in the HVAC industry
- These standards “inform” the codes
- ASHRAE 90.1 is virtually equivalent to the IECC

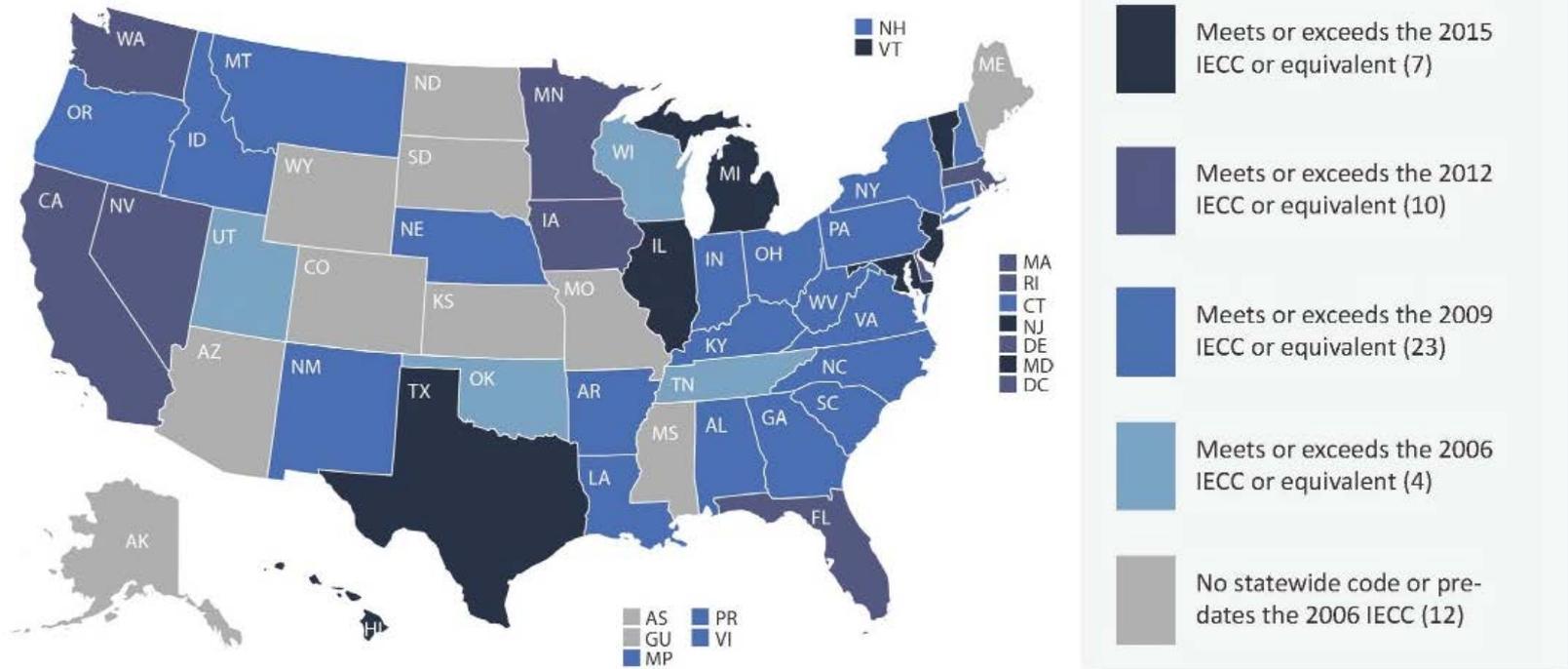


Fun Factoids: Codes in New Hampshire

- 1979 – NH first state to adopt an energy code
- NH currently requires the 2009 ICC codes
- State of NH requires ASHRAE 189 for projects >25,000 sf and/or >\$1M
- Municipalities may adopt “Stretch Codes”
- Durham adopted the 2012 codes and then the 2015 when they became available
- Keene adopted the International Green Construction Code
- 2018 codes are currently in ICC review; expected to be available for adoption this summer

Code Adoption for Residential Buildings

RESIDENTIAL



Building Codes Assistance Project

Decided to the adoption, implementation, and advancement of building energy codes.

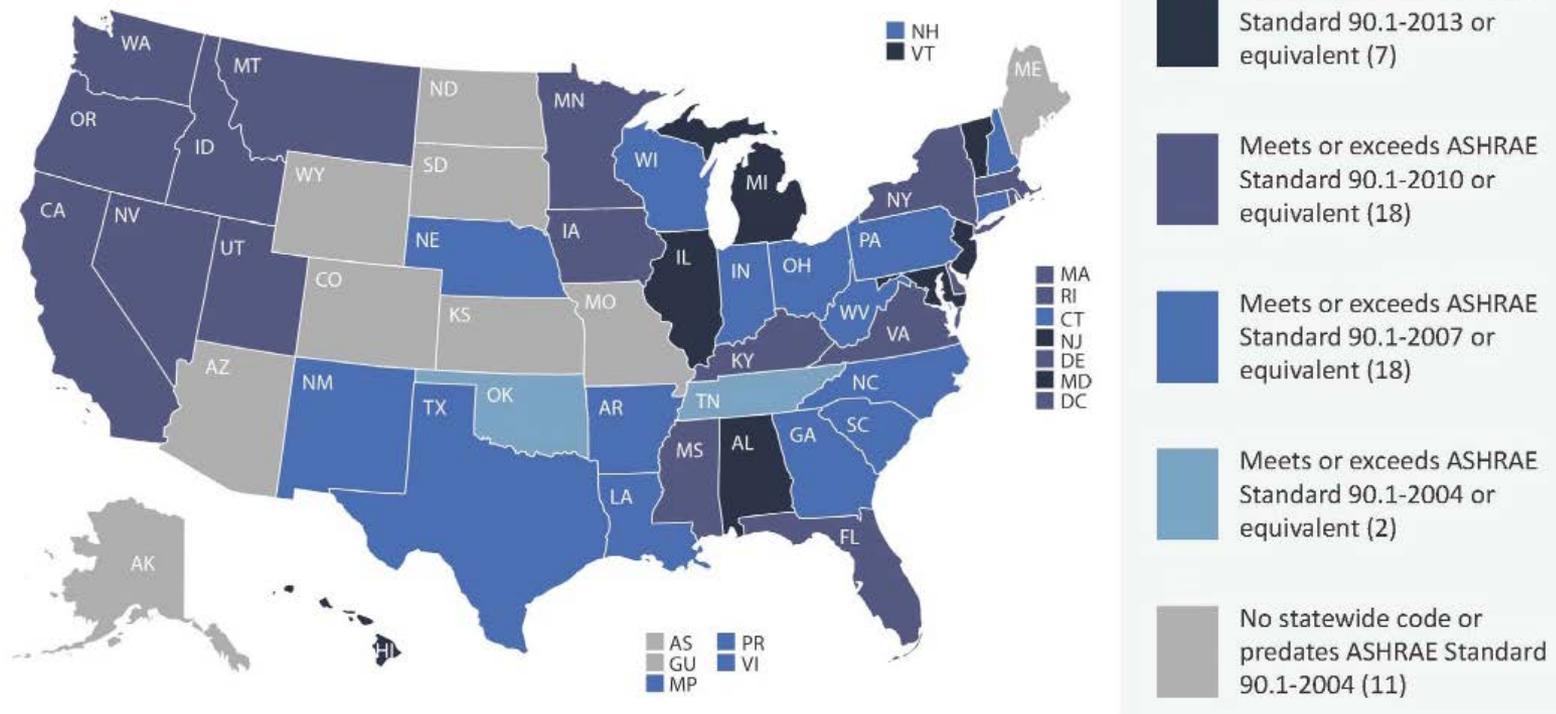
1850 M St NW, Suite 610 | Washington, D.C. 20036 | 202.857.0666 | bcap-energy.org

A project of the Trust for Conservation Innovation

Graphic courtesy: Building Codes Assistance Project, updated February 2016
http://bcap-energy.org/wp-content/uploads/2015/11/code_status_february_2016.pdf

Code Adoption for Commercial Buildings

COMMERCIAL



Building Codes Assistance Project

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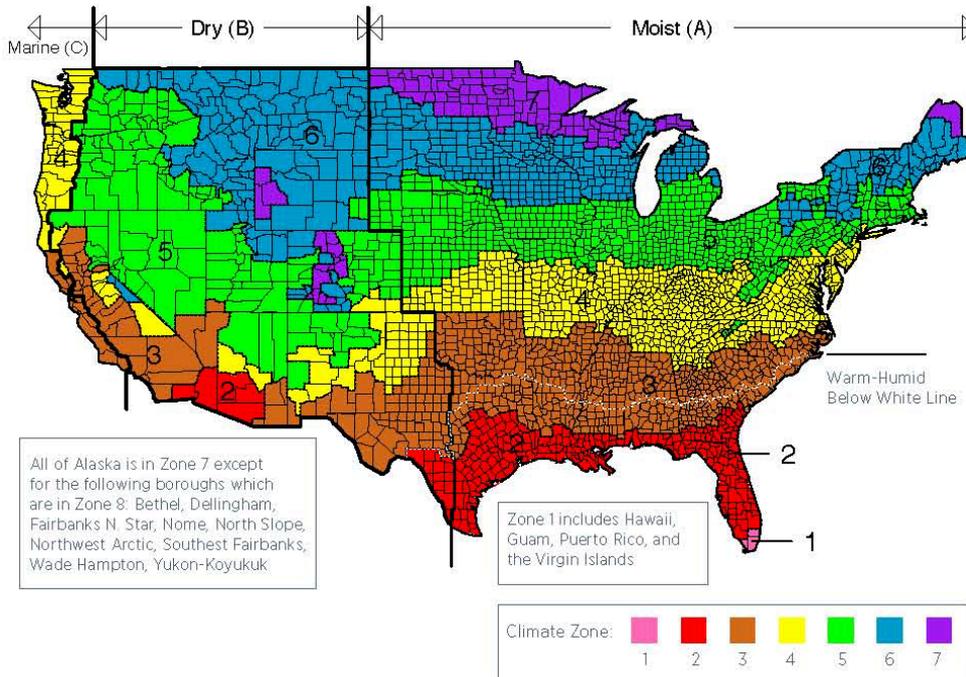
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Climate Zones

International Energy Conservation Code (IECC) Climate Regions



REFERENCES

Baechler, MC, JL Williamson, TL Gilbride, PC Cole, MG Hefty, and PM Love. 2010. *Building America Best Practices Series Volume 7.1: Guide to Determining Climate Regions by County*, http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/ba_climateguide_7_1.pdf

BECP. 2009. "Energy Code Climate Zones," Prepared by Pacific Northwest National Laboratory for the U.S. Department of Energy Building Energy Codes Resource Center, <http://resourcecenter.pnl.gov/cocoon/morf/ResourceCenter/article/1420>

Briggs, RS; RG Lucas; and ZT Taylor. 2003. "Climate Classification for Building Energy Codes and Standards: Part 1 - Development Process, and Part 2 - Zone Definitions, Maps and Comparisons," *Technical and Symposium Papers, ASHRAE Winter Meeting*, Chicago, IL, January 2003.

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

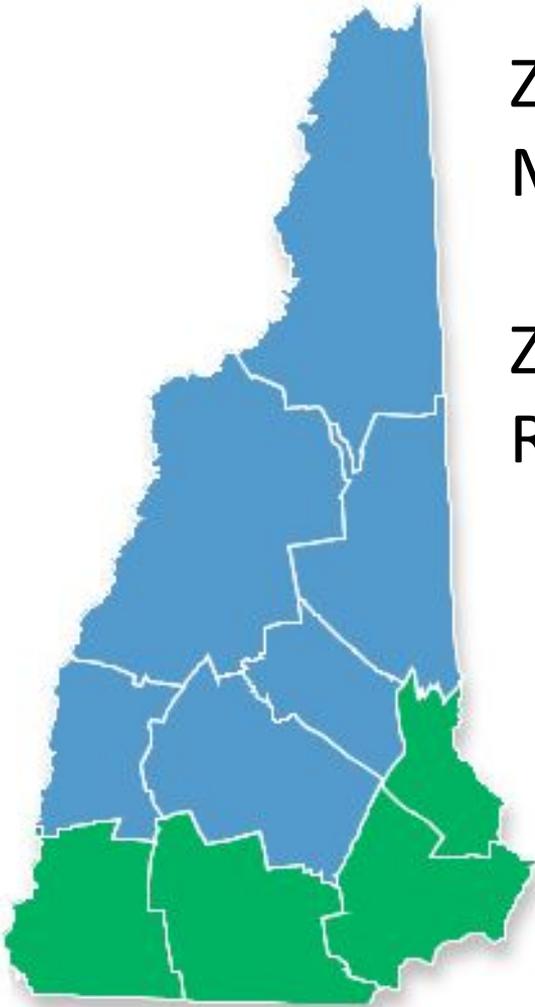
DOE Building Technologies Program
www.buildings.gov

Building America Solutions Center
www.buildingamerica.gov/solutionscenter

PNNL-SA-90570 January 2013



New Hampshire's Climate Zones



Zone 6: Coos, Grafton, Carroll, Sullivan, Merrimack, Belknap Counties

Zone 5: Cheshire, Hillsborough, Rockingham, Strafford Counties

Jumping from 2009 over 2012 to 2015

Using 2006 IECC as a baseline:

- 2009 IECC reduced energy use by 16%
- 2012 IECC reduced energy use an add'l 14%
 - 2012 IECC had some inconsistencies that led to a lot of confusion
 - NH determined that focus should instead be on improved compliance with the 2009 IECC
 - Contractors and Code Officials felt it was too much too fast
- 2015 IECC reduces energy use by an additional 1% - but tightens up inconsistencies

NH Building Code Review Board - Membership

1. Commissioner of Safety or designee - CHAIRMAN
2. Licensed architect (Board of Architects)
3. Licensed structural engineer (Board of Engineers)
4. Licensed mechanical engineer (Board of Engineers)
5. Licensed electrical engineer (Board of Engineers)
6. Building Official (NH Municipal Association)
7. Municipal building official (NH Building Officials Association)
8. Municipal fire chief (NH Association of Fire Chiefs)
9. Active Fire Prevention Officer (NH Association of Fire Chiefs)
10. Building contractor - non-residential buildings (Associated General Contractors)
11. Building contractor - residential buildings (NH Home Builders Association)
12. State energy conservation code office (Public Utilities Commission)
13. Licensed master plumber (Mechanical Licensing Board)
14. Mechanical contractor- business of mechanical construction (Plumbers, Fuel Gas Fitters, and HVAC Association of New Hampshire)
15. Licensed master electrician Electrician's Board
16. Committee on Architectural Barrier-Free Design (Governor's Commission on Disability)
17. Licensed master electrician (NH Electrical Contractors Business Association)

NH Building Code Review Board - Process

- More vetting atop that of ICC, analysis, more public input, consideration for what is appropriate for NH
- Code Updates: Subcommittee reviews new codes, determines if they are appropriate for NH; submits proposal for review/recommendation to BCRB; public hearings, deliberation, vote to send to Legislature for adoption
- Becomes effective upon action by the Legislature, and effective date

NH Building Code Review Board - Process

Amendments

- Can be brought to the BCRB at any regularly scheduled meeting by general public, affected party, member of BCRB, or State Official
- Amendment Form as part of the Proposal
- Public Hearing, Deliberation, Vote
- Becomes effective immediately
- Must be ratified by the Legislature within 2 years or the pre-amendment requirements go back into effect
- <https://www.nh.gov/safety/boardsandcommissions/bldgcode/>

NH Legislature

- Executive Departments & Administration Committee handles code updates
- House Bill 1282 currently in ED&A Committee
- Considering amendments from NH Home Builders
- House ED&A → Full House; Senate ED&A → full Senate, then to the Governor
- If HB1282 with current proposed amendments passes, effective date of Jan 1, 2017.



Challenges

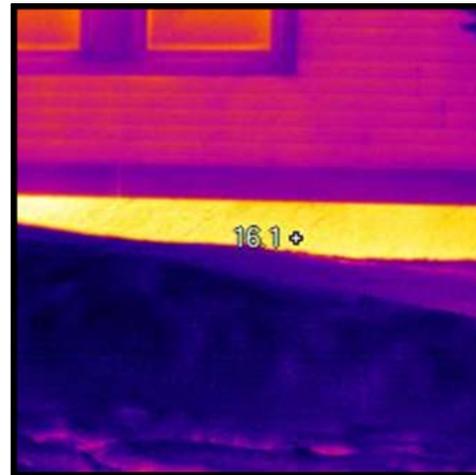
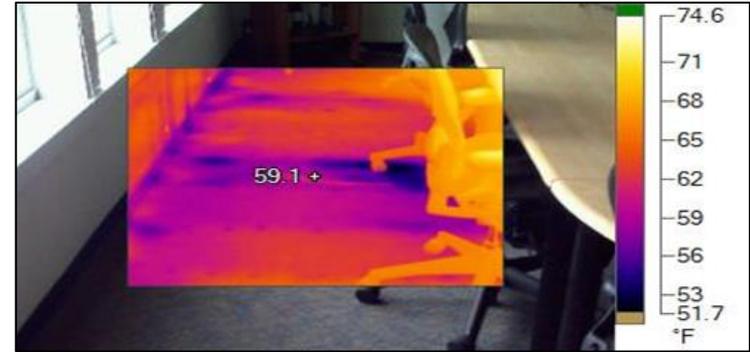
- Many municipalities do not have a dedicated code official, budget, training, or even code books
- Some municipalities view code compliance as an unfunded mandate
- Builders not licensed; there is no requirement for continuing education
- NH is home to variability of workmanship and code enforcement, and priorities in what is enforced
- Some upgrades are not valued by appraisers, assessors, real estate professionals – and some contractors find bolstered codes to be a hard sell to consumers
- **Codes become headline news when there is a tragedy**

High visibility problems



The roof of a home on Tanglewood Drive in Henniker collapsed on Friday, February 21, 2014. No one was injured. This photo was taken using long exposure with a flash. (ARIANA van den AKKER / Monitor staff)

Less visible challenges



Energy Code Compliance

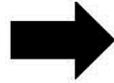
- ARRA-State Energy Program funds tied to assurance that NH would achieve 90% compliance with the 2009 IECC by 2017
- NH's approach was to develop a roadmap, tools and trainings to encourage improved compliance. GDS and OEP led this effort, still on-going



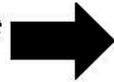
Home Energy Scorecard

Profile Elements

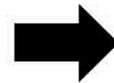
About Profile description



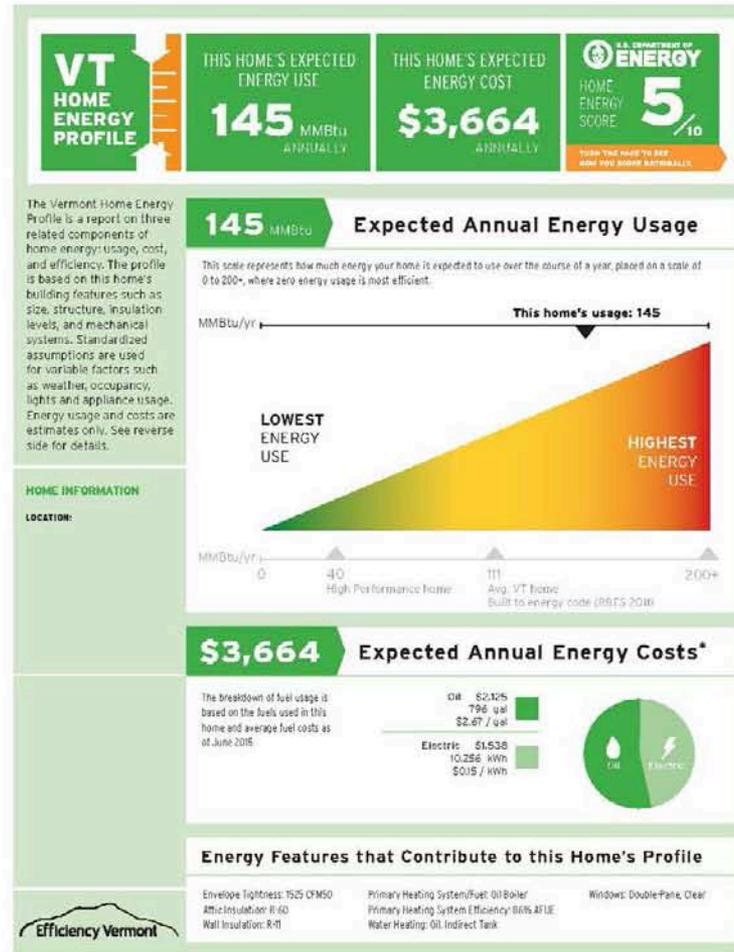
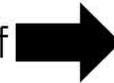
General home information



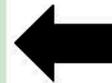
Assessor information



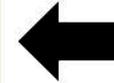
Features Key features of the home



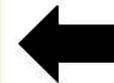
Dashboard Key metrics to rate home's performance



Wedge Visualization of total energy use & reference points



Annual Cost Estimated fuel use and costs



What's New for Residential Codes?

- 402.1 Windows:** From U Max of 0.35 to U Max of 0.3
- 402.1 Ceilings:** From R38 to R49 for Zone 5
- 402.1 Above Grade Walls:** Continuous Insulation for Zone 6 (being removed by amendment)
- 402.1 Basement Walls:** From R10/13 to R15/19 for Zone 5
- 402.1 Crawl Space:** From R10/13 to R15/19 for both zones
- 402.4 Air Sealing:** From “Testing Optional” (7ACH50) to “Testing Mandatory” (3ACH50) but being amended to 7ACH50 “Mandatory”
- 403.2 Boilers:** Outdoor Reset now required

What's New for Residential Codes?

403.3 Duct Leakage: Leakage allowed increased back to 2009 levels by amendment

403.6 Mechanical Ventilation: New requirement in 2015 removed by amendment

404.1 Lighting: From 50% to 75% of permanent lights to be energy-efficient

406. New "Performance" Section "Energy Rating Index"

Zone 5 = ERI of 55 (45% less energy than house meeting IECC 2006). Zone 6 = ERI of 54. But, utility rebates available for "Energy Star."

What's New for Commercial Codes?

402.1 Roof Insulation: From R20 to R30 when continuous (both zones) & from R38 to R49 in attic if zone 6

402.1 Walls: From R13 + 5.6 c.i. to R13 + 13 c.i. for metal buildings (both zones) (c.i. = continuous insulation)

402.4 Windows: From U=0.45 max. to U=0.38 / 0.36 max.
SHGC is now by orientation in 2015.

402.4.1 Fenestration: Max. Area from 40% to 30% unless using daylight design and lighting controls incorporated.

Skylights now req'd for large / tall spaces and controls required for lights underneath.

402.5 Air Leakage: Can be Visual or Tested but requirements for means and methods now spelled out.

What's New for Commercial Codes?

403.2 Mechanical Equipment: A/C and Boiler min. efficiencies raised slightly. No change to Furnaces.

Many incremental changes made to other mechanical systems too.

405 Lighting: Expanded use of lighting and daylighting controls.

Reduction of LPD (Watts/SF) by 10 -40%.

406 Additional Efficiency Options: (New to IECC) Choose 1 of 6 options: 1: HVAC 2: LPD 3: Lighting Controls 4: On-Site Renewable Energy 5: DOAS 6: Water Heating

SHGC is now by orientation in 2015.

407 Performance Based Compliance (Energy Model)

408 Commissioning (of HVAC, DHW & Lighting Systems) If < 480,000 BTUH Cooling & < 600,000 BTUH Heating & DHW then exempt.



Thank you!



The Jordan Institute

Laura Richardson
Executive Director
The Jordan Institute
lrichardson@jordaninstitute.org
603-226-1009, x204

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— GROUP —
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Paul Leveille
High Performance Buildings Specialist
Resilient Buildings Group, Inc.
pleveille@ResilientBuildingsGroup.com
603-226-1009, x205