BUILT UP OPPORTUNITIES: BUILDING ENERGY CODES IN NEW HAMPSHIRE

July 25, 2018

BROUGHT TO YOU BY

NH Local Energy Solutions
ABOUT NH Local Energy Solutions

- Ad-hoc group of energy professionals representing the public, private, & non-profit sectors
- Serve as a resource for local energy committees, municipalities, schools, & other political subdivisions looking to:
  - Reduce energy use
  - Minimize energy costs
  - Reduce fossil fuel consumption
- Host a monthly webinar series
- Co-host the annual LES Conference: **November 16, 2018**
- Visit [www.nhenergy.org](http://www.nhenergy.org) to learn more!
QUESTIONS

• Please enter questions in the panel at the right side of your screen

• If your question is not answered, please follow-up to henry@nhsea.org
PANELISTS

- Bruce Buttrick, MCP, Zoning and Code Enforcement Official
  Town of Hudson, NH

- Darren Port, Buildings and Community Solutions Manager
  Northeast Energy Efficiency Partnerships (NEEP)

- Matt Siska, Senior Project Manager
  GDS Associates, Inc.

- Joe VanGombos, Energy Efficiency Program Coordinator
  Unitil Corporation

- Chris Skoglund, Climate and Energy Program Manager
  NH Department of Environmental Services (NHDES)
AGENDA

• **Overview**
  o Chris Skoglund, NHDES

• **Codes Adoption Past and Present**
  o Bruce Buttrick, Town of Hudson
  o Darren Port, NEEP

• **Benefits of Codes**
  o Matt Siska, GDS Associates
  o Darren Port, NEEP

• **Resources and Opportunities** - Joe VanGombos, Unitil

• **What You Can Do** - Chris Skoglund, NHDES

• **Q&A** - Henry Herndon, NHSEA
BUILDING CODES IN NH

Presented by:

Bruce Buttrick, MCP

Zoning Admin/Code Enforcement Officer

Town of Hudson
BUILDING CODES IN NH

Definitions:

- RSA= Revised Statutes Annotated
- (State Law) voted in by the State Legislature.

- BOCA= building codes developed by the Building Officials and Code Administrators.

- ICC= building codes developed by the International Code Council.
Code development history:

- Prior to 2000, the US had 3 regional “national codes” of which the Northeast and Midwest primarily used the BOCA codes.

- In NH the RSAs allowed municipalities to adopt the BOCA codes (building, plumbing, etc) any edition.
BUILDING CODES IN NH

• When did codes become “statewide”?

• Piecemeal at best:

• 1977: Licensed electricians needed to follow the National Electrical Code.

• 1978: Licensed plumbers needed to follow the BOCA plumbing code.

• In 1979: RSA 155-D “ENERGY CONSERVATION IN NEW BUILDINGS” became a statewide “energy code” as state law passed by the legislature.
BUILDING CODES IN NH

• Administration of RSA 155-D was done by the Public Utilities Commission.

• Local enforcement was spotty:

• Municipalities with a building dept. enforced.

• Municipalities without building dept. relied on the Architect or builder to submit plans to the Public Utilities Commission for compliance review.
BUILDING CODES IN NH

• 2000: Nationwide, the 3 major code organizations formed the ICC to establish a nationwide code.

• 2002: NH legislature adopts the 2000 editions of ICC codes with RSA 155-A: International Building Code (IBC), International Plumbing Code (IPC), etc. As the state building code(s).

• Except the International Residential Code (IRC) which includes townhouses.
BUILDING CODES IN NH

Note:
- With the adoption of the statewide Building Code (RSA 155-A) in 2002, (which included the International Energy Conservation Code (IECC)), was in addition to the old version of an Energy Code (RSA 155-D), having been adopted in 1979.

- With the adoption of the statewide building code in RSA 155-A a state Building Code Review Board was created to review, recommend and amend proposed codes for adoption with ratification by the legislature.
BUILDING CODES IN NH

- The state Building Code Review Board is comprised of:
  - 17 members of the design professionals, contractors and life safety officials community.

- Any proposed code adoptions or amendments must be ratified by the State legislature within 2 yrs of approval by the State Building Code Review Board.
BUILDING CODES IN NH

- 2006 the state legislature adopts the International Residential Code (IRC) which includes townhouses as included as a statewide building code.

- 2012 the state legislature adopts the 2009 editions of the ICC codes:
  - IBC, IRC, the IECC etc. also prohibited requiring fire suppression sprinklers in 1 & 2 family dwellings.
BUILDING CODES IN NH

In summary (statewide):
• 1977 - Electrical Code
• 1978 - Plumbing Code
• 1979 - Energy Conservation Code
• 2002 - ICC codes (except IRC)
• 2006 - includes IRC.
• 2012 - latest adoption has been the 2009 ICC codes.

• Note: RSA 155-D is repealed in it’s entirety August 15, 2018.

• The end..........
Regional Code Adoption Overview

Darren Port
Buildings and Community Solutions Manager
BUILDING ENERGY CODE ADOPTION

<table>
<thead>
<tr>
<th>2009 IECC</th>
<th>2012 IECC</th>
<th>2015 IECC</th>
<th>2018 IECC</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Hampshire (18)</td>
<td>Maryland (18)</td>
<td>New Jersey (19)</td>
<td>Philadelphia, PA</td>
</tr>
<tr>
<td>Maine</td>
<td>New Hampshire (18)</td>
<td>Massachusetts (19)</td>
<td>ZE Appendix</td>
</tr>
<tr>
<td>West Virginia</td>
<td>Delaware (18)</td>
<td>DC (18)</td>
<td>Effective Oct. 1, 2018</td>
</tr>
<tr>
<td>Rhode Island (18)</td>
<td>Connecticut (18)</td>
<td><strong>JULY 2018</strong></td>
<td></td>
</tr>
</tbody>
</table>
Potential Savings for NH

Darren Port
Buildings and Community Solutions Manager
New Hampshire – Residential

New Hampshire
Current Code: 2009 IECC
Effective Date: 4/1/2010

110,400
(Metric Tons CO2)
2018-2022 Regional Emissions Savings Potential with Code Updates

$8,043,884
2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:
Pay for 201 students to attend a four-year college
Build 61 miles of new bike lanes
Power 22,144 homes for one year
New Hampshire - Commercial

Current Code: **2009 IECC**
Effective Date: **4/1/2010**
Total Commercial Projects (2005-2017): 4,583
Average Cost per Alteration Project: **$1,064,524.63**
Average Cost per New Construction Project: **$6,540,702.24**

132,480
(Metric Tons CO2)
2018-2022 Regional Emissions Savings Potential with Code Updates

$9,372,232.28
2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:
- Pay for **325** students to attend a four-year college
- Build **72** miles of new bike lanes
- Power **14,305** homes for one year
INTERNATIONAL ENERGY CONSERVATION CODE (IECC)

OVERVIEW OF MAJOR CHANGES 2009 – 2015

MATTHEW Siska, PE, CEM – SENIOR PROJECT MANAGER
Construction methods, materials, controls and equipment are constantly evolving

The ICC model codes (I-Codes) are systematically revised in 3-year intervals to keep up with technical changes and best practices
- *Continuous* air barrier required (C402.5.1). Acceptable materials and methods stipulated, must be demonstrated in construction documents.

![Diagram of building envelope layers](image-url)
**Building Envelope**

- Increased stringency for most opaque envelope and fenestration components

### Windows and Skylights

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>2009 IECC</th>
<th>2015 IECC</th>
<th>2018 IECC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Window</td>
<td>Skylight</td>
<td>Window</td>
</tr>
<tr>
<td>U-Value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CZ 5</td>
<td>0.35</td>
<td>0.60</td>
<td><strong>0.32</strong></td>
</tr>
<tr>
<td>CZ 6</td>
<td>0.35</td>
<td>0.60</td>
<td><strong>0.32</strong></td>
</tr>
</tbody>
</table>

### Attic Insulation

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>2009 IECC</th>
<th>2015/18 IECC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CZ 5</td>
<td>30 / 38</td>
<td><strong>38 / 49</strong></td>
</tr>
<tr>
<td>CZ 6</td>
<td>38 / 49</td>
<td><strong>38 / 49</strong></td>
</tr>
</tbody>
</table>
Reduced allowable residential air change rate ($ACH_{50}$)
MECHANICAL SYSTEMS

- Increased baseline efficiency standards
- System commissioning provisions added
- Incorporate best practice, cost effective energy efficiency:
  - Kitchen hood demand controls
  - Increased energy recovery for high OA systems
  - Codified requirements for walk-in coolers and freezers
  - Boiler turndown, reset and variable flow controls for hydronic systems
  - Staged cooling, economizers, and airflow control
  - VAV reheat control
  - Increased HVAC pipe Insulation
  - Demand controls for recirculated water heating systems
**Lighting Systems**

- Added space-by-space method provides greater design flexibility
- Allowable Lighting Power Densities (LPD) generally reduced

<table>
<thead>
<tr>
<th>Fixture Type</th>
<th>Total Watts</th>
<th>Actual LPD (W/ft²)</th>
<th>Annual Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2L T12 Fluorescent</td>
<td>1,410</td>
<td>0.881</td>
<td>$599</td>
</tr>
<tr>
<td>2LT832w Fluorescent</td>
<td>795</td>
<td>0.497</td>
<td>$338</td>
</tr>
<tr>
<td>LED Troffer, dimmed</td>
<td>450</td>
<td>0.281</td>
<td>$191</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>IECC 2009</th>
<th>IECC 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>1.0</td>
<td>0.82</td>
</tr>
</tbody>
</table>
Energy codes are continuously updated to reflect advances in technology and building practice.

Enhanced focus on building envelope allows for better moisture control and improves building resilience, reducing life cycle operating cost.

Recent versions include requirements for cost-effective ‘no-brainer’ energy efficiency.
Energy Codes are Life Safety Codes

Darren Port
Buildings and Community Solutions Manager
Durango City Council issues split vote on energy codes

More rigorous regulations would increase efficiency, be more expensive

Bill would repeal uniform statewide building code

AUGUSTA -- Rep. Lance Harvell told fellow lawmakers Thursday that the bill to repeal Nebraska’s energy code would:

Town meeting rejects adoption of state energy code

Controversial change on building codes clears House committee, despite lots of opposition

Battle over building code changes could take center stage in House, Senate today

Twin Cities home builders sue state over new building/energy codes

Minnesota builders divided on energy code update

As Storms Get Stronger, Building Codes Are Getting Weaker

Builders oppose strict energy codes
Energy Code is a Life Safety Code

Reasons to Not Enforce the Energy Code

Cost to Enforce
Lack of Training
Understanding Building Science
Resources to Buy Books
Availability of Software
Priority compared with the other codes
Lack of time / Over Scheduled
NOT About Life Safety

“Nobody gonna die if we don’t Enforce the energy code!”
“You all think it’s the energy code that keeps the buildings from falling down.”
Energy Code is a Life Safety Code

Controlling air flow, heat flow, and moisture flow extends structural integrity.

Moisture Management
• *Reducing moisture increases material durability.*

Indoor Air Quality
• *Indoor air quality improves as mold, and other pollutants, both interior, and exterior are limited.*

Fire Safety
• *Fire and smoke spread are reduced in tighter buildings.*
Energy Code is a Life Safety Code

Extreme Temperatures & Storms

• An EE building is a resilient building protecting occupants from minimal to severe temperature swings and providing a stable environment in the event of power loss.

Developed by Experts in Building Durability

Interactions with other codes

New Codes are Improved Codes!

The energy code is a life safety code,
http://www.swenergy.org/energy-codes-are-life-and-safety-codes-
Energy Code Cost Effectiveness

Darren Port
Buildings and Community Solutions Manager
The energy code is the only code that literally pays for itself, saving homeowners and building owners money year after year.

The energy code as a whole, and the provisions in it, are tested for their cost-effectiveness.

2009 – 2012 30% RES IECC
2013 – 2016 ASHRAE 8%
Energy Code Cost Effectiveness

Saves Consumers Money

*The Energy Code is the only code that pays for itself!*

Stimulates the Economy and Creates Jobs

Reduces Stress on Grid

Reduces Carbon/GHG and Increases Reliability

Helps Consumers Make Informed Decisions

Provides Quality, Comfort and Safety

Make a Cost-Effective Investment

Long-Term Performance
Thank You!

Darren Port
Buildings and Community Solutions Manager
NEEP

dport@neep.org
New Hampshire’s First Fuel

Primary Purposes:
- Improve Energy Security
- Lower Energy Bills for All
- Progress on Climate Goals

Secondary Benefits:
- Improve Businesses and Communities Operations, Comfort
- Invest in Technology Advancement
- Increased Local Jobs and Economic Activity

Information Exchange
- Educate Customers & Learn from Customers – this is how we improve!
Energy Efficiency Program Administrators

State of New Hampshire
PUBLIC UTILITIES COMMISSION
CONCORD, N.H.

ELECTRIC UTILITIES SERVICE AREAS

State of New Hampshire Gas Utility Franchise Areas

Legend
Service Areas
- LIBERTY
- NORTHERN UTILITIES

EVERSOURCE
Liberty Utilities
New Hampshire Electric Co-op
Unility
NHSAVES we all win
ENERGY STAR Homes

Residential New Construction Program

- Qualify by working with NHSaves Partners to design and build a home that can be 30% more efficient than a standard code-compliant home.

**THE SAVINGS**

ENERGY STAR CERTIFIED HOMES ARE AT LEAST 10% MORE ENERGY EFFICIENT THAN HOMES BUILT TO CODE AND ACHIEVE A 20% IMPROVEMENT ON AVERAGE compared to typical new homes.

$250

THE AVERAGE ANNUAL SAVINGS FROM AN ENERGY STAR CERTIFIED NEW HOME
New Construction/Major Renovation

A significant capital investment is happening, and it is the optimal time to invest in efficiency...
Prescriptive Solutions

Standardized Incentive Structures based on specific energy saving calculations and generally known project costs

Low Hanging Fruit:
- LEDs & Controls
- Motors/VFDs
- Low-flow plumbing fixtures
- Pipe Insulation
- Thermostats

More Capital Intensive or Site Specific
- New HVAC Equipment
- New Cooking Equipment
- Refrigeration Controls
# 2017 High-Efficiency Natural Gas Equipment Rebates

## Heating Equipment

<table>
<thead>
<tr>
<th>Condensing Boilers</th>
<th>Rating Details</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1701 to 2000 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$10,000</td>
</tr>
<tr>
<td>1000 to 1700 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$7,500</td>
</tr>
<tr>
<td>500 to 999 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$4,000</td>
</tr>
<tr>
<td>301 to 499 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$2,000</td>
</tr>
<tr>
<td>Up to 300 MBH</td>
<td>95% AFUE* or greater</td>
<td>$1,500</td>
</tr>
<tr>
<td>Up to 300 MBH</td>
<td>90% AFUE* or greater</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Furnace</th>
<th>Rating Details</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 150 MBH</td>
<td>97% AFUE* or greater &amp; ECM motor</td>
<td>$450</td>
</tr>
<tr>
<td>Up to 150 MBH</td>
<td>95% AFUE* or greater &amp; ECM motor</td>
<td>$300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Heating Equipment</th>
<th>Rating Details</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Demand Tankless</td>
<td>Energy Factor of .94 or greater</td>
<td>$800</td>
</tr>
</tbody>
</table>

### Infrared Heaters

<table>
<thead>
<tr>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sizes</td>
</tr>
</tbody>
</table>

### Integrated Condensing Boiler/Water Heater with On-Demand Hot Water

<table>
<thead>
<tr>
<th>Rating Details</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum AFUE Rating of 95%</td>
<td>$1,500</td>
</tr>
<tr>
<td>Minimum AFUE Rating of 90%</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

*Must be considered one unit by manufacturer.*

<table>
<thead>
<tr>
<th>Condensing Unit Heater</th>
<th>Rating Details</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 300 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$500</td>
</tr>
</tbody>
</table>
Custom Incentives

Variable Incentive Contributions based on specialized, site-specific opportunities for weatherization, advanced controls, etc.

**Low Hanging Fruit:**
- Envelope Improvements
- Insulation
- Air Sealing

**More Capital Intensive or Site Specific**
- HVAC Controls - EMS
- Energy Recovery Solutions
- Process Improvements
- Heating/Cooling System Modifications
Energy Code Trainings

Commercial Trainings
TBD
Manchester
September 2018

TBD
Lebanon
November 2018

Residential Trainings
Chase House at Mill’s Falls
Meredith, NH
September 12, 2018

Unitil HQ
Hampton, NH
October 10, 2018

Visit [https://nhsaves.com/](https://nhsaves.com/) for details on these trainings!!
# NHSaves Energy Efficiency Contacts

<table>
<thead>
<tr>
<th>Organization</th>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eversource</td>
<td>Mark Toussaint</td>
<td><a href="mailto:Mark.toussaint@eversource.com">Mark.toussaint@eversource.com</a></td>
<td>603.634.2301</td>
</tr>
<tr>
<td>Liberty</td>
<td>Bob Reals</td>
<td><a href="mailto:Bob.Reals@libertyutilities.com">Bob.Reals@libertyutilities.com</a></td>
<td>603.216.3634</td>
</tr>
<tr>
<td>NHEC</td>
<td>Joe Lajewski</td>
<td><a href="mailto:lajewskij@nhec.com">lajewskij@nhec.com</a></td>
<td>603.536.8663</td>
</tr>
<tr>
<td>Unitil</td>
<td>Joe Van Gombos</td>
<td><a href="mailto:vangombosj@unitil.com">vangombosj@unitil.com</a></td>
<td>603.294.5023</td>
</tr>
</tbody>
</table>

**Connect → Collaborate → Educate → Innovate**
BUILDINGS POSSES LONG MEASURE LIFE

ENERGY CODE ADOPTION PROCESS


3. NH Legislature considers proposed changes to definition and has two years to ratify or reject the changes.

4. Utilities provide training to building community on codes.
OPPORTUNITIES TO ENGAGE

1. House Bill 1254 (2018) established a committee to study the procedures for adoption of national codes as state building code and state fire code by the state of New Hampshire.


3. The NH Legislature may consider proposed changes to definition during its 2019 session.
1. House Bill 1254 (2018) established a committee to study the procedures for adoption of national codes as state building code and state fire code by the state of New Hampshire.

- Committee Meetings to be held in summer and fall 2018.

- Meetings are open to the public and will be posted on the NH Legislature’s Daily Legislative Calendar.
  
  [http://www.gencourt.state.nh.us/Schedule/dailySchedule.aspx](http://www.gencourt.state.nh.us/Schedule/dailySchedule.aspx)

- Any interested party may testify during public comment portions of the meetings.
OPPORTUNITIES TO ENGAGE

2. NH Building Code Review Board (BCRB) (RSA 155-A:10) reviews new ICC family of codes and adopts updates to definition of NH building code (includes energy code) in RSA 155-A:1

- The ICC released the 2018 ICC codes and BCRB will review individual code sections in summer and fall 2018.
- The BCRB subcommittee process is open to the public and meetings will be posted in advance.
- The BCRB would like to complete review and adopt changes to definitions in RSA 155 A:1 in time for 2019 legislative session.
- The BCRB wants to avoid municipalities moving ahead of the State and adopting building energy ordinances, creating a regulatory patchwork.
3. The NH Legislature may consider proposed changes to definition during its 2019 session.

- Once the BCRB has adopted a new set of codes (e.g., 2018 ICC codes with amendments), the legislature has two years to ratify them and include them in RSA 155-A:1.

- Potential for legislation to be filed in 2019 in either House and Senate Executive Departments and Administration Committees.

- Will hold public hearing that are open to the public and will be posted on the NH Legislature’s Daily Legislative Calendar.
  - Any interested party may testify regarding the bill.
SUMMARY

- Building energy codes provide economic benefits by avoiding energy costs.

- Building energy codes provide life-safety benefits by improving the integrity of buildings and increasing indoor air quality.

- Buildings are long-lived assets and it is most cost-effective to incorporate energy efficiency at the time of construction rather than retrofit later.

- There are opportunities to engage in building energy code development now and in the future.
CONTACT INFORMATION

- **Bruce Buttrick**, Zoning and Code Enforcement Official
  Town of Hudson, NH, bbuttrick@hudsonnh.gov

- **Matt Siska**, Senior Project Manager
  GDS Associates, Inc., Matt.Siska@gdsassociates.com

- **Darren Port**, Buildings and Community Solutions Manager
  NEEP, dport@NEEP.org

- **Joe VanGombos**, Energy Efficiency Program Coordinator
  Unitil Corporation, vangombosj@unitil.com

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QUESTIONS?