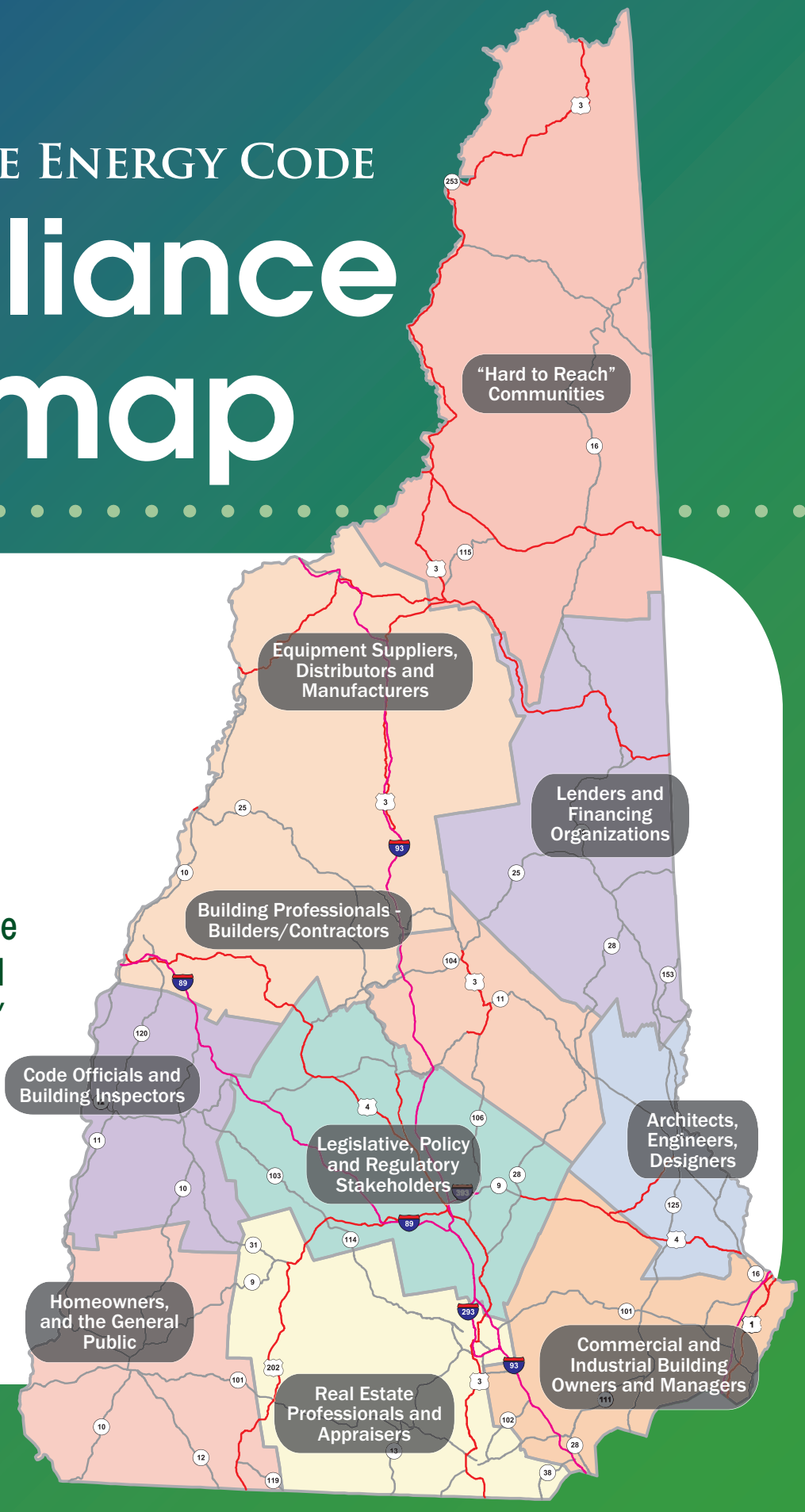
New Hampshire Energy Code

Compliance Roadmap



FULL REPORT

"Achieving 90% Compliance with the 2009 International Energy Conservation Code"

GDS Associates, Inc.
Engineers and Consultants

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NOTICE

ACKNOWLEDGMENTS

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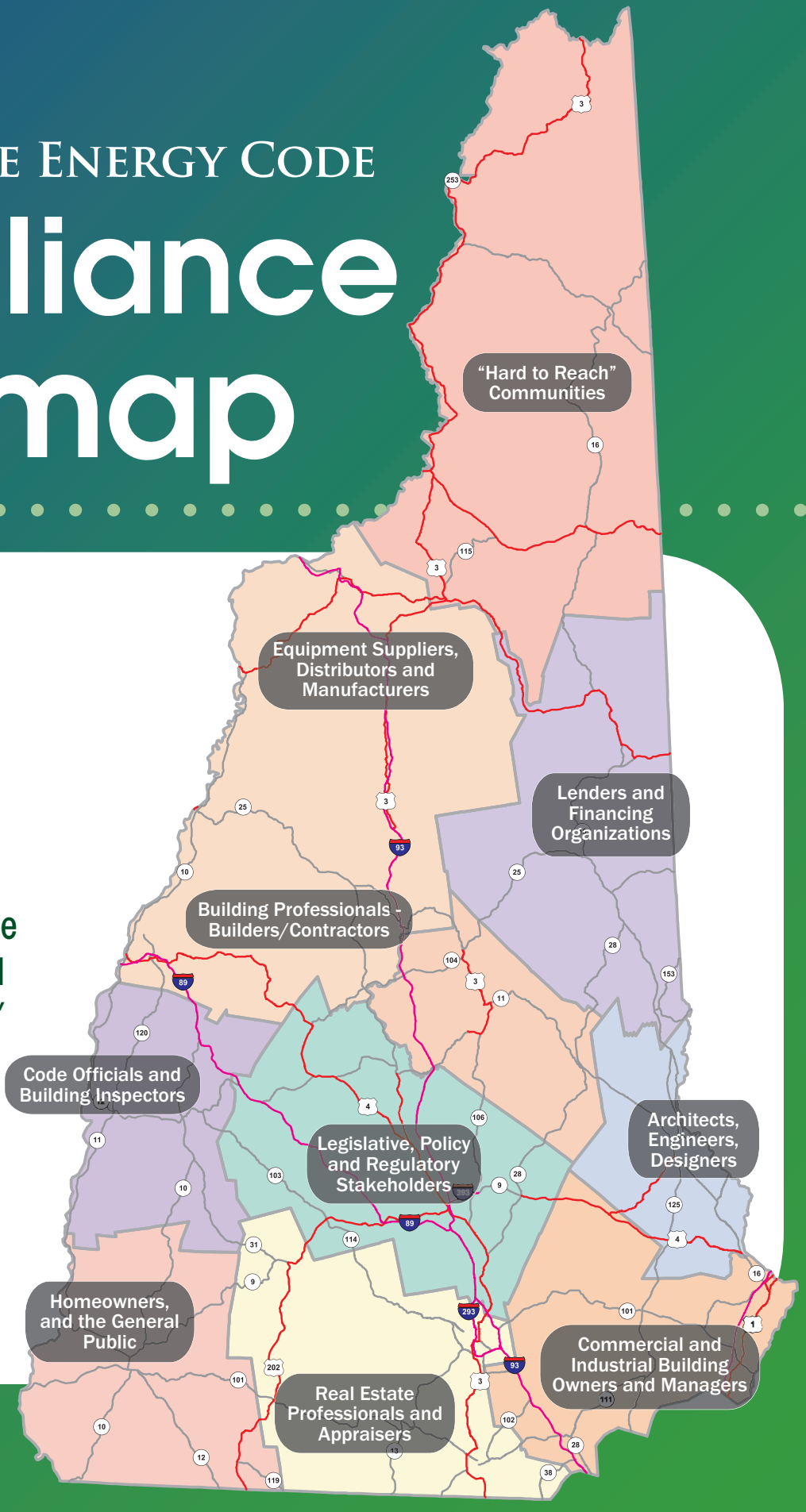
Compliance Roadmap



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Introduction

In response to the American Recovery and Reinvestment Act (ARRA), many state governors across the U.S. sent letters of assurance regarding energy codes to the U.S. Secretary of Energy. Specifically, these assurances called for the development of plans to achieve 90% compliance with the 2009 International Energy Conservation Code[1] (2009 IECC) for residential buildings and ANSI/ASHRAE/IESNA Standard 90.1–2007 for commercial buildings (or equivalent codes) by the year 2017. Among the governors to make this assurance in 2009 was New Hampshire's Governor John Lynch. For New Hampshire, this assurance met a federal condition for the state to receive $25.8 million in ARRA – State Energy Program (SEP) stimulus funding.[1]

Why is this an important and prudent goal? U.S. buildings use more energy and emit more carbon dioxide than either the industrial or transportation sectors. According to the U.S. Department of Energy (DOE), the single most important step to reducing energy use in buildings is to implement and enforce compliance with building energy codes.[2] By establishing and ensuring compliance with minimum requirements, building energy codes can set the baseline for energy efficient design and construction of new and renovated buildings to which further design upgrades and strategies may be compared.

Buildings often represent the single largest financial investment for families or business owners and the lifespan of a new building can be thirty to fifty years or more. For these reasons, incorporating energy efficient design has the potential to have long-lasting energy savings effects. In addition to energy savings, there are a host of other well-recognized benefits associated with buildings that meet or exceed energy code requirements including:

- ☑ reduced consumer energy bills,
- ☑ reduced air pollution (including lower greenhouse gas emissions)
- ☑ improved health and comfort, and
- ☑ increased building durability.

Once built, it is often far more expensive and sometimes impossible to achieve the energy efficiency performance than that which can be integrated economically into a building at the time of initial design and construction. For this reason, implementing energy codes and ensuring consistent enforcement is a critical component to securing the energy savings and other benefits that will last the lifetime of the building.

[1] The goals of the ARRA funded State Energy Program are to: (1) Increase energy efficiency, to reduce energy costs and energy usage for homes, businesses, and government; (2) Reduce reliance on imported energy; (3) Improve the reliability of electricity, fuel supply and the delivery of energy services; and (4) Reduce the impacts of energy production and use on the environment.

[2] U.S. Department of Energy, Building Energy Codes Program 2011 Annual Report "*Development, Adoption, Compliance – Building Greater Energy Efficiency"*, page 9.

What is a minimum standard if it is not followed anyway? The DOE has acknowledged that energy code compliance levels are very low across the nation.[3] As part of the New Hampshire Energy Code Challenge (NHBCC) project, the subject of this report, a baseline level of compliance with building energy code was estimated in NH at approximately 45%.[4] Like the nation, this means that NH has a great opportunity to capture substantial energy savings and related benefits through increased compliance with the state's current building energy codes.[5]

There are many reasons why energy code compliance levels in NH, and nationwide, are currently so low. One key objective of this report is to identify these reasons in NH and to provide recommendations for overcoming them. This is the first step to breaking the current customer-builder-lender cycle of property sales and construction of non-compliant buildings and moving toward an improved energy efficient future.

New Hampshire Building Construction Activity

In New Hampshire, residential and commercial buildings together represent 50% of the state's total energy consumption.[6] Overall, between 2006 and 2009 ("the baseline period"), there were 15,900 residential units constructed in the state and 409 commercial facilities. As shown in Figure 1, residential and commercial activity generally followed a strong geographic trend: the highest levels of construction activity occurred in the more populous southeastern counties, while there were significantly less residential and commercial starts in the northern and western counties. Overall, the counties with the highest levels of residential and commercial construction activity were Hillsborough and Rockingham, while the counties with the lowest activity levels were Coos and Sullivan.

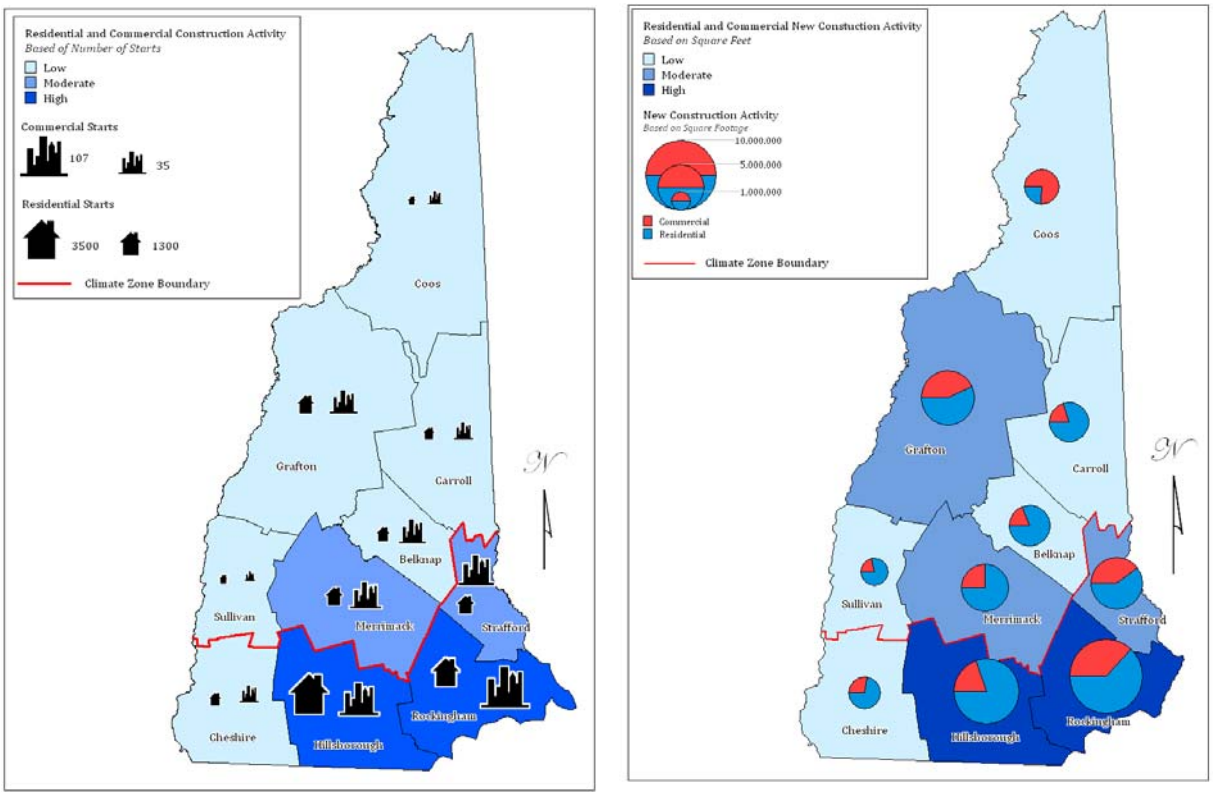
[3] U.S. Department of Energy's Building Energy Code Program www.energycodes.gov

[4] Represents estimated weighted average of building code official self-reported survey results as detailed in *NH Building Code Compliance Roadmap, Volume 2,* prepared by GDS Associates, Inc. April 2012. Statewide value derived from separate county-specific code compliance estimates for residential new construction activities (43% estimated statewide compliance), residential renovations (46% estimated statewide compliance), commercial new construction (49% statewide compliance) and commercial renovations (49% statewide compliance).

[5] According to the U.S. Department of Energy Building Energy Code Program 2011 Annual Report, 14% energy savings can be achieved by complying with the 2009 International Energy Conservation Code (IECC) and ANSI/ASHRAE/IESNA Standard 90.1-2007 minimum standards, 0ver 30% savings is achievable through compliance with 2012 IECC.

[6] New Hampshire Baseline Residential and Commercial Construction Activity and Associated Market Actors Characterization, prepared by GDS Associates, March 2011.

Figure 1. Residential and Commercial Construction Activity – Number of Starts and Square Footage



Similarly, new residential construction in most counties accounted for the majority of the total constructed area (based on square footage), averaging 67 percent statewide. This was particularly the case in counties with less active building markets, such as Sullivan and Belknap. Coos County represents a notable exception to this trend; it was the only county where the majority of the constructed area (76%) was commercial construction. This exception is due to the construction of a 1.9 million square foot federal prison in 2006 and 2007. Mirroring trends from the Number of Starts map, the most active counties were Rockingham and Hillsborough, while Sullivan and Coos counties exhibited the lowest total area constructed during the baseline period.

Based on the state's existing building stock and estimated new construction and renovation activities, Table 1 identifies the potential energy savings (0.56 trillion BTUs per year) and carbon dioxide emission reductions (0.03 million metric tons per year) that could be achieved in NH through verified implementation and enforcement of improved energy codes in the state.[7] For a comparative, based on 2007 U.S. Energy Information Administration (EIA) data, NH's total energy consumption within the residential and commercial building sectors is approximately 162

[7] Model Progressive Building Energy Codes Policy For Northeast States, a White Paper of the NEEP Building Energy Codes Policy Project, March 2009, pages 43 through 46.

trillion BTUs.[8] This equates to approximately $25M per year in energy savings and nearly $225M cumulative savings by 2019.[9]

Table 1. Potential NH Energy Savings and Emission Reductions by Sector

Sector	Annual Savings Starting in 2011	Cumulative Savings by 2019
Residential Energy Savings	0.22 trillion BTUs	1.98 trillion BTUs
Commercial Energy Savings	0.34 trillion BTUs	3.12 trillion BTUs
Total Potential Energy Savings	**0.56 trillion BTUs (approx $25M)**	**5.10 trillion BTUs (approx $225M)**
Residential CO_2 Emission Reductions	0.01 million metric tons	0.12 million metric tons
Commercial CO_2 Emission Reductions	0.02 million metric tons	0.15 million metric tons
Total Potential Emission Reductions	**0.03 million metric tons**	**0.27 million metric tons**

NH Market Actors and Barriers

The term "market actors" is used throughout this roadmap report to refer to both formal organizations and informal groups that directly participate in, or can indirectly influence the building market and the energy code landscape in NH. As part of the project, the NHBCC Program developed a list of market actor groups to target in program activities. Though this list is not exhaustive, the NHBCC Program did make efforts to recognize "non-traditional" market groups that may not dominate energy code discourse, but are nonetheless important players in moving NH forward to achieving its state-wide energy code compliance goals. Specific market actor groups identified and targeted by this project include:

1. Legislative, Policy and Regulatory Stakeholders
2. Code Officials and Building Inspectors
3. Building Professionals - Builders/Contractors
4. Architects, Engineers, Designers
5. Real Estate Professionals and Appraisers
6. Lenders and Financing Organizations
7. Commercial and Industrial Building Owners and Managers
8. Homeowners, and the General Public
9. Equipment Suppliers, Distributors, Manufacturers and
10. "Hard to Reach" Communities

[8] US EIA State Energy Data System - Consumption, Prices and Expenditures through 2007, Released: August 28, 2009. Total CO_2 emissions, across all sectors in the State is approximately 19 million metric tons according to US Global Change Research Program, 2007.

[9] Based on 3,412 BTU/kWh and $0.15/kWh conversion and cost per unit of energy calculation factors.

This report also refers to "market barriers" to energy code compliance, which are issues or circumstances identified in the current energy code landscape that in some way impede energy code compliance. Typical market barriers affect multiple market actor groups. Overcoming these market barriers can and will have a substantial impact on the state's ability to achieve its energy code compliance goals. The NHBCC Program identified a number of market barriers, which can be grouped within the following five areas:

- Leadership and policy barriers,
- Outreach and education barriers,
- Resources and funding barriers,
- Verification and enforcement barriers, and
- Measurement and evaluation barriers.

More detailed information on the unique barriers within each of these areas and recommendations for specific market actor groups to overcome them can be found in Volume 1 of the NH Building Code Compliance Program Roadmap Report. Some highlights are included in the remaining sections of this Executive Summary below.

NH Energy Code Stakeholders, Energy Code Collaborative and Ambassadors

In a well-functioning residential and commercial building energy code climate:

- Policies and policymakers support the code,
- Officials enforce the code,
- Professionals build to the code,
- Real estate professionals, lenders and appraisers value building to code,
- Consumers expect and demand the code at a minimum, and understand the value of building to beyond code levels, and
- Combined stakeholders' support reinforces the policies and policy makers who also support the code.

This roadmap report recognizes that leadership from the cross-section of state stakeholders is critical to achieving the 90% energy code compliance goal. Strong leadership and policy initiatives, along with clear delineation of responsibilities and sufficient funding tools and resources will be needed to communicate and effectively implement a strategic energy code compliance plan.

Recognizing the importance of engaging stakeholders from across the state's energy code-related spectrum, the NHBCC Program formed a NH Building Energy Code Stakeholder Panel at the outset of the project. This Stakeholder Panel has provided critical input throughout the Program's two and one-half year implementation period. The collective experience and knowledge of the diverse group of Stakeholder Panel members helped ensure that Program

activities were appropriate in their approach and that findings resulting from these activities were valid.

At the close of the NHBCC Program, the Stakeholder Panel discussed the continuation or expansion of its role in guiding code compliance efforts in NH. This report refers to this potential post-project group as "the NH Energy Code Collaborative". Among the Energy Code Collaborative members, this report has also identified "Energy Code Ambassadors" (or "Champions") who would take leadership roles in helping to communicate and clarify responsibilities and prioritize energy code compliance activities.

NH's Energy Code Compliance Navigation Plan

Overcoming market barriers to energy code compliance will be critical to achieving intermediate outcomes ("points along the way") on the path to reaching at least 90% compliance with the state energy code by the year 2017. The key building blocks for achieving 90% compliance with the NH energy code are:

- Strong leadership and policies
- Stakeholder engagement
- Targeted outreach and education
- Adequate resources and funding
- Verification and enforcement
- Measurement and evaluation

Figure 2 on the next page provides an overarching navigation guide and graphical representation of this project's recommended NH-specific "mile markers" to help guide and keep NH on the right track as it travels towards 90% compliance by 2017.

Strategies used to implement the recommendations identified in the above Navigation Plan graphic may vary depending on the market barrier and actor group. It is important to note that although some barriers *appear* similar in nature across market actor groups, small nuances between groups can dramatically alter the strategies required to overcome them within each group. The market actor-specific roadmaps that follow provide examples of strategies for overcoming some of the highest priority barriers impacting each of NH's energy code-relevant market actor groups. More detailed information on the unique barriers, recommendations, and specific market actor "champions" for each market actor group can be found in Volume 1 of the NH Building Energy Code Compliance Program Roadmap Report.

Navigation Plan

2009 • • • • • • • • • • • • • • • 2012 • 90% compliance by 2017

Leadership & Policy

- Adopt the 2009 IECC ✓
- Work with and support the NH Collaborative
- Take leadership roles
- Enact new policies where needed
- Allocate energy code compliance funding ✓
- Ratify the 2009 IECC codes
- Clarify roles and responsibilities
- Identify potential funding sources
- Establish an energy code compliance program ✓
- Leverage support to sustain outreach activities
- Expand "beyond code" programs
- Educate the public
- Dedicate and allocate resources and funding to track compliance over time (2017 and beyond)

Outreach & Education

- Develop targeted outreach and education for all market actors ✓
- Deploy public service campaign ✓
- Provide specific forums for code officials, builders, contractors, architects, engineers and designers to ask and discuss technical energy code questions/issues
- Adapt online training resources
- Continue the comprehensive outreach and education initiatives (in-field/hands-on training, video trainings, certifications, CEUs, "Ask-the-Expert" blogs)
- Deploy public service announcements ✓
- Continue targeting the "non-traditional" groups, real estate professionals, appraisers, lenders, etc.
- Develop education material, policy fact sheets ✓
- Deploy workshops and targeted training statewide ✓
- Continue to offer free workshops
- Maintain relationships with broader real estate, appraiser and lender market actors
- Leverage training resources from other state, regional and national organizations
- Grow sustained statewide training initiative
- Obtain specific CEUs for workshop ✓
- Leverage training resources from other state, regional and national organizations ✓
- Continue the comprehensive outreach and education initiatives

Resources & Funding

- Allocate funding for a comprehensive energy code compliance program ✓
- Procure/leverage resources (site inspection tools, equipment, checklists, training materials, websites)
- Leverage resources and funding from other regional/national organizations ✓
- NH Collaborative identifies stable funding mechanisms
- Dedicate funding to offer free energy code trainings (for each market actor group)
- Establish long-term energy code funding
- Sustain continued funding
- Partner with other organizations to develop outreach and education materials (checklists, curriculum, website resources, etc.) ✓
- Fund a state wide energy code staff (to conduct plans reviews, code enforcement site inspections, provide technical assistance, follow up with contractors, address code-related questions, conduct trainings and generally oversee the energy code)

Verification & Enforcement

- Survey and analyze current state and county verification and enforcement methods ✓
- Clarify roles and responsibilities for energy code compliance verification and enforcement activities
- Encourage communities to strengthen their code enforcement practices
- Increase awareness and mandated consequences/penalties associated with non-compliance
- Identify verification and enforcement barriers ✓
- Pilot a comprehensive verification method, including statistically valid plan reviews and an on-site inspection sampling plan
- Identify and develop verification and enforcement recommendations (see Roadmap Volume II) ✓
- Develop roles and responsibilities for enforcement between code officials, municipalities and "third-party" organizations (home energy raters)
- Provide codeenforcement in areas without code officials
- Pilot difference enforcement methods

Measurement & Evaluation

- Identify energy code barriers for each market actor group ✓
- Execute code compliance perception survey ✓
- Pilot compliance evaluation methodology
- Develop a comprehensive, statistically valid compliance evaluation methodology based on consistent regional/ nationally-tested and approved methodologies (model BECP's protocol)
- Develop potential methods for establishing a review process (see NH Roadmap Volume II) ✓
- Conduct final compliance evaluation study within NH
- Identify potential funding sources for conduction more robust M&V activities
- Evaluate survey to inform outreach and training activities, identify gaps and program initiatives ✓

Market Actor Roadmaps to Energy Code Compliance

The following pages include ten (10) market actor-specific roadmaps to achieving at least 90% compliance with the state energy code by the year 2017. Each market actor roadmap provides specific, high priority recommendations for overcoming some of the largest barriers impacting each of NH's energy code-relevant market actor groups. More detailed information on the unique barriers, recommendations, and specific market actor "champions" for each of the ten market actor roadmap can be found in Volume 1 of the NH Building Energy Code Compliance Program Roadmap Report.

Specific energy code roadmaps are provided for the following NH market actor groups:

1. Legislative, Policy and Regulatory Stakeholders
2. Code Officials and Building Inspectors
3. Building Professionals - Builders/Contractors
4. Architects, Engineers, Designers
5. Real Estate Professionals and Appraisers
6. Lenders and Financing Organizations
7. Commercial and Industrial Building Owners and Managers
8. Homeowners, and the General Public
9. Equipment Suppliers, Distributors, Manufacturers and
10. "Hard to Reach" Communities

Legislative, Policy, and Regulatory Stakeholders

include organizations that design, implement, and administer policies and procedures associated with energy code compliance. They ensure that policy and regulatory actions are identified and implemented to support the energy code and are responsible for granting the requisite authority to verify and enforce code compliance.

Members of this group include: the General Court, the BCRB, the PUC and DOS (including NH Fire Marshal's Office), the BOA, the HBRA, the EESE Board.

90% Compliance by 2017

Top Energy Code Compliance Barriers

Lack of Resources and Support for Policy Implementation

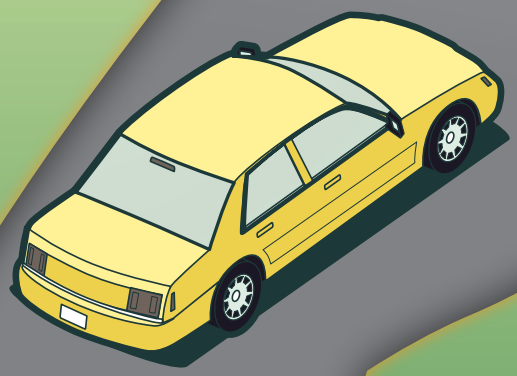
Lack of enabling funding, public resistance to taxes or fees in NH, public resistance to mandates in NH.

Limited Knowledge/Awareness

Lack of clarity within existing policies, misinformation and lack of awareness of existing policies, lack of education and outreach of existing policies.

Lack of Policy Enforcement

Confusion over enforcement roles and responsibilities and lack of resources to enforce and verify code compliance to the full extent granted by the law.



High Priority Recommendations

✔ **Clarify and publish energy code verification** and enforcement roles and responsibilities. (PUC, DOS, OEP, EESE, BCRB)

✔ **Promote targeted public outreach and education** highlighting the high cost to communities of buildings that fail to meet the energy code and that energy codes help protect the largest investment most individuals make. (NH Collaborative with Energy Code Ambassadors)

✔ **Identify critical tools/resources** for energy code compliance and consider alternative funding sources including public/private partnerships and grants, System Benefit Charge (SBC), and other sources. (NH Collaborative)

✔ **Increase awareness** of mandated consequences/penalties associated with non-compliance. (PUC, DOS, BCRB, BOA, OEP)

✔ **Encourage enhanced policy initiatives** including adopting more stringent codes (leverage NH's Local Energy Committees and Regional Planning Commissions) and expand utilization of "beyond code" programs (ENERGY STAR, Build Green NH, LEED, etc). (PUC, DOS, OEP, EESE, BCRB, Public/Private Partnerships)

✔ **By 2013, accomplish a baseline compliance study** based on the DOE's BCEP methodology (PUC, DOS, BCRB, OEP, EESE, BOA)

✔ **CRITICAL: Continue the NH Energy Code Collaborative** to help guide further energy code compliance initiatives in NH.

Code Officials and Building Inspectors

Code officials and building inspectors are the primary drivers of energy code compliance in homes and commercial buildings, which often represent the largest investment for families or business owners. Code officials conduct code-required plans analyses and on-site inspections to verify that construction proceeds in accordance with all component requirements of the building code. Code officials and building inspectors act as key liaisons between a number of important market actor groups including: policy makers, regulatory and enforcement agencies, builders, and the general public.

90% Compliance by 2017

Top Energy Code Compliance Barriers

Insufficient Funding

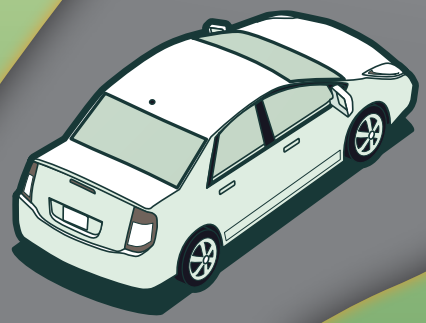
No budget or limited budget for a dedicated code official; Limited staffing capacity; Limited time inspection/enforcement responsibilities

Lack of Resource and Training

Lack time to attend trainings; Lack of resources - code books, checklists, testing equipment, blower doors, duct blasters, IR cameras; Need for advanced in-field training

Competing Priorities

Less attention and lower priority than the higher-priority life-healthy-safety code issues; Competing priorities and other code official responsibilities



High Priority Recommendations

✔ **Work with jurisdictions** to create realistic and customizable budgets to expand their energy code enforcement departments. (NH Energy Code Collaborative and Ambassadors)

✔ **Promote public awareness campaigns** and highlight that code officials ensure standards and safety of most individuals' biggest financial investment. (PUC, DOS, BOA, Energy Code Ambassadors)

✔ **Provide free trainings, resources and tools** (code books, checklists, blower doors, etc.) including in-field workshops and on-line videos, providing a forum for code officials to ask and discuss technical energy code questions. (PUC, Utilities, CCSNH, BOA, BCRB, ICC, ASHRAE, DOE)

✔ **CRITICAL: Continue the NH Energy Code Collaborative** to help guide consensus on roles and responsibilities for code officials and third parties.

Builders and Contractors

Commercial and industrial builders and contractors are responsible for the construction and renovation of the largest and most energy-intensive buildings in the state: e.g. hospitals, retail stores, and schools. Residential builders and contractors build and renovate new homes, which represent 67% of the total square footage constructed in NH and often represent the largest investment for an American family. Given that many NH towns lack a dedicated energy code official, they are often responsible for understanding the building code and documenting compliance themselves. Thus, it is essential that builders and contractors fully understand the requirements of the energy code, and use building techniques and technologies that result in high-performance energy code-compliant buildings.

90% Compliance by 2017

Top Energy Code Compliance Barriers

Limited Knowledge/Awareness

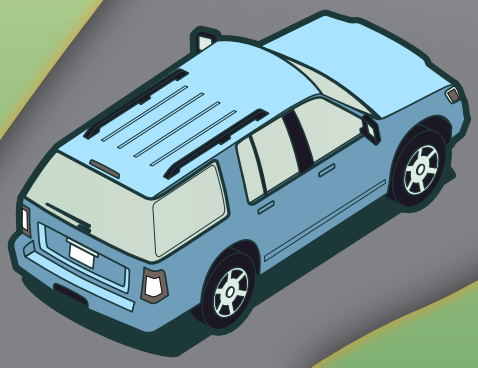
Lack of information regarding proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of building to meet or exceed energy code; Lack of awareness when codes are updated and how to verify compliance

Lack of Resource and Training

Lack of resources, material, and tools; Limited availability of code books, checklists, and testing equipment (blower door, duct blaster, etc.); Lack of targeted or advanced/ technical trainings and CEU requirements

General Sentiment

Customer driven (aesthetics, floor plan, customer choices take priority); General sentiment/ attitude "this is the way we have always done it"; Resistant to change/"added requirements"; Reliant on past practices; Assume their current building practices are correct/adequate



High Priority Recommendations

✔ **CRITICAL: Provide free trainings, resources and tools** (code books, checklists, blower doors, etc.) including in-field/hands-on workshops and on-line videos, providing a forum for builders and contractors to ask and discuss technical energy code questions. (PUC, Utilities, CCSNH, HBRA, BCRB, BOA, ICC, ASHRAE, DOE)

✔ **Promote targeted public outreach** and education highlighting the high cost to communities of buildings that fail to meet the energy code and that energy codes help protect the largest investment most individuals make. (NH Energy Code Collaborative with Energy Code Ambassadors)

✔ **Increase publicity** when building codes are updated. (BCRB, PUC, NH Energy Code Collaborative, Energy Code Ambassadors)

✔ **Develop and promote training** for the new generation of builders and contractors, offer workforce development training and CEUs through the CCSNH. (CCSNH, PUC, DOS, HBRA)

Architects, Engineers, Designers

Architecture, engineering and design firms are responsible for the design of the largest commercial and industrial buildings (e.g. hospitals, retail stores, and schools) and custom residential homes. They are often required to self-certify building compliance with energy code standards. In order for these buildings to comply with the energy code, architects, engineers and designers must understand the requirements of the code and design techniques that facilitate energy code compliance.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Limited Knowledge/Awareness

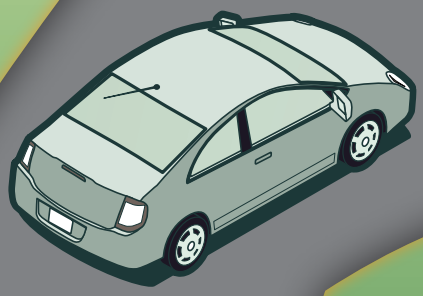
Lack of information regarding proven benefits (energy economic, cost savings, environmental, comfort, and indoor air quality) of building to meet or exceed energy code; Lack of information regarding necessary technical requirements; Lack of awareness when codes are updated and how to verify compliance

Lack of Resource and Training

Lack of resources, material and tools (including competition for capital); Limited availability of code books, checklists and compliance tools; Lack of targeted or advanced/technical trainings and CEUs requirements

General Sentiment

Customer driven (aesthetics, floor plan, customer choices take priority); Uncertain of new technologies (potential for unintended consequences); Lack of "whole system" thinking necessary to integrate new technologies; Reliant on past practices; Assume their current building designs are correct/ adequate



High Priority Recommendations

✔ **CRITICAL: Provide free advanced technical trainings, resources and tools** (code books, checklists, testing equipment, etc.), providing a forum for architects, engineers and designers to ask and discuss technical energy code questions. (PUC, Utilities, CCSNH, BCRB, AIA, ICC, ASHRAE, DOE)

✔ **Increase outreach and education** focusing on the benefits of code compliant buildings, technical requirements, and compliance methods to meet energy code. (AIA, PUC, DOS, BCRB, NH Energy Code Collaborative, Energy Code Ambassadors)

✔ **Develop and promote training** for the new generation of architects, engineers, and designers focusing on the "whole-system/ building" approach. (AIA, ASHREA, ICC, CCSNH)

✔ **Incorporate and require baseline energy code CEUs** for continuing licensure. (AIA ASHREA, ICC, Legislature)

Real Estate Professionals and Appraisers

Real estate professionals, interacting directly with home buyers, commercial building owners, and the general public, can raise customer awareness of the energy code and the benefits of energy efficient homes and buildings. Appraisers, by properly valuing energy efficient homes and buildings, can influence the building market toward energy efficient building. By quantifiably valuing energy efficient attributes of a property, appraisers can open further funding streams for energy efficient projects and can raise the overall awareness of the value of energy code compliant buildings.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Lack of Comparables ("comps")

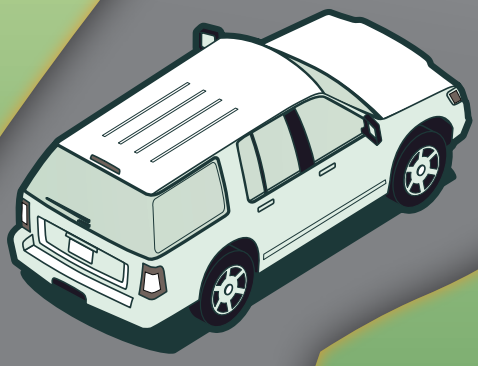
Comps do not include any "energy attributes" (sales driven by aesthetics, bed/bath ratio, neighborhood, etc.); Existing building stock inventory substandard; Lack of industry guidance or methodologies on how to value energy code and energy efficient homes/buildings; Energy attributes not seen as "investments"

Lack of Knowledge/Awareness

Assume all buildings are built to code; Lack of information regarding proven benefits (energy economic, cost savings, environmental, comfort, and indoor air quality) of homes or building that meet or exceed energy code; Prevalence of misinformation/"green washing"

Lack of Resources and Training

Lack of available and inexpensive guidance documents, checklists, and materials etc.; Lack of targeted, in-depth training programs and energy code CEUs requirements



High Priority Recommendations

✔ **CRITICAL: Include "energy attributes"** in comparables ("comps") and promote the "energy attribute rating" - HERS rating on NH's MLS listing. (NHREAB)

✔ **Promote public outreach** and education campaign highlighting the high cost to public/communities for homes and buildings that fail to meet the energy code and that energy codes help protect the largest investment most individuals make. (NH Energy Code Collaborative with Energy Code Ambassadors)

✔ **Create and publicize customized training programs** (with "field-trips" and "role-playing") targeted to real estate professional and appraisers. (NHREC, NAR, AEEREP, CCSNH)

✔ **Require energy code CEUs** for continuing licensure. (NHAR, CIBOR, NHREC, NAR)

✔ **Encourage the inclusion** of the added value of energy efficiency measures when industry standards are updated. (Local Chapter of National Organizations, CIBOR, HBAR, NHREAB)

Lenders and Financing Organizations

Though sometimes overlooked or underplayed in the energy code-related discourse, lenders and financing organizations are key actors in the residential and commercial construction markets. They are responsible for securing funding for energy efficient construction projects that may require a higher initial investment in exchange for a long-term payback. By financing construction projects, these organizations are the drivers of construction activity and can make or break the sale of real-estate.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Lack of Resources and Tools

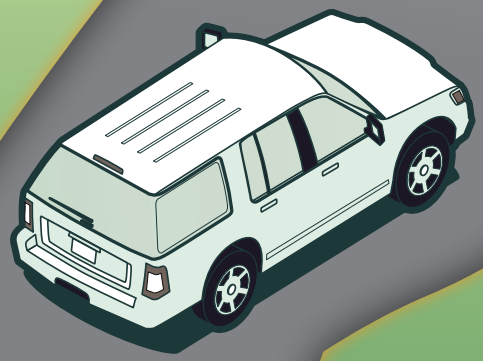
Lack of targeted information regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes/buildings that meet or exceed energy code; Lack of available and inexpensive guidance documents and other informational materials; Lack of information regarding the operational or lifetime cost savings of energy efficient buildings

Limited Knowledge/Awareness

Energy code issues are off the radar of many lenders and financing organizations; Lenders may assume all new buildings are automatically built to code; Lenders may not be sure how to quantify energy code compliance and thus, assign value to compliant homes

Strongly Influenced by Market

Lenders are strongly influenced by the advice of appraisers, who do not discount for non-compliant buildings; Low visibility or 'call' for energy code features; No motivation to focus on energy efficiency when buyers are not asking for it



High Priority Recommendations

- ✔ **Initiate and promote** an industry-targeted outreach and education campaign (industry newsletter, email, role-modeling program, public awareness campaign, etc) focusing on the benefits of code compliant buildings to the public/community. (Energy Code Ambassadors)
- ✔ **Provide and publicize analysis** on operational and lifetime costs of code compliant buildings and equipment with energy cost variables. (Consumer Protection Agencies, PUC, DOS, OEP)
- ✔ **Develop and publicize case studies** focusing on the value, pay-back, and improved comfort and savings/value of energy efficient homes. (Energy Code Ambassadors)
- ✔ **Develop graphics-heavy guide** and cheat sheets (checklists) addressing the most critical energy code issues. (PUC, DOS, OEP)
- ✔ **CRITICAL: Encourage the inclusion** of the added value of energy efficiency measures when industry standards are updated and encourage lending policy shifts to acknowledge and push for better performing buildings. (Energy Code Ambassadors)

Commercial and Industrial Building Owners and Managers

Commercial and industrial building owners, operators, and managers are responsible for making critical decisions regarding the largest and most energy-intensive buildings in the state. Collectively, commercial and industrial building owners have the capacity to drive the demand for energy code-compliant buildings. Building owners who value and demand energy code-compliant buildings compel builders and contractors to be more aware of energy code requirements and to learn techniques for meeting or exceeding these standards.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Short-term Ownership/Split Incentives

Short-term owners may have competing priorities and lack the time to focus on energy issues or may have a "build quickly and move on" mentality; Buildings are often leased space with the occupants paying the energy costs, there may be little incentive for building owners to make energy efficiency investments

Limited Knowledge/Awareness

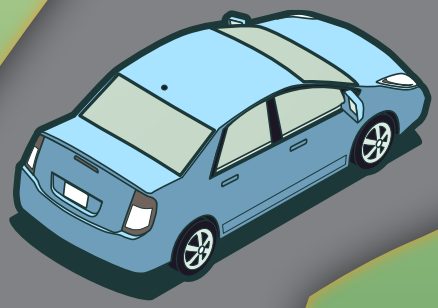
Building owners may assume all new buildings are automatically built to code; Lack of targeted information regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes that meet or exceed energy code; Owners may believe that energy code issues have little consequence

Constrained Resources/Competing Priorities

When budget is limited, building owners must make tradeoffs associated with building structure, systems, and features to balance costs and profits; Energy code requirements may not seen as investments; Financing focused on initial costs versus operational/lifetime costs

Low Enforcement

Energy code specifications on paper may not be what happens in the field; Building owners may assume building professionals are responsible and being checked by enforcement methods



High Priority Recommendations

✔ **CRITICAL: Develop a building labeling program** that would encourage lessees to know their operational costs before committing to a building. (Consumer Protection Agencies, Energy Code Ambassadors)

✔ **Initiate and promote** an industry-targeted outreach and education campaign (including newsletters, email, role-modeling programs, public awareness campaign, etc). (Industry Associations, Energy Code Ambassadors)

✔ **Develop graphics-heavy guide** and cheat sheets (checklists) addressing most critical energy code issues and increase exposure of these tools and other resources for energy efficient building. (ICC, PUC, DOS, AIA, BCRB, Energy Code Ambassadors)

✔ **Create and publicize** a building energy calculator for owners to be able to compare similar buildings (compliant vs. non-compliant). (PUC, DOS, OEP, Energy Code Ambassadors)

✔ **CRITICAL: Develop and enforce** a stronger plans review process and encourage communities to strengthen their code enforcement practices. (AIA, PUC, DOS, BCRB, NHBOA, Municipalities)

Homeowners and the General Public

Homeowners and the general public play an important and influential role in shaping residential and commercial construction market activity. A general public that values and demands energy code compliant buildings compels builders and contractors to become more aware of the code requirements and to learn techniques for meeting or exceeding these standards. Likewise, an informed and vocal general public can have a strong influence on policymakers, ensuring that energy code issues continue to receive the attention and resources necessary to achieve widespread compliance.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Limited Knowledge/Awareness

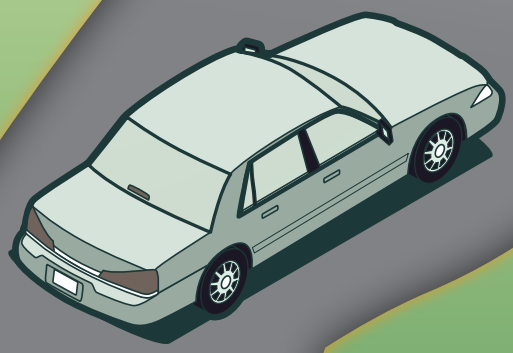
General public may not be aware of the existence or requirements of an energy code; Homeowners/general public may lack the motivation to understand energy code requirements or may be put off by the technical nature of the energy code; Public may assume all new buildings are automatically built to code

Lack of Tools and Resources

Lack of targeted information regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes that meet or exceed energy code; Homeowners may not know what energy features to look for when evaluating a home

Constrained Resources/ Competing Priorities

Homeowners may not see energy code requirements as investments; Homeowners may be concerned with high initial costs versus operational/lifetime costs or payback periods; Buyers would rather invest in fancy countertop or hot tub than "what is behind the wall"



High Priority Recommendations

✔ **CRITICAL: Promote targeted public outreach** and education highlighting the high cost to communities of buildings that fail to meet energy code and that energy codes help protect the largest investment most individuals make. (Consumer Protection Agencies, Energy Code Ambassadors)

✔ **Develop innovative public awareness campaigns** and public service announcements. Consider partnerships with the local media to develop and publicize residential energy code video spotlights. (Municipalities, Energy Code Ambassadors)

✔ **Highlight success stories** and memorable case studies in outreach efforts and empower consumers to understand and expect better performing buildings. (Consumer Protection Agencies, Energy Code Ambassadors)

✔ **Develop a graphics-heavy guide** and cheat sheets (checklists) specially designed for homeowners and the general public addressing the most critical energy code issues. Increase the exposure of these and other effective tools for energy-efficient building. (PUC, DOS, HBRA, BCRB)

✔ **Include analyses** on building operational costs over time with energy cost variables in outreach activities. (Consumer Protection Agencies, Energy Code Ambassadors)

Equipment Suppliers, Distributors, Manufacturers

Equipment suppliers, distributors, and manufacturers of construction equipment and supplies have a strong impact on the residential and commercial building markets. This group influences construction costs and the availability of materials necessary for building energy code compliant structures.

90% Compliance by 2017

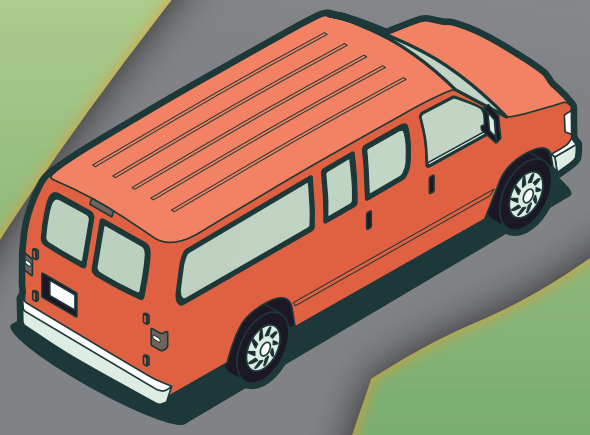
Top Energy Code Compliance Barriers

Lack of Public Outreach and Consumer Awareness

New code compliant products perceived as novel and therefore, costly; Store staff/general public unaware of code requirements and may deem new compliant products as "unnecessary"; General lack of educational materials and guidance

Product Development Reactive to Market/Consumer Demand

Consumer and market demands dictate equipment and products manufactured; Little incentive to introduce new products if sales are stable with baseline product



High Priority Recommendations

✔ **CRITICAL: Work with equipment suppliers** to promote code compliant products with better shelf space, branding, and sales efforts. (PUC, DOS, HBRA, Trade Organizations, Energy Code Ambassadors)

✔ **Increase outreach and education** to equipment suppliers, distributors and manufacturers on the benefits of code compliant products and encourage attendance at energy code workshops. (Consumer Protection Agencies, PUC, DOS, HBRA, Utilities, CCSNH, Energy Code Ambassadors)

✔ **Increase outreach and education efforts** to equipment suppliers, distributors, and manufacturers, encouraging them to be proactive players in the market. (Consumer Protection Agencies, PUC, DOS, HBRA, Utilities, CCSNH, Energy Code Ambassadors)

✔ **Brand a "code compliant" label** to affix on qualified products and train staff to promote code compliant labeled products. (Consumer Protection Agencies, PUC, DOS, HBRA, Utilities, CCSNH, Energy Code Ambassadors)

"Hard to Reach" Communities

NH's "hard to reach" communities include remote and extreme communities, impoverished communities, and minority communities throughout the state. It is essential to bring these groups into the energy code dialogue to ensure that energy code compliance issues are not ignored within these communities.

90% Compliance by 2017

Top Energy Code Compliance Barriers

Limited Knowledge/Awareness

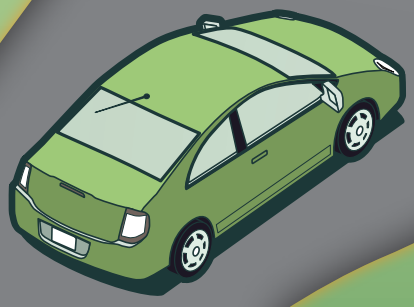
Lack of awareness of the benefits of energy code compliant buildings; Lack of trained professionals

Lack of Funding and Resources

Lack of adequate budget to cover energy code enforcement; Higher priority to provide basic community services; Building materials and resources may be limited in remote locations

General Public Sentiment

Remote dwellers historically have an independent, "do it yourself" attitude; There may be fear of gentrification in some communities



High Priority Recommendations

✔ **CRITICAL: Promote targeted public outreach** and education focusing on energy and money saved, comfort, and durability of code compliant homes. (Consumer Protection Agencies (NH Legal Assistance), Energy Code Ambassadors)

✔ **Tie higher building performance** to other issues that need attention such as job training and economic development. (CCSNH, HBRA, CAP Agencies, Utilities, Public/Private Partnerships, NHDOL)

✔ **Increase the availability of building materials** and resources and promote code compliant building techniques and products. Consider sampling new products in local hardware stores. (Consumer Protection Agencies, Manufacturers, Distributors, Energy Code Ambassadors)

✔ **Develop community buy-in** and train from within the community. In training efforts, work with CCSNH or other workforce development initiatives to develop training and internship programs. (CCSNH, HNBA, CAP Agencies, Utilities, Public/Private Partnerships, NHDOL)

✔ **Develop volunteer/grassroots groups,** starting with StayWarm NH, ButtonUP, Local Energy Committees, or similar models. (Utilities, Clean Air-Cool Planet, OEP, PUC)

Conclusions and Next Steps

All-in-all, it appears that with respect to energy codes, sufficient specific and enabling legislation exists for effective adoption and enforcement of appropriate base codes and potential stretch codes. Sufficient statutes, regulations, policies and guidelines also seem to exist regarding administrative organizational requirements and responsibilities. However, common understanding and implementation of these requirements/responsibilities appears to be lacking within and across key market actor organizations and stakeholder groups. And often, lack of resources (including funding, staffing and time) and the need to prioritize other responsibilities impacts abilities and effectiveness of energy code compliance and enforcement activities.

However, as the NHBCC Program comes to an end, efforts to establish a "NH Energy Code Collaborative" are underway. In order to meet the assurance of 90% compliance with the 2009 energy code by 2017, a strategic plan (this NH Roadmap Report, including subsequent Volumes 1 and 2) must be communicated to appropriate market actors across the state in a well-organized manner.

Members of the existing NHBCC Stakeholder Panel have decided to meet again to discuss the roles and responsibilities, structural organization, and future of an energy code collaborative in NH. This group represents knowledgeable and influential stakeholders currently working within the state's energy code implementation and compliance areas. Through coordination among these stakeholders, a continued and expanded energy code collaborative will help to inform and guide development of a functional and effective energy code infrastructure that fits the specific needs of NH. It will also serve as a mechanism for identifying recommendations from this Roadmap report that can be realistically implemented in NH and for identifying the most suitable Energy Code Ambassadors to champion these efforts. In many cases, the Ambassadors will work as "mentors" whose presence in the community will add value and momentum to energy code initiatives and effect cultural change within specific market actor groups.

As next steps will include developing and implementing a prioritized evaluation plan, the NH Energy Code Collaborative should consider coordinating with and leveraging expertise and resources potentially available through the PUC and NH utilities who already have extensive experience assessing progress and measuring the energy savings associated with the state's CORE Energy Efficiency programs funded through NH's System Benefits Charge (SBC). As a requirement of each program funded through the SBC, 5% of programmatic funds are dedicated for evaluation of program activities and M&V of resultant energy savings. Developing and implementing M&V protocols to assess the effectiveness of NH's statewide code compliance activities could fall under the jurisdiction of the PUC and be supported through SBC-funded evaluation activities. If limited evaluation funds are available, NH could focus on pilot testing the BECP code compliance verification methodology, by completing building assessments in just one, or a few counties within one construction sectors (see this NH Roadmap Report, Volume 2, Task 7 and 8 for more information regarding policy and evaluation methods).

Acronyms and Abbreviations

American Institute of Architects (AIA)

American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE)

American Recovery and Reinvestment Act (ARRA)

American National Standards Institute (ANSI)

Association of Energy and Environmental Real Estate Professionals (AEEREP)

Building Energy Codes Program (BECP)

Building Codes Assistance Project (BCAP)

Community Action Program Agencies (CAP)

Community College System of NH (CCSNH)

Consumers Union (CU)

Department of Energy (DOE)

Energy Efficiency Sustainable Energy Board (EESE)

GDS Associates (GDS)

Illuminating Engineering Society of North America (IESNA)

International Energy Conservation Code (IECC)

Institute for Market Transformation (IMT)

International Code Council (ICC)

Leadership in Energy and Environmental Design (LEED)

National Association of Realtors (NAR)

NH Association of Realtors (NHAR)

NH Building Code Compliance Program (NHBCC Program)

NH Building Code Officials Association (BOA)

NH Building Code Review Board (BCRB)

NH Commercial Investment Board of REALTORS (CIBOR)

NH Department of Labor (DOL)

NH Department of Safety (DOS)

Home Builders and Remodelers Association of NH (HBRANH)

NH Office of Energy and Planning (OEP)

NH Public Utilities Commission (PUC)

NH Real Estate Appraiser Board (REAB)

NH Real Estate Commission (REC)

NH Residential Energy Code Application (EC-1 Form)

Northeast Energy Efficiency Partnerships (NEEP)

Pacific Northwest National Laboratory (PNNL)

Program Logic Model (PLM)

Public Service Announcement (PSA)

Responsible Energy Codes Alliance (RECA)

State and Local Energy Efficiency Action Network (SEE Action)

State Energy Program (SEP)

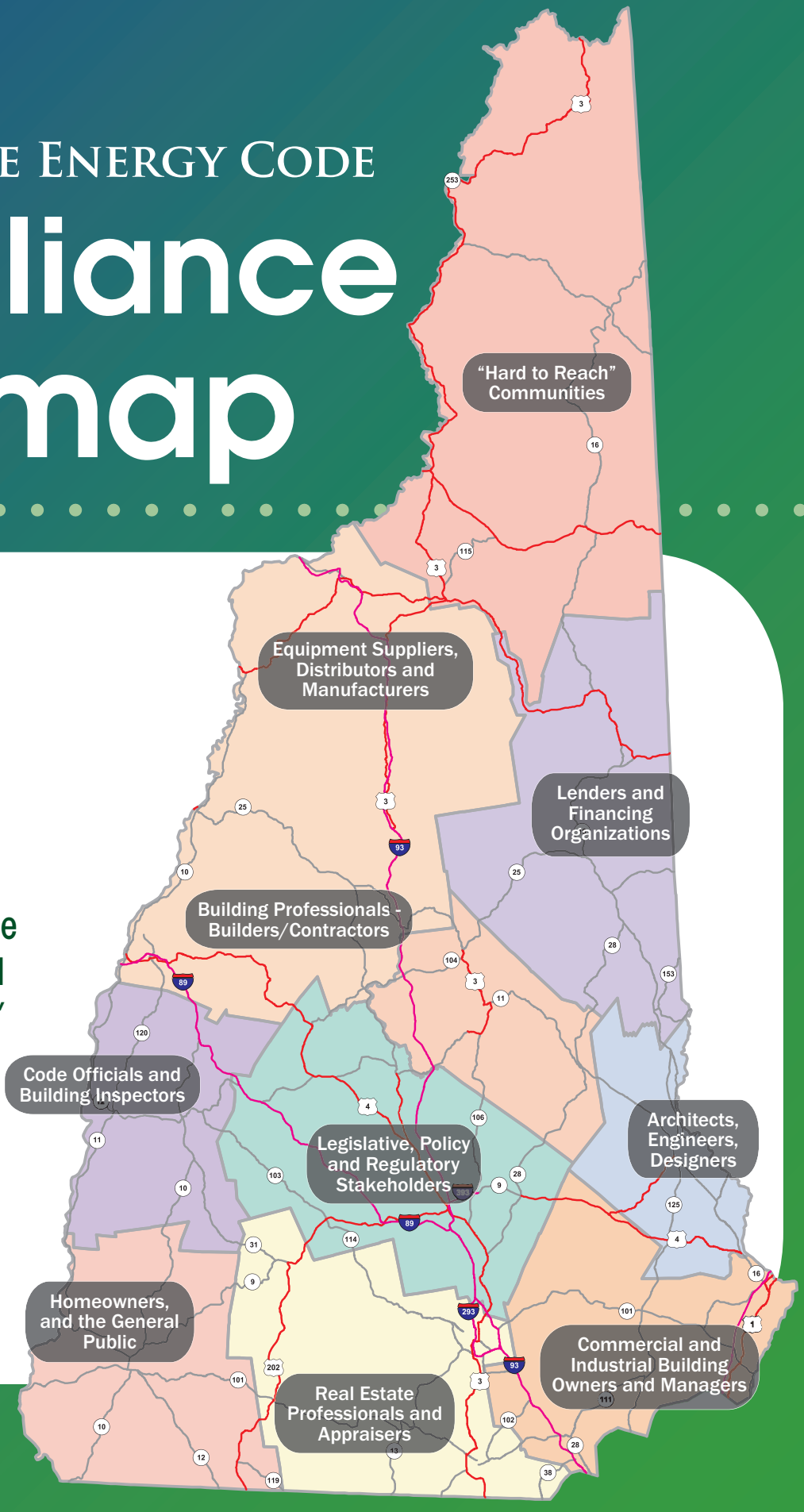
System Benefits Charge (SBC)

www.nhenergycode.com

The Compliance Roadmap was created by GDS Associates, Inc. on behalf of the NH Office of Energy and Planning (via American Recovery and Reinvestment Act of 2009 funds).

New Hampshire Energy Code

Compliance Roadmap



VOLUME 1

"Achieving 90% Compliance with the 2009 International Energy Conservation Code"

GDS Associates, Inc.
Engineers and Consultants

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FEDERAL DISCLAIMER

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NOTICE

ACKNOWLEDGMENTS

GDS Associates, Inc. (Scott Albert, Meaghan White, and Jayme Woogerd) would like to acknowledge the rest of our team of contractors for this project (including Stu Slote and Lee Wood from Navigant Consulting, Inc., Wesley Golomb – Community College System of New Hampshire, Alan Mulak, LLC, and Advertising Works, LLC) and the following organizations and individuals who contributed to the completion of many of the work tasks associated with this two and one-half year building energy code compliance roadmap development effort: The NH Office of Energy and Planning, Public Service Company of NH and all the other NH Electric Utilities, the U.S. Department of Energy's Building Energy Codes Program, the Alliance to Save Energy's Build Code Assistance Project, the Northeast Energy Efficiency Partnerships, Consumers Union, and the multiple and individual members of the project's NH Building Energy Code Stakeholders Panel. A special "thank you" goes to Laura Richardson (NH OEP) for her tremendous support, insights, extra efforts and passion throughout the entire project period.

ACRONYMS AND ABRIVIATIONS

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Introduction and Project Overview

In the United States, buildings use more energy and emit more carbon dioxide than either the industrial or transportation sectors. According to the U.S. Department of Energy (DOE), the single most important step to reducing energy use in buildings is to implement and enforce compliance with building energy codes.[1] Despite this fact, the DOE has acknowledged that building energy code compliance levels remain very low around the nation.

In response to the American Recovery and Reinvestment Act (ARRA), many state governors across the U.S. sent letters of assurance regarding energy codes to the U.S. Secretary of Energy.[2] Specifically, these assurances called for the development of plans to achieve 90% compliance with the 2009 International Energy Conservation Code[1] (2009 IECC) for residential buildings and ANSI/ASHRAE/IESNA Standard 90.1–2007 for commercial buildings (or equivalent codes) by the year 2017. Among the governors to make this assurance in 2009 was New Hampshire's Governor John Lynch. For New Hampshire, this assurance met a federal condition for the state to receive $25.8 million in ARRA – State Energy Program (SEP) stimulus funding.[3]

To support this goal, the state earmarked six hundred thousand dollars of ARRA-SEP funding to initiate the NH Building Energy Code Compliance Program ("NHBCC Program"), a comprehensive effort to gather baseline energy code compliance information, increase public awareness, and develop an action plan (a "roadmap") to identify NH-specific recommendations for meeting the 90% compliance commitment by 2017.

Through a competitive bidding process, GDS Associates, Inc (GDS) was awarded a contract to administer the activities of the NHBCC Program. Working closely with the NH Office of Energy and Planning (OEP) and numerous other key stakeholder groups, GDS deployed a state-wide initiative publically branded "The NH Energy Code Challenge". The NH Energy Code Challenge program was broken up into nine (9) key program tasks[4] as listed below. Activities, results, and recommendations associated with each of these tasks are described in detail in Volume 2 of this roadmap report,

1) Establish a baseline of energy code compliance in NH (both residential and commercial buildings), identifying roadblocks and solutions to improve compliance,
2) Create a roadmap to achieve 90% compliance with the NH state energy code (2009 IECC) by 2017,
3) Promote the program throughout the state to building and code professionals,
4) Train/mobilize building professionals for code compliance and promote above-code performance,

[1] U.S. Department of Energy, Building Energy Codes Program 2011 Annual Report "*Development, Adoption, Compliance – Building Greater Energy Efficiency"*, page 9.

[2] U.S. Department of Energy's Building Energy Code Program www.energycodes.gov

[3] The goals of the ARRA funded State Energy Program are to: (1) Increase energy efficiency, to reduce energy costs and energy usage for homes, businesses, and government; (2) Reduce reliance on imported energy; (3) Improve the reliability of electricity, fuel supply and the delivery of energy services; and (4) Reduce the impacts of energy production and use on the environment.

[4] NHOEP RFP to Develop a Building Code Compliance Program Relating to the 2009 IECC, 9/15/09, Pages 4 through 6.

5) Develop a public awareness campaign for homeowners, landlords, commercial property owners, real estate professionals, and appraisers to understand the value of the energy code and above-code performance,

6) Update and gather building code resources in one publicly accessible site,

7) Develop recommended enforcement and compliance policy options for the 2009 IECC,

8) Establish a review process to monitor and track compliance under the 2009 IECC, and

9) Submit monthly reports to OEP to present to the NH Office of Economic Stimulus, DOE, and the US Office of Management and Budget on data for number of jobs created/retained, trainings held and people reached, and funding leveraged.

A key goal of the NHBCC Program was to map out NH's existing energy code landscape, identify barriers to energy code compliance across the state's residential and commercial building sectors, and develop a plan of action outlining NH-specific recommendations for achieving 90% energy code compliance by 2017. This comprehensive NH Building Energy Code Compliance Roadmap report represents the culmination of these efforts and presents the detailed findings and recommendations resulting from program activities.

Throughout the project's two and one-half year time span, substantial efforts were made to identify and pursue opportunities to leverage resources across other leading local, regional, and national organizations with similar goals. These organizations included: the DOE's Building Energy Codes Program (BECP), the Building Code Assistance Project (BCAP), Consumers Union (CU) and Northeast Energy Efficiency Partnerships (NEEP), the NH Utilities, state agencies, code officials, and trade organizations. In addition, this report was developed in close coordination with the NH Energy Code Stakeholder Advisory Panel, a group of energy code stakeholder representatives formed as part of the NHBCC Program effort. Further details on the roles and composition of the Stakeholder Panel are discussed later in this report.

This report is organized into three separate volumes, each of which is intended to be read alone or in tandem with any other:

- The New Hampshire Building Energy Code Compliance Roadmap – Executive Summary, a high level introduction to the importance of building energy codes and brief discussion of NH building activities, the NH Energy Code Compliance Navigation Plan, and an introduction to NH market actor groups, barriers, recommendations, and specific market actor "roadmaps" to achieving 90% compliance with the energy code by 2017;

- Volume 1: The New Hampshire Building Energy Code Compliance Roadmap – Market Actor Identification and Barrier and Recommendations Report, an overview of the project including the presentation of key stakeholders (impacted market actors), specific barriers and recommendations for progressing toward achievement of 90% compliance with the energy code by 2017;

- Volume 2: The New Hampshire Building Energy Code Compliance Roadmap – Detailed Project Report, a more in-depth description of the nine (9) NHBCC Program tasks, associated findings, and recommendations directly resulting from these activities; and

- Bound Separately: The New Hampshire Building Energy Code Compliance Roadmap Report – Supporting Documentation and Appendices, materials and supporting documentation developed through the NHBCC Program and relevant materials reviewed for this report developed by other federal, national, regional, and local organization.

The Opportunity

In New Hampshire, residential and commercial buildings together represent 50% of the state's total energy consumption.[5] NH buildings use more energy and emit more carbon dioxide than either the industrial or transportation sectors. The DOE recognizes that the single most important step to reducing energy use in buildings is to implement and enforce building energy codes. In addition to energy savings, there are a host of related benefits associated with building to meet or exceed energy code requirements including:

- ☑ reduced consumer energy bills,
- ☑ reduced air pollution (including lower greenhouse gas emissions),
- ☑ improved health and comfort, and
- ☑ increased building durability.

A subset of the overall building code, energy codes and standards set minimum requirements for energy efficient design and construction for new and renovated buildings. By establishing the very minimum requirements, they set the baseline for energy efficiency in new construction and renovations to which further design upgrades and strategies may be compared. A structure built to the 2009 energy code requirements will be 14% more energy efficient than one built to the 2006 code. Likewise, the 2012 code represents a 30% improvement in energy performance over the 2006 code. These improvements represent incremental steps toward the goal of net zero buildings by 2030.

Buildings often represent the single largest financial investment for families or businesses owners and the lifespan of a new building can be thirty to fifty years or more. Thus, incorporating energy efficient design has the potential to have long-lasting energy savings effects. Once built, it is often far more expensive and sometimes impossible to achieve the energy efficiency performance than that which can be integrated economically at the time of initial design and construction. For this reason, implementing energy codes and ensuring consistent enforcement is a critical component to securing the energy savings and other benefits that will last over the lifetime of the building.

Table 1 identifies the potential energy savings (0.56 trillion BTUs per year) and carbon dioxide emission reductions (0.03 million metric tons per year) that could be achieved in NH through verified implementation and enforcement of improved energy codes in the state. This information is based on a recent white paper prepared as part of the NEEP's Building Energy Codes Policy Project, and assumes improving the code by 30% over 2006 IECC in 2011.[6] For a

[5] New Hampshire Baseline Residential and Commercial Construction Activity and Associated Market Actors Characterization, prepared by GDS Associates, March 2011.

[6] Model Progressive Building Energy Codes Policy For Northeast States, a White Paper of the NEEP Building Energy Codes Policy Project, March 2009, pages 43 through 46.

comparative, based on 2007 U.S. Energy Information Administration (EIA) data, NH's total energy consumption within the residential and commercial building sectors is approximately 162 trillion BTUs.[7] This equates to approximately $25M per year in energy savings and nearly $225M cumulative savings by 2019.[8]

Table 1. Potential NH Energy Savings and Emission Reductions by Sector

Sector	Annual Savings Starting in 2011	Cumulative Savings by 2019
Residential Energy Savings	0.22 trillion BTUs	1.98 trillion BTUs
Commercial Energy Savings	0.34 trillion BTUs	3.12 trillion BTUs
Total Potential Energy Savings	**0.56 trillion BTUs (approx $25M)**	**5.10 trillion BTUs (approx $225 M)**
Residential CO_2 Emission Reductions	0.01 million metric tons	0.12 million metric tons
Commercial CO_2 Emission Reductions	0.02 million metric tons	0.15 million metric tons
Total Potential Emission Reductions	**0.03 million metric tons**	**0.27 million metric tons**

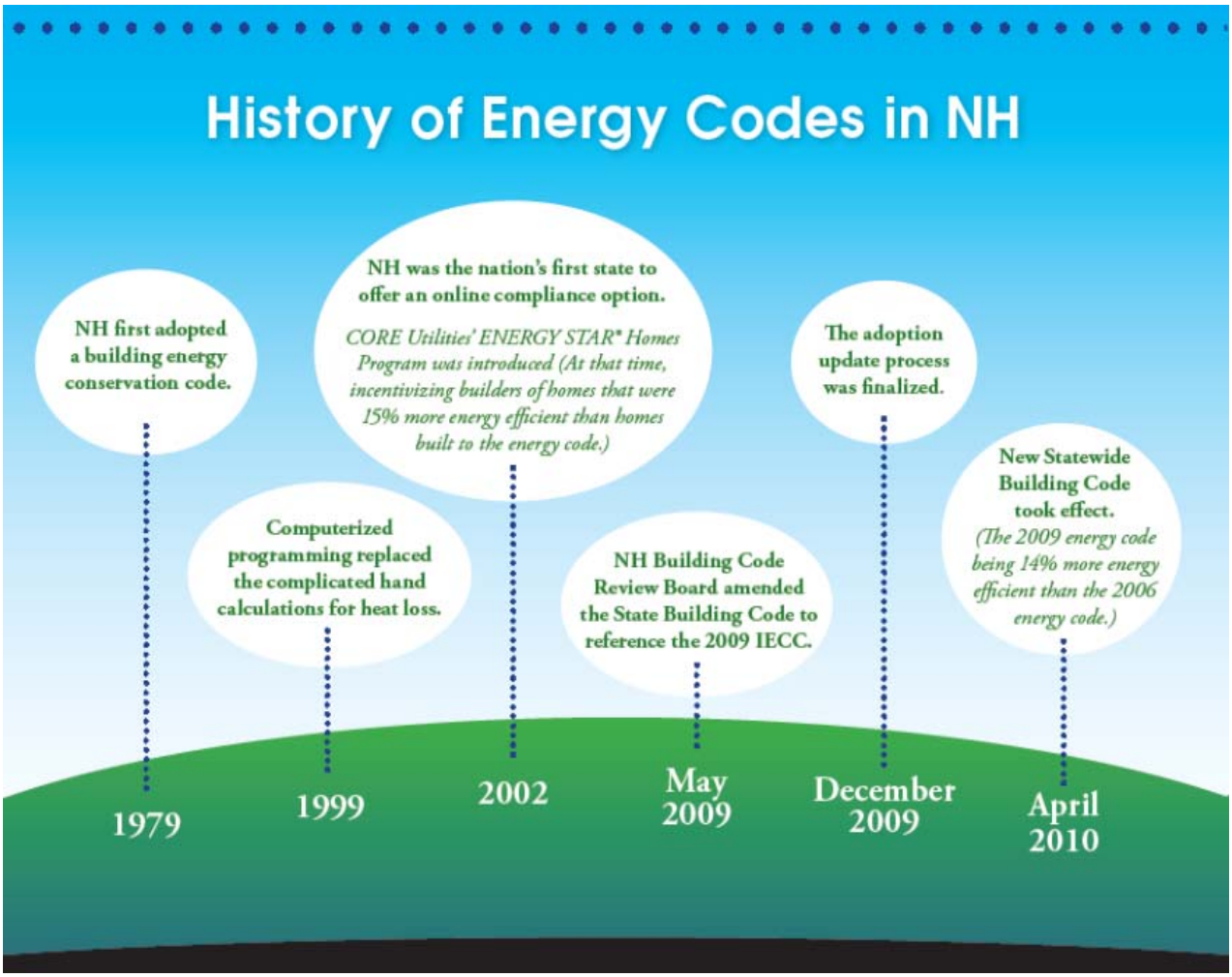
[7] US EIA State Energy Data System - Consumption, Prices and Expenditures through 2007, Released: August 28, 2009. Total CO_2 emissions, across all sectors in the State is approximately 19 million metric tons according to US Global Change Research Program, 2007.

[8] Based on 3,412 BTU/kWh conversion and cost per unit energy calculation factors.

Where We Are and How We Got Here

As shown in Figure 1, NH first adopted a building energy conservation code (energy code) in 1979. In 1999, a computer option replaced the complicated hand calculations for heat loss necessary to demonstrate compliance and in 2002, NH was the nation's first state to offer an online compliance option. In that same year, as one of the state's CORE Utility programs, the NH Utilities introduced an ENERGY STAR® Homes Program, which incentivized builders to construct houses 15% more energy efficient than homes built to the current energy code.[9]

Figure 1. History of Energy Codes in New Hampshire



The NH Building Code Review Board (BCRB) is the entity, legislatively authorized to be responsible for developing and adopting the State Building Code for NH. The BCRB is administratively attached to the NH Department of Safety (DOS) and is composed of 16 design, building, and enforcement professionals. Board members serve 3-year terms and are selected to represent their constituencies by their member organizations. Historically, the BCRB has adopted the new State Building Code every three years (2003, 2006, and most recently 2009) as

[9] NHOEP RFP Administrative Services to Develop a Building Code Compliance Program Relating to the 2009 IECC, 09/15/09, Page 3.

a minimum standard of performance; however there is no automatic review or update process in NH.

In May 2009, the BCRB updated the energy conservation portions of the State Building Code to align with the 2009 IECC for residential construction and ANSI/ASHRAE/IESNA Standard 90.1-2007 for commercial construction. The BCRB finalized the energy code adoption process in December 2009, including proposed NH-specific amendments to double the insulation for circulating hot water systems to R-4, classify commercial structures less than 4,000 square feet and three stories high as subject to the residential code, and grant log homes a window and HVAC tradeoff. The new State Building Code took effect on April 1, 2010.[10]

The Energy Code Challenge

The NH Public Utilities Commission (PUC) has legislatively designated administrative responsibilities for the NH's building energy code for residential, commercial, and industrial buildings. The DOS certifies modular homes and manufactured and mobile homes are certified federally. However, it is up to local jurisdictions and municipal code officials to implement and enforce not only the energy conservation code, but also all other building codes.

Code implementation and enforcement strategies vary quite a bit across the state. Some municipalities have full-time code officials; others have part-time code officials or job share responsibilities across multiple towns. Nearly half of NH's 234 municipalities have no code official at all. In these areas, building contractors self-certify and are required to submit compliance information to the PUC (failure to submit the required documentation is a misdemeanor). Some towns delegate code enforcement responsibilities to the DOS's State Fire Marshal's office or the local fire department.

Even in areas equipped with full- or part-time code officials, inspection offices are often short on funding and understaffed. In a market characterization assessment conducted by GDS as part of the NHBCC Program, many code officials reported that their responsibilities were greater than they could fulfill (refer to Appendix A: New Hampshire Baseline Residential and Commercial Construction Activity and Associated Market Actors Characterization for more information).

Historically, given limited resources, code officials have – understandably – focused efforts on life-safety issues over those of energy conservation. Surveys show that even in areas with high levels of compliance to the life-safety requirements of the building code, the energy conservation components may be ignored. This is evident in high percentages of over-sized heating systems, inadequate duct sealing, and other energy code infractions.[11]

[10] The NH State Building Code, effective 4/1/10, has been amended with adoption of the following documents: International Building Code (IBC), 2009 edition, with amendments; International Plumbing Code (IPC), 2009 edition, with amendments; International Mechanical Code (IMC), 2009 edition, with amendments; International Energy Conservation Code (IECC), 2009 edition, with amendments; International Residential Code (IRC), 2009 edition, with amendments and; National Electrical Code, 2010 edition, with amendments.

[11] NH OEP RFP for Administrative Services to Develop a Building Code Compliance Program Relating to the 2009 IECC, September 15, 2009, Page 3.

NH Energy Code Baseline

Establishing a baseline level of energy code compliance in NH was an important first task of the NHBCC Program. This effort had challenges of its own, including the project's work plan-approved reliance on self-reported responses from a survey of code officials. This method was chosen over a more statistically valid approach to determine the code compliance baseline (e.g. a BECP-pilot tested plans review and physical site inspections, which would have added considerable cost). Results, however, from this project's survey effort were effective in gaining substantial insights into current levels of energy code compliance in the state and associated barriers, resource needs, and existing practices. Information compiled from the survey of code officials provided a solid foundation upon which this comprehensive energy code program and NH-specific roadmap toward achieving 90% compliance with the NH energy code is based.

As described in more detail in Volume 2, Task 1 of this Roadmap report, the survey updated a previous (2006) telephone survey of NH building code officials regarding current compliance activities associated with the NH Building Energy Code. Specifically, the survey focused on the following areas of interest to this project:

- Code officials' levels of involvement with energy code enforcement,
- Code officials' awareness of the new statewide energy code (IECC 2009),
- Identification of additional tools and training opportunities that would be useful, and
- Satisfaction with the energy code related assistance and support being currently provided from the PUC and DOS.

Over 110 code officials responded to the survey (nearly two-thirds of the 173 members of the state's Building Officials Association (NH BOA). Following is a brief summary of the survey's code compliance baseline results:

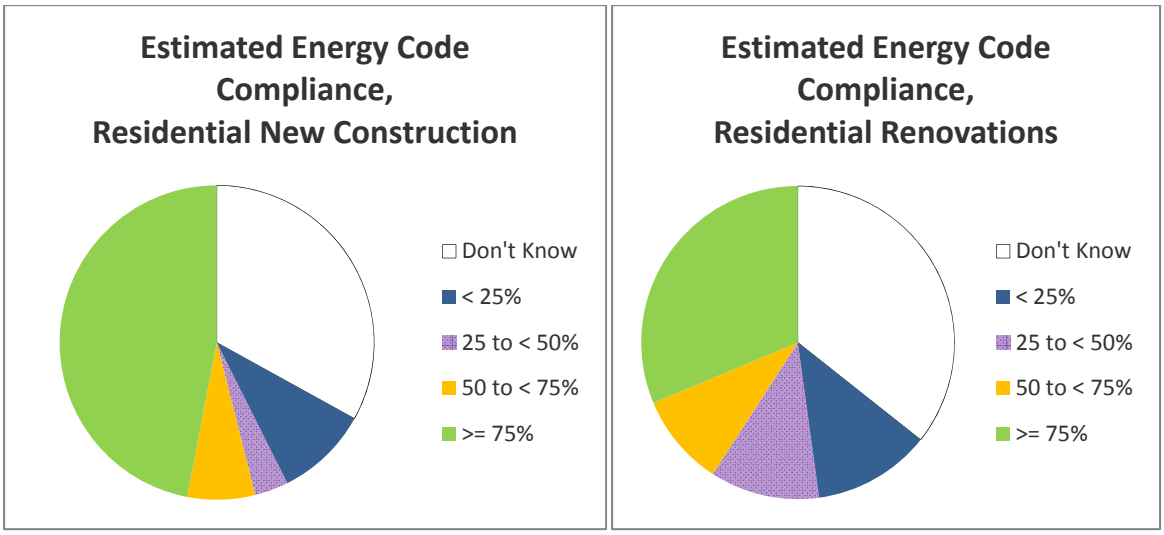
Residential Energy Code Compliance

In order to get an initial assessment of current energy code compliance levels in New Hampshire, code officials were asked to estimate the percentage of buildings within their city/town that were energy code-compliant. For residential new construction activities in the state, as shown in Figure 2, over 46% of officials responded that at least 75% of new homes were energy code-compliant.[12] Another key result of this question is the percentage of code officials who responded that they "didn't know" energy code compliance levels within their city/town. More than one-third of code officials indicated that they did not know the percentage of energy code-compliant homes within their city/town; one official commented that: "I do not have any means of making this determination." This means that, as of the date of the survey (completed in 2010) more than 50% of the responding code officials either do not believe that energy codes are complied with at least 75% of the time, or do not know whether the residential new construction projects in their jurisdictions meet the state's energy code requirements.

[12] There was some confusion among Code Officials regarding the definition of compliance. Though the question was intended to identify energy code compliance among the entire housing stock, some Code Officials' comments indicate that many interpreted the question as pertaining only to homes built since the adoption of the 2009 IECC. The survey results therefore represent a conservative estimate of IECC 2006 compliance but an overestimation of IECC 2009 compliance.

This trend was even more pronounced for renovation projects. Less than one-third of code officials responded that 75% of renovation projects within their city/town were energy code-compliant. Additionally, more than 35% indicated that they "don't know" energy code compliance levels within their city or town. This may be due to the fact that many renovations do not require a building permit or that building permits aren't sought and thus would not trigger a plans review or inspection, making it extremely difficult to estimate compliance levels. It should be noted that many of the same biases identified in the results for new construction should also be taken into consideration when estimating energy code compliance for residential renovations projects. It is important to note that these survey responses are from communities with code officials who responded to the survey. Towns whose code officials did not respond and towns with no code officials are assumed to have very low compliance rates.

Figure 2. Code Officials' Perceptions of Compliance - Residential New/Renovations

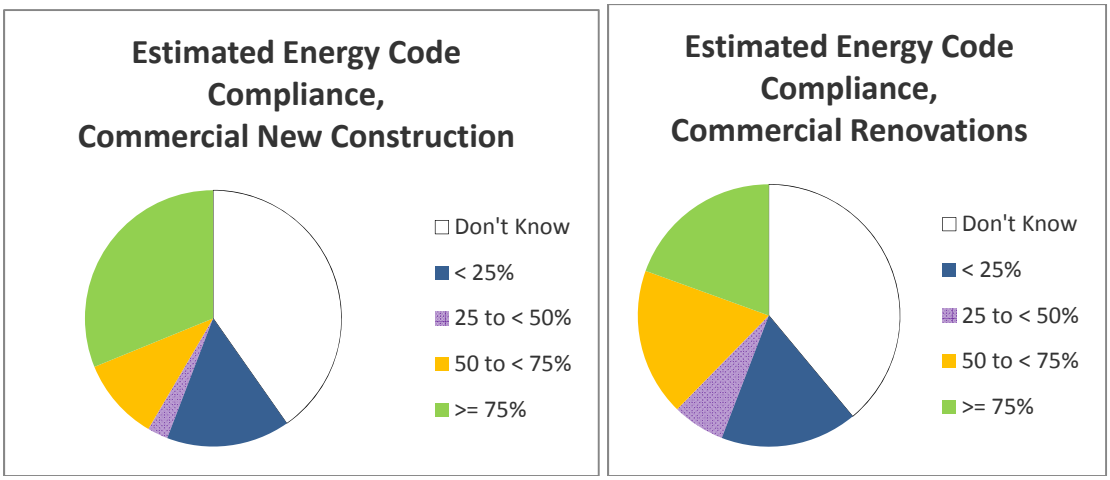


Commercial Energy Code Compliance

In order to better understand commercial, industrial and municipal (C/I/M) energy code compliance in New Hampshire, code officials were asked to also estimate the percentage of non-residential buildings within their city/town that were energy code-compliant. As shown in Figure 3, less than one-third of code officials surveyed responded that 75% or more of newly constructed C/I/M buildings in their cities/towns met energy code standards, and under 20% estimated code compliance for C/I/M renovation projects at 75% or greater.[13] For both new construction and renovation, the greatest portion, over 40%, of respondents indicated that they "didn't know" what percentage of buildings within their jurisdiction were energy code-compliant. As with residential compliance, it is difficult to estimate code compliance, particularly for code officials with shorter tenures as the city/town code official and less experience on which they could base their estimate. One code official remarked: "Very little quantifiable information upon which to form an opinion."

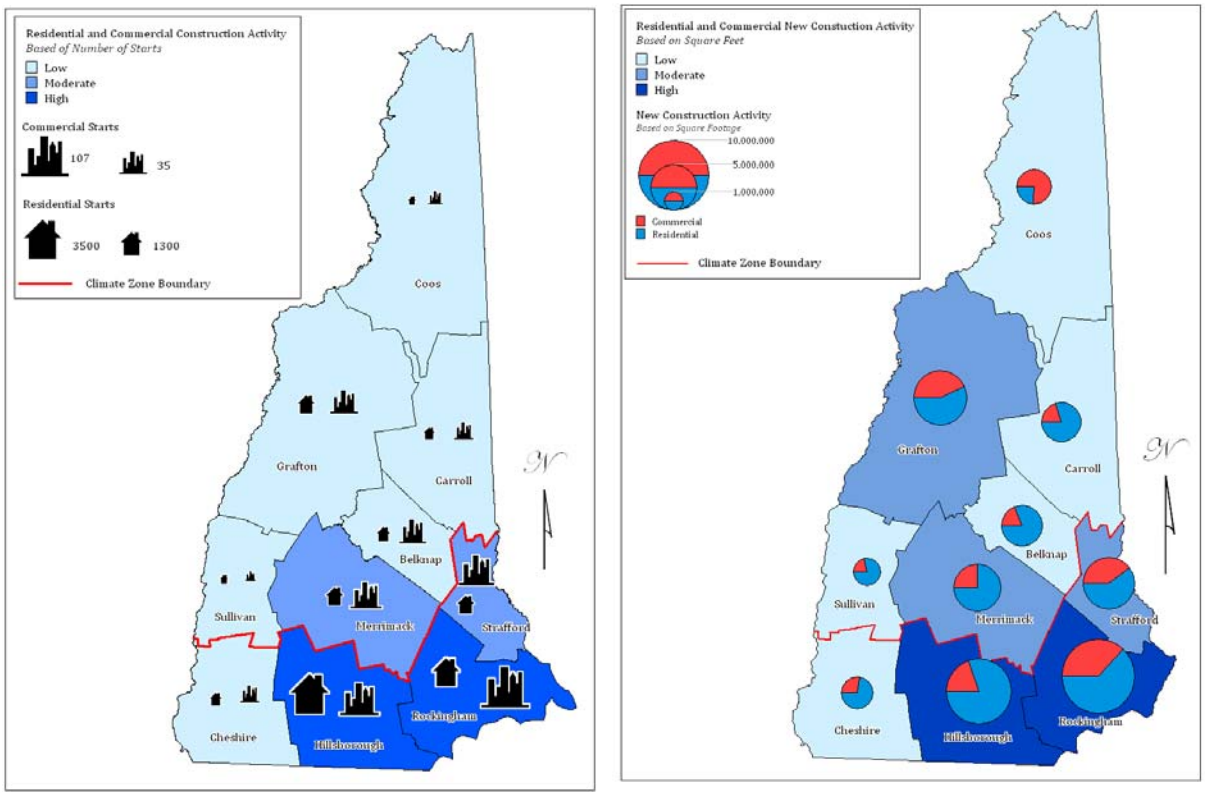
[13] It should be noted, however, that as mentioned in the previous section, a number of code officials interpreted the question as pertaining only to projects since the 2009 IECC went into effect, thus biasing the results.

Figure 3. Code Officials' Perceptions of Compliance - C/I/M Buildings New/Renovations



It is important to keep in mind, as show in Figure 4, residential and commercial activity generally followed a strong geographic trend: the highest levels of construction activity occurred in the more populous southeastern counties, while there were significantly less residential and commercial starts in the northern and western counties. Overall, the counties with the highest levels of residential and commercial construction activity were Hillsborough and Rockingham, while the counties with the lowest activity levels were Coos and Sullivan. (Refer to Volume 2 for more information on energy code compliance and specific NH demographics)

Figure 4. Residential and Commercial Construction Activity – Number of Starts and Square Footage



Summary of Findings and Recommendations

In a well-functioning residential and commercial building energy code climate:

- Policies and policymakers support the code,
- Officials enforce the code,
- Professionals build to the code,
- Real estate professional, lenders and appraisers value building to code, and
- Consumers expect and demand the code at a minimum, and understand the value of building to beyond code levels, and
- Consumers support reinforces the policies and policy makers who also support the code.

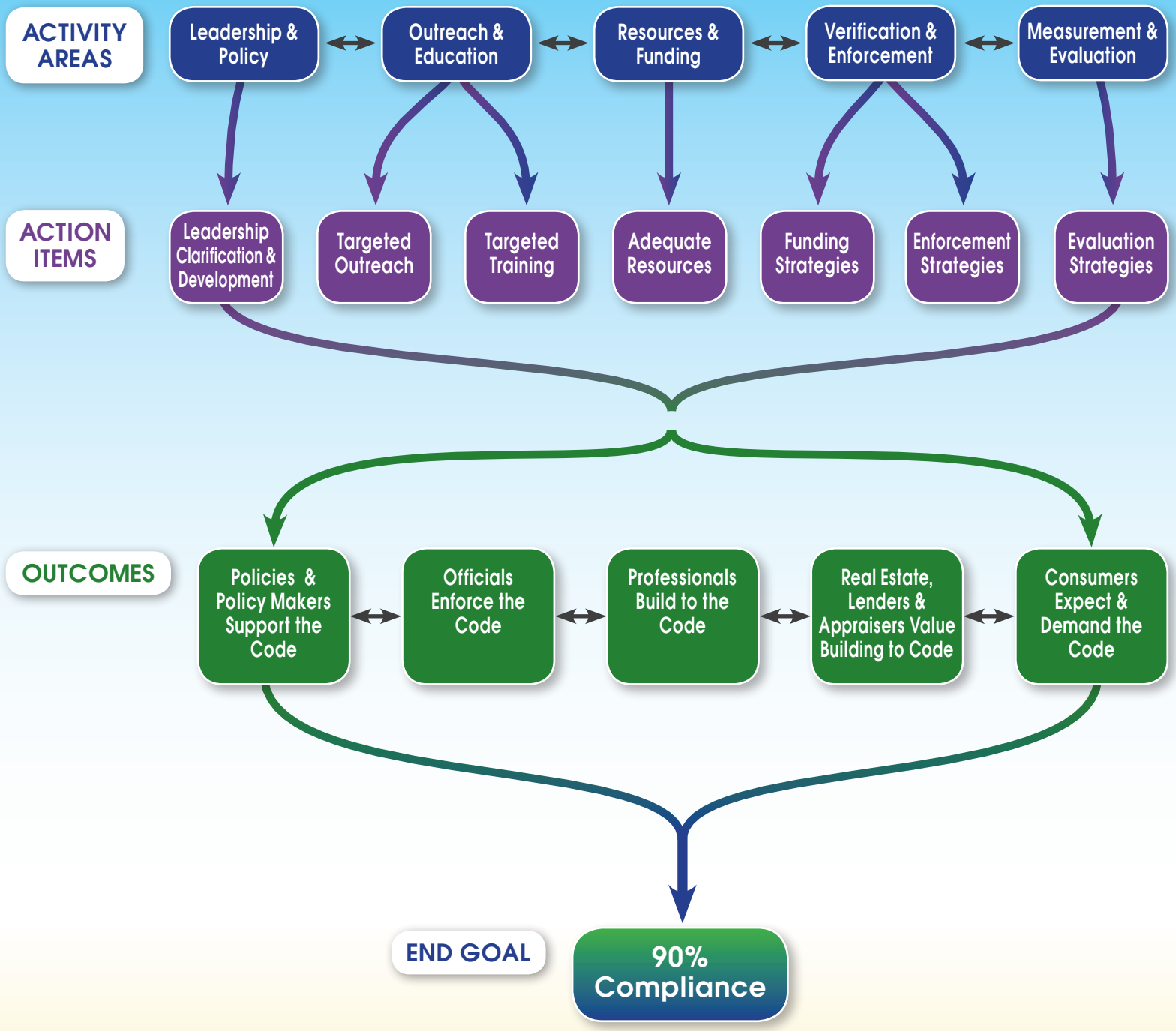
These are just a few of the stakeholders ("market actor" groups) potentially involved with or impacted by energy code activities in the state. Achieving 90% compliance with the NH Energy Code will require leadership, commitment, engagement, buy-in, and resources from all market actor groups. This NH Building Energy Code Compliance Roadmap identifies barriers and recommendations in five overarching "activity areas" outlined in Figure 5 on the next page.

As shown in Figure 5, identifying and overcoming barriers to energy code compliance in NH will help achieve important intermediate outcomes, "points along the way", and will be critical for reaching the end goal of at least 90% compliance with the state energy code by the year 2017. For more details on specific activities, outputs and outcomes, please refer to Appendix B which provides the full NHBCC Program Logic Model Report prepared as component of this project.[14]

Figure 5. New Hampshire's Energy Code Compliance Flow Chart (See Next Page)

[14] See NH Energy Code Compliance PLM, prepared by GDS Associates, dated March 25, 2011. The PLM Report was also used as a basis for *Figure 1. A Dynamic Codes Infrastructure* included in BCAP's New Hampshire Strategic Compliance Plan, dated November 2011, and prepared as part of the U.S. DOE's Compliance Planning Assistance Program.

New Hampshire Energy Code Compliance Flow Chart



It is important to acknowledge that although barriers often *appear* similar across market actor groups, small nuances between groups can dramatically alter the strategies required to overcome them within each group. These five areas (i.e., Leadership and Policy, Outreach and Education, Resources and Funding, Verification and Enforcement, and Measurement and Evaluation) represent the central building blocks for achieving energy code compliance and are described in more detail below.

Leadership and Policy

Leadership from the cross-section of state stakeholders is critical to achieving the 90% energy code compliance goal. Strong leadership and policy initiatives, along with clear delineation of responsibilities and sufficient funding tools and resources will all be needed to effectively communicate and implement a strategic energy code compliance plan. At the writing of this report, legislation is close to officially ratifying the 2009 IECC code. However, legislation alone cannot ensure buildings meet the minimum energy code requirements. The NH Legislature, state agencies, and other key organizations and stakeholder groups need to take leadership roles to clarify responsibilities, enact new policies where needed, educate the public, dedicate and allocate the appropriate resources, and prioritize energy code compliance activities. These state agencies and other key stakeholder groups include the PUC, the DOS (and Fire Marshal's office), BCRB, NH BOA, Home Builders and Remodelers Association (HBRA), and the Energy Efficiency and Sustainable Energy Board (EESE).

Outreach and Education

Outreach and education to all sectors of the NH building market in general (and associated market actor groups) is critical to achieving the 90% energy code compliance goal. Multiple NH market actors will need to be engaged in developing diverse and comprehensive outreach and education strategies and initiatives for each group, including public service campaigns, public service announcements, education material, policy fact sheets, workshops and targeted trainings (i.e., in-field trainings, video trainings, certifications), among other initiatives.

As these initiatives (a number of which have already been developed and tested as part of the NHBCC Program) are conceptualized or further refined, it will be important to recognize and leverage the many existing and complimentary programs and resources already available throughout the state, region, and nationwide. Otherwise, scarce resources will be wasted and opportunities for significant efficiencies lost. For example, the Community College System of NH (CCSNH) already offers building energy efficiency training throughout the state, including: Building Professional Institute (BPI) Building Analyst and Envelope Professional training courses, BPI Air Sealing and Insulation Installer training courses, boot camps and efficiency intensive certification programs, short-term energy efficiency training, energy efficiency professional mentoring support and an efficiency equipment rental program. Similarly, the NH BOA, NH HBRA and other relevant stakeholder groups (AIA, Realtors, Utilities, etc.) regularly offer training programs for their members and customers. Identification and close coordination with these entities and existing offerings will be valuable.

Resources and Funding

Sufficient resources and funding are required to support code compliance efforts at the local jurisdictional level, as well as within each of this report's other identified market actor areas.

Resource needs include staff to conduct plans reviews and code enforcement site inspections, and technical assistants to follow up with contacts, address code-related questions, conduct training and serve as a presence in the marketplace to oversee the energy code. Resources can also encompass inspection tools and equipment, checklists, training materials, and easily accessible websites with links to appropriate energy code resources.

With minimal funding in the past, NH has been able to make some considerable gains in energy code awareness and compliance support.[15] However, to improve compliance rates and work towards achieving 90% compliance by 2017, additional funding will be needed to develop and sustain the necessary resources. Such funding could come from a number of places including existing or increased permit and inspection fees, federal, state and local appropriations or grants, utility program-related system benefit charge or expanded energy efficiency portfolio standard (EEPS) funds, private/public contributions or in-kind services (e.g., from materials and equipment manufacturers or distributors to subsidize training fees) [16], or perhaps from compliance enforcement penalties.

Members of the NHBCC Program's current NH Energy Code Stakeholder Panel, and perhaps additional stakeholders added to an expanded post-project NH Energy Code Compliance Collaborative, would be well positioned as a valuable resource to assist with identifying and procuring the necessary resources and funding from many of the sources noted above. In addition, as discussed in the findings and recommendations section of this report, an expanded Energy Code Collaborative could provide strategic code compliance guidance to state agencies, the Legislature, local jurisdictions, the general public and to other stakeholder groups. For more information on the "whys", roles, and structure of an ongoing NH Energy Code Compliance Collaborative, please refer to BCAP's November 2011 NH Strategic Compliance Plan (the BCAP Plan). As noted in the BCAP Plan, such a NH Energy Code Collaborative could provide an important collective voice on code issues. It could also serve as a shared forum and clearinghouse on code issues. As noted earlier, it could help identify and secure funding for projects, provide targeted outreach, and assist with oversight of other important code compliance implementation activities.[17]

Verification and Enforcement

The building design and construction community in NH represents a diverse group of interests. Many members of this group fully embrace and strive to incorporate high quality construction and equipment specifications that include energy efficiency components into all of their projects, at levels that completely meet and regularly exceed minimum building and energy code requirements. Others may have different motivations, or may implement practices that are of lesser efficiency that may only marginally meet or even fail to meet the state's building energy code.

[15] Please refer to Volume 2 of this report for details regarding NH's past and current efforts in energy code compliance, including baseline assessments, program promotion, outreach and awareness activities, educational workshops, targeted trainings, website and resources development, tools, and recommendations for all market actors.

[16] See BCAP's *NH Strategic Compliance Plan*, November 2011, *Secure Funding* Section, pages 5 through 8.

[17] See BCAP's *NH Strategic Compliance Plan*, November 2011, *Compliance Collaborative* Section, pages 3 and 4.

Only through effective and consistently applied enforcement and verification activities will the state be able to achieve its 90% compliance goal. As importantly, wide-spread awareness and implementation of these activities will be critical if the state's newly constructed and renovated residential and commercial, industrial, and municipal building stock is to provide the energy savings, emission reduction and comfort, health and safety benefits that NH's citizens expect and deserve.

Measurement and Evaluation

How will we know where are, at any point in time on the road? Or, which are the best roads to take and when will we know that we have actually arrived at our desired (90% compliance) destination? The only way to truly answer any of these important questions is through the use of appropriately designed and consistently implemented measurement and evaluation protocols. Using the existing compliance baseline assessments and continuing regular assessments of progress towards the 90% compliance goal will be necessary to ensure that NH is going in the right direction. A clear indication of past, present and ongoing compliance rates (between now and 2017) will be crucial for identifying progress being made. It will also provide valuable insights that will help to inform the need for additional policies or strategy/course adjustments that may be required to keep all relevant market actors on the appropriate highways to success.

NH's Energy Code Compliance Navigation Plan

Leadership, strong policies, stakeholder engagement, state outreach, education, adequate resources and funding, verification and enforcement represent the key building blocks for achieving 90% compliance with the NH energy code. Figure 6 on the next page provides an overarching navigation guide and graphically presents recommended NH-specific "mile markers" to help guide and keep NH on the right roads as it travels towards 90% compliance by 2017.

Figure 6. NH's Energy Code Compliance Navigation Plan (See Next Page)

Navigation Plan

2009 • • • • • • • • • • • • • • • 2012 • 90% compliance by 2017

Leadership & Policy

- Adopt the 2009 IECC ✓
- Work with and support the NH Collaborative
- Take leadership roles
- Enact new policies where needed
- Allocate energy code compliance funding ✓
- Ratify the 2009 IECC codes
- Clarify roles and responsibilities
- Identify potential funding sources
- Establish an energy code compliance program ✓
- Leverage support to sustain outreach activities
- Expand "beyond code" programs
- Educate the public
- Dedicate and allocate resources and funding to track compliance over time (2017 and beyond)

Outreach & Education

- Develop targeted outreach and education for all market actors ✓
- Deploy public service campaign ✓
- Provide specific forums for code officials, builders, contractors, architects, engineers and designers to ask and discuss technical energy code questions/issues
- Adapt online training resources
- Continue the comprehensive outreach and education initiatives (in-field/hands-on training, video trainings, certifications, CEUs, "Ask-the-Expert" blogs)
- Deploy public service announcements ✓
- Continue targeting the "non-traditional" groups, real estate professionals, appraisers, lenders, etc.
- Develop education material, policy fact sheets ✓
- Deploy workshops and targeted training statewide ✓
- Continue to offer free workshops
- Maintain relationships with broader real estate, appraiser and lender market actors
- Leverage training resources from other state, regional and national organizations
- Grow sustained statewide training initiative
- Obtain specific CEUs for workshop ✓
- Leverage training resources from other state, regional and national organizations ✓
- Continue the comprehensive outreach and education initiatives

Resources & Funding

- Allocate funding for a comprehensive energy code compliance program ✓
- Procure/leverage resources (site inspection tools, equipment, checklists, training materials, websites)
- Leverage resources and funding from other regional/national organizations ✓
- NH Collaborative identifies stable funding mechanisms
- Dedicate funding to offer free energy code trainings (for each market actor group)
- Establish long-term energy code funding
- Sustain continued funding
- Partner with other organizations to develop outreach and education materials (checklists, curriculum, website resources, etc.) ✓
- Fund a state wide energy code staff (to conduct plans reviews, code enforcement site inspections, provide technical assistance, follow up with contractors, address code-related questions, conduct trainings and generally oversee the energy code)

Verification & Enforcement

- Survey and analyze current state and county verification and enforcement methods ✓
- Clarify roles and responsibilities for energy code compliance verification and enforcement activities
- Encourage communities to strengthen their code enforcement practices
- Increase awareness and mandated consequences/ penalties associated with non-compliance
- Identify verification and enforcement barriers ✓
- Pilot a comprehensive verification method, including statistically valid plan reviews and an on-site inspection sampling plan
- Identify and develop verification and enforcement recommendations (see Roadmap Volume II) ✓
- Develop roles and responsibilities for enforcement between code officials, municipalities and "third-party" organizations (home energy raters)
- Provide codeenforcement in areas without code officials
- Pilot difference enforcement methods

Measurement & Evaluation

- Identify energy code barriers for each market actor group ✓
- Execute code compliance perception survey ✓
- Pilot compliance evaluation methodology
- Develop a comprehensive, statistically valid compliance evaluation methodology based on consistent regional/ nationally-tested and approved methodologies (model BECP's protocol)
- Develop potential methods for establishing a review process (see NH Roadmap Volume II) ✓
- Conduct final compliance evaluation study within NH
- Identify potential funding sources for conduction more robust M&V activities
- Evaluate survey to inform outreach and training activities, identify gaps and program initiatives ✓

NH Market Actor Introduction

"Market actors" is a term used throughout this report to refer to both formal organizations and informal groups that directly participate in, or can indirectly influence the building market and the energy code landscape in NH. As part of this project, the NHBCC Program developed a list of market actor groups to target in program activities. Though this list is not exhaustive, the NHBCC Program did make efforts to recognize "non-traditional" market groups that may not dominate the energy code discourse, but are nonetheless important players in moving NH forward to achieving its state-wide energy code compliance goals. The specific market actor groups identified and targeted by this project include:

1. Legislative, Policy and Regulatory Stakeholders
2. Code Officials and Building Inspectors
3. Building Professionals - Builders/Contractors
4. Architects, Engineers, and Designers
5. Real Estate Professionals and Appraisers
6. Lenders and Financing Organizations
7. Commercial and Industrial Building Owners and Managers
8. Homeowners, and the General Public
9. Equipment Suppliers, Distributors, Manufacturers and
10. "Hard to Reach" Communities

A quantification of these market actor groups is presented below in Table 2 (listed from largest group to smallest).[18]

Table 2. Quantification of Targeted Market Actor Groups

Category	Climate Zone 5	Climate Zone 6	Total
Residential Builders	1,201	404	**1,814**
Realtors and Appraisers	1,154	419	**1,781**
Architects, Engineers, and Designers	375	136	**600**
Code Officials	120	53	**173**
Lenders and Financing Organizations	136	11	**159**
Commercial and Industrial Builders	43	15	**61**
Equipment Suppliers, Distributors and Manufacturers	43	17	**74**

Specific barriers are identified for each market actor group in the following section. These barriers are loosely organized along a supply-side, mid-market/infrastructure, and demand-side

[18] Non-quantifiable market actors are not listed in the table and include policy, regulatory and infrastructure stakeholders and the general public (however they are discussed in the sections that follow the table).

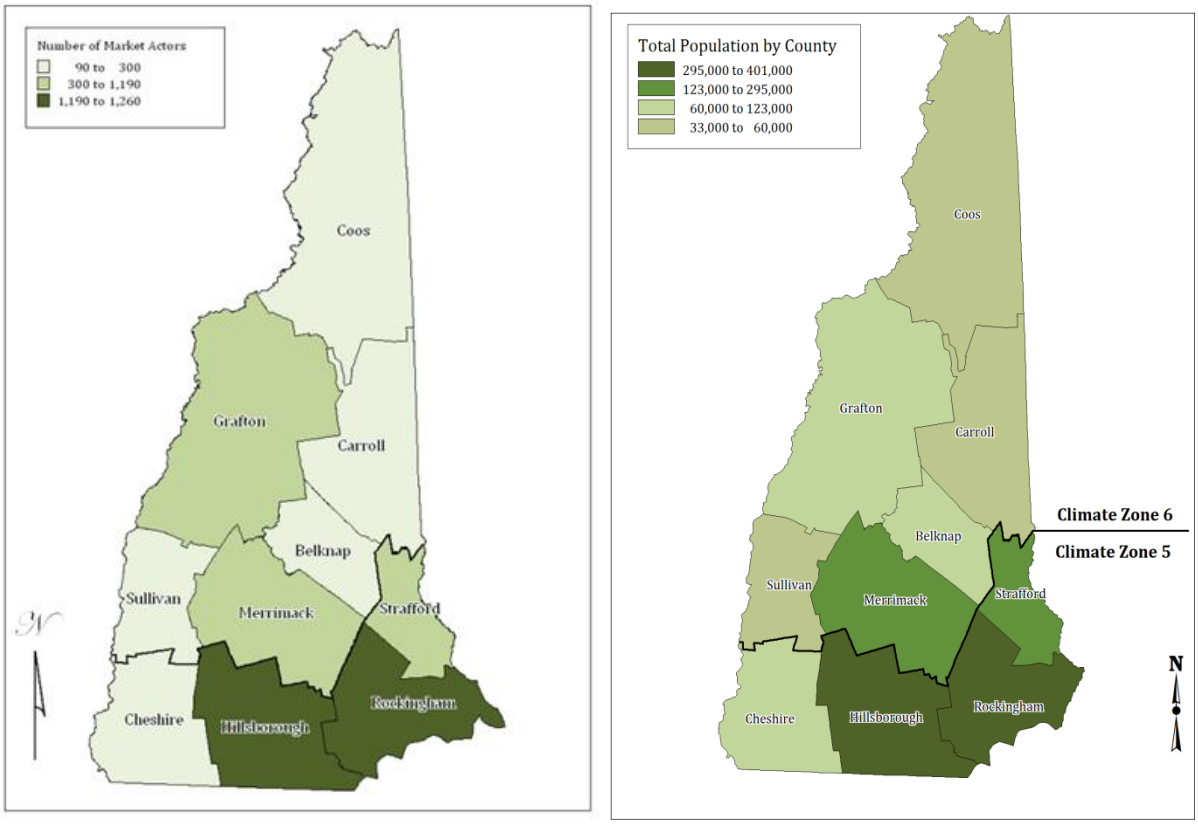
continuum. Supply-side and mid-market/infrastructure barriers include state, municipal, and business practices or policies that deter compliance with energy code requirements. Supply- and mid-market barriers may also indicate an insufficient availability of the appropriate manpower, skills, or equipment necessary for energy code compliance or a lack of commitment to code compliance. Demand-side barriers primarily involve home and building owners, developers, and building operators. It is important to recognize that barriers can differ by geography, demographics, levels of construction activity, etc. and that different recommendations or focus of delivery approach might be needed in different areas.

Given the unique geographic and demographic features of NH, the NHBCC Program recognizes that even within market actor groups there may be regional-specific differences in barriers to energy code compliance. As such, regional differences in population density, construction activity, and code enforcement strategies should be taken into account when designing strategies for state-wide compliance for each market actor group. Figure 7 highlights some of these regional differences in total number of market actors and total population.

As shown through a bold solid line on the maps in this Figure, NH is split into two Climate Zones: Zone 5 and Zone 6. Since climate has a major impact on the energy use of most buildings, the energy code establishes many requirements such as wall and roof insulation R-values, windows and door thermal transmittance requirements (U-factors) as well as mechanical system provisions based upon the building location.[19] Despite a smaller geographical area, NH's Climate Zone 5 (Cheshire, Hillsborough, Rockingham and Strafford Counties) contains a significantly higher number of market actors than NH's Climate Zone 6 (Belknap, Carroll, Coos, Grafton, Merrimack, and Sullivan Counties) in every category presented. The number of NH market actors in each zone mirror population demographics and construction trends: a higher concentration of market actors in the southern part of the state, and a more diffuse concentration in the North Country. It is reassuring to note that the total number of market actors across the entire state is small enough that a concentrated, yet reasonable effort, could effectively reach all stakeholders within the current to 2017 timeframe.

[19] IECC Zone 6 building envelope requirements: Windows Fenestration U-Factor 0.35, Insulation Ceiling R-Value 49, Frame Wall 20 or 13+5, Mass Wall 15/19, Floor 30, Foundation Wall R-Value 15/19, Slab, Depth 10, 4ft. Compared to IECC Zone 5 requirements: Windows Fenestration U-Factor 0.35, Insulation Ceiling R-Value 38, Frame Wall 20 or 13+5, Mass Wall 13/17, Floor 30, Foundation Wall R-Value 10/13, Slab, Depth 10, 2ft.

Figure 7. Total Number of Market Actors and Total Population, by County



Much of NH's construction activity has historically been centered in a few urban areas (Manchester, Nashua, Portsmouth, and Concord).[20] These are also areas that tend to have more resources to support individual city and town building code offices and full-time code officials. Given the higher concentration of resources in these areas, code awareness and compliance levels already may be relatively high. Therefore, strategies in these areas should focus on bolstering the existing code enforcement infrastructure and continuing to support energy code education and outreach. These areas should take advantage of the NH Community College network and leverage other market actor resources for trainings to educate the next cohort of building professionals; in addition to using large-scale media outlets to raise overall public awareness.

On the other hand, the situation in many rural NH areas may be quite different where a limited number of construction projects and the absence of dedicated code officials may result in very low energy code awareness and enforcement. Achieving energy code compliance in rural parts of the state may require the procurement and provision of qualified resources along with focused and sustained public awareness activities that may included an emphasis on grassroots and word-of-mouth strategies. Outreach and education in these areas should focus on the builders, contractors, architects and designers who often find themselves in situations where they must demonstrate code compliance themselves without the support of a code office.

[20] New Hampshire Baseline Residential and Commercial Construction Activity and Associated Market Actors Characterization, prepared by GDS Associates, March 2011. For more information on specific market actor demographics and further baseline information, please see Appendix A.

NH Market Actor Specific Roadmaps – Barriers and Recommendations

The remainder NH Energy Code Compliance Roadmap Report – Volume 1, identifies each of the state's ten most impacted building energy market actor groups and provides individual, market actor-specific roadmaps to achieving at least 90% compliance with the state energy code by the year 2017. Each individual roadmap provides specific, high priority recommendations for overcoming some of the largest barriers impacting each of NH's energy code-relevant market actor groups. Following each roadmap graphic are market actor-specific tables containing more detailed information of the unique barriers, associated recommendations and specific energy code "champions" for each of the ten market actor groups.[21] More details on these recommendations and additional information regarding all activities conducted as part of the NHBCC Program can be found in Volumes 2 of this report.

Specific energy code roadmaps are provided for the following NH market actor groups:

1. Legislative, Policy and Regulatory Stakeholders
2. Code Officials and Building Inspectors
3. Building Professionals - Builders/Contractors
4. Architects, Engineers, and Designers
5. Real Estate Professionals and Appraisers
6. Lenders and Financing Organizations
7. Commercial and Industrial Building Owners and Managers
8. Homeowners, and the General Public
9. Equipment Suppliers, Distributors, Manufacturers and
10. Hard to Reach" Communities

[21] Energy Code Ambassadors or "champions" are those organizations (or individuals) who are identified as playing a critical role in a specific energy code arena. The Ambassadors' work as "mentors" whose presence in the community can add value and momentum to an energy code initiative and effect cultural change within a specific market actor group. These individuals are a valuable asset to influencing stronger code compliance (they could be particularly useful in rural regions of the state). Typically these Ambassadors would be members of the NH Energy Code Collaborative, or a Collaborative appointed designee.

Legislative, Policy, and Regulatory Stakeholders

include organizations that design, implement, and administer policies and procedures associated with energy code compliance. They ensure that policy and regulatory actions are identified and implemented to support the energy code and are responsible for granting the requisite authority to verify and enforce code compliance.

Members of this group include: the General Court, the BCRB, the PUC and DOS (including NH Fire Marshal's Office), the BOA, the HBRA, the EESE Board.

90% Compliance by 2017

Top Energy Code Compliance Barriers

Lack of Resources and Support for Policy Implementation

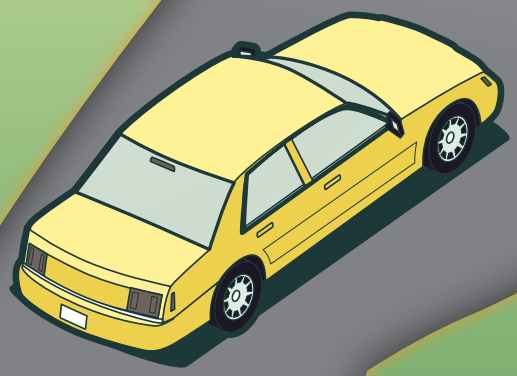
Lack of enabling funding, public resistance to taxes or fees in NH, public resistance to mandates in NH.

Limited Knowledge/Awareness

Lack of clarity within existing policies, misinformation and lack of awareness of existing policies, lack of education and outreach of existing policies.

Lack of Policy Enforcement

Confusion over enforcement roles and responsibilities and lack of resources to enforce and verify code compliance to the full extent granted by the law.



High Priority Recommendations

✔ **Clarify and publish energy code verification** and enforcement roles and responsibilities. (PUC, DOS, OEP, EESE, BCRB)

✔ **Promote targeted public outreach and education** highlighting the high cost to communities of buildings that fail to meet the energy code and that energy codes help protect the largest investment most individuals make. (NH Collaborative with Energy Code Ambassadors)

✔ **Identify critical tools/resources** for energy code compliance and consider alternative funding sources including public/private partnerships and grants, System Benefit Charge (SBC), and other sources. (NH Collaborative)

✔ **Increase awareness** of mandated consequences/penalties associated with non-compliance. (PUC, DOS, BCRB, BOA, OEP)

✔ **Encourage enhanced policy initiatives** including adopting more stringent codes (leverage NH's Local Energy Committees and Regional Planning Commissions) and expand utilization of "beyond code" programs (ENERGY STAR, Build Green NH, LEED, etc). (PUC, DOS, OEP, EESE, BCRB, Public/Private Partnerships)

✔ **By 2013, accomplish a baseline compliance study** based on the DOE's BCEP methodology (PUC, DOS, BCRB, OEP, EESE, BOA)

✔ **CRITICAL: Continue the NH Energy Code Collaborative** to help guide further energy code compliance initiatives in NH.

Legislative, Policy, and Regulatory Stakeholders

This market actor group includes organizations that design, implement, and administer policies and procedures associated with energy code compliance. The General Court, the NH BCRB, the PUC and DOS (including NH Fire Marshal's Office), the NH BOA, the HBRA, the EESE Board, and other organizations are all important stakeholders in the code compliance effort. They ensure that policy and regulatory actions are identified and implemented to support the energy code and are and responsible for granting the requisite authority to verify and enforce code compliance.

Engagement of this market actor group will be a key component in achieving the state's energy code compliance goals. There are a number of barriers to energy code compliance that exist within this market actor group that can be grouped into the following categories:

- Lack of clarity within existing policies,
- Lack of awareness, education and outreach associated with these policies,
- Lack of resources and support for policy implementation,
- Lack of policy enforcement, and
- Need of policy enhancements.

There are numerous subcomponents and issues that fall within these high-level categories, which are identified and explored in more detail in Volumes 2 of this report.

With respect to energy codes, sufficient specific and enabling legislation exists for effective adoption and enforcement of appropriate base codes and potential stretch codes. Sufficient statutes, regulations, policies and guidelines also exist regarding administrative organizational requirements and responsibilities. However, common understanding and implementation of these requirements/responsibilities appears to be lacking within and across key market actor organizations and stakeholder groups. Lack of resources (including funding, staffing and time) and the need to prioritize other responsibilities often impacts abilities and effectiveness of energy code compliance and enforcement activities.

In NH, a partnership between the local jurisdictions, municipal code officials, the PUC's Sustainable Energy Division, and DOS's Fire Marshal's Office is required to effectively implement and enforce the state's legislative and regulation associated with the building energy code. (See Appendix A: New Hampshire Baseline Residential and Commercial Construction Activity and Associated Market Actors Characterization for more information regarding the demographics of code officials and lack of local code officials in northern regions of the state). The local jurisdictions and officials must also enforce all other building codes. Some towns delegate code enforcement responsibilities to the State Fire Marshal's office or the local fire department, and the PUC is responsible for energy code training and rulemaking authority. In this light, targeting specific public policy activities could help to better shape the state's energy

code climate, build real estate markets, and encourage improved energy code compliance while making strong progress towards NH's overarching energy and climate goals.[22]

NH policymakers, including existing statutorily designated state agencies, boards, jurisdictions, and organizations can improve building energy code compliance and enforcement. They can improve compliance and enforcement through development of clear and consistent policies, based on solid underlying regulations and statutes, increased funding, provision of outreach, and education and technical support to municipalities (and other impacted market actors, including regular training offered to local building inspection departments, etc.). To this end, below are some recommended policy options, tailored specifically for NH, that have also been effective as best practices for bolstering energy code compliance in other states.

Key recommendations to address these barriers are presented in Table 3 below. Each recommendation has been prioritized in the table (high, mid or low) and an assessment has been made as to ease of deployment (easy, mid or hard). Finally, for each recommendation an effort has been made to identify potential "champions" that could lead the charge on implementation. One frequent "champion" identified is entitled "Energy Code Ambassadors"[23] – the concept of "Ambassadors" is detailed in BCAP's NH Strategic Compliance Plan (see pages 11 and 12 of that report), and would be identified and drawn from amongst the members of the NH Energy Code Compliance Collaborative discussed earlier. It is important to note that many of these recommended policy options will address the same barriers that exist across multiple market actor groups:

Table 3. Legislative, Policy, and Regulatory Stakeholders – Barriers and Recommendations

Recommendations: Policy Clarification	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
☐ Clarify and publish the roles and responsibilities for energy code verification and enforcement practices between the state and municipalities* – include commitment to statewide measurement and verification of code compliance using appropriate, acceptable and affordable methodologies consistent with best practices nationwide (US DOE supported strategies) and ensure sufficient funding available to track compliance levels over time (between now and 2017, and beyond)	High	Mid	PUC, Lead with Energy Code Collaborative BCRB, DOS
☐ Clarify regulatory, administrative and enforcement roles and responsibilities – stakeholder/collaborative panel meeting topic where each responsible party presents their roles, successes, barriers and wish lists – consider having the PUC open up a generic	**Critical**	Mid	PUC, Lead with Energy Code Collaborative

[22] See *The New Hampshire Climate Action Plan*, dated March 2009, Prepared by the New Hampshire Climate Change Policy Task Force, Thomas S. Burack, Chair, Commissioner, N.H. Department of Environmental Services.

[23] Energy Code Ambassadors or "champions" are those organizations (or individuals) who are identified as playing a critical role in a specific energy code arena. The Ambassadors' work as "mentors" whose presence in the community can add value and momentum to an energy code initiative and effect cultural change within a specific market actor group. These individuals are a valuable asset to influencing stronger code compliance (they could be particularly useful in rural regions of the state). Typically these Ambassadors would be members of the NH Energy Code Collaborative, or a Collaborative appointed designee.

docket/proceeding on the topic, or have the EESE Board take this issue on leading to further recommendations ▪ Where ambiguities may exist, identify and develop collaborative approaches to resolve and solidify areas of responsibility, and develop revised policies or legislation (including amendments to existing statutes, where needed)			BCRB, DOS
Recommendations: Policy Education, Outreach and Awareness	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
☐ Communicate and clarify NH's energy code requirements, goals and targets (including state government's roles and goals within their own buildings), associated benefits, and current baselines of compliance	High	Easy	PUC, Lead with Energy Code Collaborative BCRB, DOS, Energy Code Ambassadors
☐ Develop concise summaries and press pieces, targeting various market actors/sectors, presentations, speaker/ambassador circuit	Mid	Mid	PUC, Lead with Energy Code Collaborative BCRB, DOS, Ambassadors
☐ Provide simple, single source location for access to information, resources, etc. (www.nhenergycode.com – under ownership or maintenance by PUC, DOS, BCRB, BOA or OEP)	High	Easy	PUC, DOS, BCRB, BOS, OEP
☐ Dedicate funding to offer free energy code training for code officials and design/construction professionals*	High	Mid	PUC, Lead with Energy Code Collaborative, Utilities, Public/Private Partnerships
Recommendations: Policy Implementation Resources and Support:	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
☐ Review "fee" provisions, assess funding and resource needs (local, state agencies, etc.) and assess administrative/implementation consistency between jurisdictions and within/across agencies regarding development, assignment and enforcement of fees	Mid	Mid	PUC, Lead with Energy Code Collaborative BCRB, DOS, Ambassadors
☐ Identify and consider alternative funding sources including public/private partnerships, grants, etc.	**Critical**	Mid	PUC, Lead with Energy Code Collaborative BCRB, DOS, Ambassadors Utilities, Private Public Partnerships

☐ Enable and encourage energy code compliance activities to be funded under the System Benefits Charge*	Mid	Hard	PUC, Lead with Energy Code Collaborative BCRB, DOS, Energy Code Ambassadors Utilities
☐ Identify current resources and tools being used and assess their associated availabilities – develop policies and approaches for securing additional tools and resources to better meet needs so the PUC can fulfill its administrative and implementation responsibilities (including training), so state can achieve its State-owned building efficiency goals, and so DOS can effectively perform its administrative and implementation roles (including providing local jurisdictions without code officials and State-owned buildings) with the resources needed to meet their responsibilities	High	Mid	PUC, Lead with Energy Code Collaborative BCRB, DOS, Energy Code Ambassadors Utilities
☐ Identify opportunities for coordination, minimizing duplication of efforts, improving administrative and enforcement efficiency – leverage and expand existing programs based on focus for achieving common goals (not the least of which is achievement of 90% compliance by 2017). Where gaps exist, or are identified, develop collaborative strategies to fill them	High	Easy	PUC, Lead with Energy Code Collaborative BCRB, DOS, Energy Code Ambassadors
☐ Provide code officials and inspection departments with the training, tools, DOE materials, and other resources to improve energy code enforcement (post ARRA-funded initiatives). ▪ Maintain and expand the training and infrastructure development progress gained through AARA-funded initiatives to achieve code compliance, perhaps through permit or development fees,* or through encouragement of partnerships between the state, trade associations, utilities, and contractors to result in ongoing and periodic outreach, education, and training for code officials and contractors.	High	Mid	PUC, Lead with Energy Code Collaborative BCRB, DOS, Energy Code Ambassadors
☐ Dedicate funding to support 2 state-employed "roving code officials" to support understaffed and/or rural regions*	Mid	Mid	PUC, Lead with Energy Code Collaborative BCRB, DOS, OEP, Energy Code Ambassadors
☐ Dedicate a state-level representative to participate in the Energy Code Collaborative, pursue funding opportunities, maintain energy codes website, and coordinate compliance evaluation program*	High	Easy	OEP, PUC, DOS, BCRB, Energy Code Collaborative
☐ Ensure compliance with NH's High Performance Building Code for State Buildings (RSA 155-A:13 and Executive Order 2011-1, Item 8)*	Mid	Mid	PUC, DOS, BCRB, BOA, Towns, Energy Code Ambassadors

☐ Coordinate with and leverage expertise and resources potentially available through the PUC and NH Utilities when developing and implementing a prioritized evaluation plan[24]	High	Mid	PUC, DOS, BCRB, BOA, NH Utilities
Recommendations: Policy Enforcement	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
☐ Provide code enforcement in unincorporated areas and jurisdictions*	Mid	Hard	PUC, DOS, BCRB
☐ Increase awareness of mandated consequences/penalties associated with non-compliance – possibly pursue and enforce a test case	High	Easy	PUC, DOS, OEP, BCRB, BOA
Recommendations: Policy Enhancement	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
☐ Encourage municipalities to adopt more stringent codes than the state – highlight existing legislation and process for such adoptions (Town of Durham, NH provides an excellent example). Consider developing additional enabling legislation to encourage a higher standard statewide, i.e. optional stretch codes, or above codes options* ▪ Leverage the momentum of NH's more than 100 Local Energy Committees, along with other town government leadership and the Regional Planning Commissions to encourage adoption of "stretch" codes in other communities	Mid	Mid	Legislature, Energy Code Collaborative, Energy Code Ambassadors
☐ Develop policies or programs to encourage expanded utilization of "beyond code" programs including: ENERGY STAR, Build Green NH, Leadership in Energy and Environmental Design (LEED), the National Association of Home Builders' National Green Building Standard, Passive House, ICC's upcoming International Green Construction Code, etc.*	Mid	Mid	Legislature, Energy Code Collaborative, Energy Code Ambassadors

[24] The PUC and NH Utilities already have extensive experience assessing progress and measuring the energy savings associated with the state's CORE Energy Efficiency programs funded through NH's System Benefits Charge (SBC). As a requirement of each CORE Energy Efficiency program funded through the SBC, 5% of programmatic funds are dedicated for evaluation of program activities and M&V of resultant energy savings. Developing and implementing M&V protocols to assess the effectiveness of NH's statewide code compliance activities could fall under the jurisdiction of the PUC and be supported through SBC-funded evaluation activities. If limited evaluation funds are available, NH could focus pilot testing the BECP code compliance verification methodology, by completing building assessments in just one, or a few counties within one construction sector (e.g., residential new construction in Hillsborough County).

☐ Use building energy labeling as a means for increasing energy efficiency of existing buildings* ▪ Leverage NH's participation in the national Home Energy Score pilot program and use the experience gained from the pilot program to continue and expand effective building labeling activities across the state*	Mid	Mid	Legislature, Energy Code Collaborative, Energy Code Ambassadors
☐ Develop minimum licensure requirements, including continuing education units (CEUs), for state- and municipally-employed code officials, including consideration of revenue sources to support such inspector certification program and local enforcement*	Mid	Hard	Legislature, Energy Code Collaborative, Energy Code Ambassadors
☐ Develop minimum licensure requirements, including CEUs, for New Hampshire contractors* ☐ Develop minimum licensure requirements for certified "third-party" code inspectors*	Mid	Hard	Legislature, Energy Code Collaborative, Energy Code Ambassadors

* Included in BCAP Gap Analysis & Roadmap documents, VEIC SB323 Report, and/or NH Climate Action Plan

End goal: NH legislature, policy, and regulatory stakeholders support the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Code Officials and Building Inspectors

Code officials and building inspectors are the primary drivers of energy code compliance in homes and commercial buildings, which often represent the largest investment for families or business owners. Code officials conduct code-required plans analyses and on-site inspections to verify that construction proceeds in accordance with all component requirements of the building code. Code officials and building inspectors act as key liaisons between a number of important market actor groups including: policy makers, regulatory and enforcement agencies, builders, and the general public.

90% Compliance by 2017

Top Energy Code Compliance Barriers

Insufficient Funding

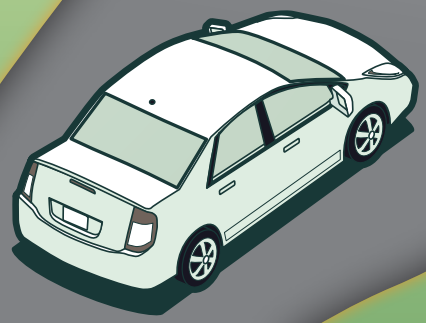
No budget or limited budget for a dedicated code official; Limited staffing capacity; Limited time inspection/enforcement responsibilities

Lack of Resource and Training

Lack time to attend trainings; Lack of resources - code books, checklists, testing equipment, blower doors, duct blasters, IR cameras; Need for advanced in-field training

Competing Priorities

Less attention and lower priority than the higher-priority life-healthy-safety code issues; Competing priorities and other code official responsibilities



High Priority Recommendations

✔ **Work with jurisdictions** to create realistic and customizable budgets to expand their energy code enforcement departments. (NH Energy Code Collaborative and Ambassadors)

✔ **Promote public awareness campaigns** and highlight that code officials ensure standards and safety of most individuals' biggest financial investment. (PUC, DOS, BOA, Energy Code Ambassadors)

✔ **Provide free trainings, resources and tools** (code books, checklists, blower doors, etc.) including in-field workshops and on-line videos, providing a forum for code officials to ask and discuss technical energy code questions. (PUC, Utilities, CCSNH, BOA, BCRB, ICC, ASHRAE, DOE)

✔ **CRITICAL: Continue the NH Energy Code Collaborative** to help guide consensus on roles and responsibilities for code officials and third parties.

Code Officials and Building Inspectors

Code officials and building inspectors are the primary drivers of energy code compliance in homes and commercial buildings, which often represent the largest investment for families or business owners. Code officials conduct code-required plans analyses and on-site inspections to verify that construction proceed in accordance with all component requirements of the building code. Code officials and building inspectors also act as key liaisons between a number of important market actor groups, including policy makers, regulatory and enforcement agencies, builders, and the general public.

Engagement of this market actor group, and facilitation of their duties, will be a key component of achieving compliance with energy code requirements. As shown in by associated recommendations.

Table 4, there are a number of barriers to energy code compliance that exist within this market actor group and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into the following categories:

- Resource limitations (funding, staff, time, tools, etc.),
- Limited knowledge and awareness (general awareness, detailed training/skills),
- Behavioral situations (reliance on past practices),
- Regulatory/policy conflicts or uncertainty (conflicting priorities),
- General public sentiment,
- Lack of code compliance measurement and data tracking (report cards from which to assess status and need for change/improvement), and
- Lack of industry consensus (job description, responsibilities, methods, enforcement policies, structure, 3rd parties, etc.).

For this Table, and all subsequent tables, specific barriers for the market actor group are identified and immediately followed by associated recommendations.

Table 4. NH Code Officials and Building Inspectors – Barriers and Recommendations

Barrier	**Specifics**	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
Insufficient funding	No budget or limited budget for a dedicated code official in many jurisdictions			
Recommendations:				
☐ Reach out to jurisdictions to develop code enforcement plans		High	Hard	NHBOA, PUC, DOS
☐ Work with jurisdictions to create realistic and customizable budgets		High	Hard	NHBOA, PUC, DOS, OEP
☐ Develop community support of energy code benefits, raising the visibility and priority of energy codes when funds are distributed		High	Mid	Energy Code Ambassadors

✔ NHBCC Program recommends leveraging support and expertise from regional, national, and federal organizations and continuing the outreach and education efforts of the program, including the energy codes workshops, www.nhenergycode.com website resources, public service announcements, "Ask-the-Expert" blog, on-line training videos, etc.	High	Easy	Energy Code Ambassadors, Leveraging off other resources including ICC, BCAP, CU, PSA, etc.
Lack of staffing capacity	Many NH jurisdictions lack code officials; Some code officials are part-time and/or have overburdened workloads; Code officials have limited time for on-site inspections, plans reviews, and in-depth energy code trainings; One-on-one question and support needed		
Lower priority	Energy code receives less attention and a lower priority than the life-health-safety code; Code officials have many other responsibilities beside energy code enforcement		
Recommendations:			
☐ Continue to engage in outreach and education about the benefits of energy code	High	Easy	Energy Code Ambassadors
☐ Work with local jurisdictions to initiate or expand their code enforcement departments	Mid	Hard	NHBOA, PUC, DOS,
☐ Encourage code official job-sharing amongst local communities	Mid	Hard	NHBOA, PUC, DOS
☐ Ensure that energy code education is included in the training of the next generation of code officials through community colleges and grass roots groups	High	Mid	CCSNH, PUC, NHBOA, HBRA, DOS
✔ The BOA has developed a manual to assist communities in starting and maintaining a building department as well as a mentorship program to help in this process. The mentorship program connects communities with a building official who is experienced in code enforcement	High	Easy	NHBOA
Lack of training	Code officials lack the time and/or budget to attend trainings; Code officials are unaware that training is available; Officials ignore training and/or feel threatened by their ignorance of the energy code requirements		
Need for advanced training	Lack of on-site/in-field and in-depth training and online training, such as targeted, in-field, hands-on training for code officials		
Limited availability of tools and resources	Lack of computer-based or online inspection documents; Limited availability of code books and checklists; Limited availability of expensive testing equipment (e.g. blower doors, duct blasters, IR camera and other resources)		
Lack of awareness of e-code requirements	Sentiment – "this is the way we have always done it"		
Recommendations:			
☐ Reach out to code enforcement departments and local jurisdictions to initiate and sustain energy code dialogue	High	Easy	NHBOA, PUC, DOS,
☐ Increase visibility of training programs	High	Easy	NHBOA, PUC, DOS,CCSNH, Ambassadors

☐ Develop and promote classes for a new generation of code officials via local community colleges and other energy code groups	High	Mid	CCSNH, NHBOA, PUC, DOS, HBRA, AIA, BCRB
☐ Encourage participation in a role-modeling program	Mid	Mid	NHBOA, PUC, DOS, Ambassadors
☐ Provide free training - including local, in-person training, online training and videos	High	Mid	ICC, ASHRAE, Utilities, PUC, NHBOA, DOS, Manufacturers, Distributors (CCSNH as venue)
☐ Expand advanced training programs - including in-the-field, technical trainings (leveraging the CCSNH's workforce training)	High	Mid	ICC, ASHRAE, Utilities, PUC, NHBOA, DOS, CCSNH
☐ Make code books or field guides available for free download	High	Mid	OEP, ICC, ASHRAE, DOE
☐ Develop graphics-heavy guide and cheat sheets (checklists) addressing the most critical energy code issues	High	Mid	BCRB, PUC, DOS, NEEP, Responsible Energy Code Alliance
☐ Provide forum for code officials to ask and discuss technical energy code questions	**Critical**	Mid	PUC, NHBOA, ICC, ASHRAE, DOE
☐ Initiate and support a tool rental program or tool-share plan between communities	Mid	Hard	Municipalities, NHBOA, OEP, PUC, HBRA
✔ NHBCC Program recommends leveraging and continuing the outreach and education, free e-codes workshops, email campaigns, in-the-field training, website and on-line training videos, distribution of the NH Field Guide, code official e-code checklists, Ask-the-Expert blog and other resources posted on the NH Energy Code website	High	Easy	OEP, PUC, NHBOA, BCRB
Lack of certifications	Code officials know the basics of the job description but there is little expectation to strive for deeper understanding of the energy code; No energy code certification or credentialing process for code officials		
Recommendations:			
☐ Promote certification and phase in certification requirements	Mid	Hard	PUC, DOS, Legislation, JC, Joint Board of Licensure
☐ Encourage exposure to energy code materials and resources (to reduce intimidation level of the energy code)	High	Easy	NHBOA, PUC, DOS,Ambassadors

☐ Promote practice exam events (even if code officials are not ICC members)	Low	Hard	ICC, PUC, DOS, NHBOA
✔ NHBCC Program recommends incorporating practice certification material into the existing free energy code workshops and updated the NH website to include these resources for code officials	Mid	Easy	ICC, PUC, DOS, NHBOA

Lack of community support and respect	Assumption that energy code issues have little consequence and/or impact; Code officials must balance community relations with responsible code enforcement (i.e. too strict code enforcement may anger community but too relaxed enforcement will result in poor building performance and eventually job termination), although potential exists for law-suits in non-compliance buildings
Lack of public outreach	Lack of role modeling; Lack of educational material and guidance (checklists, pamphlets, internet/websites, presentations, newsletters, etc.); Existing disconnect between expectation and actual building performance

Recommendations:

☐ Promote consistent expectations for energy code compliance and enforcement among code officials, builders, local jurisdictions, other market actors, and general public	High	Mid	PUC, DOS, NHBOA, BCRB
☐ Counteract negative or misleading language and information vacuum with outreach and education	High	Easy	NHBOA, PUC, DOS, Energy Code Ambassadors
☐ Promote public awareness campaigns and highlight that code officials ensure standards and safety of most individuals' biggest financial investment	**Critical**	Easy	NHBOA, PUC, DOS, Energy Code Ambassadors
☐ Increase outreach and education, focusing on the benefits of the energy code to the public/community	High	Easy	NHBOA, PUC, DOS, Energy Code Ambassadors, Leverage where practical.
☐ Avoid using technical code language in outreach efforts	High	Easy	NHBOA, PUC, DOS, Energy Code Ambassadors, Leveraging
✔ NHBCC Program recommends developing consensus among code officials and continuing the programs public awareness campaign and public service announcement efforts, highlighting the $1 to $6 investment to benefit ratio of code enforcement	High	Mid	PUC, DOS, NHBOA, BCRB

Lack of inspection and enforcement	Other competing and higher-priority code issues (life-health-safety); Perception that code inspection/enforcement represents government over-reach; Perception that inspections add costs to projects
Uncertainty regarding need for inspection/enforcement	Uncertainty in inspection and/or enforcement protocol in circumstances where permits are not taken out

Confusion about independent third parties (enforcement)	Energy code enforcement is a young market; Confusion over responsibilities of third parties and/or code officials enforcement roles (third parties include independent energy raters, green verifiers or individuals certified to inspect and provide verification and performance testing for buildings); Uncertainty over costs and appropriate certification processes for third parties			
Recommendations:				
☐ Develop a consensus on a job description/responsibility structure for code officials (and third parties)		High	Hard	PUC, DOS, NHBOA, BCRB
☐ Increase outreach and education, focusing on the benefits of the energy code to the public/community		High	Mid	NHBOA, PUC, DOS, Energy Code Ambassadors (Spokespeople from each of the impacted stakeholder groups) Leveraging off other resources including ICC, BCAP, CU, PSA, etc.
☐ Promote relationship building and energy code exposure, events, trainings, and job shadowing opportunities to code officials and other potential third parties		Mid	Mid	NHBOA, PUC, DOS, Energy Code Ambassadors (Spokespeople from each of the impacted stakeholder groups)
✔ NHBCC Program recommends continuing the NH Energy Code Stakeholder Panel to help guide consensus and roles and responsibilities for code officials and third parties		**Critical**	Easy	NHBOA, PUC, DOS, Energy Code Ambassadors (Spokespeople from each of the impacted stakeholder groups) Leveraging off other resources including BCAP, etc
Lack of substantiating data from designers/builders	Limited understanding of energy code compliance methods; Confusion amongst designers/builders as to what information is needed to demonstrate compliance			

Recommendations:			
☐ Increase outreach and education and promote relationship building between code officials, third parties, designers, and builders	High	Mid	NHBOA, PUC, DOS, Energy Code Ambassadors (Spokespeople from each of the impacted stakeholder groups)
☐ Promote American Institute of Architects (AIA) continuing education units (CEUs) for energy code	Mid	Mid	PUC, AIA
✔ NHBCC Program recommends leveraging and expanding the existing free energy code workshops to include targeted training on compliance methods, including informational guides, checklists, online trainings and informational videos	High	Easy	NHBOA, PUC, DOS, Utilities, Energy Code Ambassadors (Spokespeople from each of the impacted stakeholder groups)

End goal: code officials and building inspectors enforce the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Builders and Contractors

Commercial and industrial builders and contractors are responsible for the construction and renovation of the largest and most energy-intensive buildings in the state: e.g. hospitals, retail stores, and schools. Residential builders and contractors build and renovate new homes, which represent 67% of the total square footage constructed in NH and often represent the largest investment for an American family. Given that many NH towns lack a dedicated energy code official, they are often responsible for understanding the building code and documenting compliance themselves. Thus, it is essential that builders and contractors fully understand the requirements of the energy code, and use building techniques and technologies that result in high-performance energy code-compliant buildings.

90% Compliance by 2017

Top Energy Code Compliance Barriers

Limited Knowledge/Awareness

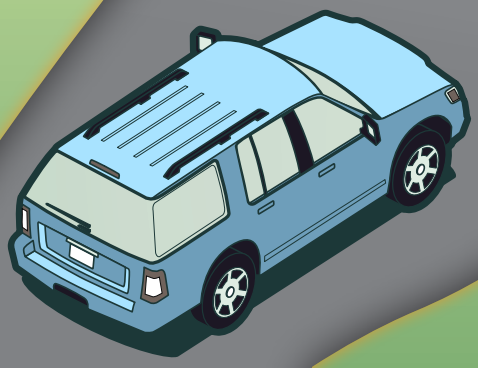
Lack of information regarding proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of building to meet or exceed energy code; Lack of awareness when codes are updated and how to verify compliance

Lack of Resource and Training

Lack of resources, material, and tools; Limited availability of code books, checklists, and testing equipment (blower door, duct blaster, etc.); Lack of targeted or advanced/ technical trainings and CEU requirements

General Sentiment

Customer driven (aesthetics, floor plan, customer choices take priority); General sentiment/ attitude "this is the way we have always done it"; Resistant to change/"added requirements"; Reliant on past practices; Assume their current building practices are correct/adequate



High Priority Recommendations

✔ **CRITICAL: Provide free trainings, resources and tools** (code books, checklists, blower doors, etc.) including in-field/hands-on workshops and on-line videos, providing a forum for builders and contractors to ask and discuss technical energy code questions. (PUC, Utilities, CCSNH, HBRA, BCRB, BOA, ICC, ASHRAE, DOE)

✔ **Promote targeted public outreach** and education highlighting the high cost to communities of buildings that fail to meet the energy code and that energy codes help protect the largest investment most individuals make. (NH Energy Code Collaborative with Energy Code Ambassadors)

✔ **Increase publicity** when building codes are updated. (BCRB, PUC, NH Energy Code Collaborative, Energy Code Ambassadors)

✔ **Develop and promote training** for the new generation of builders and contractors, offer workforce development training and CEUs through the CCSNH. (CCSNH, PUC, DOS, HBRA)

Builders and Contractors

Commercial and industrial builders and contractors are responsible for the construction and renovation of the largest and most energy-intensive buildings in the state: e.g. hospitals, retail stores, and schools. Residential builders and contractors build and renovate new homes, which represent 67% of the total square footage constructed in NH and often represent the largest investment for an American family.[25]

Builders and contractors are crucial market actors who must be engaged in order to achieve the state's energy code compliance goals. Given that many NH towns lack a dedicated energy code official, they are often responsible for understanding the building code and documenting compliance themselves. Thus, it is essential that builders and contractors fully understand the requirements of the energy code, and use building techniques and technologies that result in high-performance energy code-compliant buildings.

As shown in Table 5, there are a number of barriers to energy code compliance that exist within this market actor group and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into a number of categories including:

- Resource limitations (competing capital, limited tools, resources, CEUs, etc),
- Limited knowledge and awareness (general awareness, detailed training/skills),
- Behavioral situations (reliance on past practices, resistance to change, new technologies),
- General public sentiment,
- Friction (code officials and other trades),
- Claim that consumers are not asking for energy codes,
- Argument for voluntary compliance, not mandated compliance,
- Claim that their energy efficiency work is not valued by appraisal, lending, insurance or real-estate market actors.

Table 5. NH Builders and Contractors – Barriers and Recommendations

Barriers	Specifics	Priority (Low, Mid, High)	Deploy (Easy, Mid, Hard)	Champion (Leader?)
Driven by customer demand	Aesthetics, floor plan, and other physical elements often take priority over energy code related requirements;			
Lack of understanding and curiosity about the value of energy code	Members of this group may lack the motivation to understand energy code requirements; Many energy efficient measures are "invisible" (insulation in walls, higher efficiency of boilers, lower u-factor of windows, etc); Not a lot of visibility or 'call' for energy code features			

[25] GDS Associates, Inc. *New Hampshire Baseline Residential and Commercial Construction Activity and Associated Market Actors Characterization.* March 2011

Resistant to change and resistive attitudes	Members of this group may be resistant to change - "This is the way we have always done it" attitude; Sensitive – builder pride based on craftsmanship, quality and experience, however energy performance varies within even "high-quality" builders; Some builders and contractors may wish to avoid calling attention to themselves and the shortcuts they may or may not know they are making; Builders and contractors may assume that their current building practices are correct or adequate; Members of this group may be resistant or defensive to corrections or suggestions to their building practices		
Lack of awareness when codes are updated	No industry-wide notification method; Not a lot of visibility of energy codes or 'call' for energy code upgrades; Energy code issues are off the radar of many builders and contractors		
Recommendations:			
☐ Increase education and outreach focusing on the benefits of code-compliant buildings, the technical requirements of building to energy code, and compliance methods	High	Easy	PUC, DOS, Utilities, HBRA, BCRB,CCSNH - Leveraging off other resources including ICC, BCAP, CU, PSAs
☐ Improve the visibility of code cycle changes	High	Easy	PUC, DOS, BCRB, HBRA, Regional/National Organizations
☐ Increase publicity about code updates and the implications for each market actor	High	Easy	Energy Code Ambassadors
☐ Increase visibility of training programs	High	Easy	PUC, DOS, Utilities, HBRA, BCRB, CCSNH
☐ Offer workforce development training (capture the youth and retrain individuals entering the field - introduce what is important and why) through the Community College System of NH (CCSNH)	High	Easy	CCSNH, PUC, DOS, HBRA
☐ Develop and promote classes for a new generation of builders and contractors	High	Mid	Energy Code Ambassadors
✔ NHBCC Program recommends leveraging and continuing the outreach, education, public awareness efforts, email marketing and public service announcement, highlighting the $1 to $6 investment to benefit ratio	High	Easy	Energy Code Ambassadors, Leveraging off other resources including ICC, BCAP, CU, PSAs
Lack of awareness and knowledge regarding the proven benefits to building to energy code	Lack of targeted information (for each market actor) regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of building to meet or exceed energy code		

Lack of public outreach	Lack of educational material and guidance (pamphlets, internet/websites, presentations, newsletters, etc.)
Lack of awareness regarding cost savings	Lack of information available regarding cost savings resulting from energy efficient building; Some members of this group may perceive return-on-investment (ROI) analyses to be complex math, therefore not worth the effort; Members of this group may be hesitant to trust the validity of ROI calculations
Lack of priority and time	Members of this group face competing priorities in costs and time when building (e.g. aesthetics or using a specific technology may be a higher priority than energy efficiency); Builders and contractors don't typically occupy or own the building, therefore have little incentive to make long-term investments (split incentives)
Competition for capital	When budget is limited, members of this group must make tradeoffs associated with building structure, systems, and features in order to balance costs and profits

Recommendations:

☐ Increase outreach and education, focusing on the benefits of code-compliant buildings to the public/community	High	Easy	Consumer Protection Agencies & Energy Code Ambassadors
☐ Avoid using technical code language in outreach efforts	High	Easy	Consumer Protection Agencies & Energy Code Ambassadors
☐ Provide and publicize analysis on operational and lifetime costs of code-compliant buildings and equipment, with energy cost variables	High	Mid	BCRC, PUC, DOS, NEEP, OEP
☐ Engage in public outreach to consumers/building occupants highlighting the increased comfort of energy efficient homes	High	Easy	Consumer Protection Agencies & Energy Code Ambassadors
☐ Develop and publicize case studies	High	Mid	BCRC, PUC, DOS, NEEP, OEP
☐ Develop and implement a penalty system for builders who fall short of quality standards, and encourage builders who demonstrate above and beyond high-quality workmanship (Note: cannot incentivize the code because it is law)	Mid	Hard	PUC, DOS, Legislature, Municipalities
✔ NHBCC Program recommends continuing the program's public awareness campaign and PSA efforts, highlighting the $1 to $6 investment to benefit ratio of code enforcement	High	Easy	Energy Code Ambassadors

Non-existent certification programs or CEUs	Certification or licensure for some trades is not required in many locales; Requirements for credentialing or licensure do not require energy code curriculum; Energy code continuing education classes are elective areas of study; Members of this group may believe continuing education efforts to be too costly or time consuming; High turnover rate in this sector means there may be little incentive for individuals to invest in continuing education; General resistance to added requirements; NH State Constitution 28A		
Recommendations:			
☐ Provide free training where certification is not required	High	Mid	PUC, DOS, Utilities, ICC, CCSNH
☐ Promote optional energy code CEUs for continuing licensure (where certification is required)	High	Hard	PUC, DOS, ICC, BPI, HBRA
☐ Partner with trade groups to provide and publicize CEUs and certification programs	High	Mid	Trade Organizations, PUC, DOS, ICC, BPI, HBRA
Lack access to resources and tools	Lack of available and inexpensive guidance documents and other information materials; Limited availability of code books and checklists; Limited availability of expensive testing equipment (e.g. blower doors, duct blasters, IR camera and other resources); Members of this group may believe that resources will become obsolete in a year or two		
Recommendations:			
☐ Develop graphics-heavy guide and cheat sheets (checklists) addressing the most critical energy code issues,	High	Mid	PUC, DOS, BCRB, NEEP Leverage where practical
☐ Make code books available for free download,	High	Mid	PUC, ICC, ASHRAE
☐ Provide more free training - including local, in-person training and online training and videos,	High	Mid	PUC, Utilities, HBRA, CCSNH
☐ Expand advanced training programs - including in-the-field, hands-on, and technical training,	High	Mid	PUC, Utilities, HBRA, CCSNH
☐ Increase exposure to effective tools and techniques (e.g. duct sealing techniques)	High	Mid	Energy Code Ambassadors, Leveraging
☐ Encourage product distributors/sales companies to reach out to builders for 1:1 technical training	Mid	Mid	Trade Organizations, Product Distributors
✔ NHBCC Program recommends leveraging and continuing the education, training, workshops, on-line training videos, and resource updating efforts	High	Easy	PUC, DOS, Utilities, HBRA, BCRB,CCSNH

Information on compliance methods	Lack information on why, where, when and how to verify compliance with the energy code in a new or renovated building		
Recommendations:			
☐ Increase education and outreach focusing on the technical requirements of the energy code and compliance methods,	High	Mid	PUC, Utilities, HBRA, BCRB, CCSNH
☐ Expand advanced training programs - including in-the-field, hands-on, and technical training	High	Hard	PUC, Utilities, HBRA, BCRB, CCSNH
☐ Expand awareness and visibility of the energy code electrical box sticker (Example method: signage at transfer stations, PSA, etc.)	High	Easy	PUC, DOS, OEP, Consumer Protection Agencies
☐ Expand visibility of the Public Utilities Commission (PUC) role	High	Easy	PUC, DOS, OEP, Energy Code Ambassadors
✔ NHBCC Program recommends leveraging the existing free energy code workshops and in-field training workshop for advanced building professionals	High	Easy	PUC, Utilities, HBRA, BCRB, CCSNH
New technology awareness and techniques to meet code	Builders and contractors may be hesitant to endorse or build with new technologies and techniques and/or may be comfortable with existing practices; Lack of "whole system" thinking necessary to integrate new technologies		
Potential for new technology to perform poorly and with surprise negative ramifications	History of new energy efficient products and equipment overstating benefits and/or underperforming; History of unintended consequences when implementing energy efficient products and techniques (e.g. increasing the air tightness of a building while not addressing altered ventilation requirements leads to moisture/Indoor Air Quality (IAQ) problems); Members of this group may recognize the potential for increased call-backs, which is bad for business and a nuisance		
Recommendations:			
☐ Use outreach and educational avenues to periodically feature new and proven technologies from a respectable source	High	Easy	Energy Code Ambassadors, Leveraging
☐ Encourage educators and training programs to emphasize the "whole-systems" approach building design	High	Easy	ICC, BPI, CCSNH, PUC, DOS, BCRB, HBRA, Leveraging
☐ Brand a "code-compliant" label to affix on qualified products	High	Hard	PUC, DOS, Legislature, Manufacturers, Distributors, Ambassadors, Leveraging

☐ Provide forum for builders and contractors to ask and discuss technical energy code questions	**Critical**	Mid	PUC, DOS, BCRB, HBRA, ICC
Friction with other trades and code officials	Existence of competing responsibilities and territorialism within and across trades; Confusion over the responsibilities of each party (especially if some trades are licensed and others are not); Existence of friction between builders/contractors and code officials, especially over code interpretation		
Recommendations:			
☐ Promote the use of a third-party facilitator for projects before they start	Mid	Hard	PUC?
☐ Encourage contractors to hold pre-project construction meetings with all subcontractors to negotiate responsibilities and expectations (could be done at time of plans review and/or permit pulled)	Mid	Mid	PUC, HBRA, Training with CCSNH

End goal: NH builders and contractors build buildings that meet or exceed the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Architects, Engineers, Designers

Architecture, engineering and design firms are responsible for the design of the largest commercial and industrial buildings (e.g. hospitals, retail stores, and schools) and custom residential homes. They are often required to self-certify building compliance with energy code standards. In order for these buildings to comply with the energy code, architects, engineers and designers must understand the requirements of the code and design techniques that facilitate energy code compliance.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Limited Knowledge/Awareness

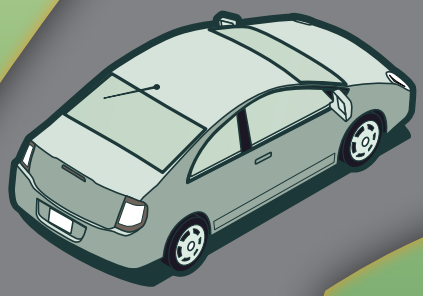
Lack of information regarding proven benefits (energy economic, cost savings, environmental, comfort, and indoor air quality) of building to meet or exceed energy code; Lack of information regarding necessary technical requirements; Lack of awareness when codes are updated and how to verify compliance

Lack of Resource and Training

Lack of resources, material and tools (including competition for capital); Limited availability of code books, checklists and compliance tools; Lack of targeted or advanced/technical trainings and CEUs requirements

General Sentiment

Customer driven (aesthetics, floor plan, customer choices take priority); Uncertain of new technologies (potential for unintended consequences); Lack of "whole system" thinking necessary to integrate new technologies; Reliant on past practices; Assume their current building designs are correct/ adequate



High Priority Recommendations

✔ **CRITICAL: Provide free advanced technical trainings, resources and tools** (code books, checklists, testing equipment, etc.), providing a forum for architects, engineers and designers to ask and discuss technical energy code questions. (PUC, Utilities, CCSNH, BCRB, AIA, ICC, ASHRAE, DOE)

✔ **Increase outreach and education** focusing on the benefits of code compliant buildings, technical requirements, and compliance methods to meet energy code. (AIA, PUC, DOS, BCRB, NH Energy Code Collaborative, Energy Code Ambassadors)

✔ **Develop and promote training** for the new generation of architects, engineers, and designers focusing on the "whole-system/ building" approach. (AIA, ASHREA, ICC, CCSNH)

✔ **Incorporate and require baseline energy code CEUs** for continuing licensure. (AIA ASHREA, ICC, Legislature)

Architects, Engineers, and Designers

Architecture, engineering, and design firms are important actors in the residential and commercial construction market, and particularly important for building code compliance. These market actors are responsible for the design of the largest commercial and industrial buildings (e.g. hospitals, retail stores, and schools) and customer residential homes. They are often required to self-certify building compliance with energy code standards. In order for these buildings to comply with the energy code, it will be necessary for architects, engineers, and designers to understand the requirements of the code and design techniques that facilitate energy code compliance.

Engagement of this market actor group and facilitation of their knowledge and understanding will be a key component of achieving compliance with energy code requirements. As shown in Table 6, there are a number of barriers to energy code compliance that exist within this market actor group and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into the following general categories:

- Resource limitations (competing capital, limited tools and CEUs, etc),
- Limited knowledge and awareness (general awareness, detailed training/skills),
- Behavioral situations (reliance on past practices, uncertainty of new technologies),
- General public sentiment.

Table 6. NH Architects, Engineers, and Designers – Barriers and Recommendations

Barriers	**Specifics**	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
Driven by customer demand	Aesthetics, floor plan, and other physical elements often take priority over energy code related requirements;			
Awareness and knowledge regarding the proven benefits to building to energy code	Lack of targeted information (for each market actor) regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of building to meet or exceed energy code			
Awareness of the energy code requirements	Members of this group may lack the motivation to understand energy code requirements or may be put off by the technical nature of the energy code; Members of this group may be resistant to change - "This is the way we have always done it" attitude			
Information on energy code compliance methods	Lack information on why, where, when and how to verify compliance with the energy code in a new or renovated building			
Lack access to tools and resources	Lack of available and inexpensive guidance documents and other informational materials; Code books may be prohibitively expensive			

Recommendations:			
☐ Increase education and outreach focusing on the benefits of code-compliant buildings, the technical requirements of the energy code, and compliance methods	High	Easy	AIA, PUC, DOS, BCRB, Energy Code Ambassadors.
☐ Increase visibility of training programs	High	Easy	AIA, PUC, DOS, BCRB, Energy Code Ambassadors
☐ Develop and promote classes for a new generation of architects, engineers and designers	High	Mid	AIA, PUC, DOS, BCRB, CCSNH, Energy Code Ambassadors
☐ Provide more free training - including local, in-person training and online training and videos	High	Mid	AIA, PUC, Utilities, HBRA, CCSNH
☐ Expand advanced training programs - including in-the-field, hands-on, and technical training	High	Mid	AIA, PUC, Utilities, CCSNH, HBRA
☐ Make code books available for free downloads	High	Hard	AIA, ICC, DOE, ASHREA, PUC, OEP
☐ Develop graphics-heavy guide and cheat sheets (checklists) addressing the most critical energy code issues	High	Easy	ICC, PUC, DOS, AIA, BCRB, NEEP, Leveraging
☐ Provide forum for architects, engineers, and designers to ask and discuss technical energy code questions	**Critical**	Mid	AIA, ICC, ASHREA, PUC
✔ NHBCC Program recommends leveraging and continuing outreach and education, free energy code workshops, email campaigns, in-the-field training, website and on-line training videos, distribution of the NH Field Guide, Code Official e-code checklists, Ask-the-Expert Blogs and other resources posted on the NH Energy Code Website	High	Easy	AIA, ICC, ASHREA, PUC, Energy Code Ambassadors, Leveraging

Lack of priority and time	Members of this group face competing priorities when designing buildings (e.g. aesthetics, floor plan flow or using a specific technology may be a higher priority than energy efficiency)
Competition for capital	When budget is limited, members of this group must make tradeoffs associated with building structure, systems, and features in order to balance costs and profits
Lack of public outreach	Lack of educational material and guidance (pamphlets, internet/websites, presentations, newsletters, etc.)

Recommendations:			
☐ Increase outreach and education, focusing on the benefits of code-compliant buildings to the public/community,	High	Easy	Energy Code Ambassadors
☐ Provide and publicize analysis on operational and lifetime costs of code-compliant buildings and equipment, with energy cost variables	High	Mid	BCRC, PUC, DOS, OEP, Leveraging
☐ Develop case studies	High	Mid	ICC/ASHRAE, BCRC, PUC, DOS, OEP, Leveraging
✔ NHBCC Program recommends continuing the programs public awareness campaign and public service announcement efforts, highlighting the $1 to $6 investment to benefit ratio of code enforcement	High	Easy	Energy Code Ambassadors, Leveraging

Lack of continuing education units (CEUs)	Requirements for credentialing or licensure do not require energy code curriculum (example: "energy certifications (i.e. LEED)" are numerous but does not mean baseline energy code is understood, baseline is usually just assumed); Energy code continuing education classes are elective areas of study

Recommendations:			
☐ Require specific energy code CEUs for continuing licensure	High	Hard	AIA. Legislature
☐ Partner with trade groups to provide specific energy code CEUs and certification programs	High	Hard	AIA, Trade Groups, Organizations
☐ Penetrate the industry and incorporate baseline energy code into licensure	High	Hard	AIA

Lack of awareness of new technologies and techniques necessary to meet or exceed energy code	Members of this group may be hesitant to endorse or design with new technologies and techniques and/or may be comfortable with existing practices; Lack of "whole system" thinking necessary to integrate new technologies
Potential for new technology to perform poorly with surprising or unintended consequences	History of new energy efficient products and equipment overstating benefits and/or underperforming; History of unintended consequences when implementing energy efficient products and techniques (e.g. increasing the air tightness of a building while not addressing altered ventilation requirements leads to moisture/IAQ problems); Members of this group may recognize the potential for increased call-backs, which is bad for business

Recommendations:			
☐ Use outreach and educational avenues to periodically feature new and proven technologies from a respectable source	Mid	Mid	Energy Code Ambassadors, Leveraging

☐ Encourage educators and training programs to emphasize the "whole-systems" approach building design	Mid	Mid	ICC, AIA, ASHREA, PUC, BCRB, HBRA, Energy Code Ambassadors
☐ Brand a "code-compliant" label to affix on qualified products	High	Hard	PUC, DOS, Legislature, Energy Code Ambassadors, Leveraging

End goal: NH architects, engineers, and designers design buildings that meet or exceed the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Real Estate Professionals and Appraisers

Real estate professionals, interacting directly with home buyers, commercial building owners, and the general public, can raise customer awareness of the energy code and the benefits of energy efficient homes and buildings. Appraisers, by properly valuing energy efficient homes and buildings, can influence the building market toward energy efficient building. By quantifiably valuing energy efficient attributes of a property, appraisers can open further funding streams for energy efficient projects and can raise the overall awareness of the value of energy code compliant buildings.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Lack of Comparables ("comps")

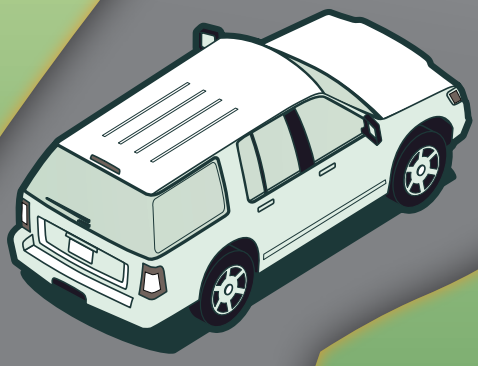
Comps do not include any "energy attributes" (sales driven by aesthetics, bed/bath ratio, neighborhood, etc.); Existing building stock inventory substandard; Lack of industry guidance or methodologies on how to value energy code and energy efficient homes/buildings; Energy attributes not seen as "investments"

Lack of Knowledge/Awareness

Assume all buildings are built to code; Lack of information regarding proven benefits (energy economic, cost savings, environmental, comfort, and indoor air quality) of homes or building that meet or exceed energy code; Prevalence of misinformation/"green washing"

Lack of Resources and Training

Lack of available and inexpensive guidance documents, checklists, and materials etc.; Lack of targeted, in-depth training programs and energy code CEUs requirements



High Priority Recommendations

✔ **CRITICAL: Include "energy attributes"** in comparables ("comps") and promote the "energy attribute rating" - HERS rating on NH's MLS listing. (NHREAB)

✔ **Promote public outreach** and education campaign highlighting the high cost to public/communities for homes and buildings that fail to meet the energy code and that energy codes help protect the largest investment most individuals make. (NH Energy Code Collaborative with Energy Code Ambassadors)

✔ **Create and publicize customized training programs** (with "field-trips" and "role-playing") targeted to real estate professional and appraisers. (NHREC, NAR, AEEREP, CCSNH)

✔ **Require energy code CEUs** for continuing licensure. (NHAR, CIBOR, NHREC, NAR)

✔ **Encourage the inclusion** of the added value of energy efficiency measures when industry standards are updated. (Local Chapter of National Organizations, CIBOR, HBAR, NHREAB)

Real Estate Professionals and Appraisers

Real estate professionals and appraisers together play an integral role in ensuring the achievement of the state's energy code compliance goals. Real estate professionals, interacting directly with home buyers, commercial owners and the general public, can raise customer awareness of the energy code and the benefits of energy efficient homes and buildings. Appraisers, by properly valuing energy efficient homes and buildings, can influence the building market toward energy efficiency building. By quantifiably valuing energy efficient attributes of a property, appraisers can open further funding streams for energy efficient projects and can raise the overall awareness of the value of energy code-compliant buildings.

Engagement of the real estate professional and appraisers will be a key component of achieving compliance with the energy code. One major barrier to energy code compliance that needs to be addressed is the lack of real estate comparables or "comps". Comps (or comparables), are currently regarded as the single-best tool in determining a home's value. Real estate professionals and appraisers use them to contrast criteria from recently-sold properties in a neighborhood, such as sale price, age of house, size, and square footage. Real estate agents use comps to prepare a Comparative Market Analysis (CMA) for their clients. Comps currently do not include any "energy attributes" and are often conservative measures (the recent market downturn has only made them more conservative).

As shown in Table 7, there are a number of additional barriers to energy code compliance that exist within this group and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into the following general categories:

- Substandard inventory (existing building stock substandard, lack comparables "comps"),[26]
- Lack of national leadership (industry guidance/methodologies valuing energy code),
- Limited knowledge and awareness (general awareness, detailed training/skills, misinformation),
- Behavioral situations (reliance on past practices, resistance to change),
- Resource limitations (competing capital, limited tools, resources, CEUs, etc),
- General public sentiment.

[26] Comps, or comparables, are currently regarded as the single-best tool in determining a home's value. They contrast criteria from recently-sold properties in a neighborhood, such as sale price, age of house, size, and square footage. Real estate agents use comps to prepare a Comparative Market Analysis (CMA) for their clients. They do not include any "energy attributes" and are often conservative measures (the recent market downturn has only made them more conservative).

Table 7. NH Real Estate Professionals/Appraisers – Barriers and Recommendations

Barriers	Specifics	Priority (Low, Mid, High)	Deploy (Easy, Mid, Hard)	Champion (Leader?)
Lack of awareness that energy code issues exist	Members of this group may assume all new buildings are automatically built to code or are "fixer-uppers"; Member of this group may assume building professionals are responsible and being checked by enforcement methods; Energy efficient "green" buildings (or stretch code buildings) are often custom-built and/or may be seen as a custom			
Awareness and knowledge regarding the proven benefits of compliance	Lack of targeted information (for each market actor) regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes that meet or exceed energy code			
Recommendations:				
☐ Increase outreach and education, providing tools such as checklists, focusing on benefits of code-compliant buildings to the public/community		High	Easy	NHAR, CIBOR, Leveraging Regional/National Organizations as appropriate
☐ Avoid using technical code language in outreach efforts		High	Easy	NHAR, CIBOR
☐ Initiate and promote an industry-targeted outreach campaign (industry newsletter, email, role-modeling program, public awareness campaign etc)		High	Mid	NHAR, CIBOR
✔ NHBCC Program recommends leveraging the targeted real estate training curriculum, guidance material, checklist and www.nhenergycode.com website resources, specifically designed through the program, for real estate professionals and appraisers		High	Mid	NHAR, CIBOR
Inventory substandard (existing building stock substandard)	Most of the existing building-stock, inventory fails to meet the energy code; Members of this group may be hesitant to call attention to the energy code when current inventory is substandard; Current vocabulary is euphemistic (focusing on what is positive about the property, not its problems)			
Lack of comparables "comps" available	Appraisers may not be sure how to quantify energy code compliance and thus, assign value to compliant homes; Physically apparent building features are easier to point out and value (e.g. aesthetics, building measurements, neighborhood, bed/bath ratio, etc); Comps, or comparables, are regarded as the single-best tool in determining a home's value. They contrast criteria from recently-sold properties in a neighborhood, such as sale price, age of house, size, and square footage. Real estate agents use comps to prepare a Comparative Market Analysis (CMA) for their clients. They do not include any "energy attributes" and are often conservative measures (the recent market downturn has only made them more conservative)			

Appraisers don't value code or higher efficiency	Appraisers may not be sure how to quantify energy code compliance and thus, assign value to compliant homes; Appraisers don't discount the value of non-compliant buildings; Their goal is to sell the house and make money – the higher the sales cost – the higher their net; Pointing out inadequacies would reduce the selling price, therefore their cut.
Prevalence of misinformation ("green washing")	Prevalence of misleading claims and overstated benefits of "green" building; EcoBokers and marketing information promote superficial understanding of energy and "green" products; Industry is susceptible to "green washing" (deceptive promotion of products or services as environmentally friendly)
Lack of national leadership	Lack of industry guidance or methodologies on how to value energy code and energy efficiency buildings

Recommendations:

☐ Develop and publicize case studies, focusing on the improved comfort and savings/value of energy efficient homes	High	Easy	NHAR CIBOR USGBC NH
☐ Encourage the inclusion of "energy attribute rating" on MLS listing	High	Mid	NHREAB
☐ Increase radius from which "comps" for energy code compliance and other energy efficiency features can be gathered and valued	High	Hard	NHREAB, National Industry Organizations
☐ Include "energy attributes" in "comps" (Comparative Market Analysis (CMA) for homeowners)	**Critical**	Hard	NHREAB, National Industry Organizations
☐ Create a "code-compliant building" labeling and rating program	High	Hard	DOE, OEP, NHAR, CIBOR, Other
☐ Encourage the inclusion of the added value of energy efficiency measures when industry standards are updated	High	Hard	NHREAB, Brokers
☐ Work within the industry to develop a checklist of energy code requirements and discount value of non-compliant buildings	High	Mid	Associations NHAR, CIBOR
☐ Develop and publicize a rubric of tiered values for upgraded energy efficient techniques and products, this will add value for quality product and quality installation (Example: new windows – vinyl double pane vs. fiberglass triple pane windows – all called "new")	Mid	Hard	CEE, ACEEE, NEEP, BCRB, ASHRAE, ANSI, Manufacturers
☐ Use case studies and public outreach to focus attention on the positive impacts and long-term value of energy upgrades on buildings	High	Mid	Energy Code Ambassadors

☐ Promote needed national leadership	High	Mid	Local Chapters of National Organizations (CIBOR, HBAR, etc.)
☐ Industry overhaul and reprioritization	Low	Very Difficult	Local Chapters and National Organizations (CIBOR, HBAR, etc.)
Competition for capital	Members of this group may focus on initial costs vs. operational and/or lifetime costs; Homeowners move about every five years; Energy code requirements are not seen as "investments"		
Recommendations:			
☐ Provide and publicize analysis on operational and lifetime costs of code-compliant buildings and equipment, with energy cost variables,	High	Mid	Energy Code Ambassadors (Spokespeople from each of the impacted stakeholder groups)
☐ Highlight the long-term value of energy/financial savings in outreach efforts	High	Mid	Energy Code Ambassadors (Spokespeople from each of the impacted stakeholder groups)
Lack of motivation	Not a lot of visibility or 'call' for energy code features; No motivation to focus on energy efficiency when buyers are not asking for it; Members of this group may lack the motivation to understand energy code requirements or may be put off by the technical nature of the energy code; Not easily swayed by something they consider "novelty"		
Competing interests	Energy code/efficiency is lower priority on a list of housing attributes; Physically apparent building features are easier to point out and sell; Members of this group must cater to consumer preferences (e.g. granite counter tops over energy efficient features); Perceived long ROI – energy upgrades yield small returns over time vs. immediate gratification ("Start enjoying that countertop today!"); Real estate professionals put a positive spin on even the most miserable properties; They don't point out negatives; They are "positive people" – leads to misinformation and assumptions by consumers		
Lack of priority and time	Members of this group often feel pressure to move houses quickly and move on to maximize profits; Slim profit margins often mean it is not worth the time needed to become educated on the energy code or to point out in adequacies in their inventory		

Recommendations:			
☐ Develop and publicize case studies of energy code-compliant buildings	High	Mid	NHAR CIBOR
☐ Encourage real estate professionals to highlight properties that are available with energy attributes	High	Hard	NHAR CIBOR USGBC NH HBRA
☐ Support real estate professionals and help them teach and sell the concept "energy attributes" to potential buyers, develop reputation for representing buyers, long-term interests	High	Mid	USGBC NH HBRA
☐ Highlight the state's long-term net zero goals in outreach efforts and emphasize that energy code issues are not going away	High	Easy	EESE Ambassadors
Lack of understanding of energy code/efficiency language and topics	Members of this group may not feel comfortable with being the authority on energy efficiency topics; Members of this group may be intimidated by the technical language and details associated with the energy code and/or may be uncomfortable with their lack of knowledge concerning the code		
Recommendations:			
☐ Create training programs to train the next (younger) generation of real estate professionals and appraisers	Mid	Mid	NHREC, NAR, AEEREP
☐ Incorporate basic energy efficiency topics and introduce energy code vocabulary in training programs	High	Mid	NHREC, NAR, AEEREP
☐ Support the further professionalization of the industry and encourage the inclusion of energy code curriculum in licensure continuing education requirements	High	Hard	NHREC, NAR,AEEREP
☐ Enhance the current Eco-Broker® Program	Low	Mid	AEEREP
☐ Continue with outreach efforts to consumers and the general public, encouraging buyers to inquire about the energy efficiency specifications of a property	Mid	Mid	NHAR CIBOR
Lack of access to training, resources and tools	Lack of available and inexpensive guidance documents and other information materials; Training programs and continuing education requirements don't dive deeply; Lack of available training programs and CEUs are not required in licensure		

Recommendations:			
☐ Create and publicize training programs targeted to real estate professionals, appraisers, and home inspectors	High	Mid	NHREC, NAR,AEEREP, CCSNH and Ambassadors
☐ Distribute graphics-heavy guide and cheat sheets (checklist**s**) addressing the most critical energy code issues	High	Mid	NHAR, CIBOR, Leveraging when appropriate
☐ Promote value-added energy code training during slow periods	High	Mid	NHAR, CIBOR
☐ Require energy code CEUs for continuing licensure (where certification is required)	Mid	Hard	NHAR, CIBOR, NHREC, NAR
☐ Host walkthroughs, "field trips" and "role-playing" as part of energy code training curriculum	High	Mid	NHAR,CIBOR NHREC
✔ NHBCC Program recommends leveraging the targeted real estate training curriculum, guidance material, checklist and www.nhenergycode.com website resources, specifically designed through the program, for real estate professionals and appraisers	High	Easy	Energy Code Ambassadors

End goal: NH real estate professionals and appraisers value buildings that are built to meet or exceed the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Lenders and Financing Organizations

Though sometimes overlooked or underplayed in the energy code-related discourse, lenders and financing organizations are key actors in the residential and commercial construction markets. They are responsible for securing funding for energy efficient construction projects that may require a higher initial investment in exchange for a long-term payback. By financing construction projects, these organizations are the drivers of construction activity and can make or break the sale of real-estate.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Lack of Resources and Tools

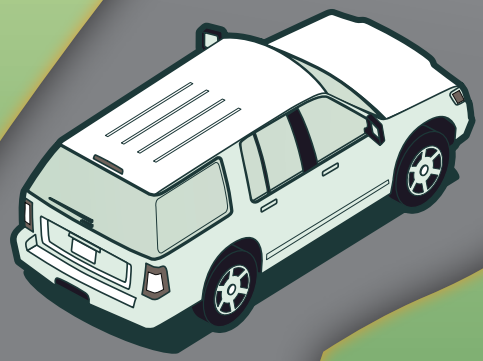
Lack of targeted information regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes/buildings that meet or exceed energy code; Lack of available and inexpensive guidance documents and other informational materials; Lack of information regarding the operational or lifetime cost savings of energy efficient buildings

Limited Knowledge/Awareness

Energy code issues are off the radar of many lenders and financing organizations; Lenders may assume all new buildings are automatically built to code; Lenders may not be sure how to quantify energy code compliance and thus, assign value to compliant homes

Strongly Influenced by Market

Lenders are strongly influenced by the advice of appraisers, who do not discount for non-compliant buildings; Low visibility or 'call' for energy code features; No motivation to focus on energy efficiency when buyers are not asking for it



High Priority Recommendations

- ✔ **Initiate and promote** an industry-targeted outreach and education campaign (industry newsletter, email, role-modeling program, public awareness campaign, etc) focusing on the benefits of code compliant buildings to the public/community. (Energy Code Ambassadors)
- ✔ **Provide and publicize analysis** on operational and lifetime costs of code compliant buildings and equipment with energy cost variables. (Consumer Protection Agencies, PUC, DOS, OEP)
- ✔ **Develop and publicize case studies** focusing on the value, pay-back, and improved comfort and savings/value of energy efficient homes. (Energy Code Ambassadors)
- ✔ **Develop graphics-heavy guide** and cheat sheets (checklists) addressing the most critical energy code issues. (PUC, DOS, OEP)
- ✔ **CRITICAL: Encourage the inclusion** of the added value of energy efficiency measures when industry standards are updated and encourage lending policy shifts to acknowledge and push for better performing buildings. (Energy Code Ambassadors)

Lenders and Financing Organizations

Though sometimes overlooked or underplayed in the energy code-related discourse, lenders and financing organizations are key actors in the residential and commercial construction markets. They are responsible for securing funding for energy efficient construction projects that may require a higher initial investment in exchange for a long-term payback. By financing construction projects, these organizations are the drivers of construction activity and can make or break the sale of real estate.

Though a relatively small group, lenders and financing organizations have the potential to influence a large number of other market actors, by lending for energy efficient projects and improvements, they signal to the market the value of building energy codes. It is critical for groups like the NH Housing Finance Authority (NHHFA) and the NH Community Loan Fund to understand value of energy codes and reinforce this knowledge within the financial community.

As shown in Table 8, there are a number of barriers to energy code compliance that exist within this group and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into the following general categories:

- Resource limitations (competing capital, guidance, resources, etc),
- Limited knowledge and awareness (general awareness, misinformation),
- Behavioral situations (reliance on past practices, resistance to change),
- General public sentiment,
- Reactive and slow to respond (rely on appraisers).

Table 8. NH Lenders/Financing Organizations – Barriers and Recommendations

Barriers	Specifics	Priority (Low, Mid, High)	Deploy (Easy, Mid, Hard)	Champion (Leader?)
Lack of awareness and knowledge regarding the proven benefits of energy code-compliant buildings	Lack of targeted information (for each market actor) regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes that meet or exceed energy code			
Lack of understanding and curiosity about value of energy codes	Lenders may not be sure how to quantify energy code compliance and thus, assign value to compliant homes; Energy efficiency represents a "new", untested variable; Many existing buildings are "underwater" from historically overvalued property, leading to further depressed home values			

Recommendations:			
☐ Increase outreach and education focusing on the benefits of code-compliant buildings to the public/community	High	Easy	Energy Code Ambassadors, Leveraging
☐ Avoid using technical code language in outreach efforts	High	Easy	Energy Code Ambassadors
☐ Initiate and promote an industry-targeted outreach campaign (industry newsletter, email, role-modeling program, public awareness campaign etc.)	High	Mid	Energy Code Ambassadors
☐ Develop and publicize case studies focusing on the value, pay-back, and improved comfort and savings/value of energy efficient homes	High	Mid	Energy Code Ambassadors, Leveraging

Assumes buildings are built to code	Energy code issues are off the radar of many lenders and financing organizations; Lenders may assume all new buildings are automatically built to code and assume building professionals are responsible and being checked by enforcement methods; History of lending for non-code-compliant buildings
Economy uncertainty	Lenders and financing organizations may be hesitant to endorse anything innovative in the current market; Lenders may be wary of valuing properties higher than their appraisal value; Pressure exists to not depress building values further
Lack access to resources and solid case-by-case information about operational costs for buildings	Lack of available and inexpensive guidance documents and other information materials including checklists; Lack of information regarding the operational or lifetime cost savings of energy efficient buildings

Recommendations:			
☐ Develop and publicize case studies focusing on the improved comfort and savings/value of energy efficient homes	High	Mid	Consumer Protection Agencies, PUC, DOS, OEP, Leveraging
☐ Develop graphics-heavy guide and cheat sheets (checklist**s**) addressing the most critical energy code issues	High	Mid	PUC, DOS, OEP, Leveraging
☐ Create a "code-compliant building" labeling program	Mid	Hard	PUC, DOS, Legislature, Ambassadors, Leveraging
☐ Provide and publicize analysis on operational and lifetime costs of code-compliant buildings and equipment with energy cost variables	High	Mid	Consumer Protection Agencies, PUC, DOS, OEP, Energy Code Ambassadors,

☐ Highlight the long-term value of energy/financial savings in outreach efforts	High	Mid	Energy Code Ambassadors
☐ Host walkthroughs and "fieldtrips" focusing on the energy code requirements and associated savings	Mid	Hard	Energy Code Ambassadors, Leveraging
☐ Work with banks (initially with smaller community banks); begin working with large lenders after a track record of positive results has been established	High	Hard	Energy Code Ambassadors, Leveraging
☐ Encourage lending policy shifts to acknowledge and encourage better performing buildings	**Critical**	Hard	Energy Code Ambassadors, Leveraging
Influenced strongly by appraisals	Appraisers don't discount the value of non-compliant buildings; Lenders are strongly influenced by the advice of appraisers		
Reactive and slow to respond to changing dynamics	Not a lot of visibility or 'call' for energy code features; No motivation to focus on energy efficiency when buyers are not asking for it; Lenders and financing organizations often follow the lead from national groups (FHA,HUD) on policy changes		
Recommendations:			
☐ Promote the facts that lower energy bills reduce the occupants total costs, and therefore reduced risks in outreach efforts to this group	High	Easy	Energy Code Ambassadors, Leveraging
☐ Encourage the inclusion of the added value of energy efficiency measures when industry standards are updated	**Critical**	Hard	Energy Code Ambassadors, Leveraging
☐ Industry overhaul and reprioritization	High	Hard	Energy Code Ambassadors

End goal: NH lenders and financing organizations lend and invest in buildings that are built to meet or exceed the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Commercial and Industrial Building Owners and Managers

Commercial and industrial building owners, operators, and managers are responsible for making critical decisions regarding the largest and most energy-intensive buildings in the state. Collectively, commercial and industrial building owners have the capacity to drive the demand for energy code-compliant buildings. Building owners who value and demand energy code-compliant buildings compel builders and contractors to be more aware of energy code requirements and to learn techniques for meeting or exceeding these standards.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Short-term Ownership/Split Incentives

Short-term owners may have competing priorities and lack the time to focus on energy issues or may have a "build quickly and move on" mentality; Buildings are often leased space with the occupants paying the energy costs, there may be little incentive for building owners to make energy efficiency investments

Limited Knowledge/Awareness

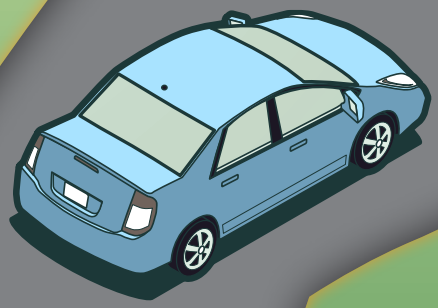
Building owners may assume all new buildings are automatically built to code; Lack of targeted information regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes that meet or exceed energy code; Owners may believe that energy code issues have little consequence

Constrained Resources/Competing Priorities

When budget is limited, building owners must make tradeoffs associated with building structure, systems, and features to balance costs and profits; Energy code requirements may not seen as investments; Financing focused on initial costs versus operational/lifetime costs

Low Enforcement

Energy code specifications on paper may not be what happens in the field; Building owners may assume building professionals are responsible and being checked by enforcement methods



High Priority Recommendations

✔ **CRITICAL: Develop a building labeling program** that would encourage lessees to know their operational costs before committing to a building. (Consumer Protection Agencies, Energy Code Ambassadors)

✔ **Initiate and promote** an industry-targeted outreach and education campaign (including newsletters, email, role-modeling programs, public awareness campaign, etc). (Industry Associations, Energy Code Ambassadors)

✔ **Develop graphics-heavy guide** and cheat sheets (checklists) addressing most critical energy code issues and increase exposure of these tools and other resources for energy efficient building. (ICC, PUC, DOS, AIA, BCRB, Energy Code Ambassadors)

✔ **Create and publicize** a building energy calculator for owners to be able to compare similar buildings (compliant vs. non-compliant). (PUC, DOS, OEP, Energy Code Ambassadors)

✔ **CRITICAL: Develop and enforce** a stronger plans review process and encourage communities to strengthen their code enforcement practices. (AIA, PUC, DOS, BCRB, NHBOA, Municipalities)

Commercial and Industrial Building Owners, Operators and Managers

Commercial and industrial building owners, operators and managers are responsible for making critical decisions regarding the largest and most energy-intensive buildings in the state. Collectively, commercial and industrial building owners in theory have the capacity to drive the demand for energy code-compliant buildings. Building owners who value and demand energy code-compliant buildings compel builders and contractors to be more aware of energy code requirements and to learn techniques for meeting or exceeding these standards.

Therefore, it is important for building owners to understand the energy code requirements and the benefits of energy efficient buildings. The engagement of commercial and industrial building owners, operators and managers into the energy code dialogue is a key component in achieving state-wide compliance with the energy code. As shown in Table 9, there are a number of barriers to energy code compliance that exist within this group and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into the following general categories:

- Resource limitations (competing capital, financing, low-bid),
- Limited knowledge and awareness (general awareness, detailed training/skills),
- Behavioral situations (reliance on past practices, split incentives),
- General public sentiment.

Table 9. NH Commercial Building Owners/Operators & Managers – Barriers and Recommendations

Barriers	**Specifics**	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
Split incentives	Since buildings are often leased space with the occupants paying the energy costs, there may be little incentive for building owners to make energy efficiency investments			
Recommendations:				
☐ Develop a building labeling program that would encourage lessees to know their operational costs before committing to a building		**Critical**	Hard	Consumer Protection Agencies, Collaborative, Energy Code Ambassadors
Hard to access the "chain of command"	Building owners are usually offsite; A building's internal and external management chains may be hard to access; Confusion over which parties are responsible			
Recommendations:				
☐ Encourage better communications between internal management and ownership and external architects and engineers, code officials, and builders		Mid	Mid	PUC, DOS, AIA, NHBOA, Energy Code Ambassadors

Lack of responsibility	Building owners may assume all new buildings are automatically built to code; Building owners may assume building professionals are responsible and being checked by enforcement methods; Owners may believe that energy code issues have little consequence and/or impact; Energy code specifications on paper may not be what happens in the field			
Short-term ownership	Short-term owners may have competing priorities and lack the time to focus on energy issues; Short-term owners may have a "build quickly and move on" mentality and/or may lack the motivation to build a high-quality building			
Low-bid buildings	Buildings with intentionally undersized budgets may be subject to mediocre craftsmanship or may lack supervision during the building process; Owners may intentionally cut corners in the building process			
Recommendations:				
☐ Develop and enforce a stronger plans review process		High	Mid	AIA, PUC, BCRB, NHBOA
☐ Continue to engage building owners in outreach and education about the benefits of energy code		High	Easy	Energy Code Ambassadors, Leveraging
☐ Develop and implement a penalty system for builders who fall short of quality standards, and encourage builders who demonstrate above and beyond high-quality workmanship (Note: cannot incentivize the code because it is law)		Mid	Hard	PUC, DOS, BCRB, Legislature
☐ Encourage adding energy code requirements in bid documents		Mid	Mid	PUC, DOS, AIA, Energy Code Ambassadors
☐ Role model with existing commercial/industrial/municipal buildings		Mid	Mid	PUC, DOS, AIA, Energy Code Ambassadors
☐ Require buildings to meet performance benchmarks and be commissioned before occupancy		Mid	Mid	PUC, DOS AIA, BCRB Legislature, Energy Code Ambassadors
Limited financing	Financing focused on initial costs not operational/lifetime costs; Energy code requirements are not seen as investments			
Competition for capital	When budget is limited, building owners must make tradeoffs associated with building structure, systems, and features in order to balance costs and profits			

Recommendations:			
☐ Create financing tool that incentivizes energy performance via financing – Property Assessed Clean Energy (PACE), Qualified Energy Conservation Bonds (QECBS)	High	Hard	Energy Code Ambassadors, Leveraging
☐ Create and publicize a building energy calculator for owners to be able to compare similar buildings (compliant vs. non-compliant)	High	Hard	PUC, DOS, OEP, Energy Code Ambassadors, EPA, Portfolio Managers
☐ Require commissioning or retro-commissioning of buildings at closing of building sale	High	Hard	PUC, DOS, NHBOA, Energy Code Ambassadors
☐ Encourage commercial lenders to offer tiered rates based on a building's projected operational costs (derived from its modeled energy use)	High	Hard	PUC, DOS, Energy Code Ambassadors
Lack of awareness and knowledge regarding the proven benefits of building to energy code	Lack of targeted information (for each market actor) regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of building to meet or exceed energy code		
Lack of awareness of the energy code requirement and compliance methods	Members of this group may lack the motivation to understand energy code requirements or may be put off by the technical nature of the energy code; Members of this group may be resistant to change - "This is the way we have always done it" attitude; Lack information on why, where, when and how to verify compliance with the energy code in a new or renovated building		
Recommendations:			
☐ Initiate and promote an industry-targeted outreach and education campaign, including public awareness campaign, newsletters, email, role-modeling programs (Example: Acknowledge and applaud Kohl's for buildings to ENERGY STAR standards, and they tout it to their customers with "store elevator music")	High	Mid	Industry Associations, Energy Code Ambassadors, Leveraging
☐ Avoid using technical code language in outreach efforts	High	Easy	Energy Code Ambassadors
☐ Provide access to online resources and computer software programs (e.g. COMcheck)	High	Easy	PUC, AIA, ICC, ASHRAE

✔ NHBCC Program recommends leveraging and continuing the outreach and education, highlighting the $1 to $6 investment to benefit ratio of code enforcement, and publicizing compliance resources and links through the NH Energy Code website	High	Easy	Energy Code Ambassadors, Leveraging
Inadequate building certification processes	Certification implies the code requirements are met, however specification on paper may not be what happens in the field; Often details specified on the architecture plans are not what finally make it into the building structure (Examples: Ducts are left unattached or insulation is installed incorrectly, etc.)		
Recommendations:			
☐ Encourage a high level of scrutiny of building plans at review stage	Mid	Mid	PUC, DOS, BCRB, NHBOA
☐ Encourage communities to strengthen their code enforcement practices	**Critical**	Hard	PUC, DOS, BCRB, NHBOA, Municipalities
☐ Strengthen training requirements for engineers and architects to include information on climate zones, energy code-compliant details, and new products and techniques	High	Mid	AIA, ICC, ASHRAE, PUC, DOS
☐ Encourage architects/engineers to provide more enlarged/detailed views (schedules) of how wall designed need to be accomplished	Mid	Mid	AIA, PUC, NHBOA
Lack of access to resources and tools	Lack of available and inexpensive guidance documents and other information materials		
Recommendations:			
☐ Develop graphics-heavy guide and cheat sheets (checklists) addressing most energy code critical issues	High	Easy	ICC, PUC, DOS, AIA, BCRB, Leveraging
☐ Make code books available for free downloads	High	Hard	AIA, ICC ASHREA, PUC, OEP
☐ Increase exposure to effective tools and techniques for new energy efficient buildings or renovations	High	Mid	Energy Code Ambassadors, Leveraging
✔ The NHBCC Program recommends leveraging the resources, checklists, tools and Ask-the-Expert blog developed through the program and posted on the NH Energy Code website	High	Easy	Energy Code Ambassadors, Leveraging

End goal: NH commercial buildings owners buy and operate buildings that are built to meet or exceed the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Homeowners and the General Public

Homeowners and the general public play an important and influential role in shaping residential and commercial construction market activity. A general public that values and demands energy code compliant buildings compels builders and contractors to become more aware of the code requirements and to learn techniques for meeting or exceeding these standards. Likewise, an informed and vocal general public can have a strong influence on policymakers, ensuring that energy code issues continue to receive the attention and resources necessary to achieve widespread compliance.

Top Energy Code Compliance Barriers

90% Compliance by 2017

Limited Knowledge/Awareness

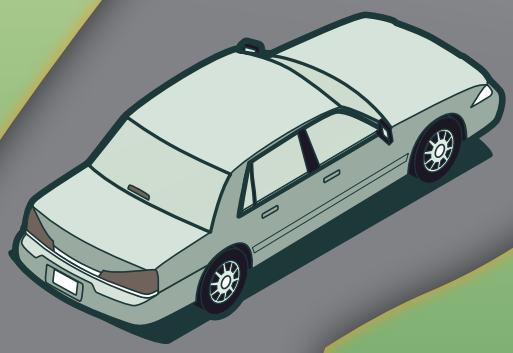
General public may not be aware of the existence or requirements of an energy code; Homeowners/general public may lack the motivation to understand energy code requirements or may be put off by the technical nature of the energy code; Public may assume all new buildings are automatically built to code

Lack of Tools and Resources

Lack of targeted information regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes that meet or exceed energy code; Homeowners may not know what energy features to look for when evaluating a home

Constrained Resources/ Competing Priorities

Homeowners may not see energy code requirements as investments; Homeowners may be concerned with high initial costs versus operational/lifetime costs or payback periods; Buyers would rather invest in fancy countertop or hot tub than "what is behind the wall"



High Priority Recommendations

✔ **CRITICAL: Promote targeted public outreach** and education highlighting the high cost to communities of buildings that fail to meet energy code and that energy codes help protect the largest investment most individuals make. (Consumer Protection Agencies, Energy Code Ambassadors)

✔ **Develop innovative public awareness campaigns** and public service announcements. Consider partnerships with the local media to develop and publicize residential energy code video spotlights. (Municipalities, Energy Code Ambassadors)

✔ **Highlight success stories** and memorable case studies in outreach efforts and empower consumers to understand and expect better performing buildings. (Consumer Protection Agencies, Energy Code Ambassadors)

✔ **Develop a graphics-heavy guide** and cheat sheets (checklists) specially designed for homeowners and the general public addressing the most critical energy code issues. Increase the exposure of these and other effective tools for energy-efficient building. (PUC, DOS, HBRA, BCRB)

✔ **Include analyses** on building operational costs over time with energy cost variables in outreach activities. (Consumer Protection Agencies, Energy Code Ambassadors)

Homeowners and General Public

Homeowners and the general public play an important and influential role in shaping residential and commercial construction market activity. A general public that values and demands energy code-compliant buildings compels builders and contractors to become more aware of the code requirements and to learn techniques for meeting or exceeding these standards. Likewise, an informed and vocal general public can have a strong influence on policymakers, ensuring that energy code issues continue to receive the attention and resources necessary to achieve widespread compliance.

Increasing the awareness and knowledge of energy code issues and benefits in homeowners and the general public will be a key component in achieving state-wide compliance with the energy code. As shown in Table 10, there are a number of barriers to energy code compliance that exist within this group and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into the following general categories:

- Resource limitations (competing capital, guidance, resources, etc),
- Limited knowledge and awareness (general awareness, technical knowledge, misinformation),
- Behavioral situations (reliance on past practices, resistance to change, new technologies, fear of angering their contractor),
- General public sentiment,
- Friction (code officials and other trades).

Table 10. NH Homeowners and the General Public – Barriers and Recommendations

Barriers	**Specifics**	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
Awareness and knowledge regarding the proven benefits of buying energy code homes	Lack of targeted information (for each market actor) regarding the proven benefits (energy, economic, cost savings, environmental, comfort, and indoor air quality) of homes that meet or exceed energy code; Hard to break the cycle if other market actors (realtors, appraisers, lenders, builders, neighbors) don't know or value the energy code – hard to make the case that it is needed/important (although it is the law), This is a "chicken and egg" scenario – here is a spot that can break the cycle			
Recommendations:				
☐ Offer home tours, open houses, and demonstrations of code-compliant houses and details		High	Mid	HBRA, Utilities Energy Code Ambassadors
☐ Publicize photos and stories of non-compliant homes and buildings and ramifications		High	Easy	Product, Industry, Community

☐ Include energy code visibility at Home Shows	High	Easy	PUC, DOS, BCRB, HBRA, Utilities
☐ Highlight success stories and memorable case studies in outreach efforts	High	Easy	Consumer Protection Agencies, Energy Code Ambassadors
☐ Post signage about energy code at all town halls, libraries, town buildings, box stores, town transfer stations etc. (readable/fun)	High	Easy	Municipalities, Energy Code Ambassadors
☐ Avoid using technical code language in outreach efforts	High	Easy	Municipalities, Energy Code Ambassadors
☐ Partner with the local media to develop and publicize residential energy code video spotlights	High	Mid	Municipalities, Energy Code Ambassadors
☐ Develop innovative public awareness campaigns and public service announcements	High	Easy	Energy Code Ambassadors, Leveraging
☐ Teach homeowners that they need to ask for at least the most up-to-date energy code requirements (they are their own best advocate)	High	Mid	Consumer Protection Agencies, PUC, DOS, Energy Code Ambassadors
✔ NHBCC Project recommends leveraging and continuing the outreach and education efforts, targeting homeowners with PSAs, highlighting the $1 to $6 investment to benefit ratio of code enforcement	High	Easy	Municipalities, Energy Code Ambassadors, Leveraging
Assumes that all new construction meets basic code	Building owners may assume all new buildings are automatically built to code; Building owners may assume building professionals are responsible and being checked by enforcement methods; Owners may believe that energy code issues have little consequence and/or impact; Homeowners may not know what energy features to look for when evaluating a home; Not a lot of visibility or 'call' for energy code features; When buying or renovating, there are many other complicated issues to worry about		
"Live Free or Die" mentality	NH general public resistant to oversight or mandates (NH State Constitution 28A); NH general public historically possess a very independent, "do-it-yourself" attitude; General public may be complacent regarding energy issues		
Recommendations:			
☐ Run local "Exposure/60 Minutes style or Discovery Channel" documentaries	High	Mid	Municipalities, Energy Code Ambassadors

☐ Promote public outreach and education including targeted messaging highlighting the fact that energy codes help protect the largest investment most individuals make (connection to consumer protection laws) and the cost to communities of buildings that fail to meet the energy code	High	Easy	Consumer Protection Agencies, Energy Code Ambassadors, Leveraging
☐ Develop consumer protection and public trust initiatives	High	Easy	Consumer Protection Agencies, Energy Code Ambassadors
☐ Encourage insurance companies to decline coverage if a house is not signed off by code official	Mid	Hard	Insurance Industry, PUC, DOS, NHBOA

Lack of public outreach and awareness when codes are updated	No knowledge that codes are updated; If homeowners/general public don't know codes are updated, they won't expect it and won't ask about codes; Lack of role modeling and educational material and guidance (pamphlets, internet/websites, presentations, newsletters, etc.) regarding energy code
Lack of awareness of energy code requirements and compliance methods	Homeowners/general public may lack the motivation to understand energy code requirements or may be put off by the technical nature of the energy code; Lack consumer information on why, where, when, and how to verify compliance with the energy code in a new or renovated buildings

Recommendations:

☐ Increase outreach and education, focusing on the benefits of code-compliant buildings to the public/community (make it interesting/fun)	High	Easy	Consumer Protection Agencies, Energy Code Ambassadors
☐ Improve visibility about code cycle changes	High	Easy	PUC, DOS, BCRB, HBRA, Consumer Protection Agencies, Energy Code Ambassadors
☐ Increase publicity about code updates and the implications for each market actor	High	Easy	PUC, DOS, BCRB, HBRA, Consumer Protection Agencies, Energy Code Ambassadors

Understanding about energy code cost savings	Homeowners may assume that the return-on-investment (ROI) for energy efficiency features is small; Short-term owners may not reap the long-term economic benefits of energy code-compliant houses			
Focused on initial costs	Homeowners may not see energy code requirements as investments; Homeowners may be concerned with high initial costs versus operational/lifetime costs or payback periods; Homeowners may lack the motivation or knowledge to calculate lifetime costs or payback periods; Homeowners move every five years			
Competition for capital	Competing household priorities; Would rather invest in fancy countertop or hot tub than "what is behind the wall"; Tradeoffs regarding costs and profits associated with building structure, systems, and features			
Recommendations:				
☐ Provide analysis on operational costs over time with energy cost variables		High	Mid	BCRC, PUC, DOS, OEP, Leveraging
☐ Empower the consumer to understand and expect better performing buildings		High	Mid	Consumer Protection Agencies, Energy Code Ambassadors
☐ Promote Do-It-Yourself (DIY) programs to connect people with energy projects - ButtonUp, StayWarm, others		High	Mid	Utilities, PUC, DOS, HBRA
Lack access to resources and tools	Lack of available and inexpensive guidance documents, tools, and other energy code information materials			
Recommendations:				
☐ Develop graphics-heavy guide and cheat sheets (checklists) specially designed for homeowners and the general public addressing most critical energy code issues		High	Easy	PUC, DOS, BCRB, Collaborative, Leveraging Regional/National
☐ Increase exposure to effective tools and techniques for new energy efficient buildings or renovations		High	Easy	PUC, DOS, HBRA, BCRB, Collaborative, Leveraging Regional/National
✔ The NHBCC Program recommends leveraging the resources, checklists, tools, and Ask-the-Expert blog developed through the program and posted on the NH Energy Code Website		High	Easy	Municipalities, Energy Code Ambassadors, Leveraging
Awareness of new code technologies and techniques	Homeowners may be hesitant to buy or endorse new technologies and techniques and/or may be comfortable with existing practices; Lack of "whole system" thinking necessary to integrate new technologies			

Potential for technology to perform poorly and unintended consequences	History of new energy efficient products and equipment overstating benefits and/or underperforming; History of unintended consequences when implementing energy efficient products and techniques (e.g. increasing the air tightness of a building while not addressing altered ventilation requirements leads to moisture/indoor air quality problems)			
Recommendations:				
☐ Use outreach and educational avenues to periodically feature new and proven technologies from a respectable source		High	Mid	BCRC, PUC, DOS, OEP, HBRA, Leveraging
☐ Encourage educators and training programs to emphasize the "whole-systems" approach building design		High	Easy	ICC, PUC, BCRB, HBRA, Utilities, CCSNH, BPI, Energy Code Ambassadors
☐ Brand a "code-compliant" label to affix on qualified products		High	Hard	PUC, DOS, Legislature, Energy Code Ambassadors, Leveraging
☐ Provide forum for homeowners and the general public to ask and discuss energy code questions		High	Mid	PUC, DOS, BCRB, HBRA, OEP, Energy Code Ambassadors
Friction with building trades and code officials	Homeowners may not feel comfortable challenging the builder or others for superior performance; Code official often portrayed as the "bad guy", not the occupant advocate; Existence of historic friction between tradesmen, code official, and the homeowner			
Recommendations:				
☐ Promote code official as advocates for the building occupant		High	Easy	NHBOA, PUC, DOS, Consumer Protection Agencies
☐ Encourage the inclusion of customer service philosophy in code official training		High	Easy	NHBOA, CCSNH, PUC, DOS, BCRB

End goal: NH homeowners and the general public demand buildings that are built to meet or exceed the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Equipment Suppliers, Distributors, Manufacturers

Equipment suppliers, distributors, and manufacturers of construction equipment and supplies have a strong impact on the residential and commercial building markets. This group influences construction costs and the availability of materials necessary for building energy code compliant structures.

90% Compliance by 2017

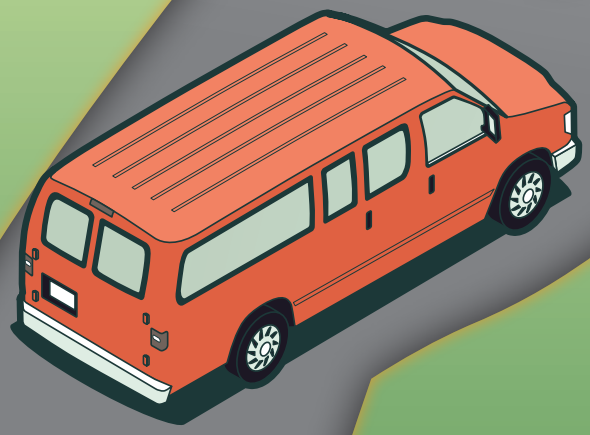
Top Energy Code Compliance Barriers

Lack of Public Outreach and Consumer Awareness

New code compliant products perceived as novel and therefore, costly; Store staff/general public unaware of code requirements and may deem new compliant products as "unnecessary"; General lack of educational materials and guidance

Product Development Reactive to Market/Consumer Demand

Consumer and market demands dictate equipment and products manufactured; Little incentive to introduce new products if sales are stable with baseline product



High Priority Recommendations

✔ **CRITICAL: Work with equipment suppliers** to promote code compliant products with better shelf space, branding, and sales efforts. (PUC, DOS, HBRA, Trade Organizations, Energy Code Ambassadors)

✔ **Increase outreach and education** to equipment suppliers, distributors and manufacturers on the benefits of code compliant products and encourage attendance at energy code workshops. (Consumer Protection Agencies, PUC, DOS, HBRA, Utilities, CCSNH, Energy Code Ambassadors)

✔ **Increase outreach and education efforts** to equipment suppliers, distributors, and manufacturers, encouraging them to be proactive players in the market. (Consumer Protection Agencies, PUC, DOS, HBRA, Utilities, CCSNH, Energy Code Ambassadors)

✔ **Brand a "code compliant" label** to affix on qualified products and train staff to promote code compliant labeled products. (Consumer Protection Agencies, PUC, DOS, HBRA, Utilities, CCSNH, Energy Code Ambassadors)

Equipment Suppliers, Distributors, and Manufacturers

Suppliers, distributors and manufacturers of construction equipment and supplies have a strong impact on the residential and commercial construction markets. This group influences construction costs and the availability of material necessary for building energy code-compliant structures. When engaged effectively, this relatively small market actor group has the potential to influence the awareness of both building professionals and the general public.

Engagement of this market actor group will be a key component of achieving compliance with energy code requirements in homes and buildings. As shown in Table 11, there are a number of barriers to energy code compliance that exist within this market actor group and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into a number of categories including:

- Behavioral situations (resistance to new products, reactive to market),
- Limited knowledge and awareness (general awareness, detailed training/skills),
- Reactive to the market (comfortable with baseline product).

Table 11. NH Equipment Suppliers, Distributors, and Manufacturers – Barriers Recommendations

Barriers	**Specifics**	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
Challenge for new products to break into the market	New code-compliant products perceived as novel and therefore, costly; History of new energy efficient products overstating benefits and/or underperforming			
Recommendations:				
☐ Work with equipment suppliers to promote code-compliant products with better shelf space, branding, and sales efforts		High	Mid	PUC, DOS, Legislature, HBRA, Trade Organizations, Energy Code Ambassadors, Leveraging
☐ Initiate or bolster consumer protection efforts to encourage early adopters		Mid	Mid	Consumer Protection Agencies, Energy Code Ambassadors
☐ Provide "workshops" at distribution centers/ homecenters so that builders and trades can learn effective/code-compliant techniques (Examples: plumbers learn how to program new boilers, or contractors learn how to smear on mastic, etc.)		Mid	Mid	PUC, DOS, Utilities, HBRA, CCSNH

Lack of incentive to pioneer new products	Market for energy efficient products is emergent and therefore, unstable; Shelf space is limited and competitive; There is little incentive to introduce new products if sales are stable with a baseline product; Suppliers must clear inventory before switching over to new products		
Recommendations:			
☐ Outreach to market players and encourage them to make available code compliance products	Mid	Mid	PUC, DOS, Legislature, HBRA, Trade Organizations, Peer-to-Peer, NH's ButtonUp Program, Energy Code Ambassadors
☐ Encourage efforts to transform the product market	Mid	Hard	Legislature, PUC, DOS, Legislature, HBRA, Trade Organizations, Energy Code Ambassadors
Some stores stock non-code-compliant products and sell cheapest available product	Code compliance requirements are not checked during the procurement process; Central administration, management, and staff are not motivated to promote better products; Staff may have worked "in the field" in a past trade and be unaware of the 2009 requirements, therefore report these products as "unnecessary"		
Recommendations:			
☐ Engage in outreach to educate central administration and managers to the energy code requirements and benefits of code-compliant products	High	Mid	Consumer Protection Agencies, Energy Code Ambassadors
☐ Develop procedures to stock code-compliant products first (only allow non-compliant products to be special ordered)	Mid	Mid	Industry Organizations, Energy Code Ambassadors
☐ Develop demonstrations to train equipment supplier staff to promote better code-compliant products	Mid	Mid	Consumer Protection Agencies, Energy Code Ambassadors, Leveraging

☐ Brand a "code-compliant" label to affix on qualified products (train staff to promote code-compliant labeled products)	High	Hard	Consumer Protection Agencies, PUC, DOS, Legislature, Energy Code Ambassadors, Leveraging
☐ Work with equipment suppliers to promote code-compliant products with better shelf spaces, branding, and sales efforts	High	Mid	Consumer Protection Agencies, PUC, DOS, Legislature, Energy Code Ambassadors, Leveraging
Production and distribution is reactive to market, consumer driven	Consumer and market demands dictate equipment and products manufactured; Distributors and suppliers stock equipment and products that market analysis suggests will be popular		
Recommendations:			
☐ Engage in outreach efforts to educate equipment suppliers, distributors and manufacturers to be proactive players in the market	High	Easy	Consumer Protection Agencies, PUC, DOS, Legislature, Energy Code Ambassadors, Leveraging
☐ Develop energy code inserts for product catalogs (climate zone specific)	Mid	Easy	Consumer Protection Agencies, PUC, DOS, Legislature, Energy Code Ambassadors, Leveraging
Lack of public outreach and consumer awareness	Lack of educational material and guidance (pamphlets, internet/websites, presentations, newsletters, etc.)		

Recommendations:			
☐ Increase outreach and education, and encourage attendance at energy code workshops	High	Easy	PUC, DOS, HBRA, Utilities, CCSNH, Energy Code Ambassadors
☐ Avoid using technical code language in outreach efforts	High	Easy	Energy Code Ambassadors
✔ NHBCC Project recommends leveraging and continuing the outreach and education efforts, targeting NH's equipment suppliers, distributors and manufacturers with drop flyers for workshops, fact sheets, and public service announcements highlighting the $1 to $6 investment to benefit ratio of code enforcement	High	Easy	Energy Code Ambassadors, Leveraging

End goal: NH equipment suppliers, distributors, and manufacturers provide products that meet or exceed the code, resulting in at least 90% compliance with the NH building energy code by 2017.

"Hard to Reach" Communities

NH's "hard to reach" communities include remote and extreme communities, impoverished communities, and minority communities throughout the state. It is essential to bring these groups into the energy code dialogue to ensure that energy code compliance issues are not ignored within these communities.

90% Compliance by 2017

Top Energy Code Compliance Barriers

Limited Knowledge/Awareness

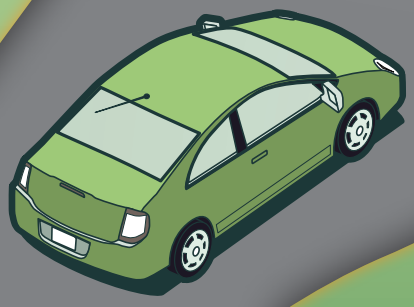
Lack of awareness of the benefits of energy code compliant buildings; Lack of trained professionals

Lack of Funding and Resources

Lack of adequate budget to cover energy code enforcement; Higher priority to provide basic community services; Building materials and resources may be limited in remote locations

General Public Sentiment

Remote dwellers historically have an independent, "do it yourself" attitude; There may be fear of gentrification in some communities



High Priority Recommendations

✔ **CRITICAL: Promote targeted public outreach** and education focusing on energy and money saved, comfort, and durability of code compliant homes. (Consumer Protection Agencies (NH Legal Assistance), Energy Code Ambassadors)

✔ **Tie higher building performance** to other issues that need attention such as job training and economic development. (CCSNH, HBRA, CAP Agencies, Utilities, Public/Private Partnerships, NHDOL)

✔ **Increase the availability of building materials** and resources and promote code compliant building techniques and products. Consider sampling new products in local hardware stores. (Consumer Protection Agencies, Manufacturers, Distributors, Energy Code Ambassadors)

✔ **Develop community buy-in** and train from within the community. In training efforts, work with CCSNH or other workforce development initiatives to develop training and internship programs. (CCSNH, HNBA, CAP Agencies, Utilities, Public/Private Partnerships, NHDOL)

✔ **Develop volunteer/grassroots groups,** starting with StayWarm NH, ButtonUP, Local Energy Committees, or similar models. (Utilities, Clean Air-Cool Planet, OEP, PUC)

NH's "Hard to Reach" Communities

NH's hard to reach communities include remote and extreme communities, impoverished communities, and minority communities throughout the state. It is essential to bring these groups into the energy code dialogue to ensure that energy code compliance issues are not ignored within these communities.

Engagement of these groups are an important component of achieving compliance with energy code requirements. As shown in Table 12, there are a number of barriers to energy code compliance that exist within these "hard to reach" communities and a number of corresponding recommendations to potentially overcome these barriers. These barriers can be grouped into a number of categories including:

- Resource limitations (competing priorities, funding, guidance, resources, etc),
- Limited knowledge and awareness (general awareness, misinformation),
- Behavioral situations,
- General public sentiment,
- Friction (other communities, code officials, trades).

Table 12. "Hard to Reach" Communities – Barriers and Recommendations

Barriers	**Specifics**	**Priority** (Low, Mid, High)	**Deploy** (Easy, Mid, Hard)	**Champion** (Leader?)
Remote/Extreme NH Communities	Buildings in remote areas may not use building plans and/or may be build with whatever materials are available; Advanced building products may be hard to come by; Remote dwellers historically have an independent, "do it yourself" attitude; Remote areas are hard to physically access, which means travel time to inspect is costly			
Recommendations:				
☐ Make resources more widely available and promote availability		High	Hard	Consumer Protection Agencies, Energy Code Ambassadors
☐ Promote stronger building techniques, products and materials that target this audience		High	Mid	Consumer Protection Agencies (NH Legal Assistance), Energy Code Ambassadors

☐ Avoid using technical code language in outreach efforts	High	Easy	Consumer Protection Agencies, (NH Legal Assistance), Energy Code Ambassadors
☐ Focus on the energy and money saved, comfort, and durability of code-compliant homes in outreach efforts	High	Easy	Consumer Protection Agencies (NH Legal Assistance), Energy Code Ambassadors
☐ Focus public outreach, education and product samples on small town's hardware stores and general stores	High	Mid	Product Developers, Distributors, Energy Code Ambassadors
☐ Develop and promote Ask the Expert program, where interested parties can ask questions about building science, new products, code requirements, etc	High	Mid	Consumer Protection Agencies (NH Legal Assistance), Energy Code Ambassadors, Leverage UNH Energy Answers
Impoverished Communities	Impoverished communities may lack an adequate budget to cover energy code enforcement; There may be a higher priority to provide basic community services; Lack of trained professionals (visibility and infrastructure); Little role-modeling available		
Recommendations:			
☐ Develop community buy-in and train from within community	High	Mid	CAP Agencies, Consumer Protection Agencies (NH Legal Assistance), Energy Code Ambassadors

☐ Build visible and community centric model homes that fit local vernacular	Mid	Mid	HBRA, Habitat for Humanity, CAP Agencies, PUC, DOS, NHBOA, OEP
☐ Develop volunteer/grass-roots groups, starting with StayWarmNH, ButtonUp, or similar models (neighbors helping neighbors)	High	Mid	Utilities, Clean-Air-Cool-Planet, OEP, PUC
☐ Work with CCSNH or workforce development initiatives (capture youth entering industry – introduce what's important and why?)	High	Mid	CCSNH, PUC, HBRA
☐ Source grants for materials - basic winterizing	High	Mid	OEP, Manufacturers, Distributors
☐ Phase in better building products	High	Hard	Manufacturers, Distributors HBRA, ACEEE, ANSI, National Orgs
☐ Partner communities with product manufacturers for close-out products or donations	Mid	Hard	OEP, Manufacturers, Distributors
☐ Develop internship programs	High	Mid	CCSNH, HBRA, CAP Agencies, Utilities, Public/Private Partnerships, NHDOL
Minority Communities	Community ownership; Fear of gentrification (which would destroy community fabric), Other priorities; Economic stability; Lack of role-modeling; Benefits of better buildings is not on radar		
Recommendations:			
☐ Develop community buy-in and train from within community	High	Mid	CAPAgencies, Consumer Protection Agencies (NH LegalAssistance), Ambassadors
☐ Develop volunteer/grass-roots groups, starting with StayWarmNH, ButtonUp, Local Energy Committees or similar models (neighbors helping neighbors)	High	Mid	Utilities, Clean-Air-Cool-Planet, OEP, PUC

☐ Source grants for materials - basic winterizing	High	Mid	OEP, NH Charitable Foundation, Manufacturers, Distributors
☐ Tie better performing buildings to other issues that also need attention - job training and economic development via community members	High	Mid	CCSNH, HBRA, CAP Agencies, Utilities, Public/Private Partnerships, NHDOL
☐ Promote relevant and replicable success stories	High	Easy	CAP Agencies, Consumer Protection Agencies, Energy Code Ambassadors

End goal – NH "hard to reach" communities support buildings that are built to meet or exceed the code, resulting in at least 90% compliance with the NH building energy code by 2017.

Balance of the Report

This concludes Volume 1 of the NH Building Energy Code Compliance Roadmap report. Volume 2 of this report highlights The NH Building Code Compliance Program and provides in-depth detail on the methods, results, and relevant recommendations from each of the nine (9) tasks/goals and objectives of the project. Bound separately are the compilation of supporting documentation and appendices developed during the project and used to provide context for this NH Roadmap report.

www.nhenergycode.com

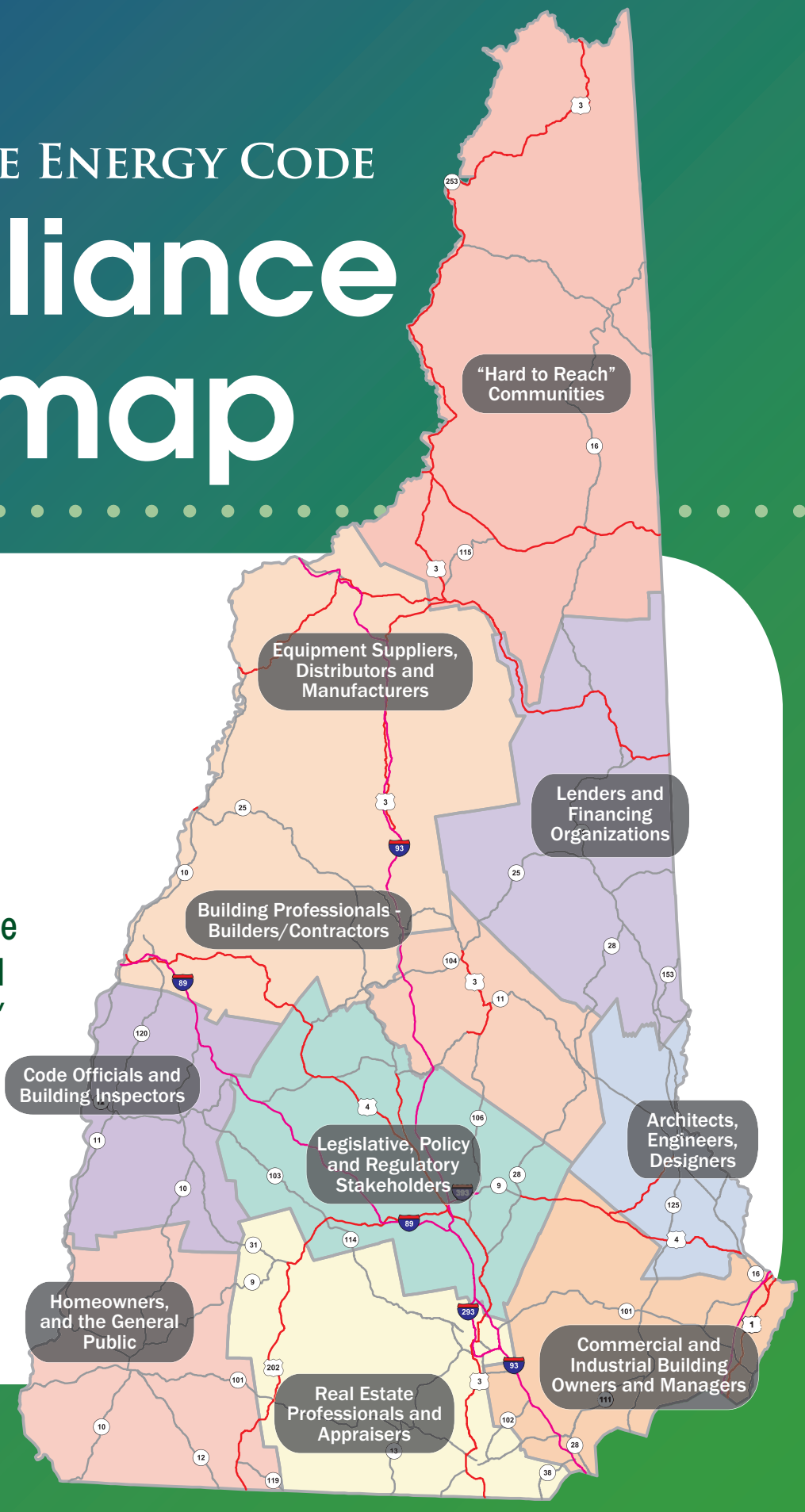
The Compliance Roadmap was created by GDS Associates, Inc. on behalf of the NH Office of Energy and Planning (via American Recovery and Reinvestment Act of 2009 funds).

New Hampshire Energy Code

Compliance Roadmap

Volume 2

"Achieving 90% Compliance with the 2009 International Energy Conservation Code"



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FEDERAL DISCLAIMER

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NOTICE

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ACRONYMS AND ABRIVIATIONS

American Institute of Architects (AIA)

American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE)

American Recovery and Reinvestment Act (ARRA)

American National Standards Institute (ANSI)

Association of Energy and Environmental Real Estate Professionals (AEEREP)

Building Energy Codes Program (BECP)

Building Codes Assistance Project (BCAP)

Community Action Program Agencies (CAP)

Community College System of NH (CCSNH)

Consumers Union (CU)

Department of Energy (DOE)

Energy Efficiency Sustainable Energy Board (EESE)

GDS Associates (GDS)

Illuminating Engineering Society of North America (IESNA)

International Energy Conservation Code (IECC)

Institute for Market Transformation (IMT)

International Code Council (ICC)

Leadership in Energy and Environmental Design (LEED)

National Association of Realtors (NAR)

NH Association of Realtors (NHAR)

NH Building Code Compliance Program (NHBCC Program)

NH Building Code Officials Association (BOA)

NH Building Code Review Board (BCRB)

NH Commercial Investment Board of REALTORS (CIBOR)

NH Department of Labor (DOL)

NH Department of Safety (DOS)

Home Builders and Remodelers Association of NH (HBRANH)

NH Office of Energy and Planning (OEP)

NH Public Utilities Commission (PUC)

NH Real Estate Appraiser Board (REAB)

NH Real Estate Commission (REC)

NH Residential Energy Code Application (EC-1 Form)

Northeast Energy Efficiency Partnerships (NEEP)

Pacific Northwest National Laboratory (PNNL)

Program Logic Model (PLM)

Public Service Announcement (PSA)

Responsible Energy Codes Alliance (RECA)

State and Local Energy Efficiency Action Network (SEE Action)

State Energy Program (SEP)

System Benefits Charge (SBC)

The NH Building Code Compliance Program

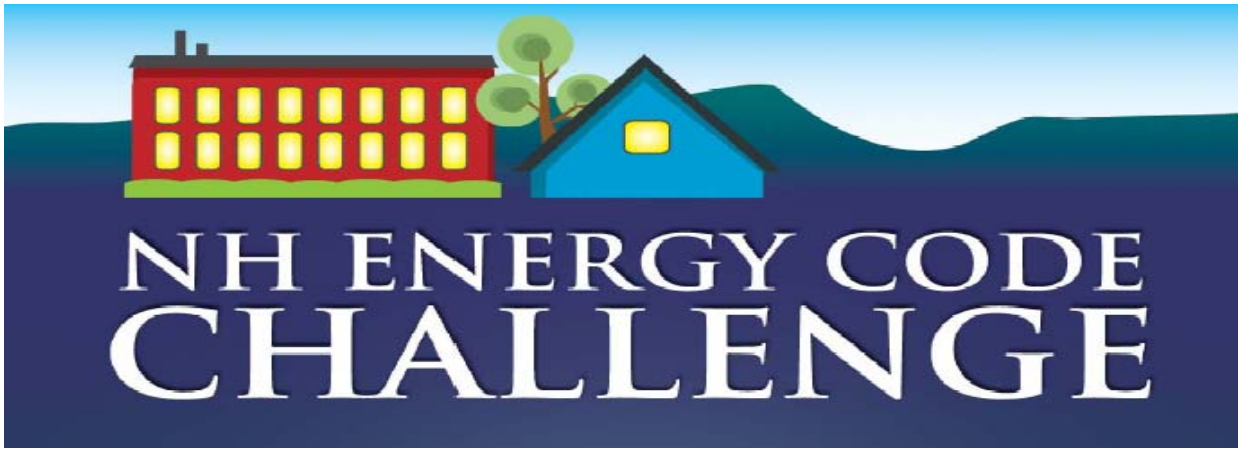
Introduction

In the United States, buildings use more energy and emit more carbon dioxide than either the industrial or transportation sectors. According to the U.S. Department of Energy (DOE), the single most important step to reducing energy use in buildings is to implement and enforce compliance with building energy codes.[1] Despite this fact, the DOE has acknowledged that building energy code compliance levels remain very low around the nation.

In response to the American Recovery and Reinvestment Act (ARRA), many state governors across the U.S. sent letters of assurance regarding energy codes to the U.S. Secretary of Energy.[2] Specifically, these assurances called for the development of plans to achieve 90% compliance with the 2009 International Energy Conservation Code[1] (2009 IECC) for residential buildings and ANSI/ASHRAE/IESNA Standard 90.1–2007 for commercial buildings (or equivalent codes) by the year 2017. Among the governors to make this assurance in 2009 was New Hampshire's Governor John Lynch. For New Hampshire, this assurance met a federal condition for the state to receive $25.8 million in ARRA – State Energy Program (SEP) stimulus funding.[3]

In support of meeting this condition, the state earmarked $600,000 of ARRA-SEP funding to initiate the NH Building Energy Code Compliance Program ("NHBCC Program"), a comprehensive effort to gather baseline energy code compliance information, increase public awareness, and develop an action plan (a "roadmap") to identify NH-specific recommendations for meeting the 90% compliance commitment by 2017.

Through a competitive bidding process, GDS Associates, Inc (GDS) was awarded a contract to administer the activities of the NHBCC Program. Working closely with the NH Office of Energy and Planning (OEP) and numerous other key stakeholder groups, GDS deployed a state-wide initiative publically branded "The NH Energy Code Challenge".



[1] U.S. Department of Energy, Building Energy Codes Program 2011 Annual Report "*Development, Adoption, Compliance – Building Greater Energy Efficiency"*, page 9.

[2] U.S. Department of Energy's Building Energy Code Program www.energycodes.gov

[3] The goals of the ARRA funded State Energy Program are to: (1) Increase energy efficiency, to reduce energy costs and energy usage for homes, businesses, and government; (2) Reduce reliance on imported energy; (3) Improve the reliability of electricity, fuel supply and the delivery of energy services; and (4) Reduce the impacts of energy production and use on the environment.

Project Scope

The NH Energy Code Challenge program was broken up into nine (9) key program tasks[4] as listed below:

1) Establish a baseline of energy code compliance in NH (both residential and commercial buildings), identifying roadblocks and solutions to improve compliance,
2) Create a roadmap to achieve 90% compliance with the NH state energy code (2009 IECC) by 2017,
3) Promote the program throughout the state to building and code professionals,
4) Train/mobilize building professionals for code compliance and promote above-code performance,
5) Develop a public awareness campaign for homeowners, landlords, commercial property owners, real estate professionals, and appraisers to understand the value of the energy code and above-code performance,
6) Update and gather building code resources in one publicly accessible site,
7) Develop recommended enforcement and compliance policy options for the 2009 IECC,
8) Establish a review process to monitor and track compliance under the 2009 IECC, and
9) Submit monthly reports to OEP to submit to the NH Office of Economic Stimulus, DOE, and the US Office of Management and Budget on data for number of jobs created/retained, trainings held, and people reached, and funding leveraged.

A key goal of this NHBCC Program has been to map out NH's existing energy code landscape, identify barriers to energy code compliance across the state's residential and commercial building sectors, and develop a plan of action outlining NH-specific recommendations for achieving 90% energy code compliance by 2017. This NH Building Energy Code Compliance Program Roadmap – Detailed Project Results Report provides extensive information regarding Program methodologies and results from each of the nine program activities listed above.

Throughout this project's two and one half year time span, substantial efforts were made to identify and pursue opportunities to work with and leverage resources across other leading local, regional, and national organizations with similar goals including: the US Department of Energy's (DOE's) Building Energy Codes Program (BECP), the Building Codes Assistance Project (BCAP), Consumers Union (CU) and Northeast Energy Efficiency Partnerships (NEEP), and the NH Utilities, state agencies, code officials, and trade organizations. In addition, this report was developed in close coordination with a NH Energy Code Stakeholder Advisory Panel (the make-up of which is discussed in more detail later in this report) that was formed and activated as part of the NHBCC Program effort. In its entirety, this report is organized into three separate volumes, each of which is intended to be read alone or in tandem with any other:

- The New Hampshire Building Energy Code Compliance Program Roadmap – Executive Summary, a high level introduction to why building energy codes are important, NH building activities, a NH Energy Code Compliance Navigation Plan, and an introduction

[4] NHOEP RFP to Develop a Building Code Compliance Program Relating to the 2009 IECC, 9/15/09, Pages 4 through 6.

to NH "market actor" groups, barriers, recommendations, and specific market actor "roadmaps" to achieve 90% compliance with the energy code by 2017,

- Volume 1: The New Hampshire Building Energy Code Compliance Program Roadmap Report – Market Actor Identification and Barrier and Recommendations Report, an overview of the project including the presentation of key stakeholders (impacted market actors), specific barriers and recommendations for progressing toward achievement of 90% compliance with the energy code by 2017;

- Volume 2: The New Hampshire Building Energy Code Compliance Program Roadmap – Detailed Project Report, a more in-depth description of the nine (9) NHBCC Program tasks, associated findings, and more detailed recommendations directly resulting from these activities; and

- Bound Separately: The New Hampshire Building Energy Code Compliance Program Roadmap Report – Supporting Documentation and Appendices, providing materials and supporting documentation developed through the NHBCC Program and other relevant materials developed by federal, national, regional, and local organizations reviewed for this report.

Program Tasks

The sections below detail the nine (9) key tasks of the NHBCC Program. Each section presents the goals and objectives of the task, the methods used, task results, leveraged resources (where applicable) and NH-specific recommendations for meeting 90% compliance with the NH energy code by 2017.

Task 1. Establish a Baseline of Compliance

Establishing a baseline level of energy code compliance in NH was an important first step of this project. This effort had challenges of its own, including the project's work plan-approved reliance on self-reported responses from surveys completed by code officials, as opposed to using a more statistically valid (perhaps BECP-pilot tested and more costly, plans review and physical site inspections) approach for initial code compliance baseline determination. Results, however, from this project's survey effort proved to be very effective in gaining substantial insights regarding current levels of energy code compliance in the state and associated barriers, resource needs and existing practices. Compiled information has provided a solid foundation upon which this comprehensive energy code program and NH-specific roadmap toward achieving 90% compliance with the NH energy code has be based.

Methodology

In 2010, GDS conducted a NH Code Compliance Perception Survey of local code officials. This survey updated a previous (2006) telephone survey of NH Building Code Officials regarding current compliance with the NH Building Energy Code.[5] These survey results provided self-reported perceptions from building code officials throughout the state and were combined with

[5] *NH Residential Energy Code, Findings of Phone Survey to Local Code Enforcement*, GDS Associates, November, 2006, PowerPoint Presentation

other activities in this NHBCC project as an initial step in compiling baseline information with respect to energy code compliance. Going forward, monitoring and tracking compliance with 2009 IECC in NH will require a more comprehensive and statistically valid process, based on consistent regional and nationally-tested and approved methodologies.

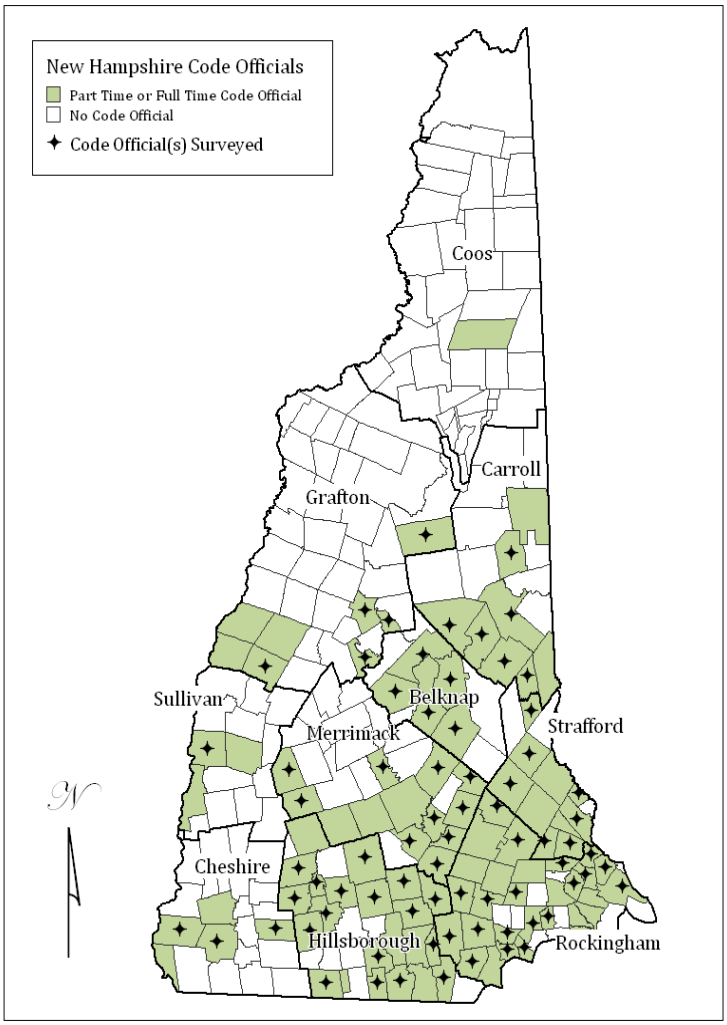
With the direct advisory support from GDS Team member, Wes Golomb (a former Energy Conservation Coordinator for the NH PUC), the task of establishing a baseline of energy code compliance began with reviewing all previous code compliance surveys and other relevant NH resources. Following the document review, the NHBCC Team met with the OEP and other key stakeholders to plan an updated survey and inventory of local code official compliance practices and associated barriers. This updated Code Officials Survey Instrument was administered between July and August 2010 (a copy of which is included as Appendix C). Code officials were asked questions about enforcement practices, barriers, and possible solutions in relation to both residential and commercial new construction and major renovations. Specifically, the 2010 survey focused on the following areas of interest:

- Code officials' level of involvement with energy code enforcement,
- Code officials' awareness of the new statewide energy code (IECC 2009/ASHRAE 90.1-2007),
- Identification of additional tools and training opportunities that would be useful, and
- Satisfaction with the energy code related assistance and support being currently provided from the NH PUC and the NH Department of Safety (DOS).

The survey was marketed to each of the 173 members of the NHBOA through individual phone calls and emails (with easy access to completion of the survey instrument through an internet link). Advance letters, to help increase awareness of the survey effort and spur responses was signed by the Director of the NH Office of Energy and Planning and sent to all targeted building code officials (see Appendix D for a copy of the advance letter). The survey was completed by 111 code officials, representing almost two-thirds of the NHBOA membership (representing nearly a 65% response rate).

In NH's rural areas, it is common for individual code officials (or the PUC or Fire Marshal's Office) to be responsible for multiple towns, whereas larger cities typically have more than one code official. Figure 1 shows the cities and towns with full-time or part-time code officials, and identifies the towns with code officials who completed the survey instrument.

Figure 1. New Hampshire Code Officials Surveyed 2010, Full and Part-Time



The data from the survey were used to estimate overall energy code compliance in the state of NH. Results were also used to develop an understanding of typical code official practices, and identify potential enforcement models and important barriers. The majority of responses were collected via web portal, though a limited number were also conducted over the phone using the same questions and coded responses. This facilitated the administration of the survey and allowed all responses to be easily aggregated in a consistent manner. It is important to note that the responses to the survey are self-reported by the code officials, and thus may be subject to some bias or inaccuracy.

Results

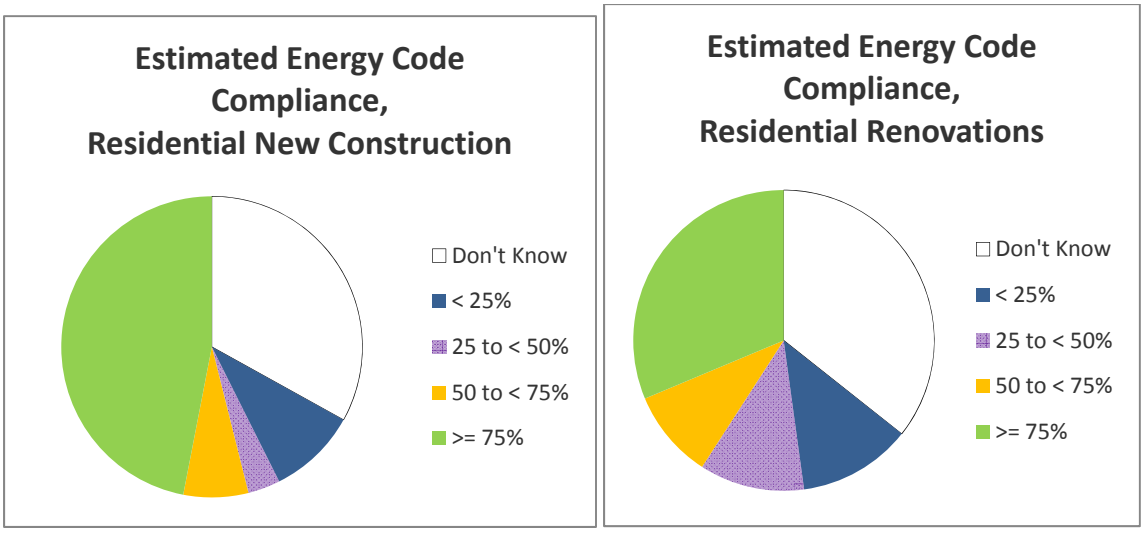
This section presents the results and baseline information garnered from the Code Officials Survey Instrument administered between July and August of 2010. Additional information on survey results can be found in Appendix E, which provides a copy of the PowerPoint slides used in a presentation given to the NH Building Energy Code Stakeholder Panel in October, 2010.

Residential Energy Code Compliance

In order to get an initial assessment of current energy code compliance levels in New Hampshire, Code Officials were asked to estimate the percentage of building activity within their city/town that were energy code compliant. For residential new construction activities in the state, as shown in Figure 2, over 46% of officials responded that at least 75% of new homes were energy code compliant.[6] Another key result of this question is the percentage of Code Officials who responded that they "didn't know" energy code compliance levels within their city/town. More than one-third of Code Officials indicated that they did not know the percentage of energy code compliant homes within their city/town; one official commented that: "I do not have any means of making this determination." This means that, as of the date of the survey (completed in 2010) more than 50% of the responding code officials either do not believe that energy codes are complied with at least 75% of the time, or do not know whether the residential new construction projects in their jurisdictions meet the state's energy code requirements.

This trend was even more pronounced for renovation projects. Less than one-third of Code Officials responded that 75% of renovation projects within their city/town were energy code compliant. Additionally, more than 35% indicated that they "Don't Know" energy code compliance levels within their city or town. This may be due to the fact that many renovations do not require a building permit or that building permits aren't sought and thus would not trigger a plans review or inspection, making it extremely difficult to estimate compliance levels. It should also be noted that many of the same biases identified in the results for new construction should also be taken into consideration when estimating energy code compliance for residential renovations projects. Based on these results, achieving 90% compliance rates will require significant effort.

Figure 2. Code Officials' Perception of Compliance (Residential New Construction and Renovations)

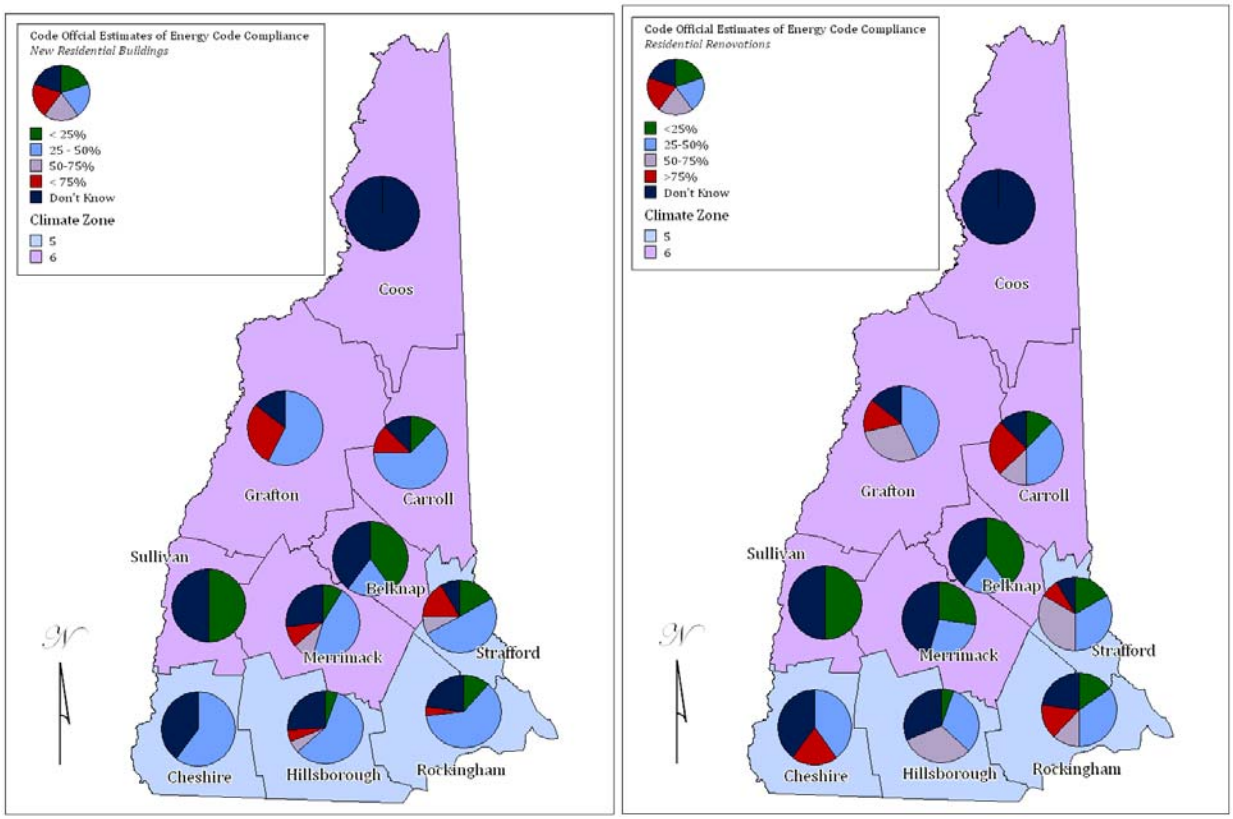


[6] There was some confusion among Code Officials regarding the definition of compliance. Though the question was intended to identify energy code compliance among the entire housing stock, some Code Officials' comments indicate that many interpreted the question as pertaining only to homes built since the adoption of the 2009 IECC. The survey results therefore represent a conservative estimate of IECC 2006 compliance but an overestimation of IECC 2009 compliance.

As shown in Figure 3, perceptions regarding levels of compliance with energy code vary dramatically, by county, across the state. Some comments received by responding code officials included the following:

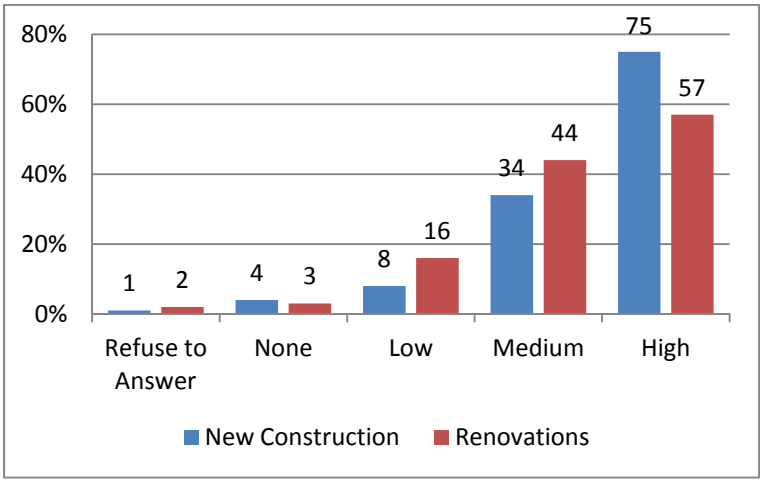
- "I do not have any means of making this determination."
- "The components that are reviewed at the plan stage are usually compliant."
- "I have not estimate as I am not permitted to do compliance inspections."
- "Debatable questions since we don't really know what 'comply' means."
- "Don't do a lot of new construction, mostly permit renovations."

Figure 3. Residential Energy Code Compliance – By County



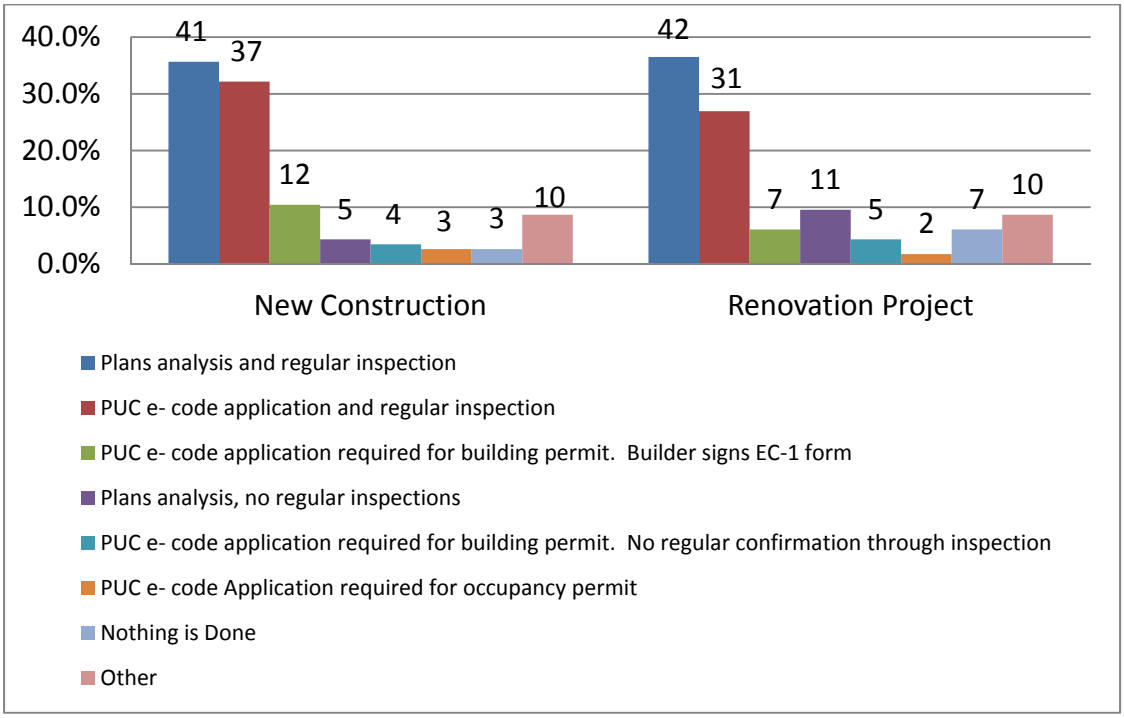
As shown in Figure 4, a majority of respondents reported that their towns had a high level of involvement in residential energy code compliance activities (60% report "high" for involvement in new construction activities, nearly 50% for renovation).

Figure 4. City/Town Involvement in Residential Energy Code Compliance Activities



Types of compliance practices reported by code officials included: plans analysis and regular inspection, PUC energy code applications and regular inspection, PUC energy code application required for building permit (with builder signing EC-1 form, see Appendix K), plans analysis with no regular inspections, PUC energy code application required for building permit with no regular confirmation through inspection, PUC energy code application required for occupancy permit. As shown in Figure 5, the most common energy code compliance implementation activity in NH cities and towns is plans analysis and regular inspections (implemented by approximately 35% of respondents for both residential new construction and renovation projects).

Figure 5. Certification Practices – Residential Projects

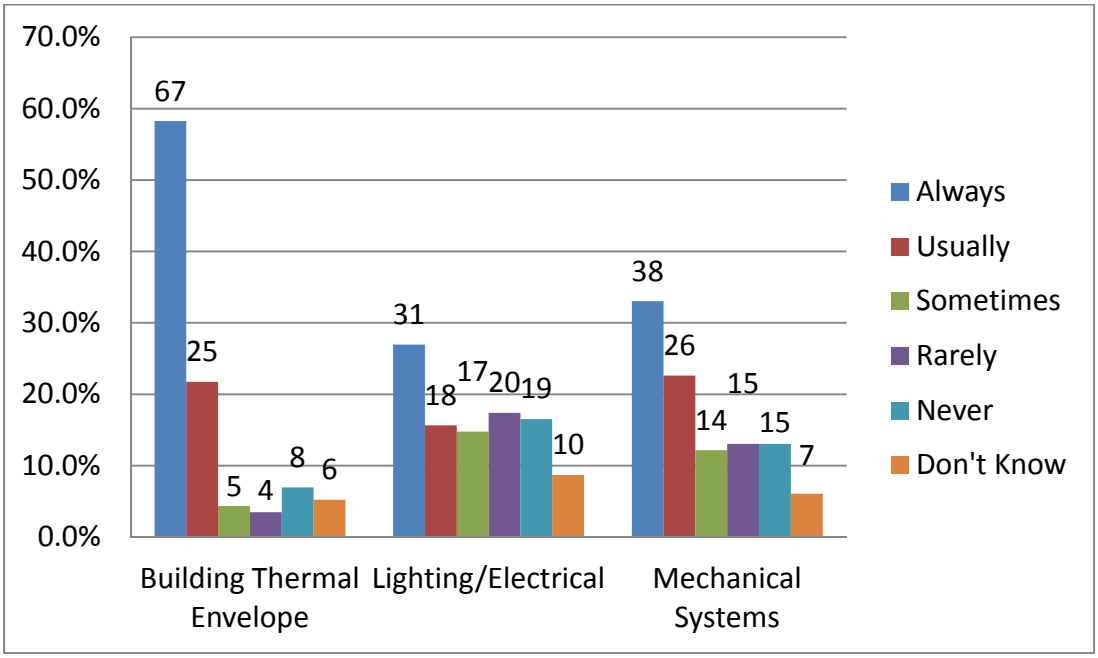


Some comments regarding code official's energy code compliance practices included:

- "When it comes to residential, the review depends on the complexity of the project."
- "Because of lack of resources (time and people) I used to only do inspections when asked."
- "I do not review building plans, but only require NH PUC compliance number."
- "Depending on how major the renovation project is would dictate how detailed the information we would require."
- "Site inspections are limited to R values of insulation, window U factors, gaps around window and door framing… the more complex inspections are done by a third party and or blower door test will be done for new construction."

Code officials were asked how often they conducted plans reviews for new residential projects, by building system (i.e., building thermal envelope, lighting/electrical systems, and mechanical systems). As shown in Figure 6, a majority of respondents (nearly 60%) reported always conducting plans reviews for building thermal envelope components of new residential projects. Just over 30% reported always doing so for mechanical systems, and under 30% reported "always" for lighting and electrical systems. This means that there remains a large number of building officials in the state that do not do plans reviews for specific systems as part of their energy code compliance activities for new residential projects. Similar trends, with even lower percentages, were found for residential renovation projects. Based on these results, achieving 90% compliance will require significant effort.

Figure 6. Frequency of Plan Review, by Residential Building System

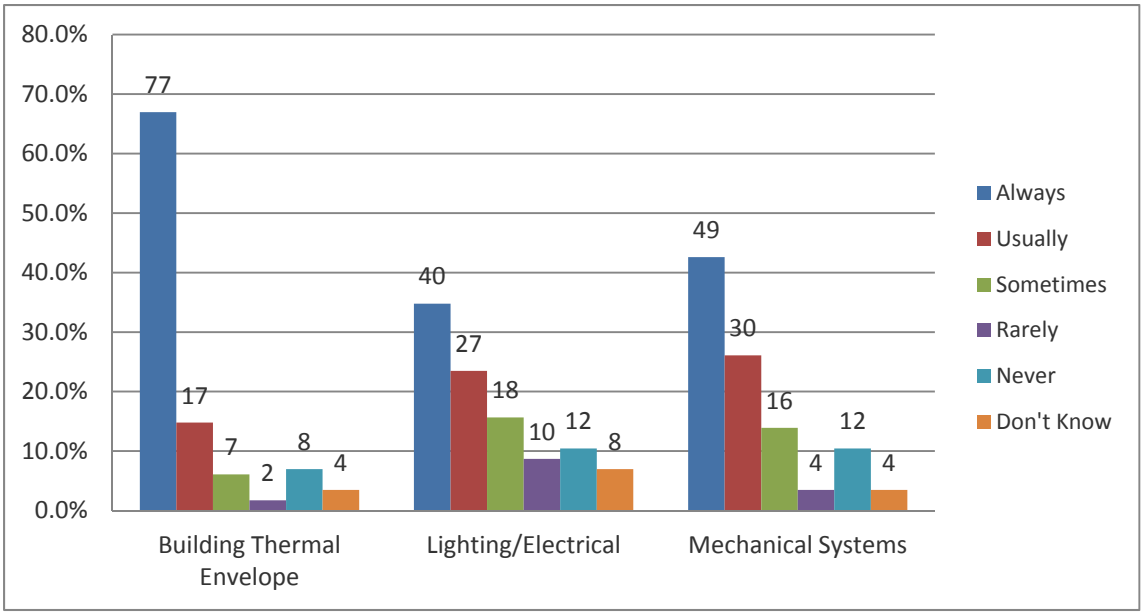


As shown in Figure 7, a majority of respondents (nearly 70%) reported always conducting on site inspections for building thermal envelope components of new residential projects. Approximately 50% reported always doing so for mechanical systems, and just over 40% reported "always" for lighting and electrical systems. This means that there remains a large number of building officials in the state that do not inspect mechanical and electrical systems as part of their energy code compliance activities for new residential projects. Similar trends, with lower percentages, were found for residential renovation projects.

Some comments regarding areas that code officials reported as being non-compliant included:

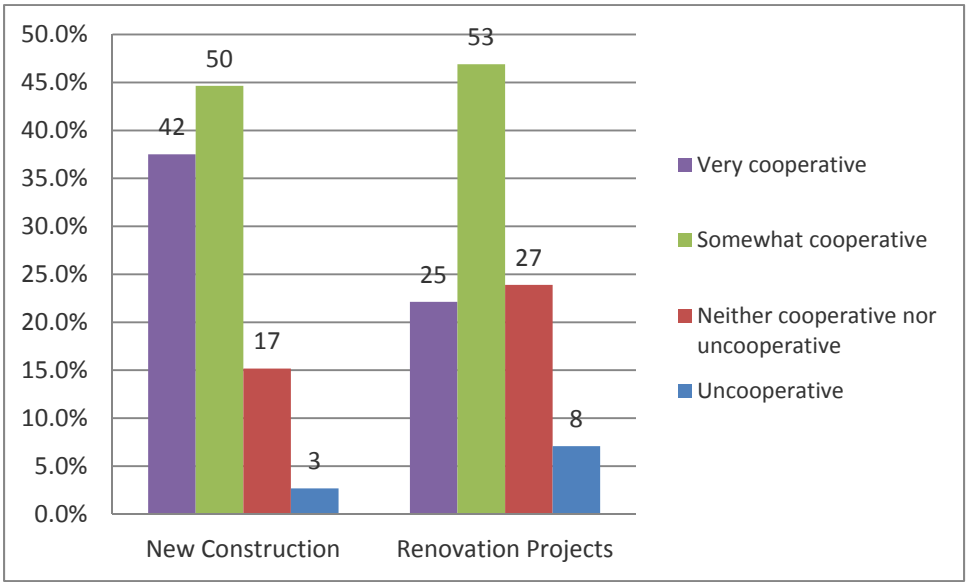
- "The whole attic/roof insulation with over-the-wall requirement gets 'em every time."
- "Insulation installation is poor, vapor barriers, fitting insulation."
- "The primary area of non-compliance is fire caulking or insulation around electrical boxes."
- "All of it! Builders have no clue about energy code."
- "People not aware of stringent requirements for mechanical equipment."

Figure 7. Frequency of On-Site Inspections, by Residential Building System



When asked how cooperative builders and contractors were in response to code official's oversight of energy codes for residential projects, as shown inFigure 8, over 80% reported residential new construction builder and contractors to be either "somewhat" or "very" cooperative. The positive response rate dropped a bit when asking this same question regarding residential renovation projects, with under 70% answering either "somewhat" or "very" cooperative. This means that substantial opportunities exist for increasing awareness and understanding of the requirements and importance for compliance with NH's residential energy code.

Figure 8. Energy Code Oversight – Builder/Contractor Cooperation

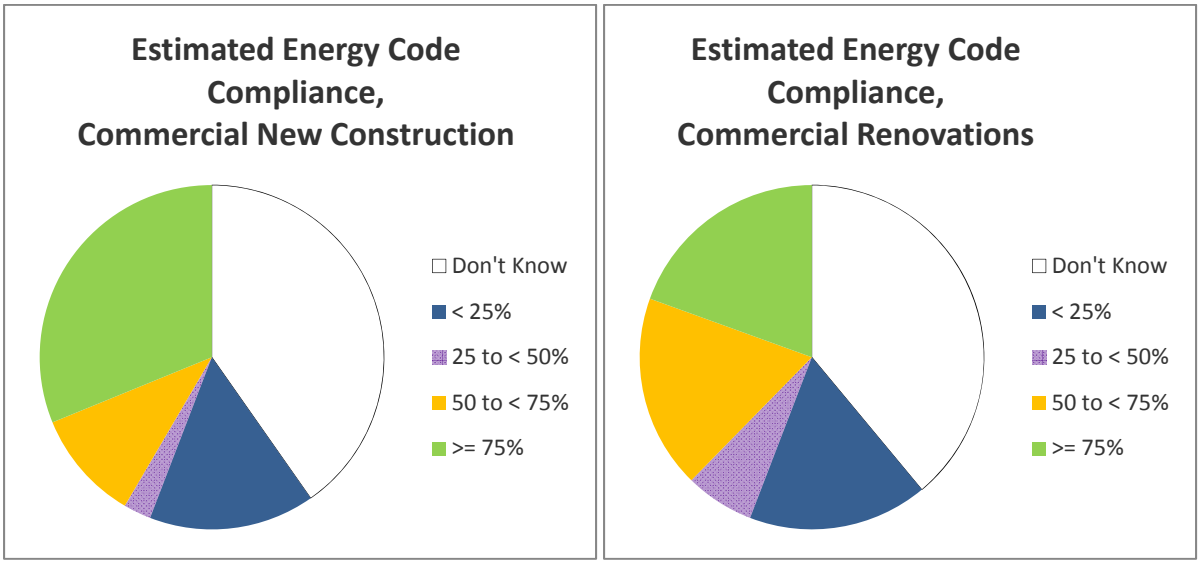


Commercial Energy Code Compliance

In order to better understand commercial, industrial and municipal (C/I/M) energy code compliance in New Hampshire, Code Officials were asked to estimate the percentage of non-residential buildings within their city/town that were energy code compliant. As shown in Figure 9, less than one-third of Code Officials surveyed responded that 75% or more of newly constructed C/I/M buildings in their cities/towns met energy code standards, and under 20% estimated code compliance for C/I/M renovation projects at 75% or greater.[7] For both new construction and renovation, the greatest portion, over 40%, of respondents indicated that they "didn't know" what percentage of buildings within their jurisdiction were energy code compliant. As with residential compliance, it is difficult to estimate code compliance, particularly for Code Officials with shorter tenures as the city/town code official and less experience on which they could base their estimate. One code official remarked: "[He had] very little quantifiable information upon which to form an opinion."

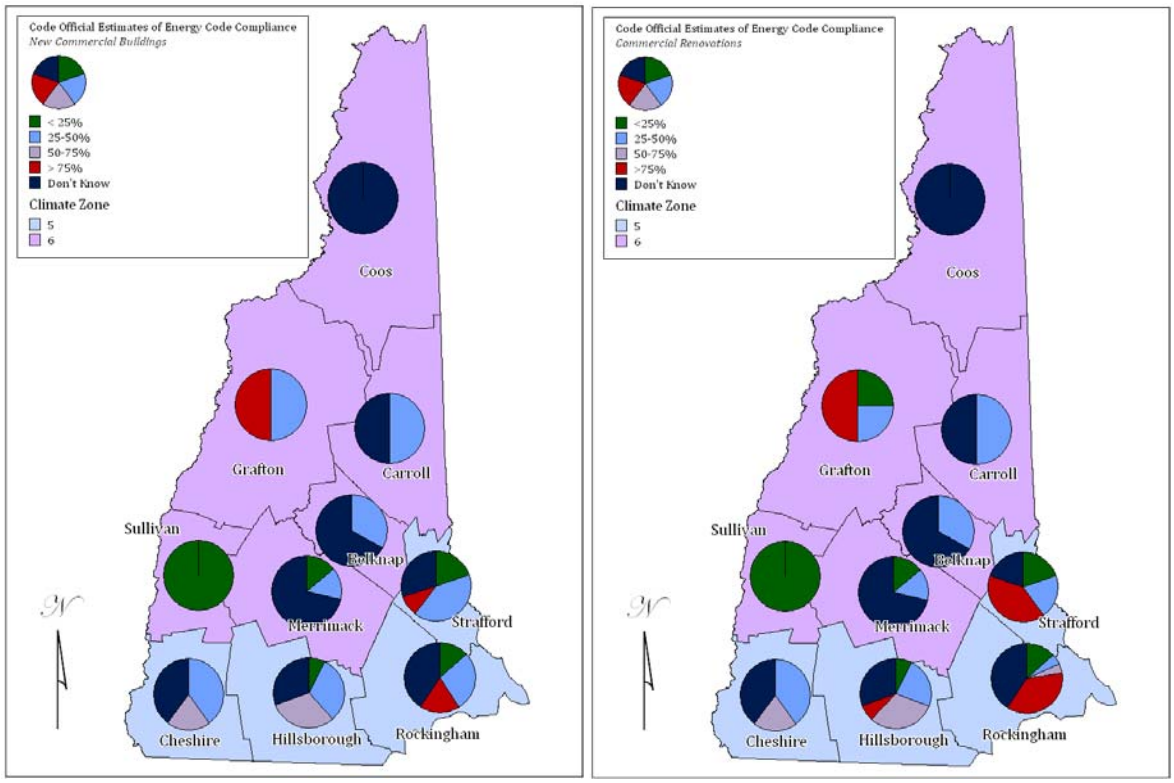
[7] It should be noted, however, that as mentioned in the previous section, a number of Code Officials interpreted the question as pertaining only to projects since the 2009 IECC went into effect, thus biasing the results.

Figure 9. Code Officials' Perceptions of Compliance (C/I/M Buildings New Construction/Renovations)



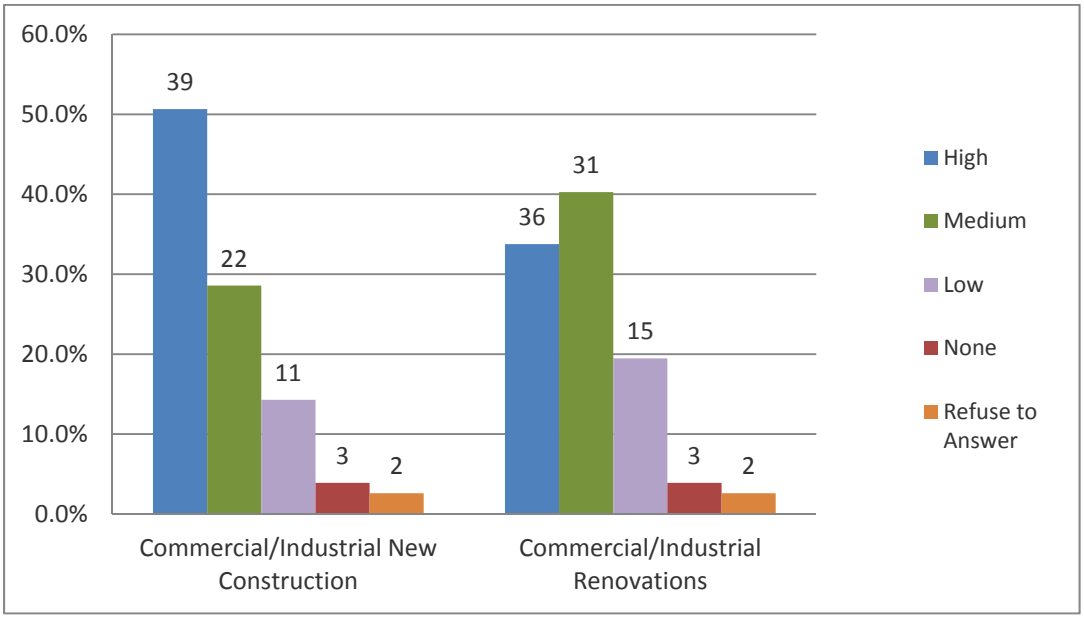
As with the residential sector, and shown in Figure 3, perceptions regarding levels of commercial building compliance with energy code vary dramatically, by county, across the state.

Figure 10. Commercial Energy Code Compliance – By County



As shown in Figure 11, a majority of respondents reported that their towns' had a medium to high level of involvement in commercial energy code compliance activities (nearly 80% report "medium" to "high" for involvement in new construction activities, nearly 75% for renovation).

Figure 11. City/Town Involvement in Commercial Energy Code Compliance Activities



Types of compliance practices reported by code officials included: inspector checks plans and regularly inspects for energy code compliance, PUC energy code applications required for building permit (with builder signing EC-1 form, see Appendix K), outside architects/engineers responsible for compliance (code officials not involved), PUC energy code application required for building permit with inspector regularly confirming through on-site inspection, inspector checks plans, but does not regularly inspect for energy code, PUC energy code application required for building permit with no regular confirmation through inspection, and PUC energy code application required for occupancy permit. The most common energy code compliance implementation activity in NH cities and towns is where the inspector checks plans and regularly conducts inspections (implemented by approximately 40% of respondents for new construction projects and 45% for renovation projects).

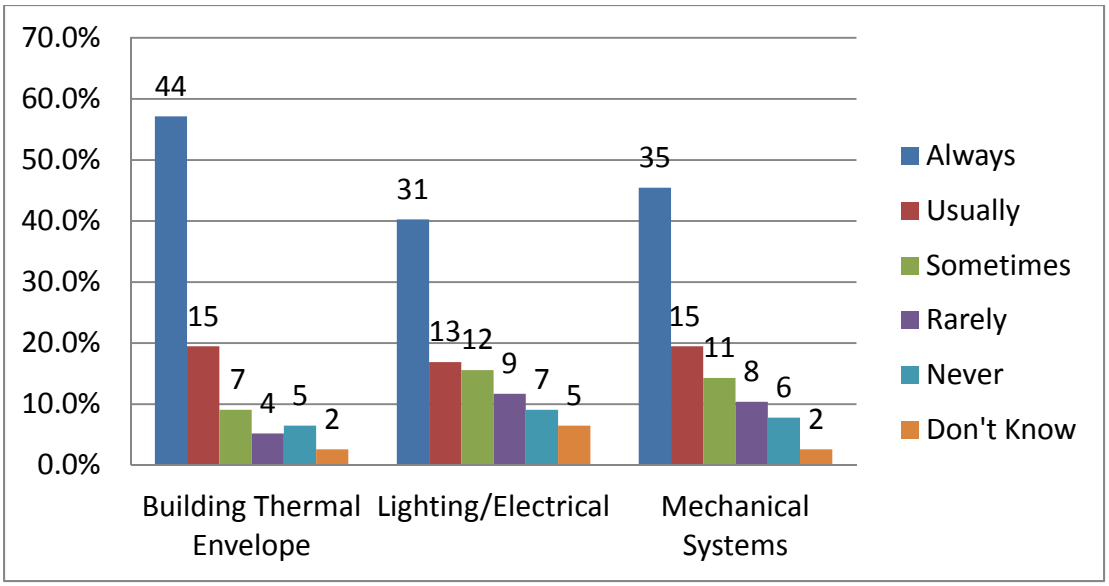
Some comments regarding code official's energy code compliance practices included:

- "No new commercial construction to date, we will follow residential procedures when we have applications to review."
- "[Applicants] don't really know how to use REScheck/COMcheck – and those two can be cheated."
- "When it comes to residential, the review depends on the complexity of the project."
- "New and major renovations typically have plans and details along with PUC approved affidavit from the architect or design engineer stating that the project complies with the energy code submitted with the application."
- "Other minor renovations may not have any of those details but are field inspected and verified."

Code officials were asked how often they conducted plans reviews for new commercial projects, by building system (i.e., building thermal envelope, lighting/electrical systems, and mechanical systems). As shown in Figure 12, a majority of respondents (over 55%) reported always conducting plans reviews for building thermal envelope components of new commercial

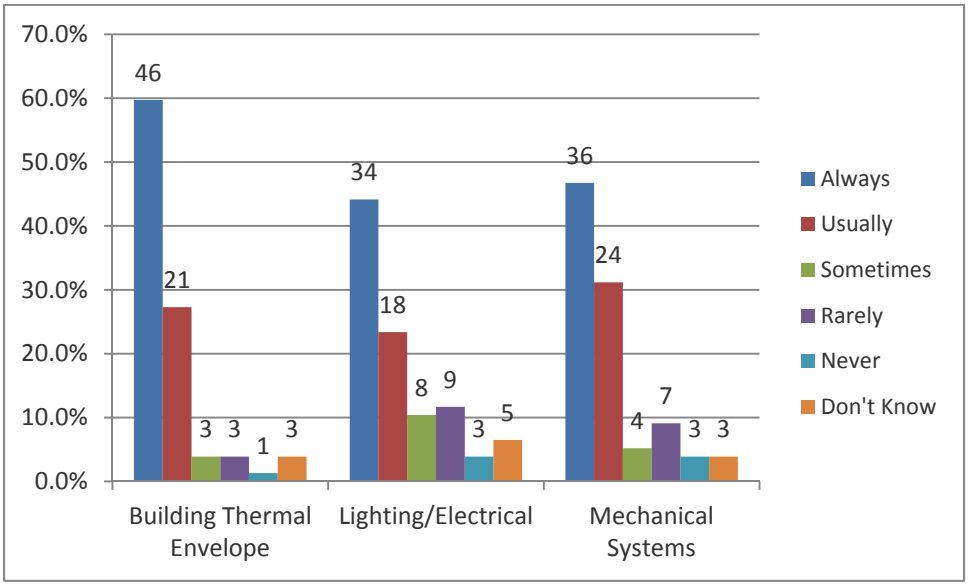
construction projects. Nearly 45% reported always doing so for mechanical systems, and 40% reported "always" for lighting and electrical systems. This means that there remains a large number of building officials in the state that do not do plans reviews for specific systems as part of their energy code compliance activities for new residential projects. Similar trends, with even lower percentages, were found for commercial renovation projects.

Figure 12. Frequency of Plan Review, by Commercial Building System



Code officials were asked how often they conducted on-site inspections for new commercial construction projects, by building system (i.e., building thermal envelope, lighting/electrical systems, and mechanical systems). As shown in Figure 13, a majority of respondents (nearly 60%) reported always conducting on-site inspections for building thermal envelope components of new commercial projects. Approximately 45% reported always doing so for mechanical systems and for lighting and electrical systems. This means that there remains a large number of building officials in the state that do not inspect mechanical and electrical systems as part of their energy code compliance activities for commercial new construction projects. Similar trends, with lower percentages, were found for commercial renovation projects.

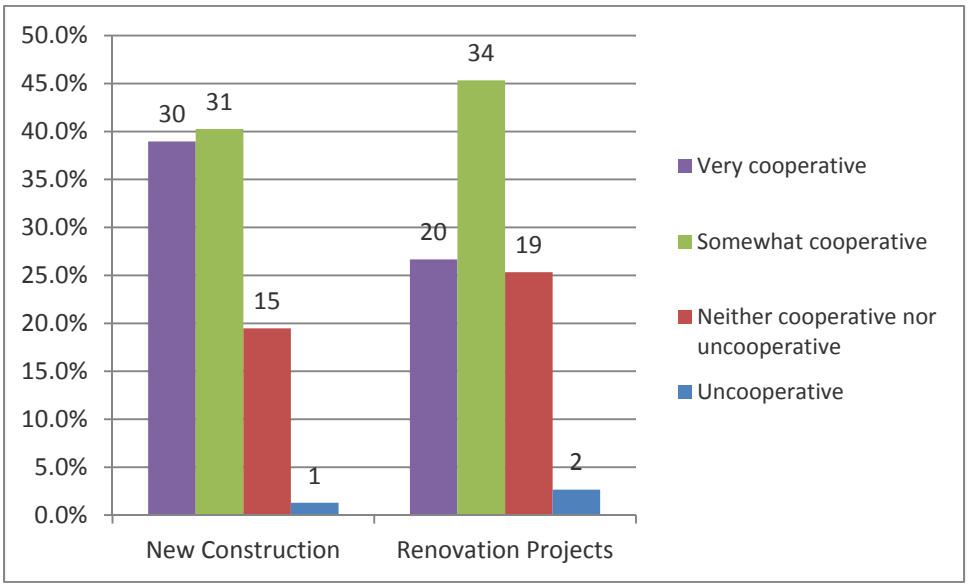
Figure 13. Frequency of On-Site Inspections, by New Commercial Building System



When asked how cooperative builders and contractors were in response to code official's oversight of energy codes for commercial projects, as shown in

Figure 14, nearly 80% reported commercial new construction builder and contractors to be either "somewhat" or "very" cooperative. Similar to the cooperative trend for residential projects, the positive response rate dropped a bit when asking this same question regarding commercial renovation projects, with just over 70% answering either "somewhat" or "very" cooperative. This means that, similar to the residential projects, substantial opportunities exist for increasing awareness and understanding of the requirements and importance for compliance with NH's commercial energy code.

Figure 14. Energy Code Oversight – Commercial Builder/Contractor Cooperation



Some comments regarding areas that code officials reported as being non-compliant included:

- "Situations where you have envelope issues – contractor making in-the-field adjustments that don't meet code."
- "Slab details and continuous envelopes seem to be a problem for architects to wrap their heads around."
- "Ductwork not always to code with mastic tape and insulation."
- "Not enough experience to answer."

Other Results from the 2010 Baseline Survey

Other results from the 2010 updated survey effort include information on years of experience and code officials' identification and assessment of potential market barriers to code compliance and energy code enforcement models. Code officials were also asked to rate their interactions with state agencies (i.e., the PUC and DOS) on energy code-related matters, and to assess their receptiveness to more stringent energy codes. Results from each of these areas are presented below.

Concerning code officials' experience, the majority of code official respondents (53%) reported having between one and seven years of experience. While 21% each reported have between 8 to 14 years and more than 15 years experience and approximately 5% report having less than 1 year of experience on the job.

Energy Code Compliance Barriers

As shown in Table 1, the top three energy code compliance barriers include:

- Need for public outreach/educational materials and guidance (internet/website based, or pamphlets),
- Need for energy code training, and
- Lack of guidance documents and other information materials readily available to builders, contractors, and trades people.

In the table below, bold values highlighted in red designate response rates deemed to be most noteworthy (i.e., greater than or equal to 27%). Other market barriers identified by respondents, but not specified in the table above included:

- For residential market actors:
  - Expense to homeowners and the cost of construction,
  - Scheduling for on-site inspections, and
  - Lack of customer awareness of the value of energy code compliance, despite the incremental cost.
- For commercial projects:
  - Resistance from design professionals to suggested (building plan) changes in order to comply with energy code,
  - Lack of funds to pay for 3rd party inspections, and
  - Over reliance on architect, engineer, and design profession self-certification.

Table 1. Ranking of Code Enforcement Barriers by NH Code Officials

Market Barrier	0 - not at all a barrier	1	2	3 - significant barrier	Not Applicable
Need for public outreach through provision of educational materials and guidance (internet/website based, or pamphlets	15.3%	16.2%	24.3%	**39.6%**	4.5%
Need for energy code training	17.1%	16.2%	**28.8%**	**35.1%**	2.7%
Lack of guidance documents and other information materials readily available to builders, contractors and trades people	16.2%	23.4%	24.3%	**32.4%**	3.6%
Need for general public to want/expect code enforcement	18.0%	23.4%	22.5%	**30.6%**	5.4%
Lack of staff capacity	**27.9%**	18.9%	18.0%	**29.7%**	5.4%
Need for sufficient resources (funding) and assistance	21.6%	22.5%	21.6%	**29.7%**	4.5%
Limited by workloads	22.5%	21.6%	24.3%	**27.9%**	3.6%
Inadequate time for training	21.6%	23.4%	24.3%	**27.9%**	2.7%
Need for building departments to make guidance documents and other information materials more readily available to builders, contractors and trades people	17.1%	24.3%	**27.0%**	**327.0%**	4.5%
Insufficient time available on site	24.3%	18.9%	22.5%	**27.0%**	7.2%
Lack of funds	26.1%	18.9%	24.3%	23.4%	7.2%
Inconsistent and variable code enforcement	24.3%	23.4%	19.8%	21.6%	10.8%
Lower priority vs. life-health-safety, thus less attention	**28.8%**	18.9%	25.2%	20.7%	6.3%
Lack of tools	25.2%	25.2%	24.3%	18.9%	6.3%
Diversity among the building community impacting diffusion of new technology and practices	18.9%	23.4%	**29.7%**	18.9%	9.0%
Access to information	**31.5%**	**28.8%**	25.2%	9.9%	4.5%

Code Enforcement Models and State Agency Interactions

Code officials were asked to assess how helpful (or appropriate) various code enforcement models were including: local enforcement, 3rd party enforcement, state agency enforcement (as a supplement to local officials) and self certification. As shown in Table 2, local enforcement of the energy code was rated by respondents as the most appropriate/helpful (over 56%), followed by 3rd party inspectors (36%, state agencies (27%), and self-certification (less than 23%). Interesting to note was the fact that 36% of respondents believed that self-certification was "not appropriate".

Table 2. Assessment of Various Code Enforcement Models

Code Enforcement Model	0=not appropriate or helpful	1	2	3=extremely appropriate/ helpful	N/A
Local enforcement	8.1%	3.6%	26.1%	**56.8%**	5.4%
3rd Party enforcement	13.5%	15.3%	**29.7%**	**36.0%**	5.4%
State Agency Enforcement (as supplement to local officials)	20.7%	20.7%	26.1%	**27.0%**	5.4%
Self-certification	**36.0%**	20.7%	16.2%	22.5%	4.5%

When asked to what extent code officials interact with state agencies regarding energy code matters, as shown in Table 3, and approximately 50% of respondents reported that they interact either "some" or "significantly" with the PUC and 25% with the DOS. Concerning interactions with the PUC, approximately 60% of those that reported having such interactions were either "somewhat" or "extremely satisfied". While less than 30% of those reporting interactions with the DOS said they were either "somewhat" or "extremely satisfied" (see Table 4). Combined, this means that there remains substantial opportunity for increased levels of interaction and satisfaction between local code officials and state agencies when it comes to seeking guidance or support associated with energy code compliance.

Table 3. Code Officials' Interactions with State Agencies

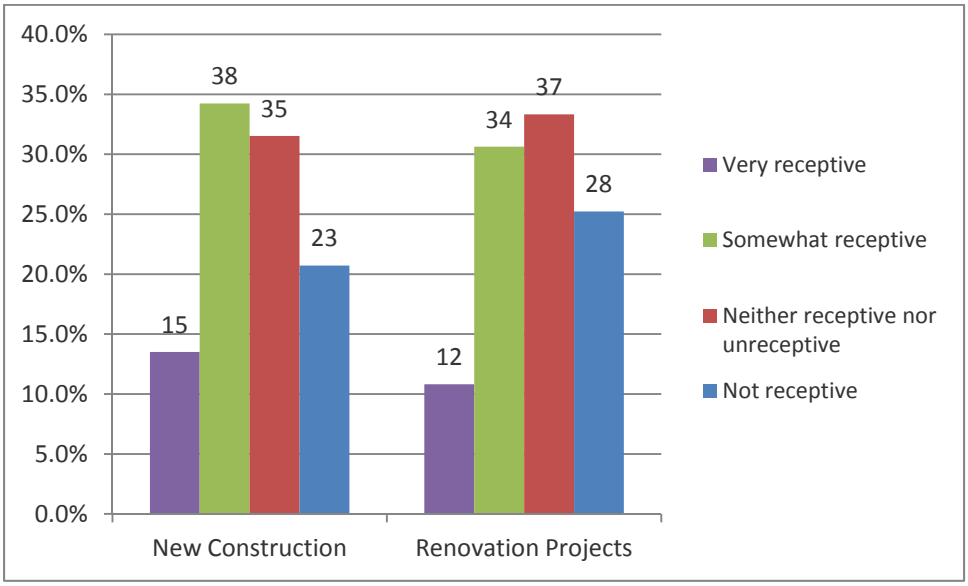
State Agency	0 - no interaction	1	2	3 - significant amount of interaction
NH PUC	24.3%	25.2%	**29.7%**	20.7%
NH DOS	**52.3%**	21.6%	14.4%	11.7%

Table 4. Code Official Satisfaction with State Agency Interactions

State Agency	0 - not at all satisfied	1	2	3 - extremely satisfied
NH PUC	17.1%	21.6%	**27.9%**	**33.3%**
NH DOS	**40.5%**	20.7%	23.4%	15.3%

Finally, when asked how receptive code officials might be to more stringent energy codes, as shown in Figure 15, approximately 50% of respondents said they would either be "somewhat" or "very receptive" (53% more stringent codes for new construction projects, 46% for renovation projects).

Figure 15. Code Officials' Receptiveness to More Stringent Energy Codes



Other key results and respondent observations from the survey include:

- Code officials are not a homogenous group; each is influenced by specific local constraints and construction markets.
- Code officials identified a need to establish a consensus for the interpretation of energy code requirements.
- Less than half of the surveyed code officials responded that they had participated in free training programs and or accessed resources available through the NH Energy Code Challenge website.

Task 1 – NHBCC Program Recommendations

Key recommendations from results associated with the NHBCC Program's Task 1 activities are presented in Table 5 below:

Table 5. Task 1 Recommendations – Establish a Baseline of Compliance

Task 1 Recommendations – Establish a Baseline of Compliance
☐ In areas of the state without code officials, use the DOE's Building Energy Code Program (BECP) methods, tools and procedures to measure and report baseline compliance with the building energy code. ▪ Currently NH has self-reported surveys of code officials; no baseline compliance method has been established in jurisdictions without code officials.
☐ Establish a consensus for the interpretation of energy code requirements, potentially through a NHBOA consensus committee. ▪ Currently the NH code is subject to the interpretation of the individual inspector, which may result in variable levels of enforcement and compliance.
☐ Provide on-site trainings for code officials, improving the energy code knowledge base. ▪ The NHBCC Program developed targeted in-field, hands-on training curriculum for NH code officials and building professionals. ▪ Currently the NH Utilities run free classroom beyond energy code trainings for building professionals.
☐ Provide a licensing or certification process for builders, contractors, architects, design professionals and in particular, insulation installers to raise energy code awareness and improve coordination between market actors in code-related building issues, leveraging the Community College System of NH. ▪ Currently NH has no required energy code license process.
☐ Provide energy code checklists for code officials with all energy code-related items and requirements. ✔ The NHBCC Program distributed *a NH Field Guide for Residential New Construction* to all building professionals and code officials around the state – the *NH Field Guide* includes an IECC Residential Data Collection Compliance Checklist. ✔ The NH Energy Code Challenge website provides a link to the DOE's BECP *Resource Guide for Code Officials*.
☐ Develop a consensus for consistent, state-wide energy code enforcement (potentially through a NHBOA consensus committee) that could be distributed to builders, contractors, and home owners in order to improve their awareness of the NH energy code requirements. ▪ Current energy code enforcement practices vary across the state; in some municipalities local officials are responsible for code enforcement, in others builders and contractors report compliance to the PUC themselves.
✔ Increase code official awareness and traffic to the NH Energy Code Challenge website for energy code compliance and enforcement resources including free on-site, classroom, and online trainings and other code-related documents and tools.

Task 1 Recommendations – Establish a Baseline of Compliance
✓ The NH Energy Code Challenge website provides opportunities including, access to free workshops, free on-site and online trainings, energy code videos, an energy code blog, quick links to energy code resources, timely news updates, public service announcements, and other guidance materials for all market actor groups.
☐ Increase the communication and interaction between code officials, the NH PUC, and the NH DOS to ensure consistent and clear answers for energy code compliance questions and to promote information on the impacts of energy code and life-safety issues. ▪ In the self-reported NH Code Officials Survey, NH code officials report low levels of communication and interaction with the NH PUC and the NH DOS.
☐ With each code update and adoption cycle, engage in widespread outreach and education efforts about the purpose and benefits associated with robust and adequately enforced building energy code. ▪ Historically, the NH energy code update process occurs with little initial outreach and education.

Task 2. Develop a New Hampshire Roadmap

One of the key goals of the NHBCC Program was to map out NH's existing energy code landscape and identify barriers to energy code compliance across the state's residential and commercial building sectors and to use this information to develop a plan of action outlining NH-specific recommendations for achieving 90% energy code compliance by 2017. Task 2 of the NHBCC Program was to use the results from Task 1, and many of this project's other tasks, to help inform the design of an action plan ("roadmap") for achieving widespread code compliance in New Hampshire by 2017 (now just 5 years away).

Methodology

Development of this roadmap, in many ways, can be viewed as the culmination of the entire NHBCC project effort and entailed compilation of results from multiple project activities and input from many parties and leveraged resources. In addition to compiling, reviewing and assessing all results and feedback obtained through Tasks 1 and 3 through 9, to complete this task, the following two additional activities were undertaken and summarized in more detail below:

- Development of a Program Logic Model for the NHBCC project
- Formation and regular meetings with a NH Energy Code Compliance Stakeholder Panel

The NHBCC Program Logic Model

A unique element of the roadmap development process was the initial exercise of constructing a NHBCC Program Logic Model (PLM), which served as a guiding document to organizing and evaluating Program activities. A copy of the complete logic model report is included as Appendix B. The formal PLM document provided:

1) A table showing a list of documents reviewed that relate to the New Hampshire Energy Code Compliance Program used to provide insights during development of this program logic model report;
2) A high-level summary of the context of the markets within which this program operates, other potential complimentary and/or competing programs, and a brief program description. Available market characterization information is also presented in this section, including a description of baseline conditions;
3) Key program-specific elements, including the ultimate goals of the program, market barriers and associated market actors, program activities, inputs, anticipated outputs/outcomes (goals) and potential external influences;
4) A Program Logic Model (PLM) diagram showing the linkages between program activities, outputs and outcomes, and identifying inputs and potential external influences;
5) A table listing the key outputs and outcomes, including identification of relevant measurement indicators and potential data collection approaches to guide later prioritization, and development of a monitoring and evaluation plan; and
6) A list of potential researchable issues for consideration within evaluation planning.

The PLM proved to be a highly effective means for facilitating the roadmap development effort, including a visual program logic model diagram showing how the activities of the Program will lead to short, intermediate and long-term outcomes and goals of the overall NHBCC Program.

Results from the logic modeling exercise are presented later in this section and were shared with OEP (the project sponsor) and all program stakeholders and other interested parties (NEEP, BCAP, etc.) to help describe the context within which program activities were being implemented and to explicitly identify the multiple paths needed to overcome barriers and achieve anticipated objectives.

The NH Energy Code Compliance Stakeholder Panel

Another valuable activity conducted as part of this project task was to initiate a first-of-its-kind (for NH), collaborative NH Energy Code Compliance Stakeholder Panel. This panel was established to inform and increase the effectiveness of all other Program activities. Comprised of members representing a broad swath of market actors, the mission of the Stakeholder Panel was to provide expert input and feedback on Program activities as they were being conceptualized and completed, including baseline findings, potential approaches for consideration in Program scoping, and peer review of draft options, policy recommendations, barriers, strategies, and results. The backgrounds, knowledge, directly relevant experience and buy-in of a diverse group of Stakeholder Panel members has helped ensure the appropriateness of approaches and the validity of findings resulting from specific Program activities.

To maximize the effectiveness and acceptance of the Program deliverables, strategies, and recommendations, the NH Energy Code Compliance Stakeholder Panel met regularly throughout the NHBCC project period and consisted of individuals representing the following organizations and impacted market actor groups:

Program Policy and Administration Stakeholders:

- NH Office of Energy and Planning (NHOEP),
- GDS Associates Team,
- NH Building Code Review Board (NHBCRB),
- NH Municipal Association;

Energy Code Compliance Verification Stakeholders:

- NH Public Utilities Commission (NHPUC),
- NH Building Officials Association (NHBOA),
- Fire Marshal's Office/Department of Safety (DOS),
- Contractors;

Other Implementation Stakeholders:

- NH Electric and Gas Utilities,
- NH Residential Energy Performance Association (REPA),
- NH Home Builder's & Remodelers Association (HBRA),
- NH Chapter of US Green Buildings Council (USGBC),
- NH Chapter of American Institute of Architects (NH AIA),

- NH Realtors Association,
- Community College System of NH (CCSNH);

Other NH Stakeholders Involved on the Periphery:[8]

- NH Office of Consumer Advocate (OCA),
- NH Mortgage Bankers Association,
- The General Public.

In addition to the Stakeholder Panel, the NHBCC Program actively collaborated with other regional and national organizations to leverage funding and resources for a number of additional first-of-its-kind initiatives, which were otherwise unattainable with limited Program funding. By tapping into these existing resources, individuals, reports, agencies, organizations and businesses, the NHBCC Program has maximized the success of the Program and the quality content of the roadmap to ensure that all valuable data and content has been included. The NHBCC Program partnered and leveraged support from of the following well-respected regional and national organizations including:

Regional and National Resources:

- Building Codes Assistance Project (BCAP),
- Consumers Union (CU),
- Institute for Market Transformation (IMT),
- International Code Council (ICC),
- Northeast Energy Efficiency Partnerships (NEEP),
- Pacific Northwest National Laboratory (PNNL),
- Responsible Energy Codes Alliance (RECA)
- State and Local Energy Efficiency Action Network (SEE Action), and
- US Department of Energy's Building Energy Codes Program (BECP).

Results

The initial development of a Program Logic Model for the NHBCC Program laid the groundwork for all subsequent roadmap development efforts. Key results of the PLM effort included identifying target market actor groups, the associated market barriers to energy code compliance for each of these market actor groups, and a visual PLM diagram showing how the activities of the Program will lead to short, intermediate, and long-term outcomes and goals of the overall NHBCC Program. Each of these results of the PLM is examined individually below.

[8] Other organizations invited to attend the NH Stakeholder Panel meetings and never sent a representative, although remained informed of program and stakeholder activities thought phone and email correspondence

Targeted Market Actors

The NHBCC Program set out to identify and reach out to a wide variety of energy code compliance market actor groups, including "non-traditional" market groups. The Program targeted a number of market actors identified through the PLM development process including:

- Code Officials
- State Fire Marshal
- Organizations/Associations/Planning Groups
- Regulatory/Legislative bodies
- State Agencies (NH Utilities, NHPUC, NHDOS, NHOEP)
- Building Professionals - Builders/Contractors
- Architects, Engineers, Designers
- Equipment Suppliers
- Energy Raters
- Real Estate Brokers/Agents
- Banks, Lenders, Appraisers
- Building Owners/Operators/Managers
- Homeowners and the General Public

Barriers to Energy Code Compliance

Identifying and overcoming barriers to energy code compliance in New Hampshire will help achieve important intermediate goals, "points along the way", and will be critical for reaching the end goal of at least 90% compliance with the state-wide energy code by the year 2017.

As identified through the PLM development and vetting process, in a well-functioning residential and commercial building energy code climate:

- Policies and policymakers will support the code,
- Code officials will enforce the code,
- Professionals will build to the code,
- Real estate professionals, lenders and appraisers will value buildings built to code, and
- Consumers will expect and demand the code at a minimum, and understand the value of building to beyond code levels, and
- Combined stakeholders' support reinforces the policies and policy makers who also support the code.

Barriers identified for each market actor group, are loosely organized by supply-side, mid-market/infrastructure, to demand-side continuum. Supply-side and mid-market/infrastructure barriers include state, municipal, and business practices or policies that deter compliance with energy code requirements. Supply- and mid-market barriers may also indicate an insufficient availability of the appropriate manpower, skills, or equipment necessary for energy code compliance or a lack of commitment to code compliance. Demand-side barriers primarily involve home and building owners, developers, and building operators.

Widely recognized barriers to energy code compliance, applicable to multiple market actor groups were documented and vetted through the PLM development process and typically include:

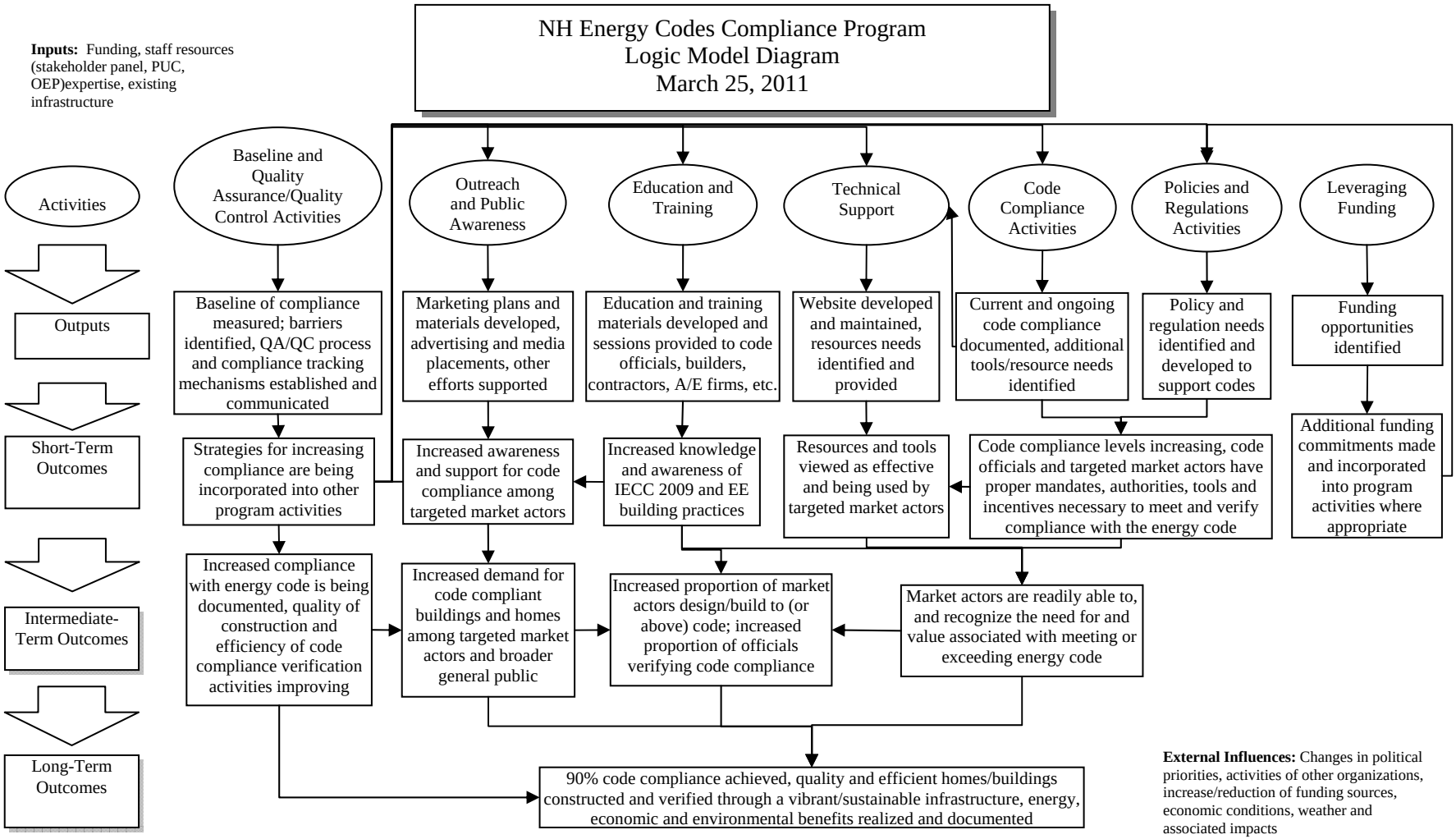
- lack of funding,
- limited outreach and education,
- lack of appropriate training, tools and resources,
- limited policy initiatives,
- lack of compliance evaluations and verification, and
- lack of energy code enforcement.

Achieving 90% compliance with the NH energy code will require leadership, commitment, engagement, buy-in, and resources from all market actor groups. It is important to acknowledge that although barriers often appear similar in nature across market actor groups, small nuances between groups can dramatically alter the strategies required to overcome them in each group. More information on the nuances regarding these barriers, as categorized by market actor group, can be found in the full PLM report included as Appendix B of this report.

Program Logic Model Diagram

Figure 16 on the next page is a reprint of the PLM diagram prepared for this NHBCC Program. It presents key features of the Program and shows the link between program activities, outputs, and outcomes and identifies inputs and potential external influences.

Figure 16. NHBCC Program Logic Model Diagram (See Next Page)


NH Energy Codes Compliance Program
Logic Model Diagram
March 25, 2011
Inputs: Funding, staff resources (stakeholder panel, PUC, OEP)expertise, existing infrastructure
Activities
Outputs
Short-Term Outcomes
Intermediate-Term Outcomes
Long-Term Outcomes
Baseline and Quality Assurance/Quality Control Activities
Outreach and Public Awareness
Education and Training
Technical Support
Code Compliance Activities
Policies and Regulations Activities
Leveraging Funding
Baseline of compliance measured; barriers identified, QA/QC process and compliance tracking mechanisms established and communicated
Marketing plans and materials developed, advertising and media placements, other efforts supported
Education and training materials developed and sessions provided to code officials, builders, contractors, A/E firms, etc.
Website developed and maintained, resources needs identified and provided
Current and ongoing code compliance documented, additional tools/resource needs identified
Policy and regulation needs identified and developed to support codes
Funding opportunities identified
Strategies for increasing compliance are being incorporated into other program activities
Increased awareness and support for code compliance among targeted market actors
Increased knowledge and awareness of IECC 2009 and EE building practices
Resources and tools viewed as effective and being used by targeted market actors
Code compliance levels increasing, code officials and targeted market actors have proper mandates, authorities, tools and incentives necessary to meet and verify compliance with the energy code
Additional funding commitments made and incorporated into program activities where appropriate
Increased compliance with energy code is being documented, quality of construction and efficiency of code compliance verification activities improving
Increased demand for code compliant buildings and homes among targeted market actors and broader general public
Increased proportion of market actors design/build to (or above) code; increased proportion of officials verifying code compliance
Market actors are readily able to, and recognize the need for and value associated with meeting or exceeding energy code
90% code compliance achieved, quality and efficient homes/buildings constructed and verified through a vibrant/sustainable infrastructure, energy, economic and environmental benefits realized and documented
External Influences: Changes in political priorities, activities of other organizations, increase/reduction of funding sources, economic conditions, weather and associated impacts

NH Energy Code Stakeholder Panel

As a result of the program's swift initiative to gather a diverse group of stakeholders shortly after Program commencement, six (6) NH Energy Code Stakeholder Panel meetings were held over the two and one-half year project period. The backgrounds, knowledge, directly relevant experience, and buy-in of this diverse group of NH Stakeholders help to ensure that Program activities, resources and recommendations were effective and appropriate for the unique NH energy code environment. Frequent input from active members ensured that Program decisions and activities were not undertaken in a vacuum and that these activities reflected the diverse interests of a majority of the parties most affected by the building energy code. Meetings were held at GDS' office in Manchester, NH on the following dates. Copies of all meeting agendas are included in Appendix F.

In addition to actively procuring input from the Stakeholder Panel, the NHBCC Program reinforced the limited energy code-related funding in NH by collaborating with a number of established and well-respected regional and national organizations, most directly resulting in identification, compilation and/or mutual development of a suite of shared resources and tools designed to address specific market barriers identified through the PLM and verified as important by feedback through the Stakeholder Panel. Examples of this leveraged support include:

- Leveraging support from the NH Utilities to allow the Program to increase the number of program-supported energy code workshops from 24 to 32 over the Program period.
- Working with BCAP to develop a "NH Gap Analysis", and a NH-specific "Compliance Strategy Plan", completed in 2011, which leveraged data collected and findings from independent and combined research activities within the state and across the country.[9]
- Partnering with Consumers Union to develop and distribute educational energy code brochures, tool-kits, consumer messaging for the general public, and website-related resources and support.
- Working with NEEP to develop energy code guidance documents and checklists specifically targeted to NH real estate professionals and coordinating with NEEP to develop a half-day energy code workshop curriculum designed specifically for NH real estate professionals, easily adaptable and replicable for a broader audience.
- Collaborating with NEEP to develop a first-of-its-kind, full day, in-the-field energy code training workshop for code officials and advanced building professionals. This in-field workshop focused on hands-on educational tools including blower door and duct blaster testing at a residential construction project.
- Collaborating with building science professors from the Community College System of NH to videotape workshops, ultimately developing short energy code compliance videos posted on the www.nhenergycode.com website.

[9] *New Hampshire Gap Analysis*, Prepared as part of The Compliance Planning Assistance Program, by the Building Codes Assistance Project (BCAP) with funds from the U.S. DOE, February 2011, and *New Hampshire Strategic Compliance Plan, Improving Energy Code Compliance in New Hampshire's Buildings*, prepared as part of The Compliance Planning Assistance Program, by the Building Codes Assistance Project (BCAP), November 2011.

- Collaborating with the NH Home Builders and Remodelers Association to update the NH Field Guide for Residential New Construction with 2009 IECC energy code information and best-practice residential building techniques.
- Soliciting feedback from the members of the NH Energy Code Compliance Program Stakeholder Panel to help inform and improve the content of an updated NH Field Guide for Residential New Construction and to provide input to an evolving "ask-the-expert" blog on the www.nhenergycode.com website.
- Leveraging support from local NH businesses (including a residential contractor and a modular homes manufacturer) to run in-the-field energy code workshops for code inspectors and advanced building professionals.
- Coordinating with NH's Granite State Trade School to acquire 2009 IECC code books to be sold to building professionals at the energy code workshops around the state.
- Leveraging resources from National organizations (including DOE's BECP, BCAP, PNNL, CU, NEEP, IMT, and RECA) to bolster energy code resources posted on the www.nhenergycode.com website and to design and implement a number of best practices.

Task 2 – NHBCC Program Recommendations

Key recommendations from the NHBCC Program's Task 2 are also presented in detail in Volume 1 of this report. Table 6 provides more information on these recommendations:

Table 6. Task 2 Recommendations – Develop a New Hampshire Roadmap

Task 2 Recommendations – Develop a New Hampshire Roadmap
✔ Establish a NH Energy Code Stakeholder Panel to maximize the effectiveness and buy-in for energy code activities, including adoption, compliance, and enforcement. ✔ Include stakeholders representing a cross-section of the state building code communities, including "hard-to-reach" groups such as real estate professionals, lenders, and appraisers so that all market actor groups affected by the building energy code have a voice to support a functional framework for energy code compliance. ✔ The NHBCC Program brought together a diverse group of experts and established a first-of-its-kind NH Energy Code Stakeholder Panel.
☐ Maintain the NH Energy Code Stakeholder Panel to maximize the continued effectiveness and buy-in of energy code activities for adoption, compliance, and enforcement. ☐ Use connections with stakeholders to communicate a well-organized and easily understood plan of action (roadmap) throughout the state. ▪ Currently BCAP is working with the NHBCC Program to establish an "Energy Code Compliance Collaborative", organizing knowledgeable and influential stakeholders to shape a functional and effective energy code infrastructure that fits the needs of New Hampshire.
☐ Maintain a diverse but manageable group of stakeholders, recognize and address political sensitivities, and ensure that all affected market actors groups are represented in the energy code dialogue. ▪ Currently, the Stakeholder Panel has a diverse group of members; however representation is needed from NH's "hard-to-reach" groups, including low-income groups. Throughout the project, the Panel included 3 to 6 active members, as more groups are included a continuing collaborative, attention will need to remain focused on recognizing and addressing political sensitivities
☐ Maintain a stakeholder group who meets on a regular basis (suggested quarterly or more frequently as deemed appropriate). ▪ The NHBCC Program held a Stakeholder Panel meeting about three times a year throughout the course of the project. Increasing the meeting frequency to quarterly would be ideal to maintain current Program initiatives and energy code information to all NH constituents
☐ Reach out to include additional stakeholders: building product manufacturers, building supply houses, advocacy groups, trade associations, universities and research groups, consumer protection, low-income advocates, and real estate lenders and appraisers. ▪ The NHBCC Program reached out to these groups, however these organizations did not send representatives to the Stakeholder meetings.

Task 2 Recommendations – Develop a New Hampshire Roadmap
✔ Collaborate and coordinate with other established local, regional, national, and federal organizations.
✔ The NHBCC Program collaborated with local, regional, national, and federal organizations to develop innovative, first-in-kind initiatives, otherwise unattainable with limited Program funding.
✔ Leverage resources, funding and materials that have already been developed by other established and well-respected local, regional, national, and federal organizations.
✔ The NHBCC Program collaborated and coordinated with local, regional, national, and federal organizations to develop innovative, first-in-kind initiatives, otherwise unattainable with limited Program funding.
✔ Share resources broadly and be certain to give collaboration credit where credit is due.
✔ The NHBCC Program shared a number of resources over the course of the project, including its one-of-a-kind Public Service Announcement (PSA) with Nevada to help increase awareness of the energy code in Nevada.
✔ Develop and communicate a simple to follow plan (roadmap) for all energy code stakeholders to achieve 90% compliance with the 2009 IECC by 2017.
✔ The NH Building Energy Code Compliance Roadmap identifies the key market actor groups, baseline compliance, barriers, goals, activities, recommendations, and points-along-the-way associated with achieving 90% compliance with the 2009 IECC by 2017 for each market actor group.
✔ Develop the Roadmap in close coordination with key members of the NH Stakeholder Panel to provide input and feedback to ensure the appropriateness and validity of recommendations and approaches.
✔ The NHBCC Program leveraged the backgrounds, knowledge, and expertise of its diverse group of stakeholders in order to inform the roadmap development effort and create buy-in.

Task 3. Promote the Program

Under Task 3, the NHBCC Team promoted program activities throughout the state to building and code professionals and all other key stakeholders.

Methodology

Building off of the existing in-house pathways of information dissemination and outreach, the NHBCC Team, with valuable input and support from AdvertisingWorks LLC, promoted awareness of both the training workshops and the overall program to building and code professionals and all other key stakeholders including building inspectors, code officials, engineers, architects/designers, residential and commercial builders, real estate professionals, lenders and appraisers, facility managers, commercial building owners, and homeowners and the general public. Key program promotional activities included:

- Workshop outreach,
- Social media,
- NH Energy Code Challenge Program website, and
- Regional and National networking (including a Congressional briefing).

All promotional activities included acknowledgement of Federal support and were accompanied by appropriate ARRA and State of NH logos and disclaimers. Examples of some print and online marketing efforts that the NHBCC Team developed over the course of the Program are available in Appendix G. More information on each of these activities is provided below.

Workshop Outreach

Training workshops were actively promoted through a combination of email announcements, print ads, online and print event calendars, press releases, social media, as well as through word-of-mouth networking throughout the various newsletters and email list-serves around the state. The project also distributed training brochures to the commercial departments at big box stores like various Lowe's and Home Depot locations.

Over the course of the project, the program amassed an email list of 2500 building and code professionals, which included members of the NH Home Builders and Remodelers Association, the NH Building Officials Association (and other NH building inspectors), the Structural Engineer Association, ASHRAE, NH Association of Fire Chiefs, the Mortgage Bankers & Brokers Association, Mortgage Appraisers, and AFE. The email list was managed through a free web service (Constant Contact), which allowed for the program to designate several subgroups, and compose interactive and polished marketing emails. This outlet proved the most effective way to get the word out on workshop schedules and other code-related updates.

The program also coordinated with various trade groups to promote workshop schedules through their respective online and print event calendars and newsletters. These groups included: the LEC Newsletter, ABC-NH/VT newsletter & quarterly magazine, HBRANH quarterly magazine, the AGCNH newsletter, NHSPE/NH quarterly magazine, Plan NH newsletters, AIANH newsletters, NHREIA newsletters, and NHAR's social media and newsletter.

Before each round of workshops, press releases and brochures were developed and emailed out to multiple list-serves and industry newsletters, posted on the www.nhenergycode.com website and submitted to the print organizations identified in Table 7 below (with mixed/limited print success of coverage):

Table 7. NHBCC Program Workshop Promotion Publications

Daily Newspapers	Business Publications	Weekly Papers		Industry Publications
Concord Monitor	NH Business Review	Bedford Bulletin	Salem Community Patriot	NH Home Magazine (monthly)
Union Leader	Business NH Magazine	Goffstown News	Windham Independent	BIA ebrief (weekly)
Nashua Telegraph	NH Magazine	Hooksett Banner	Amherst Citizen	NH Forum (AIANH) (10x/yr)
Eagle-Tribune		Salem Observer	Milford Cabinet	AGC of NH News (bi-weekly)
Portsmouth Herald		The Hippo	Merrimack Journal	Build Green NH
Keene Sentinel		Hudson Litchfield News	Bedford Journal	Granite State Builder (quarterly)
The Citizen		Pelham Windham News	Hollis Brookline Journal	ABC NH/VT Construction Resource (quarterly)
Conway Daily Sun		Derry News	Carriage Towne News	NHSPE/NH The Observer (quarterly)
Berlin Daily Sun		Littleton Courier	Carroll County Independent	
Valley News		Coos County Democrat	Berlin Reporter	
Eagle Times		Mountain Ear	Record Enterprise	
Caledonian Record		Colebrook Chronicle	Colebrook News & Sentinel	
		Intertown Record	Great Woods Journal	

Social Media Approach

The Program also tapped into new social media outlets such as Twitter and Facebook to broaden the outreach efforts to the community. These technologies were most suited for providing timely updates and reminders for workshop schedules and other general program promotional announcements. The NHBCC Team also used social media to keep abreast of code-related happenings across the state and to maintain active contact with the growing list of Program contacts.

NH Energy Code Challenge Website

In addition to the methods listed above, the NHBCC Team developed a custom web portal for the purpose of serving as the official central repository of information related to the Program. This portal, branded the *NH Energy Code Challenge* website, was designed and built to be used by multiple market actor groups including both building and code professionals, and the general public.

The custom website served as the cornerstone to many of the Program tasks, and one of its major functions was to be an extension of the consolidated media campaign. A full section of the website was dedicated to providing a single-source access point to the unified mission and goals of the Program. The site hosted information on the various Program details, including the original RFP, the NHBCC Project Team and the Stakeholder Panel. In addition, all marketing materials including the printed brochures and flyers, newsletters and press releases, workshop presentations, and the PSA were made available for download from the site.

The web portal also served as the location for information about trainings, including schedules, directions, presenter information, links to relevant code compliance resources (tools, software, books, etc.), and online registration for the trainings. Further explanation on the website's role in the workshop trainings (Task 4) and the updating and gathering of code resources (Task 5) is included in those sections of this report.

Regional and National Networking

The NHBCC Program outreach efforts also included several appearances and presentations at conferences, home shows, local green teams and energy committees. Examples of these appearances include: teaming up with the NH Home Builders and Remodelers Association as part of the Seacoast Inc. / NH Home Builders "Building NH" conference and hosting home owner-oriented training workshops at the NH Home Show.

Early on in the project, the program worked with the Building Codes Assistance Project to help them develop a website page for NH[10] and was featured as one of the BCAP's "Top 10 Places to Watch" in the nation.

The NHBCC Program Team was frequently invited to present on the lessons learned and results from the Program at NEEP's quarterly Regional Building Energy Codes conferences and the

[10] (http://bcap-ocean.org/tenplaces/NewHampshire)

State and Local Energy Efficiency Action Network (SEE Action) conferences, as example of best practices for other states.

In addition, the NHBCC Program was invited to present on the importance of consumer involvement in energy codes at a congressional briefing in Washington, DC on March 20, 2012. This event, hosted by the Environmental and Energy Study Institute, was a unique opportunity to present the NHBCC Program's achievements and findings to a national audience. Speakers at the event included NH Senator Jeanne Shaheen, Stacey Weisfeld of Consumers Union, Maureen Guttman of BCAP, and NHBCC Team member Laura Richardson of the NH OEP.

In addition, the Program was selected by the Association of Energy Service Professionals (AESP) to develop peer-reviewed paper and make a presentation of the goals, results and lessons learned from the NHBCC Program at their National Convention in San Diego, CA on February 8th 2012. The paper and presentation was titled "Achieving Energy Code Compliance – the NH Experience", and highlighted key lessons learned and critical strategies to achieving energy code compliance in a diverse and challenging state and political climate. The AESP National Conference was opportunity to promote the activities, strategies, and methods of the NHBCC Program and gain national recognition for the building energy code efforts in NH. A copy of the Congressional Briefing and AESP presentation and associated published paper is included as Appendix H.

A late boon to Program outreach was a partnership with Consumers Union (CU) to cross-market educational energy code resources. In coordination with CU, the program was able to distribute building professional, realtor, and consumer brochures throughout the state and included these materials in the distribution of the updated NH Field Guide for Residential Construction (see Task 6 discussion). Furthermore, the Consumers Union made a unique NH webpage within its own "A Greener Energy Future" website, which is dedicated to code-related consumer outreach on a national level.

Lastly, a number of other websites linked to the NH Energy Code Challenge website and provided the program with a broader audience for the energy code-related activities in NH.

Results

As a result of the program's early identification of key market actors and development of a cohesive marketing plan, the program was able to reach a broad audience with targeted and consistent messaging. Appendix H includes more details on the program's marketing plan and associated press kit. Additional results of these efforts include the following:

- By the end of the Program, the NHBCC Team had amassed a list of over 2,500 building professionals to whom the program sent regular promotional emails and code-related updates.

- The website had over 5,450 unique visitors and 30,900 total page views from the beginning of the Program.

- The workshops had over 1,617 registrants and a show-rate of over 75%.

- Web-based training registration improved the overall efficiency of the communication process as it allowed the program to send automated confirmation emails to those

attendees who register with links to workshop directions. The system also allowed the Program to send reminder emails a few days prior to each workshop to ensure the "no-show rate" was minimized. The "no-show rate" is a relatively serious concern with free workshops as it directly impacts planning for refreshments, handling printed workshop materials, and filling the trainings adequately.

- The Program's collaboration with Consumers Union allowed the program to extend the limited overall energy code-related funding in NH to further develop and distribute educational energy code brochures, tool-kits, consumer messaging for the general public, and website-related resources and support.

- Cross-promotion with BCAP extended the Program's reach to a broader audience and NH's nomination as one of the "Top 10 Places to Watch" in the country for energy code activities put the NHBCC Program in the national spotlight.

- The NHBCC Program was nominated by both BCAP and NEEP for an AESP award at the 2012 National Conference in the areas of "Outstanding Achievement in Marketing Communications" and "Outstanding Achievement in Energy Program Design or Implementation". The NHBCC Team presented at the AESP National Conference on the barriers to energy code compliance and the best practice strategies the NHBCC Program deployed to overcome key market barriers.

Task 3 – NHBCC Program Recommendations

Key recommendations from the NHBCC Program's Task 3 activities and results are presented in Table 8 below:

Table 8. Task 3 Recommendations – Promote the Program

Task 3 Recommendations - Promote the Program
✔ Collaborate and coordinate with other established, well-respected local, regional, national, and federal organizations to extend outreach efforts.
✔ The NHBCC Program collaborated with local, regional, national, and federal organizations to develop innovative, first-in-kind initiatives, otherwise unattainable with limited Program funding.
☐ Develop a strategic marketing plan early in the Program and identify key market actor groups so that marketing messages can be tailored to each audience.
✔ Share resources broadly and be certain to give collaboration credit where credit is due. ▪ The NHBCC Program shared its one-of-a-kind Public Service Announcement (PSA) with Nevada to help increase awareness of the energy code in Nevada.
☐ Invest in a functional and accessible website that hosts comprehensive information about the Program goals, outreach and educational documents, and all Program-related materials. Point back to the website in all printed and online marketing activities.
☐ Take advantage of free sources and avenues of marketing: "grass-roots" and word-of-mouth marketing, free newsletters, printed and online calendars, and free airtime on radio stations for public service announcements.
☐ Target promotional/marketing material and messages to specific audiences.

Task 4. Train and Mobilize Building Professionals

To raise the awareness and knowledge base of NH's building inspectors, code officials, architects, designers, engineers, residential and commercial builders, real estate professionals, lenders and appraisers, facility managers, and commercial building owners, the NHBCC Team conducted 32 NH Energy Code Challenge workshops across the state over a two and one-half year period.

Methodology

At the outset of the NHBCC Program, the NHBCC Team had extensive experience developing and running statewide Energy Code Compliance Workshops and trainings. Over the course of 2003-2009, GDS had been the vendor of choice for the NH Electric Utilities and the PUC with responsibilities for coordinating and conducting residential and commercial "Going Beyond Energy Code" workshops throughout the state.

Leveraging off these existing strong relationships with the electric and gas utilities in NH, as well as with the NH Builders and Remodelers Association's Green Building Program, National Association of Home Builders, NHAIA, Community College System of NH, and many other key local groups, the Program hosted 32 energy code workshops in more than 16 towns, reaching a total of over 1,220 building professionals during the current project period. For this Task, the following activities were undertaken (each of which is described in more detail in the paragraphs below):

- Organizing and implementing "traditional" energy code workshops,
- Organizing and implementing targeted training workshops,
- Securing Continuing Education Credits (CEUs),
- Coordinating with and procuring NH electric and gas utilities support, and
- Integrating training outreach and resources into the NH Energy Code Challenge website.

"Traditional" Energy Code Workshops

Of the 32 total workshops offered, 10 were "traditional" Commercial and 15 were "traditional" Residential workshops. These "traditional" workshops were capped at 50 attendees per workshop in order to foster an open dialogue among attendees. Important components of these training sessions included technical code compliant building strategies and technologies, major changes to the energy code, and software options for plan code compliance.

The program also hosted two General Public Residential Homeowner workshops at the NH Home Show and the Local Energy Solutions Conference. These workshops focused on getting the word out to "hard-to-reach" audiences: home owners and other non-building professionals. These workshops were less technical, and focused on the health and economic benefits of energy-code compliant buildings.

Targeted Training Workshops

Heeding feedback from the "traditional" classroom-based Residential and Commercial workshops and from the Stakeholder Panel and Code Official survey responses, the Program experimented with workshops targeted to more specific market groups. A critical component of the NH Energy Code Challenge project included the development of an in-the-field technical training workshop for code officials and advanced building professionals. The in-the-field training session was deployed in October 2011 in Weare, NH and was directed toward residential builders and code officials. This workshop focused on proper building techniques and common issues in energy code compliance in residential new construction.

Furthermore, with curriculum development insights and support provided by NEEP and the Institute for Market Transformation (IMT), a targeted New Hampshire Real Estate Professional Energy Code Workshop Presentation and Energy Code Checklist and Guidance document were jointly developed and customized to educate real estate professionals and commercial lenders on the benefits and value of energy efficiency and energy code compliance.

Using this curriculum, the first targeted energy code real estate professional presentation was given to the New Hampshire Realtors Association's Public Policy Committee, a 40-person committee in May 2011. This targeted presentation provided an opportunity for the Program to raise awareness of and support for the building energy code within this specific market group and raise the possibility for state-wide distribution of free real estate professional energy code workshops, guidance documents, and checklists.

With the feedback and support gained from the first Realtors Association's Public Policy Energy Code Workshop, the Program finalized targeted curriculum and associated energy code guidance and checklists documents. The Program rounded out its workshop offerings with a total of four real estate professional-specific workshops, with approved continuing education credits (CEUs), deployed at NH Realtor's Committee meetings throughout the state.

Continuing Education Credits (CEUs)

A large factor ensuring the success of the workshops was to offer continuing education credits, as well as to tap into existing training programs and organizations. "Traditional" Commercial and Residential workshops and the in-field trainings were endorsed by the Building Performance Institute (BPI), the American Institute of Architects (AIA), and the International Association of Certified Home Inspectors (InterNACHI).

Real estate professional-focused workshops held at the NH Realtor's Committee meetings counted toward two hours of CEUs approved by the NH Real Estate Commission.

NH Utilities Support

The original NHBCC Program proposal called for the GDS Project Team to conduct a minimum of 24 energy code-focused trainings. Recognizing the mutual objectives between the NHBCC Program and components of the NH Utilities' CORE Programs, namely, teaching residential and commercial building professionals high performance building practices that both satisfy and go beyond energy code, the NH Utilities agreed to direct some of their CORE Program funding to

support the NHBCC's 2010 NH Energy Code Workshop Series. The NH Utilities' financial support created leveraged funding opportunities that allowed for an increased number of workshops to be held during the NHBCC Program period.

Based on an agreement reached in August 2010, the NH Utilities provided funding for eight additional workshops at an estimated total cost of $42,400. As denoted by an asterisk in the first column of Table 9 in the Results Section below, these additional workshops were held during the 3rd and 4th quarters of 2010 (plus one workshop held in January 2011). They increased the total quantity of energy code training workshops implemented as part of the NHBCC Program from 24, over its planned two and one-half year Program period, to 32 workshops held over that same period.

NH Energy Code Challenge Website Integration

The custom web portal, branded the *NH Energy Code Challenge* website, served as the primary location for information about workshop trainings. This website provided a one-stop access point for interested parties to view upcoming workshop schedules, directions to venues, presenter biographical information, and register for a workshop.

In addition, workshop attendees and other interested parties could access the site to find links to relevant code compliance resources (tools, software, books, etc.) referenced in the live training sessions, download printed copies of all presentations, and search, select and view topic specific videos of actual residential and commercial NH energy code workshop sessions.

Results

Table 9 provides a summary of the final registration and attendance numbers for all the workshops held throughout the NHBCC Program (items denoted with an asterisk represent workshops supported by the NH Utilities).

Table 9. NHBCC Program Energy Code Workshops 2010 – 2012

Spring 2010 – NHBCC Energy Code Workshops						
Type	**Venue**	**Date**	**City**	**Registrations**	**Attendance**	**Show Rate**
1-Commercial	Keene Public Library	April 20th 2010	Keene	76	41	54%
2-Residential	Keene Public Library	May 4th 2010	Keene	92	72	78%
3-Residential	Tin Mountain	May 11th 2010	Albany	48	39	81%
4-Residential	NHTI	May 18th 2010	Concord	72	58	81%
5-Commercial	NHTI	May 20th 2010	Concord	76	48	63%
6-Residential	Public Service of New Hampshire	May 26th 2010	Manchester	61	43	70%

Spring 2010 – NHBCC Energy Code Workshops						
7-Residential	White Mountains Community College	June 8th 2010	Berlin	34	20	59%
8-Commercial	Highland Center	June 17th 2010	Bretton Woods	42	23	55%
9-Residential	Residential Code Officials	August 11th 2010	Concord	~65 (Private NHBOA Roster)	~65 (Private NHBOA Roster)	NA
Fall/Winter 2010 – NHBCC Energy Code Workshops						
10-Residential*	Holiday Inn & Suites	October 28th 2010	Nashua	34	24	71%
11-Residential*	Horseshoe Pond Place (Phase I & II)	November 2nd 2010	Concord	52	38	73%
12-Residential*	Leavitt Park House	November 9th 2010	Laconia	39	33	85%
13-Commercial*	Urban Forestry Center	November 16th 2010	Portsmouth	56	50	89%
14-Residential*	Urban Forestry Center	November 18th 2010	Portsmouth	72	55	76%
15-Commercial*	Leavitt Park House	December 2nd 2010	Laconia	36	30	83%
16-Commercial*	Holiday Inn & Suites	December 9th 2010	Nashua	53	41	77%
17-Residential*	Bethlehem Town Building	January 13th 2011	Bethlehem	28	15	54%

Spring 2011 – NHBCC Energy Code Workshops						
18-Residential/ Homeowners	NH Home Show	March 4-6, 2011	Manchester	50	50+	NA
19-Local Energy Solutions Members/ General Public/ Homeowners	LES Conference	April 2nd 2011	Penacook	30	30+	NA
20-Commercial	Manchester Community College	April 5th 2011	Manchester	108	73	68%
21-Residential	Manchester Community College	April 25th 2011	Manchester	143	94	66%
22-Residential	Preferred Building Systems	May 12th 2011	Claremont	38	30	79%
23-Commercial	Preferred Building Systems	May 17th 2011	Claremont	33	25	76%
24-Residential	Plymouth State University	May 19th 2011	Plymouth	35	22	63%
25-Realtor	Realtor Public Policy Committee Meeting	May 20th 2011	Concord	40	40	100%
26-Commercial	Plymouth State University	May 24th 2011	Plymouth	31	25	81%
Fall 2011 – NHBCC Energy Code Workshops						
27-Residential In-Field	Strategic Contracting New Construction - Single Family Home	October 18th 2011	Weare	15	14	93%
28-Residential	Highland Center	October 20th 2011	Bretton Woods	29	26	90%
29-Commercial	Nashua City Hall	November 10th 2011	Nashua	44	30	68%

Winter 2012 – NHBCC Energy Code Workshops						
30- Real Estate Professional	Prudential Verani	March 2nd 2012	Londonderry	15	10	67%
31- Real Estate Professional	Keller Williams	March 7th 2012	Bedford	15	25	167%
32- Real Estate Professional	Prudential Verani	March 9th 2012	Portsmouth	15	6	40%
NHBCC Energy Code Workshop Totals:				**1,617**	**1,220+**	**>75%**

Some additional results of the Program's training activities included the following:

- Leveraging support from NH's Utilities, the number of Program-supported energy code workshops was increased from 24 to 32 workshops in more than 16 towns, reaching a total of over 1,220 building professionals during the two and one-half year Program period.
- Collaborating with NEEP to develop a first-of-its-kind, full day, in-the-field energy code training workshop for code officials and advanced building professionals. This in-field workshop focused on hands-on educational tools including blower door and duct blaster testing at a residential construction project. The in-field training workshop was extremely popular; initial email marketing yielded over 50 interested attendees for 12 available spots.
- Working with NEEP to develop energy code guidance documents and checklists specifically targeted to NH real estate professionals and coordinating to develop a half-day energy code workshop curriculum designed specifically for NH real estate professionals, easily adaptable and replicable for a broader audience.
- Collaborating with building science professors from the Community College System of NH to videotape workshops, ultimately developing short energy code compliance videos posted on the www.nhenergycode.com website.
- Leveraging support from local NH businesses (including a residential contractor and a modular homes manufacturer) to run in-the-field energy code workshops for code inspectors and advanced building professionals.
- Reaching out to rural and hard-to-reach areas of NH including the North Country. The Program engaged in regionally-specific outreach to rural areas, including local networking and local newspaper advertisements to increase workshop registration numbers in these areas.
- Web-based training registration improved the overall efficiency of the communication process as it allowed the program to send automated confirmation emails to attendees. The system also allowed the program to send reminder emails a few days prior to each workshop to ensure the "no-show rate" was minimized.

Task 4 – NHBCC Program Recommendations

Key recommendations from the Program's Task 4 activities are presented in Table 10 below:

Table 10. Task 4 Recommendations – Train and Mobilize Building Professionals

Task 4 Recommendations - Train and Mobilize Building Professionals
☐ Execute on-site trainings for code officials to build the energy code knowledge base within building inspectors. ▪ The NHBCC Program developed targeted in-field, hands-on training curriculum for NH code officials and building professionals. ▪ Currently the NH Utilities run free classroom beyond code trainings for building professionals.
☐ To reduce barriers to workshop attendance, offer workshops free of cost and in locations distributed across the state. Pay particular attention to rural areas and other hard to reach sectors in workshop location choice.
☐ Leverage free spaces to host workshops including the existing Community College System of NH and local businesses.
☐ Utilize social media and email services like Constant Contact, and network with local trade and energy groups to ensure that marketing activities for training workshops reach a broad audience.
☐ Offer targeted workshops, tailored to each market actor group or several related market actor groups: code officials and residential and commercial builders call for more technical training; lenders and appraisers need training that emphasizes the value of energy code compliant home, etc. ✔ The NHBCC Program developed targeted curriculum and resources, tailored to specific market groups including building professionals and real estate professionals.
☐ Coordinate with national trade and industry groups to offer relevant CEU credits to workshop attendees. ✔ The NHBCC Program obtained CEUs from BPI, AIA and InterNACHI for the traditional workshop for building professionals and targeted CEUs for real estate professional workshops

Task 5. Develop a Public Awareness Campaign

In order to ensure widespread understanding and awareness for the NH energy code and the benefits of "going beyond code", the NHBCC Program engaged in a state-wide public awareness campaign. Task 5 of the Program included activities in support of this campaign to deliver thoughtful and consistent messaging throughout the state.

Methodology

The public awareness campaign included most of the same outreach and marketing efforts as described in Task 3, however these efforts were focused and targeted towards non-code officials and non-building professional audiences such as homeowners, landlords, commercial property owners, real estate appraisers and realtors, and key NH policy makers and legislators. Key activities conducted within this Task area included:

- Developing targeted messages for specific market actor groups
- Producing and promoting a Public Service Announcement (PSA)
- Customizing the NH Energy Code Challenge Website to provide resources for specific market actors
- Pursuing leverage opportunities through strategic partnership with Consumers Union
- Preparing a Public Awareness Campaign Kit for potential future consideration and use

Each of these activities is discussed in more detail in the following paragraphs:

Targeting Market Actors

An initial focus of the NHBCC Program's public awareness campaign was to identify the major market actors working in, or impacted by the energy code environment. The project team worked with GDS Team member Advertising Works, to determine how best to reach out to each unique market actor group. Two key questions considered for each group were: what the message should be, and how it could be most effectively delivered. This targeted communication plan and market actor analysis was central to all components of the program, beyond the outreach and awareness activities– not only did it help inform the structure of the NH Energy Code Challenge website and all printed marketing materials, but it also served as a backbone to the development of the first section of this Roadmap to compliance.

An example of the targeted marketing materials developed by the program included a typical homeowner-focused fact and info sheet for use at home shows, and other public events, to help get the "demand side" of the market more aware of the energy code, why it matters, what it requires, and how to learn more. A copy of this material is included in Appendix H.

Public Service Announcement

In addition to the program promotional efforts noted in Task 3 and above, a first-of-its-kind and light-hearted public service announcement (PSA) targeting "non-code-official" audiences (e.g. homeowners and the general public, including key NH policy makers and legislators) was developed and deployed across the state. Through creative messaging and thoughtful content strategy, this 60-second radio spot promoted consumer awareness of energy codes benefits. The NH Energy Code Challenge PSA highlighted the consumer advantages and benefits of building to the 2009 IECC energy code standards and made an important link between energy code compliance and energy cost savings. The PSA also pointed to NH Energy Code website, where

interested parties could learn more about energy codes. The PSA remains active and can be heard by visiting the Program's www.nhenergycode.com website.

The Program publically released the PSA in mid-June 2011 to numerous media outlets and towns across NH as shown in Table 11:

Table 11. NHBCC Program Public Service Announcement Radio Release List

Town	Station
Franklin:	WFTN-FM (94.1 FM) WFTN-AM (1240 AM)
Moultonborough:	WSCY-FM (106.9 FM)
Plymouth	WPNH-FM (100.1 FM)
Concord:	WTPL-FM 107.7 "The Pulse" News, Talk, Sports
Upper Valley:	WMXR-FM 93.9 "MAXX" The Morning BUZZ and Classic Hits/Sports WXXK-KIXX 100.5 The Valley's Best Country WGXL-XL 92.3 Today's Best Hits WTSL-1400 AM 94.3 FM "The Pulse"News Talk and Sports
Keene:	K-ROCK 101.9 The Morning Buzz-Rock WEEY 93.5 Sports talk from WEEI in Boston
Other:	95.7 FM (WZID) WPNH/1300AM

The NH Energy Code Challenge Website

The strategy for attacking a general lack of awareness and education across market actor groups was to target each group with specific, stakeholder-appropriate information and resources. The result was the creation of individual resource pages for each major market actor group. When a member of any particular group visits the site (e.g. a code official, a commercial or residential builder/contractor, a realtor or appraiser, a policymaker, or a homeowner), they found a resource page that was customized to include the specific resources most relevant to their role in energy code compliance.

This site structure fit in nicely with the overall public awareness campaign – all marketing

efforts usually included a pointer to the website where different groups could find information and resources developed specifically for them.

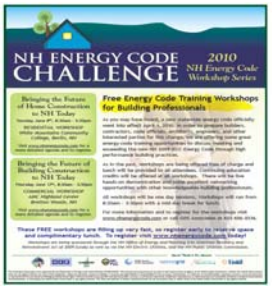
Partnership with Consumers Union

The Program continued collaboration efforts with the Consumers Union in recognition of the two groups' similar goals to educate the general public and promote general awareness of building energy codes. The two programs have shared resources specifically developed for consumers including checklists, code finder maps and introductory energy codes fact sheets, and worked to cross-market each other's efforts on their respective websites and general public/consumer-focused marketing materials.

As mentioned in Task 3, the Consumers Union also made a unique New Hampshire webpage within its own "A Greener Energy Future" website, which is dedicated to code-related consumer outreach on a national level. An example of the Consumers Union's outreach material is included in Appendix I.

Going Beyond Code - Public Awareness Campaign Kit

Another crucial part of the public awareness campaign was the development of a "Going Beyond Code – Public Awareness Campaign Kit", which was distributed to communities throughout the state. The kits included fact sheets, case studies, sample press releases, and ready-to-use PowerPoint presentations for local energy committees and green teams, the public service announcement, and other "grass roots driven" mediums. (see Appendix H).



Results

Since the public awareness campaign included most of the same outreach and marketing efforts as described in Task 3, there is some degree of overlap between the two tasks. Some of the results of the marketing activities included:

- The website had over 5,450 unique visitors and 30,900 total page views from the beginning of the Program.

- The program's collaboration with Consumers Union allowed the program to extend the limited overall energy code-related funding in NH to further develop and distribute educational energy code brochures, tool-kits, consumer messaging for the general public, and online resources.

- Cross- promotion with BCAP extended the program's reach to a broader audience and NH's nomination as one of the "Top 10 Places to Watch" in the country for energy code activities put the program in the national spotlight.

- The NHBCC Program was nominated by both BCAP and NEEP for an AESP award at the 2012 National Conference in the areas of "Outstanding Achievement in Marketing Communications" and "Outstanding Achievement in Energy Program Design or Implementation". The NHBCC Team presented at the AESP National Conference on the barriers to energy code compliance and the best practice strategies the NHBCC Program deployed to overcome key market barriers.

- The PSA had more than 200 plays on 17 NH radio stations across the state. As a result of its effectiveness, other states expressed interest in adapting the PSA for broader use in specific state jurisdictions and nationally.

- The PSA was recognized at the 2011 Energy Code Conference in Utah and received positive feedback from many energy code-related groups. Most notably, Nevada adapted the PSA for use in its own region.

Task 5 – NHBCC Program Recommendations

Key recommendations from the NHBCC Program's Task 5 activities are summarized in Table 12 below:

Table 12. Task 5 Recommendations – Develop a Public Awareness Campaign

Task 5 Recommendations - Develop a Public Awareness Campaign
☐ Develop a strategic marketing plan early in the Program and identify key market actor groups so that marketing messages can be tailored to unique audiences.
✔ Share resources broadly and be certain to give collaboration credit where credit is due ▪ The NHBCC Program shared its one-of-a-kind Public Service Announcement (PSA) with Nevada to help increase awareness of the energy code in Nevada.
☐ Invest in a functional and accessible website that hosts comprehensive information about the Program goals, outreach and educational documents, and all Program-related materials. Point back to the website in all printed and online marketing activities.
☐ Take advantage of as many free sources and avenues of marketing: "grass-roots" and word-of-mouth marketing, free newsletters and printed and online calendars, and free airtime on radio stations for public service announcements.
☐ Develop an easy to understand, informative, and memorable public service announcement and utilize free radio airtime to communicate the benefits of energy code compliance and the goals of the Program to the general public.

Task 6. Update and Gather Building Energy Code Resources

Through the custom web portal described in Task 3, the NHBCC Team developed a central website-based repository for updating and gathering building energy code related resources in one publically, electronically accessible location.

Methodology

Key activities conducted as part of this Task included:

- Developing market actor-targeted resource pages on the Program's dedicated website and reviewing, compiling and posting relevant tools, checklists and links to specific pages where appropriate,
- Producing and posting live training videos and an "ask the expert" blog, and
- Updating the NH Field Guide to Residential New Construction.

More information on each of these activities is presented in the paragraphs below.

Market-Actor Targeted Resource Pages

A critical component in the overall success of the NHBCC Program was the development and deployment of a state-specific website dedicated to providing resources and educating all relevant market actors about the importance of energy code and needs/strategies for compliance. The approach used for attacking a general lack of awareness and education across market actor groups was to target each group with specific, stakeholder appropriate information and resources. The result was the creation of individual resource pages for each major market actor group.

When a member of any particular group visits the site, (e.g. a code official, an architect/engineer/ designer, a commercial or residential builder/contractor, a realtor or appraiser, a policymaker, or a homeowner), they can find a resource page customized with specific resources most relevant to their role in energy code compliance. In aggregate, these pages formed a central repository of energy code information and useful resources collected throughout the duration of the Program.

Key NHBCC Team members reviewed and added new resources to the relevant website pages frequently throughout the course of the Program. The types of resources available included reports, case studies and white papers, checklists and fact sheets, presentations (both from the NHBCC program and relevant others), marketing materials, press releases, compliance software tools, NH-specific residential and commercial energy code workshop training videos (described

in more detail below), and links to an expansive list of regional and national code-related agencies with further resources.

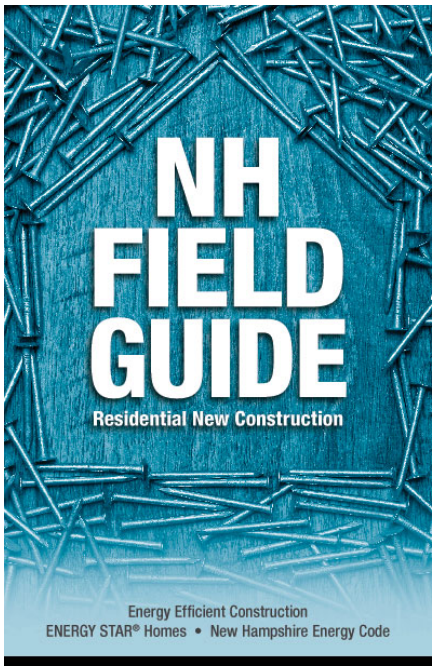
Live Training Videos and "Ask the Expert" Blog

In an effort to reach as many building professionals and code officials as possible, including those who could not attend an energy code workshop in person, the NHBCC Team also developed short training videos, which were filmed at several live energy code workshops. These "live-training" videos were posted on the website, supplementing the printed and online resources for each market actor group. Most videos were short clips, focusing on one attribute or topic in relation to code compliance, e.g. building envelope or air sealing. In this way, interested professionals and other market actors could select specific topics of interest and maximize their viewing effectiveness rather than needed to filter through a single 60 minute or longer video presentation.

The Program also initiated an experimental feature of the website, a unique "Ask the Expert" blog, in which Program staff could share code developments, and code experts (and other stakeholder panel representatives) could answer code-related questions and comments solicited from various web site visitors. The intent of the blog was to open up a dialogue between code experts and those who are affected by the code about code compliance issues and benefits.

Updated NH Field Guide to Residential New Construction

Another major hallmark of Task 6 was the release of an updated version of the NH Field Guide for Residential New Construction. As part of this process, the NHBCC Team solicited input from the NHBCC Program Stakeholders and the document's original authors (Conservation Services Group) to update this graphical guide to reflect the 2009 IECC and ASHRAE 90.1-2007 requirements. In addition, the Field Guide was updated to include 2012 IECC requirements and ENERGY STAR Version 3.0 information.



More than 2,200 hard copies were mailed to builders, contractors, architects, engineers, designers, energy auditors, code officials, town officials, libraries, and many others in the state. Limited additional copies of the printed Field Guide were also made available to the public through the NHHBRA and the PUC. The Program also made the document available for free viewing and download from the NHBCC website: www.nhenergycode.com.

By providing free copies of the Field Guide to building professionals and making it publically accessible through town libraries and town halls, the Program used this tool to increase the awareness and knowledge of the NH energy code standards amongst NH building professionals – a first step toward significantly improving energy code compliance rates across the state.

Results

- Collaborating with building-science professors from the Community College System of NH to videotape workshops, ultimately developing short energy code compliance videos posted on the www.nhenergycode.com website.
- Coordinating with NEEP to develop a half-day energy code workshop curriculum designed specifically for NH real estate professionals, easily adaptable and replicable for a broader audience.
- Coordinating with NH's Granite State Trade School to acquire 2009 IECC code books to be sold to building professionals at the energy code workshops around the state.
- Leveraging resources from national organizations (including DOE, PNNL and BECP) to bolster energy code resources posted on the www.nhenergycode.com website.
- Collaborating with the NHHBRA to update the NH Field Guide for Residential New Construction with 2009 IECC energy code information and best practice residential building techniques.

Task 6 – NHBCC Program Recommendations

Key recommendations from the NHBCC Program's Task 6 activities are presented in Table 13 below:

Table 13. Task 6 Recommendations – Update and Gather Building Code Resources

Task 6 Recommendations - Update and Gather Building Code Resources
☐ Provide checklists with energy code-related items and requirements for code officials.
✔ The NHBCC Program distributed a NH Residential New Construction Field Guide to all building professionals and code officials around the state. The Field Guide includes an IECC Residential Data Collection Compliance Checklist.
✔ The DOE provided free electronic download of 2009 IECC – widely promoted in NH, as an added resource to improve compliance and understanding
✔ The NHBCC website provides a link to the DOE's BECP *Resource Guide for Code Officials*.
☐ Use the key market actor groups identified in the marketing strategy plan to inform and target resources for diverse audiences.
☐ Update resources frequently and use established marketing outlets to alert relevant parties to updates and code-related news.
☐ Use online forums and new media technologies to ensure messaging reaches a broad audience. Examples include using social media like Facebook and Twitter, and experimenting with blogging forums and online video training.
☐ Leverage free resources offered by other related groups, and make resources developed through the program available and easily accessible.
☐ Develop materials that are informative, but also engaging and memorable. Technical resources like guide books and checklists should include pictures and accurate, detailed information.
☐ Develop mobile application of the NH Residential New Construction Field Guide

Task 7. Develop Policy Options

Beyond the formal adoption of a state-wide energy code, state and local policy can play an essential role in supporting an effective energy code infrastructure, particularly with respect to administration, education, enforcement, funding allocation, resources and other complementary programs. Based on the results, information and experience collected and compiled through the extensive task activities above, this section identifies potential approaches for improving energy code compliance in NH specifically through state and local policies (including regulations, laws/statutes, various organizational positions and funding mechanisms). In addition, potential structures, authorities and responsibilities of NH building and energy code officials and other energy code enforcement and implementation entities are presented. This section takes into account national best practices and NH's challenging changing political climate, history, needs, historic funding paucity, local control, and sensitivity to unfunded mandates to local jurisdictions.

Background

In 2009, as part of the process for securing ARRA funds for the state, NH's Governor John Lynch made an assurance that NH would achieve 90% compliance with the 2009 IECC by the year 2017. In May 2009 the NH Building Code Review Board (BCRB – the entity responsible for developing and adopting State Building Codes) amended the State Building Code to reference the 2009 IECC. It finalized the adoption update process in December 2009, reviewing and including proposed amendments to double the insulation for circulating hot water systems to R-4, classifying commercial structures less than 4,000 square feet and three stories high as subject to the residential code, and granting log homes a window and HVAC tradeoff.

The BCRB is made up of 16 design, building, and enforcement professionals who serve 3-year terms, selected to represent their constituencies by their member organizations. The chairman of the BCRB is appointed by the Commissioner of the NH Department of Safety (DOS).[11] Historically, the BCRB has adopted the new State Building Code every three years (2003, 2006, and now 2009) as a minimum standard of performance; however there is no automatic review and update process currently in NH.

The new State Building Energy Code, based on 2009 IECC, took effect on April 1, 2010 along with numerous other relevant building codes.[12] In accordance with NH State Statute (RSA 155-A:3, III), adoption of 2009 IECC will sunset if legislative ratification is not achieved shortly. House Bill 137 is currently working its way through the state legislature as the last official step to formally ratify the BCRB's adoption of 2009 IECC and other relevant building codes (and associated amendments) for the state. Absent this ratification, although it would be difficult to go back to 2006 IECC since the state has been operating under the 2009 IECC for two years now,

[11] The 16 BCRB professional positions are: Board Chair, Licensed Architect, Licensed Structural Engineer, Licensed Mechanical Engineer, Licensed Electrical Engineer, Municipal Association Representative, Municipal Building Official, Municipal Fire Chief, Fire Prevention Officer, Non-Residential Building Contractor, Residential Building Contractor, State Energy Conservation Code Office Representative, Licensed Master Plumber, Mechanical Contractor, Master Electrician, Committee on Architectural Barrier Representative, Master Electrician

[12] The NH State Building Code, effective 4/1/10, has been amended with adoption of the following documents: International Building Code (IBC), 2009 edition, with amendments; International Plumbing Code (IPC), 2009 edition, with amendments; International Mechanical Code (IMC), 2009 edition, with amendments; International Energy Conservation Code (IECC), 2009 edition, with amendments; International Residential Code (IRC), 2009 edition, with amendments and; National Electrical Code, 2010 edition, with amendments.

court challenges could create confusion regarding which IECC vintage was applicable. At the time of this report, HB 137 passed the full House of Representatives (on January 5th, 2012) and is now under consideration in the Senate. After which, if approved, it will move on to the Governor's Office for signature and final, formal ratification.

As highlighted previously in this report, there are multiple market actors in NH that have a role in developing, implementing and/or overseeing building energy code and associated policies in the state (i.e., energy efficiency, sustainable energy and energy code initiatives are administered by several different entities including investor-owned and cooperative utilities, state agencies, regulatory commissions and professional associations/review boards). Some of these entities have overlapping duties. In addition to the state legislature which debates and sets overarching policy and regulations, the major entities in the state set up to focus on energy and code-related issues (although may not have historically done so) include: the NH Public Utilities Commission (PUC), the Department of Safety (DOS), (the NH Office of Energy and Planning (OEP)), the NH Building Codes Review Board (BCRB), and the Energy Efficiency and Sustainable Energy Board (EESE Board).

The NH Public Utilities Commission (PUC) administers the energy conservation code for residential, commercial and industrial buildings. The Department of Safety (DOS), through the Fire Marshal's Office, is responsible for fire safety and other building code enforcement (including the energy code) for state-owned facilities and the NH University system. In addition the DOS is a resource for building energy code enforcement and support for communities that have no building code official, and certifies modular homes, while manufactured and mobile homes are certified federally. The NH OEP is included in the Executive Branch of NH's state government, within the Office of the Governor, and the Director of the OEP is appointed by the Governor. The OEP administers energy-related programs and initiatives pertaining to a variety of energy issues – including this Energy Codes Roadmap Project. The NH BCRB (headed by the NH DOS Commissioner of Safety) is responsible for reviewing, recommending and adopting state building codes (including the building energy code), and is responsible for hearing and making findings on appeals associated with building codes and related matters. The EESE Board, created in 2008 to promote and coordinate programs related to energy efficiency, demand response, and sustainable energy in NH, is currently responsible for providing recommendations to the PUC and legislature on the administration of energy efficiency, energy code and renewable energy funds.

Although an exhaustive research and compilation effort of all documents associated with the state's existing, controlling energy code related regulations, policies and mandates was a bit outside the scope of this project, some identification and assessment has been conducted, highlights of which are summarized in Table 14 on the next page:

Table 14. NH Issuing Authority – Controlling Rules, Regulations and Policy Documents

Issuing Authority	Controlling Rules, Regulations and Policy Documents
NH State Legislature	**- NH RSA Title XII Public Safety and Welfare, Chapter 155-A NH Building Code (2009 – pending 2012 amendments via HB 137):** designates codes (including building energy codes) in effect state-wide for residential, commercial, and state-owned buildings and associated enforcement authorities/responsibilities, permitting requirements, penalties, fees establishment capabilities, appeals procedures, establishes State Building Code Review Board and associated responsibilities, sets building requirements for state-funded buildings. **- NH RSA Title XII Public Safety and Welfare, Chapter 155-D Energy Conservation in New Building Construction (1990):** establishes framework for future response to changes in federal energy conservation requirements (Federal Energy Policy and Conservation Act) and advances in energy conservation requirements and technologies, establishes construction standards, administrative responsibilities (towns and cities, code officials, general contractors, public utilities commission, architects and engineers, manufactured or prefabricated structures, defines unlawful acts, specifies permit issuance, injunction, penalties, exemptions and occupancy change requirements, designates PUC responsibilities for training and rulemaking requirements. **- NH RSA Title LXIV Planning and Zoning, Chapter 673, Local Land Use Boards, Establishment of Boards (2010):** requires every building code adopted by a local legislative body to include provisions for establishment of a building inspector position. (Chapter 673:1,V). **- NH RSA Title LXIV Planning and Zoning, Chapter 674, Local Land Use Planning and Regulatory Powers, Building Codes (2008):** allows local legislative bodies to enact additional provisions of the state building code provided they are not less stringent than the requirements in the state building code. Requires such adopted ordinances to be submitted to the state BCRB for informational purposes. (Chapter 674:51, I and II). **- NH RSA Title LXIV Planning and Zoning, Chapter 675, Enactment and Adoption Procedures, Zoning Ordinance, Historic District Ordinance and Building Code Enactment Procedures (1990, 1996):** specifies method of enactment in cities and towns operating under town council form of government (785:2), town and village districts (675:3), and methods of enactment by petition (675:4). **- NH RSA Title LXIV Planning and Zoning, Chapter 676, Administrative Enforcement Procedures (1989, 1997, 2008, 2009):** requires building permits prior to commencement of construction (676:11), specifies conditions for withholding building permits (676:12), building permit restrictions (676:13), penalties and remedies/injunctive relief (676:15), and fines/penalties – second offense (676:17).
NH Public Utilities Commission - Sustainable Energy Division (www.puc.nh.gov/energycodes)	**- NH Code of Administrative Rules, Chapter PUC 1800, Administration of NH Code for Energy Conservation in New Building Construction (2007):** Specifies minimum design and construction requirements (energy code related) for new buildings and structures or additions/alternations to existing buildings (1802), methods of compliance regarding design (1803), application and appeals process (1804), and evidence of compliance of completed buildings (1805).

NH Department of Safety - Division of Fire Safety, Bureau of Building Safety & Construction (www.nh.gov/safety/divisions/firesafety/divisions)	- State Fire Marshal's Office charged, by statue, with ensuring compliance with NH State Fire Code and State Building Code through review of plans prior to construction of: state and county owned property, NH University System, educational and healthcare occupancies, and locations where there is no fire chief or local building/code official - Third Party Plan Reviews authorized and utilized (RSA 153:5) - State Fire Marshal's office responsible for administering and implementing Modular Buildings Program to assure modular construction is built in accordance with the codes and standards adopted at the state level. Compliance with the program is witnessed by the application of NH modular labels on each unit following approval by the State Fire Marshal's Office and 3rd part inspection agency review and approval of construction plans and process inspections on each unit. -NH Joint Board of Licensure and Certification (July 2011) responsible for inspection/approval of manufactured housing (RSA 205-A, 541-A, and Administrative Chapter Man 100 through 400)
NH Office of Energy and Planning (www.nh.gov/oep)	-OEP is part of the Executive Department of the Office of the Governor. - OEP promotes smart growth principles through municipal/regional planning assistance program, ensures energy supply reliability, availability/security through statewide energy plan, offers community services, promotes energy efficiency and cost reduction for low income households, state government buildings, businesses and industry, and schools and towns, explores opportunities to expand use of renewable, domestic energy sources, promotes land use efficiency, supports natural resources protection/management programs, and coordinates with Department of Information Technology to create online grant portal to keep parties informed of current statewide grant opportunities - NH Energy Plan (November 2002), developed pursuant to NH Chapter 121 (2001) was a 10-year state energy plan and included recommendations to strengthen state energy codes and assist with compliance (Chapter 9.4 and 9.5). This Building Energy Codes Roadmap project is one such program that OEP is supporting.

NH Office of the Governor and Executive Orders	- NH Climate Action Policy Task Force and Climate Action Plan (Executive Order #2007-3) – directed Task Force to submit Action Plan by 9/1/2008. Final Plan was released on 3/25/2009 and included 67 recommended actions, some of which were energy code related including: upgrading building energy codes and increasing building energy code compliance (both part of an overarching strategy for maximizing energy efficiency in buildings). -In response to the American Recovery and Reinvestment Act (ARRA), many state governors across the U.S. sent letters of assurance regarding energy codes to the U.S. Secretary of Energy. Specifically, these assurances called for the development of plans to achieve 90% compliance with the 2009 International Energy Conservation Code (2009 IECC) for residential buildings and ANSI/ASHRAE/IESNA Standard 90.1–2007 for commercial buildings (or equivalent codes) by the year 2017. Among the governors to make this assurance in 2009 was New Hampshire's Governor John Lynch. For New Hampshire, this assurance met a federal condition for the state to receive $25.8 million in ARRA – State Energy Program (SEP) stimulus funding. - State Government Lead-by-Example in Energy Efficiency (Executive Order #2001-1): In addition to requiring work towards reducing fossil fuel use in its facilities by 25% of 2005 levels on a square foot basis by 2025 (per RSA 21-I:14-c), includes requirement that design criteria associated with requests for new construction or renovations exceeding 25,000 sq ft or $1M meet a high performance, energy efficient, sustainable design standard (in accordance with RSA 155-A:13) that meets or exceeds current IECC energy code.
Municipalities	- Multiple scenarios: full-time code officials, part-time code officials (shared resources), fire chief, 3rd party inspectors, no code official - Stricter codes adoption (i.e. Durham, NH)
NH BCRB	**- NH RSA Title XII Public Safety and Welfare, Chapter 155-A:10 NH Building Code (2010 – pending 2012 amendments via HB 137):** Establishes Board with responsibility for reviewing and updating the NH building codes (including building energy code), provides independent analysis and recommendations to legislature on modifications to the state building codes and fire codes, hears appeals of variances or exceptions to the fire code and appeals of decisions by the Fire Marshal in enforcing provisions of the State Building Code (155-A:11,I). - Chapter BCR 100 (Organizational Rules), Chapter BCR 200 (Practice and Procedure), BCR 300 (Updates and Changes to the State Building Code Manuals Rules):
NH EESE Board	- Title X Public Health, Chapter 125-O:5, Multiple Pollutant Reduction Program – Board created to promote/coordinate NH energy efficiency, demand response/sustainable energy programs. Responsible for developing plan to achieve State's energy efficiency potential for all fuels, including setting goals/targets for energy efficiency that are meaningful and achievable – Energy Code policy is part of objective.
Other organizations/business interests	- NH Building Officials Association: an organization comprised of Building Officials throughout the state that stands ready to help any community in the development of a building department to enforce the state building codes (as provided in RSA 674:51). Offers its expertise, as needed, to its membership or to any NH city or town, or other code enforcement agencies interested in the protection of public safety, health, and welfare from the hazards of fire or other dangers resulting from unsound construction or code violations. In

Other organizations/business interests (continued)	addition NHBOA promotes the acquaintance of the membership; gathers and disseminates all matters of interest; establishes, fosters and maintains a professional spirit; promotes good fellowship among its members. -According to NHBOA's website: "The building department, in most communities, can be a self-supporting department and therefore not a tax burden. The expertise necessary to maintain such a department is minimal and training is available locally at [NHBOA] monthly meetings and area workshops. [The BOA has] also developed a manual to assist communities in starting and maintaining a building department as well as a mentorship program to help in this process. The mentorship program connects communit[ies] with a building official who is experienced in code enforcement." - Home Builders & Remodelers Association of NH: founded in 1952, represents residential building and remodeling interest in NH. Advocates for all housing related issues so that NH citizens can enjoy high quality, energy efficient and affordable home ownership. [http://www.hbranh.com/index/index] - NH Association of Realtors: Internally, NHAR anticipates, initiates, communicates and provides business resources and solutions for REALTOR® members to attain a high degree of professionalism to ethically serve the public. Externally, NHAR is the business, industry and public policy advocate for private property rights in New Hampshire. [http://www.nhar.org/mission/] - NH Chapter of AIA: Mission includes: illuminating the profession of architecture through advocacy, public outreach, education, fellowship, and recognition of design excellence. Members and allied partners express their commitment to excellence in design and livability in the nation's buildings and communities. Members adhere to a code of ethics and professional conduct that assures the client, the public, and colleagues of an AIA-member architect's dedication to the highest standards in professional practice. [http://www.aianh.org/]
NH Utilities	- Beyond Codes training programs: Long history of support. The NH Electric Utilities Educational Programs include an energy code training component which provides financial support of historically $40,000 annually for the Utility/State of NH/NHPUC statewide residential and C&I energy code trainings. [13] - CORE utility programs: Long history of implementation. The eight CORE Energy Efficiency Programs were born out of the Energy Efficiency Working Group recommendations (Docket No. DR 96-150) that were developed between May 1998 and June 1999 and received final approval from the Commission in May 2002 to launch the CORE Programs. This represented the first time that a coordinated effort had been made by the electric utilities to offer the same programs statewide.[14]

[13] NHPUC Docket No. DE10-188, NH Electric Utilities Before the NH Public Utilities Commission, *2011-2012 CORE New Hampshire Energy Efficiency Programs,* August 1, 2012

[14] NHPUC Docket No. DE10-188, NH Electric Utilities Before the NH Public Utilities Commission, *2011-2012 CORE New Hampshire Energy Efficiency Programs,* August 1, 2012

It is important to note that the rules, regulations and policies included in the previous table all exist within a broader energy policy environment in the state, the subject of which has previously been addressed in a report completed by the Vermont Energy Investment Corporation (VEIC) as part of an Independent Study of Energy Policy Issues, conducted for the NH PUC, dated September 30, 2011. Within the VEIC report, examples of major policy legislative bills, state statutes, executive orders and other documents are provided that articulate the state's intention to move toward greater energy efficiency and sustainable energy development and use over time.[15]

All-in-all, it appears that with respect to energy codes, sufficient specific and enabling legislation exists for effective adoption and enforcement of appropriate base codes and potential stretch codes. Sufficient statutes, regulations, policies and guidelines also seem to exist regarding administrative organizational requirements and responsibilities. However, common understanding and implementation of these requirements/responsibilities appears to be lacking within and across key market actor organizations and stakeholder groups. And often, lack of resources (including funding, staffing and time) and the need to prioritize other responsibilities impacts abilities and effectiveness of energy code compliance and enforcement activities.

In NH, a partnership between the local jurisdictions, municipal code officials, the PUC's Sustainable Energy Division, and DOS's State Fire Marshal's Office - all often short of funding and capacity - is required to effectively implement and enforce the state's legislative and regulatory mandates associated with the building energy code. (See Appendix A – NH's Market Characterization Report for more information regarding the demographics of code officials and lack of local code officials in northern regions of the state). The local jurisdictions and officials must also enforce all other building codes. Some towns delegate code enforcement responsibilities to the State Fire Marshal's office or the local fire department, and the PUC is responsible has energy code training and rulemaking authority. In this light, targeting specific public policy activities could help to better shape the state's energy code climate, real estate markets, and encourage improved energy code compliance while making strong progress towards NH's overarching energy and climate goals.

NH policymakers, including existing statutorily designated state agencies, boards, jurisdictions, and organizations can improve building energy code compliance and enforcement through development of clear and consistent policies, based on solid underlying regulations and statutes, increased funding, provision of outreach, education and technical support to municipalities and other impacted market actors (including regular training offered to local building inspection departments, etc.). To this end, below are some recommended policy options, tailored specifically for NH, that have also been effective as best practices for bolstering energy code compliance in other states.

[15] *Independent Study of Energy Policy Issues*, by Vermont Energy Investment Corporation, Jeffrey H. Taylor & Associates, Inc., and Optimal Energy, Inc., dated September 30, 2011. Pages 2-1 and 2-2, as required by SB 323.

Task 7 – NHBCC Program Recommendations

Key recommendations from the NHBCC Program's Task 7 activities are presented in Table 155 below. It is important to note that many of these recommended policy options will address the same barriers that exist across multiple market actor groups. Recommendations marketed with an asterisk [*] are also included in the BCAP Gap Analysis & Roadmap documents, VEIC SB323 Report, and/or NH Climate Action Plan:

Table 15. Task 7 Recommendations – Deploy Policy Options

Task 7 Recommendations – Deploy Policy Options
Policy Clarifications: ☐ Clarify and publish the roles and responsibilities for energy code verification and enforcement practices between the state and municipalities* – include commitment to statewide measurement and verification of code compliance using appropriate, acceptable and affordable methodologies consistent with best practices nationwide (US DOE supported strategies) and ensure sufficient funding available to track compliance levels over time (between now and 2017, and beyond). ☐ Clarify regulatory, administrative and enforcement roles and responsibilities – stakeholder/collaborative panel meeting topic where each responsible party presents their roles, successes, barriers and wish lists – consider having the PUC open up a generic docket/proceeding on the topic, or have the EESE Board address this issue. ☐ Where ambiguities exist, identify and develop collaborative approaches to resolve and solidify areas of responsibility, and develop revised policies or legislation (including amendments to existing statutes, where needed).
Policy Education, Outreach and Awareness: ☐ Communicate and clarify the State's energy code requirements, goals and targets (including state government's roles and goals within their own buildings), associated benefits, and current baselines of compliance. ☐ Develop concise summaries and press pieces, targeting various market actors/sectors, presentations, speaker/ambassador circuit. ☐ Provide simple, single source location for access to information, resources, etc. (www.nhenergycode.com – under ownership or maintenance by PUC, DOS, BCRB, BOA or OEP). ☐ Dedicate funding to offer free energy code training for code officials and design/construction professionals and other market actors.*
Policy Implementation Resources and Support: ☐ Review "fee" provisions, assess funding and resource needs (local, state agencies, etc.) and analyze administrative/implementation consistency between jurisdictions and within/across agencies regarding development, assignment and enforcement of fees – identify and consider alternative funding sources including public/private partnerships, grants, etc. ☐ Enable and encourage energy code compliance activities to be funded under the System Benefits Charge.* ☐ Identify current resources and tools being used and assess their associated availabilities. Develop policies and approaches for securing additional tools and resources to better meet needs so, 1) the PUC can fulfill its administrative and implementation responsibilities (including training), 2)the state can achieve its state-owned building efficiency goals, and 3) the DOS can effectively perform its administrative and implementation roles (including providing local jurisdictions without code officials and state-owned buildings) with the resources needed to meet their responsibilities.

- ☐ Identify opportunities for coordination, minimizing duplication of efforts, improving administrative and enforcement efficiency – leverage and expand existing programs based on focus for achieving common goals (not the least of which is achievement of 90% compliance by 2017). Where gaps exist, or are identified, develop collaborative strategies to fill them.
- ☐ Provide code officials and inspection departments with the training, tools, DOE materials, and other resources to improve energy code enforcement (post ARRA-funded initiatives).
- ☐ Maintain and expand the training and infrastructure development progress gained through AARA-funded initiatives to achieve code compliance, perhaps through permit or development fees,* or through encouragement of partnerships between the state, trade associations, utilities, product manufacturers, distributors, and contractors to result in ongoing and periodic outreach, education and training for code officials and contractors.
- ☐ Dedicate funding to support 2 State-employed "roving building energy code officials" to support understaffed and/or rural regions.*
- ☐ Dedicate a state-level representative to participate in the Energy Code Collaborative, pursue funding opportunities, maintain energy codes website, and coordinate compliance evaluation program.*
- ☐ Ensure compliance with NH's High Performance Building Code for State Buildings (RSA 155-A:13 and Executive Order 2011-1, Item 8).*

Policy Enforcement:

- ☐ Provide code enforcement in unincorporated areas and jurisdictions.*
- ☐ Increase awareness of consequences/penalties associated with non-compliance – possibly pursue and enforce a test case.

Policy Enhancements:

- ☐ Encourage municipalities to adopt more stringent codes than the State – highlight existing legislation and process for such adoptions (Town of Durham, NH provides an excellent example). Consider developing additional enabling legislation to encourage a higher standard statewide, i.e. optional stretch codes, or above codes options.*
- ☐ Leverage the momentum of NH's more than 100 Local Energy Committees, along with other town government leadership and the Regional Planning Commissions to encourage adoption of "stretch" codes in other communities.
- ☐ Develop policies, or programs to encourage expanded utilization of "beyond code" programs including: ENERGY STAR, Build Green NH, Leadership in Energy and Environmental Design (LEED), the National Association of Home Builders' National Green Building Standard, Passive House, International Green Construction Code, etc.*
- ☐ Use building energy labeling as a means for increasing energy efficiency of existing buildings*
- ☐ Leverage NH's participation in the national Home Energy Score pilot program and use the experience gained from the pilot program to continue and expand effective building labeling activities across the state.*
- ☐ Develop minimum licensure requirements, including continuing education units (CEUs), for state- and municipally employed code officials, including consideration of revenue sources to support such inspector certification program and local enforcement.*
- ☐ Develop minimum licensure requirements, including CEUs, for New Hampshire contractors.*
- ☐ Develop minimum licensure requirements for certified "third-party" code inspectors.*

* Included in BCAP Gap Analysis & Roadmap documents, VEIC SB323 Report, and/or NH Climate Action Plan

Task 8. Establish a Review Process

Establishing a review process in order to monitor and track compliance with the 2009 IECC is critical. The state must know where it has been and where it is, in order to inform where it is going. Evaluating compliance is critical to understanding the usefulness of the energy code compliance activities (outline in the tasks above) and ultimately to substantiate the role of energy code in advancing statewide energy efficiency.

Methodology

In 2010 GDS Associates conducted a NH Code Compliance Perception Survey of local code officials. Described in detail above, Task 1- Establishing a Baseline, the survey updated a previous (2006) telephone survey of NH Building Code Officials regarding current compliance with the NH Building Energy Code. The survey results combine with other activities in this NHBCC project as initial steps in compiling baseline information with respect to energy code compliance in the state.

Going forward, monitoring and tracking compliance with 2009 IECC in NH will require a more comprehensive and statistically valid process, based on consistent regional and nationally-tested and approved methodologies. In addition to monitoring and verifying the state's percent compliance with energy code, a number of the state's energy code-related resource needs management, awareness, training, implementation and enforcement activities should also be evaluated to help assess their effectiveness and progress toward achievement of other statewide energy code goals, associated energy savings and cost effectiveness.

Following is a summary of emerging compliance monitoring and tracking approaches and more traditional energy efficiency program measurement indicator identification and evaluation strategies:

Compliance Monitoring and Tracking Approaches

The U.S. Department of Energy's Building Energy Codes Program (BECP) is developing procedures that states can apply to measure and report compliance with building energy codes.[16] These procedures are being tested through a number of pilot efforts nationwide, and once finalized, will be accompanied by support tools that will allow each state to effectively address compliance verification. Rather than creating its own review process for monitoring and tracking the state's energy code compliance, it is recommended that NH leverage results from the BECP's evolving national compliance measurement pilot efforts. These efforts should be closely monitored by the PUC, DOS, BCRB, HBRA and other key NH code stakeholders (perhaps through the planned continued collaboration and expansion of this project's NH Building Energy Code Stakeholder panel), for ultimate adoption and utilization at the appropriate time. Following is a brief summary of the energy code compliance evaluation steps as they are currently proposed through BECP:[17] More details can be found by visiting the BECP web site directly at www.energycodes.gov.

1. Obtain Evaluation Checklists – according to BECP, "A reliable measurement of energy code compliance calls for on-site evaluations of a valid sample of building projects (both

[16] http://www.energycodes.gov/arra/reaching_compliance.stm

[17] http://www.energycodes.gov/arra/documents/Step_by_Step_Companion_Guide.pdf

new construction and renovations. To check on compliance, the first step is to have a proper checklist." Checklists for residential and commercial buildings are available for download on the BECP website, along with corresponding instructions. Key elements addressed in these checklists, which vary by climate zone include:

   a. Compliance Approach – prescriptive, trade-off, or performance
   b. Pre-inspection/Plan Review – documentation regarding key components and HVAC load calculation
   c. Site Inspections – Foundation, Framing/Rough-in, Insulation and Final Inspections – by IECC components (and/or ASHRAE 90.1-2007 component where applicable, commercial vs. residential buildings)

2. Generate Samples – BECP recommends evaluating a statistically significant number of buildings within four building populations (residential new construction, commercial new construction, residential renovations and commercial renovations). A State Sample Generator is provided on the BECP website and results in roughly 44 building projects within each population, randomly selected to provide a representative sample with respect to building type, size and location, by county and climate zone. Using the State Sample Generator for NH, and based on the average of total permits issued over the three most recently available years of data, the following construction samples have been identified (please refer to Appendix J for printouts of the construction samples generated for NH using BECP's State Sample Generator tool):
   a. Residential New Construction: Based on 1,192 permits in Climate Zone 5, 2 projects would need to be randomly selected and reviewed in Cheshire County, 10 in Hillsborough County, 12 in Rockingham County, and 1 in Strafford County. Based on 872 permits in Climate Zone 6, 4 projects would need to be randomly selected and reviewed in Belknap County, 2 in Carroll County, 1 in Coos County, 6 in Grafton County, 2 in Merrimack County, and 4 in Sullivan County.
   b. Commercial New Construction: Based on 80 commercial construction starts in Climate Zone 5, 8 small projects would need to be randomly selected across Cheshire, Hillsboro, Rockingham and Strafford Counties, 6 medium projects and 6 large projects (with specific quota for each county). Based on 44 construction starts in Climate Zone 6, 4 small, 6 medium and 5 large projects would need to be randomly selected across Belknap, Grafton and Merrimack Counties (with specific quota for each county).
   c. Commercial Renovations: Based on 253 construction starts in Climate Zone 5, 29 projects would need to be randomly selected across Cheshire, Hillsboro, Rockingham and Strafford Counties (with specific quota for each county). Based on 83 construction starts in Climate Zone 6, 10 projects would need to be randomly selected across Belknap, Grafton, Merrimack and Sullivan Counties (with specific quota for each county).
3. Conduct Onsite Evaluations: Using the checklists acquired through Step 1, data must be collected on each selected project including actual field information on foundations, framing/rough-in (including door, glazing skylight and sunroom U-factors and associated SHGC values, slab, basement, wall, floor, ceiling and attic insulation R-values, vapor barriers and air sealing, fenestration air leakage, duct insulation, sealing, tightness testing, HVAC and water piping insulation, outdoor intake/exhaust openings, heating equipment, lighting, thermostats and other IECC components (and/or ASHRAE 90.1-2007 component where applicable, commercial vs. residential buildings). According to BECP

protocols, formal onsite inspections should be conducted by third-party evaluators who are sufficiently skilled and properly credentialed.

4. Analyze the State's Data: With raw data in hand, this information must be analyzed and used to generate an overall state compliance metric. BECP can provide assistance with this analysis in two ways: states can send BECP the individual paper checklists completed on each sample project and BECP will calculate the overall state compliance metric, or states can use BECP's on-line Checklist Store and Score Tool – where raw data from each project checklist is entered into an automated software tool to generate building-specific and state-wide metrics.

Alternative approaches are also suggested including self assessments, surveys and spot checks. There is much discussion and debate ongoing among national stakeholder groups regarding compliance analysis methods and protocols. BECP's method uses uniform compliance metric definitions including one where each evaluated building is assigned a compliance rating (0% to 100%) calculated as the proportion of code requirements that the building has met. Compliance scores for each building are then averaged across the entire sample of buildings inspected to calculate an overall compliance score for that building sector and statewide. Other analysis approaches considered, but dropped by BECP, included a "pass/fail" method where each building was either found to comply, or not with code. As recommended previously, the BECP methodology and associated issues and metrics should be closely monitored by the PUC, DOS, BCRB, HBRA and other key NH code stakeholders for ultimate adoption and utilization at the appropriate time.

Traditional Energy Efficiency Program Evaluation Strategies

Multiple evaluation strategies have been utilized for decades to assess effectiveness and impacts associated with energy efficiency programs throughout the region, nationwide and internationally. Such evaluations typically fall into a number of categories including: process, impact (including savings and cost effectiveness), and market assessment (including baseline studies). As part of an earlier task in the NHBCC project, a logic model was developed to describe critical energy code compliance-related activities and associated short, intermediate and long term outcomes/indicators that could be assessed over time to track progress toward achievement of key goals (including ultimate minimum 90% compliance with 2009 IECC by 2017). Based on this NHBCC program logic model assessment, a number of researchable issues were identified and are noted again below. Research addressing these questions would help to validate the reasonableness of the expectations associated with specific energy code compliance activities and would help inform code officials, compliance administrators and other key stakeholders of progress and potential areas for enhancement and refinement. Based on recognition of key underlying program hypotheses, the following issues are proposed for potential assessment.

Short Term

- Are Quality Assurance /Quality Control activities identifying strategies for increasing compliance with energy code and are these strategies being incorporated into other program activities?
- Are outreach and public awareness efforts resulting in increased awareness and support for code compliance among targeted market actors?

- Are education and training activities and outputs leading to increased knowledge and awareness of 2009 IECC and associated energy efficient building practices? Is this increased knowledge and awareness leading to increased support for code compliance within and across key market actor groups?
- Are the tools and technical support services being viewed as effective and used by targeted market actors?
- Is increased focus on code compliance and associated policies and regulations leading to an increased level of code compliance?
- Do targeted market actors feel they have the proper mandates, authorities, tools and incentives necessary to meet and verify code compliance?
- Are leveraged funding opportunities being identified and incorporated into program activities?

Intermediate Term

- Are strategies for increased compliance leading to documented increased compliance, improved quality construction, and more efficient code compliance verification processes?
- Is increased awareness among the general public and increased knowledge of 2009 IECC and related energy efficiency building practices leading to increased demand for code and beyond code compliant buildings?
- Are program activities leading to development of an infrastructure of market actors that recognize the need and value for, and are readily able to provide services that meet or exceed energy code?
- Is increased demand for code (or beyond code) compliant buildings, and an increased knowledgeable/skilled infrastructure of market actors leading to a greater proportion of market actors designing/building to (or above) code?
- Is increased demand for code (or beyond code) compliant buildings, and an increased knowledgeable/skilled infrastructure of market actors leading to a greater proportion of code officials verifying code compliance?

Long Term

- Is increased demand for and the availability of a knowledgeable/skilled infrastructure of market actors (including code officials/code compliance resources) leading to greater compliance with energy code (90% by 2017)?

The following tables list outputs (Table 166) and outcomes (Table 177), taken directly from the logic model, and associated measurement indicators. For each indicator, a proposed data source or collection approach is presented. Where appropriate, the need for baseline data is also noted. Items in these tables should be prioritized and subsequently considered as potential areas for investigation as part of a formal program evaluation plan.

Table 16. Energy Code Compliance Program Outputs, Indicators and Potential Data Sources

Outputs	Indicators	Data Sources and Potential Collection Approaches
Outputs from Baseline and QA/QC Activities		
Baseline of compliance with building energy code measured	-Number of NH code officials, location, roles/responsibilities -Name, number and location of other entities in NH responsible for verifying code compliance -NH code officials and other responsible code compliance verification entities' current levels of awareness of NH Energy Codes (IECC 2006 and 2009) -NH code officials and other responsible code compliance verification entities' self reported estimates of compliance, by jurisdiction, and residential new construction, residential renovations, commercial new construction and commercial renovations	Baseline study/survey of code officials and other relevant market actors, site visits/plan reviews, etc.
Barriers identified	-Number and description of code compliance barriers, by key market actor, location and type of related construction activity (residential/commercial, new construction/renovation)	Baseline study/survey of code officials and other relevant market actors, site visits/plan reviews, etc and feedback from stakeholder panel members
QA/QC process and compliance tracking mechanism established and communicated	-Description of QA/QC processes and tracking mechanisms -Number/type of communications	NHBCC Program records
Outputs from Outreach and Public Awareness Activities		
Marketing plans and materials developed	-Number, types and purpose of marketing plans and materials developed, by target audience	NHBCC Program records
Advertising and media placements	-Number, types and targets for ads and media placements -Number of impressions/views of marketing materials/ads	NHBCC Program records
Other outreach and public awareness efforts supported	-Number, types, purpose and targets for other outreach and public awareness support	NHBCC Program records
Outputs from Education and Training Activities		
Education and training materials developed	-Number, types, purpose and targets of education and training materials developed, by target audience, planned delivery source (website, workshop, pamphlet, etc.) and geography	NHBCC Program records
Education and training sessions provided to code officials, builders, contractors, A/E firms, etc.	-Number of education and training sessions held, by type, delivery source and location -Number of code officials, builders, contractors, A/E firm employees trained, by target audience -Geographic distribution of trained builders, code officials, A/E employees trained	Education and training session records

Outputs	Indicators	Data Sources and Potential Collection Approaches
Outputs from Technical Support Activities		
Website developed and maintained	-Number and type of website content developed -Frequency of updates and website maintenance	Website review NHBCC Program records
Other resource needs identified and provided	-Number, types and purpose of other resources identified, by targeted audience -Number, types and delivery approach used for each of the other resources provided, by targeted audience and geography	NHBCC Program records
Outputs from Code Compliance Activities		
Current and ongoing code compliance documented	-Percent compliance with energy code (current and ongoing) by construction type and jurisdiction	Baseline study/survey of code officials and other relevant market actors, site visits/plan reviews, etc.
Additional tools/resource needs identified	-Number, types and purpose of other resources identified, by targeted audience	NHBCC Program records
Outputs from Policies and Regulations Development Activities		
Policy and regulation needs identified	-Number, types, purpose and target audiences identified as needing policies and regulations	Program files, baseline report results, other secondary research and stakeholder panel discussions/input
Policies and regulations supporting codes compliance developed	-Number, types, purpose and status of policies and regulations developed, by source and location (house, senate, PUC, DES, local, regional, national jurisdiction, etc.)	Program files, copies of draft bills, proposed and enacted legislation, etc.
Outputs from Leveraging Funding Activities		
Funding opportunities identified	-Number, dollar value and description of opportunities identified, by type, source and targeted activity	Program records, other secondary research/data sources

Table 17. Energy Code Compliance Program Outcomes, Indicators, and Potential Data Sources

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Short Term (1 - 2 years)		
Strategies for increasing compliance being incorporated into other program activities	-Number and type of strategies being incorporated, by program area	NHBCC Program records
Increased awareness and support for code compliance among targeted market actors	-Change in levels of public awareness of code and compliance requirements, by market actor group and location -Change in the level of public support for code compliance, by market actor group and location	Market actor surveys to assess changes from baseline
Increased knowledge and awareness of IECC 2009 and EE building practices	-Change in the level of builders, contractors, A/E and code officials' awareness of IECC 2009 specifics and associated building practices, by market actor group and location	Exit interviews from training sessions Market actor surveys to assess changes from baseline
Resources and tools being used and viewed as effective by targeted market actors	-Number and types of resources and tools being used, by market actor group and location (separate by carrots and sticks) -Change in the level of awareness of available resources and tools, by resource/tool type, market actor group and location -Change in the level of usage of tools and resources (hit rates on web site, etc.), by resource/tool type, market actor group and location -Change in the level of satisfaction associated with specific tools and resources, by type, market actor group and location	NHBCC Program records Web site visit statistics Surveys of market actor groups
Code compliance levels increasing	-Change in the level of code compliance, by sector (residential and commercial, new construction and renovations) and by location -Reasons for increased compliance (i.e., through changes in behavior through awareness, incentives, etc. that are creating market pull to better buildings, and/or through ramp up of enforcement/penalties that spur compliance or result in achieving compliance)	Surveys, site visits, plan reviews compared to baseline levels
Code officials and targeted market actors have proper mandates, authorities, tools and incentives necessary to meet and verify compliance with energy code	-Number and types of mandates, authorities, tools and incentives viewed as valuable by market actors (separate by carrots and sticks) -Change in levels of satisfaction associated with these items, by type, market actor group and location	NHBCC Program files, copies of enacted legislation, regulations Other secondary research Surveys of market actor groups
Additional funding commitments made and incorporated into program activities where appropriate	-Change in the amount of leveraged funding, by type, purpose and location	NHBCC Program records Surveys of market actor groups

Intermediate Term (3-4 years)		
Increased compliance with energy code is being documented	-Change in energy code compliance, by type of construction (residential, commerical, new, renovation) and by jurisdiction	Records review, plans review, site visits, surveys – based on statistically valid sampling techniques (i.e., BECP proposed protocols) compared against baseline QA/QC activities
Quality of construction improving	-Change in quality and levels of efficiency in new buildings and renovation projects, by type of construction and jurisdiction	Records review, plans review, site visits, surveys compared against baseline QA/QC activities
Efficiency of code compliance verification activities improving	-Change in the amount of time and cost required to conduct energy code compliance verification activities, by type of construction and jurisdiction	Surveys with code officials, DOS and PUC compared against baseline QA/QC activities
Increased demand for code compliant buildings and homes among targeted market actors directly involved in designing, building, selling or buying	-Change in the percentage of market actors who feel that it is important to buy or build to IECC 2009 standards, by type of construction and location	Market actor surveys compared against baseline
Increased demand for code compliant buildings and homes among broader general public	-Change in the percentage of general public who feel that it is important to buy or build to IECC 2009 standards, by type of construction and location	Broader survey of general public compared against baseline
Increasing proportion of market actors design/build to (or above) code	-Change in the percentage of market actors directly involved in the design and construction of new/renovated buildings to are meeting or exceeding energy code, by type of construction and location	Survey of targeted market actors, compared against baseline QA/QC activities
Increasing proportion of code officials verifying compliance with the energy code	-Change in proportion of code officials verifying compliance with energy code, by construction type and location	Records review, plans review, site visits, surveys compared against baseline QA/QC activities
Market actors are readily able to, and recognize the need for and value associated with meeting or exceeding energy code	-Proportion of market actors that report needing and valuing the construction or renovation of buildings to levels that meet of exceed energy code, by type of constructionand location -Types of "values" reported by market actorss	Survey of targeted market actors, compared against baseline

Long Term (5-7 or more years)		
90% Code Compliance Achieved	-Percentage of buildings meeting IECC 2009, by type of construction and location	Records review, plans review, site visits, surveys – based on statistically valid sampling techniques (i.e., BECP proposed protocols) compared against baseline QA/QC activiites
Quality and efficient homes/buildings constructed and verified through a vibrant/sustainable infrastructure	-Change in the percentage of quality and energy efficient homes and buildings being constructed or renovated, by construction type and location -Change in the number of market actors that design and build/renovate quality and EE homes and buildings, by type of construction and location	Records review, plans review, site visits, surveys compared against baseline QA/QC activities
Energy, economic and environmental benefits realized and documented	-kWH, kW, BTU, initial costs for construction, long term costs for operation, avoided energy, fuel and environmental benefits, CO2 and other emission reductions quantified	Records review and cost-effectiveness analysis

When developing and implementing a prioritized evaluation plan, care should be taken to coordinate with and leverage expertise and resources potentially available through the PUC and NH utilities that already have extensive experience assessing progress and measuring the energy savings associated with the state's CORE Energy Efficiency programs funded through NH's System Benefits Charge (SBC). As a requirement of each CORE Energy Efficiency program funded through the SBC, 5% of programmatic funds are dedicated for evaluation of program activities and M&V of resultant energy savings. Developing and implementing M&V protocols to assess the effectiveness of NH's statewide code compliance activities could fall under the jurisdiction of the PUC and be supported through SBC-funded evaluation activities. If limited evaluation funds are available, NH could focus pilot testing the BECP code compliance verification methodology, by completing building assessments in just one, or a few counties within one construction sector (i.e., residential new construction in Hillsborough County). In addition to getting some initial sense of percent compliance, findings, even from such a limited study will provide insights into the strengths and weaknesses of the methodology and will identify potential areas for improvement that will help move the state in a positive directly toward 90% compliance by 2017.

Task 8 – NHBCC Program Recommendations

Key recommendations from the Program's Task 8 activities are presented in Table 188 below:

Table 18. Task 8 Recommendations – Establish a Review Process

Task 8 Recommendations – Establish a Review Process
☐ BECP's compliance evaluation methodology pilot test efforts should be closely monitored by the PUC, DOS, BCRB, HBRA and other key NH code stakeholders (perhaps through the planned continued collaboration and expansion of this project's NH Building Energy Code Stakeholder panel), for ultimate adoption and utilization at the appropriate time.
☐ Consider pilot testing the BECP code compliance verification methodology in NH, by completing building assessments in just one, or a few counties within one construction sector (i.e., residential new construction in Hillsborough County).
☐ Work with the PUC and NH utilities to identify potential funding sources for conducting more robust M&V of code compliance-related activities.
☐ Review and prioritize logic model-driven output, outcome and other measurement indicators to identify potential areas for investigation as part of a formal energy code activities effectiveness assessment.
☐ Clarify and publish the roles and responsibilities for energy code compliance verification and enforcement, with clear delineation of responsibilities between the PUC, DOS, local jurisdictions, BCRB, and the role that certified third party inspectors can support.

Task 9. Reporting

The last task, task number 9, of the overall program included reporting on all activities outlined above. The Program reporting responsibilities included submitting monthly reports including, the "1512 Worksheet for Hours Tracking" by the 5th of each month and the "Worksheet for Milestones and Metric Tracking" by the 10th of each month. The reports included the following:

- The number of jobs created and retained, funds expended, number of stakeholder meetings, number of trainings held (including the number of attendees reached by each training), the number of people reached through program promotion and through the public awareness campaign, and
- Other funding sources, such as the NH utility funding as the additional funding sources helped to extend the reach of the buildings code compliance efforts through additional training and outreach in specific communities.

Conclusion

This concludes Volume 2 of the Roadmap and recapped all the goals, objectives and tasks of the two and one-half year, NH Building Energy Code Compliance Program, in an effort to document the activities accomplished through the program and providing guidance to NH organizations who continue energy code compliance efforts around the state. Following are next steps, a glossary of terms, a bibliography and all the supporting appendices.

Next Steps – Establishing a "NH Energy Code Collaborative"

All-in-all, it appears that with respect to energy codes, sufficient specific and enabling legislation exists for effective adoption and enforcement of appropriate base codes and potential stretch codes. Sufficient statutes, regulations, policies and guidelines also seem to exist regarding administrative organizational requirements and responsibilities. However, common understanding and implementation of these requirements/responsibilities appears to be lacking within and across key market actor organizations and stakeholder groups. And often, lack of resources (including funding, staffing and time) and the need to prioritize other responsibilities impacts abilities and effectiveness of energy code compliance and enforcement activities.

However, as the NHBCC Program comes to an end, efforts to establish a "NH Energy Code Collaborative" are underway. In order to meet the assurance of 90% compliance with the 2009 energy code by 2017, a strategic plan (this NH Roadmap Report, including subsequent Volumes 1 and 2) must be communicated to appropriate market actors across the state in a well-organized manner.

Members of the existing NHBCC Stakeholder Panel have decided to meet again to discuss the roles and responsibilities, structural organization, and future of an energy code collaborative in NH. This group represents knowledgeable and influential stakeholders currently working within the state's energy code implementation and compliance areas. Through coordination among these stakeholders, a continued and expanded energy code collaborative will help to inform and guide development of a functional and effective energy code infrastructure that fits the specific needs of NH. It will also serve as a mechanism for identifying recommendations from this Roadmap report that can be realistically implemented in NH and for identifying the most suitable Energy Code Ambassadors to champion these efforts. In many cases, the Ambassadors will work as "mentors" whose presence in the community will add value and momentum to energy code initiatives and effect cultural change within specific market actor groups.

As next steps will include developing and implementing a prioritized evaluation plan, the NH Energy Code Collaborative should consider coordinating with and leveraging expertise and resources potentially available through the PUC and NH utilities who already have extensive experience assessing progress and measuring the energy savings associated with the state's CORE Energy Efficiency programs funded through NH's System Benefits Charge (SBC). As a requirement of each program funded through the SBC, 5% of programmatic funds are dedicated for evaluation of program activities and M&V of resultant energy savings. Developing and implementing M&V protocols to assess the effectiveness of NH's statewide code compliance activities could fall under the jurisdiction of the PUC and be supported through SBC-funded evaluation activities. If limited evaluation funds are available, NH could focus on pilot testing the BECP code compliance verification methodology, by completing building assessments in just one, or a few counties within one construction sectors (see Task 7 and 8 for more information regarding policy and evaluation methods).

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U.S. Department of Energy's Building Energy Code Program: www.energycodes.gov

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