Jack Ruderman, Director
PUC Sustainable Energy Division
21 South Fruist Street, Suite 10
Concord NH 03301

March 23, 2009

RE: RFP – Greenhouse Gas Emissions Reduction Fund

1.1 Program Title:

Upgrade State of New Hampshire Energy Codes
Development Energy Education Center and Learning Community

1.2 Program Type:

1. This proposal will enhance the quality and quantity of energy audits as part of the code development, education and compliance process.
3. This proposal will enhance the development and training of energy efficiency related work force.
7. This proposal will substantially insure compliance with energy codes.
10. This proposal will substantially increase the education and outreach regarding energy efficiency, codes and related matters through the development of the Energy Education Center learning community.

1.3 Program Summary:

This proposal is requests that 'other entities' undertake specific programs related to the adoption of progressive energy codes, increased code compliance and the measuring of energy consumption related to compliance efforts as well as the development of a separate collaborative educational institute to develop and support a learning community committed to the development and growth on advanced energy codes.

1.4 Low Income Residential Customer Qualification:

The program will indirectly serve low income residential customers by insuring that construction is undertaken with attention to advanced energy codes.

1.5 Applicants:

Professor Wes Golomb	Dr. Clay Mitchell, Esq.

1.6 Partners:

This proposal is a proposed project for "other entities". At a minimum our proposal invokes the potential for partnerships from the PUC, the NH Department of Safety, NH

Office of Energy and Planning, Lakes Region Community College, Carbon Solutions New England, municipalities of NH and other public and private groups in the state.

1.7 Authorized Negotiator(s):

Primary: Wes Golomb 224 South Road, Deerfield NH
Alternate: Clay Mitchell 5 Hilton Drive, Newmarket NH

1.8 Projected Energy Savings:

Carbon Solutions New England ("CSNE") and NEEP both did analysis of the effect of the code-related policies discussed in this proposal. The results of their work are listed in Appendix A. These savings are achieved through advanced codes, enhanced education about those codes, increased compliance monitoring for code officials and inspectors and the development of support for a learning community related to code development, compliance, and implementation.

The projected energy savings for Residential and Commercial Code changes to increase efficiency by 30% will generate a savings of 0.56 Trillion BTUs, respectively. The projected savings based on advancements are listed in Appendix A.

1.9 Projected Greenhouse Gas Emissions Reductions:

CSNE and NEEP both did analysis of the effect of the policies discussed. The results of their work are listed in Appendix A.

The projected greenhouse gas reductions related to Residential and Commercial Code changes to increase efficiency by 30% will generate a savings of 0.03 million metric tons of CO2. The projected savings based on advancements are listed in Appendix A.

1.10 Length of Program:

These programs are permanent. The funding from the GGERF is proposed for the initial setup of the programs. This period should be completed in two years. If properly managed, the program can be sustained through reasonable fees for inspections, code compliance reviews and other programmatic fees.

1.11 Total Program Costs:

At this stage the total costs are unknown, since this proposal relies on other entities for implementation.

1.12 GHGER Funds Requested:

At this stage the total costs are unknown, since this proposal relies on other entities for implementation.

2. Executive Summary

A wide range of public, private and institutional entities in the State of New Hampshire are on the verge of spending significant sums of money on energy related projects with the expectations that we will significantly reduce greenhouse gas emissions, lower energy consumption, and at the same time create an entire industry of new jobs.[1] Each of these results will be sustained in their presence in the state and will lead to an economy based on efficiency and energy conservation.

This funding package is welcome and certainly needed to insure development and implementation of programs to reduce greenhouse gas emissions. The most important element of these programs is the assurance that our baseline code set for building construction is sufficient to insure long-term compliance with these new reduced greenhouse gas reduction targets.

In order to measure how much energy we are currently using (and GHG we're emitting), and to insure that the funds we are spending to reduce this consumption is effective, and finally in order to measure the real effect of our efforts, we need to establish a foundation program that operates as the touchstone for these sustained efforts. To maximize the effects of our funding we need to develop, from the outset, a means to insure a high standard of quality work and results for our expenditures.

We are not operating in a vacuum, several other important developments are simultaneously occurring which supplement the potential of these RGGI funds to achieve greenhouse gas reductions, energy conservation, and a transformative and sustainable economy based on these results. Through the recently adopted American Recovery and Reinvestment Act of 2009 ("ARRA"), there are at least three separate allocations that relate to this proposal.

When considered together, these three programs focus the importance of code advancements in terms of implementing programs that will result in implementing the recommendations of the Climate Change Task Force and starting as well as sustaining the programs necessary to realize the goals of NH RSA 125-O.

State Energy Program

The ARRA results in $25,827,000 for State Energy Program (SEP) funding for New Hampshire. SEP funds are distributed in accordance with 42 USC 6321. These existing provisions require the adoption of a State Energy Conservation Plan, describes the plan

[1] In a recent report delivered to the Rockingham Economic Development Commission, *New Hampshire and Rockingham County's Green Economy: Current Employment and Future Opportunities,* UNH Professor Ross Gittell estimated that the potential for "green" jobs could grow from the current 3.2 % to 8% by the year 2018. In addition, Gittell concludes that these jobs, on average, pay 25% more than average salaries. The report was completed before the adoption of the stimulus package and may represent a conservative estimate.

requirements and optional programs and how the federal government funding may be used in furtherance of the plan. Finally, and most importantly, these sections, funding through ARRA are meant to implement the State Energy Conservation Plan as a supplement to state funds. In addition, state matching funds are not required for funds distributed under ARRA. (Section 410(b)).

ARRA also provides for increased funding beyond the minimum distribution. (Section 410(a)). To be eligible for the expanded funds under the SEP the ARRA requires that Governor Lynch sign a letter stating that he has assurances that the following will occur: utility rates are structured to encourage conservation and efficiency, that energy codes for residential buildings meet or exceed the latest Energy Conservation Code or those requirements, that commercial buildings codes will meet or exceed ASHRAE Standard 90.1-2007, and that a plan be implemented to insure that at least 90% of all new and renovated buildings are in compliance with these codes (the plan shall include active training, enforcement and measures of compliance).

Weatherization Assistance Program

The ARRA also provides for an allocation to New Hampshire for $23,218,594. These funds are administered through 42 USC 6861. There are no additional funding provisions as found under the SEP program. The additional funds however represent a nearly ten-fold increase in monies available to the state. Considered in conjunction with these programs and the RGGI effort, the overall effect results in a dramatic incentive for the creation of mutually expansive results.

Energy Efficiency and Conservation Block Grants

The ARRA also includes a 2.8 billion dollar allocation for grants administered under 42 USC 17151. These grants have a minimum allocation of 1.9 billion to local governments, 784 million to states of which a minimum of $9,800,000 is set aside for New Hampshire. The competitive grant provisions have a set aside of 56 million and are prioritized for local governments that are found in states that have less than 2 million in population (NH has less than this amount).[2]

[2] The unanswered question relates to the remaining 400 million allocated in ARRA. Although it states in the language of the text of ARRA that these are to be eligible under a "competitive basis" it does not state whether these competitive grants will follow the same statutory requirements that prioritizes low-population states like New Hampshire. ARRA H.R. 1-24.

3. Proposed Work Scope and Schedule

Task I: Prepare for an Update to New Hampshire Building Energy Code

A. Prepare the revisions and references to the latest International Energy Conservation Code for Residential Structures for incorporation into the NH State Building Code.

The 2009 IECC is ready for adoption at the present time. The addition of this version of the code should be started immediately to insure the foundation for future action starts from the appropriate benchmark versus the existing 2006 IECC provisions found in NH RSA 155-A.

B. Prepare the revisions and references to ASHRAE Standard 90.1-2007 for Commercial Structures for incorporation into the NH State Building Code.

The 90.1-2007 standard is also ready for adoption and this process should be implemented immediately within the Code adoption process and for integration in RSA 155-A and RSA 155-D where relevant.

C. Prepare a Plan for Implementation, Education, Credentialing, and Measurement of Verification of New Codes.

The NH PUC and other state agencies in conjunction with other entities – private and institutional – should develop the framework for a state Energy Education Center. The fundamental principle of this Center should be to operate as the research, education, and credentialing body that informs the current proposal and future progressive action for code development. Structurally, the state Energy Education Center, should mirror a "learning community" format. This format provides for collaborative research, assistance, and shared learning and compliance. Preserving the competition of the marketplace requires a detached entity whose purpose is the wide-spread sharing of information and growth in code development, implementation as well as measurement and verification.

Task II: Legislation Action – 2010 Session.

The existing statutory provisions on the state building code will need to be updated to incorporate the new code provisions. RSA 155-D. By incorporating the provisions of codes that are even stricter than the proposed baseline code, the State will enable municipalities to choose more advanced code regimes. Although these codes are will exceed the state minimum code requirements, the incorporation by reference will prevent a widely disparate adoption of confusing code sets across the state. It is critical to insure that these standards do not represent a "race to the bottom". Allowing for optional adoption, will give progressive local jurisdictions to be a part of the solution and promote a wider acceptance of enhanced code requirements.

These changes will require targeted changes to RSA 155-A and RSA 155-D. Increased flexibility for municipalities will require changes to RSA 674:51 and 51-a to insure that municipalities can participate in advancing the code requirements beyond the state code.

Task III: Develop the Foundation for Energy Efficiency and Code Advancement

The State's policy for Energy Efficiency and Code Advancement will have three primary functions. The role and position of the PUC is meant to supplement the efforts of the State Energy Plan by retaining a strong and collaborative connection to the Energy community.

A. Research and Consider the Integration of NEEP into a Progressive Energy Code for NH and Create the Foundation for Advanced Codes beyond the IECC.

The PUC and energy stakeholders should research and consider optional code structures and provisions that exceed 2009 IECC and 90.1-2007 for integration into the optional provisions for adoption in RSA 155-A and RSA 674:51 so that Towns may, on a case-by-case basis adopt provisions that accelerate the deployment of advanced codes. In conjunction with Energy Stakeholders, New Hampshire may develop an Informative Appendix to the State Building Energy Code. This informative index would provide specific paths which would yield higher efficiencies than the 2009 energy code. (NEEP White Paper at Appendix B).

B. Credentialing

For economic, ecological, and ethical reasons it is important that energy efficiency work is undertaken in a high quality manner. The PUC should work with the Energy Stakeholders and the appropriate private, public, non-profit and educational institutions to establish criteria for qualifications of persons who wish to diagnose or implement energy efficiency or renewable energy measures to ensure that all public monies spent on energy efficiency are spent appropriately and the associated work is carried out in an effective and cost effective manner and documented. This could take the form of licensing, a third party certification, education requirements and/or a state license.

The PUC should make a serious effort to require some reasonable proof of training of contractors and subcontractors who perform energy efficiency services in New Hampshire starting with RGGI and Stimulus funding. Every effort should be made to establish and publish suggested criteria for private contractors doing efficiency work. Other options include third party certification, education, and/.or documented experience at a particular task.

C. Develop the New Hampshire Energy Education Center Education

We believe that education is crucial to the process. If we are to truly transform the way we use energy and produce carbon emissions, we must educate every sector of society. To that end we propose that the Energy Services and Technology Program at Lakes Region Community College be designated as a state Energy Education Center, in partnership with the entities and groups discussed in this proposal. This existing program can expand to create and maintain an ongoing learning community that provides the foundation for sustaining the code changes, proposed as well as future progress in developing a resilient and adaptive code-based response to energy and buildings.

The primary goal of this program is develop and maintain this learning community. The objectives of the learning community are to provide support services and education programs to support energy code education and training for raters of commercial and residential structures. In addition, education and support to other interested groups like local energy committees and non-profits could be a part of this program in an effort to better inform the energy efficiency and code community.

4. Project Benefits

The intent of this proposal is to suggest a means to upgrade energy codes, and integrate them with other energy efficiency and renewable energy programs. This proposal is largely based on a NEEP White Paper. We envision that several state agencies will expand their current duties to establish the means to carry out the tasks. The PUC currently administers the code and we suggest that new administrative tasks be assumed by the PUC. Currently, Towns and the Department of Safety have the responsibility for enforcing the energy code.

The proposed program is the foundation for all building related impacts. For that reason, this program is potentially the foundation for all benefits. Since the proposal relates to an as yet unknown final form, the extent to which specific benefits can be itemized is limited. However, it is clear that code advancements and the development of a learning community will dramatically reduce energy consumption and greenhouse gas emissions. New technologies will be developed and implemented through increase code requirements and education. An entire industry of code officials and educated consumers will be developed in response to the awareness generated through the proposal.

5. Measurement & Verification

CSNE will be responsible for monitoring compliance and verifying results as part of their tasks related to the Governor's Climate Change Task Force role. They have already completed the projections for this program's suggested course and can insure seamless integration of the proposal into their existing metrics. In addition, the following requirements could be integrated into the program to assist in this effort as well as informing the policy process for code development and advancement.

Energy data should be collected and kept as part of the permanent record on every structure (these files could be electronic to minimize other expenses and ease maintenance, access and use for data-based research). Verified data should be kept in a central location so we can measure where we are and the changes we are making.

Require Commissioning for Commercial Buildings:

Commissioning consists of the process that confirms that building systems are planned, designed, installed, tested, operated and can be maintained in accordance with design requirements drawn up at the beginning of the project. Commissioning results should be filed as part of the building file for the structure and reported accordingly.

Require the Disclosure of Home Energy Use at Time-of-Sale

Time of sale requirements address the reality that new construction makes up only one piece of the energy savings that can be realized from residential and commercial buildings. This policy can be implemented most effectively only if there is a sufficient pool of trained and licensed certifiers or building raters. A number of professionals could potentially serve in this role, but all would need proper training in order to accurately identify and relay the energy efficiency of the property to the potential buyers. In conjunction with proper training, a system should be implemented for registering the data so that all property energy efficiency disclosures are identical.

Require Building Benchmarking at Building Permit/Certificate of Occupancy

Benchmarking consists of developing a record of the baseline energy use of and a rating of commercial buildings in order to compare it to other similar buildings. Benchmarking can help guide the development of public policies that seek to maximize building energy efficiency, as well as to evaluate the efficacy of these policies. To properly develop benchmarks, states need to gather data from commercial building owners and establish an easily accessible database that contains the energy consumption information.

Requiring energy ratings for new construction and the disclosure of energy usage of existing buildings at the time of sale creates market incentives for both builders and current owners to make energy saving improvements in both new and existing dwellings as well as commercial buildings. Home energy ratings and benchmarking can help confirm compliance with energy code as well as help track compliance across the state.

6. Budget

This proposal is for "other entities" and relies on the participation and submission of additional applications. A proposed budget in this form of application would be premature.

7. Applicant Qualifications

Professor Wes Golomb

Wes Golomb worked for the Public Utilities Commission since 1999 as the Energy Conservation Coordinator. Wes moved into new territory as Professor of Energy Services and Technology at Lakes Region CC's campus. Professor Golomb has many years of experience teaching about energy efficiencies, conservation, and renewable energies. His community and non-profit volunteer efforts include the NH Residential Energy Performance Association, Residential Energy Services Network, the Deerfield Conservation Commission, NH Estuaries Board, Project Nature, Ambassadors to the Solar System, and myriad other organizations. He joined the NHSEA Board of Directors in autumn 2006.

Dr. Clay Mitchell, Esq.

Clay Mitchell is a planner and an attorney who has worked at the local level in New Hampshire for the last 12 years. He is a graduate of Vermont Law School with a JD and a Masters in Environmental Law and also holds a Ph.D. in Natural Resources from the University of New Hampshire. His primary focus is on a wide range of energy-related matters and developing policies, projects and practices that contribute to economic sustainability and reduce greenhouse gas emissions.

Mitchell sits on the Board of Directors for the New Hampshire Sustainable Energy Association, the Northeast Combined Heat and Power Initiative and is a member of the Carbon Coalition Local Energy Committee Working Group. Working with the Town of Epping, Mitchell helped adopt one of the first in the nation voter-approved energy efficiency and sustainable design ordinances that applies to all non-residential construction. In addition, he has managed specific municipal energy efficiency projects as well as renewable and co-generation installations for Epping that are predicted scheduled to reduce costs and emissions for these buildings by 50% – 66%. The work in Epping has led to tremendous economic development opportunities with a "green" focus and has become an example for other communities.

8. Additional Information – N/A

9. Letters of Interest of Commitment - Attached

Appendix A:

The following four tables are the summarized results from the Implementation of the NEEP Model Building Energy Codes Policy for the Northeast States:

NH Residential Code:

Measure	Trillion BTUs
Annual Immediate Savings from Improving the Code by 30% in 2011	0.22
Annual Savings in 2019 as Result of Cumulative Gains from 30% Improvement in Code in 2011	1.98
Annual Savings in 2029 as Result of Cumulative Gains from Improving the Code by 70% in 2020	6.9
Annual Savings in 2030 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	7.36
Annual Savings in 2050 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	3.5

NH Commercial Code:

Measure	Trillion BTUs
Annual Immediate Savings from Improving the Code by 30% in 2011	0.34
Annual Savings in 2019 as Result of Cumulative Gains from 30% Improvement in Code in 2011	3.12
Annual Savings in 2029 as Result of Cumulative Gains from Improving the Code by 70% in 2020	11.43
Annual Savings in 2030 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.[1]	12.28
Annual Savings in 2050 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	7.85

NH Residential Code:

Measure	Million Metric Tons
Annual Immediate Savings from Improving the Code by 30% in 2011	0.01
Annual Savings in 2019 as Result of Cumulative Gains from 30% Improvement in Code in 2011	0.12
Annual Savings in 2029 as Result of Cumulative Gains from Improving the Code by 70% in 2020	0.43
Annual Savings in 2030 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.[2]	0.46
Annual Savings in 2050 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	0.22

NH Commercial Code:

Measure	Million Metric Tons
Annual Immediate Savings from Improving the Code by 30% in 2011	0.02
Annual Savings in 2019 as Result of Cumulative Gains from 30% Improvement in Code in 2011	0.15
Annual Savings in 2029 as Result of Cumulative Gains from Improving the Code by 70% in 2020	0.51
Annual Savings in 2030 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	0.57
Annual Savings in 2050 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	0.36

23 March 2009

Wesley Golomb
Professor, Lead Instructor
Energy Services and Technology
Lakes Region Community College
379 Belmont Road
Laconia, NH 03246

Dear Mr. Golomb,

Carbon Solutions New England is pleased to write in support of your suggestions submitted to the RGGI GHGERF. After having discussed the suggestions on the phone with you directly and having reviewed your written document, we have found that the goals behind these measures are consistent with those we identify as critical to reducing greenhouse gas emissions in the State, as reported in the New Hampshire Climate Action Plan. Higher efficiency standards for new buildings, measurement and verification of efficiency gains, and education and workforce training are all essential components of reducing energy use and the accompanying greenhouse gas emissions of new residential and commercial buildings. Furthermore, the efficiency gains represented by the suggested code standards are within the range identified by Carbon Solutions New England as providing net economic benefits to the State.

Sincerely,

Cameron P. Wake
Director

Northeast Energy Efficiency Partnerships, Inc.

Model Building Energy Codes Policy for Northeast States

A White Paper of the NEEP
Progressive Building Energy Codes Project

October 2008

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I. Executive Summary

Northeast Energy Efficiency Partnerships' (NEEP) Model Building Energy Code Policy delineates a comprehensive set of measures designed to maximize the energy savings potential of the building energy codes that govern new building construction in the Northeast states. The ultimate goal of these guidelines is to support state adoption of policies that will lead the majority of new building construction by 2030 to be comprised of "net-zero energy" buildings.[1]

NEEP has developed this white paper in response to expressed public policy needs for guidance in creating and/or adopting building energy policies that will lead, ultimately, to large-scale energy and carbon emissions savings in the built environment across the region. If building energy codes in Northeast states were to require all new buildings constructed by 2030 to be energy neutral or net-zero energy buildings, the region collectively would realize 663 trillion BTUs annually in energy savings and a reduction of 35 million metric tons annually of carbon emissions. These savings correspond to (for the Northeast region) approximately 7.5 percent of current energy use of residential and commercial buildings and 12 percent of current carbon dioxide emissions currently emitted by electricity generating power plants.

This white paper highlights each element of the policy and includes enabling statutory language (where needed), explanations of the specific policies, and references to industry and policy best practices. This paper also includes estimates of the energy and carbon savings potential of progressively more stringent building energy codes that result in buildings consuming less energy.

NEEP's Model Building Energy Codes Policy includes four major concentrations:

1. **Code Adoption.**

Under code adoption, the paper will discuss the need to regularly update the state building energy code to keep abreast of the most recent editions of the International Energy Conservation Code (IECC). States should also include an Informative Appendix as part of the state code. The Informative Appendix would include "above" code standards such as the New Buildings Institute Core Performance Guide and Energy Star for Homes. The Informative Appendix provides a guide to building professionals seeking to build more energy efficient homes as well as to states seeking to implement policies that promote the construction of more energy efficient dwellings and buildings.

2. **Code Compliance**

[1] A Net-zero energy buildings as a residential or commercial building with greatly reduced energy needs through energy efficiency gains such that the balance of energy needs can be supplied with renewable technologies.

There is, however, no ultimate consensus definition of net-zero energy buildings. In fact, there are many definitions of net-zero energy buildings. The above definition is taken from a paper submitted to the 2006 American Council for an Energy Efficient Economy Summer Study. *Zero-energy buildings: A critical look at the definition.* Torcellini et al. http://www.nrel.gov/docs/fy06osti/39833.pdf

The paper will show the methods towards improving compliance with the building energy code. These methods include better training and certification of code officials, building professionals and building operations and maintenance staff through the state building energy code administrator. Instituting a specialized plan check and inspectors system option for local governments. Maintaining adequate funding so that code agencies can administrate, train local officials, provide technical support and finally enforce the code. Finally, tracking and reporting energy code compliance to inform progress.

3. Measuring Energy Consumption

This section will highlight the need and methods towards measuring energy consumption by dwellings and commercial buildings (both new and existing). Through accurate and complete measurement, policymakers will be able to tell whether the policy generates the promised energy savings. Measurement will be accomplished through the use of benchmarking and time-of sale disclosure and labeling.

4. Integrating Building Energy Codes with other Energy Efficiency Policies

Any comprehensive codes policy will intersect with other energy efficiency policies. The development of codes will need to be coordinated with current and future energy efficiency programs, the development of high performance buildings, municipal initiatives and appliance efficiency standards.

II. Introduction

In the Northeast, policies requiring states to reduce their greenhouse gas emissions and energy consumption are increasingly being implemented. Policymakers and consumers alike also recognize that, as energy prices increase, reducing consumption of fossil fuels and electricity represents a cost effective way to lessen those price impacts. Northeast state governors have signaled that reducing the emissions of greenhouse gases is a policy priority by taking a number of steps, both individually and collectively, particularly through their engagement with the Regional Greenhouse Gas Initiative (RGGI). Simultaneously, the majority of Northeast states have also enacted policies that place energy efficiency on equal footing with energy supply through procurement mandates, portfolio standards and other measures. Increasing the energy efficiency of buildings must be included as a cornerstone of any strategy to reduce energy consumption, control costs and reduce greenhouse gas emissions.

Goals of NEEP Progressive Building Energy Codes Policy

Buildings consume 40 percent of the energy and 70 percent of the electricity use in the country[2]. Unlike automobiles, appliances or other energy consuming devices, buildings, by their very nature, are meant to last, meaning that a building built today will have an impact on our energy use for 50 to 100 years or more. Therefore, any effective energy policy must address building

[2] United States Environmental Protection Agency; Buildings and the Environment, A Statistical Summary; December 20, 2004

energy use. Adopting and effectively implementing state building energy codes and beyond-code building standards represents one of the most cost-effective ways of reducing building energy consumption in new construction and substantial building renovation, including building additions. **Progressively stronger building energy codes will lead to continual improvements in building practices such that by 2030, net-zero energy buildings should comprise the majority of new construction.**

How Building Energy Codes Reduce Energy Consumption in Buildings

Building energy codes set the floor for energy efficiency; they establish the worst performing building that can still meet the minimum requirements specified in the energy code. A building energy code that requires building professionals to incorporate energy efficiency in the overall building design helps to ensure that all new housing stock and commercial construction, and any building with major renovations, meets a baseline of efficiency.

Improving the energy code generates energy savings in a consistent and long lasting manner. Yet, typically, improvements to the energy code have been slow to occur. Progressive changes to national model energy codes require significant research to identify, test and incorporate new building methods and technologies. Ensuring strong enforcement of the code requires intensive education of building professionals from designers to builders, as well as code officials, on both the state and local levels. Finally, measuring building energy use requires the continual development of effective tools and methodologies to accurately gauge the energy footprint of a building. All of this takes time. In the end, because energy performance is upgrades only when renovations or replacements occur, an inefficient building built today will remain inefficient for decades. **Therefore, it is imperative that states act decisively on improving the energy efficiency in the building code.**

Potential Energy and Environmental Savings

Adopting and implementing strong building energy codes – as well as providing informed guidance on the construction of beyond-code, high performance buildings – provides an effective means of tackling the twin goals of reducing energy use in the region and lowering emissions of greenhouse gases.

Under a progressive building energy codes policy savings for the Northeast can add up rapidly. If Northeast states adopt residential building energy codes that are 30 percent above the current national model energy code and achieve full compliance, the Northeast would realize savings of 63 trillion BTUs per year by 2019. Similar action regarding commercial energy codes would total savings of 104 trillion BTUs. Continuing to raise the bar so that buildings reduce energy consumption by 70 percent [3]starting in 2020 would generate 221 trillion BTUs annually in residential savings and 381 trillion BTUs in commercial savings. Achieving net-zero energy

[3] According to the DOE, 70% is approximately the amount that a building can reduce its energy use solely through energy efficiency. http://www1.eere.energy.gov/buildings/goals.html

buildings by 2030 would save the region 594 trillion BTUs per year from reduced energy use in residential buildings and 1.25 quadrillion BTUs (quads) annually from commercial buildings[4].

The lower energy use would have a substantial impact on carbon dioxide emissions as measured against similar benchmarks. By 2019, annual carbon dioxide emissions would drop by 8 million metric tons in the Northeast, a total CO_2 savings that would increase to 32 million metric tons by 2029 as a result of implementing building energy codes that increase energy efficiency by 70 percent over current national model codes in 2020. Finally, by 2050, building energy codes mandating net-zero energy buildings will result in carbon dioxide emission savings of almost 99 million metric tons. This is equivalent to removing nearing 15 millions cars from the road. [5]

The adoption and implementation of strong building energy codes throughout the region will make a significant contribution to helping meet the Northeast state energy and environmental goals Northeast. The savings outlined above would represent approximately XX percent of the needed savings.

Need for Comprehensive Approach to Building Energy Code

Any one of the measures discussed in this white paper would improve building energy code policy. However, to maintain the ultimate goal of reducing building energy consumption, policymakers should pursue a comprehensive approach to building energy codes. Policymakers should increase the stringency of the code but that effort will not generate energy savings unless builders comply with the code. Compliance with the code happens due to internal building practices such as the use of commissioning along with well-funded and properly trained building inspectors. In order to know whether compliance goals are being achieved, there must exist robust methodologies designed to measure building performance. Finally, a comprehensive policy must address the energy performance of existing buildings.

III. Policy Recommendations

A comprehensive and effective building energy code policy requires the adopting of stringent code requirements; instituting of effective means of enforcing the implementation and enforcement of code requirements; and continually measuring and labeling building energy use to ensure that the policies actually result in lower energy consumption. Additionally, codes policy should be integrated with other energy efficiency polices, such as minimum appliance efficiency standards and ratepayer-funded energy efficiency programs, since as codes can and should both enhance and complement these other approaches. The following sections detail the contours of the Progressive Model Energy Code Policy.

For each proposed policy, any necessary statutory language is laid out, along with an explanation of the policy and examples of government and industry best practices.

[4] The amount of energy savings accumulates rapidly because once a building gets built efficiently, it lasts for decades. Thus, a home built efficiently in 2015 will still be part of the total energy savings in 2035, for example.

[5] According to the United States Environmental Protection Agency: http://www.epa.gov/climatechange/emissions/ind_calculator.html

A. Code Adoption

1) Regularly Update the State Building Energy Code

Suggested statutory language: *The [Authority Having Jurisdiction[6] (AHJ)] shall adopt the latest edition of the International Energy Conservation Code (IECC), published by the International Code Council, together with any other more stringent energy efficiency provisions that the {AHJ} concludes are warranted every three years. No amendments to the energy conservation code or the existing building code shall be adopted that increase energy consumption in buildings.*

Policy explanation: Regular updates to the state building energy code help ensure that a state code remains aligned with the latest developments in building technologies and practices. Regular updates to the existing buildings code help ensure that such technologies and practices are implemented to the extent possible and practical in existing buildings. The process for updating a state code requires a huge amount of time and effort involving significant research and analysis as well as coordination with other state codes such as the mechanical and building code. This often results in an unnecessarily long process that leaves the state code out of date, often unnecessarily complex and out of step with codes from nearby states. In addition, state code offices or other authorities having jurisdiction are often forced to fulfill their myriad duties with limited resources and staff. A better process for updating building energy codes is to automatically reference the latest edition of the national model codes, and to participate in the national code change cycles with like-minded jurisdictions in order to change the requirements of the model energy code.

NEEP recommends that states seek to automatically adopt the current version of the International Energy Conservation Code (IECC) as an integral part of a comprehensive codes adoption process. The IECC is the nationally recognized model energy code, developed by the International Code Council (ICC), which thoroughly vets this code through a rigorous amendment adoption process that ensures all changes are subject to open public comment and debate. For the same reasons, NEEP also recommends that states automatically adopt the complementary International Existing Buildings Code (IEBC). This inclusive process entails the proposal of amendments, committee action, and then a final vote by code officials and other state representatives. Furthermore, the IECC and IEBC integrate and work in concert with the other ICC building codes, such as structural and mechanical codes, to ensure seamless implementation and the elimination of conflicts among the various components of a building code. The ICC process brings out the best proposals that stand the tests of consistency, energy cost reduction, energy use reduction, and reduction of greenhouse gas emission. In the end, the AHJ can better allocate its resources so that it can concentrate on improving compliance.

The ICC code updates occur on a three year schedule, with two cycles of hearings between its three-year publication intervals. This is beneficial for states, as it allows for aggressive improvements to energy conservation while also allowing time for a state to incorporate new technological advances into practice and update the appropriate training in and enforcement of

[6] Please see the glossary for a definition of the term.

the new code. This also helps to minimize the economic impact to the state while maximizing the ability to adopt and implement the most up to date code.

The ICC incorporates amendments based on a process that depends on the participation of state code officials. **States should collaborate with regional and national efforts** in order to leverage resources and positively affect the development of each new edition of the code.

Best Practices: There are three important aspects to a recommended periodic update policy. First, the agency must be **required** to adopt the latest version of the national model code. Care must be taken not to introduce vague language as was done by the Vermont legislature. [7] Second, any legislative language should **prohibit adoption of less stringent provisions**. Over the last couple of updates, the energy provisions of the IECC and the International Residential Code (IRC) have increasingly diverged with the IRC either adopting weaker standards or failing to adopt strong new standards included in the IECC. Therefore, the state should **link all prescriptive requirements to the International Energy Conservation Code (IECC) either by simply adopting the IECC or through amendments to the IRC.** Alternatively, a state could simply delete the energy chapter of the IRC (Chapter 11). The newly codes statute in Maine [8] adopts both the IRC and IECC. It will now be left to the statutorily created Technical Building Codes and Energy Committee to resolve any inconsistencies between the two codes. Unfortunately, this situation opens the door to the possibility that the committee may adopt the less stringent IRC provisions. Pennsylvania law [9] allows both the IECC and the IRC and also provides an additional alternative to complying with the IRC energy provisions.

To help ensure that building code adoption goes smoothly, state code offices should **maintain a technical committee** such as those found in New York and Massachusetts to help inform code updates and implementation.

Code Update Policy: Best Practices Examples	
State	**Statute**
Massachusetts	Green Communities Act, Chapter 143; Section 94; Item (m) http://www.mass.gov/legis/laws/mgl/143-94.htm
Summary: The "Green Communities Act" of 2008 contains language that will tie the state energy conservation code to the IECC, and includes "backsliding" language in that it requires any changes to the IECC to increase energy efficiency. The code update must occur every three years.	

[7] See Act Number 0092, 2007 Legislative Session http://www.leg.state.vt.us/docs/legdoc.cfm?URL=/docs/2008/acts/ACT092.HTM)

[8] See LD 2179 30A MRSA Section 4451: http://www.bcap-energy.org/files/ME%20LD2179.pdf

[9] See 35 P.S. 7210.101 et seq: http://www.dli.state.pa.us/landi/CWP/view.asp?a=185&Q=160464 OR Section 403.21 of the Uniform Construction Code: http://www.pacode.com/secure/data/034/chapter403/chap403toc.html

2) Include an Informative Appendix to the State Building Energy Code

Suggested Statutory Language: *Within one year of enactment of this section, the AHJ shall develop specific options for defining how any residential and commercial building can exceed the requirements of the adopted energy code by a minimum of 20 percent. These options shall be added to the building energy code as an Informative Appendix. Any building complying with an option included in the Informative Appendix shall be deemed to meet state building energy code.*
The AHJ shall, within one year from enactment of this section, develop specific options defining how any proposed residential or commercial building can exceed the requirements of the adopted energy conservation code by a minimum of thirty (30) percent. These options shall be set forth in such code as an Informative Appendix thereto. Any building that shall comply with an option listed therein shall be deemed as meeting the requirements of the energy conservation code.

Policy Explanation: In recent years there has been an explosion of interest in building energy codes that are more energy efficient than the national model codes or adopted state energy codes. Alternatively referred to as "stretch code," "beyond code," or "above code," these advanced building energy standards have been included as policies in several municipalities and states in the region, spawning a plethora of above code standards with differing baselines and measurements for achieving energy improvements. Although well-intentioned, these various policies have generated significant confusion in the marketplace, particularly in regard to defining the "above code" standard. Moreover, many new state laws include requirements for certain categories of buildings to be a certain percentage more efficient than the state energy code. An AHJ can address this confusion and provide guidance by adopting an "Informative Appendix," or a section of the code that contains a listing of codes and building standards that have been determined by the AHJ to be acceptable as more stringent codes and consistent with state and/or local policy. An Informative Appendix:

- Informs architects, engineers and other building and design professionals who are looking to build energy efficient buildings with an appropriate reference.
- Establishes a baseline for ratepayer funded energy efficiency new construction programs
- Establishes criteria for state policies to incent high performance buildings, such as tax credits or utility demand-side management rebates.
- Points the way for changes to be measured and then added to the energy conservation code adoption in the next cycle.

Municipalities: Many municipalities in the Northeast have adopted codes that are more stringent than their respective state's code such as Boston, several cities in Long Island, Montgomery County Maryland. The Informative Appendix provides a consistent set of codes to ensure that the municipalities adopt codes that, in fact, go beyond the state code, contain enforcement mechanisms and limits the number (and inevitable confusion and difficulty to building professionals) of different "stretch" codes within a state.

The use of the Informative Appendix helps drive state codes toward the eventual adoptions of net-zero energy buildings. By maintaining codes that go beyond the state code, it ensures that state codes remain a dynamic policy that doesn't settle into an unproductive status quo. Consequently, the Informative Appendix works well, for example, within the context of state commitments towards net-zero energy buildings such as the effort currently underway in Massachusetts where the Governor established a net-zero energy building task force.

Best Practices: Any code or standard included within an Informative Appendix must possess the following features.

- A building meeting this code or standard must exceed the energy efficiency of the current state building energy code by a given policy-directed minimum.
- The code or standard must be written in code-enforceable language.
- Building officials must be able to verify that the buildings meet the code or standard. (This may include programs to train building inspectors on how to inspect the buildings. Moreover, the specific code or standard should include mechanisms for its enforcement such as but not limited to, Home Energy Rating System (HERS) that can provide documentation to the building official that the building meets the requirements of the code or standard being used.
- The AHJ must specify within its adopted code that a building complying with a code or standard listed in the Informative Appendix would comply with the state energy code.

Among the advanced building guidelines that NEEP recommends for potential inclusion in an Informative Appendix are:

For Commercial Buildings:

- New Building Institute's Advanced Buildings *Core Performance Guide*[10]
- The Northeast Collaborative High Performance Schools (NE-CHPS) or state-specific CHPS guidelines such as MA-CHPS.[11]

For single, duplex and multi-family homes:

- Title 24 of the California Building Code[12] (for residential buildings)
- The "30% Solution" savings package introduced by the Energy Efficient Codes Coalition for adoption by the International Code Council (ICC) [13]
- ENERGY STAR for Homes, Tier 2.

[10] The Core Performance Guide is currently a standard but work is being done to translate the standard into code-enforceable language.

[11] NEEP strongly recommends that any regulations applicable to school building construction in the Northeast not tie conservation requirements to LEED but rather the NE-CHPS guidelines. These school construction guidelines have been developed specifically with the Northeast climate in mind. In addition, these guidelines are more stringent than LEED, focus on schools as a "community center" and provide superior features such as better Indoor Environmental Quality.

[12] It should be noted that Title 24 requirements are keyed to California specific climate zones. Prior to any other state or municipality adopting Title 24, the appropriate climate zones should be specified.

[13] The full set of proposals from the EECC is found as proposal EC-154 in the latest round of technical amendments to the IECC.

B. Energy Code Compliance

1) Develop training and certification requirements for Building Energy Code Inspectors

Suggested Statutory Language: *The AHJ, in consultation with [relevant state agency(s)] shall develop requirements and promulgate regulations for the training and certification of building code enforcement officials that incorporate the energy provisions of the state building code. The AHJ shall also require that all construction, reconstruction, alteration or repair of all buildings be approved by inspectors certified in the state building code energy provisions.*

Policy Explanation: Having a strong energy code does not guarantee energy efficient buildings. Adequately trained and certified inspectors are needed to ensure that buildings comply with the energy code. Feedback from code officials indicates that as the safety of buildings is paramount, and due to a lack of time, local code inspectors put a priority on the health and safety portions of the building code and often give energy code compliance only cursory attention. Limited knowledge and training on the energy code also hinder the ability to properly inspect buildings for energy code compliance. Mandated energy code training, supplemented by updated procedures, results in better compliance and better energy savings.

Many states, however, do not specifically require energy code training for code inspectors, although it is offered as a part of their continuing education credit requirements. Legislation can be crafted to specifically require the AHJ to implement or develop an energy training and certification program for inspectors to assure technical comprehension and increase code compliance. Certification of commercial and residential plan review/inspections candidates is available through the International Code Council's certification programs and testing. Through a state education and certification fund a municipality can assure that its inspectors are adequately trained and certified in energy code inspections. Alternatively, municipalities lacking certified staff could accept reports from third party inspectors to perform the energy portion of the code inspection.

Best Practices: One effective way to set up a code training certification program is to establish a third party inspection process modeled after the effort instituted in Washington State as the Special Plans Examiner and Inspection program (SPE/I). The program would consist of training and testing individuals interested in pursuing the duties of a code inspector. [14] The AHJ would maintain a list of all qualified inspectors and make the list available to any interested party, such as builders or municipal officials, who wants to ensure that a properly trained inspector certifies any new building or substantial renovation project. The program should include supporting materials such as a guidebook[15] showing how municipalities and/or builders could use the services of a third party inspector. Moreover, the adoption of a third party inspection system should be voluntary and at the discretion of a given municipality. However, any certification system should include training standards that are consistent for both public and private sector inspectors.

[14] It should be noted that requirements for training individuals for public sector work will likely have to be done through existing state requirements.

[15] Examples of guidebook include the **XXX** field guide published by NEEP in **XXXX.**

A program should be established that recognizes the need for training and certification in energy codes, building science and technology to certify building officials, and any private party who may qualify, to review plans and conduct energy inspections. Such private parties may assist any jurisdiction requiring assistance in energy code enforcement; through services as on-call staff or as pre-qualified contractors available on an as-needed basis. Alternatively, such municipalities may choose to combine in sharing staff or securing services from county/ regional government where such option has been arranged by the affected municipalities.

The AHJ should establish a training committee to oversee the development, promotion, and delivery of training on building codes, including energy conservation code training to building officials, code officials, local inspectors, and the regulated community such as architects, engineers, building professionals, construction trades and facilities directors. The training committee should have the authority to approve and develop training materials and delivery options (which may include a combination of face-to-face and online training), as well as consult with building officials' education committees to ensure support and compliance. The AHJ would be charged with the responsibility for conducting such programs. The training committee should also develop an annual plan for bldg code training and technical support – what, where, when, who, how – that leverages resources and knowledge. One available means is through certification of commercial and residential plan review/inspections candidates conducted the International Code Council's certification programs and testing

Training could be accomplished through a whole host of avenues that include Community Colleges and other professional associations. For example, the Boston Society of Architects conducts a series of trainings throughout the state each time the Massachusetts Board of Building Regulations and Standards updates the building codes. Other entities such as utilities could manage a similar effort. The trainings could be funded through a wide variety of sources such as: tuition, grants, and rate-payer funded programs for training and tech support for best practices to build to and beyond the minimum energy code.

Energy code training classes or seminars should be developed, through a regulatory procedure, which would cover at a minimum, the following topics:

- Energy Code and Residential Code plan review issues;
- Interpreting energy software program results;
- Integration of plan review results into inspection tasks;
- Inspection procedures based on integration of energy issues into individual site visits;
- Field inspection issues of envelope and systems components;
- Above-code optional programs and strategies; and
- Measurement tools and criteria (such as blower door and duct blaster testing).

A well-crafted code training program should include mentoring and inspection tools development for code officials and building professionals. As part of the continuing certification of inspectors, energy conservation code modules must be a specific requirement. Also, the state should seek to increase opportunities for training of the regulated community and use state agencies and tools to market this training. Partnerships with professional associations,

community colleges, and universities can assist in the delivery of face-to-face training. Finally, financial resources (which NEEP recommends be drawn from building permit fees) should be allocated directly to funding for all energy, health and safety training, the activities of the Training Committee, and for the resources to fully implement training programs. Proper training and certification must have an adequate and secure source of funding. But training does not have to be expensive. The Washington State program cost approximately $5 million over the three-and-a-half-year life of the program. Funding issues are covered more fully in Section B2.

Compliance Policy: Best Practices Examples	
State	**Statute**
Massachusetts	"Green Communities Act" Section 94 of Chapter 143 (Pending)http://www.mass.gov/legis/bills/senate/185/st01/st01971.htm
Summary: This legislation requires the state's Board of Building Regulations and Standards (BBRS) to work collaboratively with the Department of Energy Resources (state energy office) to adopt regulations for the training and certification of energy code inspectors. It also mandates that all new construction and major renovations pass inspections by certified energy code inspectors. The statute allows room for the establishment of rules for third party inspectors.	
Maine	LD 2179 30A MRSA Section 4451 http://www.bcap-energy.org/files/ME%20LD2179.pdf
Summary: Maine's code training mandate incorporates the need for the Maine Community College System, the Department of Environmental Protection, the Department of Health and Human Services, state energy efficiency programs, and the office to all work collaboratively to establish the continuing education program. The mandate also requires that the program provide basic and advanced training in the technical and legal aspects of code enforcement necessary for certification. The legislation explicitly allows for the use of third party inspectors.	
Pennsylvania	35 P.S. 7210.101 et seq: http://www.dli.state.pa.us/landi/CWP/view.asp?a=185&Q=160464 Section 403.103of the Uniform Construction Code: http://www.pacode.com/secure/data/034/chapter403/chap403toc.html
Summary: Pennsylvania includes specific language allowing the use of third party inspections and has a set of regulations that govern the use of third-party inspections in the Uniform Construction Code. .	
Washington	SPE/I Program: The Washington State Energy Code: Certification for Inspectors and Plan Reviewers for the Non-Residential Energy Code. January 1997 http://www.energycodes.gov/implement/documents/case_certify.doc
Summary: This report gives a broad overview of the third party inspection program developed and implemented by Washington State, including descriptions of successful and unsuccessful aspects of the program. It also includes important recommendations helpful to any other jurisdiction contemplating the adoption of a similar program.	

2) Provide Adequate Funding for Code Agencies

Suggested Statutory Language: *The Commissioner of (XXX) shall adopt, in accordance with requirements of [statute] a schedule of fees to be added to local permit fees, adequate to defray the direct and indirect costs for administration of a training and certification program for code enforcement officials, design professionals, and building construction trades, to be known as the [Codes Enforcement] Training Fund. Such fee schedule shall carry forward to each subsequent fiscal year. Should the fund balance of such Fund exceed {$XXXXX} at the end of any fiscal year, such excess funds shall be deposited in the General Fund.*

Policy Explanation: Simply requiring inspections without supplying adequate funding for those inspections will not only raise issues of unfunded local mandates, but continue to provide an opportunity to ignore the proper training necessary to assure effective enforcement of the building code. Municipalities should not have to shoulder alone the financial burden of achieving better building energy code compliance. Instead, a user "fee for services" should be established, to be collected as a portion of the building permit fees, as a way of ensuring that funds are available to properly review construction drawings and inspect the building during construction. Consequently, this fund would be separate from state general funds and impose no burden on municipal governments. In other words, the fund would be under the control of the municipal building department or the relevant local authority.

Best Practice: Funds raised through local user fees should be dedicated to funding review of construction documents and inspections. The funding model should also be flexible enough to allow for instances where small, rural communities could potential pool resources to allow for qualified energy code inspectors to be hired on a shared basis, with compliance responsibilities based on a population formula.

Local permit surcharges may also be dedicated to continuing education, certification training and support for administrative tasks associated with the training. In Connecticut, for example, a surcharge of $0.16 per $1,000 value of permit work raises over $1 million per year for education programs. It supports training staff at the state level, outside instructors, training materials and aids, and venues where training is conducted. Such an education/certification program should embrace all code officials, building and fire, as well as other licensed and non-licensed professionals and trades on the basis of what their statutory needs are for continuing education. A key concept is allowing the general public access to the programs on a space-available basis. Those members of the building community required to attend to maintain licensure or certification are guaranteed space and then members of the general public may attend if there is space available. These sessions can be held at local community centers or firehouses.

Inspector Funding Policy: Best Practices Examples	
Connecticut	Chapter 541 part 1A section 29-522a http://www.cga.ct.gov/2007/pub/Chap541.htm#Sec29-252a.htm
Summary: -Connecticut charges a flat surcharge fee of 16 cents/$1000 construction value for code training and education programs for building officials, construction trades and design professionals, applied to local permit fees and remitted to the state. The surcharge adequately accounts for statutory training and certification of these groups, plus codes training for other parties and the general public. There is not a separate fund set up for the surcharge collection. Rather the funds are deposited into a General Fund and the amount credited to the CT Department of Public Safety. A separate Office of Education & Data Management provides training, certification and all administrative functions relating to the program, funded out of the fees collected.	

3) Require Commissioning for Commercial Buildings

Suggested Statutory Language: *The AHJ, in consultation with the [relevant state agency], shall develop requirements and promulgate regulations, requiring a process to ensure that all new non-residential buildings and any major reconstruction, alteration, or repair of all non-residential buildings perform as designed with respect to energy consumption by undergoing building commissioning. Non-residential buildings less than 50,000 square feet shall not be subject to such regulations. Initial operation and testing must be completed and approved before issuance of a permanent certificate of occupancy. Such regulations shall utilize a nationally accredited standard.*

Policy Explanation: Commissioning consists of the process that confirms, with extensive documentation, that building systems are planned, designed, installed, tested, operated and can be maintained in accordance with design requirements drawn up at the beginning of a project. As the technology required to construct highly efficient commercial and industrial buildings becomes more complex, the need to ensure that all building systems (such as heating, cooling and lighting) function optimally becomes paramount. Requiring a fully integrated commissioning process from the beginning of a project assures a building owner that the building will perform as designed and will generate the designed level of energy efficiency.

The full scope of commissioning extends beyond the purview of the building codes. Many of the requirements affect not only energy, but overall performance of equipment and systems. Thus, the scope of requirements that are covered by the model codes is incorporated within the Mechanical Code, in order that the issues of systems design, load, sizing, control, operation and maintenance are coordinated. This is a clear illustration of how code adoptions must be

comprehensive and coordinated in order to achieve buildings that answer all issues of safety, health and welfare.

Best Practices: Clearly, no "one size fits all" process exists for building commissioning. However, certain guidelines should be used to help maximize the benefits of commissioning. Such guidelines include but are not limited to: [16]

- The commissioning agent works (at the beginning of the project) with all interested parties (owner, design team, builder, facilities manager) to develop the Owner Project Requirements (OPR) which includes information to properly plan, design, construct, operate and maintain the systems.
- A commissioning plan is developed that is guided by the OPR and defines the process and procedures for the commissioning process.
- A testing program is developed and implemented.
- All commissioning activities are continuously documented.
- Written, repeatable test procedures, prepared specifically for each project, are used to functionally test components and systems in all modes of operating conditions specified for testing.
- Every commissioning project is documented with a Commissioning Process Progress Report.
- All phases of design and construction documents are reviewed.
- Equipment submittals are reviewed for compliance with commissioning issues.
- The scheduling and procedures used for system start-up are verified or managed.
- Training for the owner's operating staff is verified as being in accordance with the project documents.
- Operations and Maintenance manuals are verified as in compliance with the contract documents.
- Assistance is provided to the owner in assessing systems' performance and addressing related issues prior to expiration of the construction contract warranty.
- Follow up testing and reviews are conducted after full operation of the building systems is achieved, with particular attention to maintaining design conditions under actual operating loads and conditions.

[16] For a more complete description, go to http://www.peci.org/CxTechnical/resources.html#construction

Commissioning Policy: Best Practices Examples	
State	**Statute**
California	California Acceptance Requirements [17] http://www.energy.ca.gov/title24/2005standards/archive/documents/2002-04-22_workshop/2002-04-11_ACCEPTANCE.PDF
Summary: Provides detailed instructions on how to properly conduct the Title 24 acceptance requirements.	
California	California Green Building Code (Section 504.4) http://www.documents.dgs.ca.gov/bsc/prpsd_stds/combined_green_et_7_08.pdf
Summary: Provides the outline of steps required to fulfill the commissioning requirement.	
ASHRAE	ASHRAE Guidelines 0-2005[18]
Summary: Provides a detailed guide to commissioning a non-residential building**.**	

C. Measuring Energy Consumption

1) Require the Disclosure of Home Energy Use at Time-of-Sale

Suggested Statutory Language: *The[relevant state agency – one having jurisdiction over consumer protection], in consultation with the AHJ shall develop requirements and promulgate regulations establishing a building energy scoring program to require energy scoring by*

[17] These requirements are for the 2005 edition of Title 24. The 2008 edition (with updated requirements) shall be published within the next few months.
[18] There is no link to these requirements as they must be purchased from ASHRAE

licensed personnel at the time of sale of new single-family residential dwellings, multiple-family residential dwellings and commercial buildings. The AHJ shall consider other state energy scoring programs and any relevant federal programs when developing requirements and promulgating regulations.

The [relevant state agency – one having jurisdiction over consumer protection] shall include in its regulations any provisions requiring sellers of existing single-family dwellings, multiple-family dwellings and commercial buildings to provide potential buyers with copies of utility and, if applicable, heating bills for the building for charges incurred during the prior calendar year; and, if the seller has not retained such bills, provisions requiring electric and fuel gas utilities , and heating oil distributors to provide potential sellers or their agents billing information for the dwelling for charges incurred during the prior calendar year.

The [relevant state agency – one having jurisdiction over consumer protection] shall include in its regulations a requirement to provide a label that indicates the energy use of the existing single-family dwelling, multiple-family dwelling or commercial building.

The regulations shall include requirements for training and licensure; standards of professional and ethical conduct for home energy scoring personnel; and the establishment of reasonable fees for the services of such personnel, to be paid by the sellers of such dwellings.

Policy Explanation: Time of sale requirements address the reality that new construction makes up only one piece of the energy savings that can be realized from residential and commercial buildings. Energy improvements to existing buildings can also generate significant savings in energy consumption as existing buildings far outnumber new construction. Even modest improvements spread widely among existing buildings can generate large energy savings. Unfortunately, building codes typically only address new construction or extensive renovation, as the existing building stock is grandfathered through law. Thus, mandatory time of sale energy use disclosures are the only reasonable and effective way that the current system can address the energy use of existing homes and commercial buildings. Requiring energy ratings for new construction and the disclosure of energy usage of existing buildings at the time of sale creates market incentives for both builders and current owners to make energy saving improvements in both new and existing dwellings and commercial buildings. Home energy ratings can help confirm compliance with energy code as well as help track compliance across the state.

Best Practices: Through regulatory proceedings, a state should seek to establish guidelines for the scoring, implementation, evaluation, labeling and training of inspectors for time of sale disclosure. Any effective program would cover new and existing dwellings and buildings. An effective scoring guideline should include a home energy audit by a qualified energy rater. Disclosure of energy conservation aspects of the property (such as envelope insulation, window u-factor, and HVAC efficiency) should be included. Historical energy use, recent energy upgrades and evaluation of proper installation should be mandated information for existing buildings.

While vital, the disclosure of utility information needs to be supplemented with a simple system of labeling the dwelling or building so that both sellers and buyers have a simple reference

(much like miles per gallon for cars) upon which to compare buildings. The European Union currently has draft regulations in place that will require the use of "Building Energy Ratings."

This policy can be implemented most effectively only if there is a sufficient pool of trained and licensed certifiers or building raters. A number of professionals could potentially serve in this role, but all would need proper training in order to accurately identify and relay the energy efficiency of the property to the potential buyers. In conjunction with proper training, a system should be implemented for registering the data so that all property energy efficiency disclosures are identical.

Disclosure of Home Energy Use at Time of Sale Policy: Best Practices Examples	
State	**Directive**
European Union	Article 7 Directive 2002/91/EC of the European Parliament and of the Council of 16 December, 2002 on the energy performance of buildings. **http://www.sei.ie/index.asp?locID=151&docID=-1**
Summary: This directive gives requirements on the use of Energy Performance Certificates (EPC) as part of a labeling requirement. The EPCs are given to the buyer at the time of sale.	
Sustainable Energy Ireland	**Building Energy Rating Certificate** **http://www.sei.ie/index.asp?locID=1177&docID=-1**
Summary: This section gives an example on how to implement the above referenced European Union Directive.	

2) Require Building Benchmarking

Suggested Statutory Language: *(a) On and after January 1, 20XX, electric and gas utilities shall maintain records of the energy consumption data of all nonresidential buildings to which they provide service. This data shall be maintained, in a format compatible for uploading to the United States Environmental Protection Agency's Energy Star Portfolio Manager, for at least the most recent 12 months.*

(b) On and after January 1, 20XX, upon the written authorization or secure electronic authorization of a nonresidential building owner or operator, an electric or gas utility shall upload all of the energy consumption data for the account specified for a building to The United States Environmental Protection Agency's Energy Star Portfolio Manager in a manner that preserves the confidentiality of the customer.

(c) In carrying out the requirements of this section, an electric or gas utility may use any method for providing the specified data in order to maximize efficiency and minimize overall program cost, and is encouraged to work with the United States Environmental Protection Agency and customers in developing reasonable reporting options.

(d) On and after January 1, 20XX, an owner or operator of a nonresidential building shall disclose the United States Environmental Protection Agency's Energy Star Portfolio Manager benchmarking data and ratings for the most recent 12-month period to a prospective buyer, lessee of the entire building, or lender that would finance the entire building. If the data is delivered to a prospective buyer, lessee, or lender, a property owner, operator, or their agent is not required to provide additional information, and the information shall be deemed to be adequate to inform the prospective buyer, lessee or lender regarding the United States Environmental Protection Agency's Energy Star Portfolio Manager benchmarking data and ratings for the most recent 12-month period for the building that is being sold, leased, financed, or refinanced.

(e) Notwithstanding subdivision (d), nothing in this section increases or decreases the duties, if any, of a property owner, operator, or his or her broker or agent under this chapter or alters the duty of a seller, agent, or broker to disclose the existence of a material fact affecting the real property.

Policy Explanation: Benchmarking consists of developing a record of the baseline energy use of and a rating of commercial buildings in order to compare it to other similar buildings. Benchmarking can help guide the development of public policies that seek to maximize building energy efficiency, as well as to evaluate the efficacy of these policies. To properly develop benchmarks, states need to gather data from commercial building owners and establish an easily accessible database that contains the energy consumption information.

An effective building energy codes policy requires the accurate accounting of building energy use to track the potential savings from implementing energy efficient codes and other state policies. Through benchmarking, building owners, lenders and potential buyers can make informed decisions regarding building energy use. For example, a building owner could use the information to lower energy use and make the building more commercially attractive to buyers or tenants. A potential buyer, on the other hand, can use the information to press for improvements in energy use on the part of the current building owner. Benchmarking should also help policymakers achieve energy gains by tracking the progress of policies such as building energy codes.

Finally, benchmarking (much like home energy ratings) can help determine whether individual buildings comply with the state code as well as help track compliance across the state.

Best Practices: A policy on building benchmarking should aim for the most comprehensive and accurate energy use data possible. The state of California, which mandates building energy benchmarking for non-residential buildings, employs the Environmental Protection Agency's Portfolio Manager (PM) as the basic database tool. The PM has the ability to provide summary reports on the full universe of buildings as well as subsets to help track energy use.

Any building benchmarking policy should include both state- and privately-owned commercial buildings. (Gathering data from state-owned buildings would allow officials to work out any unforeseen (or foreseen) problems, such as difficulty in determining the extent of information required from the property, prior to applying the policy to private, commercial properties.)

A benchmarking policy should feature a system for ensuring that all stakeholders, buyers, owners and lenders have access to the gathered information; should offer easy identification of building types and organize energy use data by month. The responsible agency or organization must also work with utilities to create the appropriate disclosure forms that will provide the necessary information and protect the confidentiality of customer information.

Finally, state policy should seek to tie commissioning to benchmarking. Commissioning ensues accurate data of a buildings performance. Conversely, the use of retro-commissioning can help reduce discrepancies between a building's predicted energy use and its measured energy use.

Benchmarking Policy: Best Practices Examples	
State	**Statute**
California	Section 25402.10 of the Public Resources Code (Enabling Language) http://www.leginfo.ca.gov/cgi-bin/displaycode?section=prc&group=25001-26000&file=25400-25405.6
Summary: This statute would require electric and gas utilities, as defined, on and after January 1, 2009, to maintain records of the energy consumption data of all nonresidential buildings to which they provide service. The bill would require, on and after January 1, 2010, that a non-residential building owner or operator disclose ENERGY STAR Portfolio Manager benchmarking data and ratings, for the most recent 12-month period, to a prospective buyer, lessee, or lender.	
Washington D.C.	Clean and Affordable Energy Act of 2008 http://www.dccouncil.washington.dc.us/images/00001/20080804150618.pdf
Summary: The statute will first require the benchmarking, using the Energy Star Portfolio Manager tool, for all city buildings greater than 10,000 square feet. Starting in 2010 until 2013, the city will require energy use information for all private buildings between 50,000 and 200,000 square feet to benchmark these buildings.	

D. Integrating Building Energy Codes with Other Policies

1) Integrate Building Energy Codes with Ratepayer-Funded Energy Efficiency Programs and Comprehensive Building Energy Code Adoptions

Suggested Statutory Language: *None*

Policy Explanation: Building energy codes and ratepayer-funded energy efficiency programs share a common goal of increasing energy efficiency and decreasing energy use in residential, commercial and industrial buildings. Specifically, energy efficiency programs can incent developers and building owners to construct energy efficiency buildings that exceed the state building energy code requirements.

Part of integrating the statutory (codes) and voluntary (efficiency programs) efforts is the need for energy regulators to acknowledge that as energy codes increase in stringency, it becomes necessary for baselines on efficiency programs to likewise be raised. Program administrators and regulators need to carefully analyze the programs before the adoption of new codes to ensure that the program incentives are promoting technologies and products that are significantly more efficient than the current code to maintain the appropriate distance between the efforts to "raise the ceiling" on building technologies and practices (programs) and lock in those savings as the "floor" established by the building energy codes.

Lastly, building energy code agencies and other stakeholders (building code and energy efficiency advocacy organizations; organizations of building professionals; and others) should work with the energy efficiency administrators, promoting the exchange of information to ensure that the program administrators are aware of energy code changes that may affect the program incentives, and inform appropriate code updates. In addition, opportunities will exist for state building code administrators to collaborate with the energy efficiency program administrators on training and certification programs, particularly because the program administrators already have established relationships with many building professionals.

Attention to the efforts at integration should extend to other energy efficiency related efforts. For example, a progressive energy code policy would be an integral part of the development of high performance building such as schools or hospitals which would undoubtedly incorporate strong building energy codes as a minimum baseline for energy performance.

Best Practices: A building code policy properly integrated with energy efficiency programs should result in the following:

1. The adopted building energy code will establish a clear and consistent statewide "construction baseline" reference point to support and enhance the residential, commercial and industrial energy efficiency program services provided by the program administrators.

2. Residential and commercial construction programs should provide financial incentives for efficiency measures tied to the informative appendix adopted as part of the building energy code.

3. The state energy office should represent the state in multi-state and national building code forums and initiatives, along with the code officials and energy efficiency program administrators, in order to improve the effectiveness, coordination, training, and compliance of energy codes in the Northeast. Policies should encourage participation of municipalities through their code enforcement personnel in national building code forums as a means of securing policy initiatives. Governmental representatives who attend these forums are the only decision-makers at the national model code adoptions.

4. Code officials and program administrators should be encouraged by regulators to work together on training and certification programs for building professionals.

5. The AHJ and building energy codes advisory board [if any] shall invite energy efficiency program administrators to participate in the building energy code review process.

Although the language for the integration of building energy codes with the energy efficiency programs is legislative, the majority of the implementation work will come at the AHJ and program administrator level. It will be their responsibility to ensure compliance training through the development of the program plans.

IV. Conclusion

Progressive building energy codes provide an important means to curbing energy use in the Northeast. Pursuing a comprehensive building energy codes policy will result in codes that are more energy efficient, in more buildings that comply with code and more effective tools to measure and verify the energy savings that occur.

Energy efficient buildings result in multiple benefits: financial savings that accrue to both owners and occupants; fewer emissions of greenhouse gases, and less stress on the electricity grid. It cannot be emphasized enough that newly-constructed and substantially renovated buildings represent a narrow opportunity to either ensure substantial energy, environmental and economic savings for years to come, or to permit buildings that will use more energy than they should, saddle occupants with unnecessary and unpredictable costs, and make compliance with aggressive air quality and climate change policies much more difficult. It is NEEP's intent that the Model Building Energy Codes Policy will help states recognize that opportunity and act upon it in a way that supports the construction of more efficient, sustainable and affordable homes and buildings across the region.

V. Appendices

A. Potential Energy Savings and Potential Reductions in Carbon Emissions Resulting From More Efficient Building Energy Codes

The following four tables highlight the energy and environmental benefits of improving energy codes in the Northeast. Tables 1 and 2 show potential energy savings in the residential and commercial sectors, respectively, while Tables 3 and 4 show the potential carbon dioxide emissions avoided in those same sectors.

The levels of code improvement in these tables coincide with the major policy aims established by agencies such as the Department of Energy and the California Public Utilities Commission. The DOE has made the improvement of the national model code (2006 Edition of the IECC and the ASHRAE 90.1-2004) by 30 percent (toward the eventual realization of net-zero energy buildings) as an explicit policy goal. The next milestone for which code savings are analyzed – 70 percent more efficient than the 2006 IECC – is derived from the DOE defined target of 70 percent energy savings necessary to attain net zero energy building status, with the remaining energy to attain neutrality resulting from on-site or building-integrated renewable energy mechanisms.

For comparison, the average home in New England uses approximately 120 million BTUs of energy per year. Therefore, the Massachusetts energy savings in 2011, for example, are equivalent to the energy consumption of 1,600 New England households. By 2050, the annual energy savings total about 135,000 households.

An average automobile emits roughly 12,100 lbs of carbon dioxide per year. Therefore, the avoided annual carbon dioxide emissions in 2050 in the Northeast roughly equates to removing over 16 million cars off the road.

Table 1
Energy Savings from Implementation of Improved Residential Energy Codes in Northeast States[19] (Trillion BTUs)

	Annual Immediate Savings from Improving the Code by 30% in 2011	Annual Savings in 2019 as Result of Cumulative Gains from 30% Improvement in Code in 2011	Annual Savings in 2029 as Result of Cumulative Gains from Improving the Code by 70% in 2020	Energy Supplied by On-site Renewable Energy in 2030 to Reach Net-Zero Energy	Annual Savings in 2030 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.[20]	Annual Savings in 2050 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	Annual Savings in 2050 as Result of Cumulative Gains Supplied by On-Site Renewable Energy 2030-2050
Connecticut	0.38	3.42	11.93	0.33	12.73	6.06	26.10
District of Columbia	0.04	0.32	1.13	0.03	1.20	0.57	2.47
Delaware	0.21	1.87	6.53	0.18	6.96	3.32	14.28
Maine	0.57	5.05	17.60	0.49	18.76	8.94	38.48
Maryland	0.94	8.38	29.22	0.81	31.16	14.84	63.90
Massachusetts	0.19	1.70	5.94	0.16	6.34	3.02	13.00
New Hampshire	0.22	1.98	6.90	0.19	7.36	3.50	15.09
New Jersey	1.10	9.80	34.17	0.94	36.44	17.35	74.72
New York	1.41	12.59	43.89	1.21	46.80	22.29	95.98
Pennsylvania	1.30	11.53	40.21	1.11	42.88	20.42	87.93
Rhode Island	0.08	0.71	2.49	0.07	2.65	1.26	5.44
Vermont	0.67	5.93	20.67	0.57	22.04	10.50	45.20
Total	**7.11**	**63.29**	**220.69**	**6.10**	**235.32**	**112.07**	**482.59**

[19] The totals for Tables 1-4 come from computer models developed by the Building Codes Assistance Project.
[20] As noted earlier, the 30 percent improvement occurs in 2011 and the 70 percent improvement occurs in 2020.

Table 2
Energy Savings from Implementation of Improved Commercial Energy Codes in Northeast States (Trillion BTUs)

	Annual Immediate Savings from Improving the Code by 30% in 2011	Annual Savings in 2019 as Result of Cumulative Gains from 30% Improvement in Code in 2011	Annual Savings in 2029 as Result of Cumulative Gains from Improving the Code by 70% in 2020	Energy Supplied by On-site Renewable Energy in 2030 to Reach Net-Zero Energy	Annual Savings in 2030 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.[21]	Annual Savings in 2050 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	Annual Savings in 2050 as Result of Cumulative Gains Supplied by On-Site Renewable Energy 2030-2050
Connecticut	0.57	5.21	19.10	0.61	20.52	13.11	49.69
District of Columbia	0.24	2.21	8.09	0.26	8.69	5.55	21.04
Delaware	0.37	3.37	12.35	0.39	13.26	8.48	32.13
Maine	1.00	9.09	33.35	1.06	35.81	22.89	86.75
Maryland	1.33	12.10	44.40	1.41	47.69	30.47	115.50
Massachusetts	0.29	2.61	9.59	0.30	10.30	6.58	24.95
New Hampshire	0.34	3.12	11.43	0.36	12.28	7.85	29.74
New Jersey	2.06	18.72	68.69	2.18	73.77	47.14	178.68
New York	3.08	28.09	103.06	3.27	110.68	70.73	268.09
Pennsylvania	1.91	17.43	63.95	2.03	68.68	43.89	166.35
Rhode Island	0.12	1.09	4.00	0.13	4.30	2.75	10.41
Vermont	0.10	0.90	3.30	0.10	3.55	2.27	8.59
Total	**11.41**	**103.94**	**381.31**	**12.09**	**409.52**	**261.69**	**991.92**

[21] As noted earlier, the 30 percent improvement occurs in 2011 and the 70 percent improvement occurs in 2020.

Table 3
CO2 Emissions Avoided Through Improvements in Residential Energy Code in Northeast States (million metric tons)

	Annual Immediate Savings from Improving the Code by 30% in 2011	Annual Savings in 2019 as Result of Cumulative Gains from 30% Improvement in Code in 2011	Annual Savings in 2029 as Result of Cumulative Gains from Improving the Code by 70% in 2020	Energy Supplied by On-site Renewable Energy in 2030 to Reach Net-Zero Energy	Annual Savings in 2030 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.[22]	Annual Savings in 2050 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	Annual Savings in 2050 as Result of Cumulative Gains Supplied by On-Site Renewable Energy 2030-2050
Connecticut	0.02	0.22	0.75	0.02	0.80	0.38	1.64
District of Columbia	0.00	0.02	0.07	0.00	0.07	0.03	0.14
Delaware	0.01	0.11	0.38	0.01	0.41	0.19	0.84
Maine	0.04	0.32	1.10	0.03	1.18	0.56	2.42
Maryland	0.06	0.48	1.70	0.05	1.82	0.87	3.74
Massachusetts	0.01	0.11	0.37	0.01	0.40	0.19	0.82
New Hampshire	0.01	0.12	0.43	0.01	0.46	0.22	0.95
New Jersey	0.06	0.57	1.99	0.06	2.13	1.02	4.37
New York	0.08	0.67	2.40	0.07	2.63	1.25	5.38
Pennsylvania	0.08	0.67	2.34	0.07	2.51	1.20	5.15
Rhode Island	0.01	0.05	0.16	0.00	0.17	0.08	0.34
Vermont	0.04	0.37	1.29	0.04	1.39	0.66	2.84
Total	**0.42**	**3.70**	**12.98**	**0.36**	**13.97**	**6.65**	**28.65**

[22] As noted earlier, the 30 percent improvement occurs in 2011 and the 70 percent improvement occurs in 2020.

Table 4
CO2 Emissions Avoided Through Improvements in Commercial Energy Code in Northeast States (million metric tons)

	Annual Immediate Savings from Improving the Code by 30% in 2011	Annual Savings in 2019 as Result of Cumulative Gains from 30% Improvement in Code in 2011	Annual Savings in 2029 as Result of Cumulative Gains from Improving the Code by 70% in 2020	Energy Supplied by On-site Renewable Energy in 2030 to Reach Net-Zero Energy	Annual Savings in 2030 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.[23]	Annual Savings in 2050 as Result of Cumulative Savings from 30% and 70% Improvement in Codes.	Annual Savings in 2050 as Result of Cumulative Gains Supplied by On-Site Renewable Energy 2030-2050
Connecticut	0.03	0.24	0.86	0.03	0.95	0.61	2.30
District of Columbia	0.01	0.11	0.43	0.01	0.46	0.30	1.12
Delaware	0.02	0.18	0.65	0.02	0.71	0.45	1.71
Maine	0.05	0.43	1.50	0.05	1.66	1.06	4.01
Maryland	0.07	0.63	2.35	0.07	2.54	1.62	6.15
Massachusetts	0.01	0.12	0.43	0.01	0.48	0.30	1.15
New Hampshire	0.02	0.15	0.51	0.02	0.57	0.36	1.38
New Jersey	0.11	0.97	3.63	0.12	3.93	2.51	9.52
New York	0.13	1.21	4.71	0.16	5.38	3.44	13.04
Pennsylvania	0.10	0.91	3.38	0.11	3.66	2.34	8.86
Rhode Island	0.01	0.05	0.18	0.01	0.20	0.13	0.48
Vermont	0.00	0.04	0.15	0.00	0.16	0.10	0.40
Total	**0.56**	**5.03**	**18.78**	**0.61**	**20.70**	**13.23**	**50.13**

B. Glossary of Terms relating to Building Energy Codes

Following is a list of terms that are commonly used in relation to building energy codes.

Administrative Amendment: A change to a model code requirement that brings the adopted regulation into compliance with state and/or local laws.

Adopting Authority: The agency or agent that adopts the energy code in a state.

ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers.

ASHRAE/IES Standard 90.1-2007: The latest American Society of Heating, Refrigerating and Air-Conditioning Engineers/Illumination Engineering Society Standard for construction of commercial buildings.

[23] As noted earlier, the 30 percent improvement occurs in 2011 and the 70 percent improvement occurs in 2020.

Authority Having Jurisdiction [AHJ]: The state, county, or municipal governmental entity charged with adoption or administration or enforcement of a regulation or code, including any responsible administrative subdivision.

Building Codes Assistance Project [BCAP]: Organization that assists states in adoption and implementation of energy codes.

Building Energy Code: Minimum requirements for the building envelope, mechanical systems and lighting for energy efficiency/conservation.

Building Standard: A recognized measurement of quality, efficiency, performance determined through a consensus process of all stakeholders by and accredited agency.

Building Inspector: The official responsible for the compliance of construction documentation with the adopted building codes.

Building Official: The officer or his designated representative authorized to act on behalf of the authority having jurisdiction.

COMCheck: Department of Energy compliance software for energy conservation in buildings other than low-rise residential buildings.

Energy Performance Rating: The energy use of the proposed building under actual operating conditions. Projected energy use targets can be used for buildings in the design or construction process. Examples include kBTU/sf/yr, dollars/square foot/yr, dollars/gross sales, Energy Performance Rating Score (US EPA), or like expressions of energy performance.

Energy Performance Standard: NBI, RESNET, CHPS, LEED, etc.

Home Energy Rating Service [HERS]: A rating of a residence's energy performance as compared to a code-compliant dwelling, with the minimally code compliant design set at 100. A better-performing dwelling rating will achieve a lower score (under 100), while a non-compliant dwelling would receive a higher score (over 100).

I-Code Family: The compendium of separate, integrated model building codes published by the International Code Council and which include codes that govern energy use. .

ICAA: Insulation Contractors Association of America.

ICC: International Code Council

IEBC: International Existing Building Code

IECC: The International Energy Conservation Code formerly known as the Model Energy Code. The IECC was published in 1998, 2000, 2003, and 2006 with amendments adopted in the intervening years. The IECC is on an eighteen month cycle.

IRC: The International Residential Code**.** This code covers one and two family dwellings, including attached townhouses.

NCSBCS: The National Conference of States on Building Codes and Standards members include state code administrators and officials.

NEBCA: The Northeast Building Code Association, an organization founded in New England in 1966 to promote adoption of uniform building codes throughout the region.

NFRC: National Fenestration Rating Council. Adopts standards for window and door performance.

NWWDA: National Wood Window and Door Association.

Performance Approach: A performance approach (also known as a systems performance approach) compares a proposed design with a baseline or reference design and demonstrates that the proposed design is at least as efficient as the baseline in terms of annual energy use. This approach allows the greatest flexibility but may require considerably more effort. A performance approach is often necessary to obtain credit for special features such as a passive solar design, photovoltaic cells, thermal energy storage, fuel cells, and other nontraditional building components. This approach requires an annual energy use value. There are several commercially available software tools that perform this analysis.

Prescriptive Approach: A prescriptive approach lists minimum R-value/maximum U-factor requirements for building envelope components, such as windows, walls, and roofs. It lists lighting systems prescriptive performance in commercial buildings as the allowable watts per

square foot of interior space for various building uses. Minimum required equipment efficiencies for mechanical systems and equipment are not prescriptive by code, but by Federal standards.

RECA: The Responsible Energy Codes Alliance, dedicated to adoption of the latest energy conservation codes by all jurisdictions with no technical amendments.

RESCheck: Department of Energy compliance software for energy conservation in low-rise residential buildings, including detached residences and townhouses.

ASHRAE Standard 189-1: An ASHRAE standard for minimum requirements for sustainable construction. Standard 189.1 aims for a 30% improvement in energy efficiency over ASHRAE 90.1-2004

Technical Amendment: A revision or waiver of a building quality, efficiency or performance standard requirement in a model code.

Third Party Inspectors: Qualified, approved inspection agencies and individuals responsible for inspection of specialized construction work under the authority of an approved design professional in responsible charge of a special inspections program.

Time-of –Sale Energy Code Requirements: A local law setting either a reporting or energy upgrade requirement on transfers of property.

Trade-Off Approach Energy efficiency compliance achieved for an entire building or structure by allowing decreased energy efficiency in one component against increased efficiency in another component, thereby offsetting each other and maintaining a prescribed level of efficiency/energy loss. These trade-offs typically occur within major building systems (e.g. envelope, mechanical) or in commercial lighting, but may not be allowed between systems unless by exception.