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AUGUSTA, MAINE  
04333-0018

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COMMISSIONERS

February 15, 2008

The Honorable Phillip L. Bartlett II, Senate Chair  
The Honorable Lawrence Bliss, House Chair  
115 State House Station  
Augusta, Maine 04333

Re: Report on Building Energy Codes

Dear Senator Bartlett and Representative Bliss:

During the 2007 session, the Legislature considered Resolve Chapter 93 "Resolve to Improve the Energy Efficiency of Residential and Commercial Buildings. The Committee directed the Commission and the Maine State Housing Authority to study the feasibility and make recommendations for policies or programs to increase compliance with Maine's Model Building Energy Code. The attached report documents new training and certification activities by the Commission and MaineHousing that are currently underway and which will increase compliance with the energy codes. In addition the report provides a summary of our study of current new home building practices. Finally, the report recommends support for the findings included in Maine State Planning Office's response to Legislative Resolve Chapter 46 "Directing the Development of a Building Code and Building Rehabilitation Code Implementation Plan." On behalf of the Commission and MaineHousing, we submit the attached report which summarizes the results of our investigations.

We look forward to working with you and your Committee on the issues addressed in the attached report. If you have any questions or comments regarding this report, please contact us.

Sincerely,

Kurt Adams, Chairman JP  
Maine Public Utilities Commission

On behalf of

Sharon M. Reishus  
Vendean V. Vafiades  
Commissioners  
Maine Public Utilities Commission

Attachment

cc: Utilities and Energy Committee Members  
Lucia Nixon, Legislative Analyst



PRINTED ON RECYCLED PAPER

Report on LD 1655  
Building Energy Codes

Developed by the  
Maine Public Utilities Commission  
And  
MaineHousing

Presented to the Joint Standing Committee  
On Utilities and Energy  
February 15, 2008

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## EXECUTIVE SUMMARY

This report responds to Legislative Resolve Chapter 93 “Resolve to Improve the Energy Efficiency of Residential and Commercial Buildings”. The resolve requests the Commission and Maine State Housing Authority study the feasibility and make recommendations for policies or programs to increase compliance with Maine’s Model Building Energy Code. Independent of this resolve, a steering committee headed by Maine’s State Planning Office has developed recommendations in response to Legislative Resolve Chapter 46 “Directing the Development of a Building Code and Building Rehabilitation Code Implementation Plan.” This resolve is directed at all building codes including the energy code. Taken together, the recommendations contained in the two reports will significantly increase compliance with all building codes. Efficiency Maine’s ongoing education and training programs along with two incentive programs new this year, the Residential New Construction and Commercial New Construction programs, will educate the building community and consumers about construction practices that exceed the State’s building energy code. The Commission and Maine State Housing support the recommendations on training and enforcement provisions reported by the steering committee for Resolve 46. Those recommendations will increase code uniformity throughout the State, increase awareness of the codes, and provide for better and more uniform enforcement. These improvements will in turn result in buildings that consume less energy, are better constructed, more durable and lasting, and healthier for their occupants.

### I. BACKGROUND

Resolve Chapter 93, of the First Regular Session of Maine’s 123<sup>rd</sup> legislature, **Resolve, To Improve the Energy Efficiency of Residential and Commercial Buildings**, directs the Maine Public Utilities Commission (MPUC) and the Maine State Housing Authority (MSHA) to undertake a study of state policies or programs that will increase compliance with the State’s model building energy code. Any recommendations made by the agencies must provide exemptions for low income individuals for whom compliance with the code is a financial hardship as well as for individuals who build their own residences. The study is to include consultation with stakeholders including homeowners, building contractors, and representatives of the real estate industry. The study must consider the development and implementation of education and outreach strategies to inform owners and builders of residential and commercial buildings about the model building energy code. In addition, the two agencies are to report their findings to the Joint Standing Committee on Utilities and Energy and include a summary of any data gathered related to the energy efficiency of the housing stock in the State.

A. **Building Energy Codes in Maine.** On April 1, 2005, the Maine Public Utilities Commission Ordered adoption of Chapter 920 – Maine Model Building Energy Code, a major substantive rule that established a Maine Model Building Energy Code, as required by P.L. 2003 ch. 645<sup>1</sup>. Chapter 920 establishes the two components of the Maine Model Building Energy Code, an energy component and a ventilation component. The energy component allows that compliance may be satisfied through attainment of the International Energy Conservation Code version 2003 (IECC-2003), Chapter 11 of the International Residential Code (IRC-2003),

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<sup>1</sup> MPUC Docket No.2005-521

components of the code are, ASHRAE 62-2001 (commercial buildings) and ASHRAE 62.2-2003 (residential dwellings).

**B. Code Oversight in Maine.** Unlike most other states, Maine does not have a single state agency that develops and maintains building codes, disseminates information, and contributes to enforcement. These functions are dispersed among many agencies, including the Department of Professional and Financial Regulation (PFR), which oversees licensing and assists with enforcement and maintenance of licensed professionals' requirements; the Department of Public Safety, which houses the State Fire Marshal's Office; the State Planning Office (SPO), which coordinates codes training; and municipalities, which interpret and enforce the codes that they adopt as well as some of the state mandated codes; and the Maine PUC, which has the statutory authority to grant variance to energy codes. This balkanized approach increases the overall cost of code development and enforcement while decreasing the State's ability to maintain comprehensive, effective building codes.

**C. Applicability.** Together sections 4, 5, and 6, of MPUC Chapter 920 "Maine Model Building Energy Code" define where the code applies. Section 4 defines the types of buildings to which the code applies. Section 5 "Other Codes and Standards" of the code clarifies that a number of other codes (sometimes referred to as "Life Safety Codes") overrule energy codes when there are conflicts. Finally, section 6 "Adoption" explains the local rule aspects of Maine's residential building energy code. Section 6 explains that towns without energy codes are not required to adopt one. Should they adopt a code, it must be the Maine Model Building Energy Code. Towns that have energy codes may not amend those codes except to adopt the Model Code. Finally, local jurisdictions may ammend the model code upon adoption. This local ammendability clause allows towns an "a la carte" approach to the residential building energy codes in Maine, causing confusion and increasing costs in residential construction. This is not true for commercial buildings where the Model Building Energy Code in Maine is a mandatory, uniform code that applies to all non-residential buildings across the State.

**D. Enforcement.** In 2003, the MPUC was directed by the legislature to examine compliance and enforcement methods designed to ensure residential and commercial construction complies with building energy codes. (P.L. 2003 ch. 645 "The Energy Code Act"). On December 31, 2004, the Commission reported back to the Joint Standing Committee on Utilities and Energy. The report, titled, "Investigation of Building Code Compliance and Enforcement Methods," presented six different enforcement models deemed suitable for Maine along with the Commission's recommendations for an enforcement mechanism that would provide improved compliance while keeping added administrative costs to a minimum<sup>2</sup>. At the time of the report, the residential component of the code was enforced voluntarily by municipalities whom chose to adopt an energy code. Commercial energy codes were being enforced by requiring the building owner to submit a letter certifying the building had been constructed to the energy code before the utility could establish permanent service to the building.

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<sup>2</sup> The Resolve 46 Steering Committee has recommended a seventh enforcement mechanism worthy of consideration. See recommendation # 2 in section II.C below.

The Commission report recommended maintaining the status quo with regard to enforcement of the residential energy codes, i.e. enforcement responsibility should be retained by the municipality that elects to establish the code. The rationale for this was that municipalities may voluntarily adopt the code. For commercial buildings, the report recommended municipalities have the option for enforcing locally. If municipalities do not want jurisdiction, the report recommended that prior to establishing temporary power to a construction site, electric utilities would require a licensed engineer or architect submit plans showing the building would meet code requirements. After construction, prior to receiving permanent power, utilities would require certification by the licensed professional that the final building complies with the codes. The Commission's entire report along with an explanation of the five other enforcement models and its Appendix A showing how other states enforce the codes is available on the MPUC website at the following link:

[http://www.maine.gov/mpuc/staying\\_informed/legislative/2005legislation/Enforcement%20Report%20final.pdf](http://www.maine.gov/mpuc/staying_informed/legislative/2005legislation/Enforcement%20Report%20final.pdf)

The legislature took no action regarding enforcement of the residential energy code, and the requirements for utility representatives to obtain a statement of compliance from building owners were eliminated from statute. As a result there are currently only two relatively weak (compared to other states) mechanisms for enforcement of building energy codes in Maine.

The first is with respect to commercial buildings for which the IECC 2003 or ASHRAE 90.1-2001 is the mandatory state wide code. Any commercial building over 1,000 square feet in floor area in the state must be designed by a licensed engineer or architect. The codes ethics and licenses for these professions require they keep current with all standards and laws, and that they design and construct buildings that conform with all applicable codes, standards, and laws.

The second mechanism regards residential building energy codes. Towns that elect to adopt a residential building energy code also elect to enforce the code. Our conversations with multiple code enforcement officials across the State reveal that the code officers are professionals who understand the codes and to the extent that limited resources allow, endorse and support enforcement of the energy codes along with other building codes.

## II. **CURRENT EFFORTS.**

**A. Education and Outreach Strategies.** The Commission's Efficiency Maine program conducts multiple workshops on building energy use. Many of these trainings provide opportunities to inform attendees about the building energy codes, and encourage them to treat the energy code as a minimum standard. In FY'07, the program provided the following trainings;

- 1. Maine Building Benchmark;** The "Maine Building Benchmark" is a handbook of guidelines that provides instruction on how to construct commercial buildings that are 20% more energy efficient than the model building energy code. The Commission has conducted training programs on the use of the handbook. Target audiences have been architects, engineers, school superintendents, and school business managers.
- 2. Building Operator Certification (BOC) Courses;** The Commission sponsors the Building Operator Certification course to train facility managers about energy use in

their buildings. The 100 level BOC course devotes an entire day to education regarding all codes including the energy and indoor air quality codes.

3. **Training Partnerships:** The Commission has partnered with the Maine Indoor Air Quality Council to conduct a number of trainings on the built environment. In FY'07, we jointly sponsored the following training programs;
  1. **Keeping Foundations Warm and Dry:** A course offered in partnership with lumber yards to teach builders about the value of better construction practices with a focus on foundation insulation and mold prevention problems. The program was offered twice last year.
  2. **Ventilating New & Existing Homes;** Another course offered in partnership with lumber yards, to teach builders ways to comply with Maine's residential ventilation codes and why they are important to occupant health. This program also was offered twice last year.
  3. **Building Shell;** A program devoted to showing builders how to build homes that exceed the energy codes. One building shell training was offered last year.
  4. **Energy Efficiency and Indoor Air Quality:** A training designed to show builders, architects, and engineers how to exceed the energy codes without trading off indoor air quality.

**B. Incentive and Market Transformation Efforts:** The Commission's Efficiency Maine program "pulls" the market by providing financial incentives, training, and information to induce demand and increase supply of more energy efficient goods and services. Efficiency Maine is initiating two new programs this year to improve the efficiency of new residential and commercial buildings. The programs will increase the demand for higher efficiency buildings by promoting their benefits to consumers. The programs will increase supply by training and certification to the building industry that participate in the program. Because the model energy code serves as a baseline for each program, awareness of the code will be increased through the training process.

The Efficiency Maine Residential New Construction Program will begin in the spring of 2008. The program will encourage home builders to build Energy Star rated homes. Energy Star is a brand developed and maintained jointly between US DOE and US EPA that encourages consumers to purchase goods that exceed the normal energy codes and standards (Efficiency Maine's residential lighting program promotes Energy Star rated lighting). The efficiency level of homes will be measured and rated, and training on building beyond energy codes will be provided to participating builders. Efficiency Maine is developing a "baseline" efficiency level by surveying new home construction practices. This is being done by auditing recently constructed homes and interviewing all of the stakeholder groups identified in section 1 of Resolve 93.

Education programs have demonstrated success in the past. Central Maine Power Company operated the "Good Cents Home" program between 1986 and 1990. "Good Cents" was a program that promoted premium energy efficiency for homes. During that time, CMP moved the construction of high efficiency homes from 2% of the new housing market to 23% in only 3 years. Evaluations of the program revealed that builders applied the training provided by the program to improve their construction even of homes not

included in the program. Non-participating builders also increased the quality of their construction practices as lessons learned by participating builders spread through the industry.<sup>3</sup> Even without enforcement, the Commission's new construction programs are likely to increase compliance with energy codes.

Efficiency Maine's Commercial New Construction program will also begin during the spring of 2008. It will operate in a manner similar to the residential new construction program; a baseline performance level (current energy code) will be set, and design tools and trainings will be provided to building professionals around the State. In other jurisdictions, such programs have been shown to increase contractor and building professional's awareness of codes and to make lasting change in commercial construction practices<sup>4</sup>.

**C. MaineHousing's Affordable Housing Initiatives:**

MaineHousing administers several financing programs for multifamily housing. Energy efficient, sustainable and environmentally sensitive construction are core goals of all programs. Working closely with developers, designers, engineers, and contractors, MaineHousing's Construction Services Team provides technical oversight during design and construction of all new construction multifamily projects to assure compliance with program goals and objectives. MaineHousing has been a nationally recognized leader in initiating and promoting, energy efficient, sustainable and environmentally sensitive construction, including:

1. **Green Building Standards:** MaineHousing was the first housing finance agency in the country to develop, adopt, and implement *Green Building Standards* for all new and substantial rehabilitation construction of multifamily housing financed through the authority. In addition to standards for sustainable and environmentally responsive construction, it is estimated that the energy related standards result in housing that is upwards of 30% more energy efficient when compared with previously developed projects built with more conventional materials and methods.
2. **Home Design Competition:** MaineHousing developed, administered, and promoted a *Mainstream Green Home Designs* competition. The contest, winning designs, and green design and construction tips have been captured and a publication educating the development, design and building community in advanced construction techniques can be found at [www.mainehousing.org](http://www.mainehousing.org). These techniques result in buildings that exceed the Maine Model Building Energy Code.
3. **Financing Assistance:** MaineHousing has formulated and funded a single-family subdivision program that offers a funding stimulus to developers, provided the homes constructed under the program meet the *Green Building*

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<sup>3</sup> "Process evaluation of Central Maine Power Company's Good Cents Homes Program" RCG/Hagler Bailly, Inc. December 11, 1989

<sup>4</sup> LIAP Commercial New Construction program evaluation results, presented at IEPEC 2005

*Standards* established by the authority and exceed the Maine Model Building Energy Code.

**D. Resolve 46:** During the first session of the 123<sup>rd</sup> legislature, the Business, Research and Economic Development (BRED) Committee of the Legislature passed Resolve 46, directing state agencies to develop a proposal to implement the building codes and resolve conflicts between those codes and other related codes in statute.

A Steering Committee consisting of Department of Economic and Community Development, Maine Historic Preservation Commission, the State Fire Marshal, Department of Professional and Financial Regulation and chaired by the State Planning Office conducted research and analysis and gathered stakeholder input. Input was gathered by conducting focus groups and holding public meetings with numerous groups involved in building construction. The study made seven “Key Findings” followed by seven recommendations. The findings and recommendations are summarized below<sup>5</sup>.

### **Steering Committee Findings**

1. There are about 70 towns in Maine that have adopted some form of a building code, but there is a great deal of variability from town to town and this causes confusion and adds time and cost to the permitting process.
2. Although the State has identified and nominated model building codes in statute, little to no effort has been expended to administer and enforce the codes.
3. Training for the codes is not regularly offered in Maine despite strong interest from the building community.
4. Separate State professional boards and agencies have responsibilities for interpretation and enforcement of the current codes resulting in uncoordinated and sometimes contradictory regulations.
5. There is a lack of clarity in the permitting process at the State level.
6. Code issues for existing and historic buildings are negotiated on a case by case basis. This lack of uniformity causes confusion and increases cost. There is a rehabilitation code codified in statute, but a lack of training and support causes it to be virtually unknown.
7. Some aspects of Maine codes (specifically public access, flood hazard standards, and elevator laws) are much stricter than national standards and present a barrier to investment and increase in compliance costs.

### **Steering Committee Recommendations:**

1. Maine’s Legislature should put a framework in place that will establish state wide uniform building and energy codes. The Steering Committee recommended the institution of a Technical Building Codes Board made up of experts in each area be appointed with the authority to adopt and amend codes for Maine’s use, update codes when appropriate, resolve any conflicts among codes,

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<sup>5</sup> A full copy of the study and report on focus group activities can be found on the State Planning Office website at [www.maine.gov/spo](http://www.maine.gov/spo)

interpret codes, provide conflict resolution, and ensure that training on the codes is available, accessible, and affordable.

2. Code enforcement should remain at the local level. In Maine, towns with populations greater than 2000 are required to have a building inspector, but the inspectors are not required to inspect for code compliance. The Steering Committee found that requiring these inspectors to inspect and enforce the codes would improve public safety and provide consumer protection. The cost of this activity should be recovered through the collection of building permit fees.

3. Training in the codes should be offered to contractors, builders, engineers and architects, and be mandatory for code enforcement officials. A training coordinator position should be created at the state level and be responsible for providing continuous training opportunities using expert instructors.

4. Funding will be needed to support the Codes Board, the training coordinator, and the training activity. The Committee listed 3 options to collect the funds; Increase fees to the Fire Marshall's office and use RGGI funds, create a surcharge on all building permits; institute contractor licensing and use licensing fees.

5. Additional work is needed to make builders and contractors more responsible for their work. Licensed professions such as architects and engineers are responsible for seven years for the quality of their work. Contractors and builders have no such liability.

6. Additional work is needed to make Maine's code administration system more efficient and better coordinated. There are now at least five separate state agencies and a number of boards involved in the administration of building codes. This increases costs of doing business in Maine. Steering Committee recommends that a plan be developed to consolidate these functions and develop "one stop shopping" for building code related issues.

7. Evaluate the social cost and benefit of those Maine codes that are stricter than national standards

### III. CURRENT HOME BUILDING PRACTICES IN MAINE

**A. Baseline report findings;** Efficiency Maine contractors have recently completed an extensive survey of residential new home construction practices and attitudes towards energy efficient building practices in Maine. Major findings of the survey include the following;

- Eighty-four percent (84%) of newly built homes would not pass the Maine Model Building Energy Code (IECC-2003 using consumption compliance path);
- Eighty-one percent (81%) of homes would not pass the Maine Ventilation Code;
- Ceiling insulation effectiveness was compromised and resulted in low effective R-values due to both poor quality of installation in combination with areas of missing insulation (such as attic hatches, among other locations);
- Only 23% of foundation walls were insulated;
- No homes were found to be already "ENERGY STAR labeled";
- Heating system efficiencies were relatively high (85%+ AFUE);

- The overwhelming majority of light fixtures (85%) are still incandescent with opportunities for over 55 sockets per home to be fitted with efficient fluorescent CFLs; and
- There are numerous opportunities to improve the energy efficiency of new Maine homes.

Comparing the efficiency level scores of newly constructed homes in Maine with those in neighboring states with new home construction programs shows that homes in Maine are slightly less energy efficient than those that have recently started such programs and significantly less efficient than those in Vermont which has had such a program for more than ten years.

#### IV. RECOMMENDATIONS

**A. Continue Cross Promotion of Education and Outreach Strategies:** There are multiple educational opportunities available that will improve industry knowledge and compliance with codes. The sponsors of this training should cross promote opportunities and work towards harmonizing their messages where applicable. This report has discovered three different entities offering training on advanced building design and construction;

- Maine Housing provides training and support on its Green Building Standards.
- Efficiency Maine has partnered with the Maine Indoor Air Quality Council to offer trainings on advanced building techniques. Efficiency Maine's survey of new housing construction practices revealed that 77% of new homes are not meeting the building energy code because basement walls are not being insulated. This construction practice is directly dealt with in the "Keeping Foundations Warm and Dry" training promoted by MPUC and MIAQC.
- The State Planning Office conducts code trainings for builders, engineers, architects, and code officials on building codes. By providing links to each other's websites, coordinating their training offerings, and cross promoting the trainings, more building professionals will be reached.

**B. Maintain and Expand Incentive and Market Transformation Program Efforts:** Programs designed to persuade consumers and builders of the benefits of buildings that exceed energy codes have been shown to be successful in Maine. Though Maine Housing's Green Building Standards are relatively new, and the Efficiency Maine programs have not yet been implemented, the State's prior success with the CMP Good Cents Homes program indicates this type of activity should be pursued as one way to advance the building practices in Maine. The baseline survey for the residential new construction program also shows that in neighboring states with this type of program, new homes are significantly more energy efficient than those constructed in Maine.

**C. Defer Decision on Energy Code Exemptions for Low income Housing:** We are reluctant at this time to recommend exemptions for low income individuals for whom compliance with the code is a financial hardship as directed by Resolve 93. The Commission definition for low income customers is found in MPUC Rule Chapter 380 and relies on Maine State Housing Authorities qualification process for LIHEAP customers. *"Low-income residential consumer" means a customer of a transmission*

*and distribution utility living in a household that would qualify to receive assistance through the Low Income Home Energy Assistance Program (LIHEAP), as those qualifications are established in Rule by Maine State Housing Authority from time to time. If a customer has not applied for authorization to receive LIHEAP benefits but conforms to the criteria established by Maine State Housing Authority, he or she shall be considered a low-income consumer for the purpose of this Chapter”.* This level of income is very low and individuals in this income bracket are unlikely to build new homes. Moreover, to the extent that the recommendations of the Steering Committee to Resolve 46 are adopted, this provision could conflict with the Steering Committee’s number one recommendation; to develop a statewide uniform building code. If there is to be a low income exemption created in code, we believe it would be better adopted as part of the comprehensive reconfiguration of codes.

**D. Support Recommendations of the Resolve 46 Steering Committee:** The Commission and MaineHousing recommend supporting the recommendations of the Steering Committee. The multiplicity of building code variations, differences in interpretation of the codes, and a lack of a single authority on building codes in the State are economically inefficient and result in reduced quality in residential and commercial buildings. MaineHousing has experienced this directly. The agency receives complaints from developers that overly strict and inconsistent interpretation of codes in small buildings being rehabilitated for supportive housing result in higher costs than necessary. Examples cited include replacement of existing railings with new ones only a few inches higher than those in place, or requirements by some code inspectors for expensive restaurant quality oven hoods in facilities with community rooms.

Training and certification programs operated by MaineHousing and the Efficiency Maine program already respond to some Steering Committee recommendations. Training for some sectors of the building industry is taking place in the Efficiency Maine new construction programs and in MaineHousing’s Affordable Housing Initiatives, Steering Committee recommendation number 3. The Efficiency Maine new residential and commercial construction programs will provide oversight and review of new construction projects. MaineHousing’s Construction Services Team also conducts review and inspection of new multifamily housing. Together these efforts respond to Steering Committee recommendation number 5 by requiring greater accountability of participating builders and contractors. Using the energy codes as a program baseline, the agencies’ programs are also providing training in the codes to an audience that would otherwise be unlikely to receive it.