Developing Protocols for Codes and Standards Activities in Massachusetts: A Work in Progress

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Why Codes and Standards in Massachusetts EE Programs

- Long term EE programs
- Ambitious goals for EE programs
- More stringent codes decrease the savings attributed to EE programs—unless the C&S savings themselves can be attributed to the programs
- Adoption of IECC 2009 and stretch codes raises compliance issues
- ARRA funds to be used for supplemental baseline information informing compliance levels

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Background

- Green Communities Act of 2008 in Massachusetts
  - State building code upgraded every three years with the IECC code adopted within a year of its release
  - Allows for advocacy for enhancements to IECC 2009 or IECC 2012 that would be applicable to Massachusetts
  - Green community designation

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Green Communities

- Stretch code criterion
  - More efficient than ENERGY STAR—homes must meet a HERS index of 70 or less (65 or less for homes over 3000 sq. ft.)
  - Performance based
- More green communities than expected—46 municipalities as of September 2010

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Massachusetts Residential Metrics for 2009

- "… research California's mechanisms for claiming savings from code development, support, implementation and enforcement activities and design a similar mechanism for claiming savings for codes and standards (C&S) activities in Massachusetts."

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Massachusetts Compared to California

- Far less residential new construction that would yield code savings (MA building permits in 2006 are 12% of those issued in CA)
- Far fewer existing housing units that would yield standards savings (MA housing units in 2006 are 21% of those in CA)
- Currently no separate C&S program to absorb expenses in MA

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Program Savings Attribution Adapted from California Model

$$\text{Attribution Score} = \Sigma\ (FW_i * FS_i)$$

where:

FW_i = factor weight for factor *i* or the relative importance of factor *i* in generating C&S savings

FS_i = factor score for factor *i* or the PAs' relative contribution to factor *i*

Factor weights must sum to 1; factor scores range from 0 to 1

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Massachusetts Proposed Attribution Models

- Attribution not likely to take place for several years
- Factor weights and scores determined by expert panels
- Desirable attributes of panel candidates
  - Independence
  - Experience in the residential new construction market
  - Long-term familiarity with the Massachusetts New Homes with ENERGY STAR Program

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Considerations for Code Upgrades

- **Factor 1) Technical and cost information**
  - Research and development and/or demonstration of potential technologies that lead to inclusion in new codes.
  - Calculation of energy savings and, if applicable, peak demand savings
  - Document incremental cost of the measure over baseline practices
  - Document measure's cost-effectiveness

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Considerations for Code Upgrades (continued)

- **Factor 2) Compliance with the upgrade**
  - Builder, subcontractor, and code official trainings
  - Development of reliable test methods for compliance with upgrades to the code

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Considerations for Code Upgrades (continued)

- **Factor 3) Feasibility of meeting the upgrade**
  - General market readiness to meet the upgrade
  - Market readiness, such as availability of products to meet the upgrade, market penetration, and homebuyer acceptance
  - PA contributions to market readiness, to comply with the code upgrade
  - Experiences with the upgrade in stretch code communities and the support provided to help communities adopt the stretch code
  - Stakeholder concerns about the costs of compliance

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Considerations for Compliance Enhancement

- **Factor 1) Training and education programs**
  - Training of builders, subcontractors and trade allies
  - Training of building departments and code officials
  - Educational programs that improve customer or trade ally awareness of the code and need for compliance

- **Factor 2) Incentive programs**
  - Supporting an infrastructure of HERS raters who can provide performance testing for different homes
  - Providing incentives for homes that comply with the energy code in stretch code communities

- **Factor 3) Other factors under consideration**

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Planned C&S Activities in Massachusetts

- **Identifying desirable changes in the Massachusetts building code** and, in consultation with key stakeholders, helping develop technical analysis and providing testimony in support of these changes.
- **Supporting individual communities considering adoption of the Stretch Code** including development of compliance documents with other stakeholders and trainings for builders, architects, and code officials on the Stretch Code.
- **Expanding training for building and design professionals and code officials** addressing code compliance
- **Highlighting measures and practices that go beyond** code requirements and/or are promoted by the PAs' program offerings.

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Potential Research Areas for 2010 and Later Years

- Estimation of potential savings that may be achieved through **enhanced compliance** with IECC 2009
- Estimation of potential savings that may be achieved through **upgrades** to IECC 2009
- Ensure that the PAs' role and actions are documented following a similar process as the California IOUs
- Independent verification of compliance at the beginning and the end of the code cycle through baseline studies
- Calculate actual savings from enhanced compliance and code upgrades

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Potential Savings from Compliance Enhancement—Preliminary Draft

NMR estimated potential savings from enhanced compliance (higher portion of new homes in compliance) to the IECC 2009 code for four measures

- Wall insulation
- Basement insulation
- Proper sealing of ducts in unconditioned spaces
- Fifty percent high efficacy lamp requirement

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Savings Potential From Enhanced Compliance—Preliminary Draft

Estimated Total MMBtu from Four Measures

	Annual Savings	Lifetime (25 year)* Savings
2011	29,774	744,350
2012	23,051	576,275
2013	13,114	327,850
Total from 2011 to 2013	65,939	1,648,475

*Assuming a 25 year life for all measures; based on NMR draft memo "Estimated Potential Savings from Enhanced Compliance with the IECC 2009 Residential Building Code in Massachusetts," September 7, 2010

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NMR's Assumptions Underlying Potential Savings Estimate

- Homes to be built in Massachusetts in 2011, 2012, and 2013
- ENERGY STAR homes to be built in Massachusetts in 2011, 2012, and 2013
- Baseline compliance rates for the four measures in 2011, 2012, and 2013

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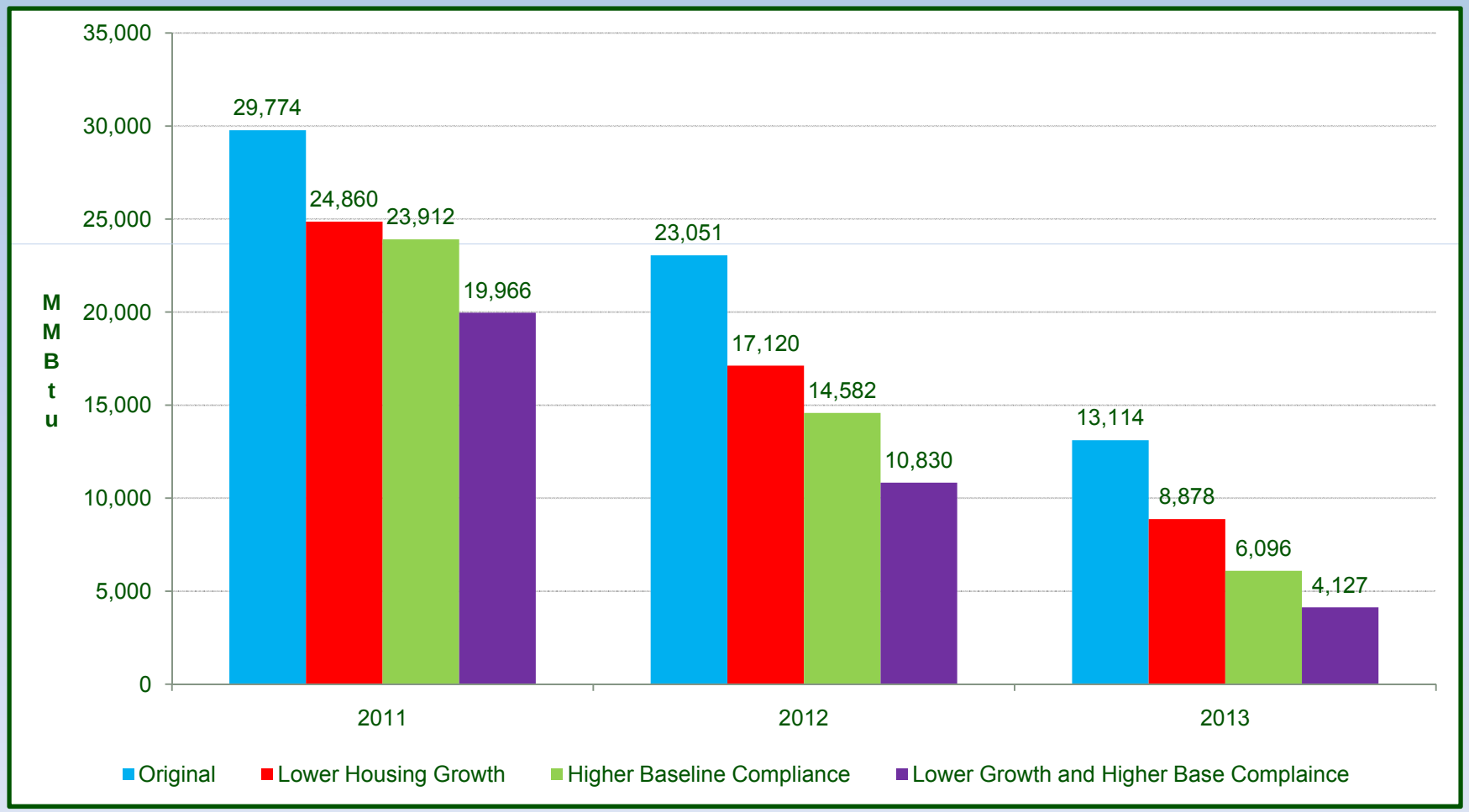
Sensitivity Analyses for Annual Savings—Preliminary Draft



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Where Do We Go From Here?

- The analyses done to date point to sizeable benefits from C&S work—the full 2011 enhanced compliance potential savings (preliminary draft) alone may be 20 to 30 percent of 2011 MA residential new construction goal
- Cost of C&S activities and related EM&V are also significant
- Next steps

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