

Stretch Energy Code

Public Hearing

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Lexington, MA

Frequently Asked Questions

The Stretch Energy Code is an optional appendix to the Massachusetts building energy code that allows cities and towns to choose a more energy-efficient option. The Stretch Energy Code option increases the energy efficiency code requirements in any municipality that adopts it, for new residential and commercial buildings, as well as for those residential additions and renovations that would normally trigger building code requirements.

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General Questions:

1. How is the stretch code different from the existing 'base' energy code?

The stretch code appendix offers a streamlined and cost effective route to achieving approximately 20% to 25% better energy efficiency in new residential buildings, and 20% in new commercial buildings, than is required by the existing base energy code. This is largely achieved by moving to a performance-based code, where developers are required to design buildings so as to meet an energy target substantially better than code, and have flexibility in how they meet that target to allow for cost effective and appropriately designed solutions. New residential construction must use the performance-based approach, but residential renovations and most commercial buildings may instead follow a 'prescriptive' route that requires a set of specific energy efficiency improvements, which in the commercial case add up to approximately a 20% improvement over the current code. Many of these changes have been endorsed by the federal Department of Energy and are likely to be incorporated into the next International Energy Efficiency Code (IECC) in 2012, so to a large degree the stretch appendix is an early look at the potential 'next' code.

2. Why did the Board of Building Regulations and Standards (BBRS) create this option?

There have been mounting calls for additional stringency in the building energy code, linked to the desire to reduce energy costs, cut dependence on imported fuels, and address concerns about climate change and national security.

Several towns and cities asked for the ability to adopt their own stronger building energy code, and/or proposed legislative changes to allow municipalities to strengthen their building code options. The last legislative session in Massachusetts led to the creation of several new laws related to energy and the building sector, notably the Green Communities Act, the Green Jobs Act, and the Global Warming Solutions Act.

In response to this, the BBRS, along with the energy and environmental agencies, collaborated with regional and national code experts to develop one alternative 'stretch' code that is consistent across the state, in order to meet demands for a stricter code without having multiple competing code standards developed and implemented at the town or city level.

3. What are some of the expected benefits to a municipality of a more stringent energy code?

In addition to allowing municipalities to take meaningful action on energy use and climate change, the adoption of the more stringent and more performance based 'stretch' energy code is anticipated to result in significant cost savings for local residents and businesses, and increase design and construction firm competitiveness in the growing green building marketplace.

4. What is the anticipated cost of implementing a more stringent energy code?

Initial adoption of a higher performance standard for buildings is likely to result in slightly higher first costs for construction, estimated to be approximately \$2 to \$3 per square foot for a typical single family home, or about 1% to 2% of the selling price of the home and in the 1% to 3% range for commercial buildings. However, after energy cost savings on heating and electricity are included these higher performance standards save money. In addition, there are financial incentives available from the federal government and electric and gas utilities in the state provide financial incentives that further reduce the upfront costs of high performance buildings, and allow for faster returns on the investment in energy saving measures.

For example, a residential home purchased with a 30-year mortgage would typically result in net savings to the homeowner in the first year due to energy bill savings that are larger than the increase in mortgage payments from construction and financing costs. Case studies of commercial buildings following the energy efficiency recommendations on which the commercial code changes are based have shown paybacks of 1 to 2 years, when standard incentives from electric utilities are included on the benefits side.

5. Where can I find and read more about the stretch code appendix?

The stretch code appendix language is freely available on the Massachusetts BBRS website.¹ A 2-page summary² of the stretch energy code is also available on the BBRS website. In addition, the stretch code appendix 120.AA can be found with the rest of the Massachusetts energy code in the state bookstore. Because the stretch code is an appendix to the base energy code, it is best read together with the new base energy code document published as the International Energy Conservation Code, 2009 edition (IECC2009) available from the ICC website³ and other online bookstores.

6. Why is Lexington considering adopting the stretch energy code?

Adoption of the stretch code fulfills one of the requirements of the State's Green Communities Act which makes towns and cities eligible to receive Green Community grants. There is up to \$10M of Green Community grant money available annually to be apportioned among qualifying Green Communities.

Energy costs have risen significantly in recent years. Higher building code standards are an effective means of reducing energy costs and insulating residents and business owners from future energy price shocks. Homes built to the stretch code will return typical Lexington homeowners between \$27,400 and \$54,400 over 10

years. Stretch compliant commercial buildings can be cash flow positive from day 1 with internal rates of return often over 100%.

The town's energy conservation committee has unanimously recommended that Lexington adopt the stretch energy code.

7. Why not let the market drive adoption of energy efficiency measures?

The market is far from a perfect communicator of the benefits of energy efficiency. For example:

- Builders and home buyers are generally not one in the same. Builders are often more concerned with reducing initial construction costs. Home buyers are often more concerned with total lifetime operating costs. It is much more difficult and expensive to install energy efficiency measures after a structure is built.
- Disseminating information on energy efficiency is not effortless and estimation of the benefits of energy efficiency measures is difficult without performance standards. Many homeowners and builders are not aware of the availability of energy efficient mortgages, tax incentives, or utility rebate and incentive programs. Third party performance verification under the stretch energy code provides evidence of construction quality, relative energy efficiency, and the cost of operating a home.
- The retail cost of energy does not incorporate all the societal costs of consuming a gallon of home heating oil or a cubic foot of natural gas, including the increased cost to our economy of paying for foreign energy or the military expenditures to protect foreign oil supplies. The market also does not measure the societal benefits of improving our local economy or reducing pollution and greenhouse gas emissions.

Scope

8. What building types does the stretch energy code apply to?

The stretch code appendix applies to both residential and commercial buildings:

All Residential buildings from single family homes up to and including buildings 3 stories or less of any size. This includes both new and existing residential buildings that are renovated. Historic buildings and existing buildings not being renovated are exempt from both the stretch code and the base code.

New commercial buildings over 5,000 square feet in size, including multi-family residential buildings over 3 stories, but excluding specialized facilities with unusual energy usage requirements such as supermarkets, laboratories, and warehouses up to 40,000 square feet. Other building types with unusual energy usage profiles can also apply for a waiver from the stretch code from the BBRS.

9. Does the stretch code apply to major renovation projects as well as new construction?

For commercial buildings: No, for residential buildings: Yes. The 'stretch' energy code does apply to residential building renovation and addition projects, but has less stringent energy performance requirements for renovations than for new buildings. In addition, renovators have the option of using a simple 'prescriptive' path to code compliance, installing specified efficiency measures, instead of performance testing. This greater flexibility is available for residential renovations due to the greater design constraints in working with an existing building. Due to the wide variety in types and conditions of commercial buildings, at this time there are no widely-accepted standards for renovating such buildings, so only new commercial buildings are covered by the stretch code requirements.

10. Does the stretch code apply to minor additions to existing buildings?

Additions to existing buildings that are large enough to require code compliance are treated in the same way as new construction for commercial buildings, and in the same way as renovations in residential buildings. In both cases additions can elect to follow the performance approach to code compliance or a simplified prescriptive path. In the case of residential additions, this requires following the Energy Star Homes program National Builders Option Package (BOP), which results in modest, cost-effective, increases in energy savings over those already required by the new Massachusetts base code.

11. What happens to buildings not covered by the 'stretch' energy code?

Building types that do not fall under the 'stretch' energy code scope, such as small commercial buildings under 5,000 sq ft, or specialized use buildings like small laboratories, will follow the existing base code requirements, which are also changing to the 8th edition of the MA building code in 2010.

12. What categories do multi-family residential buildings fall into?

Residential multi-family buildings that are above 100,000 square feet and at least four stories tall have to follow the same performance path (20% better than the ASHRAE standard 90.1-2007) as other commercial buildings larger than 100,000 square feet. Residential buildings below 100,000 square feet and at least four stories tall would be classified with commercial buildings between 5,000 and 100,000 square feet. Multi-family buildings with one to three stories of any size fall under the residential stretch code standards. In the rare case of a multi-family building of three stories or less that is larger than 100,000 square feet, the developer may elect to be treated either as a residential or as a commercial building.

13. How does the stretch code apply to historic buildings?

The stretch code appendix, similar to the base energy code, allows an exemption for listed historic buildings. More specifically, historic buildings listed in state or national registers, or designated as a historic property under local or state designation law or survey, or with an opinion or certification that the property is eligible to be listed, are exempt from both the base energy code and the stretch appendix to the energy code.

14. Does the stretch code apply to existing homes or a home that is for sale?

No. The Stretch code does not change the sections of the state base building code that apply to existing buildings and historic buildings. The stretch code has no effect on a home that is for sale. It has no effect on an existing home unless the owner undertakes a renovation that would normally trigger building code requirements.

Standards

15. What standards are the stretch code appendix based on?

The residential stretch code is based on the existing 'Energy Star for Homes'⁴ program developed by the federal EPA and Department of Energy, and customized for Massachusetts. This Energy Star program is in turn built upon the Home Energy Rating System (HERS) which is developed and administered by the national residential energy organization called RESNET.⁵

The commercial stretch code for buildings from 5,000 square feet to 100,000 square feet is based on a comparison to the current edition of the International Energy Conservation Code (IECC 2009), developed by the International Code Council⁶ (ICC), which will also be the new base energy code for Massachusetts. The energy saving improvements above the commercial IECC code are based on the New Buildings Institute (NBI) Core Performance program for commercial buildings, recently revised and published as the Core energy code.⁷ Above 100,000 square feet commercial buildings are required to show a percentage improvement below ASHRAE 90.1-2007 energy standards.⁸ This performance approach is also an option for smaller commercial buildings.

16. What training and materials are available on these standards?

In addition to the websites referenced in the answer to the prior question, training on the IECC 2009 base energy code and an introduction to the stretch code appendix is being provided to all municipal code officials (at no cost), as well as to interested building professionals (at a cost), beginning in November 2009. In addition, the existing Massachusetts Energy Star Homes program provides regular training covering HERS and other requirements of the residential stretch code, and the major Massachusetts electric and gas utilities offer training on NBI Core Performance for commercial buildings.

Process

17. What is the process for adoption of the stretch energy code?

Now that it has been approved and published by the Board of Building Regulations and Standards (BBRS), the stretch code has been incorporated into the Massachusetts building code as optional appendix 120.AA. Towns and cities in Massachusetts are able to choose to remain on the base energy code, or to adopt the stretch energy code as their mandatory energy code requirement. A municipality would remain on the base energy code unless and until they adopt the stretch code through their appropriate public process.

18. How would a town or city adopt the stretch energy code?

The stretch energy code appendix may be adopted by any municipality in the commonwealth. Lexington's town legal counsel has determined that Town Meeting approval is required to accept or to enact as a bylaw the Stretch Energy Code. In order to be adopted, the appendix must be considered at an appropriate municipal public hearing, subject to the municipality's existing public notice provisions.

19. How soon after a town or city adopts it would the stretch code take effect?

In order to provide consistency among communities, once adopted the stretch code can only go into effect on January 1st or July 1st, and there must be at least six months between adoption and when the stretch code becomes mandatory. For example: if Lexington voted to adopt in March 2010, then on January 1st 2011 the stretch code would replace the base energy code as the sole, mandatory energy code in Lexington. During the interim period, from July 1, 2010 through December 31, 2010 the stretch code and the base IECC 2009 code would be available as an option for builders to use.

Enforcement/Requirements

20. How would the stretch code be implemented and enforced?

Once the stretch energy code is adopted by a town or city, it supplements the base energy code language and becomes the binding energy code language for building projects in that municipality. Implementation and enforcement of the code is similar to existing code, where the developer is responsible for submitting documentation of compliance to the building inspector for review, and the building inspector conducts a site review.

21. What is the role of a building code official and a HERS rater for residential projects?

Residential buildings meeting the stretch code through a HERS rating and thermal bypass checklist require independent certification by a HERS rater. Their work will produce a report detailing the energy systems in the building and will provide a HERS index score, together with proof of whether the home qualifies for federal tax credits. Submission of a copy of the HERS report, together with a completed Energy Star Thermal Bypass checklist, and posting the relevant energy data on the electrical panel in the home are the steps required to demonstrate compliance with the energy portions of the code, and must be submitted to the local building inspector prior to receiving a certificate of occupancy. In this way the local inspector retains their oversight role but the additional energy requirements are intended to not place a significant additional burden on their time.

22. Will there be any change made to the requirements for securing a building permit?

No, there will be no change to the rules defining when a building permit is required.

Residential Building Questions:

R1. How do I meet the residential stretch code for new homes?

For new residential homes including multi-family homes of 3 stories or less, builders essentially follow the Energy Star for Homes program requirement in Massachusetts, and are required to show that each unit meets or is below a maximum Home Energy Rating System (HERS) index score. For new homes greater than 3,000 square feet in size the maximum HERS score is 65 (Energy Star tier 2), for smaller homes less than 3,000 square feet in size the maximum HERS score is 70. In addition to the HERS score the homes must be inspected using the Energy Star 'thermal bypass checklist' and similar to the new base code may require duct testing. These inspections ensure that the home is well air sealed, while the HERS rating ensures that the home is designed to be well insulated with efficient heating and cooling and lighting – all measures that save energy and reduce utility bills.

R2. What is a HERS rating?

HERS stands for 'Home Energy Rating System,' and is a national standard that uses information on the design of the energy systems in a home to calculate, via computer modeling, the average energy needs of that home and give it a rating score. The HERS Index was developed by the non-profit Residential Energy Services Network (RESNET) for the mortgage industry, and is utilized by the Federal Internal Revenue Service (IRS) and the LEED for Homes program. On the HERS 2006 index scale smaller numbers are better, with 0 representing a net zero energy home, and 100 represents a home built according to meet the national model energy code in 2006 (the IECC 2004 with 2005 amendments) . A HERS rating of 65 means that the home uses about 35% less energy than the same size home built to the 2004/2005 IECC code requirements. The Residential Stretch code is based on the nationally successful 'Energy Star for Homes' program requirements, which utilize HERS ratings.

R3. Do I have to get a HERS rating?

New homes built under the stretch code will have to get a HERS rating. Renovations and additions to homes have the option of the HERS rating or a 'prescriptive' approach, whereby specific efficiency measures are required, but no computer modeling is done. The HERS performance-based approach provides a very good way to ensure that homes are not only well designed but also well built. As part of the HERS rating the home will be tested for air leakage, and under both the base and the stretch code homes with heating and cooling ducts may also have those tested for leakage. Combined with the thermal bypass checklist the HERS rater, builder and building inspector can have confidence that the completed homes really are energy efficient.

R4. How do I meet the residential stretch code when making renovations to existing homes?

Existing homes being renovated or expanded have two choices when it comes to stretch code compliance. The performance option is to use a HERS rating, and the prescriptive option is to use the Energy Star Builders Option Package and the base IECC 2009 code where it is more stringent (for example in wall insulation). If the prescriptive option is chosen, then you only need to meet code for the systems that are being replaced. This means that adding a new efficient boiler does not require changing the windows, and adding wall and attic insulation does not require modifying the basement – although it may often make sense to combine measures where that is cost-effective.

However, choosing to follow the HERS rating approach used by new construction often makes sense when doing a whole house renovation. While using the same HERS approach as new homes, existing homes have an easier standard to meet. For home renovations greater than 2,000 square feet the maximum HERS score is 80 and for renovated homes less than 2,000 square feet the maximum HERS score is 85. 85 is also the maximum score allowed to meet the Energy Star Homes program baseline.

R5. What is the anticipated extra cost of implementing the stretch energy code for small repairs?

Simple and small repairs (for example, patching drywall, replacing an existing door, repairing a window sash or frame, installing storm windows, replacing bulbs or ballasts in existing lighting) do not require a building permit and as a result are not required to meet stretch energy code requirements. There is no incremental cost of compliance with the stretch energy code for these types of activities.

R6. What is the anticipated extra cost of implementing the stretch energy code for updating a bathroom?

If we consider a typical bathroom upgrade which will replace plumbing fixtures, remove and replace the shower / bathtub, install new cabinets and countertops, and installing a tile floor, there will be no extra cost for compliance with the stretch energy code. These changes will not trigger any energy related changes to the rest of the home like a new heating system or attic insulation. If you expose existing ceiling, wall or floor cavities during the renovation both the baseline building code and the stretch energy code require that any empty cavities be filled with insulation that meets or exceeds an R value of 3.5 / inch. There is no difference in cost for this renovation under the stretch energy code or the baseline building code.

R7. What is the anticipated extra cost of implementing the stretch energy code for updating a kitchen?

If we consider a typical kitchen upgrade which will replace plumbing fixtures, remove and replace the appliances, install new cabinets and countertops, and installing a new floor, the only incremental cost for compliance with the stretch energy code will be purchasing Energy Star compliant appliances. These changes will not trigger any energy related changes to the rest of the home like a new heating system or attic insulation. If you expose existing ceiling, wall or floor cavities during the renovation both the baseline building code and the stretch energy code require that any empty cavities be filled with insulation that meets or exceeds an R value of 3.5 / inch. According to Energy Star documents the incremental cost of purchasing an Energy Star refrigerator is \$30 and the incremental cost of purchasing an Energy Star dishwasher is \$0. This means that the incremental cost of completing this kitchen upgrade under the stretch energy code will be \$30.

R8. If I'm replacing windows, will I have to meet the stretch energy code?

Most replacement windows available today meet stretch energy code requirements. If a small renovation involved replacing a couple of windows and opening part of a wall cavity, then those new windows and wall cavity would have to be brought up to the stretch energy code, just as the plumbing in the kitchen or bathroom being remodeled would have to comply with the current plumbing code. Only the systems being modified have to be brought up to code.

R9. How do I find a HERS rater?

HERS raters work with the residential builder/developer/design team, and should be included in the team from the outset. The easiest way to find and choose a HERS rater is to register for the free Energy Star for Homes program and work with the program staff to contact a HERS rater in your region.

R10. What training and certification do HERS raters undergo?

HERS raters are typically experienced building professionals, who in addition take a week or two week long intensive training course in residential energy efficiency. After completing the training, learning how to use HERS rating software, and passing a test, new raters must also complete at least 5 ratings with an experienced HERS rater before being able to independently award ratings. In addition to this initial training and certification, HERS raters must be affiliated with a certified HERS provider which is responsible for ongoing code education and quality assurance oversight of the HERS rater's work. The HERS providers also carry liability insurance and allow builders to request a review from a second HERS rater in the rare case of disputes.

R11. What testing equipment is required to meet the residential stretch code?

HERS ratings require testing of the air leakage rate of residential units. In addition, for homes that have forced air heating and central air conditioning systems that have ductwork running outside of the heated portion of a house, a duct leakage test is needed. These tests help calculate how much energy is needed to heat and cool a home, and help builders to identify possible problems before a home is completed, when there is still time to fix them cost-effectively.

R12. Are there enough HERS raters and testing equipment available?

In 2008 over 15 percent of all new homes in Massachusetts were built through the Energy Star for Homes program, a percentage that is steadily increasing. The majority of these homes used HERS raters and testing equipment to achieve a HERS rating. Several states surrounding Massachusetts have higher percentages of new construction using HERS ratings on a voluntary basis. This means that there is already in place an active market for HERS raters and testing equipment and the gradual adoption of the stretch energy code is not likely to cause a dramatic increase in demand for these services. That said, the growing interest in HERS ratings has led to more building professionals going through HERS training and certification and expanded sales of blower door and duct testing equipment. This is a good sign of a market response to our growing green economy, and we don't anticipate demand for HERS raters exceeding supply in towns and cities adopting the stretch code.

R13. How much more does it cost to build to the stretch code, and how does this compare to the energy savings?

For new construction additional first costs are estimated at around \$8,100 based on a 2,700 square foot single family home, which translates to \$530 extra a year on a 30-year mortgage at 5% interest. These investments cut energy bills by about \$1,360/year, resulting in net annual savings to the homeowner of \$830. Initial costs will be slightly higher for larger homes, though the percentage of total costs will likely be lower. In addition, larger homes will have proportionally larger energy savings.

In the case of renovating a 3-unit urban triple-decker, the additional construction costs for all three units combined was around \$15,000, while the annual energy savings were over \$2,700/year, again yielding immediate net cash savings to the unit owners. Separate documents are available that summarize the detailed cost-benefit analysis that has been undertaken to help set the appropriate level of energy efficiency for the stretch code. These calculations do not include substantial financial incentives available both from utilities in Massachusetts and through federal tax credits (see next question). This economic benefit to the homeowner comes in addition to the broader societal benefits of more energy efficient buildings. Costs for HERS ratings currently range from \$400 to \$1,200 per unit in Massachusetts, and they are also subsidized by the utility-sponsored Energy Star for Homes program. There are several companies providing this service and the price variation may reflect differing levels of technical assistance to the builder depending on their needs and preferences.

R14. What financial savings/rebates are there from building to the stretch code?

The stretch code is designed to allow builders to get the maximum benefits of the existing Energy Star Homes program with its full range of training, support and financial incentives. A new home with a HERS rating of 65 or less currently qualifies for \$1,250 from the Energy Star utility sponsors, and additional rebates are available for installing high efficiency heating and cooling equipment, appliances and lighting. The utility companies also partially cover the cost of hiring a HERS rater to work with the builder. In addition to these Massachusetts-based incentives there is a federal \$2,000 tax credit available for homes built with less than half of the heating and cooling load of a 2004 code home. The HERS rater and software can tell you whether a new home qualifies for this and the HERS report provides the core documentation needed.

For existing home renovations there are tax credits for the homeowner as well as the same utility incentives on efficient equipment, appliances, and windows. There are also major incentives available to add insulation to existing homes, through the MassSave program sponsored by the gas and electric utility companies.

The HERS index has been in use for many years by the mortgage industry to qualify for energy efficient mortgages. Home buyers who qualify for an energy efficient mortgage generally qualify for a higher mortgage payment because the lender recognizes the operational savings that result from a more energy efficient home. Much more on energy efficient mortgages can be found here:

http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.energy_efficient_mortgage

R15. Utilities currently offer rebates/incentives for projects that exceed base energy code requirements. If Lexington adopts the stretch code, will Lexington residents still qualify for these energy rebates?

Yes. An agreement was recently adopted between the state government and the utilities to ensure that utility rebates and incentives will be offered to residents in communities that have adopted the stretch energy code.

R16. How is the MA stretch code different from the existing Energy Star for Homes program?

The Energy Star for Homes program is a voluntary program for home builders. In Massachusetts this program is currently administered by ICF International on behalf of the major energy utilities in the state, and has several hundred builders enrolled. This program accounted for 15% of all new homes in Massachusetts in 2008. There are 2 or 3 tiers to the Energy Star program. The stretch code essentially makes the current Energy Star program requirements mandatory in any adopting municipality, and sets a specific minimum HERS index rating of 65 or 70 based on size for new homes, and less strict requirements for renovations. This standard for new construction is more stringent than the base Energy Star for Homes requirement currently set at 85, but for large homes it is the same as the current Energy Star tier 2 set at a HERS index score of 65.

R17. Do I have to use the Energy Star program?

Residential builders in stretch code communities will be required to get a HERS rating for new homes. In the case of renovation or additions to existing buildings builders may instead meet the requirements of the Energy Star Builders Option package. In both cases builders must also complete the Energy Star thermal bypass checklist. In order to do this and also to simplify qualification for all the rebates and training and technical assistance that is offered we strongly recommend that builders participate in the Energy Star for Homes program. However, it is not mandatory, and in the future when the Energy Star Homes program or the stretch code is revised and updated they may take different approaches.

R18. How does the building official in my town/city check whether I met the stretch energy code?

Currently, under the 7th edition base energy code in Massachusetts it is already possible to meet the code requirements by achieving a HERS rating and/or Energy Star homes certification, and submitting a copy of the HERS report and Energy Star paperwork to the local building code official to demonstrate this. The stretch code expands the use of this existing code compliance option to all residential construction. Building officials will be receiving free training on the new base energy code and the stretch code. This training is scheduled to begin before the end of the year to ensure that they are fully aware of this option and the requirements. The same training is also available to interested building professionals for a small fee to cover costs.

R19. How does the stretch code work with LEED for Homes?

LEED for Homes is a voluntary residential green building program that encompasses a significant energy efficiency component. The mandatory energy and atmosphere requirements of the LEED for homes program are that a home at least meets the minimum Energy Star Home requirements of a HERS rating of 85 and a completed thermal bypass checklist. Homes can then gain additional points for achieving a lower HERS score. Because LEED for Homes and the stretch code share the same HERS and Energy Star underpinnings they are completely compatible.

Commercial Building Questions:

C1. What building types are covered by the commercial stretch code?

New buildings, and new additions to existing buildings covered by the commercial energy code, that are greater than 5,000 square feet in size are covered by the stretch code appendix. New commercial buildings smaller than 5,000 square feet, as well as all existing commercial buildings and renovation to existing commercial buildings are exempt from the stretch code and would remain on the base energy code.

C2. What is required for large new commercial buildings above 100,000 square feet?

The designed energy use in large commercial buildings is required to be at least 20% below the use expected based on the building code energy modeling standards contained in ASHRAE 90.1 2007,10 which is the latest version of the national model code for commercial buildings. This would be determined by computer modeling of the building, taking into account factors such as air sealing, insulation, and efficiency of the cooling and heating systems, ventilation, and lighting design. Builders have the flexibility to choose the set of energy efficiency features they prefer, as long as modeling shows that overall they yield the 20% reduction relative to the base ASHRAE 90.1-2007 requirements for the same building.

C3. What is required for new commercial buildings between 5,000 and 100,000 square feet?

Builders of such buildings have two choices. First, they can use the same modeling as for buildings above 100,000 square feet, and meet the same standard of 20% below ASHRAE 90.1 2007. Alternatively, they can choose a set of "prescriptive" requirements for particular efficiency measures, based on the new base energy code for commercial buildings (International Energy Conservation Code 2009), supplemented by cost-effective energy saving enhancements taken from the Core Performance program developed by the New Buildings Institute. 11 The Core Performance program and the newly updated Core Energy Code are nationally-recognized standards already in use by Massachusetts gas and electric utility companies as the basis for providing financial incentives to commercial building developers.

C4. What would be required of small new commercial buildings, below 5,000 square feet?

Such buildings would be exempt from the Stretch Code requirements.

C5. How are commercial renovations handled by the stretch code?

Commercial renovations are exempt from the Stretch Code requirements.

C6. How are new commercial buildings with special energy needs handled?

Supermarkets, laboratories, and warehouses **above 40,000** square feet in size must meet the performance modeling requirements of the stretch code that apply to regular commercial buildings greater than 100,000 square feet. Because these buildings often have large and unusual energy loads they are likely to be energy modeled, so meeting the standard of 20% below ASHRAE 90.1-2007 via energy modeling should be a straightforward compliance approach.

Supermarkets, laboratories, and warehouses **below 40,000** square feet are exempt from the stretch code requirements, but must still meet the base energy code. Other specialty buildings could apply for waivers based on evidence that they have unusual energy loads, and that they are not typically built using energy modeling.

C7. How do the benefits and costs from the commercial Stretch Code standards compare to the baseline code?

Case studies of specific buildings by Massachusetts utility companies National Grid and NSTAR show that the savings in reduced energy costs far exceed the greater initial construction costs. If the costs are included in a mortgage, then owners would see immediate cash-flow savings. Moreover, the utilities offer generous incentives that make the efficiency improvements even more profitable. For example, on one mid-sized office building in Warwick, Rhode Island, the additional cost was \$91,000, while the annual energy savings were \$29,500, for a three year payback. But NGRID provided a rebate of \$63,100, reducing the initial cost to

\$28,000, which is covered by the first year's energy savings. More generally, we anticipate that any additional upfront costs incurred in construction should be recovered from energy savings with a payback after rebates of less than three years.

C8. How does the stretch code work with LEED buildings?

The commercial stretch code has two code compliance pathways. Both of these qualify for LEED new construction points, and require no additional work because of the stretch code. If pursuing the performance approach, then achieving the stretch code standard of 20% below ASHRAE 90.1-2007 uses the same baseline and modeling as the 2009 LEED program and qualifies for 5 out of 19 LEED energy and atmosphere points. Many LEED buildings will go significantly beyond these energy efficiency requirements, in order to obtain additional LEED points. Similarly meeting the stretch code through the Core Performance-based prescriptive approach qualifies for LEED points.

C9. Does the stretch code require 3% renewable electricity or solar panels?

This question has come up because there is an option under the prescriptive path of the stretch code to meet the requirements of one section of the code with onsite renewable electricity generation. However, this is not a requirement, it is merely one of three options under this code approach, and there is also the alternative to meet the commercial stretch code requirements using the 20% better than ASHRAE 90.1-2007 modeling approach. The three options which appear in section 507 of the prescriptive code option for buildings between 5,000 and 100,000 square feet are:

- a) More efficient heating and cooling equipment – widely available and with utility rebates available to offset much of the incremental cost.
- b) More efficient lighting – also widely available and eligible for significant utility rebates.
- c) Providing at least 3% of the onsite electric load from onsite renewable generation – which qualifies for both large federal tax incentives and significant state renewable energy incentives from the Massachusetts Renewable Energy Trust (MRET).