

Massachusetts Electric and Gas Program Administrators

Stretch Code Market Effects Study

March 28, 2017

Prepared by:
NMR Group, Inc.



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Part of the Special and Cross-Cutting Evaluation Program Area

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1. EXECUTIVE SUMMARY

As part of the Massachusetts cross-cutting evaluation studies, NMR examined the various causal mechanisms that may have contributed to stretch code adoption and to the level of compliance with the stretch code. The stretch code was adopted by Massachusetts on July 1, 2009 as an optional appendix to the state building code. In the period under study, it had approximately 20 percent greater building efficiency requirements than the code based on 2009 IECC, and used a performance path for compliance. Adoption of the stretch code is one of the requirements for becoming a Green Community under the Green Communities Designation and Grant Program,¹ which began in 2009.

The study focused on understanding how the programs and initiatives sponsored by the Program Administrators (PAs) could possibly have affected stretch code-related savings both by affecting individual communities' adoption of the stretch code, and by increasing energy code compliance in stretch code communities. Key findings from this study include the following:

- The two main reasons for adoption of the stretch code by the communities studied are the desire to be environmentally responsible, and the Green Community designation which provides access to state funding.
- The new construction programs sponsored by the PAs, particularly for residential homes, also played a role in the adoption of the stretch code by individual communities by offering incentives to partially compensate for increased construction costs.
- New construction programs have also likely played a role in increasing the base of HERS raters available, thus helping, at least during the early period, some communities to adopt the stretch code, which uses a performance path for compliance, and requires HERS ratings for all newly built homes. HERS raters provide vital information, such as blower door tests, to help code officials enforce the stretch code.
- Most code officials considered the Code Compliance Support Initiative (CCSI) trainings sponsored by the PAs to be useful in enforcing the stretch code.
- However, there has been little use of the Mass Save Energy Code Technical Support outside the classroom.

The study concluded that the PAs' programs and efforts have played a role in adoption of and compliance with the stretch code. Given that 55 percent of communities still have not adopted the stretch code² and Massachusetts has recently adopted a new stretch code based on the 2015 IECC, the PAs should consider continuing the present course.

¹ <http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/gc-grant-program/>.

² One hundred ninety (190) municipalities have adopted the Board of Building Regulations and Standards (BBRS) Stretch Code, as of March 13, 2017. <http://www.mass.gov/eea/docs/doer/green-communities/grant-program/stretch-code-towns-adoption-by-community-map-and-list.pdf>, accessed March 27, 2017.



1.1 METHODOLOGY

The study methodology consisted of conducting historical case studies in six stretch code communities, not to produce a representative sample of the close to 200 current stretch code communities, but to examine the possible causal mechanisms that can influence adoption and compliance in different types of communities. The six Massachusetts communities are Everett, Lexington, Newburyport, Tewksbury, Williamstown, and Woburn. NMR reviewed various publically available documents from these six communities concerning the adoption of the stretch code, including city council or town meeting minutes as well as other relevant documents such as committee agendas or minutes, municipal annual reports, and newspaper articles.

Following this review, NMR conducted thirty in-depth interviews (IDIs) with individuals involved with adoption of and compliance with the stretch code. These include ten IDIs with individuals involved with adoption of and compliance with the stretch code on a statewide level, eleven IDIs with individuals involved with adoption in the specific communities studied, and nine IDIs with individuals involved with compliance at the community level.

1.2 ADOPTION FACTORS

The two main reasons for adoption of the stretch code by the communities studied are the desire to be environmentally responsible, and the Green Community designation that provides access to state funding. Common concerns about the stretch code include increased construction costs, misinformation about how it affects work on existing buildings, and adding red tape to the construction process. These concerns were addressed through DOER presentations.³ Most interviewees believe the availability of new construction programs had a positive effect on the adoption of the stretch code. The programs provided incentives to help defray the incremental costs of energy efficient homes, including hiring HERS raters. Most presentations for communities considering adoption of the stretch code included a slide describing the new construction programs and incentives available to defray additional costs.

The stretch code uses a performance path for compliance, thus requiring HERS ratings for all newly built homes. In addition to the incentives, new construction programs have likely increased the base of HERS raters available to serve, at the least, the needs of the earlier stretch code communities. Prior to 2007, all HERS ratings required for participation in the residential new construction program were done through the company charged with implementing the program. The current program implementer, ICF, switched to an open HERS rater system in 2007; that, and the growth in the number of homes participating in the program, brought more HERS raters into the market before 2010 when communities started adopting the stretch code⁴. While the number of individual HERS raters was not available from the Program, the number of HERS rater companies increased from one in 2006 to nine in 2008, sixteen in 2009, and twenty in 2010. Since the Program's market share of new homes jumped from 14 percent in 2008 to 28 percent in 2009, the number of HERS raters

³ The PAs funded ICF's travel costs to various communities where ICF, working under the DOER contract to provide technical assistance on the stretch code, also presented information on the Massachusetts Residential New Construction Program showing how new construction meeting the stretch code would qualify for program incentives with minimal adjustments.

⁴ Newton and Cambridge were the only communities to adopt the stretch code in late 2009.



likely increased as well. Since then, the stretch code itself, as well as the new construction program, has likely driven the increase in HERS raters; the latest estimate is 62 companies in 2016.

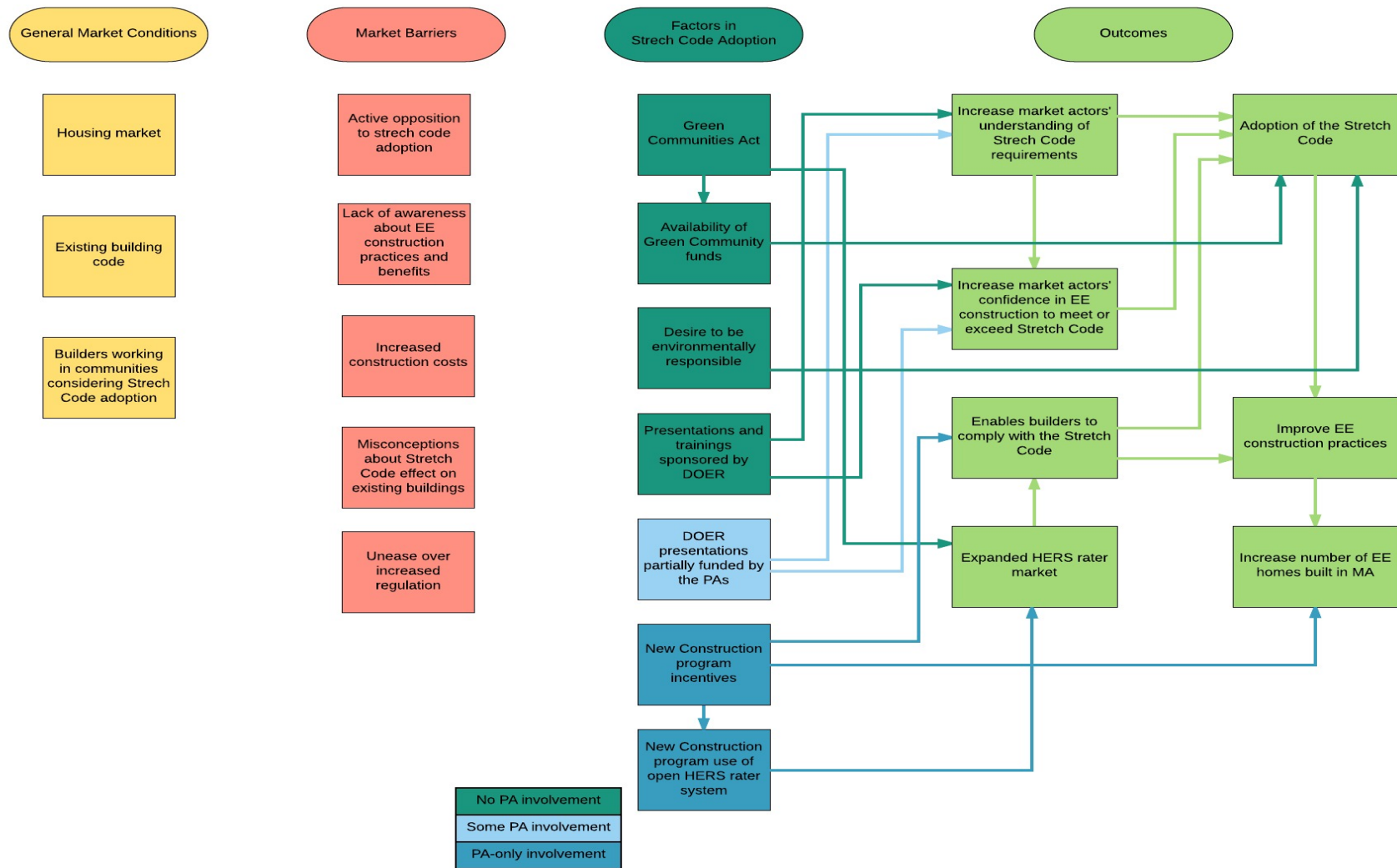
1.3 ADOPTION MARKET LOGIC MODEL

Figure 1-1 presents a model of the stretch code adoption process based on the interviews and reviews of documents related to adoption by the selected communities. The market conditions reflect the passage of the Green Communities Act and the motivations for adoption; general conditions include the housing market and the existing building energy code. The model differentiates between direct support for stretch code adoption (i.e., what was provided by the DOER) and the indirect support provided by PA programs and efforts. Both types of support addressed the different concerns or barriers to adoption and, where successful, resulted in adoption of the stretch code.

The stretch code market conditions, including the desire to be designated a Green Community and qualify for energy project funding and to be recognized as an environmentally conscious community, laid the ground for adoption of the stretch code. Subsequent presentations by the DOER and their consultants supported adoption. Other factors supporting adoption included the incentives provided by the new construction programs sponsored by the PAs and the increased availability of HERS raters likely fostered, in part, by those programs. Adoption by the six communities studied and by most stretch code communities across the state would likely have been harder in the absence of the PA-sponsored program elements.



Figure 1-1: Adoption Market Logic Model





1.4 COMPLIANCE FACTORS

Most of the building code officials interviewed said they were fairly well prepared to enforce the stretch code when it was adopted by their communities; however, most also said builders and contractors were ill prepared to comply with the stretch code upon adoption. The interviewees considered HERS raters to be an important factor in helping enforce the stretch code by documenting performance path compliance with the energy code. Building code officials in Everett, Lexington, Newburyport, and Woburn felt there were enough HERS raters available to serve the needs of their communities, but those in Williamstown and Tewksbury noted a shortage of HERS raters, most likely reflecting the more remote location of Williamstown, as well as both communities' proximity to state lines.

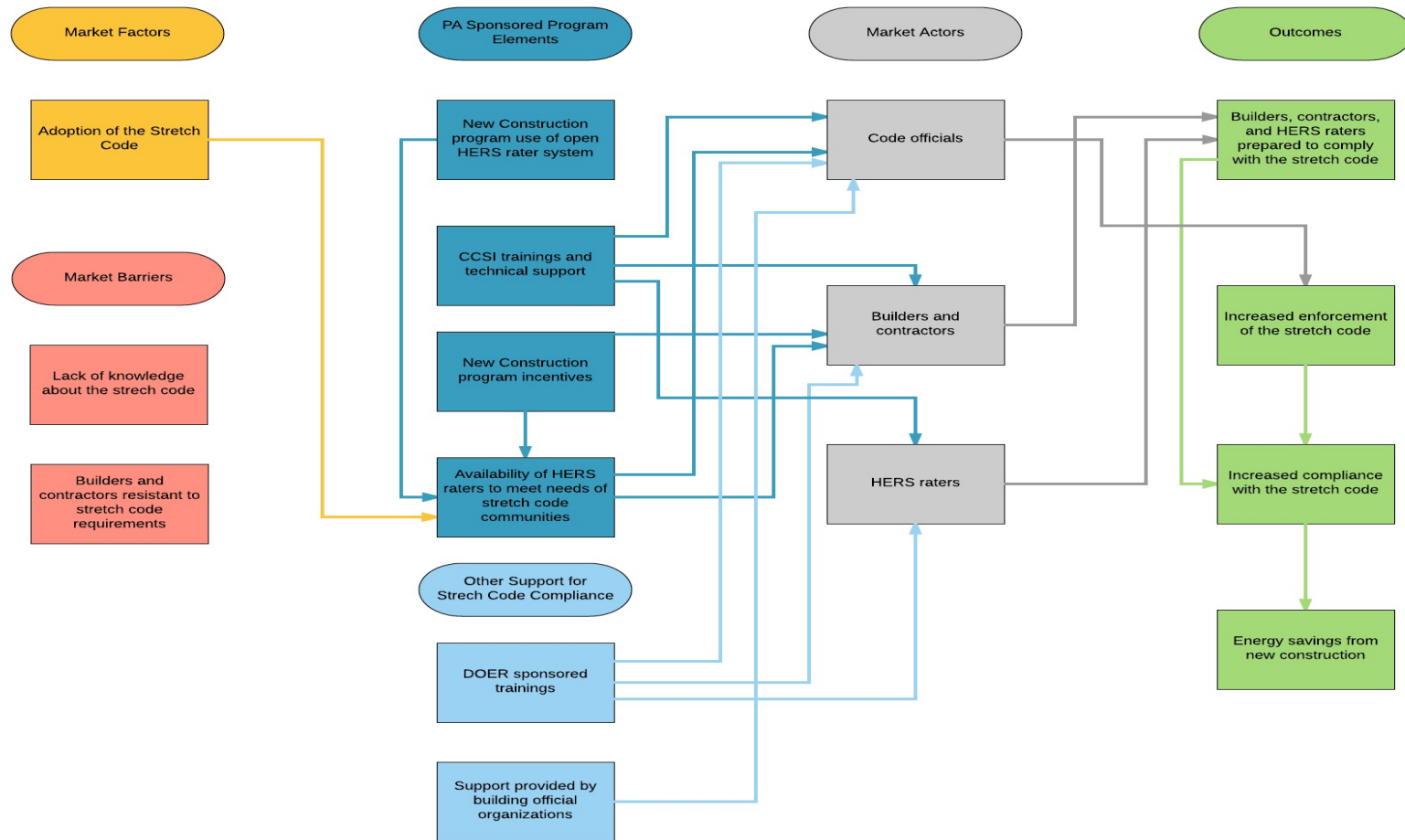
Most code officials considered the Code Compliance Support Initiative (CCSI) trainings sponsored by the PAs to be useful in enforcing the stretch code; however, there has been little use of the Mass Save Energy Code Technical Support outside the classroom. This reflects low usage of Technical Support in general.

1.5 COMPLIANCE MARKET LOGIC MODEL

Figure 1-2 presents a model of the stretch code compliance process based on the interviews with building code officials and other individuals knowledgeable in this area. The market conditions reflect the key factor, which is the adoption of the stretch code by the community, and barriers to compliance, which include lack of stretch code knowledge and resistance to its enforcement on the part of builders and contractors. The model differentiates between existing support for stretch code compliance (i.e., the early trainings provided by the DOER) and the support provided, directly and indirectly, by PA programs and efforts. The latter includes trainings, incentives through the new construction programs, and the increased availability of HERS raters likely fostered in part by those programs. Both types of support addressed the needs of different market actors—building code officials, builders and contractors, and HERS raters—and contributed to compliance with and enforcement of the stretch code in the six communities studied and across the state, which results in energy savings from new construction. The increased availability of HERS raters, likely fostered in part by the new construction programs, appears to be the most significant contribution on the part of the PA programs and efforts in the enforcement of the stretch code, since HERS ratings are required for the performance compliance path and code officials rely on the HERS rater work to ensure code compliance.



Figure 1-2: Compliance Market Logic Model





2. INTRODUCTION

NMR, as part of the cross-cutting team, conducted this study in order to frame and understand the various causal mechanisms that may have contributed to stretch code adoption and to the level of compliance with the stretch code. The stretch code was adopted by Massachusetts on July 1, 2009 as an optional appendix to the state building code. In the period covered by this study, it was based on the 2009 IECC energy code. The stretch code had approximately a 20 percent greater building efficiency requirement than the code based on 2009 IECC and used a performance path for compliance. The stretch code is generally adopted by a vote of the community's governing body after a public hearing. Massachusetts municipalities began adopting the stretch energy code,⁵ one of the requirements for becoming a Green Community under the Green Communities Act,⁶ soon after its enactment in 2009.

The study focused on understanding how the programs and initiatives sponsored by the Program Administrators (PAs) could possibly have affected stretch code-related savings by affecting individual communities' adoption of the stretch code, and by increasing energy code compliance in stretch code communities.

There are a multitude of factors that may affect both the adoption of the stretch code and the level of compliance in stretch code communities. PA-funded efforts include providing travel costs for a number of advocacy and information sessions sponsored by the DOER, training sessions under the Code Compliance Support Initiative (CCSI), and the new construction programs; the latter provides incentives for energy-efficient new construction and was one factor in the increased availability of HERS raters needed to comply with the stretch code.

The study methodology consisted of conducting historical case studies in six stretch code communities – not to produce a representative sample of the close to 200 current stretch code communities, but to examine the possible causal mechanisms that can influence adoption and compliance in different types of communities. Once the six communities were selected and approved by the PAs and Energy Efficiency Advisory Council (EEAC), NMR reviewed the minutes of the city council or town hall meetings discussing the adoption of the stretch code. NMR also conducted in-depth interviews with ten individuals involved with adoption of and compliance with the stretch code on a statewide level, eleven individuals involved with adoption in the specific communities studied, and nine individuals involved with compliance at the community level.

⁵ <http://www.mass.gov/eopss/docs/dps/8th-edition/115-appendices.pdf>. While some communities adopted the stretch code in 2009, the earliest effective data was July 2010.

⁶ <http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/gc-grant-program/>.



2.1 SELECTION OF THE SIX COMMUNITIES USED AS CASE STUDIES

NMR considered the following factors in the selection of the six communities to examine in case studies:

- Sizeable residential new construction activity, including multifamily
- Sizeable commercial construction activity
- Locations throughout the state
- Economic diversity
- Anecdotal information about addressing resistance to the stretch code.

NMR also sought to have three communities where ICF provided information on the stretch code to the community on behalf of the Department of Energy Resources (DOER), with travel costs funded by the PAs, and three communities where there was no assistance provided involving the PAs. ICF, under contract to the DOER, presented on details of the stretch code and answered questions at various community meetings from March of 2010 through October of 2013. The PAs funded ICF's travel costs to various communities where ICF, working under the DOER contract to provide technical assistance on the stretch code, also presented information on the Massachusetts Residential New Construction Program showing how new construction meeting the stretch code would qualify for program incentives with minimal adjustments. Travel costs, as a rough average, constitute about a quarter of the total costs of doing a stretch code presentation for a community. Of the 66 communities receiving assistance from ICF with travel costs funded by the PAs, 47 adopted the stretch code.

After reviewing demographic, construction, and economic data for twelve communities meeting these criteria, NMR selected the following cities and towns for the stretch code case studies: Everett, Lexington, Newburyport, Tewksbury, Williamstown, and Woburn. These are described, in alphabetical order, briefly below, and the data reviewed are summarized in Table 2-1.

Everett adopted the stretch code fairly recently, in June of 2014, with an effective date of July of 2015 through a vote by its City Council. The stretch code had thus been in effect less than one year when the study began. The stretch code was adopted after the PAs had stopped funding ICF's travel costs for promoting adoption of the stretch code, under contract to the DOER (although the slides showing how new construction meeting the stretch code would qualify for program incentives with minimal adjustments had remained in the presentation). Everett is a fairly urban city just north of Boston; most residential new construction consists of multifamily buildings; there is little commercial construction. Its mean and median household incomes are well below those for the state as a whole.

Lexington is a town in the western Boston suburbs with relatively high household incomes. It adopted the stretch code at the end of March of 2010; the PAs had just started funding ICF's travel costs and did not do so for Lexington. Lexington has a fair amount of residential new construction, all of it single family, and a considerable amount of commercial construction as well.



Newburyport is a small city on the North Shore close to the New Hampshire border, with household incomes moderately higher than those of the state as a whole. It adopted the stretch code fairly early in 2010 through a vote by its City Council; ICF held an informational session in Newburyport in March of 2010, under contract to the DOER with travel costs funded by the PAs, where various concerns were addressed. Residential new construction consists of single-family homes and there is a fair amount of commercial new construction for a city of its size.

Tewksbury is a town in north central Massachusetts near Lowell with household incomes moderately higher than those in the state as a whole. It adopted the stretch code at a town meeting in 2011. In the month before the stretch code adoption, ICF, under contract to the DOER with travel costs funded by the PAs, attended a Green Committee presentation at Tewksbury Town Hall and answered technical questions from the Town Manager and the Board of Selectman on adoption of the stretch code. Tewksbury has a fair amount of residential new construction, some of it multifamily, and a small amount of commercial new construction.

Williamstown is a small town in western Massachusetts with household incomes slightly higher than in the state as a whole. It adopted the stretch code in May of 2010 through a town meeting; the PAs had started funding ICF's travel costs at this time, but this did not apply to the western part of the state. Williamstown has a small amount of residential new construction, particularly multifamily, and a fair amount of commercial new construction for a town of its size.

Woburn is a small city northwest of Boston with a higher median household income and a slightly lower mean income than in the state as a whole. ICF, under contract to the DOER with travel costs funded by the PAs, presented the Stretch Code to the Woburn City Council on March 14th and 15th of 2011; the City Council voted to adopt the stretch code on March 15, 2011. Woburn has a fair amount of residential new construction, some of it multifamily, and a moderate amount of commercial new construction.



Table 2-1. Construction, Economic, and Demographic Data for Proposed Stretch Code Communities

City or Town	Location	2014 Population	2014 Household Income		2014 Residential Building Permits			Comm Construction 2009–2013 (\$000)	Stretch Code Information			
			Median	Mean	Bldgs	Units	Value (\$000)		Adoption Date	Effective Date	How Adopted	PAs Fund Travel
Everett	North of Boston	44,231	\$51,056	\$62,978	31	437	\$49,605	\$20,854	6/23/14	7/1/15	City Council	no
Lexington	West of Boston	32,306	\$137,456	\$189,916	99	99	\$29,700	\$127,003	3/31/10	1/1/11	Town Meeting	no
Newburyport	North Shore	17,416	\$83,149	\$113,961	12	12	\$3,913	\$94,258	11/8/10	7/1/11	City Council	yes
Tewksbury	North central Mass	28,961	\$87,496	\$104,725	76	201	\$23,871	\$15,636	5/4/11	1/1/12	Town Meeting	yes
Williamstown	Western Mass	7,599	\$73,397	\$102,488	3	42	\$7,215	\$154,803	5/8/10	1/1/11	Town Meeting	no
Woburn	Northwest of Boston	39,038	\$77,883	\$90,017	48	67	\$16,246	\$69,343	3/15/11	1/1/12	City Council	yes
State of Mass.	n/a	6,745,408	\$67,846	\$92,850	7,849	14,486	\$3,300,682	\$22,122,000	n/a	n/a	n/a	n/a

Sources: Population and household incomes from US Census Bureau, Community Facts, http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml. Residential building permits from US Census Bureau, Building Permits Survey, New Residential Construction, <http://www.census.gov/construction/nrc/index.html>. Commercial construction expenditures calculated from project information provided by the Dodge Players Database for Projects started January 1, 2009 to December 31, 2013. Commercial construction expenditures are summed from 2009 through 2013 to avoid bias from examining only one year. Expenditures include new construction, additions, and renovations, but exclude multifamily buildings which are included in residential new construction. Stretch code information from <http://www.mass.gov/eea/docs/doer/green-communities/grant-program/stretch-code-towns-adoption-by-community-map-and-list.pdf>.



NMR examined additional stretch code communities that were ultimately not proposed for the adoption and compliance case studies. While they would likely have provided interesting case studies, this qualitative project was limited to six communities, which necessitated some judgement calls. The rationale, in brief, for deciding not to study the additional communities follows.

NMR considered three additional communities that received some assistance from ICF working on behalf of DOER, with travel costs funded by the PAs: Barre, Gloucester, and Westminster. NMR considered Barre for geographic diversity; it is the westernmost stretch code community that received assistance from ICF with travel costs funded by the PAs. However, the amount of residential and commercial new construction in the community is quite low; NMR thus chose Woburn, which has a fair amount of residential and commercial new construction. NMR considered Gloucester for economic diversity since its income is below the state average and it has a fair amount of new construction. However, Newburyport, which is quite close to Gloucester, appeared to be a better candidate for a case study since ICF needed to address considerable resistance to the stretch code within the community before it was adopted. Newburyport also has a fair amount of commercial new construction. Similarly, NMR considered Westminster for geographic diversity given its location in the north central part of the state, but chose Tewksbury, where ICF again had to address considerable resistance before the stretch code was adopted. Tewksbury also has a fair amount of residential new construction, some of it multifamily.

NMR also considered four additional communities that adopted the stretch code without any assistance involving the PAs: Cambridge, Marshfield, Mashpee, and Newton. The team decided to not include communities that had adopted the stretch code before the PAs began funding travel costs and included slides showing how new construction meeting the stretch code would qualify for program incentives with minimal adjustments in presentations; this eliminated Cambridge, Mashpee, and Newton. These three communities had initially been considered since they had a fair amount of residential new construction (all three), provided geographic and economic diversity (Mashpee), and a great deal of commercial new construction (Cambridge). NMR also sought a community that had adopted the stretch code fairly late, but still had an effective date that would allow the study of compliance. For this reason, NMR considered Marshfield, which has a fair amount of commercial new construction, but chose Everett which provides some economic diversity, with incomes well below the state average and a fair amount of multifamily new construction.

2.2 REVIEW OF CITY COUNCIL AND TOWN MEETING MINUTES

In an effort to understand the various stakeholders, issues, and processes involved in communities' adoption of the stretch code, NMR reviewed various publically available documents for the six communities of interest. These resources included city council or town meeting minutes as well as other relevant documents such as committee agendas or minutes, municipal annual reports, and newspaper articles. This review involved documenting the dates on which the stretch code was presented before the public, detailing the parties involved and issues that were discussed, and the final outcome, including the date that the community enacted the stretch code and when it became effective. The review of these community-level documents helped NMR to identify potential interviewees and informed specific questions to ask of these stakeholders.



2.3 IN-DEPTH INTERVIEWS

NMR conducted thirty in-depth interviews (IDIs) with individuals involved with adoption of and compliance with the stretch code, both at the statewide and community level. The adoption IDIs covered the following areas:

- Key reasons communities (statewide) or specific community adopted the stretch code
- How reasons for adoption differ among communities and over time (statewide)
- Relative importance of the desire to access Green Community funding for energy projects among the reasons for adoption
- Relative importance of the residents' desire to be environmentally responsible among the reasons for adoption
- Public hearings and other meetings attended for different communities (statewide) or the community in question
- Concerns about the stretch code and how they were addressed
- Whether they discussed enforcement issues during the adoption process and how these were addressed
- Key sources of information for questions on the stretch code
- Familiarity with the market for HERS raters and their role in performance-based compliance
- Whether there are enough HERS raters to cover the statewide or community-specific needs
- Whether and how the availability of programs providing support and incentives for energy efficient new construction makes it easier for communities (statewide)/the community to adopt the stretch code.

The compliance IDIs covered the following areas:

- How well prepared the community was to enforce the stretch code
- What factor(s) were most instrumental in enforcing the stretch code
- Greatest challenges in enforcing the stretch code
- Attendance at CCSI trainings and, if so, their usefulness in enforcing the stretch code
- Use of the Mass Save[®] Energy Code Technical Support Initiative and, if used, its usefulness in enforcing the stretch code
- Other trainings attended and their usefulness
- Key sources of information for questions on the stretch code



- Familiarity with the market for HERS raters and their role in performance-based compliance
- Whether there are enough HERS raters to cover community-specific needs
- Whether and how the availability of programs providing support and incentives for energy efficient new construction in a community makes it easier to enforce the stretch code.

Appendix A contains copies of all the IDI guides used. Table 2-2 lists the number of adoption and compliance interviews conducted for this study. Please note that the adoption interviews, particularly at the statewide level, addressed some compliance issues. Statewide adoption interviewees also commented on community-specific issues when they had worked directly with the six communities used as case studies.

Table 2-2. Number of In-Depth Interviews Completed

Jurisdiction	Type of Interview	
	Adoption	Compliance
Statewide	10	n/a
Everett	1	2
Lexington	2	1
Newburyport	1	2
Tewksbury	3	1
Williamstown	2	1
Woburn	2	2
Total	21	9



3. ADOPTION OF THE STRETCH CODE BY COMMUNITIES

Under the Green Communities Act of 2009, cities and towns may earn Green Community designation by meeting five criteria including developing plans to reduce energy usage by 20 percent in five years, purchasing only fuel-efficient vehicles, and adopting the stretch building energy code. The stretch code was approximately 20 percent more efficient for new construction than the 2009 IECC energy code,⁷ and uses a performance path for compliance, necessitating HERS ratings for all projects. Green Community designation qualifies cities and towns for grants that finance additional energy efficiency and renewable energy projects at the local level.

The main factors underlying adoption of the stretch code are the Green Community designation with access to state funding and the desire to be (and publically appear) environmentally responsible. Common concerns about the stretch code include increased construction costs and adding red tape to the construction process. The reasons for adoption and concerns vary by community and across time. This section discusses the reasons for and concerns about adoption and how PA programs and efforts supported adoption. The section is organized to offer, first, an overall perspective, followed by the narratives for the six communities studied, and then by an annotated market/logic model of the market and the causal mechanisms that led to adoption.

3.1 REASONS FOR ADOPTION OF THE STRETCH CODE

Most interviewees, both at the statewide level and the community level, said that the desire to be designated a Green Community and qualify for energy project funding is the most important reason cities and towns adopt the stretch code. Some interviewees related this to saving money on energy bills from more efficient buildings. Interviewees at the statewide level stressed that the reasons for adoption varied among communities, with the earliest adopters more likely to be motivated by environmental concerns, or at least the desire to appear environmentally conscious. One of the interviewees who had worked with early adopters noted:

Early adopters were definitely motivated by concerns about climate change and wanting to do something at the municipal level. The stretch code was developed in response to municipalities raising their desire to go beyond the state code; Provincetown, Cambridge, Northampton expressed these desires... with Dept. of Public Safety... with neighboring towns and cities, it was looking at the recognition and funding their neighbors were getting; at one point DOER did an animated map which showed that neighbors were more likely to adopt the stretch code. The latter communities are doing it because they are seeing and hearing that it is not particularly onerous...also due to the cache and cash of being a Green Community.

⁷ The stretch code was not changed when Massachusetts adopted an energy code based on the 2012 IECC, but was recently updated to reference the 2015 IECC building code.



Another interviewee who has worked with multiple communities was blunter:

Money from Green Communities Act – That’s the main driver. I say—obviously more eloquently—you can either adopt the stretch code and receive money or wait for it to become code and get nothing... You’ll either be ahead of the curve and prepare your builders and your market to adjust and shift earlier than waiting for it to become code and it gets forced on you...A very few handful of towns have adopted the stretch code for reasons beyond funding. They adopted it because they wanted a more stringent or deeper energy code.

An interviewee who had supported adoption in Berkshire County talked more about the different motivations in a community.

No one has adopted the stretch code who is not going for the Green Community grants. It’s all a package deal...I think there are some people in the community—residents—who speak [about saving energy] at a town meeting, but the vast majority of town officials are doing it because of the grants that come with it. I’m not saying that they’re anti-green or anti-energy efficiency, but town officials struggle with municipal budgets and it’s seen more as a way to save money than to save energy. Saving energy is sort of a bonus.

3.2 CONCERNS OVER ADOPTION OF THE STRETCH CODE

The most common concern over adoption of the stretch code, mentioned by all adoption interviewees, was the increase in construction costs. One interviewee who advocated statewide for the stretch code noted that the lack of detailed information on incremental costs early in the process allowed builders and others opposed to adoption to spread misinformation.

In most of the towns where it gets a bad rap...the builders have led the opposition to it. They say it costs too much, and will put people out of range to buy a new house. A lot of misinformation about the costs. What’s odd about that is that they build the house and then they leave. There’s not enough cost benefit promotion that shows if you spend more to build a house to make it energy efficient...the real rule of thumb regarding payback period and energy savings...They (builders opposed to the stretch code) inflate the cost ridiculously. We’ve had some cost-benefit analysis which should be helpful, but it has to be as simple as possible...Lack of detailed info in the past hurt us because people could make any claim.

In addition to misinformation about costs, some communities did not understand how the stretch code affected work on existing buildings. Concerns about renovations were mentioned by five of the 21 adoption interviewees. An interviewee who had worked with multiple communities noted:

There was a lot of misinformation with the stretch code, especially when it comes to renovations and additions. People were being told by the real estate boards that when the town adopts stretch code, every home in the town regardless of construction had to be brought up to meet the stretch code. If you’re doing a simple thing like a bathroom reno, your whole house had to be brought up to code.



Four adoption interviewees mentioned concerns about increasing government interference, but these concerns appear to have been addressed fairly early. Again, an interviewee involved in adoption on a statewide basis noted:

I've had people ask, "we could adopt the code and it's not a guarantee that we get the money because the government is going to take it from somewhere else." I explain that it's outside of local and state coffers; (Green Community grants come from) a separate fund that can only be used for this.

As already noted by some of the interviewees, addressing concerns about the stretch code entailed working closely with communities and presenting cost estimates. An interviewee working in southeastern Massachusetts explained the process:

A lot of the questions will get answered at the information session or hearing... Sometimes a representative of the town or energy committee feels they are confident enough to answer the questions, but if not, then they'll ask someone from our team (DOER) to come and answer them as well. We respond to emails from any questions that come in after the forum. We also have information flyers that give an overview of the stretch code that people can hand out at the forum or town meeting... In the presentation, there's a standard slide on misconceptions that have come out over the course of speaking on the stretch code and that helps too.

Another interviewee who worked on statewide adoption noted:

We worked hard to create some case studies. These were limited in that they were theoretical because no developer wanted to share their actual cost data... they were still based on fact but people would complain about our assumptions. We did show how quickly there was a return on the investment.

3.3 FACTORS SUPPORTING ADOPTION

As earlier noted, there have been several key reasons and concerns over adoption of the stretch code. The interviews probed into the factors that may have supported adoption – specifically, the Mass Save Residential and Non-Residential New Construction Programs, sponsored by the PAs, which provide support and incentives for energy efficient new construction, including Energy Star certification. The interviews also probed into the respondent's experience with the market for HERS raters and availability of raters to serve the needs of stretch code communities. HERS scores are required for all new homes under the stretch code, which is performance based.

3.3.1 New Construction Program Incentives

Sixteen of the 21 adoption interviewees said that the availability of new construction programs had a positive effect on the adoption of the stretch code; these include eight of the ten statewide and eight of the eleven community-specific interviewees. These interviewees said that, in general, new construction programs could provide examples of energy efficient homes that could be built using the performance path for compliance and, more importantly, incentives to help defray the incremental costs of energy efficient homes, including hiring HERS raters. Most stretch code presentations for communities considering adoption included



a slide describing the new construction programs and incentives available to defray additional costs. These programs were particularly important for the early adopters; an interviewee who had worked with many communities commented:

Definitely a factor, more so early on. Now we can say, there are builders who are doing this in neighboring communities, but early on, it was a new thing and we could say there were homes already being built with HERS ratings under this program. Also was helpful that the new construction programs were closely aligned with Energy Star homes. (The incentives were) definitely something we (DOER) emphasize particularly on the residential side in presentations to towns. We had CLEAResult look at what is the cost to the builder and homebuyer and used that in presentations along with incentives.

Another interviewee who had promoted the stretch code in southeastern Massachusetts noted:

It helps defray the upfront cost. It reduces the capital cost to do energy efficiency things. You're looking at everything you can on the upfront cost and if the windfall is that it helps you save on the monthly operating cost, all the better, but it gets to be a balance in terms of how that works. You have to be able to afford your mortgage before you can even think about paying electric and gas bills.

Another interviewee involved in adoption on a statewide basis noted:

The fact that they can tap into this program, and offset the incremental cost of meeting this code, second strongest selling point outside of the Green Community funding.

Of the five remaining interviewees, two did not believe the availability of new construction programs had a positive effect on the adoption of the stretch code and three said they did not know. The two who did not believe the programs had an effect were community-specific interviewees who did not remember the programs being discussed in adoption hearings. Of those who said they did not know, one was a statewide interviewee who was not familiar with the new construction programs and two interviewees, one statewide and one community-specific, simply noted that they could not say whether the programs would sway decision makers in a particular direction.

3.3.2 New Construction Program Effect on HERS Raters

In addition to the incentives provided by the new construction programs, the programs have also likely played a role in increasing the base of HERS raters available in the early years of stretch code adoption to serve the needs of stretch code communities. Prior to 2007, all HERS ratings required for participation in the residential new construction program were done through the company charged with implementing the program. Builders could use different HERS raters in their construction practices, but they could not qualify for program incentives unless they used the HERS raters working for the program implementer. The current program implementer, ICF, switched to an open HERS rater system in 2007, spurring the growth of this market. An ICF interviewee who has worked with multiple communities adopting the stretch code noted how HERS rater availability has changed over time.



On residential side, in 2010, when we started talking about the stretch code—it requires performance testing on all new construction—you have to work with HERs raters and back in 2010, 2011 when I would do presentations one of the big questions was that there weren't enough HERs raters. Back then, there weren't. If the 177 cities and towns (stretch code adoptees at the time of the interview) had adopted the stretch code in 2010, there would have been a major issue. There wasn't an infrastructure to handle that amount of work ...When ICF won the residential new construction contract in 2007 we came in with a market transformation market model... We incentivize HERs raters through the program. Once a builder does performance path construction and works with a HERs rater, they very rarely go back to not doing performance based. The retention rate in the program is huge. That's because the codes are driving participation and vice versa.

He went on to describe how the HERS rater market has grown over the past decade in Massachusetts:

ICF...brought in three (HERS rater) companies (in 2007). Now we have 58 companies actively working. It's been a great green jobs success story that people don't capitalize on. These companies employ 200-300 people that weren't doing HERs ratings or working in the green jobs market. The state should also highlight that as a success of the stretch code; it created an incredible amount of jobs.

Table 3-1 presents the number of HERS rating companies working with the Residential New Construction Program in Massachusetts, the number of homes participating in the Program, and its market share of new housing permits from 2006 to 2016.⁸ The number of individual HERS raters was not available from the Program, but, given the jump in participating homes from 2008 to 2009, it likely increased significantly. This made it easier, at least in the earlier years, for more communities to adopt the stretch code. Since then, the stretch code itself, as well as the new construction program, has likely driven the increase in HERS raters.

⁸ These numbers were provided by ICF to the PAs.



Table 3-1. HERS Rating Companies and Market Penetration for the Residential New Construction Program

Year	HERS Rating Companies	Program Homes	Housing Permits	Market Share
2006	1	3318	19580	17%
2007	2	1616	15358	11%
2008	9	1369	9883	14%
2009	16	2194	7941	28%
2010	20	2622	9075	29%
2011	40	2576	7725	33%
2012	45	3259	11111	29%
2013	46	3719	14569	26%
2014	54	4942	14237	35%
2015	59	3693	17424	21%
2016	62	6712	15407	44%

Seventeen of the 21 adoption interviewees said there are currently enough HERS raters to serve the needs of stretch code communities, though ten of these respondents noted that was not the case several years ago in the earlier days of the stretch code. The remaining four adoption interviewees, one statewide and three community-specific, said they did not have enough information about HERS raters to comment on availability.

3.3.3 Influence of LEED Certification

The adoption interviews also asked if experience with other energy efficiency certifications for new buildings, such as LEED, factored into adopting the stretch code. None of the 17 adoption interviewees who were familiar with LEED thought it had much influence in the adoption of the stretch code for two reasons. First, LEED encompasses different criteria for certification such as using recycled materials in construction, while the stretch code focuses only on energy efficiency. Second, LEED is seen as an issue for commercial buildings while the stretch code is mostly a factor for residential new construction.

3.4 ADOPTION PROCESS AND FACTORS FOR INDIVIDUAL COMMUNITIES

As noted, NMR selected six communities as historical case studies of the stretch code adoption process and factors, which are described in this section.

3.4.1 Everett

Everett adopted the stretch code on June 23, 2014 with an effective date of July 1, 2015. On June 23, 2014 Everett's Director of Community Planning, the Director of Code Enforcement, and an ICF consultant presented the anticipated benefits and costs of adopting the stretch code to city council members. Green Community designation would earn Everett a \$140,000 designation grant and additional grants of up to \$250,000 per year. Construction costs were estimated to increase by around \$3,000 for a typical single family home and by 1 percent to 3



percent of total costs for commercial buildings. The director of code enforcement explained that the stretch code would apply only to the portion of the building under renovation for homes under renovation.

Prior to the city council vote, a builders' forum was held to educate builders and contractors about the stretch code. One interviewee who attended the builders' forum and who had worked with numerous communities recalled that things went relatively smoothly in Everett. This interviewee stated:

There really weren't any issues related to it because Everett is pretty built out. The new single-family home construction is pretty nonexistent. It was pretty easy.

While another interviewee who had worked with numerous communities recalled a relatively high level of concern among builders in Everett compared to builders in other, more affluent communities, a city council interviewee indicated that the stretch code was anything but a hot-button issue in Everett. This individual stated:

I don't think anyone had any concerns. No one contacted me about it. No one said to me, 'You got to get out and vote for that,' or, 'Vote against it'. Nothing like that happened. It's just another thing that passed, and it's good. I don't think most people even know that we have it.

When asked why Everett adopted the stretch code, this city council interviewee replied that it is a good policy and it is not very demanding. He did not believe that a desire to be environmentally responsible among Everett residents played any role in stretch code adoption. Another city councilor viewed the stretch code as the industry standard given the number of communities that had already adopted it. It should be noted that Everett adopted the stretch code at a later date than the other communities selected for case studies; by the time it went into effect, the energy code in non-stretch code Massachusetts communities was based on 2012 IECC, which had similar energy efficiency requirements. The relatively smooth path to adoption is likely a reflection of the timing. The Everett adoption interviewee did not believe the new construction program incentives had any effect on the stretch code adoption.

3.4.2 Lexington

Lexington adopted the stretch code on March 31, 2010, and it became effective on January 1, 2011. Ian Finlayson, from the Massachusetts Department of Energy Resources, gave an overview of the stretch code when it was presented to the Town Meeting. One of the interviewees noted that Finlayson was “*instrumental as a source of information.*” Overall, the stretch code was well received and had strong support from various stakeholders, including elected officials from the Board of Selectman and Town Meeting as well as the town-appointed Sustainable Lexington Committee. Adoption of the stretch code was also supported by groups such as the Lexington Global Warming Action Committee, Citizens for Lexington Conservation, the League of Women Voters, and members of the homebuilding community, including a local builder and a local realtor.

The Lexington interviewees consistently stated that the potential increased cost was the primary concern related to adopting the stretch code. Builders questioned what impact the stretch code would have on construction costs, and homeowners similarly were worried how the stretch code would affect renovation or building costs. One of the interviewees also



mentioned that builders were concerned about additional training that would be required to meet the stretch code. According to the interviewees, proactive efforts, mostly by one of the stretch code advocates interviewed for this study, to educate builders and enlist their support was key to their success in Lexington. This interviewee recalled that proponents of the stretch code shared a compelling cost analysis that modeled the payback period, based on data from DOER, and took into account the upfront cost and energy-related savings with community members. This same interviewee also stated that having builders who had experience with building projects that successfully met or exceeded the stretch code in other areas was another positive strategy in Lexington.⁹ This individual also noted that the program incentives for new construction made it easier for Lexington to adopt the stretch code since “*financial incentives make it easier to tell the story and get people involved*”.

According to the Lexington interviewees, the Green Community designation and related grant funding were the primary drivers for adopting the stretch code in Lexington. One of the interviews also reported that the Green Community designation was a “badge of honor” and that it would help attract new residents to the area. Two interviewees also stated that some stakeholders promoted the stretch code because of its benefits to the environment. For these constituents, the adoption of the stretch code was a means to help reduce the negative effects of greenhouse gas emissions and climate change. As one interviewee remarked, “*We wanted to do as much as we could to put practices in place that we thought were environmentally sound.*”

3.4.3 Newburyport

Newburyport adopted the stretch code on November 8, 2010 with an effective date of July 1, 2011. The first time Newburyport city councilors considered adopting the stretch code, on April 26, 2010, they voted against it because of concerns over increased costs to builders and homeowners. A city councilor who worked in construction and disapproved of the stretch code described it as “*just another fee on the taxpayer and another government regulation.*”¹⁰ The second time, on November 8, 2010, eight out of ten Newburyport city councilors voted in favor of adopting the stretch code. Most residential building activity in Newburyport consists of renovations and additions rather than new construction. Stretch code proponents argued that most building in the city already met stretch code standards. Furthermore, stretch code standards would eventually become the statewide minimum, and adopting them preemptively would make the city eligible for grants. A local committee and a professional consultant, funded by DOER, worked to educate the public about the stretch code in Newburyport. ICF held an informational session in Newburyport in March of 2010 where various concerns were addressed.

The primary concern among all stakeholders was increased building costs. One interviewee described the public meeting held to discuss the stretch code as “*a room full of very angry builders.*” Builders wanted to know if they would need to learn new skills, work with unfamiliar materials, or charge their customers more. Some didn’t believe that the truss systems commonly used in coastal communities like Newburyport were physically compatible with the

⁹ Builders may well have had this experience working under the Residential New Construction Program, but this was not explored in the interview.

¹⁰ http://www.newburyportnews.com/news/local_news/port-council-loosens-on-stretch-code/article_e85fa864-2d58-51ee-a98a-a51faf99c64b.html.



new insulation requirements. According to a city council interviewee involved in adoption, contractors “*get set in their ways*” and are “*uneasy about changes in the regulatory climate.*” However, builders’ concerns were largely allayed once they learned that stretch code requirements for renovations and additions were virtually the same as the existing requirements, and that historic buildings were exempt.

Green Community designation and the associated access to state grants was the primary driving force behind stretch code adoption in Newburyport and was most often stressed in informational sessions. Another factor that may have influenced stretch code adoption in Newburyport was advocacy by a HERS rater who had worked with local builders, possibly on program homes, and provided information on what the requirements entailed. The Newburyport city councilor who worked to adopt the stretch code also said the new construction programs had a positive effect “because they have a base of experience and can answer a lot of the questions they have heard...previously.”

In addition to the desire for Green Community designation, an overall desire to be environmentally responsible among Newburyport residents and city government played a role. Shortly before the stretch code was presented to Newburyport residents, they had supported the decision to purchase solar energy to power the city’s public facilities. One interviewee, a city councilor involved in adoption, stated that Newburyport residents identify with environmental protection, pointing out that Newburyport encompasses a national wildlife refuge and a state park that was once under threat from development. According to this interviewee:

People value the natural beauty of the region and place a very high premium on maintaining and preserving it...If you had asked [the city councilors] at the time, I think all of them would have acknowledged that [the stretch code] is what the public would probably support.

3.4.4 Tewksbury

After a failed attempt in 2010, Tewksbury adopted the stretch code on May 4, 2011, and it went into effect on January 1, 2012. The initial effort, which took place on October 5, 2010, resulted in a 47-44 defeat of the stretch energy code. The first time that it was presented to Town Meeting, there was a lengthy and contentious debate about the merit of the stretch code. When asked about why the stretch code was not adopted in 2010, one interviewee specifically noted that builders strongly opposed the regulations. At that time, the homebuilder community was hesitant because the economy, and the real estate market in particular, was still recovering from the recession of 2008. This individual remarked, “*some of the builders were hurting and were concerned about having additional rules and costs imposed on them by a more enhanced building code.*” Two very outspoken opponents included two residents, a local developer and a former town treasurer. Two of the interviewees also noted that in general, stretch code proponents were not well prepared to explain the requirements, and did not have adequate information to address builders’ concerns.

When the Tewksbury Green Committee brought the stretch code before the Town Meeting again in 2011, they were more informed about and better equipped to address resident and voter opposition. The Green Committee is a town-appointed committee focused on energy conservation and renewable or alternative energy strategies for the town. In addition to enlisting a local developer in their efforts, proponents had held a well-attended public information forum, funded by DOER, that better addressed many of the concerns voiced at



the 2010 meeting. When it was presented at the 2011 Town Meeting, Mike Berry, ICF consultant, also shared his knowledge and expertise regarding the stretch code. In the end, the stretch code was approved with an overwhelming majority voice vote.

As noted above, many of the concerns regarding the stretch code came from the homebuilder community. There were concerns about increased costs for builders, and for costs passed on to homeowners. Builders also expressed strong resistance to increased regulations. Many felt that the existing building code was sufficient, and perceived the stretch code as additional, unnecessary oversight. As one interviewee noted:

Builders had a knee-jerk reaction to something new. [They saw the stretch code as] another 'Big Brother' code coming in over your head trying to tell you how to do things.

To alleviate these various concerns, proponents of the stretch code proactively engaged builders and developers in their education and outreach efforts. The failed attempt to pass the stretch code in 2010 provided lessons regarding these key areas of interest, and helped proponents further hone their messaging and engagement strategies.

The Tewksbury interviewees reported that the Green Community designation and associated grant funding were the primary reasons for adopting the stretch code in Tewksbury. The interviewees also noted that environmental responsibility played a factor. Of the three local interviewees, two stated that the Green Community designation and grant funding were the prevailing reason; one interviewee felt that environmental responsibility and related energy savings were just as important as the Green Community status and funding. The latter interviewee commented, *"It really was a two-part decision. Yes, we're getting money and yes, we'll save money on energy bills. We were going to promote both equally."* He also stated that proponents also stressed the importance of early adopters receiving relatively larger grants, explaining:

As more communities came on board, there was less money to spread around to the towns. The same amount of money was getting spread around to more towns and communities. We wanted to get in on the first couple of waves.... There was a sense of urgency, too, to get the money to get it adopted. If we don't do it, someone else would get the money.

Two of the three local interviewees did not believe the new construction program incentives had any effect on the stretch code adoption; the third thought new construction incentives become more important especially as more communities are vying for the Green Community funding.

3.4.5 Williamstown

Williamstown adopted the stretch code on May 11, 2010, and it went into effect on January 1, 2011. Stakeholders involved in promoting the stretch code include the CO² Lowering (COOL) Committee, a town-appointed committee focused on sustainable practices in Williamstown; the Center for Ecological Technologies (CET) and Berkshire Regional Planning Commission (BRPC), two local organizations concerned with regional environmental, economic, and related issues; and elected town officials from the Board of Selectman and Town Meeting. One interviewee felt that the coordinated approach among stretch code proponents was



important to its adoption in Williamstown and other communities in the area. This individual stated:

If anything, it was that the supporters - the BBRS (Board of Building Regulations and Standards), DOER, CET and the planning divisions - us all working together, that was the strength of getting so many communities [to adopt the stretch code] in western Massachusetts. We really kept up with eastern Massachusetts percentage-wise... We had the right contingent of groups [involved].

With a recommendation from both the Finance Committee and the Board of Selectman, the stretch code was presented to the Town Meeting with very little opposition, and adopted with a majority voice vote.

When the stretch code was presented in public meetings and forums, proponents highlighted a number of benefits, including energy and related cost savings. The availability of incentives through the Mass Save New Construction program was another benefit that supporters emphasized during their presentations on the stretch code. Both of the Williamstown adoption interviewees thought these incentives had a positive effect on adoption of the stretch code. Supporters of the stretch code also stressed the financial benefit of becoming an early adopter since communities that adopted the stretch code in the early years received relatively larger grants. One community adoption interviewee reported that, “*the early adopters got bigger grants... It was an internal competition that we were able foster.*” Another aspect of early adoption was the fact that impending updates to the energy codes were very likely at the time. One stakeholder remarked,

There was a sense that it was a stretch at the time, but the code would continue to be strengthened. We were just passing a little sooner than it would come anyway. I don't think we felt like it was too much of a hardship.

While the stretch code was passed with little opposition, there were some notable concerns raised prior to the Town Meeting vote. There were concerns regarding the increased costs to both builders and homeowners. Builders also expressed misgivings about potentially having to learn new technologies and other training-related issues; one interviewee also noted that builders were wary of more government oversight. In general, the builders' concerns were largely due to a lack of understanding of the stretch code requirements, and groups like CET and BRPC sought to moderate the builders' trepidation by providing cost scenarios that compared the approximate increase in construction costs and the long-term energy-related cost savings. They also promoted the trainings that would be available for builders and inspectors, and enlisted a builder who had first-hand experience with the stretch code to speak in support of it at the Town Meeting.

According to the Williamstown interviewees, the Green Community designation and grant funding were the two primary reasons that the town adopted the stretch code. The interviewees also indicated that in general, environmental responsibility was a secondary, but very important, factor to getting the stretch code passed in Williamstown. One interviewee indicated that for some individuals involved in getting the stretch code adopted, the Green Community status and related funding were just as important as their sense of environmental responsibility. This individual commented:



There was an equal push to do the right thing for energy efficiency because their energy committee [the COOL Committee] is a very strong environmentally committed group, and becoming a Green Community would net them a check for doing energy-efficient upgrades... In Williamstown, they were very concerned with energy efficiency. As much as with the check.

3.4.6 Woburn

Woburn adopted the stretch code on March 15, 2011 with an effective date of January 1, 2012.

On March 14, 2011, an ICF consultant provided a presentation on the stretch code to city council members. This presentation was the last of several made by various individuals and committees over the course of about a year before the issue was brought to a vote. On the following day, the Woburn city council voted unanimously to adopt the stretch code. Two individuals who had worked with numerous communities recalled that the adoption process was relatively easy in Woburn, and one of these interviewees attributed this to having the full support of the mayor.

Green Community designation and the associated access to state grants was a driving force behind stretch code adoption in Woburn. According to a city council interviewee:

That was the catalyst that pushed us in this direction, but in some ways we were heading down that path anyways.

This interviewee characterized the stretch code as a pocketbook issue, stating that city councilors wanted developers to build energy efficient homes so that residents would save on energy bills. In addition, he emphasized the importance of communicating this benefit to residents in order to gain their support for the stretch code. Another interviewee viewed improving Woburn's public image as a driving force behind Green Community designation and stretch code adoption. Woburn's public image suffered in the 1970's and 1980's when numerous cases of cancer were linked to contaminated groundwater from improper disposal of trichloroethylene by Woburn businesses. This interviewee stated:

Woburn took it very seriously to become a Green Community...Being a leader in Green Communities and stretch code, we all viewed as very important to improving our image. There have been issues in the past that still linger over Woburn: the water supply, for instance...Adopting the stretch code was the right thing to do...There is a feeling we wanted to do things the right way. It definitely has an influence over what we do. Everybody was excited about the Green Communities.

This interviewee also said that residents' desire to be environmentally responsible played a role in stretch code adoption. A city council interviewee added that the perception that the Green Community grant funding was limited and that communities were in competition for it created a sense of urgency to take action sooner rather than later.

A city council interviewee explained that it was more difficult to gain public and policymaker approval for the stretch code than for any of the other Green Communities requirements, and that increased building costs were the primary concern among stakeholders. Woburn's land usage is split approximately equally between residential and commercial purposes. The



majority of residential building in Woburn consists of renovations and additions. City councilors wanted to make sure that Woburn continued to be an attractive place for people to do business, and that it did not become burdensome for residents to renovate their homes. These concerns were alleviated once city councilors learned that new commercial buildings often met stretch code requirements with minimal modifications, and that residential and commercial renovations would not be impacted by the stretch code. Residential developers were concerned that the stretch code would increase their building costs. A city council interviewee addressed this concern by instructing developers to pass the costs on to homebuyers and to use energy efficiency as a selling point. He encouraged developers to explain to homebuyers that they would recover the costs over time in energy bill savings. Another interviewee recalled that some developers did indeed embrace the enhanced energy efficiency as a marketing point, and added:

Basically we thought that it would add some costs, but overall it was helping the city get the Green Communities initiative passed and protecting consumers a little bit more in getting better quality, energy-efficient homes.

Both of the Woburn adoption interviewees believe the new construction program incentives were a positive factor in adoption of the stretch code, though they associate Mass Save more with encouraging improvements to existing homes.

3.5 ADOPTION MARKET LOGIC MODEL

Table 3-2 summarizes the direct and indirect factors that led to stretch code adoption and the barriers encountered for each community studied. Where the interviewees did not believe a factor applied to a community or did not mention a barrier, the space has been left blank.

Figure 3-1 presents a model of the stretch code adoption process based on the interviews and reviews of documents related to adoption at the selected communities. The market conditions reflect the passage of the Green Communities Act and the motivations for adoption; general conditions include the housing market and the existing building energy code. The model differentiates between existing support for stretch code adoption (i.e., what was provided by the DOER) and the support provided, directly and indirectly, by PA programs and efforts. Both types of support addressed the different concerns or barriers to adoption and, where successful, resulted in adoption of the stretch code.

The stretch code market conditions, including the desire to be designated as a Green Community and qualify for energy project funding along with environmental consciousness, laid the ground for adoption of the stretch code. Subsequent presentations by the DOER supported adoption. Other key factors supporting adoption included the incentives provided by the new construction programs sponsored by the PAs and the increased availability of HERS raters fostered by those programs before the widespread adoption of the stretch code (although later increases in the number of HERS raters is more directly attributable to the stretch code). Adoption by the six communities studied and most communities across the state would likely have been harder in the absence of the PA-sponsored program elements.

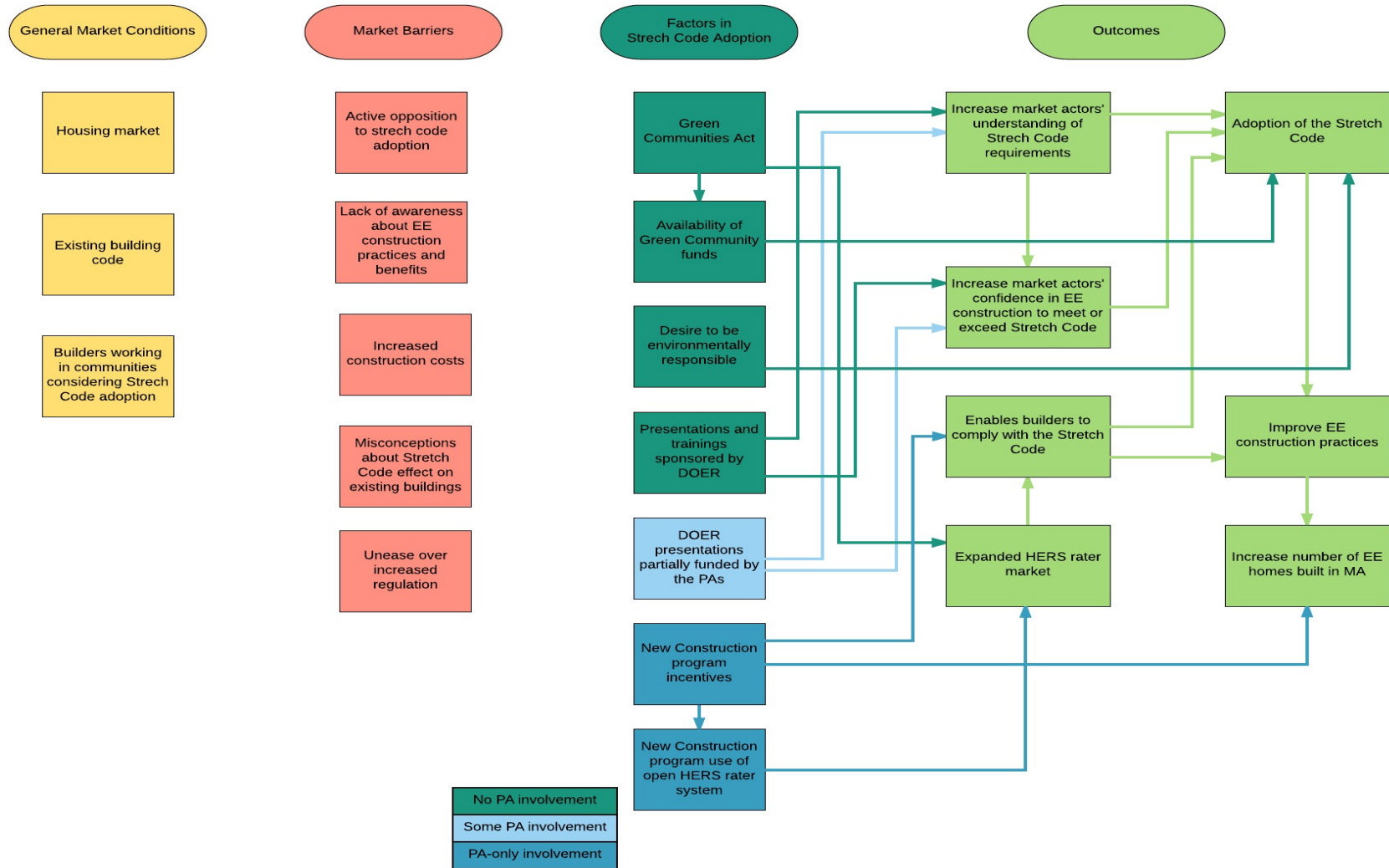


Table 3-2. Stretch Code Adoption Factors and Barriers

	Everett	Lexington	Newburyport	Tewksbury	Williamstown	Woburn
Stretch code adoption factors						
Green Community funding	Primary	Primary	Primary	Primary	Primary	Primary
Desire for environmental responsibility		Secondary	Primary	Secondary	Secondary	Primary
Presentations done under contract to DOER*	Indirect	Indirect	Indirect	Indirect	Indirect	Indirect
Availability of RNC program incentives		Indirect	Indirect		Indirect	Indirect
Stretch code adoption barriers						
Increased construction costs	Primary	Primary	Primary	Primary	Primary	Primary
Concerns additional builder training		Primary	Primary		Secondary	
Misinformation on code requirements			Primary	Secondary		Secondary
Resistance to increased regulations			Primary	Primary	Secondary	

*The PAs paid for travel costs in Newburyport, Tewksbury, and Woburn

Figure 3-1: Adoption Market Logic Model





4. COMPLIANCE WITH THE STRETCH CODE

Energy savings attributable to the stretch code depend on how well it is enforced, or its compliance rate, as well as its adoption. The adoption IDIs included questions on enforcement issues for interviewees; in addition, NMR conducted nine IDIs with code officials in the six communities selected for case studies.

4.1 PREPAREDNESS AND CHALLENGES IN ENFORCING THE STRETCH CODE

Eight of the nine building code officials interviewed said they were fairly well prepared to enforce the stretch code when it was adopted by their communities and one felt he was not well prepared. However, only two interviewees said that builders and contractors were prepared to comply with the stretch code upon adoption; one was not sure and the remaining six believed builders and contractors were ill prepared when the stretch code was adopted in their communities. One building inspector noted:

(I was) very well prepared. Besides the classes that were sponsored by the state we had gone to some classes beforehand and had a good idea what was coming. Personally, I don't believe the builders were prepared. They know about the classes and don't go. I've personally trained more than the number that has trained themselves or gone to classes on their own. I like to be proactive and tell them what's going on and what's coming up so that way when they come the end of the job I don't have to be the guy to tell them failed because they didn't know what they were doing.

Another inspector noted the difference between himself and the local contractors:

Fairly well—I was a builder before that, I was building to a standard pretty close to what the stretch code was anyway. I already knew what to be looking for and what to expect. HERS raters were prepared. The builders had absolutely no clue, and honestly, we're five years in and most of them still don't have any idea. If the insulation company doesn't do a good job, they don't know what they're looking for. It's business as usual unless somebody fails and then it's—oh, well, we didn't know. With leakage tests, it's like pulling teeth on a weekly basis. I hear a lot of "they don't require that in X town," even though they're stretch code communities. Then again, they say that about everything.

The inspector who said he was not well prepared to enforce the stretch code noted:

Not well. I would say the only ones that was prepared for it were the HERS raters. They learned what was going to be required (the paperwork, the testing they needed to do); they were probably the most prepared. The contractors that had to come to our counter, we said, "take your plans back, you're now going to be required to comply with the stretch energy codes," they were shaking their heads too. Unless they had a lot of dealings in other cities and towns, then maybe they were prepared for it. For the most part, I don't think they were prepared.



The interviewers asked about specific challenges encountered in enforcing the stretch code. Two of the nine respondents said they could not think of any challenges. The remaining seven focused on educating builders and contractors about the stretch code requirements and the need for HERS ratings. One building inspector noted,

Getting the builders to understand what they have to do to get their scores. To buy into the fact that they need a HERS rater. “You mean I got to pay someone else to come in and tell me if I did the house right?’ Yeah”. Again, we tried to be proactive and tell everyone to be aware after this date this is what you’re going to have to do... I’ve taken it upon myself to talk to these guys one-on-one and encourage them to take advantage of the education opportunities.

Another building inspector commented on his work in the field:

It’s the in-the-field application of it. You have insulation companies that still can’t even pull it off. I don’t do the insulation inspections until after the HERS rater has gone in to do theirs. It avoids a lot of headaches. When we don’t have a HERS rater involved, I do a lot of sketches and a lot of pulling up products on an iPhone.

A building commissioner expressed his frustration with differences in local codes:

When Massachusetts implemented a statewide code... to get everyone on the same page. Now with the stretch energy code, it’s the only code that varies from town to town... I think it should be a uniform state code. Make a decision, this is what we’re going to do and everyone does their best to get on the same page. That’s why we have our building official organizations and continuing ed... Even with a uniform state building code, it’s very difficult to get everyone on the same page. Everyone has a different knowledge base, different experiences, and takes a lot of time and energy for people to achieve consistency. Having the stretch energy code just throws a monkey wrench into the whole thing, in my opinion.

4.2 FACTORS AFFECTING ENFORCEMENT OF THE STRETCH CODE

The interviews probed into the factors that may support enforcement of the stretch code; specifically, various trainings, including those sponsored by the PAs through the Code Compliance Support Initiative (CCSI), the availability of HERS raters to serve the needs of stretch code communities, and new construction program incentives.

4.2.1 Trainings

The Massachusetts Department of Energy Resources (DOER) did early trainings on the energy code based on 2009 IECC and the corresponding stretch code. The PAs took over code training in 2014, focusing mostly on the 2012 IECC and less on the stretch code, which, until 2017, was still based on the 2009 IECC. All nine compliance interviewees had attended



at least one CCSI training, typically a three-hour classroom training, as had most code officials in Massachusetts.¹¹ The interviews probed about the usefulness of the CCSI trainings and other resources such as the Mass Save Energy Code Technical Support, available online and by telephone.

Six of the nine respondents considered the CCSI trainings to be useful in enforcing the stretch code. A building commissioner noted:

It's very informative. We as inspectors don't understand all of it. Often times we're the ones that need to provide the advice so that errors aren't made in the field. There's very little at all training available to the contractors. They might not build enough residential units to warrant that type of investment in education.

However, one interviewee said the trainings would be useful only when there is a code change and the differences are pointed out and one said the classes are too drawn out and too technical for code officials. The third interviewee also wanted an alternative to classroom trainings:

It's a lot different learning something in a classroom as opposed to applying it. I find it a lot easier doing it hands on: a workshop type of thing. If you give us plans and scenarios and you're applying it in real time, I think that it would have been more helpful than sitting there listening to somebody talk about it. It doesn't sink in with me unless I'm actually looking at scenarios.

Seven of the nine interviewees were aware of the Mass Save Energy Code Technical Support; however, only two had used it to pose questions online or over the telephone. These two interviewees were very satisfied with the support they received; one noted:

The phone number is pinned up at my desk... I continue to refer builders there when they don't believe what I say is required by the code... I feel the Code Technical Support has the most experienced and knowledgeable people. We may have differences of opinion on some things, but Technical Support has a great deal of knowledge.

The same interviewee said he would go to the Mass Save Energy Code Technical Support website first if he had a code-related question. Four of the other interviewees said they would go to the code book first; two said they would simply search the internet; one would ask a coworker; and one would use the BBRS website. In general, the responses provided by the interviewees for this study on the stretch code are consistent with those from studies assessing the CCSI as a whole.

¹¹ According to the Massachusetts Department of Public Safety, 767 individuals are currently required to maintain their certification as building code officials. Of these, 547 or 71 percent have attended at least one CCSI training. Source: Kim Spencer, Mass DPS, January 24, 2017



4.2.2 HERS Raters

As noted in Section 3.3.2, the new construction programs have had a positive effect on the availability of HERS raters to serve the needs of stretch code communities. Seven of the nine building code officials interviewed believe there are currently enough HERS raters available to meet the needs of their communities. The two code officials who did not believe there were enough HERS raters work in Tewksbury and Williamstown. Their concerns appear to be tied to location: there are fewer companies providing ratings in western Massachusetts, and Tewksbury seems to compete with other towns close to the New Hampshire border for access to HERS raters.

Building code officials noted that the HERS ratings provide vital information to help them do their jobs; one interviewee referred to them as “the first line of defense.” Another code official noted:

The most important thing is the blower door test (provided by the HERS raters). It will tell you where you're getting your air infiltration, which accounts for 40 percent of your heat loss.

Another code official noted:

I make it a point if a HERS rater is on site while I'm there that I introduce myself and compare notes about the site.

4.2.3 New Construction Program Incentives

Five of the nine building code officials interviewed believe new construction program incentives have made it easier for them to enforce the stretch code; three did not think the incentives affected enforcement; and one had no opinion on the matter. When asked if the availability of programs providing support and incentives for energy efficient new construction make it easier to enforce the stretch code, one interviewee noted:

Yes, people are more aware and they are more inclined to do what is necessary to meet the stretch code. Especially when they realize they are going to save money. That's one of the bigger things is the selling of an idea.

4.3 CODE COMPLAINT FACTORS FOR INDIVIDUAL COMMUNITIES

As noted, NMR selected six communities as historical case studies of the stretch code compliance factors, which are described in this section.

4.3.1 Everett

The Everett building code officials interviewed reported no major challenges in enforcing the stretch code. However, since Everett adopted the stretch code relatively late, it had already been on the 2012 IECC code and the interviewees noted that multiple changes in relatively quick succession had caused some confusion, stating:

We were up to the 2012 energy code, and when we adopted [the stretch code] it kicked us back to the 2009 energy code, which meant we were going



backwards in the book. And then as far as blower door tests with the stretch code, now you had to bring yourself up to speed with all the changes. It was a lot of change all at once.

The interviewee noted that the city's relationship with the Massachusetts Building Commissioners and Inspectors Association (MBCIA) had been very helpful in enforcing the stretch code.

The interviewees indicated that builders and contractors were not very prepared to comply with the stretch code. One of the interviewees said that educating contractors about the blower door test had been the greatest challenge in enforcing the stretch code. The interviewees consider HERS raters important in enforcing the stretch code and believe there are enough to serve Everett's construction needs. They both noted there is little residential new construction in the city.

The Everett building code officials interviewed had somewhat mixed opinions of the usefulness of the CCSI trainings they had attended. One interviewee described the training as "*very informative*," because of the use of real-life examples. However, the other interviewee stated that he found classroom training like the ones offered by CCSI to be less useful than more hands-on training formats.

The new construction program incentives also appear to have had little effect on enforcing the stretch code in Everett; one interviewee noted that they would be more applicable to a more affluent community where a lot of relatively high-priced new homes are being built.

4.3.2 Lexington

The Lexington building code official interviewee believes that the DOER-sponsored trainings and support were instrumental in preparing him to enforce the stretch code. However, he also believes that builders were not as prepared to address the stretch code as they should have been, and this continues to be an area for improvement. Aside from builders' lack of knowledge and understanding regarding the stretch code, the interviewee noted that on occasion builders have expressed resistance to compliance with a performance code in general, with some telling him "*You mean I got to pay someone else to come in and tell me if I did the house right?*" The code official indicated that more education about the importance of the HERS rating was needed. The interviewee also believes there are enough HERS raters to serve Lexington's construction needs.

The Lexington code official interviewee spoke favorably about the CCSI trainings, and stated that other resources such as the Mass Save website and technical support are very helpful for enforcing the stretch code. He considers the Mass Save Energy Code Technical Support a primary source of information and believes that the staff are the most experienced and knowledgeable in this area. He also feels that builders are aware of trainings but do not attend them; he has individually encouraged builders to take advantage of the education and training opportunities available to better their understanding of the energy code.

The Lexington code official believes that new construction program incentives help with enforcement, mainly because they foster residents' awareness and desire to construct energy-efficient homes that meet the stretch code. These incentives are a primary driver for helping homebuyers to construct energy-efficient homes because they help owners recognize the long-term positive return on their investment.



4.3.3 Newburyport

Both of the Newburyport building code officials interviewed felt prepared to enforce the stretch code. One interviewee attributed this to many years' experience in enforcing energy codes and noted that the stretch code made his job easier because HERS raters identify energy code deficiencies for builders to correct before he conducts the final inspection. He explained:

I still did my inspections. I still looked at insulation, checked windows, still did everything, including the HVAC systems and things like that. But to have that backup—to know before I walked into a house that its already been approved by a HERS rater—made my job easier.

The other code official interviewed concurred:

It certainly takes a lot of the onus off of us. We do our inspections anyway, but we rely on the initial estimate and final results.

The interviewees indicated that builders generally met the stretch code requirements and that the greatest challenge they faced in enforcing the stretch code had to do with paperwork. One interviewee recalled rejecting applications because they were missing REScheck documents, and the other interviewee complained of HERS raters forgetting to sign and date paperwork. This anecdote is consistent with the major lack of energy code documentation found by NMR in visits to 52 building departments across the state in 2015.¹² Both interviewees believe there are enough HERS raters to serve Newburyport's construction needs.

The Newburyport building code officials interviewed had attended energy code trainings offered by various sponsors, including CCSI. They indicated that the CCSI trainings and resources were important, but not necessarily more important than trainings from other sponsors; they also attend monthly MBCIA meetings. One of the interviewees stressed the importance of training contractors and believes the trainings should target them.

The Newburyport building code officials interviewed thought that the new construction program has made it easier to enforce the stretch code since,

If they get credit through the program, then obviously it's another set of eyes and it tells me that it's working.

One of the interviewees also observed that ENERGY STAR had become a selling point for homes in Newburyport.

4.3.4 Tewksbury

The Tewksbury building code official interviewee felt well prepared to enforce the stretch code upon its adoption, but he also felt that it took a little longer for it to become "automatic" for others in the building community. According to this interviewee, at the time that the stretch

¹² NMR Group, Inc. *Residential Single-Family Building Department Document Review-Final Report*, Prepared for the Massachusetts Electric and Gas Program Administrators, December 1, 2015.



code was adopted, many contactors were not very knowledgeable about its requirements. Over time, the building community has become more educated about the stretch code, and there are a greater number of HERS raters to support builders. The code official interviewee acknowledged this improvement by saying, *“It’s very rare that we get someone in here and we have to remind them that we’re a stretch community and they have to comply with the stretch code.”*

However, he believes there are still not always enough HERS raters to serve the town’s construction needs and also voiced concern with the *“thoroughness of their work.”* He also believes contractors are not very familiar with how to locate and work with HERS raters. The interviewee, admittedly, has limited interaction with HERS raters and generally only comes in contact with them when they have not done a satisfactory job. The interviewee also noted that, due to Tewksbury’s close proximity to New Hampshire, there are HERS raters who are not as well versed in the Massachusetts building code.

The interviewee said that the earlier DOER trainings on the stretch code and the later CCSI trainings have been helpful in enforcement. To date, he has not used the Mass Save website or technical support.

He does not believe that new construction program incentives affect enforcement of the stretch code in Tewksbury, although he noted that the incentives likely help the contractors with offering energy-efficient features in the homes that they build.

4.3.5 Williamstown

The Williamstown building code official interviewee felt adequately prepared to enforce the stretch code. According to this interviewee, most housing in Williamstown typically exceeds the stretch code because of the residents’ desire to build efficient homes and save money on their energy costs. He remarked, *“this year and next, you’ll see that they’re above and beyond any energy code that’s required because people don’t want to pay a high gas and electric bills.”* However, he also noted that Williamstown has not experienced a lot of new construction due, in part, to the slow economic recovery from the 2008 recession as well as the relatively high proportion of second homeowners in the town. For these reasons, the interviewee has faced very few challenges with enforcing the stretch code.

However, the interviewee believes there are not enough HERS raters to meet the needs of Williamstown. He indicated that this is largely a regional issue, being in the western part of the state. He acknowledged the important role of HERS raters, but stated that the demand has always outpaced the supply since, *“There’s always been greater demand because of our location. We’re not in downtown Boston.”*

The Williamstown building code official interviewee had said that any training is only really useful when there is a code change and the instructor can point out what has changed; otherwise, he sees little value. He also stated he has no opinion on the effect of new construction program incentives and support on the enforcement of the stretch code.

4.3.6 Woburn

The two Woburn building code officials interviewed felt prepared to enforce the stretch code. One interviewee attributed this to previous experience working as a builder and building to



standards similar to stretch code requirements. According to the interviewees, builders and contractors in Woburn were not as prepared. One of the interviewees said that the greatest challenge in enforcing the stretch code was explaining it to contractors. The other interviewee indicated that oftentimes when builders failed an inspection due to a stretch code violation, they either said they were not aware of the requirement, or complained that other stretch code communities were not enforcing the requirement. The interviewees stated that builders generally met the stretch code, but largely as a result of the involvement of HERS raters.

The interviewees believed that there are currently enough HERS raters to serve the construction needs in Woburn. One of the interviewees added:

At first, some of the builders had no idea and couldn't find anybody. Now it seems like everybody's a HERS rater.

The Woburn building code officials interviewed had mixed opinions of the usefulness of the CCSI trainings they had attended. One interviewee described the training as “very useful,” and reported utilizing class handouts. However, the other interviewee found the trainings to be drawn out and overly technical, and indicated that he preferred more hands-on training formats.

One interviewee does not believe that new construction program incentives affect enforcement of the stretch code in Woburn; the other does not have an opinion on the matter.

4.4 COMPLIANCE MARKET LOGIC MODEL

Table 4-1 summarizes the primary and secondary factors affecting enforcement of the stretch code and the barriers based on the community code official interviews. Where the interviewees did not believe a factor applied to a community or did not mention a barrier, the space has been left blank.

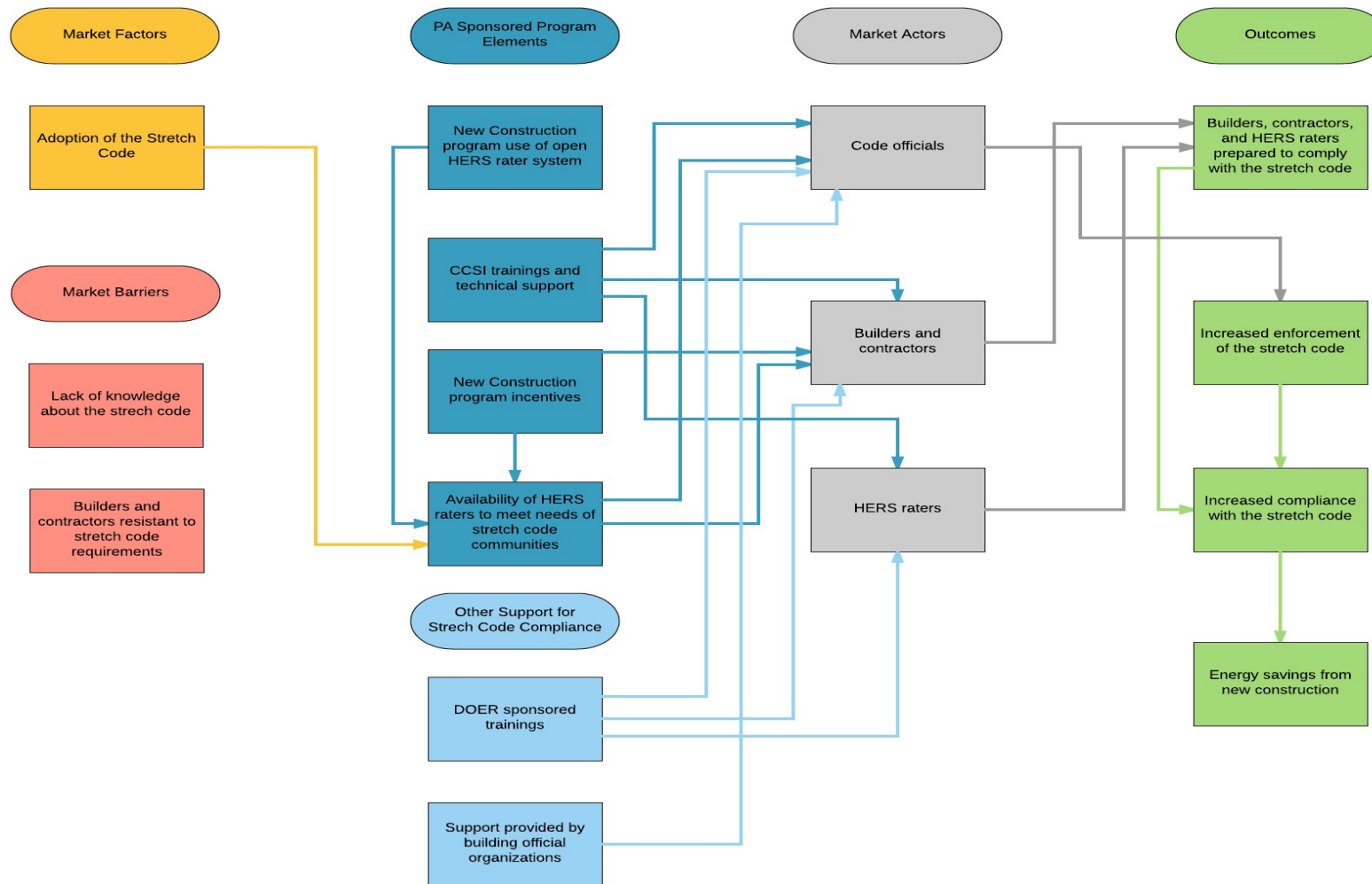
Figure 4-1 presents a model of the stretch code compliance process based on the interviews with building code officials and other individuals knowledgeable in this area. The market conditions reflect the key factor, which is the adoption of the stretch code by the community, and barriers to compliance, which include lack of stretch code knowledge and resistance to its enforcement on the part of builders and contractors. The model differentiates between existing support for stretch code compliance (i.e., the early trainings provided by the DOER) and the support provided by PA programs and efforts. The latter include trainings, incentives through the new construction programs, and the increased availability of HERS raters fostered by those programs as well as the widespread adoption of the stretch code. Both types of support addressed the needs of different market actors—building code officials, builders and contractors, and HERS raters—and have contributed to compliance with and enforcement of the stretch code in the six communities studied and across the state, which results in energy savings from new construction. The increased availability of HERS raters appears to be the most important contribution on the part of the PA programs and efforts in the enforcement of the stretch code since HERS ratings are required for the performance compliance path and code officials rely on the HERS rater work to ensure code compliance. (Again, PA programs are only partially responsible for the growth in the HERS rater market, primarily before a significant number of communities began adopting the stretch code in 2010.)



Table 4-1. Stretch Code Compliance Factors and Barriers

	Everett	Lexington	Newburyport	Tewksbury	Williamstown	Woburn
Stretch code compliance factors						
Mass Save Energy Code Technical Support Initiative		Primary				
CCSI trainings	Secondary	Primary	Secondary	Secondary		Secondary
Support from Mass Building Commissioners and Inspectors Assn.	Primary		Secondary			
Availability of RNC program incentives		Secondary	Secondary	Secondary		
Availability of HERS raters	Primary		Secondary	Primary		Primary
Previous experience in code enforcement			Primary			Primary
Stretch code compliance barriers						
Lack of builder knowledge of, and resistance to requirements and process	Primary	Primary	Primary	Primary		Secondary
Changing code requirements	Secondary				Primary	

Figure 4-1: Compliance Market Logic Model





APPENDIX A: INTERVIEW GUIDES

In-depth Interview Guide for Stretch Code Market Effects— Adoption—Statewide Actors

Name: _____ Title: _____
Company or Department: _____ Telephone: _____

Email: _____
Interview date: _____ Time: _____

Introduction: Hello, may I speak to [_____]? My name is _____, and I'm calling from NMR Group on behalf of the sponsors of the Mass Save[®] Energy Code Technical Support Initiative. We are conducting interviews with individuals that have worked for stretch code adoption to learn more about the adoption processes and factors that affected adoption of the stretch code in different communities. Your responses will be kept confidential; we will combine them with those of other respondents for the findings and analyses we present to the sponsors of this Initiative. We can do this interview now or schedule for a more convenient time. [If need to confirm legitimacy, refer to William Blake of National Grid at 781-907-1583 or William.Blake@nationalgrid.com.]

Overall Reasons for Adoption

Intro. [If respondent was involved in the communities we are studying] I would like to talk with you about adoption in general and about a few specific communities; these are [READ COMMUNITIES WHERE THE RESPONDENT WAS INVOLVED]

1. What do you believe is the overall most important reason communities throughout the state have adopted the stretch code? What other factors have played a role? Why were these factors important?
2. Have the reasons for adopting the stretch code been different for different types of communities? What different factors come into play for different communities?
3. Have the reasons for adopting the stretch code been different for communities that adopted early after the stretch code became available versus those who have adopted in the last couple of years? How are they different?



4. [If respondent was involved in adoption by the communities of interest] What do you believe is the most important reason COMMUNITY(S) adopted the stretch code? What other factors played a role? Why were these factors important?
5. [If respondent was involved in adoption by the communities of interest and not brought up in Question 4] Do you believe one of the reasons COMMUNITY(S) adopted the stretch code was to become a designated Green Community and have access to state grants for energy projects? If yes, how important was this compared to other factors?
6. [If respondent was involved in adoption by the communities of interest and not brought up in Question 4] Do you believe there was an overall desire to be environmentally responsible among the residents and city/town government that led to adoption of the stretch code in COMMUNITY(S)? If yes, how important was this compared to other factors?

Adoption Process

Now, I would like to talk about the adoption processes.

7. Approximately how many public hearings discussing stretch code adoption have you attended?
 - a. And about how many presentations of the stretch code have you done for these public hearings? What points do you cover in these presentations?
 - b. And how many public hearings did you attend and answer questions, but not offer a presentation?
 - c. Regardless of whether you do presentations, what types of questions have you fielded in public hearings?
8. [If respondent was involved in adoption by the communities of interest] Please tell me as much as you can recall about how the stretch code was presented at the public hearing(s) in COMMUNITY(S) before its adoption.
 - a. Who did the presentations [Probe for different parties doing presentations]
 - b. What points they covered [Probe for points covered by different parties]
 - c. What benefits of the stretch code they emphasized
9. Do you know of other presentations or informal meetings about the stretch code? If yes, what parties were present? What points about the stretch code were covered?



10. What concerns do communities have about adopting the stretch code? Who has these concerns? How did these issues differ across the different parties? [Probe for examples]
11. [If respondent was involved in adoption by the communities of interest] What concerns did people in COMMUNITY(S) have about adopting the stretch code? What concerns were brought up at the public hearing(s)? How else were concerns brought up?
12. [If respondent was involved in adoption by the communities of interest] Who had these concerns in COMMUNITY(S)? How did these issues differ across the different parties? [PROBE if builders, contractors, elected officials, building department employees, homeowners, others had different concerns and what they were]
13. How are concerns about adopting the stretch code addressed? [PROBE if addressed at public hearings or otherwise; how specific concerns are addressed; examples]
14. [If respondent was involved in adoption by the communities of interest] How were concerns about adopting the stretch code in COMMUNITY(S) addressed? [PROBE if addressed at public hearing or otherwise; how specific concerns were addressed]

Key Sources of Information

15. When a question or an issue concerning the stretch code came up, where or to whom would you first go to look for information? What sources ultimately provide you with the information you are seeking? [Probe: may have different sources depending on the issue or measure affected; also, may simply Google question rather than go to a particular source]
 - a. [IF MENTION USING GOOGLE TO SEARCH AND NOT GOTTEN ULIMATE SOURCES ABOVE] Can you tell me what sources ultimately provide you with the information you are seeking?



New Construction Programs and other Factors

16. Many homes and buildings in stretch code communities participate in the Mass Save Residential and Commercial New Construction Programs. Would you say the availability of these programs providing support and incentives for energy efficient new construction, including Energy Star certification, makes it easier for communities to adopt the stretch code? Why or why not? [PROBE about whether the New Construction Programs were brought up at community hearings or other discussions of the stretch code and what points were made; if respondent was involved in adoption by the communities of interest, probe about those hearings]

17. Does experience with other energy efficiency certifications for new buildings, such as LEED, factor into adopting the stretch code? Why or why not?

18. As you know, the stretch code is performance based, requiring HERS scores for new homes. What interactions, if any, do you have with HERS raters? Do you believe there are enough HERS raters to serve the construction needs in stretch code communities? Do you have any insight into the efficiency of how HERS raters manage their privately owned businesses? Has this changed over time [PROBE if communities had difficulties getting HERS reports on schedule earlier; if this has improved; try to get examples of issues with HERS raters and if they are due to individual business operations or not enough people to do the audits needed]?

Closing

19. Is there anything we have not covered that you would like to add; in particular, are there any important factors behind stretch code adoption that we have not covered?

Thank you so much for your time!



In-depth Interview Guide for Stretch Code Market Effects— Adoption—Community Actors

Name: _____ Title: _____
Company or City/Town: _____ Telephone: _____

Email: _____
Interview date: _____ Time: _____

Introduction: Hello, may I speak to [_____]? My name is _____, and I’m calling from NMR Group on behalf of the sponsors of the Mass Save® Energy Code Technical Support Initiative. We are conducting interviews with individuals in cities and towns that have adopted the stretch code to learn more about the adoption processes and factors that affected adoption of the stretch code in COMMUNITY. Your responses will be kept confidential; we will combine them with those of other respondents for the findings and analyses we present to the sponsors of this Initiative. We can do this interview now or schedule for a more convenient time. [If need to confirm legitimacy, refer to William Blake of National Grid at 781-907-1583 or William.Blake@nationalgrid.com.]

Overall Reasons for Adoption

Intro. I have here that COMMUNITY adopted the stretch code on DATE and it went into effect on DATE. Does that sound right? [If NO, get corrected dates.]

And were you at the public hearing on the stretch code held on DATE? [If NO, ask if they know of someone involved in this work who was at the hearing; then thank and terminate]

20. What do you believe is the most important reason COMMUNITY adopted the stretch code? What other factors played a role? Why were these factors important?

21. [If not brought up in Question 1] Do you believe one of the reasons COMMUNITY adopted the stretch code was to become a designated Green Community and have access to state grants for energy projects? If yes, how important was this compared to other factors?



22. [If not brought up in Question 1] Do you believe there was an overall desire to be environmentally responsible among the residents and city/town government that led to adoption of the stretch code? If yes, how important was this compared to other factors?

Adoption Process

Now, I would like you to think back to the time when the stretch code was adopted on DATE.

23. Please tell me as much as you can recall about how the stretch code was presented at the public hearing before its adoption.

- d. Who did the presentation [Probe for different parties doing presentations]
- e. What points they covered [Probe for points covered by different parties]
- f. What benefits of the stretch code were emphasized

24. Do you know of other presentations or informal meetings about the stretch code? If yes, what parties were present? What points about the stretch code were covered?

25. What concerns did people in COMMUNITY have about adopting the stretch code? What concerns were brought up at the public hearing? How else were concerns brought up?

26. Who had these concerns? How did these issues differ across the different parties? [PROBE if builders, contractors, elected officials, building department employees, homeowners, others had different concerns and what they were]

27. How were concerns about adopting the stretch code addressed? [PROBE if addressed at public hearing or otherwise; how specific concerns were addressed]



Key Sources of Information

28. When a question or an issue concerning the stretch code came up, where or to whom would you first go to look for information? What sources ultimately provide you with the information you are seeking? [Probe: may have different sources depending on the issue or measure affected; also, may simply Google question rather than go to a particular source]
- a. [IF MENTION USING GOOGLE TO SEARCH AND NOT GOTTEN ULIMATE SOURCES ABOVE] Can you tell me what sources ultimately provide you with the information you are seeking?

New Construction Programs and other Factors

29. Many homes and buildings in stretch code communities participate in the Mass Save Residential and Commercial New Construction Programs. [If needed, have figures for the particular community available] Would you say the availability of these programs providing support and incentives for energy efficient new construction, including Energy Star certification, made it easier for COMMUNITY to adopt the stretch code? Why or why not? [PROBE about whether the New Construction Programs were brought up at community hearings or other discussions of the stretch code and what points were made]
30. Did experience with other energy efficiency certification for new buildings, such as LEED, factor into adopting the stretch code? Why or why not?
31. As you know, the stretch code is performance based, requiring HERS scores for new homes. What interactions, if any, do you have with HERS raters? Do you believe there are enough HERS raters to serve the construction needs in COMMUNITY? Do you have any insight into the efficiency of how HERS raters manage their privately owned businesses? Has this changed over time [PROBE if had difficulties getting HERS reports on schedule earlier; if this has improved; try to get examples of issues with HERS raters and if they are due to individual business operations or not enough people to do the audits needed]?



Closing

32. Is there anything we have not covered that you would like to add; in particular, are there any important factors behind stretch code adoption that we have not covered?

Thank you so much for your time!



In-depth Interview Guide for Stretch Code Market Effects— Compliance—Code Officials

Name: _____ Title: _____
Company or City/Town: _____ Telephone: _____

Email: _____
Interview date: _____ Time: _____

Introduction: Hello, may I speak to [_____]? My name is _____, and I'm calling from NMR Group on behalf of the sponsors of the Mass Save[®] Energy Code Technical Support Initiative. We are conducting interviews with code officials in cities and towns that have adopted the stretch code to learn more about the enforcement processes and factors that affect compliance with the stretch code. Your responses will be kept confidential; we will combine them with those of other respondents for the findings and analyses we present to the sponsors of this Initiative. We can do this interview now or schedule for a more convenient time. [If need to confirm legitimacy, refer to William Blake of National Grid at 781-907-1583 or William.Blake@nationalgrid.com.]

Overall Compliance

Intro. I have here that COMMUNITY adopted the stretch code on DATE and it went into effect on DATE. Does that sound right? [If NO, get corrected dates.]

33. And how long have you been working in COMMUNITY at enforcing the stretch code?
- Since adoption
 - Other [GET DATE]
34. Overall, how would you say enforcement of the stretch code has worked out? [PROBE: everything continued as before; faced difficulties in the beginning; continues to face difficulties]
35. How well would you say you were prepared to enforce the stretch code? And how well do you think the builders, contractors, and HERS raters were prepared to comply with it?
36. If you had to pick one factor, what would you say has helped you the most in enforcing the stretch code in COMMUNITY?



37. Since COMMUNITY adopted the stretch code have you reviewed building permit applications and conducted on-site inspections of projects permitted under the stretch code?
- [If reviewed building permit applications] Approximately how many housing units were involved for residential applications and how many buildings for commercial applications? How have you changed the review processes since COMMUNITY adopted the stretch code?
 - [If conducted on-site inspections] Approximately how many housing units were involved for residential inspections and how many buildings for commercial inspections? How have you changed the inspection processes since COMMUNITY adopted the stretch code? [PROBE: Do they require a HERS rating, based on actual field verification (not plans), as an indication of compliance for residential buildings? Similarly, if applicable, do they check model results or require actual installed data for commercial buildings?]
38. What would you say have been the greatest challenges in enforcing the stretch code? [PROBE if they have been in reviewing permit applications, reviewing HERS rater reports, on-site inspections, or other.]
- How have you tried to address these challenges?
 - Are these issues being resolved as COMMUNITY gains more experience with the stretch code?

Trainings

39. [If there is a record of attending CCSI classroom trainings] I have here that you attended [TRAINING(S)] sponsored by the Mass Save[®] Energy Code Technical Support Initiative on [DATES]. Is that correct? [If NO, get correct dates and titles] [If YES, ask] Did you also attend any other trainings through the Mass Save[®] Energy Code Technical Support Initiative which I didn't mention? [If YES, get dates and titles] [GO TO Question 10]
40. [If there is no record of attending CCSI classroom trainings] Are you aware of the trainings over the last two years sponsored by the Mass Save[®] Energy Code Technical Support Initiative at various locations? These trainings would have covered, on the residential side, HVAC and indoor air quality envelope building science. On the commercial side they cover mechanical provisions, lighting, and envelope building science.
41. [If YES to Question 8] Have you attended any of those trainings?



- a. [If YES get dates and titles]
 - b. [If NO] Why have not attended any of these trainings?
42. Have you attended any of the webinars sponsored by the Mass Save[®] Energy Code Technical Support Initiative? [If YES get dates and titles]
43. [If have attended any classroom trainings or webinars] How useful would you say the Mass Save[®] Energy Code Technical Support Initiative training(s) have been to your work enforcing the stretch code. [If filled out immediate paper survey: I know you answered some of these questions in the paper survey(s) filled out after the trainings; I'm just looking to ask specifically about the stretch code and how you feel about the training(s) after being in the field again.] [Probe: what was particularly useful; if not that useful, why not; how well did the training(s) apply to enforcing the stretch code]
- a. Have you used the handouts provided at the trainings [IF ATTENDED TRAININGS AFTER AUGUST 2015] (and the copies of the training slides you may have received) as a reference or in any other way in your work? [IF YES; PROBE on how the handouts/slides have been used and how often they are used]
44. [Ask of everyone; if have attended any classroom trainings or webinars read text in brackets] [In addition to the Mass Save[®] Energy Code Technical Support Initiative training(s),] have you attended any [other] trainings, webinars, or gatherings discussing building energy codes since COMMUNITY adopted the stretch code? [If YES, ask a through c below]
- a. Please tell me the names, sponsors, and approximate dates of these events. We're also interested in the speakers at these events, if you can remember their names. [PROBE if the training or discussion was in conjunction with another event such as a general association meeting]
 - b. What was the focus of this (these) event(s)? [PROBE if covered the stretch code, a particular area of the stretch code, or other]
 - c. Did you find this/these event(s) useful? Why or why not?

Key Sources of Information

45. When a question or an issue concerning the stretch code comes up, where would you first go to look for information? [Probe: may have different sources depending on the issue or measure affected; also, may simply Google question rather than go to a particular source]



- a. [IF MENTION USING GOOGLE TO SEARCH] Can you tell me what sources ultimately provide you with the information you are seeking?
46. [IF THE RESPONDENT HAS MENTIONED MASS SAVE OR THE ENERGY CODE TECHNICAL SUPPORT INITIATIVE SPONSORED BY THE PAs IN RESPONSE TO QUESTION 13]
- a. How important is the Mass Save Energy Code Technical Support Initiative as a source of code information compared to other sources you might use? [PROBE: not that important, medium, vital]
 - b. Have you ever gone to the Mass Save website looking for information? [IF YES] Were you satisfied with the website? Why or why not?
 - c. Have you ever asked the Mass Save Energy Code Technical Support any questions through email or the telephone? [IF YES] Please tell me briefly how satisfied you were with the response(s) and why.
47. [IF THE RESPONDENT HAS *NOT* MENTIONED MASS SAVE OR THE ENERGY CODE TECHNICAL SUPPORT INITIATIVE SPONSORED BY THE PAs IN RESPONSE TO QUESTION 13] Are you aware of the support provided by the Mass Save Energy Support Technical Initiative on line and by telephone? [IF YES, ASK a through c below]
- a. How important is this source of code information compared to other sources you might use? [PROBE: not that important, medium, vital]
 - b. Have you ever gone to the Mass Save website looking for information? [IF YES] Were you satisfied with the website? Why or why not?
 - c. Have you ever asked the Mass Save Energy Code Technical Support any questions through email or the telephone? [IF YES] Please tell me briefly how satisfied you were with the response(s) and why.

New Construction Programs and other Factors

48. Many homes and buildings in stretch code communities participate in the Mass Save Residential and Commercial New Construction Programs. [If needed, have figures for the particular community available] Would you say participation in these programs has made it easier to enforce the stretch code? Why or why not?
49. Does having other energy efficiency certifications, such as LEED, factor into enforcing the stretch code? Why or why not?



50. What interactions do you have with HERS raters? How important are they in enforcing the stretch code? Are there enough HERS raters to serve the construction needs in COMMUNITY? Has this changed over time [PROBE if had difficulties getting HERS reports on schedule earlier; if this has improved]?

Closing

51. Is there anything we have not covered that you would like to add; in particular, are there any important factors behind stretch code compliance that we have not covered?

Thank you so much for your time!