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Massachusetts Electric and Gas Program Administrators

Follow-up Interviews with CCSI Residential Training Attendees—Final

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Prepared by:

NMR Group, Inc.

NMR Group, Inc.

CADMUS

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Part of the Special and Cross-Cutting Evaluation Program Area

Tetra Tech
6410 Enterprise Lane, Suite 300 | Madison, WI 53719
Tel 608.316.3700 | Fax 608.661.5181
www.tetratech.com

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1. EXECUTIVE SUMMARY

As part of the ongoing evaluation of the Massachusetts Code Compliance Support Initiative (CCSI), NMR conducted follow-up in-depth interviews (IDIs) with 60 individuals who had attended one or more residential classroom trainings approximately six months earlier. Thirty respondents work as municipal building code employees and 30 work as builders, architects, equipment suppliers, or energy efficiency professionals (referred to as 'builders and others'). The overall goal of the follow-up interviews is to determine if and how the subjects are using what they learned at the trainings in the field; the interviews also explored how information from the trainings is shared, the changing environment for code compliance and enforcement, and suggestions for improving the trainings.

1.1 USE OF TRAINING INFORMATION IN THE FIELD

Nearly two out of three respondents (63 percent) said they had made some changes in their work as a result of the training(s) they attended. Municipal building code employees were more likely to say they had made changes due to the trainings (73 percent for inspections and 53 percent for building permit review) than builders and others (53 percent for all work). The areas most affected by changes were insulation, particularly checking depths and around electric boxes for municipal building code employees, and insulation and air sealing for builders and others.

Close to one-half of the municipal building code employees (13 out of 30, or 43 percent) said that the most useful part of the trainings were related to insulation and envelope areas. Air barriers and vapor barriers were also mentioned by close to one-fifth (5 out of 30, or 17 percent) of municipal building code employees as the most useful topic areas that were discussed during the trainings. Many builders and others (10 out of 30, or 33 percent) reported that discussions about insulation and envelope issues were the most useful part of the trainings to them.

The most common reasons for not making any changes to fieldwork after attending the trainings were already knowing the information and working in a stretch code community. While municipal building code employees often cited the latter as a reason for not making any changes, a sizable number who work in stretch code communities (9 out of 16) also noted that they had made changes to their work in the field. Respondents also praised the trainings, noting the benefits of bringing together a diverse group of market actors to discuss code compliance.

1.2 SHARING INFORMATION FROM THE TRAININGS

Nearly three-fourths of respondents (43 out of 60, or 72 percent) had shared some of the information from the trainings with other parties. Builders and others were more likely to share the information (83 percent) than municipal building code employees (60 percent). Among, those who did share information, nearly all of the municipal building code employees (94 percent) shared information from the trainings with builders and contractors, and 39 percent said they shared information with other code official colleagues. Nearly all of the builders and others (96 percent) who shared information from the trainings did so with other builders and contractors and 17 percent said they shared information with code officials. The majority of

respondents (35 out of 43, or 81 percent) said that most of the various parties that they shared information with were using it.

Just over one-half (32 out of 60, or 53 percent) of the respondents said they had attended one or more trainings or gatherings discussing building codes since attended the CCSI training. These trainings and gatherings included seminars, webinars, presentations, conferences, industry association meetings, classroom seminars, and online classes. Municipal building code employees were more likely than builders and others to report having attended a training or gathering discussing building codes since the CCSI training: 19 building code employees compared to 13 builders and others.

1.3 CODE COMPLIANCE AND ENFORCEMENT ENVIRONMENT

Most builders and others reported increased interest in energy efficiency among both code officials (67 percent) and their customers (80 percent) during the past year. Most municipal building code employees (27 out of 28, or 96 percent) placed either a medium, medium-to-high, or high priority on energy efficiency, with about one-half of respondents (15 out of 28, or 54 percent) reporting that checking for energy efficiency is a high priority. Over one-half of municipal building code employees (16 out of 28, or 57 percent) said the priority for checking energy efficiency will continue to increase in the future, with most reporting that it will increase as the code continues to increase.

1.4 CONSIDERATIONS FOR IMPROVING THE CCSI TRAININGS

The most frequent suggestion offered by all respondents was for the CCSI to try to get more people to attend the trainings, especially builders (from municipal building code employees) and contractors (from builders and others). The respondents offered a few specific suggestions for increasing attendance by these groups. These include offering different trainings for attendees with different levels of knowledge and experience, partnering with lumber yards or other suppliers, and coordinating with supervisor license training classes. Other common suggestions from municipal building code employees were to provide different kinds of checklists (5 out of 25, or 20 percent), to adjust the types and duration of the trainings (5 out of 25, or 20 percent), and to focus more on particular areas, especially ventilation (four out of 25, or 16 percent). Builders and others also suggested more focus on areas such as HVAC and types and applications of insulation.

More general suggestions for improving code compliance include offering field assistance at construction sites and educating homeowners about the new code through information accessible by the public. While not all the suggestions provided by the respondents may be practical or cost-effective to implement, they should be considered as some respondents have made good cases for increasing training flexibility to serve more difficult to reach populations.

Finally, all but two of the 60 respondents reported that they would encourage their colleagues to attend the CCSI trainings. Respondents expressed their appreciation for the trainings giving them a good introduction to the energy code and bringing together code officials, builders, and others to discuss situations encountered in the field.

2. INTRODUCTION

NMR, as part of the cross-cutting team, conducted follow-up in-depth interviews (IDIs) with 60 individuals who had attended one or more residential classroom trainings. Thirty respondents work as municipal building code employees and 30 work as builders, architects, equipment suppliers, or energy efficiency professionals. The overall goal of the follow-up interviews is to determine if and how the subjects are using what they learned at the trainings in the field; thus, the team allowed for at least six months between the trainings and the follow-up IDIs. The subjects attended the trainings from September 2014 through February 2015; the team interviewed them from June through September 2015.

2.1 RESIDENTIAL CLASSROOM TRAININGS

The Code Compliance Support Initiative (CCSI) sponsored thirty residential classroom trainings, lasting between three and three-and-one-half hours each, between September 23, 2014 and June 5, 2015.[1] Eighteen trainings concentrated on envelope and building science, twelve on HVAC and indoor air quality, and three on a more general overview of moving from 2009 IECC to 2012 IECC. NMR estimated the residential trainings had 870 unique attendees from the enrollment data and completed immediate surveys available at the trainings. The follow-up IDIs drew from attendees of the 23 trainings held from September 2014 through February 2015 in order to allow for at least six months after attendance.

2.2 FOLLOW-UP INTERVIEW DESIGN

The follow-up interview guides are designed to assess how the trainings have influenced activities in Massachusetts in the past several months.[2] They address the following areas related to the trainings:

- Activities since attending training(s) depending on the type of trainee—home inspections, building permit review, projects under design, projects under construction, and completed projects
- How and if the work done since the training(s) has made use of the information provided
- Most useful part of the training(s) and suggestions for improvement
- Whether the respondents have shared what they learned with others and how this information is being used
- Whether the respondents have recommended the trainings to others.

[1] After a summer hiatus, residential classroom trainings restarted on September 18, 2015. Nine additional residential trainings were offered through the end of 2015.

[2] The CCSI evaluation also uses immediate paper surveys that attendees fill out at the end of each training. The immediate surveys focus more on the quality of the trainings and how much material was new to the respondents. NMR provides summaries of the immediate training survey responses at the end of every five to six residential trainings.

The interview guides also address perceived changes in code enforcement and the market for energy efficiency in the following areas:

- Type of information filed with building departments to document energy code compliance
- Other trainings the respondents have attended and sources of information used
- For builders and others, whether customers have become more interested in energy efficiency and are more willing to pay more for it in the last year or so
- For builders and others, whether interactions with code officials have changed over the past year
- For municipal building code employees, serious issues related to energy efficiency encountered over the past year or so and how they were addressed
- For municipal building code employees, what factors influence the effort spent on checking for the energy-efficiency aspects of code compliance, including time constraints and the availability of trained personnel.

APPENDIX A: contains copies of the interview guides for municipal building code employees and builders and others.

2.3 SAMPLING AND RESPONDENTS

The 60 respondents work in various fields that make use of the trainings provided by the CCSI. One-half of the respondents work for municipalities enforcing the building code; occupations for this group of respondents include building commissioner, deputy building commissioner, and code official. The other one-half of respondents work as builders, architects, subcontractors, equipment suppliers, and energy efficiency professionals, mostly HERS raters; they are referred to as 'builders and others' in this report.

The follow-up IDI sample drew from attendees of the residential trainings held from September 2014 through February 2015 in order to allow for at least six months after attendence. The sample consisted of unique attendees who had registered for the trainings and filled out the immediate survey forms distributed at the end of the sessions. The sample was cleaned to remove attendees who were employed by the Program Administrators or the implementation contractors. This left a sample of 448 individuals, consisting of 275 municipal building code employees and 173 individuals in the builders and others category.

The interviewers sent emails to the entire sample explaining the purpose of the study and the participation process. The study offered $100 as compensation for the interviewees' time which could be paid to them, their employers, or a charity. Individuals who responded to the emails expressing interest were then contacted by the interviewers to complete the interviews.

Eighteen of the 30 IDIs with municipal building code employees and 27 of the 30 IDIs with builders and others were completed with individuals who had respoonded to the emails. The interviewers then selected individuals who had not responded to the emails using a random sample identifier function and contacted them for participation in the study. The interviewers

contacted 138 individuals in total, 71 municipal building code employees and 67 builders and others, to complete the 60 IDIs. Table 2-1 summarizes the sample disposition.

Table 2-1. Sample Disposition

Sample	Total	Municipal Building Code Employees	Builders and Others
Initial sample receiving emails	448	275	173
Total sample contacted by telephone	138	71	67
IDIs completed with individuals expressing interest to emails	45	18	27
IDIs completed through random telephone calls	15	12	3
Total IDIs	60	30	30

The respondents also listed up to three Massachusetts municipalities where they do most of their work. Table 2-2 lists the occupations of the 60 follow-up interview respondents[3] and the numbers who work in municipalities under 2012 IECC building code, the stretch code, or both.[4] More than one-half of the municipal building code employees attending the residential trainings work only in cities and towns that are under the stretch code, while two-thirds of the builders and others work in at least some 2012 IECC municipalities.

Table 2-2. Follow-Up Interview Respondents
(number of respondents)

Position	Total Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
All municipal building code employees	30	12	16	2
Building commissioners	5	2	3	0
Deputy building commissioners	1	0	1	0
Other code officials	24	10	12	2
All builders and others	30	12	10	8
Builders	11	6	3	2
Architects	5	2	2	1
HERS raters	5	0	3	2

[3] Subcategories are listed, with indentations, under the main categories for all tables in this report.
[4] The stretch code, based on 2009 IECC, has been adopted by close to one-half of Massachusetts cities and towns. These municipalities do not use the new building code based on 2012 IECC since the stretch code is considered roughly equivalent to it. A small number of code officials cover more than one town and work under both codes.

Position	Total Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Other energy efficiency specialists	3	1	0	2
Equipment suppliers	2	2	0	0
Engineer	2	0	1	1
Housing rehab specialist	1	0	1	0
HVAC subcontractor	1	1	0	0
All respondents	60	24	26	10

Two out of five respondents attended the Envelope and Building Science (EBS) but not the HVAC and Indoor Air Quality (HVAC-IAQ) trainings while less than one-quarter attended the HVAC-IAQ but not the EBS trainings and one-third attended both (Table 2-3).

Table 2-3. Trainings Attended by Follow-Up Interview Respondents
(number of respondents)

Type of Training Attended	Total Number of Respondents	Type of Respondent	
		Municipal Building Code Employees	Builders and Others
EBS only*	24	11	13
HVAC-IAQ only*	14	4	10
Both EBS and HVAC-IAQ	20	13	7
2009 to 2012 IECC	2	2	0
Total	60	30	30

*Some of these respondents also attended the 2009 to 2012 IECC training or various commercial trainings

3. USE OF TRAINING INFORMATION IN THE FIELD

A key goal of the follow-up interviews is to assess how the training attendees are using what they have learned in their everyday jobs. The question posed to them was:

> "Have you changed how you conduct inspections for the energy code (code officials)/ made any changes in your work on these projects to better comply with the energy code (builders and others) as a result of the training(s) you attended?"

Nearly two out of three respondents (63 percent) said they had made some changes in their work as a result of the training(s) they attended. Municipal building code employees were more likely to say they had made changes due to the trainings (73 percent for inspections and 53 percent for building permit review) than builders and others (53 percent for all work). This section first examines the opportunities trainees had to use what they had learned—that is, how many housing units they built or how many building inspections they conducted. The respondents also estimated the number of inspections for units permitted under 2012 IECC and, for municipal building code employees, how many building permits they had reviewed. This section then examines what changes the respondents believe they made due to the trainings and why a sizeable minority did not make any changes.

3.1 BUILDING UNITS INSPECTED AND HOUSING CONSTRUCTION

Most respondents (88 percent) have either conducted building inspections or been involved in residential unit construction since attending the trainings. Seven respondents have not been involved in inspections or residential construction; one is a municipal building code employee who only reviews permits and two are equipment suppliers. Of the remaining four, one works mainly on commercial projects, one works mainly outside Massachusetts, and two have not had their projects reach an inspection stage.

As shown in Table 3-1, 14 of the 29 municipal building code employees who have participated in home inspections since attending the trainings have examined homes permitted under 2012 IECC. The respondents estimated the total number of housing units involved per inspection; this includes housing units in multifamily projects. We also note that some inspections involve rehabs and additions; others involve specific areas such as HVAC systems rather than entire new construction projects. Municipal building code employees estimated close to 5,000 inspections on a housing unit basis, including nearly 1,600, or about one-third, permitted under 2012 IECC.

Table 3-1. Inspections by Follow-Up Interview Respondents
(Municipal Building Code Employees)

Types of Inspections	Number of Respondents	Number of Housing Units
All inspections	29	4,889
All inspections of 2012 IECC homes	14	1,591
Final inspections	29	1,698
Final Inspections of 2012 IECC homes	14	844

As shown in Table 3-2, 14 out of the 24 builders and others who have worked on residential construction projects since attending the trainings have worked on homes permitted under 2012 IECC. Their work involved 832 housing units with, again, one-third or 275 of them permitted under 2012 IECC.

Table 3-2. Construction by Follow-Up Interview Respondents (Builders and Others)
(multiple response for number of respondents)

Types of Projects	Number of Respondents	Number of Housing Units
All projects	24	832
Projects in the planning stage	9	123
Projects under construction	17	403
Projects with final inspections	18	306
All 2012 IECC projects	14	275
2012 IECC projects in the planning stage	6	56
2012 IECC projects under construction	8	122
2012 IECC projects with final inspections	8	97

The follow-up IDIs also asked municipal building code employees to estimate how many building permit applications they had reviewed since attending the trainings. Twenty-eight of the 30 code officials said they are responsible for permit review; they estimated they had reviewed permits involving over 12,000 housing units since attending the trainings. Again, many of the permits involved multifamily projects as well as rehabs and additions to existing homes.

3.2 CHANGES MADE TO WORK AFTER ATTENDING TRAININGS

The interviewers asked all respondents who said they made any changes to their work after attending the trainings to explain how they had changed what they do in the field. To the extent possible, the interviewers tried to get the respondents to describe the areas affected by

these changes. The resulting descriptions, as detailed in this section, varied from focusing on specific areas to more general changes.

3.2.1 Municipal building code employees

Most (22 or 73 percent of 30) municipal building code employees said they made some changes to conducting inspections after attending the trainings. As shown in Table 3-3, respondents who attended both the EBS and HVAC-IAQ trainings were more likely to make changes to conducting inspections. This may be due to respondents with less knowledge in this field attending more trainings.

Table 3-3. Trainings Attended by Follow-Up Interview Respondents
(number of municipal building code respondents)

Whether made changes to conducting inspections	Number of Respondents	Type of training attended			
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ	2009 to 2012 IECC
Yes	22	7	2	11	2
No	8	4	2	2	0

As already noted, all respondents had filled out immediate survey forms after their trainings. Table 3-4 compares the responses to the immediate survey question of when they expected to first use what they had learned in the training session with whether the respondents reported changing how they conduct inspections in the follow-up interviews. While one respondent correctly noted in the immediate survey that he would not use information for more than one year, most respondents, even those who did not change the way they conduct inspections, had said they would be using the training information immediately.

Table 3-4. When Expected to First Use Training Information and Changes Made
(number of municipal building code respondents)

Expected to first use training in immediate survey	Whether made changes to conducting inspections	
	Yes	No
As soon as I walk out the door	18	6
Sometime in the next three months	3	1
In the next four to six months	1	0
More than a year from now	0	1

As shown in Table 3-5, the most frequently mentioned area affected by changes to inspection was insulation; some respondents gave more specific answers, noted below the general areas.

Table 3-5. Areas Affected by Municipal Building Code Employee Changes to Inspections

(number of respondents; multiple response)

Areas	Number of Respondents	Type of training attended			
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ	2009 to 2012 IECC
All building code employees who made changes	22	7	2	11	2
All insulation and envelope areas	10	4	1	4	1
Insulation around electric boxes	2	1	0	1	0
Checking insulation depth using the guides provided	2	2	0	0	0
Attic insulation	1	0	1	0	0
Verifying proper application of spray foam insulation	1	1	0	0	0
Verifying insulation of ductwork in unconditioned areas	1	0	0	1	0
Verifying sheetrock installation	1	0	0	1	0
Air/vapor barriers	4	2	0	2	0
All ventilation	4	0	2	1	1
Bathroom fans	2	0	1	1	0
Paying attention to air exchanges	1	0	1	0	0
Air sealing	5	2	2	1	0
Ductwork	3	0	0	3	0
Educating builders and contractors	2	1	0	1	0
Reviewing HERS reports	1	0	0	1	0
Asking for the Manual J calculations performed	1	0	0	1	0
Did not provide specific areas	3	1	0	1	1

The follow-up IDIs also asked municipal building code employees if they were spending more time on inspections after the trainings and, if so, to estimate how much more. Only five of the municipal building code employees said their time had increased. In all cases, the increases

were small; two said the time spent on inspections had increased by five minutes; one said it had increased by two to three minutes; and two said it took “a little while longer”.

Fewer municipal building code employees (16 out of 30, or 53 percent) said they had changed how they review building permit applications after the trainings. Most mentioned the same areas covered in the changes to how they conduct inspections (Table 3-6). All of the building code employees who said they made changes to permit review after the trainings had also said they made changes to how they conduct inspections.

Table 3-6. Areas Affected by Municipal Building Code Employee Changes to Permit Review
(number of respondents; multiple response)

Areas	Number of Respondents	Type of training attended			
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ	2009 to 2012 IECC
All building code employees who made changes	16	5	2	8	1
Checking insulation requirements	8	2	1	4	1
Ventilation	2	0	1	0	1
Checking HERS reports	2	0	1	1	0
Air/vapor barriers	1	1	0	0	0
Air sealing	1	1	0	0	0
Ductwork	1	0	0	1	0
Verifying compliance path is in the plans	1	0	0	1	0
Understanding prescriptive requirements	1	0	0	1	0
Asking for the Manual J calculations performed	1	0	0	1	0
Did not provide specific areas	2	1	0	1	0

Again, the follow-up IDIs also asked municipal building code employees if they were spending more time on plan review after the trainings and, if so, to estimate how much more. Only three municipal building code employees said their time had increased. Again, the increases were small; one estimated ten minutes per plan, one estimated two minutes, and one could not give an estimate.

Some respondents elaborated on the subtle ways they are using what they learned at the trainings in the field. Regarding inspections, one deputy building commissioner that attended an EBS training noted:

> *I’m just more aware and in tune of some of the finer details and ensuring that things are being done properly. Making sure there’s no voids in the insulation. … I pay a little bit closer attention to some of the finer details such as making*

sure behind electrical boxes and things like that to ensure that's been properly completed.

Regarding permit review, another code official that attended an HVAC-IAQ training noted:

> *Those two things that I remember off the top of my head [ceiling & knee wall insulation], we are certainly looking for them and people are generally not putting them in plans, but we point it out with our red pencil so they have to do it. [Do you pay more attention to certain areas and, if so, which ones?] The HERS rating. We're looking at that now, but we never used to look at it because it really wasn't presented. So not just the insulation in isolation, but the whole building – we're looking at that a lot more than we used to.*

3.2.2 Builders and others

Slightly more than one-half (16 or 53 percent of 30) of the builders and others interviewed said they made some changes to their work after attending the trainings. As shown in Table 3-7, respondents who attended the EBS training were more likely to make changes to their work.

Table 3-7. Trainings Attended by Follow-Up Interview Respondents
(number of builder and other respondents)

Whether made changes to work	Total Number of Respondents	Type of training attended		
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ
Yes	16	8	5	3
No	14	5	5	4

As already noted, all respondents had filled out immediate survey forms after their trainings. Table 3-8 compares the responses to the immediate survey question of when they expected to first use what they had learned in the training session with whether the respondents reported changing anything in their work. Note that some respondents provided different responses for the different trainings they attended. Interestingly, respondents who said they did not change anything in their work following the trainings were actually more likely to say that they would use what they had learned as soon as they walked out the door in the immediate surveys, but this is based on a small sample size.

Table 3-8. When Expected to First Use Training Information and Changes Made
(number of builder and other respondents; multiple response)

Expected to first use training in immediate survey	Whether made changes to work	
	Yes	No
As soon as I walk out the door	10	11
Sometime in the next three months	6	3
In the next four to six months	1	1
In the next seven to twelve months	1	0
More than a year from now	1	0

As in the case of the municipal building code employees, most of the builders and others who said they made some changes to their work after the trainings, with some prodding by the interviewers, specified areas they addressed after the trainings. As shown in Table 3-9, insulation, air sealing, HVAC requirements, and ventilation were mentioned most frequently; some respondents gave more specific answers, noted below the general areas.

Table 3-9. Areas Affected by Builder and Other Trainee Changes
(number of respondents; multiple response)

Areas	Number of Respondents	Type of training attended		
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ
All builders and others who made changes	16	8	5	3
All insulation and envelope areas	10	5	2	3
Floor insulation	2	1	0	1
Allocate funds to areas that require better insulation	2	0	1	1
Sheeting	1	1	0	0
All air sealing	7	3	2	2
Improved caulking techniques	1	0	0	1
Changed products used for air sealing	1	1	0	0
HVAC requirements	4	0	2	2
Better review of subcontractor work	1	0	1	0
Ventilation	3	2	1	0
Relayed information to employees or subcontractors	2	0	1	1
Understand need to call in HERS rater early	2	0	2	0
Air/vapor barriers	2	1	1	0
Duct sealing	2	1	1	0
Ductwork	1	1	0	0
Did not provide specific areas	1	1	0	0

Respondents in this group were more likely than the municipal building code employees to elaborate on the specifics of how their work had changed. One builder that attended the EBS and HVAC-IAQ trainings said,

> *Probably the biggest difference is that one of our installers of insulation – a guy that sprays an open cell product - changed his product because the stuff that he used was having problems adhering, which was never visible or noticeable, but it was something that was talked about in the class, making sure that its*

sticking to the substrate properly then checking it, which we have done and realized this one product was not working well...[Do you pay more attention to certain areas and, if so, which ones?] All the little stuff, like seams in termination points and getting around fenestrations; things that are easy to skip over that need to be addressed better. And the separation between first floor and basement is done a little bit differently since then. It's a matter of where does the insulated envelope start and stop. In the basement that has been something that's not fully understood or left open to interpretation, whereas now it's very clear…The big picture stuff we're all very aware of, it's more ancillary details that have been refined in the class.

Another builder was quite happy he attended the HVAC-IAQ training,

That one [2012 IECC] project we completed, I should have called the HERS rater sooner than I did, because I didn't know I had to call him because the town it was done in didn't necessarily say I needed a HERS rater. From now on I'm going to call a HERS rater right from the start. I'm paying a lot more attention to energy, insulation, caulking, and sealing. I thought I paid a lot of attention to it before, but that is nothing compared to what I pay to it now. It's just a requirement for doing business. If I had not attended the trainings, I probably would have failed the inspection on the one [2012 IECC] unit that was completed that required a lot of attention to insulation. I would have likely failed; I wouldn't have gotten an occupancy permit.

3.3 WHY NO CHANGES WERE MADE AFTER ATTENDING TRAININGS

Twenty-seven percent of municipal building code employees and 47 percent of builders and others said they made no changes to their work in the field after attending the trainings. The main reasons were already being familiar with the information presented at the trainings and working in communities under the stretch code.

3.3.1 Municipal building code employees

As shown in Table 3-10, municipal building code employees were slightly more likely to say they had not made any changes to how they conducted inspections since they already knew the information presented. However, they were more likely to say they did not make any changes to building permit application review because they work in stretch code communities.

Table 3-10. Why Municipal Building Code Employees Made No Changes
(numbers of respondents; multiple response)

Reasons	Inspections	Building Permit Application Review
All building code employees who did not make changes	8	14
Already knew the information covered	4	5
Work in a stretch code community	3	7
Did not give a reason	0	1
Do not do inspections/permit review	1	3

3.3.2 Builders and others

As shown in Table 3-11, HERS raters and other energy efficiency specialists were the most likely to say they had not made any changes to their work because they already knew the material covered by the trainings. All but one of the five HERS raters interviewed said they had made no changes to their work and all three of the other energy efficiency specialists interviewed said they had made no changes to their work after the trainings. However, only two of the 11 builders and one of the five architects interviewed said they had made no changes to their work in the field, again, because they believe they are already working on very efficient homes.

Table 3-11. Why Builders and Others Made No Changes
(numbers of respondents; n=14)

Type of Respondent	Reason	Number of Respondents
HERS Rater	Already knew the information covered	4
Other energy efficiency specialist	Already knew the information covered	2
Other energy efficiency specialist	Does not apply to work	1
Equipment supplier	Does not apply to work	2
Builder	Already building energy efficient homes	1
Builder	Too late for current projects but can use in the future	1
Architect	Already designing energy efficient homes	1
HVAC subcontractor	Already working to code	1
Engineer	Working in stretch code community	1

3.3.3 Stretch code effect

As noted above, municipal building code employees often said they made no changes after the trainings because they work in stretch code communities. Table 3-12 gives an overall perspective on the stretch code effect; while most (7 out of 8) of the municipal building code

employees who did not change anything were in stretch code communities, 9 out of the 22 municipal building code employees who made changes work exclusively in stretch code communities. Working in stretch code communities appears not to have had much effect on whether builders and others changed their practices after the trainings.

Table 3-12. Changes to Work Practices by Community
(numbers of respondents; n=60)

Respondents	Total	2012 IECC Community	Stretch Code Community	Both
Municipal building code employees who changed some practices	22	11	9	2
Municipal building code employees who did not change anything	8	1	7	0
Builders and others who changed some practices	16	5	6	5
Builders and others who did not change anything	14	7	4	3
All respondents	60	24	26	10

3.4 BENEFITS OF THE TRAININGS CITED BY RESPONDENTS

After discussing the changes that they had made to their work or why they had made no changes, the respondents talked about other areas where the trainings had provided benefits. An equipment supplier who attended an EBS training and had earlier said the trainings did not affect his work, noted:

> *We have a lot of retrofit customers…but knowing the building codes on new construction gave me more confidence in talking to those guys doing new construction….knowing…the proper installs and products, having that knowledge from the training has been good interacting with these new customers*.

The other equipment supplier who also attended an EBS training and had not made changes to his work also commented:

> *The R-values increasing; that [requires] more insulation, which increases volume for me as a distributor selling insulation products. It shed some light into how the program, how the state of Massachusetts is helping inspectors, builders, and contractors really know what the new changes are going to be; whether it's insulation or windows.*

Some municipal building code employees also noted that the trainings had influenced their work beyond doing inspections and reviewing building permit applications. One code official who attended both EBS and HVAC-IAQ trainings noted that his interactions with the public are changing:

> *Yes. I would say we're more proactive in trying to get people to do more than just the code. We get the question, "how much insulation should I put in?" And*

I will tell them, "the code requires this level, but as much as you can afford, you're better off putting it in." We try to push them to spend a little more money to make the houses more efficient. We try to steer people in the direction of spray foam insulation. We've had a lot of questions this spring in regards to ice damns. I tell people, "the only thing I can tell you that cures ice damns is spray foam insulation in the roof."

A builder who had attended the EBS, HVAC-IAQ, and 2009 to 2012 IECC trainings commented on the benefits of bringing together a diverse group of market actors to discuss compliance:

I find the seminar is good because you bring together a whole bunch of not just builders, but also inspectors. And when you have a good open discussion in the classroom environment, some good ideas get exchanged: what the inspectors are looking for in particular, different ways of applying new products or new ways of doing things that get the job done better. I find that discussion to be as helpful as what you actually learn from the seminar itself.

4. MOST USEFUL INFORMATION FROM TRAININGS

A key goal of the follow-up interviews is to identify what areas the attendees found most useful about the trainings and why. The question posed to them was:

> "To the best of your recollection, can you tell me which part or parts of the training(s) you found most useful and why?"

The resulting descriptions, as detailed in the following subsections, varied from focusing on specific topics that respondents found useful to more general feedback about the usefulness of the trainings.

4.1 MUNICIPAL BUILDING CODE EMPLOYEES

Table 4-1 shows the feedback received from municipal building code employees about which part or parts of the trainings they found most useful. Close to one-half of the municipal building code employees (13 out of 30, or 43 percent) said that the most useful part of the trainings were related to insulation and envelope areas. Air barriers and vapor barriers were also mentioned by close to one-fifth (5 out of 30, or 17 percent) of municipal building code employees as the most useful topic areas that were discussed during the trainings.

Table 4-1. Most Useful Information from Trainings—Municipal Building Code Employees
(multiple response; n=30)

Most Useful Part of Training	Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
All insulation and envelope areas	13	6	7	0
Blower door test	3	3	0	0
Draft stopping	1	1	0	0
Thermal imaging photographs	1	0	1	0
Air/vapor barriers	5	2	3	0
Good overview of code changes	5	1	3	1
Duct work/testing	2	0	1	1
All HVAC	2	1	1	0
Manual J	1	1	0	0
All Ventilation	2	0	2	0
Ventilation formulas	1	0	1	0
Exhaust fans	1	0	1	0
Examples of proper and improper installations	2	1	1	0
Prescriptive requirements	2	1	1	0

Most Useful Part of Training	Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Acceptable materials	1	0	1	0
Air sealing	1	1	0	0
Classroom demonstration	1	0	1	0
Future code requirements	1	0	1	0
Good presenters	1	1	0	0
Open dialogue	1	0	1	0
Photographs from inspections	1	1	0	0
Training followed the code well	1	1	0	0
General	4	0	4	0
Don't remember	1	0	1	0

Regarding insulation and air barriers, one code official who attended an EBS training noted:

> *Knee wall insulation and other issues like that are difficult to understand for many contractors. The trainings are helpful for them in terms of issues related to air barriers and what materials are acceptable and won't break the bank. Contractors need to talk about acceptable solutions for materials and the training did that well.*

Another code official who also attended an EBS training described how seeing thermal imaging photographs was useful:

> *The thermal imaging photographs were very helpful. It gives you a gauge of how much heat is actually being lost. Especially comparative photographs where they're showing a set of exterior concrete steps, one that had been properly insulated away from the house and one that was not. You could see the one that was not was glowing red. There were more photographs similar to that, and I found that to be very helpful in seeing how much heat is being lost with some of the improper construction techniques.*

One Building Commissioner provided more general feedback about how useful the EBS training he attended was to himself and others in attendance:

> *The classes try to put everyone on the same page, which is helpful. As a Building Commissioner, I already knew the information, but I like to attend to see what others are asking about and to answer any questions or provide context from my perspective. We do a lot of existing building work [in our town], and I thought it was very helpful for the audience to talk about the renovation side of things.*

Another Building Commissioner in a stretch code community who attended both the EBS and HVAC-IAQ trainings noted the following about the usefulness of the trainings, despite the trainings' focus on topics more relevant to the 2012 IECC code:

[Our city] is a stretch community so a lot of the training topics were not yet applicable to us because they were talking about the 2012 [IECC] code or future codes, but it's still helpful for us to get a sense of what is going on with these other codes. Also, it's helpful to hear what others experience going through the inspection process.

4.2 BUILDERS AND OTHERS

Table 4-2 shows the feedback received from builders and others about which part or parts of the trainings they found most useful. As in the case of the municipal building code employees, many builders and others (10 out of 30, or 33 percent) reported that discussions about insulation and envelope issues were the most useful part of the trainings to them. Builders and others tended to give more general answers with close to one-half (13 out of 30, or 43 percent) reporting that the most useful part of the training to them was being provided with a good overview of the code.

Table 4-2. Most Useful Information from Trainings – Builders and Others
(multiple response; n=30)

Most Useful Part of Training	Total Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Good overview of code changes	13	6	3	4
All insulation and envelope areas	10	3	2	5
Housing tightness	1	1	0	0
Infiltration	1	0	0	1
Molding	1	0	1	0
Thermal bridge	1	0	0	1
Air/vapor barriers	4	1	2	1
Duct work/testing	3	2	1	0
HVAC	3	3	0	0
Prescriptive vs. Performance paths	3	0	1	2
Good presenters	2	2	0	0
Showing examples and referring to specific sections in code	2	0	1	1
Social opportunity with other stakeholders	3	1	1	1
Acceptable materials	1	1	0	0
Air sealing	1	0	0	1
Context behind code	1	1	0	0
Correction of misinformation	1	0	1	0
Different techniques	1	0	0	1

Most Useful Part of Training	Total Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Examples of proper and improper installations	1	0	1	0
Graphs, charts on energy usage	1	0	1	0
Photographs from inspections	1	0	1	0
Renovations	1	1	0	0
Ventilation	1	1	0	0
Don't remember	1	0	1	0

One builder who attended both the EBS and HVAC-IAQ trainings described the usefulness of learning about insulation code changes as well as less disruptive installation techniques:

> *Part of the changes to the code have to do with increased insulation levels so less energy is used. I found all of those to be helpful because the discussions that ensued talked about different insulation techniques so that you could be least disruptive in the traditional way of building… finding the techniques that are the least disruptive in the way they've been doing things is always good to know, so you can work with your trades and point things out to make things easier for them.*

Another builder who attended the HVAC training commented on the usefulness of having been provided with the context behind why the insulation code is written as it is:

> *I found the information on insulation requirements the most helpful. Just getting up to speed… and having a broader understanding of what they need to accomplish is from an insulation standpoint very helpful to me to advocate with the people that are designing our stuff that we try and put as much of the ductwork as we can within the envelope.*

Another builder who attended both the EBS and HVAC-IAQ trainings commented on the usefulness of the HVAC discussion as well as envelope, air sealing, and infiltration topics:

> *When I took the trainings last November, I was somewhat new to residential. I had done more work on the commercial side, so it was a good intro to standard building practices on the residential side. I specifically remember the HVAC section being interesting: learning about the different HVAC systems and things to look for in code compliance as well as the specifics of the building envelope, air sealing, and infiltration parts of the code were really valuable to learn because they are somewhat different from the commercial code.*

One architect who attended the EBS training commented on the usefulness of images to show installation techniques:

The most useful part was the fact that they used slides and photos and showed the "forensic" side of doing inspections. There were useful images shown of proper and improper installations.

A HERS rater who attended the EBS training commented on the usefulness of having many stakeholders in the same place to discuss the code:

What was nicest was the fact that everybody was in the room: raters, building code officials, architects, builders. I was more interested in what people were being told, because code is getting interpreted differently everywhere.

5. SHARING OF INFORMATION AND RECOMMENDING TRAININGS

The follow-up interviewers also probed into whom the training attendees have shared information from the trainings with, what information was shared, how the information is being used, and whether the training attendees have recommended the trainings to their colleagues. The questions posed to them were:

> "Please think of different parties you interact with such as people in your building department, colleagues from other jurisdictions, builders, contractors, and others (municipal building code employees)/ as people working on your project, colleagues, code officials, and others (builders/others). Have you shared information from the training(s) with others?
>
> Can you tell me what information you shared and with whom?
>
> Do you believe the party/parties is/are making use of the information you have shared? How are they using this information?
>
> Would you recommend that your colleagues attend the Energy Code Technical Support Initiative trainings? Why or why not?"

The resulting feedback, as detailed in the following subsections, shows that a variety of information was shared from the trainings with a diverse group of stakeholders. Nearly all training attendees would recommend the trainings to their colleagues; some respondents noted that they had already done so and that these other parties had attended a training.

5.1 PARTIES THAT INFORMATION HAS BEEN SHARED WITH

The interviewers asked respondents if they had shared information from the trainings with other parties that they typically interact with. As shown in Table 5-1, close to three-fourths of respondents (43 out of 60, or 72 percent) had shared some of the information from the trainings with other parties. Builders and others were more likely to share the information than municipal building code employees. Note that one respondent did not provide a response to this question, and 16 others said they had not shared any information from the trainings with anyone else as of yet.

Table 5-1. Training Information Shared with Other Parties

Training Info Shared with Others?	Number of Respondents	Type of Respondent	
		Munic. Bldg. Code Empl.	Builder/Other
Yes	43	18	25
No	16	11	5
No response	1	1	0

The interviewers then asked the respondents who said they had shared information (n=43) which parties they had shared the information with. As shown in Table 5-2, almost all of the municipal building code employees (94 percent) shared information from the trainings with

builders and contractors, and seven of eighteen municipal building code employees (39 percent) said they shared information with other code official colleagues.

Table 5-2. Parties that Municipal Building Code Employees Shared Training Information With
(multiple response; n=18)

Party Information was Shared with	Total Number of Respondents
Builders/contractors	17
Code officials	7
Architects	3
Homeowners	3
HERS raters	1
Municipal committees and trusts	1
Tradespeople	1

As shown in Table 5-3, almost all of the builders and others (96 percent) shared information from the trainings with other builders and contractors.

Table 5-3. Parties that Builders and Others Shared Training Information With
(multiple response; n=25)

Party Information was Shared with	Total Number of Respondents
Builders/contractors	24
Code officials	4
HERS raters	4
Homeowners	4
Municipal committees and trusts	4
Architects	3
Tradespeople	2
Engineers	1

The majority of respondents (35 out of 43, or 81 percent) believe that most of the various parties that they shared information with are using it. Five respondents said that only some of the other parties are using the information, or that they can only assume the information is being used. Finally, five other respondents said they were not sure if the parties were using the information, or did not know if it was being used in a tangible way (Table 5-4).

Table 5-4. Whether Information Shared with Others Is Being Used
(multiple response; n=43)

Parties Receiving Information from the Trainings	Yes	Some are	Assume so	Not sure	Not in a tangible way
n	*35*	*2*	*3*	*4*	*1*
Architects	6	0	0	0	0
Builders/contractors	33	2	2	4	0
Code officials	8	0	3	0	0
Engineers	1	0	0	0	0
HERS raters	5	0	0	0	0
Homeowners	6	0	0	1	0
Municipal committees and trusts	4	0	0	0	1
Tradespeople	3	0	0	0	0

5.2 INFORMATION SHARED WITH OTHER PARTIES AND USE

The interviewers also asked respondents to describe the information that they shared with other parties. Table 5-5 shows the information from the training that attendees shared with code officials. Most of the code officials that attendees shared information with were provided information about insulation and envelope training topics.

Table 5-5. Information Shared with Code Officials
(multiple response; n=11)

Information Shared	Total Number of Respondents
All insulation and envelope areas	7
Insulation	4
Envelope	2
Infrared photography	1
Code information/changes	5
Air sealing	2
Ductwork	2
HVAC	1

Table 5-6 shows the information from the trainings that respondents shared with builders and contractors. Similar to code officials, close to two-thirds (25 out of 38, or 66 percent) of the builders and contractors that respondents shared information with were provided information about insulation and envelope training topics.

Table 5-6. Information Shared with Builders and Contractors
(multiple response; n=38)

Information Shared	Total Number of Respondents
All insulation and envelope areas	25
Make up air	3
Thermal barriers	2
Blower door testing	1
Housing tightness	1
Infiltration	1
Infrared photography	1
Moisture issues	1
Air sealing	8
Code information/changes	8
All HVAC	4
Mechanical ventilation	2
Sizing of heating systems	1
Ductwork	4
Air/vapor barriers	2
Ventilation	1
Don't remember/didn't say exactly what was shared	8

Table 5-7 shows the information from the trainings that respondents shared with all other parties. Respondents most often shared information with architects about insulation and envelope training topics, and with HERS raters and homeowners about code information/changes.

Table 5-7 Information Shared with All Other Parties
(multiple response; n=18)

Information Shared	Party Receiving Information					
	Architects	Engineers	HERS Raters	Home owners	Municipal committees and trusts	Trades people
n	*6*	*1*	*5*	*7*	*4*	*3*
Code information/changes	3	1	4	6	2	0
All insulation and envelope areas	4	0	1	0	2	3
Housing tightness	0	0	0	0	1	0
Infiltration	0	0	0	0	0	1
Infrared photography	1	0	0	0	0	0
Air sealing	1	0	0	0	0	0
Ductwork	0	0	0	0	0	1
Ventilation	0	0	1	0	0	0
Don't remember/didn't say exactly what was shared	0	0	0	1	2	1

Feedback on the use of training information passed on to various parties is broken out into broad categories in Table 5-8, Table 5-9, and Table 5-10 by the type of party using the *information (not by respondent type).*

Table 5-8 shows how the information that respondents shared with code officials is being used. Code officials are using the information for code enforcement in general, as well as specifically to help them enforce air sealing, ductwork, envelope, HVAC, and insulation requirements.

Table 5-8. How Information Is Being Used by Others: Code Officials
(multiple response; n=11)

How Information is Being Used	Total Number of Respondents
To enforce code - general	6
To enforce insulation requirements	3
To enforce air sealing requirements	2
To enforce ductwork requirements	2
To enforce envelope requirements	2
To enforce HVAC requirements	1

Table 5-9 shows how the information that respondents shared with builders and contractors is being used. Builders and contractors are using the information to help them meet the code in general (8 out of 38, or 21 percent), as well as specifically to help them meet insulation and envelope requirements (23 out of 38, or 61 percent), and air sealing requirements (8 out of 38, or 21 percent). Close to one-fourth (9 out of 38, or 24 percent) of respondents said they shared information from the trainings with this group, but did not know how the information was used.

Table 5-9. How Information Is Being Used by Others: Builders and Contractors
(multiple response; n=38)

How Information is Being Used	Total Number of Respondents
All insulation and envelope areas	23
To meet insulation requirements	10
To meet envelope requirements	3
To meet make-up air requirements	3
To meet thermal barrier requirements	2
To meet blower door testing requirements	1
To meet housing tightness requirements	1
To meet infiltration requirements	1
To price insulation work correctly	1
To troubleshoot moisture issues	1
All air sealing	8
To meet air sealing requirements	7
To price air sealing work correctly	1
To meet code - general	8
To meet ductwork requirements	4
To meet HVAC requirements	2
To meet mechanical ventilation requirements	2
To meet air barrier requirements	1
To meet vapor barrier requirements	1
Don’t know how information was used	9

Table 5-10 summarizes how the information that respondents shared with all the other parties that were mentioned is being used. Most often these other parties are using the information they received to include in their architectural plans (architects), meet the code (engineers, HERS raters, tradespeople), or to understand the code better (homeowners, town or city committees, and trusts).

Table 5-10. How Information Is Being Used by Others: All Other Parties
(multiple response; n=18)

How Information is Being Used	Architects	Engineers	HERS Raters	Home owners	Municipal committees and trusts	Trades people
n	*6*	*1*	*5*	*7*	*4*	*3*
Incorporate into architectural plans	5	0	0	0	0	0
To meet code	0	1	5	0	0	5
To meet ductwork requirements	0	0	0	0	0	1
To meet envelope requirements	0	0	0	0	0	1
To meet HVAC requirements	0	0	0	0	0	1
To meet infiltration requirements	0	0	0	0	0	1
To meet insulation requirements	0	0	1	0	0	1
To meet ventilation requirements	0	0	1	0	0	0
To understand code	1	0	1	6	4	0
To understand envelope requirements	1	0	0	0	1	0
To understand housing tightness best practices	0	0	0	0	1	0
Don't know how information was used	0	0	0	1	2	1

The following quotes provide more context about what information was shared, and how that information was used.

An HVAC subcontractor who attended the EBS and HVAC-IAQ trainings noted discussing the training topics in a more general way with his colleagues and with local inspectors:

> *After we take these courses we all kind of discuss with the inspector and among ourselves the things that have changed and the things we need to look for and things that we're going to start doing better. We talk about the whole class and what's changed and what we like and what we don't like and stuff like that.*

A code official who attended both the EBS and HVAC-IAQ trainings noted what he had shared with his colleagues as well as builders and contractors and why he believes it is important to share that information:

> *With other building inspectors, we've talked about R-values and envelope, the upcoming new requirements for makeup air, the requirement for insulating exhaust duct work. I've shared all that same information with builders and contractors; it's just a little different conversation. I take the approach that I'd much rather spend 5 minutes with someone who doesn't know and teach them what's required, knowing that the next time they will do it the right way and I won't have to make 2 trips to pass an inspection, just one…Especially because all the contractors and builders talk to each other.*

An equipment supplier who attended the EBS training noted sharing insulation-related information with his customers:

> *The guys I deal with on a daily basis (insulation contractors) are always asking about the new changes. They have questions. The inspectors are going back to the insulation contractors and are making sure they are doing everything up to code. They come back to me as the distributor who should know this information and explain to them the correct way to go about the individual jobs they need to do. There's just been a lot of questions on what the correct R-values are. What type of R-value they need to achieve, I bring it back from the information I learned in that class.*

A builder who attended both the EBS and HVAC-IAQ trainings noted that he passes on different techniques that he has learned to the various subcontractors and tradespeople that he works with:

> *I pass on different techniques on how to do different things as part of what they're doing, whether it's the heating people or the insulation people, even plumbers and electricians. We are trying to make everybody more aware of the envelope of the structure so we can cut down on air infiltration.*

5.3 RECOMMENDING TRAININGS TO OTHER PARTIES

The interviewers asked respondents if they would recommend that their colleagues attend the Energy Code Technical Support Initiative trainings. All but two of the 60 respondents reported that they would encourage their colleagues to attend the trainings. One municipal building code employee thought the trainings were mandatory for colleagues and so did not see the purpose of recommending them to anyone. One HERS rater said she worked alone and did not interact with colleagues.

One HVAC contractor who attended both the EBS and HVAC-IAQ trainings provided the following additional context about why he would recommend the trainings to his colleagues:

> *I think it's necessary, I think it should be required. It kind of is required for us to maintain our licenses; we need a certain amount of continuing education credits. I think this is a great way to get it because you're learning what you need to do. It saves you money, it saves the contractor money, it saves everyone money if people walk onto the job site knowing what they're job is and what they need to get done to make it right. I think everyone should take it.*

An equipment supplier who attended the EBS training provided some insight about why he thought it was important for those new to the industry to be encouraged to attend the trainings:

> *I was new to the industry a year and a half ago. I was always ears open, willing to learn. I was able to take a lot of that info and continue to develop my knowledge of the industry, products, and codes. I thought it was great. For new people, you can learn a lot from that.*

A builder who attended both the EBS and HVAC-IAQ trainings said that he would recommend the trainings to others for the following reason:

> *It's very helpful to do the trainings because it keeps you up to date with code changes which in turn is needed for inspectors to sign off on your work and to get your renewal of your license. So much money is at stake if a mistake is made that it's important to keep up with code.*

An architect who attended the EBS training and would recommend the trainings to her colleagues believes Mass Save should try to encourage more architects to attend in the future:

> *Yes, I would advertise it more with architects because I think it's very helpful for architects as well…The target audience is contractors, building inspectors, and architects or building professionals, but in reality I have the feeling that mostly contractors and building officials are going to the Mass Save seminars. They are well priced and I think many architects would benefit from going there.*

Seventeen respondents volunteered that the parties that they had recommended the trainings to had attended one or more of the trainings. The interviewers did not directly ask if the respondents had actually recommended the trainings or if the other parties had attended. It is possible that more respondents have recommended the trainings and know of colleagues who have attended.

6. SOURCES OF INFORMATION IN ADDITION TO CCSI

The follow-up interviews presented an opportunity to identify the primary sources of information that municipal building code employees, builders, and others consult regarding building code requirements. The questions posed to them were:

> "Since [DATE(S) of CCSI TRAINING(S)], have you attended any other trainings, webinars, or gatherings discussing building codes? If yes, what was the focus of these events?
>
> Other than the [CCSI TRAINING(S)] and [any other trainings, webinars, or gatherings discussing building codes attended since DATE(S) of CCSI TRAINING(S)], what are your main sources of information on building code requirements?"

6.1 TRAININGS ATTENDED SINCE CCSI TRAININGS

Just over one-half (32) of the 60 respondents said they had attended one or more trainings or gatherings discussing building codes since attending the CCSI training. These trainings and gatherings took a variety of forms, including seminars, webinars, presentations, conferences, industry association meetings, classroom seminars, and online classes. Municipal building code employees were more likely to report having attended a training or gathering discussing building codes since the CCSI training: 19 building code employees compared to 13 builders and others. The 13 builders and others consisted of four builders, three HERS raters, two architects, two engineers, and two other energy efficiency specialists.

When asked to describe the type of training or gathering they attended, respondents generally recalled the sponsor, the topic, or both. The IDIs did not specifically ask if the trainings or gatherings attended focused on the energy aspects of the building code; nor did the interviewers probe into this area.[5] However, some interviewees did volunteer information about their sources of information on energy codes. As noted in the appropriate sections, some of the trainings or presentations cited by the respondents may well have been sponsored by MassSave.

There appear to be few classroom trainings or presentations on the energy code in Massachusetts outside of the CCSI. Some of the PAs partnered with the University of Massachusetts in Amherst to offer some trainings on energy-efficient technologies (Massachusetts Energy Efficiency Partnership). The International Code Council also offers presentations on the energy code, though these may be held outside Massachusetts.

Since attending the CCSI training, most of the 19 municipal building code employees had attended a training or gathering sponsored by a building inspector association. Meanwhile, within the group of 13 builders and others who had attended a training or gathering, most non-builders had attended one sponsored by an industry/professional association, while most builders had attended one sponsored by a building materials supplier. Fifteen municipal building code employees reported attending a training or gathering focused on building code,

[5] Future follow-up IDIs may probe more into the information sources used by the respondents, in addition to the CCSI, specifically on the energy aspects of the building code.

compared to only two builders and others. The specific types of building code on which the trainings and gatherings attended by municipal building code employees focused reflect the numerous types of building codes these individuals are responsible for enforcing, including residential, commercial, energy, fire, and other building codes.

6.1.1 Municipal building code employees

Table 6-1 displays the sponsors of trainings and gatherings municipal building code employees attended since attending the CCSI training. All but two of the 19 municipal building code employees attended a training or gathering sponsored by a building inspector association. Additional sponsors of trainings and gatherings attended by numerous municipal building code employees include the International Code Council, MassSave, various state agencies, and other industry/professional associations. Several of the organizations mentioned, such as the Massachusetts Building Commissioners and Inspectors Association (MBCIA) , the Board of Building Regulations and Standards, the International Code Council, the Boston Society of Architects, and MassSave (most often mentioned by respondents attending the commercial CCSI trainings) do offer some trainings or discussions on the energy code. Some of the discussions and presentations mentioned by the respondents, such as the ones at MBCIS and the Boston Society of Architects, may well have been sponsored by MassSave.

Table 6-1. Sponsors of Trainings Attended by Municipal Building Code Employee
(number of respondents; multiple response)

Training Sponsors	Number of Respondents
All municipal building code employees who attended trainings since CCSI trainings	19
Building inspector association	17
MA Building Commissioners and Inspectors Association	4
Southeastern Massachusetts Building Officials	4
Building Officials of Western Massachusetts	3
International Code Council	3
MassSave	3
Massachusetts State Agency	3
Board of Building Regulations and Standards	1
Department of Public Safety	1
Department of Finance Services	1
Other industry/professional association	3
Local builders association	1
Electrical Inspectors Association of MA and RI	1
Boston Society of Architects	1
National Fire Protection Association	1

Training Sponsors	Number of Respondents
American Wood Council	1
Not specified	5

Table 6-2 displays the topics on which trainings and gatherings municipal building code employees attended focused. Building code was the most frequently mentioned topic. Many respondents specified the type of building code, including commercial code, energy code, fire code, residential energy code, code enforcement, code for existing homes, and property maintenance code. Additional topics of trainings and gatherings attended by numerous municipal building code employees include make-up air exchanges, HERS reports, and Manual J calculations. Fourteen of the 19 respondents who had attended trainings or gatherings discussing building codes since attending the CCSI training mentioned some coverage of energy code issues.

Table 6-2. Topics at Trainings Attended by Municipal Building Code Employees
(number of respondents; multiple response)

Training or Gathering Topics	Number of Respondents
All municipal building code employees who attended trainings since CCSI trainings	19
All building code	15
Commercial code	3
Energy code	2
Fire code	2
Residential energy code	2
Code enforcement	2
Code for existing homes	1
Property maintenance	1
Make-up air exchanges	2
HERS reports	2
Manual J	2
Building case studies	1
Geothermal	1
Hazardous materials	1
Insulation	1
Did not provide specific topics for a particular training	14

6.1.2 Builders and others

Table 6-3 displays the sponsors of trainings and gatherings builders and others said they attended since attending the CCSI training. These respondents most frequently mentioned an industry or professional association as the type of sponsor; respondents attending these events include two HERS raters, an architect, an engineer, and two other energy efficiency specialists. Respondents most commonly mentioned the Northeast Sustainable Energy Association with events attended by almost one-quarter of the 13 builders and others, followed by building materials suppliers, with three builders attending a training sponsored by building materials suppliers such as a lumberyard or an electrical contractor. Several of the organizations mentioned, such as the Northeast Sustainable Energy Association (NSEA), Affordable Comfort, Inc., and MassSave (most often mentioned by respondents attending the commercial CCSI trainings) typically sponsor trainings or discussions on the energy code. As in the case of municipal building code employees, some of the discussions and presentations mentioned by the respondents, such as the ones at NSEA, may well have been sponsored by MassSave.

Table 6-3. Sponsors of Training Attended by Builders and Others
(number of respondents; multiple response)

Training Sponsors	Number of Respondents
All builders and others who attended trainings since CCSI trainings	13
Industry/professional association	6
Northeast Sustainable Energy Association	3
Home Performance Coalition/Affordable Comfort Inc.	2
Association of Energy Engineers	1
Building materials supplier	3
Builders association	2
MassSave	1
Not specified	4

Table 6-4 displays the topics of trainings and gatherings builders and others said they attended since attending the CCSI training. Though the respondents were asked specifically about building code trainings, some mentioned more general areas. Two respondents reported attending trainings on building code; however, one of those two said the focus was on building code for a state other than MA. Additional topics mentioned by numerous builders and others include building energy, home performance, and insulation. Seven of the 13 respondents who had attended trainings or gatherings discussing since attending the CCSI training mentioned some coverage of energy issues.

Table 6-4. Training Topics Attended by Builders and Others
(number of respondents; multiple response)

Training Topics	Number of Respondents
All builders and others who attended trainings since CCSI trainings	13
All building code	2
Energy code	1
Code in other state	1
Building energy	2
Home performance	2
Insulation	2
Blower door testing methods	1
Electronic control systems	1
Historic preservation	1
Water and mold damage	1

Did not provide specific topics	4

6.2 OTHER SOURCES OF INFORMATION ON BUILDING CODES

When asked to name their main sources of information on building code requirements, respondents named the individual or organization supplying the information, the information medium, or both. The most commonly mentioned information source among all respondents was trade magazines, and the most commonly mentioned trade magazine was the Journal of Light Construction. Respondents also mentioned the Internet, telephone, newsletters, memos, seminars, webinars, conferences, and trade shows. Municipal building code employees and builders and others consult many of the same information sources, including the code itself or the code book, peers and colleagues, professional/industry associations, the International Code Council, the MA Board of Building Regulations and Standards, Building Science Corp, and MassSave. Builders and others were more likely than municipal building code employees to cite the code itself/code book as a primary source of information, while municipal building code employees were more likely than builders and others to cite peers and colleagues as a primary source of information.

6.2.1 Municipal building code employees

Twenty-eight of the 30 municipal building code employees named at least one source of information on building code requirements that they use. As shown in Table 6-5, trade magazines were the most frequently mentioned information source on building code requirements, especially the Journal of Light Construction and Fine Home Buildings. The next most commonly mentioned information sources were peers and colleagues, International Code Council (ICC), the MA Board of Building Regulations and Standards (BBRS), and building inspector associations. Five municipal building code employees identified the energy code itself or the code book as a key source of information, four mentioned MassSave resources including handouts and a hotline, and three indicated they simply search the web when questions arise.

Table 6-5. Main Building Code Information Sources for Municipal Building Code Employee
(number of respondents; multiple response)

Information Sources	Number of Respondents
All municipal building code employees who utilize information sources other than trainings	28
Trade Magazines	16
Journal of Light Construction	7
Fine Home Buildings	5
Handyman	1
Coastal Connections	1
Remodeler's Digest	1
Peers and colleagues	7
International Code Council	7

Information Sources	Number of Respondents
Website	4
Telephone	3
Newsletter	1
MA Board of Building Regulations and Standards	6
Bulletins	4
Telephone	2
Building inspector associations	6
Websites	3
Seminars	2
Publications	1
The code itself/code book	5
MassSave	4
Handouts	3
Hotline	1
Internet/web search	3
Building Science Corp newsletter	2
MA Department of Public Safety website	2
Product manufacturers	2
National Fire Protection Association website	1
National Fire Academy white papers	1
Buildingcodeforum.com	1
Association of General Contractors publications	1

6.2.2 Builders and others

Twenty-six of the 30 builders and others named at least one source of information on building code requirements that they use.[6] As shown in Table 6-6, trade magazines were the most frequently mentioned information source on building code requirements, especially the Journal of Light Construction. The next most commonly mentioned sources of information were the code itself or the code book, followed by industry/professional associations. Builders and others also identified peers and colleagues, building inspectors, the Building Science Corp newsletter, local builders associations, ENERGY STAR and MassSave resources as information sources on building code requirements.

[6] Two of the four builders and others who did not name any information sources indicated that the CCSI trainings were their only source of information on building code requirements.

Table 6-6. Main Building Code Information Sources for Builders and Others
(number of respondents; multiple response)

Information Sources	Number of Respondents
All builders and others who utilize information sources other than trainings	26
Trade Magazines	15
Journal of Light Construction	5
Custom Builder	1
Home Power	1
Green Building Advisor	1
Remodeler's Digest	1
Professional Builder	1
Fine Home Buildings	1
Builder	1
The code itself/code book	10
Industry/professional associations	8
Boston Society of Architects	2
American Institute of Architects	1
ASHRAE	1
Green Builders Association	1
Home Performance Coalition/Affordable Comfort Inc.	1
RESNET	1
Peers and colleagues	3
Building inspectors	3
Building Science Corp newsletter	3
Local builders association	2
ENERGY STAR	2
Checklists	1
MassSave	2
Hotline	1
Greentech Media	1
International Code Council newsletter	1
MA Board of Building Regulations and Standards website	1
Northeast HERS reference manual	1

7. CODE COMPLIANCE AND ENFORCEMENT ENVIRONMENT

A key goal of the follow-up interviews is to identify perceived changes in code enforcement and the market for energy efficiency. This section first examines builders and others' perceptions of their interactions with code officials and their customers' interest in energy efficiency. The majority of the builders and others reported increased interest in energy efficiency among both code officials and their customers during the past year or so. Next, this section explores municipal building code employees' and builders' and others' perceptions of the priority given to checking energy efficiency during inspections. Almost all respondents consider energy efficiency to be a medium or high priority relative to the other components of building inspections. This section then looks at energy efficiency issues municipal building code employees encounter in the field, revealing that insulation issues are relatively common. Finally, it explores the factors impacting the amount of time municipal building code employees spend checking for the energy-efficiency aspects of code compliance, and ends with a summary of information filed at local building departments to document energy code compliance for residential construction.

7.1 BUILDERS AND OTHERS' INTERACTION WITH CODE OFFICIALS

Interviewers asked builders and others if their interactions with code officials and code enforcement regarding energy efficiency changed in the last year or so. As shown in Table 7-1, over one-half (17 out of 30) of the builders and others said that their interactions with code officials regarding energy efficiency had changed in the last year or so.

Table 7-1. Changes in Interactions with Code Officials
(number of respondents; n=30)

Have your interactions with code officials regarding energy efficiency changed?	Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Yes	17	7	6	4
No	10	4	4	2
No interaction with code officials	3	1	0	2

As shown in Table 7-2, builders and others enumerated a variety of changes they had noticed, including increased awareness of the energy code among code officials, increased enforcement of the energy code by code officials, and increased discussion of energy efficiency with code officials (three respondents for each category). Two respondents thought that code officials had become more knowledgeable about energy efficiency issues and two others pointed out that their interactions with code officials have changed insomuch as the code itself has changed.

Table 7-2. Types of Changes in Interactions with Code Officials
(multiple response; n=17)

Types of Changes	Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Increased awareness of energy code	3	1		2
Increased enforcement of energy code	3	2	1	0
Talk about energy efficiency more	3	1	1	1
Increased knowledge of energy efficiency issues	2	0	1	1
Just as it applies to the new code requirements	2	2	0	0
Improved relationship	1	0	1	0
Increased anxiety over inspections	1	1	0	0
Increased frequency of communication	1	0	1	0
More helpful/able to provide guidance	1	0	0	1
Increased interest in energy efficiency	1	0	0	1
Request more documentation	1	0	1	0

One respondent who attended the HVAC-IAQ training thought that his relationship with code officials had improved, stating:

> *My relationship has gotten better because I'm more aware of what they're doing. Not just what they're doing, but why they're doing it.*

However, another respondent who attended both the EBS and HVAC-IAQ trainings noticed "increased anxiety between builders and code officials":

> *The builders want their inspections to go smoothly so that they can feel proud of the projects they work on after putting a lot of time and effort into them, and code officials want inspections to go well so that they're signing off on work that they feel confident in.*

Other changes that respondents noticed included increased frequency in communication with code officials, increased helpfulness on the part of code officials, increased interest in energy efficiency, and increased requests for documentation.

7.2 CUSTOMER INTEREST IN ENERGY EFFICIENCY

Most (24 out of 30, or 80 percent) of builders and others said that their customers had become more interested in energy efficiency in the last year or so (Table 7-3). However, just under one-half (11 out of 24, or 46 percent) of these respondents said their customers were willing to pay more for energy efficiency without qualifying their answers. An additional eight

respondents said some of their customers are willing to pay more, but it depends on the customer and/or circumstances, such as the length of the payback period and whether rebates are available. Two respondents said that their customers were not willing to pay more for energy efficiency; both work in stretch code communities.

Table 7-3. Changes in Customer Interest in Energy Efficiency
(number of respondents; n=30)

Have your customers become more interested in energy efficiency?	Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Yes	24	8	9	7
No	6	4	1	1
If yes, are customers willing to pay more for energy efficiency?	24	8	9	7
Yes	11	6	1	4
Some are/it depends	8	2	4	2
No	2	0	2	0
Does not apply	3	0	2	1

7.3 PRIORITIZATION OF ENERGY EFFICIENCY

The follow-up interviewers asked respondents how checking for energy efficiency during inspections is prioritized relative to other areas, whether that priority has changed after attending the training (municipal building code officials), or whether that priority has changed in the last year (builders and others). The interviewers asked both groups if they thought that priority would increase in the future.

Specifically, the interviewers asked municipal building code employees the following questions:

> "Would you say checking the energy efficiency of a project is a low, medium, or high priority in building inspections, relative to the other things you and other members of your building department have to look for? Why? Has this priority changed since you attended [TRAINING(S)]? Do you anticipate the priority given to checking energy efficiency will increase in the future? [IF YES] Why is that?"

The interviewers asked builders and others a similar set of questions:

> "Would you say checking the energy efficiency of a project is a low, medium, or high priority in building inspections, relative to the other things you or the building department has to check? Why? Has this changed over the past year or so? If yes, how has it changed? Do you anticipate the priority given to checking energy efficiency will increase in the future? [IF YES] Why is that?"

7.3.1 Municipal building code employees

Table 7-4 shows how municipal building code employees prioritize checking for energy efficiency relative to other areas and their reasonings behind those prioritizations. Note that two of the thirty municipal building code employees did not respond to this question.

Table 7-4. Energy Efficiency Prioritization - Municipal Building Code Employees
(number of respondents; n=28)

Reasons for Energy Efficiency Prioritization	How Energy Efficiency is Prioritized			
	High	Med-High*	Medium	Low
n	*15*	*2*	*10*	*1*
Checked equally with other requirements	5		1	
To save money and energy	3			
Code increases have led to higher prioritization	2		1	
Goal to ensure code is enforced in city/town	2			
Required by code	2			
Health/safety/structural come first	1	1	8	1
Green Community		1		

*While the interviewer offered the categories low, medium, and high, a number of respondents answered 'medium to high'.

All but one municipal building code employee (27 out of 28, or 96 percent) places either a medium, medium-to-high, or high priority on energy efficiency, with about one-half of respondents (15 out of 28, or 54 percent) reporting that checking for energy efficiency was a high priority. The most common reason provided was that they check it equally with all other requirements, with one code official who attended the EBS training noting:

> *We do a thorough job and all inspections are high quality. We make sure everything meets code, including the energy efficiency aspects of the project.*

Three respondents reported that they believe it is a high priority to help save energy and money, with another code official who attended both the EBS and HVAC-IAQ trainings noting:

> *I consider it high. I would say most people consider it at least medium if not high. I'm born and bred from an old Yankee who is cost conscious and I know the more energy you can save, the less money you'll spend on heat, AC, and electricity.*

Two municipal building code employees reported that they highly prioritize energy efficiency because it is a key goal in their town, with one building commissioner who attended both the EBS and HVAC-IAQ trainings noting:

> *We take the code requirements very seriously, it's a very high priority in our town. We work with a lot of builders, engineers, and architects who don't submit the correct paperwork, or don't properly design the project to meet code, or who haven't followed the code closely enough during construction. We are sticklers, and often have to ask people to go back and do things again, or make changes.*

Over one-third of municipal building code employees (10 out of 28, or 36 percent) said that checking for energy efficiency was a medium priority, with health, safety, and structural elements coming first (n=8). One respondent mentioned that it was a low priority, also stating that they believe health, safety, and structural elements are higher priorities.

The interviewers then asked the municipal building code employees if their prioritization of energy efficiency has changed since they attended the trainings (Table 7-5). Note that three municipal building code employees did not respond to the question.

Table 7-5. Influence of Training on Prioritization of Energy Efficiency

Influence of Training on Prioritization of Energy Efficiency	Total Number of Respondents
n	*27*
Has not influenced prioritization of checking for energy efficiency	24
Has somewhat influenced prioritization of checking for energy efficiency	3

Most respondents (24 out of 27, or 89 percent) said their prioritization has not changed since they attended the training. Note that all but one of the 24 respondents who said their prioritization has not changed since attending the training ranked energy efficiency as a high (n=14), medium-to-high (n=2), or medium (n=7) priority, and only one ranked it as a low priority.

The interviewers then asked the municipal building code employees if they anticipate that the priority given to checking energy efficiency will increase in the future (Table 7-6). Note that two municipal building code employees did not respond to this question.

Table 7-6. Whether Priority for Checking Energy Efficiency will Change in Future
(number of respondents; n=28)

Why Priority Will or Will Not Change	Will Priority Change in Future?		
	Yes	No	Hope not
n	*16*	*11*	*1*
Will continue to increase in importance as code increases	15		
Will continue to increase in importance as awareness grows	1		
Will continue to be a high priority		*6*	
Health/safety/structural will continue to be higher priorities		*4*	
Important to meet all aspects of code and not prioritize one over another		*1*	*1*

Over one-half of respondents (16 out of 28, or 57 percent) think the priority for checking energy efficiency will continue to increase in the future, with most reporting that it will increase as the code continues to increase. One code official who attended both the EBS and HVAC-IAQ trainings noted,

> *As more people figure this out, it's going to have to be dealt with. I think as the energy codes work harder to make houses more efficient, you'll have no choice but to pay more attention and make sure what's supposed to be done is being done.*

Close to two-fifths of respondents (11 out of 28, or 39 percent) said that they did not think the priority for checking energy efficiency will change in the future, with one code official who attended the HVAC-IAQ training noting

> *It's at a reasonable level now, so it's probably going to stay the same.*

Another code official who attended the EBS training said it's important to meet all aspects of the code and not prioritize one over another noting,

> *Everything is important, but structural comes first; energy code is also very important because it is crucial that all the details are done correctly so that the house functions correctly and so you don't get damage in terms of mold or air infiltration, and tighter houses mean ventilation is a bigger issue.*

Finally, one code official who attended both the EBS and HVAC-IAQ trainings said that he hoped the priority given to checking for energy efficiency would not increase in the future, noting:

> *I hope not, honestly because we don't want to make it to be such a priority that you lose focus on other things. You want to keep equal focus on all parts of the building, in particular fire safety, life safety, and thermal energy compliance.*

7.3.2 Builders and others

The interviewers asked the builders and others about the prioritization they or their building department gives to checking the energy efficiency of a project relative to other areas. They also asked the respondents to describe the reasoning behind those prioritizations (Table 7-7).

Table 7-7. Reasons for Energy Efficiency Prioritization by Builders and Others
(number of respondents; n=30)

Reasons for Energy Efficiency Prioritizations	How Energy Efficiency is Prioritized		
	High	Med-High	Medium
n	*27*	*1*	*2*
Energy efficiency is central to their business practices	11		
Code increases have led to higher prioritization	8		
Required by code	3		
To build better, more comfortable buildings	3		
Checked equally with other requirements	1		
Customers more aware of monetary savings	1		
Health/safety/structural come first		1	2

All respondents say they place a medium, medium-to-high, or high amount of priority on energy efficiency, with almost all (27 out of 30, or 90 percent) reporting that checking for energy efficiency was a high priority. The most common reason mentioned was that it is central to their business practices, with one builder who attended the HVAC-IAQ training noting:

> *It's a very high priority, and that high priority is somewhat self-directed because the clientele that we have are low- and very-low-moderate income folks who are first time homeowners. When we build something we want to make it as efficient as possible from an economic perspective because of the economic circumstances of our homeowners. We want to give our homeowners every opportunity to succeed in home ownership…The success of the homeowner…affects a whole bunch of things other than just the homeowners in that home: it affects the neighborhood, the community, and the city.*

A HERS rater who attended the HVAC-IAQ training discussed the importance of customer satisfaction, comfort, and energy efficiency:

> *It's high for me. The same things you're checking for energy efficiency are going to make it a more durable project, more comfortable. They all go hand in hand. You could say, sure I don't care about energy efficiency, but I do care about not having to be called back because a client is complaining that the building is poor, or window is drafty, those are much higher priorities than energy, but the irony is there's not a real easy way to say, lets codify comfort…Everybody wants to make their customers happy*

and worrying about energy, making that a high priority is an easy way to keep customers happy.

Over one-fourth of respondents reported that code increases have led to higher prioritization of energy efficiency (8 out of 30, or 27 percent), with one architect who attended the EBS training commenting:

Means and methods are more common. So now when I talk to people (builders) about insulating their basement a certain way they all have the vocabulary, they understand.

The interviewers also asked the builders and others to comment on the prioritization that they believe *the building departments that they work with* give to energy efficiency during inspections (Table 7-8). Note that two interviewees said they could not comment on this question and did not respond.

Table 7-8. Reasons for Energy Efficiency Prioritization by Building Departments
(number of respondents [builders and others]; n=28)

Reasons for Energy Efficiency Prioritizations	How Energy Efficiency is Prioritized			
	High	Medium	Low	Depends on building dept./official
n	*16*	*3*	*4*	*5*
Code increases have led to higher prioritization	8	1		
Required by code	5			
Has been a high priority for many years	1			
Health/safety/structural come first	1	1	1	
Important as they are a Green Community	1			
Don't think they check for energy efficiency enough			1	
Some are more interested/aware than others				5
Still trying to get up to date with the new code		1	1	
Think code officials need more HVAC training/experience			1	

Over three-fifths of respondents (19 out of 28, or 68 percent) said they think building departments they work with place a medium or high amount of priority on energy efficiency. Close to one-third of respondents (8 out of 28, or 29 percent) mentioned that increases in the code in recent years have led to building departments highly prioritizing efficiency. An architect who attended the EBS training noted:

It's a very high priority, since even before this 2012 adoption. They've gone so far as to even put the R-values of assemblies on the building permit card, which I had never really seen 10 to 12 years prior. Obviously spray foam has been out for a while… But since then people have been doing a lot more sort of alternative insulation products…So the building department is getting more comfortable with seeing more

specifications and allowing those to be used. I would say energy is much higher than it's ever been in terms of being on their radar.

Four respondents believed that building departments that they work with place a low priority on energy efficiency, with another architect who attended the EBS training commenting:

It's a low priority [for building departments], unfortunately. They are still looking more for safety issues, fire code and such. Maybe they aren't educated enough to look in detail about that? It's very spotty what they check. Since it involves the entire building enclosure, it's hard to check sometimes: it's hidden somewhere, they aren't there at the moment when the work is done and then it's all closed up and invisible.

One HVAC contractor who attended both the EBS and HVAC-IAQ trainings thought that inspectors were not familiar enough with how to make sure HVAC equipment is rightsized:

I think they don't check energy efficiency enough. I think they need to go deeper because there's a lot of companies out here that do it wrong, even with the new codes. I see a lot of oversized equipment, buildings that are way over engineered too much tonnage as far as AC goes and they put in dehumidifiers because the house is getting moldy… So I wish the inspectors knew more about what they're inspecting …I think they [building inspectors] should be licensed contractors that… want to move on to something else so that they know what they're looking at.

Five respondents said that the type of prioritization depends on the building department or the individual official that they are working with, noting that some are more aware or interested in energy efficiency than others. A builder who attended both the EBS and HVAC-IAQ trainings commented:

Every town or city inspector does things their own way, so they have their own focus on what's important to them. So every different thing they are checking has a different level of priority depending on which inspector you're dealing with. They're generally more aware of air infiltration and insulation requirements, but one of them may emphasize looking at the insulation more than the air infiltration, and another one might be the opposite.

The interviewers then asked the builders and others if the prioritization of energy efficiency has changed in the last year (Table 7-9). Note that three of the builders and others said they could not comment on this question and did not respond.

Table 7-9. Whether Priority for Checking Energy Efficiency has Changed in Last Year
(number of respondents; n=27)

Reasons for Why Priority has/has not Changed in Last Year	Priority Changed?	
	Yes	No
n	*18*	*9*
Priority has increased as code has increased	9	
Priority has increased as awareness has increased	9	
Has been a high priority since new code was adopted		4
Don't think industry checks energy efficiency enough		2
Has been a high priority for many years		2
Has been a high priority since becoming a Green Community		1

Two-thirds of respondents (18 out of 27, or 67 percent) said that the priority for checking energy efficiency has increased in the last year. Nine respondents mentioned that they thought it has increased as the code has increased, with one builder who attended the HVAC-IAQ training saying:

> *Yes. With the code changes the inspectors have become more particular about certain aspects of weather sealing and HVAC installations.*

One-third of respondents (9 out of 27, or 33 percent) mentioned that the priority has increased over the last year due to increased awareness of energy efficiency issues, with one builder who attended both the EBS and HVAC-IAQ trainings saying:

> *Yes. It's become on the forefront of the enforcement officers' perspectives, and in turn now, all the contractors are very savvy to it.*

Another one-third of respondents (9 out of 27, or 33 percent) said that they did not think there were increases to the priority given to checking energy efficiency in the last year, with four respondents noting that it has been a high priority since the new code was adopted. Two believe it's been a high priority for many years, and one engineer said it has been a high priority since the town he works in most often became a Green Community. Two respondents thought the priority has not changed because they don't think the industry as a whole is checking energy efficiency enough during inspections.

The interviewers then asked respondents if they anticipate that the priority given to checking energy efficiency will increase in the future (Table 7-10). Note that two of the builders and others said they could not comment on this question and did not respond.

Table 7-10. Whether Priority for Checking Energy Efficiency will Change in Future
(number of respondents; n=28)

Why Priority Will or Will Not Change	Will Priority Change in Future?		
	Yes	No	Hope so
N	*18*	*7*	*3*
Will continue to increase in importance as code increases	11		
Will continue to increase in importance as awareness grows	4		
Direction in which both code and industry is headed	2		
Will continue to be a high priority as long as it's in the code	*1*		
Will continue to be a high priority		*3*	
Code officials don't want to be bothered		*2*	
Not sure how it could be prioritized more than it already has been		*1*	
Will stay even with whatever the code requires		*1*	
If code is better enforced, prioritization will hopefully increase			*1*
If HVAC requirements are better understand, it will be easier to enforce code			*1*
May increase in importance as code increases			1

The majority of respondents (18 out of 28, or 64 percent) think the priority for checking energy efficiency will continue to increase in the future, with most of these respondents (11 out of 28, or 39 percent) believing that it will increase as the code continues to increase. One equipment supplier who attended the EBS training agreed:

> *I anticipate it will increase more in the future; with everyone being energy conscious in the retrofit market as well as the new construction market, they're all doing their due diligences to get up to speed on current code as well as being more efficient in building as well as remodeling. It's a growing trend. We see it with energy efficient products that we sell: the high, expensive types of insulation are growing more so than less expensive, less efficient type of products.*

A builder who attended the HVAC-IAQ training also agreed:

> *Because there is a movement under foot within the country and within the code department to tighten up energy code so we all use less energy. It's clearly going to go up, no doubt in my mind.*

Four respondents said they believe prioritization for energy efficiency will increase in the future as awareness about the code and about energy issues grow, with another equipment supplier who attended the EBS training saying:

> *I'm sure it will. As costs go up, people will become more and more aware of it.*

A HERS rater who attended the EBS training added:

> *Yes [it will increase] because it has nowhere to go but up. It's a slow process. It's been changing quickly. It's been changing drastically, whereas prior to the last code iterations, each code update changed relatively little. Now it's on a steeper changing curve. It takes time for people to grasp and understand. It's at least a 2 to 3 year lull after the requirement comes out before it's uniformly enforced. Which is surprising to me: I was always a builder and I thought that the building officials were always up to date with the latest of everything and now that I'm on the other side of the counter I can see that they're not.*

Three other respondents say they hope the prioritization placed on energy efficiency will increase in the future, and seven do not believe it will increase more than it already has. Note that most of these respondents who do not think it will increase already think it is a high priority and will continue to be, don't think it could be prioritized more than it already is, or believe it will stay even with whatever the code requires.

Interviewers also asked those who were neither builders nor municipal building code employees if they thought that builders were more concerned about complying with code. Nine respondents, including four HERS raters, two equipment suppliers, two architects, and an HVAC subcontractor thought that builders were more concerned about complying with code. Three respondents, including a HERS rater, an architect, and an energy efficiency specialist said that some builders are, but it depends on the builder. Two respondents, including an architect and an energy efficiency specialist, indicated that some builders are becoming more aware of the code requirements, but most builders need a lot of training and education in order to comply with code. Both of these respondents work in municipalities in which 2012 IECC is in force (Table 7-11).

Table 7-11. Others' Perceptions of Builders Concern Regarding Code
(number of other respondents; n=14)

Are builders more concerned about complying with code?	Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Yes	9	3	4	2
Some are/it depends	3	0	1	2
Builders need training	2	2	0	0

7.4 SITUATIONS CODE OFFICIALS ENCOUNTER IN THE FIELD

Interviewers asked municipal building code employees to recall any serious issues related to energy efficiency they encountered during inspections over the past year or so. Twenty-four of the 30 municipal building code employees recalled at least one issue related to energy efficiency they had encountered in the field, although over one-half (14) of these 24 respondents said the issues were not very serious. The most common type of issue municipal building code employees encountered during inspections had to do with insulation: thirteen municipal building code employees recalled encountering issues with insulation. Seven respondents said they had observed insulation that had not been installed in accordance with

code requirements. Other insulation issues respondents mentioned included failing to document insulation R-values and potential fire safety issues resulting from the use of paper-based insulation or improper installation of spray foam around sprinkler heads. The second most commonly mentioned issue was a general lack of knowledge regarding code requirements. Respondents mentioned that it was difficult for builders and contractors to keep up with changing code requirements, and two respondents commented that this was particularly the case with out-of-state engineers, architects, and contractors. The third most commonly encountered issue pertained to indoor air quality, including exhaust venting issues and concerns that new buildings did not have proper air exchange. Three municipal building code employees encountered air sealing issues (Table 7-12).

Table 7-12. Issues Encountered During Inspections
(multiple response; n=24)

Issue	Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
All insulation issues	13	5	8	
Insulation requirements not met	7	2	5	
R-values not properly documented	1		1	
Fire safety issues	1		1	
General lack of code knowledge	7	3	4	
Out-of-state contractors	2		2	
Indoor air quality	6	2	4	
Exhaust venting issues	2	1	1	
Proper air exchange	2	1	1	
Air sealing	3	1		2
Window/door installation	1		1	
Unsealed ducts	1		1	

7.5 TIME SPENT ON ENFORCEMENT OF ENERGY CODE

Interviewers asked municipal building code employees to describe the factors that determine the amount of time they spend checking for the energy-efficiency aspects of code compliance. As shown in Table 7-13, the most commonly mentioned factor was the quality of work with respect to how well it meets code: the more problems there were, the longer it took to point them out to the builder, architect, or engineer for correction. As one interviewee who attended both the EBS and HVAC-IAQ trainings explained:

> *Whether or not they do the job right the first time. Usually you can tell when you look at the job the type of work they do and if you walk in and it looks crappy then you have to spend more time because there's probably more mistakes to find. The poorer quality jobs take more time because you have to point out all the inefficiencies.*

The second most commonly mentioned factor was the complexity of the project, with more complex projects requiring more time. The third most commonly mentioned factor was time and/or the availability of personnel was a factor. As one interviewee who attended both the EBS and HVAC-IAQ trainings explained:

> *The number one enemy of any building inspector is not the willful disregard of compliance with code, but the simple lack of time.*

Two interviewees said that their experience with a particular builder or contractor was a factor. For instance, some builders were simply more careful with respect to building to code than others, and the ones who were more careful required less time. In addition, an interviewee explained that if he knew a contractor had not previously worked in a stretch code town, he paid extra attention inspecting the work. Other factors mentioned by interviewees included the level of energy efficiency the builder was trying to achieve and the presence of architectural drawings. One interviewee commented that the new code requirements required more time than the previous code, and another interviewee recalled having to spend more time inspecting insulation installed by homeowners.

Table 7-13. Factors Impacting Time Spent Enforcing Energy Code
(multiple response; n=22)

Factors	Number of Respondents	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Quality of the work/how well it meets code	11	6	4	1
Complexity of the job	8	6	2	
Time/availability of personnel	3	1	2	
Experience with the builder/contractor	2	1	1	
Level of energy efficiency the builder is trying achieve	1		1	
Presence of architectural drawings	1		1	
Homeowner DIY insulation	1		1	
New code requirements	1		1	

7.6 CODE COMPLIANCE DOCUMENTATION FILED

Interviewers asked municipal building code employees to briefly describe the type of information filed at their building department to document energy code compliance for residential construction. If necessary, the interviewers probed further, asking:

> "What percent of the projects you review submit the following:
>
> - REScheck files with supplemental checklists for mandatory requirements
> - REScheck files with no supplemental information
> - Prescriptive checklists

- Documentation that ducts are tested and/or that a blower door test is conducted."

Interviewers asked builders and others if they were involved in filing information to document energy code compliance for residential construction with the local building department, and if so, to briefly describe the type of information filed and whether it has changed since attending the training(s). If necessary, the interviewers probed further, asking:

"For what percent of the projects do you submit the following:

- REScheck files with supplemental checklists for mandatory requirements
- REScheck files with no supplemental information
- Prescriptive checklists
- Documentation that ducts are tested and/or that a blower door test is conducted."

7.6.1 Municipal building code employees

Municipal building code employees mentioned anywhere from one to six types of information or documents filed at their building departments. Nearly four-fifths (23) of the municipal building code employees said that documentation that ducts were tested and/or a blower door test was conducted is filed at their building department; 18 of these 23 indicated that it took the form of a HERS rating. Almost two-thirds (19) of the municipal building code employees said that REScheck files were filed at their building departments, and about one-half (nine) of those 19 said the REScheck files were accompanied by supplemental checklists for mandatory requirements. Only three municipal building code employees said that Manual J documents were filed at their departments, and only one stretch code municipal building code employee said that thermal bypass checklists were filed (Table 7-14).

Table 7-14. Information Filed at Municipal Building Code Employees' Building Departments
(multiple response; n=29)

Type of Information Filed	Number of Responses	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
HERS or other documentation of duct blaster and/or blower door test	23	9	12	2
REScheck	19	9	8	2
Prescriptive checklist	7	2	3	2
Energy code compliance path	4	2	2	
Plans/drawings showing insulation values	3	1	2	
Manual J	3		2	1
Documentation of insulation inspection	2		1	1

Type of Information Filed	Number of Responses	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
Thermal bypass checklist	1		1	
Other	11	4	7	

7.6.2 Builders and others

Fourteen builders and others – including three architects, four HERS raters, and seven builders – said they were involved in filing information to document energy code compliance for residential construction with the local building department. Twelve of the 14 builders and others said they submitted REScheck files, and one-half of those 12 said they submitted supplemental checklists for mandatory requirements along with the REScheck files. Over three-fifths (nine) of the 14 builders and others said the submitted documentation that ducts were tested and/or a blower door test was conducted; six of those nine (including four HERS raters) specified that it took the form of a HERS rating. Only one respondent working in stretch code communities - a HERS rater – reported submitting thermal bypass checklists. In addition, only one respondent - an architect working in 2012 IECC communities - reported submitting Manual J documents (Table 7-15).

Table 7-15. Information Builders and Others File at Building Departments
(multiple response; n=14)

Type of Information Filed	Number of Responses	Building Code in Municipalities Covered		
		2012 IECC Code	Stretch Code	Both Codes
REScheck	12	5	5	2
HERS or other documentation of duct blaster and/or blower door test	9	3	4	2
Prescriptive checklist	4	2	2	
Thermal bypass checklist	1		1	
Documentation of insulation inspection	1			1
Manual J	1	1		
Other	2	1	1	

Two of these 14 builders and others said the type of information they file to document energy code compliance at local building departments had changed since attending the training, including one builder and one architect. The builder explained that prior to the training, he was not aware that 2012 IECC required a blower door test. The architect stated that he was more diligent about including actual figures in specifications following the training.

8. SUGGESTIONS FOR IMPROVING THE CCSI TRAININGS AND OTHER COMMENTS

Most respondents offered specific suggestions for improving the CCSI trainings as well as more general comments for promoting code enforcement and energy efficiency. These suggestions and comments came up throughout the interviews. The interviewers also posed two questions before concluding each interview.

> "Is there anything that you would want added to the [TRAINING(S)] that was not already covered?
>
> Is there anything we have not covered that you would like to add; in particular do you have any suggestions for how the Energy Code Technical Support Initiative can help you to enforce (municipal building code employees)/comply with (builders and others) the energy code?"

The most frequent suggestion was to get more people to attend the trainings, especially builders and contractors.

8.1 MUNICIPAL BUILDING CODE EMPLOYEES

Eleven of the 25 (44 percent) municipal building code employees who offered training suggestions wanted to get more people, especially builders, to attend them. As shown in Table 8-1, other common suggestions were to provide different kinds of checklists (7 out of 25, or 28 percent), to adjust the types and duration of the trainings (5 out of 25, or 20 percent), and to focus more on particular areas, especially ventilation (5 out of 25, or 20 percent).

Table 8-1. Municipal Building Code Employee Suggestions for Improving the CCSI Trainings
(number of respondents; multiple response)

How to Improve the CCSI Trainings	Number of Respondents	Type of training attended			
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ	2009 to 2012 IECC
All municipal building code employees who offered suggestions for improvement	25	10	4	9	2
All suggestions about getting more people to attend	11	4	2	3	2
Get more builders to attend	7	2	2	2	1
Get more contractors to attend	5	3	0	1	1
Get more architects to attend	2	0	1	1	0
Make trainings shorter and more high-level to get builders to attend	2	1	0	1	0
Get more HERS raters to attend	1	1	0	0	0

How to Improve the CCSI Trainings	Number of Respondents	Type of training attended			
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ	2009 to 2012 IECC
Make trainings mandatory for builders	1	0	1	0	0
Make training mandatory for code officials	1	0	0	1	0
More focus on specific areas	8	4	0	4	0
Ventilation	5	3	0	2	0
Air sealing	2	1	0	1	0
HVAC	1	0	0	1	0
Thermal barriers	1	0	0	1	0
All suggestions for checklists	7	3	0	3	1
Create permitting and inspection checklists	2	0	0	2	0
Create inspection checklist for performance and prescriptive paths	1	0	0	1	0
All suggestions for adjusting types and duration of trainings	6	2	1	2	1
Trainings too fast-paced and high level	2	1	0	1	0
Do different trainings for beginners and those wanting more in-depth information	3	0	0	2	1
Do longer trainings	1	1	0	0	0
Include geothermal and solar options	2	0	0	2	0
Offer more information on retrofits and renovations	2	1	1	0	0
Train on use of infrared cameras to detect heat loss	1	0	0	1	0
Put slides and handouts on the MassSave website	1	0	0	1	0
More training for code officials on HERS forms	1	0	0	0	1
Have separate sections on the 2012 IECC and the stretch code	1	0	0	0	1
Hold trainings on-site for large departments such as Boston	1	0	0	1	0

How to Improve the CCSI Trainings	Number of Respondents	Type of training attended			
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ	2009 to 2012 IECC
Provide hand-outs for in-field use by contractors	1	1	0	0	0
Better advertise the trainings on-line	1	0	1	0	0

Table 8-1 presents a wish list from the respondents; not all suggestions may be practical. The aim of the CCSI trainings is to increase code compliance; thus, adding sections on solar and geothermal options may not make much sense. It may also not be practical to offer different trainings for attendees with different levels of knowledge and experience. However, the respondents who proposed doing so made some good points, such as the following:

> *The training [was] too fast paced with not enough info for beginners; [it was] in my town so I put a lot of effort into getting as many builders to come as I could…A lot of builders couldn't follow and asked [the instructor] to further explain things after the session. Builders are not at same caliber as the building officials. The trainings should be two part. I think there could be a whole class on thermal barriers alone. That's what is driving blower door tests – or some other specific topic. Start out very basic by explaining key elements before getting into the specifics about the code. (Code official who attended the EBS training)*

> *[Offer] more trainings that are specific to builders because they are not showing up at the general trainings in very large numbers; maybe make it shorter and more high level for them (Code official who attended the EBS training)*

Municipal building code employees also offered more general suggestions for increasing code compliance. These include:

- Offer field assistance at construction sites (two respondents)
- Educate homeowners about the new code with information accessible by the public (two respondents)
- Issue technical bulletins about the new code
- Email newsletters or use similar means to reach targeted audiences.

One municipal building code employee made a strong case for facilitating more discussions among the attendees:

> *The trainings should be longer and more round table style stuff where people should feel comfortable asking questions and troubleshooting challenges…in-depth, longer trainings with more back and forth dialogue where people can talk about anecdotal learning rather than just being lectured to…It is nice to have a rundown of what is in the old and new codes but they didn't go into it in*

enough depth; should bring the energy code book and slow down. [It is] difficult to see which code they are talking about…too much in too little time for most people. (Code official who attended the EBS training)

8.2 BUILDERS AND OTHERS

Eight of the 23, or 35 percent builders and others who offered training suggestions wanted to get more people, especially subcontractors, to attend them; as in the case of municipal building code employees, this was the most popular suggestion (Table 8-2).

Table 8-2. Suggestions from Builders and Others for Improving the CCSI Trainings
(number of respondents; multiple response)

How to Improve the CCSI Trainings	Number of Respondents	Type of training attended		
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ
All builders and others who offered suggestions for improvement	23	11	7	6
All suggestions about getting more people to attend	8	4	1	3
Get more subcontractors to attend	5	3	1	1
Get more builders to attend	4	1	1	2
Get more insulation contractors to attend	2	1	0	1
Get more code officials to attend	2	1	0	1
Partner with lumber yards or other suppliers to get more attendees	2	1	0	1
Coordinate with supervisor license training classes to get more contractors to attend	2	1	0	1
Offer evening trainings to get more attendees	1	1	0	0
More focus on specific areas	4	2	1	1
HVAC	2	1	1	0
Types and application of insulation	2	1	0	1
Air leakage	1	1	0	0
Air sealing	1	1	0	0
Ventilation	1	0	0	1
More information on the science of efficient building techniques	2	2	0	0
Offer more real life examples of homes failing inspection, tightness, and other details	2	1	1	0

How to Improve the CCSI Trainings	Number of Respondents	Type of training attended		
		EBS Only	HVAC-IAQ Only	EBS and HVAC-IAQ
Continue the trainings	2	0	2	0
Pictures of installations done right and wrong are very helpful	1	0	0	1
Have trainings in more western Mass. Locations	1	0	0	1
Put more resources on-line, especially the presentations	1	0	1	0

Again, Table 8-2 presents a wish list from the respondents and not all suggestions offered may be practical. However, one architect who attended the EBS training offered some good points for reaching more subcontractors:

> *It's hard for contractors to take a day off to do an in person training; residential contractors are small businesses and very busy so they don't have the same opportunities that someone working in a code official capacity might have. Maybe that means requiring trainings or an evening training with food. A lot of contractors don't do so much on-line and the MassSave model is focused on email. Contractors are more phone based…could have information available for them at the counter where they pick up building permit applications. [It is] important to have a phone number to make [the training] more accessible.*

The respondents also commented on the importance of the trainings for builders. One engineer who attended the HVAC-IAQ training noted:

> *Builders are not necessarily interested in energy efficiency; [I] have seen builders discourage homeowners from making changes due to risk and cost…[It is] important to show the average builder how these can be pulled into everyday construction and not be burdensome.*

Meanwhile, a builder who attended both the EBS and HVAC-IAQ trainings stressed the importance of interactions with code officials, which the trainings help bring about:

> *Create stronger relationships and information sharing between builders and code officials—having the building community in an organized relationship with the code officials needs to be fostered. More frequent meetings could help alert [the parties] of changes and increase communication about problems and how to solve them within the local community.*

Two builders also offered more general suggestions, similar to those from the municipal building department employees, for increasing code compliance; one wanted field assistance and one wanted more education for homeowners. Finally, one builder who attended the HVAC-IAQ training expressed his appreciation for the training instructors.

There's some really top notch people…They have a hands on experience, and when those of us that actually do the building ask questions, they don't scratch their heads and say, 'I don't know what that means.' They have a lot of practical experience and understanding of how things happen. They talk the talk and they walk the walk. That makes answering questions a lot easier when they understand the questions that are being asked.

APPENDIX A: INTERVIEW GUIDES

A.1 FOLLOW-UP IN-DEPTH INTERVIEW GUIDE FOR RESIDENTIAL TRAINING ATTENDEES—MUNICIPAL BUILDING CODE EMPLOYEES—FINAL

Name: _____ Title: _____

Company or City/Town: _____ Telephone: _____

Email: _____

Name for Incentive Check: _____ No Incentive Accepted: _____

Address for Incentive Check: _____

_____

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 follow-up interviews with those who have attended the trainings offered by this Initiative in the last few months to understand how the information from the trainings is being used in the field. We offer compensation of $100 for your time in responding to this interview which should take about 30 to 45 minutes; the check could be made payable to you, your employer, or a charity; you do not have to accept compensation for this interview. 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.]

[VERIFY OCCUPATION, JURISDICTION, TITLE, AND EMAIL; IF RESPONDENT IS A BULDING CODE OFFICIAL AND SAYS S/HE HAS ANOTHER OCCUPATION AS WELL, INSTRUCT HIM/HER TO ANSWER QUESTIONS IN CAPACITY AS A BUILDING CODE OFFICIAL]

Intro 1. I have an attendance list that indicates you attended [TRAINING(S)] on [DATE(S)]. Is that correct?

a. Yes

b. No [THANK AND TERMINATE]

Intro 1a. [USE ONLY IF RESPONDENT HAS ATTENDED BOTH RESIDENTIAL AND COMMERCIAL TRAININGS] For this interview I would like to cover just the [RESIDENTIAL TRAININGS] you attended on [DATE(S)].

Intro 2. I would also like to confirm that your jurisdiction [CITY/TOWN(S)] is using the building code based on 2012 IECC/is using the stretch code/is using both the building code based on 2012 IECC and the stretch code.

a. Yes

b. No; explain which code they are using _____

Use of Training

1. To the best of your recollection, can you tell me which part or parts of the TRAINING(S) you found most useful and why?

2. Since you attended [TRAINING(S)] on [DATE(S)], can you give me an estimate of how many residential on-site inspections you have conducted or participated in? [RECORD]

    a. How many housing units were involved?

    b. And can you estimate how many of these were final inspections?

    c. [ASK IF IN 2012 IECC JURISDICTION] And, how many involved construction permitted under 2012 IECC.

	All inspections	Construction permitted under 2012 IECC, if applicable
Total inspections		
Total housing units		
Final inspections		
Housing units in final inspections		

    d. [IF HAVE ZEROS FOR ALL THE SQUARES IN QUESTION 2] Do you normally conduct residential inspections in your position?

        i. [IF YES] When would you expect to next conduct an inspection?

3. [IF DONE ANY INSPECTIONS SINCE COMPLETED TRAINING(S)] Have you changed how you conduct inspections for the energy code as a result of the training(s) you attended?

a. [IF YES] Can you please tell me how your inspection process has changed? [PROBE, IF NECESSARY:]

    i. Do you pay more attention to certain areas and, if so, which ones?

    ii. Has the time spent on inspections changed and, if so, by how much?

    iii. Do you verify the insulation levels or other values reported differently than before the training? If so, how has this changed?

b. [IF NO] Why would you say the training has not affected how you conduct inspections? [PROBE, IF NECESSARY:]

    i. Was the training relevant to how you do inspections?

    ii. Do you feel you already did everything you should to enforce the code?

    iii. Has there not been enough time to incorporate what you have learned?

c. [IF HAVE NOT CHANGED ANYTHING DUE TO TRAINING(S) OR IF HAD ZEROS FOR ALL THE SQUARES IN QUESTION 2 BUT EXPECTED TO DO INSPECTIONS IN THE FUTURE] Do you expect what you have learned at the TRAINING(S) will influence your inspections in the future?

    i. [IF YES] How and when do you expect TRAINING(S) to influence your inspections?

4. Since you attended [TRAINING(S)] on [DATE(S)], can you give me an estimate of how many residential building permit applications you have reviewed or participated in reviewing and how many [HOUSING UNITS/BUILDINGS] in total were involved?

    a. [IF HAVE NOT REVIEWED ANY PERMIT APPLICATIONS IN QUESTION 4] Do you normally review building permit applications in your position?

        i. [IF YES] When would you expect to next review an application?

5. [IF REVIEWED ANY BUILDING PERMIT APPLICATIONS SINCE COMPLETED TRAINING] Have you changed how you review building permit applications as a result of the training(s) you attended?

    a. [IF YES] Can you please tell me how your review process has changed? [PROBE, IF NECESSARY:]

        i. Do you pay more attention to certain areas and, if so, which ones?

        ii. Has the time spent on permit review changed and, if so, by how much?

iii. Do you verify the insulation levels or other values reported differently than before the training? If so, how has this changed?

b. [IF NO] Why would you say the training has not affected how you review permit applications? [PROBE, IF NECESSARY:]

i. Was the training not relevant to how you do inspections?

ii. Do you feel you already did everything you should to enforce the code?

iii. Has there not been enough time to incorporate what you have learned?

c. [IF HAVE NOT CHANGED ANYTHING DUE TO TRAINING(S) OR IF HAD NOT REVIEWED ANY BUILDING PERMIT APPLICATIONS BUT EXPECTED TO DO SO IN THE FUTURE] Do you expect what you have learned at the TRAINING(S) will influence your building permit application reviews in the future?

i. [IF YES] How and when do you expect TRAINING(S) to influence your reviews?

6. Are there areas other than inspections and permit review where the training(s) has/have influenced your work?

a. [IF YES] Can you describe those tasks and how the training(s) has/have influenced your work?

7. Can you briefly describe the type of information filed at your building department to document energy code compliance for residential construction?

a. What percent of the projects you review submit the following:

i. REScheck files with supplemental checklists for mandatory requirements ____%

ii. REScheck files with no supplemental information ____%

iii. Prescriptive checklists ____%

iv. Documentation that ducts are tested and/or that a blower door test is conducted _____%

Sharing Information

8. Please think of different parties you interact with such as people in your building department, colleagues from other jurisdictions, builders, contractors, and others. Have you shared information from the [TRAINING(S)] with others?

    a. [IF 8 = YES] Can you tell me what information you shared and with whom?

    b. [IF 8a = YES] Do you believe [PARTY] is making use of the information you have shared? [PROBE: How are they using this information?]

Other Sources of Information

9. Since [DATE], have you attended any other trainings, webinars, or gatherings discussing building codes?

    a. [IF YES] Please tell me the names and approximate dates of these events.

    b. What was the particular focus of these events?

10. Other than the [TRAINING(S)] and [EVENTS IN QUESTION 9], what are your main sources of information on the building codes and methods of enforcement?

General

11. Would you say checking the energy efficiency of a project is a low, medium, or high priority in building inspections, relative to the other things you and other members of your building department have to look for?

    a. Why?

    b. Has this priority changed since you attended [TRAINING(S)]?

    c. Do you anticipate the priority given to checking energy efficiency will increase in the future?

        i. [IF YES] Why is that?

12. What, if any, serious issues related to energy efficiency have you encountered during inspections over the past year or so, that needed to be fixed?

    a. [IF MENTIONED IN QUESTION 12] Please describe what happened and how it was addressed?

    b. [IF MENTIONED IN QUESTION 12] How often do these issues occur?

13. In general, what factors determine the amount of time you spend checking for the energy-efficiency aspects of code compliance?

    a. [PROBE, IF NECESSARY:] Is time and/or the availability of personnel an issue?

Closing

14. Is there anything that you would want added to the [TRAINING(S)] that was not already covered?

    a. What would you add and why?

15. Would you recommend that your colleagues attend the Energy Code Technical Support Initiative trainings?

    a. Why or why not?

16. Is there anything we have not covered that you would like to add; in particular do you have any suggestions for how the Energy Code Technical Support Initiative can help you to enforce the energy code?

Thank you so much for your time!

A.2 FOLLOW-UP IN-DEPTH INTERVIEW GUIDE FOR RESIDENTIAL TRAINING ATTENDEES—BUILDERS AND OTHERS—FINAL

Name: _____ Title: _____

Company or City/Town: _____ Telephone: _____

Email: _____

Name for Incentive Check: _____ No Incentive Accepted: _____

Address for Incentive Check: _____

_____

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 follow-up interviews with those who have attended the trainings offered by this Initiative in the last few months to understand how the information from the trainings is being used in the field. We offer compensation of $100 for your time in responding to this interview which should take about 30 to 45 minutes; the check could be made payable to you, your employer, or a charity; you do not have to accept compensation for this interview. 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.]

[VERIFY OCCUPATION, TITLE, EMAIL, AND ADDRESS FOR SENDING CHECK]

Intro 1. I have an attendance list that indicates you attended [TRAINING(S)] on [DATE(S)]. Is that correct?

c. Yes

d. No [THANK AND TERMINATE]

Intro 1a. [USE ONLY IF RESPONDENT HAS ATTENDED BOTH RESIDENTIAL AND COMMERCIAL TRAININGS] For this interview I would like to cover just the [RESIDENTIAL TRAININGS] you attended on [DATE(S)].

Intro 2. I would also like to confirm that you work in [CITY/TOWN(S)], which are using the building code based on 2012 IECC/are using the stretch code/are using both the building code based on 2012 IECC and the stretch code.

c. Yes

d. No; explain which code they are using _____

For subcontractors and equipment suppliers, note the type of work done/equipment supplied.

_____

Use of Training

1. To the best of your recollection, can you tell me which part or parts of the TRAINING(S) you found most useful and why?

2. Since you attended [TRAINING(S)] on [DATE(S)], can you give me an estimate of how many residential projects you have conducted? [RECORD]

    a. How many housing units were involved?

    b. What stage are these projects currently in (e.g., planning, under construction, final inspection completed)?

    c. How many of these projects involved construction permitted under 2012 IECC?

	All projects	Construction permitted under 2012 IECC, if applicable
Total projects		
Total housing units		
Planning stage projects		
Planning stage housing units		
Under construction projects		
Under construction housing units		
Final inspections		
Housing units in final inspections		

d. [IF HAVE ZEROS FOR ALL THE SQUARES IN QUESTION 2] Do you expect to work on a residential structure within the next year?

i. [IF YES] When would you expect to start?

ii. How many housing units would be involved and at what stage would they be at?

3. [IF HAVE WORKED ON ANY PROJECTS SINCE COMPLETED TRAINING(S)] Have you made any changes in your work on these projects to better comply with the energy code as a result of the training(s) you attended?

a. [IF YES] Can you please tell me how your work has changed? [PROBE, IF NECESSARY:]

i. Do you pay more attention to certain areas and, if so, which ones?

ii. What, if anything, would you have done differently if you had not attended the [TRAINING(S)?]

iii. [IF YES AND MORE THAN ONE PROJECT LISTED IN QUESTION 1] Do these changes apply to any particular projects or all the work you have done since the training(s)?

1. Which projects in particular have been affected by you attending the [TRAINING(S)]?

b. [IF NO] Why would you say the training has not affected your work?

[PROBE, IF NECESSARY:]

i. Was the training relevant to your work?

ii. Do you feel you already did everything properly to code?

iii. Has there not been enough time to incorporate what they you learned?

4. [IF HAVE NOT CHANGED ANYTHING DUE TO TRAINING(S) *OR* IF HAD ZEROS FOR ALL THE SQUARES IN QUESTION 2] Do you expect what you have learned at the TRAINING(S) will influence your work in the future?

a. [IF YES] How and when do you expect [TRAINING(S)] to influence your work?

5. Are there areas we have not covered where the training(s) has/have influenced your work?

a. [IF YES] Can you describe these areas and how the training(s) has/have influenced your work?

6. Are you involved in filing information to document energy code compliance for residential construction with the local building department?

    a. [IF YES] Please briefly describe the type of information filed and whether it has changed since you attended TRAINING(S). For what percent of the projects do you submit the following:

        i. REScheck files with supplemental checklists for mandatory requirements ____%

        ii. REScheck files with no supplemental information ____%

        iii. Prescriptive checklists ____%

        iv. Documentation that ducts are tested and/or that a blower door test is conducted _____%

Sharing Information

7. Please think of different parties you interact with such as people working on your project, colleagues, code officials, and others. Have you shared information from the [TRAINING(S)] with others?

    a. [IF YES] Can you tell me what information you shared and the party involved?

    b. [IF YES] Do you believe [PARTY] is making use of the information you have shared?

    c. How are they using this information?

Other Sources of Information

8. Since [DATE], have you attended any other trainings, webinars, or gatherings discussing building codes?

    a. [IF YES] Please tell me the names and approximate dates of these events.

    b. [IF YES] Was there a particular focus at these events you can remember? If so, describe.

9. Other than the [TRAINING(S)] and [EVENTS IN QUESTION 8], what are your main sources of information on building code requirements?

General

10. Would you say checking the energy efficiency of a project is a low, medium, or high priority in building inspections, relative to the other things you or the building department has to check? Why?

    a. Has this changed over the past year or so? If yes, how has it changed?

    b. Do you anticipate the priority given to checking energy efficiency will increase in the future?

        i. [IF YES] Why is that?

11. Have your interactions with code officials and code enforcement regarding energy efficiency changed in the last year or so?

    a. [IF YES] What changes have you experienced?

12. Do you put in more effort and/or spend more time in complying with the energy code in the past year or so?

    a. [IF YES] Please explain where you put in more effort/spend more time.

13. Have your customers become more interested in energy efficiency in the last year or so? Why or why not?

    a. [IF YES] Are customers willing to pay more for energy efficiency?

    b. [FOR RESPONDENTS OTHER THAN BUILDERS = YES] Are builders more concerned about complying with code?

Closing

14. Is there anything that you would want added to the [TRAINING(S)] that was not already covered?

    a. [IF YES] What would you add and why?

15. Would you recommend that your colleagues attend the Energy Code Technical Support Initiative trainings? Why or why not?

    a. Why or why not?

16. Is there anything we have not covered that you would like to add; in particular do you have any suggestions for how the Energy Code Technical Support Initiative can help you to comply with the energy code?

Thank you so much for your time!