

# Findings of Follow-Up Interviews with Massachusetts Code Compliance Support Initiative Residential Training Attendees (TXC 46)

FINAL

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SUBMITTED TO:

Massachusetts Electric and Gas Program Administrators

SUBMITTED BY:

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## Executive Summary

As part of the ongoing evaluation of the Massachusetts Code Compliance Support Initiative (CCSI), in 2017 NMR conducted follow-up in-depth interviews (IDIs) with 40 individuals who had attended one or more residential classroom training approximately six months earlier.

This report summarizes the findings from these interviews. A second report for this study will summarize the findings from IDIs with individuals who attended commercial classroom trainings.

The residential trainings all covered the code based on the 2015 International Energy Conservation Code (IECC). Twenty respondents work as municipal building code employees and 20 work as builders, architects, energy managers, contractors, equipment suppliers, or energy-efficiency professionals (referred to as ‘building professionals’). The overall goal of the follow-up interviews was to determine if and how the subjects apply the training to their work. 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. Key findings include the following:

- Most respondents – 85% of municipal building code employees and 65% of building professionals – made some changes to their work because of the trainings. These changes were predominantly focused on insulation and envelope areas (all respondents), builder and contractor education (municipal building code employees), and ventilation (building professionals).
- The most useful aspects of the trainings for all respondents were the updates and summaries on code changes. This is not surprising considering most interviewees had attended early trainings on the 2015 IECC code.
- Almost all respondents (93%) had shared some of the information from the trainings with other parties; close to one-half (45%) also shared the handouts and other materials provided at the trainings. More than one-half of all respondents have recommended the trainings to others previously (55%), and the vast majority said they would recommend the trainings to others in the future (93%).
- Respondents’ suggestions for improving the trainings include having a stronger focus on specific areas (areas varied among respondents) and focusing on best practices for code compliance. Both municipal building code employees and building professionals suggested that offering continuing education credits could increase training awareness and attendance among builders and contractors.

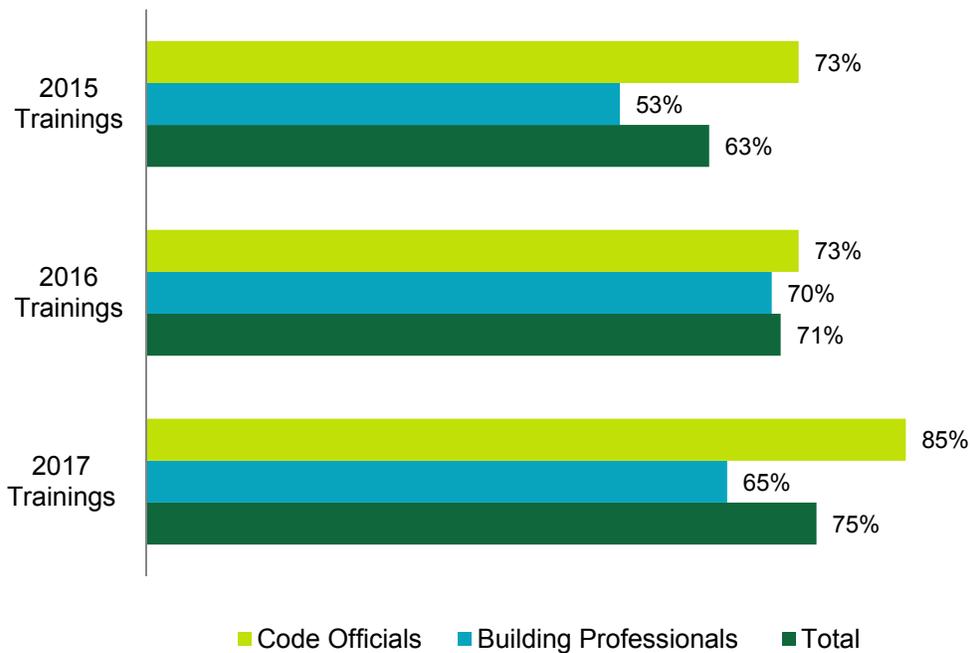
This study is similar in design to studies completed at the end of 2015 and 2016 (referred to as the 2015 study and the 2016 study, respectively). The 2015 study consisted of 60 follow-up IDIs with individuals who had attended earlier residential CCSI trainings, while the 2016 study consisted of 52 follow-up IDIs.

## USE OF TRAINING INFORMATION IN THE FIELD

Three-quarters of respondents (75%) said they had made some changes in their work because of the training(s) they attended. A higher percentage of municipal building code employees said they made changes (75% for inspections; 60% for building permit review; 85% for either inspections or building permit review) than building professionals (65% for all work). The areas most affected by changes were insulation and envelope areas (all respondents), builder and contractor education (municipal building code employees), ventilation (building professionals), and ductwork (building professionals).

It is important to note that the interviewees had worked on a large number of projects since attending the trainings. The municipal building code employees estimated they had reviewed permits involving close to 6,000 housing units and conducted final inspections involving close to 3,000 housing units. The building professionals said they had worked on projects involving over 6,000 housing units since the trainings.

The findings for respondents making changes to their work because of the trainings are slightly higher than the those from the 2015 and 2016 studies, as shown in [Figure 1](#). The higher percentages in 2017 are likely to due to the trainings covering a new energy code based on 2015 IECC.



**Figure 1: Making Changes to Work due to CCSI Trainings**

Two-fifths (8 out of 20, or 40%) of municipal building code employees reported that updates on code changes and help in understanding the code book were the most useful aspects of the trainings. As noted earlier, this is not surprising since the respondents attended early trainings on the 2015 IECC code. The next most useful area was insulation topics, mentioned by one-fourth of municipal building code employees. This was followed by

information on blower door tests and duct sealing, each mentioned by three of the 20 respondents. Building professionals also considered updates and summaries of code changes to be the most useful aspects of the trainings (8 out of 20, or 40%). The next most useful areas were getting handouts to use as references and having conversations with other attendees, each mentioned by three of the 20 respondents.

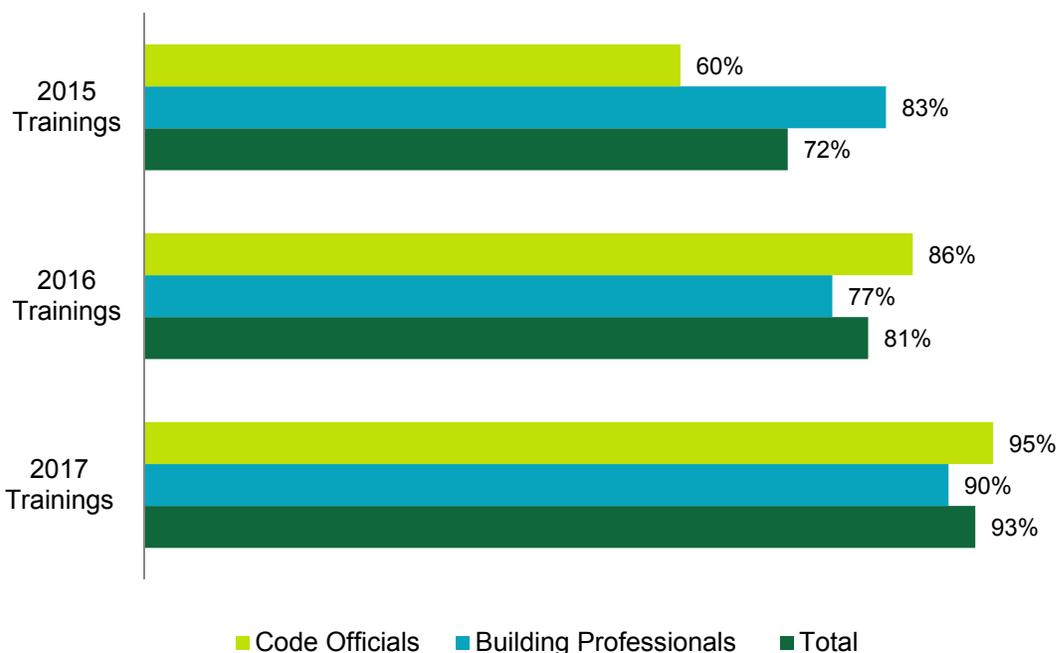
The most common reason offered by both types of respondents for not making any changes to fieldwork after attending the trainings was already being familiar with the information presented at the trainings. The second most common reason was that the training did not apply to their work; for example, municipal building code employees might not conduct inspections or building permit reviews. As expected, since the stretch code was also updated, working in a stretch code community appears not to have had much effect on whether municipal building code employees and building professionals said they have changed their practices after the trainings.

### SHARING INFORMATION FROM THE TRAININGS

The vast majority of respondents (37 out of 40, or 93%) had shared some of the information from the trainings with other parties. Municipal building code employees were slightly more likely than building professionals to share the information (95 and 90%, respectively). Close to one-half of respondents (18 out of 40, or 45%) had shared the handouts or other materials from the trainings with other parties. The municipal building code employees (10 out of 20, or 50%) were slightly more likely than building professionals to share the training materials with others (8 out of 20, or 40%). Code officials most often shared information with colleagues, followed by builders and contractors. Building professionals most often shared information with builders, architects, and subcontractors.

The findings for respondents sharing information from the trainings are higher than the those from the 2015 and 2016 studies, as shown in Figure 2. The higher percentages in 2017 are likely due, in part, to the trainings providing handouts starting in the fall of 2015 and the fact that the most recent trainings covered the new code.

Figure 2: Sharing CCSI Training Information



The information source most frequently mentioned by all respondents was the building code book or website. This was followed by handouts from the trainings and Mass Save Technical Support for code officials. For building professionals, key sources of information after the building code book or website were peers and colleagues, code officials, and building contractors. Municipal building code employees were more aware of the online and telephone support provided by the Mass Save Energy Support Technical Initiative than building professionals (90% and 65%, respectively). Municipal building code employees and building professionals who were aware of the support provided were equally as likely to have used the web, phone, or email services provided by Mass Save (just over one-half for each group). All 11 municipal building code employees and six of the seven building professionals who had used the website for code information or called the help line were satisfied with the results.

## CODE COMPLIANCE AND ENFORCEMENT ENVIRONMENT

Over two-fifths (7 out of 17 or 41%) of the building professionals who interact with code officials said there were changes in their interactions with code officials regarding energy-efficiency in the last year or so. These changes include increased discussion of energy code with code officials, more suggestions from them on compliance, and more general awareness of the codes. Most (13 out of 20, or 65%) building professionals said that their customers had become more interested in energy-efficiency in the last year or so, and a majority (11 out of 13, or 85%) of these respondents said their customers were willing to pay more for energy-efficiency without qualifying their answers. The percentage that said their customers were willing to pay more for energy-efficiency without qualifying their answers is higher than in the 2015 and 2016 studies (46% and 30%, respectively).

Most municipal building code employees consider energy-efficiency to be either a high (10 out of 20 or 50%) or medium priority (6 out of 20 or 30%). The remaining respondents said it was equal to other parts of the building code (10%) or a low priority (10%). Less than one-third of respondents who answered the question (5 out of 16, or 31%) said their prioritization of energy-efficiency has risen since they attended the training. Note that six respondents who said their prioritization has not changed since attending the training ranked energy-efficiency as a high priority, four ranked it as a medium priority, and one ranked it as a low priority. The portion that said the priority had changed is lower than in the 2016 report, in which over half of respondents (10 out of 18, or 56%) noted a change in prioritization after the training. Close to one-half of respondents (7 out of 16, or 44%) think the priority for checking energy-efficiency will continue to increase in the future, with most reporting that it will increase as contractors learn and improve upon it more and energy codes get stricter.

Most (17 out of 20 or 85%) code officials have encountered at least one issue related to energy-efficiency in the field. The most common issues encountered during inspections were insulation installation, such as uncovered spray foam, gaps in air barriers, and high air leakage leading to failed blower door tests.

### RESPONDENT SUGGESTIONS FOR IMPROVING THE CCSI TRAININGS

Eight of the 12 (67%) municipal building code employees who offered training suggestions wanted the trainings to have a stronger focus on specific areas, including HVAC, air barriers, performance-based code compliance, and existing buildings. The second most frequent suggestion was to provide different training materials, particularly for enforcing the code and explaining it to builders. Five of the 14 (or 36%) building professionals who offered training suggestions also wanted the trainings to have a stronger focus on specific areas, particularly ventilation. Other suggestions included focusing on best practices for compliance, explaining code requirements more clearly, and highlighting the major changes between codes.

Both municipal building code employees and building professionals offered suggestions to help increase the awareness of trainings among builders and contractors, including offering continuing education credits to increase attendance. Respondents also suggested working with homebuilder associations, having local code officials promote the trainings, and advertising in the local media.

Finally, more than one-half of all respondents have recommended the trainings to others (22 out of 40, or 55%), and the vast majority said they would recommend the trainings to others in the future (37 out of 40, or 93%).

### OVERALL CONSIDERATIONS

Based on the follow-up interviews and other work on the CCSI, NMR offers the following considerations for improvement.

- Consider offering trainings of varying lengths. Longer trainings allow time to offer more real-life examples, as suggested by some respondents. Longer trainings may also be more appropriate for attendees with moderate knowledge of the subject.
- Consider additional focus on areas such as insulation, ventilation, and HVAC, as suggested by some respondents. This may be offered in conjunction with longer trainings.
- Examine options to encourage more builders and contractors to attend the trainings. This may include continuing education credits, having local code officials promote the trainings, working with homebuilder associations and local media, or offering trainings in the evenings with dinner included.

# 1

## Section 1

## Introduction

NMR, as part of the Cross-cutting evaluation team, conducted follow-up in-depth interviews (IDIs) with 40 individuals who attended one or more residential classroom trainings sponsored by the Massachusetts Code Compliance Support Initiative (CCSI). The CCSI seeks to improve compliance with residential and commercial building codes in Massachusetts through various avenues over the long term. The overall goal of the follow-up interviews is to determine if and how the trainees are using what they learned at the trainings in the field. NMR and Cadmus have been documenting the effects of CCSI trainings and other efforts since 2014. These evaluation efforts, including this report, feed into the attribution process for residential and commercial code compliance savings.

This report is organized as follows:

- Overview of the CCSI residential classroom training, the evaluation approach, and characteristics of the respondents
- Findings, including:
  - Trainee use of information from the training
  - Information trainees identify as most useful
  - Trainee sharing of information from the training
  - Other sources of code compliance information that trainees identify as useful
  - Description of the code compliance and enforcement environment
  - Suggestions for improving the training
  - Considerations
- Appendix A: Interview guides

### 1.1 OVERVIEW OF CCSI RESIDENTIAL CLASSROOM TRAININGS

Through the CCSI, since September 2014 the PAs have offered residential classroom trainings about complying with the 2012 and 2015 International Energy Conservation Code (IECC) to builders, architects, equipment suppliers, energy efficiency professionals, building inspectors, and others involved in either applying or enforcing building codes. The purpose of these trainings is to increase the rate of compliance with the energy code in new homes built in Massachusetts. The trainings cover topics including code changes, air barriers and insulation, ventilation, and efficient equipment or mechanical systems.

This evaluation focuses on the residential classroom trainings conducted between August 10, 2016 and June 26, 2017. During this time, the CCSI sponsored 20 trainings. The trainings lasted from three to three-and-one-half hours each, and had a total of 967 attendees.

## 1.2 EVALUATION APPROACH

This study is similar in design to those the evaluation team performed at the end of 2015 and 2016. These earlier studies also entailed follow-up IDIs, with between 52 and 60 individuals who attended residential CCSI trainings over various periods from 2014 through 2016.

The follow-up IDIs performed for this study drew from attendees of the 12 trainings held from August of 2016 through March of 2017, and were performed from June through September of 2017. The follow-up interview guides are designed to assess how the trainings have influenced activities in Massachusetts in the previous several months.<sup>1</sup> We scheduled the interviews so that at least six months passed between training attendance and the interview. This ensured that trainees would have time to start applying lessons from the training to their work, and enough experience after the training to be able to reflect meaningfully on whether, and how, the training had changed their practices.

### 1.2.1 Interview Questions

The interview guides addressed the same topics as those used for the 2015 and 2016 studies:

- Activities since attending training(s), depending on the type of trainee (these include home inspections, building permit review, projects under design, projects under construction, and completed projects)
- If and how interviewees have applied the training to their work
- The most useful aspects of the training(s) and suggestions for improvement
- Whether the respondents have shared what they learned with others and how this shared information is being used
- Whether the respondents have recommended the trainings to others.

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 building professionals, 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 building professionals, 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

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<sup>1</sup> 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.

- 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.

Finally, the interview guides probed for sources of energy code information used by the respondents. In addition to open-ended questions about where respondents first turn when they have a question on the energy code, the guides address the following areas:

- Awareness of the support provided by the Mass Save Energy Code Technical Support Initiative
- Use of the Initiative's website, email, and phone services for information on the energy code
- For those who have used the Mass Save Energy Code Technical Support Initiative, satisfaction with the support provided

[Appendix A](#) of this report contains copies of the interview guides for municipal building code employees and building professionals.

### 1.2.2 Sample Design and Disposition

The sample frame consisted of 316 unique attendees who registered for trainings held during the study period. We removed attendees who were employed by the Program Administrators or the implementation contractors. We then categorized trainees into two strata:

- 'Municipal building code employees' who work enforcing the building code, such as building commissioners, building inspectors, and code consultants, and
- 'Building professionals,' including builders, architects, energy managers, contractors, equipment suppliers, and energy efficiency professionals (mostly HERS raters).

We set quotas of 20 respondents for each stratum.

Since the interviews began before all the trainings for the study period were held, and took place over four months, not everyone who attended these trainings was part of the sample. For example, building professionals who attended the March 2017 trainings were not contacted, since NMR had reached the goal of 20 IDIs for this group before September 2017, which is the earliest we could have interviewed these trainees. To recruit 40 interviewees, we sent emails to the 308 trainees explaining the purpose of the study and the participation process, followed by telephone calls as needed. To encourage participating in the interviews, we offered an honorarium of \$45 to municipal building code employees and \$100 to building professionals as compensation for their time. This honorarium could be paid to the interviewee, their employer, or a charity; respondents could also decline to accept the incentive. NMR offered a lower incentive to municipal building code employees because they are typically required to report any compensation of \$50 or more.

Table 1 summarizes the sample disposition. Just over three-quarters of the sample never responded to repeated contact attempts. After omitting those considered ineligible and assuming the sample that never responded to additional emails and telephone calls had the same rate of ineligibility, the response rates for the sample are 11% for municipal building code employees and 19% for building professionals.

**Table 1: Sample Disposition**

| Sample  | Total | Municipal Building Code Employees | Building Professionals |
|---|-------|-----------------------------------|------------------------|
| Initial sample receiving emails                                       | 308   | 200                               | 108                    |
| IDIs completed with individuals expressing interest to initial emails | 14    | 4                                 | 10                     |
| IDIs completed through follow-up telephone calls and/or emails        | 26    | 16                                | 10                     |
| Sample not responding to follow-up emails and telephone calls         | 234   | 150                               | 84                     |
| Refusals  | 28    | 25                                | 3                      |
| Ineligible  | 6     | 5                                 | 1                      |
| Total IDIs  | 40    | 20                                | 20                     |

### 1.3 CHARACTERISTICS OF RESPONDENTS

Each respondent provided their occupation and listed up to three Massachusetts municipalities where they do most of their work. Table 2 shows respondents by occupation and the building code in the municipalities in which they work (2015 IECC building code, stretch code, or both). Thirteen of the municipal building code employees who attended the residential trainings work in cities and towns that are under the stretch code, four work in municipalities under 2015 IECC, and three work under both codes.<sup>2</sup> None of the building professional respondents work exclusively in 2015 IECC municipalities, but eleven work exclusively in stretch code municipalities and nine work in both stretch code and 2015 IECC municipalities.

<sup>2</sup> The state building inspector works in Metrowest Boston, covering communities with the 2015 IECC code and the stretch code. Two local inspectors work in communities that adopted the stretch code in 2017; thus, their inspections have involved housing permitted under both the 2015 IECC and the associated stretch code.

**Table 2: Follow-Up Interview Respondents**

(number of respondents; n=40)

| Position                              | Total Number of Respondents | Building Code in Municipalities Covered |              |            |
|---------------------------------------|-----------------------------|---|--------------|------------|
|                                       |                             | 2015 IECC Code                          | Stretch Code | Both Codes |
| All municipal building code employees | 20                          | 4                                       | 13           | 3          |
| Local building inspectors             | 8                           | 1                                       | 5            | 2          |
| Building commissioners                | 5                           | 1                                       | 4            | 0          |
| Deputy building commissioners         | 2                           | 1                                       | 1            | 0          |
| State building inspector              | 1                           | 0                                       | 0            | 1          |
| Other code officials                  | 4                           | 1                                       | 3            | 0          |
| All building professionals            | 20                          | 0                                       | 11           | 9          |
| Architects                            | 6                           | 0                                       | 4            | 2          |
| HERS raters                           | 5                           | 0                                       | 1            | 4          |
| Other energy-efficiency specialists   | 2                           | 0                                       | 1            | 0          |
| Equipment suppliers                   | 2                           | 0                                       | 2            | 0          |
| Contractors                           | 2                           | 0                                       | 1            | 1          |
| Energy managers                       | 2                           | 0                                       | 2            | 1          |
| Builders                              | 1                           | 0                                       | 0            | 1          |
| All respondents                       | 40                          | 4                                       | 26           | 10         |

Just over one-half of respondents only attended the Envelope and Building Science (EBS) trainings, while just over one-quarter only attended the HVAC-IAQ trainings. Fewer than one-fifth attended both (Table 3).

**Table 3: Residential Trainings Attended by Follow-Up Interview Respondents**

(number of respondents; n=40)

| Type of Training Attended | Total Number of Respondents | Type of Respondent                |                        |
|---------------------------|-----------------------------|-----------------------------------|------------------------|
|                           |                             | Municipal Building Code Employees | Building Professionals |
| EBS only                  | 22                          | 15                                | 7                      |
| HVAC-IAQ only             | 11                          | 2                                 | 9                      |
| Both EBS and HVAC-IAQ     | 7                           | 3                                 | 4                      |
| Total                     | 40                          | 20                                | 20                     |

# 2

## Section 2 Use of Training Information in the Field

Key findings for each section appear in boldface bullets at the beginning of the section.

### Key Findings

- **Three-quarters of respondents (75%) said they had made some changes in their work because of the training(s) they attended. The percentages saying they had made some changes were higher for municipal building code employees (75% for inspections; 60% for building permit review; 85% for either inspections or building permit review) than for building professionals (65% for all work).**

### Section Overview

A key goal of the follow-up interviews was to assess if and how the training attendees apply the trainings to their work. The following questions were posed to code officials:

*“Have you changed how you conduct inspections for the energy code as a result of the training(s) you attended?”*

*“Have you changed how you review building permit applications as a result of the training(s) you attended?”*

A similar question was posed to building professionals:

*“Have you made any changes in your work on these [projects worked on since training] to better comply with the energy code as a result of the training(s) you attended?”*

This section first examines the opportunities trainees had to use what they had learned – that is, how many housing units they worked on or how many building inspections they conducted. The respondents also estimated the number of inspections for units permitted under 2015 IECC and the updated stretch code. Municipal building code employees also estimated how many building permits they had reviewed under 2015 IECC and the updated stretch code. This section then examines what changes the respondents believe they made due to the trainings and why some did not make any changes.

### 2.1 BUILDING UNITS INSPECTED AND HOUSING CONSTRUCTION

All respondents have either conducted building inspections or been involved in residential unit construction since attending the trainings. Nineteen of the twenty municipal building code employees interviewed have also been involved in permit review.

As shown in Table 4, all municipal building code employees have participated in inspections of homes permitted under 2015 IECC or the associated stretch code since attending the trainings. The respondents estimated the total number of housing units involved per

inspection, including housing units in multifamily projects. Inspections for all municipal building code employees involved over 7,000 housing units, while final inspections involved over 2,500 housing units. The interviewers asked respondents who worked with both the 2015 IECC and the stretch code to estimate the percentage of units permitted under each code; this information is used to estimate the number of housing units permitted under 2015 IECC and the stretch code in Table 4, Table 5, and Table 6. Of the 20 building code official respondents, four worked exclusively in 2012 IECC communities, thirteen worked exclusively in stretch code communities, and three worked in both 2012 IECC and stretch code communities.

**Table 4: Inspections by Follow-Up Interview Respondents (Municipal Building Code Employees)**

(multiple response for number of respondents; n=20)

| Types of Inspections                                   | Number of Respondents | Number of Housing Units |
|--|-----------------------|-------------------------|
| All inspections  | 20                    | 7,669                   |
| All final inspections                                  | 18                    | 2,869                   |
| All 2015 IECC or associated stretch code inspections   | 20                    | 7,140                   |
| 2015 IECC or associated stretch code final inspections | 18                    | 2,732                   |
| All 2015 IECC inspections                              | 7                     | 2,327                   |
| 2015 IECC final inspections                            | 7                     | 745                     |
| All 2015 IECC stretch code inspections                 | 16                    | 4,813                   |
| 2015 IECC stretch code final inspections               | 14                    | 1,987                   |

The follow-up IDIs also asked municipal building code employees to estimate how many building permit applications they had reviewed since attending the trainings. Nineteen of the 20 code officials said they are responsible for permit reviews. They estimated they had reviewed permits involving close to 6,000 housing units since attending the trainings, with most of these being in communities using the stretch code (Table 5).

**Table 5: Building Permits Reviewed by Follow-Up Interview Respondents  
(Municipal Building Code Employees)**

(multiple response for number of respondents; n=19)

| Building Permits  | Number of Respondents | Number of Housing Units |
|---|-----------------------|-------------------------|
| All building permits                                      | 19                    | 5,962                   |
| All 2015 IECC or associated stretch code building permits | 18                    | 5,466                   |
| All 2015 IECC building permits                            | 6                     | 731                     |
| All 2015 IECC stretch code building permits               | 14                    | 4,735                   |

As shown in Table 6, all of the building professionals have been involved with residential construction projects since attending the trainings, and 19 out of 20 have worked on projects permitted under the 2015 IECC code or associated stretch code. Their work involved over 6,000 housing units. This number includes two respondents, an energy manager and a HERS rater, working on multifamily projects with a total of 4,000 units. Of the 19 respondents who listed any 2015 IECC or associated stretch code projects since attending the training(s), ten worked exclusively in stretch code communities and nine worked in both 2015 IECC and stretch code communities.

**Table 6: Construction by Follow-Up Interview Respondents (Building Professionals)**

(multiple response for number of respondents; n=20)

| Types of Projects  | Number of Respondents | Number of Housing Units |
|--|-----------------------|-------------------------|
| All projects   | 20                    | 6,214                   |
| Completed projects   | 17                    | 4,134                   |
| All 2015 IECC or associated stretch code projects                    | 19                    | 5,420                   |
| 2015 IECC or associated stretch code projects with final inspections | 17                    | 3,644                   |
| All 2015 IECC projects   | 8                     | 440                     |
| 2015 IECC projects with final inspections                            | 8                     | 348                     |
| All stretch code projects  | 18                    | 4,980                   |
| Stretch code projects with final inspections                         | 16                    | 3,296                   |

The follow-up IDIs asked all respondents to estimate how much of their work involved new construction, including gut rehabs, and how much involved renovations or additions to existing structures. (This question was new to the study in 2017.) Renovations and additions made up a sizable portion of the work for both municipal building employees and building professionals. Municipal building code employees reported that renovations and additions accounted for an average of 79% of the housing units permitted and 81% of the housing units inspected, while building professionals reported that renovations and additions accounted for 44% of the housing units worked on.

## 2.2 CHANGES MADE TO WORK AFTER ATTENDING TRAININGS

The interviewers asked all respondents who said they made changes to their work after attending the trainings to explain how they had changed what they do in the field. The interviewers asked respondents to describe the areas affected by these changes, to the extent possible. The resulting descriptions, as detailed in this section, varied from focusing on specific areas to more general changes.

### 2.2.1 Municipal Building Code Employees

Three quarters (15 of 20, or 75%) of the municipal building code employees said they made some changes to the way they conduct inspections after attending the trainings. As shown in Table 7, respondents who only attended the EBS trainings were more likely to make changes in how they conduct inspections; however, this is based on a small number of respondents.

**Table 7: Trainings Attended by Follow-Up Interview Respondents**

(number of municipal building code respondents; n=20)

| Made Changes to Conducting Inspections | Number of Respondents | Type of Training Attended |               |                  |
|--|-----------------------|---------------------------|---------------|------------------|
|  |                       | EBS Only                  | HVAC-IAQ Only | EBS and HVAC-IAQ |
| Yes                                    | 15                    | 12                        | 1             | 2                |
| No                                     | 5                     | 3                         | 1             | 1                |

More than one-half of the municipal building code respondents had filled out immediate survey forms after their trainings. In the immediate survey, respondents were asked when they expect to first use what they had learned in the training sessions. Table 8 compares their responses in the immediate survey with whether the respondents reported changing how they conduct inspections in the follow-up interviews. Note that this is not a direct comparison of individual participants, but a comparison of the overall sample. Most immediate survey respondents had said they would use the information from the trainings immediately, regardless of whether they reported changing their practices in the follow-up interviews; in fact, those who did not make any changes to their practices were equally likely to say that they would use the information “as soon as I return to work”.<sup>3</sup> While this analysis is based on only a few respondents, it does seem that changes in the field are less likely to occur than trainees believe at the end of the sessions; follow-up interviews give a better sense of the trainings’ effect. It is also possible that some respondents had made changes, but forgot that they had learned the information at the trainings.

**Table 8: When Expected to First Use Training Information and Changes Made**

(number of municipal building code respondents; n=20)

| Expected to First Use Training in Immediate Survey | Made Changes to Conducting Inspections |    |
|--|--|----|
|  | Yes                                    | No |
| As soon as I return to work                        | 6                                      | 3  |
| Sometime in the next three months                  | 2                                      | 1  |
| Did not answer immediate survey question           | 7                                      | 1  |
| Total  | 15                                     | 5  |

As shown in Table 9, the most frequently mentioned area affected by changes to inspection was insulation; some respondents gave more specific answers (noted below the general

<sup>3</sup> The immediate survey forms provided the respondents with additional options that none of the municipal building code interviewees had selected. These included the option to indicate longer periods until they first used information from the trainings and to check “not likely to ever use it.”

areas). Respondents also noted that they are more likely to use the information from the trainings to educate builders and contractors on the requirements to meet the energy code.

**Table 9: Areas Affected by Municipal Building Code Employee Changes to Inspections**

(number of municipal building code respondents; multiple response; n=15)

| Areas  | Number of Respondents | Type of Training Attended |               |                  |
|--|-----------------------|---------------------------|---------------|------------------|
|  |                       | EBS Only                  | HVAC-IAQ Only | EBS and HVAC-IAQ |
| All building code employees who made changes               | 15                    | 12                        | 1             | 2                |
| All insulation and envelope areas                          | 11                    | 9                         | 0             | 2                |
| Verifying R values of insulation                           | 5                     | 4                         | 0             | 1                |
| Exterior envelope insulation including sheeting and siding | 5                     | 4                         | 0             | 1                |
| Attic insulation   | 2                     | 1                         | 0             | 1                |
| Foundation wall insulation                                 | 1                     | 1                         | 0             | 0                |
| Verifying insulation of ductwork in unconditioned areas    | 2                     | 2                         | 0             | 0                |
| Insulation around fan vents                                | 1                     | 1                         | 0             | 0                |
| Educating builders and contractors                         | 6                     | 4                         | 1             | 1                |
| Air sealing  | 3                     | 1                         | 1             | 1                |
| Blower door tests  | 2                     | 1                         | 1             | 0                |
| Reviewing HERS reports and building checklists upfront     | 2                     | 1                         | 1             | 0                |
| Air/vapor barriers   | 2                     | 1                         | 0             | 1                |
| Air leakage and heat loss                                  | 2                     | 2                         | 0             | 0                |
| Efficiency of heating units                                | 2                     | 2                         | 0             | 0                |
| Ventilation  | 1                     | 0                         | 0             | 1                |
| Ductwork   | 1                     | 0                         | 0             | 1                |
| Windows  | 1                     | 1                         | 0             | 0                |
| Appliance efficiency                                       | 1                     | 1                         | 0             | 0                |
| Considering how measures in a home interact                | 1                     | 0                         | 0             | 1                |
| Did not provide specific areas                             | 1                     | 1                         | 0             | 0                |

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. Eight of the 15 municipal building code employees who had made changes to their inspections said their time had increased. In five cases, the increases were small; two said the time spent on inspections had increased by 5 to 10% and three said they spent about ten minutes more on each inspection. However, one respondent said the time spent on each inspection had gone up by 25% and one said the it had gone up by 40 to 50%. The eighth respondent did not specify how much more time was spent on inspections.

Fewer municipal building code employees (12 out of 22, or 60%) said they had changed how they review building permit applications after the trainings. They most often noted that they were paying more attention to the thermal envelope and insulation values; four respondents also said they used better checklists, which were provided at the trainings (Table 10). All but two of the building code employees who said they made changes to permit review after the trainings also said they made changes to how they conduct inspections.

**Table 10: Areas Affected by Municipal Building Code Employee Changes to Permit Review**

(number of respondents; multiple response; n=12)

| Areas  | Number of Respondents | Type of Training Attended |               |                  |
|--|-----------------------|---------------------------|---------------|------------------|
|  |                       | EBS Only                  | HVAC-IAQ Only | EBS and HVAC-IAQ |
| All building code employees who made changes                     | 12                    | 10                        | 1             | 1                |
| Pay more attention to the thermal envelope and insulation values | 7                     | 6                         | 0             | 1                |
| Use better checklists  | 4                     | 3                         | 0             | 1                |
| Check HERS rater paperwork                                       | 2                     | 2                         | 0             | 0                |
| Check drawings to confirm compliance with the updated code       | 1                     | 0                         | 0             | 1                |
| Check window u values  | 1                     | 1                         | 0             | 0                |
| Check HVAC data  | 1                     | 1                         | 0             | 0                |
| Pay more attention to wall penetrations                          | 1                     | 1                         | 0             | 0                |
| Pay more attention to ventilation                                | 1                     | 0                         | 0             | 1                |
| More aware of where air leakage occurs during blower door tests  | 1                     | 1                         | 0             | 0                |
| Used DOE website to get more stretch code information            | 1                     | 1                         | 0             | 0                |
| Gather more information from builders upfront                    | 1                     | 1                         | 0             | 0                |
| Did not provide specific areas                                   | 2                     | 2                         | 0             | 0                |

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 five municipal building code employees said their time had increased; three estimated by 5 to 15 % and two said they spend 10 to 15 more minutes per plan.

Some respondents elaborated on how they are using what they learned at the trainings to educate contractors in the field. Regarding inspections, one respondent that attended an EBS training noted,

*"I'm able to explain more about why the codes are in place, which is really helpful... how they run insulation on ducts systems, mini split systems, returns in each room... [I am] able to explain this better with the science behind it."*

This respondent went on to emphasize the importance of the trainings for municipal building code employees:

*“They want engineers as building inspectors, but engineers don’t have the field application, and towns don’t pay the price that is going to attract engineers. So what happens is you get guys from the building trades and cross train them to do the job. Trainings are paramount to get these guys up to an engineer’s level.”*

Regarding permit review, a building commissioner that attended an EBS training stressed the importance of reviewing all documents filed with his office:

*“The R values don’t match up – the HERS rater will tell the contractor what rating needs to be met, but the drawing doesn’t match that value. They don’t show how it’s properly sealed. [If I had not attended the training] my guys wouldn’t be paying as close attention to energy requirements.”*

### 2.2.2 Building Professionals

Close to two-thirds (13 of 20, or 65%) of the building professionals said they made some changes to their work after attending the trainings. As shown in Table 11, respondents who attended the EBS training were more likely to make changes to their work; this is similar to the feedback from the municipal building code employees.

**Table 11: Trainings Attended by Follow-Up Interview Respondents**

(number of building professional respondents; n=20)

| Made Changes to Work | Total Number of Respondents | Type of Training Attended |               |                  |
|----------------------|-----------------------------|---------------------------|---------------|------------------|
|                      |                             | EBS Only                  | HVAC-IAQ Only | EBS and HVAC-IAQ |
| Yes                  | 13                          | 6                         | 4             | 3                |
| No                   | 7                           | 1                         | 5             | 1                |

Some respondents had filled out immediate survey forms after their trainings. In the immediate survey, respondents were asked when they expect to first use what they had learned in the training sessions. Table 12 compares their responses in the immediate survey with whether the respondents reported changing how they conduct inspections in the follow-up interviews. Again, this is not a direct comparison of individual participants, but a comparison of the overall sample. As in the case of municipal building code employees, there is little relationship between the responses to the immediate surveys and whether building professionals report changing anything in their work in the follow-up interviews because of the trainings (this is based on a small sample size).<sup>4</sup>

<sup>4</sup> Again, the immediate survey forms provided the respondents with additional options that none of the municipal building code interviewees had selected. These included the option to indicate longer periods until they first used information from the trainings and to check “not likely to ever use it.”

**Table 12: When Expected to First Use Training Information and Changes Made**

(number of builder and other respondents; n=20)

| Expected to First Use Training in Immediate Survey | Made Changes to Work |    |
|--|----------------------|----|
|  | Yes                  | No |
| As soon as I return to work                        | 2                    | 1  |
| Sometime in the next three months                  | 4                    | 3  |
| In the next four to six months                     | 1                    | 1  |
| Did not answer immediate survey question           | 6                    | 2  |
| Total  | 13                   | 7  |

As in the case of the municipal building code employees, most of the building professionals 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 13, insulation, ventilation, ductwork, and air sealing were mentioned most frequently; some respondents gave more specific answers (noted below some of the general areas). Interestingly, respondents talked about sharing information with others, such as builders, without further prompting when asked how they had changed their work. More information on sharing what was learned in the trainings is included in [Section 4](#), where, later in the interviews, respondents replied to specific questions about information sharing.

**Table 13: Areas Affected by Builder and Other Trainee Changes**

(number of respondents; multiple response; n=13)

| Areas   | Number of Respondents | Type of Training Attended |               |                  |
|---|-----------------------|---------------------------|---------------|------------------|
|   |                       | EBS Only                  | HVAC-IAQ Only | EBS and HVAC-IAQ |
| All building professionals who made changes                               | 13                    | 6                         | 4             | 3                |
| All insulation and envelope areas   | 8                     | 5                         | 0             | 1                |
| Use of spray foam insulation  | 3                     | 3                         | 0             | 0                |
| Envelope and thermal bridging for heat transfer                           | 2                     | 1                         | 0             | 1                |
| Wall insulation   | 1                     | 1                         | 0             | 0                |
| Attic insulation  | 1                     | 1                         | 0             | 0                |
| Educating builders about rigid foam insulation                            | 1                     | 1                         | 0             | 0                |
| Paying more attention to wall penetrations                                | 1                     | 1                         | 0             | 0                |
| Insulating the backs of electrical boxes                                  | 1                     | 1                         | 0             | 0                |
| Ventilation   | 5                     | 1                         | 2             | 2                |
| Ductwork; includes putting ducts in conditioned space                     | 4                     | 1                         | 2             | 1                |
| All air sealing   | 4                     | 2                         | 1             | 1                |
| Downloaded infrared app on phone  | 2                     | 1                         | 0             | 1                |
| Doing blower door tests after projects                                    | 1                     | 1                         | 0             | 0                |
| Checking air infiltration   | 1                     | 0                         | 1             | 0                |
| Air/vapor barriers  | 3                     | 2                         | 0             | 1                |
| Windows and doors   | 3                     | 2                         | 1             | 0                |
| Duct sealing  | 2                     | 0                         | 2             | 0                |
| More proactive in discussing 2015 IECC code requirements with builders    | 2                     | 1                         | 1             | 0                |
| Paying more attention to indoor air quality                               | 1                     | 0                         | 1             | 0                |
| DHW efficiency  | 1                     | 0                         | 1             | 0                |
| Asks more questions before recommending insulation contractors to clients | 1                     | 0                         | 0             | 1                |
| Asks more questions before recommending HVAC contractors to clients       | 1                     | 0                         | 0             | 1                |
| Added items to audit checklist  | 1                     | 0                         | 0             | 1                |
| Did not provide specific areas  | 1                     | 0                         | 1             | 0                |

Respondents in this group elaborated on the specifics of how their work had changed. One architect that attended the EBS and HVAC-IAQ trainings said,

*I am being really conscious of the air barrier and what materials I use there; I am talking to contractors and material reps, and not just accepting what the contractor wants to put in, but paying much more attention to that.*

Another architect who attended the HVAC-IAQ training noted how her expectations changed:

*“A lot of times, if I knew the local code person, I could get a little complacent, but now I’m not complacent. It was September [2016] and there were a lot of changes coming in January, so knowing that if things took a little bit longer than I expected it was good”*

### 2.3 WHY NO CHANGES WERE MADE AFTER ATTENDING TRAININGS

Fifteen percent of municipal building code employees and 35% of building professionals 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 not being responsible for inspections or building permit review.

#### 2.3.1 Municipal Building Code Employees

As shown in Table 14, most municipal building code employees with no changes to their work said they already knew the information presented. Respondents also noted that the permit review process is less affected by the trainings because, as one respondent explained,

*“In reviewing an application of plans, you refer to the same areas of the code. Some of the internal numbers may change, but the review process is the same.”*

**Table 14: Why Municipal Building Code Employees Made No Changes**

(numbers of respondents; n=10)

| Reasons   | Inspections | Building Permit Application Review |
|---|-------------|------------------------------------|
| All building code employees who did not make changes          | 5           | 8                                  |
| Already knew the information covered/was enforcing the code   | 4           | 4                                  |
| Do not believe the trainings affect the permit review process | 0           | 3                                  |
| Did not give a reason   | 1           | 0                                  |
| Do not do permit review                                       | 0           | 1                                  |

Two municipal building code employees who had not made any changes to inspections or permit review said they expected that what they had learned in the trainings may serve them well in the future, as building energy codes become stricter.

### 2.3.2 Building Professionals

As shown in Table 15, four of the seven building professionals who did not make any changes after the trainings said they already knew the information covered. Additionally, two said the material did not apply to their work and one noted that she had made changes as the code changed but did not think the training should take credit for that. However, a HERS rater who did not change anything believes they may use the trainings in the future because,

*“Knowing that the experts that were presenting were in line with what I thought, it gave me more confidence that what I and my raters are doing is commonly believed to be best practices. A lot of time the code doesn’t address every example, but the presenter addressed many [circumstances]”*

**Table 15: Why Building Professionals Made No Changes**

(numbers of respondents; n=7)

| Type of Respondent  | Reason   | Number of Respondents |
|---------------------|--|-----------------------|
| HERS Rater          | Already knew the information covered   | 3                     |
| Mechanical engineer | Does not apply to work   | 1                     |
| Equipment supplier  | Does not apply to work   | 1                     |
| Architect           | Made changes due to code changes but does not think it was due to the training | 1                     |
| Energy manager      | Already knew the information covered   | 1                     |

### 2.3.3 Stretch Code Effect

As shown earlier in Table 5, most of the municipal building code employees and all of the building professionals interviewed work in at least some communities that have adopted the stretch code. As shown in Table 16, working in a stretch code community appears not to have had much effect on whether municipal building code employees and building professionals said they have changed their practices after the trainings.

**Table 16: Changes to Work Practices by Community**

(numbers of respondents; n=40)

| Respondents   | Total | 2015 IECC Community | Stretch Code Community | Both |
|---|-------|---------------------|------------------------|------|
| Municipal building code employees who changed some practices  | 17    | 3                   | 11                     | 3    |
| Municipal building code employees who did not change anything | 3     | 1                   | 2                      | 0    |
| Building professionals who changed some practices             | 13    | 0                   | 6                      | 7    |
| Building professionals who did not change anything            | 7     | 0                   | 5                      | 2    |
| All respondents   | 40    | 4                   | 24                     | 12   |

## 2.4 USE OF HANDOUTS PROVIDED AT THE TRAININGS

Most respondents (80% of municipal building code employees and 70% of building professionals) said they continue to use the handouts they received at the trainings (Table 17).

**Table 17: Use of Handouts Provided at the Trainings**

(number of respondents; n=40)

| Do you use the Handouts Provided? | Total Number of Respondents | Type of Training Attended |               |                  |
|-----------------------------------|-----------------------------|---------------------------|---------------|------------------|
|                                   |                             | EBS Only                  | HVAC-IAQ Only | EBS and HVAC-IAQ |
| Municipal building code employees |                             |                           |               |                  |
| Yes                               | 16                          | 11                        | 2             | 3                |
| No                                | 4                           | 4                         | 0             | 0                |
| Building professionals            |                             |                           |               |                  |
| Yes                               | 14                          | 6                         | 5             | 3                |
| No                                | 6                           | 1                         | 4             | 1                |

Respondents commented on the usefulness of the handouts. A HERS rater who attended an HVAC-IAQ training said,

*"I refer to the handouts on a regular basis, especially if I have questions or differences in interpretations in how something is formulated... Often the code officials don't know the answer and so they look to me to provide it."*

Similarly, a municipal building code employee who attended an EBS training noted,

*“I keep it on my desk as reference, just to check on things and compare to make sure it makes sense. I use it almost every time a permit comes in.”*

Another municipal building code employee who also attended an EBS training noted,

*“I do, all the time. Have them right in the code book. [Good for] finding references, quicker than looking through the index, and I have notes on them that are helpful as well.”*

The handouts provide a path to sharing what was learned in the trainings with others; this is explored in depth in [Section 4](#).

# 3

## Section 3 Most Useful Information from Trainings

### Key Findings

- The most useful parts of the trainings for all respondents were the updates and summaries on code changes. This is as expected since all interviewees attended early trainings on the new code based on the 2015 IECC. For municipal building code employees, the next most useful area was insulation topics; for building professionals, it was getting handouts to use as references sharing perspectives with other attendees.

### Section Overview

A key goal of the follow-up interviews was to identify the aspects of the trainings attendees found most useful and why. Interviewees were asked the following question:

*“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.

### 3.1 MUNICIPAL BUILDING CODE EMPLOYEES

Table 18 shows the feedback received from municipal building code employees to the open-ended question about which part or parts of the trainings they found most useful. Since most respondents had attended early trainings on the 2015 IECC code, it was unsurprising that two-fifths (8 out of 20, or 40%) reported that updates on code changes and help in understanding the code book were the most useful part of the trainings. The next most useful area was insulation topics, mentioned by one-fourth of municipal building code employees. This was followed by information on blower door tests and duct sealing, each mentioned by three of the 20 respondents.

**Table 18: Most Useful Information from Trainings - Municipal Building Code Employees**

(number of respondents; multiple response; n=20)

| Most Useful Part of Training                             | Number of Respondents | Building Code in Municipalities Covered |              |            |
|--|-----------------------|---|--------------|------------|
|  |                       | 2015 IECC Code                          | Stretch Code | Both Codes |
| <i>n</i>   | 20                    | 4                                       | 13           | 3          |
| Updates on code changes; help in understanding code book | 8                     | 2                                       | 4            | 2          |
| Insulation topics  | 5                     | 2                                       | 3            | 0          |
| Blower door tests  | 3                     | 0                                       | 2            | 1          |
| Duct sealing information                                 | 3                     | 0                                       | 2            | 1          |
| Air sealing information                                  | 2                     | 0                                       | 2            | 0          |
| How to verify HVAC contractors are complying with code   | 2                     | 1                                       | 1            | 0          |
| Infrared photography of heat loss                        | 1                     | 0                                       | 1            | 0          |
| What to look for in HERS reports                         | 1                     | 0                                       | 1            | 0          |
| Images of air sealing                                    | 1                     | 0                                       | 1            | 0          |
| Science behind energy codes                              | 1                     | 1                                       | 0            | 0          |
| HVAC system sizing                                       | 1                     | 0                                       | 0            | 1          |
| What trade-offs work to achieve efficiency goals         | 1                     | 0                                       | 1            | 0          |
| Ventilation  | 1                     | 0                                       | 1            | 0          |
| Windows and doors  | 1                     | 1                                       | 0            | 0          |
| Interactive session                                      | 1                     | 1                                       | 0            | 0          |
| Ability to ask questions                                 | 1                     | 0                                       | 1            | 0          |
| Everything was useful                                    | 2                     | 0                                       | 2            | 0          |

Code officials stressed the importance of the trainings in light of the switch to the 2015 IECC code. One code official who attended both the EBS and HVAC IAQ trainings said,

*“Overall I’m a big fan of these trainings. The energy code changed as of the first of the year, and the rest of the building code did not, so there was lots of confusion. This was a good overview of what parts of the energy codes were changing and when. It also provided a good written summary that you can take with you. This overview handout would lead you to where you could look something up quickly.”*

Another code official who attended an EBS training also stressed how useful it was to have someone clearly explain how to use the codebook. They especially found the images useful.

*“Letting us know where to look in the codebook; introducing the 2015 IECC codebook to us. When you have three hours [at the training] you absorb as much as you can, you later look in the book and read it. It was helpful showing us areas [using photos] that were good applications and bad applications.”*

A third code official who attended both the EBS and HVAC trainings said that the explanation of the science behind the code was useful:

*“The science behind it. We can all read the code, but knowing the background [makes] it easier to enforce. HVAC and insulation; what is necessary, [what is important], why is it... better to be tighter vs. looser. Good as background to enforcing code. [I’m] explaining this in the field during inspections.”*

A fourth respondent who attended an EBS training found the detailed photos and charts on insulation and ductwork particularly useful in his fieldwork:

*“It was helpful to me, as a building official, to have someone go through the process of exactly what techniques, through the photos, charts, and calculations that were provided, constitute a solid air barrier, where the thermal envelope is, what builders must go through, and what we should be really looking for in terms of air sealing and insulation values.... The training was useful in terms of some inspection techniques and items to look out for, like have the duct work been sealed, who is responsible for what, and what tradeoffs actually seem to be working out in the field.”*

Finally, a code official who also attended an EBS training noted how he could use what he learned to help projects while they are under construction:

*“[It is most useful] when they review the proper way to install installation, because we see that the most out in the field. They also have images on how to seal the wall assembly and pass a blower door test. If we can correct this in the field when its being constructed, they avoid the issue of not passing a blower door test at the end.”*

### 3.2 BUILDING PROFESSIONALS

Table 19 shows the feedback received from building professionals about which part or parts of the trainings they found most useful. Similar to code officials, two-fifths of building professionals (8 out of 20, or 40%) reported that updates and summaries of code changes were the most useful part of the trainings. The next most useful areas were getting handouts to use as references and sharing perspectives with other attendees, each mentioned by three of the 20 respondents.

**Table 19: Most Useful Information from Trainings – Building professionals**  
(number of respondents; multiple response; n=20)

| Most Useful Part of Training                                    | Number of Respondents | Building Code in Municipalities Covered |                                  |
|---|-----------------------|---|----------------------------------|
|   |                       | Stretch Code                            | Both 2015 IECC and Stretch Codes |
| <i>n</i>  | 20                    | 11                                      | 9                                |
| Updates and summaries of code changes                           | 8                     | 5                                       | 3                                |
| Having handouts to use as references                            | 3                     | 2                                       | 1                                |
| Conversations and sharing perspectives with other attendees     | 3                     | 0                                       | 3                                |
| Ability to ask questions  | 2                     | 2                                       | 0                                |
| Relationship between 2015 IECC and the stretch code             | 2                     | 2                                       | 0                                |
| Better understanding of the building envelope                   | 2                     | 2                                       | 0                                |
| Better understanding of framing and treatment of corners        | 2                     | 1                                       | 1                                |
| Mass Save incentives for insulation, air sealing, and duct work | 1                     | 1                                       | 0                                |
| Testing for ventilation   | 1                     | 0                                       | 1                                |
| Different images of proper installations                        | 1                     | 1                                       | 0                                |
| Photographs of common errors by HVAC contractors                | 1                     | 0                                       | 1                                |
| Indoor air quality as affected by code changes                  | 1                     | 0                                       | 1                                |
| Class participation   | 1                     | 0                                       | 1                                |
| Everything  | 1                     | 0                                       | 1                                |

An energy-efficiency consultant, who advises building owners on contractor selection, appreciated the scope of the trainings for the builders and contractors in the audience:

*“[It is important for contractors] to understand what is expected of you, (not necessarily what inspectors will look for), because some inspectors are more strict than others. Some are not looking for much, so it can be too easy to pass. Basically, good to learn what the code actually is, not what you can get away with.”*

An equipment supplier who attended the EBS training found the details presented at the training most useful:

*“I liked when they put up pictures of new code changes, went over those specifically with framing. How houses are supposed to be framed at the corners. Getting into the nitty gritty what builders are required to do because that’s the market we are in.”*

Finally, an architect who attended the EBS training found being in a physical classroom, rather than learning online, to be quite useful:

*“Code changes being laid out was helpful, getting a better understanding of envelope building science and how that applies to the work that I do, being able to ask questions as opposed to reading online or attending a webinar.”*

## 4

## Section 4 Sharing of Information and Recommended Training

### Key Findings

- Almost all respondents (93%) had shared some of the information from the trainings with other parties; close to one-half (45%) also shared the handouts and other materials provided at the trainings. Moreover, more than one-half of all respondents have recommended the trainings to others previously (55%), and the vast majority said they would recommend the trainings to others in the future (93%).
- Respondents shared a variety of information from the trainings with a diverse group of stakeholders.

### Section Overview

The follow-up interviewers also asked who 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 interviewers posed the following questions:

*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)/ such as people working on your project, colleagues, code officials, and others (building professionals). Have you shared information from the training(s) with others?*

*Have you seen others offering to share information from the trainings?*

*Can you tell me what information you shared and the party involved?*

*Did you share any of the handouts or other materials you received at the trainings?*

*Do you believe the party/parties is/are making use of the information you have shared? How are they using this information?*

*Did you recommend the party/parties attend any of the trainings? Why or why not?*

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

### 4.1 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 20, the vast majority of respondents (37 out of 40, or 93%) had shared some of the information from the trainings with other parties. Municipal building code employees were slightly more likely than building professionals to share the information (95 and 90%, respectively).

**Table 20: Training Information Shared with Other Parties**

(number of respondents; n=40)

| Training Info Shared with Others | Number of Respondents | Type of Respondent      |                        |
|----------------------------------|-----------------------|-------------------------|------------------------|
|                                  |                       | Munic. Bldg. Code Empl. | Building Professionals |
| Yes                              | 37                    | 19                      | 18                     |
| No                               | 3                     | 1                       | 2                      |

The interviewers asked respondents if they had seen others offering to share information from the trainings. (This question was new to the study in 2017.) One respondent, a HERS rater, said he had heard other raters use informational points from the trainings in conversations. Six other building professionals did not know of anyone else sharing information from the trainings, and the remaining 33 respondents could not answer the question.

The interviewers also asked respondents if they had shared any of the handouts or other materials that they might have received at the trainings. As shown in Table 21, close to one-half of respondents (18 out of 40, or 45%) had shared the handouts or other materials from the trainings with other parties. The municipal building code employees (10 out of 20, or 50%) were slightly more likely than building professionals to share the training materials with others (8 out of 20, or 40%). Note that 13 respondents could not answer this question.

**Table 21: Whether Handouts or Other Training Materials Were Shared**

(number of respondents; n=40)

| Shared Training Materials with Others | Number of Respondents | Type of Respondent      |                        |
|---------------------------------------|-----------------------|-------------------------|------------------------|
|                                       |                       | Munic. Bldg. Code Empl. | Building Professionals |
| Yes                                   | 18                    | 10                      | 8                      |
| No                                    | 9                     | 3                       | 6                      |
| No response                           | 13                    | 7                       | 6                      |

The interviewers then asked the respondents who said they had shared information (n=37) which parties they had shared the information with. As shown in Table 22, more than one-half of the municipal building code employees (11 out of 19, or 58%) who shared any information from the trainings said they shared with other code official colleagues and nine out of 19 (47%) said they shared information with builders and contractors.

**Table 22: Parties with Whom Municipal Building Code Employees Shared Training Information**

(number of respondents; multiple response; n=19)

| Party with Which Information Was Shared | Total Number of Respondents |
|---|-----------------------------|
| Code officials                          | 11                          |
| Builders                                | 9                           |
| Architects                              | 2                           |
| Homeowners                              | 1                           |
| Fire chief                              | 1                           |
| Did not specify                         | 3                           |

As shown in Table 23, close to one-half of the building professionals (8 out of 18, or 44%) who shared any information from the trainings shared with builders. Information was also often shared with architects, insulation contractors, HVAC contractors, and other subcontractors.

**Table 23: Parties with Whom Building Professionals Shared Training Information**

(number of respondents; multiple response; n=18)

| Party with Which Information Was Shared | Total Number of Respondents |
|---|-----------------------------|
| Builders                                | 5                           |
| Architects                              | 5                           |
| Insulation contractors                  | 4                           |
| HVAC contractors                        | 4                           |
| Other subcontractors                    | 4                           |
| Code officials                          | 3                           |
| HERS raters                             | 3                           |
| Homeowners                              | 2                           |
| Mechanical engineer                     | 1                           |
| Energy manager                          | 1                           |
| Did not specify                         | 1                           |

Respondents believe that most of the varied parties with which they shared information from the trainings are using that information (Table 24).

**Table 24: Whether Information Shared with Others Is Being Used**

(number of respondents who shared information;  
multiple response for parties receiving information; n=37)

| Parties receiving information from the trainings | Yes | Think so | Some do | Don't Know/Not Answered |
|--|-----|----------|---------|-------------------------|
| <i>n</i>   | 32  | 10       | 7       | 7                       |
| Builders   | 10  | 1        | 2       | 1                       |
| Code officials                                   | 7   | 3        | 2       | 2                       |
| Architects                                       | 6   | 1        | 0       | 0                       |
| Insulation contractors                           | 2   | 1        | 1       | 0                       |
| HVAC contractors                                 | 2   | 1        | 1       | 0                       |
| Other subcontractors                             | 1   | 0        | 1       | 2                       |
| HERS raters                                      | 0   | 2        | 0       | 1                       |
| Homeowners                                       | 2   | 1        | 0       | 0                       |
| Mechanical engineer                              | 1   | 0        | 0       | 0                       |
| Energy manager                                   | 1   | 0        | 0       | 0                       |
| Fire chief                                       | 0   | 0        | 0       | 1                       |

## 4.2 INFORMATION SHARED WITH OTHER PARTIES AND USE

The interviewers also asked respondents to describe the information that they shared with other parties. Table 25 shows the information from the training that attendees (both code officials and building professionals) shared with code officials. Most of the code officials that attendees shared information with were provided information on the code changes; several were provided copies of the slides or other handouts from the trainings. A few respondents noted that they provided more specific information to code officials.

**Table 25: Information Shared with Code Officials**

(number of respondents; multiple response; n=14)

| Information Shared                         | Total Number of Respondents |
|--|-----------------------------|
| Code information/changes                   | 9                           |
| Detailed inspection process and checklists | 2                           |
| Insulation                                 | 2                           |
| HVAC                                       | 2                           |
| Building science                           | 1                           |
| Windows                                    | 1                           |
| Slides or handouts from the trainings      | 6                           |
| Not specified                              | 2                           |

Table 26 shows the information from the trainings that respondents shared with builders and contractors. Many respondents simply said they shared slides or handouts from the trainings. The most popular topics for those who gave more specific answers were code changes and insulation.

**Table 26: Information Shared with Builders and Contractors**

(number of respondents; multiple response; n=26)

| Information Shared                    | Total Number of Respondents |
|---------------------------------------|-----------------------------|
| Code information/changes              | 7                           |
| All insulation topics                 | 7                           |
| Insulation--general                   | 4                           |
| Using spray foam insulation           | 2                           |
| Prescriptive insulation requirements  | 1                           |
| Using detailed checklists             | 2                           |
| Duct sealing                          | 2                           |
| Mechanical ventilation                | 2                           |
| Air tightness                         | 2                           |
| Best practices                        | 2                           |
| Indoor air quality                    | 1                           |
| Incentives offered by Mass Save       | 1                           |
| Slides or handouts from the trainings | 9                           |
| Not specified                         | 3                           |

Table 27 shows the information from the trainings that respondents shared with all other parties. Respondents most often shared information with architects about code information and changes, as well as slides or handouts from the trainings.

Table 27: Information Shared with All Other Parties

n=16)

| Information Shared                    | Party Receiving Information |             |            |                      |                 |            |
|---------------------------------------|-----------------------------|-------------|------------|----------------------|-----------------|------------|
|                                       | Architects                  | HERS Raters | Homeowners | Mechanical Engineers | Energy Managers | Fire Chief |
| <i>n</i>                              | 7                           | 3           | 3          | 1                    | 1               | 1          |
| Code information/changes              | 3                           | 2           | 1          | 1                    | 1               | 1          |
| Incentives offered by Mass Save       | 0                           | 1           | 1          | 0                    | 0               | 0          |
| Air sealing                           | 0                           | 0           | 0          | 0                    | 0               | 1          |
| Duct testing                          | 0                           | 0           | 0          | 1                    | 0               | 0          |
| HVAC equipment installation           | 1                           | 0           | 0          | 0                    | 0               | 0          |
| Slides or handouts from the trainings | 5                           | 1           | 1          | 1                    | 1               | 0          |

(number of respondents; multiple response;

Most interviewees provided fairly general answers when asked how the parties with which they had shared information from the trainings were using it. Table 28 shows the responses for information shared with all non-code officials (builders, contractors, architects, etc.). Other than meeting the new codes in general, respondents most often thought non-code officials were using information from the trainings in their insulation work.

**Table 28: How Information Is Being Used by Non-Code Officials**  
(number of respondents; multiple response; n=31)

| How Information is Being Used                              | Total Number of Respondents |
|--|-----------------------------|
| To meet the new codes in general                           | 15                          |
| To meet insulation requirements and use best practices     | 5                           |
| To meet housing tightness requirements                     | 2                           |
| To select better equipment or insulation materials         | 2                           |
| To seal ducts according to code                            | 2                           |
| To meet infiltration requirements                          | 1                           |
| To meet HVAC testing requirements                          | 1                           |
| Air barriers   | 1                           |
| Equipment sizing   | 1                           |
| Use additional checklist in the field                      | 1                           |
| Architects putting more effort into analyzing energy usage | 1                           |
| To save money in the long run                              | 1                           |
| To apply for incentives                                    | 1                           |
| Not specified  | 6                           |

Only a few interviewees could comment on how they thought code officials were using the information shared with them. Three municipal building code employees who had shared information with their colleagues believe it is being used as a reference when talking with builders and contractors. One respondent stressed the importance of code officials from different municipalities being consistent about requirements in their interactions with builders and contractors.

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

A project manager who attended an EBS training said he shares information that he learned about insulating ducts with subcontractors and code officials who need to use it in the field:

*“I think you have to, you’re asking for trouble if you don’t. The days of being ignorant are gone, that doesn’t work. Customers even know, you have to know more than them.”*

A HERS rater who attended an HVAC-IAQ training talked about sharing information with builders:

*“Sometimes they can push back, but mostly they are receptive. [The shared training materials] work to prove the case and make them comply.”*

Another HERS rater who attended an HVAC-IAQ training talked about the importance of the training information in his field:

*“[I share the information with] everyone I meet on a job site, all the trades. Electricians, plumbers, builders, insulation contractors...I advise the builder, but the builders are often more vague with the HVAC contractors so the ventilation systems don’t end up being correct for the infiltration value. Equipment sizing can really affect indoor air quality and most contractors don’t really understand. [There is a] tremendous lack of knowledge on ventilation in all of the trades, which is a huge problem with builders in stretch code communities now that they have to meet a HERS score of 55... Some want to get it and want to learn, others are just along for the ride. It needs to be enforced more consistently across towns. Code officials are often asking me questions.”*

A building commissioner who attended an EBS training talked about sharing information from the training:

*“Every time people come in. I am always telling someone something new every day, that’s my job as the inspector. I almost always have something new to share with contractors. I try to keep them updated and have conversations. I email or text contractors [materials provided at the training] all the time. I have pictures of the slides on my phone.”*

Finally, a code official working for the state who attended both an EBS and a HVAC-IAQ training noted,

*“[I share information from the trainings with] building inspectors at monthly meetings, the builders themselves, home designers.... they are probably the most popular topic at district meetings.”*

### 4.3 RECOMMENDING TRAININGS TO OTHER PARTIES

The interviewers asked respondents if they had already recommended the Energy Code Technical Support Initiative trainings to others, and whether they would recommend the trainings to others in the future, regardless of whether they had recommended them in the past. Table 29 shows that more than one-half of all respondents have recommended the trainings to others (22 out of 40, or 55%), and the vast majority said they would recommend the trainings to others in the future (37 out of 40, or 93%).

**Table 29: Recommending Trainings to Other Parties**

(number of respondents; n=40)

| Recommend Trainings to Others | Have Recommended Previously |                         |                       | Would Recommend in Future |                         |                       |
|-------------------------------|-----------------------------|-------------------------|-----------------------|---------------------------|-------------------------|-----------------------|
|                               | Number of Respondents       | Type of Respondent      |                       | Number of Respondents     | Type of Respondent      |                       |
|                               |                             | Munic. Bldg. Code Empl. | Building Professional |                           | Munic. Bldg. Code Empl. | Building Professional |
| Yes                           | 22                          | 8                       | 14                    | 37                        | 17                      | 20                    |
| No                            | 5                           | 2                       | 3                     | 2                         | 2                       | 0                     |
| No response                   | 13                          | 10                      | 3                     | 1                         | 1                       | 0                     |

One of the two municipal building code employees who would not recommend the trainings to others in the future noted that everyone in his staff had already attended. The other respondent had found the training he attended rather monotonous and would not recommend unless someone needed the continuing education credits.

Respondents that would recommend the trainings offered several perspectives. An energy manager who attended an HVAC-IAQ training said,

*“They should go just to keep up. It’s a good networking opportunity and you can see how everyone else is dealing with compliance issues.”*

A code official who had attended an EBS training said that he recommends his colleagues all attend the trainings:

*“It’s helpful for everyone to be on the same page, since when someone calls the department they should get the same answer from anyone they talk to.”*

A project manager who attended an EBS training noted,

*“You have to start somewhere, and going to these is better than not knowing. If nothing else, it makes people go find other resources. Makes people need to solve these energy problems that they may not have been aware of. It’s a good jumping off point.”*

This respondent went on to say,

*“Make more of these classes available! Not a lot of info coming out of the state, we need more! With the changes in code, I expected more of a push to train people. They need to step up and make the trainings more available. Only time when you have to do anything is when your license is up, and then you scramble. Energy needs to be part of the way you see a job. It seems to be an us vs. them thing, but it doesn’t have to be, they’re all looking for the same thing: builders are looking to make money, the state is trying to increase compliance.”*

## 5

## Section 5 Sources of Information in Addition to CCSI

### Key Findings

- The most commonly mentioned information source among all respondents was the building code book or website. For code officials, this was followed by handouts from the trainings and Mass Save Technical Support. For building professionals, the next most commonly mentioned sources of information were peers and colleagues, code officials, and building contractors.
- Municipal building code employees were more aware of the support provided by the Mass Save Energy Support Technical Initiative online and by telephone than building professionals (90% and 65%, respectively).
- Of those respondents who had used the website for code information or called the help line, all 11 municipal building code employees and all but one of the seven building professionals were satisfied with the results.

### Section Overview

The follow-up interviews presented an opportunity to identify the primary sources of information that municipal building code employees and building professionals consult regarding building code requirements. They were asked the following questions:

*Since [DATE(S) of CCSI TRAINING(S)], have you attended any other trainings, webinars, or gatherings discussing building energy codes? If yes, please describe these events. What was their focus? Did you find these event(s) useful? Why or why not?*

*When a question or an issue concerning the energy code comes up, where would you first go to look for information? [If use the internet to search] Can you tell me what sources ultimately provide you with the information you are seeking?*

*[If aware of or mentioned the Mass Save Energy Code Technical Support Initiative as a source of code information] How important is the Mass Save Energy Code Technical Support Initiative as a source of code information compared to other sources you might use? Have you ever gone to the Mass Save website looking for information? If yes, were you satisfied with the website? Why or why not? Have you ever asked the Mass Save Energy Code Technical Support any questions through email or the telephone? If yes, please tell me briefly how satisfied you were with the response(s) and why.*

## 5.1 TRAININGS ATTENDED SINCE CCSI TRAININGS

Three-fifths (24) of the 40 respondents said they had attended one or more trainings or gatherings discussing building codes since attending the CCSI training (Table 30).<sup>5</sup> 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 slightly more likely than building professionals to report having attended a training or gathering discussing building codes since the CCSI training: 14 municipal building code employees compared to ten building professionals. The ten building professionals consisted of four HERS raters, two energy managers, one equipment supplier, one testing contractor, one mechanical engineer, and one other energy-efficiency specialist.

Eleven of the 24 respondents described other CCSI trainings they had taken, most often commercial trainings. In addition, three of the groups that sponsor trainings – the Southeastern Massachusetts Building Officials Association (SEMBOA), the Building Officials of Western Massachusetts (BOWM), and the Northeast Sustainable Energy Association (NESEA) – have had CCSI trainings offered to their members. Thus, the trainings mentioned in Table 30 seem to indicate that there are few sources of energy code training available to the respondents outside of the CCSI.

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<sup>5</sup> The interviewers specifically asked about trainings or gatherings on the building *energy* code, but some respondents may have talked about the building code in general.

**Table 30: Sponsors of Trainings Attended by Code Officials and Building Professionals**

(n=24, multiple response)

| Training Sponsors   | Number of Respondents |
|---|-----------------------|
| <i>All respondents who have attended trainings since the CCSI (n)</i> | 24                    |
| CCSI training on different subject                                    | 11                    |
| RESNET  | 3                     |
| Southeastern MA Building Officials Association (SEMBOA)               | 2                     |
| Building Officials of Western MA (BOWM)                               | 2                     |
| Home Performance Coalition  | 1                     |
| Passive House Institute US  | 1                     |
| Mitsubishi  | 1                     |
| Northeast Sustainable Energy Association (NESEA)                      | 1                     |
| MA Board of Building Regulations and Standards (BBRS)                 | 1                     |
| Mass Save training not part of CCSI                                   | 1                     |
| Unspecified training  | 3                     |
| Unspecified webinar   | 3                     |

Table 31 displays the topics of trainings and gatherings respondents said they attended since attending the CCSI training. The 2015 IECC and energy codes in general were most frequently mentioned. Respondents also attended trainings on the commercial code. Additional topics of trainings and gatherings attended by respondents included building envelope, HVAC, air infiltration, spray foam insulation, and other energy topics. Interestingly, seven respondents said they had attended trainings or webinars but could not remember the topics.

**Table 31: Topics at Trainings Attended by Code Officials and Building Professionals**

(n=24, multiple response)

| Training Topics   | Number of Respondents |
|---|-----------------------|
| <i>All respondents who have attended trainings since the CCSI (n)</i> | 24                    |
| 2015 IECC   | 4                     |
| Energy codes (general)  | 4                     |
| Commercial HVAC   | 4                     |
| Commercial building envelope  | 4                     |
| Residential HVAC systems  | 3                     |
| Residential building envelope   | 3                     |
| Air infiltration  | 1                     |
| Passive homes   | 1                     |
| Rebates   | 1                     |
| Spray foam insulation   | 1                     |
| Duct systems  | 1                     |
| Solar PV  | 1                     |
| Stretch code  | 1                     |
| Commercial lighting   | 1                     |
| Commercial code compliance paths                                      | 1                     |
| Unspecified topics  | 7                     |

## 5.2 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 the building code book or website, followed by handouts from the trainings and Mass Save Technical Support for code officials. For building professionals, sources of information after the building code book or website were peers and colleagues, code officials, and building contractors.

Municipal building code employees were more aware of the support provided by the Mass Save Energy Support Technical Initiative online and by telephone than building professionals were (90% and 65%, respectively). Municipal building code employees and building professionals who were aware of the support provided were equally as likely to

have used the web, email, or phone services provided by Mass Save (just over one-half for each group). All 11 municipal building code employees and six of the seven building professionals who had used the website for code information or called the help line were satisfied with the results.

**5.2.1 Municipal Building Code Employees**

All 20 of the municipal building code employees named at least one source of information on building code requirements that they use. As shown in Table 32, the code itself (including the code book and amendments) was the most frequently mentioned source of information on building code requirements. Several respondents also mentioned Mass Save resources maintained by the CCSI, including handouts and the hotline, as well as peers and colleagues.

**Table 32: Main Building Code Information Sources for Code Officials**  
(n=20, multiple response)

| Information Sources   | Number of Respondents |
|---|-----------------------|
| <i>Respondents (n)</i>  | 20                    |
| Code book   | 16                    |
| Mass Save training handouts                                   | 6                     |
| Mass Save hotline   | 4                     |
| Peers/ colleagues   | 3                     |
| Code book addendum/ commentary                                | 2                     |
| HERS raters   | 1                     |
| Mass Save website   | 1                     |
| MA Board of Building Regulations and Standards (BBRS) website | 1                     |
| MA State Building Code Commission                             | 1                     |
| Sheet Metal Board   | 1                     |
| Air Conditioning Contractors of America (ACCA)                | 1                     |

As shown in Table 32, five municipal building code employees mentioned using the Mass Save help line and website as a primary source of code information. Interviewers asked municipal building code employees who had not mentioned Mass Save as a primary source of code information if they were aware of the web and telephone support provided by the Mass Save Energy Support Technical Initiative. When combined, the vast majority of municipal building code employees (18 out of 20, or 90%) were aware of the support provided (Table 33).

**Table 33: Awareness of Support Provided by Mass Save Energy Support Technical Initiative—Municipal Building Code Employees**

(number of respondents; n=20)

| Awareness of Support Provided | Number of Respondents |
|-------------------------------|-----------------------|
| <i>n</i>                      | 20                    |
| Yes                           | 18                    |
| No                            | 2                     |

Of the 18 municipal building code employees who were aware of the support provided by the Mass Save Energy Support Technical Initiative, over one-half (10 out of 18, or 56%) said this source of code information was either very important (6) or important (4) compared to other sources they use (Table 34).

**Table 34: Importance of Support Provided by Mass Save Energy Technical Support Initiative - Code Officials**

(n=18)

| Importance of Support  | Number of Respondents |
|------------------------|-----------------------|
| <i>Respondents (n)</i> | 18                    |
| Very important         | 6                     |
| Important              | 4                     |
| Somewhat important     | 3                     |
| Not that important     | 4                     |
| Don't know             | 1                     |

As shown in Table 35, over three-fifths (11 out of 18, or 61%) of municipal building code employees who were aware of the support provided by the Mass Save Energy Support Technical Initiative have used the Mass Save website to look for information about the energy code or asked for help through email, called the help line with questions, or both.

**Table 35: Use of Mass Save Energy Code Technical Support - Municipal Building Code Employees Aware of Service**

(number of respondents; n=18)

| Use of Mass Save Energy Code Technical Support | Number of Respondents |
|--|-----------------------|
| <i>n</i>                                       | 18                    |
| Used website or email only                     | 4                     |
| Used telephone help line only                  | 3                     |
| Used both website and telephone help line      | 4                     |
| Have not used                                  | 7                     |

All 11 municipal building code employees who had used the website for code information or called the help line were satisfied with the results. Two respondents added that they were very satisfied with the help line, as the staff listened carefully to their questions and responded promptly with the information needed. Respondents who had used the website were asked if they were aware that it had recently been redone with the goal of being more user-friendly. None of the respondents could comment on differences between the old and new website.

### 5.2.2 Building Professionals

All 20 of the municipal building professionals named at least one source of information on building code requirements that they use. As shown in Table 36, similar to the municipal building code employee responses, building professionals mentioned the code book itself most frequently as a source of information. Other commonly mentioned information sources include Mass Save resources, maintained by the CCSI, such as handouts and the website; peers and colleagues; code officials; and subcontractors.

**Table 36: Main Building Code Information Sources for Building Professionals**  
(n=20, multiple response)

| Information Sources                     | Number of Respondents |
|---|-----------------------|
| <i>Respondents (n)</i>                  | 20                    |
| Code book                               | 16                    |
| Peers/ colleagues                       | 5                     |
| Code officials                          | 4                     |
| Subcontractors                          | 4                     |
| Mass Save website                       | 3                     |
| Mass Save training handouts             | 2                     |
| HERS raters                             | 2                     |
| Department of Energy Resources (DOER)   | 1                     |
| MA Residential New Construction Program | 1                     |
| RESNET                                  | 1                     |
| Mechanical engineers                    | 1                     |
| Internet search                         | 1                     |

As shown in Table 36, three building professionals mentioned using the Mass Save website as a primary source of code information. Interviewers asked building professionals who had not mentioned Mass Save as a primary source of code information whether they were aware of the web and phone support provided by the Mass Save Energy Support Technical Initiative. When combined, close to two-thirds of building professionals (13 out of 20, or 65%) were aware of the support provided (Table 37).

**Table 37: Awareness of Support Provided by Mass Save Energy Support Technical Initiative—Building Professionals**  
(number of respondents; n=20)

| Awareness of Support Provided | Number of Respondents |
|-------------------------------|-----------------------|
| <i>n</i>                      | 20                    |
| Yes                           | 13                    |
| No                            | 7                     |

Of the 13 building professionals who were aware of the support provided by the Mass Save Energy Support Technical Initiative, over one-half (7 out of 13, or 54%) said this source of code information was either very important (5) or important (2) compared to other sources they use (Table 38).

**Table 38: Importance of Support Provided by Mass Save Energy Technical Support Initiative – Building Professionals**

(n=13)

| Importance of Support                     | Number of Respondents |
|---|-----------------------|
| <i>Respondents (n)</i>                    | 13                    |
| Very important                            | 5                     |
| Important                                 | 2                     |
| Somewhat important                        | 2                     |
| Not that important                        | 2                     |
| Important as a resource but have not used | 2                     |

Of the 13 respondents aware of the service, seven have gone on the website to look for information or ask questions via email or telephone. Six of these respondents were satisfied with the website and responsiveness; the seventh said that no one had gotten back to him with a response after his call.<sup>6</sup>

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<sup>6</sup> His name does not appear on the list of contacts provided by the Mass Save Technical Support Initiative to the evaluators, so it is unclear who he contacted.

## 6

## Section 6 Code Compliance and Enforcement Environment

### Key Findings

- Fewer than one-half of building professionals who interact with code officials reported their relationships changing as the latter become more interested in energy efficiency. However, more than half of the building professionals reported increased interest in energy efficiency among their customers during the past year or so.
- Seventeen of the 20 code officials interviewed recalled at least one issue related to energy efficiency they had encountered in the field. The most common issues encountered during inspections concerned insulation installation, such as uncovered spray foam and gaps in air barriers and high air leakage leading to failed blower door tests.

### Section Overview

A key goal of the follow-up interviews was to identify perceived changes in code enforcement and the market for energy-efficiency. This section first examines building professionals' perceptions of their interactions with code officials and their customers' interest in energy-efficiency.

Next, this section explores code officials' and building professionals' perceptions of the priority given to checking energy-efficiency during inspections.

This section then looks at the energy-efficiency issues that code officials encounter in the field, and explores the factors impacting the amount of time municipal building code employees spend checking for the energy-efficiency aspects of code compliance. It ends with a summary of information filed at local building departments to document energy code compliance for residential construction.

### 6.1 BUILDING PROFESSIONALS' INTERACTION WITH CODE OFFICIALS

Interviewers asked building professionals if their interactions with code officials and code enforcement regarding energy-efficiency changed in the last year or so. As shown in Table 39, less than half (7 out of 17 or 4%) of the building professionals who interact with code officials said there were changes in their interactions with code officials regarding energy-efficiency in the last year or so.

**Table 39: Changes in Interactions with Code Officials**  
(number of respondents; n=20)

| Have your interactions with code officials regarding energy-efficiency changed? | Number of Respondents | Building Code in Municipalities Covered |                             |
|---|-----------------------|---|-----------------------------|
|   |                       | Stretch Code                            | 2015 IECC and Stretch Codes |
| Yes   | 7                     | 1                                       | 6                           |
| No  | 10                    | 6                                       | 4                           |
| Not much interaction with code officials  | 3                     | 3                                       | 0                           |

As shown in Table 40, building professionals enumerated a variety of changes they had noticed, including increased discussion of energy code with code officials, more suggestions from them on compliance, and more general awareness of the codes.

**Table 40: Types of Changes in Interactions with Code Officials**  
(number of respondents; multiple response; n=7)

| Types of Changes  | Number of Respondents | Building Code in Municipalities Covered |                             |
|---|-----------------------|---|-----------------------------|
|   |                       | Stretch Code                            | 2015 IECC and Stretch Codes |
| More discussion of energy codes                                   | 3                     | 1                                       | 2                           |
| New ideas and suggestions on compliance paths from code officials | 3                     | 1                                       | 2                           |
| More awareness of energy code                                     | 2                     | 0                                       | 2                           |
| Code officials and building professionals more on the same page   | 1                     | 1                                       | 0                           |
| More knowledge from code officials on energy code                 | 1                     | 0                                       | 1                           |
| Better enforcement because of the presence of HERS Raters         | 1                     | 0                                       | 1                           |
| More proactive about energy code to avoid failed inspections      | 1                     | 0                                       | 1                           |

One building professional who attended an EBS training elaborated on how code officials have been increasingly proactive about energy code compliance:

*More and more of them [code officials] are getting on board, they're learning. They don't want failed inspections, so it's helpful for them to be up to date on these things and let the builders know as the project is starting so that it passes later.*

These findings are slightly lower than those from the 2016 study, when one-half (12 out of 24) of the building professionals said that their interactions with code officials regarding

energy-efficiency had changed in the last year or so. The reasons given for change in interactions remained similar, including increased awareness and discussion of energy code.

## 6.2 CUSTOMER INTEREST IN ENERGY-EFFICIENCY

Most (13 out of 20, or 65%) building professionals said that their customers had become more interested in energy-efficiency in the last year or so (Table 41). In addition, a majority (11 out of 13, or 85%) of these respondents said their customers were willing to pay more for energy-efficiency without qualifying their answers. An additional two respondents reported that willingness to pay more varied widely between customers, or that it depended on how well the benefits were explained. One respondent noted an interest in recommendations to go above and beyond code:

*There are some customers that understand that the better a home will do in an inspection, the cheaper the home will be to maintain. I have had some customers that pass inspection and then ask for recommendations on what we can do to make it even better. It's an understanding of a long-term investment.*

**Table 41: Changes in Customer Interest in Energy-Efficiency**

(number of respondents; n=20)

| Have your customers become more interested in energy-efficiency?        | Number of Respondents | Building Code in Municipalities Covered |                             |
|---|-----------------------|---|-----------------------------|
|   |                       | Stretch Code                            | 2015 IECC and Stretch Codes |
| Yes   | 13                    | 7                                       | 6                           |
| No  | 6                     | 2                                       | 4                           |
| N/A   | 1                     | 0                                       | 1                           |
| <b>If yes, are customers willing to pay more for energy-efficiency?</b> |                       |   |                             |
| Yes   | 11                    | 5                                       | 6                           |
| No  | 0                     | 0                                       | 0                           |
| Some are/ it depends  | 2                     | 2                                       | 0                           |

These results are lower than the 2016 study, in which a larger majority (23 out of 30, or 77%) of building professionals said that their customers had become more interested in energy-efficiency in the last year or so. However, there was an increase in the proportion of respondents that claimed customers were willing to pay more for energy-efficiency (7 out of 23, or 30%).

### 6.3 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 employees), or whether that priority has changed in the last year (building professionals). The interviewers asked both groups if they thought that priority would increase in the future.

Specifically, municipal building code employees were asked 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 must look for? Why? Has this priority changed since you attended [TRAINING(s)]? [IF YES] Why is that? [IF NOT MENTIONED IN RESPONSE] Do you believe the training(s) are a factor in changing this priority? Why or why not? Do you anticipate the priority given to checking energy-efficiency will increase in the future? [IF YES] Why is that?”*

Building professionals were asked 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 must check? Why? Has this changed in the past year or so? How has it changed? [IF YES] Why is that? [IF NOT MENTIONED IN RESPONSE] Do you believe the training(s) that you attended and are also attended by code officials are a factor in changing this priority? Why or why not? Do you anticipate the priority given to checking energy-efficiency will increase in the future? [IF YES] Why is that?”*

#### 6.3.1 Municipal Building Code Employees

Table 42 shows how municipal building code employees prioritize checking for energy-efficiency relative to other areas and their reasoning behind those prioritizations.

**Table 42: Energy-Efficiency Prioritization - Municipal Building Code Employees**

(number of respondents; multiple responses for prioritization reasons; n=20)

| Reasons for Energy-Efficiency Prioritization                  | How Energy-Efficiency is Prioritized |        |                   |     |
|---|--------------------------------------|--------|-------------------|-----|
|   | High                                 | Medium | Equal to All Code | Low |
| <i>n</i>  | 10                                   | 6      | 2                 | 2   |
| Structural/ fire/ safety come first                           | 0                                    | 4      | 1                 | 2   |
| It's part of the code, so it must be checked                  | 3                                    | 1      | 2                 | 0   |
| Energy conservation/ savings                                  | 3                                    | 0      | 0                 | 0   |
| Doesn't directly impact safety of occupants                   | 0                                    | 1      | 0                 | 1   |
| Directly relates to safety and quality of interior conditions | 2                                    | 0      | 0                 | 0   |
| Homeowners/ contractors/ banks focusing more on it            | 2                                    | 0      | 0                 | 0   |
| Directly impacts the public                                   | 1                                    | 0      | 0                 | 0   |
| Builders/ code officials have not adapted                     | 0                                    | 1      | 0                 | 0   |

Most code officials consider energy-efficiency to be either a high or medium priority (16 out of 20, or 80%). A code official who attended an EBS training noted,

*It directly relates to the safety and quality of the interior built environment. Any failure in many of these areas will have a follow-up effect. If an air barrier isn't sealed properly and it allows moist hot air in, you'll have structural damage eventually. If the focus from the building official perspective is overall safety in the built environment, then ensuring people are adequately provided with fresh conditioned air is part of that. Ensuring the systems we are demanding to have put in aren't creating follow-up health issues for them is very important.*

Not all respondents shared that opinion; in fact, the most common response (4 out of 24 total responses) was that direct structural, fire, and safety issues were a higher priority than energy-efficiency.

The interviewers then asked the municipal building code employees if their prioritization of energy-efficiency has changed since they attended the trainings (Table 43). Note that four municipal building code employees did not respond to the question.

All municipal building code employees who answered this question now place either a medium or high priority on energy-efficiency or said that it is considered equal to all other building code requirements. One code official who attended the EBS training noted,

*It's a high priority – quite often I will catch stuff the HERS rater hasn't picked up on. If you're going to the expense of doing insulation and miss a couple areas, it's kind of useless. It's like leaving the door wide open. It's important—just as much as the structural aspect.*

The municipal building code employees who said that checking for energy-efficiency was a medium priority (4 out of 21 or 19%) most often noted that health, safety, and structural elements were higher priorities.

**Table 43: Influence of Training on Prioritization of Energy-Efficiency**

(number of respondents; n=16)

| Influence of Training on Prioritization of Energy-Efficiency               | Total Number of Respondents |
|--|-----------------------------|
| <i>n</i>   | 16                          |
| Has influenced prioritization of checking for energy-efficiency            | 5                           |
| Has not influenced rising prioritization of checking for energy-efficiency | 11                          |

Less than one-third of respondents (5 out of 16, or 31%) said their prioritization of energy-efficiency has risen since they attended the training. Note that six respondents who said their prioritization has not changed since attending the training ranked energy-efficiency as a high priority, four ranked it as a medium priority, and one ranked it as a low priority. The portion saying the priority had changed has gone down from last year's results, when over half of respondents (10 out of 18, or 56%) noted a change in prioritization after the training.

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 44). Note that four municipal building code employees did not respond to this question.

**Table 44: Whether Priority for Checking Energy-Efficiency Will Change in Future**

(number of respondents; n=16)

| Reason Priority Will or Will Not Change                       | Will Priority Change in the Future? |    |            |
|---|-------------------------------------|----|------------|
|   | Yes                                 | No | Don't Know |
| <i>n</i>  | 7                                   | 3  | 6          |
| Contractors are learning/ improving                           | 3                                   | 0  | 0          |
| Energy codes are getting stricter                             | 2                                   | 0  | 0          |
| It is already a high priority                                 | 0                                   | 2  | 0          |
| Will become just as important as structural and other aspects | 1                                   | 0  | 0          |
| Energy costs will increase and people will pay attention      | 1                                   | 0  | 0          |
| Safety and structural will continue to be top priority        | 0                                   | 1  | 0          |

Close to one-half of respondents (7 out of 16, or 44%) think the priority for checking energy-efficiency will continue to increase in the future, with most reporting that it will increase as contractors learn and improve upon it more and energy codes get stricter. One code official who attended the EBS training noted,

*The way the industry seems to be going...Costs for fuel, heating, and other energy sources are going up and we're not necessarily generating any more [power].*

### 6.3.2 Building Professionals

The interviewers asked the building professionals about the prioritization they or their building department give 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 45). Note that one building professional did not respond to this question.

**Table 45: Reasons for Energy-Efficiency Prioritization by Building Professionals**

(number of respondents; n=19)

| Reasons for Energy-Efficiency Prioritization                        | How Energy-Efficiency is Prioritized |        |                   |     |
|---|--------------------------------------|--------|-------------------|-----|
|   | High                                 | Medium | Equal to All Code | Low |
| <i>n</i>  | 9                                    | 6      | 1                 | 3   |
| Structural/ fire/ safety come first                                 | 0                                    | 2      | 0                 | 1   |
| Code officials rely on HERS Raters for this                         | 2                                    | 0      | 0                 | 1   |
| Code officials are becoming more aware                              | 2                                    | 0      | 0                 | 0   |
| People have mastered structural, so this is the next most important | 2                                    | 0      | 0                 | 0   |
| Varies by town and inspector  | 0                                    | 2      | 0                 | 0   |
| Code officials don't care   | 0                                    | 1      | 0                 | 0   |
| Time constraints/ other codes take priority                         | 1                                    | 0      | 0                 | 0   |
| Cost it adds to projects  | 0                                    | 1      | 0                 | 0   |
| Unless there is a HERS Rater, code officials don't prioritize       | 0                                    | 0      | 0                 | 1   |
| Affects other areas of projects                                     | 1                                    | 0      | 0                 | 0   |
| Clients want the best   | 1                                    | 0      | 0                 | 0   |
| Can't choose which codes to comply with, they are equally important | 0                                    | 0      | 1                 | 0   |

Most respondents (15 out of 19 or 79%) say they place a high or medium amount of priority on energy-efficiency. Respondents were divided on the role of HERS Raters in influencing prioritization of energy-efficiency. Some building professionals said that HERS Raters increase code officials' prioritization, while another respondent said that code officials are becoming too reliant on HERS Raters and that it actual makes it a lower priority for them. As an equipment supplier who attended an EBS training noted,

*A lot of time it [checking energy code] is being done by the HERS rater but at the same time, if there is no HERS rater then I've never heard of builders running into difficulties with building inspectors on the insulation aspect of it. I don't think they are very well versed with the grading of insulation for code.*

A HERS Rater who attended an HVAC-IAQ training offered a different perspective on the process:

*Most builders know how to make a building so it doesn't fall down. Where they get into trouble is when they start using these new products that are on the market and putting*

*assemblies together that work, that meet or exceed code. There are certain things that are so different today, now we are demanding that we tighten homes up, so indoor pollutants are huge. If you do things incorrectly, you're going to have a compost heap. Building science is progressing and continuing to evolve, sometimes past what a builder can really do, which is why they need HERS Raters and consultants.*

The interviewers then asked the building professionals if the prioritization of energy-efficiency has changed in the last year (Table 46). Note that two building professionals said they could not comment on this question and did not respond.

**Table 46: Whether Priority for Checking Energy-Efficiency Has Changed in Last Year**

(number of respondents; multiple responses for why priority has changed; n=18)

| Reason for Why Priority Has or Has Not Changed          | Has Priority Changed? |    |
|---|-----------------------|----|
|   | Yes                   | No |
| <i>n</i>  | 9                     | 9  |
| Code officials are behind/ don't prioritize             | 0                     | 4  |
| Increased awareness and enforcement                     | 3                     | 0  |
| Code changes  | 2                     | 0  |
| More focus on energy codes                              | 2                     | 0  |
| Now checks for energy-efficiency earlier in the project | 1                     | 0  |
| More towns are adopting strict energy codes             | 1                     | 0  |
| Mass Save trainings                                     | 1                     | 0  |
| No reason given   | 0                     | 5  |

There was an even split regarding changes in priority of checking energy-efficiency in the past year. Respondents that did note an increase in priority cited an increase in awareness and enforcement of code. The most common reason cited for priority not changing was that code officials don't prioritize it themselves. One respondent, a project manager who attended an EBS training and does not believe priority has changed, offered an interesting perspective:

*The issue with inspectors is that you typically just make an experienced builder an inspector after many years, and they have a lot of experience. It's now becoming a profession of its own. Now you only need a little training and a few years of experience, as long as you can pass a test. So if you're not up to speed, you won't be enforcing it. These inspectors are just looking for paperwork, head down in a clipboard, they don't really check.*

However, another energy manager who also attended an EBS training has seen significant improvement in prioritization of energy-efficiency:

*Because of the trainings, I have seen a marked improvement and increase in the knowledge base out there for officials, and contractors. It's impressive how the trainings have helped to implement and push the standards forward from when they first started with stretch code, it's night and day.*

The interviewers then asked respondents if they anticipate that the priority given to checking energy-efficiency will increase in the future (Table 47). Note that one of the building professionals said they could not comment on this question and did not respond.

**Table 47: Whether Priority for Checking Energy-Efficiency Will Change in Future**

(number of respondents; multiple responses for why priority will or will not change; n=19)

| Reason Priority Will or Will Not Change   | Will Priority Change in the Future? |    |
|---|-------------------------------------|----|
|   | Yes                                 | No |
| <i>n</i>  | 17                                  | 2  |
| Energy codes are getting stricter   | 7                                   | 0  |
| Increased awareness   | 4                                   | 0  |
| It needs to change  | 2                                   | 0  |
| HERS Ratings will become more important for compliance                                | 2                                   | 0  |
| Will increase as people get more comfortable with it and understand it                | 2                                   | 0  |
| Will increase, but savings from stricter code will plateau soon                       | 1                                   | 0  |
| Important in the Boston area  | 1                                   | 0  |
| It is already a high priority   | 0                                   | 1  |
| Homeowners may be interested in seeing increased energy code compliance/ performance  | 1                                   | 0  |
| Not unless the MA Board of Building Regulations and Standards provides more oversight | 0                                   | 1  |

Most respondents (17 out of 19, or 89%) think the priority for checking energy-efficiency will continue to increase in the future, with many noting that it will increase as a necessity as energy codes become stricter. A project manager who had attended an EBS training noted,

*As the systems change within the home, you have to change with it. All building code is changing, you either learn it or you don't pass inspections.*

An architect who had also attended an EBS training cited incremental costs as a factor in increased prioritization in the future:

*There is a bit of fatigue in the constant pushing of the standards up. We have gone way up on that curve and expected to flatten out as far as getting out what you've put in. I think all of us out here are looking at each other asking "is this really worth it?" For the incremental cost, we have to add to the project and the clients are asking, "why is it so expensive?" All these things have pushed every component up in price because it needs to be better at what it does and we need to be better at what we do, paying more attention to this and that. You get all these ratings and all these inspections and those things contribute to the project doing well; it's better than it used to be. Much, much better. But at the same time, we are hitting the top at where we can go without it getting silly.*

Interviewers also asked those who were not builders, contractors, or municipal building code employees if they thought that builders were more concerned about complying with the energy code (Table 48). Over three-fifths of respondents (8 out of 13, or 62%) believe builders are more concerned about complying with the energy code than in the past, largely due to stricter codes and more enforcement.

**Table 48: Others' Perceptions of Builders Concern Regarding Code**

(number of other respondents; n=13)

| Are builders more concerned about complying with energy code? | Number of Respondents | Building Code in Municipalities Covered |                            |
|---|-----------------------|---|----------------------------|
|   |                       | Stretch Code                            | 2015 IECC and Stretch Code |
| Yes   | 8                     | 3                                       | 5                          |
| Some/ it depends  | 3                     | 1                                       | 2                          |
| No  | 2                     | 2                                       | 0                          |

An architect who attended an EBS training noted,

*They know they can get nicked if they don't, doing things over can get expensive. The subs [also] become better at what they do.*

## 6.4 SITUATIONS CODE OFFICIALS ENCOUNTER IN THE FIELD

Interviewers asked code officials to recall any serious issues related to energy-efficiency they encountered during inspections over the past year or so. Seventeen of the 20 code officials recalled at least one issue related to energy-efficiency they had encountered in the field. The most common issues encountered during inspections concerned insulation installation, such as uncovered spray foam, gaps in air barriers, and high air leakage leading to failed blower door tests (Table 49).

**Table 49: Issues Encountered During Inspections**

(number of respondents; multiple response; n=17)

| Issues                              | Number of Respondents | Building Code in Municipalities Covered |                            |           |
|-------------------------------------|-----------------------|---|----------------------------|-----------|
|                                     |                       | Stretch Code                            | 2015 IECC and Stretch Code | 2015 IECC |
| <i>n</i>                            | 17                    | 13                                      | 2                          | 3         |
| Insulation installation             | 5                     | 5                                       | 0                          | 0         |
| Air leakage/failed blower door test | 5                     | 4                                       | 1                          | 0         |
| Air sealing                         | 3                     | 1                                       | 0                          | 2         |
| Window installation                 | 2                     | 2                                       | 0                          | 0         |
| Air barriers                        | 2                     | 2                                       | 0                          | 0         |
| HVAC systems                        | 1                     | 1                                       | 0                          | 0         |
| Mold remediation                    | 1                     | 1                                       | 0                          | 0         |
| Roofing--cavities not up to code    | 1                     | 1                                       | 0                          | 0         |
| Frozen pipes                        | 1                     | 0                                       | 1                          | 0         |
| Poor HERS Rating                    | 1                     | 0                                       | 0                          | 1         |
| Duct Sealing                        | 1                     | 1                                       | 0                          | 0         |
| Contractors fudging measurements    | 1                     | 0                                       | 1                          | 0         |

A building commissioner who attended both the EBS and HVAC-IAQ trainings discussed his problems with inaccurate HERS Ratings:

*I don't know how to file a complaint against a HERS Rater. There have been instances where the raters have submitted ratings and there have been serious violations. There were bays that they had verified had insulation in them, and upon inspection they did not. I'm concerned about that, but it's out of my jurisdiction.*

## 6.5 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. Note that three municipal building code employees did not respond to the question. As shown in Table 50, the most commonly mentioned factors were limited staffing, the time available, and the complexity of the project. Respondents also emphasized that their workload and their familiarity with the builder's work – or, at least, the initial impression they got walking onto a site – influenced how much time they spent checking for enforcement.

**Table 50: Factors Impacting Time Spent Enforcing Energy Code**

(number of respondents; multiple response; n=17)

| Factors                                | Number of Respondents | Building Code in Municipalities Covered |                            |           |
|--|-----------------------|---|----------------------------|-----------|
|  |                       | Stretch Code                            | 2015 IECC and Stretch Code | 2015 IECC |
| <i>n</i>                               | 17                    | 12                                      | 3                          | 2         |
| Limited staffing                       | 5                     | 4                                       | 1                          | 0         |
| Time available                         | 4                     | 3                                       | 0                          | 1         |
| Complexity of project                  | 4                     | 2                                       | 1                          | 1         |
| Work load                              | 3                     | 3                                       | 0                          | 0         |
| Contractor competence/ quality of work | 3                     | 2                                       | 1                          | 0         |
| Size of the building                   | 2                     | 2                                       | 0                          | 0         |
| How accurate documentation is          | 1                     | 0                                       | 1                          | 0         |
| Materials used                         | 1                     | 1                                       | 0                          | 0         |
| Education and training for staff       | 1                     | 1                                       | 0                          | 0         |
| Presence of contractor at inspection   | 1                     | 1                                       | 0                          | 0         |
| Importance of measures being checked   | 1                     | 1                                       | 0                          | 0         |

One code official who attended both the EBS and HVAC-IAQ trainings noted his impression of the contractor's work as a factor:

*Overall contractor competence. If you see basic issues with the standard building code, then you look at everything much closer*

A local inspector who attended the HVAC-IAQ training notes the presence of the contractor as a big factor:

*When there is a contractor there, going over it with him keeps the time down because you can point things out and make a list. If the contractor isn't there, it takes more time to find him and explain it and make the list.*

## 6.6 CODE COMPLIANCE DOCUMENTATION FILED

Interviewers asked code officials and building professionals to briefly describe the type of information that they submit or review at their building department to document energy code compliance for residential construction. Specifically, the following questions were asked:

*What percent of the projects you review/ submit contain 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.*
- *HERS Certificate*
- *No compliance documentation filed for project*

### 6.6.1 Municipal Building Code Employees

Municipal building code employees mentioned various types of information or documents filed at their building departments. It is important to note that most respondents discussed all building document files, including those for renovations and new construction. Table 51 shows the numbers of respondents who said that different types of information were filed with their departments for at least some new construction or renovation projects. While the interviewers asked what percentage of projects had different types of documentation filed, most respondents could not estimate portions; thus, we report the numbers who said any projects filed a particular type of documentation. Almost all said that documentation that ducts were tested and/or a blower door test was conducted is filed at their building department, most often as part of a HERS rating. Most also said that REScheck files accompanied by supplemental checklists for mandatory requirements, as well as prescriptive checklists, are filed with their departments (Table 51).

**Table 51: Information Filed at Municipal Building Code Employees’ Building Departments**

(number of respondents; multiple response; n=20)

| Type of Information Filed                 | Number of Respondents | Building Code in Municipalities Covered |                            |           |
|---|-----------------------|---|----------------------------|-----------|
|   |                       | Stretch Code                            | 2015 IECC and Stretch Code | 2015 IECC |
| <i>n</i>                                  | 20                    | 13                                      | 3                          | 4         |
| HERS rating                               | 18                    | 12                                      | 3                          | 3         |
| Blower door/ duct test documentation      | 17                    | 10                                      | 3                          | 4         |
| REScheck with supplemental information    | 15                    | 8                                       | 3                          | 4         |
| Prescriptive checklists                   | 13                    | 8                                       | 2                          | 3         |
| No documentation filed                    | 3                     | 2                                       | 1                          | 0         |
| REScheck with no supplemental information | 2                     | 1                                       | 0                          | 1         |
| Manual J                                  | 1                     | 1                                       | 0                          | 0         |

**6.6.2 Building Professionals**

Seventeen building professionals – including five architects, four HERS raters, one HVAC contractor, and seven builders – said they were involved in filing information to document energy code compliance for residential construction with the local building department or supplying this information to be filed by the owners. Fourteen of the seventeen building professionals said they submitted some documentation of a duct blaster or blower door test, most often as part of a HERS Rating. The respondents also often mentioned submitting prescriptive checklists and REScheck files with supplemental checklists for mandatory requirements. Nearly half of respondents reported filing no documentation for energy code compliance, but this was usually for renovation projects that did not require it. As in the case of municipal building code employees, it is important to note that most respondents discussed information filed for renovations and new construction. Note that three building professionals who were not involved with preparing information documenting code compliance did not respond to the question (Table 52).

**Table 52: Information Building Professionals File at Building Departments**

(number of respondents; multiple response; n=17)

| Type of Information Filed                 | Number of Respondents | Building Code in Municipalities Covered |                            |
|---|-----------------------|---|----------------------------|
|   |                       | Stretch Code                            | 2015 IECC and Stretch Code |
| <i>n</i>                                  | 17                    | 10                                      | 7                          |
| Blower door/ duct test documentation      | 14                    | 8                                       | 6                          |
| HERS Rating                               | 11                    | 4                                       | 7                          |
| Prescriptive checklists                   | 10                    | 6                                       | 4                          |
| No documentation filed                    | 8                     | 5                                       | 3                          |
| REScheck with supplemental information    | 7                     | 3                                       | 4                          |
| REScheck with no supplemental information | 1                     | 1                                       | 0                          |

## 7

## Section 7 Suggestions for Improving the CCSI Trainings and Other Comments

### Key Findings

- The most frequent suggestions for training improvement were to have a stronger focus on specific areas (which varied among respondents) and to focus on best practices for code compliance. Both municipal building code employees and building professionals suggested that offering continuing education credits could increase training attendance by builders and contractors.
- Respondents offered suggestions to increase training awareness and attendance by builders and contractors. These included working with homebuilder associations, having local code officials promote the trainings, and advertising in the local media.

### Section Overview

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

*Is there anything that you would want added to the [TRAINING(S)] that was not already covered? What would you add and why?*

*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 (building professionals) the energy code?*

The Program Administrators (PAs) and Energy Efficiency Advisory Council (EEAC) added two more questions to the closing section of the interviews:

*What was the main reason you took the [TRAINING(S)]?*

*How do you think these trainings could attract more attendees in the building trades? (For municipal building code employee respondents.) How do you think these trainings could attract more of your colleagues? (For building professional respondents.)*

These questions were added after the interviews had begun, so not all interviewees responded to them.

## 7.1 SUGGESTIONS FOR IMPROVING THE CCSI TRAININGS

### 7.1.1 Municipal Building Code Employees

Municipal building code employee respondents most often wanted the trainings to focus more on specific areas (Table 53). The second most frequent type of suggestion was to provide different training materials, particularly for enforcing the code and explaining it to builders. Note that eight municipal building code employees did not offer any suggestions.

**Table 53: Municipal Building Code Employee Suggestions for Improving the CCSI Trainings**

(number of respondents; multiple response; n=12)

| How to Improve the CCSI Trainings   | Number of Respondents | Type of Training Attended |               |                  |
|---|-----------------------|---------------------------|---------------|------------------|
|   |                       | EBS Only                  | HVAC-IAQ Only | EBS and HVAC-IAQ |
| All municipal building code employees who offered suggestions for improvement | 12                    | 8                         | 1             | 3                |
| More focus on specific areas  | 9                     | 4                         | 0             | 5                |
| HVAC  | 1                     | 0                         | 0             | 1                |
| System sizing   | 1                     | 0                         | 0             | 1                |
| Manual J  | 1                     | 0                         | 0             | 1                |
| Air barriers  | 1                     | 1                         | 0             | 0                |
| Pools and hot tubs  | 1                     | 0                         | 0             | 1                |
| Existing buildings  | 1                     | 1                         | 0             | 0                |
| Performance based compliance rather than prescriptive requirements            | 1                     | 1                         | 0             | 0                |
| Understanding HERS ratings  | 1                     | 0                         | 0             | 0                |
| Focus on fewer areas and provide more specific information                    | 1                     | 1                         | 0             | 0                |
| Suggestions about training materials  | 5                     | 4                         | 0             | 1                |
| Provide more tools and statistics to explain the code to builders             | 1                     | 1                         | 0             | 0                |
| Provide more checklists   | 1                     | 0                         | 0             | 1                |
| Use more photos   | 1                     | 1                         | 0             | 0                |
| Provide more examples of new materials and equipment                          | 1                     | 1                         | 0             | 0                |
| Provide hands-on displays such as an efficient mini HVAC system               | 1                     | 1                         | 0             | 0                |
| Suggestions about getting different types of attendees                        | 2                     | 0                         | 2             | 0                |
| Get more contractors to attend  | 1                     | 0                         | 1             | 0                |
| Get more providers of insulation and air sealing materials to attend          | 1                     | 0                         | 1             | 0                |
| Provide more commercial trainings   | 1                     | 1                         | 0             | 0                |
| Hold trainings after code goes into effect rather than before                 | 1                     | 1                         | 0             | 0                |
| Have a single document with all code upgrades on the Mass Save website        | 1                     | 0                         | 0             | 1                |

One respondent hoped Massachusetts would soon require mechanical inspectors as well as building inspectors, a suggestion beyond the scope of the CCSI. Table 53 presents a wish list from the respondents; not all suggestions may be practical.

One municipal building code employee who attended both the EBS and HVAC-IAQ trainings emphasized their importance in doing his job:

*“More trainings are always better. More training on HVAC mechanical systems, sizing, Manual J. We want to understand HERS certificates and how they are developed, want to understand what is behind the numbers. So that we have a full understanding of what we are looking at, and have a better understanding of what is behind those numbers and are not just accepting paperwork blindly.”*

### 7.1.2 Building Professionals

Building professionals most often wanted the trainings to have a stronger focus on specific areas, particularly ventilation (Table 54). Other suggestions include focusing on best practices for compliance, explaining code requirements more clearly, and highlighting the major changes between codes. Note that six building professionals did not offer any suggestions.

**Table 54: Suggestions from Building Professionals for Improving the CCSI Trainings**

(number of respondents; multiple response; n=14)

| How to Improve the CCSI Trainings                                  | Number of Respondents | Type of Training Attended |               |                  |
|--|-----------------------|---------------------------|---------------|------------------|
|  |                       | EBS Only                  | HVAC-IAQ Only | EBS and HVAC-IAQ |
| All building professionals who offered suggestions for improvement | 14                    | 6                         | 4             | 4                |
| More focus on specific areas                                       | 5                     | 1                         | 2             | 2                |
| Ventilation, particularly energy recovery and heat recovery        | 3                     | 0                         | 2             | 1                |
| Insulation   | 1                     | 1                         | 0             | 0                |
| Existing buildings   | 1                     | 0                         | 0             | 1                |
| Focus on best practices for compliance                             | 3                     | 1                         | 2             | 0                |
| Explain code requirements more clearly                             | 2                     | 1                         | 1             | 0                |
| Highlight major changes between codes                              | 2                     | 1                         | 1             | 0                |
| Focus more on building science                                     | 1                     | 1                         | 0             | 0                |
| Have more interaction among attendees and presenters               | 1                     | 1                         | 0             | 0                |
| Promote specific products for energy-efficient construction        | 1                     | 1                         | 0             | 0                |
| Have follow-up sessions with more in-depth training                | 1                     | 0                         | 0             | 1                |
| Make website easier to navigate                                    | 1                     | 0                         | 0             | 1                |
| Put on-site construction videos on-line                            | 1                     | 0                         | 1             | 0                |
| Communicate through email or a newsletter about upcoming trainings | 1                     | 1                         | 0             | 0                |
| Encourage attendees to call Technical Support                      | 1                     | 0                         | 0             | 1                |
| Have HERS raters on the Technical Support line                     | 1                     | 0                         | 1             | 0                |

Again, Table 54 presents a wish list from the respondents; not all suggestions offered may be practical. An architect who attended both the EBS and HVAC-IAQ trainings made a good case for dealing with existing buildings:

*“There was one thing that struck me given how many people that I know that work on existing homes doing renovations and additions. The trainings were pretty much*

*focused on new construction, so I continually had to ask and clarify whether something was different for existing homes, at least half a dozen times if not more. It just wasn't the focus at all and it wasn't made clear during the presentation... Especially because it is a huge and important part of energy conservation work that is getting done right now. There is way more of that [renovation] work going on than new construction, at least in the Boston area, there's just not that much land to build on."*

An equipment supplier who attended an EBS training wanted more specific information on insulation:

*Provide more information on insulation; the current insulation methods that are being done that comply with the code... Contractors putting rigid foamboard on basement walls and using this type of adhesive are successful in doing that... For example, not using the poly on walls because of condensation and moisture issues.... More of that kind of stuff, common building insulations and ones that do and don't comply. Best practices kind of stuff.*

Finally, an energy manager who attended an EBS training expressed his satisfaction:

*"The instructors were excellent. There was confusion about what the code changes were going to be, and they did a good job clarifying. The building science aspect helped a lot in making the codes real."*

## 7.2 MOTIVATION FOR TRAINING ATTENDANCE AND ATTRACTING BUILDING PROFESSIONALS

### 7.2.1 Why Attend the CCSI Trainings

Municipal building code employees generally said they attended the trainings for general education on codes, to obtain required continuing education credits, or to learn about the new codes (Table 55).

**Table 55: Why Municipal Building Code Employees Attended the Trainings**

(number of respondents; multiple response; n=16)

| Motivation for Attendance                           | Total Number of Respondents |
|---|-----------------------------|
| Become better informed about the code in general    | 7                           |
| Need continuing education credits                   | 5                           |
| Learn about code changes                            | 4                           |
| Help build more efficient buildings that same money | 1                           |
| Be able to explain new code to the public           | 1                           |
| Enjoy learning about building science               | 1                           |
| Part of monthly code official meeting               | 1                           |

Since this question was added to the study after most of the interviews with building professionals had been completed, only six people from this group noted why they had attended the trainings. Four said they had attended to learn about changes to the codes and building science. One HERS rater also noted that it would help him act as a resource to other building professionals, another said he took the training as a refresher, and a third HERS rater said he attended for networking purposes.

### 7.2.2 Attracting Building Professionals to the Trainings

The CCSI is looking for ways to improve building professionals' training attendance, particularly for builders and contractors. Thirteen of the 16 municipal building code employees who were asked about getting more building professionals to attend offered various suggestions, as shown in Table 56. Since continuing education credits are important in getting code officials to attend (Table 55), one suggestion is to consider offering them for other attendees (a similar suggestion is to somehow make the trainings mandatory). While some respondents suggested working with homebuilder associations, others noted that high dues prevent some contractors from joining. Thus, they advised using word of mouth, such as having local code officials promote the trainings, and advertising in the local media.

**Table 56: How the Trainings May Attract Building Professionals**

(number of municipal building code respondents; multiple response; n=16)

| Motivation for Attendance   | Total Number of Respondents |
|---|-----------------------------|
| Offer continuing education credits                                      | 4                           |
| Use word of mouth, such as through code officials and local advertising | 3                           |
| Work with homebuilder associations                                      | 3                           |
| Offer trainings at more locations                                       | 3                           |
| Advertise in trade publications   | 2                           |
| Offer trainings at the end of the day or on weekends                    | 2                           |
| Offer more on-line trainings  | 2                           |
| Focus more on retrofits and additions                                   | 1                           |
| Offer trainings free of charge  | 1                           |
| Make trainings open to the public                                       | 1                           |
| Make trainings mandatory  | 1                           |
| Do not know   | 3                           |

Again, since this question was added to the study after most of the interviews with building professionals had been completed, only five people from this group commented on getting more builders and contractors to attend the trainings. Three respondents talked about increasing awareness of the trainings, mostly by partnering with trade groups, such as the Builders and Remodelers Association of Greater Boston (BRAGB) and the National Association of the Remodeling Industry (NARI), as well as local lumber yards and supply houses. Two respondents said the trainings should offer continuing education credits, though they would most likely apply to HERS raters rather than builders and contractors, and one respondent noted that attendance would increase if it was mandated.

## 8

## Section 8 Considerations

## Overall

Based on the follow-up interviews and other work on the CCSI, NMR offers the following considerations for improvement.

- Consider offering trainings of varying lengths. Longer trainings allow time to offer more real-life examples, as suggested by some respondents. They may also be more appropriate for attendees with moderate knowledge of the subject.
- Consider additional focus on areas such as insulation, ventilation, and HVAC, as suggested by some respondents. This may be offered in conjunction with longer trainings.
- Examine options to encourage more builders and contractors to attend the trainings. This may include continuing education credits, having local code officials promote the trainings, working with homebuilder associations and local media, or offering trainings in the evenings with dinner included.



## 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<sup>®</sup> 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 \$45 for your time in responding to this interview which should take about 30 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](mailto:William.Blake@nationalgrid.com).]

[VERIFY OCCUPATION, JURISDICTION, TITLE, AND EMAIL; IF RESPONDENT IS A BUILDING 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.** For this interview, I would like you to focus on the trainings on [DATE] which covered the 2015 IECC code rather than any earlier trainings you may have attended. [USE ONLY IF RESPONDENT HAS ATTENDED BOTH RESIDENTIAL AND COMMERCIAL 2015 IECC TRAININGS] and we are covering just the [RESIDENTIAL TRAININGS] you attended on [DATE(S)].

**Intro 2.** I would also like to confirm that your jurisdiction [CITY/TOWN(S)] is currently using the building code based on IECC 2015/is using the stretch code/is using both the building code based on IECC 2015 and the stretch code.

- a. Yes

- b. No; explain which code they are using \_\_\_\_\_
- c. [IF THEY WORK IN JURISDICTIONS THAT USE BOTH 2015 IECC AND THE STRETCH CODE] Approximately what percentage of your work is in [STRETCH CODE LOCATION] and what percentage is in [2015 IECC LOCATION] \_\_\_\_\_

**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. How many of the housing units in these inspections involved new construction or gut rehabs and how many involved retrofits, renovations, or additions to existing homes?
  - d. And, how many involved construction permitted under IECC 2015 or the stretch code updated to 2015 IECC? [WORK WITH RESPONDENT TO FILL OUT THE TABLE BELOW]

|                                    | All inspections | Permitted under 2015 IECC or associated Stretch Code | New construction or gut rehab | Retrofit, renovation, or addition |
|------------------------------------|-----------------|--|-------------------------------|-----------------------------------|
| Total inspections                  |                 |  |                               |                                   |
| Total housing units                |                 |  |                               |                                   |
| Final inspections                  |                 |  |                               |                                   |
| Housing units in final inspections |                 |  |                               |                                   |

- e. [IF HAVE ZEROS FOR ALL THE SQUARES IN QUESTION 2] Do you normally conduct residential inspections in your position? [IF NO, GO TO Q. 4]
      - i. [IF YES] When would you expect to next conduct an inspection? [GO TO Q.3c]
  
3. [IF DONE ANY INSPECTIONS SINCE COMPLETED TRAINING(S)] Have you changed how you conducted inspections for the energy code as a result of the training(s) you attended? [IF HAVE DONE INSPECTIONS ON UNITS PERMITTED BOTH UNDER 2015 IECC AND EARLIER CODES IN QUESTION 2 ABOVE, PROBE

ABOUT WHICH CHANGES APPLY TO THESE 2015 IECC PROJECTS AND WHICH APPLY TO

EARLIER PROJECTS; IF WORK UNDER BOTH 2015 IECC AND THE STRETCH CODE ABOVE, PROBE ABOUT WHAT CHANGES APPLY TO WHICH CODE]

- a. [IF YES] Can you please tell me how your inspection process has changed **as a result of the training(s)**? [PROBE, IF NOT COVERED IN RESPONSE:]
    - 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?
    - iv. Do you spend more time or pay more attention to blower door tests? If so, how has this changed?
    - v. Do you spend more time or pay more attention to duct blaster tests? If so, how has this changed?
    - vi. Since the training(s), are you now finding, and correcting, lack of code compliance that might have been missed prior to the training(s)? If yes, please describe these areas.
    - vii. What would you be doing differently if you had not attended the training(s)? [PROBE: were they doing something differently because they unaware of code requirement or did not think it was important and how did the training change their behavior]
    - viii. [IF WORK IN STRETCH CODE AREAS] Do you feel the training affected your ability to use the performance-based code requirements of the stretch code? If so, how? Can you provide any specific applications beyond those just asked about?
  - b. [IF NO] Why would you say the training has not affected how you conduct inspections? [PROBE, IF NOT COVERED IN RESPONSE:]
    - 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?
    - iv. [IF WORK IN STRETCH CODE AREAS] Do you feel the training did not apply to the stretch code?
  - 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. How many of these permits were for homes permitted under 2015 IECC or the corresponding stretch code?

- b. How many were for new construction or gut rehabs and how many involved retrofits, renovations, or additions to existing homes? [WORK WITH RESPONDENT TO FILL OUT THE TABLE BELOW]

|                     | All permits | Permitted under 2015 IECC or associated Stretch Code | New construction or gut rehab | Retrofit, renovation, or addition |
|---------------------|-------------|--|-------------------------------|-----------------------------------|
| Total permits       |             |  |                               |                                   |
| Total housing units |             |  |                               |                                   |

- c. [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? [IF HAVE REVIEWED APPLICATIONS PERMITTED UNDER 2015 IECC IN QUESTION 4 ABOVE, PROBE ABOUT WHICH CHANGES APPLY TO THESE 2015 IECC PERMITS AND WHICH APPLY TO EARLIER PERMITS; IF WORK UNDER BOTH 2015 IECC AND THE STRETCH CODE ABOVE, PROBE ABOUT WHAT CHANGES APPLY TO WHICH CODE]

- a. [IF YES] Can you please tell me how your review process has changed **as a result of the training(s)**? [PROBE, IF NOT COVERED IN RESPONSE:]
- 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?
  - iv. Since the training(s), are you now finding, and correcting, lack of code compliance that might have been missed prior to the training(s)? If yes, please describe these areas.
  - v. What would you be doing differently if you had not attended the training(s)? [PROBE: were they doing something differently because they unaware of code requirement or did not think it was important and how did the training change their behavior]
  - vi. [IF WORK IN STRETCH CODE AREAS] Do you feel the training affected your work in given that your jurisdiction uses the stretch code? If so, how?
- b. [IF NO] Why would you say the training has not affected how you review permit applications? [PROBE, IF NOT COVERED IN RESPONSE:]
- 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?

- iv. [IF WORK IN STRETCH CODE AREAS] Do you feel the training did not apply to the stretch code?
  - 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. Have you used the handouts provided at the trainings and the copies of the training slides you may have received as a reference or in any other way in your work? [IF YES; Probe on how the handouts/slides have been used and how often they are used]
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 \_\_\_\_%
    - v. Home Energy Rating Certificates \_\_\_\_\_%
    - vi. No compliance documents filed for project \_\_\_\_\_%
  - b. Have these percentages changed after the adoption of the code based on 2015 IECC?
    - i. [IF YES] How has they changed?
    - ii. [IF NO] Do you expect them to change? If so, How?
8. 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?

**Sharing Information**

9. 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 YES] Can you tell me what information you shared and the party involved?
  - b. [IF NOT MENTIONED ABOVE] Did you share any of the handouts or other materials you received at the trainings?
  - c. [IF SHARED ANYTHING] Do you believe [PARTY] is making use of the information you have shared?
  - d. How are they using this information?
  - e. Did you recommend the [PARTY] attend any of the trainings? Why or why not?

**Key Sources of Information**

10. When a question or an issue concerning the energy code comes up, where would you first go to look for information? [Probe: may have different sources depending on the issue or measure affected; also, may simply Google question rather than go to a particular source]
- a. [IF MENTION USING GOOGLE TO SEARCH] Can you tell me what sources ultimately provide you with the information you are seeking?
11. [IF THE RESPONDENT HAS MENTIONED MASS SAVE OR THE ENERGY CODE TECHNICAL SUPPORT INITIATIVE SPONSORED BY THE PAs IN RESPONSE TO QUESTION 10]
- a. How important is the Mass Save Energy Code Technical Support Initiative as a source of code information compared to other sources you might use? Would you rate it as not that important, somewhat important, important, or very important?
  - b. Have you ever gone to the Mass Save website looking for information?
    - i. [IF YES] Were you satisfied with the website? Why or why not?
    - ii. Are you aware that the Mass Save website has recently been redone aiming to be more user-friendly?
    - iii. [IF YES TO PREVIOUS QUESTION] Do you think the new website better serves your needs now? Why or why not?
  - c. Have you ever asked the Mass Save Energy Code Technical Support any questions through email or the telephone? [IF YES] Please tell me briefly how satisfied you were with the response(s) and why.
12. [IF THE RESPONDENT HAS *NOT* MENTIONED MASS SAVE OR THE ENERGY CODE TECHNICAL SUPPORT INITIATIVE SPONSORED BY THE PAs IN RESPONSE TO QUESTION 10] Are you aware of the support provided by the Mass Save Energy Support Technical Initiative on line and by telephone? [IF YES, ASK a through c below]
- a. How important is this source of code information compared to other sources you might use? Would you rate it as not that important, somewhat important, important, or very important?
  - b. Have you ever gone to the Mass Save website looking for information? [IF YES] Were you satisfied with the website? Why or why not?
    - i. [IF YES] Were you satisfied with the website? Why or why not?
    - ii. Are you aware that the Mass Save website has recently been redone aiming to be more user-friendly?
    - iii. [IF YES TO PREVIOUS QUESTION] Do you think the new website better serves your needs now? Why or why not?
  - c. Have you ever asked the Mass Save Energy Code Technical Support any questions through email or the telephone? [IF YES] Please tell me briefly how satisfied you were with the response(s) and why.
13. [ASK OF ALL RESPONDENTS WHO DO NOT CONSIDER MASS SAVE ENERGY CODE TECHNICAL SUPPORT AN IMPORTANT OR VERY IMPORTANT SOURCE OF INFORMATION IN Q 11 OR Q12] Why do you consider the Mass Save Energy Code Technical Support Initiative a less than important source of code information?

[PROBE IF NOT COVERED IN THE RESPONSE: do they already have enough sources of info, are not happy with the information available, do not know what information is available, or some other reason]

14. Since [DATE], have you attended any other trainings, webinars, or gatherings discussing building energy codes? [IF YES, ASK a THOUGH c BELOW]
- a. Please tell me the names, sponsors, and approximate dates of these events. We're also interested in the speakers at these events, if you can remember their names. [Probe if the training or discussion was in conjunction with another event such as a general association meeting]
  - b. What was the focus of this (these) event(s)? [Probe if covered a particular area of the energy code, the 2015 IECC code, or other]
  - c. Did you find this/these event(s) useful? Why or why not?

### General

15. 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 must look for?
- a. Why?
  - b. Has this priority changed since you attended [TRAINING(S)]?
    - i. [IF YES] Why is that? [IF NOT MENTIONED IN RESPONSE] Do you believe the training(s) are a factor in changing this priority? Why or why not?
  - c. Do you anticipate the priority given to checking energy-efficiency will increase in the future?
    - i. [IF YES] Why is that?
16. 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 ANY ARE MENTIONED IN QUESTION 16] Please describe what happened and how it was addressed?
  - b. [IF ANY ARE MENTIONED IN QUESTION 16] How often do these issues occur?
17. 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

18. Is there anything that you would want added to the [TRAINING(S)] that was not already covered?
- a. What would you add and why?
19. Would you recommend that your colleagues attend the Energy Code Technical Support Initiative trainings?
- a. Why or why not?

20. 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—BUILDING PROFESSIONALS—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 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](mailto: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?

- a. Yes
- b. No [THANK AND TERMINATE]

**Intro 1a.** For this interview, I would like you to focus on the trainings on [DATE] which covered the 2015 IECC code rather than any earlier trainings you may have attended. [USE ONLY IF RESPONDENT HAS ATTENDED BOTH RESIDENTIAL AND COMMERCIAL 2015 IECC TRAININGS] and we are covering 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 IECC 2015/are using the stretch code/are using both the building code based on IECC 2015 and the stretch code.

- a. Yes
- b. No; explain which code they are using \_\_\_\_\_
- c. [IF THEY WORK IN JURISDICTIONS THAT USE BOTH 2015 IECC AND THE STRETCH CODE] Approximately what percentage of your work is in [STRETCH CODE LOCATION] and what percentage is in [2015 IECC LOCATION]

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

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### 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 worked on? [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 the housing units involved new construction or gut rehabs and how many involved retrofits, renovations, or additions to existing homes?
  - d. How many of these projects involved construction permitted under IECC 2015 or the stretch code updated to 2015 IECC? [WORK WITH RESPONDENT TO FILL OUT THE TABLE BELOW]

|                                    | All projects | Permitted under 2015 IECC or associated Stretch Code | New construction or gut rehab | Retrofits, renovations, or additions |
|------------------------------------|--------------|--|-------------------------------|--------------------------------------|
| 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 |              |  |                               |                                      |

[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, would they be new construction or renovations, and at what stage, that is, planning or under construction, 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? [IF HAVE WORKED ON PROJECTS PERMITTED BOTH UNDER 2015 IECC AND EARLIER CODES IN QUESTION 2 ABOVE, PROBE ABOUT WHICH CHANGES APPLY TO THESE 2015 IECC PROJECTS AND WHICH APPLY TO EARLIER PROJECTS]

a. [IF YES] Can you please tell me how your work has changed **as a result of the trainings?** [PROBE, IF NOT COVERED IN RESPONSE:]

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

- ii. Have you changed the equipment or subcontractors you use for any of these changes? If so, please describe what has changed.
  - iii. Have you made any changes to insulation materials or levels? If so, please describe what has changed.
  - iv. Have you made any changes to insulation installation or paying attention to the building envelope to improve air sealing? If so, please describe how your work has changed.
  - v. Have you made any changes to ductwork to improve duct sealing? If so, please describe how your work has changed.
  - vi. What, if anything, would you have done differently if you had not attended the [TRAINING(S)]? [PROBE: were they doing something differently because they unaware of code requirement, did not think it was important, the code official did not care or another reason and how did the training change their behavior]
  - vii. [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)]?
    - 2. [[IF WORK IN STRETCH CODE AREAS] Do you feel the training affected your work in using the performance-based code requirements of the stretch code? If so, how?
- b. [IF NO] Why would you say the training has not affected your work?

[PROBE, IF NOT COVERED IN RESPONSE:]

- 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?
  - iv. [IF WORK IN STRETCH CODE AREAS] Do you feel the training did not apply to the stretch code?
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. Have you used the handouts provided at the trainings and the copies of the training slides you may have received as a reference or in any other way in your work? [IF YES; Probe on how the handouts/slides have been used and how often they are used]
  
6. 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?
  
7. 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, whether you use a HERS rater to file it, 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 \_\_\_\_%
    - v. Home Energy Rating Certificates \_\_\_\_\_%
    - vi. No compliance documents filed for project \_\_\_\_\_%
  - b. Do you use a HERS rater to file any of this information? If so, what information does the rater file?
  - c. Has any of this information or percentages changed since you attended the TRAINING(S)? If so, how has it changed?
  - d. Have these percentages changed after the adoption of the code based on 2015 IECC?
    - i. [IF YES] How have they changed?
    - ii. [IF NO] Do you expect them to change? If so, How?

### Sharing Information

8. 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 NOT MENTIONED ABOVE] Did you share any of the handouts or other materials you received at the trainings?
  - c. [IF SHARED ANYTHING] Do you believe [PARTY] is making use of the information you have shared?
  - d. How are they using this information?
  - e. Did you recommend the [PARTY] attend any of the trainings? Why or why not?
  - f. Have you seen others offering to share information from the trainings? If yes, please briefly describe the circumstances and information shared.

### Key Sources of Information

9. When a question or an issue concerning the energy code comes up, where would you first go to look for information? [Probe: may have different sources depending on the issue or measure affected; also, may simply Google question rather than go to a particular source]
  - a. [IF MENTION USING GOOGLE TO SEARCH] Can you tell me what sources ultimately provide you with the information you are seeking?
10. [IF THE RESPONDENT HAS MENTIONED MASS SAVE OR THE ENERGY CODE TECHNICAL SUPPORT INITIATIVE SPONSORED BY THE PAs IN RESPONSE TO QUESTION 9]
  - a. How important is the Mass Save Energy Code Technical Support Initiative as a source of code information compared to other sources you might use? Would you rate it as not that important, somewhat important, important, or very important?
  - b. Have you ever gone to the Mass Save website looking for information?
  - iv. [IF YES] Were you satisfied with the website? Why or why not?
  - v. Are you aware that the Mass Save website has recently been redone aiming to be more user-friendly?
  - vi. [IF YES TO PREVIOUS QUESTION] Do you think the new website better serves your needs now? Why or why not?

c. Have you ever asked the Mass Save Energy Code Technical Support any questions through email or the telephone? [IF YES] Please tell me briefly how satisfied you were with the response(s) and why.

11. [IF THE RESPONDENT HAS NOT MENTIONED MASS SAVE OR THE ENERGY CODE TECHNICAL SUPPORT INITIATIVE SPONSORED BY THE PAs IN RESPONSE TO QUESTION 9] Are you aware of the support provided by the Mass Save Energy Support Technical Initiative on line and by telephone? [IF YES, ASK a through c below]

a. How important is the Mass Save Energy Code Technical Support Initiative as a source of code information compared to other sources you might use? Would you rate it as not that important, somewhat important, important, or very important?

b. Have you ever gone to the Mass Save website looking for information?

i. [IF YES] Were you satisfied with the website? Why or why not?

ii. Are you aware that the Mass Save website has recently been redone aiming to be more user-friendly?

iii. [IF YES TO PREVIOUS QUESTION] Do you think the new website better serves your needs now? Why or why not?

c. Have you ever asked the Mass Save Energy Code Technical Support any questions through email or the telephone? [IF YES] Please tell me briefly how satisfied you were with the response(s) and why.

12. [ASK OF ALL RESPONDENTS WHO DO NOT CONSIDER MASS SAVE ENERGY CODE TECHNICAL SUPPORT AN IMPORTANT OR VERY IMPORTANT SOURCE OF INFORMATION IN Q 10 OR Q11] Why do you consider the Mass Save Energy Code Technical Support Initiative a less than important source of code information? [PROBE IF NOT COVERED IN THE RESPONSE: do they already have enough sources of info, are not happy with the information available, do not know what information is available, or some other reason]

13. Since [DATE], have you attended any other trainings, webinars, or gatherings discussing building energy codes? [IF YES, ASK a THROUGH c BELOW]

a. Please tell me the names, sponsors, and approximate dates of these events. We're also interested in the speakers at these events, if you can remember their names. [Probe if the training or discussion was in conjunction with another event such as a general association meeting]

b. What was the focus of this (these) event(s)? [Probe if covered a particular area of the energy code, the 2015 IECC code, or other]

c. Did you find this/these event(s) useful? Why or why not?

**General**

14. 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 must check? Why?
- a. Has this changed over the past year or so? If yes, how has it changed?
    - i. [IF YES] Why is that? [IF NOT MENTIONED IN RESPONSE] Do you believe the training(s) that you attended and are also attended by code officials are a factor in changing this priority? Why or why not?
  - b. Do you anticipate the priority given to checking energy-efficiency will increase in the future?
    - i. [IF YES] Why is that?
15. Have your interactions with building officials enforcing the energy code changed in the last year or so?
- a. [IF YES] What changes have you experienced? Again, do you believe the training(s) that you attended and are also attended by code officials are a factor in changing these interactions? Why or why not?
16. 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. Again, do you believe the training(s) that you attended and are also attended by code officials are a factor this increasing time and/or effort? Why or why not?
17. 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**

18. 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?

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

a. Why or why not?

20. 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!