Process Assessment for the Cross-Cutting Code Compliance Support Initiative Evaluation (TXC54)

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SUBMITTED TO:
The Massachusetts Electric and Gas Program Administrators

SUBMITTED BY:
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Process Assessment for the Cross-Cutting Code Compliance Support Initiative Evaluation (TXC54)

This process assessment of the classroom trainings, webinars, and assistance offered through Mass Save Technical Support by the Code Compliance Support Initiative (CCSI) documents the quality and usefulness of these offerings as well as considerations for improvement.

### Methods

- **Attend classroom trainings**
  - 3 residential
  - 3 commercial

- **Attend webinar trainings**
  - 3 residential
  - 3 commercial

- **Review technical support**
  - Phone requests
  - Email requests

### Key Findings

#### Classroom Trainings
- Trainings were informative overall but contained little coverage of stretch code provisions.
- The presenters were knowledgeable and well-spoken, but copies of the slides were not provided to attendees.
- As classroom trainings were held in conjunction with building code official gatherings, most attendees were code officials.

#### Webinar Trainings
- Trainings were comprehensive and effective; two with additional detail exceeded the one-hour time frame, leaving no time for questions.
- Residential slides were high-quality and contained clear graphics; some commercial slides had issues with length, spelling, and errors.
- Unlike classroom trainings, webinar attendees were more likely to be energy professionals, architects, and builders.

#### Mass Save Technical Support
- Since the inception of CCSI, code officials have been the largest single group asking for code support.
- Many individuals have contacted Mass Save repeatedly for code support over the years.
- In the past year, resolution times have improved; nearly three-quarters of requests are resolved on the same day.

### Considerations

1. Provide hard copies of slides at the start of the classroom trainings and send attendees copies by email following the presentation.
2. Ensure that all webinar attendees receive copies of all questions asked and responses and this information is publicly posted.
3. Provide more classroom trainings during breakfasts or evening hours for non-code officials. Target builders and contractors, who are responsible for compliance on work sites.
4. Ensure the stretch code is adequately covered in all relevant sessions, as it applies to most construction in Massachusetts.
5. Ensure presentations highlight specific code provisions as numbered in the energy code so participants can apply the course to their work.
6. Enhance presentation materials by enlarging screenshots of documents, using pictures or call-outs to reduce text length on slides, and proofreading.
7. If the instructor is not certain the polling system used to interact with audiences is working properly, it should be discarded.
Executive Summary

Methodology

The Massachusetts Program Administrators (PAs) and the Energy Efficiency Advisory Council (EEAC) consultants have contracted with NMR on the residential side and Cadmus on the commercial side (the team) to attend classroom trainings and webinars offered by the CCSI under its most recent contractor, Performance Systems Development (PSD) as well as review the data on inquiries through the Mass Save Technical Support Initiative since its inception in 2014.

This process assessment of the classroom trainings, webinars, and assistance offered through Mass Save Technical Support by the Code Compliance Support Initiative (CCSI) documents the quality and usefulness of these offerings as well as considerations for improvement.

The team attended six classroom trainings (three residential and three commercial) and six webinar trainings (three residential and three commercial) between May and October 2018. NMR also reviewed 196 phone and email requests for information received by PSD, and 270 requests received by CLEAResult, through the Mass Save technical support line.

Findings

Classroom Trainings

The team found all the residential and commercial classroom trainings attended to be informative overall and engaging for participants of all skill and knowledge levels. However, there was little coverage of stretch code provisions.

All the training presenters appeared knowledgeable about the code and building science. They spoke with confidence and conviction and related to the audience with good voice projection, eye contact, and a sense of humor.

The presentation slides for the classroom trainings were high quality and useful. However, they were not provided to attendees.

The October residential and commercial trainings were longer and covered areas with a narrower scope than the earlier training. This made for a level of detail that was more helpful and appropriate for the attendees.

All six classroom trainings reviewed were held in conjunction with building code official gatherings. As a result, almost all attendees worked for municipal building departments.

However, the trainings were applicable to a wide range of occupations.
**Webinars**

As with the classroom trainings, the team found all six webinars attended to be comprehensive and appropriately detailed for their topics and the one-hour timeframe. The webinars effectively appealed to a wide variety of occupations and skill levels.

Two of the six webinars attended (one residential and one commercial) had scopes that exceeded the one-hour timeframe leading to the presenter rushing through the last portions and not publicly answering the questions posed.

The quality of the slides for the residential webinars contained clear and useful photos, diagrams, and charts. However, some of the commercial webinar slides had issues with text length, redundancy, misspellings, and grammatical errors.

Unlike the classroom trainings, webinar attendees were more likely to be energy professionals, architects, and builders.

**Mass Save Technical Support**

Since the inception of the CCSI, code officials have been the single largest group asking for code support. Many individuals have contacted Mass Save repeatedly for code support over the years.

In the past year, there has been a marked improvement in resolution times with close to three-quarters of requests resolved on the date they are received.

**Considerations**

Provide hard copies of the slides at the start of the classroom trainings as these may be useful for notetaking. Attendees should also receive copies by email after the presentation as these may be more useful to some individuals.

Ensure all webinar participants receive copies of the questions asked and responses provided, unless an attendee requests that their question and response is not shared with the group. This information should also be publicly posted.

Provide more classroom trainings for non-code officials, since a fair number of them attended the webinars reviewed. In particular, the CCSI should try to target builders and contractors since they are on the work sites that need to comply with the energy code. Breakfast or evening sessions that do not interfere with work schedules may attract more participants.

Ensure presentations highlight or otherwise reference specific code provisions as they are numbered in the energy code. This will make it easier for attendees to reference the code later and apply knowledge from the course to their work.

**Ensure the stretch code is adequately covered in all relevant sessions as it applies to most construction in Massachusetts.**

The presentation materials may be enhanced by using enlarged screen shots of smaller portions of the documents, using pictures or text boxes to make the slides less wordy and more engaging, and proofreading for spelling, punctuation, and grammatical errors.

If the instructor is not certain the polling system used to interact with audiences is working properly, it should be discarded.
Section 1  Introduction and Methodology

The Massachusetts Program Administrators (PAs) and the Energy Efficiency Advisory Council (EEAC) consultants have contracted with a Cross-Cutting Research Area evaluation team to conduct a process assessment of the Code Compliance Support Initiative (CCSI) activities under the most recent implementation contractor, Performance Systems Development (PSD). The evaluation team (henceforth referred to as the team) is made up of NMR Group, Inc. (NMR), on the residential side, and Cadmus, on the commercial side. The objective of this evaluation is to provide timely feedback on the CCSI training and other services delivered by PSD. Through this evaluation, the team will also identify changes that could be made to improve the CCSI.

The CCSI seeks to improve compliance with residential and commercial building energy codes in Massachusetts over the long term by providing education and technical assistance to industry professionals. The initiative was designed to assist code officials and building professionals in understanding the requirements of the energy code, how requirements have changed over time, and how building practices might change in the face of new requirements. Since its introduction in 2014, the CCSI has provided classroom trainings, webinars, and technical assistance (i.e., providing answers to energy code questions by phone and email through the Mass Save Technical Support line). PSD took over CCSI implementation from CLEAResult in November of 2017.

For this evaluation, NMR attended three residential classroom trainings and three residential webinars and Cadmus attended three commercial classroom trainings and three commercial webinars. The team also reviewed data on inquiries received through the Mass Save Technical Support Initiative.

1.1 Assessment of Classroom Trainings and Webinars

NMR attended three residential classroom trainings and three residential webinars, listed below:

- Classroom training, “Are You Ready for Solar Ready?” on May 9, 2018
- Classroom training, “Are You Ready for Solar Ready?” on May 10, 2018
- Classroom training, “Residential Air Barriers and Insulation Installation” and “Ventilation for Tight Homes: Reducing Energy Waste, Improving IAQ” on October 3, 2018
- Webinar, “Applying the Energy Code to Existing Homes” on May 30, 2018
- Webinar, “Residential Air Barrier Details” on June 27, 2018
- Webinar, “Residential Duct Leakage, Sealing, and Testing” on August 29, 2018

The first two residential classroom trainings that NMR attended were ninety minutes long, while the third training consisted of two modules and was three hours long in total. The webinars were each one hour long. We note here that the first two residential classroom trainings and the first two residential webinars were taught by an individual who has since left PSD. The third residential classroom training and the third residential webinar were led by the instructor who is currently
responsible for the residential CCSI work at PSD. The classroom training and webinar attended by NMR were among the first he has done at PSD. The process assessment and takeaways offered here should be viewed in this context.

Cadmus attended three commercial classroom trainings and three commercial webinars, listed below:

- Classroom training, “MA Energy Code Update and The Top Ten Things You Really Need to Know: 2015 IECC and 9th Edition: Commercial” on May 9, 2018
- Classroom training, “MA Energy Code Update and The Top Ten Things You Really Need to Know: 2015 IECC and 9th Edition: Commercial” on May 10, 2018
- Classroom training, “MA Energy Code Update: Commercial Air Barrier Requirements, Details, and Construction” on October 1, 2018
- Webinar, “Plan Review – COMcheck for an Existing Commercial Building” on June 27, 2018
- Webinar, “Third Party Documentation and Above-Code Programs” on September 26, 2018
- Webinar, “Designers, Builders, and Code Officials Working Together for Improved Energy Code Compliance” on October 31, 2018

Please note that the classroom trainings on May 9 and May 10, and the webinars on June 27, were held on dates that included both residential and commercial offerings. Similarly, the classroom trainings on October 1 (commercial) and October 3 (residential) were held as part of a three-day conference for code officials. The team assessed the following areas in the classroom trainings and webinars attended (the last area only applies to classroom trainings):

- Structure and pace
- Areas covered and how much time was spent on each area
- Comprehensiveness
- Usefulness
- Quality of the presentations and presenters’ skills
- Quality of the slides and handout materials
- Number and types of questions posed and how they were handled
- Audience characteristics
- Emphasis on filling out the immediate surveys and its effect on the response rate

### 1.2 Assessment of Code Support Through Telephone and Email

NMR reviewed 196 energy code phone and email technical assistance requests received by PSD, and 270 requests received by CLEAResult, through the Mass Save technical support line. The CLEAResult requests came in from July 2014 through October 2017, and the PSD requests came in from November 2017 through October 2018. The team assessed the following:

- Types of individuals accessing the code support services
- Number of unique individuals accessing the code support services
- Types of questions asked
- How the questions were addressed
- Amount of time it took to answer the questions or resolve the issues raised

Please note that the code support assessment covers the work done since the start of the CCSI, while the assessment of classroom trainings and webinars only covers activities under PSD, the most recent implementation contractor. The team has included the earlier code support activities since we had not provided assessment of the Mass Save technical support line in the past.
Section 2    Residential Sector Findings

The team attended three residential energy code classroom trainings and three residential energy code webinars. The team found these trainings to be thorough, effective, and useful to a wide range of occupations and varying levels of knowledge. The residential classroom trainings provided pertinent information on specific code requirements, compliance, and real-world application. The webinars covered relevant and useful topics outside of traditional energy code education, including existing building requirements, air barriers, and useful checklists that could be taken into the field. Section 2.1 lists key findings from the residential evaluation, followed by more detailed information upon which the findings are based.

2.1  Summary of Key Findings

Classroom Trainings

➢ The team found that all the residential classroom trainings attended were informative and engaging.

➢ The earlier trainings, Are you Ready for Solar Ready? (in May 2018) had a wide scope. Some areas were covered quickly due to time constraints.

➢ The last residential training attended “Residential Air Barriers and Ventilation” (October 2018) was longer and had a narrower scope than the earlier trainings. This allowed the training to present a level of detail that was more helpful and appropriate for the attendees.

➢ Both training presenters appeared to be familiar with the code. While presenting, they projected their voice, made good eye contact, and had a sense of humor, which made for a strong connection with the audience. In addition, the slides were clear and provided useful information.

➢ The major drawback of all the trainings attended was that the slides were not provided as handouts at the beginning of the sessions. The team staff attending believe that having printed copies of the slides in advance would have facilitated notetaking for the attendees.

➢ The questions posed by the audience were made clear in the third training because the trainer repeated them before answering. In the earlier trainings (May 2018), it was difficult to hear the questions being asked.

➢ All three classroom trainings were held in conjunction with building code official gatherings. As a result, almost all attendees worked for municipal building departments.

Webinars

➢ As with the residential classroom trainings, the team found all three residential webinars to be comprehensive. Despite the one-hour time constraint, the webinars provided sufficient information.
The presentation structure of the first two residential webinars was clear from the outset, and the pace was generally appropriate. The third residential webinar had a more fluid structure with quite a bit of back and forth between the presenter and the moderator, which became a bit meandering and conversational. The presenter was new to this effort and the structure is likely to improve as he does more webinars.

Some of the questions posed during the webinars were not answered publicly because of time constraints. Though the answers may have been provided to the individuals that posed the questions, the other attendees did not see these answers.

Unlike the classroom trainings, most webinar attendees were not code officials. They often worked as energy professionals, architects, and builders.

2.2 CLASSROOM TRAININGS

Overall, the team found the residential classroom trainings attended to be useful and engaging. In the following sections, we provide general information on the types of attendees and offer observations on the trainings’ comprehensiveness and usefulness, structure and pace, and overall quality. We also discuss the questions posed by training attendees.

2.2.1 Classroom Training Attendees

A total of 102 people attended the three residential classroom trainings (excluding team staff). Attendance for individual sessions is shown below:

- 28 attendees for “Are You Ready for Solar Ready?” on May 9
- 40 attendees for “Are You Ready for Solar Ready?” on May 10
- 34 attendees for “Residential Air Barriers and Insulation Installation” and “Ventilation for Tight Homes: Reducing Energy Waste, Improving IAQ” on October 3

All three classroom trainings were held in conjunction with building code official gatherings. The trainings on May 9 and May 10 were part of a Southeastern Massachusetts Building Officials Association (SEMBOA) event, and the October 3 training was part of a New England Building Officials Education Association (NEBOEA) conference. Consequently, all attendees at the first two sessions and all but three at the third session were building code officials.¹

2.2.2 Classroom Training Comprehensiveness and Usefulness

The team found the classroom trainings to be useful overall; however, some areas in the May 9 and May 10 trainings were covered quickly due to time constraints. The October 3 training had a narrower scope and a longer duration. This allowed the presenter to provide more detail, especially in areas where the trainees had the most questions.

The May 9 and May 10 trainings covered the new 2018 requirements for solar readiness, the 2015 IECC updates, and mechanical ventilation. The section on solar readiness was very useful for those looking to be brought up to speed on the differences between the

¹ Two attendees of the 10/3 training identified as architects and one identified as an HVAC contractor. Ten of the 31 building officials at the 10/3 training work outside of Massachusetts.
Massachusetts’ 8th ed. residential code and the 9th ed. residential code (namely, the solar ready home provisions). These trainings were somewhat useful as a refresher course on the differences between the 2012 and 2015 IECC and mechanical ventilation. However, these trainings were not useful in covering the stretch code, which applies to about two-thirds of construction in Massachusetts. The areas covered, and the time spent on each area in the May 9 and May 10 classroom trainings, are shown in Figure 1.

**Figure 1: “Are You Ready for Solar Ready?” – Classroom Training – May 9 and May 10**

The October 3 classroom training on residential air barriers and ventilation provided a high level of detail on air barriers and a moderate level of detail on insulation. The October 3 training also provided a good amount of detail on whole-house ventilation. The areas covered and the time spent on each area in the October 3 classroom training are shown in Figure 2 and Figure 3.
The October 3 training on residential air barriers and ventilation covered areas with a narrower scope than the May 9 and May 10 trainings on solar readiness. The team staff who attended both types of trainings believe that the narrower scope, as well as the longer duration, meant that the level of detail provided was more helpful and appropriate for the attendees.

2.2.3 Classroom Training Structure and Pace
The team staff who attended the residential classroom trainings found the presentations were structured in a clear and logical manner. The presenters followed a pace that allowed them to cover the necessary topics without rushing through the content. All questions asked publicly during all three classroom trainings were resolved.
The presenters at all three trainings encouraged the attendees to fill out the immediate paper surveys, which were collected at the end of the sessions. The presenter at the May 9 and May 10 trainings encouraged participants to fill out the immediate surveys both before the training began and at its conclusion. The presenter at the October 3 training encouraged participants to fill out the immediate survey multiple times during the training and stressed that he needed the feedback to improve. The response rates for the immediate surveys are as follows:

- May 9 training – 29%
- May 10 training – 37%
- October 3 training – 62%

While it appears that the October 3 presenter was much more effective in getting attendees to fill out immediate survey forms before they left, the response rate may have been affected by additional factors. As noted above, the October 3 training was longer than the two earlier trainings and more focused in scope. These differences may have attracted participants who have a deeper interest in the areas covered and would therefore be more willing to provide feedback.

2.2.4 Classroom Training Quality

The presenter for the May 9 and May 10 trainings was familiar with the code and connected with the audience. He projected his voice, made good eye contact, and had a sense of humor when answering questions. The May 9 and May 10 trainings included helpful slides, with diagrams showing the portions of the roof affected, required documentation, and exemptions from the solar-ready provisions. The visuals he presented were also helpful in describing different strategies for mechanical ventilation.

The major drawback of the May 9 and May 10 trainings (which also applies to the October 3 training) was that the slides were not provided as handouts at the beginning of the sessions. Having hardcopies of the slides at the start of the training would have facilitated notetaking. It also would have been easy to provide the energy code hotline information to everyone attending the trainings in a handout.²

The presenter for the October 3 training also appeared knowledgeable about the code and connected with the audience. He projected his voice, made good eye contact, and had a sense of humor. The slides used for the October 3 training provided clear text and images throughout the presentation. The trainer also provided the attendees with three checklists that reinforced the concepts discussed in the presentation, which seemed very useful. Some attendees even asked if commercial checklists were available because they found the residential ones so useful. However, as with the earlier trainings, the slides were not made available to the attendees at the start of the training, though the presenter offered to email them to whomever was interested. The presenter at the October 3 training did provide the energy code hotline information to everyone attending the training.

² The team had also suggested providing copies of the slides used at the beginning of the classroom trainings in the immediate survey memos submitted when CLEAResult was the CCSI implementer. As a result, CLEAResult provided these handouts in the latter trainings.
2.2.5 Classroom Training Questions

There were two types of questions: those asked of the audience by the presenter and those posed by the audience. Both presenters effectively used various questions asking about people’s technical knowledge (as well as keeping them occupied and focused on the trainings) at various points during the presentations and then correcting misperceptions. The polling system used in the May 9 and 10 trainings required participants to use their cellphones to log in and answer the questions posed by the presenter. While it worked for the May 9 training, it failed on the May 10 training and provided a distraction. There was no polling system used in the October 3 training.

The presenter of the May 9 and May 10 trainings did a good job of answering the questions posed without letting specific questions and discussions derail him too much from the presentation. However, the team staff believe he should have started by repeating the question for the audience (it was difficult to hear most questions) and confirming that the person was satisfied with the response at the end (within reason). The team staff found the presenter’s handling of the questions at the October 3 training to be very good. Everyone who asked a question during this session seemed satisfied with the answers they received.

2.3 Webinars

Similar to the residential classroom trainings attended, the team found all three residential webinars attended to be clear, informative, and well structured. Below, we provide general information on the types of attendees and offer observations on the trainings’ comprehensiveness and usefulness, structure and pace, overall quality, and questions posed by attendees.

2.3.1 Webinar Attendees

The three webinars reviewed had a total of 146 attendees, excluding team staff. As shown in Table 1, the highest portion of attendees (43%) listed their occupation as code official. Unlike the classroom trainings, a large proportion of the webinar attendees were not code officials. After code officials, the next highest portion of attendees were energy professionals or specialists (25% of attendees at the three webinars assessed). This group includes HERS raters, project managers for energy consulting firms, and energy-efficiency program managers. Smaller proportions of attendees were architects (17%) or builders or contractors (9%).
Table 1: Types of Webinar Attendees

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<td>Total</td>
<td>53</td>
<td>54</td>
<td>39</td>
<td>146</td>
</tr>
</tbody>
</table>

2.3.2 Webinar Comprehensiveness and Usefulness

Despite the one-hour time allotment, the team found all three webinars to be comprehensive. The areas covered and the time spent on each area are shown in Figure 4,
Figure 5, and Figure 6.

Figure 4: Applying the Energy Code to Existing Homes – Webinar – May 30
The team found all three webinars useful for the attendees. The May 30 webinar, *Applying the Energy Code to Existing Homes*, filled a need given that, while a large portion of construction work involves existing buildings, much of the education effort is focused on new construction. One-half of the time was spent on additions and one-quarter on alterations.

Similarly, the June 27 webinar, *Residential Air Barrier Details*, filled a need by clarifying code requirements that sometimes appear a bit vague regarding air barriers. It was useful for those who wanted to understand the code requirements for this area and for code officials, who could use the provided air barrier checklist during inspections.

The August 29 webinar, *Residential Duct Leakage, Sealing, and Testing* was useful for those who wanted to understand the residential duct sealing code requirement, particularly code
officers, and individuals interested in the Massachusetts’ 9th edition Energy Code checklist provided.

2.3.3 Webinar Structure and Pace
The team staff attending the first two residential webinars found that the structure of the presentations was clear from the outset. The third residential webinar had a more fluid structure with quite a bit of back and forth between the presenter and the moderator. As noted in Section 1, the presenter of the third webinar had recently joined PSD and this was one of his first webinars. Therefore, he was relying on the moderator for support. This will likely improve as he becomes more comfortable with all aspects of the Massachusetts building energy code.

The pace for all three webinars was generally appropriate with some time issues. However, the presenter rushed through the slides somewhat at the end of the June 27 Residential Air Barrier Details webinar and the August 29 Residential Duct Leakage, Sealing, and Testing webinar. The August 29 presentation felt repetitive in some spots, and there was not enough time to publicly answer all the questions that had been submitted.

2.3.4 Webinar Quality
The team staff attending the webinars found both presenters were knowledgeable, clear, and engaging. The presenter for the first two webinars (May 30 on existing homes and June 27 on air barriers) was clear and concise. He was very familiar with the subject matter and able to offer interpretations on parts of the code that had some ambiguity, especially concerning existing homes. He also effectively used examples to highlight what each code provision meant and how it would be used during an inspection. The presenter for the third webinar (August 29 on ducts) was easy to understand and provided clear reasoning and explanations for the code. As noted earlier, this was one of his first webinars and he frequently relied on the moderator for support. This led to having two presenters at times, which became a bit meandering and conversational. These webinars are likely to improve as he does more of them.

All three webinars had very effective and useful slides and handouts, which could be downloaded by attendees through GoToWebinar. Attendees could also download a recording of the webinars if they needed to remember the discussions around specific areas. The slides for the May 30 webinar on existing homes had diagrams and photos, which were specifically helpful for using RESCheck forms for prescriptive paths in additions and alterations. Similarly, the slides for the June 27 and August 29 webinars had clear pictures and helpful charts and graphs that aided in the audience’s understanding of the topics covered. The team staff also found the checklists provided by the webinars to use during inspections (or as a reminder to contractors) useful for people in the field.

2.3.5 Webinar Questions
Like the classroom trainings, there were two types of questions: those asked of the audience by the presenter and those posed by the audience. Throughout the webinars, both presenters effectively used questions to gauge the technical knowledge of the attendees (as well as
keep them occupied and focused on the trainings) at various points during the presentations and correct misperceptions.

The questions asked by the attendees were not always apparent to the team staff attending the webinars. Participants could write in questions during the presentations and were told that if their questions were not covered during the webinar, they would be answered at the end. **It appears that all questions from the May 30 Applying the Energy Code to Existing Homes and June 27 Residential Air Barrier Details webinars reviewed were publicly addressed. About half of the questions from the August 29 Residential Duct Leakage, Sealing, and Testing webinar were not answered publicly because the presenter ran out of time, though answers may have been provided to the individuals that posed the questions.**
Section 3  Commercial Sector Findings

The team attended three commercial code classroom trainings and three commercial code webinars. The team found these trainings to be thorough, effective, and useful to a wide range of occupations and varying levels of knowledge. The commercial classroom trainings provided pertinent information on specific code requirements, compliance, and real-world application. The webinars covered relevant and useful topics outside of traditional energy code education, including existing building requirements, above code programs, and the use of third-party energy professionals. Section 3.1 lists key findings from the commercial evaluation, followed by more detailed information upon which the findings are based.

3.1  SUMMARY OF KEY FINDINGS

Classroom Trainings

➢ Overall, the team found the commercial classroom trainings attended to be informative and engaging for participants of all skill and knowledge levels.

➢ Although provided in conjunction with building code official events, the trainings were applicable to a wide range of occupations. Almost all attendees worked as code officials.

➢ The structure of all three classroom trainings was clear and logical and the overall quality of the presented material was clear and useful.

➢ Although an effective course, the Commercial Code Update trainings had such a wide scope that the course exceeded the one-hour timeframe at both offerings. The Air Barriers course was longer and provided a more in-depth discussion of the topic than the earlier trainings.

➢ The instructors appeared knowledgeable about the presented material, building science, and the energy code in general.

➢ The polling system incorporated into the presentations as a means of interacting with the audience was ineffective. This was also the case for one residential training.

➢ As with the residential courses, a major drawback of all the trainings attended was that the slides were not provided as handouts at the beginning of the sessions.

Webinars

➢ The team found all three commercial webinars to be appropriately detailed for their topics and the one-hour timeframe. The webinars applied to a wide variety of occupations and skill levels.

➢ All three webinars began by outlining learning objectives; however, only the Existing Buildings webinar clearly aligned with the objectives.

➢ The pace for two of the three webinars, Existing Buildings and Working Together, was appropriate given the one-hour timeframe.
➢ The instructors were well-informed, humorous, and spoke with confidence and conviction.
➢ Overall, the quality of the slides presented was acceptable. However, text length, redundancy, and misspellings and grammatical errors were common issues.
➢ Webinar attendees represented a wider range of occupations than those of the classroom trainings.

3.2 CLASSROOM TRAININGS
The team attended and reviewed three commercial classroom trainings. The first two presentations, held on May 9 and 10, were one hour in length and provided an overview of the significant updates to the commercial energy code (*Commercial Code Update*). The third training, which was three-and-a-half hours in length, targeted commercial air barrier requirements (*Air Barriers*). In the following sections, we provide general information on the types of attendees and offer observations on each training’s comprehensiveness and usefulness, structure and pace, and overall quality. We also discuss the questions posed by training attendees.

3.2.1 Classroom Training Attendees
The three classroom trainings attended by the team had a total of 44 attendees. Attendance for individual sessions is shown below:

- 17 attendees for “MA Energy Code Update and The Top Ten Things You Really Need to Know: 2015 IECC and 9th Edition: Commercial” on May 9
- 3 attendees for “MA Energy Code Update and The Top Ten Things You Really Need to Know: 2015 IECC and 9th Edition: Commercial” on May 10
- 24 attendees for “MA Energy Code Update: Commercial Air Barrier Requirements, Details, and Construction” on October 1

All three classroom trainings were held in conjunction with building code official gatherings. Consequently, all attendees at the first two sessions and all but three at the third session were building code officials. The May 10 training had very low attendance as it was the final session before the end of the two-day conference; course attendees commented that conference goers generally leave early on the second day.

3.2.2 Classroom Training Comprehensiveness and Usefulness
The team staff attending the commercial classroom trainings found them to be comprehensive and useful overall. Although the *Commercial Code Update* trainings on May 9 and 10 were shorter in length and covered a larger scope than the *Air Barrier* course on October 1, the team found all three to be effective in providing attendees with key information on commercial code changes applicable to their current occupations and building practices. The trainings were suitable for attendees of all skill levels.

The agenda items for the May *Commercial Code Update* trainings were to introduce the major commercial changes in the ninth edition of the Massachusetts State Building Code 780 and to discuss the ten key requirements of the 2015 IECC. No other learning objectives were outlined.
for this course. For a course scheduled for one-hour, both presentations were comprehensive and thorough. The team found the courses to be informative to a wide range of attendees – from those new to the energy code to individuals with years of experience complying with and enforcing commercial code provisions. Figure 7 and Figure 8 show the amount of time spent on each topic during the May Commercial Code Update trainings. In both courses, the instructor spent the greatest amount of time discussing air barriers, documentation, and solar readiness requirements. However, the time spent on the topics varied between courses. The trainings lasted 75 and 67 minutes, respectively.

**Figure 7: Commercial Code Update – Classroom – May 9**

![Figure 7: Commercial Code Update – Classroom – May 9](image)

**Figure 8: Commercial Code Update – Classroom – May 10**

![Figure 8: Commercial Code Update – Classroom – May 10](image)

The purpose of the October 1 training was to educate attendees on new commercial air barrier requirements. The greatest amount of time was spent on the benefits of air barriers, building science, air barrier requirements, and a real-world example of a challenging building issue and its innovative solution. Figure 9 shows this breakdown as a percentage of overall time by topic. The extended length of the course and narrow topic allowed for a more in-depth and comprehensive training. This course was useful to occupations in the design, construction, and enforcement industries as it covered design considerations, methods for achieving compliance, and testing requirements. None of the classroom trainings assessed covered the stretch code.
### 3.2.3 Classroom Training Structure and Pace

The team staff who attended the commercial classroom trainings found the structure of the presentations to be clear and logical. The structure of the May 9 and 10 sessions was very clear from the beginning of the presentation. The topics were presented in the order they appear in the energy code, with the associated code provision number highlighted for six of the ten topics. These were the only commercial classroom trainings attended that provided code provision numbers (one webinar did as well); the team believes it is important to tie what is presented in a class or webinar back to the code provisions so that attendees will be able to reference the code book in the future. The team staff attending the October 1 course also noted that the structure of the training was excellent. This training began with definitions for air barriers and other crucial background information to ensure attendees started the class with a basic knowledge of the subject. From there, the instructor provided more in-depth discussion in a clear and logical manner.

The effectiveness of the pacing varied by training type. The May 9 training began ten minutes later than anticipated because the conference coordinators did not factor in an appropriate amount of time between sessions. The session also ran 15 minutes over the expected one-hour timeframe. Time management was less of an issue for the May 10 training, which began on time and only went over the hour by seven minutes. Although the instructor exceeded the time for both courses, he did not rush or skip over topics and attendees did not seem concerned.

The October 1 course was much longer and the topic more narrowly focused, which allowed the instructor flexibility. He was able to spend additional time on topics that attendees were less knowledgeable about or more interested in. The instructor managed time well and was able to cover the information appropriately without rushing. He also included time for breaks.

To gather attendee information and feedback on the courses, the instructors for each of the commercial trainings encouraged the attendees to fill out the immediate paper surveys collected at the end of the sessions. The response rates to these surveys were 50% for the May 9 and 10 courses (cumulative between the two) and 47% for the October 1 course.
3.2.4 Classroom Training Quality

The team staff found the instructors of the May *Commercial Code Update* courses and the October *Air Barrier* course to be very knowledgeable about the topics presented, and both appeared to be skilled in building science and the energy code in general. The instructors included anecdotes of situations they encountered in the field and at building departments, and frequently added much more information and depth to what was included on the slides.

**The quality of the material presented was good.** The slides used during the May 9 and 10 courses were generally clear and concise, and most were appropriate in length. The use of pictures and diagrams throughout the presentation was effective in providing attendees with visual representations of the information presented.

The slide deck used in the October 1 course was also clear and concise. The examples and photographs included, particularly in the building science portion of the presentation, were very good. They included real life examples of poor practices, as well diagrams and photographs demonstrating building science topics. The real-life challenge and solution presented at the end of the session was particularly effective in demonstrating the application of air barrier requirements and how compliance can be achieved, even in problematic situations. **Copies of the slide decks were not provided to attendees of any of the courses.**

3.2.5 Classroom Training Questions

In each of the three courses, instructors encouraged attendees to ask questions as they arose, and inquired if attendees had any additional questions at the end of sessions. **Questions were generally answered to the satisfaction of the attendee asking and provided for good discussion and interaction between audience members.** The instructors also utilized a polling system to ask questions of the audience. **This means of interacting with the audience was not effective.** Due to the timing issues of the May 9 course, the instructor either skipped or rushed through the polling questions, leaving no time for the audience to participate. In the May 10 course, the three attendees elected not to participate. Participation in the polling in the October 1 course was better; however, the instructor was somewhat unfamiliar with the questions and answers.

3.3 Webinars

The following sections provide general information on the commercial webinars attended regarding the attendees, comprehensiveness, usefulness, structure, pace, quality, and questions posed.

3.3.1 Webinar Attendees

The three webinars reviewed had a total of 115 attendees, excluding team staff. As shown in Table 2, over half (64%) of all attendees listed their occupation as code official.
Table 2: Types of Commercial Webinar Attendees

<table>
<thead>
<tr>
<th>Occupation</th>
<th>June 27</th>
<th>9/26</th>
<th>October 31</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code Official</td>
<td>20</td>
<td>29</td>
<td>25</td>
<td>74</td>
</tr>
<tr>
<td>Energy</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Professional/Specialist</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Architect</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Builder/Contractor</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>37</td>
<td>41</td>
<td>37</td>
<td>115</td>
</tr>
</tbody>
</table>

Webinar attendees represented a wider range of occupations than those of the classroom trainings.

3.3.2 Webinar Comprehensiveness and Usefulness

The team found all three commercial webinars to be appropriately detailed for their topics and the one-hour timeframe. The June 26 webinar thoroughly covered the different ways in which the energy code applies to existing buildings and how to use COMcheck to document energy code compliance. As shown in **Figure 10**, the instructor spent nearly half (25 minutes) of the webinar discussing the applicability of the energy code to additions, alterations, repairs, and changes in occupancy or use. The remainder of the webinar, excluding the introduction and closing, was spent on the use of COMcheck for compliance. The webinar lasted 59 minutes.

**Figure 10: Existing Buildings – Webinar – 6/26/2018**

The September 27 webinar focused on above-code programs permitted in Massachusetts and the documentation third-parties must submit to demonstrate compliance with such programs. **Figure 11** illustrates the time devoted to each topic. The instructor spent the greatest amount of time on third-party documentation, an overview of high-performance buildings, and HVAC and lighting system commissioning. The webinar was 62 minutes in length.
The October 31 webinar provided an overview of the role of each project team member in relation to the energy code and code compliance. As shown in Figure 12, the webinar covered two topic areas: Roles of Construction Team and Doing Our Jobs. This webinar lasted a total of 61 minutes.

Like the residential webinars, the team found each commercial webinar attended to be useful to a variety of audiences. The webinars were not targeted specifically to code enforcement officials; instead, they included information applicable to all members of the design and construction processes. For example, the October 31 webinar, although not rich in technical code information, provided a much-needed discussion of how each member of the project team contributes to overall compliance with the energy code. Additionally, the June 26 and September 27 webinars captured segments of the market not typically targeted in energy code training sessions – existing buildings and building above code.
3.3.3 Webinar Structure and Pace

The team’s assessment of the structure of the webinars was mixed. The June 26 webinar had an exemplary structure. This webinar included clear learning objectives that served as an agenda that participants could easily follow. The webinar slides were developed around the learning objectives, with each slide clearly supporting one or more of the agenda items. Slides were presented in a clear, logical order. There was an appropriate amount of time remaining at the end of the presentation to address questions and provide a sufficient closing to the webinar.³

The September 27 webinar was less structured. While the presentation included learning objectives, it was often unclear which slides supported which objective, and some objectives were not clearly covered at all. The team found many of the slides to be repetitive and out of order. The instructor was short on time and he was forced to rush through the last few topics, often skipping slides entirely.

The team found the structure of the October 31 webinar to be confusing and redundant as well. While discussion of the agenda items occurred sporadically throughout the presentation, the presentation did not follow nor highlight any of the items except for the roles of the design/construction team. The team found the content within the two main topics, Roles of Construction Team and Doing Our Jobs, to be repetitive for the occupations discussed. The instructor had no issues completing the presentation in the one-hour time frame and did not have to skip or modify any topic areas to remain on track.

3.3.4 Webinar Quality

The team found the instructor of the June 26 webinar to have a great depth of knowledge of building science, the energy code, and compliance documentation. He provided unscripted examples of many of the topics covered throughout the presentation. However, he did not appear to have great familiarity with the slide deck or with the answers to the poll questions. The instructor of the September 27 and October 31 webinars was well informed on the wide range of information presented – from above-code programs and their relationship to the Massachusetts energy code to third-party energy professionals and their role in demonstrating compliance.

Overall, the slides used throughout the June 26 webinar were good. Examples and photographs were incorporated into the slides from the beginning, text boxes were used to effectively highlight important text, and code requirements and exceptions were clearly referenced, making it especially easy for participants to reference the webinar material in the future. However, many slides also contained too much text, some of it very small. The COMcheck portion successfully utilized software screenshots to go through its various features.

Overall, the quality of the slides presented during the September 27 webinar was acceptable. The text on the slides was generally very lengthy and the instructor did not use animations or any other techniques to manage the delivery of the slides. An appropriate amount of graphics, photos, and examples was used throughout the presentation. However, screenshots of the handouts and other documents were often too blurry, or the text was too small, to effectively follow along, despite the thoroughness of the explanation offered by the instructor. The team

³ The June 26 webinar had a different instructor from the September 27 and October 31 webinars.
found the slides used during the October 31 webinar to be very wordy as well, with few pictures or diagrams to support the lengthy text. The slides also contained many distracting spelling and grammatical errors, including misspellings, incorrect use of punctuation, and inconsistent capitalization.

For each of the webinars, the slide deck was available as a downloadable handout at the start of the presentation; however, attendees of the October 31 webinar were not told where to find the handouts at any time during its commercial portion. An email with a recording of the webinar was sent to attendees following each of the webinars.

3.3.5 Webinar Questions
At the beginning of each commercial presentation, the instructors encouraged attendees to submit, via text, any questions regarding the presented material using the online webinar platform, with a question and answer session held at the end of two of the sessions. The instructors also utilized an online polling system to ask questions of the audience. Overall, the instructors proficiently answered audience questions, although the team staff noted that only two questions were asked. The polling system effectively engaged the audience and aided in correcting any misconceptions participants had on the presented material in one of the three presentations.
Section 4  Code Support Through Telephone and Email

The team reviewed 196 requests for code support that were received by PSD through phone calls and emails as of the end of October 2018. The team also reviewed 270 requests received by CLEAResult, the previous CCSI implementer, from July 2014 through October 2017. Table 3 notes the types of requests, the contact method used, and the occupation of the person that requested information.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Requests Received by PSD (11/17—10/18)</th>
<th>Requests Received by CLEAResult (7/14—10/17)</th>
<th>All Code Support Requests (7/14—10/18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>196</td>
<td>270</td>
<td>466</td>
</tr>
<tr>
<td>Residential</td>
<td>63%</td>
<td>75%</td>
<td>70%</td>
</tr>
<tr>
<td>Commercial</td>
<td>32%</td>
<td>18%</td>
<td>24%</td>
</tr>
<tr>
<td>Both</td>
<td>5%</td>
<td>7%</td>
<td>6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact Method</th>
<th>Requests Received by PSD (11/17—10/18)</th>
<th>Requests Received by CLEAResult (7/14—10/17)</th>
<th>All Code Support Requests (7/14—10/18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>196</td>
<td>270</td>
<td>466</td>
</tr>
<tr>
<td>Phone</td>
<td>75%</td>
<td>73%</td>
<td>74%</td>
</tr>
<tr>
<td>Email</td>
<td>25%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>In-person</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Requests Received by PSD (11/17—10/18)</th>
<th>Requests Received by CLEAResult (7/14—10/17)</th>
<th>All Code Support Requests (7/14—10/18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>196</td>
<td>270</td>
<td>466</td>
</tr>
<tr>
<td>Code Official</td>
<td>31%</td>
<td>37%</td>
<td>35%</td>
</tr>
<tr>
<td>Energy Professional</td>
<td>21%</td>
<td>16%</td>
<td>19%</td>
</tr>
<tr>
<td>Architect</td>
<td>7%</td>
<td>11%</td>
<td>9%</td>
</tr>
<tr>
<td>Engineer</td>
<td>15%</td>
<td>4%</td>
<td>9%</td>
</tr>
<tr>
<td>Contractor</td>
<td>9%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Builder</td>
<td>6%</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>Homeowner</td>
<td>8%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>1%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
<td>7%</td>
<td>5%</td>
</tr>
</tbody>
</table>
As shown in Table 3, a greater portion of the most recent requests, received by PSD, were about the commercial code, than in the past. Residential requests still made up over three-fifths of the total. About three-quarters of requests came in by phone while one-quarter came by via email. Code officials continued to be the largest single group asking for code support. The second largest group is energy professionals, including HERS raters, energy-efficiency modelers, and building science consultants.

There has also been a steady rise in the number of requests received over the years—from 29 in the last six months of 2014 to 66 in 2015, 71 in 2016, 122 in 2017, and 178 in the first ten months of 2018. The increase is likely due to more widespread knowledge of the service and the adoption of the 2015 IECC in the beginning of 2017. It is also possible that quick impromptu requests were not always recorded in the earlier years.

Many individuals contacted the Mass Save Technical Support repeatedly for help understanding and applying the code. Table 4 shows that 281 unique individuals requested code support across the timeline of the CCSI, compared to the 466 requests shown in Table 3.

### Table 4: Unique Individuals Requesting Code Support

<table>
<thead>
<tr>
<th>Requests Received by PSD (11/17—10/18)</th>
<th>Requests Received by CLEAResult (7/14—10/17)</th>
<th>All Code Support Requests (7/14—10/18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Code Official</td>
<td>125</td>
<td>181</td>
</tr>
<tr>
<td>Energy Professional</td>
<td>31%</td>
<td>32%</td>
</tr>
<tr>
<td>Architect</td>
<td>8%</td>
<td>14%</td>
</tr>
<tr>
<td>Engineer</td>
<td>14%</td>
<td>5%</td>
</tr>
<tr>
<td>Contractor</td>
<td>11%</td>
<td>13%</td>
</tr>
<tr>
<td>Builder</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Homeowner</td>
<td>12%</td>
<td>7%</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Most requests for code support were resolved the same day they were received. Table 5 shows a marked improvement in resolution times under PSD. We note, however, that the longer response times for requests received by CLEAResult may also be due to the newness of the CCSI and some failures to consistently record when a case was closed.⁴

---

⁴ In cases that did not have a closure date, the team estimated how long it took to respond from notes included in the database.
### Table 5: Resolution Time for Code Support Requests

<table>
<thead>
<tr>
<th></th>
<th>Requests Received by PSD (11/17—10/18)</th>
<th>Requests Received by CLEAResult (7/14—10/17)</th>
<th>All Code Support Requests (7/14—10/18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>196</td>
<td>267</td>
<td>463</td>
</tr>
<tr>
<td>Same Day</td>
<td>74%</td>
<td>55%</td>
<td>63%</td>
</tr>
<tr>
<td>One to Two Days</td>
<td>18%</td>
<td>21%</td>
<td>20%</td>
</tr>
<tr>
<td>Three to Seven Days</td>
<td>6%</td>
<td>13%</td>
<td>10%</td>
</tr>
<tr>
<td>More than Seven Days</td>
<td>2%</td>
<td>11%</td>
<td>7%</td>
</tr>
</tbody>
</table>