

## MEMORANDUM

**To:** Massachusetts Program Administrators (PAs), Massachusetts Energy Efficiency Advisory Council (EEAC) Consultants

**From:** Betty Tolkin, Julian Ricardo, and Katherine Weber, NMR Group

**Cc:** Monica Nevius, NMR Group; Lynn Hoefgen, NMR Group; Allen Lee, Cadmus Group; Althea Koburger, Cadmus Group

**Date:** March 21, 2018

**Re:** Analyses of Immediate Code Compliance Support Initiative Residential Training Surveys on 2015 IECC – May 31 through November 21, 2017 (TXC46)

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This memo provides analyses of the immediate survey responses collected through paper surveys, registration data, and Audience Response Systems (ARS) from ten Code Compliance Support Initiative (CCSI) residential trainings held from May 31 through November 21, 2017. CLEAResult, the CCSI contractor, held the trainings on Envelope and Building Science (EBS) and HVAC and Indoor Air Quality (HVAC-IAQ), based on the residential 2015 IECC code which became mandatory in Massachusetts at the beginning of 2017. The trainings were:

1. HVAC-IAQ held in Natick on 5/31/17
2. HVAC-IAQ held in Fitchburg on 6/1/17
3. EBS held in North Andover on 6/15/17
4. HVAC-IAQ held in West Springfield on 6/21/17
5. HVAC-IAQ held in Milford on 6/26/17
6. HVAC-IAQ held in Townsend on 9/19/17
7. HVAC-IAQ held in Northampton on 9/27/17
8. EBS held in Shrewsbury on 10/16/17
9. EBS held in Eastham on 10/17/17
10. HVAC-IAQ held in Westboro on 11/21/17.

Please note that these are the last residential classroom trainings conducted by CLEAResult for the CCSI. A new implementation contractor will start offering CCSI trainings in 2018.

Seventy-three percent of the estimated 190 attendees filled out paper survey forms. Of these survey respondents, 95 were building code officials and the remaining 44 fell into the general category of builders, architects, contractors, equipment suppliers, and others, referred to as “building professionals.” Not everyone who turned in a survey form answered all the questions; the number of respondents for each individual survey question is shown in the tables throughout this memo.

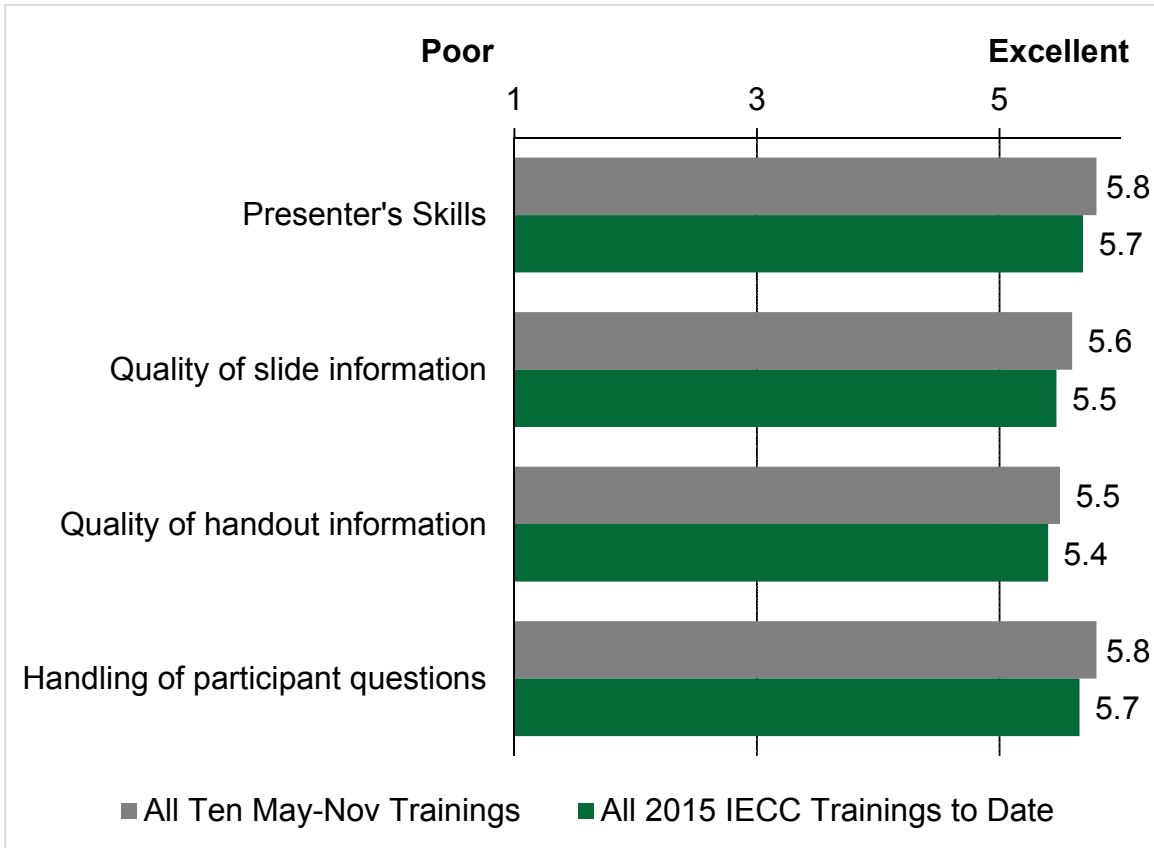
The tables in this memo are similar to the ones provided to PAs on 10/31/14, 12/29/14, 3/13/15, 7/10/15, 12/23/15, 9/29/16, 1/9/17, and 6/13/17. In addition to results from the ten IECC residential trainings listed above, we provide some overall statistics based on cumulative responses from all 28 residential trainings on the 2015 IECC energy code held from August 10, 2016 through November 21, 2017. Tables and figures displaying cumulative results are labeled as “all 2015 IECC trainings to date.”

### SUMMARY OF KEY FINDINGS

Below we summarize the key findings from the immediate survey responses collected during the most recent residential 2015 IECC trainings:

- Of the approximately 131 code official attendees, 95, or 72%, filled out immediate survey forms. Of the approximately 59 building professional attendees, 44, or 75%, filled out immediate survey forms. The overall response rate of 73% is similar to that for the trainings held in the early spring of 2017, when 76% of the attendees filled out paper survey forms, and much higher than the 58% response rate from trainings held in the fall of 2016.
- There were 887 unique attendees at the CCSI 2015 IECC trainings between August 10, 2016 and November 21, 2017. Four hundred individuals attended only residential trainings, 333 attended only commercial trainings, and 154 individuals attended both residential and commercial trainings.
- Respondents provided positive feedback on the quality of the trainings. On a 6-to-1 scale, in which 6 is excellent and 1 is poor, mean ratings ranged from 5.5 for the handouts to 5.8 for the presenter’s skills and handling of participant questions. All respondents would recommend the training to others. The latest training quality ratings are slightly higher than the ratings for all 2015 IECC residential trainings to date (Figure 1); however, the differences between current ratings and those for all 2015 IECC trainings to date are small and not likely statistically significant. The quality ratings shown in Figure 1 reflect 139 responses from the most recent 2015 IECC trainings and 458 responses from all 2015 IECC trainings.

**Figure 1: Average Quality Ratings – Recent Trainings and All 2015 IECC Trainings to Date**



- Two-thirds of respondents (67%) said they expect to use the information offered in the training immediately, while an additional 21% said they expected to use it within the next three months. These responses are consistent with those provided from all 2015 IECC residential trainings to date. Moreover, about three out of five building professionals and code officials had worked or expected to work on or inspect a home permitted under 2015 IECC by the end of the first half of 2017.
- Using an ARS provided during the training, all training attendees indicated that an average of just over three-fifths of the permits they drew, or which were drawn in their jurisdictions, were for retrofit projects, and three out of five of these retrofits were energy-related. Building code officials provided similar responses to the rest of trainees overall.
- EBS training attendees found information about different types of insulation to be the most useful information provided in the trainings. Those attending the HVAC-IAQ trainings considered the 2015 IECC code overview, and information provided about ventilation and ductwork, to be the most useful (Figure 2 and Figure 3). The usefulness ratings shown in Figure 2 and Figure 3 reflect 45 and 89 responses from the most recent EBS and HVAC-IAQ trainings, respectively, and 280 and 151 responses from all 2015 IECC EBS and HVAC-IAQ trainings, respectively.

- NMR calculated an overall measure of usefulness by averaging the responses for the various areas examined in each type of training. For the most recent EBS trainings the mean usefulness (on a 6-to-1 scale, in which 6 is extremely useful and 1 is not at all useful) is 5.3, compared to 5.1 for all 2015 IECC EBS trainings. The mean usefulness for the most recent HVAC-IAQ trainings is 5.4, compared to 5.3 for all 2015 IECC HVAC-IAQ trainings. The differences between the two different types of trainings and between current ratings and those for all 2015 IECC trainings to date are small and not likely statistically significant.

**Figure 2: Average Usefulness Rating of EBS Training Components**

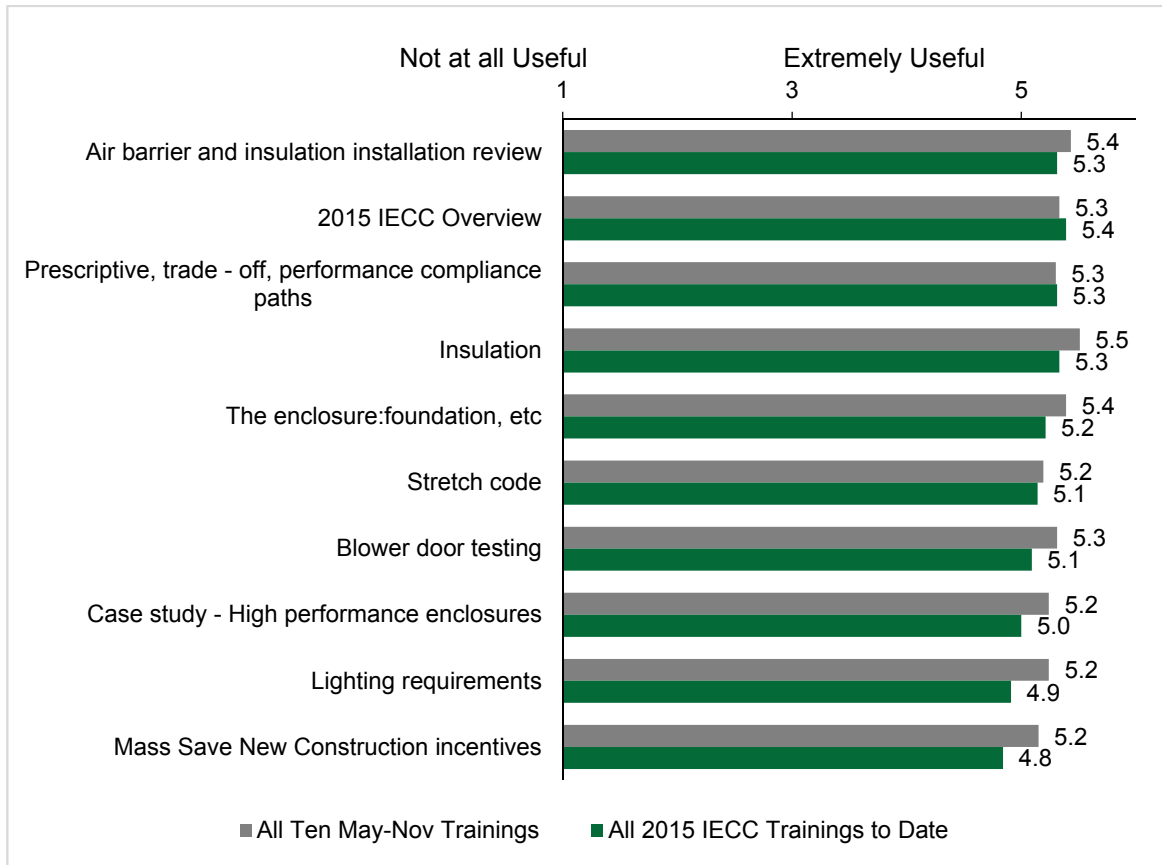
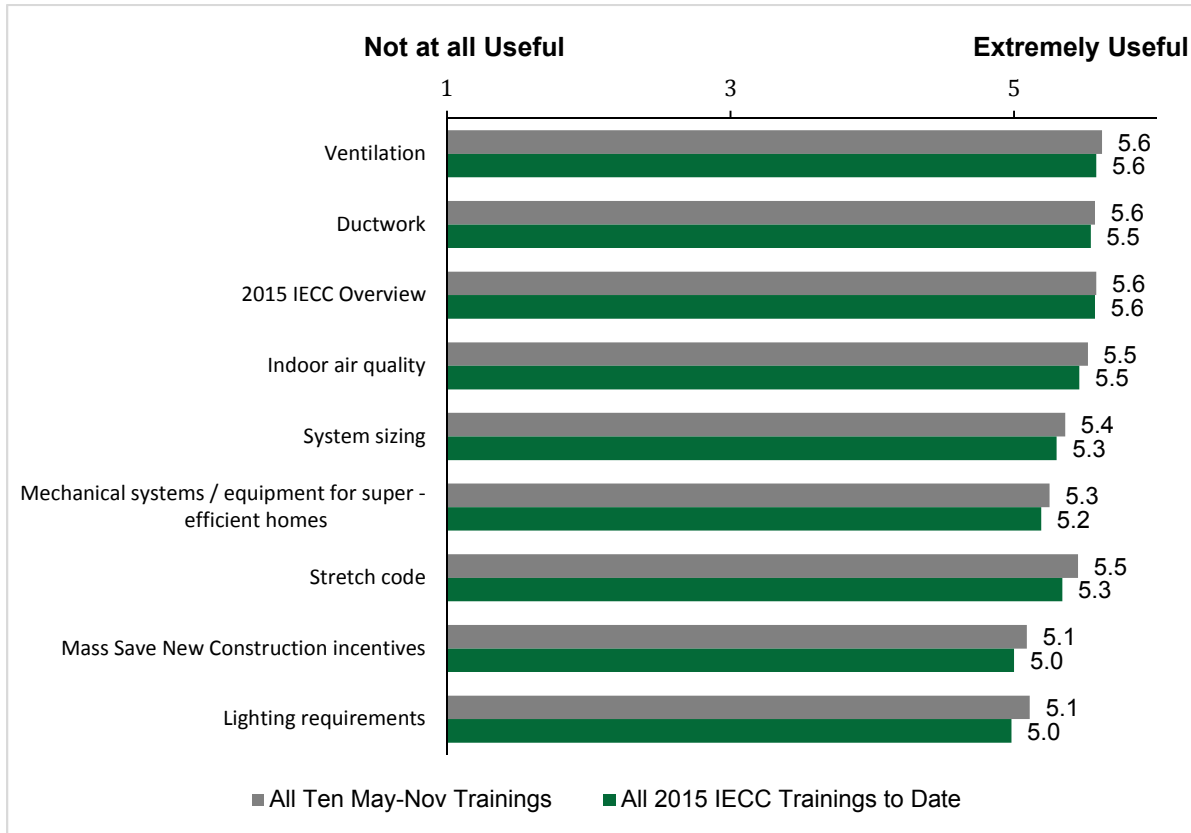


Figure 3: Average Usefulness Rating of HVAC-IAQ Training Components



- Relatively few respondents offered additional comments. Those who did most often wrote that the instructors were excellent and they appreciated the fact that the trainings were provided. As in the past, several respondents noted that other groups, notably contractors, should attend these trainings.

NMR provided summaries of the findings from the immediate residential training surveys to the PAs and EEAC every other month in 2014, three times in 2015, and twice each in 2016 and 2017.<sup>1</sup> These interim deliverables are designed to provide early feedback to PAs, EEAC, and implementers on how well specific aspects of the trainings are being received. A listing of the residential and commercial immediate survey memos previously provided can be found in [Appendix B](#).

<sup>1</sup> The second 2017 summary was provided in January of 2018.

## Appendix A Detailed Findings

### A.1 USEFULNESS AND QUALITY

The surveys asked respondents to rate the usefulness of eight to ten components of the trainings on a 1-to-6 scale, in which 6 is extremely useful and 1 is not at all useful. As shown in [Table 1](#), the overall mean ratings for the most recent EBS training components ranged from 5.2 to 5.5, while mean ratings for HVAC-IAQ training components ranged from 5.1 to 5.6 ([Table 3](#)). The overall usefulness ratings for the most recent 2015 IECC EBS training components were mostly slightly higher than the ratings for all the 2015 IECC EBS trainings studied to date; however, the differences between the two groups are small and not likely statistically significant. The usefulness ratings for the most recent 2015 IECC HVAC-IAQ training components were similar to the ratings for all the 2015 IECC HVAC-IAQ trainings studied to date. The usefulness ratings shown in [Table 1](#) and [Table 3](#) reflect 45 and 89 responses from the most recent EBS and HVAC-IAQ trainings, respectively, and 280 and 151 responses from all 2015 IECC EBS and HVAC-IAQ trainings, respectively.

The survey respondents overwhelmingly rated all the 2015 IECC training components listed as 4, 5, or 6 in terms of usefulness. EBS training attendees found information about different types of insulation to be the most useful provided by the trainings, while those attending the HVAC-IAQ trainings considered the 2015 IECC code overview, and information about ventilation and ductwork, to be the most useful provided.

NMR calculated an overall measure of usefulness by averaging the responses for the various areas examined in each type of training. For the most recent EBS trainings the mean usefulness (on a 6-to-1 scale, in which 6 is extremely useful and 1 is not at all useful) is 5.3, compared to 5.1 for all 2015 IECC EBS trainings. The mean usefulness for the most recent HVAC-IAQ trainings is 5.4, compared to 5.3 for all 2015 IECC HVAC-IAQ trainings. The differences between the two different types of trainings and between current ratings and those for all 2015 IECC trainings to date are small and not likely statistically significant.

The immediate surveys also asked if all or most of the information in the trainings was new to the respondents, some of the information was new, or none of the information was new ([Table 2](#) and [Table 4](#)). Please note this question series was different for the five residential trainings held from September through November 2017 than for the five earlier trainings. Survey forms for the earlier trainings simply asked if the information was new to the respondent, as a yes or no question. For this reason, [Table 2](#) and [Table 4](#) list the responses from the later five trainings; responses from the earlier five trainings are included under the column “all 2015 IECC.” As was the case in the earlier trainings, fewer respondents answered this question than rated training usefulness. All the training components were new, at least in part, to more than one-half of respondents. Respondents to the most recent 2015 IECC trainings were generally more likely to indicate the training information was new or partly new to them than in the past, when they had to simply indicate if it was new.

Table 1: Usefulness Ratings for EBS Training Components

Training Component	Number of Respondents			Rating of Usefulness for May thru Nov. 2017 (percent)							Mean Ratings for May thru Nov. 2017			Mean for All 2015 IECC
	All	Code Off.	Build/ Prof.	6 – Extr. Useful	5	4	3	2	1—Not at all Useful	NA/ DK	All	Code Off.	Build Prof.	
Air barrier and insulation installation review	44	20	24	50%	43%	7%	0%	0%	0%	0%	5.4	5.5	5.4	5.3
2015 IECC overview*	45	21	24	49%	36%	16%	0%	0%	0%	0%	5.3	5.3	5.3	5.4
Prescriptive, trade-off, performance compliance paths	45	21	24	42%	42%	13%	0%	0%	0%	2%	5.3	5.4	5.2	5.3
Insulation	45	21	24	56%	40%	4%	0%	0%	0%	0%	5.5	5.7	5.4	5.3
The enclosure: foundation, etc.	44	20	24	43%	52%	5%	0%	0%	0%	0%	5.4	5.4	5.4	5.2
Stretch code	45	21	24	36%	42%	18%	0%	0%	0%	4%	5.2	5.3	5.1	5.1
Blower door testing	45	21	24	38%	56%	7%	0%	0%	0%	0%	5.3	5.4	5.3	5.1
Case study - High performance enclosures	41	19	22	39%	46%	15%	0%	0%	0%	0%	5.2	5.2	5.3	5.0
Lighting requirements	41	19	22	41%	44%	12%	2%	0%	0%	0%	5.2	5.2	5.3	4.9
Mass Save New Construction incentives	40	19	21	40%	40%	12%	2%	2%	0%	2%	5.2	5.1	5.2	4.8

\*This item was added in March of 2017.

Table 2: Whether the EBS Training Components Were New

Training Component	September through November 2017												All 2015 IECC	
	All				Code Officials				Building Professionals				All	
	<i>n</i>	All or Most	Some	None	<i>n</i> *	All or Most	Some	None	<i>n</i> *	All or Most	Some	None	<i>n</i>	Yes
Mass Save New Construction incentives	22	45%	50%	5%	10	4	5	1	12	6	6	0	151	46%
2015 IECC Overview**	23	30%	52%	17%	10	2	5	3	13	5	7	1	52	65%
Case study - High performance enclosures	20	30%	50%	20%	9	3	6	0	11	3	4	4	145	42%
Lighting requirements	21	29%	38%	33%	10	2	4	4	11	4	4	3	150	37%
Prescriptive, trade-off, performance compliance paths	22	36%	45%	18%	10	3	6	1	12	5	4	3	166	33%
Air barrier and insulation installation	22	32%	45%	23%	10	3	6	1	12	4	4	4	153	26%
Stretch code	22	32%	45%	23%	10	3	4	3	12	4	6	2	164	27%
Blower door testing	22	23%	36%	41%	10	2	4	4	12	3	4	5	160	24%
The enclosure: foundation, etc.	22	23%	45%	32%	10	3	4	3	12	2	6	4	157	22%
Insulation	22	27%	41%	32%	10	2	5	3	12	4	4	4	163	20%

\*The number of responses is shown where sample size is less than 20.

\*\*This item was added in March of 2017.



**Table 3: Usefulness Ratings for HVAC-IAQ Training Components**

Training Component	Number of Respondents*			Rating of Usefulness for May thru Nov. 2017 (percent)							Mean Ratings for May thru Nov. 2017			Mean for All 2015 IECC
	All	Code Off.	Build/Prof.	6 – Extr. Useful	5	4	3	2	1 – Not at all Useful	NA/DK	All	Code Off.	Build/Prof.	
Ventilation	89	20	69	67%	27%	6%	0%	0%	0%	0%	5.6	5.8	5.6	5.6
Ductwork	89	20	69	64%	30%	4%	1%	0%	0%	0%	5.6	5.7	5.5	5.5
2015 IECC Overview	89	20	69	64%	31%	3%	1%	0%	0%	0%	5.6	5.7	5.6	5.6
Indoor air quality	89	20	69	57%	38%	3%	1%	0%	0%	0%	5.5	5.7	5.5	5.5
System sizing	87	20	67	49%	38%	9%	2%	0%	0%	1%	5.4	5.5	5.3	5.3
Mechanical systems/equipment for super-efficient homes	87	20	67	49%	36%	8%	5%	2%	0%	0%	5.3	5.2	5.3	5.2
Stretch code	88	19	69	57%	34%	7%	2%	0%	0%	0%	5.5	5.7	5.4	5.3
Mass Save New Construction incentives	83	20	63	48%	27%	16%	5%	0%	4%	1%	5.1	5.3	5.0	5.0
Lighting requirements	83	19	64	43%	29%	18%	5%	0%	1%	4%	5.1	5.3	5.1	5.0

\*The number of responses is shown where sample size is less than 20.

**Table 4: Whether the HVAC-IAQ Training Components Were New**

Training Component	September through November 2017												All 2015 IECC	
	All				Code Officials				Building Professionals				All	
	<i>n</i>	All or Most	Some	None	<i>n</i>	All or Most	Some	None	<i>n</i> *	All or Most	Some	None	<i>n</i>	Yes
Mechanical systems/equipment for super-efficient homes	53	25%	30%	45%	43	28%	28%	44%	10	1	4	5	76	53%
2015 IECC Overview	53	25%	32%	43%	43	28%	28%	44%	10	1	5	4	81	65%
Indoor air quality	52	27%	33%	40%	42	29%	29%	43%	10	2	5	3	80	45%
System sizing	51	24%	31%	45%	41	27%	29%	44%	10	1	4	5	80	48%
Ventilation	50	28%	34%	38%	41	32%	29%	39%	9	1	5	3	78	44%
Ductwork	52	23%	31%	46%	42	26%	29%	45%	10	1	4	5	77	44%
Lighting requirements	53	34%	36%	30%	43	35%	30%	35%	10	3	6	1	73	48%
Stretch code	47	30%	30%	40%	38	32%	21%	47%	9	2	6	1	79	47%
Mass Save New Construction incentives	50	22%	42%	36%	40	25%	35%	40%	10	1	7	2	76	57%

\*The number of responses is shown where sample size is less than 20.

Respondents also gave high ratings to the quality of the presentations (Table 5), with mean ratings ranging from 5.3 to 5.9 on a 6-to-1 scale, in which 6 is excellent and 1 is poor. The highest ratings went to the presenter’s skills and handling of participant questions. All respondents said they would recommend the training to others. The latest training quality ratings were slightly higher than the ratings for all 2015 IECC residential trainings studied to date.

**Table 5: Quality of Trainings**  
(Mean ratings on a 6 to 1 scale)

General Category	5/31 HVAC- IAQ	6/1 HVAC- IAQ	6/15 EBS	6/21 HVAC- IAQ	6/26 HVAC- IAQ	9/19 HVAC- IAQ
<i>n</i>	8	7	12	12	21	14
Presenter's skills	5.9	5.8	5.8	5.9	5.7	5.8
Quality of slide information	5.6	5.8	5.5	5.8	5.5	5.5
Quality of handout information	5.6	5.8	5.5	5.7	5.4	5.3
Handling of participant questions	5.9	5.8	5.8	5.8	5.8	5.8
<i>n</i> *	7	7	12	12	21	14
Percent recommending training to others	100%	100%	100%	100%	100%	100%
General Category	9/27 HVAC- IAQ	10/16 EBS	10/17 EBS	11/21 HVAC- IAQ	All Ten May- Nov Trainings	All 2015 IECC Trainings
<i>n</i>	14	17	17	17	139	458
Presenter's skills	5.9	5.8	5.5	5.8	5.8	5.7
Quality of slide information	5.8	5.6	5.4	5.7	5.6	5.5
Quality of handout information	5.6	5.4	5.4	5.7	5.5	5.4
Handling of participant questions	5.9	5.7	5.5	5.7	5.8	5.7
<i>n</i> *	13	14	17	17	134	436
Percent recommending training to others	100%	100%	100%	100%	100%	98%

\*Different numbers of respondents replied to this separate question than provided ratings above.

The training attendees also provided feedback on the training quality through an ARS used during the presentations. The ARS asked trainees to indicate how much they agreed with certain statements on a scale of 1 (strongly agree) to 6 (strongly disagree). Please note that ARS data was not collected for the HVAC-IAQ trainings held on 6/1/17, 6/21/17, and 6/26/17. As shown in Table 6, most trainees strongly agreed that the trainer was organized, prepared, knowledgeable, and informative, encouraged participation and kept an appropriate pace. More than nine out of ten respondents strongly agreed or agreed that they would recommend the training to others. While the ARS statements are not directly comparable to the paper survey questions in Table 5, the responses confirm that, in general, the respondents rated the quality of the trainings highly. The mean ratings for May through November 2017 are about the same as the ratings for all the previous trainings that had used an ARS.

**Table 6: ARS Ratings of Training Quality**

Statement	n	Agreement with Statement (Percent)						Mean	
		1 – Strongly Agree	2	3	4	5	6 – Strongly Disagree	May thru Nov.	2015 IECC Train to Date
The trainer was organized and prepared	107	74%	15%	2%	2%	3%	4%	1.6	1.7
The trainer was knowledgeable and informative	51	61%	33%	6%	0%	0%	0%	1.5	1.5
The trainer encouraged participation	54	72%	17%	2%	0%	4%	5%	1.6	1.5
The trainer kept an appropriate pace	58	76%	14%	2%	0%	3%	5%	1.6	1.7
I would recommend this training	54	59%	35%	6%	0%	0%	0%	1.5	1.6

**A.2 USE OF TRAINING**

Since the trainings reviewed took place less than a year after the 2015 IECC code became mandatory, the immediate surveys asked building code official respondents to estimate how many residential units they expected to be permitted in their jurisdictions under the 2015 IECC code, and how many final inspections of such units they expected to conduct in the year 2017. The immediate surveys asked building professionals how many housing units permitted under the 2015 IECC code they expected to work on in 2017, and how many of those units they expected would be completed in 2017. The respondents also indicated when they had conducted or first expected to conduct a final inspection of a home permitted under 2015 IECC (code officials), or work on one (building professionals).

Three-quarters (76%) of code officials expect to have more than ten housing units permitted in their jurisdictions under 2015 IECC in 2017, compared to less than two-fifths (37%) of building professionals (Table 7).

**Table 7: Housing Units Expected Under 2015 IECC for May through Nov. 2017 Trainees**

Number of Housing Units	Expected units permitted in 2017		Expected units completed in 2017	
	Code officials	Building professionals	Code officials	Building professionals
<i>n</i>	69	22	65	17
Less than five	3%	41%	5%	53%
Five to ten	22%	23%	28%	29%
Eleven to 100	54%	32%	46%	12%
More than 100	22%	5%	22%	6%

The immediate surveys also asked when the respondents had first inspected, or expected to inspect or work on, a home permitted under 2015 IECC. As shown in Table 8, three out five of building professionals (62%) and code officials (57%) had worked on or inspected a home permitted under 2015 IECC, or expected to do so, by the end of the first half of 2017.

**Table 8: When First Expect to Inspect or Work on a Home Permitted under 2015 IECC**

Estimated Time Period	Code officials	Building professionals
<i>n</i>	95	44
Before January 2017	10%	31%
January through March 2017	20%	14%
April through June 2017	27%	17%
July through September 2017	21%	24%
October through December 2017	15%	10%
Other	5%	3%

The surveys also included a simpler timing question – namely, when the respondents first expected to use something learned at the training. As shown in Table 9, more than two-thirds of respondents (69%) said they expected to use the training immediately, with an additional 21% saying they expected to use it within the next six months. These responses are fairly consistent with those provided to date, indicating that the trainings are providing trainees with useful information that has immediate applications.

**Table 9: Expected First Use Training Information**

Expected First Use of Training Information	May through Nov. 2017 Trainings			All 2015 IECC Trainings		
	Code Officials	Building professionals	Total	Code Officials	Building professionals	Total
<i>n</i>	92	43	135	278	156	434
As soon as I return to work	71%	58%	67%	64%	57%	62%
Sometime in the next three months	24%	14%	21%	25%	24%	25%
In the next four to six months	3%	19%	8%	9%	14%	11%
In the next seven to twelve months	1%	5%	2%	1%	3%	2%
More than a year from now	1%	5%	2%	0%	2%	1%
Not likely to ever use it	0%	0%	0%	0%	0%	0%

### A.3 MOST IMPORTANT INFORMATION AND OTHER QUALITATIVE DATA

Respondents who attended the EBS trainings found the 2015 IECC code changes and the information on the solar requirements to be the most important new information provided by the trainings, while those attending the HVAC-IAQ trainings considered the 2015 IECC code changes and ventilation systems and testing requirements to be the most important new information provided (Table 10).

**Table 10: Most Important New Information Provided by the Trainings**  
(Percent; multiple response)

General Category	EBS	HVAC- IAQ	Both Types of Trainings
<i>n</i>	24	50	74
2015 IECC code changes	33%	24%	27%
Ventilation systems and testing requirements	4%	30%	22%
Everything - general overview	25%	4%	11%
Solar requirement	17%	6%	9%
Duct Sealing	0%	10%	7%
MA amendments to code	12%	4%	7%
Equipment sizing	0%	8%	5%
Stretch code	4%	4%	4%
Air barrier and insulation	4%	0%	1%
ASHRAE 62.2 2013	0%	2%	1%
BBRS checklist	0%	2%	1%
Heating	0%	2%	1%
Hot water recovery	0%	2%	1%
Lighting	0%	2%	1%

Building code officials mostly said they would use this information during their plan review and building inspections and relay it to builders and contractors. Building professionals mostly said they would use this information during the construction process and design phase to make projects code compliant ([Table 11](#)).

**Table 11: How Information Provided by the Trainings Will Be Used**  
(Percent; multiple response)

General Category	Code officials	Building professionals	Total
<i>n*</i>	40	26	66
During construction process	0%	62%	24%
Plan review	30%	0%	18%
Building inspections	28%	0%	17%
General knowledge for code enforcement	25%	0%	15%
Relay to builders and contractors	22%	0%	14%
Designing new projects	0%	31%	12%
Advise architects	5%	0%	13%
Advise clients	0%	8%	3%
Building tighter homes	0%	8%	3%
Prepare for insulation inspections	0%	4%	2%
Prepare for ductwork inspections	0%	4%	2%

Just 21 responding attendees who provided additional comments and suggestions for improving the trainings. They most often said the instructors were excellent and they appreciated the fact that the trainings were provided. Several respondents suggested that other groups, notably contractors, should attend these trainings (Table 12).

**Table 12: Additional Comments and Suggestions to Improve Trainings**  
(Percent; multiple response)

General Category	EBS	HVAC-IAQ	Total
<i>n*</i>	8	13	21
Excellent instructor	3	3	29%
Appreciated the training	1	3	19%
Other groups should be encouraged to attend	1	3	19%
Please add more trainings	0	2	10%
Please provide full size printouts of the slides	1	1	10%
Does not address prescriptive mandatory requirements in additions and remodeling	0	1	5%
For some of the slides it was not obvious what was being illustrated	1	0	5%
More on vapor retarders and unvented roofs	1	0	5%

\*The number of responses is shown where sample size is less than 20.

#### A.4 TRAINING ATTENDEE DATA

Close to two-thirds of attendees who completed detailed registration forms work as building code officials. Table 13 presents more detailed self-descriptions of the trainees' positions.



**Table 13: Training Attendees**  
(Percent)

Position	May thru Nov. 2017 Trainings on the 2015 IECC			All 2015 IECC Trainings to Date
	EBS	HVAC-IAQ	Total	
<i>n</i> *	44	89	133	695
Building code official	48%	73%	65%	61%
Architect or Design Engineer	11%	11%	11%	5%
Builder (Oversees the entire construction of a home or building)	18%	6%	10%	10%
Building contractor	18%	6%	10%	10%
HERS Rater or energy efficiency consultant	2%	2%	2%	6%
Other	0%	2%	2%	7%
Equipment Supplier	2%	0%	1%	1%

As in the earlier trainings, most building code officials, builders, and architects participating in the ten trainings examined here have been in their present positions for at least ten years (Table 14). However, most energy efficiency consultants or HERS raters at the most recent trainings are comparatively new to the industry, having been at their present positions for ten years or less.

**Table 14: Years in Present Position for May through Nov. 2017 Trainees**  
(Number of responses)

Position	<i>n</i>	Less than 1 year	1 to 5 years	6 to 10 years	11 to 15 years	16 to 20 years	More than 20 years
Architect or Design Engineer	13	1	1	1	2	2	6
Builder (Oversees the entire construction of a home or building)	13	0	1	1	2	1	8
Building code official	67	5	17	5	13	11	16
Building contractor	12	0	0	3	0	4	5
Equipment Supplier	1	0	0	0	0	1	0
HERS Rater or energy efficiency consultant	3	0	1	1	0	0	1
Other*	2	0	0	1	0	1	0

\*Indicated 'other' on registration form.

Residential trainings held from December 2014 through November of 2017 used ARS to develop estimates of the proportion of all building permits that are drawn for retrofit projects, and for the retrofit projects, the proportion of building permits that are energy-related. As

shown in Table 15, the respondents indicated that an average of just over three-fifths of the permits they drew, or that were drawn in their jurisdictions, were for retrofit projects, and three out of five retrofits were energy-related. Note that the questions asked for the portion of energy related retrofit permits as a percent of a percent. So, for all attendees, 37% of all permits would be for energy-related retrofits (0.62 times 0.60). Building code officials provided similar responses to all trainees.

**Table 15: Proportion of Retrofit Building Permits**  
(Percent)

Percentage of all building permits issued	All trainees		Building code officials only	
	Retrofit portion	Portion of energy-related retrofit permits	Retrofit portion	Portion of energy-related retrofit permits
<i>n</i>	845	917	596	414
None	3%	3%	1%	2%
20%	12%	15%	8%	16%
40%	14%	18%	25%	23%
60%	24%	21%	20%	27%
80%	38%	26%	34%	25%
100%	9%	17%	12%	7%
Mean	62%	60%	63%	55%

Survey respondents who attended these ten trainings work in cities and towns across Massachusetts.<sup>2</sup> Cape Cod and western Massachusetts locations were frequently listed due to where these trainings took place (Table 16). Of the 126 locations listed in Table 16, 85 use the stretch code and 41 use the code based on the 2015 IECC. Of the 124 respondents who indicated specific locations on their survey forms, 95 worked in at least one stretch code location.

<sup>2</sup> Attendees could list up to three municipalities on the survey forms.

**Table 16: Cities and Towns Represented in the May through November 2017 Trainings**

(Number of responses; multiple response; \* indicates stretch code location)

City or Town	Code Officials	Building Prof.	Total	City or Town	Code Officials	Building prof.	Total
Acton*	2		2	Lunenburg*	1	1	2
Acushnet*	1		1	Lynnfield		1	1
Adams*	1	1	2	Marblehead	1		1
Alford	1		1	Marlborough*	2	1	3
Amherst*	2	3	5	Medfield*	1	1	2
Andover*		1	1	Medford*		1	1
Arlington*		1	1	Medway*	2	0	2
Ashburnham*	1		1	Mendon*		1	1
Ashland*	1		1	Middlefield*	1		1
Athol*		2	2	Middleton		1	1
Ayer*	1	1	2	Milford		1	1
Beckett*	1		1	Monterey	1		1
Belchertown*		3	3	Natick*		1	1
Belmont*	1		1	Needham		1	1
Blackstone*	1		1	New Bedford*	3		3
Bolton*		1	1	New Marlborough	1		1
Boston*	1	2	3	Newburyport*	1		1

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City or Town	Code Officials	Building Prof.	Total	City or Town	Code Officials	Building prof.	Total
Boxford		1	1	Newton*		2	2
Braintree	3		3	North Andover*		2	2
Brewster	1	3	4	Northampton*	2	2	4
Brimfield*	1		1	Northbridge*	1		1
Brookline*	1		1	Northborough*	2		2
Cambridge*	1	1	2	Norwood		1	1
Chatham		4	4	Orleans	3	7	10
Chelmsford*		1	1	Pelham*	1		1
Chester*	1		1	Pepperell*		1	1
Chicopee*	1		1	Phillipston	2		2
Clinton		2	2	Pittsfield*		2	2
Dalton*	1	1	2	Princeton	3		3
Dedham*		1	1	Provincetown*	2		2
Dennis		2	2	Sheffield	1		1
Dover*		1	1	Shirley*	1		1
Dracut		1	1	Shrewsbury*	4		4
Dudley*	1		1	Somerville*	1	1	2
Dunstable		2	2	South Hadley*	2		2

IMMEDIATE CCSI RESIDENTIAL TRAINING SURVEY ANALYSIS

City or Town	Code Officials	Building Prof.	Total	City or Town	Code Officials	Building prof.	Total
Eastham	2	5	7	Southbridge*	1		1
Fitchburg*	1	2	3	Southborough*		1	1
Framingham*	1	1	2	Sterling	1	2	3
Gardner*		1	1	Stow*	1	1	2
Grafton*		1	1	Sturbridge	1		1
Granby*	1	1	2	Topsfield*		1	1
Great Barrington*		1	1	Townsend*		3	3
Greenfield	1	1	2	Truro*		1	1
Groton		1	1	Tyngsboro*	1		1
Groveland		1	1	Upton*		1	1
Hadley	1	2	3	Uxbridge		1	1
Hampden	1		1	Waltham*	1	1	2
Harwich	1	1	2	Ware*		2	2
Hatfield*	1		1	Watertown*	1		1
Holden	1		1	Wellfleet*		3	3
Hopedale	1		1	West Boylston	5		5
Hopkinton*	1	1	2	Westborough	2	2	4
Hudson		2	2	Weston*	1		1

## IMMEDIATE CCSI RESIDENTIAL TRAINING SURVEY ANALYSIS

City or Town	Code Officials	Building Prof.	Total	City or Town	Code Officials	Building prof.	Total
Lancaster*		2	2	Westport	1		1
Lawrence	1		1	Westwood*		1	1
Lee	1		1	Williamsburg*	2	1	3
Leeds	1		1	Williamstown*		2	2
Lenox*		1	1	Winchester*		3	3
Leominster*	1	1	2	Woburn*	1		1
Lexington*		1	1	Worcester*	2	1	3
Lowell*	1	2	3	Worthington	1		1

**A.5 UNIQUE ATTENDEES – ALL TRAININGS**

The team calculated the number of unique trainees for all 2015 IECC trainings from August 10, 2016 through November 21, 2017 by using trainee enrollment data and completed immediate surveys. As shown in Table 17, 400 individuals have attended only residential trainings, 333 have attended only commercial trainings, and 154 individuals have attended both residential and commercial trainings. Over one-half of unique attendees have been code officials; the trainings have also had sizable numbers of architects in attendance. As would be expected, builders, described as those overseeing the entire construction of a home or building, and building contractors responsible for specific aspects of construction, have been much more likely to attend residential trainings. Trainees listed as “other” most often described themselves as engineers, facilities managers, or consultants to the PAs. This table will be updated for each memo, residential and commercial, provided on the immediate training surveys.

**Table 17: Numbers of Unique Training Attendees – 8/10/16 to 11/21/17**  
(Number of attendees)

Position	2015 IECC Residential Training Only	2015 IECC Commercial Training Only	2015 IECC Both Res. and Com. Training	Total Unique Training Attendees
Architect or design engineer	53	81	9	<b>143</b>
Builder (Oversees the entire construction of a home or building)	52	24	5	<b>81</b>
Building code official	189	154	130	<b>473</b>
Building contractor	32	13	2	<b>47</b>
Equipment supplier	4	2	0	<b>6</b>
HERS rater or energy efficiency consultant	30	14	1	<b>45</b>
Other	36	44	7	<b>87</b>
Position not known*	4	1	0	<b>5</b>
<b>Total unique training attendees</b>	<b>400</b>	<b>333</b>	<b>154</b>	<b>887</b>

\*Includes individuals who did not indicate their position on the registration form and a small number of individuals who attended the trainings (and filled out the immediate paper surveys), but did not register.

## Appendix B

**Table 18: Listing of Immediate Survey Memos Delivered**

Date	Residential Immediate Surveys	Commercial Immediate Surveys
2012 IECC Trainings		
10/31/14	X	
12/29/14		X
3/13/15	X	
4/30/15		X
7/10/15	X	
7/31/15		X
12/23/15	X	
12/30/15		X
9/26/16	X	
12/5/16		X
2015 IECC Trainings		
12/21/16 (final on 1/9/17)	X	
12/30/16 (final on 1/24/17)		X
5/30/17 (final on 6/13/17)	X	
6/14/17 (final on 6/28/17)		X
1/26/18 (final on 3/6/18)	X	
2/5/18		X