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REPORT #E16-336

Building Operator Certificate Program Dataset Analysis

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Memorandum

To: Amy Webb, Project Manager, MR&E, NEEA

From: Ryan Bliss, Managing Director, Research Into Action

Date: February 16, 2016, revised March 30, 2016

Re: 2015 BOC Program Dataset Analysis

This memo documents Research Into Action’s analysis of the Northwest Energy Efficiency Council (NEEC) Building Operator Certification (BOC) program dataset as of 2015. The primary goal of this analysis was to describe the 2015 new BOC certificants and update the count of active BOC certificants in the four Pacific Northwest (“Northwest”) states as of January 20, 2016. Certificants classified as active are *all individuals who have received or renewed the BOC credential since 2010*. These are individuals for whom NEEA counts energy savings for 2015.

The certificants counted in this memo include those in target groups of NEEA’s BOC Expansion (BOC-E) Initiative, established in 2012 to accelerate adoption of BOC and increase its market penetration in the Northwest. Those groups are: operators in underserved areas¹, Federal employees, and members of the International Union of Operating Engineers (IUOE). Although BOC-E targets the above specific groups, the NEEA’s support for BOC is not limited to those groups.

Methods

This section describes how Research Into Action developed a BOC dataset to track year-by-year data on BOC certificants, how we update that dataset annually with data from NEEC, and how we calculate annual counts of certificants from the data in the updated dataset.

Development of the NEEA BOC Dataset

From 2012 through 2015, Research Into Action used data from NEEC and the Intermountain Building Operators Association (IBOA) to develop a dataset of 2,563 individuals employed in the Northwest that had received BOC certification from 1996 through 2014. That dataset resides on the NEEAnet Sharepoint site – this memo refers to it as “the NEEA BOC Dataset.”

Each record in the NEEA BOC Dataset includes the same fields that are in the NEEC database, which contain information about the certificant and his/her employer as well as the years of certification and expiration of BOC Level 1 and Level 2 certifications. As maintaining certification requires annual renewal, the year of “expiration of certification” is the year

¹ “Underserved markets or communities” are defined as markets that BOC serves on an infrequent basis (i.e. once every three to seven years), and generally only with the active engagement of a utility sponsor or larger employer.

following the last year of renewal or the year of certification if the certificant did not renew certification.² In addition, the NEEA BOC Dataset includes fields and worksheets that Research Into Action created to provide year-by-year counts of active BOC certificants as well as to generate additional analyses of interest to NEEA.

Updating the NEEA BOC Dataset

NEEC continues to maintain a separate database of BOC certificants in the Northwest.³ NEEC annually updates the certification status, contact information, and employment information of BOC certificants in its database. If a BOC certificant retires from work or is deceased, NEEC indicates that information in the database fields that track employment data. Each year, NEEC provides Research Into Action with a data file containing records of new BOC certificants for the four NEEA states as well as records of continuing certificants with updated data. Research Into Action uses that data file each year to update the NEEA BOC Dataset.

On January 20th 2016, NEEC provided Research Into Action with a data file containing 2,810 records of individuals certified and employed in the Northwest. Research into Action reviewed the 2015 NEEC BOC data file to identify:

- › New certificants (i.e., individuals not already identified in the NEEA BOC Dataset) who received their certification in 2015 or 2016.
- › Any previous certificants (i.e., individuals already existing in the NEEA BOC Dataset) with new or updated certification or expiration years.
- › Any test records.
- › Any records with missing certification or expiration years or other irregularities.

During the initial data review, Research Into Action staff identified 35 instances in which the information in the NEEA BOC Dataset was inconsistent with that in the 2015 NEEC data file. Research Into Action staff worked with NEEC staff to resolve those discrepancies so that the NEEA BOC Dataset and NEEC database contained the same information for all 35 cases.

Research Into Action staff also determined that the 2015 NEEC data file did not include records for eight individuals who were in the NEEA BOC Dataset. Working with NEEC, Research Into Action determined that NEEC had excluded five of those individuals from its annual update data file for NEEA because they do not work in the Northwest. Research Into Action retained those five records in the NEEA BOC Dataset and recorded them as being employed outside of the

² Certificants that do not renew certification in a given year may renew in a later year if they complete all the continuing education requirements for the missed years. BOC considers those individuals to have maintained certification continuously. However, if in a given year a certificant did not renew in the previous year, BOC considers the certification to have expired in the previous year.

³ Prior to 2014, NEEC maintained a database of Washington and Oregon BOC certificants, while IBOA maintained a separate database of Idaho and Montana BOC Certificants. In 2014, NEEC integrated the IBOA certificant data into its database and since then has maintained a database of certificants in all four states.

Northwest as of 2015.⁴ The other three cases were individuals for whom NEEC staff accidentally overwrote the database records; NEEC staff reconstructed their database records using the data that Research Into Action provided.

In addition, Research Into Action identified ten pairs of records in the 2015 NEEC data file with the same first and last names. Those record pairs did not provide sufficient other identifying information (employer information, home address and phone number) to clearly establish whether each pair represented a single individual or separate individuals. Research Into Action notified NEEC staff, who reviewed the records and initially identified one of the ten pairs as possibly a single individual but suggested that the other pairs represented separate individuals. Research Into Action staff received permission from NEEC to follow up with the individuals via email and/or phone to attempt to determine the actual number of individuals. Based on our efforts, we determined that one pair of records represented two individuals and two other pairs represented separate individuals; we were not able to contact the remaining individuals. For those remaining record pairs, we followed NEEC's initial suggestion that each pair represented separate individuals. Thus we retained all remaining records, ensuring that the information retained in the NEEA BOC Dataset for each record was the same as the information for that record in the NEEC data file.

Finally, Research Into Action identified one pair of records, existing in both the NEEA BOC Dataset and in the NEEC data file, in which the first and last names were switched: the first name recorded for the one record was the last name for the other record, and vice versa. Both records showed the same Level 1 certification date, but had no other overlapping information. One record indicated that the certificant was deceased and provided no employer, work phone number, or email address. The other record indicated an employer name, work phone number, and email address. Two things led Research Into Action staff to believe that the two records likely represented a single individual. First, the first and last name were not unusual in one order but they were quite unusual in the opposite order. Second, the record with the unusual name order was the one with the email address, which followed an addressing convention that was more consistent with the other record. Research Into Action staff contacted the employer listed for that record, who confirmed that the first and last names were switched for that individual, who was deceased. Therefore, we concluded that the two records represented a single individual. We retained a single record, which included all of the information available from both records, and we notified NEEC of our finding.

The data review activities described above resulted in the deduplication of two pairs of records, meaning that the NEEC data file had records for 2,808 separate individuals certified and employed in the Northwest. Of those, Research Into Action identified 243 records of certificants that were not already in the NEEA BOC Dataset (11 of whom were certified prior to 2015) and 589 records with updated Level 1 or Level 2 certification or expiration data. Research Into Action added the new certificants to the NEEA BOC Dataset and updated the Level 1 or Level 2 certification or expiration data for the other records. For 1,976 records, the 2015 NEEC data was

⁴ In two cases, the NEEC BOC Dataset showed that the individuals had worked in the NW at the time of certification; in the other three cases, the NEEC BOC Dataset showed no previous work state data.

identical to that already in the NEEA BOC Dataset so there was no need for Research Into Action to update those records. Table 1 summarizes the type of updates made.

Table 1: Summary of Disposition of 2015 NEEC Data File

TYPE OF RECORD	COUNT
<i>Number of records received from NEEC, of individuals certified and employed in the Northwest</i>	2,810
Number of duplicate pairs identified	2
Number of records of separate individuals	2,808
New records added to the NEEA BOC Dataset	243
Certified 2016 ¹	13
Certified 2015	219
Certified before 2015	11
Records matching existing records in NEEA BOC Dataset	2,565
Updated information	589
Received new Level 1 certification (not previously certified) ²	9
Recertified Level 1 (after original certification had expired)	3
Renewals	578
Renewed Level 1 only	359
Renewed both Level 1 and Level 2	134
Renewed Level 1 and received Level 2	31
Renewed Level 2 only	31
Received new Level 2 and previously had Level 1 ⁴	22
No updated information³	1,976

1 These 13 individuals are not included in counts of 2015 active certificants (see “2015 Count of Active Certificants”).

2 These 9 individuals are included in counts of 2015 active certificants (see “2015 Count of Active Certificants”).

3 Includes 13 records in NEEA BOC Dataset with work state outside of the Northwest.

4 This case counts as a renewal because receiving a new Level 2 certification renews an existing Level 1 certification.

Note that the NEEC update file included 219 new records with 2015 certifications and identified 2015 certifications for nine individuals that the NEEA BOC Dataset previously included without certification dates, for a total of 228 2015 certifications. Note also that the NEEC update file showed that three individuals recertified after their original certification had expired. In one case, the original certification had been expired for less than five years, and so NEEA had continued to count savings for that individual; the new certification enables NEEA to continue counting savings without interruption. In the other two cases, the original certification had been expired for more than five years and so there was a period during which NEEA could not count savings. To maintain accurate year-by-year counts of savings, we created a new record for each of those

certificants, with the new certification and expiration dates, while maintaining the old records with the previous certification and expiration dates.⁵

Updating Certificant Counts in the NEEA BOC Dataset

To update the count of active BOC certificants from 2014, we calculated: 1) the number of new BOC certificants – those certified for the first time in 2015⁶; 2) the number of prior certificants for whom, starting in 2015, NEEA no longer counts savings (“savings-retired certificants”) – those whose certification had been expired more than five years (the assumed measure life of the certification)⁷; 3) the number of certificants who left the workforce (moved out of the Northwest, retired from work, or died before their savings retired); and 4) the number of certificants who were unemployed in 2015.⁸ Additional details are in *2015 Count of Active Certificants*, below.

NEEA does not calculate savings separately for Level 1 and Level 2 certification. Rather, it calculates savings from the earliest year of either certification to the year before savings retire. For individuals with both BOC Level 1 and Level 2 certification and different certification or expiration years for the two levels ($n = 510$), we assigned a single “first year certified” as the earlier year in which the individual received either certification; and we assigned a single “last year certified” as the last year in which that individual was certified at either level – the year before the later of the two expiration years. For example, if a certificant has a Level 2 certification expiration year later than their Level 1 certification, the later year will override the earlier year. Table 2 provides an example to illustrate this.

Table 2: Example Computation of First Year Certified and Last Year Certified

YEAR	LEVEL 1	LEVEL 2	CERTIFICATION STATUS
2002	Received Certification		Certified (Level 1)
2003	Renewed Certification	Received Certification	Certified (Level 1 and 2)
2004	Did Not Renew Certification	Renewed Certification	Certified (Level 1 and 2)
2005	Certification Expired	Renewed Certification	Certified (Level 2)
2006		Did not Renew Certification	Certified (Level 2 – Last Year Certified)
2007		Certification Expired	Not Certified

⁵ We have documented the protocol in our *Guideline for Updating BOC Data File Memo*.

⁶ These included individuals that already had records in the NEEA BOC Dataset but had not received certification as well as new records from NEEC.

⁷ NEEA established this assumption in 2005 (source: RLW Analytics, Inc (2005). Impact and Process Evaluation Building Operator Training and Certification Program. Accessed 3/26/2012 at http://www.theboc.info/pdf/Eval-BOC_NEEP_2005.pdf). Subsequent research has supported the assumption: Navigant Consulting (2011). Long-Term Monitoring and Tracking Report on 2010 Activities. Accessed 11/29/2011 at http://intranet.neea.org/Teams/Market-Planning/TeamWiki/Documents/NEEA_LTMT_Report_2010-11_Revised_2011-06-13%20v02_Confidential.docx, and Research Into action (2013). Final Report: BOC-Expansion Initiative Market Progress Evaluation Report

⁸ NEEC does not track the specific date when a certificant becomes unemployed or regains employment. If the NEEC update file shows someone is unemployed, we make the conservative assumption that they were unemployed the entire year. Any other assumption would complicate the calculation of savings. If a subsequent update shows the individual is employed, we will assume that the individual was employed the entire year.

BOC Expansion Attributes

The 2015 NEEA BOC Dataset includes information relevant to the BOC expansion (BOC-E) efforts. It identifies individuals who attended any of three types of classes introduced through the Initiative: *Large Employer*, or classes formed through the Initiative’s outreach to large employers; *Underserved*, or classes held in previously underserved areas; and *Online*, or classes that incorporate online modules. The dataset also identifies individuals who are members of any of four groups that the Initiative has targeted: certificants that received training from the International Union of Operating Engineers (IUOE); returning veterans who served in Afghanistan or Iraq (2001 to 2012); federal employees; and the unemployed. For the purpose of brevity, this memo refers to having received training in the three BOC-E classes and membership in the four targeted groups as BOC-E “attributes.”

As of 2015, a total of 600 individuals have one or more of the above attributes. Of those individuals, 551 received BOC certification for the first time from 2012 through 2015 (“new certificants”) and 49 had received BOC certification prior to 2012 (typically Level 1) but received an additional certification through BOC-E (typically Level 2) from 2012 through 2015 (“continuing certificants”).⁹ Table 3 shows counts for various attributes of BOC-E certificants.¹⁰

When NEEA launched the BOC-E initiative, it targeted unemployed trainees as well as veterans who served from 2001 to 2012 (the Afghanistan and Iraq era); it also tracked veterans who served prior to 2001. As of year of this report, BOC-E does not target the unemployed, but continues to track them in the BOC database (Table 4).

2015 Count of Active Certificants

The NEEC update file identified 219 new records with 2015 certifications and showed 2015 certifications for nine individuals that were already in the NEEA BOC Dataset without certification dates. Thus, a total of 228 individuals received certification for the first time in 2015 (192 through BOC-E). The updated data also showed 115 certificants whose savings retired that year. In all, our counts show that BOC has certified 2,793 individuals working in the Northwest from 1996 to 2015 – but we count three of these individuals twice each because they recertified after their certification had been expired more than five years. Thus, we count 2,796 new certifications¹¹, of whom 1,568 are currently active certificants as defined above.

Table 5 shows the year-by-year counts from 1996 through 2015. Each row shows, for a particular year, the number of new certificants, the number of prior certificants whose savings

⁹ Some certificants are both “new” and “continuing” as they received a level 1 certification between 2012 and 2014 and Level 2 in 2015 – therefore they were counted as “new” for the Level 1 certification and as “continuing” for Level 2.

¹⁰ As individuals may possess more than one of the attributes found in the table, the total of the line items may exceed the total of unique BOC-E certificants.

¹¹ The NEEC update data file included 2,808 individuals. Of those, 2,795 received certification from 1996 to 2015 while working in the NW. The NEEA BOC Dataset includes records for two individuals who received certification from 1996 to 2015 while working in the NW, who were not in the NEEC update file. Those two individuals left the NW in 2015, and NEEC did not include them in its update file.

have retired (“savings-retired certificants”), and the cumulative number of active certificants. The latter number is equal to the number of continuing certificants from the previous year plus the number of new certificants, minus the number of savings-retired certificants.

The number of “active” certificants in any given year also should exclude the total number of prior certificants who retired from work or died before their savings retired or who were unemployed in that year. The NEEC BOC database does not record the year of death, work retirement, or unemployment, so we could not subtract such individuals from any given year’s cumulative total when we first identified the need to do so in 2014. In that year, we identified 17 individuals who reported work retirement or were deceased before their savings would have retired and eight who were unemployed, for a total of 25. Since we could not subtract them from any given year’s cumulative total, we subtracted them from the 2013 cumulative total and instituted a procedure to identify new cases of individuals leaving the workforce before savings retirement going forward.

By comparing each year’s new NEEC BOC dataset to the NEEA BOC Dataset, we can identify the year of all new individuals who left the workforce before their savings would have retired. The combined 2015 BOC dataset shows 11 additional individuals who left the workforce before their savings retired (six in 2014 and five in 2015). This includes those certificants that died, retired, or who were unemployed or gained employment outside of the Northwest. We included those 11 individuals in the counts of “Saving Retired or Left Workforce” for each respective year.

Table 6 shows the year-by-year counts of new, retired, and total active certificants by the state the certificant reported working in.

Finally, Table 7 shows the year-by-year counts of new, retired, and total active certificants grouped into likely NEEC certificants or IBOA certificants. The dataset does not provide comprehensive information on training provider, so we assumed that all certificants that work in Oregon or Washington received certification through NEEC and those that work in Idaho or Montana received IBOA certification.

Table 3: BOC Expansion Special Class Type (Multiple Selections Allowed; n = 600)

Attribute Type	New BOC-E Certificants ¹					Continuing BOC-E Certificants Receiving Additional Certification ²					All BOC-E Certificants				
	2012	2013	2014	2015	Total	2012	2013	2014	2015	Total	2012	2013	2014	2015	Total
ATTENDED SPECIAL BOC-E CLASS															
Large Employer	38	71	95	56	260	0	18	4	8	30	38	89	99	64	290
Underserved	25	46	70	114	255	0	10	1	7	18	25	56	71	121	273
Online Class	0	12	93	25	130	0	0	1	0	1	0	12	94	25	131
Attended Any Special Class ³	62	102	165	189	518	0	27	5	15	47	62	129	170	204	565
TARGETED GROUP															
IUOE is Education Provider	0	10	1	0	11	0	0	0	0	0	0	10	1	0	11
Federal Employee	1	2	10	26	39	0	0	1	0	1	1	2	11	26	40
Unemployed	24	1	0	0	25	0	3	0	0	3	24	4	0	0	28
In Any Targeted Group ⁴	25	13	11	26	75	0	3	1	0	4	25	16	12	26	79
ANY BOC-E ATTRIBUTE (ATTENDED SPECIAL CLASS OR IS IN TARGETED GROUP)															
Any BOC-E Attribute ⁵	85	111	166	189	551	0	29	5	15	49	85	140	171	204	600

1 These are individuals who received their initial BOC certification between 2012 and 2015.

2 These are individuals who: a) received their initial BOC certification before 2012 and then received a second certification between 2012 and 2015; or b) received their initial BOC certification in 2012 and then received a second certification between 2013 and 2015. Since BOC-E began in 2012, there are no continuing BOC-E certificants in that year.

3 Large employer, underserved, and/or online class. An individual may be in more than one of these three groups. Therefore, this number does not equal the sum of the counts for the three special classes.

4 Includes IUOE as education provider, federal employee, and unemployed. Initially also included veterans, but those are no longer targeted.

5 Includes large employer, underserved, online class, IUOE as education provider, federal employee, and unemployed. Some respondents were in more than one of these groups; therefore, this count is not the sum of the various other counts.

Table 4: Other Tracked Associations (Multiple Selections Allowed; $n = 174$)¹

ASSOCIATION	PRE-2012	2012	2013	2014	2015	TOTAL
Returning Veteran (pre-2001)	4	21	22	21	25	92
Returning Veteran (2001-2012)	1	4	6	5	8	24
IUOE Other Than as Education Provider	10	16	9	18	15	68
Any of the above	15	38	35	40	46	174

¹ Counts from this table are separate from the counts in Table 3.

Table 5: Market Status of Active Certified Building Operators

Year	ANNUAL NEW ¹			SAVING RETIRED OR LEFT WORKFORCE EARLY ²			RE-ENTERED WORK FORCE ³			CUMULATIVE TOTAL ACTIVE ⁵
	BOC	BOC-E ⁵	TOTAL	BOC	BOC-E ⁴	TOTAL	BOC	BOC-E	TOTAL	
1996	9	0	9	0	0	0	0	0	0	9
1997	1	0	1	0	0	0	0	0	0	10
1998	61	0	61	0	0	0	0	0	0	71
1999	143	3	146	0	0	0	0	0	0	217
2000	152	0	152	0	0	0	0	0	0	369
2001	103	0	103	0	0	0	0	0	0	472
2002	202	0	202	0	0	0	0	0	0	674
2003	165	0	165	0	0	0	0	0	0	839
2004	93	0	93	6	0	6	0	0	0	926
2005	145	0	145	89	1	90	0	0	0	981
2006	101	0	101	105	0	105	0	0	0	977
2007	103	1	104	75	0	75	0	0	0	1,006
2008	201	3	204	106	0	106	0	0	0	1,104
2009	121	3	124	112	0	112	0	0	0	1,116
2010	176	5	181	86	0	86	0	0	0	1,211
2011	165	17	182	128	0	128	0	0	0	1,265
2012	119	98	217	86	0	86	0	0	0	1,396
2013	50	115	165	77	0	77	0	0	0	1,484
Left workforce ⁶	--	--	---	17	8	25	0	0	0	--
Subtotal in 2013	2,110	245	2,355	887	9	896	0	0	0	1,459
2014 ⁷	43	169	212	218	2	220	0	0	0	1,451
2015 ⁷	37	192	229	113	1	114	1	1	2	1,568
Total in 2015	2,190	606	2,796	1,218	12	1,230	1	1	2	1,568

- 1 New = first certified in that year.
- 2 Savings Retired = certification expired more than five years. Left Workforce Early = deceased, retired from employment, no longer works in the Northwest, or unemployed before savings would have retired.
- 3 Re-Entered Work Force = certificant “left workforce early” (see previous footnote) and then re-entered the workforce before savings became retired. This set of columns is necessary to account for the fact that such certificants were not actively contributing to Northwest savings for a specific period of time.
- 4 This column records the year of initial BOC certification for each individual who received any certification in the BOC-E Initiative. This includes 32 students who received their first BOC certification before the BOC-E Initiative began in 2012, and then achieved a second certification through BOC-E in 2012 or later.
- 5 Cumulative Total Active (present year) = Total Active (previous year) + Annual New - Annual Retired, Left Work Force Early, or Unemployed + Re-entered Work Force.
- 6 This row shows the total number of individuals that had left the workforce before their savings would have retired because of work retirement or death (17) and the total unemployed (8) as of 2013. In 2015, we began tracking the year in which the death, work retirement, or unemployment occurred.
- 7 The “Left Workforce Early” column includes six individuals who left the workforce early in 2014 and five individuals who left the workforce in 2015.

Table 6: Market Status of Active Certified Building Operators, by State¹

YEAR	ANNUAL NEW ¹				SAVING RETIRED OR LEFT WORKFORCE EARLY ²				RE-ENTERED WORK FORCE ³				CUMULATIVE TOTAL ACTIVE ⁴			
	OR	WA	ID	MT	OR	WA	ID	MT	OR	WA	ID	MT	OR	WA	ID	MT
1996	0	0	9	0	0	0	0	0	0	0	0	0	0	0	9	0
1997	0	1	0	0	0	0	0	0	0	0	0	0	0	1	9	0
1998	0	49	12	0	0	0	0	0	0	0	0	0	0	50	21	0
1999	46	81	14	5	0	0	0	0	0	0	0	0	46	131	35	5
2000	53	76	22	1	0	0	0	0	0	0	0	0	99	207	57	6
2001	38	58	0	7	0	0	0	0	0	0	0	0	137	265	57	13
2002	33	123	31	15	0	0	0	0	0	0	0	0	170	388	88	28
2003	11	94	47	13	0	0	0	0	0	0	0	0	181	482	135	41
2004	21	38	2	32	0	0	6	0	0	0	0	0	202	520	131	73
2005	30	88	16	11	20	63	6	1	0	0	0	0	212	545	141	83
2006	16	64	8	13	37	45	23	0	0	0	0	0	191	564	126	96
2007	28	61	8	7	23	49	1	2	0	0	0	0	196	576	133	101
2008	22	120	20	42	19	68	14	5	0	0	0	0	199	628	139	138
2009	18	67	24	15	19	54	31	8	0	0	0	0	198	641	132	145
2010	15	97	4	65	16	40	13	17	0	0	0	0	197	698	123	193
2011	53	101	10	18	26	70	15	17	0	0	0	0	224	729	118	194
2012	69	114	0	34	19	51	7	9	0	0	0	0	274	792	111	219
2013	41	104	9	11	21	48	4	4	0	0	0	0	294	848	116	226
Left workforce ⁶					2	20	2	1								
Subtotal in 2013	494	1336	236	289	202	508	122	64	0	0	0	0	292	828	114	225
2014 ⁷	33	131	23	25	29	111	32	48	0	0	0	0	296	848	105	202
2015 ⁷	35	114	55	25	19	72	15	8	0	2	0	0	312	892	145	219
Total in 2015	562	1581	314	339	250	691	169	120	0	2	0	0	312	892	145	219

1 New = first certified in that year.
 2 Savings Retired = certification expired more than five years. Left Workforce Early = deceased, retired from employment, no longer works in the Northwest, or unemployed before savings would have retired.

- 3 Re-Entered Work Force = certificant “left workforce early” (see previous footnote) and then re-entered the workforce before savings became retired. This set of columns is necessary to account for the fact that such certificants were not actively contributing to Northwest savings for a specific period of time.
- 4 This column records the year of initial BOC certification for each individual who received any certification in the BOC-E Initiative. This includes 32 students who received their first BOC certification before the BOC-E Initiative began in 2012, and then achieved a second certification through BOC-E in 2012 or later.
- 5 Cumulative Total Active (present year) = Total Active (previous year) + Annual New - Annual Retired, Left Work Force Early, or Unemployed + Re-entered Work Force.
- 6 This row shows the total number of individuals that had left the workforce before their savings would have retired because of work retirement or death (17) and the total unemployed (8) as of 2013. In 2015, we began tracking the year in which the death, work retirement, or unemployment occurred.
- 7 The “Left Workforce Early” column includes six individuals who left the workforce early in 2014 and five individuals who left the workforce in 2015.

Table 7: Market Status of Active Certified Building Operators, by NEEC and IBOA Certificants¹

YEAR	NEW		SAVING RETIRED OR LEFT WORKFORCE EARLY		RE-ENTERED WORKFORCE		CUMULATIVE TOTAL ACTIVE	
	NEEC	IBOA	NEEC	IBOA	NEEC	IBOA	NEEC	IBOA
1996	0	9	0	0	0	0	0	9
1997	1	0	0	0	0	0	1	9
1998	49	12	0	0	0	0	50	21
1999	127	19	0	0	0	0	177	40
2000	129	23	0	0	0	0	306	63
2001	96	7	0	0	0	0	402	70
2002	156	46	0	0	0	0	558	116
2003	105	60	0	0	0	0	663	176
2004	59	34	0	6	0	0	722	204
2005	118	27	83	7	0	0	757	224
2006	80	21	82	23	0	0	755	222
2007	89	15	72	3	0	0	772	234
2008	142	62	87	19	0	0	827	277
2009	85	39	73	39	0	0	839	277
2010	112	69	56	30	0	0	895	316
2011	154	28	96	32	0	0	953	312
2012	183	34	70	16	0	0	1,066	330
2013	145	20	69	8	0	0	1,142	342
Left workforce pre 2014			22	3				
Subtotal in 2013	1,830	525	710	186	0	0	1,120	339
2014	164	48	140	80	0	0	1,120	339
2015	149	80	91	23	2	0	1,204	364
Total in 2015	2,143	653	941	289	2	0	1,204	364

1 Annual New= certified in that year. Annual Retired = did not receive a new certification or renewal within the previous five years. Total Active (present year) = Total Active (previous year) + Annual New – Annual Retired.

2 For each column, total inactive is the sum of savings retired, work retired or deceased before savings retired, and unemployed.

3 For each column, total active is the sum of total new minus total inactive.