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## 2017 Building Operator Certification (BOC) Program Dataset Analysis

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## Memorandum

This memo documents Research Into Action’s analysis of the Northwest Energy Efficiency Council (NEEC) Building Operator Certification (BOC) program dataset as of 2017. The primary goal of this analysis was to describe the 2017 new BOC certificants and update the count of active BOC certificants in the four Northwest (“Northwest”) states as of January 29, 2018.

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 areas,<sup>1</sup> Federal employees, and members of the International Union of Operating Engineers (IUOE). Although BOC-E targets the above specific groups, NEEA’s support for BOC is not limited to those groups.

## Types of Certification

Prior to 2016, NEEC awarded a certification to BOC graduates who completed certain requirements. NEEC offered two certification levels: Level I and Level II.<sup>2</sup> Starting in 2016, to align BOC with the ISO 17024 standard, NEEC established an additional and separate level of certification. Students who complete the existing BOC certification requirements receive the Training Certificate of Completion (“TCOC”) designation. Those who pass an additional exam that conforms with the 17024 Standard earn the “Certified Building Operator” (“CBO”) certification. In 2016, NEEC changed the designation of all previous BOC certificants to TCOC and allowed them to obtain the CBO status after completing the additional requirements.

The distinction between TCOC and CBO is not important for calculating energy savings from NEEA’s support of BOC. Since no research has documented that savings are different for those who achieve the CBO status, NEEA counts both types of certificants equally in savings calculations. Therefore, this memo treats them as equal for counting the number of certificants and refers to them collectively as “BOC” certification.

## Methods

This section describes how Research Into Action developed a BOC dataset to track year-by-year data on 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.

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<sup>1</sup> “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.

<sup>2</sup> Level I classes focus on HVAC controls, common opportunities for operational improvements, and building scoping for energy efficiency, key activities associated with energy efficient building operations. Level II training is designed for individuals who have completed Level I training or who have three or more years of experience working in operations and maintenance of a commercial or institutional facility.

## Development of the NEEA BOC Dataset

From 2012 through 2014, Research Into Action used data from NEEC and the Intermountain Building Operators Association (IBOA) to develop a dataset of 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 BOC (now TCOC) certification and expiration of Level I and Level II certifications. As maintaining certification requires annual renewal, the year of “expiration of certification” is the year following the last year of renewal or the year of certification if the certificant did not renew certification.<sup>3</sup> In addition, the NEEA BOC Dataset includes fields and worksheets that Research Into Action created to provide year-by-year counts of active 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 TCOC and CBO certificants in the Northwest.<sup>4</sup> NEEC annually updates the BOC certification status, contact information, and employment information of certificants in its database. If a 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 TCOC recipients and 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. At the time of the previous update, done in January 2017, the NEEA BOC Dataset contained 2,951 records.

On January 29, 2018, NEEC provided Research Into Action with a data file through the end of 2017 containing 3,092 records of individuals who received their TCOC or CBO certificate and are employed in the Northwest. The 2017 NEEC data file contained a total of 48 records for individuals who passed the additional exam to earn their CBO certification. NEEC reclassified all remaining individuals as TCOC certificants. As noted above, however, for tracking and claiming energy savings for NEEA, the distinction between TCOC and CBO does not matter.

Research into Action reviewed the 2017 NEEC BOC data file to identify: 1) new certificants (i.e., individuals not already identified in the NEEA BOC Dataset) who received their BOC certification in 2017; 2) any previous certificants (i.e., individuals already existing in the NEEA BOC Dataset) with new or updated BOC certification or expiration years; 3) any certificants who received their BOC certification, but had a work state outside of the Northwest; and 4) any records with missing BOC certification or expiration years or other irregularities.

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<sup>3</sup> 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.

<sup>4</sup> 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.

For the remainder of this memo, any mention of “certificants” includes both TCOC and CBO certificants. Certificants classified as active are all individuals who have received or renewed their credential since 2011. These are individuals for whom NEEA counts energy savings for 2017.

During the initial data review, Research Into Action staff determined that the 2017 NEEC data file included 35 new certificants that had “old” Level I or Level II certification years listed but did not have TCOC or CBO certification years. Working with NEEC, Research Into Action determined that these 35 certificants had taken classes in 2016 and received the now discontinued BOC certification and had not yet taken the CBO certification exam. NEEC will contact these individuals during the summer of 2018 to recommend taking the certification exam by December 31, 2018; if they do not take that exam, NEEC will list them as TCOC. Research Into Action characterized these records as new certificants for 2017.

Research Into Action identified one 2016 certificant in the 2017 NEEC data file that was neither in the existing NEEA BOC Dataset nor in the 2016 NEEC data file. After confirming with NEEC that the record should be included, we added the record into the NEEA BOC Dataset.

Research Into Action identified five records in the 2017 NEEC data that had recertified in 2017, though their savings had expired prior to their recertification. Since these five records recertified outside of the five-year window for which NEEA counts savings, they each count both as individuals with retired savings and as individuals with newly active savings. To enable them to continue to be counted as both (maintaining accurate counts for past years and future years), we added duplicate records for these certificants into the NEEA BOC Dataset.

Research into Action excluded 11 records that were in the 2017 NEEC data file. Of the 11, eight records had work locations outside of NEEA territory. We identified two records without a certification year because the individuals did not take the final exam. NEEC confirmed these two records should not be included. The remaining record had a 2018 certification date; we will add that record to the NEEA BOC Dataset during the 2018 update.

Finally, Research Into Action identified an unemployment tracking issue with 64 records. These records contained notes in the work address column that indicated they were no longer working at the company on record but did not contain the word “unemployed” in their record. We found these same notes in the 2014, 2015, and 2016 NEEC update files. After working with NEEC and NEEA, Research Into Action determined that it was not possible to know for certain that these certificants were actually unemployed and that their savings should continue to be counted.

The data review activities described above resulted in a final NEEC data file that contained records for 3,092 individuals with BOC certification and employed in the Northwest. Of those, Research Into Action identified 150 new records of certificants (that is, records that were not already in the NEEA BOC Dataset) and 2,942 records that matched existing records in the NEEA BOC Dataset. The count of 2,942 matching records is nine fewer than the 2,951 that were in the NEEA Dataset as of the January 2017 update. Most of the discrepancy is accounted for by NEEC’s exclusion of eight records of individuals who received their BOC certification in the Northwest but moved out of state and two individuals who needed additional paperwork to receive certification status. The remaining discrepancy comes from the one individual who was missing from the 2016 NEEA BOC Dataset update, despite becoming certified in 2016.

Of the 2,942 matching records, 470 had updated Level I or Level II BOC certification or expiration data. Research Into Action added the 150 new certificants to the NEEA BOC Dataset and updated the Level I or

Level II BOC certification or expiration data for the other 470 records. For the other 2,472 records, the 2017 NEEC data was 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 2017 NEEC Data File**

Type of Record	Count
<b>Number of records received from NEEC, of individuals certified and employed in the Northwest</b>	<b>3,092</b>
<b>New 2017 Certificants or TCOC records added to the NEEA BOC Dataset</b>	<b>150</b>
New record for 2017	145
Existing Record - recertified after savings expired, new record added to NEEA BOC Dataset <sup>1</sup>	5
<b>Records matching existing records in NEEA BOC Dataset</b>	<b>2,942</b>
<b>Updated information</b>	<b>470</b>
Received Level I BOC certification in 2016, but not previously counted <sup>2</sup>	1
Renewals	469
Renewed Level I only	293
Renewed both Level I and Level II	121
Renewed Level I and received Level II	10
Renewed Level II only	19
Received new Level II and previously had Level I	26
<b>No updated information</b>	<b>2,472</b>

- 1 These five individuals' savings had retired before recertification, but then they recertified in Level I or Level II in 2017, causing them to be newly counted as new certificants in 2017.
- 2 This individual was not found in the existing NEEA BOC Dataset or the 2016 NEEC data file, but his record indicates certification in 2016.

## Updating BOC Certificant Counts in the NEEA BOC Dataset

To update the count of active BOC certificants from 2016, we calculated: 1) the number of new certificants – those certified for the first time in 2017;<sup>5</sup> 2) the number of prior certificants for whom, starting in 2016, NEEA no longer counts savings (“savings-retired certificants”) – those whose BOC certification had been expired more than five years (the measure life of the certification),<sup>6</sup> 3) the

<sup>5</sup> These included individuals that already had records in the NEEA BOC Dataset but had not received certification as well as new records from NEEC.

<sup>6</sup> 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](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](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

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 2016.<sup>7</sup> Additional details are in *2017 Count of Active Certificants*, below.

NEEA does not calculate savings separately for Level I and Level II BOC certification. Rather, it calculates savings from the first year of BOC certification – whether that was Level I or Level II certification<sup>8</sup> – to the year before savings retire. For individuals with both BOC Level I and Level II certification and different certification or expiration years for the two levels ( $n = 654$ ), 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 received BOC certification at either level – the year before the later of the two expiration years. For example, if a certificant has a Level II BOC certification expiration year later than their Level I BOC 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 I	Level II	Certification Status
2002	Received Certification		Certified (Level I)
2003	Renewed Certification	Received Certification	Certified (Level I and II)
2004	Did Not Renew Certification	Renewed Certification	Certified (Level I and II)
2005	Certification Expired	Renewed Certification	Certified (Level II)
2006		Did not Renew Certification	Certified (Level II – Last Year Certified)
2007		Certification Expired	Not Certified

## 2017 Count of Active Certificants

The NEEC update file identified 145 new records with 2017 certifications and five individuals that recertified in 2017 after their savings had retired for a total of 150 new 2017 records (six through BOC-E). The updated data also showed 164 certificants whose savings retired that year. In all, the updated combined NEEA BOC Dataset consists of 3,092 individuals employed in NEEA territory that had received certification since 1996, of whom 1,551 are currently active certificants as defined above.

Table 3 shows the year-by-year counts from 1996 through 2017. Each row shows, for a given year, the number of new certificants, the number of prior certificants whose savings 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.

<sup>7</sup> 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.

<sup>8</sup> Most BOC students who get Level II certification get Level I first, but that is not a requirement, and some students get Level II first or get only Level II.

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 data file 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 2017 BOC Dataset shows 18 additional individuals who left the workforce before their savings retired (seven in 2014, five in 2015, none in 2016, and six in 2017). This includes those certificants that died, retired, or who were unemployed or gained employment outside of the Northwest. We included those 18 individuals in the counts of “Saving Retired or Left Workforce” for each respective year.

Table 4 shows the year-by-year counts of new, retired, and total active certificants by the state the certificant reported working in.

Finally, Table 5 shows the year-by-year counts of new, retired, and total active certificants grouped into 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: Market Status of Active Certified Building Operators**

Year	Annual New <sup>1</sup>			Saving Retired or Left Workforce Early <sup>2</sup>			Re-entered Workforce <sup>3</sup>			Cumulative Total Active <sup>5</sup>
	BOC	BOC-E <sup>5</sup>	Total	BOC	BOC-E <sup>4</sup>	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	142	3	145	0	0	0	0	0	0	216
2000	151	0	151	0	0	0	0	0	0	367
2001	102	0	102	0	0	0	0	0	0	469
2002	202	0	202	0	0	0	0	0	0	671
2003	164	0	164	0	0	0	0	0	0	835
2004	94	0	94	6	0	6	0	0	0	923
2005	144	0	144	89	1	90	0	0	0	977
2006	101	0	101	103	0	103	0	0	0	975
2007	105	1	106	75	0	75	0	0	0	1,006
2008	201	3	204	106	0	106	0	0	0	1,104
2009	120	3	123	112	0	112	0	0	0	1,115
2010	174	4	178	86	0	86	0	0	0	1,207
2011	163	18	180	127	0	127	0	0	0	1,260
2012	119	98	217	86	0	86	0	0	0	1,391
2013	48	117	165	77	0	77	0	0	0	1,479
Left workforce <sup>6</sup>	--	--	---	17	8	25	0	0	0	--



Year	Annual New <sup>1</sup>			Saving Retired or Left Workforce Early <sup>2</sup>			Re-entered Workforce <sup>3</sup>			Cumulative Total Active <sup>5</sup>
	BOC	BOC-E <sup>5</sup>	Total	BOC	BOC-E <sup>4</sup>	Total	BOC	BOC-E	Total	
<b>Subtotal in 2013</b>	2101	246	2347	884	9	893	0	0	0	1,454
2014 <sup>7</sup>	42	170	212	218	2	220	0	0	0	1,446
2015 <sup>7</sup>	37	192	229	109	0	109	1	1	2	1,568
2016	86	72	158	161	0	161	0	1	1	1,566
2017 <sup>7</sup>	144	6	150	162	2	164	0	0	0	1,551
<b>Total in 2017</b>	<b>2,409</b>	<b>686</b>	<b>3,095</b>	<b>1,534</b>	<b>13</b>	<b>1,547</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1,551</b>

1 New = first certified in that year.

2 Savings Retired = BOC 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 Workforce = 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 Workforce Early, or Unemployed + Re-entered Workforce.

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 seven individuals who left the workforce early in 2014, five individuals who left the workforce in 2015, and six individuals who left the workforce in 2017.

**Table 4: Market Status of Active Certified Building Operators, by State<sup>1</sup>**

Year	Annual New <sup>1</sup>				Saving Retired or Left Workforce Early <sup>2</sup>				Re-entered Workforce <sup>3</sup>				Cumulative Total Active <sup>4</sup>			
	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	80	14	5	0	0	0	0	0	0	0	0	46	130	35	5
2000	53	75	22	1	0	0	0	0	0	0	0	0	99	205	57	6
2001	38	57	0	7	0	0	0	0	0	0	0	0	137	262	57	13
2002	33	123	31	15	0	0	0	0	0	0	0	0	170	385	88	28
2003	11	93	47	13	0	0	0	0	0	0	0	0	181	478	135	41
2004	21	39	2	32	0	0	6	0	0	0	0	0	202	517	131	73
2005	30	88	16	10	20	63	6	1	0	0	0	0	212	542	141	82
2006	16	64	8	13	37	43	23	0	0	0	0	0	191	563	126	95
2007	28	61	10	7	23	49	1	2	0	0	0	0	196	575	135	100
2008	22	120	20	42	19	68	14	5	0	0	0	0	199	627	141	137
2009	18	67	23	15	19	54	31	8	0	0	0	0	198	640	133	144
2010	15	95	3	65	16	40	13	17	0	0	0	0	197	695	123	192
2011	52	100	10	18	26	69	15	17	0	0	0	0	223	726	118	193
2012	69	114	0	34	19	51	7	9	0	0	0	0	273	789	111	218
2013	41	104	9	11	21	48	4	4	0	0	0	0	293	845	116	225
Left workforce <sup>6</sup>					2	20	2	1								
<b>Subtotal in 2013</b>	493	1,330	236	288	202	505	122	64	0	0	0	0	291	825	114	224

Continued

Year	Annual New <sup>1</sup>				Saving Retired or Left Workforce Early <sup>2</sup>				Re-entered Workforce <sup>3</sup>				Cumulative Total Active <sup>4</sup>			
	OR	WA	ID	MT	OR	WA	ID	MT	OR	WA	ID	MT	OR	WA	ID	MT
2014 <sup>7</sup>	33	131	23	25	29	111	32	48	0	0	0	0	295	845	105	201
2015 <sup>7</sup>	35	114	55	25	18	69	15	7	0	2	0	0	312	892	145	219
2016	58	56	32	12	14	68	11	68	0	1	0	0	356	881	166	163
2017 <sup>7</sup>	27	64	19	39	35	92	16	21	0	0	0	0	348	853	169	181
<b>Total in 2017</b>	646	1,695	365	389	298	845	196	208	0	3	0	0	348	853	169	181

1 New = first certified in that year.

2 Savings Retired = BOC 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 Workforce = BOC 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 Workforce Early, or Unemployed + Re-entered Workforce.

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 seven individuals who left the workforce early in 2014, five individuals who left the workforce in 2015, and six individuals who left the workforce early in 2017.

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**Table 5: Market Status of Active Certified Building Operators, by NEEC and IBOA Certificants<sup>1</sup>**

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	126	19	0	0	0	0	176	40
2000	128	23	0	0	0	0	304	63
2001	95	7	0	0	0	0	399	70
2002	156	46	0	0	0	0	555	116
2003	104	60	0	0	0	0	659	176
2004	60	34	0	6	0	0	719	204
2005	118	26	83	7	0	0	754	223
2006	80	21	80	23	0	0	754	221
2007	89	17	72	3	0	0	771	235
2008	142	62	87	19	0	0	826	278
2009	85	38	73	39	0	0	838	277
2010	110	68	56	30	0	0	892	315
2011	152	28	95	32	0	0	949	311
2012	183	34	70	16	0	0	1,062	329
2013	145	20	69	8	0	0	1,138	341
Left workforce < 2014			22	3				
<b>Subtotal in 2013</b>	<b>1,823</b>	<b>524</b>	<b>707</b>	<b>186</b>	<b>0</b>	<b>0</b>	<b>1,116</b>	<b>338</b>
2014	164	48	140	80	0	0	1,116	338
2015	149	80	87	22	2	0	1,204	364
2016	114	44	82	79	1	0	1,237	329
2017	91	58	127	37	0	0	1,201	350
<b>Total in 2017</b>	<b>2,341</b>	<b>754</b>	<b>1,143</b>	<b>404</b>	<b>3</b>	<b>0</b>	<b>1,201</b>	<b>350</b>

1 Annual New = BOC 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.

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

## BOC Expansion Attributes

The 2017 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 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 2017, 677 individuals have one or more of the above attributes. Of those individuals, 627 received BOC certification for the first time from 2012 through 2017 (“new BOC certificants”) and 50 had received BOC certification before 2012 (typically Level I) but received an additional certification through BOC-E (typically Level II) from 2012 through 2017 (“continuing BOC certificants”).<sup>9</sup> **Error! Reference source not found.** Table 6 shows counts for various attributes of BOC-E certificants.<sup>10</sup>

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 before 2001. As of the year of this report, BOC-E does not target the unemployed, but continues to track them in the NEEA BOC Dataset (Table 7**Error! Reference source not found.**).

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<sup>9</sup> Some BOC certificants are both “new” and “continuing” as they received a Level I certification between 2012 and 2016 and Level II in 2017 – therefore they were counted as “new” for the Level I certification and as “continuing” for Level II.

<sup>10</sup> 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.

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**Table 6: BOC Expansion Special Class Type (Multiple Selections Allowed; n = 677)**

Attribute Type	New BOC-E Certificants <sup>1</sup>							Continuing BOC-E Certificants Receiving Additional Certification <sup>2</sup>							All BOC-E Certificants						
	'12	'13	'14	'15	'16	'17	Total	'12	'13	'14	'15	'16	'17	Total	'12	'13	'14	'15	'16	'17	Total
<b>ATTENDED SPECIAL BOC-E CLASS</b>																					
Large Employer	38	72	96	61	23	3	292	0	18	5	8	1	0	32	38	90	101	68	24	3	324
Under-served	25	46	70	114	47	2	304	0	9	1	7	0	0	17	25	55	71	121	47	2	321
Online Class	0	12	93	25	2	0	132	0	0	1	0	0	0	1	0	12	94	25	2	0	133
Attended Any Special Class <sup>3</sup>	62	103	165	189	72	5	595	0	26	6	15	1	0	48	62	129	171	203	73	5	643
<b>TARGETED GROUP</b>																					
IUOE is Education Provider	0	10	1	0	0	0	11	0	0	0	0	0	0	0	0	10	1	0	0	0	11
Federal Employee	1	2	10	26	1	0	40	0	0	1	0	0	0	1	1	2	11	26	1	0	41
Un-employed	24	1	0	0	0	0	25	0	3	0	0	0	0	3	24	4	0	0	0	0	28
In Any Targeted Group <sup>4</sup>	25	13	11	26	1	0	76	0	3	1	0	0	0	4	25	16	12	26	1	0	80
<b>ANY BOC-E ATTRIBUTE (ATTENDED SPECIAL CLASS OR IS IN TARGETED GROUP)</b>																					
Any BOC-E Attribute <sup>5</sup>	85	111	166	188	72	5	627	0	28	6	15	1	0	50	85	139	172	203	73	5	677

1 These are individuals who received their initial BOC certification between 2012 and 2017.

2 These are individuals who: a) received their initial BOC certification before 2012 and then received a second certification between 2012 and 2017; or b) received their initial BOC certification in 2012 and then received a second certification between 2013 and 2017. 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.

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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 7: Other Tracked Associations (Multiple Selections Allowed;  $n = 195$ )<sup>1</sup>**

Association	Pre-2012	2012	2013	2014	2015	2016	2017	Total
Returning Veteran (pre-2001)	4	21	22	21	25	14	0	107
Returning Veteran (2001-2012)	0	4	6	5	8	6	0	29
IUOE Other Than as Education Provider	11	16	9	18	16	1	1	72
Any of the above	15	38	35	40	46	20	1	195

1 Counts from this table are separate from the counts in Table 6Error! Reference source not found..