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REPORT #E20-400

2019 BOC Program Dataset Analysis

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Memorandum

April 8, 2020

To: Amy Webb, NEEA

From: Lynn Roy, BrightLine Group

CC: John Jennings, Greg Kaleka, NEEA

Re: 2019 BOC Dataset Analysis

This memo outlines the analysis of the Northwest Energy Efficiency Council (NEEC) Building Operator Certification (BOC) program dataset as of 2019. The primary objective of this analysis was to describe the 2019 new BOC certificants and update the count of active BOC certificants in the four Northwest states as of January 13, 2020.

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, NEEA's support for BOC is not limited to those groups. The NEEA BOC Dataset includes information relevant to this BOC-E effort between 2012 and 2017. As of 2018, NEEC no longer tracked BOC-E related information on certificates. The 2018 BOC Program Dataset Analysis memo² presents the data related to the BOC Expansion Attributes and no changes or additions were made for this 2019 update.

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.³ 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

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.

² NEEA Report #E19-387, *2018 BOC Program Dataset Analysis*, Prepared by: Research Into Action, July 23, 2019

³ 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.

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 one in the same for counting the number of certificants and refers to them collectively as “BOC” certificants.

Methods

This section describes how BrightLine Group updated the NEEA database with the 2019 data from NEEC, to calculate the annual counts of certificants for NEEA’s tracking purposes.

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 and this memo refers to it as “the NEEA BOC Dataset.”

Each record in the NEEA BOC Dataset includes most of 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, along with other information. 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.⁴ In addition, the NEEA BOC Dataset includes fields and worksheets that were 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 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 NEEA 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. That data file is used

⁴ 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.

each year to update the NEEA BOC Dataset. At the time of the previous update, done in January 2019, the NEEA BOC Dataset contained 3,259 records.

In January 2020, NEEC provided NEEA with a data file containing 4,431 records of individuals. BrightLine Group reviewed the 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 2019; 2) any previous certificants (i.e., individuals already existing in the NEEA BOC Dataset) with renewed BOC certification; 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, including duplicate entries. During the initial data review, BrightLine Group identified 1,084 records with blank certification years, one duplicate entry, and one certificant who had moved out of state, resulting in 3,345 who received their TCOC or BOC certificate and are employed in the Northwest, as of the January 13, 2020. As noted above, for tracking and claiming energy savings for NEEA, the distinction between TCOC and CBO does not matter. As such, for the remainder of this memo, any mention of “certificants” includes both TCOC and BOC 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 2019. BrightLine Group’s data review activities resulted in the summary outlined in Table 1.

Table 1: Summary of Disposition of 2019 NEEA BOC Dataset

Type of Record	Count
<i>Number of records received from NEEC, of individuals certified and employed in the Northwest</i>	3,345
New 2019 Certificants or TCOC records added to the NEEA BOC Dataset	98
2019 records matching existing records in NEEA BOC Dataset	3,247
Updated information for 2019	665
Renewals	662
Renewed Level I only	462
Renewed both Level I and Level II	144
Received new Level II and previously had Level I	17
Renewed Level II only	17
Renewed Level I and received Level II	22
No updated information for 2019	2,582

Table 2 presents a comparison to the NEEA BOC 2018 and 2019 datasets. Overall, the number of total records and renewals increased from 2018, but the number of new certificants decreased between 2018 and 2019.

Table 2: Disposition Comparison between 2018 and 2019 NEEA BOC Dataset

Type of Record	2018 Count	2019 Count	Delta	Percent Change
<i>Number of records received from NEEC, of individuals certified and employed in the Northwest</i>	<i>3,259</i>	<i>3,345</i>	<i>86</i>	<i>2.6%</i>
New Certificants	169	98	-71	-42%
Records matching existing records in NEEA BOC Dataset	3,090	3,247	157	51%
Updated information	499	665	166	33%
New record with certification date prior to update year (newly counted)	1	3	2	200%
Renewals	498	662	164	33%
Renewed Level I only	329	462	133	40%
Renewed both Level I and Level II	140	144	4	3%
Received new Level II and previously had Level I	13	17	4	31%
Renewed Level II only	13	17	4	31%
Renewed Level I and received Level II	3	22	19	633%
No updated information	2,591	2,582	-9	-0.3%

Updating BOC Certificant Counts in the NEEA BOC Dataset

To update the count of active BOC certificants from 2018 to 2019, the BrightLine Group calculated: 1) the number of new certificants – those certified for the first time in 2019, 2) the number of prior certificants for whom, starting in 2019, 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), 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 2019. Additional details are in the section *2019 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 certification⁵– 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, we assigned a single “first year certified” as the earlier year in which the individual received either certification; and we assigned

⁵ 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.

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 3 provides an example to illustrate this.

Table 3: Example Computation of First Year Certified to 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

Results

2019 Count of Active Certificants

Table 4 shows the year-by-year counts from 1996 through 2019. 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 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. 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.

Table 5 shows the year-by-year counts of new, retired, and total active certificants by the state the certificant reported working in.

Table 6 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 it is 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 4: Market Status of Active Certified Building Operators

Year	Annual New ⁶			Saving Retired or Left Workforce Early ⁷			Re-entered Workforce ⁸			Cumulative Total Active
	BOC	BOC-E	Total	BOC	BOC -E	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	152	0	152	0	0	0	0	0	0	368
2001	102	0	102	0	0	0	0	0	0	470
2002	202	0	202	0	0	0	0	0	0	672
2003	164	0	164	0	0	0	0	0	0	836
2004	93	0	93	6	0	6	0	0	0	923
2005	144	0	144	90	1	91	0	0	0	976
2006	101	0	101	103	0	103	0	0	0	974
2007	105	1	106	75	0	75	0	0	0	1,005
2008	201	3	204	106	0	106	0	0	0	1,103
2009	120	3	123	112	0	112	0	0	0	1,114
2010	174	4	178	86	0	86	0	0	0	1,206
2011	163	17	180	127	0	127	0	0	0	1,259
2012	119	98	217	85	0	85	0	0	0	1,391
2013	48	117	165	77	0	77	0	0	0	1,479
2014	42	170	212	216	1	217	0	0	0	1,449
2015	37	192	229	108	0	108	1	1	2	1,572
2016	86	72	158	162	0	162	0	1	1	1,569
2017	144	6	150	161	2	163	0	0	0	1,556
2018	170	0	170	112	44	156	0	1	1	1,571
2019	98	0	98	76	54	130	0	0	0	1,539
Total in 2019	2,678	686	3,364	1,719	110	1,829	1	3	4	1,539

⁶ Annual New = first certified in that year

⁷ Savings Retired = BOC certification expired more than five years. Left Workforce Early = deceased, retired, no longer works in Northwest, or unemployed before savings would have retired.

⁸ 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 certifiants were not actively contributing to Northwest savings for a specific period of time.

Table 5: Market Status of Active Certified Building Operators, by State⁹

Year	Annual New				Saving Retired or Left Workforce Early				Re-entered Workforce				Cumulative Total Active			
	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	48	13	0	0	0	0	0	0	0	0	0	0	49	22	0
1999	46	80	14	5	0	0	0	0	0	0	0	0	46	129	36	5
2000	53	75	23	1	0	0	0	0	0	0	0	0	99	204	59	6
2001	38	57	0	7	0	0	0	0	0	0	0	0	137	261	59	13
2002	33	123	31	15	0	0	0	0	0	0	0	0	170	384	90	28
2003	11	93	47	13	0	0	0	0	0	0	0	0	181	477	137	41
2004	21	38	2	32	0	0	6	0	0	0	0	0	202	515	133	73
2005	30	88	16	10	20	62	8	1	0	0	0	0	212	541	141	82
2006	16	64	8	13	37	43	23	0	0	0	0	0	191	562	126	95
2007	28	61	10	7	23	49	1	2	0	0	0	0	196	574	135	100
2008	22	120	20	42	19	68	14	5	0	0	0	0	199	626	141	137
2009	18	67	23	15	19	54	31	8	0	0	0	0	198	639	133	144
2010	15	95	3	65	16	40	13	17	0	0	0	0	197	694	123	192
2011	52	100	10	18	26	69	15	17	0	0	0	0	223	725	118	193
2012	69	114	0	34	19	50	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
2014	33	131	23	25	29	109	31	48	0	0	0	0	295	847	106	201
2015	35	114	55	25	18	68	15	7	0	2	0	0	312	895	146	219
2016	58	56	32	12	14	69	11	68	0	1	0	0	356	883	167	163
2017	27	65	19	39	35	91	16	21	0	0	0	0	348	857	170	181
2018	34	98	19	19	53	75	9	19	0	1	0	0	329	881	180	181
2019	36	47	15	0	25	87	9	9	0	0	0	0	340	841	186	17
Total in 2019	716	1839	401	408	376	1002	215	236	0	4	0	0	340	841	186	172

⁹ Same definitions from prior Table apply

Table 6: Market Status of Active Certified Building Operators, by NEEC and IBOA Certificants

Year	Annual New		Savings 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	48	13	0	0	0	0	49	22
1999	126	19	0	0	0	0	175	41
2000	128	24	0	0	0	0	303	65
2001	95	7	0	0	0	0	398	72
2002	156	46	0	0	0	0	554	118
2003	104	60	0	0	0	0	658	178
2004	59	34	0	6	0	0	717	206
2005	118	26	82	9	0	0	753	223
2006	80	21	80	23	0	0	753	221
2007	89	17	72	3	0	0	770	235
2008	142	62	87	19	0	0	825	278
2009	85	38	73	39	0	0	837	277
2010	110	68	56	30	0	0	891	315
2011	152	28	95	32	0	0	948	311
2012	183	34	69	16	0	0	1,062	329
2013	145	20	69	8	0	0	1,138	341
2014	164	48	138	79	0	0	1,116	338
2015	149	80	86	22	2	0	1,207	365
2016	114	44	83	79	1	0	1,239	330
2017	92	58	126	37	0	0	1,205	351
2018	132	38	128	28	1	0	1,210	361
2019	83	15	112	18	0	0	1,181	358
Total in 2019	2,555	809	1,378	451	4	0	1,181	358

Figure 1 through Figure 9 present comparisons of new certifications, savings retired, and cumulative active total certifications by state and in total over the past six years. In general, cumulative active total certifications have remained relatively flat across each state over the past five years, with annual new certifications varying in Oregon, Montana and Washington and decreasing in Idaho and when totalled across all states.

Figure 1: Six-Year Comparison BOC New Certifications by State

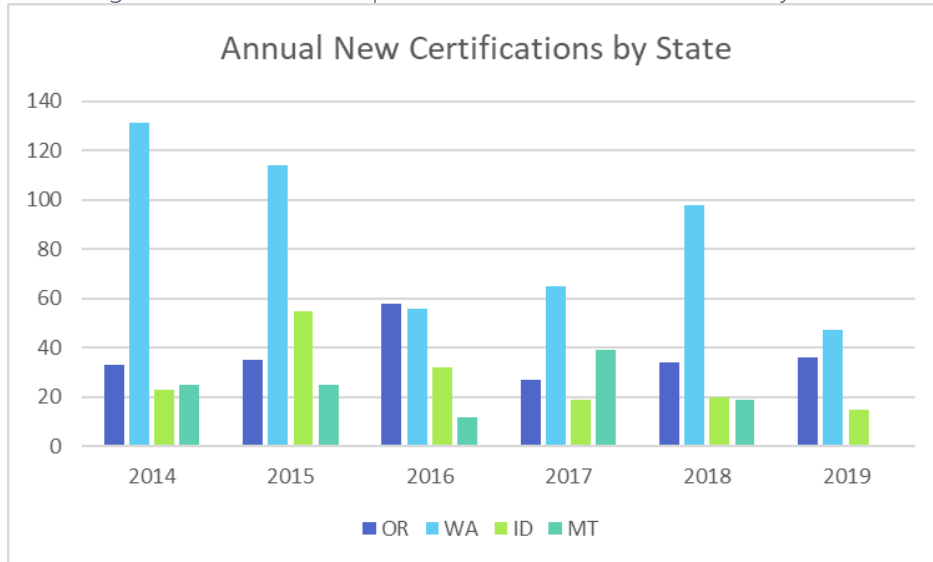


Figure 2: Six-Year BOC New Certifications by State

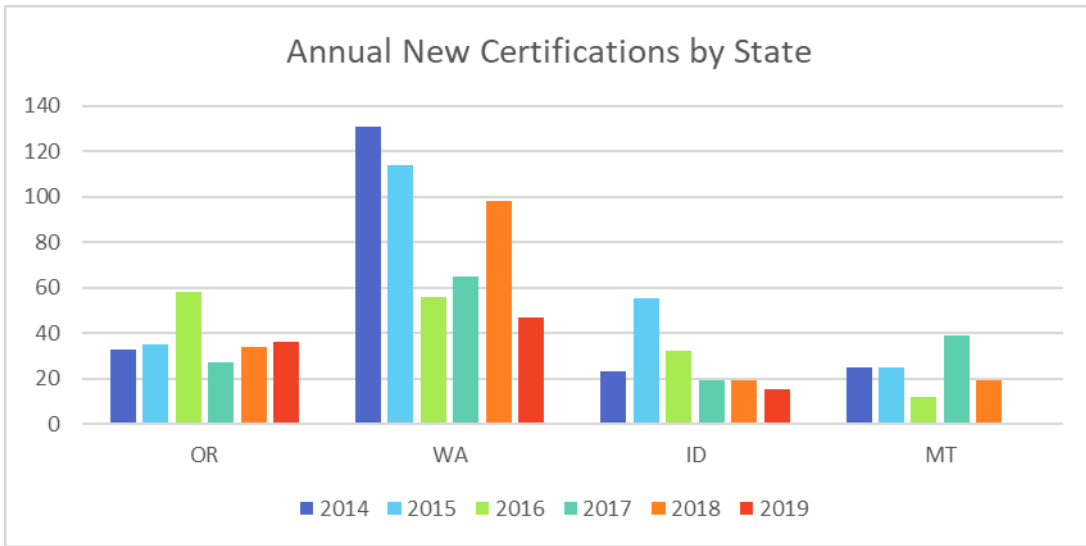


Figure 3: Six-Year Comparison BOC Savings Retired or Left Workforce Early by State

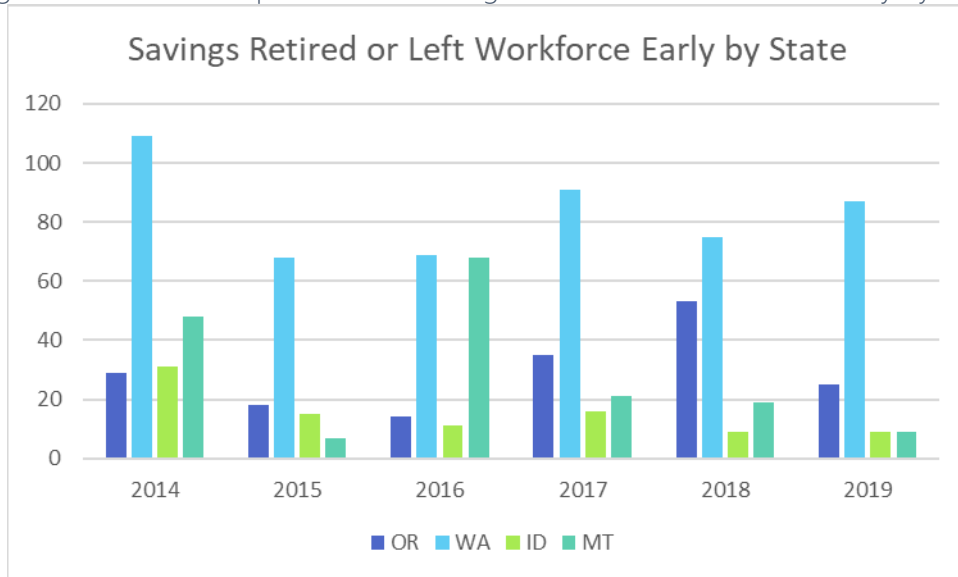


Figure 4: Six-Year BOC Savings Retired or Left Workforce Early by State

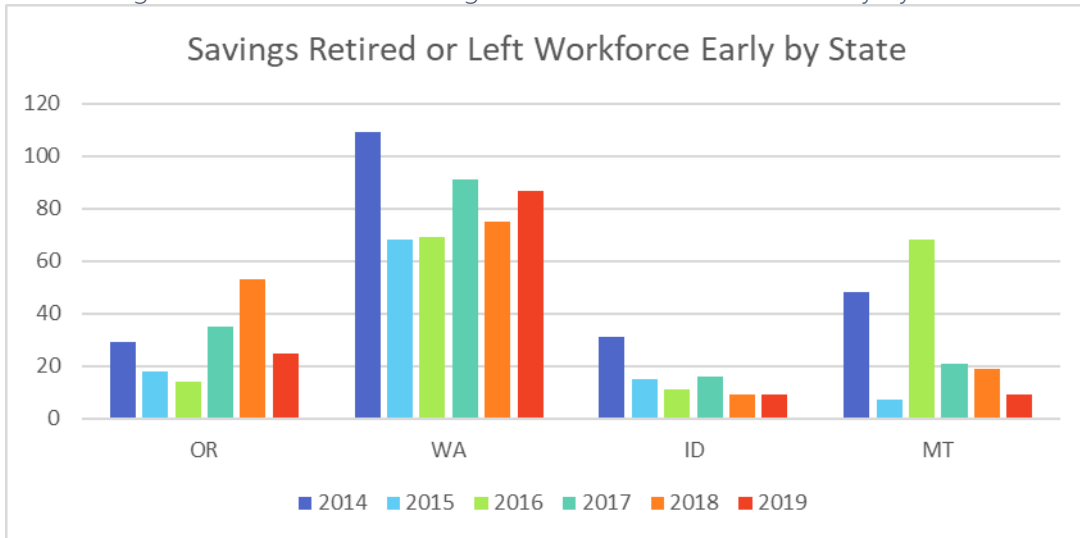


Figure 5: Six-Year Comparison BOC Cumulate Active Total by State

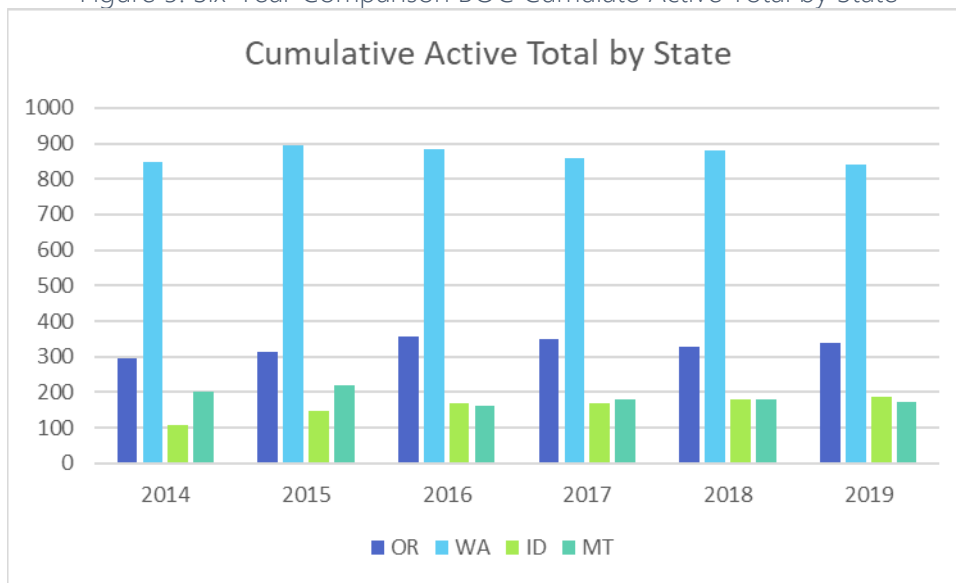


Figure 6: Six-Year BOC Cumulate Active Total by State

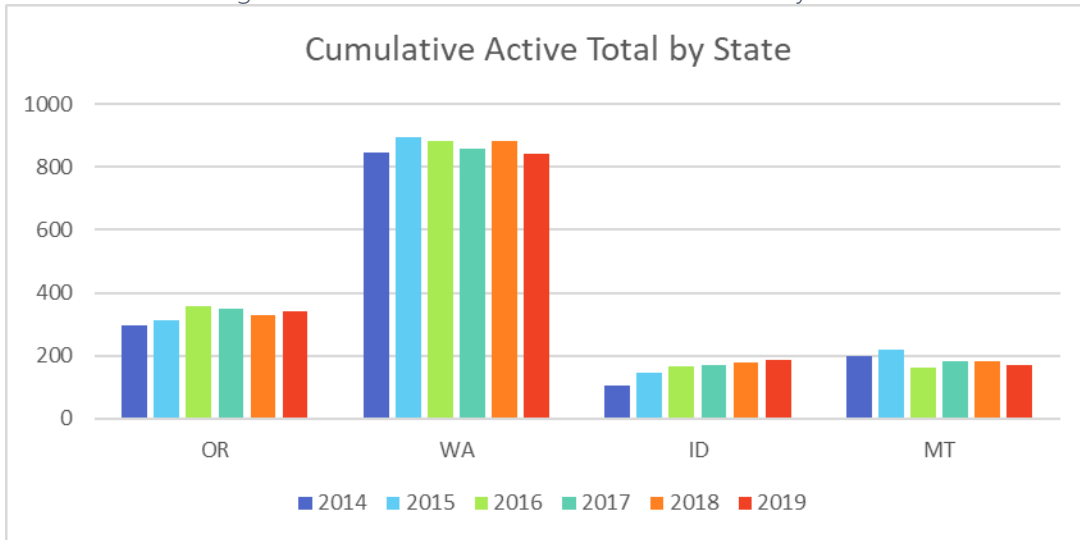


Figure 7: Six-Year BOC New Certifications All States

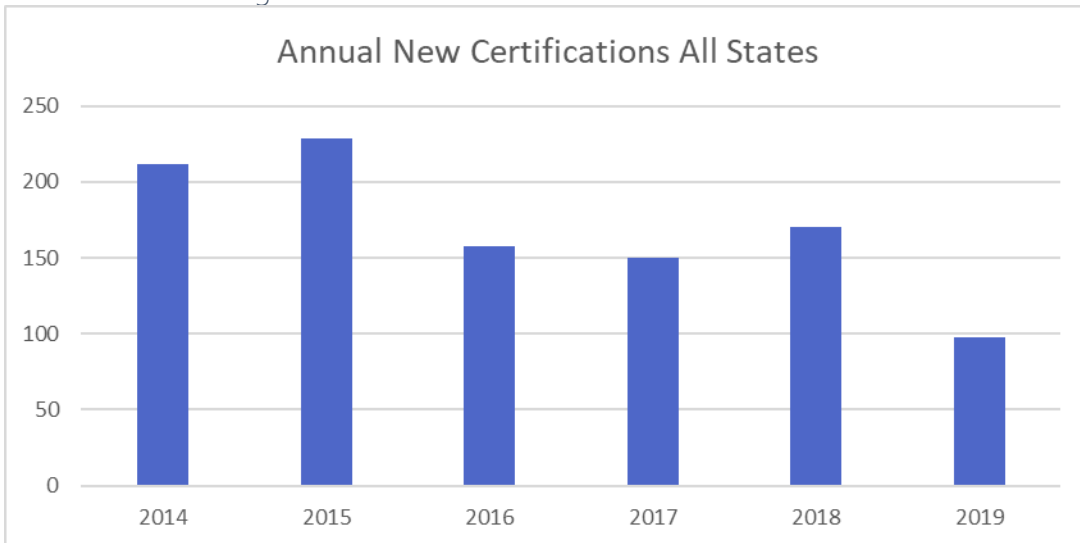


Figure 8: Six-Year BOC Savings Retired or Left Workforce Early All States

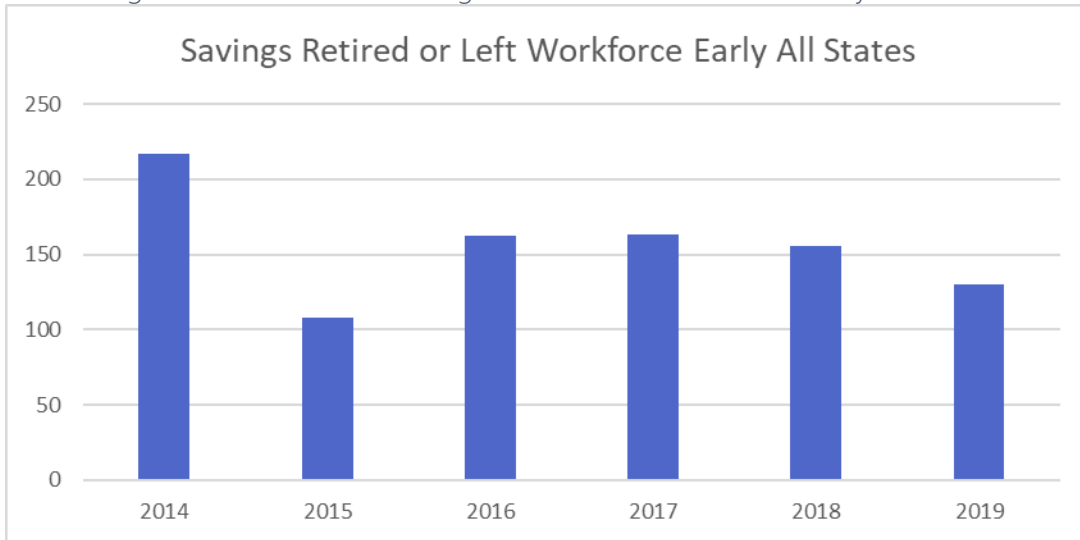


Figure 9: Six-Year BOC Cumulate Active Total All States

